FLY INTO THE HEART OF A TYPHOON

Read this terrific story of a B-29 crew — Page 133
NEW PLYMOUTH

packed with value and ready to prove it!

Here's the sensational new standard for excellence in the low-priced car field—the brilliant new, value-packed Plymouth!

No other car at the price gives you anything like the new Plymouth's great engineering advantages. The speed and ease of Ignition Key starting... the thrilling performance of the 7.0 to 1 high compression engine... the swift, smooth stops of big Safe-Guard Hydraulic Brakes... the positive blowout protection of Safety-Rim Wheels.

The new Plymouth rides like a heavy, high-priced limousine yet handles with amazing ease! No wonder this fine car of great value is now—more than ever—the car that likes to be compared! No wonder this new American Beauty is now—more than ever—the low-priced car most like high-priced cars!

Plan to visit your nearby Plymouth dealer now. He'll gladly arrange for a demonstration drive. Then you can test this car and see for yourself that the new Plymouth is the most car value you can possibly buy at Plymouth's low price!

PLYMOUTH Division of CHRYSLER CORPORATION, Detroit 31, Michigan
A NEW STAR RISES

PATENTED CORALOX INSULATOR

CORALOX is rising swiftly in public preference, because it eliminates the principal causes of spark plug trouble.

Fouling at low engine speeds—misfiring under heavy loads—failure due to heat shock—accumulation of oxide coating—these are primarily insulator troubles.

CORALOX is AC's patented Insulator. It has 4 times greater heat conductivity—10 times greater electrical resistance at high temperatures—than the best ceramic insulator material in use before CORALOX. It is 3 times as strong. It is basic in chemical composition.

For better and more economical performance in your car, truck or tractor, use AC Spark Plugs with patented CORALOX Insulator. There's a size and type for your engine.

AC SPARK PLUG DIVISION - GENERAL MOTORS CORPORATION

MARCH 1950
IT'S DONE WITH MIRRORS!

Protected by a wall of lead bricks and using a mirror to guide his instruments, this Bell Laboratories scientist is preparing a solution of a radioactive isotope, for use as a tracer to study materials for your telephone system.

Bombardment by neutrons turns some atoms of many chemical elements into their “radioactive isotopes”; these are unstable and give off radiation which can be detected by a Geiger counter. Chemically a “radioactive isotope” behaves exactly like the original element. Mix the two in a solution or an alloy and they will stay together; when the Geiger counter shows up an isotope, its inactive brother will be there too. Minute amounts beyond the reach of ordinary chemical methods can be detected—often as little as one part in a billion.

The method is used to study the effect of composition on the performance of newly developed germanium transistors—tiny amplifiers which may one day perform many functions which now require vacuum tubes.

It enables scientists at Bell Telephone Laboratories to observe the behavior of microscopic impurities which affect the emission of electrons from vacuum tube cathodes. It is of great help in observing wear on relay contacts. And it may develop into a useful tool for measuring the distribution and penetration of preservatives in wood.

Thus, one of science’s newest techniques is adopted by Bell Laboratories to make your telephone serve you better today and better still tomorrow.
this month's cover

SLAMMED AND WRENCHED by the mighty muscles of Nature, that B-29 on our cover is skywriting history. She is a tough old bird, the only plane ever to circle at low level through the eye of a typhoon and come out alive. She barely limped back to base, flaps twisted, rivets popped from her skin, great gaps in her wings and her fin askew. Her opponent was Beverly, as vicious a lad as ever roared out of the tropics to threaten the islands of the Pacific. Beverly started as a wisp of a cloud, then wrapped herself in a swirling wind and sped northeast, spinning like a destructive top. She toyed playfully with the big B-29, then roared on to the Arctic where a mass of polar air tore her heart out. "Look a Typhoon in the Eye" on page 133 is as exciting a story as we've ever presented, a story of weather research that reads like fiction. Artist Roswell Brown depicted the eerie battle on our cover

FOR THE CRAFTSMEN

Kiddie Roller Coaster - - - - - - - 174
Inexpensive Windows for Your Lake Cottage - 184
Lay Your Own Linoleum—Part II - - 188
Motorizing an Old Reed Organ - - - - - - 201
Make Your Own Transformer—Part II - - 213
Combine Cutter Bar Operated Electrically - 218
Bandsawed Castings - - - - - - - - - - - - 223
Radio-Television, Electronics - - - - - 229
Clinic for Homemakers - - - - - - - - - - 240

Other items, and manufacturers of available products described, are listed on pages 10, 12 and 14.
It's FORD for '50

ITS NEW
SUPER-QUIET
100 h.p. V-8
WHISPERS QUALITY!

New cast camshaft with special quieting ramp on cam lobes gives "hushed" valve operation.

New "super-fitted" pistons have steel struts in cam-ground skirts to control expansion, permit closer clearances. Result—longer life, extra quiet.

Perma-quiet valve assembly with straight-stem valve, one-piece valve guide and shot-peened valve spring requires no adjustment.

New 3-blade fan gives greater air flow with minimum noise.

New extra-narrow V-belts drive accessories quietly, efficiently.

New laminated composition timing gear meshes with metal gear on crankshaft for practically "noiseless" operation.

There's a Ford in your future...
...with a future built in!

50 WAYS NEW

New rotary door latch, with nylon-plastic shock absorber in striker plate—doors close silently and securely.

New automatic courtesy light goes on when either front door is opened—for comfort, convenience, safety.

Style Note—The rich, new Ford medallion on hood and rear deck marks America's "Fashion Car."

New double-walled glove compartment door has piano-type hinge. Locks and works better.


Ford's "Lifeguard" Body—now 13 ways stronger—additional heavier sealer in 41 areas for better sound and weather conditioning.

The one and only car with "Fashion Car" Styling— the one FINE car in the low-price field.

Take a GOOD look—Take a GOOD ride!

AT YOUR FORD DEALER'S

POPULAR MECHANICS
TO EVERY SPARK PLUG USER!

CAPT. EDDIE RICKENBACKER VOLUNTEERS THIS AMAZING STORY ABOUT CHAMPIONS!

President and General Manager of Eastern Air Lines Credits SAME SET OF DEPENDABLE CHAMPIONS with 240,000 Miles of Air Travel!

"THIS SPARK PLUG is one of the set of thirty-six (36) which operated in the #4 engine #75737 in Eastern Air Lines' new type Lockheed Constellation #115A for 811 consecutive hours of trouble-free operation. This amount of operating time, which is most unusual, based on an average cruising speed of 300 MPH, is equal to approximately 243,000 miles. During this period the spark plug fired approximately sixty million times. This type of service from a spark plug is remarkable even when compared to the type of operation as recent as a year ago. During its life it was one of the spark plugs (none of which were changed) that helped carry myself and party on our Latin American Tour during August of 1949."

All Champion Spark Plugs, regardless of type or purpose, are products of the same unequalled research engineering and manufacturing facilities. As a result, the same qualities of outstanding performance and dependability, so dramatically demonstrated above, are inherent in every Champion for every engine.

FOLLOW THE EXPERTS Demand

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night, over the ABC network

MARCH 1950
Protect your car with PYROIL

ROUND THE CLOCK

Every time you add Pyroil to your car, you're improving lubrication. No matter what kind of gas or oil you use, Pyroil gives oil the added property of clinging to cylinder walls and piston rings, protecting these vital parts against exposure to condensation, and metal-to-metal friction. Pyroil prevents clogging due to gummy deposits. Pyroil prevents damaging dry starts—because that constant clinging film of oil is a round-the-clock protector whether your car is rolling along or parked for the night.

Ask your gas station attendant to "add Pyroil"—and add miles of carefree driving.

GIVEN! An attractive Pyroil metal savings bank—takes coins up to 50c pieces. MOTORISTS, it's yours for the asking—sent postage paid.

Manufactured and Guaranteed by Pyroil Company, 101 Pyroil Bldg., La Crosse, Wisconsin

Canadian Distributors
Central Purchasing Agencies, Ltd., Toronto, Ontario

PYROIL COMPANY
101 Pyroil Bldg., La Crosse, Wisconsin
I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.

Name:

Address:

City or Town: State:

PYROIL THE WINNER

World's Largest "Pineapple"

WHEN the Hawaiian Pineapple Company announced plans for a huge water tank, the City Fathers cried out against any "eyesore" on the lovely Hawaiian skyline. The result, writes Dick Botts, author of the story on the mechanizing of the pineapple plantations (page 144) is shown here—the world's largest "pineapple."

Letter to the Editor

It has taken us just 32 years to learn that we played the part of Cupid, unwittingly, in a World War I romance of 1917. The story began at—well, let William E. Rohrer tell it himself, in the letter he wrote to the Editor:

November 1, 1949

"This is a letter I have been wanting to write to Popular Mechanics Magazine for the past 25 years. While serving in the U.S. Army at Camp McClellan, Anniston, Ala., in the summer of 1917, I visited the camp library and became interested in an issue of Popular Mechanics. While reading same I noticed the name of a girl in Jersey City, N.J. Also her address. The name was Frances Gode, 234 Sherman Ave., Jersey City. I felt the urge to write to her at the time just for the sake of correspondence. You know how it is in Army camps."

"I was 18 at the time and I later found out that she was 16. I continued writing to her during the period which I served overseas. When I returned from overseas our friendship became stronger, though I will admit I had some competition. It was not long before I had the situation well in hand."

"So on November 19, 1924, we were married."

"I want to take this opportunity to thank a wonderful magazine for introducing me to a wonderful girl who has been a wonderful wife for the past 25 years, along with three daughters. My wife has all of my

(Continued to page 8)
5 reasons why ACCOUNTANCY

offers you MORE MONEY... and SUCCESS!

REASON #1. If you were an expert accountant right now, chances are you would find yourself among the highest-paid of all professional men and women. Even back in "depression years," surveys showed that accountants earned more on the average than men in other major professions.

REASON #2. The demand for accountants is great—everywhere. All businesses must have trained accountants to cope with ever-growing requirements. It's a profession offering wide opportunity—always—to the man who knows.

REASON #3. You can fit into any business, anywhere in the country—because accounting principles are universal. Think what this means in terms of security and independence!

REASON #4. Accountancy is open to all. Any man or woman of good intelligence, who enjoys figure work and is willing to follow LaSalle's systematic "problem method" plan, can rapidly qualify for a highly profitable, enjoyable lifetime career... and he doesn't have to finish his training before beginning to "cash in."

REASON #5. Without losing a day from your present work, you can prepare in spare hours at home, at low cost, under LaSalle's step-by-step "Problem Method" of "learning by doing." This famous plan accounts for LaSalle's remarkable record of having trained nearly 10 per cent of all Certified Public Accountants in the U. S. and of having put many thousands of others into high-paying careers.

Send today for LaSalle's interesting booklets, "Accountancy, the Profession That Pays," and "Success Reports." Learn about the five great fields of opportunity... and LaSalle's time-tested plan for helping men and women to rapid advancement, higher income, greater prestige and professional standing. The coupon below will bring these fact-filled booklets to you—without cost or obligation. Mail the coupon NOW.

LaSalle Extension University
A Correspondence Institution
Dept. 364-H, 417 S. Dearborn St., Chicago 5, Ill.

Please send me, free of all cost or obligation, your 48-page illustrated book "Accountancy, the Profession That Pays," and the booklet "Success Reports"—send also "Ten Years' Promotion in One"—a book which has helped many men.

Name ........................................ Age ...........
Address ..................................................
City, Zone, State .................................

LASALLE EXTENSION UNIVERSITY
417 S. Dearborn St., Chicago 5

MARCH 1950
letters to her; her letters to me at the time we met by mail were lost when a transport was sunk in the Atlantic.

"Wishing you many successful years... I remain ever thankful to you.

"William E. Rohrer
254 Sherman Ave.
Jersey City, N. J."

Letter to the Editor

Your recent articles on fishing lures (April, May, June 1949) were very interesting. I am an ardent fisherman and we do really get some big stuff here. I enjoy the "hints and tips" given in your magazine... may I give you one or two?

When fishing with bait which is liable to be nibbled off by small fish, try criss-crossing an elastic band around the bait when on the hook so the small fish cannot get it off.

Iron or steel exposed to sea water... rusts away quickly. The following is a mixture I put on some exposed iron work 36 years ago. It is still unblemished. The proportion is as follows: Coal tar, one gallon; paraffin oil, one pint; cement, one pound; mix well, heat and keep stirring; apply hot and your troubles are over.

I enclose a shot of two red steenbras caught by me on light tackle within 25 minutes of each other from a pier at Simonstown. One was 73 pounds, the other 70 pounds. In case you get mixed, I am the person holding the rod.

Col. W. McI. Robinson,
The Firs,
Simonstown, South Africa.
CASH IN on your HIDDEN TALENTS

Locked in your mind may be the germ of a valuable idea ... an undeveloped aptitude ... a hidden talent. And the key that can help unlock those capabilities of yours is training—sound, practical, down-to-earth training!

Helping men and women bring out the best that's in them has been the job of I.C.S. for more than 57 years. In every field of industry, you'll find leaders whose skills were developed through study with I.C.S.

They are the ones who sensed a latent ability within themselves—and who proceeded to do something about it. While others (equally gifted, perhaps) plodded along in routine jobs, they mastered I.C.S. Courses ... qualified themselves for rich rewards.

You can develop your hidden talents the same way they did. Start today and be ready for tomorrow's opportunities. Here's the coupon to mail:

INTERNATIONAL CORRESPONDENCE SCHOOLS

Without cost or obligation, please send me full particulars about the course BEFORE which I have marked X:

- Air Conditioning and Plumbing Courses
- Chemical Courses
- Electrical Courses
- Engineering Courses
- Industrial Courses

Name
City
State
Age
Home Address
Working Hours
A.M. to
P.M.
Present Position
Length of Service in World War II
Employed by

Enrollment under G.I. Bill approved for World War II Veterans. Special tuition rates to members of the Armed Forces.

MARCH 1950
WHERE-TO-BUY-IT INDEX

Source of supply appears after items commercially available

AUTOMOTIVE

Japan electrifies the gas buggy... 88
Rear-view mirror fitted on safe driving (Am-Ben Corp., 410 W. Belmont, Chicago 41).... 104
Water vapor from radiator increases gasoline mileage (Hummer Vaporizer Corp., 1470 Chester Ave., Cleveland, Ohio) .... 105
Fender skirt swings out on hinges (Holt's-Rowe, Ltd., Derby, England) .... 141
Carburetor jug (Keller Research Corp., 12727 St. Joe Ave., Detroit, Mich.) ... 141
Trailer coupler applies brakes (Stromberg Hydraulics Brake & Coupling Co., Room 126, 50 W. Adams St., Chicago) .... 190
"Echo" car stereo radio show (Plasto Mfg. Co., Springfield, Ill.) .... 164

HOUSE AND HOME

Cold-drink dispenser fits any refrigerator (Trysil Mfg. Co., 57 Post St., San Francisco 4, Calif.) ... 128
Quart of cherries pitted in a minute (Smith Hoover Industries, 2725 Westchester Ave., Kalamazoo 3, Mich.) .... 128
Space saver holds six garments on one hook (A. J. Burger, 435, 10th St., New York City 14) .... 128
All-purpose ladder (Lincoln Mfg. Co., Inc., New Rochelle, N. Y.) .... 128
Fire extinguisher for auto (Vincent D. Lawler Co.) .... 128
Electric drier for towels (Prentis, 332 N. La Brea Ave., Los Angeles 36, Calif.) .... 129
Safety belt for motorcycle (Vince S. J. Lawler Co.) .... 129
De luxe opener (Prentis Approved Products, 1115 S. Glendale Ave., Los Angeles 6, Calif.) .... 129
Vertical blinds made of translucent fabric (San Vertical Blinds, Co., 3313 Main St., Xington City, Mo.) .... 129
Invisible wallpaper coating (Merrill Mfg. Co.) .... 130
Needle threader for any size needle (Gary Products Co., 934 N. Elston Ave., Chicago 5, Ill.) .... 131
Sink divider (Duo Sink, Box 206, Station F, Milwaukee, Wis.) .... 131
Two-way slicer for vegetables (S. A. Products, 1901 1/2 Greenfield Ave., Los Angeles 26, Calif.) .... 131
Stove knob reamer fits around the knob (Brtch M. Co., 1176, Beverly Hills, Calif.) .... 131
Magnetic rack has bobby-pin opener (Howard Industries, Inc.) .... 131
Troy clamps to arm of chair (Almaco Molded Products, Inc., 21 E. Ponderosa Park, Calif.) .... 131
One-wheel garden tractor (George Tractor Division, Consumers Eng., Sullivan, Ill.) .... 132
Weed cutter uses razor blades (Love Engineering Co., Lincoln Park, N. J.) .... 132
Rest circulator can be inserted in fireplace (Firesplace Insert, Circulator Co., 625 Willard St., Lansing, Mich.) .... 170

INDUSTRY

Rubber "bath" toughens leather. .... 87
Aluminum metal ("The Globe Chemical Co., Inc., Murray Road and Big 4 Railroad, Cincinnati 17, Ohio) .... 91
Plastic piping drains salt water from all deposits (W. W. Wire stone saw cuts granite with ease (L. M. Gilbert Co.) .... 101
340 Chestnut St., Philadelphia 6, Pa.) .... 112
Wax from waste bleach is used as a fire retardant (W. C. Johnson Laboratories, Inc.) .... 122
Model of river helps build dam. .... 122
Press-button key for trains. .... 126
Tire keyboard (Kolberg Switchboard & Supply Co., 6050 S. Ciero Ave., Chicago) .... 140
Vacation "return" for equipment (W. C. Johnson Laboratories, Inc.) .... 140
Folding hand truck will carry 700-pound load (Business Equipment Specialists, 18 W. 44th St., New York City 18) .... 143
No-contact printing system (W. C. Johnson Laboratories, Inc.) .... 143
Mamaneck Ave., Mamaroneck, N. Y.) .... 143
Mine-trolley scale phone system (Farrington Co., 549 Brushton Ave., Pittsburgh 21, Pa.) .... 161
Vibrating meat cutter. .... 172
The packers also sell meat. .... 172

NOVELTIES

Discarded nylon hose make artificial flowers. .... 86
Bottle-cap vases. .... 149
Danish electric motor as small as a match head. .... 149

OUTDOOR RECREATION

Pocket gauge checks golf-ball size (Golf-Aid Products, New York) .... 11
Canine caddy. .... 113
Knapsack bike. .... 117
Crouse-Warrier (Warner Industry, Inc.) .... 22
Drive Wiitoba, Kan.) .... 22
"Bicycle on wheels" built in a canvas trailer. .... 132
Back-yard glass. .... 132

PHOTOGRAPHY

"Paintbrush" photo kit (Brush-A-Photo Co., Metropolitan Life Bldg., Minneapolis, Minn.) .... 90
Camera wagon for photographing. .... 91
Philosophy in pictures (W. C. Johnson Laboratories, Inc.) .... 91
Gear-driven tripod (Mr. Ashley P. Hartman, 7515 Clinton St., Los Angeles 36, Calif.) .... 127

(Continued to page 12)

POPULAR MECHANICS
WHAT Every AUTO MECHANIC Wants to Know

A motor vehicle is a machine of many parts, each part designed and constructed for its own special function. All good mechanics, like good doctors, should know the working theory and operation of each part and understand what causes trouble and how to remedy it.

LET AUDELS AUTO GUIDE SOLVE YOUR PROBLEMS

Every auto mechanic, helper, serviceman and operator can use AUDELS AUTO GUIDE. The information it gives saves time, money and worry. Highly endorsed by all users. It presents the whole subject of auto mechanics from A to Z in plain language and simple terms.

This Big Practical Book gives full information with working diagrams covering the principles, construction, ignition, service and repair of modern cars, trucks and buses.

A complete Guide of 1800 pages, with over 1500 illustrations showing inside views of the working parts, with instructions for service jobs. Diesel engines, Fluid and Hydra-matic drives fully explained.

IT PAYS TO KNOW HOW TO

How to fit pistons—How to locate engine knocks—How to fit connecting rod bearings—How to service main bearings—How to recondition valves—How to service valve guides—How to adjust fan belts—How to adjust carburetors & chokes—How to rebuild a clutch—How to service automatic transmissions—How to service brakes—How to adjust steering gear—How to cope with ignition troubles—How to service distributors—How to operate—How to "tune up" an engine.

INFORMATION IN A HANDY FORM

73 INTERESTING CHAPTERS—Read this partial list of subjects on which practical information is fully given for quick reference under the headings as shown below. Ready Reference Index.


7 DAYS' FREE TRIAL

TO GET THIS ASSISTANCE FOR YOURSELF SIMPLY FILL IN AND MAIL COUPON TODAY.

Ask to See It!

$4 COMPLETE PAY $1 A ONLY 1 MO.

AUDEL, Publishers, 49 W. 23 St., New York 10, N.Y.
EXTRA!

Here is the biggest news in the tool industry today. The leading hand service tools are now named PROTO tools—formerly Plomb tools. All PROTO tools are of the very finest quality. That's why they have been the favorites of professionals since 1907. Remember the name—PROTO tools—formerly Plomb tools, when you want the best.

Buy the ones you need from your dealer today.

Write for catalog to

PLOMB TOOL COMPANY
2255M Santa Fe Ave., Los Angeles 54, Calif.
YOU BUILD this Power Pack as part of my new Communications Course. Use it to conduct fascinating experiments with frequency multipliers, multiplexers, buffer stages, etc.

YOU BUILD this Receiver Circuit and conduct Frequency Modulation experiments and many other tests as part of my Communications Course.

YOU BUILD this Wavemeter as part of my Communications Course. Use it with Oscilloscope, too! Build it! that furnishes basic power to transmitter and determine transmitter frequency.

VETERANS GET THIS TRAINING WITHOUT COST UNDER G. I. BILL

MAIL COUPON: FIND OUT ABOUT THIS TESTED WAY TO BETTER PAY

MAIL COUPON: FIND OUT ABOUT THIS TESTED WAY TO BETTER PAY

Mail Coupon For Books Free

Act now! Send for my FREE DOUBLE OFFER. Coupon entitles you to actual lesson, "GETTING ACQUAINTED WITH RECEIVER SERVICING." It shows how many pictures and diagrams are used to make learning at home easier, practical. You also get my 64-page book, "HOW TO BE A SUCCESS IN RADIO TELEVISION." It tells more about YOUR opportunities details of my Course...what my graduates are doing and earning...how quickly you can go to good pay, success, a bright future. Send coupon in envelope or paste on penny postal. J. E. SMITH, President, Dept. OCP, National Radio Institute, Pioneer Home Study Radio School, Washington, 8, D. C.

MAIL COUPON: FIND OUT ABOUT THIS TESTED WAY TO BETTER PAY

Mail Coupon: Find out about this tested way to better pay.
A BIGGER BETTER PLASTIC MANUAL

Combined with NEW SUCCESS PLAN!

Great news at last for people who want to make all kinds of fine things with Plastic! Now, just released, is a great new Plastic Book—bigger, better, more complete than anything ever before published in this field. This Book not only tells you how to make valuable articles at home, but also gives proved Success Methods for having a business of your own. Positively new—startling—different—100% Practical—for those who want to make things—and make money, besides.

GREAT NEW MONEY-MAKING IDEAS

New, Modern developments are explained. Think of producing gorgeous flower shows with the latest 'plasticizing' process, instead of old, slow, costly electropolishing methods. Just treat wood with Castolite, new, magic liquid plastic, and get any desired color-finish. Also make your own hand-painted wood, any shape, any color. Or create striking plastic profile silhouette wall plaques of children, family, friends. Have the time of your life, and get the extra money you've been wanting.

EASY TO START

Begin making things very first day. But first get this handsome book giving complete instructions and Success Secrets. Tells what you can do; what others are doing in this fascinating field. Send 25c today for your copy of "A Success Plan for You".

Radio-Television, Electronics


1950 "Little Giant" is complete FM receiver. 230

Power units for phone transmitter. 232

IMPORTANT NOTICE. It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. We take no responsibility as to whether the disclosures contained in our articles are covered by patents and advise readers to investigate each subject before making, selling, or selling any of the products, machines, or processes described in order to avoid possible liability for patent infringements.

The CASTOLITE Co.
W. COOMBS, ILL.

POPULAR MECHANICS
Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY JACOBSON
Registered Patent Attorneys
O1-C DISTRICT NATIONAL BUILDING • WASHINGTON 5, D. C.

Patents • • • Trademarks • • • Copyrights
YOU Need My PRACTICAL Training to Make Money in TELEVISION, RADIO and ELECTRONICS!

Learn at HOME IN YOUR SPARE TIME

I'll Send You 8 BIG KITS of Radio Parts and Equipment

Now is the Time to Get Into This Fast Growing Industry—Prepare for a Fine Paying Job or Your Own Business!

I have trained hundreds of men to become technicians—and I'm ready to do the same for you. Whether your goal is a fine paying job in one of Radio's many branches—or a successful Radio and Television business of your own—you need the kind of training I offer. 

My training is practical and down to earth. YOU NEED NO PREVIOUS EXPERIENCE. I start you with basic fundamentals and give you plenty of practical shop-bench training with many kits of parts I send you. This is the training that sticks with you and makes money for you on the job.

GET PAID FOR SPARE TIME WHILE LEARNING

Soon after you start training I send you my famous BUSINESS BUILDERS that show you how to make money in spare time doing interesting Radio jobs. I send you big kits of Radio parts and equipment that help you build step-by-step a powerful 6-tube superhet radio, a 16-tube test meter, plus other mighty useful equipment for Radio and Television servicing. You will perform over 175 fascinating experiments while training. You will learn about Television—so that you will be qualified to step into this fast growing, profitable field. I also send you many valuable service manuals, diagrams, and a book telling exactly how to set up your own Television and Radio shop. 

Have a Business of Your Own

A profitable Radio and Television Service Shop may be started with little capital. I will show you how to get started. At left is pictured one of my graduates, Mr. Morris C. Sperry, Fairmont, Minn., in his own shop.

My Training Includes...

Radio and Television Industry Booming

You couldn't pick a better time to get into Radio-Television and Electronics. New Television stations are going on the air to serve every major city—hundreds of new AM and FM Radio broadcasting stations are also on the air. All this creates new and bigger opportunities for the trained man who knows Radio-Television and Electronics.

RUSH COUPON Today!

SPRAYBERRY ACADEMY of RADIO, Dept. 10-G 111 North Canal Street, Chicago 6, Illinois

Please rush my FREE copies of "How To Make Money in Radio-Television and Electronics," and "How to Read Radio Diagrams and Symbols."

Name: ..................................... Age: ..................

Address:..........................................................................................................................

City: .................................... State: .................

( ) Check here if you are a Veteran

These Two Big FREE Radio Books


No obligation. Don't delay! Mail coupon now—and count on me for fast action.

SPRAYBERRY ACADEMY OF RADIO 111 N. CANAL, DEPT. 10-G. CHICAGO 6, ILL.

POPULAR MECHANICS
INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are your laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON
Registered Patent Attorneys

PATENTS • TRADE MARKS • COPYRIGHTS
135-A VICTOR BUILDING, WASHINGTON 1, D. C.

MARCH 1950
Lend Me 12 Minutes A Day...and I'll prove I can make you a new man!

I'm trading in old bodies for new! I'm talking men who know that the condition of their arms, shoulders, chest and legs—their strength, wind and endurance—is not 100%. And I'm making new men of them!

If you can simply raise your arm and flex it, I can add solid muscle to your biceps—on each arm—in a double-quick time! I can broaden your shoulders, strengthen your back, develop your entire muscular system inside and outside.

What only 15 minutes a day can do

I can add inches to your chest, give you a V-shaped grip, make those legs of yours like and powerful. I can shoot new strength into your old backbone, exercise those inner organs, help you clean your body so full of pop, vigor and red-blooded vitality that you won't feel there's even "standing room" left for weakness and that lazy feeling! Before I get through with you—I'll have your whole frame 'measured' to a nice, new, beautiful suit of muscle!

I was a 97-lb. weakling.

All the world knew I was once a skinny, scrawny, 97-pound weakling. And now it knows that I won the title, "The World's Most Toned-up Man." Against all odds! How did I do it? How do I work miracles in the bodies of other men in only 15 minutes a day? The answer is "Dynamic Toning," the amazing method I discovered and which changed me from a 97-pound weakling into the champion you see here!

My illustrated book is yours—Not for $1.00 or 10c—but free.

Name ____________________________ Address ____________________________

NATIONAL SCHOOL OF MEAT CUTTING
Incorporated 1901
505 E. 111th St., Chicago 8, Ill.

LEARN MEAT CUTTING
At Home—In Spare Time

Get into the vital meat industry. Concise, practical Home Training based on 25 years proven instruction methods used at Nation's famous meat cutters school. Prepares you for the bigger pay as Meat Cutter, Supervisor, yard manager of more money in your own store. Do as many as your spare time permits, Diploma. Start Now to learn how. Send for FREE bulletin today. No obligation.

NATIONAL SCHOOL OF MEAT CUTTING, INC., Div. B-114, Toledo 4, Ohio

LEARN WATCH REPAIRING
AT HOME. By our modern and original system of instruction you can learn every part of the WATCH REPAIRING TRADE AT HOME. Prepare yourself for a well-paid position or start in business after completing our course of instruction. Good watch repairers are in demand and generally earn very well. Inquire particulars apply to the School.

WISCONSIN SCHOOL OF WATCH REPAIRING
759 North Milwaukee St., Milwaukee 2, Wis.

TRI-STATE COLLEGE
B.S.
DEGREE IN
27 MONTHS

Founded 1884
World-Wide Enrollment


MAKE MONEY!
RAISE CHIN-CHIN!
Pedigreed Valuable Breeders!

PROFITABLE EASY PLEASANT!
Free Illustrated Book
WRITE TODAY!

ROCK HILL RANCH
SELLERSVILLE 36, PA.

LEARN Poultry AT HOME

Write for Free Catalog

Poultry provides a good full-or part-time income—for thousands of men and women. Thorough training and "Know-How" can make the difference between success and failure. That's why thousands have obtained their poultry education from N.P.I.'s home-study course, beginning past 29 years. Courses are easily understood. Interesting, practical, bring students the hard-earned experience of experts in every phase of this $3½ billion industry. If you want to enter the poultry business, you should get our free catalog describing courses, methods, service, opportunities. Write today to Charles N. Burmaster, Mgr., Dept. 90.

NATIONAL POULTRY INSTITUTE
Adams Center, N.Y.

POPULAR MECHANICS
IIf there ever was a "Stairway to Success" the training you get from I. C. S. is it! Many of the leaders of industry are I. C. S. graduates. And tens of thousands of "average" people have won promotions and pay increases that they attribute to I. C. S. training.

It's only natural. The International Correspondence Schools have been training men for 58 years. They know how to do it. I. C. S. courses are written by the experts in their fields. You'll find texts practical, thorough, easy to grasp.

You learn at home—in your spare time. You move ahead just as quickly as your ambition and energy permit. Start now to step up! Check the course you want—and mail the coupon today!

Without cost or obligation, please send me full particulars about the course BEFORE which I have marked X:

Air Conditioning and Plumbing Courses
- Air Conditioning
- Heating
- Refrigeration
- Chemical Engineering
- Chemistry, Analytical
- Chemistry, Industrial
- Chemistry, Mfg. Iron & Steel
- Petroleum Refining
- Paper Making
- Pulp and Paper Making
- Civil Engineering, Architectural and Mining Courses
- Architecture
- Architectural Drafting
- Bridge and Building Foreman
- Building Estimating
- Civil Engineering
- Coal Mining
- Contracting and Building
- Highway Engineering
- Lumber Dealer
- Reading Structural Blueprints
- Sanitary Engineering
- Structural Drafting
- Structural Engineering
- Surveying and Mapping
- Communications Courses
- Electronics
- Practical Telephony
- Radio, General
- Radio Operating
- Radio Servicing
- Telephon Engineering
- Electrical Courses
- Electrical Drafting
- Electrical Engineering
- Electrical Light and Power
- Lighting Technician
- Practical Electrician
- Internal Combustion Engines Courses
- Auto Technician
- Diesel Electric
- Diesel Engines
- Gas Engines
- Mechanical Courses
- Aeronautical Engineer, Jr.
- Aircraft Drafting
- Flight Engineer
- Foundry Work
- Heat Treatment of Metals
- Industrial Engineering
- Industrial Instrumentation
- Industrial Metallurgy
- Machine Shop
- Mechanical Engineering
- Mold Loft Work
- Patternmaking—Wood, Metal
- Reading Shop Blueprints
- Sheet Metal Drafting
- Sheet Metal Worker
- Ship Drafting
- Toolmaking
- Welding Engineering
- Welding—Gas and Electric
- Railroad Courses
- Air Brake
- Diesel Locomotive
- Locomotive Engineer
- Locomotive Fireman
- Locomotive Mechanic
- Railroad Section Foreman
- Steam-Diesel Loco. Eng.
- Stationary Engineer's Courses
- Boilermaking
- Combustion Engineering
- Engine Running
- Marine Engineering
- Power Plant Eng'g
- Steam Eng'g
- Textile Courses
- Cotton Manufacturing
- Loom Fixing
- Textile Dyeing
- Woolen Manufacturing

Business and Academic Courses
- Accounting
- App. Psychology
- Bookkeeping
- Business Administration
- Bus. Correspondence
- Bus. Law
- Certified Public Accounting
- Commercial
- Commercial Art
- Cost Accounting
- Federal Tax
- First Year College
- Foremanship
- French
- Good English
- High School
- Higher Mathematics
- Illustration
- Industrial Supervision
- Motor Traffic
- Postal Civil Service
- Retail
- Retail Bus. Management
- Secretarial
- Sign Lettering
- Spanish
- Traffic Management

Name
Age
City
State
Home Address
Working Hours
A. M. to
P. M.
Present Position
Length of Service in
World War II

Enrollment under G. I. Bill approved for World War II Veterans. Special tuition rates to members of the Armed Forces.

Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.

MARCH 1950
INVENTORS

If you consider your invention to be something of importance—if you have invented any new and useful art, machine, manufacture or composition of matter or improvement thereof—you are advised to protect your invention by applying for a U. S. patent.

A patent is a valuable right. It grants you a monopoly—the right to exclude others from making, using or selling your invention as claimed for a term of seventeen years.

The specification and claims of a patent, particularly if the invention be at all complicated, constitute one of the most difficult legal instruments to draw with accuracy. Therefore, unless you are thoroughly familiar with such matters, you are advised to employ a competent registered patent attorney or agent.

This firm is registered to practice before the U. S. Patent Office and is available to assist in the preparation and prosecution of your patent application.

The "Evidence of Invention" form mentioned below is offered as a convenience to you in making your disclosure to us for search purposes.

You should date and sign your disclosure and have it witnessed by two or more persons who are capable of understanding your invention.

Your disclosure should be mailed to us together with a letter authorizing us to conduct a preliminary search among previously granted U. S. patents for similar types of invention.

We then make this search and prepare a report of the probable patentability of your invention. If such report is favorable, we recommend the further course for you to take.

The "Evidence of Invention" form and booklet are suggested as conveniences to you and us in starting action on your invention.

530-C Merlin Building, Washington 6, D. C.

We shall be glad to send you promptly and without obligation, an instructive booklet, "Patent Protection for Inventors", which was prepared to give inventors detailed information and steps to take toward patent protection—also our convenient "Evidence of Invention" form.

Use address Victor J. Evans & Co., 530-C Merlin Building, Washington 6, D. C.

Command Bigger Money!

STUDY LAW

STUDY AT HOME for BUSINESS SUCCESS and LARGER PERSONAL EARNINGS. 40 years expert instruction—over 114,000 students enrolled. LL.B. Degree awarded. All text material furnished. Easy payment plan. Send now for FREE BOOK— "Law and Executive Guidance." It explains the course—how you may enroll and the many ways you can profit from Law Study. Write TODAY to:

AMERICAN EXTENSION SCHOOL OF LAW
Dept. 24-PN, 646 N. Michigan Ave., Chicago 11, Ill.

AMAZING SECRETS REVEALED TO EVERY POULTRY RAISER

ABSOLUTELY FREE BOOK. My new Picture Tour Book tells all about one of America's largest and best Poultry Breeding Farms and Hatchery organizations. I know you'll enjoy it, and profit in your poultry work by reading it. Tells latest methods of profitable chicken raising, feeding and especially about pure-breds, cross-breeds and hybrids. If you want to know about better and more profitable chickens, be sure to write me TODAY for your FREE copy. Just one postcard will bring it.

MRS. HARRY HAM, Route 56, Atchison, Kansas

BOYS!

Make Your OWN RADIO!

Learn Interesting Details

Fun, interest and education in making your own simple, tubeless, batteryless crystal radio. Send 25c for a genuine Melonite crystal with complete illustrated instructions for making your own set. Complete with others for long distance reception. Crystal sent postpaid with instructions and our own publication "The Magic Crystal" which is full of news, diagrams, questions and answers of interest.

Send 25c TODAY.

ALLEN RADIO. Dept. 137, Clinton, Mo.


VALPARAISO TECHNICAL INSTITUTE, Dept. B. Valparaiso, Ind.

YOU CAN SUCCEED BY KLOK TRAINING

There is no other practical training in the wood industry whereby you can succeed so quickly as through our training. You can study either at home by correspondence or come to Grand Rapids and study with us here. The KLOK Course teaches you Sketching—Drafting—Woodworking—Time Study—Cost and Production Scheduling. The training will enable you to run your own shop more successfully or enable you to get a top position in the furniture and woodworking industry. Write NOW for free booklet, "Stepping Stones to Top Positions in the Woodworking Industry. State Preference—Home Study or Resident Training—Age, and if you are a Veteran.

KLOK INSTITUTE
Louis St., N. W., Grand Rapids, Michigan
Prepare in our Big Training Shops for these GREAT OPPORTUNITY FIELDS!

ELECTRICITY OR RADIO AND TELEVISION

FIVE BIG FLOORS PACKED WITH MASSIVE EQUIPMENT

Thousands of men and young men have come to our big training shops where we have floor upon floor packed with massive equipment to train with, to prepare for good jobs and real futures in the opportunity fields of Electricity and Radio-Television. For many years, these fields have offered great opportunities to trained men. With new developments, including Electronics and Television, they will continue to grow and offer even greater opportunities. Why be satisfied with a "no future" job? Many "one operation" jobs that exist today will not last. Prepare for a good job with a real future for steady pay and advancement by training NOW in the great training shops of COYNE in Chicago.

NOT "HOME-STUDY" COURSES

Our famous Radio-Television Practical-Technical method gives you practical experience on a massive outlay of equipment. Not by correspondence, but actual shop work plus necessary technical training. You are trained right here in the great COYNE shops that have been training men and young men for over 50 years.

LARGEST, OLDEST, BEST EQUIPPED SCHOOL OF ITS KIND IN THE U.S.

Mail Coupon for Big FREE Book!

Whether you prefer Electricity, or Radio-Television, train on actual equipment at COYNE. We have a big, fully illustrated book on each course, and we'll send you the one you want, or both if you want to consider both fields, without obligation. Mail coupon—TODAY.

GREAT FUTURE AHEAD. Here at COYNE you're trained for Construction, Testing, Troubleshooting on Radio, Public Address, Sound Units, Training includes FM, Television Servicing, etc. Many COYNE trained men in good jobs or own well-paying Radio-Television businesses of their own.

ELECTRIC REFRIGERATION

This valuable training now included with either course means added opportunities.

G. I. APPROVED

NON-VETERANS who are short of cash can finance most of their tuition and pay in easy monthly payments after graduation. Many earn while learning.

B. W. COOKE, President

COYNE ELECTRICAL AND RADIO-TELEVISION SCHOOL 500 S. Paulina St., Dept. 30-72H, Chicago 12, ILL.

Mail Coupon for Big FREE Book!

Whether you prefer Electricity, or Radio-Television, train on actual equipment at COYNE. We have a big, fully illustrated book on each course, and we'll send you the one you want, or both if you want to consider both fields, without obligation. Mail coupon—TODAY.

COYNE ELECTRICAL AND RADIO-TELEVISION SCHOOL 500 S. Paulina St., Dept. 30-72H, Chicago 12, ILL.

Send me the book, checked below and details of your training offer. This does not obligate me and no salesman will call.

☐ ELECTRICITY  ☐ RADIO-TELEVISION

NAME

ADDRESS

CITY

STATE

MARCH 1950
DOES YOUR FUTURE NEED A "TUNE-UP" JOB?

Take the "knocks" out of your career — Learn a good trade through famous C.T.I.!

If you don’t like your present job—if your income is low—or if you feel you’re not getting ahead fast enough...it’s time you learned a trade! Opportunities for success may never again be as great as they are today. Good jobs are waiting for trained men. You can acquire technical skill through C.T.I. within months. You can learn either at home in your spare time or in our resident school.

So, "step on the starter". Fill out and mail coupon below. Do this today!

THESE C.T.I. MEN ARE GETTING SET FOR SUCCESS

Technical skill makes a big difference in whether or not you will succeed. Many C.T.I. graduates discovered this fact, as they tell you in their own words: "Your training has been of great assistance in helping me get ahead. Since beginning your course I have more than doubled my earnings."..."I own my own shop now, and if I don’t get ahead, I can truthfully say it will be my own fault."...

"Since I finished my training through C.T.I., I’ve made enough money to buy tools, and now have a small business started."..."I am on my own. It came sooner than I anticipated, and with the training I’ve received from C.T.I., I’m sure I’ll go places, but fast!"

Each of these graduates—as well as many others—at one time did just what you’re going to do right now: They mailed a coupon to C.T.I.! (See below)

C.T.I. TRAINING IS G.I. APPROVED

All C.T.I. courses, both residential and home study, are fully approved by the Veterans Administration—which means that eligible veterans will have their tuition paid by the government.

COMMERCIAL TRADES INSTITUTE, Dept. E2-3
1400 Greenleaf - Chicago 25

FILL OUT - CUT OUT - MAIL TODAY

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. C. Anderson, President</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>COMMERCIAL TRADES INSTITUTE, Dept. E2-3</td>
<td>□ Veteran</td>
<td>□ Non-Veteran</td>
</tr>
<tr>
<td>1400 Greenleaf Ave., Chicago 25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Send free illustrated Brochures and other information about the field I have checked below:

- Automotive Mechanics
- Body & Fender Rebuilding
- Diesel Mechanics
- Refrigeration & Air Conditioning
- Electricity & Electronics
- Radio & Television
- Building Construction
- Mechanical Drafting

Name ________________________  Age __________
Address ___________________________
City ___________________________ State __________
Get into Diesel-Auto Mechanics Master All Phases

Jobs like these are available to trained mechanics. Choose the field you like best.

---

Get Complete Training

Diesel Fuel Injection
Automotive Mover Tune-up
Diesel Engine Rebuilding
General Garage Mechanics
Agricultural Implements
Auto Engine Rebuilding
Auto Elec. Service
Public Utilities
Parts Dealers
Bus & Truck Lines
Industrial Maintenance
Contracting & Excavating
Business of Your Own
AND MANY other similar openings.

As a National Schools graduate, you are trained for ALL opportunities in the Diesel & Auto Industries.

---

Earn While You Learn

With our practical Master Shop-Method Home Training, you study at home in your spare time. You receive Spar Time Work Lessons, which show you how to earn while you learn... for extra money and experience. You learn by doing.

---

Tools and Equipment

To make your training complete, we give you selected mechanic's tools and equipment, illustrated below, including all-metal toolbox—as a regular part of your instruction.

---

National Schools
Los Angeles 37, Calif. Est. 1905

Find out now... Mail coupon today

Mail the price the book, your future in Diesel-Auto Mechanics, together with the sample lesson, I understand I may keep and use the information with no obligation.

---

© Check here if Veteran of World War II
THOUGHTS ... THAT MOVE MOUNTAINS

... IS MIND POWER REAL?

Have you read volumes on the power of thought? Perhaps you have listened to lengthy theoretical addresses on the forces of mind. You may have wondered if these same writers and lecturers on mind power know how to use it. How many mountains of personal obstacles—everyday trials and tribulations—have they moved? What are these subtle principles whereby man can skillfully remove the barriers that impede his progress? How can you displace the obstructions and hindrances to your goal... the mountains in your life? Can practical information about inner power be reduced to mere words... words for public dissemination? Or, is there a secret method especially and uniquely preserved for the worthy seeker... practicable only under ideal circumstances? If so, who has the secret method? Where can it be found?

Investigate the Rosicrucians (NOT a religion), the oldest practical philosophical fraternity on earth. See if they cannot show you a method for attainment such as you may not have dreamed possible. Thousands of men and women today are enjoying mental mastery... realization of ideals... the attainment of their objectives. They know the secret methods for converting mountains of personal problems into green valleys of achievement.

Accept this offer

A free book, The Mastery of Life, is yours for the asking. It explains how easily you may enter upon the path of attainment. Fill in and send coupon today!

SCRIBE Q.M.K.
THE ROSICRUCIANS (AMORC)
San Jose, California

Please send me the book, The Mastery of Life, which explains how I may learn to use my faculties and powers of mind.

Name
Address
City
Zone Number
State

The ROSICRUCIANS (AMORC) San Jose, California
Only D.T.I. offers you the "BIG 5" TELEVISION RADIO-ELECTRONICS Laboratory Type HOME TRAINING

Build and Keep 10, 12½ or 16 inch Picture Tube Quality TELEVISION RECEIVER as you prepare for a Profitable Future

Here is everything you need to prepare you at home for FASCINATING WORK, GOOD MONEY and a THRILLING FUTURE in one of America's most promising fields.

This includes the opportunity to build and keep the top quality Television Receiver shown above—with choice of a 10, 12½ or 16 inch picture tube that gives big, bright, sharp, steady pictures. This is an optional feature—available when you complete your training described below.

Get the complete facts. See how D.T.I.'s wonderfully practical "BIG 5" method meets industry's needs. No previous experience needed. Mail coupon today!

16 Big Shipments of Parts — Plus Lessons

Work over 300 electronic experiments and projects from 16 big shipments of parts. This includes building and keeping all test equipment and radio set shown at left side of page. Modern easy-to-read lessons with handy fold-out diagrams simplifies your entire training.

You Also Use Home Movies

D.T.I., alone includes the modern, visual training aid... MOVIES to help you learn faster, easier at home. See electrons on the march and other fascinating "hidden action"—a remarkable home training advantage that speeds your progress.

Employment Service

When you complete your training, our effective Employment Service helps you get started toward a real future in Television-Radio-Electronics.

Modern Laboratories

If you prefer, you can get All your preparation in our new Chicago training laboratories... one of the finest of its kind. Ample instructors... modern equipment. Write for details!

MAIL THIS COUPON TODAY!

DeFOREST'S TRAINING, INC.
2533 North Ashland Avenue,
Chicago 14, Illinois.

Without obligation, give me complete facts showing how I may make my start in Television-Radio-Electronics.

Name ___________________________ Age ___________________________
Street: __________________________________ Apt: ______________________
City: __________________________ Zone: __________________________
State: ___________________________

DeFOREST'S TRAINING, INC.
Chicago 14, Illinois
A DeVry Institution

MARCH 1950
$250,000 FOR THIS!

2100 Other Inventions Badly Needed—Big Cash Waiting for Your Little Ideas

It's often the simplest ideas that make the most money! The Kiddle Kar brought its inventor a cool million dollars. A 70-year-old grandmother made $350,000 on an improved overall buckle. The paper clip, the hairpin, the rubber pencil tip all made fortunes for the people who "dreamed" them up.

You can cash in, too—if you concentrate on the inventions that are really needed!

The EASY Way to Get Started

Don't waste time and brain-work on something nobody wants. Find out WHAT to invent. A valuable book by Raymond F. Yates, noted science editor and inventor, lists and describes over 2100 practical, money-making ideas that are crying aloud to be invented!

These 2100 ideas are the things most needed and surest to make money. They are listed under 34 different headings for quick reference: Electrical, Radio, Automotive, Agricultural, Building, Household, Clothing, Toys, Time-savers, etc.

This book also tells how to think inventively, how to protect your ideas, how to develop an invention step-by-step, etc.

FREE EXAMINATION OFFER—SEND NO MONEY

Wouldn't you like a slice of the $230,000,000 that American inventors get each year in royalties? Get started now! You don't risk a penny. Simply mail coupon below without money—and get 2100 Needed Inventions by Raymond F. Yates, for 5 days' Free Trial. If, even in that short time, you are not convinced that this book can help you make money—just return it and owe nothing. Otherwise, send only $2.50 plus few cents postage, as payment in full.

Any one of the 2100 ideas in this book can bring somebody a fortune. Maybe it can be YOU! Mail coupon at once! Wilfred Funk Inc., Dept. T493, 227 East 44th Street, New York 17, N. Y.

FREE 5-DAY EXAMINATION

WILFRED FUNK, Inc.

227 East 44th Street, New York 17, N. Y.

Please send me 2100 NEEDED INVENTIONS, for FREE EXAMINATION. If I keep the book I will send you $2.50 plus few cents postage. Otherwise I will return it within 5 days, without further obligation.

Name:

Address:

City, State:

Zone No.

Check here if enclosing $2.50 with coupon, and we will pay all postage charges. Same 5-day return privilege, for full refund, applies. Canadian Orders—$3.50 extra for carrying charges. (Only U.S. funds accepted.)

Enjoy a hobby that's fun!

Get this picture-packed book on Model Railroading now!

• It's simple — this book will tell you how you can have your own railroad in your basement, attic, or even a corner. It's inexpensive — surprisingly little money is needed. It's constructive — hobbies from 17 to 70 spend absorbing hours with the work of growing hobbies.

Fully illustrated — this book explains how you, too, can start. Send 10c today for your copy of "Model Railroading for You," written by a well-known authority. MODEL RAILROADER MAGAZINE, DEPT. 1531, Milwaukee 3, Wis.

RAISE HAMSTERS

The new wonder animals from Syria. Often called Toy Bears. Delightful pets. Everyone wants them. Laboratories need thousands. Clean, odorless, raise anywhere. A profitable and interesting hobby or business. We furnish breeding stock with manual of instructions.

Write today for free illustrated literature.

GULF HAMSTER, 1536 BASIL, MOBILE, ALA.

LEARN PHOTOGRAPHY

There's big money in PHOTOGRAPHY — and an action-packed career for you. Our HOME STUDY COURSE famous throughout the world — it's your smartest short cut to success! Or if you wish, take our personal aviation course, the famous New York Studios is available with instruction under the G. E. Staff. Our 6th year. Write immediately!

NEW YORK INSTITUTE OF PHOTOGRAPHY

Dept. "49", 10 W. 33 St., New York 1, N. Y.

ELECTRICIANS' SCHOOL

APPROVED FOR VETERANS TRAINING

PENNSYLVANIA INSTITUTE

SCHOOL OF ELECTRICITY

42nd and Spruce Sts., PHILADELPHIA 4, PENNA.

Learn Watch Repairing at Home or at School

Learn while at home or at school.

Write today for free information.

Write to: TOY & WINDUP WATCH REPAIRING SCHOOL, 270-276 East Blvd., Grand Rapids 6, Michigan

APPROVED FOR G. E. TRAINING

Our school is set up on an individual basis where every student receives individual attention from his own personal instructor. Individual student at any time can contact trained instructor on any question or complaint. JOHN H. VAN PLEUSSEN, Director.
NOW! BRAND-NEW, UP-TO-THE-MINUTE Edition of Famous Manual MAKES ANY AUTO REPAIR JOB YOUR "MEAT"!

ENLARGED!
95 MORE Pages!
795 BIG Pages in All!
More Chapters! More Facts!

REVISED!
418 NEW Pictures—2100 in All! 141 NEW Pictures on Hydramatic Drive!

TRY BOOK FOR A WHOLE WEEK—FREE
Return and Pay Nothing if Not Satisfied!

HERE it is—the brand-new, revised, enlarged edition of MoToR's Auto Repair Manual! Now you can "lick" any auto repair job on any car built since 1935—including all 1949 models! Just look up make, model, and job in quick index—and go to it.

EVERYTHING YOU NEED TO KNOW TO REPAIR ANY CAR!
795 BIG pages; 2100 "how-to-do-it" pictures; 200 "quick-check" specifications, charts, and tables; over 200,000 facts make every operation a "snap"! Beginners will find in this giant book the most helpful guidance on every kind of service and repair job imaginable. Experts will be amazed by the shortcuts they'll discover.

Win Prestige! Earn More Money!
Factory engineers from every auto plant in America worked out these timesaving procedures. Now you get all this wealth of "know-how" from over 150 Official Shop Manuals, "boiled down" into clear terms in one handy book! Now you can tackle jobs you wouldn't think of trying before. And you'll win more prestige, more money!

Right at your fingertips you have every "how-to-do-it" fact you want. Over 35,000 essential dimensions on 697 car models! Whether you want to make a simple carburetor adjustment or completely rebuild a transmission, step-by-step instructions show exactly WHAT to do, HOW to do it. Used by U. S. Army, technical schools, thousands of auto service men.

SEND NO MONEY
Send no money. Enjoy this brand-new book—at our risk—for a full week, FREE! Test it right in your own garage shop. If book doesn't more than pay for itself in 7 days, simply return it and pay nothing. Mail coupon NOW to MoToR Book Dept. Desk 1C, 250 West 55th St., New York 19, N. Y.

MAIL COUPON NOW FOR 7-DAY FREE TRIAL
MoToR BOOK DEPT., Desk 1C, 250 West 55th St., New York 19, N. Y.

Same FREE Offer on MoToR's TRUCK MANUAL
Covers EVERY job on EVERY truck made from 1935 thru 1940; 1400 pictures, 852 pages, 300,000 facts. All types: Gasoline Engines, Truck Diesels, Remanu, Fuel Systems, Governors, Lubrication, Ignition, Starters, Clutches, Axles, Brakes, etc., etc. Also covers many buses, tractors, contractor and road building equipment, stationary power machinery. Check box in coupon.

MARCH 1950
Get Into RADIO, TELEVISION and ELECTRONICS Master ALL Phases


GOOD PAY and Unlimited Opportunities in JOBS LIKE THESE:
- Business of Your Own
- Radio Manufacturing, Sales, Service
- Broadcasting, Telecasting
- Television Manufacturing, Sales, Service
- Laboratories: Installation, Maintenance of Electronic Equipment, Electronics, Call Systems
- Garages: Auto Radio Sales, Service, Sound Systems and Telephone Companies
- Oil Well and Drilling Companies
- Engineering Firms
- Theatre Sound Systems
- Police Radio
- And scores of other good jobs in many related fields

YOU CONDUCT MANY EXPERIMENTS LIKE THESE!
- Checking action of condensers
- Experiments with AF and RF amplifiers
- Experiments with resonance
- Producing beat frequencies
- Calibrating oscillators
- Experiments with diode grid-bias grid-leak and infinite impedance detectors
- Practical experience in receiver trouble shooting
- Application of visual tester in checking parts and circuits
- Experiments with audio oscillators
- Advanced trouble-shooting
- ...and many, many others

Complete Training by Practical Resident Trade School, Est. 1905
The same highly trained faculty, instruction materials and methods used here in our large, modern resident school, are adapted to your training in your own home. Shop Method Home Training has been proved by hundreds of successful graduates.

Both Resident and Home Study Courses Offered

NATIONAL SCHOOLS
LOS ANGELES 37, CALIF. • EST. 1905

FIND OUT NOW ... MAIL COUPON TODAY

National Schools, Dept. PM-3
4000 South Figueroa Street
Los Angeles 37, California

Send me your FREE book "Your Future in Radio" and the sample lesson of your course. I understand no salesman will call on me.

NAME: [Redacted]
ADDRESS: [Redacted]
CITY: [Redacted] ZONE STATE

☐ Check here if Veteran of World War II

For quick action, mail coupon today and we'll rush you full information.

Free!
NEW, ILLUSTRATED OPPORTUNITY BOOK AND SAMPLE LESSON SHOW YOU HOW WE TRAIN YOU . . . SEND FOR THEM TODAY! NO COST. NO OBLIGATION.

MARCH 1950
What's the matter...

NOT SATISFIED WITH YOUR PAY CHECK?

Home study training, in spare time, can increase your earnings!

For 52 years we've been training men for BETTER JOBS AT BIGGER PAY

The successes of thousands of today's money-makers started in a coupon similar to the one below, which they checked, signed, and mailed to AMERICAN SCHOOL. The information they received opened doors of real opportunity, and steps upward which brought promotions and better living through bigger pay checks.

- Who earns promotions — more money — security? It's the ambitious man with know-how and the self-confidence that comes from training. It's the man who looks far beyond the next pay day and sets his goal. He is determined to merit responsibility and its rewards, and is willing to devote some of his spare time to acquiring the knowledge that will give him the power to climb.

For over half a century American School has provided specialized training for commercial and technical advancement. It has enabled men to earn more while they learn more and win promotions. In almost every business field you'll find highly paid leaders whose success began with American School training.

IT COSTS SO LITTLE — PROVIDES SO MUCH

At a cost you can afford and in hours you might otherwise waste you can prepare to climb in the field of work you prefer. American School, an educational institution not for profit, offers you a wide choice of training opportunities. Give serious thought to the list in the coupon, then check one or more subjects, add your name and address and mail it. You will receive full information, without obligation of any kind. Do it now. You'll be glad you did.

AMERICAN SCHOOL
Dept. G-345, Drexel at 58th Street, Chicago 37

MARCH 1950
YOU can acquire LAW NIGHTS AT HOME! L.L.B. DEGREE

LaSalle's famous Law Library—used as reference in many Law libraries and Law offices—has enabled thousands to master Law surprisingly fast, in spare hours at home, for business and professional advancement.

These 14 remarkable volumes, compiled by leading professors and lawyers, cover the whole basic field of Law in condensed, orderly, simplified manner.

You advance rapidly with this great library, plus special lectures furnished. We guide you step-by-step with personalized Problem Method of instruction ... you learn by doing—handling legal problems—not by memorizing rules.


LA SALLE EXTENSION UNIVERSITY A Correspondence Institution 417 S. Dearborn St., Dept. 364-L, Chicago 5, Ill.

Send me your two FREE booklets described above, without obligation.

Name__________________________________________________________Age_________________________

Street........................................................................................................................................

City, Zone & State........................................................................................................................

BIG PAY JOBS for men who qualify in DIESEL

ASSURE YOUR FUTURE. Steady, high-pay jobs await men qualified in Diesel, Tractor, and Heavy Equipment. Are you qualified for job and advancement opportunities in this fast-growing field? You can qualify!

COMPLETE DIESEL COURSE NOW AVAILABLE. If you are ambitious and want to get ahead in this big money field, you'll want to know about the complete Diesel home training course now offered by Interstate Training Service. Covers all phases of operation, repair, service. Easy to master in spare time. No interference with present job. Up-to-the-minute. Regularly revised to cover new developments. We invite comparison of material offered. Free placement advisory service.

YOU OWE IT TO YOURSELF to investigate Interstate Training Service Diesel Training. Those hands agree it has helped them to better jobs—better pay. It can do the same for you!

SEND FOR FREE BOOK TODAY!

INTERSTATE TRAINING SERVICE, Portland 12, Ore.

Getting Ahead In Diesel, a 24-page book, designed for the busy man.

STOP AUTO ACCIDENTS

with new STOP LIGHT FLASHER! MAKES YOUR STOP LIGHT FLASH 15 TIMES A MIN.

FREE OFFER TO YOU! The "Stop-It!" warns other drivers behind you that your lights flash on & off! Completely automatic, acts instantly when you step on for a brake & stops to flash in 3 seconds. Approved by all state engineers, used by Police & Fire Dept., newspapers, radio stations. The "Stop-It!" is an introductory offer—no obligation. Get this amazing "Stop-It!" for your car at no cost to you! Dealers, salesmen wanted.

MACCHI & Co., Dept. MC, 127 Larkin St., San Francisco, Calif.

EASY TO LEARN CODE

Learn or increase speed with an Instructograph—the Radio-Teletype Code Teacher that takes the place of an instructor-instructor and enables anyone to master code without further assistance. One of the new developments in radio and telegraphy. Ideal for beginners or as a review aid. Designed to teach the code by association. Correspondence course on 44 cards at 75, 125 or 300 W.P.M. illustrative of all Morse symbols. Send 25c for your choice. Instructographs have acquired the code with the Instructograph System. Write today for convenient rental and purchase plans.

INSTRUCTOGRAPH COMPANY 4702 V. Sheridan Road. Chicago 40, Illinois

LIFE AFTER DEATH "Heaven and Its Wonders, and Hell" by Emanual Swedenborg, with a brief biography of this famed theologian, philosopher and scientist. 325 page, 8vo book, illustrated. Original from Western Reserve College Library. 5c

The SWEDENBORG FOUNDATION Room 1618, 51 E. 42nd St., New York 17, N.Y.

NEED MORE MONEY?

Thousands already earn big, steady profits selling famous Bostonian shirts, rainwear, hosiery, underwear and other everyday needs for men, women and children. Also new lines of Hamilton shoes. No selling experience needed—if you're keen and really want to assure yourself of a steady income, Bostonian will back you and set you up in business. You get big profits, immediate cash and big selling kit. Our Company has tripled its business in the past year. Write now—big Spring season ahead. Bostonian Mfg. Co., Dept. 339, 89 Bickford Street, Boston 30, Mass.

Write for FREE Selling Kit

POPPULAR MECHANICS
AMAZING NEW OFFER!
LEARN HOW TO MAKE REAL MONEY IN
TELEVISION
RADIO & ELECTRONICS

AT NO EXTRA COST!
YOU GET A ROUND TRIP TO
NEW YORK CITY

After you have completed the home study section of your course, your transportation to New York City, by any means—by RTTA, on special train for RTTA students. You will be paid by RTTA for your time and expenses.

FREE EMPLOYMENT HELP
Upon completing your training, you will be placed in your field of interest. You may choose to work at home or in a laboratory in New York City. You will receive a certificate from the National Broadcasting Company, which guarantees your job security.

IN DOUBLE QUICK TIME
EARN BIG PAY,
OWN YOUR OWN BUSINESS

You will learn how to earn money while you are still in school. You will have the opportunity to build and sell your own television sets. You will learn how to repair and maintain television equipment.

ALL EQUIPMENT FURNISHED

The kits you will receive contain all the necessary TUBES and BATTERIES. You will receive a complete set of tubes for your TELEVISION RECEIVER, plus the VIDEO and AUDIO TUBES. In addition, you will receive everything needed to build and test your equipment.

MAIL COUPON NOW!

RADIO TELEVISION TRAINING ASSOCIATION
972 BROAD STREET
NEWARK 2, NEW JERSEY

MARCH 1950
YOU CAN HAVE THIS KIND OF BUSINESS...

A big business where there is a constantly growing demand... all of the time. ELECTRICAL APPLIANCE SERVICING! Millions of new appliances are sold annually. All will eventually need repair.

**IF YOU ARE AMBITIOUS**
Want Financial Security... want Independence... a profitable business of your own, full or part time... or just extra spare time earnings. Learn ELECTRICAL APPLIANCE SERVICING. Age is no barrier.

**IF YOU ARE WILLING TO DEVOTE SPARE TIME**
Our New Shop Method Home Training Program will bring practical and technical Electrical training right into your home! You learn by working with your hands... building, testing, repairing.

**IF YOU ARE MECHANICALLY INCLINED**
Like to "tinker" with tools... CTS will send you their big FREE Illustrated Book, "Electrical Appliance Servicing" and special form for getting their Electronic Kit, special training kits, etc. on a "Pay from earnings while learning" plan.

**IF YOU MAIL THIS COUPON TODAY!**

CHRISTY TRADES SCHOOL, Dept. D-7903
4432 N. Kedzie Ave., Chicago 25

Please rush FREE BOOK, Facts about ELECTRONIC KIT, Special form for paying from "Earnings While Learning".

Name______________________Age________________________
Address______________________
City________________________Zone______State__________

---

**FREE BOOK WORTH $3,500 A YEAR TO YOU!**

Big Pay Jobs Waiting for HIGH SCHOOL GRADUATES

Big 1956 page book shows you how to qualify quickly in only 15 minutes a day spare time reading. Records prove High School Graduates average $5,400 more than poorly trained men and women. "High School Subjects Self Taught" makes it easy to learn more and earn more to decide if study, but fascinating reading. No class room examinations. You "Pass" yourself! Write now! Get Book that can mean a fortune to you.

**SEND NO MONEY**. Pay postman $0.95 plus postage, or pay money order of exact amount. Book will be sent promptly. Read book for 5 days. Show friends, High School Teachers, Students. If you don't agree book is worth retail, return for full refund by next mail.

Mail order today and we'll include FREE 150-page book of study charts to help you take and pass test for a HIGH SCHOOL EQUIVALENT CERTIFICATE or graduate with diploma. Enrol after four years high school, now possible without high school attendance. Don't delay. Send order now to: NATIONAL SELF-STUDY INSTITUTE, INC., 90-61 Sutphin Boulevard, Jamaica 6, N. Y.

**AMAZING NEW BOOK**

"HOW TO ANSWER ADS"

Never before have you seen anything like this. Tells you in simple language the correct way to answer ads, gets you quicker replies—better results, and greater satisfaction. Will save you time and money and it's ABSOLUTELY FREE. No obligation whatever. Every reader of advertising should have this book. Send a postcard for your copy NOW. Advertising Department, Popular Mechanics, 200 East Ontario Street, Chicago 11, Ill.

**AJAX LIGHT BRAHMAS**


AJAX HATCHERY, Box 916, QUINCY, ILLINOIS

**MONEY CASTING AT HOME**

Make your own rubber molds quickly, cheaply with X.L. EUPHORIA. Cast thousands of perfect figurines, book ends, plaques, ornaments, ash trays. Etc. GREAT PROFITS! Write for New Catalog.

X.L. Rubber, Pte. $2.00. Gts. $3.50. Gallons $4.95. Models and enough rubber for 2 mold $1.00 postpaid.

Dept. 2, 3243 S. MADISON ST. L. Muncie Inc.

**BIG MONEY SIGN PAINTING**

**Learn in Spare Time**

Quickly become an expert, Tremendous Demand everywhere for trained men. We teach you quickly—in home spare time. No previous experience or artistic talent needed. Simple, illustrated course quickly qualifies you to start a Big-Money Business of your own.

FREE BOOK, send a stamp—cost you nothing. Stamp on page 32 and we will send you absolutely free—complete information and valuable money-making facts on how you may quickly get started in a Business of Your Own. No cost—or obligation, rush name and address today to Farrell School of Commercial Sign Lettering, 734 Long Ave., Chicago 44.

Tells How You Can Learn to MOUNT BIRDS!

FREE BOOK

LESLIE A. THOMAS, Example Book, famous Bird Book, tells all about Taxidermy. Contains over 100 beautiful engravings. A 24 page display book. Its yours FREE, if you rush your request. You can network all kinds of wild game and common specimens too. We can post competitive price. Rush letter for free book. Spacious display room to inspect. FREE SMALL POSTER for this amazing FREE BOOK. Don't wait, State your AGE.

H. W. SCHOOL OF TAXIDERMY, 2103 E wides Blvd., Chicago 2, Ill.
Get into the World’s Fastest Growing Industry

I Can Train You at Home
For a Fascinating Money Making Career in RADIO
and TELEVISION

Not in two decades has such an opportunity been available as is now presented to the ambitious, forward looking man to get into a giant new industry of the future, at the start of its growth.

Thousands of new Television Receivers are being sold each day—more Television Stations are coming on the air each month. It is predicted that Radio-Television will be one of the world’s top ten industries in the next 5 years.

MAKE YOUR MOVE NOW!

Now is the time to get the training that will help prepare you for success in Radio-Television. But be sure that you get the best training available, for your future success may well be measured by the quality of the training you get.

FREE!

Sample TV Lesson and 56-page Book which explains my 2-way method of training, actual practice PLUS lesson instruction.

Sending for this book has marked the turning point in the lives of many men. You owe it to yourself to find out about H.R.T.I. training. Mail below coupon TODAY!

C. H. MANSFIELD, Pres., Dept. A-19
Hollywood Radio and Television Institute
810 West Sixth St., Los Angeles 14, California, U.S.A.

Send me your FREE book, "Your Opportunities in Radio, Television and Electronics," which explains your 2-way home study training method. Also the FREE Sample Television Lesson.

No Salesman Will Call

Name _________________________________________
Address _______________________________________
City ___________________ Country _________________

If a veteran of World War II, check here[ ]

APPROVED FOR VETERANS
Check Coupon (If a veteran of World War II)

HOLLYWOOD RADIO & TELEVISION INSTITUTE
810 West 6th St., Los Angeles 14, California, U.S.A.

MARCH 1950
Learn
CLOCK
Repairing
in THREE Easy LESSONS
AT HOME

There is big money to be made in this fascinating field—

And you need no previous experience to become expert in clock repairing.

We teach you in three easy lessons how you can overhaul and repair an alarm clock—mantel clocks—and even chime and grandfather clocks. Our course consists of three simple, comprehensive lessons, explained in understandable, non-technical language that even a boy can understand.

There is nothing mysterious about clock repairing—almost any one can become proficient in a very short time, and start making extra money quickly. Our course has been prepared by experts in this field, and you can learn as fast as you choose.

WE GIVE YOU EVERYTHING
YOU NEED TO START

Included as part of the course for you to keep are 2 pliers, clock tweezers. 7 screwdrivers, hand puller, 2 hammers, pincise, eye loupe, hand drill, 8 drill bits, bench keys, 2 files, bench vise, set of closing punches, bench block, 4 brushes, cleaner, oil, clock oil, oil cup, level, hand chuck, bundle of pegwood, 2 broaches, assorted pithwood. AND—a spring balance clock movement and an 8-day pendulum clock movement.

So learn clock repairing—send the coupon today for FREE information! How you can get into this money-making, fascinating field quickly.

Course prepared by the Illinois School of Watch Repairing, the largest correspondence school of its kind in the world.

If more interested in watch repairing or jewelry repairing, check coupon below and mail.

MAIL COUPON TODAY

Mr. E KING
Illinois School of Watch Repairing, Dept. PM-3
2870 Elston Avenue, Chicago 18, Ill.

Send me at once without obligation FREE literature on

☐ TIME REPAIRING

☐ CLOCK REPAIRING

☐ WATCH REPAIRING

☐ JEWELRY REPAIRING

Name: ...........................................

Address: ..................................................

City, Zone & State: ...................................

DRAW Top Pay • No Job Worries!

Learn to work on Auto Mechanic Specialties. New FREE booklet tells how to prepare for the good jobs with high pay and job security. Our modern equipment and practical instruction makes it easy to learn—get experience as ENGINE REBUILDING or GENERAL AUTO MECHANICS.

VETERANS
American is a G.I. approved school.

WRITE TODAY FOR FREE BOOKLET

AMERICAN TRADE SCHOOL
2415 McGee
Kansas City, Mo.

FREE TO HOME PLANNERS

L. F. GARLINGHOUSE CO., INC., Box 80 PM-O
TOPEKA, KANSAS

NEW POPULAR BOOKS SHOWING ALL TYPES
OF HOME DESIGNS

$2.50 Postpaid

Many designs in color

RUPTURED?

Get Relief This Proven Way

Why try to worry along with troumis that gouge your flesh—press heavily on hips and spine—enlarge opening—fail to hold rupture? You need the Cluthes. No leg-strap or cutting belts. Automatic adjustable pad holds at real opening—follows every body movement with instant increased support in case of strain. Cannot drift whether at work or play. Light. Waterproof. Can be worn in bath. Send for amazing volume book—"Advice To Ruptured," and details of liberal truthful day trial offer. Also endorsements from grateful users in your neighborhood. Write:

CLUTHES SONS, Dept. 31, Bloomfield, New Jersey

LEARN MONEY-MAKING CARTOONING

IN SPARE TIME—by Easy Picture Chart Method

Same simplified method that has helped tens of thousands of people in every walk of life to make quick money by cartooning. Send for free coupon for Picture Chart to test your ability. Ask for full details. (State age.)

THE LANDON SCHOOL, 5003 Clare, Transist Bldg., Cleveland, 0.

LEARN CARPENTRY, BRICK LAYING

Big money in the Building Trades. Learn how to earn a comfortable living today! National method teaches men to work just like masters. Pay S 5.00 down.

NATIONAL PHOTO COLORING SCHOOL
1315 S. Michigan, Dept. 1353, Chicago 5

Thrilling Work—Coloring Photos

Perspective view of your home loaded on horse by those with attitude. Thrilling masterpiece. National methodtaughtons, life-like scenes. Pay S 5.00 down.

POPULAR MECHANICS
YOU BUILD THIS 23-TUBE TELEVISION RECEIVER NOW!

FOR THE FIRST TIME YOU CAN GET Real Practical HOME TRAINING In

TELEVISION RADIO AND ELECTRONICS

YOU WORK AND LEARN WITH REAL TELEVISION AND RADIO EQUIPMENT

Radio-television training school's master Technicians guide you. Located in the very heart of America's Television, Broadcasting, Radio and Sound Industries, RTS is right "on-the-spot" where new technical improvements are first introduced, is in the best possible position to bring students actual methods and practices developed by the radio-tele-

vision industry, leading to real money making opportunities. The 11 BIG KITS RTS gives you enable you to do many practical jobs, build the equipment illustrated, perform more than 100 other fascinating, valuable experiments. These jobs you do give you actual shop experience so vitally necessary to your future success. Thus our methods assure you balanced training—Theory plus Real Experience.

OPPORTUNITIES NOW WIDE OPEN FOR Properly Trained Men

Latest reports estimate 400 MILLION new television and radio sets will be built in the next 10 years. More than 72 million dollars is being spent RIGHT NOW just for radio repairs alone! When you are thoroughly trained by RTS Experts—who have their fingers in the pulse of the Radio-Television industry—a field of unlimited opportunities will open up for you in your own Radio-Television Sales & Service Business, F.M., Equipment Manufacturing, Communications and allied fields.

EARN EXTRA MONEY while learning at HOME

Under the RTS amazingly easy, practical home-training plan there is no need for you to quit your present job. You study in spare time only! RTS Experts show you how

YOU BUILD THIS 6-TUBE STANDARD SUPER HETERODYNE RADIO SET with SHORT WAVE CONVERTER

RTS LEADS THE WAY WE GIVE YOU 11 BIG TELEVISION AND RADIO KITS AT NO EXTRA COST

27 YEAR SUCCESS RECORD

Backed by over a quarter-century of experience in home training, RTS (formerly Radio Training Association of America) offers practical "Learn-by-doing" methods, assuring you quick step-by-step progress. Begin preparing for your future in Radio-Television now while the time is ripe. If you are at all mechanically inclined—and have a grammar school education, RTS can teach you how to make good in Radio-Television.

GET THE FACTS

Send for FREE BOOK which tells you all about the RTS "time-tested" home-training plan, developed by technicians in the heart of the Radio-Television field. Fill out the coupon now—today! and your free book entitled "How To Make Good In Radio-Television" will go out to you at once. No Obligation. No salesman will call. Act now!

YOU KEEP ALL EQUIPMENT—IT'S YOURS!

radio-television training school, dept. pm 3
5100 south Vermont avenue, Los Angeles 37, Calif., U.S.A.

send FREE illustrated book showing how I can make good in TELEVISION and Radio through training under the guidance of expert RTS Technicians. No obligation.
(No salesman will call).

NAME: ____________________________
Age: __________________

St. & No.: ____________________________
City: __________________ Zone: ______
State: ____________________________

MARCH 1950
AUDELS Carpenter's and Builders Guides
4 vols. $6

Inside Trade Information for Carpenters, Builders, Joiners, Building Contractors and all Woodworkers. These Guides give you the shortcut instructions that you want - including trade secrets, methods, solutions, plans, systems and money-saving suggestions. An easy, accessible guide for the professional and student. A must for every Apprentice Carpenter everwhere using these Guides as a convenient rule. Better Work. Better Work and Better Pay. To get the most value for yourself, study it well and mail the F A R E COUPON below.

AUDEL, Publishers, 49 W. 23rd St., New York 10, N. Y.
Mail Application. Carpenters and Builders 6 vols. $6, 3 vols. $3. 4 vols. $4. 2 vols. $2. 1 vol. $1. Apply for trial. If OK I will remit $1 in 7 days and $1 monthly until $6 is paid. Otherwise I will return them. No obligation unless I am satisfied.

Learn A Trade NOW!

PRACTICAL SHOP TRAINING!

In Our Chicago Shops

- AUTO MECHANICS
- DIESEL MECHANICS
- REFRIGERATION
- BODY-FENDER

Above Approved For G. I.'s and Civilians
One of America's Leading Practical Schools
7 Floors of Fully Equipped Shops
Over 48,000 Successful Graduates
Expert Individual Instruction
Learn by Doing—Low Living Expense
Established 1902—Day and Evening Classes

Also the following Home Study Courses

- PLASTIC
- REFRIGERATION
- DIESEL

CALL IN PERSON OR MAIL THIS AD TO

GREER SHOP TRAINING
Chicago, I1, Ill.
460 South State St.

Please send without obligation free information regarding trade checked above. Specify whether you are a Veteran □ or Civilian □

Name:
Address:
City:
State:

H I G H S C H O O L

AT HOME—IN SHORTEST POSSIBLE TIME

Course prepares you for College entrance, professional schools, and personal advancement. Diplomas awarded. Why be handicapped all your life when you can become a High School graduate with so little effort? Write for free prospectus. See what High School training did for so many of our graduates—what it can do for you. Residence course approved for veterans.

ACADEMY FOR ADULTS, Dept. 23
1300 W. Washington, Chicago 8, Illinois

Say You Saw It in Popular Mechanics

FALSE TEETH

KLUTCH holds them tighter

KLUTCH forms a comfort cushion: holds dental plates so much firmer and snugger that one can eat and talk with greater comfort and security; in many cases almost as well as with natural teeth. KLUTCH lessens the constant fear of a false plate chattering away 25c and 50c at drugstores. . . . If your druggist hasn’t it, don’t waste money on substitutes, but send us 10c and we will mail you a generous trial box.

KLUTCH CO. Box 5093-C
ELMIRA, N. Y.
$200 GROSS IN MY FIRST WEEK!

Some Make More, Some Less... Start This Business for YOUR OWN

Would YOU like to own a permanent, year-round business in which it is possible to take in as much as $200 gross the first week, as did L. A. Eagles? R. E. Traynor says, "I made $62 gross in one day." R. H. Newlin reports, "I have averaged $173 gross per week." Others report gross from $100 per week to $12,000 per year.

Surely YOU will want to investigate a golden opportunity like that. You need not have any special skill or experience, but if you are ambitious, honest and courteous, we will help you to start and succeed in YOUR own moneymaking business where net profits are high.

No Shop Necessary

Our Electric Rug Washer cleans rugs and carpets like new right on the customer's floor. This quick, thorough and highly efficient method removes dirt and grime, thus restoring the natural, fresh beauty of floor coverings. Anyone can run it. Rugs and carpets are not harmed.

There are hundreds of possible customers in YOUR vicinity. Most of them have several rugs needing regular cleaning. To get a quick start, shampoo a few rugs or carpets. These customers tell their friends and soon you should have an independent, prosperous business, and you should be able to keep it growing. Send the coupon RIGHT NOW for booklet that explains everything.

Every Machine Guaranteed and Easy to Own

You take no risk. These wonderful, fully guaranteed machines have been used and endorsed by largest hotels, railroads also used by U. S. Government. Many individuals have built up successful businesses that made big profits. Mail the coupon TODAY and we will send complete information, including how to start and succeed in YOUR business without a large investment. Don't delay your big opportunity. Send the coupon AT ONCE.

MAIL COUPON TO
VON SCHRADER MFG. CO., 310 PL, RACINE, WIS.

BE A PHOTO-ENGRAVER

We furnish complete equipment and supplies. Learn at home or in our modern, friendly APPROVED school in MISSOURI. Get into this big demand, high profit, high wage field. You can start your own profitable, full time or part time PHOTO-ENGRAVING business right in your own home.

THE AURORA SCHOOL OF PHOTO-ENGRAVING, DEPT. 99M, TASOPE BLDG., AURORA, ILL.

BLISS Electrical Training

Intensive 32 weeks' residence course in fundamentals of industrial electrical engineering, including radio and electronics. Extensive laboratory, shop work, drafting. Prepares for electrical technician and engineering aides in communications, power, manufacturing, business machines, sales, service. G. I. approved. 57th year. Enter March 6, Sept. 5. Catalog. 7628 TAKOMA AVENUE. WASHINGTON 12, D. C.

Watchmakers MAKE MONEY!

Large earnings with no dull seasons. Professional dignity, a steady secure future are yours as a Master Watchmaker! You can choose a fine job or go into your own business.

SEND FOR FREE BOOK NOW

Since 1908, Chicago School of Watchmaking graduates have been in constant demand. Write today for your free copy of our new illustrated book about the big opportunities in watch repairing, gem setting and engraving.

CHICAGO SCHOOL OF WATCHMAKING, 1608 Milwaukee Avenue, Chicago 47, Illinois, Dept. 130

Please send your new book, "Master Watchmakers Wanted" without cost or obligation.

I am interested in attending residence school.

I am interested in home study.

I am a veteran.

I am a non-veteran.

NAME
ADDRESS
CITY. (Zone) STATE

MARCH 1950 39
INVENTORS

Before you make any effort to market your invention, you should take the first steps toward proceeding for patent protection.

The usual first step is to have a search of the U. S. patent records conducted, so that I can report to you on the question of patentability.

I shall be pleased to furnish you with information relative to patent procedure and also on the matter of trade-mark registration, upon request from you, and this will be without any obligation on your part.

PATRICK D. BEAVERS
(Formally RANDOLPH & BEAVERS)
Registered Patent Attorney
934 Columbian Building Washington 1, D. C.

INVENTORS
IF YOU WISH TO PROTECT YOUR INVENTION, You should take steps to protect it by a U. S. Patent. Write me for "Record of Invention" form.

CARL MILLER
REGISTERED PATENT ATTORNEY
WOOLWORTH BLDG., 35th FLOOR, 30A, NEW YORK CITY

BE AN INVESTIGATOR
WORK HOME or TRAVEL. Experience unnecessary. INVESTIGATOR Particulars FREE. Write to GEO. M. P. WAGNER, 125 W. 86th St., N. Y.

LEARN MOVIE PROJECTION THEATRE MANAGEMENT
The Motion Picture Theatre Business offers big opportunities for trained men. Get into a fascinating field with a promising future. Train at home in spare time. Free Catalog. Established 20 years.

THEATRE SCHOOL, 370 Washington St., Elmira, New York

HIGHEST ROYALTIES and CASH FOR YOUR INVENTIONS

Write for FREE booklet without obligation

UNIVERSAL MARKETING CO.
354 S. SPRING ST. (Suite M) LOS ANGELES 13, CALIF.
How to Build—at a
Price that will Make You
GASP!

50,000 Now Letting This Book Build
For Them—You, Too, Can Find Out
FREE How to Plan, Buy, or Build!
Get Top Quality—Save HUNDREDS!

When a Texas man who never built before,
believe his own... when an ex-
perienced architect writes the best book on
building for a man like me... When hundreds
of schools, colleges, universities rapidly replace old-
building this amazing volume... Then you, too, ought to have this book on your table! We
have proof—a cabinet full of letters from people who
are just beginning to plan their new homes—
their money's worth, NOW, today. Let "How to
Have a Better Home" prove without risk that
it can tackle and
building or remodeling
job. Let it work
with you on the job.
Let it solve the problems as
they come up, one at a time, let it do all this, without risking a cent!

Heirloom (Name)

Wise Use of Money

Practical Guide Book
We will pay you QUADRUPLE if you can beat it. If Undecided
Whether To Build or Buy, the
Leary of 'Cheap' Building, Shoddy Work, Poor Design—If Fed-Up
With DREAMING AND WANT TO GET STARTED—Then This
Will PROVE TO YOU
Here is the answer to how to build
the WORKS—how to plan, construct, supervise—simplies, clearly explains
step-by-step, Jam-packed with everything
you need to build your own, or
have a contractor build. Hundreds
of cut-out, COMPLETE diagrams.
Amaze everyone! Read IT FREE AT
OUR RISK!

EVERYTHING YOU NEED TO KNOW
TO GET STARTED
All the facts. Whether you spend $2,000 or
$20,000—whether you employ an archi-
tect or use plans—should be regarded as a
standards. This book will help you. Before you build know the diffé-
ence between good and bad now. You can save hundreds of dollars. Get
a
draft of the best, plan of
your home, this building
language is so different, it may be the
friends admire the home being built,

Where to Begin
No matter what your problem, you will
find the answer. No truth is kept from you. You are told of precautions to safeguard your
investment. Learn how to select a competent ab-
solution, lawyer, real estate dealer, archi-
tect, contractor. Discusses methods of buying fully. Chance at the partial table of contents on this page for some of thousands of
FAN letters and testimonials with this volume contains. Those who have bought a copy write they
have never seen so thorough a work on this subject for ANY PRICE, ANYWHERE.

Hundreds of Construction Details

FREE Examination Coupon—Mail Now
The Westport Publishing Company,
"BOOKS OF MURRIS," Dept. WP-3, Westport, Conn.
Please send me, for one week's FREE EX-
AMINATION, a copy of "How to Build a Better Home." After 7 days
I will either return the book and mail-
ning, or I will keep it and send you $3.08
(plus shipping charges, in two monthly
payments, if I wish.)

Name:_________________________ Age:____
Address:_______________________
City & Zone:_____________________

READ what Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

Read Great Building Authorities Say
About This Amazing Book (names on request)

How to Build—from Plans to Pawn
No step important step missing.
See for yourself.
Spend NO MONEY
Let us build for you, too,
7 Days FREE!
Don't risk a cent to examine
"How to Build a Better Home.
Just mail coupon. Study it for a
week. Then decide. See how it
to supervise and build. YOUR
self like other men you know who have taken advantage
Then, if THRILLED, send only $3.08
and unobstructed building, no
trilled return book and pay
nothing. Puts you in position to
build not just a house, but a house that will build itself! Moreover, this
EXAMINATION COUPON NOW
to the nearest office of the
MARCH 1950

Free 7 Day Trial

Just Mail Coupon

BOWLS OF HOW-TO-DO IT DIAGRAMS—DUNNO EASY!

FREE

MARCH 1950

41

FREE

MARCH 1950

41
FREE 1950 TV & RADIO CATALOG!

ALLIED'S 1950 TV & RADIO CATALOG!

196 PAGES OF BIG VALUES

EVERYTHING IN RADIO AT LOWEST PRICES

Send for Radio's Leading Buying Guide

Save money on every radio need! Get the new 196-page 1950 ALLIED Catalog, preferred and used by everyone in radio. See the world's largest stocks of top-quality equipment, all at low, money-saving prices! Latest TV releases, home radios and radio-phonos, Amateur equipment, PA systems and High-Fidelity Sound, recorders, test instruments, builders' kits—plus thousands of parts, tubes, tools, books and diagrams. Have all the advantages of quick delivery, complete selections, big savings and expert personal help from the World's Largest Radio Supply House. Send today for your FREE copy of the 1950 ALLIED Radio Buying Guide!

ALLIED RADIO

ALLIED RADIO CORP.
833 W. Jackson Blvd., Dept. 5-CC-0
Chicago 7, Illinois

Rush FREE 1950 ALLIED Catalog

Name
Address
City Zone State

CORTINAPHONE Makes it EASY To:

SPEAK FRENCH-Spanish

GERMAN-ITALIAN

BIG OPPORTUNITIES await Americans who speak languages. Learn a child can learn—by listening! to these COR-TINA recordings. The CORTINAPHONE METHOD famous for 68 years, teaches you right at home to speak FRENCH, SPANISH, GERMAN or ITALIAN as a NATIVE speaker.

Count Cortina

Listen to this Record!

FREE VETS FRENCH or SPANISH course available under G.I. Bill State if Veteran

Send on 5 Days' Approval
Write today for free book which describes the amazing "Cortina Short-Cut" Method. State Language interested in.

BOOK
FREE
CORTINA ACADEMY
Dept. 643, 105 W. 40 Street, N.Y.C.

Save Your Feet
Thousands relieved from pain walk freely with HEEFNER ARCH SUPPORTS

Write for Free Booklet
"FOOT FACTS"

HEEFNER ARCH SUPPORT CO., 675 Leesburg Blvd., Salem, Virginia

Bar Bells
Buy Direct From Factory

$8.95

INDEPENDENT IRON WORKS
DEPT. B
2416 East 23rd Street,
Los Angeles 11, Calif.

BRAND NEW!
7 JEWELS!
3 Year SERVICE GUARANTEE
- Sweep Second $5.95
- Radiant Dial
- Chrome Case
- Leather Band
- Shock, Water Resist

Special Order today! Money back if not satisfied. Sorry, no COD's.

ELCO PRODUCTS CO., 3805 Broadway, Los Angeles 22

it's fun to earn

RAISING HAMSTERS
Cash in on the growing demand for SYRIAN GOLDEN HAMSTERS recently introduced into the U. S. Ideal pets ... big laboratory demand. Healthy clear, odorless. Easily and profitably raised anywhere.

AKOPIAN HAMSTERY
the largest in the West
7158 H VARNAS AVE., NORTH HOLLYWOOD, CALIF.

GET THIS SUIT AS A BONUS!
YOU PAY 1/2 • WE PAY 1/2
Sold popular Studio tailored-to-measure suits. Make up to $10-$15 daily. Take orders from friends. As an extra bonus, get your own suit at 50% wholesale. No experience needed. Send for FREE selling kit and sample line, send no money. Write fully, state age, etc.

W. D. SMITH & CO., DEPT. D
833 W. Jackson Blvd., Chicago 7, Ill.

Learn PHOTOGRAPHY at Home


AMERICAN SCHOOL OF PHOTOGRAPHY
1315 S. Michigan Ave., Dept. 1353
Chicago 5, Ill.
SALESMEN!

SALES GOING CRAZY!

Work hard for 7 months
...then LOAF the rest of the year!

AMAZING Underground SPRINKLER SYSTEM—
Retail for ONLY... $49.50

...Sweeping SALESmen into the biggest money
of their lives! "GOLD MINE" for DISTRIBUTORS!

Last year, EVERSPRAY created a nationwide
sensation — poured spectacular
profits into the laps of salesmen
everywhere.

This year, the NEW Improved EVERSPRAY is going to make your last year's
earnings look like small change! Be-
cause this year, we offer Salesmen TWO
spectacular order getters until now un-
heard of in the history of Direct Selling.

1. A COMPLETE DEMONSTRATOR
you carry right in your pocket.

2. An EVERSPRAY SYSTEM complete
in every detail that you can

spread out on a prospect's
lawn and have in full operation
IN LESS THAN 10 MINUTES!

This year—right before a prospect's very
eyes—you can show him exactly how
his EVERSPRAY Underground Sprinkler
System is going to work when it's
installed in his lawn!

With either one of these two amazing
demonstrations you clinch a sale 9
times out of 10. Every home owner who
takes a speck of pride in his lawn will
want to install an EVERSPRAY as quick as
it can be delivered to his door.

EVERSPRAY installed at North Acres Gardens, Anderson, Indiana

"People Tell Me I Have the Finest
Lawn They've Seen in Years"

L. C. Johnson

"When my EVERSPRAY is in operation, people actu-
al stop to watch it and to admire the
smooth, velvety green texture of my lawn. I never
saw anything like EVERSPRAY in all my life."

And R. C. Freeman, Chicago, says: "It's amazing
how EVERSPRAY keeps our lawn in tip-top condi-
tion all season long. Best of all, I don't have to
waste hours of time sprinkling with a garden hose."

CUSTOMER INSTALLS IN FEW HOURS without damage to lawn!

Now, for the first time in history, any
home owner—anywhere—can get an
Underground Sprinkler System
at a price he can afford. Now his
lawn can be sprinkled like a mil-
lion-dollar estate. And look! Ever-
spay is all solid brass and copper.
Nothing to rust or wear out. No
pipe fitting to do. No plumber's
bills to pay. No repairs. No inspection.
No maintenance. No freezing

because EVERSPRAY drains itself—
automatically—every time it's shut
off. No wonder home owners by
the thousands are rushing to buy
EVERSPRAY!

No wonder Ray J. Eckenrode
says: "EVERSPRAY works like a
charm. On the strength of this
installation, a neighbor asked
me to purchase the same layout
for him."

DON'T CALL YOURSELF A SALESMAN IF YOU CAN'T MAKE

$60.00 A DAY!

In the NEW Improved EVERSPRAY you've got
your hands on the biggest summer seller ever invented.
When musk lilies are dead or dying, EVERSPRAY is just
coming to life! Our sure-fire "Jack-Pot" Pyramid Sales
Plan turns your first sale into TEN more. Then
EXTRA orders start pouring into your hand automat-
ically—without a bit of effort on your part!

FREE! SEND NAME

This very minute, send your name on the coupon or
penny postcard for beautiful Illustrated Folder that
shows pictures of actual EVERSPRAY installations, Demo-
nstrator Offer and Details of sure-fire "Jack-Pot"
Pyramid Sales Plan. Everything is FREE. Hurry. Send
now or never. Time is precious. Send name today.

EVERHOT PRODUCTS CO.
(Everspray Division)
2001 Carroll Avenue, Dept. 2-C, Chicago 12, Illinois

MARCH 1950
**PLASTICS EVERYTHING YOU NEED UNDER ONE ROOF**

**CLARO-CAST**
A clear rigid plastic for making plastic parts, lenses, flowers, etc. Price: $3.95 to $14.95. See full line from book - $2.00.

**METALLIC ACETATE**
Newest thing in plastics. Great material for making custom machine parts, flowers, book covers, etc. Aqueous, or black, pink, copper, gold, purple, green, silver, red, blue, four colors. Sheets 10x10 - Price $0.65, 20x20 - Price $3.00.

**CRYSTAL-CRAZE**

**FOR PLASTICS "KNOW-HOW"**
Free catalog by letter. Receive for "know-how" price $1.50.

**COMPLETE CATALOG - FREE!**
A catalog of plastic supplies for the hobbyist. Everything in plastic under one roof. Everything you can afford to get our catalog.

**FRY PLASTICS CO. - DEPT. 73**
7604 S. Vermont - Los Angeles 44, Calif.

---

**LIGHT or HEAVY INDUSTRIAL WHEELS**
Pressed Steel or Rubber Tires
ALL BALL-BEARING
If you are building portable equipment that uses pneumatic wheels, here's a standard high-quality line at attractive prices. All made for standard axles (3/8" or 1/4") and finished in infra-red baked enamel. Money back guarantee.

**LOW PRICES CASH WITH ORDER**

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 1.50</td>
<td>$1.25</td>
</tr>
<tr>
<td>6 x 2.00</td>
<td>$2.25</td>
</tr>
<tr>
<td>6 x 2.50</td>
<td>$2.50</td>
</tr>
<tr>
<td>6 x 3.00</td>
<td>$2.75</td>
</tr>
<tr>
<td>6 x 3.50</td>
<td>$3.00</td>
</tr>
<tr>
<td>6 x 4.00</td>
<td>$3.25</td>
</tr>
</tbody>
</table>

Please Specify Size Desired

**NEFF EQUIP. CO.**
400 Petroleum Bldg., Wichita, Kansas

---

**FOR YOUR BETTER FUTURE**
Learn AERIAL-PRECISION Instruments, be a specialist in a great industry. Trained men in demand now. Short, intensive training approved for Vets, non-Vets. Employmnt and housing assistance. Visit school or write for free information.

**HOMESITES $300 LOW TERMS**

**RICHARD S. OTTO**
DEPT. M
SAN LUIS OBISPO, CALIFORNIA

---

**Do you want**

||
|---|---|
|To go to College?|or enter a Profession?|
|Such as Accounting, Architecture, Nursing, Dentistry, Teaching, Social Work, Office Duty, Beauty, Optometry, Embalming, Chiropractic, Law, Medicine, etc.||

---

**High School Course at Home**
Many finish in 2 Years

**American School, Dept. HS45, Drexel Ave. at 58th St., Chicago 37, Ill.**

Gentlemen: Send me FREE information covering special training in subjects checked below. No obligation on my part.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture and Building</td>
<td>Drafting</td>
</tr>
<tr>
<td>Automotive</td>
<td>Design</td>
</tr>
<tr>
<td>Business Management</td>
<td>Men &amp; Women</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Plastics</td>
</tr>
<tr>
<td>Refrigeration</td>
<td>Mechanical</td>
</tr>
<tr>
<td>Air Conditioning</td>
<td>Engineering</td>
</tr>
<tr>
<td>Home Training</td>
<td>Aviation</td>
</tr>
<tr>
<td>Electronics, Industrial</td>
<td>Salesmanship</td>
</tr>
<tr>
<td></td>
<td>Radio</td>
</tr>
</tbody>
</table>

**Name:**

**Address:**

---

**171 MPH - Ford V8**

**INCREASE SPEED • INCREASE POWER**

This V8 powered Streamliner using a Ford V8 was enclosed at 171 M.P.H.

**Ford V8 exchange $25.00**

20% or more in your stack car with HOWARD GROUND CAMS

Write for prices and literature

**Howard's Cams**

1012 S. Main Street
Los Angeles 3 California

---

**POPULAR MECHANICS**
Get into the
ELECTRIC APPLIANCE REPAIR & SERVICE BUSINESS

OPEN YOUR OWN SHOP
As soon as you enroll, I send you my New Book—"How to Open Your Own Business" at no extra cost. PTS training is more than a home study course in electric appliance repair and service. It gives you the "know how" on the operation of your shop from a business standpoint: What to charge, how to get customers. Everything possible is done to start you on the road to success.

WE TEACH YOU:
Electric motors, house wiring, refrigerators, auto ignition, automatic washers, garbage disposals, fluorescent lights, ironing, cleaners, etc., at home.

SEND FOR THIS FREE BOOK

MAIL THIS COUPON TODAY
PACIFIC TRAINING SCHOOL H. T. ARMSTRONG
7219 S. Broadway, Dept. P-503, Los Angeles 3, Calif.
Please send me, without obligation, your free booklet and details.

Name
Address
City Zone State

Put Your Future in Your Own Hands
Be an ARTIST

HERE'S THE AMAZING WAY WE TEACH YOU STEP BY STEP TO DRAW AT HOME IN SPARE TIME

TWO BIG ART OUTFITS GIVEN
As soon as you enroll, we send you the first of the TWO complete Artist's Outfits, including all the material you need to start the course. Later in the course you receive the second, advanced outfit—all at no extra cost.

Read What These Graduates Say:
"TRAINING PAYS OFF"—Fred J. Collet of Cicero, Illinois, says, "I have turned your teaching into profit very quickly." (1-49)

STAFF ARTIST AND CARTOONIST—
G. W. Thomas, Los Angeles newspaper artist 265; "W.S.A. is Number One school in U. S. A." (1-48)

WRITE FOR FREE BOOK
"ART FOR PLEASURE & PROFIT" tells about our course of instruction and commercial opportunities for you...also about W.S.A. students, reproductions of their art work, and results enjoyed by our graduates.

WASHINGTON SCHOOL OF ART
We are approved for Veterans Est. 1924

LEARN TO DRAW FOR MONEY
Prepare yourself for a pleasant, profitable Art career. COMMERCIAL ART, DESIGNING, CARTOONING—all in one richly illustrated, modern home study course. Good art positions available in this great field. You can become your own boss—work at home on your own time. Many students earn extra money while learning by designing posters, rendering simple artwork, lettering, etc. W.S.A. is now in its 36th successful year of training men and women. No previous Art experience necessary, we teach you from the beginning for professional art jobs in advertising, television, newspaper and magazine publishing, department stores, printing, art studios, etc. Get the facts now. Low cost—only $5 monthly.

FREE BOOK gives details
WASHINGTON SCHOOL OF ART, Studio 123W
1115—15th St., N.W., Washington 5, D. C.
Please send me full information and your Free Book, "Art for Pleasure and Profit." (Please print)

Name
Age
Street
City Zone State

☐ I am entitled to training under the G.I. Bill.

MARCH 1950
Train for these growing fields
AIR CONDITIONING
HEATING
REFRIGERATION

Prepare for a substantial opportunity in industry or a business of your own

In 6 to 24 months you can be equipped for a career in these fascinating fields. This 47-year-old, nonprofit technical school offers world-famous training programs. Experts from industry cooperate with faculty of specialists to keep courses geared to latest developments. Laboratories and shops are well-equipped. Specialized technical training is coupled with solid education in basic sciences and related arts. You pass step-by-step to certificates of "Refrigeration Serviceman" in 6 months—"Refrigeration Heating Serviceman" 6 months later—and "Refrigeration Heating Air Conditioning Technician" in 12 added months.

Military, Academic or Practical Training is evaluated for advanced credit. Preparatory courses available.

Faculty of 55 specialists. 1,555 currently enrolled from 48 states and 23 foreign countries. Over 35,000 alumni. Terms open April, July, Oct., Jan.

MILWAUKEE SCHOOL of ENGINEERING
Founded 1903 by Oscar Wirthers

Write for free 110-page catalog and 48-page pictorial booklet, "Your Career."

Milwaukee School of Engineering
Dept. PM-350
1020 N. Broadway, Milwaukee, Wis.
Without obligation, send me the 110-page catalog and 48-page "Your Career" booklet.

(Click 6 to 26 month courses which interest you)

- Air Conditioning
- Refrigeration
- Heating
- Electrical Engineering—B.S. Degree:
  - Power
  - Electronics

Name: ____________________________ Date: ____________
Address: _________________________ Age: ____________
City: ____________________________ State: ____________

SAY YOU SAW IT IN POPULAR MECHANICS

WANTED
MAN WITH CAR

No Time Like Now to Get In McNess Business
It's no trick to make good money when you use your car as a McNess "Store on Wheels." Farmers buy everything they can from McNess Men because McNess Products are 100% in quality, represent extra values, attractive business-getting price and premiums; also money-saving deals to customers make selling McNess daily necessities a snap.

We Supply Capital—Start Now!
There's no better work anywhere. Pays well, permanent, need no experience to start, and we supply capital to help you get started quick. You begin making money first day. Write at once for McNess Dealer Book. It's Free. Tells all no obligations.

THE McNESS CO...883 Adams St., Freeport, Ill.

SADDLES
GENUINE
McCLELLAN
1295
COMPLETE
Express collect
Normally worth $75 to $90—these wonderful Army Surplus Saddles of finest first-quality top-grade select cowhide. Complete with braided horsecloth cinch, metal stirrups, recessed suede leather. Send check or money order.

NATIONAL STORES
200 Southmouth St., Dept. P.M.
PITTSBURGH 22, PA

LEGIONSRide At Home In Your Time

You can easily improve your writing or become an expert carver by our simplified method at home in spare moments; for your Social and Business Advantage. Without obligation, write for details and our FREE BOOK, "How to Become An Expert Penman," which contains specimen and tells what others learned. Send $1.00 for Special Pencils and your name written on a Flourished Bird elegantly written on a card.

NEW! BIG FIELD
FOR PROFIT AND PLEASURE
COPPER TOOLING & ETCHING
ERN BIG MONEY—SPARE OR FULL TIME
Earnings from $25 to $75 weekly for one hour at once. BIG MONEY waiting in COPPER ART field. Plates, Plaques, Paperweights, Prizes, Gifts, Souvenirs of All Kinds. Start on the road to success NOW! Here is your opportunity to get started in your own Big Paying Business—FREE DETAILS don't wait—WRITE NOW!

Hollywood Copper Art Studios
4297 Beverly Blvd., Dept. PM-3, Los Angeles 4, Calif.

BUILD SOLID MODELS for display

Bonanza Kit, 59c

Planes—trains—ships! Accurate scale models to decorate home or office, display on mantel, desk, or in collector's group. All planes ready-shaped for easy assembly. Wide range of subjects, including newest ships, planes, and historic trains. Also solid model cars for HO layouts. See them at your Hobby Dealer.

Send for free circular describing all models

STROMBECK-BECKER MFG. CO., Dept. PM-5, Moline, Illinois

POPULAR MECHANICS
New! Print Your Own Advertising Post Cards

New, easy, low-cost way to greatly increase sales for any business. Amazing new ROTO-PRINT DUPLICATOR prints and illustrates your Advertising messages on Ice Commerce Post Cards, or larger cards. Thousands surprised at great amount of extra business such low-cost advertising brings—and great amount of money it saves on printing. Also prints Announcements, Notices, Price Lists, Labels, Forms, Order Blanks, etc., on cards or paper.

16-DAY TRIAL OFFER—Low Factory-To-You Price!

Many make big profits printing for others. Not a toy—but a strong, speedy, professional machine. Easy to use. Cylinder and Handle of finest metal. Hard, smooth base has Card Guides—to assure even, uniform printing. Prints several colors. GUARANTEED FOR LIFE TIME. Comes complete with necessary supplies and instructions. FREE! Write for full information about ROTO-PRINT AGENTS and the FREE Book of Money-Making Ideas—16-DAY TRIAL OFFER—and Low Factory-To-You Price! WANTED! ROTO-PRINT CO., 211 North 7th St., Dept. B-1, St. Louis 1, Mo.

3-Pc Paint Stripe Set Only $10

3 SEPARATE TOOLS—Each makes different width Stripe perfect lines—straight, curved, with any paint, lacquer, enamel, easy as drawing lines with ruler! Beautify furniture, toys, auto; make signs and imitation tile. Simple instructions included. SEND NO MONEY; mail order. Pay postman only $1.00 plus postage. If not delighted return in 5 days for full money back. Order Now.

STRADER MFG. CO.
259 Strader Ave. Dept. M-351
Cincinnati 26, Ohio

Diezel Auto Body & Fender Refrigeration Air Conditioning

Practical training in these big pay trades covers overheating, trouble-shooting, installation, maintenance techniques. Proven, easy-to-follow method prepares you at home in spare time, follows with actual shop practice. Also G. I. approved resident courses. Full information FREE! Write today 2525 Sheffield Ave., Dept. E-6, Chicago 14, Ill.

Utilities Engineering Institute
Founded 1927

Seen the NEW Crosman CO2 PISTOL & RIFLE?

They're sensational...a revolutionary, new idea in "powder without powder" guns that is sweeping the country. Ask your Crosman dealer to demonstrate their many exclusive features. Write for literature.

Crosman Arms Co., Inc. • Rochester 7, N. Y.

KEEP COLLAR POINTS DOWN SMART NEW PLASTICIZED Adhesive STAYS

Reusable, can't harm, fray, or tear fabric. Won't "show." No slots or pins. Use again and again!

Just stick 'em under your collar 32 Pairs $1 Postpaid

SEND $1.00 TODAY TO:

WES-KO DISTRIBUTORS
2069 S. SANTA FE AVE. LOS ANGELES 11, CALIF.

Get Into Business for Yourself!

Metalizing Baby Shoes at Home in Spare Time

Get facts about amazing money-making Warner Success Plan that shows you every easy step in completely charted path to personal independence—with your home as your headquarters. This proved and tested Plan is working like magic. It's backed by an old, reliable company...and we send it to you on a No-Risk Trial Money Back Guarantee.

QUICK CASH WAITING

Demand for Metalized Baby Shoes and other keepsakes is growing bigger daily. Our Tested Plan Shows How to Do the Work, How to Bring in the Business. How to Make as much as $5 an Hour. Send money order for FREE Fact Sheet and Time in precious.

Ray Brandell, Mgr., Warner Electric Co.
1412 Jarvis Ave., Dept. A-3, CHICAGO 46, ILL.

Please rush samples about your No-Risk Trial Money Back Plan for Metalizing Baby Shoes. Everything you send is FREE and costs me nothing—now or ever.

NAME
ADDRESS
CITY STATE

FREE offer of COMPLETE MONEY MAKING PLAN
SEND NO MONEY JOIN NOWstück COUPON

BOOKS ON APPROVAL

SEND NO MONEY. Just mail the coupon for a complete set of 4 Big, Thick Auto Books, 20th Edition. Over 2700 Pages! Whether you are a mechanic or helper, expert or apprentice, auto owner or driver, take immediate advantage of this FREE EXAMINATION OFFER.

MAKE GOOD MONEY NOW HOLD A PERMANENT JOB

America wants its automobiles kept in good repair. Men with "know how" are in demand, at big pay. These books will help you get and hold an important job, or give you a chance to go into business for yourself as a mechanic or service manager. Those who half try to improve their own can learn auto servicing and repairing by this quick method. Use the JIFFY INDEX to find easily understood answer to any auto problem. These books are prepared by eleven of America's great automobile engineers. Many hundreds of valuable illustrations. Send the coupon TODAY.

Ayer's consulting privileges with our engineers now given with these books without extra charge.

AMERICAN TECHNICAL SOCIETY, Dept. A319
Drexel Ave. at 52nd St., Chicago 37, Ill.

I would like to examine the 4-Volume Set of Auto Books. I will pay the delivery charges only, but if I choose I may return them expense effective, if after 5 days from receipt. I will send you $2 and pay the balance at the rate of only $3 a month until $21.80 has been paid. Include consultation service as offered above.

Name
Address
City State

Please attach letter stating age, occupation, employer's name and address and name and address of at least one business man as reference. Men in service, also please give home address.
“Here I am at work making good money as a draftsman. I’m glad I sent the coupon to Chicago Tech for that Free Trial Lesson and found out how easy it is to learn Drafting in spare time at home. Today I feel secure in my job because the draftsman’s work comes first on any new project. And, in addition, draftsman can’t be replaced with machines. What’s more, I feel I’m slated for promotion and more pay, because I see so many draftsmen advancing to high-pay jobs.”

LEARN IN SPARE TIME—AT HOME!
(or at the College in Chicago)

A few hours of pleasant home study every week—that’s all. No interference with your present job. All the tools you need, drawing outfit included. With Chicago Tech’s help, you train yourself step by step. This tested method—developed over 45 years of C.T.C. progress—prepares men quickly for good positions in industry.

FREE INFORMATION—SEND COUPON

To prove to you how easy it is to learn Drafting at home by the Chicago Tech method, we will send you this FREE TRIAL LESSON. No charge for this lesson, now or later. Fill out and mail coupon, or send post card today.

CHICAGO TECHNICAL COLLEGE
Mail me FREE Lesson with information about big opportunities in DRAFTING

Name
Address
City
Zone
State

“WOVEN-Gards” BETTER
Hand Protection at Amazing Low Cost

“WOVEN-Gards” are hand protectors, mitts, pads and sleeves made out of a wholly new safety material to provide: flexibility, comfort, resistance to abrasion and cutting for beyond that of anything used before. They are extremely oil-absorbent for excellent handling of oily, slippery objects and slabs. The porous weave makes them the best “hot” handlers ever offered.

Thousands of enthusiastic users say they have never seen values like “WOVEN-Gards” best protection at lowest cost. Send now for descriptive folder and prices. INDUSTRIAL GLOVES CO. 1405 Garfield St., Danville, Ill. (In Canada: Safety Supply Co., Toronto)

LEARN EXPORT

WHAM-O SPORTSMAN
Sports w. a 20. KILLS RABBITS, SQUIRELS, FROGS. For Hunting, Target, Racing. Funs. Dealers Write

HUNTING SLINGSHOT
Powerful, silent, accurate. Complete with 40 pellets and extra rubber bands. Send $1.00 today to: WHAM-O Mfg. Co., Box 29, South Pasadena, Calif.

STUDY A HOME
WITH AN EDUCATIONAL INSTITUTION
Courses in ENGINEERING: Electrical, Civil, Mechanical, Drafting, Architectural, Automotive, Steam, Printers, Electrical, Structural, Mining, Industrial, Petroleum, Marine, Refrigeration, Air Conditioning, Chemical.
Courses in ARTS AND SCIENCES: Philosophy; Education; Letters; Public Health; Medical Jurisprudence; Psychology; Sociology; Physics; Chemistry; Geography; Pol. Science; Theology; Law; Business and Commerce: Mathematics; Statistics; Agriculture.

Speed + Mileage Manual
Easily Get Super Speed, Acceleration, Mileage—Top Racing Performance from Any Automobile. Famous New Book shows simplified Speed Training Methods—Speed Tuning—Secrets of High Performance Engines—Latest Track Proven Methods. Send for Free Copy. Complete Set of 7 books $5.00, Individual copies 75c. Also $1.00 for all 7 books.

SANDEE MUFFLER CO. 5643 Corryne Pl., Culver City, Calif.
AT LAST!
The ABC's of TELEVISION

all in one big book!

Complete Self-Teaching Course in TELEVISION Prepared by Famous RCA Institutes Instructor — Starts From Scratch, Takes You Step-by-Step From Elements of Set Design To Advanced Problems and Color Television

Now, you can do ANY TV installation, service, or repair job like an expert; operate field testing equipment; understand problems of TV broadcasting.

Bernard Grob, instructor at the famous RCA Institutes has taught hundreds of men just like you to become TV experts. He knows the questions that come up in a student's mind . . . and how to answer these questions simply and clearly! Now, he gives you everything you want to know about TV theory, broadcasting, repairs, installations . . . a complete TV course in one GIANT manual so that you can become a TV "whiz" at home . . . in your spare time.

At-A-Glance Charts Trace Trouble In A Jiffy, Show How To Fix It

How to "cure" poor pictures. Over 50 common troubles solved step-by-step.

TRY BOOK Free FOR 10 DAYS!
Get ready now for a prosperous career in America's fastest growing industry. Be the TV expert of your neighborhood.

SEND NO MONEY! Mail coupon below to try "Basic Television" FREE for 10 days. No obligation whatsoever. Mail it NOW.

---

PARTIAL CONTENTS
Installation Made Easy
Repair of Circuit Troubles
Testing Equipment
Making the Switch To Color TV
Control Adjustments
Portable Field Equipment
Short Cuts to Proper Tuning
Trouble-Shooting Transmitters
Amplifier Installation
Receiver Alignment
Tube Troubles and Their Cures
Television Motion Picture Film
Solving Scanning Troubles
Synchronizing Sight and Sound
Brightness Control and D-C Relaition
The Video Signal from Camera Pickup to Image Reproduction
Techniques of Camera Pickup
Projection TV

Almost 600 Pages—400 Pictures
In 592 big pages, 461 pictures, diagrams, 14 tables, charts—he shows you how to install and service TV receivers expertly . . . how the video AM and audio FM signals originate . . . how each is transmitted . . . how each is received. Full directions for servicing each circuit block of receiver. How to read oscilloscope patterns in voltage, amplitude, frequency.

No matter what the real problem is—this book shows you how to "lick" it quickly and expertly. At-a-glance troubleshooting charts, identify the symptoms, tell step-by-step how to "clear the picture."

Prepares You For The Future

This book will pay for itself the first time you use it on a job. Contains more than enough material to qualify you for FCC's added FM and TV requirements for 1st Class License Test. Qualifies technician for big-pay jobs—own service business! Gives experienced technician more confidence, shows him new tricks!

---

MARCH 1950

---

---

---

---
Secure YOUR FUTURE
3 Trades in 1 Career

WATCHMAKING • JEWELRY-ENGRAVING • STONE SETTING

Each trade can be a full-time job; together they assure numerous high paying opportunities, or a business of your own. Profit by the Nationally Recognized Training Methods of the Kansas City School of Watchmaking.

ENROLLMENTS NOW AVAILABLE
Clip and Mail this Coupon Today

KANSAS CITY SCHOOL OF WATCHMAKING
1218 Admiral Blvd.
Kansas City 6, Missouri

Please send me, without obligation, complete information on training in the above courses.

Name _______________________________________
City ________________________________________
State ________________________________________

[Box to check if Veteran]

G. I. Approved

NEW ELECTRIC LIBRARY

$1.50 A VOLUME

WHAT EVERY ELECTRICIAN WANTS TO KNOW!

Electricity made simple as ABC. Up-to-date, trade dope for the expert and ALL electrical workers. Questions, answers, diagrams, calculations, underwriter's code; design, construction, operation and maintenance of modern electrical machines and equipment FULLY COVERED.

All available at small cost, easy terms. BOOK-A-MONTH service puts this new information in your hands for 8c a day. You can start your subscription with any volume. Write TODAY for electric Folder and FREE TRIAL offer.

THEO. AUDEL & CO., 46 W. 23rd St., New York City
Mail Vol. 1. Electric Library on 7 days' free trial. If O. K. I will remit $1.50, otherwise I will return it. I also request you to mail me book each month on same terms. No obligation unless I am satisfied.

Name _______________________________________
Address _______________________________________
Occupation _______________________________________

NEW PHOTO PROCESS

enables you to print any photograph on cloth, leather, wood, paper

No photographic experience or equipment necessary. Easy to use. Just follow simple directions. You can reproduce any snapshot negative you have on ties, handkerchiefs, scarfs, greeting cards, stationery, Postcards—won't wash off. Won't harm fabric or negative. Kit contains complete instructions and enough solution to make over 200 prints. Only $1.49, prepaid.

BURKE CO. 8052 MUSKEGAN AVE. CHICAGO 17, ILLINOIS

PONG PONG TABLE

Only $17.95 COMPLETE!

SAVE UP TO $30 ON THIS STURDY REGULATION SIZE PONG PONG TABLE

$0 EASY TO ASSEMBLE. ALL YOU NEED IS A SCREW DRIVER.

COMPLETE INSTRUCTIONS AND HARDWARE INCLUDED

SEND NO MONEY WE SHIP COD COLLECT

KAY-BILT MFG. CO., 199 RICHARD ST., BROOKLYN, N. Y.

Stop Dust and Pollen Irritation

New FLEX-a-FOAM Masks

Unbelievable relief with new featherweight, flexible foam rubber masks. Stops particles as small as 1/25000 of an inch! A-1 protection for indoor and outdoor jobs. Comfortable snug fit—unequaled breathing freedom. Attractive, easy to clean... With three extra washable pure latex filters $2.00 p. p. —Order Now!

ROBBLE PARTS CO.—Dept. PM—Cleveland 13, Ohio

FOREIGN EMPLOYMENT

IN ALASKA, LATIN AMERICA, FAR EAST, AFRICA

and many other countries. Big pay for executives, technicians, office help, mechanics and skilled or semi-skilled workers. Wide choice of jobs. For comprehensive latest bulletin of firms now working and hiring, and valuable tips, advice and suggestions send $1.00 to

RICO, INC.
P. O. BOX 388
MIAMI, FLORIDA

MAKE MONEY IN LANDSCAPING

Thorough training by internationally known Landscape Architect to start your own business. Improve your home or advance in this well paid field. Many Opportunities. Approved for Veterans. Send for FREE BOOK.

NATIONAL LANDSCAPE INSTITUTE
Dept. P-3, 310 So. Robertson
Los Angeles 48, Calif.

RUNNING WATER SYSTEM

For Shallow Well, Cistern, Lake or Stream

Or as Replacement or Booster-Pump

Simply connect to water source (22" depth or less) — turn on faucet — have all the sparkling water you want, instantly! Up to 300 gal. per hour! Never improved pump principle. Motor starts when any faucet is opened. Built-in pressure tank insures continuous flow. Pressure gauge and switch, 110-V. A.C. Amazingly compact. Complete. Anyone can install. Fully Guaranteed. Only $59.50 prepaid. Order from ad or write for details and for gigantic mail-sale bargain catalogue.

BURDEN SALES COMPANY
805 "Q" ST., LINCOLN, NEBR.
**SALESMEN!**

**WRITE THREE WORDS COLLECT $9.95**

**SENSATIONAL NEW ADVERTISING SIGN**

YES, MAKE $9.95 on 10-second demonstration to merchants. Write on glass with amazing magic crayon and presto—a 5-color advertising message takes fire and glows like a brilliant neon sign! Three sales a day and $29.85 profit is for "lazy" men. Workers can double to triple that amount. FREE SALES KIT. Don't wait. Rush your name and address on a penny postcard for full details and complete sales kit—ALL FREE.

MAXILUME CO., 125 W. Hubbard
DEPT. L-83
CHICAGO 10, ILLINOIS

**FREE UPHOLSTERING LESSON**

**RUPTURE!**

An amazing Air-Cushion Invention allows body freedom at work or play.

Light, neat, cool, sanitary.

Durable, cheap. Day and night protection helps Nature support weakened muscles gently but surely.

No risk. **Sent on Trial! Write NOW for free booklet and Proof of Results.** All correspondence confidential.


**SAVING ALMOST HALF!**

PRECISION MAUSER-TYPE VERNIER CALIPER

World famous precision, style, workmanship of famous Mauser organization of Germany. Made to exacting standards. One-hand operation with positive-action release. Chromed nose throughout, a perfect tool for shop and home. Measures accurately to 1/1000 inch. Scales 1-1/8 in. Inside, outside, depth measurements. Now, because full scale production is again underway, this beautiful Mauser-type caliper is yours at a price almost half of any comparable tool! Order yours today!

In protective leatherette case. Dealer inquiries invited.

**GLOGAU & CO., INC.**

1900 Birchwood Avenue Chicago 26, Illinois

**GET A Government JOB!**

START AS HIGH AS $3,450.00 YEAR

Many early Examinations Expected. Prepare NOW! Veterans Get Special Preference 40-

Page Civil Service Book FREE

Mail Coupon Today SURE

F.O.B. CHICAGO, ILL.

Franklin Institute
DEPT. 884
Rochester 4, N. Y.

(Not Gov't Controlled)

Gentlemen: Rush to me FREE of charge, list of U. S. government big pay jobs. Send FREE 40-page book describing salaries, vacations, hours, work, etc. Tell me how to qualify for one of these jobs.

Name
Address
Age
Sex
Education
Vet?
AUTOMOBILES, MIDGET CARS


CALIFORNIA Custom accessory headquarters. Buy direct from original designers. Get overhead, grips, side windows, dashboards, interior trim, etc. No extra charge. Send for illustrated catalogue.

DIRECT From California. Dual manifolds for Willys Jeeps to Oldsmobile Rocke- ters. Fitted heads, three carburetor manifolds, over 100 different makes and models. Speed and dress-up equipment for passenger cars. Magneto ignitions, aluminum flywheels, racing camsharts, water injectors, clutch shoes, exhaust headers, etc. Illustrated catalogue. (Dealers, request wholesale catalogs. National Automotive Industries, 5655-57 E. Beverly, Los Angeles 22.)

DIRECT Ford speed manual. 128 pages full of cutaway construction drawings, photos, and understandable technical data. Includes complete data on installing V-8 motor in Model A chassis, hydraulic brakes for any Ford, rodster and fast car info. How to rework these engines for speed. V-8, Mercury, Ford 6, Zephyr, Model A. Guaranteed, return defective, money refunded. Illustrated catalogue. Published. Send postpaid for $2.00. California tool, Box 3FC, Eslerick, Los Angeles 11.


From Speedway to roadway! Track-proven hi-speed heads and manifolds now available for your passenger car! No special tools needed! Increase horsepower 25%! Extending cetawar! Ford Illustrated catalog. Speedsop, 6213F, Diversey, Chicago 39.

FORD Owners and mechanics, we supply simple replacement parts making Ford and Mercury braves from lineup super powerful with self-feeding eliminators. (Saves loss on parts.) Functional, rigged, designed to work. All models 1938-1948. Easily installed by yourself. Write for details. Super Brake Parts Co., 4022 W. Lake Street, Chicago 14, Illinois.


NEW Sensational seat cover. Mono, 6545 Santa Monica Blvd., Hollywood, Califini.

AUTOMOTIVE Surplus tool shop! Pullers, wrenches, socket sets, reamers. Other tools. Ship to nearest freight house. Send for catalog. Glenn Supply Co., 7250 Myrtle Avenue, Glenview, III.


CHEVROLET Parts, Scarce parts, body, sheet metal parts. Grassman Chevrolet, Miskin Street, South Bend, Ind.


CHEVROLET Parts, Scarce parts, body, sheet metal parts. Grassman Chevrolet, Miskin Street, South Bend, Ind.


CHEVROLET Parts, Scarce parts, body, sheet metal parts. Grassman Chevrolet, Miskin Street, South Bend, Ind.


CHEVROLET Parts, Scarce parts, body, sheet metal parts. Grassman Chevrolet, Miskin Street, South Bend, Ind. 


CHEVROLET Parts, Scarce parts, body, sheet metal parts. Grassman Chevrolet, Miskin Street, South Bend, Ind.
ELECTRIC Appliance parts catalog and complete repair handbook. Letterhead for wholesale list. Send 50c for catalog. Malakies Box 197, 1512 Prevost, Fort Worth 7, Texas.

LAMPS—How to build lamps from waste pieces of plate glass. Special top for top and bottom lighting, alternately or together. How to wire a lamp. Sine of 150 pages. Send 3c for catalog of all lamp parts, 25c. Goyo, 5402 Clark, Chicago 40.

WIRE—Wire for generators, welders from aircraft generators, streetcar, railway and other electric services, many other electrical bargains. Leavitt Brothers, 2126 N. Michigan Ave., Chicago 40.


ELECTRIC Motors, free bargain list. Penge, 9 Stuyvesant Oval, New York 9, N.


WELDING, SOLDERING, PLATING


ACETYLENE Welding outfits, new $45.00, used $25.00. arcwelders $46.00. Esig Welding, Austin Field, FM 563 Broadway, Chicago 40, Ill.

NEW—Electrolytic tank chrome plating units, small and large sizes, $8.00 complete. Manteno Mfg. Co., Box 247, Manteno, Ill.

ARCA Welder—New—arca welder without reimbonding armature. Plans $1.00 each. 20 to 600 amperes from automotive 6-c. motors, 200 to 2,000 amperes from large motors, etc. for railroads, builders, etc. Welders Club, AB-2432, Chicago 26, Ill. Send 30c for a.C. welder plans $1.00 each.

110V. PORTABLE Transformer, welder, $25.00. Morro, 1859 A State, Schenectady, N. Y.


RECTIFIERS 0.4 V. D.C. $9.50. 0.4 V.D.C. $12.50. 0.6-12 V.D.C. $18.50. All 0-100 ampere current. Black and Decker Mfg. Co., 2634 Market St., Philadelphia, Pa.

RADIATING Books, supplies, equipment, tubing, stones, Write, Curtman Co., Marysville, Ohio.


ELECTROPLATING Salts and rectifiers. Mirror restorers and chipped glass repair, etc. Instructions, John Sprinkle, V5, Marion, Indiana.

MACHINERY, TOOLS, SUPPLIES

ELECTRIC Sump pumps. (Cellar drawers). Wholesales. Also mercury tubes and close-out bargains. R. E. Co., 227 E. 33 St., New York City 16, N. Y.

LOWEST Prices on a.c.-welders, power movers, parts. Holgerston's Service, Can- ton, Ohio.


BUILD-IT plans. Make your own—three point raking hydraulies, others. Information literature, 2808 Chapman Blvd., P.O. Box 3677, Long Beach 7, California.

BUILD-IT boat from our accurate a- pproved patterns which are for sale. Forty years designing and construction. Description, plans, price $2.00. Technical Publication, book small boat construction $1.50 postpaid. Germain Boat Company, W. Saginaw, Michigan. (Enclose 4c.)


CONVEX and Jeep to 100% marine engines with Oseco's world famous Con- Vokee-Cutis, Deluxe catalogue 25c (free). Oseco Company, 34 Penna.

FREE World's most complete catalog listing 2500 parts of all known marine engines, conversion, boat building, lumber, iron, steel, chain, canvas, Marine Mart, Buffalo 7-N, New York.

REBUILD "Outboard" motors—Later models. Write for price quotations, giving description of motors wanted. Standard and overseas outboard motor parts. Outboard Motor Mart, 3608 Atlanta Avenue, Brooklyn 6, N. Y.


TWENTY Fivefoot boats plans $1.00. Catalog of boating plans 10c. The Rudder, 5 Murray Street, New York 10, N. Y.

SAVE GOOD money in building your own boat with our ready cut parts by the Welsh system. No experience necessary. Rowboats to cruisers. 25% off work. Just Add Water. Midwest Boat Company, Menominee Falls, Wisconsin.

OUTBOARD MOTORS—Used bargains, 15 up, free list. Used parts, most models, save money! Boat and motor equipment and supplies. Write for your copy. Crane-Dillard, 1191 Commonwealth, Boston, Mass.


MARINE Conversions for Ford and Jeep engines. Catalog 10c, Lehamn Manufacturing Company, Department D, Newark 2, New Jersey.

ENGINES, MOTORS, DYNAMOS


BARGAINS. Welding Alternating or direct current, portable or stationary. Advise us your needs. Harrison Company, Box M-338, Troy, Ohio.

WELDING GENERATOR, 150 amperes $47.50. Medium duty, new, great price. See offer below. Molitor, 7225 Madison, Forest Park 3, Illinois.

ELECTRIC MOTORS, 1/2 h.p. $14, Stand- ard catalog. No c.o.d. Columbia P, Silver Creek, N. Y.

WATER MOTORS—All sizes, for any purpose—Rotary and reciprocating—air, steam, for air or steam. Duplex Motors, Harring- ton, Iowa.

BUILD-IT—For the do-it-yourselfer, winders, free testing and winding equipment bulletins. Motor Industries, Quincy, Illinois.

Mtering, listing 228 motors, single and three phase, $1.00. Motor Data Co., Box 8651, Kansas City 3, Mo.

ATHLETIC EQUIPMENT, BODY BUILDING COURSES

MUSCLE Courses $2.09. (Pictures, etc.) Old's System, PM14, Southgate, Calif.


FREE Illustrated catalogue—1 lc for postage and handling appreciated. Dr. B. C. Dunn, Det. 9, 910 Fulton, Manhattan, N. Y. World's leading dealer.


GREAT Strength easily obtained. See page 75, December issue.


BARBELLS, Exercise equipment, body con- for free booklet. Good Barbel Co., Reading, Penna.

SPORTING GUNS, FISHING TACKLE, ARCHERY, TRAPPING

FREE Guidebook— "Top Tips For Fish- ermen." Invaluable advice, tips, tricks, new, free, Richardson 23-page booklet containing 250 fishing tips, compiled by the expert, long time members of the fishing rods— the fishing rods that are tagged with the Fish number. Send name, address, etc. sent without cost or obligation, print your name and address on a penny post card and mail to: "The Fish", 3165 N. Sawyer Ave., Chicago 18, Ill.


SCHMIDER—Make your own sissers with our catalog. Free. Illustrated instructions. Reading Instrument Co., Box 78, Reading, Penna.

GUNS—Bought, sold, swapped. Barlow's, 5555 South Howell Ave., Milwaukee 7, Wisconsin.

MARCH 1950 55

SEND in for list 100 used guns. Franz's, Willmar, Minn.

FELLOWS: Fishin' just around the corner. Catch 'em with this new bait, 5c. Send 5c for your share, Darbly Co., 843 W. 5th Ave. Chico 24, Ill.

GUN Replacement parts, state your gun's model, caliber, size. W. F. Schiller, Lakefield, Minn.

BAG'S Merchandise list lost again. 25c. Bogen Company, Dahlgren, Illinois.

MOLDS For fisherman's sinkers, lug, spool, and No. 4, 100 percent fisher man's sinker, fully guaranteed. Write for free catalogue to C & F. Scott & Son, Dept. T, Van Norden, New York.


PROFESSIONALLY Illustrated pages antique and modern pistol, sword, etc. val. 50c. Robert Abel, A659 Lexington Ave., New York 21, N.Y.

GUNSTOCKS, Rilfe, revolvers, over 500 woods. Also carriages, list 10c. coin, Ed Howe, 52 Main, Coopers Mills, N.Y.

5000 BAGGAGES, Firearms, binoculars, war relics. Catalog 40c. Smith Firearms, Hemstead, New Jersey.

TAXIDERMY

"MODERN Taxidermist Magazine," Greenfield Center, N.Y. Devoted exclusively to taxidermy. Two samples copies 25c.

BINOCULARS, TELESCOPES, MICROSCOPES, MAGNIFIERS

TELESCOPES, 20 Power, extends 10'; precision lenses. Satisfaction guaranteed or money refunded. Scott's, 7712 South Broadway, Dept. PMC 4, 438 Asylum, Hartford 3, C. S.

SAVE 50c On new binoculars! Free catalog. Free book. "How to Select Binoculars" by Dr. Robert C. Scott, Dept. 43-M 3 East Green, Pasadena 1, California.

ASTRONOMICAL Telescopes, binoculars, microscopes. Lists 10c. Rasmussen-Reece, Amster dam, N. Y.

What a bargain! bargains, binoculars, telescopes, sextants, millions of lenses, prisms, reticles, eye pieces, objectives, etc. Request free catalogue and $1.00 for the "How to Shop" CH-10-piece lens kit and big instruction book. Edmund salvaje co., Harrington, N. J.

GIANT Astronomical telescope with 6 ft. of focal length. Precision made, (10,000 area magnification). Clear vision, full power guaranteed. Ready for use. Scott's Science Service, Dept. BT, Riverhead, N. Y.

BINOCULARS, Telescopes, watches, binoculars, trade. Schiever's, Don nellson, Iowa.

REFLECTING Telescopes, 60X, complete. Satisfaction guaranteed. Guarante e ob server clearness. Free Information. Skyscope, 475 Fifth Avenue, New York 17, N. Y.

TELESCOPES, Binoculars, microscopes. bait casting rods, etc. Aslow Co., Company, 24 West 45th Street, New York.

POWERFUL Astronomical telescopes eclipse glasses and binoculars: $100.00, 10x00, X00, 20X00, 40X00, 60X00, $50.00. Full power, full glass, full magnification. Aslow Co., Dept. 10c, Suffolk Science Service, Riverhead, N. Y.

PETS—DOGS, BIRDS, RABBITS, HAMSTERS, ETC.

RABBITS Fitch and housing. New, revolutionizing equipment, automatic, economical enabling two persons care for 1000 does. Plans, photographs $5.00 postpaid. Reliable Industries, Montebello, Calif.

ALKAL—The great American frontier, offers unlimited opportunities. $1.09 brings 100 or more items. Retail trade or home study. Full list of materials. $1.00, catalog. Business directory listing big con-
struction projects: Fishing; mining, aviation; hunting—fishing—game rules, fur-
raising, lumber; agriculture; live stock raising; homesteading. Highway information. Hot list of firms bit-
ing. Aldous Huxley, 1560 F. P.O. Box 685, Calif.

INTERESTED IN Latin American and Canadian foreign trade? Get free copyrighted "Foreign Service Directory" with new complete listings in U. S. and Canada. Over 15,000 entries. World-
wide oil firms, mining, aviation, steam-
ship, railroads, engineering manufacturers, im-
porters and exporters: domestic and for-

AUGUST

2400 MONTHLY Publishing Angora rabbits. No experience required. Details free. Vote's Rabbitry, Norwich, Ohio.

446 PRODUCTION—IP—jigsaw necessary. Write, Woodcrafts, P. 38, Bridge-
water, Mass.


600-00 WEEKLY Growing mush-
rooms, fresh foods. Dominion patent patented. T. W. Jackson, 1395 Yonge, Toronto, Canada.

BOOKS, PERIODICALS, PICTURES, POSTCARDS

ENTERTAINMENT: Package 3 wonderful books: Puzzle Paradise, Self-Entertain-
ment, Coronet Quiz Book. $1.50 value, all yours. Hurry—Limited offer. Book Readers' Circle, Box M, 80 W. 57th St., New York 19, N. Y.

POSTCARDS—Roberts Kodachrome pro-

PRE-CATALOGUE: Special interesting books. Melvin Powers, 1324 Wilshire, Hol-
lywood, California.

BIG CIRCULARS: 500 comic cards, $1. Harris, Box 560, Palm Springs, Calif.

SELF-EXPLAINING Bible: Illustrated circular free. Box 44-F, Minneapolis, Minn.

BOOKS! Many subjects. Catalogue 3c.


SEARCH Light on Bible and x-ray by credentials. Free. Scientific society, Sidney Moore, P.O. Box 547, Ports-
smouth, Ohio.

MOTOR Trend Magazine—custom, for-

ed, foreign, domestic, sports cars. Road testing, specifications, prices and 

Fuller pail. $3. Motor Trend, 448 S. San 
Vicente, Los Angeles 48, Calif. Dept. DM

HOW TO—do 4 books on every sub-

Written by Messrs. Equipment's largely 
understandable and professionally 
planning and practices, projects, hobbies 
household repairs, motors, cooking, 
photography, hobbies, and many others. Also booklets on specific 

ASK ELLA! All subjects. Send want list. Ella Book Service, 603-P East 172 
Street, New York 57.


NATIONAL Geographic Magazine 1888-
1949. Any issue, $2.75. Periodical Service, 
Pittsburgh, Penna.

TEXAS Books, on Texas and south-
west, carry postpaid. Old Fort Davis, Fort Davis, Texas.

GAMES, TOYS, NOVELTIES

269 ADDRESSES—Toy and novelty dealers $5.00. Kepsey, 75 Bridge St., Salem, Mass.

INDIAN Squaw with papoose or Indian 

doll—14", high only $1.00 cash at 

Orders fill. H. H. Rice and Co., 16 A 

Market St., Philadelphia 5, Penna.

JOKER'S Headquarters! Imitation bed 

bugs, drabiling water glasses, "poo 
"poo" cars, many others. Send 25c 

10 cent postcard. Order now. J. F. 

Clyde and Co., 1312-21 W. 42nd St., New York.

INDIANA Squaw with papoose or Indian 

doll—14", high only $1.00 cash at 

Orders fill. H. H. Rice and Co., 16 A 

Market St., Philadelphia 5, Penna.

SEND 10c for latest Joker toy catalog. 

J. F. Clyde, 1310-21 W. 42nd St., New 

YORK, 10c.

10c for catalog and mail order 

F. Clyde, 1310-21 W. 42nd St., New 

YORK, 10c.

339 TRICKS Catalog and book. 94 Car-

clay, 1310-21 W. 42nd St., New York.

25c Tricks book. 10c to box和社会 

juggling. Simplifying trick catalog. 10c 

clay, 1310-21 W. 42nd St., New York.

25c Tricks book. 10c to box和社会 

juggling. Simplifying trick catalog. 10c 

clay, 1310-21 W. 42nd St., New York.

WILD FORGIVEAGLIA and Mexican 

Finger-Bend Mail, friends these goofy 

gags. Both 50c postpaid. Hal Empe, 

Burlington, Iowa.

599 TRICKS Catalog and book. 75c 

clay, 1310-21 W. 42nd St., New York.

599 TRICKS Catalog and book. 75c 

clay, 1310-21 W. 42nd St., New York.
OLD Money wanted. Pay $100.00 for 1894 dime, $50.00 for 1895 Liberty nickel. Big premiums paid for all rare coins. Send 4c for large list of prices. Numismatic Co., Dept. 20, Fort Worth, Tex.

HALF Dollar 100 years old. Large cent, 19th Century, 1830-1860. All different. Indian head cents $2.00. 20 different dates Indian head cents $1.00. Wat. 7, T. Waterman.

INDIAN Head penny with list, 10c. Charles Banker, Salisbury, Kansas.

ARE you aware of your coins worth? Amazing! Fell out of a box book. Everything on every cent--silver, 10c, 1c, 5c, dime--all kinds; remember that cent! One in a million. Pay postmarked only $1.50 (incl. sales tax) for $1.50 postpaid (refundable) Order now! Plaschke & Bockers, 894 4th Ave., New York 16, N. Y.

BARGAINS! Rare collection contains various dates of 1850-1880--75 c. Flying Eagle cent. White Indian cent, 1864. 2 cents, 1850. Better date of 1860. Large silver half dime. 3c silver, 3c nickel, half dime. Shield nickel. 1913 nickel. Certificate of authenticity. Liberty seated quarter, large $1.00. Civil War cent. Centimes, French, Italian, foreign coin and bill and our complete buying-selling catalogue. All $2.00. Catalogue alone 2c, 25 different dates Indian cents 3c, 1850-1854 D quartz 1c, 1856-1860 D quartz. 1860 D cent 1c, 1861-1862 D cent 1c, 1863-1866 D cent 1c, 1867-1868 D cent 1c, 1869-1871 D cent 1c. Worth Coin Corporation, 294 Washington (1-2100), Boston, Mass.

43 MIXED Indian cents $1.00, 33 different foreign coins $1.00. Chelsea, 40 West 11th St., New York City.


INDIAN, Lincoln cents bough, sold. Send 25c today for bargain list and Indian cent. 10c. Banker, Wells, Fargo Coin Company, Box 6370A, Chicago 80.

UNCIRCULATED Foreign coin banknote and coin catalog illustrated catalog available to approved dealers only. Hardt Coinse, Springfield 36, Mass.

GET Profit and pleasure in collecting old coins! Write for list of old coins. Coin catalog. You'll be delighted with it. Send for it now. B. Max Mehl, 310 Mehl Bldg., Chicago. Coin catalog in establishment in U.S. Established 50 years.

16 PAGE Coin catalog list and Mexican 19 peso bill, all for dime. Coin Shop, 31 N. Main, St. Louis, Mo.

COINS Wanted. Will pay up to $300.00 for certain coins, send $25 for catalogue. Banker, Wells, Fargo Coin Company, Box 6370A, Chicago 80.


STAMP COLLECTING


**PLASTICS**

**PLASTIC; Sheets, cut pieces, and scrap in all colors and grades, for mixing, designs, jewelry findings. Send $1.00 for 4 booklets sample assortment. Regal Plastic Supply, 720 Main, Kansas City, Missouri.**

**ALUMINUM FOIL for thermo-impacter materials. Lutine, polytyrene, celloloid. Half pint $1.00. Craft Chemical Lab, 4531 East 63rd Street, Chicago 37, Ill.**

**INTERNAL Carved roses, orchids, swans, goldfish, butterflies, etc. Jewelry and sign materials.erial Novelty Co., Bebound New, California.**

**INTERNAL Carvers—Guaranteed fast cutting, high speed, tapered drills with sharp cutting edges, from 1/16" to 3/32" wide. 1/4" - $1.00 each postpaid. See Stockton Supply Co., Dept. D, 101 Fifth Ave., New York 3, N. Y.**

**EMBED Real flowers, butterflies, shells, photos, to make unusual coasters, plaques, lilies, cornucopias, objects with new liquid plastic. Crystal clear or color. Several fine kits to choose from. Send picture-packed package showing how to make your own. We supply materials. Book, $5.00. Castile, Dept. C-101, Woodstock, Illinois.**

**EMBED Prime mask 6" x 12" Plexiglas sheets for $1.50, postpaid. Cutting drills 1/16", 1/32" 1/6", 1/32" each postpaid. Free catalog. Craft Plastics, Somerville, New Jersey.**

**AMAZING Liquid plastic kit $3.25. Embellishes any object, makes it beautiful. Sold objects, clear, colors. Beautiful results in half hour. Easily tixed, inexpen-

sive. Send $3.25, Crystal Plastics, Krista1on, Dept. 2-10, Box 26, Winnetka, Ill.**

**PLASTIC Engineer and consultant, 65 East Richmond, Columbus 15, Ohio.**


**PLASTIC, Sheets, rods, tubes, etc. Free literature at your request. J. N. Malm, 2011 N. Grand Blvd., St. Louis 7, Mo.**

**WHOLESALE Plastics supply catalog, 1,000 clean, dry, and ready-to-use, 15 colors. Thick Lucite buttons, polished blanks for carving, metal findings, tools, finished objects. Send 50 cents on plastic casting. Gem-O-Lite, Box 6665, North Hollywood, Calif.**

**CHEMISTRY**

**USEFUL Laboratory, item catalog of chemicals, laboratory apparatus, 12c. Rex Book Service, 2644A Birchwood, Chicago 35, Illinois.**

**NEW, Used catalog 10c, refundable, Atlantic Laboratory Supply, 21 Wenham, Boston 19, Mass.**

**NEW Idea chemical and apparatus outfit. New, double heads, microscope, chemists, biological and laboratory supplies in small quantities. Catal-

yst, 3810 E. 63rd St., Chicago 37, Ill.**

**ILLUSTRATED Catalog: Chemistry, mineralogy, biology, 10c. Trace Laboratories, Evanston, Illinois.**


**SNOEPERSCOPE Tube. Permits night vision. Tube and complete instruc-


**MARCH 1950**
null

INVENTORS: Test the commercial value of your patented inventions quickly and inexpensively. Write for free booklet, "American Inventions," Dept. 40-E, 1825 5th St., N.W., Washington 6, D.C.

MANUFACTURING

MODELS, Tools, dies. Experimental work. Small manufacturing, Dornn Machine Works, 1700 71st Street, North Bergen, N.J.

INVENTORS: Without obligation, write for the "Inventor's Guide" containing information for which you should take a patent on your invention. John N. Randolph, Registered Patent Attorney, Columbus, Ohio.


INVENTORS: The usual first step is to apply for a patent. For S. Patton & Co., San Francisco, we conducted, so I can report on patentability. Write, without obligation, Patrick D. Bevan, Registered Patent Attorney, 333 Columbus Building, Columbus, Ohio.


INVENTIONS WANTED

INVENTIONS, Gadgets, patented, unpatented, wanted. S. Patton & Co., 21 Palm St., Nashua, N.H.

INVENTIONS Wanted. Patented or unpatented. Write, with full description, to S. Patton & Co., 21 Palm St., Nashua, N.H.

INVENTORS, engineers, inventors, manufacturers, new ideas solicited. Invention Consolations, Inc., 110-115 E. 42nd St., New York, N.Y.

RThunder—Bike performs as bike, motorcycle, car, truck, amphibious vehicle. Built by Congress Industries, Inc., Dept. PM, 501, 1947 Broadway, New York, N.Y.

CASH—Royalties we manufacture, internationally distribute. C. W. Burbridge, Nashville, New England House Products Co., Oklahoma City, Okla.

INVENTIONS Promoted. Patented or unpatented. Write, with full description and drawings. W. Adamson, Fisher Company, 61 Enright, St. Louis, Mo.

INVENTORS—What have you, patented, patented pending, to offer manufacturers? Write, with full description, to W. Adamson, Fisher Company, 61 Enright St., St. Louis, Mo.

INVENTIONS, hundreds of inventions, wanted. Write, with full description, to B. R. Taylor, 6403 West Division St., Chicago 21, Illinois.

CHESS, Checker, board games, hands on games, children's toys, novelties. Write, with full description, to J. M. B. Co., 44 North Sandusky Ave., Sandusky, Ohio.

LEATHERCRAFT Supplies, leather, tools and equipment. Write, with full description, to J. P. Knappey Co., Department 3, Benicia, Calif.

INVENTIONS, instruments, machines, tools, implements, new ideas, inventions, novelties, etc. Write, with full description, to W. Adamson, Fisher Company, 61 Enright, St. Louis, Mo.

BANCROFT—Established 1891. Registered Patent Attorney, 1535 18th St., N.W., Washington 6, D.C.

PATENTS FOR SALE

PLAYGROUND Equipment manufacturers! Patents: $2,446.25; Sensational "See Saw," 1927. Pending two inventions. Combination Phillips and regular screwdriver handle has been awarded a patent for leverage and ratcheted action. Combination Phillips, Tambrands, 729 Park Ave., New York 21, N.Y.

PENDING Two inventions. Combination Phillips and regular screwdriver handle has been awarded a patent for leverage and ratcheted action. Combination Phillips, Tambrands, 729 Park Ave., New York 21, N.Y.

PATENT Pend, triple cake and dough cutter. Cuts uniform pieces. Sell to bakers, grocers, precautions, etc. Josephine Heinrich, Climax, Minn.

WORKING Model spinning wheel kit, 12 inches high. Wood patters, complete kit, plans, and instructions $3.50 each. Write, with full description, to Woodcraft, 6409 31st Ave., Kenosha, Wis.


CACTUS Wood, lisp size sample, 60c postpaid. 214 East Yavapai, Tucson, Ariz.

LUMBER For home craftsmen. Cut to order. Write Forest Products Company, Box 341, Eau Claire, Wis.

CEDAR, Tennessee, aromatic, dry, dressed 2 sides, 1/4, 1 3/4 per ft. Direct from mill. Craftsman Mathews, 1007 E. 28th St., Oklahoma City, Okla.

TUBING, 5/8 O.D. x 1/4" wall lamineal pipe. Up to 18" lengths at 50c linear foot. The Tubing Co., Keokuk, Iowa.

WALNUT Lumber—Send your requirements. Dry, rough or dressed. P. Benn, Redwood Lumber Co., 1200 Main St., Redwood City, Calif.

LEATHER Carving. Fascinating, highly paid art; age-old secrets now taught for first time, 12 lectures, study course. For hobby, profession or profitable business. Write: Bair School of Leather Carving, 705 S. 4th Ave., St. Paul, Minn.

MAKE Original jewelry—Earring, pin, other findings shipped promptly. Free literature. Larry Armitage, Dept. M, 152 E. 26th St., New York 10, N.Y.

TURN Your workshop into cash. Send directions for making objets d'art. Descriptions describing hundreds of things to make for your shop, home, plans, 123-E S. Michigan, Chicago 3.


REVOLVING Work bench rack—For screws, bolts, nails, slides, buttons, etc. Makes efficient use of space. Swinging on natural finished wood rack. Heights from 12 to 48 inches. Wholesale $2.50 to $20.00; retail $7.50 to $48.00. Write, with full description, to 16, 29, 52, $5 postpaid. Catalogues, $0.50 each. Midwest Supply, 1113 W. Michigan, Detroit, Mich.

CHESS, Checker, board games, hands on games, children's toys, novelties. Write, with full description, to J. M. B. Co., 44 North Sandusky Ave., Sandusky, Ohio.

CRAFTSMAN CATALOG. Write, with full description, to J. M. B. Co., 44 North Sandusky Ave., Sandusky, Ohio.

CHESS, Checker, board games, hands on games, children's toys, novelties. Write, with full description, to J. M. B. Co., 44 North Sandusky Ave., Sandusky, Ohio.

CHESS, Checker, board games, hands on games, children's toys, novelties. Write, with full description, to J. M. B. Co., 44 North Sandusky Ave., Sandusky, Ohio.

CHESS, Checker, board games, hands on games, children's toys, novelties. Write, with full description, to J. M. B. Co., 44 North Sandusky Ave., Sandusky, Ohio.

BEAUTIFUL, Full-size whirnelt pattern, 900 pieces. J. O. C. Box 41-M. Omaha 7, Nebr.


LEATHERCRAFT—Two 16" steel blades, full size bench, leathercraft catalog. Kate Crafts, 2250 Madison, Chicago 47.


MAKE Gifts from rare and beautiful Oregon myrtlewood, free price list. Myrtle- wood Studio, Grants Pass, Ore.


FREE Catalogue—Call yourself a leathercrafter and learn to design and make your own kit. Write, with full description, to J. M. B. Co., 44 North Sandusky Ave., Sandusky, Ohio.
URANIUM Prospecting equipment. New improved Geiger counters. $44.50 to $125.00, Stopped Scintillators, $3.50. Mingers from $12.50. Complete with accessories and radio-active specimens. F. R. Ingalls, metal detectors for gold and silver, from $125.00. Western Radiation Laboratory, 209 W. 57th St., New York City.

YOUR Own sign. Weatherproof. 3 inch letters, two lines, maximum fifteen letters. Only 60¢. Incl. post, copy. Darby, West Pittston, Pennsylvania.


PERSONAL Stationary, 50 double sheets of paper, 50 envelopes, name and address neatly printed in beautiful plastic relief $1.00 postpaid, money refunded if not satisfied. Crafty Press, Box 149-N, Chicago 90.

DUTS, Pipes, fittings for installing your heating system. Catalog, Metal Products, Antioch, Illinois.


GEIGER Counter plans plus prospecting manual $1.00. Satisfaction or refund. Box 48, Detroit, Michigan.


VERMONT Maple syrup and sugar, 100% pure. 25c a pint. Blue Hill, Maine.

SQUARE Dance instructions, 40 dances, 1.00. Wesley Rader, 1923 Orani, Denver, Colorado.


TATTOOG Outfits, supplies, Illustrated list free. Zeis, 728 Leslie, Rockford, Illinois.


BARGAINS in foam rubber, flat or corded stock. We have special prices on U.S. Military equipment in bulk. Re-upholster seats, furniture and automobiles. AMC Supply, P. O. Box 1440-B, Fort Worth 1, Texas.


SAVE Money on paint brushes Buy direct. Postcard brings descriptions and prices. Kenmore Brushes, P. O. Box 53, Kenmore, New York.


$600 BUILDS Cozy home, 4 room concrete block. Step-by-step instructions and blueprint. $1.00, L. C. Farrow, 433, Box 394, Columbus, Ohio.

CARD Players—5 decks with name or initials $2.00, Edo Card Co., 2850 Tuck- shoos Road, Camden 4, New Jersey.

IMPROVED Hybrid popcorn, 4 lbs. $1.00 post paid. Lee Pet, Riverton, Iowa.

FREE—Amazing new book, "How to Answer Ads. Never have you before seen anything like this. Tells you in simple language the correct way to answer ads. Gets you where you want to go. Send 10c in stamps, money and it is absolutely free. Every reader of this ad says he is going to get a copy for his bookshelf. Send a postcard for your copy now. F. W. Johnson, (Room 600), 200 East Ontario Street, Chicago, 11, Ill.

TRADE Neckties. Mail 6 neckties you are tired of for one of our new patterns from $3.00. Mail order too. 250 29th St., Chicago 9.

SUSPICIOUS man looking superman overnight! Floor everybody! Order Menominee! $1.00, Bijou, Box 727, Hollywood, California.

INSTRUCTIONS for Building Radio Treasure Finder. 1.00, Wyse, 1041 Francisco St., San Francisco, Cal.

PANNING Gold—Beginners booklet 35 pages; catalogue, supplies, mining books, maps, how to go, etc. 25c. Old Prospector, B-505 Dutch Flat, Calif.

IF you want to earn $2000 per month, inventing toys, games, gadgets, write, Hendrickson, Argyle 1-A, Wisconsin.


MISCELLANEOUS

FREE! Monthly gain. Announce your business to 10,000 Fraternity members each month. Write Harrison Books, 7231 North Fifth Ave., Waco, Texas.


SMALL Mailing cartons, shipping labels, postal scales, List. Fountainhead, 1104 South Glascow, Chicago, Illinois.

ALASKA Highway offers thousands of opportunities. Complete information 15c, self-packed words. Postpaid $1.00 cash. Guide, Box 142, North Battleford, Canada.

"TELEGRAPH Mails" 25c keeps name on mailing list three months. Beatty, Jr., Desk-A, Chatauqua, Mass.

NEW—Four color pencils. Premiums four different colors orange, green, blue, black. Finger tip control switches any one of its colors into writing position instantly. Handy and makes writing a pleasure. Order 12c or trial order 5c. Am. Art, Inc., Wausau, Wisconsin.

100 MARKETS for handicrafts, leather, wood, metal, crochet, novelties, etc. Big catalog $1.00 in stamps, cash, 1000 Atwater, Los Angeles, Calif.

MILLION Articles wholesale. Supply sources, wholesale. Price List 25c. Publisher's Box 1320, Detroit, MI.


ELECTRIC Pencil — Engraves all metals. $2.95. Reb Industries, Elmhurst, Illinois.

YOUR Leather jacket renewed by our craftsmen, expertly, reasonably. Free descriptive circular: No. 8, Berlelf Mf' Co., Foresport, N. Y.

MEN: Large size shoes, large size socks, women's shoes, all price, shoes for large size. All types, all sizes, all types. Slightly less, 5c. All for cash. D. F. S. E. C. Dress sport work shoes. Guaranteed 1 year. 20c. Free catalog. King Size, 321, Brockton, Mass.

NAME Plates, 40 Engrem, Rutland, Vermont. Chrome, chrome, plastic, list.

INDIANA TECHNOLOGICAL COLLEGE
530 E. Washington Boulevard
Fort Wayne 2, Indiana
Please send me free information on B.S. Engineering Degrees, offered in these departments:
Aeronautical, Chemical, Civil, Electrical, Mechanical and Radio Engineering (including Television).

Hundreds of young men are earning engineering degrees in this recognized institution each year. Continuous operations.

New terms start quarterly. Many students earn a major part of their college expenses by industrial employment.

Low tuition. Competent instruction. Thorough intensive practical program. Modern laboratory facilities including new and modernized wind tunnel. Individualized instruction emphasized.

Approved for Veterans. Engineering preparatory courses. Special programs for non-college students. Enter for March, June, September or December. Send coupon for free catalog and full information. Enroll now.

Send coupon today.

FREELAND SONS Co. Sturgis, Mich.
BARBELLS
Save Money—Buy the finest barbell equipment direct from the manufacturer. No company can match our low price or value. Send for free catalog. Write Dept. V for details.

BUR BARBEL CO.
Lyndhurst 15, New Jersey

FOR LOCATING URANIUM
and all radioactive ore. OSSCO Geiger counters are used throughout United States, Canada and Alaska. Alaska and California. Use for locating uranium ore on your next trip. Write Dept. I for details and prices.

OMAHA SCIENTIFIC SUPPLY CO.
1001-24th St., OMAHA 10, NEB.
YOU CAN'T LOSE!

HAVE A PROFIT MAKING BUSINESS OF YOUR OWN

NATIONALLY ADVERTISED PRODUCTS
NO EXPERIENCE NECESSARY
FULL OR PART TIME
FREE SAMPLE OUTFITS

A LIFETIME FUTURE

Man or woman—young or old, YOU can earn a steady income in full or spare time as an independent Kendex dealer. Amazing and almost "impossible" earnings can become a reality for you. Herbert Armstrong of Tenn. earned $202 in 9 days. C. O. Watkins of Oregon sent 92 orders in one day. You have the same opportunity to duplicate these exceptional earnings. Over one million dollars will be earned in 1950 by Kendex dealers—why not let us establish you in your own business and get a share of these wonderful earnings?

KENDEX NYLONS REPLACED FREE...

if they run or snag within guarantee period up to three months! Impossible? It's true! No matter what the cause—hard use or deliberate abuse—whether it is fault of the hose or the wearer—Kendex nylons are replaced FREE if they run, snag or become unfit for wear within the guarantee period. How could any woman resist a positive guarantee of satisfaction when she can obtain it without paying any more than other standard advertised brands? Kendex nylons are NOT sold in stores, so you have no competition. Complete line includes everything from heavy 70 dealer service weight to gossamer luxurious ultra sheer 15 denier 60 gauge. Proportioned sizes and lengths. Latest colors plus white.

LINGERIE - ROBES - HOUSECOATS - MEN'S HOSE

In addition to the sensational Kendex nylons, you will have a complete line of glamorous lingerie, beautiful robes and housecoats plus a complete line of Kendercraft mens' hosiery guaranteed for one full year. Any pair or pairs of men's hose that does not give satisfactory wear within one year of purchase will be replaced FREE!

NATIONALLY ADVERTISED

Kendex will spend over $350,000.00 in 1950 to tell millions of readers of the advantages in buying from you, Almost every issue of Good Housekeeping, Saturday Evening Post, McCall's, Women's Home Companion and Ladies' Home Journal carry our advertising in addition to many others. Kendex has advertised in Life, Look, Collier's, etc. Awarded Good Housekeeping Seal. Thousands of orders are shipped daily, from coast to coast.

FREE NYLON STOCKING

EVERYTHING GIVEN FREE

Risk nothing! Mail coupon and we will send you, free and prepaid, complete money-making outfits including sample nylon stocking, samples of lingerie, robes, housecoats and men's hose fabrics and everything you need to immediately start making money. Complete outfits become your property even if you don't send any business. Simply write orders, we deliver and collect. Advance cash plus huge bonus. No money or experience needed. Mail the coupon is all you need to start the road to a 52-weeks-of-the-year high paying business of your own. You have everything to gain and nothing to lose.

KENDEX COMPANY, BABYLON, 546, N.Y.

FIVE MONEY-MAKING LINES

- WOMEN'S NYLON HOSIERY
- GLAMOROUS LINGERIE
- HOUSECOATS—ROBES
- MEN'S HOSIERY

MAIL TODAY

NOTHING TO PAY
NO OBLIGATION

KENDEX COMPANY
BABYLON 546, N.Y.

Send me, free and prepaid, everything I need to make money as a Kendex dealer, including sample stocking, etc. There is nothing for me to pay now or later and I am under no obligation in accepting your money-making outfits.

Name: ________________________
Address: _______________________
City: __________________________
State: _________________________

Date: 1950

MARCH 1950
BE A CLERK all my life?
NOT ME!!

Of course you say you won't. But you may be unless you do something about it. Hoping and wishing won't get you a better job and more money. You must prepare for that step ahead—be ready to make promotion come.

We have helped thousands of ambitious men and women get ahead in the business world—perhaps we can help you.

At least you should investigate. It may be the turning point in your life to a better job and more money. So send the coupon without delay. Check the field of your choice and write to us to send you without obligation the requirements and opportunities in that field—plus "Ten Years' Promotion in One"—a book which has helped many men.

LASALLE Extension University
A Correspondence Institution
417 S. Dearborn St., Dept. 364-R, Chicago 5, Ill.

I want to know whether you can help me get ahead in the field I have checked below. Send free 18-page booklet and full information about your home-study training—plus "Ten Years' Promotion in One."

☐ Higher Accountancy
☐ C.F.A. Coaching
☐ Bookkeeping
☐ Legal Secretarial
☐ Business Management
☐ Salesmanship
☐ Traffic Management
☐ Foremanship
☐ Industrial Management
☐ Stenotype
☐ (Machine Shorthand)

Name: ___________________________ Age: ______
Address: ________________________
City: ___________________________ Zone: __________ State: __________

New Advertising Machine
Prints & Illustrates
1¢ Post Cards FREE
"Learn how thousands of business men, in every line, are boosting sales in spite of conditions—with 1¢ messages—printed and illustrated in a few minutes on govt. post cards. Use with amazing new patented CARDMASTER. Your "today's" ideas, read by your prospects next morning. Not a toy, but a sturdy advertising machine, built to last for years. Low price, sold direct. Guaranteed for five years. Send name today.

SEND NAME: ___________________________

CARDBRASCER COMPANY
1920 SUNNYSIDE, Dept. 133, CHICAGO 40, ILL.

$169 in 1 Week!
P. Zucarro earned it showing amazing new pocket-sized fire extinguisher. You can make good money too.

Zucarro is just one of many men "cleaning up" with amazing new kind of fire extinguisher. "Pretends" to be about the size of a flashlight; yet does job of bulky extinguishers that cost 4 times as much, are 8 times as hot-discharged chemical 1.5 to 6 times more effective. Guaranteed for 20 years. Sells for only $3.98. Earn money as you go. Just tell show to people who have garage, barns, etc. Write for FREE DETAILS. No obligation.

MERLITE INDUSTRIES, Dept. 53, Pittsburgh 22, Pa., New 1, New 3, Pa. (If you want demonstration sample too send $2.50, Money back if you wish.)

LEXIPower
WE THINK IN WORDS. THOUGHT IS POWER.
LexiPower is the new man-made vocabulary that will help you get on. Helps you develop the right vocabulary on the spot. Thought Power makes you see, think, and feel ideas with total clarity.

ITALIAN ACCORDIONS
Hand Made. Very Best. Your Direct Factory Representative at lowest wholesaler prices and save money. Send Name, Address, and Address For FREE catalog

ITALIAN ACCORDION MFG. CO.
7600 Cottage Ave., Dept. PM-3, Chicago 19, Ill.

AMAZING NEW CHEMICAL MAKES
OLD BUMPERS LIKE NEW!

Not a Paint! Not a Polish! Looks like expensive chrome plating! Wonderful new chemical makes parts chrome-like finish on car bumpers, doors, fenders, trim, etc. Protects metals from rust and corrosion. Takes only minutes to use. Send 35¢ for Full Sample. Use on car bumpers and parts for only 35¢. A $1.00 savings if you have a car in need of repair. Send full name and address.

SEND NO MONEY: just send name and address. Pay postman actual mailing cost of 35¢ plus cash in post office. (Mailed postcard shown above.)

AJAX AUSTRALORPS
SENSATIONAL WORLD CHAMPION LAYERS
Mature fast. Excellent turn-over. Massive sales. U.S. approved-Patented-Product. Low farm prices. PROFIT TO YOU FREE, PLAN. Call now.

AJAX Hatchery, Box 914, Quincy, Illinois

NEW HOT ROD CATALOG!!
Get Yours Now! A Complete Catalog of SPEED EQUIPMENT & SPECIAL PARTS by such leading manufacturers as Offenhauser, Edelbrock, Wilwood, Stewart-Warner & many others.

DON'T MISS THIS MONEY SAVER!! — Only 25c
to 1016 West Valley Blvd. ALHAMBRA, CALIF.

BUILD YOUR FUTURE IN
WATCHMAKING and JEWELRY
Avoid dime-a-dozen trades—learn Watchmaking, today's top mechanical profession, at the world's largest and best equipped school of its kind. Work for established jewelers or build your own business—approved course offered in watch, clock, chronograph and jewelry repair and engraving. Enroll any time, day or evening classes. Send now for free 16-page illustrated information packet.

WESTERN PENNSYLVANIA HORELOGICAL INSTITUTE
DESK 40, 706 SMITHFIELD ST., PITTSBURGH 22, PA.
World's Largest Watchmaking School

POPULAR MECHANICS
Learn A Trade NOW!

PRACTICAL SHOP TRAINING!

In Our Chicago Shops

- Auto Mechanics
- Welding—Arc and Gas
- Diesel Mechanics
- Machinist
- Refrigeration
- Piano Tuning
- Body Fender

Above Approved For G.I.'s and Civilians

One of America's Leading Practical Schools

7 Floors of Fully Equipped Shops

Over 48,000 Successful Graduates

Expert Individual Instruction

Learn by Doing—Low Living Expense

Established 1902—Day and Evening Classes

Also the following Home Study Courses

- Plastic
- Refrigeration
- Diesel

Call in Person or Mail This Ad to

GREER SHOP TRAINING
(Desk 10) 460 South State St., Chicago 5, Ill.

Please send without obligation free information regarding trade checked above. (Specify whether you are a Veteran or Civilian)

Name: ____________________________ Age: ________

Address: __________________________

City, State: ________________________

Say You Saw It in Popular Mechanics

Can a Man MY Age Become a HOTEL EXECUTIVE

Even Though He Has No Previous Hotel Experience?

Would you like to step into a well-paid position as Hotel Director or Manager? Purchasing Agent, Social Director or Assistant Manager? Wouldn't you know forward happily to the future? The success of Lewis graduates from 18 to 50 PROVES you can — though you have no experience in hotel work.


"After my release from the Air Force, I enrolled for Lewis Training. Now Assistant Manager of this Club, my position is fascinating as well as lucrative. The people with whom I am associated are of the finest caliber. My salary is more than $400 a month, and I've been in this work less than a year! Thanks to Lewis Training."

Step Into a Well-Paid Hotel Position

FREE Book Gives Fascinating Facts

Our FREE Book, "Your Big Opportunity," explains how you can qualify for a well-paid position at home, in leisure time. Free if you are registered FREE of expense in the Lewis National Placement Service. Most important, it shows how you can be a Lewis Certified Employee—certified to "make good" when placed in a position. Mail the coupon NOW!

Course Approved for Veterans' Training

LEWIS HOTEL TRAINING SCHOOL
Room SC-324, Washington 7, D. C.

Send me the Free Book, "Your Big Opportunity," without obligation. I wish to know how to qualify for a well-paid position at home, in my leisure time.

Name: ____________________________ Age: ________

Address: __________________________

City, State: ________________________

Check here if eligible under G. I. Bill of Rights.

SHOE REPAIR OFFERS BIG INCOME

LEARN IN 12 WEEKS TIME

You can own your own shop or earn big income as skilled shoe repairman. Growing demand everywhere at top wages for men who know how. We teach you quickly by actual practice on shoes and modern machines. School open to all from 18 to 60 years of age. FREE BIG 40 PAGE BOOKS explains everything. Send for your copy today. Chicago & Los Angeles schools only approved for Vets.

MODERN SHOE REBUILDING SCHOOL

Established 1909, Dept. PM. 2937 Belmont Ave., Chicago, 361-12th St, Oakland, Calif., 300 So. Figueroa St., Los Angeles 14, Calif.

FREE Book How To Select Binoculars

BUSNELL

Dept.-M3, 43 E. Green, Pasadena 1, Calif.

How Many Men Will Wear this SAMPLE SUIT

and Makeover to $15.00 in a Day?

Amazing plan! Wear sample suit and take orders for handsome made-to-measure tailoring from friends, from family, from friends. Just take a few minutes—wear a big cash profit and get your own suit without extra cost. Send for money-back guarantee. Write, with your name, address, city, state, J. C. FIELD & SON, INC., Dept. C-1716 Harrison & Throop Sts., Chicago 7, Ill.

MARKET MONEY

Become an Artist!

CASH IN ON BIG ART MARKET!

LEARN Cartooning, Commercial Art, Lettering, Showcard Writing, Photoshop etc. QUICKLY with our NEW, EASY METHODS.

Interesting Catalog FREE

NATIONAL ARTISTS BUREAU
Dept. A, Box 4248, Dallas 1, Texas

Autowasher

Your car sparkling clean—in a jiffy! Simply slide into car, PEESFOR Dust, grease, dirt, and grime disappear in a jiffy. Leaves finish clear, laustrous. Auto's gleam like a mirror.

See your Agents

For sample offer of importance to all those good people of once. Demand special card. No obligation. KRISTEE CO., 695 Bart St., Atrose, Ohi0.
STOPS THIEVES
AMAZING WAY
FOR CARS
HOMES
FARM BUILDINGS
A South Dakota manufacturer has discovered an easy way to protect cars, homes, farm buildings from Burglar, sneak and chicken thieves. The manufacturer is so confident on this revolutionary DEVIL DOG BURGLAR Alarm that he is willing to let you try it for ten days and will offer you $1.00 if testing it. New sales plan promises him a large demand for his alarm and this device will create ahipped product from factory to ten year guarantee. Rush name and address to
NORTHWEST ELECTRIC CO., Dept. 110-C, Pukwana, S. Dak.

NEW, QUICK, EASY WAY TO ENJOY
AMERICA'S FAST-GROWING HOBBY
People Who Never Dreamed They Had Any Talent Are Now Painting Good Pictures—Thanks to This New Guide

How to Oil Painting makes it easy to paint landscapes, trees, still life, sun lights, reflections, water, etc. Amaze your friends with your artistic ability. Create lovely gifts. Decorate your own homes. Thousands of readers of the new book, "Week-End Painter" are doing it already—business men, professional people, office workers, craftsmen, artists, and others. They tell us that even make extra money from their local stores display pictures. Letting local stores display pictures and taking orders for.

No Previous Training Needed
"Week-End Painter" was written by a businessman who took up painting as a hobby a few years ago, Lawrence V. Burton. The author has questioned many famous artists and methods. He has experimented with hundreds of different brushes, paints, brushes, etc. He will be sure to find pictures. His book is packed with all his accumulated wisdom. It's written especially for people "starting from scratch." No previous training of any kind necessary.

Mr. Burton takes you to the art supply store, helps you choose materials and supplies. He includes a complete set of simple painting directions. The first two lessons are carefully finished paintings. He makes the material on materials. He uses an expert guide to help you with your commission. Guides in pictures, drawings and paintings of different subjects. "Capture" sunlight, shadows, work, etc. He will show you how many ingenious short cuts, you'll be the envy of your friends and neighbors.

SEND NO MONEY
Examine Book Free 10 Days
Painting is a wonderful hobby. It develops your artistic ability. It provides a wonderful "escape" from nagging worries and problems. You'll be the envy of your friends and neighbors.

McGRAV-HILL BOOK CO., INC., Dept. PMF-3, 327 West 41st St., New York 18, N. Y.

Please send me for 10 days FREE EXAMINATION:

☐ "Week-End Painter" if not interested, return. We will keep it and send you the entire book. (See what Publishing Co. is worth—pay nothing. Otherwise we will return your payment immediately. We will keep it and send you the entire book. Order now and collect a return within one month later.

Name __________________________
Address ________________________
City ____________________________ Zone No. ______ P.M.F. 3
State ____________________________
Commences: ______, 1950

We'll pay postage if you enclose full payment. "Water-Color Painting Is Fun," $3.05. Order now and collect a return within one month later.

MARCH 1950
EARN MORE MONEY IN ELECTRICITY!

with APPLIED PRACTICAL ELECTRICITY

Coyne's new set helps men get ahead in Electricity. This great new 360-page program offers 3,460 subjets: hundreds of wiring diagrams, tables, formulas, index, history of Electricity. Written and edited by the Coyne School—backed by 50 years experience in electrical training that has put hundreds of electricians on top earnings. APPLIED PRACTICAL ELECTRICITY is the MOST COMPLETE ELECTRICAL SET IN AMERICA.

USE SET FREE FOR 7 DAYS!

You have to SEE these things to know how much they'll help you. See them FREE! Just out now below and mail in for FREE! SEND NO MONEY. Examine the set for 7 days AT OUR RISK.

FREE TRIAL COUPON—MAIL NOW!

150 SHOP PRINTS BOOK FREE—FOR PROMPT ACTION

Act promptly and we will include FREE, our valuable new book—150 Shop Prints and How to lust Them. If you return the book and have one change in 7 days, you own nothing. The cost is just $2.75 in cash or $3.00 after 7 days. Plus $3.00 per month until paid. Send for your FREE 150 Shop Prints Book. It's yours FREE! Coupon below is just a request to see APPLIED ELECTRICITY SET and for FREE Shop Prints Book for doing so. Mail coupon AT ONCE!

FREE TRIAL COUPON—MAIL NOW!

Educational Book Publishing Division
COYNE ELECTRICAL & RADIO SCHOOL
SO. PAUL, Minn. Dept. 36-F

YES! Send Coyne's new free 8 volume set—Applied Practical Electricity—for FREE TRIAL, per your offer. Include, FREE of charge, your 150 Shop Prints Book.

Name:

Age:

Town:

State:

TOO SPECIAL TO MISS

EVERYDAY PROFIT

AT LOWEST COST

ON FREE TRIAL

JUST OUT—FOR THE MAN WHO WORKS FROM BLUEPRINTS

“Audels Answers on Blue Print Reading for Mechanics and Builders” by F. D. GRAHAM

The Blue Print of Today is the Machine of Tomorrow. Audels Answers on Blue Print Reading covers all types of plan reading, including Aircraft & Ship Building—tells you how to easily understand working drawings. What to look for first, tells what each line and symbol means. The relation of one part to another. How to understand scales and specifications. How to make a sketch. How to make blue print a key book. Every mechanic, builder and draughtsman—552 pages—its new, comprehensive, fully illustrated, gives short cuts, helps, hints, suggestions, questions and answers.

ASK TO SEE IT!

To get this assistance for yourself, simply fill in and mail coupon today.

AUDELS, Publishers, 49 West 23rd St., New York

Please mail Audels Blue Print Reading (Price $2); if satisfactory, I will return $2 on its return, otherwise, I will return this book.

Name:

Address:

Occupation:

Company:

You Can't Buy Better Quality at any price. We sell just GOOD TIMES—No fancy promises. Our Tires used on Buses & Trucks for every purpose. One Trial Will Convince You.

WRITTEN GUARANTEE

Sent with every Tire You Buy

TUBE GIVEN WITH EACH TIRE

10% Discount May Be Taken on 1 or more tires if you SEND THIS AD

Be Wise—Read this Reform You Buy

ONE QUAY—ONE PRICE—Why Ink Lead?

TIRE IN CONFIDENCE POPULAR BRANDS

Positively Not Re-Caps or Re-Molds

GOOD ORIGINAL TIREMATES—Needless to pay more—risky to pay less

BUY IN CONFIDENCE POPULAR BRANDS

780-16 MILITARY & FLIP REGULAR 45-62—SUPER 52-15

570-20 MILITARY & FLIP REGULAR 45-62—SUPER 52-15

Thousands of Tires Shipped to Satisfied Customers Throughout United States and Many Distant Points. Send This Ad with Check or Money Order. Dept. 2.

STANDARD 834 N. Broad St., Philadelphia 30, Pa.

LEARN MEAT CUTTING


NATIONAL SCHOOL OF MEAT CUTTING, Dept. 59-C, Toledo 4, Ohio

ANGORAS FOR QUICK MONEY

Angoras cheap and easy raised. Thousands needed for breeders in new industry furnishing wool for textile mills. Free illustrated booklet shows sales opportunities, success stories, etc. Write Today.

WILSONS

STANTON 17. CALIFORNIA

BARBELLS

FINES OUST QUALITY

$9.98 up

FREE CATALOG

Send today for big new color fully illustrated free catalog of BARBELLS, dumbbells and health equipment. Free—world famous $19.00 value. Write today. No obligation. Complete dumbbell training courses with every purchase.

DAN LURIE BARBEL CO.

DEPT. 1590, 1700 HAYWARD PARKWAY

BROOKLYN 12, N. Y.

MONEY BACK IF NOT SATISFIED

E-Z CAR WASHER

Soaps & Washes in One Operation

No Special Soap Required

Easily used—insert teaspoonful of any household soap powder or detergent in built-in soap pouch. 40-inch aluminum handle. Replaceable mop. Washes cars easily without getting your hands wet. Send $3.50 check or money order. We deliver on postpaid.

E-Z CAR WASHER

401 W. 48th St., Dept. PM10, New York 19, N. Y.
FAMOUS BAND LEADER LEARNED MUSIC THIS EASY A-B-C WAY!

You, too, can learn to play by this simple, short-cut method. Read what Lawrence Welk says about it . . .

“I got my start in music with a U. S. School Course. And was I ever surprised when I began my lessons and found out how easy it is to learn to read notes and play an instrument this "teach yourself" way! Everything is so clear and easy to understand. In fact, this school did so much for me that I've enrolled my two daughters . . . one for the Piano Course and one for the Violin. I strongly urge anyone who is interested in learning music quickly and reasonably to take advantage of the U. S. School courses.”

Thousands have learned music by this money-saving, no-teacher method!

LAWRENCE WELK, Popular Orchestra Leader

NEW WAY TO MAKE BIG MONEY!

Costs You Only 5c—You Get $5.00

Now is the time to cash in on this big-paying, easy-to-operate year "round business, and you need no experience! Metallize Baby Shoes in real GOLD, SILVER, BRONZE & PEARL. Everything furnished so you can start earning money at once—up to $1,000.00 per month full time, or $50 to $75 per week part time—at $5 per hour. They will last FOREVER, and there are 15 million eager customers every waiting to buy. FREE DETAILS—send no money—a postcard with your name will bring all the facts. Don't pass up this opportunity to start your own business on a shoestring—ACT NOW. Write to:

KIKTAY COMPANY, Dept. PM-3
2111 W. BANCORNE BLVD., LOS ANGELES 42, CALIFORNIA

MARCH 1950

LEARN REFRIGERATION and AIR CONDITIONING

Train now for an aviation career in sunny southern california

Maximum training in minimum time

Specializing in aeronaautical engineering and mastee aviation mechanics since 1939.

America's finest aero-technical institute 7000 successful graduates. Make more money mail coupon today approved for veterans.

BOARD AND ROOM AVAILABLE.

Without obligation, send free catalogue with full information.

NAME

ADDRESS

CITY

STATE

CAL-AERO TECHNICAL INSTITUTE
GRAND CENTRAL AIR TERMINAL • GLENDALE 1, CALIFORNIA
9 BIG BUILDING BOOKS
12th EDITION FOR EXAMINATION
SEND NO MONEY
Learn to draw plans, estimate, be a live-wire builder, do remodeling, contracting. These 9 practical, profusely illustrated books cover subjects that will help you to get more work and make more money. Masonry, concrete forms, carpentry, steel square, roof framing, construction, plumbing, heating, painting, decorating and many other subjects. More than 4600 pages - 2750 illustrations.

BETTER JOBS -- BETTER PAY
A nationwide building boom is in full swing and trained men are needed. Big opportunities are always for MEN WHO KNOW HOW. These books supply quick, easily understood training and handy, permanent reference information that helps solve building problems. Coupon Brings Nine Big Books for Examination

AMERICAN TECHNICAL SOCIETY. Publishers since 1898
DEPT. 6319 APPROVED AT 34th STREET CHICAGO 37, I1.

You may ship me the Up-to-Date edition of my nine big books, "Building, Estimating and Contracting," without any obligation to buy. I will pay the delivery charges only, and if fully satisfied in ten days, I will return them and pay only $3.50 a month, until the total price of only $34.80 is paid. I am not obligated in any way unless I keep the books.

Name:
Address:
City:
State:

Please attach a letter stating your occupation, employer's name and address, and name and address of at least one business man as a reference. Men in service, also please give home address.

NOW EASY PICTURE MAKING
from your own negatives, in ordinary room light!

You can make permanent, professional looking prints in less than one minute with BRUSH-A-PHOTO. Complete home kit contains special printed paper, developing solution, fixer, wetting agent, frame, cartonnegatives and instructions. At your dealer or send $1.49 to BRUSH-A-PHOTO, Dept. 7,

Paper 12 sheets 5c Metropolitian Life Bldg., Minneapolis, Minn.

TOOTHACHE?
Ask your Druggist for
DENT'S
TOOTH GUM
TOOTH DROPS
POLLUCHE

New ARMY MINE DETECTOR
As/PR-1 is a portable device for detecting metallic and non metallic objects. Various, Buried Cables and Sewer Ties. Price with battery $26.40. Batteries. Battery: Three 45 volt and one 8 volt batteries. User standard batteries. Original Cost $364.00. SHIPPING WEIGHT apx. 80 lbs. F.O.B. New York. To C.O.D.'s. Send Order to:

COLUMBUS TRADING CO., INC.
304 CANAL ST. DEPT. P.M. NEW YORK, N.Y.
LOWEST PRICE EVER
FOUR COLOR MECHANICAL PENCIL

ONLY
$2.98

THIS TYPE OF PENCIL
USUALLY
SELLS FOR
$4.50
$6.98

STUDWELL PRODUCTS COMPANY, Dept. 250
70 East 45th St.
New York 17, N. Y.

WELDING SHOP
TRAINING
G.I. APPROVED—GAS AND ARC
Classes start on Monday each week.  Presentation Plans for
Vets.  Welders needed in practically every industry.  Train
for a field where you have greater nonsense of Steady Work.  Good.
Pay. Write for Free Information.
A & S VOCATIONAL WELDING SCHOOL
812 E. 63rd Street, Dept. PM-3, Chicago, Illinois

BIG MONEY
at HOME Weaving

NO SEWING

EARN at Rate of
$7.50 an Hour

EASY TO MAKE! No Sewing. Everything with your own hands!

EASY TO LEARN! Get your complete Introductory Kit only
$1.00 postpaid, including Air Horns, Free Catalog, 20 or more

True GARNETT INK. It won’t clog, runs smooth.

GUARDIAN AIR HORNS
$39.50 postpaid COMPLETE KIT

MARTHA GREEN HOBBS, Dept. 73, EVANSTON, ILLINOIS

Your Preventive Accident Insurance

Buell Air Horn power reaches out and warns when other horns can’t be heard. One accident avoids pays for horns many times. Easily installed under hood. Kit includes chrome horns 5" dia., x 18" long, Foot Control Valve, air tank, etc. Compressor can be added. Some horns as heard on Greyhounds. See dealer or send $39.50 check, M.O. or C.O.D. while offer lasts.

BUELL MANUFACTURING COMPANY PLANT 7
619 West 49th Place • Chicago 6, Illinois

MARCH 1950
HIGH PAY • SECURITY
When You
LEARN A TRADE
Get ready for a well-paid, lifetime job
or a business of your own in one of
these FIVE ESSENTIAL TRADES.
Complete training under expert in
structors with practical experience
prepares you to step into a good paying
job with a future and security.
ELECTRICITY: Basic electricity, Residential
and Industrial Wiring and Appliance Repair
PLUMBING: Every phase—pipe cutting and
threading to complete installations, blue print
reading.
AUTOMOTIVE & TRACTOR: Engine overhauls,
Transmission, Carburetion, Generator-Ignition
Systems, Tune Up.
DRAFTING: College level training in general
Machine and Architectural
SHOE REPAIRING: Complete practical train-
ing includes reconditioning and rebuilding.
Approved for Veteran's Training.
NATIONAL TRADE SCHOOL
2610 Grand • Kansas City 8, Mo.
Without obligation to me please send full
information on the course checked
Automotive and Tractor Technician ...Drafting
Plumbing ...Electricity ...Shoe Repairing
Name ____________________________ Age ____________________
Address __________________________
City _______ State _______
Veterans ________

Here's How CREI Prepares You for a
Professional Career with Industry-Recognized
Training in a Minimum of Time

TELEVISION
RADIO-ELECTRONICS ENGINEERING
GRADUATES of CREI residence school are preferred
by industry because of their training and ability.
This recognition is the reason that CREI men
quickly find good jobs. With 23 years of practical
training experience in these highly technical fields,
CREI offers an outstanding faculty, modern and
complete laboratories, shops and equipment.
New students are accepted twice monthly and
each may advance as rapidly as he is capable.
The basic course with one specialized course requires an average
of 20 months to complete.
CREI is recognized as one of the country's leading
technical institutes. Its work is of college level. It pre-
pared the young man for a good job in industry in a
minimum of time.
G. I. Approved

CAPITOL RADIO ENGINEERING INSTITUTE
An Accredited Technical Institute Founded in 1927
Mail coupon for Free Catalog
Capital Radio Engineering Institute, Dept. 173B
16th & Park Rd., N.W., Washington 10, D. C.
Please send me your residence school catalog and complete
details, (If interested in Home Study check below.)
Name ____________________________ Age ____________________
Address __________________________
City _______ State _______
Street ____________________________
If I am entitled to training C Send information on Home
under G.I. Bill, Study Courses.

ANALYZE HANDWRITING
NEW, unworned, fascinating field. Gratifying
earnings reported by graduates in Employment,
Credit, Social Service, Police and Entertainment
new. Other have developed profitable private
practice, full or part time, as Personal and
vocational Counselors. Send for 3,000-word TEST
LESSON and PROOF book FREE. Write today!

SAY YOU SAW IT IN POPULAR MECHANICS
TRADE MAGAZINES HELP YOU GET AHEAD
Latest single copies. More than 1,150 different periodicals covering
every trade, business or interest available through our easy-to-get se-
lected service. Write now for full particulars and price-list.
COMMERCIAL ENGRAVING PUB. CO., 344 A. No. Ritter, Indianapolis 18, Ind.

Start REFRIGERATION
Make Top Profits
Service Sealed Units
and Home Freezers
Ambitious refrigerator service men
with experience will find this book
is just what they need to specialize
in servicing Sealed Units and Home Freezers. Beginners will
find it the best means of getting started on pleasant, profit-
able career. Non-technical, Covers theory, practical appli-
cation of refrigeration in all branches. Diagrams in eight colors.
928 pages, 468 illus. Clip this ad. and mail with $5.00 bill or
check today. Money back if not satisfied.
GOODHEART-WILLCOX CO., Dept. 115
1321 S. MICHIGAN AVE., CHICAGO 5
WHOLESALE GUARANTEED EXCEPTIONALLY GOOD USED TIRES DIRECT TO YOU
10% discount on 2 or more tires if you send this ad with order.
TUBE DELIVERED WITH TIRE AT NO EXTRA COST FOR 15" AND 16" PASSENGER TIRES
Safe — Our tires used on school buses and ambulances.

EXCEPTIONALLY GOOD TREAD — NO RECAPS
GUARANTEED FOR 24 MONTHS

<table>
<thead>
<tr>
<th>Size</th>
<th>500-16</th>
<th>500-16</th>
<th>500-16</th>
<th>500-16</th>
<th>500-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>ply</td>
<td>$4.50</td>
<td>$5.00</td>
<td>$5.50</td>
<td>$6.00</td>
<td>$6.50</td>
</tr>
<tr>
<td>Tire</td>
<td>T-60</td>
<td>T-60</td>
<td>T-60</td>
<td>T-60</td>
<td>T-60</td>
</tr>
<tr>
<td>Size</td>
<td>500-16</td>
<td>500-16</td>
<td>500-16</td>
<td>500-16</td>
<td>500-16</td>
</tr>
<tr>
<td>ply</td>
<td>$4.50</td>
<td>$5.00</td>
<td>$5.50</td>
<td>$6.00</td>
<td>$6.50</td>
</tr>
<tr>
<td>Tire</td>
<td>T-60</td>
<td>T-60</td>
<td>T-60</td>
<td>T-60</td>
<td>T-60</td>
</tr>
</tbody>
</table>

ALL GOOD TIRES GUARANTEED FOR 12 MONTHS

<table>
<thead>
<tr>
<th>Size</th>
<th>500-16</th>
<th>500-16</th>
<th>500-16</th>
<th>500-16</th>
<th>500-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>ply</td>
<td>$8.99</td>
<td>$9.50</td>
<td>$10.00</td>
<td>$10.50</td>
<td>$11.00</td>
</tr>
<tr>
<td>Tire</td>
<td>T-100</td>
<td>T-100</td>
<td>T-100</td>
<td>T-100</td>
<td>T-100</td>
</tr>
</tbody>
</table>

GOLD BOND SPECIAL — 750-20 MILITARY TIRES

Will fit 600 x 20 Saloon 20 600 x 20 (6 & 8 ply) 34 1 x (6 & 8 ply)

Send check or money order with this ad.

GOLD BOND TIRE CO., Dept. PM 24
512 NORTH 13TH ST., RICHMOND, VA.
"A gold bond written guarantee with every tire"

T'S easy to turn unused attic space into your own private "office" with new Gold Bond Insulation Board. It comes in big ivory panels and in tiles and random width. Planks finished in ivory and harmonizing variegated blends. No further decoration is needed. Just nail the board in place and the job is done. You will not only have an attractive room, but one that's insulated... warmer in winter, cooler in summer. For further details on new Gold Bond Insulation Board write Div. X, Dept. PM-3a.

Available at your local Gold Bond Lumber and Building Materials Dealer!

NATIONAL GYPSUM COMPANY
BUFFALO 2, N.Y.

SAY YOU SAW IT IN POPULAR MECHANICS

WORK FOR THE GOVERNMENT START AS HIGH AS $3,450.00 YEAR
Veterans Get Special Preference

MEN — WOMEN
Railway Mail Clerks
Postoffice Clerks, Carriers
Liquor Inspectors
Stenographers-Typists
Meat Inspectors
Many Other Jobs

PREPARE IMMEDIATELY FOR NEXT EXAMS
Common Education
Sufficient
Mail Coupon TODAY

Franklin Institute
Dept. 23
ROCHESTER 4, N.Y.
(Not Government Controlled)

Gentlemen: Rush to me, FREE of charge, list of U. S. Government Big Pay Jobs. Send FREE 40-page book describing salaries, vacations, hours, work. Tell me how to qualify for one of these jobs.

Name ____________________________
Address ____________________________

MARCH 1950
CALENDAR WATCH

Tells at a glance date, hour, minute and second!

With Automatic Calendar

Only $12.95

(Regular price $21.25)

In Rolled Gold Case $14.95

Waterproof, Screw Back $15.95

(Regular price $27.50)

- Ruby jewels for all principal bearings -
- Mainspring power for 48 hours running -
- All parts of non-magnetic alloys -
- Waterproof, non-discoloring crystal -
- Patented shock absorber device -
- Luminous hands and numerals -
- New tarnishing, steel back case -
- Handsome, genuine leather strap -

3 YEAR GUARANTEE! 10 DAY RETURN PRIVILEGE!

Mail orders carefully and promptly filled; enclose remittance for CALENDAR WATCH of your choice, or we ship C.O.D. plus postage. SATISFACTION GUARANTEED!

IMPEXTRA

TWIN-USE

POCKET WATCH & ALARM CLOCK

 LOWEST PRICE EVER $9.95

FREE DIRECT & SAVE!

20 DAY RETURN PRIVILEGE, IMPEXTRA, (PM-5), 551 Fifth Ave., N.Y. 17.

AJAX WHITE GIANTS

FAMOUS MEAT-EGG PRODUCERS


AJAX HATCHERY, Box 615, QUINCY, ILLINOIS

WORK SHIRT BARGAIN

Surplus Stock from Mid-West Supply Firm!

What a buy! These sturdy, serviceable work shirts, though used, have been washed, sterilized and put in perfect condition. Each shirt is cut from durable wash materials, choice of blue or tan. Well made with reinforced stitching at strain points. Order today at our risk! No money-back guarantee!

SEND NO MONEY! Just send name, address, neck size and color choice. Pay postman plus postage or send each and we ship prepaid. Inspect 10 days. Return for refund if not delighted!

WORK PANTS TO MATCH $9.95

Send waist measure and leg length

COVERALLS $1.49

Send chest measurement


THE NEW WAY TO ELECTRIFY TREADLE SEWING MACHINES

Terrific! Amazing changes any treadle sewing machine, regardless of age, into a modern electric! A child can do it in 5 minutes! Kit comes complete with Universal motor, foot control, belt, pulley, brackets. Completely wired — just clamp on and plug in!

MAKE BIG MONEY!

Start now! Make $5.20 on every kit you sell. Millions of women can't afford new electric machines are waiting for it! Easy to sell over 10 per day! And Brant's back you with a complete line, from needles to new machines — for BIG profits without any investment! Sell from our catalog and collect commissions in advance! Send for your kit and free literature, today!

BRANT SEWING MACHINE CO.

Department DM-2, Cincinnati 10, Ohio

- Rush motor kit C.O.D. I'll pay $11.75 plus postage.
- I enclose $11.75 — Ship prepaid.
- I want to be an agent! Send complete sales plan.
- My machine is a...
- Hand wheel turns...to forward...
- Address...
- City...
- Zone...
- State...

ROCKET HYDRAULIC BRAKE BOOSTER

NOW... You can have power brakes on your car like the big trucks and buses—stop twice as fast with half the effort— with this amazing new invention.

SAVE... Owners report double the brake lining life after installing a ROCKET BOOSTER.

EASY TO INSTALL... No special tools required — easily installed in about 30 minutes — connects directly to your master cylinder. Each kit contains all necessary line and fittings, with complete instructions.

SPECIAL PRICE TO READERS OF POPULAR MECHANICS...postpaid, including tax...

ORDER TODAY

Car and Year...

Name...

Address...

ROCKET SALES - DEPT. D2
363 W. CLAREMONT ST., PASADENA 3, CALIFORNIA
PLASTICIZE WITH PLASTIC-SHINE

Cleans, glazes and protects in one easy application.

- Luster lasts up to one year
- Showroom finish in 40 minutes
- Won't fingerprint or smear
- Send today for this miracle plastic car polish. Only 98c

LARGE SIZED CAN ONLY

98¢ Money refunded if not completely satisfied.

P. O. BOX 1306
CHICAGO, ILL.
MFG. BY PLASTIC-SHINE LABORATORIES

HIGH POWER TELESCOPE
60 POWER - ALUMINUM TUBES - OPENS TO 33"

Variable Power Eyepieces Adjustable to 15x, 30x and 60x.

$4.50

5 Sections, 4 Ground & Polished Lenses. Also used as 50X Microscope. Ready to use, only $4.50 POSTPAID.

BROWNSCOPE CO.,

NOW! CLEAN—CLEAR WATER
Right from your faucet

SCIENTIFIC TESTS PROVE—
The AQUA-MITE FILTER
REMOVES
RUST, SILT, DIRT, ALGAE,
Chlorine Tastes, Disagreeable Odors
Get sparkling clear, spring fresh tasting water from kitchen or bathroom faucet.
Rid drinking water of obnoxious tastes and odors. The mighty AQUA-MITE, an amazing scientific discovery, actually performs miracles...yet costs so little. Order an AQUA-MITE filter today! Taste the difference...see the difference in your drinking water! AQUA-MITE is precision-built, guaranteed by Del-Mar Services of Chicago, Illinois.

COSTS ONLY

$6.95

LASTS FOR YEARS

AQUA-MITE is duo-action chemical & mechanical, filters hot and cold water. 20 strain-wrap molded screens. Inside casing are rust and corrosion proof. Approved chemicals do not need replacement. No messy cleaning, simple reverse and flush.

ORDER NOW!
ENJOY CLEAN, TASTY, HEALTHFUL WATER
See your local dealer or send check or money order—AQUA-MITE will be mailed prepaid.

RETIF OIL FILTER CORPORATION
1237 No. Highland, Dept. PM3, Los Angeles, Calif.

OIL FILTER ELEMENTS...7c

Here's news! Ordinary toilet paper makes an ideal oil filter. Laboratory tests prove it cleans oil faster and better than popular makes of filter elements. All you need is a simple set of Retif Adapter Plates...and you can start using toilet paper rolls (costing about 7 cents) in your present oil filter. For proof and descriptive literature, send name and address to:

RETIF OIL FILTER CORPORATION
1237 No. Highland, Dept. PM3, Los Angeles, Calif.

5 YEAR WRITTEN GUARANTEE
17 JEWEL WRIST WATCH
2 PUSH BUTTON

ORIGINAL PRICE $59

INCABLOC-PROTECTED WATER REPPELLENT
Sacrificed Because

They’re POST-War Surplus
Luminous dial sweep second hand
Super accurate
Imported Swiss precision movement and case.

$21.95

5 YEAR WRITTEN GUARANTEE

ORIGINALLY $71.50

POST-WAR SURPLUS
Our Price Now Only

$21.95

Plus $2.20

TAX

EASIlY RE-SETTABLE ALARM

ANEROID BAROMETER

MARYLAND DISTRIBUTORS, Dept. 29

501 EAST BALTIMORE STREET
BALTIMORE 2, MD.

TRIAL OFFER! Wear at our risk. Money back in 5 days if not delighted. Send only $3.50 for 16 jewelled watch. Pay balance to postman on arrival plus postage. Or we pay postage if you include full payment plus $3.50. Watch includes 20 year-case, Spring Barometer, and 12 year-warranty. ORDER NOW!

NOW! CLEAN—CLEAR WATER
Right from your faucet

SCIENTIFIC TESTS PROVE—
The AQUA-MITE FILTER
REMOVES
RUST, SILT, DIRT, ALGAE,
Chlorine Tastes, Disagreeable Odors
Get sparkling clear, spring fresh tasting water from kitchen or bathroom faucet.
Rid drinking water of obnoxious tastes and odors. The mighty AQUA-MITE, an amazing scientific discovery, actually performs miracles...yet costs so little. Order an AQUA-MITE filter today! Taste the difference...see the difference in your drinking water! AQUA-MITE is precision-built, guaranteed by Del-Mar Services of Chicago, Illinois.

COSTS ONLY

$6.95

LASTS FOR YEARS

AQUA-MITE is duo-action chemical & mechanical, filters hot and cold water. 20 strain-wrap molded screens. Inside casing are rust and corrosion proof. Approved chemicals do not need replacement. No messy cleaning, simple reverse and flush.

ORDER NOW!
ENJOY CLEAN, TASTY, HEALTHFUL WATER
See your local dealer or send check or money order—AQUA-MITE will be mailed prepaid.

DEL-MAR SERVICES
3937 Milwaukee Ave., Chicago 41, Ill.
Please send...AQUA-MITE filters...
(check...) money order enclosed.

Name
Address
City
State

MARCH 1950
Every Mason Will Want This
MASONIC QUIZ BOOK
OR
"Ask Me Another, Brother"

A real help to every Lodge Officer, Master Mason or Masonic Student for advanced in Masony. Does not disclose any secret work but gives a vast amount of authoritative information on Masonic history, ritual. Includes a fascinating present for Masons to have to do with the Boston Tea Party. What reference is made to the Catholic Church in Masonic teachings? Has everyone President of the United States been a Mason? 284 pages, illustrated, bound in cloth, and a distinct addition to the library of every Mason, even though he is not a Mason.

$300 Postpaid

A Gift that every Mason and prospective Mason will appreciate

THE CHARLES T. POWNER CO., 407 S. DEARBORN ST., PM 3, CHICAGO 4, ILL.

"YOU ARE UNDER ARREST!"

There's a Thrill in Bringing a Crook to Justice Through Scientific CRIME DETECTION

I have taught thousands of men and women this exciting, profitable, professional course. Let me show you how to make $300, in your own home. Prepare yourself in your leisure time to fill a responsible, steady, well-paid position in a very short time and at very small cost. What others have done, you too can do.

53% of All American Identification Bureaus

Employ students or graduates of I.A.S. This fascinating work is easy to learn and the training is inexpensive. You, too, can fit yourself to fill a responsible crime detection job with good pay and steady employment. But don't delay—get the details now. Let me show you how completely I can prepare you for this fascinating work, during spare time, in your own home. You may pay as you learn. Write today for free Crime Book.

FREE! "THE BLUE BOOK OF CRIME"

It's a thriller. Tells about the most interesting crimes ever perpetuated and how they were detected through the very methods taught by I.A.S. Sold now—be sure to state age.

INSTITUTE OF APPLIED SCIENCE
Dept. 1355, 1920 S. Sunnyvale Ave., Chicago 40, Illinois

NEW DIRECTION SIGNAL
Flashes Your Turns Electrically
No more window cranking for arm signals. The new AUTO-TURN DIRECTION SIGNAL fits any car, flashes front and rear lights (60-80) times a minute. No interference with regular lights, no extra weight or current for non recent cars. Smoothly operating, flash light center. Works similar to factory installed models. All parts furnished—install yourself. Satisfaction money back or trade. Lifetime Guarantee and Year. For cars earlier than 1942, write for price.

MONEY BACK GUARANTEE
Box M-2, 1743 North Milwaukee Ave., Chicago 47, Illinois

Appliance Repairing Made Easy!

Here's a new and SIMPLIFIED METHOD of repairing appliances. Can be learned quickly—begin repairing immediately! A COMPLETE APPLIANCE TESTER INCLUDED! Fix any appliance with this tester. Prepare for a GOOD INCOME NOW. Send for the Simplified Course TODAY and get the famous model 40 Appliance Tester—BOTH FOR ONLY 800.00 Postage, 150.00 cash. SATISFACTION GUARANTEED. Fully Circular.

B.T.S.C. 4317-A, SOUTH VERNON AVE., LOS ANGELES 37, CALIF.

WHEELS—WHEELS

5" Disc Wheel 5/8" Tire 5/16" or 3/4" Sleeve.................30c ea.
6" Disc Wheel 3/8" Tire 3/16" or 1/2" Sleeve.................36c ea.
6" Disc Wheel 1/2" Tire 1/16" or 5/32" Sleeve.................57c ea.
6" Disc Wheel 5/8" Tire 5/32" Sleeve.................40c ea.
6" Disc Wheel 3/4" Tire 1/4" Sleeve.................60c ea.
6" Disc Wheel 7/8" or 1" Tire 1/8" or 7/32" Sleeve.................1.50 ea.
6" Disc Wheel 1 1/16" or 1 1/8" Tire 1/16" or 7/32" Sleeve.................1.50 ea.
6" Disc Wheel 1 1/8" or 1 1/4" Tire 1/16" or 7/32" Sleeve.................1.50 ea.
6" Disc Wheel 1 1/4" or 1 1/2" Tire 1/16" or 7/32" Sleeve.................1.50 ea.

Above wheel prices include hub cap.
10" Aluminum Wheel 2 1/2" semi-precision, T. 1/2" S.B.................4.30 ea.
Includes postage, 30% C.O.D. or money order.
UNITED WHEEL STAMPING CO., PM-3
2755 W. 11th Street
CHICAGO 23, ILLINOIS

You can be an All Around HE-MAN

JOWETT INSTITUTE, Dept. PM-03, 220 Fifth Avenue, New York City

Take 3-DIMENSIONAL PICTURES WITH YOUR OWN 35 MM CAMERA

NEW REDUCED PRICE
STEREO-TACH
$17.70

Now only $24.95
ADVERTISING DISPLAYS, INC.
Covington, Ky.

Use Easter Seals

Learn AUTO BODY-FENDER REPAIR

Specialize—Draw Top Pay

Here is a book covering every phase of auto body and fender repair work that will put you right into this profitable business. Cover's use of tools, latest approved procedure, shows how to do a professional job. Also how to operate a shop successfully. Clip this ad and mail with $3.50 today. Money back if not satisfied.

GOODHEART-WILLCOX CO., Dept. 119
1321 S. Michigan Ave., Chicago 5

8OF

POPULAR MECHANICS
Clean and Mothproof Rugs and Upholstery

See our column "ad" in April House & Garden. Can you qualify? If you are dependable, honest and willing to work, send for FREE Booklet explaining how you may become "your own boss" in a growing business of your own. You'll use proven successful methods of established DURACLEAN Dealers. Service rendered "in the home," offices and public buildings. Easy to learn. No experience necessary.

DURACLEAN cleans by absorption! No scrubbing. No soaping or shrinking. Fabrics dry in a few hours. Dirt, grease and many stains vanish as if by magic. Colors revive. Upholstery and floor coverings last longer.

DURAPROOF kills moths and carpet beetles. Makes material resistant to both! Another year 'round service. DURAPROOF, to our knowledge, is the only moth proof service backed by a National Money Back, 4 YEAR WARRANTY. Also rendered on location "In the Home," at your customer's convenience.

These services are Nationally Advertised! Leading furniture and department stores recommend DURACLEAN Dealer's service. Almost every building in your territory has a potential customer. Even auto dealers buy your service to revive upholstery in used cars. You get many voluntary and repeat orders.

Some dealers establish a shop or an office after business has grown. Others continue to operate from their own home. Profit up to $15 and $20 for a day's service on EACH of your service men. Territories are limited! Write now for FREE Booklet explaining details of these Nationally Advertised services.

Duraclean Co., 0-163 Duraclean Bldg., Deerfield, Illinois

LOOK--SPEEDEX AGAIN PAVES THE WAY TO LOWER PRICES IN GARDEN TRACTORS

FOUR-- MODELS 1.9 H. P., 2 H. P., 5 H. P. and our famous 8 H. P. four wheel riding type. Prices start at only $119.50 to $350.00 for the powerful 8 H. P. Rider

ALL-- Speedex Garden Tractors are built with enclosed gears running in oil, powered with popular make engines and equipped with the latest type rubber tires.

JUST-- for the asking we will mail you absolutely FREE a circular illustrating and describing these tractors.

WHY-- not write today. Please use a penney post card.

SPEEDEX GARDEN TRACTOR CO.
BOX 216-D1
Ravenna, Ohio
P-1140-24

ARTISTS MAKE MONEY

Do you like to draw? Send name, address, age and occupation for FREE ART TEST, to find out your ability.

ART INSTRUCTION, Inc.
3130 ART INSTRUCTION BLDG., MINNEAPOLIS 15, MINN.

YOU CAN HELP CRIPPLED CHILDREN--USE EASTER SEALS

BUILD AND RUN A MODEL RAILROAD A HOBBY FOR REAL CRAFTSMEN

JOIN 300,000 MODEL RAILROAD FANS

If you appreciate fine authentic detail in models you'll get hours of fun and satisfaction building a true to scale railroad that operates by electricity. Not toys, but precision made masterpieces that are easy to construct. HO GAUGE keeps cost down and allows big layouts in small spaces. Start with a single car kit or a full train set, but start.

Automatic Gondola Car Kit. $2.95
Switch Engine Kit Complete with electric motor $15.00
Complete Train Kit (save the price of one car)--Switch Engine, Tender, 2 Flat cars, Gondola and Caboose only $27.50
Model Railroad Manual, 66 pages $.50
Send 10c for Railroad booklet and caterers catalog. We pay Postage. Money Back Guarantee. Shipped postpaid on receipt of Money Order. On C.O.D. send $1.00 deposit.

TRAIN DEPT. Mail Order Supply Co.
3511 CONNER ST., N. Y. C. 66, N. Y.

MARCH 1950
Perfect Circle

Honored by Doctors of Motors. America's expert mechanics, who actively express their piston ring preference by installing millions of Perfect Circles every year.

Honored by America's foremost automotive engineers, who recently acclaimed Perfect Circle Piston Rings as best engineered—4 to 1.*

Honored by motor-wise car owners all over America, who in survey after survey have invariably named Perfect Circle their first choice by a wide margin.

Look for this sign (right). It identifies a place where your car will receive expert attention. Your local Doctor of Motors knows your car, knows the value of honest workmanship and reliable parts. He will install a set of Perfect Circle Piston Rings Custom Made for your car to restore power, save gas, stop oil pumping.


*In an independent survey among automotive engineers—maintenance men, fleet operators and designers of new equipment—Perfect Circle was first choice as the best engineered piston ring—first by more than 4 to 1—and received more votes than ALL other brands combined!

Illustrated—WS-85 Oil Ring, one of 62 types of Perfect Circle Piston Rings for Custom Made Sets

HOME OF

The DOCTOR OF MOTORS
Inventor in a Carriage House

By Walter E. Burton

NOW IF YOU will hold out your hand...." the man suggested.

I extended one hand, palm upward, and he spread over it a four-inch square of thin, metallic-looking cloth. After perhaps 10 seconds, he said, "Now tell me what you feel?"

"It's getting warm!"

He nodded. "Your hand feels warmer, but it isn't receiving any heat from the outside or from the cloth. What you feel is the accumulation of heat radiated by your skin, heat that normally would be lost. The cloth keeps it from escaping."

James H. Rand, III, sold a washing-machine invention for $500,000, plus royalties. From his Ohio workshop come also such items as metal fabric, a heart massager for surgeons, and a diaper.
This new kind of cloth, by enabling us to get along with lightweight gold, silver or aluminum-lined clothing in the severest weather, may change our centuries-old ideas of how to keep warm.

The demonstrator was James H. Rand, III, who operates a unique research and invention center in Bratenahl, a suburb of Cleveland, Ohio. I had gone to his workshop, which formerly was a carriage house, mainly to learn how he had developed a washing-machine idea he sold for $500,000 plus royalties. I discovered that this ex-barn is a humming laboratory in which are brewing dozens of ideas for making living easier and cheaper, and even for saving life itself.

Rand, a 36-year-old son of the president of Remington Rand, Inc., is considered one of the country's most energetic inventors. Among other accomplishments, he designed the Remington Rand electric shaver. Since 1936 he has been operating his own research establishment and has surrounded himself with a staff of scientists and mechanical specialists. His chief engineer, W. M. Nichols, has been with him for 15 years.

The inventor has set up the Rand Foundation for Medical Research, which builds special medical equipment—for free. Of all the money Rand's laboratory earns from development work and the sale of patents, 25 percent goes into the medical foundation. Three shop projects out of four pertain to medical problems.

Among Rand's newest inventions is a "robot watchman" that calls the fire department if a house catches on fire when the family is not at home. It is a telephone attachment that is set off by a thermostat when heat reaches 160 degrees. The machine dials the fire department and when a fireman answers a phonograph record starts
and a voice reports the blaze. If the wrong number is accidently dialed by the attachment, the “robot” tells whoever answers of the fire and asks them please to call the fire department. The attachment, nearing production, will sell for between $25 and $50.

Naturally, Rand frequently is approached by inventors who are seeking help in perfecting or marketing their ideas. He tells them that he is not a promoter. Being an inventor himself, he is really one of their competitors.

As an example of Rand’s strikingly original thinking, take a look at his flexible washing machine. He sold the patent rights for $500,000 plus royalties that may bring him several times that amount. Surprisingly simple in operation, the washer has a tub made of a flexible material. Extending upward in the tub center is a plastic agitator which produces an undertow action in the water. After a period of agitation, a suction pump extracts air from the top of the tub through the hollow agitator. Atmospheric pressure pushes the tub wall inward, squeezing the clothes toward the agitator. Lighter-than-water impurities are floated to the top and disappear down the agitator spindle, while sand and other heavy materials pass out through a bottom drain. At the end of the washing cycle, rinsed clothes are subjected to the vacuum and squeezing action until they are damp-dry and ready for the line.

A laboratory flask planted the idea for the novel washer in Rand’s mind. He had observed many times that water can be made to boil in a partly filled flask by pumping air from the space above it. Water alone will boil for a time, but eventually the action stops. But if the water contains a trace of soap, bubbling will continue until the flask has boiled dry.

It occurred to the inventor that this action might be applied to washing clothes. He tried various methods before he hit upon the idea of a flexible tub. Lowering of the atmospheric pressure in the covered tub duplicates the action in the evacuated flask.

The National Association of Washing Machine and Ironer Manufacturers has set up, as a target for all makers of washers, a “standard washing machine” that has an

Rand’s plastic air mattress prevents bed sores. Divided into compartments, it is inflated and deflated to change its shape automatically.
Tracing instrument analyzes the complicated contours of jet-engine rotor blades on an oscilloscope screen.

arbitrary cleaning efficiency of 100 percent. When Rand's squeeze-tub machine was tested against the standard, its efficiency was reported at 188 to 120 percent.

Some day your winter shirt may be a lightweight rayon affair coated with gold, and your overcoat a featherweight topper having a silver or aluminum lining—if Rand's metal-treated fabrics are generally adopted.

Rand explains that the body loses heat in four ways: by convection, conduction, evaporation and radiation. For centuries, people have been trying to regulate this heat loss by controlling, largely with wool and cotton clothing, the first two factors and, to some extent, the third. But almost no effort has been made to regulate the fourth and usually the most important—radiation.

When the temperature is around 70 degrees Fahrenheit, as much as 70 percent of the body heat may be radiated. At lower temperatures, the loss is still higher.

Wool fibers are constructed of smooth-surface, overlapping plates, making wool a

Rand's seatless water faucet will last indefinitely, cleans itself and can be operated with one finger.
fairly good natural reflector of heat. But Rand has shown that there can be better materials for conserving body heat.

By metallizing rayon cloth .008 inch thick, he can make it warmer than unmetallized wool .033 inch thick. The metal, whether gold, aluminum or something else, is in the form of very thin overlapping flakes. Because of its thinness, even gold can be used economically, just as gold leaf is used for decorating book covers.

Rand explains that the fabric won't become uncomfortably hot, for it is porous and permits hot air and moisture to escape through it.

Another Rand invention is a seatless valve that apparently will last untold years. A test water faucet has been turned on and off, twice a second, for months, has worn out one automatic counter and is still going strong after 32,000,000 on-off operations.

Conventional valves, the inventor explains, try to compress rubber, which is essentially an incompressible material. Rubber flows under pressure. If the flow is extensive enough it will undergo permanent set. So Rand designed his simple valve so that the rubber in it is distorted only slightly—enough to make a tight seal but not to cause permanent set. When the valve is open the rubber plunger moves against the pressure, which tends to close it. At each movement the plunger wipes the seat clean. Rand demonstrates the valve's dirt-handling ability by dumping a spoonful of sand into a disassembled model, reassembling it and then cleaning out the sand in two or three open-shut operations. The faucet works so easily that it can be opened and closed with the little finger.

Rand's ideas wander into strange fields. One of his inventions, now on the market, is a baby diaper that eliminates the flood hazard. A waterproof-plastic envelope carries a replaceable pad that absorbs moisture, drawing it away from baby's skin.

(Continued to page 258)
Discarded Nylon Hose Make Artificial Flowers

Discarded nylon hose, some fine copper wire and an artistic talent are all that Mrs. Vivian Keller of Long Beach, Calif., needs to create beautiful artificial flowers. She bleaches the nylon and tints it to the desired shades. The copper wire is formed to the shape of the petal or leaf and the nylon folded over it and fastened with adhesive. Commercial stamens complete the attractive floral displays.

Super Scissors

Giant scissors employing compound leverage will cut metal stock in sheets, rods or bars up to \( \frac{3}{8} \) inch thick. Added leverage for the shears comes from a rack and gear mechanism. Only 60 pounds of pressure are needed to cut stock that requires 145 pounds of pressure with ordinary shears. One of the handles ends in a foot pedal which can be held stationary while both hands are used to apply leverage. The tool is 36 inches long, has 9-inch blades and weighs 27 pounds.

Japanese Cycle Truck

Powered by a liquid-cooled motor, a three-wheel cargo cycle is used in Japan where narrow streets and congested traffic make the small truck excellent for delivery purposes. The cooling system, which uses two radiators, one on each side of the motor, prevents the motor from overheating at the slow speeds necessary in city streets. A combination chain-and-shaft drive transmits the power to the rear wheels.

[Aluminum, one of the most versatile metals, already has more than 4000 applications.]

86
Adjustable Stand Focuses Light for Many Uses

With an adjustable stand and metal reflector the homeowner can direct a concentrated pool of light anywhere from the top of his head to the tip of his toes. An ordinary light bulb, a sun lamp, an infrared lamp or a photoflood bulb can be used with the stand. With the proper bulb, the light stand can be used as a hair drier, reading lamp, nail polish and glue drier and radiant heater. When the stand is to be readjusted, a lever is depressed and the extension rod pushed into the new position. The slight pressure required prevents the stand from collapsing during the change.

One-Shot Capsules Fill Lighters

You can carry lighter fluid in your pocket or suitcase without danger of leakage, thanks to an unbreakable capsule that holds enough fluid to fill a standard cigarette lighter. Imported from England, the gelatin capsules are sealed to prevent evaporation. Pricking the capsule with a pin allows the fluid to be squeezed out. The capsules are also handy for emergency removal of stains from clothing.

Rubber “Bath” Toughens Leather

Soaking leather in a solution of natural rubber increases its durability, according to three National Bureau of Standards scientists who developed the new treating process. Abrasion and water resistance are increased sufficiently to allow even sub-standard leather to be used commercially. Rubber stock for the solution is first cold-milled to make it less viscous and better able to penetrate the leather.
JAPAN ELECTRIFIES THE GAS BUGGY

Detroit auto-builders would gasp with unbelief if they visited the Japanese plant that makes 35 Tama cars each month by hand. The model changes are a cinch.

PAPA SAN has fired his jinrikisha man. Nowadays, when he leaves for the chopstick factory in Tokyo, he buzzes off in a shiny new Tama, Japan’s postwar menace to the pedestrian. It has a top speed of 33 miles per hour, can be operated for a fraction of a cent per mile and passes up all the gas stations. Every time the speedometer begins to show another 200 kilometers (about 125 miles) Papa San merely gets out his long extension cord and looks for the nearest wall plug. The Tama is powered by a battery-driven electric motor, and the batteries can be recharged anywhere.

The Tokyo Electric Automobile Company, which builds the cars, is a source of amazement to visiting Yanks from the near-by Tachikawa Air Force Base. The plant is manned by “monkey wrench” mechanics and has no overhead cranes, no hydraulic presses or no heavy machine tools. Hundreds of hours of handwork go into each car. The wooden frame is held together by screws and is carried by hand to a body shop where sheet-metal panels are cut to size, hammered and rolled into shape, and hand-fitted to it. From this point on,
the body is pushed around on wooden dollies rolling on boards. Each part is installed by the worker who made it. Only the motor and wheels are received from outside sources.

After the car is given a primer coat of paint, it is pushed out in the open air to dry and when the final color is decided on, a worker makes the paint by hand. Upholstery is put in by an outside contractor.

Model changes are a simple matter: with no expensive retooling to worry about, each worker is merely instructed how to cut or hammer his own part into a new shape.

The Tama is manufactured in two five-passenger models. Tama Senior has an over-all length of 165.3 inches and is priced at 900,000 yen, which adds up to a little over $2300. Tama Junior sells for about $1388.

American Jeep is considered a big car in Japan. Here one is posed alongside the electric Tama Senior, the larger of the two Tamas now being manufactured by hand in unique factory near Tachikawa Air Force Base

A sheet-metal panel is rolled by hand into shape in factory where mass production and high-speed assembly lines are unknown. Model changes are made with ease—each worker cuts his part to a different design.
Tough Plastic Disks For Street Markers

Longer-lasting plastic street markers are replacing painted lines in Portland, Ore. The tough 4½-inch disks will last from four to six years, compared with the painted lines that have to be redone about twice yearly. On asphalt they are laid on a hot mastic adhesive and secured by driving a two-inch pin through the center. On concrete the installation is identical, except that a hole is drilled through the marker and into the concrete for the smaller one-inch securing pin.

“Paintbrush” Photo Kit

Even an inexperienced child can make permanent prints with an unusual photographic kit that is used in ordinary room light and requires no trays or mixing of chemicals. The special printing paper is placed in a frame with the negative and exposed to the light from a 100-watt bulb. When developing and stabilizing liquids are applied to the paper with a small brush, the permanent image results.

Elevator on Wheels Loads Bus Luggage

Luggage is loaded aboard the top of buses at an airport in France by a mobile elevator. Mounted on a tiny truck, the elevator is wheeled up to a bus waiting to be loaded and the baggage is placed on the machine’s endless belt. The truck’s engine drives a generator which supplies electric current to rotate the belt. The luggage moves to the top of the bus where an attendant fastens it in place.
Bath Polishes Metals

Metal products are polished to a mirror-like luster simply by dipping them in a chemical bath that does not deposit anything on the metal, but merely shines it. No buffing is required and the shiny surface will serve as a base for plating or, if desired, can be left as the finished surface. Metals that can be chemically polished include brass, copper, nickel, Monel and aluminum. No electricity is used, the polishing baths being simply a mixture of acids. Immersion periods vary from 10 seconds to 10 minutes and are followed by a rinse bath. It is expected that the process, developed by Battelle Institute, will result in savings in the manufacture of metal products.

Photographer's Camera Wagon

When Langston McEachern, Louisiana news photographer, drives off on an assignment, he doesn't worry about leaving any of his equipment behind. His car, a Jeepster, is designed to carry all his photo equipment and, in addition, it serves as a platform from which he shoots over crowds. In place of the rear seat, McEachern installed a cabinet with drawers and compartments for film, maps, cameras, tripods and other accessories. There is even space for extra clothing. The cabinet has a hinged lid, strong enough for him to stand on with a tripod. Lights inside the cabinet and under the dashboard enable McEachern to locate his equipment at night.
Forest Killers Are on the Run

C-47 showers death along a strip of woodland in Pennsylvania in the successful battle against gypsy moth

If, as the scientists say, the insects one day will be in charge, it's fairly certain that the gypsy moth will not be among the bugs running the earth. Nor will the tussock moth, the hemlock looper, spruce budworm or a host of other little monsters that have been chewing through some 500,000,000 board feet of timber each year.

A new offensive on a dozen buggy war fronts, spearheaded by the U.S. Department of Agriculture's "air force," is resulting in the first real wipe-out operations in history. Last spring the anti-insect fleet of about a hundred government and private aircraft, equipped with DDT spray booms under the wings, roared up to shower a mist of death over more than a million acres of infected forest from coast to coast. In Idaho, the DDT fleet routed huge infestations of the tussock moth, whose ugly little larvae were busily chewing the needles off a half-million acres of virgin firs. More than 800 billion tussock-moth caterpillars bit the dust under the 390,000-gallon DDT storm. Not a single moth has been seen in the area since.

In the Northwest, the hemlock looper has taken a 300,000-acre shellacking and...
will get another, bigger jolt this spring. The spruce budworm won't be back to gnaw new shoots off a quarter-million acres of Maine and Oregon spruce forests that were sprinkled last year. The gypsy moth is on its way to complete extermination — the first such annihilation of a forest insect pest ever achieved.

The gypsy is a harmless-looking miller about the size of a quarter. But towering forests of dead gray snags are a grim monument to the destructive prowess of the gypsy.

Today, the gypsy is losing ground under a fantastic DDT bombardment. In 1948, six spray planes zoomed over upper New York on wipe-out operations. Last year Pennsylvania saw the end of huge infestations, and 664 square miles throughout New England were swept clean. But there's a lot of infested forest still left.

Gypsy-moth slaughter begins in spring. The first warm days bring out little green caterpillars with appetites out of all proportion to their one-inch
Scent of females is made stronger in "aging cage." Then their tail segments are clipped and odor extracted

wheel bases. After stripping the trees, caterpillars "pupate" and finally emerge as grown adult moths. Along toward midsummer, lady moths lay their egg clusters on tree trunks—or anything else handy.

Armies of entomologists used to scout the woods each summer to count those clusters, thereby getting advance information on where to spray.

Today, under Jack M. Corliss who heads up the Gypsy and Brown Tail Moths Control Headquarters in Greenfield, Mass., the boys have developed a neat system for making the moths count themselves.

Young lady moths, it seems, are especially endowed with perfume in the last two segments of their tails, which attracts male moths like mad. So, every June, some 75 men from the Greenfield station prowl the New England forests plucking moths from the trees. Last year they got 2,000,000—enough to bait 25,000,000 acres of forest. These are kept in wire-screen trays in the Freetown, Mass., insectary until they hatch. Then males are destroyed. Females go in "aging cages." This aging, explains Corliss, increases the intensity of the attractant. Then the clippers go to work, snipping the tail segments and

Shaped like a bomb, new 25-gallon dispensing tank can be installed on any plane within five minutes. DDT sprays out the propeller blades.
dropping them in a chemical solvent. The liquid solvent, loaded now with "attractant," is dropped on paper wicks in special traps. Some traps consist of tin cylinders with screen baffles on each end. More common is a simple affair made of a sheet of tangle-foot paper, in the center of which is placed an inverted paper cone containing the bait.

Thousands of these contraptions are tacked to tree trunks in suspect areas. Nature does the rest. As little as three milliliters of the attractant draws eager male moths from a quarter of a mile around. Simply by counting the males thus trapped, entomologists get an accurate estimate of the number of moths in that whole area—thus determining the need for spray the following spring.

The toughest problem in gypsy-moth control has been to keep the demon from getting out of the New England area and starting new colonies. The lightweight fuzzy caterpillars, spinning from treetops on their silken strands, have been known to carry 20 miles on a stiff breeze.

Worse, lady gypsy moths aren't fussy about where they lay their eggs. Christmas trees, railroad ties, telephone poles, lumber, furniture, rugs—everything shipped from infested areas must be inspected by eagle-eyed quarantine officials.

The big weapon in the new offensive is, of course, the new insecticides. DDT and other high-powered bug killers are easy to handle, spread easily and cost one fourth as much as the older types to spray. They are spread from planes equipped with spinner-disk sprayers, designed to break up the solution into extremely fine mist over a 110-foot swath. Nowadays, a good pilot like Don Whittam can cover 80 acres of infested forest in three minutes.

It's the most hazardous kind of precision flying a few feet above the trees. In hilly country the pilot must fly on the contour around slopes for most effective placements of spray. There must be no overlap or "misses." Whittam knows how to keep throttled to 80 or 85 miles an hour—and to manage mushy controls at that near-stalling speed while skimming the leaves.

The only monkey wrench in the whole high-powered insecticide air program is people—some just ignorant, others frightened. No sooner was word of the tremendous success against the gypsy and tussock moths rumored about, than Department of Agriculture mailbags were stuffed with squawks from sportsmen, claiming that DDT was killing hordes of fish; bird lovers, who fumed that it killed birds and destroyed their food; nature lovers, who said it upset the balance of nature. A bird watcher in Scranton saw the planes fly over spreading mist and knew what it was. She promptly called the Secretary of Agriculture himself and complained bitterly. The Secretary asked if she had seen any dead birds. "Well, no," replied the bird lover, "but there's a bumblebee in my back yard in terrible shape."

What about the beneficial insects, birds and balance of nature? Down at the Department of Agriculture's big farm in Beltsville, Md., there's an experimental bi-plane with a 60-gallon tank. Every calm morning it roars into the sky to test different spray concentrations and droplet sizes, over carefully controlled areas. Dr. C. H. Hoffmann usually is on hand. It's his job to find out just what the poison will do to insects important as natural control agents and as food for game and wildlife.

Before the battle of DDT started in earnest, Hoffmann marked off a square-mile area of forest and also a trout stream for test work. Fish were netted, counted and put back in the stream. Weirs were set up at the downstream end of the area to catch fish that might die of DDT. A hive of bees was borrowed and placed in the center of the square mile.

Finally, on a mild spring morning, the N3N zoomed aloft, carrying its poison cargo, to be sprayed in murderous concentration—five pounds to the acre.

While the pilot was dumping his mist, Hoffmann and a team of scientists went in under it. "Within 10 minutes bugs fell from trees like rain," he recalls. "Birds quit singing and disappeared."

The men found seven dying birds. In the weirs, by the week's end, were about 1.5 percent of the total native brook-trout population.

It sounds bad, but don't forget it was five times the normal dose. What about the balance of nature in that forest? How long would it take for uncontaminated insect food for birds and fish to build up again, and where would it come from? Hoffmann and his men found out. With a special digging tool, they cut a square foot of soil three inches deep from the forest floor and carefully screened it. In that tiny chunk they discovered more than 10,000 crawling insects of all kinds and sizes.

Ask the bug men about insecticides upsetting the "balance of nature" and you'll get a mighty short answer. "Bugs do more unbalancing than any bug killer," they point out. "When all the trees in a big forest are killed by insects, birds must go elsewhere, food disappears, watersheds are ruined, waters become silted and won't sustain many types of native fish, the recreational value is lost. No insecticide known at the present time does that much damage—even temporarily."

MARCH 1950 95
Saw Cuts Its Own Starting Hole

There's no need to drill a starting hole for internal sawing when you use a lightweight, portable power saw that will start cutting anywhere. The blade quickly drills its way through the material and cuts any intricate shape in wood up to an inch thick, making 3/4-inch turns without binding. It can also be used as a table saw for band or jigsaw work by clamping it in a table that is sold as an accessory.

Nailing Machine Speeds Building

Subfloors and sheathing are nailed securely and speedily by a pneumatic machine that drives the nails at a rate of 40 to 50 nails a minute. Weighing about 32 pounds, the machine has a capacity of 400 to 600 nails. The operator steps on a footrest to steady the machine during use. Operated by air pressure, the tool handles 7, 8 and 10-penny nails, driving them below the surface, if desired.

Private Cable Car

Tired of climbing the 62 steps to his home, James M. Hammil of San Francisco had a personal-type cable car installed to run from street level to the door. Powered by a 3/4-horsepower motor, it makes a 60-foot steep ascent over an 80-foot track. The car automatically stops at each end of the line and will also halt if the cage gate is opened during the run. Over 100 similar cars are being installed in the city.
Masterpieces in Miniature

By Richard F. Dempewolf

ALL RIGHT from a distance, but terribly crude.

If the builder of the intricately rigged model sailing vessel in a steamship line's Chicago show window had heard August Crabtree's comment, he'd probably have had a convulsion. But Crabtree, tall, gaunt and quiet, meant what he said. His criticism was based on his own 15-ship fleet over which he has toiled 12 to 15 hours a day for the past 22 years.

The models, built 1/4 inch to the foot, literally are jewels of microscopic perfection. Sails can be raised or lowered by hauling threadlike lines through blocks smaller than apple seeds. Even the smallest—1/16 inch in diameter—have movable sheaves, so tiny they are made under a microscope. "Drop one on the floor, and it will slip into the nap of the rug and get lost," says

To carve intricate decorations on his seven-inch gondola, Crabtree uses this chisel which has a 1/2000-inch blade.

MARCH 1950
Opposite page, intricate carvings on sterns of three vessels follow the originals exactly. At left is the French galley. Center is the Royal Yacht of Charles II, with its beautifully carved portholes. Smaller model at right is the Dutch Admiralty yacht.

their builder, speaking from experience.

No single detail of construction is faked on any Crabtree ship. Each is built up plank by plank, fixture by fixture. Quarter-inch gun ports open and close on infinitesimal hinges. Belaying pins, ¼ inch long, slip into racks along the carved balusters. Ring bolts no bigger than this “0” are hand-forged to scale. Other fittings, the size of pinheads, must be placed with a magnifying glass. One-inch grille hatch covers—usually punched or carved from a wood block by model builders—are made up of painstakingly scaled “lumber,” notched, fitted and framed, just as they were on the real ships.

Each detail of hull construction conforms to big-ship plans, even to the size of timbers that are pegged or nailed with scale replicas of the pegs or spikes specified by the original shipwrights. The foot-long deck spikes used by old builders show up as ¼-inch brass nails on Crabtree’s models. Some he made himself, others were specially made for him in England. Commercial supplies rarely satisfy him. To get proper texture and scale, he weaves his own line of fine linen thread and forges his own minute chain.

Even the six-inch lifeboats on Crabtree’s

Top, model of the “St. Albans” has 270 carvings, some of which are shown under reading glass. Left, stern lamp of Dutch Admiralty yacht has all the details of the original. Below, left, primitive vessels of the Crabtree fleet are a Stone Age raft and hollow log. Below, unplanked side of British East Indiaman shows rib design. Portions of the deck are unplanked also.
ships are not carved from blocks, but are built up in lap-strake fashion. To remain faithful to scale in these lifeboats, the builder shaved shiplap so fine that the eggshell hulls are often transparent.

"Building them accurately and faithfully," Crabtree explains, "is harder than building a real ship. You work with unusually small bits of wood and very small tools. On a big ship, if you make a mistake on hull construction, you can always go below later and change it. But you can't go below on a model. It must be right the first time."

Though the Crabtree fleet ranges from a beautifully sculptured, inch-high Stone-Age man poling a raft to a six-foot model of the Cunard Line's first sidewheeled steamer launched in 1840, most are models of the ornately carved vessels that rode the seas centuries ago. This often means months of poring through rare books, crumbling shipwrights' plans and charts just to get the proper detail for a single item—like the profile of a figurehead, or the contour of a tiny baluster.

Crabtree never knows where he'll find the necessary data. The best working description for his model of the old Roman grain ship in which St. Paul took his last voyage, came from the Bible. Similarly, his model of William the Conqueror's "Mora," a Viking-type ship of lap-strake construction with shields along the side and a dragon figurehead, was pieced together largely from a picture of it which he discovered quite accidentally on the famous old Bayeaux tapestry in Normandy, France. Tiny covers over the sweep tholes on this model are so thin you can see light through them, but they open and close just as they did on the real ship.

The model with the most far-flung and romantic research background is that of the first seagoing ship known—an Egyptian vessel built about 1500 B.C.

General contours of the ship came from bas-reliefs carved in the Temple of Dier el Bahari and from hieroglyphics discovered by V. O. Lawson, British archeologist, who opened King Tut's tomb. Ancient books and parchments revealed that Egypt had not tall timber, nor did she import any in those days. Hence, Crabtree knew that side planking for the old bark would be short. The King Tut and temple drawings showed him how the short timbers were butted and dovetailed and also showed a long, heavy rope stretched from bow to stern over supports, giving the weakly constructed vessel support to prevent it from "hogging," or breaking in the middle in a heavy sea. This was known as a "hog truss."

Working with Lawson, Crabtree was able to duplicate the old ship in scale. He wove (Continued to page 238)
"Three Speed" X-Ray Unit Gives Varied Treatments

Producing radiation of phenomenal intensity and in a wider range than any of the single X-ray treatment units, the Maxitron 250 makes possible three types of treatment. Capable of delivering X-rays at voltages ranging from 100,000 to 250,000, the unit can be throttled down to produce non-penetrating "soft" rays effective in the treatment of skin diseases. The machine produces rays that penetrate sufficiently to reach lesions of medium depth in the body, and at its full voltage, can be used to treat deep-seated malignancy. The intensity of radiation is a result of a beryllium window located in a special tube and an amount of amperage double that usually used in therapy units. Differing radically in design from therapy machines, the Maxitron employs an end-grounded, multisection tube which allows the anode end of the tube to be brought closer to the part that is being treated. The design of the head makes possible 360-degree rotation and permits the beam to be aimed in any direction. Another new feature of the Maxitron is the use of a special gas instead of oil as insulation in the cylindrical tank containing the tube and transformer.

Plastic Piping Drains Salt Water From Oil Deposits

Weighing less than one pound per foot, a noncorroding plastic piping, made of Tenite, is being used by oil producers to draw off salt water from crude deposits. Being plastic, the pipe is not corroded by the salt water and requires no cement lining as does the steel pipe normally used. In addition, the tubing is flexible enough to follow the contours of the earth, making backfill requirements much less exacting.
A BIG TANKER, with trawler in tow, hove-to in Charleston Harbor recently, while all hands lined the rails to watch a Navy mine planter that seemed to be wallowing and in need of help.

Suddenly, eyes popped as the mine planter spurted forward with incredible speed, spun like a top in a space no greater than its own length and headed for a pier. It didn't coast in to a landing. It roared up parallel with the dock, about 50 feet offshore and, as though by magic, stopped on a dime. Then, like some crazy waterbug, it crabbed sideways into the pier and tied up.

Astounded watchers on board the tanker had reason to gape. They were looking at the results of the greatest advance in marine propellers since invention of the helical screw. The secret of the mine-planter's antics was "cycloidal propulsion," a method of locomotion developed in this country by Prof. F. A. Kirsten of the University of Wisconsin.

First tested on a harbor tugboat some three or four years ago, the Voith-Schneider or "eggbeater" propeller is made up of a disklike blade wheel, flush with the bottom of the ship. Sticking downward from the bottom of the blade wheel are anywhere from four to eight blades, similar to airplane propellers chopped in half. As the blade wheel whirls, the blades rotate, too, so that in ordinary forward movement they knife the water on the forward sweep, and present a paddle surface on the backward sweep. Through hydraulic controls on the bridge the pilot can adjust or even reverse the angle of the blades. The ship will respond by going faster, slower, turning, sidling broadside, backing up or spinning as though hung on a pivot. Since all movement is controlled by the propellers, the ship has no rudder.

Because of advantages in maneuverability, cycloidal propellers are considered ideal for military craft, towboats, mine planters and tugs. The propellers have tremendous drive, giving a speed about 30 percent faster than is possible with the conventional screw.
↑ Simple controls on the bridge permit pilot to spin the ship like a waterbug. Three diagrams below show how angle of blades changes direction of craft. Arrows in groups show thrust of the blades to maneuver ship in direction indicated by single arrows.

↑ Twelve blades knife downward from the two blade wheels on a model of the mine planter. Below, cycloidal propeller also was installed on a towboat. Though this unit has eight blades, number can vary.
Wide-View Mirror Aids Safe Driving

Motorists can see in a 160-degree arc to the rear with a five-section rear-vision mirror that attaches to the upper molding of the windshield. With the mirror, motorists can see both sides of the road as well as directly to the rear, eliminating the need for glancing over the shoulder in traffic. The mirrors are set in a metal frame at various angles to provide the continuous view rearward. The inventor, Charles L. Bennett of Chicago, adapted the 70-square-inch mirror from a wartime model he produced for aircraft.

"Juke Box" Caller Announces Trains

Once the chore of a leather-lunged man in uniform who sometimes sounded as though his mouth was full of pebbles, train calling is now being done in distinct and well-modulated tones by an adaptation of the modern juke box. Built for the new Texas & Pacific station at Fort Worth, the electronic caller uses a series of professional recordings that gives the calls of all trains arriving and departing from the station. Two automatic selectors, of the type used in restaurant juke boxes, are mounted behind the ticket counter in the waiting room. All a clerk has to do is dial the name of the desired call and the announcement goes out clearly over a public-address system. Professional radio talent was used to make the recordings to assure proper enunciation.

Top, selecting the proper train call is as simple as dialing a tune on a juke box. Right, this changer automatically plays any of 38 recorded announcements.
Acrobatic Bomber

One of the most unusual new warplanes is Britain's twin-jet Canberra, a bomber that does slow rolls, high-speed turns and sharp climbs like a fighter. It has a speed range of from less than 100 to more than 500 miles an hour. Classed as a light bomber, carrying a 10,000-pound bomb load, the Canberra has a crew of two, pilot and radar operator. Twelve are being built by the English Electric Company for Royal Air Force service testing. It is Britain's first jet bomber.

Water Vapor From Radiator Increases Gasoline Mileage

By transferring water vapor from the radiator to the carburetor, a vaporizer is said to make automobile-engine operation smoother and more economical. From a thermal dome, soldered to the radiator, a length of aluminum tubing carries the moisture-laden air to the carburetor to act as an antidetonant, producing more even combustion. According to the manufacturer, the vaporizer, which provides the same moist air that makes your car run better on rainy days, increases gas mileage, reduces carbon and gives longer oil life. Antifreeze, either permanent or alcohol-base, does not lessen the effect; in fact, alcohol vapors increase the benefits.

Airline travel throughout the world averaged 70,000 passengers a day during the past year.
If you've cussed 'em on the highway, prepare to take it all back. They're the world's safest drivers, these cowboys who ride

BRONCOS WITH RUBBER

Expert drivers whip around the "rodeo" course, almost perfectly, in 3 minutes.

Top drivers for 1949, left to right: Johnny Castner, double-bottom king; Ben Winterberger, semitrailer, and Steve Moon, straight truck.
TIRES

Champion Johnny Castner shows a former B-29 pilot, Leverett Richards, how to do the two-handed shift

By

Richard F. Dempewolf

Rodeos once were affairs in which bandy-legged cowboys rode kidney-busting broncos and Brahma bulls, rope-tied calves and "yahoed" all over the corral.

Now, like everything else, rodeos have gone 20th century. The steeds are there, all right, but they "augerate" on bologna (rubber tires to you) instead of iron shoes. And instead of snorting, they roar oil or gas-fumed defiance. Instead of the comfortable creak of saddle leather, there's a clashing of gears and a rumble of 20-ton trailers being whipped through narrow alleys, snaked around barrels and backed into docks that are invisible from the driver's seat.

Even the spelling of the game has been changed to conform with progress. It's a "roadeo." The only familiar item in the whole show is dust, which swirls from the spinning dual wheels of the mighty transport trucks more abundantly than it ever did from under the shoes of an ornery bronco.

The National Truck Roadeo is a natural outgrowth of a fast-growing industry. In 20 years, trucking has grown from almost nothing to a point where now some 7,500,000 thundering vehicles carry 80,000,000,000 ton-miles of freight each year across the country's supply lanes. That's more than half of all the freight in the nation. Eight billion
After leaving the serpentine, the truck has to maneuver through this offset alley with only inches to spare. Gallons of gas each year go into the hungry maws of these transports. If all that gas were put in gallon cans, you'd have enough to make five stacks to the moon.

The men who weave these gas or diesel monsters through today's traffic are a tight-knit group of swell guys, not too different from airline pilots. They are primarily interested in engines and horsepower and they're wizards behind a wheel.

It was to show the public the incredible degree of safety, courtesy and driving judgment these men have achieved that the American trucking associations held their first roadeo in 1937. It was such a whopping success that, except for a wartime intermission, it has been held every year since.

The 1949 winners of preliminaries in 34 state roadeos roared around Boston Common in their cumbersome rigs to determine who were the best truck drivers in three classes: truck and full trailer; tractor and semitrailer, and straight truck.

Biggest are the "double bottoms." These 14 to 20-wheel, 36-ton rubber-tire "freight trains," measuring some 80 feet from end to end, consist of a full-size truck with a

This hydraulic control, between cab and trailer body, is said to stop jackknifing. Pressure in cylinders retards whip action on turns and, if desired, disks can be locked in center to make vehicle a rigid unit.
full trailer. They haul freight across the Rockies. Besides the usual collection of multiple gearshift levers and a maze of instruments including tachometer (since diesels are shifted according to engine speed instead of road speed), they carry flares, shovels, sand (for trouble), and a “suicide box” or sleeping compartment behind the driver’s seat. The boys call these rigs “pajama wagons.”

Since most double-bottoms are out West, their roadeo finals were run off in Phoenix last year. Only the familiar tractor-trailer and straight trucks competed in Boston.

Before a driver can qualify for the roadeo, he must not have had a single accident during the previous year—even one that wasn’t his fault. Then he must pass an examination on ICC regulations, first aid, fire fighting and general trucking—industry questions, as well as a personal-appearance test. If he weathers all this, he’s already logged up a possible 100 points against the roadeo maximum of 400.

At Boston Common, where the semi-finals were run off last October, the park was a beehive of motorized activity. Conversation among the snappily uniformed contestants was spattered with truck jargon. Riding a tractor without trailer is a
"bareback" ride. An explosive truck is a "broom wagon," a poultry truck a "cackle crate." You don't have noisy brakes; you have "cop callers." A beat-up jalopy has "friendly fenders" that wave at you. A cab without windows is a "pneumonia sedan," and you never haul an empty truck—you "haul postholes."

Truck drivers must know every inch of their vehicles, check them over thoroughly before each run. So, each rodeo contestant must check a truck he has never seen before—and into which the judges have introduced eight "bugs:" a loose lug nut, a headlight that conks out on high bright, a loose wiper and so on. The driver is graded on the number of defects he finds and his method of inspection. Now he's ready to climb behind the wheel.

First, the rodeo driver backs his rig in and out through the "serpentine"—a row of three barrels, spaced 34 feet apart. If any are left standing, he weaves forward through them.

Now he moves to the "offset alley"—a pair of alleys about 24 inches wider than the truck. They are 10 feet apart. The second alley jogs a full 10 feet to the right of the first, so the driver must "S-turn" his long rig through both without so much as brushing a "wall."

If he's still in the fight, the jockey then does a parallel-parking job between two trucks. Straight trucks get a six-foot clearance. Trailers only get four, since they can jackknife into place. Everybody gets two cracks at it and must wind up no more than six inches from the curb without having touched either parked vehicle. Otherwise, he loses points. He loses points for hitting the curb, too.

Next comes the "alley dock," into which the driver backs, without being able to see where he's going. In spite of this, he's got to wind up with his tailgate within six inches of the loading dock at the end. One reporter at the double-bottom rodeo in Phoenix looked at it and announced: "It's impossible, that's all. Impossible." Nevertheless, Johnny Castner, last year's winner in the double-bottoms, managed the alley dock in 30 seconds—maneuvering his 60-foot rig like a tricycle.

Generally, Johnny and all the other boys manage their backing feats by use of rear-vision mirrors alone. But that's not always enough. One fellow in a previous rodeo, after three bad tries, finally ground his gears down to the "bottom hole," shut the throttle to 1/60, then got out and walked the rig into place, steering with one hand from the ground. This trick was banned in the 1949 rodeo; the drivers now are allowed to be only far enough out the door to put one foot on the running board.
Once out of the dock, the driver “walks the plank”—running his right-hand dual wheels through a double row of rubber balls on tees. He’s got two-inch clearance on each side of his big tires and loses points for every ball he tees off. If he makes it, he swings into the “diminishing alley”—a row of six-foot poles which get closer and closer as the driver approaches the finish line. When he stops between the last two poles, each stick will be exactly one inch from the side of the truck—provided the vehicle has stayed “on course.”

“An extra layer of paint on the truck and we can’t make it,” one contestant observed.

All these shenanigans must be executed at a “cruise” pace—no jiggles, jumps or hesitations. And the man who winds up with the most points and shortest time for the course is the winner.

It pays to win, too. First place in the double-bottoms was copped by Johnny Castner, driver for Pierce Auto Freight Lines in Oregon, who piled up 344 points out of a possible 350. Semitrailer winner was Ben Winterberger of the Dohrn Transfer Co., in St. Louis, with 368 of a possible 400 points. Steve Moon of the Georgia Highway Express took the straight trucks with 385 of a possible 400 points. Besides big trophies, these lads will all get $50 a month for one year from the A.T.A. Second and third-place winners get $30 and $20, respectively.

Roadeo obstacles are not so far removed from the conditions which the average truck driver meets in his daily rounds.

“That alley dock,” says Kermit Kruschka, semitrailer champ from Wisconsin, “doesn’t hold a candle to one of my daily Green Bay stops. Every day I back my 40-foot rig half a block down an alley that is exactly two inches wider than the truck—and it’s not bad until I hit the bend. I’ve got it down to 15 minutes now, with only two pull-ups to straighten out. This roadeo thing—if you don’t make it, you don’t make it. But that Green Bay loading dock . . . ! If I don’t roll the cargo in, I carry it in.”

Tommy Bennane, three-time Michigan straight-truck champ and last year’s national winner, claims that practically all city delivery alleys are offset. “I’ve got one with fire escapes that come so close, if I stuck my head out the window I’d wear it right down to my neck,” he says. Steve Moon, present national straight-truck champ, delivers to an Atlanta radio shop at the end of an alley with a two-inch clearance and an S-curve to boot. He has to pull in his mirrors and sneak back by instinct.

Even so, if you think it’s easy to wham a big rig through its roadeo paces, think again. Out in Portland, Ore., Lev Richards,

File Handle Makes Pressure Easy

Pressure is distributed evenly along a file by a new handle which gives the tool a planer motion. The handle has a tapered groove into which the shank of the file is slipped. It describes an arc above the file, thus exerting pressure along the tool instead of at one end only. Quickly installed or removed, the handle fits all sizes of flat or half-round files from 8 to 16 inches in length. The handle also can be used with carpenters’ rasps.

Pocket Gauge Checks Golf-Ball Size

Golfers can be sure the ball they are using is perfectly round, thus eliminating one cause of bad shots, with a pocket gauge that is accurate to $\frac{1}{1000}$ inch. The gauge is made of aluminum and is precision bored to match Professional Golf Association standards for ball diameter.

(Continued to page 272)
Wire Stone Saw Cuts Granite Wafer Thin

Originally developed to cut granite—in addition to marble, sandstone, limestone and other rocks—a wire stone saw may have an important bearing on a variety of stonework. A basic part of this electro-pneumatic machine is a three-strand steel rope which, when used with an abrasive, cuts the densest of stone much as a big knife would slice cheese. Granite may be cut to such waferlike thinness that it is translucent. It may be cut into blocks, slabs, veneers or other shapes requiring straight, vertical, horizontal, radius or internal cutting. Granite veneers obtained by using this machine lend themselves to attractive and original designs for the exteriors of stores and office buildings, and the interiors of theaters, office buildings, and even homes. The natural beauty of rock can be utilized without the depth and weight of solid blocks. The saw cuts granite at speeds ranging from 12 to 36 inches per hour. This machine, developed by the L. M. Gilbert Company, Philadelphia, is 13 feet 5 inches high, 18 feet wide and 18 feet 11 inches long. The three-strand steel-wire blade rotates in a horizontal plane around two large wheels which are automatically lowered as the cut progresses. The outfit is powered by a 5½-horsepower motor.

Traffic Through Tunnel Controls Ventilation Blowers

What is believed to be the first tunnel to have automatic ventilation control is now being built near Houston, Tex., under the ship channel connecting that port to the Gulf of Mexico. The speed of the blower fans providing fresh air for the new Washburn Tunnel will be governed automatically by the number of cars in the tube and the amount of poisonous carbon monoxide in the air. Photoelectric cells at the entrance and exit of each side of the tunnel will count traffic in both directions. They will transmit their count to a mechanical computer, which will keep a running total of the traffic. Traffic increases will speed up the blowers. At two points in the tunnel an automatic air-analysis machine, connected to the fan governor, keeps a constant carbon-monoxide count. Whichever unit—car counter or air analysis—calls for the most fresh air actually controls the blowers' speed at any particular time.

Transportation costs for all goods and people in the U. S. during 1949 added up to a total of over 38 billion dollars.
Canine Caddy

Capitalizing on the dog's sport of chasing a ball, Dominic Colucci of Chicago converted his Great Dane, King, into a caddy by means of a harness and two-wheel cart. During the wartime caddy shortage, Colucci began using the dog to pull his caddy cart and now he wouldn't think of beginning a round of golf without him. Lost balls are infrequent because King gallops after the ball as soon as it has been hit.

Odorless Paint

Millions of submicroscopic balls of rubber, whipped up in water to form an odorless rubbery film, may be used to coat the interiors and exteriors of houses of the future. It is washable. The new paint, made by the Dow Chemical Company, Midland, Mich., dries by the evaporation of the water component, leaving a thin sheet of rubber which adheres firmly to the wall but allows dirt to be washed off. Ordinary water-base paints now in use do not always wash satisfactorily. Pigments can be added to the new paint, but there are no turpentine, solvents or oils to cause odors.

Cyclist Propels 24-Foot Balloon Through Sky

Leg power alone runs a unique pedalcopter built by Charles Paul, a Lakehurst, N. J., attorney. He sits in a bicycle frame suspended below a 24-foot balloon and pedals a bicycle device to turn the helicopter blades operating the craft.
NIGHTLY, on the circus lot, a stocky 44-year-old Texan eases his 212 pounds into a cardboard carton, puts his head inches away from a stick and a half of dynamite and blows himself up! And all he gets is an occasional headache. How Leopold Simon does it puzzles the thousands who watch the act from behind a wire fence a safe distance away.

But it is no puzzle to Suicide Simon. He has worked out his chances of coming out alive down to a science. "My head," he says, "is only six inches from the dynamite when it goes off. I'm in the center of a vacuum. That's why I'm safe. If I were three feet away, the explosion would kill me."

The box in which he and the dynamite get together is made of wooden slats and corrugated cardboard. It is five feet long, two feet wide and two feet high. Half of the top piece is stapled to the sides of the box, the other half being left unfastened so Simon can get in. A piece of nylon string is used to tie the box down to the platform. The dynamite, together with a

There are many ways of earning a living. Blowing himself up nightly with dynamite is the chosen profession of a Texan called . . . .

Suicide Simon

By Edward Pinkowski

Below, here's how Simon doubles himself up inside the box. When the dynamite goes off, he wears protective clothing, including "Buck Rogers" helmet, above
bag of black powder and two pounds of talcum powder (to make the smoke), lies on a three-inch armor plate in the front end of the box.

When show time arrives, Suicide Simon dons a padded jacket to protect his neck, which has been broken three times, but not by dynamite blasts. Although hard of hearing, he stuffs his ears with cotton and adjusts a "Buck Rogers" contraption over his head. It is nothing more than an Army helmet put over a football helmet and a steel rod bent over the top to hold rubber earpieces with water-faucet handles.

When he crawls into the box, he pulls the lid down over him. Inside, Simon crouches on his hands and knees and bends his head under a ¾-inch
plate. With the plate supported by his shoulders, he reaches for an improvised pencil flashlight that he uses to fire the dynamite. The spectators wait tensely.

Suddenly there is a deafening roar, a towering cloud of smoke and millions of pieces of box flying in the air. Somewhere in the debris is the dynamite demon. Sometimes he hits the screen with the force of a cannonball and bounces back in the center of the stage. Or, he might jackknife above the spot where the dynamite went off.

Some months ago, in Jacksonville, Fla., the plate on which the dynamite rests broke in two, but he didn’t get a scratch. He doubled the thickness next time. Feeling a little cocky after his narrow escape from death, he added a little more dynamite to his act. But when he set it off, he landed on his back and, instead of jumping up to bow to the crowd, he lay still. His wife, Donna, who helps him put on the show, rushed into the cage and found him unconscious. She summoned an ambulance.

A short distance from a hospital, he regained consciousness. “Where am I?” he asked. “You’re going to a hospital,” Donna replied. “Turn around,” he said, “I’m all right.” The following night, Suicide Simon was jarring himself again with 50 percent nitroglycerine lollipops.

The hardest part of the performance, Simon admits, is the timing. He has to exhale the air out of his lungs, place his tongue in the right spot and still keep his mouth open. He moves the plate up and down until he coordinates all his movements and as the plate is moving down he

(Continued to page 276)
Wax From Waste Bark

Douglas-fir bark, at present a waste product that piles up around lumber mills in Oregon, may soon be converted into high-test wax which will make this country independent of foreign supplies. Developed at the Oregon State College, an extraction process produces 54 pounds of wax from the bark of 1000 board feet of logs. At 40 cents a pound for best-quality wax, this would mean the waste bark would be worth $20, enough to make the lumber operators anxious to perfect the process for commercial application. At present, the scientists are working out methods to reduce the cost and complexity of the process. Another by-product of the extraction process is tannin, an important item that is used by the leather-tanning industry.

Knapsack Bike

Instead of a bike carrying man, man now can carry a bike if he uses a type invented by Johann Kaiser of Munich, Germany. The purpose, of course, is to make the bike easily portable when you don't want to ride it. With one bolt removed, the frame can be folded up and stored in a zipper bag along with the wheels.
First step in casting the gleaming aluminum statue was to make this "sketch model" in clay. Model then was cast in plaster and served as guide for statue.

Sculptor Williams uses a pantograph to transfer proportions from the "sketch model" to the armature made of wood. Space between clay nubbins is filled to make the finished clay model.

Armature—the base—was also made by using a pantograph to trace dimensions in the air. The wood lath is covered with clay.
MAKE US a cast-aluminum statue in full round relief, colossal proportions, to throw interesting shadows across the entry of the new Parke-Bernet galleries. We need it in nine months.”

That was the substance of the order Sculptor Wheeler Williams got from the New York City Investing Company a year ago. Not much to it. “Like asking for an atom-powered jet plane to be delivered day before yesterday,” says Williams, who is among the nation’s top 10 sculptors.

Today the statue, “Venus and Manhattan,” gleams like old silver over the entrance to the new gallery—a monument to the incredible achievement of Williams.

Many people think of sculptors as dreamy folk. “Nothing,” Williams points out, “could be further from the truth. Every sculptor worth his salt has to be a first-rate carpenter, carver, solid geometrist, anatomist, plasterer, draftsman, rigger, acrobat, businessman with bank connections, metallurgist with complete knowledge of foundry work and salesman. But,” he adds, “all this is useless unless he is an artist as well.”

Any statue starts with a pencil sketch. From this, a “sketch model” is roughed out in Plasteline or Italian clay. Williams’ sketch was one inch to the foot. This is covered with plaster to make a mold. From the mold a plaster cast is made.

Next, working from this sketch model, the sculptor models a bigger clay reproduction. In this case, it was one third the size of the finished statue. This, too, is molded and cast in plaster—only now it’s done in sections just as it will be in the final scale.

All of these sections later are locked together in the finished statue by what sculptors know as “Roman joints”—pyramidlike projections on one piece that fit into identically shaped sockets of the other. Thus the parts become rigidly joined and are bolted on the inside.

Having completed his accurate one-third scale model, Williams went to work on identical sections of the full-size colossal. By now, he had a staff of men in the shop.

Together, they helped build the “armature,” or wooden frame on which the Plasteline would be laid. No big sculpture is ever solid Plasteline or clay. Its own weight would break it apart.

To get the armature just the right size, the men used a three-dimensional pantograph. This is a simple rig, with two pointers coming off a pole which is hinged at the
Figure is divided so sections can be lifted off. Right, original mold is chipped away from plaster mold base on a universal joint. By adjusting the distance between the pointers and the length of the pointers themselves, any object touched by the bottom pointer will be increased to the desired size by the top pointer. In this case, the bottom pointer took “points” on the scale model. The top pointer jabbed the air above. The men knew that anything built out to it would be exactly three times the size of the little statue. In making their armature, they allowed an inch or two for the thickness of the Plasteline.

First, two-by-four framework went down. Then “contour boards” or shelves were set up to give the frame fullness. To these were nailed shinglelike slabs of lathing. In a short time, the thing taking shape

Beautiful statue adorns building entrance. Diagram shows how an arm was cast by the “lost wax” method
Molten wax is poured into the mold, flushed out, and the process repeated until \(\frac{1}{4}\)-inch layer is built up on the wall began to resemble a Frankensteinian robot.

Using the pantograph again, Williams then took accurate "points," which he marked with nubbins of Plasteline. Later, the spaces between the nubbin points were filled in and the statue section was modeled to perfection.

As sections of the big Plasteline model came down, the plaster casters went to work on the big molds and casts. Molds are made by coating the Plasteline statue sections with plaster. When the mold has attained a desired thickness, it is reinforced with a cage of iron pipes held together by ties of burlap dipped in plaster. To divide the mold so it can be removed, the men

(Continued to page 268)

Imperfections are removed by metalworkers and sections bolted together to complete "Venus and Manhattan"
Model of River Helps Build Dam

Hydraulic engineers at the University of Minnesota are conducting experiments in river control that eventually will aid in building one of the world's largest dams. To be constructed halfway around the world from the Minnesota campus, the Ramapadasagar dam and power site will harness the Godavari River in southeastern India. Built of concrete, it will impound a reservoir 100 miles long which will supply irrigation for 2,000,000 acres of land. The dam will be 428 feet high and 1½ miles in length. Engineers have built a model of the river with an adjustable flow. When the water is cut off, the sandy bed shows points of erosion. The information will be used in building concrete dams for the river while the dam is built.

Cartridge Carrier

Large enough to hold a box of .22 cartridges, a carrying case dispenses cartridges one at a time at the touch of a finger. The case is molded of plastic and accommodates .22 short, long, and long-rifle cartridges. With the case clipped to his belt in a convenient position, the rifleman can load his gun with one hand.

About 300,000 passengers flew across the North Atlantic on 11,000 scheduled flights made in 1949.
Carrying a boat beneath his house trailer, Coulta is always ready to go fishing. He just pulls the boat out like a drawer, below left, hooks on a tail wheel, below right, and hauls it away behind his car, above.

"Boathouse on Wheels" Built Beneath Trailer

When Jack Coulta of Conner, Mont., takes his house trailer to the lake or river, he doesn't have to worry about renting a boat because he carries one with him under the trailer floor. The 13-foot boat slides on tracks beneath the trailer body, closing dust-tight like a desk drawer. A forked tail wheel can be snapped into lugs on the bow for easy wheeling to the water's edge or, if the distance is long, the boat is hitched to the car and towed like a trailer. The outboard motor is stored in a locker at the rear of the trailer, which was designed by Coulta and contains a toilet, shower bath, photographic darkroom, air-conditioning unit, refrigeration and sleeping facilities for four persons. A small power plant supplies electricity for the appliances.

Artificial Sapphire Lens for Movie Camera Resists Scratches

Motion-picture camera lenses made of artificial sapphire have been developed at the University of Rochester. The lenses have several advantages over those made of glass. Artificial sapphire, made by crystalizing oxygen and aluminum oxide in a high temperature, is much harder than optical glass. Lenses made of the material can be cleaned by scouring them with sand without injury. The sapphire lens also has a high refractive index and low dispersion, which improves the sharpness of the images produced. As artificial sapphire is relatively inexpensive, the principal handicap to making lenses of the material is its extreme hardness, which makes it more expensive to polish than glass.

Sunflower-seed hulls formerly thrown away by a Canadian vegetable-oil company are being pressed into fuel "logs" three times as dense as wood.
Above, a G.E. scientist studies photographic film spotted by X-rays deflected from their path by the internal structure of a decaborane crystal. The film was in cylinder form during test. Below, Dr. John Kasper holds model of a decaborane crystal.

Three men have just spent two years exploring a region 30 billionths of an inch long, 16 billionths wide and 10 billionths high. The area they “mapped” was a molecule whose structure is unlike any known before.

Chemists have long been baffled by the behavior of compounds made up of the elements boron and hydrogen, which didn’t act as they should under the laws of chemistry. To find out why, Drs. David Harker, C. M. Lucht and John S. Kasper set about mapping the molecule of a boron and hydrogen compound called decaborane. For their exploration, the three General Electric Company crystallographers used the X-ray-diffraction technique.

Two years of data gathering, rechecking and almost constant use of calculating machines were needed to fix the relative location of each of decaborane’s 10 boron and 14 hydrogen atoms. In revealing decaborane to be a new exception to one of the laws of chemistry, the mapping showed why chemists have been at a loss to explain the molecule’s behavior.

Any given element, depending on its make-up, is supposed to have only a fixed number of links with adjacent atoms. Decaborane’s boron atoms, supposedly capable
of only three links, are bonded to six adjacent atoms. Four of the hydrogen atoms, theoretically limited to single links, have somehow formed two apiece.

The mapping was accomplished by passing an X-ray beam through a needlelike crystal of the substance, which was surrounded by a cylinder of photographic film. When the beam struck planes in which the atoms were arranged, it broke up and scattered at different angles. The deflected X-rays made spots on the film.

From the position of the spots, it was possible to determine the direction of the planes in the crystal. The intensities of the reflected beams, gauged by the darkness of the spots, revealed the positions of the boron and hydrogen atoms.

Based on the results of their experiment, Harker, Kasper and Lucht believe X-ray-diffraction techniques and advances in mathematics will eventually permit exploration of the structures of such materials as hormones and viruses.

Right, white crystals in the bottle are decaborane crystals. Below, "map" of a molecule. The concentric circles indicate areas of different electron densities, the highest of which are the nuclei of atoms.
PUSH-BUTTON ICER FOR TRAINS

Five tons of ice are crushed and delivered into the bunkers of a refrigerator car within 90 seconds by a mobile machine. Operated by the Santa Fe Railway, the crusher rides along railroad tracks on a dock at car-top level. A chain conveyor scoops up forty 300-pound blocks of ice a minute and carries them to crusher rolls which smash them into coarse or fine pieces. The ice then goes into either one of two hoppers and flows down chutes into cars on either side of the huge icing dock.
Bricklaying Jig

Bricks are laid three or four times faster with a portable jig that enables the workman to lay up to 12 bricks at a time. A giant scoop spreads sufficient mortar to bed the 12 bricks and spirit levels on the jig assure accurate placement. With the bricks in place, a second scoopful of mortar and a single troweling complete the operation. The jig is then lifted and placed in an adjacent position for the next operation. According to the manufacturer, a novice can learn to lay bricks quickly with the jig.

Steel Folding Rule—Takes Punishment

Combining the features of a steel tape with those of a wooden folding rule, a tempered-steel zigzag rule is so flexible it can be twisted like a pretzel without damage. It can be wrapped around cylindrical objects to measure circumference, yet it has the rigidity of a standard rule, enabling it to be used as a straightedge for drawing lines. Lighter than the average wooden rule, it does not have to be folded after each use because it is virtually indestructible. You can even step on the steel rule while it is open or closed without damage.

Gear-Driven Tripod

Vertical or horizontal panoramic shots are made as "smooth as oil" with a gear-driven tripod head designed for home-movie fans. There are no lock knobs or keys to tighten or loosen when you need the camera most. You just crank one of the handles for vertical movement, the other for horizontal movement. There is also a clutch to disengage the gear mechanism entirely.
WHAT'S NEW
For Your Home
A four-page “shopping section” dedicated to modern homemakers

COLD DRINKS serve themselves from a dispenser that fits any refrigerator shelf. You just press a push-type faucet and you’ve poured yourself a drink.

CHERRY PITTER removes the stones from a quart of cherries a minute! Crank-driven, the pitter feeds by gravity, discharging pits and cherries separately.

SPACE SAVER for closets holds as many as six garments on one hook. Made of plastic with a metal hook, the hanger comes in two models, one for dresses, the other for slacks.

ALL-PURPOSE LADDER is used as a step-ladder, extension ladder or stairway ladder, as well as two individual ladders, if desired.
FIRE GUARD, top left, is on duty 24 hours a day to warn you of fires. When a fire starts, the guard lets out a shrill whistle that is audible for ¼ mile.

ELECTRIC DISHWASHER, top right, washes and rinses a dinner service for four in 10 minutes. It weighs 25 pounds and takes up little storage space.

SAFETY HOOK, right, protects youngsters from accidents and discourages prowlers. To unlatch the screen or door, you push back a spring-loaded guard.

OPENER DE LUXE, below left, is a whole kitchen workshop in one item. With it, you can open any can, bottle or jar, remove corks and even screw-on lids.

VERTICAL BLINDS, below right, are decorative and practical. Made of translucent fabric, they are colorful, can be washed and put back in 20 minutes.
WHAT'S NEW
For Your Home
Continued from preceding page

WALLPAPER COATING is invisible, but it protects the paper so you can wash off marks with a soapy cloth.

BOTTLE STERILIZER works under pressure and it lets you sterilize the bottles with formula in them.

STEEL FIREPLACE can be installed wherever a flue is available. It can even be suspended from the wall.
**NEEDLE THREADER** works with any size needle. A spring on a wire loop pulls thread through the eye.

**SINK DIVIDER** makes a regular sink into a double-compartment model. A rubber channel strip is held against the sink by suction cups, forming a watertight seal on any sink. An aluminum sheet is the partition.

**TWO-WAY SLICER** has a double blade so you cut the vegetable in both directions, speeding the job.

**MAGNETIC RACK**, below, holds small metal items upright by magnetism. The top has bobby-pin opener.

**SPLATTER STOPPER** fits around the skillet to prevent grease from flying all over the stove and the wall.

**GRIP TRAY**, below, clamps firmly to the arm of a chair, providing a safe place for a cup or a glass.

*March 1950*
Back-Yard Beach

Larry Nelson of Burbank, Calif., converted a war-surplus rubber pontoon into a family-size back-yard swimming pool. Thirty feet long, seven feet wide and three feet deep, the pontoon is the type Army engineers used in building temporary bridges. It can be inflated in 15 minutes with a tank-type vacuum cleaner and quickly deflated by opening valves. Nelson's total cost was less than $70.
Heroic in peace as in war, B-29 crews roam the wide Pacific exploring the turbulent hearts of typhoons

Look a Typhoon in the Eye

By George Scullin

Her name was Beverly, and when she was born she was just another puff of cloud on the northern edge of the doldrums. Millions like her had been born that day, and they lay in the warm sun above the equatorial current like a blanket of cotton balls all the way from Borneo to the coast of the Americas. All day they floated in the hot, moist air, their shadows barely moving on the dead, blue water below, and that night in the coolness they slowly sank and vanished. All except Beverly.

Sometime during that December

Lt. Lykins makes a careful instrument check before take-off on perilous flight into storm

March 1950
afternoon the stagnant air held within the
strange walls of the doldrums had spilled
over, and Beverly was carried north on the
overflow. That night there was no warm
air beneath her in which to sink into ob-
 oblivion. Instead, a refreshing cool stream
from an air mass to the north slid below,
and she found herself being hurried up its
slope. Around her in the darkness were
other vague shapes and, as she rose higher,
they fell in behind her and began joining
their forces to hers. Before dawn, swollen
into a vast, towering mass, she expressed
her resentment of her uncomfortable con-
dition by releasing bolt after bolt of light-
ing into the cold air that had caused it all.

The next day did nothing to improve her
temper. She found herself squeezed into
a narrow valley between two domes of cool
air, and while it was easy to drift down the
valley, every hour carried her farther and
farther away from the quiet doldrums. It
was getting colder. The left side of the
valley was steep and rough; the right side
sloping and smooth, and the obstructions
kept dragging at her left side, holding her
back. As she flowed north at 15 miles an
hour, she encountered a new annoyance.
Down around the equator the pull of the
spinning earth had been constant, almost
as straight as gravity itself, but up around
latitude 15, North, its pull was weaker on
her north side than on the south. Twisted
by the pull of the earth and snagged by the
obstructions on her left, she began to turn
like a chip in a swirling stream. So Beverly
drifted north and east, fuming and splutter-
ing and drawing to her assistance all
the warm, moist air from a hundred miles
around. Occasionally, her rage overflowed
and she would drench the ocean with lakes
of water, or she would lash at an island
with venomous fury, tearing out giant
palm trees like dandelion tufts.
On her third day, grown now to a hundred miles in diameter and still circling sluggishly while awaiting reinforcements, she made a trial test of her strength. While an alarmed skipper saw the bottom fall out of his barometer, she hit his freighter a quartering blow with a 60-knot gust that drove the starboard rail into the water. She hit him again before the ship could right itself, but she had neglected to pile up enough of a sea to smash him down for keeps. The ship lurched out of the danger area, but with no radio left to notify the world of its experience. Beverly lashed on, pounding the seas with such violence that the bottom three miles below shook.

On the island of Guam, a thousand miles to the east, the ultrasensitive seismograph of the U.S. Navy's weather station picked up the vibrations of the ocean bottom. A few minutes later the seismographs at Okinawa and Manila were taking bearings on Beverly's outburst, and within an hour her position had been pegged. She was, the Navy announced, a big storm that had ambitions to become a dangerous typhoon.

The boys at the U.S. Air Force weather station on Guam had not been caught napping. They had noticed an hour earlier an almost imperceptible drop in the barometer. On this island, where the weather is always perfect, a change of any kind can be only for the worse, and a pressure change so light as to be ignored elsewhere is here regarded with deep suspicion. The radio, too, was bringing in the repercussions of Beverly's electronic indigestion.

The next morning there was no need for seismographs or barometers to warn of Beverly's approach. A roller longer than the whole island heaved out of nothing and smashed upon the coral. A long pause, as though the sea were taking a deep breath, and another roller foamed up the beach. After that you could see them, a quarter of a mile from one round crest to another, each roller firmly rounded in front and then gently sloping back in a long smooth fetch to the base of the next. In the west the blue of the sky was cloudless, but the
milky whiteness that usually lay low upon the horizon now extended well up into the heavens, and it was no longer friendly.

The time had come to do some flying.

The big B-29, peregrinating weather laboratory of the 514th Reconnaissance Squadron of the 2143rd Air Weather Wing, is gassed for very long range, and the ground crew again goes over her sun-bleached, rain-scarred skin, looking for ripples in the aluminum fairing and for loose rivets. She is a tough old bird.

In the weather shack of the U. S. Air Force Weather Central at Harmon Field, the weather forecasters and analysts of the Typhoon Warning Network were going over their charts with Lt. David W. Lykins, in command of the flight, his two copilots, his weather observer and his navigator. The charts showed Beverly had tightened up considerably during the night, and although her top was spread like an umbrella over 200 miles of sky, she was winding up around a central core of less than 50 miles in diameter. Wind velocities on the northeast side were pounding at the 100-knot mark, while those in the southwest quadrant were hitting 70 and 80 knots in gusts.

"She seems fairly well behaved," says the chief observer. "Not as bad as lone or Karen or Libby. We'd like to have you hit her at about 10,000 feet and penetrate to the eye."

"Any special instructions?"

The chief hesitates. "Well, yes," he admits. "When you get inside the eye, you might buzz around a bit, then drop down to 1500 feet and break through her wall at that level. We're getting a good picture of typhoons at high level, and we know from ships what they do at sea level. Now we would like a cross section at low level."

Light cruiser is tossed around like a rowboat in heavy typhoon sea. Below, destroyer looks half submerged but is only caught in trough of giant waves

Bedlam in the cockpit is portrayed on opposite page as the B-29 worked its way out of the typhoon eye. The crew said it was like "hitting Niagara Falls"
The three pilots exchange glances. The navigator gulps. The weather observer looks eager. "Yes, sir," he says.

No plane, or at least none ever seen again, had tackled a typhoon at low level before.

At 3 p.m. the B-29 leaves Harmon Field and heads due west. On board, in addition to the men listed above, are a radar operator, a radio man, a flight engineer and two scanners, one for each side of the plane, to watch for damage during those moments of extreme turbulence when not even the loss of an engine would be felt by the pilot. Flight lunches and all gear are carefully stowed. Safety belts and shoulder straps are checked again for the 20th time.

Two hours out the first feathers of a high fan of cirrus clouds reach their tips over the plane, and the weather observer, seated in the nose between and slightly below the pilots, estimates their altitude at 30,000 feet and their length at 100 miles. Lykins is holding the plane at the 700-millibar level, and the radar altimeter by the navigator shows a true altitude of 10,000 feet. Under normal weather conditions the barometric altimeter scaled in millibars drops 34 millibars for each thousand feet of climb from a standard of 1013 millibars at sea level, and a quick comparison of the two altimeters shows that Beverly's presence has caused little drop in barometric pressure.

Ahead the swells on the sea are growing closer together and higher. They are like the spreading ripples of a stone dropped into a millpond, closest together near the scene of the disturbance, but now, even from 10,000 feet, the sea is no millpond.

Whitecaps appear on the swells, and then the whitecaps are blown to a froth that whips away at right angles to the direction in which the waves are moving. The navigator estimates the swells rolling east at 26 knots, the wind swirling north at 50 knots. A high-reaching gust flows beneath the plane and gives it a playful toss the height of a five-story building, and then drops it ten. The radar operator, tuning in on the eye, has his hand wrenched from the knob by the toss, and has to begin over.

And then Beverly looms before them.

Radar operator on weather plane found weak spot in typhoon wall through which Lykins' plane "escaped"
Low at first, only her crown of innocent puffs gleaming white beneath the late sun. To north and south the rolls of clouds lie, almost in a straight line, and the B-29, much smaller now, moves toward them as if drawn by some superior power. Minute by minute the clouds seem to grow higher. The sun is swallowed, leaving a blazing halo on the topmost puffs, while the solid wall beneath turns from gray to black. Lightning flashes inside the blackness like the opening and closing of doors in a blast furnace. A deck of strato-cumulus clouds slides beneath the plane, looking amazingly smooth and calm after rolled waves, lashing out in all directions.

The radar operator has the eye of the storm on his screen, high and to the right. Lykins swings the plane 25 degrees to the right, and stretches against the shoulder straps that are pressing him into his seat until his backbone seems permanently curved. The picture of the eye is clear, like an X-ray in green of the bow of a man's rib. Occasionally, lightning flames across the screen, but the eye always returns.

The navigator makes his final notations as Beverly towers above him, her 40,000-foot summit suddenly wiped out in a blast of rain. His pencil bites deep into the paper on an updraft. "Surface winds, 70 knots from 180 degrees." A downdraft lifts him hard against his shoulder straps but his trained pencil, barely touching the paper, records, "Temperature still 10 degrees Centigrade at 7:56Z."

The weather observer had quit making notations on paper, and is now talking into a voice recorder. "Moderate rain. Exooh-treme turbulence."

The radio operator has locked his mike in a bracket and is now pounding his key at a steady 20 words a minute as the navigator hands him position reports and the ob-server feeds him the last written notations. The third pilot, clinging grimly to any handhold, acts to relay the messages from man to man.

From Lykins report we get the following: "At 09:06Z we broke into the most beautiful and well-defined eye that I have ever seen. It was a perfect circle, about 30 miles in diameter, and perfectly clear overhead. The sides sloped gently inward toward the bottom from 25,000 feet, and appeared to be formed of a solid stratus layer down to...

(Continued to page 248)

Wartime typhoon caught USS Hornet and twisted her deck like a hat brim
Non-Jump Highway Divider In 10-Foot Sections

Neither speeding autos nor heavily loaded trucks can “jump” a new-style highway divider being installed in California. It consists of 10-foot-long slabs of reinforced concrete, curved inward on the sides and bolted to the road. The state says the divider, costing $7.50 per foot to build, will pay for itself in a little over two years, since maintenance on the wood-steel barrier that is now in use averages $3.50 per foot yearly.

Typewriter Keyboard On Typesetting Machine

Typists can now set type on Linotype and Intertype composing machines through the development of a keyboard that has the standard keys of a typewriter. Forty-four keys, electrically operated, fit over the 90 keys of a standard composing machine. The keyboard can be moved from one composing machine to another as there is no installation. The new keyboard is simply placed over the top of the existing keyboard and the unit is ready for use when it is plugged into an electrical outlet. The complete outfit weighs only 25½ pounds.
Meter Checks "Juice" in Batteries To Insure Firing of Photo Bulbs

With a new meter, photographers can check the "juice" in photoflash batteries before they make that all-important shot. A spur on the meter is touched to the positive end of the battery and a flexible cord is pressed against the bottom of the battery. The available power then is read in amperes on the meter. The little meter is scaled from 0 to 23 amperes and gives positive evidence as to whether the batteries are strong enough to fire the bulbs.

Twist of the Wrist Loads and Cocks Camera

Sequence shots of rapid action are taken by a fast-operating camera designed for sports and spot-news photographers. A twist of the left wrist cocks the shutter and automatically advances the film. The lens aperture is adjusted without looking at the scale by counting audible clicks that mark each stop. The focal-plane shutter has speeds from $\frac{1}{1000}$ to $\frac{1}{500}$ second. The camera comes with an f:4 lens and uses 80-mm. perforated film.

CARBURETOR JIG, at right, gives the mechanic an extra "hand." Holding a Ford V-8 carburetor firmly, it lets him work with both hands. The jig, made of aluminum, can be clamped in a vise or bolted down.

FENDER SKIRT swings out on hinges to provide easy access to the wheel. This innovation was shown at the International Motor Show in London and was demonstrated on a Rolls Royce. It's a low-cost item.
One-Wheel Garden Tractor

Weighing only 87 pounds, a new lawn and garden tractor has only one wheel that not only supports the tractor, but also has, as part of the casting, a ring gear which drives the implement. The wheel has a six-inch tread for good traction and load distribution. A regular lawn mower, with handle detached, can be hooked to the tractor to convert it into a power mower.

Weed Cutter Uses Razor Blades

Old razor blades are put to good use in a grass cutter that takes four single or double-edge blades. A slide, which fits into the cutting arm of the tool, holds the blades firmly for good cutting action. Designed for use in trimming grass around flower beds and trees, the cutter can also be used to remove weeds by cutting below the ground surface and for light pruning.

Vacuum "Churn" for Oils May Improve Quality

Better lubricants may result from a new research technique, known as molecular distillation, that reduces changes in the molecular structure of oil to a minimum. Key to the process is an apparatus consisting of a shallow steel cone, spun at 1725 revolutions a minute inside a glass vacuum chamber. The oil is fed to the center of the cone through a tube and centrifugal force spreads it over the radiantly heated metal surface in less than 1/10 second. The more volatile or lighter portions of the oil are distilled off and collected, while the less volatile portions are thrown off the edge and collected as residue. Because the liquid spreads over the cone in a layer only 3000 molecules thick, it is distilled in a fraction of a second, thus keeping hydrocarbon decomposition at a minimum.
Folding Hand Truck Will Carry 700-Pound Load

Folding like an accordion, a lightweight hand truck—weighing only 25 pounds—can carry up to 700 pounds. It folds into a compact heap, only nine inches high; when folded, 10 of these trucks can be stored in a space ordinarily occupied by two rigid-type trucks. When fully opened, the truck reaches a height of 42 inches. A glider bar on the truck makes it easy to take loads up and down stairs. The wheels are mounted inside the frame to prevent them from catching on passing objects.

Pneumatic Pruning Tool

Only the touch of a trigger is required to lop off limbs with a new air-operated pruning tool. The pruner handles limbs ranging up to ¾ inch in diameter, and larger cuts can be made if the operator rotates the tool slightly between pulls of the trigger. Action is rapid because air pressure opens as well as closes the cutters of the 1¾-pound tool. The cutter opening can be adjusted from wide to narrow range by a slide stop to increase efficiency in cutting small vines and branches.

No-Contact Printing System

Onset printing, a revolutionary system in which no contact or pressure is used, transfers ink to paper by what is called an electronographic press. Positive and negative electrical forces work to attract the ink to the paper from the inked image. The paper is separated from the image by .001 inch. The inventor of the process, W. C. Huebner of Mamaroneck, N. Y., claims it can be used with any of 32 different printing processes and will print one or both sides of the paper in one to six colors.
Strange inventions of the past have nothing on the Hawaiian pineapple industry which for sheer survival has had to create some pretty queer machinery over the years. Today, after many decades of designing odd contraptions, the highly mechanized, multimillion-dollar industry hums along like a well-oiled machine producing golden sun-ripened pineapples by the millions.

Yet, the early producers who first grew pineapples commercially about 50 years ago found the going anything but smooth and must have frequently cursed the Spaniard, Don Francisco de Paula y Marin, for introducing such a cantankerous fruit to the islands in 1813.

Strangely enough, it was the very cantankerous nature of this West Indian fruit which started the trend toward mechanizing the infant industry around the turn of the century. For instance, the industrial pioneers found peeling and coring the pineapple by hand costly and time consuming. Gathering the crop solely by hand was slow and dangerous, for the fruit grows tough, razor-sharp and needle-pointed leaves which liked nothing better than poking out a worker's eye or slicing his legs as he hauled his bag of pines through the field. And, to top everything, the pineapple ripens suddenly and spoils unless picked, transported and canned within 48 hours.

Thus, the industry from the start was forced, by the temperament of the fruit, into mechanization until today pineapple

They Conquered

By Richard M. Botts
A CANTANKEROUS CROP

is handled almost entirely by mechanical work horses from planting to final canning.

The mechanical robots begin in the virgin field from six to eight months before the pineapple is ready for planting. The land is prepared by powerful tractors, which plow about 12 inches into the soil. This is followed by multiple disk harrows which are drawn back and forth across the field. Between plowings the soil is left to rest and soak in rainfall.

Besides plowing, subsoiling is frequently practiced. The subsoilers are tractors which trail specially built steel booms behind them. On the booms are large disks which break up the soil to a depth of 20 inches. At the tail end of the boom is a long roller that smooths out the soil after the disks have torn it up.

Finally, when the field is ready for planting, the mulch-laying machine unrolls strips of 30-inch mulch on the soil. This tar-paper-looking substance is used to discourage weed growth and hold moisture and heat within the soil. As the machine unrolls the mulch, disks on either side toss soil on the edge of the paper to hold it down. Workers, following the machine, plunge steel trowels through spots marked on the mulch and insert the pineapple slips.

While it takes about 20 months for these slips to bear, mechanical aids to the pineapple's health are continually applied until the fruit is ready for picking. For instance, it was found that while Hawaiian soils contain iron it is, oddly, in a "fixed" state and cannot be taken up by the plant's roots. And iron plant food is necessary for good, healthy pineapples. To add the required iron, growers simply dissolved scrap iron in sulphuric acid, thus creating iron sulphate.

When spraying is contemplated, these green iron-sulphate crystals are dissolved in water and sprayed from derrick booms on the back of trucks. The spray is shot over the fields from the booms so as much
Disks on subsoiling tractor break up the ground to depth of 20 inches; roller on end of boom smooths earth

Iron as possible will fall on the leaves which in turn absorb the iron into the plant.

Another spray machine invented by the industry is a truck mounted with a long, right-angled pipe boom. This is used for killing the mealy bug which at one time almost wiped out the pineapple industry. The bug feeds on the plant, sucking the juice and eventually killing the plant. An effective spray was finally found and is now used to completely saturate the plant and kill the bug. From the truck, the spray is forced under heavy pressure out through the many small holes in the pipe boom and onto the plants. A great number of plants are sprayed at one time by this method.

When the pineapples have ripened, a mechanical harvester enters the field. The harvester resembles a "carry all" lumber vehicle. There are four hydraulically operated wheelless metal "legs" which support the harvester about 20 feet off the ground. A truck coming in for a load of pine drives between these spindly legs. The "legs" are then hydraulically drawn up so the harvester actually rides on the back of the truck. The harvester then lowers its conveyor-belt boom over the field and rides piggyback on the rear of the truck, which slowly moves ahead with the pineapple pickers.

The field worker picks the pineapple, strikes off the crown with a sharp knife and dumps the pine on the conveyor-belt boom. The conveyor belt carries the pineapple along the boom to a revolving "stepladder," which transports the fruit to the top of the harvester and then down into the wooden

Strips of mulch paper 30 inches wide are placed on plowed earth just before planting to discourage weeds
Pineapple plants must have their iron so this spray machine dispenses barrels of iron sulphate over them.

bin on the truck. When the bin is filled, the mechanical harvester lowers its legs and lifts its body off the back of the truck. The truck then pulls away and proceeds to the cannery while another truck takes its place. At the cannery the wooden bin is lifted from the truck's back by tall straddle trucks known as Ross carriers. The bin is then placed on a hydraulic dumping unit which tilts one end of the bin, sending the fruit rolling out onto spiral graders.

The spiral graders have conveyor belts 48 inches wide and 250 feet long and can handle up to 100,000 pineapples an hour. The graders automatically separate the large and small pineapples and carry them on different conveyor belts into the cannery. All along the route, the pineapples are washed by high-pressure water sprayers which remove the field dirt.

At the end of the conveyor belt the pineapples are ready for the first step in the canning process—the Ginaca machine.

Invented by Henry Ginaca, in 1913, this machine is the key to mass pineapple production. The pineapples go head first into the machine and in split seconds are shelled, center cores punched out, and the naked cylinders of fruit are sent sliding through tubes to the trimming table. The machine may be adjusted to shell fruit to any size can and easily processes 100 pineapples a minute. With 30 Ginaca machines operating at full capacity, a cannery can

Besides their "iron diet," young plants must be adequately nourished with commercial fertilizers carried by special tractors. They have high wheels and the fertilizer boxes on either side of the tractor. Mechanical "hands" elevate the hoses for the correct height.
handle 180,000 pineapples an hour.

At the trimming table highly trained girls quickly inspect the fruit and do whatever final trimming the Ginaca machine missed. From the trimming table the cylinders of fruit pass onto a moving chain where they go through a cold-water spray and then into the slicing machine, which automatically cuts the pineapple cylinders into uniform slices.

From the slicing machine the pineapples move on a belt to the packing table. This is one operation that hasn't been mechanized and the sorting of pineapple slices into grades and packing into cans is done by trained workers. The workers fill the cans which are then stacked and sent to the syruring machines.

After receiving their syrup the cans of pineapple slices are run through the sealing machine which completes the vacuuming process. From here the hermetically sealed cans go to the pasteurizers where they are heated for 5 to 15 minutes so as to sterilize completely the canned product.

Cold-water sprays then cool the sterilized cans. When down to normal temperature, the cans are sent on their final assignment—to the labeling machine which can label over 1400 cans a minute.

Then, from Hawaii the mechanized pineapple goes by the millions to the far corners of the world—an example of American ingenuity and high mechanization.

Left, a close-up of the Ginaca machine for processing pineapples. Pineapple moves side-wise down chute and is spaced as it enters machine. Cored pineapple shoots through tube on far left. The girls in the picture keep pulp moving into separate chute. Below, harvester moving through field. When truck on left was full, harvester raised up to permit it to pass through. A second truck (empty) waits its turn at the harvester
Hydraulic Jack Has Separate Pump

Designed for work in close quarters, a new hydraulic jack comes in two sections. The pump is in one section and the jack in another, the two parts being connected by a rubber tube, permitting the pump to be placed some distance from the work. Because the oil is completely sealed inside the mechanism, the jack can be used in any position, horizontal or vertical. The low-lying jack is designed for railroad and industrial uses.

Portable Respirator Works by Bellows

Firemen and police officers may be able to save more lives with a compact resuscitator that requires little storage space. Developed by Dr. Joseph Kreiselman of Washington, D. C., the portable artificial respirator consists of a facepiece connected to a small bellows. The mask is held across the victim's nose and mouth with one hand while the other pumps the bellows to force air in and out of his lungs.

Bottle-Cap Vases

Discarded bottle caps provide the raw material for yard vases made by an Illinois hobbyist. The caps are center-punched and strung on stovepipe wire to form rings of varying sizes. These rings are then used to build up the vase. When completed, the vases are lacquered to prevent rusting. One large vase contains almost 6000 caps.

[[Sounding like the whistle of a steam locomotive, a six-tone diesel horn has been invented by a Canadian railway worker.]]
Here are samples of the tongue-twisters with scores of uses from camera lens to cigarette-lighter flint.

**Boom in Tongue-Twisting Metals**

By Georg Mann

TUCKED AWAY in a corner of the periodic table of the elements—that chart which every year baffles a new generation of high-school chemistry students—is a group of chemical elements that nobody pays much attention to. They are called the “rare earths” and properly speaking are the “rare earth metals.” If there is time, the teacher may point out that there are 15 of these rare earths, that their atomic numbers range from 57 to 71, and there is one of these elements that even scientists are not absolutely sure exists.

Nobody minds snubbing the rare earths. Even their names are forbidding and include such tongue-twisters as praseodymium, gadolinium, ytterbium and dysprosium. Chemists are a little inclined to blush because they mar the regular pattern of the periodic table itself.

One 50-ton carload of monazite sand yields the following “rare earth metals”: A—32,500 lbs. of mixed rare-earth oxides, B—16,300 lbs. of cerium oxide, C—6000 lbs. of lanthanum oxide, D—4750 lbs. of neodymium oxide (95 percent pure), E—400 lbs. of samarium oxide. Among the important uses for these oxides is making cores for arc-light carbons which burn brilliant white.
But without fanfare, a few industrial chemists have been making useful, hardworking citizens out of these orphan children of the periodic table. Chances are the sparks that fly when you flick your cigarette lighter come from a flint that contains some of the rare earths. The mantle hooked up to a gas jet or used to make gasoline or kerosene flames burn more brightly owes its efficiency to a healthy trace of one of the rare earths in its make-up. That expensive raspberry-colored goblet you admired on a trip through the department store probably owed its unique color to another of the rare earths. And better lenses for cameras, eyes that see farther for the Air Force, have come from putting the rare earths into overalls.

The story is a long one. It jumps from Sweden to laboratories in Paris, Heidelberg and the University of Illinois. At one time or another, a Swedish army surgeon, a Finnish professor, a Czech chemist and an Austrian baron enter into the story. It all began more than 160 years ago when a strange-looking black rock turned up near the little Swedish town of Ytterby. Slowly, step by step, the Swede, the Finn, the Czech and the Austrian—plus others—found first one, then another unique chemical element in this strange-looking mineral. The search for the rare earths resembles nothing so much as the listings for a golf or tennis tournament seen wrong end to. In such a tournament, a group of players start; from every pairing one victor emerges, until one final champion is crowned. In the case of the rare earths, the chemists first found two elements in the black rock from Ytterby, then in successive steps broke these down into new substances until they arrived at a final result of 15.

Two of the 15—rare earths called praseodymium and neodymium—were discovered by Karl Auer, an Austrian chemist who first put the rare earths to work. Auer was a pupil of Robert Bunsen, the chemist who invented the Bunsen burner. Auer was dissatisfied with the flickering gas flames that provided light during the 1880s. He had a hunch that if some mineral were put into the flame, it would glow and give a brilliant,
steady light. Thorium, a radioactive chemical but not one of the rare earths, looked like the best bet. But Auer’s thorium gas mantles didn’t work properly. Not until he mixed a thorium compound with one percent of a compound of cerium—still the most useful of the rare earths—did he produce a mantle that satisfied the customers.

That was in 1885. Cerium helped make Auer a millionaire, bought him an impressive castle, and eventually led the Emperor Franz Joseph to turn plain Karl Auer into Karl, Baron Auer von Welsbach. More than 40,000 workers all over the world made and sold his gas mantles. And there are few Americans over 50 who haven’t touched a match to a Welsbach mantle.

Fame and a more modest degree of fortune came even more slowly to the other rare earths. Auer made use of a mixture of the rare earths and iron that gave off sparks when it was struck in an automatic gas lighter. The flint in your cigarette lighter is a lineal descendant of Auer’s device. But for years the firms that made gas mantles regarded the rare earths as a good deal of

<table>
<thead>
<tr>
<th>Rare earth</th>
<th>Symbol</th>
<th>Atomic number</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanthanum</td>
<td>La</td>
<td>57</td>
<td>better camera lenses</td>
</tr>
<tr>
<td>Cerium</td>
<td>Ce</td>
<td>58</td>
<td>gas mantles, optical polishing, coloring glass, alloys</td>
</tr>
<tr>
<td>Praseodymium</td>
<td>Pr</td>
<td>59</td>
<td>rare-earth mixtures used—arc-light carbon cores</td>
</tr>
<tr>
<td>Neodymium</td>
<td>Nd</td>
<td>60</td>
<td>coloring glassware, filter for ultraviolet in sunglasses</td>
</tr>
<tr>
<td>Illinium</td>
<td>In</td>
<td>61</td>
<td>discovery disputed</td>
</tr>
<tr>
<td>Samarium</td>
<td>Sm</td>
<td>62</td>
<td>infrared phosphors</td>
</tr>
<tr>
<td>Europium</td>
<td>Eu</td>
<td>63</td>
<td>infrared phosphors</td>
</tr>
<tr>
<td>Gadolinium</td>
<td>Gd</td>
<td>64</td>
<td>minor</td>
</tr>
<tr>
<td>Terbium</td>
<td>Tb</td>
<td>65</td>
<td>minor</td>
</tr>
<tr>
<td>Dysprosium</td>
<td>Dy</td>
<td>66</td>
<td>occurs in rare-earth mixtures</td>
</tr>
<tr>
<td>Holmium</td>
<td>Ho</td>
<td>67</td>
<td>used in mixtures</td>
</tr>
<tr>
<td>Erbium</td>
<td>Er</td>
<td>68</td>
<td>used in mixtures</td>
</tr>
<tr>
<td>Thulium</td>
<td>Tm</td>
<td>69</td>
<td>used in mixtures</td>
</tr>
<tr>
<td>Ytterbium</td>
<td>Yb</td>
<td>70</td>
<td>used in mixtures</td>
</tr>
<tr>
<td>Lutecium</td>
<td>Lu</td>
<td>71</td>
<td>used in mixtures</td>
</tr>
</tbody>
</table>

none of these have separate uses
Didymium lenses used by glass blower block out 90 percent of brilliant glare from yellow sodium flame. Top photo at right shows how bright flame obscures details of the work while just below it work is shown through lens. Below, separator sorts the rare earths in accordance with their magnetic strengths.

1902. Lindsay was interested in the sale of gas mantles. Eventually, he became interested in refining the raw materials for the mantles, manufacturing them directly for the market. By 1916, Lindsay Light was refining monazite sand, the principal commercial ore of thorium and the rare earths.

During the first World War, the gas-mantle business boomed. But inevitably, the market for gas mantles began to contract as electricity dominated the lighting field. There was still a market for mantles but the future didn't look rosy. In the meantime, Lindsay's chemists were finding a mounting pile of rare earths on their hands from the monazite sand they were refining.

The situation called for some action. As Mark Eichelberger, Lindsay's vice-president explains it, monazite sand from Brazil contains six to eight percent thorium compounds. But nearly 60 percent is made up of the rare earths, and cerium makes up nearly half of these rare earths. So the chemists got busy. They worked with the rare earths, analyzed properties, tried to fit them into current methods of industrial production. They sent samples of rare-earth compounds to firms they thought would have a use for them. The missionary work paid off. Sales of the rare earth began to mount. In fact, shortly before World War II broke out, the thorium in the monazite was a drug on the market, the rare earths were the salable returns.

The atomic research of World War II brought thorium back with a bomblike bang, however, when researchers discovered that thorium could be the starting point for atomic fission. Thorium from being a temporary stepchild, became a standard for uranium and plutonium in the atomic-energy program.
or three inquiries a week from people interested in the cinnamon-brown heavy sand. And he replies with a quick, "Sure," when asked whether it's worth-while prospecting for. Current delivered prices for the monazite average around $145 a ton, more than twice what the ore sold for in 1945.

In spite of the beginning boom, not all of the 15 rare earths are important commercially. Some of them are simply too hard to get in any reasonably pure form. Others have no immediate uses. Currently, cerium, lanthanum and neodymium are among the leaders. Cerium, in a pure form soft as lead, turned up more than a century ago in the researches of the great Swedish chemist, Jons Jacob Berzelius. Nobody ever saw pure cerium, however, until 1911. That year, after three years of intensive laboratory work, Dr. Alcan Hirsch of the University of Wisconsin prepared cerium in a pure form, that is 98 percent pure. In the form of compounds, however, cerium is turning into a minor industrial jack-of-all-trades. Every one of the 15 million gas mantles made every year contains cerium nitrate. Compounds of cerium and oxygen are highly recommended for polishing glass, particularly precision lenses. Other cerium compounds are mixed into the glass itself to get rid of unwanted colors that sometimes turn up. Such compounds also ward off the color-changing effects of the sun on glass. Mixed with the metal titanium, other cerium compounds give glass a fine yellow tint. And yet other cerium compounds are being tested in metal alloys. So far, they've been found to give new and better properties to cast iron. And cerium has also turned up in therapeutic lamps and powders for flashlight photography.

Lanthanum was first discovered by the
(Continued to page 262)
Gun Welds Aluminum Four Times Faster

Aluminum is welded four times faster by a pistol-shaped tool which feeds the filler metal in wire form at controlled speeds. The metal carries the welding current. A sheath of argon or helium gas surrounds the arc between the wire and the aluminum, preventing air from contacting and oxidizing the molten metal. A trigger regulates the gas flow and wire feed. Drive rollers move wire to the gun at speeds ranging from 100 to 350 inches per minute.

Mechanical Pencil “Yardstick”

Here’s a mechanical pencil with a built-in “yardstick” that enables the user to measure any distance, from a fraction of an inch upward, simply by rolling the head along the line of measurement. The head is mounted on a shaft that rotates, moving a pointer along a longitudinal slot in the side of the pencil. It has a “range” of 36 inches in one direction; for greater distances, the pencil can be reversed every 36 inches so the pointer moves the other way. The pencil can also be used as a calculator for adding and subtracting.

Electric Drive for Small Lathe Has Stepless Speed Control

Smooth and stepless speed control for a small lathe is now available by turning a single knob. The equipment does away with mechanical adjustments of gears and belts while providing greater speed range and smooth transition. Speeds may be preset or varied during operation. Developed by General Electric and called the Thy-motor drive, the unit is easy to wire because the terminals are located at the front of an electronic panel and separated from the tubes by a protective cover. The simple control station has stop and start buttons and the knob for adjusting speed. The drive operates from 220-volt alternating current.
When Oil Wells Run Dry....

there's gasoline for hundreds of years in our mountains of shale, already being refined in a pilot plant in Colorado

By Thomas E. Stimson, Jr.

MECHANIZED mining and improved processing is cutting the price of shale oil to where it can compete with petroleum for the motorist's gasoline dollar.

W. C. Schroeder, chief of the Office of Synthetic Fuels of the U. S. Bureau of Mines, estimates that gasoline can be produced from oil shale for as little as 8.4 cents per gallon. This is based on trials at the bureau's experimental plant near Rifle, Colo., where the shale is mined and trucked to a huge retort, to have its waxy oil extracted.
and refined into gasoline. Fuel oils and other typical products can also be produced.

Ordinary overhead, transportation to market, profits and taxes would raise the base cost of shale gasoline considerably. Delivered to the consumer, shale-oil derivatives could be expected to sell in the same price range of petroleum products.

This doesn’t mean that the market is going to be flooded with shale oils and gasoline. For one thing, the United States and the world in general are enjoying a temporary overproduction of crude oil. For the next several years, at least, there is all the crude oil we need, even though the United States alone is consuming six million barrels a day.

Too, oilmen say that a complete shale-oil plant, producing 100,000 barrels a day, would cost a fabulous $400,000,000. No oil company can afford such a huge investment as long as it has adequate amounts of crude petroleum to feed to expensive refineries it already owns. Smaller shale-oil refining units would not permit the savings that are possible with large production.

Instead of starting a price war, the Rifle plant is confirming the comfortable thought that this country will not run out of liquid fuels for at least several centuries. Concern about our dwindling petroleum reserves (which is quite true) has lost its sting. The Green River oil-shale formation in Colorado, Utah and Wyoming, covering 1100 square miles, has an estimated minimum of 300 billion barrels of recoverable oil.

Boyd Guthrie, engineer-in-charge at Rifle, has the job of determining the cheapest way to mine the rock, the easiest way of extracting its oil and the most efficient method of refining it into useful products. Original ideas by his staff, techniques from abroad and suggestions by the oil industry at large are all evaluated.

At Rifle the rich 73-foot-thick Mahogany Ledge that assays 100 million barrels per square mile is used for testing mining methods. Entrance to the mine is high on the face of a cliff and the mine itself is actually an underground quarry. During a recent test period, when an average of 1491 tons of shale were broken out and moved per day, the direct mining cost was estimated to be 32.9 cents per ton. This is about half of what earlier estimates indicated.
Upper left, new multiple carriage developed by Mines Bureau drills 72 fifteen-foot shot holes in six hours. Left, a scaling rig helps men reach loose rock clinging to the walls. Lower left, “steps” in the Rifle mine are spacious enough for large, open-cut type equipment. Below, cracking unit where diesel oil and gasoline are both produced.
To get the costs down that low, power shovels are used in place of hand shovels and 15-ton diesel trucks replace ordinary mine cars. The trucks drive right into the mine and haul their loads direct to the retorting plant.

The mine is a huge cavern of the room-and-pillar type, with 60-foot square pillars of shale left 60 feet apart supporting the roof. Mining is done on three levels and in cross section the mine appears in the form of three giant steps. The top step is 27 feet from floor to roof. Behind it is a 23-foot-deep bench, and below and behind it is a second bench.

Fifteen-foot shot holes are drilled into the top step with a special multiple-drill jumbo that enables two men to drill 72 holes in six hours. Then the face is blasted out with dynamite. The lower benches are advanced by similar blasting operations.

At the preparation and retorting plant, the shale is crushed to particles one to four inches in size and moved by conveyor belt to the retort. There, oil is extracted by heat.

The present Rifle retort is of the batch type. Various oil companies have developed continuous-flow types of retorts and some of these are to be tested at Rifle.

(Continued to page 260)
Counting Machine is "Sleuth"

Anything from dollar bills to world-series tickets is counted accurately at speeds up to 1000 a minute by a new machine that feeds and stacks automatically. An optional imprinting device permits dating, coding, endorsing or canceling during the counting operation. Its trip mechanism is said to be so sensitive that it once picked out a counterfeit bill from a stack of currency, rejecting it and stopping the machine because the bill was too thick.

Trailer Coupler Applies Brakes

When the trailer and automobile are coupled with a new type of hitch, the two braking systems act as one, making it unnecessary for the driver to operate two separate controls. When he applies the brakes on his car, the coupler actuates those on the trailer. Built into the hitch is a delay mechanism which applies the trailer brakes slightly before the car brakes. Should the trailer uncouple accidentally, the brakes are locked automatically.

Two-Language Cards Help Students

Vocabulary cards aid in learning the words of a foreign language. The cards have a foreign word on one side and the English meaning on the other. Several cards are placed on the table and then put

Learn Foreign Tongue

aside one by one as the meanings are memorized. A complete set includes 1000 foreign words and their meanings, plus a set of blank cards upon which the student may write other words.
Mine-Trolley Phone System

Collision hazards of electric trolleys in coal mines have been reduced to a minimum by a carrier-wave telephone system. With the communications system, which puts out a high-frequency signal over the power wire, motormen can talk to each other and to the dispatcher simply by pressing a button on the microphone. A loudspeaker on the car is always turned on, broadcasting all messages sent over the system. The set is shock-mounted to protect it from vibration.

Machine Drives Nails Like Hand Stapler

Four times faster than hand nailing, this portable nailing device operates like a stapler. One blow drives and countersinks the U-shaped nail that locks into the wood. Holding 100 nails in strip form for easier loading, the device feeds the nails automatically. The nailer can be used with hard or soft wood, composition and light metals. The U-shaped nail possesses greater holding strength and will not split wood. Available in several sizes from $\frac{3}{8}$ in. to $1\frac{1}{2}$ inches long, the nails are galvanized, copper, bronze or electroplated. The machine enables factory workers with little skill or experience to do the precision work.

"Economy" Car

One of the most popular new small cars at the recent International Automobile Show in Paris was the Italian "economy" car. It contains a basic Fiat engine and is said to burn a minimum of gasoline. The car has a top speed of 77 m.p.h.

At any given moment, there are approximately 1800 thunderstorms in progress all around the earth, the number needed to recharge the earth's electrical field and keep it healthfully "negative."
On a square of ivory cut from a tusk of a prehistoric mastodon, Yukon craftsman Jack Elliott is sketching the flower design that he uses for one pin. Also shown are several samples of jewelry in various stages of production.

By Lyn Harrington

Jewels From Mastodon Tusks

Probably the last place you’d expect to find a jewelry craftsman is far north in the Yukon, where men are rough and tough and winters are long and cold. Yet, Jack Elliott of Whitehorse, Yukon, has been turning fossilized mastodon tusks into fine costume jewelry for years and it all began because of the long, cold winters.

Elliott went to the Yukon in 1916 on his way to China, but that’s as far as he got and he still has no desire to leave. He took an engineer’s job on a sternwheeler plying the Yukon River. The long, cold winter, however, turns the river into solid ice and that meant no work for Elliott, and no pay. Spotting some fossilized mastodon tusks that gold miners often uncover, he thought he saw a way to pay his winter grocery bills. Since then, he has been carving the ivory into earrings, pendants and other novelties which are eagerly bought by tourists who ride his river boat in the summer.

Mastodons roamed North America in the Pleistocene Era, about 20,000 years ago. Their bones have been covered during the centuries by layers of

POPULAR MECHANICS
earth, now permanently frozen. Today, hydraulic dredges that mine the gold of the North uncover these bones, providing Elliott and other craftsmen with jewel materials.

Carving fossilized mastodon tusks is no job for a blunt jackknife. At first, Elliott used files and scrapers to shape his unusual jewels. Now, he uses a power drill with 60 different heads. With a bandsaw, he slices the tusk to the correct thickness. Then he sketches the design on the flat surface and, with the drill heads, carves back and forth to form the ornament. A buffing operation brings out a high luster. Most of his jewels also have a small gold nugget, an appropriate souvenir of the Yukon. The nugget and a strong clasp are attached by gold screws, securely tightened in the ivory.

To the tourist, anxious to take home a gift or souvenir that has the flavor of the Yukon, mastodon-ivory jewelry is perfect. Fashioned in these pins and trinkets are centuries upon centuries of Nature’s work plus the skill and individual touch of a true craftsman of the Yukon.
Hydraulic Lifter Speeds Auto Repairs

For fast and efficient transmission repairs, a hydraulically operated lift permits one man to remove transmission units from all makes of passenger cars and trucks. After the transmission is removed, the lift can be used to transport the unit to any part of the shop. Because of its great flexibility—the lift tilts backward, forward, to the right and left of center—the lifter can be used to replace the transmission unit. It can be fully rotated and permits quick alignment of locating pins with bolt holes. The hydraulic unit can also be used for other lifting tasks such as handling of drive shafts, gasoline tanks, power take-offs and truck springs. It has a lifting table 15½ inches in width. With a capacity of 800 pounds, the lifter cannot be harmed by the accidental letting down of the car as a safety relief valve protects both the car and the lifter. Maximum lift height is 70 inches.

Danish Electric Motor As Small As a Match Head

Powered by a one-volt battery, a midget electric motor built by a Danish electrician, Joergen Joergensen, is no larger than the head of a wooden match. The motor is mounted inside a glass tube to protect it from damage. A small propeller, attached to the shaft of the motor, spins rapidly when the current is turned on.

Photo Meter Converts for Color

By attaching a converter to his General Electric exposure meter, the photographer can measure the color temperature of the light and select the proper correction filter. The instrument has a range from 2800 to 30,000 degrees Kelvin, sufficient for use with any light. It also can be used for measuring incident light, thus being useful for either black-and-white or color film.
Automatic Slide Changer

You never have to handle your color slides once you file them in a plastic tray that serves as a magazine for an automatic slide changer. The slides fit in conveniently numbered slots in the tray which can be labeled for quick reference. When you want to show slides on a certain subject, you select the proper tray, insert it in the slide changer, mounted on the projector, and you are ready to put on a show! A half-turn on the changer crank moves the slide into projecting position. The second half-turn of the crank returns the slide to its original position in the tray. Additional turns move the other slides in and out of the tray for projection. When the 30 slides have been shown, you slip the tray from the changer and return it to its storage place, the slides back in original order and still untouched by hand. You can reverse the crank motion to repeat any slide or, if you wish, you can skip any number of slides. The automatic changer is designed for use with any TDC Vivid projector and works with any type of 2 by 2-inch slide.

Six-Purpose Tool

For the home handyman there is a new British-built utility tool that serves six different purposes. Made of forge-hardened steel, it is a hammer, has a claw for removing nails and has a spanner end that will turn nuts and bolts up to 9/16 inch in width. One side of the tool handle is a file, the other is a six-inch rule and the tapered tip acts as a screwdriver.

Chemical Kills Brush

Brush and stumps can be prevented from resprouting by spraying them with weed killer during the cold dormant season, according to the Dow Chemical Company. In one test, brush sprayed during the winter with the weed-killing 2,4,5-T failed to produce leaves in the spring. Freshly cut stumps sprayed with 2,4-D and 2,4,5-T in kerosene or fuel oil during winter did not resprout.
AN FBI AGENT and five policemen were sitting in the agent's car parked beside the police station in a little Western town. They were talking shop and spotting the darkness with glowing cigarettes.

Suddenly, a new sedan with out-of-state license plates squealed around the corner, sped on down the street.

"This is for us," said the FBI man and spun the motor of his car into action.

The racing sedan cut off on a deserted road leading to the country and the police-car loaded car reeled after it. As the gap closed, the siren sounded. The sedan slowed reluctantly, pulled to a stop at the side of the road. The FBI agent cut in behind it, quickly stepped out and walked over to the sedan, his hand on the gun at his hip.

"All right, you can—"

The driver of the sedan, holding a leveled pistol, pulled the trigger. The FBI agent slumped to the road—then got up quickly and dusted himself off.

"See what I mean?" he asked the policemen. "I'm dead—or would be if that gun was loaded and the man who pulled the trigger wasn't another agent. Now I'll do it right."

The agent got back in the car and this time, before stepping out, he swung a spotlight on the driver of the sedan. Then he eased out of the car, taking care to stand behind the protective glare of the spotlight.

"Now, you in the sedan, step out."

The roadside drama was just part of the "classwork" in one of the world's most unusual traveling schools conducted for policemen by the FBI. In these schools, the book is not "thrown at the students." It is thrown away. There are lectures, of course,
This dummy has been "murdered" hundreds of times to help the FBI teach proper methods of handling clues.

but they are kept to an absolute minimum.

Practical demonstrations are stressed, with emphasis on the word "practical." Checking up on a suspicious car, for instance, is one of the most dangerous assignments a policeman has to perform. The number of officers now dead from bullets fired inside a car attest to this fact and the FBI is stressing the wary approach.

As one agent told a class, "It's sometimes an officer's own fault when he gets killed."

It is significant to note that you rarely read of an FBI agent being killed by a criminal. The answer is his training, which is now being brought directly to the nation's local police stations. This police-school program, with a curriculum covering such varied subjects as safe-cracking, bank robbery and murder, is the most intensified and widespread this country has ever known.

Between June 30, 1945, and Nov. 30, 1949, enrollment in training schools put on by the FBI totaled 316,150. During the current year that training is expected to continue at an even higher rate. Many officers represented in these enrollment figures attend more than one school, but, since World War II, it is estimated that more than 150,000 different officers have had an opportunity to familiarize themselves with the latest FBI techniques.

The need for such widespread training is pressing. Our crime rate went up rapidly during and following the war and has maintained a high level. In the first six months of 1949, crime increased 2.7 percent in the cities and 7.6 percent in rural areas, compared with the same period in 1948. Burglaries rose 4.4 percent in cities and 13.1 percent in the country, and larcenies went up 3.3 and 8.8 percent, respectively, in cities and rural areas. Robberies remained about the same in urban areas but increased 8 percent in rural districts.
It is not surprising then that J. Edgar Hoover, Director of the Federal Bureau of Investigation, has stepped up FBI aid in the schooling of the nation’s police to an all-time high. The FBI training program has been given a top priority rating by the director and it gets plenty of attention from all the agents scattered throughout the United States.

In an FBI traveling school, anything can happen. The instruction is generally patterned after that of the FBI National Academy, but the ingenuity and imagination of the individual agents leave their mark on the various schools.

While one school was in progress, a safe was cracked in the town’s biggest warehouse and the policemen students were put to work on the case. The best clue was the peculiar tread mark of a tire so the students spent hours between classes checking tires in town. Finally, one patrolman, who was willing to suspect anybody, found the right tire—on the local chief’s car parked daily in front of the school. The safe-cracking job was a cooperative one between the chief and the FBI for instructional purposes.

One of the most dramatic traveling-

---

**Policemen learn judo also. This is the wrist throw**

---

**This disarming maneuver has to be done fast or else!**
school crimes was the “Case of the Blood-stained Beer Bottle,” staged by agents of the Philadelphia office in a Pennsylvania town. In addition to FBI agents, the actors included a local judge, prosecuting attorney, chief of police, some of the businessmen, a college law professor and a Philadelphia policewoman who out-molled a moll.

At the start of the school, a “murdered” man, impersonated by an agent, was found by students in a dingy rooming house with the beer bottle at his side. While the students were running down fingerprints from the bottle and other clues, the FBI instructors gave the students a jolt by adding a second “murder” to the case. The students were chagrined to find their best suspect beaten to death in a car on a lonely road.

They trapped the “killer” through plaster-of-paris casts of footprints and telltales arm scratches, but when he was tried in a moot court, the jury acquitted him. The students had failed to follow up on a couple of vital pieces of evidence, which would probably have knotted the rope around the “killer’s” neck. One consisted of fibers of cloth caught in the molding at the scene of

(Continued to page 266)
Small white screen in front of the camera lens is the phosphor screen where the object appears under ultraviolet light. The drawing shows the setup for photographing the heat of a teakettle through the screen.

Camera Photographs Temperature of Objects

Sensitive chemicals known as phosphors, which absorb heat waves and give off a glow, are used to “take” the temperatures of objects by photography. With the technique, it is possible to record temperatures of many parts of an object simultaneously. A small screen, coated with phosphors, is placed between the object and a large curved mirror which focuses the heat radiations of the object on the screen. When ultraviolet light is flashed on the screen, an image of the object, varying in brightness as its temperature varies, can be photographed through a hole in the mirror. Because the phosphors show a 20-percent change in brightness with each Centigrade-degree change in temperature, accurate temperature readings can be computed from the varying tones in the photograph. This is the first time such a comprehensive picture of heat distribution has been available, according to scientists at Eastman Kodak, where the temperature-recording technique was developed.

Heat Circulator Can Be Inserted In Fireplace

No rebuilding is required for a new heat circulator that can be inserted in the opening of a conventional fireplace. It eliminates loss of heat through the chimney, uneven heating of the room and formation of drafts within the room. The circulator, which can be controlled by hand or thermostat, is custom-made in aluminum, copper or brass.
Sectional Masts of Lightweight Plywood Tubing

Weighing less than 1½ pounds per foot, a strong mast of plywood tubing provides a long-lasting support for television antennas. Sold in kit form for masts of various heights, the tubing comes in handy six-foot sections which nest together, forming firm, unyielding joints. One person can erect a flagpole or ungyed antenna mast unaided and it takes only two persons to put up a 90-foot guyed mast with an erection boom furnished with the kit. The mast won't rust and doesn't conduct electricity. The lead-in wire is strung through the tubing where it is protected from the weather. Also available are lampposts, flagpoles and roof-peak antenna masts.

Blind Musicians' Helper

Blind composers and arrangers can write anything from be-bop to counterpoint with a special music writer. It consists of a stencil—with all the musical signs and notations—that travels within a guide mounted on an inclined board. The inventor, a blind Belgian organist named August Liessens, has allowed just enough space within the guide so that notes drawn with the stencil against the bottom are on the line, while those notes drawn with the stencil against the top are in the spaces. Liessens' invention has been put into production by the American Foundation for the Blind.

Vibrating Meat Cutter

Using a short, vibratory stroke similar to a jigsaw, a cutting machine, developed in Switzerland, slices meat to any thickness. Instead of a cutting wheel, the machine uses an oscillating arm on which the blade is mounted. The blade, which can be changed in a few seconds, vibrates as it cuts.

(Chemical 2,4-D, sprayed from airplanes over an area in Oklahoma, killed 90 percent of the sagebrush at a cost of $2.25 per acre.

MARCH 1950

171
LESS THAN a hundred years ago the meat packers of this country were engaged in the simple business of selling meat. They paid hard money to teamsters who would haul away any part of the carcases not fit for your dinner table.

Today not much is left to haul away. The packers are still in the business of selling steaks and chops, but even at today’s fancy prices for beef and bacon the “waste” of packingtown earns a substantial percentage of the industry’s profits. Hide and hair, hoofs and glands go down the production line into an amazing variety of goods.

One of the newest and most publicized end-products of the hog market is the drug ACTH, certainly one of the essential ingredients of De Soto’s fountain of youth if its benefits prove out the promises of its first tests.

The hormone is extracted from a tiny fraction of the pea-sized pituitary gland of the hog. One 61-year-old businessman who had suffered crippling arthritis for 10 years was a “guinea pig” for the ACTH arthritis treatment. Within 48 hours after he received the first injection of the hormone, he tossed away his cane. A few days later all swelling had gone from his arthritic joints.

The effects were dramatic. The doctors and the packers are tempering their enthusiasm, however, with hard facts. One fact is that a handful of experimental “cures” does not prove the over-all value of the drug; it apparently relieves the symptoms of arthritis so long as ACTH is continued, but does not cure; and there may be less pleasant effects.

Fact No. 2 is that it takes 400,000 hogs to supply enough pituitary glands to pile up one pound of ACTH. It will be a long time before a sufficient supply is available for adequate research, let alone the treatment of the more than 6,000,000 Americans suffering from arthritis.

The new hormone is just one example of the results of scientific research applied to the packing-industry products. Considerable research has been conducted of late into the fatty acids derived from animal wastes, and both Armour and Swift have built new plants to isolate commercial chemicals from these fats and oils. The process is roughly similar to the fractionation of petroleum. The fatty acids serve as starting materials, and further synthesis produces new chemicals with such unusual properties that even the scientists are seeking industry’s help in exploring all the uses of them.

Certain of these chemicals combine with metals, metallic oxides or metallic hydroxides to form salts and soaps. Detergents now popular in hard-water areas come from these fatty acids and don’t precipitate scum in hard water.

Another chemical, stirred in small amounts into printing inks, “pulls them together” to decrease spread on the paper. Asphalt compounded with another chemical is more fluid when hot and tack-free when cool. Surfaces wiped with still another actually repel dust because static electricity is eliminated. Added to paint, one of them prevents a skin from forming inside the can. Still other chemicals are powerful germicides and disinfectants. Some are excellent softening and finishing agents for textiles. Another, mixed into garden sprays, “sticks” the chemicals to the plant.

A new wax, compounded with the chemicals, is resistant to both acids and alkalis, and won’t melt even when boiling water is poured across the surface.

Several of the chemicals have an odd ability to cause some water-attracting surfaces to become water-repelling and oil-attracting. A small amount stirred into a mixture of asphalt will cause it to coat sand and gravel even after a heavy rain—a fact which may bring large savings in the upkeep of the nation’s highways. Ordinarily, asphalt can’t be mixed unless the aggregate is dry, and keeping it dry often entails considerable expense and delay.

Still another new product from animal waste is a novel upholstery material. There are objections to the two materials most frequently used at present in upholstery and mattresses. Curled animal hair, used in furniture upholstery for hundreds of years, has a tendency to pack down and may mildew. The more modern foam rubber is uncomfortably warm for the human body in some applications because there is restricted air circulation through it. The new material combines the advantages and eliminates the disadvantages of each. Millions of tiny hair curls are covered and interlaced with a thin coating of rubber which binds them together, making a pad that is cool and resilient, will not lump or shift. You can sew it, nail it or tuft it. It is water, moth and vermin resistant. You’ll find it in some of the latest automobiles.

Not much of the animal carcass is considered waste, now that industry and medicine have found uses for these by-products. Even the animal’s gallstones bring income to the packer—for centuries peoples of the Orient have considered them good-luck charms!
Carnival thrills in miniature—turn page for this exciting coaster

Also in this issue
INEXPENSIVE COTTAGE WINDOWS 184
MOTORIZING OLD PUMP ORGAN 201
SHADOWLESS PHOTO REFLECTOR 211
DON'T CAST IT—BANDSAW IT! 223
KIDDIE ROLLER COASTER

Designed by WAYNE C. LECKEY

ROL-R-KO is a toy that will make your back-yard playground complete. You can build it from common lumber and standard iron wheels, and it comes apart in seven easy-to-handle sections for winter storage.
ROLLICKING good times are ahead for Billy and his pals when dad sets up this thrilling back-yard roller coaster. The rider mounts the platform by steps at the rear and climbs aboard a four-wheel car. Depressing a trip lever starts the car on its way, sending it down the dips and up an inclined section of track. In climbing the incline, the car gradually loses speed and strikes a spring bumper at the end of the track. From there it rolls backward and finally comes to a stop at ground level. The car is returned to the starting platform by pushing it back up the track. Having a platform only 3 ft. high, and deep-flanged wheels which hold the car on the track, Rol-R-Ko is perfectly safe for three-year-old youngsters. The toy is complete as originally built and pictured here, but if you have a large yard, the track can be extended to provide a much longer and more thrilling ride. This can be done either by adding additional dips down the line or merely letting the track run off on level ground, using flat, straight sections. The track sections are staked to the ground to assure a solid roadbed for the car. This, together with the flared structure
which supports the elevated sections, eliminates any likelihood of the toy tipping over or the track giving way under the weight of the rider. There’s no problem in putting Rol-R-Ko up for the winter as it is designed for easy dismantling in sections of a size convenient to handle and store overhead in a garage. For example, the canopy lifts off, both sides of the platform pull away and the steps slide out as a unit, leaving the floor and rear posts of the platform in one piece. The track itself is detachable from the platform by removing four screws and, in turn, comes apart in two separate sections. Being of knockdown construction, Rol-R-Ko can be built easily in the basement workshop which permits you to get an early start and have the toy ready to set up outdoors when warm weather arrives.

The complete toy is constructed from common lumberyard material, No. 2 grade being good enough. The posts for the canopy are 2 x 2s, the platform framework is of 1 x 4s, the slats are common 1 3/4-in. lattice stock and the majority of the track and bracing is of 1 x 2s. The flanged cast-iron wheels for the car are standard items which can be purchased for 1/2-in. axles. Colorful waterproof awning material is selected for the canopy.

A simplified and less-expensive version of Rol-R-Ko is suggested on page 179. Here, the toy is stripped to the minimum, a straight length of track being substituted for the dipped section which is merely extended off onto the ground with whatever
Here's a suggested way of building Rol-R-Ko in its most simplified form which will still give youngsters an exciting ride. Basic construction of track and platform differs very little, straight rails being substituted for bandsawn ones. As pictured, the inclined track merely runs off onto flat sections on ground.

number of straight sections of track you have room for. In either case, the basic construction of the platform is the same. The cutaway drawing in Fig. 1 details the assembly, with No. 10, 1½-in. screws being used throughout. Two 12-ft. lengths of 2 x 2 will make the four posts with waste allowed for cutting. As shown in the lower detail, Fig. 1, the posts are notched on two adjacent faces to receive the 1 x 4 platform framing and the 1 x 2 bracing at the bottom. Mortising the ends of the cross members of the framing in dado cuts makes for rigid construction, although plain butt joints can be used. The steps, Fig. 2, are assembled as a separate unit and are fastened in place with eight screws at points A and B on both sides. A 4 x 4-ft. sheet of plywood is used to floor the platform. Note that this is notched at the corners to fit around the posts and is cut out for the steps. The plywood is nailed to the ends and all cross members of the platform, but not along the sides, as otherwise the sides of the structure cannot be removed. The slats around the sides of the platform are optional, although when painted alternately red and white they add considerably to the colorful carnival appearance of the toy. All of the slats are nailed in place except those that are indicated; namely, the end ones, Fig. 9, those at each corner and the center one on each side. These must be attached with screws so that the slats can be taken off to get at the screws that are removed in dismantling the toy. Two screws at each corner of the canopy are used to fasten it to the upper ends of the posts. Each end of the canopy framework is cut from a 1 x 12-in. board and then notched along the top edges for joining both together with 1 x 2

Spring-loaded bumper absorbs the impact when the car strikes it and the car rolls back down the track

<table>
<thead>
<tr>
<th>LUMBER LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Sizes are stock sizes—not actual)</td>
</tr>
<tr>
<td>1 pc. pine, 2 x 2 x 6 ft.—Stair posts</td>
</tr>
<tr>
<td>2 pcs. pine, 2 x 2 x 12 ft.—Corner posts</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 10 x 10 ft.—Stair stringers</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 10 x 6 ft.—Stair treads</td>
</tr>
<tr>
<td>1 pc. plywood, ½&quot; or ¾&quot; x 4 ft. sq.—Floor</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 12 x 8 ft.—Canopy ends</td>
</tr>
<tr>
<td>5 pcs. pine, 1 x 2 x 4 ft.—Canopy stretchers</td>
</tr>
<tr>
<td>2 pcs. pine, 1 x 4 x 8 ft.—Platform framing</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 4 x 10 ft.—Platform framing</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 2 x 10 ft.—Platform stretchers</td>
</tr>
<tr>
<td>11 pcs. lattice, ⅛ x 10 ft.—Platform slats</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 4 x 6 ft.—Platform track</td>
</tr>
<tr>
<td>2 pcs. pine, 1 x 8 x 10 ft.—Bandsawed rails</td>
</tr>
<tr>
<td>2 pcs. pine, 1 x 2 x 10 ft.—Straight rails</td>
</tr>
<tr>
<td>2 pcs. pine, 1 x 2 x 8 ft.—Track side rails</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 2 x 12 ft.—Track cross ties</td>
</tr>
<tr>
<td>8 pcs. lattice, ⅛ x 10 ft.—Track slats</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 2 x 6 ft.—Braces (A)</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 3 x 10 ft.—Brace legs Nos. 1 and 6</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 3 x 12 ft.—Rest of brace legs</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 2 x 10 ft.—Brace cross cleats</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 2 x 12 ft.—Track bracing</td>
</tr>
<tr>
<td>1 pc. pine, 1 x 4 x 3 ft.—Bumper</td>
</tr>
<tr>
<td>1 pc. pine, ⅛ x 10&quot; x 14&quot;—For horse head</td>
</tr>
<tr>
<td>1 pc. pine, 1&quot; x 13&quot; x 26&quot;—Base for car</td>
</tr>
<tr>
<td>1 pc. pine, 1&quot; x 4&quot; x 26&quot;—Sides for car</td>
</tr>
<tr>
<td>1 pc. pine, 2 x 4 x 2 ft.—For bumper, etc.</td>
</tr>
</tbody>
</table>

(Waste from rails will make track coupling)

MARCH 1950
Unless you can buy 48 or 54-in. awning material, two separate pieces will have to be stitched together to cover the top. Eight scallops are cut along each edge and small copper nails are used to fasten the canvas in place.

The rails for the curved-track section, Fig. 3, are bandsawed 2 in. wide from two 1 x 8 x 10-ft. pieces. Starting from the upper end, each board is marked off lengthwise according to the drawing and the various radii indicated are swung at these points, using a long flat stick for a compass. With help, both rails can be cut at one time and notched on the bottom edges for four crossties, 15 1/2 in. long. A fifth crosstie at the lower end of the track is notched 1/2 in. deep at each end for wheel clearance and merely butted between the inner faces of the rails. The curved track is supported at the points indicated by braces, Nos. 1, 2 and 3. Brace No. 2 measures 19 1/2 in. across the bottom. The legs of each one are cut from 1 x 3 stock and the crossties are 1 x 2s. Notches are cut on the outside of each leg for 1 x 2 side rails, 7 ft. 6 1/2 in. long. The ends of these rails are half-lapped into braces A which, in turn, are drilled and counterbored for screws that are used to attach the section to the platform.

The straight inclined section of track, Fig. 4, is made similarly. Here, the rails are 10-ft. lengths of 1 x 2, crosstied together as before and supported by braces Nos. 4, 5 and 6. Both sections of track are coupled together as shown in Fig. 7, the outside pieces being notched to take the 1 x 2 ends of the inclined track. The coupling becomes a permanent part of the
inclined section. The short section of track on the starting platform, Figs. 5 and 6, is screwed to the plywood from the underside and is positioned to align with the abutting track. The manner in which the trip lever engages the rear axle of the car is shown in Fig. 5. The lever should extend far enough behind the car to permit the rider to reach around and release it. The bumper, Fig. 8, makes use of a screen-door spring to ease the shock when the front axle of the car strikes it. It's apparent from the drawing just how it works. The bumper itself is rabbeded along each side to fit in a 7/8-in. slot cut in a piece of 1 x 4. A nail driven through from the side of the slot engages the eye of the spring, while a screw and large washer retains the bumper in the slot and yet allows it to slide freely. One end of the slotted member is fastened to a croxttie and the other end to a block screwed to brace No. 6, Fig. 3. The top edges of the rails can be faced with a metal strip, if desired, although the wood will withstand considerable wear. Regular linoleum seam molding makes a neat facing.

The car is assembled as detailed in Fig. 10. If you are unable to obtain a piece of wood 13 in. wide for the base of the car, it can be built-up by doweling and edge-gluing together several narrow pieces. Both side rails of the car are cut from a single piece of 1 x 4 in the manner shown in the detail below Fig. 10. First, holes for the axles are drilled at each end and the piece is ripped in half through the center of the holes. Then each strip is bandsawed on the dotted lines. These pieces are screwed securely to the underside of the base flush with the side edges. The axles for the wheels are placed in the half-round notches, drilled for an 8d nail and pinned as shown in the sectional detail, Fig. 10. Drill a pilot hole for the nail so that it does not split the wood. A standard 1/2-in. washer placed on each axle between the wheel and the car will provide the correct tread. A paper pattern for the horse head is drawn full size from the squared outline given, then traced and cut from a piece of 13/8-in.-thick wood. The head is drilled at the point indicated for a cross handle turned in a lathe or improvised from a broomstick. The handle is locked in position by driving a nail through it from the edge. The horse head is fastened securely to the base, 2 in. from the edge, with three long screws and finally the foot blocks are screwed in place.
Window Boxes Detached Quickly If Hung With Shelf Brackets

Small flower boxes on garage windows are easy to remove for painting or refilling if they are hung with metal shelf brackets. Two brackets are used for each box. These are inverted and screwed to the top edges of the box ends, and the holes in the upright arms are slipped over heavy screw hooks turned into the siding. To be sure the brackets will clear the window sill allowing the box to hang straight, the box should be longer than the window frame.

G. E. Hendrickson, Argyle, Wis.

Down Pipe on Cesspool Drain Eliminates Clogging

When a cesspool is drained directly from the surface of the water, the draintile is likely to become clogged with muck, causing the cesspool to back up and overflow. To remedy this condition, install a down pipe on the end of the drain so that the open end of the pipe is at least 6 in. from the bottom of the cesspool. In this way, only clear water is drained off, the solid matter floating to the top of the water where it decomposes. Be sure that the horizontal run of tile is below frost level.

Septic Bend Co., Rockland, Mass.

Woolens Stored in Sandwich Bag

Mothproof storage of woolen yarn, gloves and other small items is attained by placing the material together with several moth balls in a wax-paper sandwich bag. The open end of the bag is sealed with cloth or cellulose tape. Not only are the contents of the bag protected in this way, but they are prevented from becoming breeding places for moths which are likely to infest larger garments.

Helen Lemberger, Chicago.

Chemical "Ferret" for Deep Holes

Animals can be routed from the deepest den in a few minutes without digging or drowning if this chemical ferret is burned in the hole. To make the ferret, saturate 6 x 6-in. squares of Canton flannel with a solution of potassium nitrate (saltpeter), 1 part, and water, 2 parts. After the squares have dried thoroughly, sprinkle the rough side of the flannel with a finely ground mixture of cayenne pepper, 1 part, dry mustard, 1 part, and sulphur, 3 parts. Roll the pieces of cloth, similarly to rolling a cigarette, and cement the loose edges in place with waterglass. To use, ignite one end of the roll and push it as far down into the hole as possible. The fumes given off by the burning mixture will quickly ferret the animal from its den.

R. A. Jenkins, St. Louis, Mo.

Improvised Door Bumper

If a door bumper is broken, the wall can be protected by this improvised bumper until a new one can be obtained. Cut one of the flanged ends from a thread spool and fasten it to the baseboard with a long wood screw. Then, simply press a crutch tip, if available, or a short piece of hose, over the end of the spool. Using the crutch tip and painting the exposed portion of the spool provides a suitable bumper that will give long service in proportion to its extremely small cost.
Carved WALL VASE

By Dick Hutchinson

If you'd like to try your hand at elementary wood carving, a pair of these unique wall vases provides a simple project for beginners. Some jigsawing also is required as well as practice in making a split turning. The vase is built up of three pieces (A, B and C) from black walnut and maple. First, a pattern of each cutout is made full size. Piece B, which forms the pocket in the vase, is cut from 3/4-in. stock, while the others are cut from 1/4-in. material. After piece B has been cut and sanded, its outside profile is traced directly on piece C. This establishes a guide line to follow in carving the outer edge in low relief, about 1/8 in. deep. Score the petals and leaves of the design with the point of a sharp knife and carve in bas-relief. Piece A is similarly carved, the inside area being marked off according to the pattern and given a tree-bark texture by taking small gouging cuts with a narrow gouge.

Now, the three pieces are glued together, centering and gluing piece B to piece C first. When in proper position, all three are glued and clamped together. Watch to see that they do not shift, and wipe off any excess glue. With piece C being smaller than piece B, a border of maple extends beyond the edge of piece A. The maple overlay pieces are added last. The piece at the top comes flush with the sides of piece B and the jigsawed cutout below it is merely surface-glued to piece A. The urn overlay is a split turning made by gluing two blocks of wood together with a thin cardboard inserted between them. This permits the turning to be parted in half with a knife.
Although designed primarily for summer cottages, these windows are suitable for installation in small ranch-type homes, particularly those with board-and-batten construction. From the outside, the louvered inserts appear to be ordinary window shutters.
THE REMOVABLE louvers of these novel windows not only add to the architectural lines by giving the effect of shuttered sash, but they also provide ample air circulation in summer and serve the purpose of storm sash in winter. As detailed, the frame is fitted with solid, hinged shutters with a painted decoration on the inside, Figs. 1 and 4, while the openings are closed on the outside by removable louvers made as in Figs. 2, 3 and 7. The frame must be large enough to accommodate both the window sash and the louvers, which fit into openings 6½ in. wide. Vertical members, or muntins, within the frame are dadoed into the sill and the stool is notched around them as in Fig. 3. The upper ends of the center members are simply toenailed to the upper rail of the frame. The single-pane fixed sash, Fig. 6, is fitted between the center frame members and is held in place with quarter-round molding as in section A-A. On the outside, the molding should be coped at the corners and attached with screws so that it is easily removed without damage. On the inside, the joints can be mitered and the molding nailed in place.

Note from sections A-A and B-B in Fig. 6 that the apron overlaps the stool, while the sill is nailed flat on the header, not tilted.
at an angle. There are two ways of installing the frame. Assemble the frame first, and then fit it into the wall opening, or simply build it into the opening piece by piece. If the latter method is used, set the sill and the headpiece first. Then fit the side members and also the center members in place.

The inside panels, Figs. 1 and 4, are hinged at the outer edge and swing into built-up frames as in Fig. 4. The frames are made by nailing and gluing together strips of two different widths, making a frame rabbeted on all four inside edges. Likewise, two plywood panels are fastened together to form a matching rabbet, section C-C, Fig. 4. Tight closure of the panel is made by means of a two-part hardwood latch in scrolled design. Construction of the louvers is detailed in Fig. 7. Grooves to take the louver slats are laid out on the uprights, or stiles, as in the detail. The slats are of 1/4-in. stock and the lower edges are beveled so that they are flush with the outer edges of the stiles when assembled. After assembly of the unit, the edges of the stiles are finished with half-round molding as in Fig. 2. Note that the molding is placed so that it overhangs the edges slightly. For summer use, screens are placed behind the louvers as in Figs. 2 and 5. In winter, the space can be closed by panels made by gluing together several thicknesses of felt paper. The louver unit is installed in the frame by placing the top end so that the short dowel enters the hole drilled in the frame. The bottom end is held securely in place by a single wood screw.
Combination Noted on Tape Label
When Storing Unused Padlock

After a combination-type padlock is stored for a considerable length of time, the combination is likely to be forgotten or mislaid. One of the easiest ways of keeping the combination with the lock and prevent its being lost is to print it on a strip of adhesive tape and stick the tape to the lock. When the lock is in use, the tape can be removed and placed in some inconspicuous spot for future reference.

Rotating Tether Prevents Tangling

Winding of a tether line around the stake often reduces the area of the yard capable of being covered by a watchdog or the grazing radius of a farm animal. This will be prevented and the animal allowed the full length of the rope if a rotating tether is used. The stake is simply a length of pipe or pointed rod which is drilled transversely near the upper end for two cotter pins. Washers and a rotating arm are slipped over the stake between the cotter pins as shown. The arm is bent from a piece of flat iron to fit loosely over the pipe. Two holes are drilled through the arm, one to permit riveting the two ends of the flat iron together and the other to allow fastening the rope to the free end of the arm.

Paper Cup Aids Transplanting

Starting small plants, such as tomato and cabbage, in wax-paper drinking cups facilitates transplanting, as the plants can be left right in the cup. Before setting the plant in the ground, the bottom of the cup is removed.

Handy Condiment Compartment Installed in Sink Cabinet

Owing to the construction of many wooden cabinet sinks, it is a simple matter to utilize the waste space in front of the sink basin in a convenient storage compartment for spices, salt and pepper. On this type of cabinet there usually is a panel directly in front of the sink and above the doors which is fastened from the inside and can be removed easily. All that is necessary to install the condiment shelf is to measure carefully the space between the sink basin and the front of the cabinet and then build the compartment to fit. Nail a backing of 1/4-in. plywood or hardboard to two side members of solid stock, nailing the latter to the cabinet posts. Then screw the shelf to the lower edges of the side members. Use the front panel to provide a door, mounting it on standard cabinet hinges and fitting it with a catch. A length of chain should be fastened at each end of the door to support it in the horizontal position. It will be necessary to bevel the edge of the rabbit at the top of the panel so it will not bind when closed.

John Dalen, Morton Grove, Ill.

Sample Checks Matching Paint

When mixing paint to match a color already applied, eliminate guesswork by drying a swatch of the mixed paint and comparing it with the color to be matched. Paint the sample swatch on a tin can or scrap of sheet metal and place it on a radiator or in the oven to speed drying.
LAY YOUR OWN

PART II

By Sam Brown

LAYING LINOLEUM on floors from wall to wall, and the procedures for laying the border and the border-and-feature-strip designs were covered in Part I last month. But that was only the beginning. Linoleum is supplied as either floor or wall tile to be applied in various sizes and pattern combinations and it’s also used for wainscoting, all-over wall coverings and counter tops. Such applications require somewhat different procedures.

Floor tiles: Linoleum tiles are easy to install over wood floors and, in some cases, over concrete floors that are dry at all times. The most common tile sizes are 9 in. square and 9 x 18 in. rectangular. The squares can be laid in one color only or in various patterns such as shown in Figs. 23 to 26 inclusive. Tiles are obtainable in a variety of plain and marbleized colors in standard linoleum.
LINOLEUM

and also in a special asphalt-base product. The latter floor covering is intended for use over concrete floors below grade, Fig. 21. The ordinary linoleum tile should not be laid on damp basement floors. On wooden floors, the tile is regularly applied over a felt liner which has been previously cemented to the floor. On concrete floors below grade no liner is used. Instead, the tiles are applied directly to the concrete, using a special cement which is proof against dampness. It is important that the floor over which the tiles are to be laid be made smooth and level.

Application of tile: Tiles usually are applied in a field-and-border design and the border width for any room is determined by using the simple calculation given in Fig. 22. After determining the border width required, the first border piece is laid out and cut, but is not cemented down. Then the second piece is left overwidth and is fitted to the second wall. The width of this piece is then marked at the point A, Fig. 23, and it is then squared by using the 3-4-5-ft. method, A, B, C, Fig. 28, or any other means which will assure a square corner. Never depend on the room being square. The second border piece is then cut and both the first and second pieces are cemented down. Now, start putting the tiles in place. Apply the cement with a toothed trowel over an area about equal to that covered by 8 to 10 tiles. Position each tile individually and press firmly in place. If
Standard wall linoleum comes 4 ft. 6 in. wide and is cemented directly to the wall, keeping it running level with a guide line marked on the wall. Detail shows how corner molding fits.

Top of linoleum is finished with cap mold.

Mortar "joint" is left on first piece. Mortar "joint" cut off.

Molding.

The field (room) is large, take a little extra time to square up smaller areas and then fill in these areas by working from outside to center as in Figs. 29 and 30. Wipe off all surplus cement with a damp cloth, and roll the tiles lightly as they are laid, using an ordinary rolling pin. Check carefully as each row of tiles is laid so that straight lines are maintained in both directions, Fig. 27. This precaution will assure that you finish with a straight line of tiles at the opposite walls. When the field is completed, scribe and fit the remaining border pieces. If you use a diagonal checkerboard pattern, the start in the corner is made with a quarter tile, Fig. 29. Of course, the edges will be finished with half tiles. Asphalt tiles will break cleanly along a scored line, but linoleum tiles must be cut through with a sharp knife. It will save time to make a simple wooden frame to serve as a template, or cutting jig, for this special purpose.

Wall installations: The standard material for wall application is linoleum sheets ruled into 4 1/2-in. squares. Usually the sheets are 4 1/2 ft., or 54 in. wide. If the baseboard is level, the job is simple. Always check the room and the baseboards with the level first. If the baseboard is not level all around then it will be necessary to scribe a leveled line around the room a little less than 4 1/2 ft., or the width of the linoleum sheet, above the top of the baseboard. The top edge of the linoleum is fitted to the line, Fig. 32, and the bottom edge is...
Above, counter installation is made over a duplex felt lining. After the lining is fitted, it is used as a pattern for marking and cutting linoleum as at right.

scribed to fit the baseboard. Joints should be butted, Fig. 33, and if there is an outside corner, Fig. 31, it is fitted with a metal or plastic molding after one of the walls has been finished. The adjacent wall is then fitted and the edge is underscribed to fit the molding, Fig. 34. Inside corners can be butted, although special metal moldings available for this purpose may make a neater job. After the linoleum has been applied to all the walls, the job generally is finished with a metal cap strip as in Fig. 35. Wooden strips and matching linoleum strips sometimes are used. If the baseboard is fitted with a top molding, this should always be removed before fitting the linoleum. In this case, rough fitting at the bottom edge is satisfactory as the edge will be covered when the molding is replaced. If the original baseboard is badly scratched it may be replaced with a new matching baseboard of rubber or plastic. These baseboards usually are applied with special cement.

Counter tops: Counter-top jobs call for the best-quality linoleum and careful workmanship. It’s common practice to lay the linoleum top over a felt liner, which provides not only a good cementing base but also a template for cutting the linoleum accurately. Start the job by installing all metal trim, Fig. 36. Then, if the linoleum is to extend up the wall to provide a splash back, apply a flexible plastic cove strip in the corner between the counter top and the wall. Next, fit a length of liner felt 1/2 in. short at the corners, edges and metal trim. Do not cut out for the sink well; this will be taken care of later. After rough-cutting the felt, fasten it securely with thumbtacks so that it will not move during the scribing operation which is to follow. Be sure that
the felt is pushed tightly against the cove strip. Set the scribe (dividers) to approximately a 1-in. opening and scribe up to all edges except the sink well and the front edge, Fig. 38. Now, remove the felt and spread it over the linoleum. Tape it in place to prevent movement. Then, with the same divider setting, retrace the scribed lines to transfer the outline to the linoleum as in Fig. 37. Next, place the felt back on the counter top and fit it carefully to the flanged metal trim. Then cement in place, using a moistureproof cement. Cut the linoleum to the scribed lines, spread moistureproof cement over the felt, Fig. 38, and roll the linoleum in place. Make certain of a good contact over the cove strip in the corner. Go over the entire linoleum surface with a rolling pin to assure perfect contact. Underscribe the overhanging front edge and roll it down last. Cut out the sink well with a sharp knife about 1 in. oversize. Then underscribe to a neat fit in the sink-top molding as in the lower detail, Fig. 39, and also in Fig. 40. For this particular work

**Patching:** Very often existing linoleum installations on floors, walls and counter tops can be made to give much longer service by patching the worn areas. Greatest wear comes in narrow traffic lanes through doors, in front of the kitchen stove and sink, and also on the counter top at both sides of the sink. Since most linoleum patterns are stock items, it generally is possible to purchase the amount necessary to make the repair. If the linoleum is figured, be sure to allow material for matching the pattern. Cut out the worn area, following the pattern lines wherever possible. Then match the new piece over the opening. Fasten with thumbtacks or tape and rough-cut to about 1 in. oversize. Then use the underscriber to obtain a perfect cutting line. Spread cement in the open area and press the patch firmly in place, rolling it down until it makes full contact. Clean up all excess cement and, finally, rub lightly with fine steel wool to dull the surface so that it will match the old as closely as possible.

THE END
Twin-Ball Letter Holder

HERE'S something decidedly different in a letter holder for your desk. Two wooden balls of equal size resting in a dished base, Figs. 2 and 5, automatically expand to accommodate one or more letters. Resting on a concave surface, the balls provide a constant inward pressure to grip the envelopes firmly. The sectional drawing in Fig. 3 shows the contour to follow in dishing the base. The work is mounted on a lathe faceplate, Fig. 1, by first gluing it to a scrap block. A piece of paper or thin cardboard inserted between the work and the block will permit separating the two easily with a knife blade after the turning is completed. The balls should be turned as near to a perfect sphere as possible, using a cardboard template as a guide. The balls are first rough-turned between centers, Fig. 4. Using a four-jaw chuck to hold the work permits backing away the tail center and turning the outer end. To finish off the chucked end, a wooden chuck is made by turning out a soft block to a radius slightly less than the diameter of the ball and pressing the ball firmly in place.

MARCH 1950
Lightweight Cupboard Tongs of Duralumin
Reach High Shelves in Cabinet Kitchen

You don't have to climb a ladder or stand on a chair to take canned goods off an upper cabinet or pantry shelves. Just use a pair of these easy-to-handle tongs which can be made quickly from lightweight duralumin. The metal is bent as shown in the detail and the two parts are riveted at the center, a washer being inserted between them for smooth operation. In this way, a positive gripping action is attained, causing the arms to grasp the can firmly when the handles are held closed. Note that the arms of the tongs are curved slightly and that a piece of rubber tubing is pressed over the ends.

Several Needles Previously Strung on Thread Save Time When Sewing

Sometimes when you have a few minutes to spare, why not thread five or six needles on each spool of thread that you use frequently. Then, when you're in a hurry to finish a particular job of sewing, you won't have to bother threading needles. Just use the first one threaded on the spool, slipping the others down the thread and using them in succession as needed. If your vision is such that it is difficult to thread a needle, it is helpful to have someone else thread a number of them so you will have a supply of threaded needles on hand.

Mrs. Nancy Smith, Camden, N. J.

Lead Screw Draws Special Expansive Bit Through Cross-Grained Wood

When drilling large-diameter holes through floor joists, one plumber found that the lead screw on the ordinary expansive bit lacked sufficient "bite" to draw the bit through, especially when drilling in cross-grained wood. To remedy this trouble, he made a special bit having a wing-type cutter with the same general clearance and cutting-edge characteristics as the one furnished with the regular bit, but having a lead screw turned on the body of the bit so that it would follow a pilot hole of the same diameter as the body. The body and shank of the bit are turned from tool steel and the body is shoulder and threaded for about half its length, the thread running back from the outer end to the shoulder. Next, the body is drilled transversely to provide an opening for insertion of the wing cutter, which is ground and filed to shape from tool steel. A second hole is drilled into the first one at right angles and tapped for a headless setscrew to hold the wing cutter in place. To use the bit, first drill a pilot hole clear through the wood, the pilot hole being of the same diameter as the body of the bit measured at the bottom of the thread. Then insert the threaded end of the bit in the hole and turn the brace slowly until the threads "take" in the wood. While an auger-bit brace will serve for ordinary work, the short-handed ratchet illustrated is best in places where movement is restricted.

CURIO CABINET

Colonial both in design and finish, this little curio cabinet provides an appropriate setting for displaying your treasured bits of bric-a-brac. Typical cabinet joinery is used, a right and left-hand side member being cut first from maple or birch and rabbed along the rear edges for a ¼-in. plywood panel. Except for the shelf above the door, all others, including the top and bottom of the cabinet, are cut the same size. The scrolled valance, which frames the open shelves, is built-up from four separate pieces, the side strips being bandsawn from stock 2 in. wide. The side pieces are joined to the top and bottom scrolled pieces with mortise-and-tenon joints and then nailed to the face of the cabinet flush with the sides. Finally, the top is finished off with a cove molding, and the bottom is fitted with a raised-panel door, being built-up as detailed and hung with wrought-type hinges. A bullet friction catch holds the door shut.

Norbert Engels, South Bend, Ind.

Furniture you Can Build P 139
Bench Jig Aids Sanding End Grain

In order to facilitate holding work on the bench top while sanding the end grain, one craftsman made this sanding jig simply by nailing a cleat to a rabbeted board. The cleat provides a fence against which the work is held and a sanding block is moved back and forth along the rabbet. A nail, dropped through a hole in each end of the jig so that it engages a hole drilled in the bench top, holds the unit stationary while the work is being sanded. The sanding block is made by wrapping a strip of sandpaper around a block of hardwood and tacking it at the back. Note, however, that the lower portion of the block is not covered with sandpaper.

Lorenzo Daniel, Ciego de Avila, Cuba.

Cutting Glass Jars and Bottles

To do a fast and neat job of cutting the top from a glass jar or bottle, try using oil and a heated steel rod. Fill the jar with oil to the point at which it is to be cut. Then, holding a length of steel rod with a pair of pliers, heat the rod to a cherry red, and immediately quench it in the oil. In most cases, the glass will break at the level of the oil.

Paul H. Will, Chicago.

Folding Tablecloth for Storage

After washing a tablecloth that is used only on rare occasions, fold it wrong-side-out for storage. Then, if the creases become soiled, the spots will be on the underside of the cloth when it is placed on the table.—Pat Fey, New York City.

Repairing Worn Shock Arms

Unable to purchase new control arms for the rear shocks on my 1939 Oldsmobile, I repaired the old ones with rubber bushings of the type found in the rear-spring shackles of late-model Chryslers. I forced the bushing over the stud and pressed the control arm over the bushing. Lubricating the bushing with vegetable-oil soap or graphite aids in slipping the control arm over it.—Coolidge T. Braley, Oswego, N. Y.

Woodenware should not be placed near the fire to dry, as it is likely to crack.

196
LAMP COSTUMER
For Children

LITTLE folks soon learn to keep playrooms in order when they have this novel lamp costumer which not only provides four hangers for child-sized garments but serves as an attractive floor lamp as well. Four elephant cutouts stand patiently on the base with heads bracing the lamp column. Note that the column is made from two strips, each grooved lengthwise to take 1/8-in. pipe which holds the assembly together and houses the wire, the strips being glued together to form one piece. Join the parts of the base as shown in the pull-apart detail. Round or chamfer all exposed corners and assemble and wire the lamp as indicated. Bandsaw the elephant cutouts and join them to the base and column with dowels and glue. Paint or stain to suit. I. M. Fenn, Chicago.
FLOWERPOT SAUCERS that are both attractive and waterproof can be made quickly from disks of aluminum foil. Disk is cut slightly larger than base of the pot and formed between two jar lids, crimping the edge.

Solving HOME PROBLEMS

REMOVING LINT FROM CLOTHING is done in a jiffy with cellulose tape. Wrap the tape, sticky side out, around the finger and then stroke the fabric lightly.

TO INSURE THOROUGH POPPING of popcorn, pour the kernels in a glass jar, cap tightly and chill in the refrigerator for at least an hour before popping.

STRAIGHT SEAMS ARE EASY TO SEW if a strip of adhesive tape is used as a guide. Stick the tape to bed of machine and guide seam along edge of tape.
EDGE OF SHELF PAPER REINFORCED with cellulose tape gives longer service without becoming curled or frayed. Tape also minimizes chances of tearing.

BEATERS CAN BE WASHED right in the bowl of an electric mixer by adding soap-and-water solution to bowl. Run the mixer at low speed.

ADHESIVE TAPE CLEANS GRIT from the teeth of a fingernail file. Tape is pressed over the teeth of the file and pulled loose, repeating if necessary.

HIDDEN GARBAGE CONTAINERS held with metal brackets on inside of sink doors are out of sight and yet always conveniently at hand.

FOR HANGING SLEEVELESS DRESSES, crimp the arms of a wire coat hanger so the straps will not slip off. Wire is crimped easily with a pair of pliers.

HANDLE OF DISCARDED TOOTHBRUSH forms excellent tool for threading ribbon through drawstring top. Handle is cut off and rounded.

MARCH 1950
Novelties Lettered With Noodles

Teen-agers in many parts of the country are going overboard for these clever initialed noodle pins. A pin can be made in a few minutes by cementing alphabet noodles to a wooden or colored cardboard backing, the wood being stained or the noodles colored to gain a variety of attractive combinations. Sections cut from ice-cream sticks or small tree branches form excellent backings, or they can be made by gluing together pieces of toothpick cut to the proper length. After the front portion of the pin has been completed, it is cemented to a scrap of wood or plastic. The latter is grooved on the underside and fitted with a safety pin for attaching to the garment.


Teaspoon Forms Perfect Mold For Casting Fishing Sinkers

Filling an old aluminum or steel teaspoon with molten lead is a quick way of making snapproof sinkers. First drill a hole near the tip of the spoon and press a nail through the hole from the underside. The nail should be a snug fit in the hole. Pour the lead into the spoon and, after it hardens, pull out the nail with pliers. Then tap the lead from the spoon and you will have an oval-shaped sinker with a hole for the line near one end. If still larger sinkers are desired, use a tablespoon for the mold.

Striped Luggage Identified Quickly

To save time and confusion when retrieving your luggage at an airport or railroad station, mark both ends of each bag with a clearly visible stripe. If the stripes are located the same distance from the bottom on all pieces, the group of luggage is extremely easy to spot, as shown in the photo. Use white or colored cloth tape or aluminum paint and make the stripes wide enough to be unmistakably identified from a considerable distance.

Robert Hertzberg, Jackson Heights, N. Y.

Salt Removes Fresh Ink Stains

It's a good idea to keep a container of table salt in one of the drawers of your writing desk, as the salt can be used to remove ink stains providing it is applied im-

mediately. As soon as ink is spilled on the rug, sprinkle the spot liberally with salt. After the salt has soaked up a considerable amount of the ink it is swept up and fresh salt applied to the spot. The second application of salt is removed and then foamy rug cleaner is applied to the remaining spot. Even stains from permanent-type inks can be removed if this treatment is applied before the ink has had a chance to dry.
Motorizing an Old Reed Organ

Why permit that heirloom organ to gather dust in the storeroom or basement when you can easily motorize the foot-operated bellows mechanism and enjoy reed-organ music at its best? On most old organs of the foot-operated type very few changes are necessary to adapt the instrument to a motor-driven bellows. You'll need a vacuum-cleaner motor of the type having the fan housing attached directly to the motor housing, as shown in Figs. 1 and 4. It's a good idea to have this unit on hand before you begin work. Then turn out the screws that hold the back of the organ cabinet in place and remove the back entirely so that you can get at the works from both the front and back of the cabinet. Nearly all old organs are fitted with two bellows, a large and small one, mounted separately. Remove these carefully to avoid damaging any other parts. Usually, the reed-and-valve

On old organs of the type shown below, air was supplied to the reeds by pumping the treadles. Very few basic changes are necessary to install a motor-driven exhaust blower, thus relieving the organist of the labor of operating the bellows by foot power alone.
The opening in the front of the organ where the pedals were removed is filled in with wood finished to match the rest of the cabinet as closely as possible.

Above, the underside of the valve-and-reed shelf must be covered with a plywood panel to replace old bellows assembly. Below, blower unit is shown.
hole in the bottom of the air box near one end and force-fit a short length of 2-in. thin-wall brass tubing in the hole. Then glue and screw the box to the bottom of the shelf as in Fig. 1. Just how the air duct and reed assembly are attached to the shelf will depend on the construction of these units. If possible, attach the parts to the shelf with screws and glue. In any case, the joint must be made airtight; if no other method can be used, apply adhesive tape to close open joints.

Fig. 4 details the construction of the blower unit. First, build a plywood box of approximately the dimensions given (these may have to be altered somewhat to suit the space available) and line it, top, bottom, ends and sides, with softboard as shown. The motor unit is spring-mounted in flat-iron brackets attached to the auxiliary plywood bottom of the box. In attaching the coil springs to the motor, it may be necessary to drill and tap the end housing for small screws. Detail A shows how the springs are attached in the four corners of the rectangular bracket. The fan housing is supported on two coil springs attached by means of short screws inserted through the spring eyes and turned into holes drilled and tapped in the bottom of the housing. Build the labyrinth in one end of the box as shown and drill four 1-in. air vents in the end of the box. Then wire the motor as in the wiring diagram. The 60 and 100-watt lamp bulbs are wired in the circuit to serve as resistors and reduce the speed of the motor. The motor is controlled by a toggle switch mounted on a panel near the keyboard within easy reach of the organist. Locate the blower unit in the bottom of the cabinet and anchor it firmly with screws driven through angle brackets. Connect the air box to the blower with light rubber hose and an elbow as shown in Fig. 4. Then replace the back panel.

The treadle opening in the front of the organ cabinet should be closed with a single panel cut from wood that can be finished to match the cabinet, Fig. 2. As a rule, the organ cabinet will require refinishing and generally one will be well repaid for the extra work as the cabinets of the better-grade instruments were made from fine cabinet woods with elaborately carved and scrolled parts. In refinishing, remove front panels, the music rack, keyboard cover and other parts readily removable and finish these separately. Usually, refinishing is simply a matter of softening the old finish with a suitable varnish remover and then scraping, sanding, staining and varnishing the parts to restore the original grain and color of the wood. Of course, if the wood is open-grained, such as oak or walnut, it may also be necessary to apply a wood filler.

This handy container of clear plastic stores artist’s brushes horizontally so they will dry without paint seepage into the ferrule. The box is ventilated to speed drying and, being transparent, allows the contents to be seen at a glance. The box is made from sheet plastic bent around two endpieces and cemented in place. The plastic lid slides in grooves cut lengthwise in the sides of the container just above the endpieces. The grooves are cut before bending the plastic. Note that ventholes are drilled in one end of the lid and a small block of plastic is cemented near the other end to provide a handle to facilitate opening the lid.

**Umbrella Rack for Baseboard**

A neat-appearing and convenient umbrella rack is had in a jiffy by nailing a length of board to the baseboard of the front hall or closet. The board is handsawed as shown and drilled between the scallops to receive the umbrella tips. The bottom edge of the rack can be shaped to fit over the shoe mold or the latter can be cut away so the rack fits flush with the flooring. After installation, the rack is painted to match the baseboard. Be sure that the umbrellas are completely dry before standing them in this rack.
Chinese-Modern "FIRE SCREEN"

FROM a decorative standpoint, the blackened interior of an unused fireplace is an eyesore, especially during spring and summer months when color is necessary to give a new lift to old surroundings. That's when you need this attractive trellis "fire screen" to camouflage the opening. Chinese in motif both in color and design, the screen, when augmented with a growing or artificial vine, provides a smart summer treatment for an uninviting fireplace. The outer framework of the trellis is mortised at the corners. Then the diamond shape in the center is fastened with long screws and the remaining parts with corrugated fasteners. The back of the trellis is covered with hardware cloth which is painted black to contrast with a Chinese-red framework. The base and shelf of the screen are cut from plywood, and the wooden flower box, mitered and splined at the corners, is fitted with a copper lining. The flower box and shelf are painted black to set off the red.

Furniture you can Build p. 83
Kept within easy reach on a bedside table, this handy little night light turns on as soon as it is lifted. Two plungers fitted in the base raise the battery away from the contacts when the light is resting on the table. When it is picked up, the plungers drop and lower the battery, allowing the terminals to make contact. No dimensions for the lamp are given, as these are determined by the size of the battery used. Note, however, that there must be no side play for the battery so the terminals will not slip off the brass-screw contacts. Also, the height of the battery case must be sufficient to permit the battery terminals to clear the contacts completely. On this type of battery, one terminal usually will extend across the face to the second terminal, and the long one should be cut off as shown. The contact for the base of the flashlight bulb is a brass wood screw driven through a square piece of wood which is glued inside the lamp upright. The wood is notched for a wire which makes contact with the threaded portion of the bulb. The entire unit is of simple box-type construction and can be made of plywood or scraps of solid stock, using quarter-round beading to enhance the design. The plungers can be turned from wood or metal or made by gluing a disk cut from a ½-in. dowel to a length of ⅛-in. dowel.

Peter Adamidis, Cairo, Egypt.

Retractable Clothesline for Low Basement Stored Against Ceiling Joists

If there is not room in the basement for a separate area used exclusively for hanging wash, it usually means that the clothesline must be taken down after every washing. To save time, one homeowner installed this retractable clothesline which is a permanent installation and is merely pushed up against the ceiling joists and out of the way after the wash is taken down. Each end of the line is fastened to a length of pipe which slides up and down in a wooden hanger. The latter is a piece of 2 x 4 drilled for the pipe and mounted on the side of a joist with wood screws. A stop pin keeps the pipe from being pulled out of the hanger. Note that a tension spring is installed at one end between the line and the pipe to hold the line taut.

Joseph L. Jehlicka, Chicago.

The interior of a refrigerator can be deodorized by washing it with soapy water containing a teaspoonful of dry mustard.
As a surprising climax to your next informal party, play back a candid recording of the evening's conversation. Without a doubt the playback will provide some lively entertainment, especially if you have carefully planned the recording beforehand. Of course, in making candid recordings the trick is to carry out the whole procedure undetected by your guests. With a small group this is easy to do, but recording large groups requires a planned program. Acting as host, you also can fill in as master of ceremonies, directing the conversation to hold the attention of all and keep them grouped together before the concealed microphone. Usually the recorder can be located in an adjoining room where it is not likely to be discovered, but concealing the mike in the average home calls for some ingenuity. Sometimes a small radio set will solve the problem. Just remove the back of the cabinet, fold the radio cord inside, place the mike in the cabinet and there you are. Floor-length draperies and draw curtains offer good hiding places for both mike and cord. The cord is not likely to attract attention if carefully placed along the baseboard, around a doorjamb or run from the wall outlet to the radio set in
which the mike is hidden. If any of the guests attempts to turn on the radio you can always explain blandly that the set is temporarily out of order.

Ordinarily, a lamp offers the best place for concealing the microphone, particularly if it is a small lamp of the novelty type. It can be placed anywhere in the room, and, even if unlighted, it is the least likely of any of the common household objects to attract the attention of the guest who may suspect that you are up to something unusual. Methods of concealing the microphone will depend on the construction of both the lamp and the microphone, but the photos at the right suggest two practical ways of doing it. In one instance, a dummy "lamp" is made from the mike stand by covering the base of the stand with the bottom cut from a tin can. The column of the stand is covered with a decorated paper tube and the setup is finished off with a small cloth lamp shade. The open top of the shade is covered with matching cloth. Another method makes use of a novelty lamp with a tubular shade. Fold the lamp cord into the base and attach a wire bracket to the base in such a way that it will provide a support to which the mike can be fastened with a rubber band. On some occasions it is possible to conceal the mike in your shirt pocket. This works especially well when recording conversation of the players and comment of the kibitzers at a lively card game and for picking up idle, off-the-record chatter around the basement playroom. Here, you either must be seated or standing behind a table or counter in order that the mike cord can be concealed in the clothing.

Although the microphone, which comes with the recorder as standard equipment, generally can be used for candid recording, the nondirectional mike is more versatile, as it will pick up sound from all directions. Of course, distance and background noise must be considered in planning the setup. The flat, semidirectional mike, shown in several of the photos, also is satisfactory where the sound comes from one general direction over a wide angle, as from a large group. In handling larger groups, try to locate the concealed mike so that everyone present can be induced to cut his share of the record at relatively close range. At large gatherings it seldom is practical to record everything being said at any one time. Although not essential for good recording, a preamplifier, shown in one of the photos, will increase the range of the recording set.
Fastened to the studs of a garage wall, a piece of poultry wire provides a handy rack for hammers, wrenches and other hand tools. Even screwdrivers and chisels can be hung on the rack by threading their blades between the sections of the wire. The wire is held in place by thin wooden strips nailed to the edges of the studs so that the nails engage the wire mesh.

**Screwdriver Made From Knife**

Instead of throwing away a broken or worn out kitchen knife, use it to provide an extra screwdriver for the shop. Cut the knife blade to the desired length and grind the remaining portion to shape, making the tip of the blade the required size.

S. S. Palestrant, Bronx, N.Y.

**Ribbon Sewed to Handbag Holds Door Keys**

To eliminate rummaging through your handbag for the house-door keys, tie them to a ribbon so they can be pulled from the bag in a moment. Select a ribbon that matches the handbag and loop one end around the handle, sewing it tightly in place. Then thread the keys on the ribbon or lace them to the free end. The ribbon should be long enough to permit inserting the key in the lock without difficulty.

Michael Ligocki, Gary, Ind.
On-the-Spot DARKROOM

When it is important that you come back with a picture and the chance of retaking the same shot later is out of the question, an on-the-spot darkroom will enable you to see the results right away. This portable one doubles as a carrying case for all the processing equipment needed, with room to spare for the camera. The details below show how the two-part case is built from ¼-in. plywood and made light-tight by covering the outside with balloon cloth. Elastic in the hem around the handholes makes the trap lightproof and allows the film to be loaded into the tank without the slightest danger of fogging it.

Austin H. Phelps, Omaha, Neb.

In any photographic work requiring the developing of exposed film on the spot, a portable darkroom unit of camera-case size is an essential part of the photographer’s equipment. This one provides both developing facilities and space for camera and film.
Removing Lint From Matte Prints

Lint from drying blotters sometimes sticks so tightly to the surface of matte prints that it is almost impossible to brush off. A quick way to remove these stubborn particles of lint is to tap the surface of the print gently with the sticky side of a strip of cellulose tape. The tape can be handled easily if wrapped around the fingers as shown in the photo.

Virginia Hanson, Santa Monica, Calif.

Curled Prints Pressed Flat With Household Iron

If your darkroom equipment for processing photos at home does not include an electric print drier, the household iron can be put to work to press the curl out of blotter-dried prints. Simply place the print face down on the ironing board and press the back with a medium-warm iron. If a steam-type iron is used, the result will be a print as flat as starched clothing.

Baking Soda Neutralizes Hypo In Developing Tank

To make sure that any traces of hypo left in a roll-film tank will not contaminate the developer the next time the tank is used, I always rinse the tank with baking soda before putting it away. To do this, place a pinch of common baking soda in the tank, fill it with water and place the reel in the tank. Let it stand for a few moments and then wash the tank and reel in running water. Washing will usually remove all traces of soda, but even if some remains, the soda will not contaminate the developer as will the acid from hypo.

Richard Hanscom, Elmhurst, Ill.

Paper Clips Furnish Hangers For Drying Negatives

When drying a number of cut-film negatives, use paper clips to suspend them from a length of cord. These clips are inexpensive, and are easily slipped over the cord and clamped to the negative. Also, they make a smaller hole in the corner of the film than standard hangers.—Jeanne Stasack, Chicago.

Wax Paper Seals Developer Bottle To Prevent Rapid Deterioration

Few persons realize how rapidly stock developer deteriorates when the bottle in which it is stored is not capped tightly. Contamination from the metal cap itself, caused by corrosive action of the chemical, also contributes to early deterioration. A simple way to assure a tight seal and protect against corrosion is to place a couple of pieces of wax paper over the mouth of the bottle before capping.
There are no harsh shadows in your pictures when you shoot them through this "cake pan" photo reflector. Encircling the lens, the reflector flood the subject evenly from all angles. The original was designed to hang right on the tilting front of a view camera, Fig. 2, by means of brackets A and B, Fig. 1. However, a floor stand of ½-in. pipe and fittings can be made to support the reflector in front of the camera. In either case, bracket B is bolted to the rear side of the reflector as shown in Fig. 1. Ten auto taillight sockets are installed in the bottom of the reflector. Holes are made for these in the metal and also in an insulating ring of sheet asbestos which is pressed in the bottom of the reflector before the sockets are soldered in place. Note how the sockets are wired in series, using regular asbestos heater cord. Each socket is fitted with a 100 or 300-watt projection lamp.—Del Naylor, Chicago.
Auxiliary Right-Angle Viewer Makes Candid Shots Easy

Taking candid shots of camera-shy children and adults without their knowledge is a lot of fun with this little right-angle viewer. Inserted in the regular view finder, the auxiliary one permits the camera to be focused and aimed in the normal manner, except that it is done from a side position. To the unaware subject, this makes it appear that the camera is being pointed in another direction. Thus, the subjects are completely at ease, their expressions are natural and their antics sometimes are surprisingly funny. The viewer consists of a small triangular-shaped block of wood which is cut to fit the camera view finder. One face is cut at a 45-degree angle and a small piece of mirror taken from a woman's discarded compact is cemented to the surface. As the auxiliary viewer simply wedges in place, it can be easily removed when not used. —Bob Hurst, Chicago.

Template Aids Trimming Photos

If it is necessary to cut a number of different photos to the same size and shape, use a sheet-plastic template to speed the job and save marking the print. As the plastic is transparent, it is easily positioned on the print. A coating of rubber cement applied around the edges of the template will keep it from slipping out of place while the photo is being trimmed.

Testing Condition of Hypo Solution

When in doubt as to the condition of a hypo bath, you can test it quickly with a 20-percent solution of potassium iodide. Using a medicine dropper, place a drop or two of the solution in the hypo bath. If a white precipitate forms, place a drop or two of the solution in the hypo bath. If a white precipitate forms, the hypo should be discarded—if not, the quality of the hypo is still satisfactory.

Agitation Improves Negatives

For consistently good results when processing negatives, it is important to agitate the film during development. One of the best methods of agitation is to lift the film entirely out of the developer and allow it to drain for a few seconds. This should be done once every minute during the period of development, as it insures that the film comes in contact with fresh developer after each draining. If draining the film is adopted as a standard procedure, the results will always be the same.

Ferroteype Tins Cleaned Thoroughly With Soapless Detergent

Ferroteype tins may be cleaned thoroughly without leaving an oily soap film if they are sponged with one of the soapless detergents now in general use. Work some of the detergent into a water-soaked sponge to make a rich lather and then rub the lather over the tin. Rinse the tin with clear water when finished.
Make your own TRANSFORMER

By Harold P. Strand

PART II—BUILDING

AFTER careful study of basic transformer design given last month in Part I of this story, you are ready to take up the actual building of a transformer. Although the information can be applied to the design of many other sizes and types of transformers, the calculations given will be used as an example.

The first step in building a transformer is the selection or making of the laminated iron core. Standard E-shaped pieces of iron for this purpose may be purchased or the iron from a burned out transformer may be used. The core can also be made of sheet-metal strips. In either case, the estimated size of the finished coil must be known, so the window openings of the core can be checked for sufficient clearance. The coil will consist of primary and secondary windings of wire, several layers of insulating paper and a wrapping of white cotton tape applied around the completed coil.

To calculate the cross-sectional area of the wire coils, refer to the table, Fig. 7 of Part I. The No. 19 wire to be used for the primary is listed as having 665 turns per sq. in. Dividing the 300 turns needed by 665 gives .451 sq. in. The No. 23 wire is listed as having 1600 turns per sq. in. Dividing 636 by 1600 gives .397 sq. in.
Adding these two figures makes a total of .848 sq. in. required for the wire coils. An additional 25 percent of the area needed for the wires (in this case, .212 sq. in.) will take care of the space required for insulating material. This will give a grand total of 1.06 sq. in. of window space needed for the completed coil. Since the window openings of the core iron selected for this transformer, Fig. 9, are $\frac{5}{8} \times 1\frac{7}{8}$ in. or 1.17 sq. in., the coil should just fit, provided the turns of wire are wrapped tightly and are close together.

To wind the coil, a form as shown in Fig. 10 will be needed. The dimensions of the form should be carefully figured in relation to the size of the laminations. The dimensions given are suitable for the laminations shown in Fig. 9. The coil can be wound by hand or with a hand drill clamped in a vise. However, considerable time can be saved if the form is mounted in a lathe equipped with a turn counter. The counter, shown mounted on the lathe bed, Fig. 8, is driven by a tight-fitting rubber vacuum-cleaner belt which fits over a 1-in.-dia. wooden pulley on the counter shaft and a groove turned in the hub of the lathe chuck. Both pulley diameters must be the same size to assure an accurate turn count. The center block of the form is first wrapped with one turn of flexible armature paper of .010 in. to .015 in. thickness. The start end of the wire coil, which should be about 6 in. long, is fitted with a sleeve of cotton insulating material.

After winding on the 300 turns of the primary coil, snip off the wire, allowing about 6 in. for a lead. Cover this with cotton sleeving and run it out from the coil through a slot in the narrow side of the form as indicated in Fig. 10. A piece of tape is then placed across the top layer of wire and under the lead wire. Fig. 11, for added insulation. A quick check can be made at this time by holding one of the E-shaped laminations against the coil as in Fig. 12, noting the diameter of the coil in relation to the window openings of the core. Next, place one turn of insulating paper around the primary windings, and over this the 636 turns of the No. 23 wire for the secondary coil. A piece of cotton sleeving should be used around both leads of the secondary coil and carried out through the slot in the narrow side of the form. Some transformer designs call for a fairly heavy wire with only a few turns involved. If the wire is too heavy to wind easily, two wires having a cross-sectional area equal to that of the single wire may be paralleled or wound side by side for easier winding. A neater and more uniform winding will result if a hammer and a
block of wood are used to tap the turns in place after winding each layer. Another block of wood placed under the form and resting on the lathe bed will offer a support while tapping the turns of wire.

After both coils are wound, the form and coils are removed from the lathe and four lengths of string drawn through the four slots and grooves of the form with a wire as shown in Fig. 13. The coils are then tied tightly together and the form separated. Care must be taken when knocking out the center block to avoid disrupting the shape of the coils. After this, the coils are wrapped with 3/4-in. white, cotton coil tape as in Fig. 14. Cut and remove the strings one at a time as the strings are approached with the tape and secure the end of the tape with a needle and thread. Dipping the coils in insulating varnish is the next step. Use air-dry varnish and allow the coil to remain submerged for about five minutes so that it is thoroughly impregnated. Then hang it up to dry for several days in a hot, dry place. If the coil, after drying, is too large to fit the window openings of the laminations, reinsert the center block of the winding form and compress the coil in a vise between two pieces of wood, as in Fig. 15. Before assembling the core laminations, place thin pieces of fiber on the sides and edges of the coil that will be covered by the core.

The laminations are stacked around the coil in alternate positions. This is done by placing the center portion of an E-shaped lamination in the core opening, as in Fig. 16. A straight lamination is then butted against the edges of the E-shaped lamination on the opposite side of the coil. Then, the center portion of the second lamination is inserted in the core opening on the opposite side from which the previous E-shaped lamination was placed. Thus, the sets of laminations are assembled alternately until the full height is reached.

Next, four angle brackets are made from 1/4-in. flat iron. Two holes are drilled in each bracket to correspond with those in the laminations. Bolt the angle brackets to the core so the bent portion of the brackets will serve as feet on which to stand the transformer. To prevent a hum in the transformer due to loose laminations, cut two pieces of hard fiber the width of the lamination center legs, and force them down between the latter and the coil at both sides. Terminal lugs soldered to the ends of the four lead wires complete the transformer. When properly designed and built, a transformer should operate with moderate temperature rise and draw but little current from the line at no load.

THE END
Concrete Service-Entrance Ramp Poured on Hollow-Tile Fill

Cutting the heads from the nails if the latter are used. Finally, drill corresponding holes in the jamb to receive the ends of the pins, which should extend far enough to engage the holes when the door is closed tightly.—Dr. Bernard Matzen, Napa, Calif.

Special Watering-Trough Brooms Facilitate Cleaning

To facilitate sweeping litter from watering troughs, one poultryman made several small whisk brooms from the straws of a worn-out broom. He bundled the straws together and wrapped one end of the bundles with wire to form a handle about 1 1/2 in. in diameter. Wire unwound from the old broom can be salvaged and reused to bind the new ones.

Hi Sibley, Nuevo, Calif.

Connecting Rubber Tubing

Tight-fitting hose or rubber tubing is easier to slip over faucets or glass-tubing connections if the inner surface is lubricated with glycerin. Apply the latter to about the first 1/2 in. of the tubing.

Clamping Jig for Butt Welding Provided by Horseshoe

Two small C-clamps and a horseshoe form a jig for holding small pieces that are to be butt-welded. Simply assemble the jig as in the sketch, checking with a straight-edge to make sure that the workpieces are in line, with the ends butted squarely together before tightening the clamps.

Herbert E. Fey, New Braunfels, Tex.

Pins in Hinged Edge of Door Insure Against Intruders

A locked door that opens outward will do little to bar the entrance of an intruder, as it is a simple matter to remove the door if it is hung with loose-pin hinges. When a door of this type leads to the back room of a store, an office or a storeroom, it can be made considerably more burglarproof by pinning the hinged edge of the door to the jamb. Drill two small holes in the edge of the door, one near the top and the other near the bottom. Then drive a steel pin or large nail in each hole,
Addition of Special Anvil Adapts Micrometer for Measuring Tapered Parts

Job machine shops confronted with the problem of checking measurements on small lots of tapered parts, such as gibbs, often find the solution through a simple adaptation of an ordinary micrometer. Usually, blueprints and specifications of such parts require that the finish dimension be checked at the small end of the taper, and adaptation of the mike to this work requires only the substitution of a special tapered anvil in place of the regular anvil. The substitute anvil is made from tool steel and the frame of the mike is altered by first removing the regular anvil and grinding a shouldered flat, E-F, on the frame to serve as a seat for the tapered anvil. Next, a groove is milled lengthwise in the underside of the anvil piece, the dimension A on the milled groove being equal to the thickness of the mike frame. Then the piece is slotted to form surface G and milled to form surface C. The slotting cut should be deep enough to form a chip clearance between surfaces C and G as shown in the left-hand detail. Now, the partly finished anvil is seated on the mike frame and holes are drilled through the anvil and frame and reamed for taper pins. At this stage the anvil is hardened. After the anvil is pinned in place on the frame of the mike, the milled flat, B, is surface-ground to 90 deg. with the micrometer spindle and the angle flat, C, is finish-ground to the degree of taper required. Surface G is ground to bring its center line exactly on the axis line of the micrometer spindle. Then distance D is measured and an amount equal to this distance is removed from the end of the micrometer spindle by grinding. To assure accuracy in the altered micrometer, the finish grinds on measuring surfaces must be held to close limits.

D. E. McDonald, Ansonia, Conn.
THE HARDEST WORK of operating a tractor-towed grain combine—twisting and straining repeatedly to raise or lower the cutter bar—is eliminated with this simple electric control unit, which is operated by the flick of a switch. The unit consists of an old car-starting motor belted to a threaded shaft, which moves one end of the unit horizontally to actuate the raising-and-lowering mechanism of the cutter bar.

The method of mounting the unit on the combine will be determined by your particular machine. Any method can be used if you keep in mind the fact that the movable end of the unit must be attached to the raising mechanism in a manner similar to that of the lever for manual operation, which is disconnected. In some cases, it may be possible to connect the shaft to the arm of the mechanism where the lever linkage was removed. In the original installation, it was necessary to weld another arm to the mechanism as in Fig. 10.

A careful study of the top, side and front views in Figs. 1 and 8, the cutaway view, Fig. 9, and the perspective view, Fig. 10, will give you a good idea of the assembly. Figs. 2 to 6 inclusive give other views of the unit mounted on the combine. The blue portion of Fig. 10 shows the new parts that
were added to the original installation, and Fig. 9 details the screw portion of the assembly. When rotated by the starter motor, a threaded shaft inside the assembly moves a length of pipe in or out, depending on the direction of rotation, to actuate the raising-and-lowering mechanism of the cutter bar.

The outer housing of the assembly is a length of 2-in. pipe with a cap at one end and a reducing fitting at the other. The cap is bored in the center to take a length of 1 3/4-in. pipe as a sliding fit, and the reducer is fitted with a bronze bushing made to screw into it. A length of 1-in. shafting to provide a jackscrew is turned to a diameter of 3/4 in. at one end to form a spindle, which fits into the bushing, the length of the spindle being determined by the length of the bushing plus the thickness of a large pulley hub. The latter fits on the end of the spindle where it is keyed in place and belted to a smaller pulley on the motor shaft. The other end of the shaft is threaded for a distance of 5 in. to take a “nut” of similar length, which is made of bronze. The nut floats with a 1/16-in. clearance inside the smaller pipe where it is held by a pin and a pipe cap, the latter being bored for the shaft. The opposite end of this smaller pipe, which is a sliding fit inside the larger one, also is capped and a clevis or linkage welded to it for attaching to the arm of the fulcrum or lifting mechanism. The starter motor is mounted on this unit by means of a telescoping support, which is made of pipe as shown in the lower right-hand detail of Fig. 10, and then welded in place.
The photo gives a good idea of how the control unit appears from the front, and the photo below shows the location of the auxiliary battery.

Below, good view of the motor and pulleys used to operate the control unit. The size of the large pulley determines speed at which the unit will operate.

This type of support permits adjustment of the motor height to maintain correct tension on the belt.

Electricity to operate the starter motor is provided by a 6-volt storage battery, which is mounted on the combine frame, as pictured in Fig. 5, and charged by the tractor generator. The tractor battery could be used, provided it were heavy enough to take care of the extra load, but this would necessitate running two heavy starter cables from the tractor battery to the starter motor. Since these cables are quite expensive, it is better to use a separate battery.

The starter motor used must be of the type that can be reversed. The one used in the original installation was taken from a model-A Ford car. The wiring diagram for reversing the motor is shown in Fig. 7.
you do not feel capable of doing this job yourself, your local garage mechanic or electrician should be able to do it. Notice in the diagram that four solenoid switches are used instead of manually operated switches, the solenoids being mounted on the motor housing. This is done to avoid running a number of wires to a reversing switch mounted within convenient reach of the tractor driver. With this hookup, it is only necessary to run two wires to the reversing switch on the tractor. This switch is made as shown in the lower left-hand detail of Fig. 10. It is nothing more than a piece of fiberboard fitted with two brass-screw contacts and a brass lever, the latter being grounded to complete the circuit.

In this way, only three wires are required from the tractor to the combine, two to the switch and starter motor and one from the tractor generator to the battery on the combine. However, it will be necessary to use a heavy insulated wire to ground the frames of the tractor and combine together to complete the battery-charging circuit. When connecting the battery on the combine, ground the same side of the battery to the combine frame as is grounded on the tractor battery. With a hookup like this, you have two separate electrical circuits handled by one generator, hence the reason for grounding the frames of the combine and the tractor together.

If the control unit does not operate the cutter bar rapidly enough to suit you, use a smaller pulley on the jackscrew. A pulley 19 in. in diameter was found suitable on the original installation.
Bending Thin-Walled Conduit

An electrician designed this bender especially for making short-radius bends in thin-walled conduit without crushing or folding it. The shank of the bender is made from a length of flat iron. One end is forced into a 20-in. length of pipe and welded to form a suitable handle. The other end of the shank is heated and bent around a rod of the same radius as the conduit. Next, the shank is bent edgewise and offset bends are put in as indicated. Then a grooved pulley, or better, a rope sheave having a round-bottom groove of the same radius as the conduit, is attached to the shank with two bolts. In use, the bender is slipped over the end of the conduit and the handle is pressed downward to start the bend. By “inching” the bender along the conduit and applying the necessary bending pressure at regular intervals, uniform bends of almost any required radius are made easily.

Adolph Sprenzel, Chicago.

Spring-Cushioned Drawbar

When operating certain types of tractor-drawn farm equipment over rough ground or in terraced fields, a spring-cushioned drawbar snubs the violent forward and backward thrust on a loose-pinned hitch and also eases the tractor into the load without a sudden jerk when starting. It is especially useful on tractor trailers hitched either singly or in tandem. As pictured, two heavy L-brackets are bolted to the drawbar. The ends are drilled to take the rod which carries the coil springs and an eye or clevis-type yoke at the outer end. The springs bear against the brackets and also against stops on the rod to give both forward and backward snubbing action.

Mole Trap Weighted With Spikes

One farmer wired two spikes from an old spikedtooth harrow to his mole trap and thus considerably increased the effectiveness of the trap. Because of the recoil of the lighter trap, the animals often were able to wriggle free of the prongs. However, with the addition of the spikes, which weigh approximately two pounds each, much of the recoil is overcome, giving the trap a fast, positive action.—A. E. Holden, Angola, Ind.

Cleaning Rubber Stamps

Rubber-stamp lettering that becomes clogged and blurred can be cleaned quickly by stamping it a few times on the sticky side of a piece of cellulose tape. Stamp pads can be cleaned by pressing tape against them.—A. E. Howell, San Diego, Calif.

Creosote Dispenser for Cornfield

To keep chinch bugs out of a cornfield, use this handy dispenser for quickly applying creosote to a tar-paper “fence.” The dispenser is made by soldering two lengths of copper tubing to the sides of a gallon motor-oil can near the bottom. These are bent to direct a stream of creosote to each side of the fence simultaneously. The cover of the can is punctured to permit the entrance of air and allow the creosote to flow freely.
BANDSAWED "CASTINGS"

By Alexander Maxwell

Many parts that normally would be cast or forged can be produced quickly in the small machine shop, and even in the home workshop, simply by cutting them out with a bandsaw. Bandsawing is especially helpful where only a single part or, at most, only a few identical parts must be made from steel and nonferrous metals. The speed with which the average job can be done cuts production costs to the minimum. Intricate work involving short-radius compound cuts can be done on any small bandsaw by using the proper blade and reducing the wheel speed in accordance with recommendations which have been worked out by manufacturers of metal-cutting blades.

Typical examples of bandsawed metal parts are pictured in Figs. 1, 3, 8, 10 and 13. Note the intricate compound cuts, the neatly turned fillets and the precise short-radius cuts which have been produced in forming these parts by bandsawing. In some cases, the work will not even require filing or grinding unless, of course, it is necessary to ream bore sizes, break (round) corners or finish-grind a flat to serve as a working surface for succeeding operations. In most cases, sawing is done...
freehand as in Fig. 2, but on some types of work, particularly larger parts where involved short-radius cuts are necessary, special jigs and fixtures must be used to assure uniformity, Fig. 13. In freehand operations the sawing technique is simple but rather tiring for the operator, as the trick in producing clean cuts is in maintaining a constant and uniform pressure on the work. The importance of uniform pressure is shown in the left-hand detail in Fig. 2. Each saw tooth performs exactly like any edged metal-cutting tool when cutting thick stock. As each tooth engages the work it lifts a chip, curls it and carries it all the way through. If the pressure is uniform, the chips will be uniform in size and the edges of the work will be smooth but, if the pressure varies, or if the work is stopped momentarily, the blade will vibrate sidewise, causing a ridge to form on the side of the saw cut. Maintaining con-
stant cutting pressure is especially important when making cuts on a radius, as the blade is then subjected to lateral thrust and tangential stress not encountered in the straight-line cut.

On some types of work the complete layout can be made on the blank before any cuts are made. On other jobs, only a part of the layout can be made before cutting. Figs. 4 and 7 detail typical layout procedure. In the first step, Fig. 4, the metal blank is coated with a preparation known to the trade as "steel ink," a quick-drying purple lacquer through which the layout lines are scribed with a sharp-pointed scriber or dividers. The contrast between the dark-purple ground and the brilliance of the scribed line on the metal makes the layout line easy to follow. Radii less than the minimum turning radius of the bandsaw blade are formed by center-punching and drilling before sawing. The minimum turning radius for blades ranging from 1/8 to 1 in. wide is given in Fig 9. In making cuts which must pass successively through the work in two directions, it is necessary to plan the procedure so that there will always be a flat working surface in contact with the table, Figs. 5, 6 and 7. Otherwise, there is danger of the work twisting or rocking on the table and kinking the blade. In most cases, pieces removed by sawing are clamped back into place as in the lower detail, Fig. 7, thus preserving the original bearing surface of the blank until all separate cuts have been completed. In Fig. 9, the cuts are numbered in the order in which they must be made to preserve a working face. Inside cuts, that is, those which cannot be started from an outside edge, are made by breaking or cutting the blade, passing one end through a turning hole and then rewelding. After the cut is finished, the blade is again broken, withdrawn from the work and rewelded. Production machines are provided with built-in welders designed especially for this purpose. Separate blade welders are available for shops not equipped with machines having built-in welders.

The left-hand details in Fig. 9 show two types of metal-cutting blades in common use. The buttress, or skip-tooth blade, in the narrow widths is used for work over 1 in. in thickness, while the regular blade, with the standard tooth spacing, is used on
Intricate work having short-radius turns requires a careful setting of the blade guides. Before setting the guides, be sure the blade is correctly tracked on the band wheels. Set the backing rollers so that they turn slowly when the machine is idling. Set the guide pins to bear on full body width of the blade.

**Chart I**

**JOB SELECTOR**

SAW SPEEDS, 50 TO 1500 FEET PER MINUTE

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>SAW PITCH</th>
<th>SAW VELOCITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Work Thickness</td>
<td>Work Thickness</td>
</tr>
<tr>
<td></td>
<td>1/16&quot;</td>
<td>1/16&quot;</td>
</tr>
</tbody>
</table>

| STEELS—S.A.E.               | 24 14 10 6 | 250 200 175 150 |
| Caron Steel #1020-#1095     | 18 14 10 6 | 200 150 125 100 |
| Manganese Steel #1013#1095  | 18 14 10 6 | 200 150 125 100 |
| Free Machining #X1112 #X1136 | 18 14 10 6 | 200 150 125 100 |
| Nickel Steel #2410 #2450    | 18 14 10 6 | 200 150 125 100 |
| Nickel Chromium #316 #3415  | 18 14 10 6 | 200 150 125 100 |
| Molybdenum Steel #4023 #4520| 18 14 10 6 | 200 150 125 100 |
| Chrome Steel #7526 #7535    | 18 14 10 6 | 200 150 125 100 |
| Chromium Steel #5324 #5326  | 18 14 10 6 | 200 150 125 100 |
| Chromium Vanadium #6115 #6195| 18 14 10 6 | 200 150 125 100 |
| Duralumin #7120-#7100        | 18 14 10 6 | 200 150 125 100 |
| N. E. Steel #2024 #2094     | 18 14 10 6 | 200 150 125 100 |
| Silicon Manganese #9255 #9260| 18 14 10 6 | 200 150 125 100 |

| CASTINGS                      |          |              |
| Gray Cast Iron               | 18 14 10 6 | 200 150 125 100 |
| Malleable Cast Iron          | 18 14 10 6 | 200 150 125 100 |
| Mechanite                     | 18 14 10 6 | 200 150 125 100 |
| Nickel Iron, Cast            | 18 14 10 6 | 200 150 125 100 |
| Steel, Cast                  | 18 14 10 6 | 200 150 125 100 |
| Swedish Cast Iron            | 18 14 10 6 | 200 150 125 100 |

| ALUMINUM AND ALUMINUM BASE ALLOYS |          |              |
| Aluminum (Pure, Rolled or Forged) | 18 10 6* 6* | 1500 1500 1100 750 |
| Duralumin 14ST                | 18 10 6* 6* | 1500 1500 1100 750 |
| Duralumin 17ST                | 18 10 6* 6* | 1500 1500 1100 750 |
| Duralumin 24ST                | 18 10 6* 6* | 1500 1500 1100 750 |
| Aluminum (Cast)               | 18 10 6* 6* | 1500 1500 1100 750 |

| OTHER METALS AND ALLOYS       |          |              |
| Babbitt—Lead                  | 14 8 6 6 | 1500 1500 1500 1500 |
| Brass (Soft)                  | 18 14 8* 6* | 1500 750 1500 1500 |
| Bronze—Aluminum               | 18 14 10 6 | 500 250 225 150 |
| Bronze—Ampco                  | 18 14 10 6 | 500 250 225 150 |
| Bronze—Manganese              | 18 14 10 6 | 500 250 225 150 |
| Bronze—Phosphorus             | 18 14 10 6 | 500 250 225 150 |
| Beryllium Copper              | 18 14 10 6 | 500 250 225 150 |
| Copper (Med. Hard)            | 18 14 10 6* 6* | 1100 700 500 200 |
| Magnesium                     | 18 14 10 6* 6* | 1100 700 500 200 |
| Gunite Castings               | 18 14 10 6* 6* | 1100 700 500 200 |

* Use button Nos. 2 and 3 pitch only on aluminum as indicated by asterisk. Use No. 3 button on brass, copper and magnesium as indicated.
work less than 1 in. in thickness. Note also in Fig. 9 that the blade pitch is designated as the number of teeth per inch. Chart I gives general data on blade pitch and blade velocities required to handle a wide range of metals available in stock sizes. This chart is not intended to supplant manufacturer's specifications which may vary from it, but is included merely to give a general idea of the requirements.

On small bandsaws designed primarily for woodworking, it is necessary to make a careful adjustment of the blade guides before cutting metal. Nearly all small machines are fitted with roller guides above and below the table. On some of these, the back of the blade runs on the periphery of the roller while on others the back of the blade bears against the side of the roller. The upper details in Fig. 11 show the two types. On some older machines the back of the blade bears on a fixed pin. In this case it will be necessary to provide wick lubricators as in the lower details, Fig. 11. It also is important to track the blade and adjust the roller so that the stationary guide pins, which bear against the blade from both sides, give full support to prevent the blade from twisting or "running out." Adjust the roller in or out to bring the full body width of the blade between the guide pins, allowing only the set points of the teeth to clear the corners of the pins.

<table>
<thead>
<tr>
<th>CHART II—BANDSAW BLADE SPEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE OF BANDSAW WHEELS</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>FEET PER MINUTE (APPROX.)</td>
</tr>
<tr>
<td>50</td>
</tr>
<tr>
<td>50</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>200</td>
</tr>
<tr>
<td>300</td>
</tr>
<tr>
<td>400</td>
</tr>
</tbody>
</table>

Figures correct within 10 percent or which is close enough.

Chart II outlines the average speed-reduction requirements and Fig. 12 suggests methods of reducing the band-wheel speed. The lower detail shows a multiple-pulley speed reducer utilizing an expandable pulley for speed variation. The unit is belted to a tachometer which indicates the speed of the bandsaw pulley.
Wire Guard Excludes Predators From Poultry Runs

To prevent foxes, weasels and other predators from gaining entrance to his poultry runs by digging under the fence, one poultryman attached mats of woven wire to the outside of the fences with staples and lengths of smooth wire. Arranged in the manner pictured, the mats effectively prevent small animals from digging under the fence and also keep them from getting near it, as no solid foothold is obtainable on the slanting portion of the wire mats.—John Krill, North Lima, Ohio.

Stair-Step Stile for Farm Fence

Climbing over a high wire fence is made easy by this stair-step stile. As you can see from the photo, it's built just like an open stair unit, the treads being cut from 2 x 8-in. stock and spiked to 2 x 10-in. runner planks. Lower treads are passed through the wire mesh while the upper ones go through the spaces between the individual strands, the top tread being nailed to the fence post. The treads are spaced equally on each side of the wire and the top barbed-wire strand is covered with a piece of canvas or a burlap sack to protect the user from the sharp-pointed barbs.

Slits in Sponge-Rubber Strip Hold Artists' Brushes

A strip of sponge rubber glued to a taboret or drawing board provides a convenient holder for artists' brushes. A slit is cut partially through the thickness of the rubber for each brush which is simply pressed into the slit when not in use. With this holder the brushes can be stored in a bristle-down position, thus keeping water from softening the glue in the heel of the brush and prolonging its life.—Fred Linn, Chicago.

Inserting Hectograph Ribbon Without Soiling Hands

It is not necessary to soil the hands when inserting a hectograph ribbon in the typewriter. Just fasten a leader of ordinary ribbon to the end of the hectograph ribbon using cellulose tape, and thread the leader in the machine.

Jig Aids Machining Flats on Taper

When Morse tapers are turned in a shop that does not have a milling machine, this useful jig permits a shaper to be used to machine the tongue at the end of the taper. The jig is made to the dimensions given in the detail and carefully bored and reamed to fit the Morse taper. When machining the flats on the taper, both sides of the jig are chalked to prevent metal accidentally being removed from the jig. The setscrew keeps the taper from turning in the jig while it is being machined and any marks left by the screw are removed before using the taper.—Earl R. Goddard, Denver, Colo.
HELPFUL HINTS FOR 1950

A—Producing large-size images from TV screens of nominal dimensions, this glareless, flat and extremely thin lightweight screen utilizes the Fresnel principle of magnification. Advantages are claimed to include good optical quality and freedom from edge distortion. The magnifying element of the screen is a thin sheet of Plexiglas into which hundreds of tiny circular grooves are pressed. It includes a glare filter and enlarges the image from a 10-in. TV tube up to the size received on a 16-in. tube.

B and C—High-fidelity amplifier, specially designed for those critical experimenters who assemble their own combination phonograph sets. With the increased number of FM stations now on the air, and the wider use of microgroove records, a high-fidelity audio amplifier of the type shown in the photos is desirable. No technical knowledge is necessary to make interconnections. Photo B shows the simple controls, and photo C is a rear view with the top cover removed. Output impedances permit connection to any type of speaker, and to magnetic cutting heads of disk recorders. Push-pull 6L6 tubes give high output at low distortion.

D—Tiny hearing aid, demonstrated recently at Radiolympia in London, also includes a radio receiver for receiving one broadcast program.
DEFINITELY the most popular construction article for the radio student and experimenter is the one describing the "Little Giant" model that always appears in the March issue of Popular Mechanics Magazine. It is designed to include new features of special interest to advancing students and experimenters. Although this model is not intended for beginners, it is simple to build. The receiver is described tunes the entire FM band from 88 mc. to 108 mc. While it does not include AM broadcast reception, figures show that FM broadcasts now cover a greater area of the United States than AM. The band from 88 mc. to 100 mc. is for worldwide broadcasting use; therefore, this complete FM student receiver may be used in any country where FM broadcast programs are available. Nearly all programs carried on AM are duplicated on FM.

This complete FM receiver may be housed in a table-type cabinet or it may be incorporated into a combination console. The outstanding feature that makes it comparatively easy to build is the availability of the completely prewired and aligned front-end FM tuner. This FM "dia-tuner" is a permeability-tuned unit made by the Aerotone Company and is available from all radio supply houses. It comprises all of the parts and wiring shown in the white block in circuit diagram Fig. 3. As only four connections are necessary to incorporate it in the circuit, it greatly simplifies construction. The antenna coupler coil and R.F. choke coil No. 1 are made by the same manufactur-
IS A COMPLETE FM RECEIVER

er. The Stanwyck midget-type transformers, T2, T3 and T4 shown in Figs. 2 and 3, are available from all parts houses. Additional features include choice of built-in antenna or a standard outdoor FM dipole. Of special interest is the recently available disk-type ceramic condensers which are used in place of the older and larger tubular paper-type condensers. They are flat and about the diameter of a dime. Their small size saves space and permits the use of the shortest possible leads, which is important in the high-frequency FM circuit. Some very small tubular ceramic condensers are also used.

When mounting the tube sockets on the metal chassis base, detailed in Fig. 1, arrange them so that they are keyed in the positions indicated by the arrows. Follow the parts layout just as identified in photos A, B and D. Assemble the dia-tuner last so as to reduce the possibility of damage to it. Chassis cutouts for the dia-tuner and power transformer can be made with a coping

(Continued to page 234)
Power Units for Phone Transmitter

PART II

ALTHOUGH it is quite possible that many amateurs have suitable power-supply units to operate the 160-meter phone transmitter described in the February issue, others may not. The units illustrated in photos A and B are employed in the original rig. Photo C is an underside view of the large transmitter power-supply unit. The sheet-metal chassis base of this unit is 3 x 7 x 17 in. and the base for the separate modulator power-supply unit is 2 x 7 x 11 in. Both of these bases are standard sizes and are available from radio-parts houses. These units supply plate voltage for the modulator, and both plate and heater voltage for the R.F. section of the transmitter. Dual electrolytic condensers C4, C5, and C6, C7 are directly back of T5 in photo A.

(Continued to page 236)
TAILOR-MADE FOR YOU—in performance...in price

Images 7 feet wide—
What a “throw”—what a color show! For all-round brilliant performance, look at the Model 2A. Two fine Lumenized lenses available, the Kodak Projection Ektaflex 5-inch f/3.5 and the Kodak Projection Ektaflex 7/8-inch f/4. Heat-absorbing glass protects slides. Turn of knob tilts projector. Price, $47.50. Accessory Kodaslide Changer, $17.50.

KODASLIDE PROJECTOR, MODEL 2A

Most for your money—
Kodak’s “economy model,” but with “big-time” performance. Lumenized optical system steps up screen brilliance 50%. Cooling by convection. Lumenized Kodak Projection Ektaflex Lens 4-inch f/3.5, 150-watt lamp, slide carrier, and 12-foot cord included in price, $27.50.

KODASLIDE PROJECTOR, MODEL 1A

Brightest of them all—
Projects your transparencies with new beauty, new brilliance and realism—at home or in an auditorium. 1000-watt lamp delivers more light to the screen than any other 2x2 projector. Turbine fan cools slides on both sides. Choice of 5 superb Kodak Ektar and Kodak Ektaflex Lenses. Carrying case included. $181 to $295, depending on lens choice.

KODASLIDE PROJECTOR, MASTER MODEL

EASTMAN KODAK COMPANY
ROCHESTER 4, N. Y.
Care and Feeding of Engines

1950 "Little Giant"
(Continued from page 231)

HOW OFTEN TO CHANGE OIL?

Within the past year there have been many conflicting recommendations on how often to change oil. One magazine article suggested that every 4000 miles is often enough under normal conditions. The point most often missed is that the average car owner does most of his driving between home and work. The engine does not have time to warm up enough. Sludge forms.

This sludge is potentially dangerous to your engine, no matter how efficient your oil filter. The best insurance against such danger is to change oil every 1000 miles.

WHAT ABOUT TIRE PRESSURE?

Many drivers are confused by conflicting advice on the new low-pressure tires. If you were told to keep this pressure at 24 pounds, remember that that means 24 pounds in a cold tire. A tire with a cold pressure of 24 pounds may have 29 pounds when hot. If you have tires checked while hot, and have the 29 pounds pressure reduced to 24, you will be running on under-inflated tires and will notice rapid tire wear and uneven wear. If you have your low-pressure tires inflated while hot, inflate them to 29 pounds. They will have only 24 pounds when they cool off.

SWITCH TIRES FREQUENTLY

Due to different kind of wear on front and rear, it is important to switch low-pressure tires frequently, following the method indicated in Fig. 2.

Watch for Exhaust Smoke

If you buy a used car, or if your new car has gone more than 20,000 miles, watch for exhaust smoke—an indication that you need new Sealed Power Piston Rings. There is a set of Sealed Power Rings specifically engineered to do the best possible job in your engine, whatever the make, model, or engine condition. No other ring equals the Sealed Power MD-50 Steel Oil Ring for oil control, even in badly tapered and out-of-round cylinders. To save oil, save gas, and restore engine power, get new Sealed Power Piston Rings when your exhaust smokes!

L.F. transformers for maximum reading on the voltmeter. These transformers are "slug-tuned" and require the use of a small insulated screwdriver. The trimmer slugs are reached through the top and bottom of each can. The bottom slug only of the ratio detector transformer should be adjusted for maximum voltmeter reading. These adjustments are, of course, made with a signal tuned in at the loudest point, or at maximum reading on the voltmeter. At the same time, adjust the small compression trimmer condenser on the top of the dia-tuner for maximum signal. The negative terminal of the voltmeter is connected to the junction of the 22,000-ohm resistor R14, the 220-ohm resistor R12 and the 300-mmf condenser C10. The positive terminal of the voltmeter remains on the chassis. Trim the top slug in the ratio detector transformer T4 counterclockwise as far as it will go without coming completely out. Now slowly turn the slug clockwise until the voltmeter begins to deflect. Deflection may be either above or below the zero reading. If it is below, reverse the polarity of the voltmeter. Continue to turn the slug until you

(Continued to page 236)
Take the Thrill-road to Good times!

RIDE A NEW 1950

HARLEY-DAVIDSON

HYDRA-GLIDE

RIDE THE "CHAMP"!

You’ve got a new thrill coming!
A touch of the throttle and you’re off like a comet! Hills melt away like magic!

Rough roads fly beneath you with hardly a quiver of the handlebars. Steering is feather light.

Braking is smooth and sure. Day-long riding leaves you fresh and ready for more fun as you take in exciting races, hillclimbs, delightful gypsy tours and club events. Easy payment terms bring you this finest Harley-Davidson of all time. See your Harley-Davidson dealer today. Mail the coupon now!

HARLEY-DAVIDSON MOTOR CO., Dept. P, Milwaukee 1, Wisconsin

Send for free copy of ENTHUSIAST Magazine filled with motorcycle action pictures and stories; also literature on new 1950 models.

Name...
Address...
City... State...

DEALERS: Valuable franchises available for the full line of famous Big Twins and 125 Model. Your opportunity to line up with the greatest name in motorcycles. Write or wire today.
obtain a maximum reading and it starts down again to zero. Optimum tuning is this zero point. When the proper adjustment is made, you should be able to tune through a station and hear a feeble station as you enter into peak tuning, then some distortion and next the maximum volume of the station. Then you pass through a path of distortion again and another feeble signal from the same station. After this, it goes out altogether. The center signal, or the loudest and clearest signal, is the proper one for listening in any FM set.

When using the built-in antenna, connect jumper wires from 1 to 2 and from 3 to 4; be sure to remove these jumpers, which are shown in Fig. 3, when you are using a standard outdoor FM dipole antenna. The jacks J1 and J2 are ordinary RCA-type phone plugs and jacks with a jumper wire connected to the plugs. This arrangement permits the builder to use a separate high-fidelity audio amplifier instead of the two built-in audio stages if desired. The built-in two-stage audio amplifier can also be used as an amplifier for a record player or an AM tuner if required. The PM speaker can be any size from 8 to 15 in. depending upon baffle and cabinet facilities. Photo C shows the set in operation on top of a Jensen bass-reflex speaker cabinet in which a 12-in. PM speaker is installed. Detailed student material list R-387 is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage.

Power Units for Phone Transmitter
(Continued from page 232)

The modulator unit has its own built-in power supply (which furnishes both screen voltage for the modulator tubes and plate and screen voltage for the speech amplifier tubes). The modulator plate supply can be simple as shown in diagram Fig. 1. A combination plate and filament supply transformer is shown in photo B but the separate Stancor transformers specified as T1 and T2 in Fig. 1 are advised as they are easier to obtain. A ceramic four-prong socket is mounted in the end of the chassis base to carry the power-output terminals to a standard four-prong cable plug. The large power-supply unit for the R.F. section is really two power units in one as will be noted in diagram Fig. 2. A separate filament transformer T3 is used for the 866-Jr. rectifier tubes. Filament switch No. 1 should be turned on to heat up these tubes before throwing the transmitting plate switch No. 2. All other filaments and plates can go on with switch No. 2. Detailed student material list R-386 covers the complete four-unit transmitter.

ALSO HANDY FOR WOOD HOBBYISTS!

**Firzite**

—to give you smooth finishes on fir plywood and other soft woods.

A pre-finishing material that seals the wood pores...tames the wild grain...virtually eliminates checking and grain raising. An excellent base for stain, paint or enamel. White or clear. White Firzite provides an easy, low-cost way to achieve "blond," "bleached" or "wiped" finishes.

**Satinlac**

—to preserve the beauty of all woods.

An inexpensive coating for the proper finishing of Weldwood Hardwood Plywood and similar woods. Clear. No brush marks. Brings out all the natural beauty of wood. Does not yellow or darken with age.

Firzite and Satinlac are available from paint, hardware and lumber dealers. Write for leaflet No. 3 on finishing plywood.

"But I always carry Weldwood Glue; it's wonderful for emergencies."

Remember Weldwood Glue when you need dependable wood-to-wood bonds. Quick and easy to mix with cold water...tremendously strong...stain-free...rot-proof...and permanent. At paint, hardware, variety stores and lumber yards. 15¢, 35¢, 65¢, 95¢ and larger sizes.

**WELDWOOD PLASTIC RESIN GLUE**

United States Plywood Corporation, New York 18, N. Y.
Here's the happy combination for boating fun!

A great new Evinrude packed with eager performance! 14 horsepower* for thrilling speed! With Gearshift Control...you start in Neutral...back away from docks...maneuver with finger-tip ease. Separate Cruis-a-Day Tank provides fuel for an average day's running without re-fueling. Plug fuel hose into motor—stow tank anywhere! Quik-Chek Fuel Gauge tells you supply at a glance!

SEE YOUR EVINRUDE DEALER—and see the complete 1950 line of 6 advanced models...the right motor for every boat! New FLEETWIN with Duo-Clutch, 7.5 horsepower*, gives you Neutral for starting and idling, Safe-Grip Propeller Drive for trouble-free operation in shoal water. Two famed light models with revolutionary FISHERMAN DRIVE. Look for your dealer's name under "Outboard Motors" in the yellow pages of your phone directory. CATALOG FREE—write for it today! EVINRUDE MOTORS, 4462 N. 27th Street, Milwaukee 9, Wis.

In Canada: Evinrude Motors, Peterboro, Ontario
the tiny hog truss himself, spliced it and secured it in genuine Egyptian fashion.

While these ships are old and interesting, Crabtree considers them "easy." Some of his more elaborate models would give a watchmaker nightmares.

The "St. Albans," a British ship launched in 1686 and bearing the extreme ornamentation of the era, has 270 minute carved figures set in the hull. A hundred cherubs, about ¼ inch high, fit along stern and quarter galleries alone. Crabtree chipped, chiseled, carved and shaved away for three years, putting in thousands of hours before the last piece was in place. Under the cupids and the British coat of arms on the stern, are rows of windows of real glass set in tiny metal frames. Intricate gilt wreaths circle each gun port.

Even more elaborate is the Venetian galleass, a ship dating back to 1660, which combines the features of a sweep-driven slave galleon and sailing ship. Decorating the hull of this gem are 359 sculptured figures in bas-relief. Babies' heads, no more than ¼ inch in diameter, adorn the stanchions. The galleass has scuppered ¼ inch in diameter. On the original, these scuppers were lead lined. So Crabtree lead lined his, too. He even wove eye-splices on the thread-thin shrouds, because that's what appeared on the real ship.

Crabtree's passion for accuracy knows no bounds. On his 42-inch French galley, containing 162 carvings, the ¼-inch-high balusters were crowned with babies' heads back to back. This meant carving two sets of features on each tiny head! There are dozens of such balusters on the ship. Even the 40-odd sweeps for propelling the ship are adorned with carving. Under the scarcely discernible overhang on the ladder steps, he incorporated a molding, so fine it cannot be seen with the naked eye.

The ultimate in the realism department, however, is the fur and skin used on the models. Crabtree needed the fur to dress his little stone-age man, the skin for a drum on which the coxswain beat rhythm for the French-galley slaves. No purchasable leather or fur was fine-textured enough to suit Crabtree and he refused to use substitute material. So he killed a mouse, skinned it and tanned the hide.

Some may feel that carrying things pretty far, but it's just such details that make Crabtree's ships so superior.

On several of his models, the planking has been left off one side of the hull to show accuracy of construction below decks.

(Continued to page 244)
WHEN YOUR PAINTING TURNS OUT LIKE THIS...IT'S TIME FOR A NEW BRUSH... and IF YOUR CAR FEELS LIKE THIS...IT'S TIME FOR MARFAK CHASSIS LUBRICATION

THAT CUSHIONY FEELING LASTS LONGER WITH MARFAK!

You enjoy smooth riding when Marfak lubrication protects the chassis. This tough, stretchy lubricant guards bearings and wear points for 1,000 miles and more. Longer-lasting Marfak is specially compounded to resist road pounding and wash-out—in spite of slushy going. That's why that wonderful "cushiony" feeling lasts and lasts! Get Marfak lubrication today from your Texaco Dealer, the best friend your car ever had.

THE TEXAS COMPANY
TEXACO DEALERS IN ALL 48 STATES

Texaco Products are also distributed in Canada and in Latin America

TUNE IN... TEXACO STAR THEATER presents MILTON BERLE on television every Tuesday night.
METROPOLITAN OPERA radio broadcasts every Saturday afternoon. See newspaper for time and station.

MARCH 1950
Try this sturdy, full-weight Blue Star on those tough, hard-to-shave spots. If any blue steel blade, at any price, gives you better shaves than Blue Star, we'll give you double your money back.

Blue STAR

SINGLE EDGE DOUBLE EDGE

PRECISION ASR PRODUCTS

AMERICAN SAFETY RAZOR CORP. BROOKLYN 1, N.Y.
CRAFTSMAN Circular Saws and Dado Sets
NOW at the lowest prices we know of for such top quality!
Circular Saws: 6, 7, 8, 10, 12-in. sizes

Crosscut (Cut-off) Saws
$1.95 8-in.

Rip Saws
$1.95 8-in.

Flat-ground Combination Saws
$1.95 8-in.

Hollow-ground Combination Saws
$3.69 8-in.

6-inch Dado Set
$9.50 ½ or ⅝-in. hole

SEARS Heavy Duty 8-in. Electric Hand Saw
Saw Only $9.50 Down
$8 Monthly on Easy Terms
Cash Price $9.250
With Case $5.00 Extra

Tops in Quality and Performance...
yet DOLLARS LOWER than any other similar saw!
Compact! Safe! 10 times faster on dozens of jobs!

We know of NO other complete contractor-type 8-in. electric hand saw at anywhere NEAR this low price!

These Accessories will make your saw more useful!

CUT-OFF WHEEL 8-in. Cuts tile, concrete, granite, metals. ½-in. arbor holes $1.39

NAIL-CUTTING SAW 8-in. For rough work with hand saw above, and ½-in. arbor-hole bench saws $4.50

See this CRAFTSMAN Saw at your nearest SEARS Retail Store TODAY!
Buy it NOW! Pay for it on SEARS convenient Easy Terms AS YOU USE IT!

CRAFTSMAN Hand and Power Tools by SEARS, ROEBUCK and CO.
Famous for fine quality... precision performance... low price!

MARCH 1950
Recommend as an added precaution that the walls be coated with aluminum paint and then sized before repapering.

**Warped Table Leaf**

Q—I have a drop-leaf table I would like to refinish. This table is very old, the finish is snicked and grimy and one leaf is warped, or cupped, badly. I tried to straighten it with a heavy weight, but without success; in fact, the piece began to split at the center, due. I suppose to the application of the weight. Is there a way this can be done to restore the leaf?

F.G., Raleigh, N.C.

A—Although you did not say, we are assuming that, because the table is described as old, it is built of solid wood and that the large surfaces are not veneered or built up by lamination. If this assumption is correct then probably the best and surest procedure is to remove the warped leaf and rip it lengthwise into strips about 2 in. wide. If the leaf has a curved, molded edge, keep the strips in order. Measure the width of the saw cut, or kerf, and keep track of the number of saw cuts made as a matching strip must be fitted when the leaf is reassembled. The width of the new strip must equal to the combined width of the saw cuts plus whatever planing is necessary in squaring the edges of the new frame (planing) the edges of each strip square with the face. Assemble the original strips in order and from this determine the required width of the filler strip. Cut this filler strip longer than required and see that the filler strip matches the original as nearly as possible in color and graining. Glue the pieces together edge to edge with waterproof glue and clamp until dry. When dry, sand the surface smooth on both sides. True the molded edge with sandpaper and a wood rasp until the curve is true and the mold is in the original shape. Then refinish the leaf with whatever color and type of finish is desired.

**Loosening Tight Sash**

Q—I want to paint my house this coming summer and I must do all the preparatory work and painting myself. How does one loosen upper sash that stick so tightly they cannot be pried loose without damage of some kind? I’ve tried all the methods I know without success. I don’t want to paint the frames without lowering the sash.


A—As a rule, this is quite easy to do with a putty knife. Force the blade of the knife between the sash frame and the stop and draw it along both the stiles and the top rail. Do this inside and outside to break the paint film that has hardened between the frame and the stop. Usually the sash will loosen and slide quite easily after this treatment. Sometimes the sticking is due either to swelling of the wood or settling of the building, with which it warps the wood frame slightly. In this case it may be necessary to pry out the outside stops in order to loosen the sash without damaging the wood or breaking the pane. If removal of the stops is necessary, it’s a good idea to replace them with new ones as the film built up by repeated applications of paint will have increased the sectional size of the stop considerably. Before replacing the sash, determine what has caused it to bind and if possible remove the cause by planing or other alteration to prevent further trouble.
TIME-SAVING TOOLS for SHOP and HOME

The Most Versatile Tool a Man Can Own
GRINDS, ROUTS, DRILLS, POLISHES, ETC.
MOTO-TOOL

- GRINDS, ROUTS, DRILLS, POLISHES, ETC.
- MOTO-TOOL KITS and ACCESSORIES should not be confused with "bargain offers."
- Compare Dremel Products, feature for feature, with other similar equipment.
- If ours are not superior in quality, design and performance, we don't want you to buy.

LOOK AT THESE MOTO-TOOL FEATURES
- Dynamically balanced grinding wheel eliminates vibration. This is a feature that other similar tools do not have.
- Patented automatic chuck, lock pin, swivel type sliding switch, cord protector, shockproof, take-off housing. All of these features are not found in other similar tools.
- Plugs into any 110-120 volt converter. This is an important feature for ease of use.
- Works easily in awkward places. Tools can be used in tight spaces where other tools cannot reach.
- Sands flat, surfaces evenly. This is a feature not found in other similar tools.
- Makes play of wax polishing.
- Sooths tired muscles. This is a feature not found in other similar tools.

Dremel Electric SANDER POLISHER-MASSAGER

Say goodbye to hand sanding and polishing! This miracle machine is easy to handle, a child can use it. Craftsmen and housewives find (1) As a sander, it takes the effort out of sanding cabinets, furniture, etc., with a straight-line, non-rotary action. (2) As a polisher, it does a professional job on waxed surfaces of cars, furniture, etc. (3) As a massager, it's ideal for tired or sore muscles.

LOOK AT THESE DREMEL FEATURES
- Dremel Sander delivers 14,400 strokes per min., weighs only 2 1/2 lbs. It's foolproof (has only two moving parts...never needs oiling). Dremel Sander operates on 110-120 Volt AC. Thousands and thousands of satisfied users prove its value.

SAFETY GUARANTEED
- Dremel Sander comes complete with 6 sheets assorted grade Garnet paper for sanding, plus felt pad and estheticin for polishing. If your dealer cannot supply a coupon, order direct from factory. Money back if not delighted after 5 days trial.

DREMEL MFG. CO., Dept. 110-C, Racine, Wisconsin

If Your Dealer Cannot Supply You
USE THIS HANDY ORDER FORM

DREMEL MFG. CO., Dept. 110-C, Racine, Wisconsin

- Enclosed $____ (check or money order) in full payment for items checked below.
- Enclosed $____ for shipping items checked below. C. O. D.
- I'll pay postman balance plus postage and fees.
- Dremel
- Dremel Sander $14.85
- Dremel Moto-Tool $23.50
- Kit No. 2 $23.50
- Drill $5.95
- Moto-Tool $16.50

Name: ____________________________
Address: __________________________
City: __________________ Zone: ______ State: ______

MARCH 1950 243
His model of "Catherine," royal yacht of Charles II, is that way to show the 17th century framing with single timbers. Double frames didn't appear until 100 years later. Such details are vital to Crabtree.

This particular ship, incidentally, has extremely fancy carving. It took Crabtree nine months to do the stern carvings alone. Thirty-five figures decorate the British coat of arms, plus the usual cherubs flapping around in trailing draperies. Some of the detail work on these carvings is so fine that a soiled finger rubbed over them would fill in the grooves.

The delicate work of such carving entails plenty of nervous strain. On the real fine finishing work, which he often does under magnification, Crabtree can only spend about 35 minutes at a time.

The builder does not wear glasses, nor does he use a magnifying glass until the final touches are being applied. "If you used a glass on the features and outlines," he explains, "your carvings would be all out of proportion."

Fine carving also calls for special tools. Crabtree has an elaborate shop in his home at Kissimmee, Fla., but most of his vital implements he carries with him in a cigar box. These are tools devised and made by himself, since commercial knives are much too crude. Most of his knives and chisels have been made from dentists' picks and hair-bladed surgeons' scalpels. For his microscopic finishing work on super-delicate carvings, he uses a chisel made from a dental tool. This implement has a blade measuring \(\frac{1}{8}\) inch across the broad side. Even Crabtree, with his eagle eye, needs a bright light and a magnifying glass to determine which is the broad side.

A jeweler's drill and lathe are part of his shop equipment. Painting of the carvings, done by Mrs. Crabtree (who also is sailmaker for the Crabtree shipyards), is accomplished with a camel's-hair brush boasting a total of three hairs.

It's typical of Crabtree that he wouldn't be satisfied with the kind of wood you can buy. "The commercial variety is no good," he declares. "It's not seasoned properly, and usually is too brittle, lifeless and coarse-grained for fine work." The master builder spent years experimenting with 140 different kinds of wood for various uses on his ships before he found what he wanted.

Apple wood, he decided, was best for hull planking, because it is close-grained, bends true and won't split. Fire thorn heartwood, cut in the forests of Oregon, is Crabtree's favorite carving medium. It's extremely dense and won't chip while being worked. Elm is used for sharp curves,

(Continued from page 246)
Repair Electrical Appliances and Utilities with the aid of THE NEW MODEL 50

UTILITY TESTER

A NEW KIND OF INSTRUMENT FOR TESTING ALL ELECTRICAL CIRCUITS AND APPLIANCES SUCH AS—

- RANGES
- SHAVERS
- HEATERS
- IRONERS
- VACUUM CLEANERS
- AIR CONDITIONERS
- REFRIGERATORS
- SUN LAMPS
- TOASTERS
- WASHERS
- FANS
- WASHING MACHINES
- AND MOTORS

ALL MOTORS—single phase, multi-phase, universal, squirrel cage, induction, in fact every type of motor from fractional H.P. to 2 H.P.

THE MODEL 50 UTILITY TESTER:

- Will measure the actual current consumption of any appliance or utility either A.C. or D.C. and will measure it while the unit is in operation. The reading will be direct in amperes. The appliance or utility may be plugged directly into the front panel receptacle. A special pair of insulated clip-end leads is included for motors, etc.
- Will measure the actual voltage and indicate whether the current is A.C. or D.C. and if the frequency is 25 cycles or 60 cycles.
- Incorporates a sensitive direct-reading resistance range which will accurately measure all resistances commonly used in electrical appliances, motors, etc. This range will enable continuity checks and tests for shorts and opens.
- Will indicate excessive leakage between a motor and a line up to 10 Megohms.
- Will indicate when a three phase motor is running erratically due to a “blown” fuse.
- Will test Thermostats under actual working conditions.
- Is the ideal trouble-shooter as it will instantly locate opens, shorts and grounds.
- Will test all bulbs, radio tube filaments, pilot light lamps, all fuses including cartridge, screw, etc., fluorescent bulbs, etc.

SHIPPED ON APPROVAL NO MONEY WITH ORDER—NO C.O.D.

TRY BEFORE YOU BUY! Yes, you need send no money with order or pay anything on delivery. Simply fill out this order form and mail it today. Try the Model 50 for 10 days. If completely satisfied, remit $13.90. If not, return the instrument—no explanation necessary.

The Model 50 Utility Tester comes housed in a round cornered molded bakelite case. Completes with all test leads and operating instructions—only...

$13.90

GENERAL ELECTRONIC DISTRIBUTING CO.
98 PARK PLACE, NEW YORK 7, N. Y.

Please rush one Model 50 Utility Tester. I will either remit $13.90 after a 10-day trial or return the instrument via Parcel Post.

Name ____________________________
Address __________________________
City ____________________________ State _______________

FREE PREMIUM!!

☐ Check here if you include $13.90 payment with order. In return for saving due to bookkeeping, we will include a set of 6 assorted key chains with your Model 50. If the Model 50 does not meet with your wholehearted approval after a 10-day trial, return it for full immediate refund of $13.90—keep the premium for your troubles.

MARCH 1950
and cascara he uses sometimes for deck beams. Laurel, English and French walnut and lime wood from the West Indies also find their way into Crabtree's ships.

All of these woods, of course, Crabtree cures himself so he'll know they're right. First he water-cures the wood in a creek for two or three weeks to remove all acids. Then it is dried out in a cool place with a little ventilation. After drying, the builder cuts his logs into miniature lumber and puts it away for about three years until the wood is seasoned to perfection.

The business of earning sufficient money to support a wife and an expensive hobby might have thrown anyone with less determination than Crabtree. He never let it bother him. Whenever he had to have cash, he found his services much in demand. Hollywood needs models for miniature sets and Crabtree has made many of them. "It's a nice vacation to do that junk," he says, "but it's crude set stuff, lacks important detail and would ruin a man for good work if he kept at it."

After working so many years on old ships, Crabtree has become an authority on antique vessels. He has hired out as technical advisor for such movies as "Mutiny on the Bounty," "Captains Courageous," "Captain Caution," "Reap the Wild Wind" and others. During the war he was a naval architect in the Kaiser shipyards. By adapting principles used by the ancients, he patterned and lofted the big doors on landing craft—a problem that had stumped the experts for months.

Today, however, it's no longer necessary for Crabtree to fret about prostituting his art for money. The fleet is enough of an eye-stopper so that big-city department stores pay huge sums to rent it for display. The Crabtrees have had a special truck built to accommodate their precious cargo as they tote it around the country on tour. This year they hope to set up a private museum in Florida and charge admission for a look at the handiwork.

Carting the delicate ships around the country is not Crabtree's idea of fun. It's risky and uses up time that he would rather spend building new models. The fleet is insured for $100,000, which, the owner points out, wouldn't begin to replace the labor that went into them. Crabtree feels that all the money in the world couldn't pay for them, anyway—which is one reason none has ever been for sale. When a big merchant line offered to pay him a fabulous sum to make some old ship models, he agreed to do it if they'd let him retain ownership.

"It's this way," he says, "would you sell your own child?"
A DOUBLE-BARRELED OPPORTUNITY TO MAKE MONEY!

NEW HOMES

OLD HOMES

Be Your Own Boss!

Another booming year is ahead in the building industry—and here's a double-barreled way for you to CASH IN!

Start your own business as a floor surfacing contractor with American Machines—and you will find hundreds of new and old homes are year 'round prospects for your services! No special schooling needed. No long waiting to get going in a business of your own. You can start sanding floors and make money as your own boss the very first day your machines arrive! Earnings of $25 a day are not uncommon among men like yourself who have become floormen.

You'll be proud to be a floor surfacing contractor and take your place alongside the plumber, the electrician, the painter and other building craftsmen as an important cog in the construction industry. In new construction you work as a sub-contractor and when resurfacing older homes you will usually operate as a separate businessman.

The investment in floor sanding equipment is small. The overhead is low and you need no elaborate offices, workshop, storeroom or heavy trucking equipment. Many men operate from their own homes and use a regular passenger car to transport their equipment from job to job. Pleasant indoor work...steady the year 'round...prospects everywhere...and you are your own boss...a real opportunity for a man with ambition to get ahead and MAKE MONEY!

Send for "money-making" booklet entitled "Opportunities in Floor Surfacing"—use coupon and enclose 25c in coin or stamps to cover handling.

AMERICAN FLOOR MACHINES
SEND COUPON TODAY!

The American Floor Surfacing Machine Co., 335 So. St. Clair St., Toledo, Ohio.

Enclosed find 25c in stamps or coin for booklet "Opportunities in Floor Surfacing" telling me how I can start my own floor sanding business.

Name________________________
Street________________________
City_________________________ State_
Look a Typhoon in the Eye
(Continued from page 139)
approximately 5000 feet. From 1000 feet to 5000 feet were tiers of circular cumulus clouds giving the effect of seats in a huge stadium.

"The wind was estimated at about 35 knots in the center. No calm water was seen because of the undercast.

"After the navigator had taken a loran fix and the weather observer had taken his observation, a sounding descent was begun to 1500 feet, using the eye as the let-down area."

Up to now Beverly has been behaving like a lady. But now she is a lady who has been trifled with, and as the B-29 swings in smooth circles within the solidity of her internal walls, she is preparing to vent her wrath with all the howling furies she can summon from hundreds of miles around.

The barometric altimeter reads 4100 feet. Over the intercom comes the sharp voice of the weather observer, "True altitude 1500 feet."

The radar operator cuts in, "Weak spot in the wall at 305 degrees."

Lykins banks sharply in the tight circle at the foot of the cone. As the gyrocompass reaches 330 degrees he rolls out of his bank heading 305 and level. "Hold on," he says grimly.

It is like hitting Niagara Falls. The plane sags under a wall of water. But Beverly is no puny Niagara with forces moving only in one way. The powers in the twisting crossovers and the vicious updrafts are each in their own right so staggering as to reduce by comparison the potency of Niagara to a finger leak in a dyke. Lykins is hurled into his shoulder straps so viciously his feet cannot find the rudder. A wrenched second later he is slammed into his seat, his hand nearly torn from the control column. A bolt of lightning sears past their eyes, blinding them to the weak blue of their fluorescent instruments. The copilot reaches a weighted hand to turn up the lights, and another crushing blow smashes against the nose from below. The copilot's hand, still on the knob, is snatched downward, and not until later does he see he has torn the rheostat from the instrument panel.

Lykins is trying to hold the speed of the plane to within safety limits. At times she seems racing to destruction. At other moments the wings shake with an approaching stall. She is flipped over her side and then wrenched in the opposite direction. Beverly is playing now, and both pilots have not time enough to man the throttles.

(Continued to page 250)
Only

ATKINS

makes "Silver Steel"

SAWS

That's an important fact to remember when selecting saws—any purpose... because "Silver Steel" Saws—developed, perfected and manufactured only by Atkins—are made of the finest, toughest, longest-lasting steel ever alloyed for sawing operations. They are backed by 93 years of continuous research and scientific advancement! Tell your hardware dealer you want Atkins "Silver Steel" Saws.

E. C. ATKINS AND COMPANY
402 S. Illinois St., Indianapolis 9, Indiana

...OF ALL FINE SAWS—THE FINEST ARE "SILVER STEEL" SAWS

GET THE FACTS—

the all-new IDEAL LAWNMOWER SHARPENER

A Complete Lawnmower Shop in One Machine!

Here it is, after four years of research and development, the COMPLETELY NEW IDEAL LAWN-MOWER SHARPENER. Designed and built to sharpen post-war and pre-war hand and power lawnmowers with precision and speed, the NEW IDEAL SHARPENER includes a tapered-cup grinding wheel for sharpening bed knives and a "lapping-in" reconditioner as standard equipment. Power mowers need not be dis-assembled, engines and handles remain in place during sharpening. Chain hoists or ropes are not needed to support heavy mowers, the IDEAL supports the entire weight of the mower within its rugged cast-iron frame. The IDEAL SHARPENER is a complete lawnmower shop all in one machine. Send for the IDEAL CATALOG describing the new Model 300 IDEAL LAWNMOWER SHARPENER and the other machines we manufacture for the lawnmower serviceman.

THE FATE-ROOT-SHARDEN CO.

MARCH 1950
The third pilot unbelts himself from his observer’s seat and lurches forward. An updraft crushes him to his knees, and a forward pitch tosses his head into the aluminum tubing of the captain’s seat. Another twisting dive slams his ribs against the copilot’s seat, but he gets a death grip on a cross brace. One big hand closes over the four throttles and the speed is brought under control.

But Beverly is not through. She shakes the B-29 until the rivets pop out of the flight deck. The aerial camera is torn from its rack, dashed against the ceiling and hurled to the floor. The radio operator’s earphones are torn from his head and then thrown back into his face. The navigator’s kit is emptied of maps, and they float in the air, obeying no laws of gravity.

Back in the cabin the two scanners, battered by flight lunches, Thermos bottles and life rafts, watch in consternation as sheets of aluminum torn from the wing fairings go flashing by in the brilliant glare of the Aldis lamps they have directed over the wings.

Says Lykins in his report:

“It is impossible for me to describe accurately or to exaggerate the severity of the turbulence we encountered. To some it may sound utterly fantastic, but to me it was a flight for life. I have flown many weather missions in my 30 months with the 514th Reconnaissance Squadron. I have flown night combat missions in rough winter weather out of England, and I have instructed instrument flying in the States, but never have I dreamed of such turbulence as we encountered in typhoon Beverly. It is amazing to me the ship held together as it did.”

Suddenly it is all over. Beverly has lost her plaything. When turbulence has been reduced to ordinary cyclonic intensity, the crew has time to take stock of what has happened. The period of extreme violence has lasted six minutes. Present altitude, 6000 feet, a climb of a thousand feet a minute while trying to fly level, and in spite of downdrafts, some of which exceeded a thousand feet. The inside of the plane looks as though Beverly had blown through it instead of around it. The navigator crawls around on the floor, retrieving his gear. Green grass flickers across his loran screen, and then the signals come marching in, straight and true. He takes a fix and gives the heading for Clark Field, north of Manila. At 11:33Z the B-29 is on the ground again, staggering slightly as she rolls to a stop on the long runway.

The B-29 lived through that one by a narrow margin. Hundreds of rivets had (Continued to page 252)
The finest reel money can buy

It's the only reel of its kind—the J. A. Coxe automatic free spool reel. Precision built to the smallest detail, yet you can take it apart—without tools—in less than ten seconds! Exclusive Coxe cross-bolt design assures perfect spool alignment and extra years of casting accuracy. Phosphor bronze bearings, rust-proof nickel-silver frame.

no finer reel for the money

A tackle value you've never thought you'd find! Green anodized aluminum head cap and tail plate—the rest completely chrome-plated. Adjustable drag—new lightweight spool with snap-on plastic arbor—famous Bronson Duo-Pawl. Swift and sturdy and light as its name, you'll want the Green Hornet for every one of your fishing family!

35 fresh and salt water models to choose from

Bronson "Green Hornet" $4.95

bronson

bronson reel company—bronson, michigan

world's largest makers of fine fishing reels

been popped from her skin. The flaps were twisted. Great gaps showed in her fairing, and the R.F. unit in the center section of the bomb bay had been torn from its moorings. The fuselage was twisted. Whether she will ever fly again still remains to be seen after a survey of her internal structure is completed.

Beverly roared on out to sea, obeying no laws of meteorology. A nice trough developed into which she could drift northwest into China as do most of her sisters, but she broke through it. A steering wind at the 600-millibar level was guiding her north when suddenly she turned on it and ripped it to bits. Then when it looked like no power on earth could stop her, and the poor Aleutians were going to lose some more breakwaters, a great mass of polar air tore the heat out of her in great gouts of rain. When last seen on the weather map, she was just a mild speck in a cold winter.

The lakes of water carried by Beverly and the billions of tons of sea water she displaced were all wasted on the open sea. But it was only her own strange whims that kept her from assaulting the land with the same vicious force that destroyed 20,000 boats and killed a quarter of a million people in Bengal. A twist to the west, and she could have duplicated the typhoon that washed over Honshu in 1934, killing 4000, or she might have equalled the damage of her predecessor who hit India in 1942 and killed 40,000.

Modern structures and even great battleships mean nothing to typhoons like Beverly. In 1944 one caught the U.S. fleet off Japan, damaging 28 ships and rolling over and sinking three destroyers. More than 800 officers and men were lost in that blow. A few months later the heavy cruiser, Pittsburgh, had her bow cut off as though hit with a giant ax. Two other heavy cruisers were knocked out of commission, the great aircraft carriers Hornet and Bennington had their flight decks smashed to kindling wood, and 28 other ships of the fleet were too battered to continue the mission.

Only the warnings of the typhoon trackers prevented greater loss when the worst typhoon in 20 years struck Okinawa in October 1945, killing 43 Americans and leaving 50,000 homeless. All that was loose was blown away, and then the ropes and anchor chains were torn from everything thought secure. Almost all food was lost, and 130 vessels of all kinds were sunk, crashed into the beach, or swept far inland.

Sometimes not even taking refuge in storm cellars will help. The typhoon that hit the Philippines in 1911 dropped 46 inches of rain in 24 hours (approximately (Continued to page 254)
GARAGEMEN, SERVICE STATION OPERATORS, CAR OWNERS!

SAVE UP TO 50% ON THESE NATIONALY-KNOWN AUTOMOTIVE SERVICE ITEMS

$39.00

**KRW SIX AMPERE SLOW CHARGER**

Handle 1 to 12 5-Ohm batteries or equivalent. Complete ready in use. This heavy-duty battery charger is ideal for safe charging of all types of car, truck and aircraft batteries. It incorporates all the latest design and construction features. Comes complete with bulb, writing and connectors, ready to plug in and operate. Case is 11" x 17" x 5 1/2". Operation is simple and foolproof. Plug and Jack arrangement, like a telephone switchboard. You merely plug in to the jack corresponding to number of batteries on the line. Thousands now in use. Operates on 110 Volts, 50 Cycle.

$130.00

**KRW FASTCHARGER FULLY AUTOMATIC, OPERATES ON 110 VOLTS A.C.**

Simplest and most efficient on the market. Only one inch to turn, one dial to watch. New electric timer is foolproof in operation...it automatically discharges, fast charges, slow charges and shuts off. Customer can be shown exact condition of battery on the easy-to-read, fully-automatic dial. You can do this under proper load without danger of bulking plates. Use it also for "cycling" batteries that are badly sulphated. Equipped with 8 fast and heavy-duty motor. Lowest priced dependable unit on market.

$110.00

**KRW AIR COMPRESSORS, TWO STAGE**

Highest Quality, A-Models 9.75 to 25.5 cu. ft. Displacement. Why pay $200 to $250 Premiums. For 35 years KRW has passed these savings on to users. Every feature which can contribute to maximum efficiency and long life has been "built in". Cylinders are nickel-chrome alloy iron. Crankcase drop-forged with integral counterweights. Tapered Roller Bearings. Lyman Connecting Rods. Solid Steel Pistons with 3 compression and one oil ring. Constant level oiling system. Plate-type Valve. Automatic Air Breather. Condenser Filter and Air Cleaner. Pressure Unloader for Easy Starting. Pressure Control Switch and Thermal Relay protects motor against overloading and undervoltage. 200 lbs. pressure ASME Tanks. PRICES FOLLOW:

2 H.P. 9.75 c.f.m., 80 gal. tank $373.00
5 H.P. 25.5 c.f.m., 80 gal. tank $544.00

WRITE FOR LITERATURE WITH DETAILED SPECIFICATIONS

TERMS: Cash with order. I.C.O.D., 25% must accompany order. Concerns with established credit on open account. All PRICES F.O.B. Factory. (Subject to change without notice.)

SOLD WITH 30-DAY MONEY-BACK GUARANTEE

K-R- Wilson

213 Main St.
Buffalo 3, N.Y.

WORLD'S LARGEST MANUFACTURER OF GARAGE TOOLS AND EQUIPMENT

**CUT-TO-FIT HOMES CUT BUILDING COSTS**

Build your own home and save the builders' profit—plus savings in lumber and labor with Sterling Ready-Cut Homes. Anyone can assemble with simple, easy follow plans furnished with every house complete with all lumber, roofing, nailing, glass, hardware, paint, doors and windows marked ready to erect. Freight paid Complete building plans ready for filing at low cost. Sold separately if desired. Write today!

PRICED FROM $1885 UP

INTERNATIONAL MILL AND TIMBER CO.
DEPT. P.M.-350, BAY CITY, MICHIGAN

**Your Car STARTS INSTANTLY**

WITH A

**Stewart-Warnner Electric Fuel Pump**

Save Your Battery with instant starts—every time! Stewart-Warnner's Electric Fuel Pump fits any car or truck. Feeds a steady, even flow of fuel into your engine as soon as you switch on the ignition. Thousands now in use!

Easy to Install. Complete fittings supplied. Do it yourself or see your local Carburetor Shop or Service Garage.


Please send FREE Illustrated Booklet on the dependable new Stewart-Warnner Electric Fuel Pumps.

Name ____________________________

Address __________________________

City ____________________________ Zone ______ State ____________

☐ For Cars ☐ For Trucks

MARCH 1950 253
New York's annual rainfall) and then backed up to drop four feet more in the next three days. An eight-foot lake covered all level ground.

Last year, with the seismograph boys bringing their new science of storm detection through earth tremors to perfection, and the typhoon trackers riding hard on all storms, the damage was greatly reduced. But that only applies to ships and aircraft that can be moved out of harm's way. In January 1948, Karen nearly washed away the island of Yap, the only food left being the taro roots deeply embedded in the ground. Libby moved in on Okinawa again, doing $10,000,000 in damage, but this time no lives were lost. Ione slammed into Tokyo with a heavy toll of life and damage.

All told, the 514th has flown more than a hundred typhoon-tracking missions in a single year with eight storms developing into full-fledged typhoons. The average is 25 a year. There is no such thing as a typhoon season; it's just that they get a little worse in August and September. Nor is there such a thing as a typhoon belt. In general, typhoons seem to show a tendency to drift northwest, dissipating over North China, but any one of them is just as apt to take off for the Aleutians or North America, or to turn around and go back where it came from. Some just can't make up their minds, like the one that blasted Okinawa in 1945. It went by, backed up for a second crack, and then just lay there in indecision, its trailing cone of intense wind flitting back and forth over the island like the tail of a stalking cat.

The typhoon, from the Chinese t'ai fung (great wind) or the Arabic tufan (tempest) does not qualify as such until its velocity reaches 75 miles. Some have been known to reach 175 miles per hour.

Technically, there is no difference between a Pacific typhoon, an Atlantic hurricane, an Australian willy-willy, or an Indian Ocean cyclone. All are born of the warm, moist air girdling the earth at the equator, a stagnant belt known as the doldrums. If they move north, they pick up the spin of the earth at about 15 degrees latitude and begin to twist in a counterclockwise direction. If they move south, the spin is reversed to a clockwise direction. Some hold that the Pacific typhoon is more violent than the Atlantic and Caribbean hurricane, but if this is so, it is only because typhoons have vaster areas to get up momentum before encountering obstructions. The hurricane that wiped out Galveston, killing 6000 in 1900, or the one that roared over Florida in 1928, blowing

(Continued to page 256)
Removing Paint is no problem now!

Yes, it's easy to remove any type of finish the professional WONDER-PASTE way. There's no arm-tingling work with a torch; no messy sanding needed afterward.

Simply apply WONDER-PASTE directly over the old finish with a paintbrush... Allow time for complete penetration—then remove with a putty knife. The butter-soft sludge peels off easily, quickly, cleanly! Won't injure wood, metal, fabrics, or your hands.

At paint and hardware stores everywhere.

Write for Leaflet!
WONDER-PASTE
Wilson-Imperial Company, 119 Chestnut Street, Newark 5, N.J.

MONEY for MEN ALL DATA FREE

THE PLASTEX Industry needs manufacturers on small orders and for big production of Lamp and Clock Stands, Art Goods and Novelties in Plastics and Marbles installation. Experience unnecessary. The material makes regular 10¢ store sellers, Rubber moulds for plastic production. Small investment brings good results. Big chains store orders now being placed. Ambitious men have chance for real prosperity. Our free booklet will interest and benefit you.

PIASTEX INDUSTRIES, Dept. A
3400 Third Ave.
New York 56, N.Y.

Gersnter TOOL CHESTS
Machinists and toolmakers prefer a GERSNTER Chest for systematic care of good tools. Free catalog.
GERSNTER TOOL CHESTS
406 Columbia St.
Dayton 7, Ohio

AIR RIFLES WITH SAFETY LOCK

SEND FOR FREE FOLDER OF LATEST MODELS TODAY

If you want a REAL GUN for PRACTICAL USE in and around the house, get a SAFE-CLEAN-ECONOMICAL-BENJAMIN with Adjustable Rear Sight. Our SAFETY LOCK makes it BARELY NEEDED! Use BENJAMIN H-C BALLES for BEST RESULTS in all rifle forms. WRITE AT ONCE.

BENJAMIN AIR RIFLE CO., 812 Marion St., St. Louis 4, Mo.

Hobbyist Catalog

WE PAY POSTAGE!
SHIP MODELS...TRAINS...PLANES
Cars...Art Supplies...Tools
U.S.A. and Canada Orders Only.

10¢
write
Braun-Craft
1232 Etowah, Dept. FM-7, Royal Oak, Mich.

HYDRAULIC Power Transmission
WITH INFINITELY VARIABLE SPEEDS, CLUTCH AND INVERSE OUTPUT TORQUE ADJUSTMENT UP TO 180 INCH-POUNDS

This unique displacement hydraulic Torque Converter is the ideal fluid drive with thousands of uses. Silent operation. Instant infinite speed changes, no gear herringbone, no backlash. Control and transmit your power with smoothest drive in the world... handle 14 H.P., 115 H.P. Motor, Inboard, outboard, or Farm Use. Cost: Government, $200. High quality Precision Workmanship. Buy this unit to suit the needs for your money. Case measures 7" long x 7" high x 3" wide,Input & Output Shafts 3/4" dia., Reinforced Red Crackle Finish Case.

Shipping Wght. 25 pounds
Only $54.50

1½"-8 Thread Lethe
1½"-8 Adatper, $3 extra

PREPAID 2 quarts oil included FREE

DIRZIUS MACHINE SHOP "T" 1423-25 So. 52nd Ave., Gertrude 50, III.

If you suspect you've been using too much oil, why not find out? Switch to Pennzoil, the 100% Pennsylvania oil with staying power.

Over 60,000 better dealers, coast to coast, recommend Pennzoil. It's worth looking for, easy to find at the yellow oval sign. Just sound your Z—get the genuine.

SOUND YOUR Z

100% Pure Pennsylvania

Safe Lubrication

Member Penn., Grade Crude Oil Assn., Permit No. 2

PENNZOIL MOTOR OIL AND LUBRICANTS
AT BETTER DEALERS...COAST TO COAST

MARCH 1950

255
the water right out of Lake Okeechobee and drowning 2000 persons, can hold their own in any typhoon league.

Only in the last five years has man had the means and the courage to study typhoons inside out and from top to bottom. The airplane, radar and the seismograph are revealing a lot of their mysteries, but so far nothing is known why they behave as they do, and go where they go. The seismograph is the latest instrument to be brought into play in tracking the typhoons. The Rev. J. E. Ramirez, while at work at St. Louis University, was first to notice that heavy storms produced enough earth tremors to be picked up by a sensitive seismograph, and in 1943 the Navy began experimental work along his suggested lines. Today, microseisms reveal the presence of small storms as far as 500 miles away, and the giant typhoons can be detected more than 2000 miles away. With several seismographs taking bearings on the disturbance, its path can be followed minute by minute with an accuracy of 20 miles.

In the meantime, the typhoon trackers and the hurricane hunters continue to slice through the tempests in their study of typhoon anatomy. It is doubtful that ever again will any existing planes make a low-level assault such as Lykins' attack upon Beverly, but much still remains to be learned at the upper levels. Maybe somewhere between 10,000 feet and 30,000 feet will be found the secret of where the storm is going next.

Thanks to their work, the death toll has been reduced from 80 lives per $10,000,000 damage to four lives. It is true that this picture is not entirely accurate, property values having increased tremendously, billions of dollars in crops and industries having been developed in the Pacific within the last 20 years, and more billions along our Gulf Coast. But by the same token there has been a huge increase in population density. And, thanks to the warnings, property damage has been greatly reduced by proper precautions, and the heavy loss in shipping has been nearly eliminated by getting ships and airplanes out of the threatened area.

Whether or not ways can be found to prevent typhoons remains to be seen. Since the typhoon's power is based on its latent heat, it may be vulnerable to attacks by Dry Ice, but one dry comment to this is that there isn't that much Dry Ice in the world.

Until some way is found to stop them, the Navy has prepared detailed instructions on how to sail through a typhoon, the instructions applying to all craft up to battle wagons. In full they read: STAY WELL OUT!
I'M VERY
DEAF
BUT I
HEAR

Everything with My New

**Zenith**

"MINIATURE"
HEARING AID

Don't let deafness kill the joys of living. Let a Zenith home trial prove you too, can even hear a whisper. Here's Zenith's amazing guarantee—if any $200.00 hearing aid outperforms Zenith's newest, tiny, 6¾ oz. single-unit "Miniature" Radiac Hearing Aid in efficiency or economy, your money back—under our 10-Day Return Privilege. Only $75.00 complete, ready to wear. For authorized Zenith Hearing Aid Dealer in your locality, consult your classified telephone book; or write us for complete coast-to-coast dealer list. Free descriptive literature on request. Address—

Zenith Radio Corporation, Hearing Aid Division
Dept. 391, 5801 W. Dicksons Ave., Chicago 39, Ill.

Makers of World Famous Zenith Radio,
FM and Television Sets

---

NOW... FOR ¼TH THE COST
CONVERT ANY DRILL PRESS INTO A PLANER • SHAPER • JOINTER
POWER SANDER • ROUTER

This FREE Book Tells You How
BARRON TOOL COMPANY, INC.
969 Architects Bldg., Detroit 1, Mich.

---

Find HIDDEN TREASURES

GEIGER COUNTERS for uranium ore detection. TREASURE DETECTORS for Gold, Silver, other metals and minerals. Light weight, highly sensitive. None finer at ANY PRICE.

Detection Co. Dept. 3-B

---

PRESURE PRINCESS
Makres every job EASIER

YOU have never seen a single cylinder portable air compressor that packs so much power as this one. Built by the makers of the famous 4 cylinder Pressure Queen, the Princess will do any job, from inflating tires to painting buildings. Compact, simple and rugged, it will last your lifetime and pay for itself over and over again. Powered by electric motor or gas engine.

---

JUSSON MFG. CO., 1709 Gillingham, Phila. 24, Pa.

---

THRILLING NEW SPORT BOAT!
as featured in
Aug. 15 LIFE
pages 52-54

Sailfish
Trade Mark
SPORTABOUT

Now the fast, brilliant "Sailfish" comes knocked down for easy home assembly at a big savings! Safe T-Plane hull won't sink or swamp. Gears conveniently on top. Precision pre-cut and pre-formed parts of high quality materials go together quickly. All hardware included. HULL KIT, $80.75. SAIL KIT, with centerboard, rudder, spars, rigging and finished sail, $49.75. ASSEMBLED BOAT, factory finished and complete with sail, $189. All prices f.o.b. Waterbury, Conn. Illustrated literature on request.

---

THE CAMPBELL-HAUSFELD CO.
1046 Railroad Avenue
Harrison, Ohio

---

MARCH 1950
Inventor in a Carriage House
(Continued from page 85)

It's a far jump from inventing a diaper to analyzing a jet engine, but Rand has made it. One of his instruments records the complicated contours of jet rotor blades and other irregular objects. Tracer points analyze the blades, and this information then is fed to an oscilloscope where it is reproduced as an image on the screen.

For a Cleveland surgeon, Rand developed a respirator that he says "breathes for a patient during an operation better than the patient can breathe for himself." The machine alternately squeezes and releases an anesthetic bag, and can be regulated to meet the needs of any case.

Another product of the medical-research program is a mechanical heart that maintains the patient's normal circulation while an operation is being performed on the regular heart—actually a mechanical heart that "beats" outside the body.

A third remarkable surgery aid is a heart massager that does a better job than a surgeon's hands. Occasionally, during an operation a patient's heart will stop, and the surgeon will attempt to start it by massaging with his hand through an incision. While a surgeon can forcibly cause the heart to contract by squeezing it, he has had to depend on the heart's willingness to expand to get the blood back into it. Rand's device consists of two vacuum cups, each at the end of a long handle. The surgeon presses a cup against each side of the heart, squeezes it to expel blood, then moves the cups apart so their suction can dilate the heart walls.

Built into one cup is an electrode controlled by a switch in the handle. When the heart appears to be capable of working on its own, the surgeon presses the switch and the heart receives a stimulating electrical shock that may start it to normal action. In one experiment, this massager was used to maintain circulation in a dog whose heart had been stopped for five hours. The heart was shocked into operating normally.

Still another aid from the laboratory is a plastic-film mattress which prevents bed sores. It is divided into compartments which can be inflated and deflated independently. An automatic pumping device controls this action, changing the mattress pressure on each part of the patient's body at three-minute intervals.

Rand has developed an electrical power unit for a wheel chair. The control system permits the patient to start, steer and stop the chair by moving only a finger tip or even only his tongue.

There's no need for a night watchman
(Continued on page 260)
Home Workshop Tools

PRICED TO EVERY FAMILY PURSE

She'll enjoy your shop and the money you'll save with SHOPMASTER woodworking tools

You can start your home workshop with a Shopmaster Saber Saw, like the one pictured above. The cost is less than $16.00. With it you can cross cut, rip, and do many other complicated sawing operations.

You can add to your shop at any time. All Shopmaster Tools are independent and designed to do specific work. Independent tools are always ready, and require little adjusting. Just flip the switch and you are ready to go. These uniform precision-built tools can be mounted together and powered with one motor if you wish, or can be independently powered.

There is a size of tool for every shop, so make yours a Shopmaster shop.

SHOPMASTER, INC.
1214 Third St. S., Minneapolis, Minn.

Send me your new full color catalog giving full details on the complete line of SHOPMASTER "Uniform Precision" Tools, and shop layout sheet.

Name
Address
City & State

MARCH 1950
get the world's greatest RADIO & TELEVISION CATALOG! FREE

ALLIED'S 196-PAGE GUIDE TO EVERYTHING IN RADIO & TV AT LOWEST PRICES

TELEVISION AND HOME RADIOS
SERVICE SUPPLIES BUILDERS' SUPPLIES
AMATEUR GEAR
AMPLIFIERS, P.A., SYSTEMS, RECORDERS

Everything for Experimenters, Builders, Amateurs, Servicemen, Engineers, Soundmen

Save money on every radio you need! Get the 196-page 1950 ALLIED Catalog featuring the world's largest stocks of top-quality equipment, at low, money-saving prices! Latest TV releases, home radios and radio-phonos, Amateur equipment, PA systems and High-Fidelity Sound, recorders, test instruments, builders' kits—plus thousands of parts, tubes, tools, books and diagrams. Get more for your money from the World's Largest Radio Supply House. Send today for your free copy of the 1950 ALLIED Radio Buying Guide!

When Oil Wells Run Dry

(Continued from page 159)

The principle common to all the retorts is to burn the residual oils and carbons in the spent shale to provide the heat or hot gas that in turn heats the raw shale and drives off its oil.

This crude oil is then pumped to a small flexible refinery unit for thermal cracking operations. Here the diesel oil used by the mining equipment is produced, as well as the gasoline for the plant's automobiles, burner fuels, coke and intermediate stocks.

Shale oil has excessive amounts of sulphur, nitrogen and oxygen compounds and its conversion into high-quality products is more expensive than is the refining of most crude petroleums. This, however, is balanced by cheaper production costs. It's cheaper to mine and retort the shale than explore for petroleum and dig wells.

The Bureau of Mines is also studying the production of liquid fuels from agricultural residues such as cornsobs, seeking ways of extracting additional petroleum from exhausted oil fields, and testing methods of converting the hydrocarbons in coal into liquid fuels. Started as an emergency measure during the war, the whole program has brought assurance to the United States that this country won't run out of liquid fuels for perhaps 1000 years to come.

ALLIED RADIO

ALLIED RADIO CORP.
833 W. Jackson Blvd., Dept. 5-C-0
Chicago 7, Illinois

☐ Rush FREE 196-Page Catalog

Name.................................................. 
Address...............................................
City.............................................. Zone... State...
NOW 1950 MODEL
of the famous...
HANDEE
tool of
100! USES

It's here—biggest buy of all. First tool of this type and today's finest. The "Cadillac" of small power tools—choice of mechanics and home-rafters everywhere. Make costume jewelry, train and piano models, puppets, tooled leather, initial tumbler, internally curve plastics, etc.

A FINE GIFT
Handeewi with 51 accessories in new
steal case.
Handeewi with 7 accessories
Here's smooth, controlled
power at your fingertips. Handeewi has 7-bar armature and is perfectly balanced. 25,000 r.p.m. AC or DC. Wt. 12 oz. Order today postpaid on money-back guarantee or write for catalog. Chicago Wheel & Mfg. Co. 1101 W. Monroe St., Dept. PM, Chicago 7, Ill.

POWER MOWERS & KITS
LOW FACTORY PRICES
DIRECT TO YOU
on America's finest Lawn Mowers and Easy-To-Assemble Kits and Parts. TRIANGLE Mowers are quality-built and powered high for easy cutting and long wear.

WRITE TODAY for full facts, Free Plans, Parts List, and LOW, Factory Prices.

TRIANGLE MFG. CO.
Dept. H-3, Box 185
Fort Scott, Kansas

POWER HACKSAW $47.25

LESS MOTOR
F. G. B. Benton Harbor

- Rugged cast iron construction. Wt. 56 lbs. bronze bearings. Draw cut. Auto. return lift, Auto. shut-off. Visu swirls 1.5". Cap. 4"x4".

Send for full details and name of nearest dealer.

EXCEL MACHINE TOOLS
Dept. PM-30
BENTON HARBOR, MICHIGAN

FAST—Old Town Lapstrake Boat

SMOOTH lines of this lapstrake outboard boat help you start in a hurry—and get there fast! She's roomy, too, with wide cross seats (folding backs) and long seats on both sides at the stern. Handles easily, with deep bow to fight stormy waves! Built of handsome woods for strength and service. Upkeep is easy.

FREE CATALOG shows just the model you need. Write for one today! Also rowboats, sailing dinghies, sailboats, canoes.

OLD TOWN BOATS
643 Elm Street, Old Town, Maine

PLEASE SEND ME FREE CATALOG

Name ____________________________
Address _________________________
City _____________________________
State ____________________________

MARCH 1950
“DAY OR NIGHT THE BIG ONES
HIT JITTERBUG”

23-lb. Musky and 21-lb. Northern Pike
taken at Penetang,
Georgian Bay, Canada,
on a Black Jitterbug
by Leonard Kline of
Cleveland, Ohio, and
Clarence Mulhorn of
Vandergrift, Penna.
“Following day we
took 5 Large-mouth
Bass & another North-
ern Pike on a Red and
White Jitterbug.”

NOISY SURFACE BAIT

Each $1.21

Choice
10 Colors

5/8 oz.
size

Also in 3 FIREPLUG® FLUORESCENT FINISHES $1.45 each.

MUSKY JITTERBUG (1-1/4 oz.) gets the biggest, $2.00 each.

PEANUT JITTERBUG (3/8 oz.) for light
tackle and spinning outfits $1.21 each.

WRITE FOR FREE FULL-COLOR BAIT CATALOG

FRED ARBOGAST & CO., INC.
1623 WEST NORTH STREET • AKRON 3, OHIO

METALS FOR YOUR
RAFTWORK
... OR METAL WORK!

AT WAREHOUSE-TO-YOU PRICES
Now ... from one convenient and economical source
you can get these high-quality metals
for your needs, pre-cut to your specifications.

ALUMINUM, BRASS, COPPER, STAINLESS
STEEL in RECTANGULAR SHEETS

Easy to work, adaptable to hundreds of uses
such as lamp shades, serving trays, wall brack-
ets, etc. Ideal for modern silhouette cut-outs.

CIRCLES of ALUMINUM and COPPER
Perfect for shaping and forming
into useful items, and for perforated
design work.

Write for price lists and complete information

FREE BOOKLETS tell how YOU can
use these metals—easily and quickly.
Write for your free copies today.

METAL GOODS CORPORATION
Dept. PM 5239 Brown Ave. St. Louis 15, Mo.

Boom in Tongue-Twisting Metals

(Continued from page 154)

Swedish army surgeon, Karl Mosander,
back in 1839. Like most of the rare earths,
lanthanum is seldom seen pure, is commonly
used in the form of colorless salts. During
the 1930s, chemists found that using lan-
thanum in camera lenses made for clearer,
sharper photographs. During World War
II, lanthanum went into the aerial cameras
used in photographing enemy installations
from high in the sky. Now lanthanum
lenses are appearing in the better cameras
sold to amateur photographers.

Neodymium, one of the elements dis-
covered by Karl Auer when he was still an
earnest student, began his researches with
only enough of the rare earth containing
minerals to fill a child’s hand. Now it can
be produced in varying grades of purity
for industry. It serves as a brilliant coloring
material for expensive glassware. The rasp-
berry and amethyst colors it creates cannot
be duplicated anywhere. It’s expensive
though, the neodymium alone in one col-
ored goblet could cost anywhere from $5 to
$15. In smaller amounts, neodymium cuts
out unwanted yellow colors in glass. And a
good pair of sunglasses may contain some
small amounts of this rare earth. It has a
great ability to filter out ultraviolet rays
from the sun which are hard on the eyes.

Various mixtures of the rare earths also
have important industrial uses. One mix-
ture, called didymium, is what is left when
cerium is taken out of the rare earths in
monazite sand. Industrially, didymium is
used to make glass colorless, in nonglare
lenses, and—like neodymium which it con-
tains—to cut down on the ultraviolet rays
which pass through sunglasses. Other mix-
tures include most of the heavier rare
earths found in monazite, as well as cerium.
The chloride salts of this mixture can be
applied to textiles to make them water-
proof. Furthermore, they are also valuable
in killing mildew that might settle on the
textiles. The fluorides and oxides of this
mixture go into the cores of the carbon
rods used to produce arc lights. They help
make the light that results when electric-
ity jumps between the rods a brilliant
white. Pound for pound, this use of the
fluorides and oxides in the cores of arc-light
carbons is probably the most important
single use of the rare earths.

One mixture of rare earths, called cerium
oxalate, is used in medicine. It helps pre-
vant nausea.

There are a good many production head-
aches in getting the rare earths out of the
monazite sand. For one thing, they all tend

(Continued to page 264)
U-CAN-DO-IT
WOODWORKING PLANS

You don't have to be an expert to make your own furniture! These simplified instructions will show you how to make your own tables, shelves, scrap hampers, etc.

You also get a full size bottle of our famous "Gorilla Grip" Glue. Rogers has a ton of strength in every drop. It’s great for making and repairing furniture.

Send 10c New to Rogers Isinglass and Glue Co., Gloucester, Mass.

ROGERS
the best LIQUID FISH GLUE
GLOUCESTER, MASS.

Sand Casting—Forging—Heat Treating—Case Hardening

BRONZE FOUNDRY

In your own workshop allows you to design and build your own GASOLINE ENGINE, STEAM ENGINES, STATUARY, ART OBJECTS, SPECIAL TOOLS, NEW INVENTIONS, ETC. You can also make forging and case hardening steel. Your shop is not complete without a FOUNDRY SET. Three sizes are available capable of making bronze castings of 1/4, 3 and 6 pounds weight, aluminum, copper, brass, etc.

$90.00 F.O.B. Kansas City. Domestic gas supply and 110 volt AC or DC energy required for operation. Write for circular.

Box 6022, Des. P-2

KANSAS CITY SPECIALTIES CO.

PARAGON SPRAYER
FOR 10 DAYS


Income from renting or spraying for others will bring you extra profits year after year.

No. 3: 12-gallon capacity with pipes, hose, nozzles and truck $29.95.

To take advantage of early spraying write, phone, or wire today for our special proposition.

THE CAMPBELL-HAUSFELD CO.
45 State Ave., HARRISON, OHIO

JET POWER
FOR YOUR CAR

Merrick's Multi-jet fuel atomizer gives your car worlds of added power ... quicker starting and take-off ... smoother, quieter performance ... plus more miles per gallon of gas. Install it yourself in a few moments in manifolds. Try it for ten days and if you are not delighted with results, return it. We will gladly refund money. When ordering give make and year of car. Prepaid to any place $7.75.

MERRICK ENGINEERING CO.
6700 IMPERIAL AVE.
SAN DIEGO, CALIF.

OTTAWA Buzz Master

7 MODELS—$99.00 up

Greatest offer made in our 40 years of manufacturing. A model to fit your needs and your pocketbook. Free details.

OTTAWA MFG. CO., 2-027 Brush St., Ottawa, Kans.

MODERN LAWN MOWER SHARPENER

FOR LAWN MOWER SHOPS

Golf Courses • Parks

101 OTHER JOBS

Sharpen All Reel Type Mowers • Rasps, Filetter or Gang File.

10 to 20 Minutes • No Disassembling • No Extra Attachments Needed.

All reel type mowers, from 5-inch mowers to 30-inch power mowers, are quickly sharpened to extreme cuts or torn Jets and bent twist blades.

PRICE $74.150

Less Motor

$263.00

With Motor

Order Now Immediate Delivery

MODERN MFG. CO. 100 N. FAIR OAKS AVE. PASADENA 2, CALIFORNIA

VERSATILE VISE

the versatile vise for every woodworking need

* Stands Up
* Lies Flat
* Turns to the most Convenient Position

cast semi-steel construction—weighs 16 lbs.

Only $8.95, l.o.b. Orrville, Ohio. Buy it from your dealer, or send check or money order direct to us for $8.95 (Ohio customers remit 3% sales tax) and pay the small shipping costs upon delivery. Satisfaction guaranteed or your money back.

The Willet Brothers Co.
Orrville, Ohio

Department P

MARCH 1950

263
to behave alike, although Doctor Kremers says that under certain conditions, cerium, samarium and ytterbium can be made to act like chemical individualists. This helps speed separation. And, in the meantime, he isn’t talking too much about just how the earths are pulled out from the mixture in the monazite.

The rare earths, incidentally, are hip-deep in the atomic-energy program. The 1947-1948 report of the Atomic Energy Commission, issued recently, cites the progress in preparing purified forms of the rare earths. So far, purified forms of lanthanum, cerium, praseodymium, neodymium, samarium, gadolinium and ytterbium have been prepared. The AEC reports that the demand for these substances from other laboratories is greater than the supply. Furthermore, it says, “It now appears that they (the rare-earth metals) may have a bright commercial future as alloy metals in the manufacture of high-temperature structural materials and other specialized products.”

And a scientific controversy on a now-you-see-it, now-you-don’t basis is still raging around one of the rare earths. This element is number 61 in the periodic table. In recent years it has operated under three different aliases, illinium, florentium and promethium. Illinium was the name given it by Prof. B. Smith Hopkins of the University of Illinois, who discovered it through the hotly debated magneto-optic effect, which many scientists distrust. Florentium was the name given it by Prof. Luigi Rolla of Florence, and his discovery has been doubted. Promethium is the name proposed by the team of atomic scientists who created radioactive isotopes of the element in the laboratory. So far, it doesn’t seem to have turned up in nature. They obtained their samples of the element by bombarding neodymium with the atomic particles called neutrons. The form they discovered doesn’t last long, has a radioactive half-life estimated at 3.7 years.

In spite of this argument, however, and the technical difficulties in extracting the rare earths, one thing is certain. Future generations of chemistry students are going to have a much better acquaintance with this family of elements than their fathers ever had. What was once a brief detour in high-school chemistry classes may become a broad paved highway for chemical engineering.

An air strip has been built on the Kansas State Fair grounds at Hutchinson, Kans., so that farmers, who once drove their horses many miles to see an airplane at the fair, now can fly there in their private planes—to see the horses.
3-purpose hair tonic

DESIGNED TO DO ALL THREE THINGS A HAIR TONIC SHOULD DO!

1. "Wakes Up" Scalp
   Yes... Lucky Tiger relieves itching quickly, cleans scalp of loose dandruff scales, gives scalp a keen, zesty tingle. Scalp feels better—you feel better!

2. Kills Dandruff Gems
   Lucky Tiger gets at a common cause of infectious dandruff—actually kills the germ pityrosporum ovale* on contact—so you can make progress against dandruff!

3. Grooms Hair Perfectly!
   Lucky Tiger adds lustre, makes hair easy to comb and keep in place—without that slicked-down, greasy look. You don't look "sharp"—just naturally well groomed!

Get This Pin-Up FREE!
To get a beautiful, four-color, 8½ x 11 glossy stock reproduction of the Lucky Tiger Pin-Up Girl absolutely FREE and postpaid—simply send coupon below or write the Lucky Tiger Mfg. Co., Dept. PM 10, 544 Delaware St., Kansas City 6, Mo.

3-WAY HAIR TONIC!

1. WAKES UP dull, drab, uninteresting rooms—gives life a keen, zesty tingle!
2. KILLS the Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday off-hour Blues—Lucky Boy you!
3. GROOMS the mind... perfect dream material—Hair Tonic cures what ails you!

SEND TODAY! Act at once if you want a beautiful, four-color, 8½ x 11 reproduction on glossy stock of the Lucky Tiger Pin-Up Girl. Only a limited amount available—make sure you get yours by ordering NOW!

Lucky Tiger MFG. Co.
Dept. PM 10, 544 Delaware St.
Kansas City 6, Mo.

Gentlemen: Please send me, post-paid, a beautiful four-color, 8½ x 11, glossy stock reproduction of the Lucky Tiger Pin-Up girl, absolutely FREE!

Name __________________________
Address ________________________

City __________________________ State ________

She's yours for the asking!
The tools that money couldn’t buy

Walter Chrysler made them himself. He was 17, working in a railroad roundhouse. His mechanic’s fingers itched for a kit of tools of his own. So young Walter took steel and made his own.

As he shaped them, he shaped a dream as well. It was a special American kind of dream—freeranging imagination anchored to solid things like common sense, working a little harder, making things a little better. And asking no odds.

It led Walter Chrysler to success in railroading when he was young. It led him to study the automobiles of the day. Why couldn’t a man build better cars than any known—nimblter, safer, more comfortable, handsomer?

So, 25 years ago, Walter Chrysler introduced the first Chrysler car. What he did changed the whole pattern of American motoring. He changed it with high-compression engines, 4-wheel hydraulic brakes, all-steel bodies, new ways of distributing weight for better riding... many originations the entire automobile industry eventually followed.

As Mr. Chrysler’s birthday, April 2nd, approaches and as Chrysler Corporation this year observes its own 25th anniversary, it is fitting to pay this tribute to Walter Chrysler and his genius.

And the tools of his earlier mechanic’s days? I remember when he found them in his mother’s house. It was long after he had asked me to work with him. He brought the tools back from Kansas. A few of them needed fixing and he asked me to fix them. It was a compliment I have never forgotten.

The qualities Mr. Chrysler put into his own tools still mark the great organization he founded. He built not merely material things; he inspired men with a zeal to carry on his splendid ideals.

Chrysler Corporation is still young enough to feel his inspiration. He wished this company always to be a producer of fine automobiles of great value.

And those of us who were privileged to work with him believe that the new Plymouth, Dodge, De Soto and Chrysler automobiles live up to his tradition.

It is a tradition uniquely American—to live and work with the idea of finding better ways to make what people want.

President

CHRYSLER CORPORATION
BUILD YOUR OWN
POWER MOWER!

SAVE $2500

EASY TO ASSEMBLE!

WEED CUTTING EASY, QUICKER

Complete mower parts kit for either gasoline or electric power. You can easily assemble this highly efficient mower in a few hours. We furnish instructions. Cut your lawn or field quickly at small cost. Does the work of far more expensive mowers. Factory appearance. From the world's largest manufacturer of rotary power mowers.

WRITE TODAY! FREE INFORMATION!

J. G. DOYLE ENGINEERING CO.
526 CHERRY ST. DEPT. A
KANSAS CITY, MISSOURI

HANDY CALCULATOR FOR WOODWORKERS... ONLY 10c

Just set dial, quickly solves countless problems. Converts linear to board feet, compares workability of various woods, shows bit sizes, nail specifications. Also tool sharpening tips, etc. 6" diameter heavily varnished cardboard. Send 10c to Greenlee Tool Co. 2103 Columbia Ave., Rockford, Ill.

A WORKSHOP WONDER
at a wonderful low price

LIFE-TIME PLASTIC CHEST

Improved CASCO

ELECTR-O-TOOL KIT

DRILLS - SAWS - ETCHES - POLISHES

Casco's ELECTR-O-TOOL kit is the most complete, practical power-workshop any craftsman or hobbyist can own. Has ALL the accessories you need to drill, cut, etch, carve, grind, buff, polish, sand, engrave, saw, clean and sharpen — metal, wood, glass, leather, plastic and fibre. 1001 year-round money-saving uses. Operates on AC and DC current. Fully GUARANTEED.

CASCO Products Corp.
Bridgeport 2, Conn.
the first "murder." Scientific analysis would have shown they came from the "killer's" coat. The other important evidence which the students failed to exploit was a pocket comb, containing hair. This could also have been used scientifically to strengthen the case. The lesson was well taken by the otherwise alert students, who blamed lack of coordination and cooperation among themselves for the slip-ups.

Generally, the sample crimes staged at the traveling schools are of the type that the particular area has been experiencing most frequently. For instance, when California had a plague of bank robberies, many of the schools held in that state staged holdups to demonstrate action to be taken when an alarm is sounded.

Demonstrations are conducted on the raiding of a place known to harbor criminals or the trapping of criminals as they emerge. One example, which has for its moral the value of patience, depicts a city street scene in front of a theater.

The police have a tip that a wanted man will attend the movie that night and officers are strategically placed at all exits to the theater, with the entrance, where the action is most likely to occur, covered from all angles. The criminal shows up at the theater and buys his ticket, but not an officer makes a move. Why?

Simply because it is better to trap a man coming out of a theater than going in. A man leaving a theater ordinarily is still thinking about the movie, is a bit turned around in directions and is partly blinded by the abrupt contrast in lighting.

So the police just stand and wait until their man steps out of the theater. A signal is given by the officer in charge and the police move in.

In this case, the criminal spots the closing jaws of the trap and instinctively reaches for his gun. The police have the jump on him, physically and psychologically, and cut loose with their guns. The criminal falls dead on the pavement.

This is not something out of a movie scenario, but a page from real life—the capture and killing by FBI agents of John Dillinger on July 22, 1934, in front of the Biograph Theater in Chicago.

The police are also taught how to handle a clue when they find it. They learn how to pick up a sample of dried blood from a concrete floor. (It's really simple. The blood is scraped up with a knife and put into a pillbox, or a wet piece of filter paper—a white, moistened blotter will do—is applied.)

(Continued to page 256)
Repower your FORD Car or Truck with an Authorized Reconditioned Ford Engine

ONLY AN Authorized Reconditioned FORD Engine GIVES YOU ALL THIS:

- One-day installation.
- Genuine Ford Parts—new or completely reconditioned.
- Built and tested to Ford-factory standards in Ford-authorized, Ford-inspected plants.
- Material and workmanship fully guaranteed by authorized reconditioner.
- Costs only a few dollars more than a ring and re-bore job.

For complete information see your friendly Ford dealer or independent garage displaying the Authorized emblem and selling AUTHORIZED Reconditioned Ford Engine and Engine Accessories.
Major stress is placed on fingerprint work and many of the schools run by the FBI are devoted exclusively to it. From every section of the nation, during the first six months of 1949, a total of 400,089 fingerprint-arrest records were received by the Identification Division of the FBI, and 59.4 percent represented persons who already had fingerprint-arrest cards on file in Washington. These figures pertain to fingerprint-arrest records only, and in no way relate to civil identification files at the FBI.

The police also learn jujitsu. That's the easy method of sending a 200-pound tough spinning on his ear. The FBI has not only adopted the ancient Japanese tricks, but has added a few of its own—especially for disarming criminals.

And highly significant is the fact that this training program is not a one-way street.

"I learn something from every school I conduct," was the typical comment of W.G. Banister, agent in charge of the FBI office at Butte, Mont. "We encourage the exchange of ideas and experiences, and this is one of the most valuable features of the traveling schools."

---

Manhattan's Aluminum Venus

(Continued from page 121)

stick rows of little brass "shims" into the Plasteline along the desired dividing lines before applying plaster. Then the mold is removed in sections.

Flaws inside the mold are carved out by the sculptor. The inside of the mold is then shellacked and coated with green soap as a separator so the cast won't stick to it. Then the pieces are bound together, and liquid plaster is applied.

When the cast has set, the mold is chopped away with mallet and chisel.

"All this represents lots of time and work," Williams points out, "but we still had no statue—only a lot of plaster casts."

In the gloomy confines of a Long Island foundry, however, men stripped to the waist were even then sweating out the tedious process of converting a plaster statue into one of hollow aluminum. There are two common methods of casting a metal statue: sand casting, or the "lost wax process" in which molten metal replaces a wax replica of the image embedded in a silicaplaster mix. Williams chose the latter for his statue. Here's how it works:

1. The plaster cast is covered with clay an inch or so thick. Over this goes another layer of plaster, divided by shims so it can be removed in two or more pieces. Holes are left in each section here and there. When hard, this outer shell is removed.

(Continued to page 270)
Only wide-gap Auto-Lite Resistor Spark Plugs give you SMOOTHER PERFORMANCE, DOUBLE LIFE and GREATER GAS SAVINGS.

Cut-away view shows the 10,000 ohm Resistor which permits wider initial gap settings and makes these advantages possible. Double life under equal conditions as compared with regular type spark plugs.

Millions of car owners from coast to coast are switching from narrow-gap spark plugs to the sensational new wide-gap Auto-Lite Resistor Spark Plug. They want smoother performance—money-saving gas economy—improved starting in extreme cold weather. They want the Built-in Resistor that doubles spark plug life and reduces interference with radio and television reception.

To get these remarkable benefits for your car, see your Auto-Lite Spark Plug Dealer today. You're always right... with Auto-Lite.

Tune in "Suspense!"... CBS Radio Thursdays... CBS Television Tuesdays

AUTO-LITE Spark Plugs Patented U.S.A.

Auto-Lite Spark Plugs Regular and Transport Types

MARCH 1950
The clay is lifted off the cast carefully, and the outer casing is put back in position, covering the original plaster cast like a tent. This time there’s space between its inner surface and the surface of the cast—where the clay used to be. Through a pouring hole that was provided for in the outer casing, the men pour liquid glue to make the “glue mold.” When this coagulates, it looks and feels just like rubber.

Now the outer casing is removed again, and the glue mold is stripped off the plaster cast. Unsupported, it collapses like a wobbly, boneless rubber man. But not for long. The outer casing goes back on it, holding it in proper shape, like a corset. Its inner surface, of course, is a perfect impression of the statue part that has been removed. Over this interior the men now brush melted beeswax in all the nooks and crannies, until it is \( \frac{1}{36} \) inch thick. Then melted wax is poured in and swished around, until the wax layer is built up to \( \frac{1}{4} \) inch thick.

The hollow interior is now packed with a mixture of silica—a sort of fine, powdery sand—and plaster in a semiliquid solution. When it dries it hardens.

The outer plaster shell is pulled off and tossed away—like everything else in this odd business. So is the glue mold. All that’s left now is a fine, \( \frac{1}{4} \)-inch-thick replica of the statue piece in pure delicate wax, surrounding a hard core of plaster.

Next step involves covering the whole outside of the piece with a heavy layer of the plaster-silica mix. But before this outer shell goes on, rows of nails are driven through the wax and embedded in the hard core. Their heads are left sticking out, like pins in a cushion. This is so that when the wax is melted out, the outer shell will be rigidly attached to the core.

Now a brick kiln is built around the case, and a fire started under it. The wax melts and runs out through holes, or “gates,” which are channeled to a principal opening.

Those gates serve another purpose, too. When thoroughly cooked, the case is removed from the furnace, uprighted, packed in sand and molten aluminum is poured through the principal opening into the space vacated by the wax. The metal, too, runs through all the gates. If the gates weren’t there, air wouldn’t escape from the mold spaces.

No such disasters occurred on “Venus and Manhattan.” As fast as completed aluminum casts came from molds, they were bolted together, all the seams flattened. On November 2, “Venus and Manhattan” emerged in full splendor over the doorway of the new Parke-Bernet Galleries. Williams heaved a deep sigh and went up to his country home to collapse for awhile.
When you use pliers...

You need CHANNELLOCK

Channellock's patented tongue and groove joint gives you these "plus" features: Greater Strength, Longer Wearing, Self-Cleaning, Closely-spaced Adjustments, Visible Adjustment, No Wear on Joint Bolt.

There are lots of "fussy fix-it" jobs around the house that Dad, Mom or the kids can easily do when Channellock pliers are handy. No matter what—electrical, automotive, plumbing, battery, or anything mechanical—you need Channellock pliers. Look for the Blue Channellock Display Board the next time you're shopping for tools. Step up and select the plier you need from the complete Channellock line. If you use pliers... you need Channellock.

CHAMPION DEARMENT TOOL CO.
MEADVILLE, PA.

Send for Catalog C-14 today.

Only CHAMPION DEARMENT MAKES...

CHANNELLOCK

MARCH 1950
Broncos With Rubber Tires
(Continued from page 111)

aviation editor of the Portland Oregonian, was wheedled into driving one of the double-bottoms. Johnny Castner, the new champ, had heard that Lev was a B-29 pilot during the war. "If you can handle a 50-ton plane with four 2200-horsepower engines," he told the reporter, "what's a 35-tonner with only 200 horses?"

Richards was game. He donned a parachute for effect, climbed aboard and gaped. Besides a nightmare of instruments, he found himself confronted by two gearshift levers, which give the big baby 12 speeds forward and three in reverse.

He found it takes two hands to shift. Veteran drivers stick one arm through the wheel while shifting and steer with an elbow. Richards said he did it with his teeth. "There's really nothing to it," he maintains, "if you're part octopus." On the diminishing alley, he noted that after he made his "bomb run" he did mowed down enough poles to build tepees for the whole Pendleton Roundup.

It took Richards 15 minutes to do the course. Castner has made it in less than three. "But," says Lev, "you must remember, he missed every target."

Any driver will tell you, though, that the everyday feats he performs with his lumbering charge far exceed anything he'll ever have to do in a roadeo. This is especially true of the semitrailers and double-bottoms. Handling 35,000 to 74,000 pounds of rolling freight on wet or icy mountain highways takes the best drivers in the world—and these are the boys. Jackknifing is always a threat on icy roads.

"Going up an icy hill with no traction," explains a tractor-trailer man, "can spell trouble. You can feel her grind slower and slower until she starts back. Then she 'jacks' and you do one of two things: get out or ride her down and try to ditch her."

Oddly, it's safer coming down a slick hill than going up, if the road is clear. Experienced drivers can usually feel the trailer behind them start to sway if it's getting ready to jackknife. Icy or not, the remedy is simple but hair-raising. "Just pour on the water," explains a veteran, "and pull the tractor out ahead."

The tippability of trailers has been lessened recently by the invention of a new "fifth wheel," or swivel coupling on the tractor which slides under the "box" and hooks onto a coupling pin. The fifth wheel is hung on a "rocking shaft" to permit the coupling to rock fore and aft so the tractor and trailer will snake over bumps and

(Continued to page 274)
New Star of the Lightweights

WHIZZER

Sportsman

A completely new Motor Bike

NEW beauty
NEW power
NEW economy

★ Big new 3 horsepower motor, 138 c.c.
★ Kick starter
★ Extra-large drum brakes, front and rear

★ 2-speed transmission; automatic shifting
★ 5 to 40 m.p.h.; over 100 miles per gallon of gas
★ Built-in generator, Sealed Beam headlight

RIDE ONE and you’ll BUY ONE!
Pleasure’s built into Whizzer’s new Sportsman! Powered by rugged, 3-horsepower, 138 c.c. motor, 4-cycle, precision-built. Automatic 2-speed transmission has low gear to conquer hills, give quick starts. Low center of gravity with full-size frame on 20” heavy-duty wheels. Long wheelbase. Extra-large front and rear drum-type expander brakes, rear brake pedal-controlled. Folding footrests, chrome echotube exhaust. For work, low-cost travel and pleasure-riding, you’ll want Whizzer SPORTSMAN!

$239.50
complete, plus Fed. tax

Power Package
FOR YOUR BIKE!

Famous WHIZZER, America’s Finest Bike Motor
Now 3 Big Horsepower!
4-cycle, 138 c.c. 1-5 to 40 m.p.h. on your bike! For low-cost travel, fun! Motor, complete with attachments.

$109.97

SEE YOUR WHIZZER DEALER TODAY!

WHIZZER MOTOR CO., 300 S. Sanford, Pontiac 15, Mich.
Please send me, by return mail, free illustrated catalog on Whizzer motor bikes.

Name:
Address:
City:
State:
gullies instead of riding rigid. On a tight turn, though, the shaft on older types didn't
turn with the trailer and the trailer rocked sideways. The new fifth wheel turns
with the trailer, so that the rocking shaft is always parallel with the trailer axle.

Another fifth-wheel problem was that when a driver unhooked for repairs en
route and left his trailer on the roadside, highjackers could come along with a stan-
dard tractor, hook on and ride away with the trailer full of booty. Today, there is a
"pin lock" that caps the trailer pin like an inverted mushroom to foil thieves.

Pleasure drivers, probably to excuse their own carelessness behind a wheel,
have a bad habit of blaming trucks for accidents. Actually, trucks are responsible for
less than 16 percent of all the accidents on the road. Few drivers in the world are
safer, more courteous or clearheaded than the men in the big rigs. Once in a great
while, a big trailer may "get away" on a hill. When this happens, the driver does
not "clip telephone poles" or plow into traffic. If there's a clear road ahead, he
may try to ride it out. Some men, by weaving the front end, have set the big box
swaying until finally it whipped over, snapped loose and crashed into the woods.
Then they ditched the front end. Dozens of drivers have deliberately crashed their
entire rigs to avoid hitting foolish pleasure drivers and have gone to the hospital or
cemetry for their pains.

Every "gear grinder" at the Boston Roadshow can remember a buddy who wound
up dead because of a careless motorist. "People don't realize," they'll tell you, "that
it takes a full 90 feet to stop a loaded rig going 40 miles an hour after the brakes are
applied. We allow 500 feet between us and the next car. Motorists cut in too soon."

Truck drivers would like to have people who are overtaking them dim their lights.
"Their brights are blinding us from three different mirrors," they point out.

"Truck drivers," one fellow put it, "are conservative drivers." When you see them
wheel their 20 to 65-foot rigs around a rodeo arena as though they were handling
scooters, you begin to thank your lucky stars that they are. They can gauge the
power of their engines down to the last horse and their judgment of distance is
better than a cat's whiskers. They'll tell you within a layer of paint whether or not
they can get through a hole. And if they say "yes," you know they can do it.

So, if you're one who figures the truck driver for a grizzled, lantern-jawed bull-
dozer pusher—trot around to the rodeo in your state this year and watch your mind
change.
New scintillation counter, using electron tube developed at RCA Laboratories, gives faster, more accurate measurements of atomic radiations.

What can you hear through an ear of grain?

When agriculturists want to learn what nourishment a plant is getting, they inject radioactive materials into the soil and trace their absorption with sensitive instruments. Industry and medicine also use this ingenious technique.

Until recently, scientists heard what was happening, followed the passage of atomic materials with a clicking Geiger counter. Now a more sensitive instrument—a new scintillation counter made possible by a development of RCA Laboratories—can do the job more efficiently.

Heart of this counter is a new multiplier phototube so sensitive that it can react to the light of a firefly 250 feet away! In the scintillation counter, tiny flashes, set off by the impact of atomic particles on a fluorescent crystal, are converted into pulses of electrical current and multiplied as much as a million times by this tube.

See the newest advances in radio, television, and electronic science at RCA Exhibition Hall, 36 West 49th Street, New York. Admission is free. Radio Corporation of America, Radio City, N. Y.

The principle of RCA's multiplier phototube is also used in the supersensitive RCA Image Orthicon television camera, to give you sharp, clear television pictures in dim light.

RADIO CORPORATION of AMERICA
World Leader in Radio — First in Television
Suicide Simon

(Continued from page 116)

presses the button. Ordinarily, it takes only 10 seconds to do this. Once it took him as long as two minutes.

The dynamite-laden box is no place for a sissy. Simon has a physique that looks as if it were hewn from granite. When you shake hands with him, you feel that you are shaking the hand of a marble statue. He hardened his body in 17 years of high diving. He used to saturate his clothing with gasoline, set it afire and jump 100 feet into a tank of water. But he broke his neck and other bones so many times that he decided to try something less hazardous.

Three years ago, he saw Captain Frakes, ex-Hollywood stunt man, blow himself up with dynamite. The dynamite bug hit him right away. Frakes, however, wouldn't tell him how he did it. "If Frakes can do it," Simon told himself, "I can do it."

He bought some dynamite and detonator caps and took them to his winter quarters in El Jobean, Fla. That winter he experimented, first with five steel plates, then three and two, until the dynamite worked the way he wanted it.

After wasting almost a box of explosives, he used a milk bottle to test the pressure inside the plates. When it did not break, he crawled into a wooden box himself and set off the dynamite. The blast sent him spinning like a whirligig for over 20 feet. If he had not known how to roll and tumble, the blast might have killed him. As it was, his bones ached for weeks. He made changes and found that a quarter stick of dynamite did not make enough vacuum. It hurt him more than a full stick did. Now he uses a stick and a half.

His first public appearance was in a Jacksonville park. He has appeared in many other places since then. Recently, he decided to take out some insurance. Lloyds of London charged him $40 per thousand a month for high diving, but did not show any interest to insure him in his dynamite stunt. Another company offered to insure him for 10 percent of his salary, but Simon refused the offer.

Suicide Simon works at blowing himself up only three months a year. The rest of the time he likes to go alligator hunting in the Everglades, fish for snook and jewfish in the lazy Miakka River and entertain the guests in his 28-room hotel at El Jobean.

This year, he is trying out another idea to make people think he is crazy. He is building a jet-propelled rocket to carry him about 1500 feet in the air and drop him off with a parachute. Sounds suicidal? Well, at least he'll come down by parachute.
Make $20 to $30 a Week
EXTRA MONEY

MACHINE SAW FILING
PAYS UP to $2 or $3 an HOUR

Turn your spare time into CASH—sharpening saws with a Foley Automatic Saw Filer pays up to $2 or $3 an hour. You will find you can make $20 to $30 a week in your spare time as a starter.

You can work in your basement or garage—no experience necessary. "The first saw I sharpened with my Foley Filer came out 100%," writes Clarence E. Parsons. No canvassing—"I advertised in our local paper and got in 93 saws"—says M. L. Thompson. The Foley is the only machine with which you can file all hand saws, also band saws and cross-cut circular saws.

SEND FOR FREE BOOK
"INDEPENDENCE AFTER 40"

Shows how you can get business from home owners, farmers, carpenters, schools, factories, etc. With a small investment, no overhead, no stock of goods to carry, you can get right into a cash business—and possibly later on develop into a full-time repair shop. Send coupon today for Free Book. No salesman will call.

"Each saw I filed got me six more and business has been picking up that way since a year ago. If it keeps up I will have to buy another Foley SAW Filer."—William C. Baldwin

"I have done 4 or 5 thousand saws in my spare time in the 4½ years since I got the outfit, and they are all coming back."—(Name)

"Have filed over 2,000 saws in 18 months. One customer brings another."—E. A. Fink

Center-Raising Attachment Increases Lathe Capacity

Small lathes, with from 9 to 12-inch capacities, can be converted to take work from 17 to 20 inches in diameter with a center-raising device. There are three gears in the headstock end and the gear ratio is unchanged by the converter. The tailstock and tool post are also raised so that feed mechanisms operate normally.

Chemical Reduces Danger Of Lethal Radiations

Atomic scientists at the Argonne National Laboratory have developed a method of protecting animals against death from normally lethal X-rays. The chemical used in the protective treatment is cysteine and is given orally or intravenously in a single dose within an hour before exposure. Since its administration immediately after exposure is not effective, it is believed that the cysteine, in some unknown manner, prevents cell constituents from destruction by the X-rays. Experiments show that 70 to 80 percent of the animals treated with cysteine survive an irradiation which kills about 80 percent of the untreated animals.

CHAMPION V-GLOW PLUGS
for model engines only

- CHAMPION TERMINAL assures better center electrode seal and provides sturdy electrical connection.
- CHAMPION CERAMIC INSULATORS are proved dependable in millions of Champion Spark Plugs.
- CHAMPION SILTMENT SEAL prevents excessive compression leakage between insulator and shell.
- CHAMPION "THERM-O-FLEX" CONSTRUCTION—longer element life, more dependable performance.

Follow recommendations of plug types and fuels approved by engine manufacturer.

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, O.
Double table-supports help you get greater accuracy—even on big, heavy work... with a DELTA-MILWAUKEE® 14” Wood-cutting Band Saw

Cuts wood, felt, corrugated board, paper, other materials

Two trunnions—widely spaced—one on either side of the blade—support the table of the Delta-Milwaukee 14” Band Saw. This gives you a steadier surface to work on. The table stays rigid, at any angle. You’re able to saw more accurately.

That’s only one reason why this Delta-Milwaukee machine is first choice of those who know fine tools. There are many other quality construction features:

- Ball bearings are used, giving trouble-free performance—and they are lubricated for life.
- The table is big—14” x 14”. It has a 1/4” x 3/4” miter-gage groove. Tilts 45° right and 10° left.
- Blade guide controls can be adjusted safely at the front of the table.
- Aluminum wheels are carefully balanced, so that the blade is true-running.
- Upper and lower wheels are completely guarded, to protect you. Guard covers saw blade at rear; sliding guard covers all but working surface of blade in front.
- Rip gage is available for ripping.

Have your nearby Delta distributor tell you more about these features for safety, accuracy, economy, and convenience. Inspect the Delta-Milwaukee 14” Band Saw there now—and see his complete Delta-Milwaukee line.

Look for the name of your Delta distributor under “Tools” in the classified section of your telephone directory.
TOMORROW'S TOOLS...TODAY!

At your dealer or order direct

2. DREMEL PRESS WOOD-SHAPER MODEL #60
Heavy-duty shaper. Exclusive pilot bearing eliminates side thrust. Chatter vibration—assures smooth cutting action. Complete, as pictured with 6 pair blades.
$12.95

3. CIRCLE SAW WOOD-SHAPER MODEL #SA-10. Solid steel. Absolutely fatigue-proof, blade locked in position with screws all the way through. In ordering, state diameter of your circle saw shaft. Complete, as pictured, with 6 pair blades and tool rack...
$14.95

4. ALADDIN LATHEMASTER. Fool-proof factory method of woodturning, adapted and priced for the home workshop for the first time! Even beginners can't go wrong because Lathe master measures as it cuts. Now one woodworking tool does everything—comes with standard chisel blades as well as new form cutters. Hardwood handle, chrome-plated shank. Interchangeable blade of steel. Complete, as pictured, mounted on attractive tool rack...
$9.95

5. THREE-IN-ONE DRUM SANDER 1", 2", and 3" drum sander all in one! "Pneumatic" diameters easy to change. Pilot bearing eliminates side thrust. Chatter, vibration. Complete with sandpaper sleeve for each diameter...
$6.95

11. ALADDIN WOOD-SHAPING BLADES.
Specially selected shaper steel brought to correct hardness to hold keen edges indefinitely. Exclusive money-saving feature: Aladdin blades are double-ground so you can make two standard cuts with each blade. Note that woodshaping tools #60, SA-10 and Lathemaster come only with blades pictured with each tool. When ordering extra blades, order by blade number. All blades shown below. $1.00 each. $2.00 per pair—except B-3 ($1.25 ea.). Readily hardened blank blade you can grind to shape desired.

ALL ALADDIN TOOLS ARE GUARANTEED

At your dealer or send cash, check, or money order for prepaid shipment to

Aladdin E. Manufacturing Co., Inc.
3121 MAIN STREET
KANSAS CITY, MO.

Dealers—Write for new 1950 catalog

SAY YOU SAW IT IN POPULAR MECHANICS

AT YOUR HARDWARE STORE
APRIL 28 TO MAY 6. YOUR DEALER WILL HAVE A SPECIAL ASSORTMENT OF EAGLE RULES

EAGLE RULES MFG. CORP.
NEW YORK 59, N.Y.

Lawn Mowing
Lawn Rolling
Trimming Woods
Sheveling Snow

BREADY GARDEN TRACTOR—time, work and dollar saver for home and farm. Powerful, easy-guiding, economical. Gardening implements, plus lawn mower, cutter bar, lawn roller, snow plow, other attachments • Let Bready Do the Work!

Write today for free folder & name of dealer

THE BREADY TRACTOR & IMPLEMENT CO. Box 230, Solon, O.
Meet the New Bull Saw!

Convert your electric drill into a powerful, portable saw for only $9.95.

Your electric drill becomes a portable saw with power to spare when you attach the new Bull Saw! It's sturdy, rigid—yet light enough for one-hand operation. New visual guide lets you see where you're going; new extra wide shoe plate keeps saw blade on the straight-and-narrow. Blade of high-carbon steel... one-piece safety guard of polished aluminum... double bearings for long life. Fits rigidly on any 7/8" electric drill. Depth of cut: 1/16".

Our Guarantee: This tool is as outstanding in design and performance as the Bull Buffer. Complete, ready to use as pictured...

(When ordering, ask for model BS-C)

If you already own a Bull Buffer, you can make your own Bull Saw for only $7.50! Here's how: Order the saw housing (photo 13) and attach it to the angle-head of your Bull Buffer, following the simple directions we send you. That's all—it only takes a minute to change your Bull Buffer into a powerful, portable saw! The housing you need comes complete, only...

(When ordering, ask for model BS-H)

Polish-Sand-'N-Saw Kit, Only $14.95!

Includes (a) Bull Buffer (photo 2), the famous right-angle polisher-sander, complete with rubber pad, sheepskin bonnet, and 2 sanding discs, and (b) Saw Housing (photo 13) that fits on Bull Buffer angle-head to give you a powerful Bull Saw. $19.95 value—but it's yours for only...

(When ordering, ask for model BS-K)

Who wouldn't be a "handy guy" with these new Bull Tools!

8. ShopChief Belt Sander. Convert your electric drill into a portable belt sander! Handles like a glove, interchangeable pressure plates and sanding belts do all the work from roughing to finishing. Big—rugged—almost 18 sq. inches of sanding surface! Complete, with 3 pressure pads and 2 sanding belts...

$19.95

16. Bull Hack Saw. A handy tool for home craftsmen—a "must" for every carpenter, electrician, plumber and repairman! Cuts through wood, plastic, nails, sheet metal—gets into "tight" spots with power. Ideal for making repairs on walls or floors. Small, light and sturdy, easy to carry from job to job. All working parts of hardened steel...

$16.95

5. Bull Driver. Drives screws home in wood or metal in seconds with any electric drill, drill press or flexible shaft! Automatically centers on screw groove, automatic release. (d) Model A—for screws up to #14. Center Model B—for small machine screws. (right) Model C—hand-centering model with long blade for countersunk holes. All models available in standard or Phillips head. Specify model when ordering. Any model...

$4.95

4. Bull Hole Saw. Cut 1" 1/2", 2" 1/2", holes—with one hole saw! Fits any electric drill or drill press. Cuts cleanly through any 1/4" stock—wood, metal or plastic. Complete, with arbor and 4 blades...

$4.95

10. Utility Accessories. Make your drill more useful with these handy accessories—1/8" Arbor for 1/4" electric drill, 5/16"... steel wire brush that removes paint, rust, scale... 3/16"... 3/16".... 4/16" arbor... Complete kit as pictured...

$1.95

2. The Bull Buffer. Famous polisher-sander with gear reduction. Comes complete with rubber pad, sheepskin bonnet and 2 sanding discs...

$9.95

Bertram E. Engineering Co.

3121 Main Street

Kansas City, Mo.

March 1950
Think of it! In this one fine mower you get:
1. Quick-starting Briggs & Stratton 4-cycle, 15 1/2-h.p. engine.
2. Famous, long-wearing Timken bearings.
3. Grass guards to prevent clogging of reel.
4. Heavy-duty, tractor-tread, non-skid tires.
5. Clutch and speed controls on handle.
Stands upright for small space parking.
Yes...you get all these great features, and many more.

See Your Dealer or Write Dept. C12 for Illustrated Literature

WORCESTER LAWN MOWER COMPANY

STOP LEAKS IN CELLAR WALLS

Do it with Smooth-On No. 7 Cement! Apply with trowel or stiff brush to leaky cracks, holes, porous spots, seams or other leaks in concrete, brick or stone walls and floors. The leaking will stop and Smooth-On will "stay put", for it expands slightly as it hardens. May be applied to wet or dry surfaces, indoors or outside. Use Smooth-On No. 7, too, to seal openings around pipes passing through walls. Buy Smooth-On No. 7 by name and number in 1, 5, 25 or 100-lb. size. If your hardware store hasn't it, write us.

FREE Leaflet and Handbook
We'll send you leaflet showing No. 7 uses, also the famous 40-page Smooth-On Repair Handbook describing other Smooth-On Cements and showing many helpful home repairs. 170 illustrations. Write today.

SMOOTH-ON MFG. CO., Dept. 37C
570 Communipaw Ave., Jersey City 4, N. J.

Do it with SMOOTH-ON NO. 7 CEMENT
FINE TOOLS
NEED
FINE OIL!
• Lubricates
• Prevents Rust
• Cleans • Polishes
SOLD EVERYWHERE

3-IN-ONE OIL

WAR SURPLUS
WINCH
Pulls Over 3,000 Lbs.
12" x 14", 0° high, 90-to-1 ratio
power. Used by leading truck lines
for unloading. Ideal for farmers,
contractors, etc. Excellent for any
boat deck, wagon unloader, etc. Drive with
small A-C motor, power takes-off, fan pulley, etc.
Mount on dock, tractor, truck or jeep. Finest steel
and bronze gears. Guar. Cost
Gr't over $100.
Fr't. Paid Sale Price, only...
$24.95

BURDEN SALES COMPANY
805 "O" ST., LINCOLN, NEBR.

GENIE Home-Hobby Tools
THE GEN OF ALL HAND TOOLS

Precision engineered for particular
home-hobby craftsmen. GENIE 22-in-1
Tool performs 2 different types of
operations: it notches, scows, cuts
V-shapes, drills, cuts rotor
thin, chisels, cuts holes, carves
on all kinds of materials.
Send Check or M.O. Add Tax, in Orders in Calif.
10 pc Set 16.50-20 pc Set 19.95 - Free Catalog on Request

Tool Craft Co.
629 South Hill Street
Los Angeles14, Calif.

The New
VISE-GRIP
WRENCH
Does Jobs
No Other Tool
Can Do!

Does toughest
jobs easier
and faster!
Jaw LOCK to
work with
more than
Ten-Grip
leaves hands
free. New
In-
volute Jaw Curve holds all shapes—nests, rounds, irregular shapes
with ease. Knurled Jaw Taps grip to the very tip. Has Thin Nose
and Super Wire-Cutter. WITH CUTTER—No. 7W, 7P, $2.25; No.
10W, 10P $3.50, WITHOUT CUTTER—No. 7C, 7P, $1.85; No. 10C,
10P, $2.25. If not at your dealers, order direct.
PETERSEN MFG. CO., Dept. P3, DeWitt, Nebr.

MARCH 1950

Motors made for
BETTER SERVICE
Motors made for
LONGER LIFE

Hoover Electric Motors perform like champions
and last for years because they're built
like motors costing far, far more. Stator
cores are laminated electrical silicon steel,
with coils dipped in high-grade varnish and
baked under infrared lamps. Such processing
is typical of workmanship that has made
Hoover Cleaners famous for forty years. It's
one reason folks say, "Whatever your work-
shop requirements, hitch up a Hoover and
hitch up the best!"

A typical Hoover
capacitor-start motor
for hard-starting, con-
tinuous-duty appli-
cations. Split-phase
and polyphase motors
are also available.

Check these features
of the Hoover line

- Capacitor-start, split-phase
  and polyphase types
- Ratings from 3/4 to 15 HP.,
  some with double-end shafts
- Single or dual voltage, 1725
  or 3450 R.P.M.
- Ball or sleeve bearings
- Rigid or resilient mounts that
  meet NEMA specifications
- Service and parts available
  from authorized agencies and
dealers

HOOVER MOTORS
THE HOOVER COMPANY
North Canton, Ohio
Kingston-Conley Division
North Plainfield, N. J.

SAY YOU SAW IT IN POPULAR MECHANICS
SAFETY" PAINT-STRIPPER

Instantly softens and strips off old paint, varnish, putty, from wood, without fire-hazard. Eliminates need of heavy sanding or filing. Operating cost 2c to 3c per hour. Wt. 1½ lbs.

"SAFETY" IS AN ALL PURPOSE TOOL

Used by professional and lay painters for stripping houses, interior trim, wooden boats, canvas canoes, antique furniture, etc. Also in lifting or laying composition tile on floors, linoleum, patches on roofs or boats. Removes painted or unpainted wall paper.

RUGGEDLY BUILT

for years of active service, "Safety" has finest quality heating unit. Ceramic embedded nickel-chrome wire, with nickel lead-ins through porcelain insulators. Four sharp stripping edges, idle-rest built-in. Use "Safety" as you might a torch. You'll like it! Safe, fast, silent, clean, economical and convenient. "Safety" is the result of 10 years' work. Guaranteed against original defects. Detailed instructions with each tool. Order from your dealer, or direct.

A Patented Product of

HEATING EQUIPMENT CO.
P. O. BOX 318 • ROCHESTER 1, N. Y.

Better, Easier, Quicker
GROOVE CUTTING or
CABINET-MAKING

with Warren DADO SAWING WASHERS

Just dial

DESIRED CUT

Cut accurate, parallel grooves—any width, any angle. Just dial desired width with Micromatic adjustment. Cuts smooth and clean—no burning or chewing to mar fine wood.

Just four simple washers. Available in 5 sizes—½", ¾", ½", 1", 1½". Free booklet on request. See your dealer or write direct. Absolutely guaranteed!

In Canada, send money order for $4.95 (duty and sales tax extra).

Dealers, Jobbers, Write for Information!

WARREN DADO SAWING WASHERS CO.
70 Medbury, Dept. 23, Detroit 2, Michigan

POWER MOWERS

$74.63

DEALER'S PRICE

Powerful—Streamlined

Complete with Maytag, Power Products or Briggs-Stratton Engine—18" rotary tool, full guard, blades—cast aluminum body. Cuts grass and weeds, wet or dry—does all trimming—chops grass into fine mulch, eliminating raking. Send check with order, or specify C.O.D. Write Dept. M-3 for literature.

HARTMAN

1100 SOUTH KIRKWOOD ROAD • ST. LOUIS COUNTY 22, MO.

Start a NEW BUSINESS!
or Add to your present Repair Business
SHARPEN DULL PIPE WRENCHES

PIPE TAPS & DIES
"QUIM" CIRCULAR SAWS
Write for Information

J. C. MOORE INDUSTRIES
BOX 276 • FREDONIA, PA.

Rupture Troubles Ended

Advanced method has healed thousands. No leg straps, no elastic, no plasters. No pressure on hips or spine. Flexo-pad. Entirely different. Endorsed by doctors, mechanics, clerks. Very light. INEXPENSIVE. GUARANTEED. Write for information and trial.

SMITH MANUFACTURING COMPANY
EST'D 1893
DEPT. PM
PRESTON, ONTARIO

BOAT BLUEPRINTS & FULL SIZE PATTERNS
and specifications. Designed by Naval Architect, Cruisers, runabouts, fishing, motor, sailer, commercial, steam, sail, outboard, sailing, canoe, etc. Low prices. Send 25¢ for catalog or information. SPECIAL: Send $1.00 for 1500 TO H ELL BOAT book, postpaid. PolyWog Catalog $1. Cleveland Boat Blueprint Co., Dept. 646, Cleveland 15, Ohio

Ball-Bearing SPEED WHEELS

JUVENILE WHEELS (No bearing solid tires)

4" ....... .40¢ 5" ....... .45¢ 6" ....... .55¢

5" ....... .50¢ 6" ....... .60¢ 7" ....... .75¢

(Semi-pneumatic tire, ball bearing)

5 x 1.75 ....... .365 10 x 1.25 ....... .60 5 x 1.5 ....... .355 10 x 2.125 ....... .75 5 x 2 ....... .355 10 x 2.75 ....... .90 5 x 2.5 ....... .355 10 x 3 ....... .92 5 x 3.0 ....... .355 10 x 4 ....... .11 5 x 3.5 ....... .355 10 x 6 ....... .16 5 x 4.0 ....... .355 10 x 8 ....... .20 5 x 5.0 ....... .355 10 x 10 ....... .30

INDUSTRIAL WHEELS

Long Service, Semi-Pneumatic tire

5 x 1.75 ....... .365 10 x 1.25 ....... .60 6 x 2 ....... .355 10 x 2.125 ....... .75 6 x 1.75 ....... .355 10 x 2.75 ....... .90 6 x 2.00 ....... .355 10 x 3.0 ....... .95 6 x 2.50 ....... .355 10 x 5.0 ....... .90 6 x 3.00 ....... .355 10 x 6.0 ....... .50 6 x 3.50 ....... .355 10 x 8.0 ....... .40 6 x 4.00 ....... .355 10 x 10 ....... .30

Smooth Bias, Pneumatic tire and tube

5 x 1.75 ....... 1.10 12 x 2.00 ....... 1.10 10 x 2.75 ....... .60 4 x 4.00 ....... .13 10 x 3.50 ....... .10 14 x 4.50 ....... .14 10 x 5.00 ....... .10 14 x 5.00 ....... .14

Dealers, Jobbers, and Manufacturers! Our new prices will interest you.

No c.o.d. orders. Write for circulars on all wheels.

JIM BROWN TOY COMPANY
1093 HOME AVENUE
AKRON, 10, OHIO

PUBLICATIONS
GROBAN'S WAR SURPLUS SPECIALS!

LIGHT PLANT GENERATOR

115 Volts

60 Cycle
A.C.


ITEM 257 F.O.B. CHICAGO... AN OUTSTANDING VALUE

59.50

PNEUMATIC AIR DRILLS

Made by Chicago Pneumatic Tool Co. Light, powerful, compact, pneumatic pistol grip, trigger control, ideal for all work where air pressure is available.

ITEM 258- Equipped with 11/4" Chuck, Weight: 6 lbs. 6 3/4 long, 1 1/4" thick. 14.95

ITEM 259-Larger size, equipped with 11/2" Chuck, Weight: 7 lbs. 11 1/2" long, 2 1/2" thick. 19.95

FREE: 1950, 44-PAGE CATALOG

Write For Yours Today—It's Waiting For You.

WATEROUS PUMP

Rated 500 gal. per min. for 3/4" pipe, 300 for 1" pipe. S. T. This high efficiency pump is ideal for your home or shop. It is self-priming on front end mounting on electric motor. Dodge, Studebaker and Ford trucks and comes complete with everything needed. Weight of pump 50 lbs. F.O.B. Chicago, EACH.

149.50

PUORATOR OIL FILTER

PERMANENT TYPE

The perfect oil filter to keep your motor oil clean and in good condition. Protect your pump by replacing your old filter every 1/2 hour. Just turn the handle and it is ready to work, Now, 3/4" inlet and outlet ports to accommodate 1200 cubic foot per minute. Shipping weight 4 lbs.

4.95

NEW AIRCRAFT QUALITY

LOGAN HEAVY DUTY HYDRAULIC CONTROL VALVE

Has built-in adjustable relief valve, will handle the double-acting hydraulic cylinder or two cylinders as one or a re-

 ITEM 237 - F.O.B. CHICAGO...

21.95

HYDRAULIC courseId and LIVE 19.90

Complete with Ready to Install MOUNTING KIT ONLY (ITEM 238)...

5.45 postpaid

both as complete unit (ITEM 239)...

19.90 postpaid

NEW AIRCRAFT QUALITY

LOGAN HEAVY DUTY HYDRAULIC PUMP BRAND NEW, for operating hydraulic cylinders and hydraulic appliances on tractors, with gear con-

 ITEM 242 - F.O.B. CHICAGO...

22.50

HYDRAULIC CONTROL VALVES

ITEM 224. Four-way control valve with built-in relief valve, for use with one double-action cylinder. May be used with 1500 P.S.I. hydraulic system to open and close hydraulic cylinders. Ship. wt. 8 lbs. A $8.95 value. 7.95

ITEM 226. Four-way control valve for use with two, double-action cylinders. Each cylinder may be operated independently with or without the other. Oil may be locked in any of the cylinders by moving the valve. Brand new. Ship. wt. 6 lbs. A $60 value postpaid. 5.95

ITEM 231. A two cylinder control valve for controlling movement, allowing the operator to raise both cylinders simultaneously as required. Brand new. Ship. wt. 3 lbs. A $300 value postpaid. 10.95

GROBAN SUPPLY CO. 1507 SOUTH MICHIGAN AVE. Chicago 5, III. Dept. PM-3

MARCH 1950

285
"I'll take the WHITE one every time!"

Wyteface Steel Tapes, with their jet black markings on a white background, are easier to read in any light. They are rust-resistant, hard to kink and easy to clean.

Wyteface
Trade Mark
Steel Tapes
Keuffel & Esser Co.

Save Time, Effort, Money — with Mow-Master. Mow-Master saves you time, effort, money, and makes every lawn look like a park.

Triple Duty
1. Trims lawns velvety smooth.
2. Cuts tall weeds and grass.
3. Pulverizes leaves — abolishes raking, hauling and burning.

It's great fun to trim the lawn with the New Mow-Master. It is lighter than ever, handles like a dream and mows everything. All metal rugged construction, built for the toughest mowing jobs. Amazing New Grind-a-Leaf attachment pulverizes leaves. Surplus of smooth flowing power from improved 2 H.P. POWER-PAK Engine. See it at your dealers.

Free booklet "Pointers on Making Good Lawns" and our MOW-MASTER Literature sent upon request.

Propulsion Engine Corp. Dept. PM-3
79th St. and Sunshine Rd.
Kansas City 15, Kan.

Hold-E-Zee
The Original
Automatic Grip Screwdrivers

Hold, start and set up screws in unhandsome places. Gripper instantly released by spring action, sliding up out of way when not in use. Highest quality throughout.

New Models for Recessed Head Screws

Upson Bros., Inc., Rochester 4, N.Y. At Leading Dealers Everywhere

Today's Biggest Prefab Boat Buy
Build a better boat than you can buy. Save up to 53%. See Ozarka's new 1950 line of trim, top-quality 12- and 14-footers with laminated rib construction, all-oak frame and other exclusive features, for motors up to 25 H.P. Send $25 for complete Boat & Accessory Catalog, to be refunded on first purchase. Ozarka, Inc., 650 Barnum Lane, Woodstock, Illinois.

$39.50 and Up

Utility Tool Case

Specially designed for home-and-farm owners, craftsmen, radio and TV repairmen, fishermen, hunters, campers. Approved by large utility companies for service men. Rugged. Made of hard Vulcanized Fibre with reinforced corners, with removable gray and green handles for wherelse or large loads. Strong, durable, light! Solid, comfortable polypropylene handle. Pull it inches wide: it expands high; two sizes:

17 inch (6 compartments) $6.25 postpaid.
21 inch (6 compartments) $6.50 postpaid.

No C.O.D. Money-back guarantee if returned within 30 days in good condition.

Willhour Company
277 N.J.R.R. Ave. Newark, N. J.

Only $498

Ottawa
Mule Team Tractor

Finest low-cost tractor. Costs too little to do without. Engines burn gasoline or kerosene. Starter and lights available. Other larger Models to choose from. Over 4,000 in world-wide use. Time-proved and tested. At low cost they easily mow, plow, disc, harrow, plant, cultivate, etc. Sold only direct to user. Write for free details.

Ottawa Mfg. Co., 2-027 Garden St., Ottawa, Kansas

Arc Welding
For Profit or Pleasure

60 Lbs. of Ready Made Parts

Only $124.95

Build Your Own Heavy Duty Welder

Save Buy Only Necessary Parts

All parts Ready-Made and easy to assemble. You can do all around welding on steel, cast iron and other metals after only a few hours practice. Illustrations, instructions manual included. Sold on 30-day Money-Back Guarantee.

Free:
Write today for illustrated Pamphlet P-3.

Atomic Arc Welder Co.
1937 So. 19th St.
Omaha, Neb.
NEW Power King
8” Tilt/Arbor Ball Bearing Saw

A New Standard of Value for you
Made by Atlas.

$54.75

Some of the Outstanding Features
★ Tilt/Arbor, Ball Bearing Construction! Controls At Front!
★ 25” Depth of Cut - Greatest in its class.
★ 31/2” Table Surface Ahead of Blade on 1” Cut!
★ Big Precision-Ground 16”x20” Grey Iron Table! 34” x 20” with two extensions.
★ Quick Positioning Rip Fence—Locks At Both Ends!

The Big Capacity and Quality You've Wanted

Here—at low cost—is a saw that gives you the capacity you need for any type of construction for your home, the accuracy you need for fine model and furniture projects, and the quality manufacture that assures a lifetime of useful service.

You'll value the big grey-iron table of this new Power King—its solid support for long or wide boards and big panels. You'll value its permanently smooth, easy-sliding, precision-ground surface—the quick-adjusting, full-length rip fence, the convenient front controls for blade height and angles, and the tilting arbor, with sealed ball bearings. Only in saws costing much more do you find all the quality features that Atlas engineers have put into this new Power King No. 3102.

See it at your nearest Power King dealers at your first opportunity. And for a catalog with many useful woodworking hints, send a postcard today.

ATLAS PRESS Company
335 N. Pitcher St., Kalamazoo, Mich.

NEW! FREE CATALOG SHOWS ALL 8 POWER KING TOOLS
Send a Postcard

MATCHED PRECISION TOOLS FOR WOODWORKING AND METALWORKING

MARCH 1950
Just a few strokes does it with a Norton Abrasives Stone.

Sharpening is quick, easy and efficient with a CRYSTOLON combination bench stone. It has both coarse and fine sides and is already oil-filled. Get one today at your hardware store. Priced as low as $1.10.

Send for "HOW TO SHARPEN"—10c brings you this 48-page illustrated booklet on sharpening workshop tools. Address Dept. PM 3.

BEHR-MANNING
TROY, N. Y.
Also Mfrs. of Abrasive Paper and Cloth

HAGERTY SEA SHELL $35

MAKE every week end a real vacation! Take along your Hagerty Sea Shell! Handy and light (65 lbs.) for easy carrying, easy rowing. Rugged for years of service. Takes a small outboard. Kit easily assembled in a few pleasant evenings! Holds 3 adults in safety. Ideal for all-around use. Over 15,000 in service. Fully guaranteed.

THIS 8-FOOTER SAVES YOU MONEY

HAGERTY, 113 Front St., Cohasset, Mass.
□ Please send me FREE booklet, name of nearest dealer.
□ Please send SEA SHELL kit, freight collect.
Enclosed is $35.

Name ____________________________
Address __________________________
City _____________________________
State ____________________________

Make-Or-Own Rotary POWER MOWER

ATLAS KEEN-MOWER SHIPPED ASSEMBLED AS SHOWN
Model 50M. Just add electric motor or gas engine. Concealed blade for safety. 3 cutting heights, 1 1/2", 2 1/2", 3 1/2", 18" blade. Cuts to within 1/2" of sidewalk. Ball-bearing rubber tired wheels. Wt. 45 lbs.

Order Now
America's Greatest Power Mower Value
FOB K. C. Send Check or M.O.
ATLAS EQUIPMENT CO.
229 S. W. Blvd.
Dept. PM 3
Kansas City, Mo.

Wear Sample Suit NOT 1¢ TO PAY!

Here's an amazing plant! Write me today and I'll show you how to get a fine, all-wool made-to-measure suit for yourself—to wear and show to friends. Just take a few orders, that's all! Here's an easy way to get your own suit without paying 1c, and also make fine cash profit on every order you take. You send no money, now or ever. Just rush name and address for Sample Work and Valuable Sample Suit Coupon. Act now.

W. Z. GIBSON, 500 S. Throop Street
Dept. C-516, Chicago 7, Illinois

SHOP SMITH

5 big-capacity power tools in 1 rugged, precision-built unit

Write for free, 20-page, profusely illustrated book.
SHOPSMITH, Dept. 809-B, 12017 Colt Rd., Cleveland 8, O.

Baseball Uniforms

Buy direct—Save nearly 1/2

$11.95 Uniforms $6.95
Lettering at no extra cost
Order direct, save on big-league-cut, tough cloth uniforms. 10 year letters, no extra cost! Write for free illustrated catalog with swatches. Big savings on all baseball equipment.

BACHARACH RASIN CO.
Dept. R, 14 North Howard Street, Baltimore 1, Maryland

Professional Woodworking Clamps only $2.00

Now for the first time these clamps are available to the home craftsman. Holds work securely in all positions. Better than "C" clamps. Won't mar your work. Packed in kits, complete less jays. Make the jaws yourself in one hour, with easy to follow instructions. Screws accurately machined from high tensile steel. Clamps open 90° to do all types of work. Jaws 12" long. Note: Most gluing jobs require 4 clamps. Order yours today. $2.00 each, postpaid.

Minneapolis Hardware Mfg. Co.
4324 18th Ave. S.
Minneapolis 7, Minn.

POPULAR MECHANICS
How To Get MULTIPLE UTILITY When You Buy a SMALL GRINDER

BUY THE FOREDOM MODEL 100 FLEXIBLE SHAFT MACHINE

the choice of tens of thousands because—Pencil-size handpiece provides positive, sensitive, finger-tip control, works in hard-to-reach places. Your work always well in view. Precision construction and silencer-equipped flexible shaft assures smooth-running performance. Motor not dwarfed to fit the hand, hence more power, longer motor life. Price only $16.95. Foot rheostat $4.95 extra.

BUT THAT'S NOT ALL—For $4.95 extra get Foredom's new DRILL PRESS ATTACHMENT. Magically and quickly converts machine into a power drill press.

NEW ACCESSO-RAK Mount on wall or back of bench and hang up machine. Comes with 46 highly useful accessories, all at your finger tips. Sensational value, only $4.95. ORDER TODAY. Send check or money order for items above or send C.O.D. plus postage. Sold on 10 day money back TRIAL. Write Today for FREE CATALOG No. 1127-E.

And here's another Amazing Foredom Product Now turn your old router, drill press or electric drill into a Flexible Shaft Tool with FOREDOM PRESTO-FLEX with PENCIL SIZED handpiece. Attached or removed in a jiffy! Gets into tight places. Handy 3½" overall length. And—only $5.95 complete! Precision made. For use on router, specify motor shaft diameter and add 50¢ for coupling. Available for 1/4", 5/32", 1/8", and 5/32" shafts. No. 59 Accesso-ry set, $1.95 extra.

FOREDOM ELECTRIC CO., Dept. 1127-E, 27 PARK PLACE, NEW YORK 7, N. Y.

FOREDOM—Used by INDUSTRY—Preferred by HOBBYISTS!

SET THE PACE WITH THE "Powell"
P-81!

• Cruises at 45 MPH—with faster pickup than car
• 50 miles to the gallon
• Automatic clutch
• Interior expanding brake—handle—grip throttle controls

P-81 MANUFACTURING COMPANY
DEPT. PM350 • COMPTON, CALIF.

FEELS RIGHT...WORKS RIGHT!
The minute you grasp a Stanley Plane and ease the cutter into the wood, you feel the fitness of a fine tool...the skill of your hand and eye going right down to the face of the work. It's responsive! It's beautifully balanced! It's right in every detail, from the bevel of the cutter to the way the knob and handle fit into your hands. A lot more than good steel goes into a tool like that...the best ideas of generations of the best tool users. You can't get more than that in any tool; you always get a full measure of it in Stanley Tools.

Let this coupon bring you these two books

THE TOOL BOX OF THE WORLD

[STANLEY]


STANLEY TOOLS, 130 Elm St., New Britain, Conn.

Please send by return mail:

☐ FREE booklet: "The Joy of Accomplishment".
☐ 188-page book: "How To Work with Tools and Wood". $1.00 enclosed.

(In Canada: Send order to Stanley Tool Co. of Canada, Ltd., 112 Stanley St., Rexton Pond, Quebec.)

Name: _______________________________
Address: ___________________________
City: __________________ State: _______
New! NO WASH! Non-Inflammable!

Now you can "strip off" any finish safely, easily, without mess.

Old-fashioned, inflammable solvents work by "dissolving," leaving a sticky, waxy surface that must be carefully washed, or "neutralized." But Klean-Strip penetrates all layers of old paint and actually "breaks" the bond between the bottom layer and the surface to be stripped.

Klean-Strip changes any finish into a wrinkled film that is easily peeled off with brush or putty knife. Leaves surface smooth, clean and dry.

Buy Klean-Strip whenever you buy paint. At better paint, hardware and department stores.

KLEAN-STRIP REMOVER
Product of W. M. BARR & CO.
2350 S. Lauderdale, Memphis, Tenn.

START A BUSINESS
this quick way

with

FOLEY LAWN MOWER SHARPENER
"I have taken in 100 mowers in 5 weeks since I got my Foley,—with no advertising," says George C. Wise, "in two months I have sharpened 155 hand mowers, 6 power mowers and 1 trimmer. My machine has paid for itself and everything I take in now is profit"—from Oto Zadka.

Here's a business you can start in spare time, and begin to make a CASH PROFIT right away. The Foley handles up to 3 or 4 mowers per hour, and prices run $1.00 to $3.00 for hand mowers, $5.00 to $8.00 for power mowers.

FREE BOOK "HOW TO SHARPEN POWER MOWERS" shows how to sharpen any make of power lawn mower with the Foley. Low prices, only $3.00 to $19.50—easy payments. Mail coupon today—we'll also send FREE PLAN telling how to start your own business without previous experience. No salesman will call.

FOLEY MFG. CO. 397-0 Foley Bldg.
Minneapolis 18, Minn.

NAME

ADDRESS

SHARPEN CIRCULAR SAWS LIKE AN EXPERT


Money back if not satisfied after 10 days trial. A money maker for re-saw shops, shop for itself. Orders filled at once. Order from:

SURE SHARP MFG. CO., Dept. M-30
P. O. Box 24
Santa Ana, Calif.

FURNACES FOR HOME&SHOP
COAL-LP-GAS-OIL. Fittings, pipes and registers. Water heaters,ranges and floor furnaces. BLOWERS with motors. Get the parts you need and modernize your own heating system. Wholesale & Retail. Lowest prices. FREE BOOKLET.

PEERLESS SALES & SUPPLY
4318 Sheridan
Lincoln 6, Neb.

DO MORE PLANING JOBS WITH LOW-COST BELSAW $195.

AMAZING 12½-IN. PLANER Does All Ordinary Planing Mill Jobs. Provides attachments for Joining, Racketing, Tongue, Grooving, & Matching. 12½ x 6 in. capacity. 3-knife replacement solid-steel cutter. Reversible feed from 0 to 60 minutes, 45 cuts per inch. Provided for full line of accessory attachments—joiner and band knife in the cutouthead WITHOUT REMOVING.

BELSAW MACHINERY CO.
31011 Field Blvd., 315 Westminster Rd., Kansas City 2, Mo.

KINKADE GARDEN TRACTOR and Power Lawnmower
A Practical Power Plow and Cultivator for Suburbanites, Gardeners, Florists, Estates, Fruit, Nursery & Poultrymen. Easy Terms—Write Today
American Farm Machine Co.
1058 33rd Ave. S. E.
Minneapolis, Minn.

NEW PACKAGED BOATS 1950 KITS

17 New models. Improved design, shift, overboard, outboard, sailboats. Treadle racers, cruisers, 8 to 16 ft., exclusive features, extra strength frames, Tri-Keel construction, Treadle bottom, full length stay sail, widest beam, simplified construction, easy to build, Waterbaby's Send 25c for new 1950 literature, or send $1.00 for literature, plus booklet "Plywood Boats."

BOAT PATTERNS-BLUE PRINTS
1950 Catalog—over 100 modern designs by famous naval architects. Racing cruisers, sloops, outboard sail, 8 to 35 ft. Plywood-Steel—Plank Construction plans, full-size patterns. Send 25c for catalog and helpful booklet on "Boat Building."

MARINE MART-DEPT. 24-BUFFALO 7, N. Y.

POPULAR MECHANICS
Make Garden Masonry for Spare-Time Profits

Millions of homes can use these ornamental products — urns, vases, flower boxes, bird baths, lawn seats, flagstones, etc. Easily made of sand and cement. Permanently glazed in a range of smart colors. Distinctive — attractive — quick selling.

Eye-Appeal Makes for Cash-and-Carry Sales

Selling prices allow 100% to 300% mark-up on basic costs. Only a small investment needed for supply of molds. Easily set up in shed or garage. Write immediately for catalogue OM and price list.

COLORCRETE INDUSTRIES, INC.
710 Ottawa Ave., Holland, Mich.

Sprunger Precision Built

POWER TOOLS pay for themselves on just a few jobs. Make your own furniture, home repairs, etc. with these rugged, precision tools. See them at your dealer's.

WRITE DEPT. PM-33
for latest literature. (Prices subject to change without notice.)

SPECIAL—SPECIAL—SPECIAL

Good Used 15" and 16" Tires
All Sizes — Popular Brands — $3.50 each
Free Tube With Each Tire Purchased

SAVE! SAVE! SAVE!

UNSURPASSED VALUES IN USED AUTO PARTS

Never before in our 30 years history have we had such a tremendous stock of good used guaranteed auto parts for practically all makes and models.

'47 Kaiser Sed.  '47 Lincoln Cpe.
'47 Hudson Sed.  '46 Chev. Sed.
'47 Hudson Coach  '42 Chev. Sed.
'48 DeSoto Cpe.  '41 Ford Sed.
'42 Buick Super Sed’tte  '41 Ford Coach

Now Dismantling These and Hundreds More.
We Specialise in Competent, Courteous Service

LARGEST STOCK — IMMEDIATELY AVAILABLE

EXCEPTIONAL VALUES IN GUARANTEED USED PARTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Make</th>
<th>Motors</th>
<th>Trans.</th>
<th>Rear Ends</th>
</tr>
</thead>
<tbody>
<tr>
<td>'37-'38</td>
<td>Chev</td>
<td>$45.00</td>
<td>$18.75</td>
<td>$18.75</td>
</tr>
<tr>
<td>'40-'41</td>
<td>Chev</td>
<td>56.25</td>
<td>22.50</td>
<td>18.75</td>
</tr>
<tr>
<td>'37-'38</td>
<td>Ply</td>
<td>37.50</td>
<td>20.80</td>
<td>15.00</td>
</tr>
<tr>
<td>'40-'41</td>
<td>Ply</td>
<td>63.75</td>
<td>22.50</td>
<td>18.75</td>
</tr>
<tr>
<td>'37-'38</td>
<td>Ford</td>
<td>56.25</td>
<td>18.75</td>
<td>18.75</td>
</tr>
<tr>
<td>'40-'41</td>
<td>Ford</td>
<td>75.00</td>
<td>26.25</td>
<td>26.25</td>
</tr>
</tbody>
</table>

Above prices are NET WHOLESALE to POPULAR MECHANICS readers. Other models at comparable low prices

WE SHIP ANYWHERE PROMPTLY AND PROPERLY

All merchandise fully guaranteed as represented. Order direct from this ad and receive commercial discount. Prices F.O.B. San Bernardino, California. Pay by Postal money order or check. 50% deposit on C.O.D.'s. California orders add 3% retail sales tax.

SAN BERNARDINO AUTO WRECKING
239 ARROWHEAD AVE.  SAN BERNARDINO, CALIF.
Telephones 411-72 and 523-51

FREE BOOK ON FISHING!

You need new "Fishing—What Tackle and When"—nearly 100 pages of helpful fishing tips, casting instructions, fish pictures, tackle, etc. Write for it today. FREE!

SOUTH BEND GLASS CASTING ROD

New! Hundreds of thousands of glass fibers scientifically bonded for perfect action—strength—durability. Won't "set" rot or corrode. $15.75

South Bend Bait Co., 801 High St., South Bend 23, Ind.

SOUTH BEND A NAME FAMOUS IN FISHING

MARCH 1950

SAY YOU SAW IT IN POPULAR MECHANICS 291
CROSLEY
LOWERS ALL PRICES!

Now the Crosley, made in America with U. S. skill and precision, cuts prices up to $105. And 1950 Crosley cars have hundreds of improvements including Hydrafic (airplane type hydraulic) Brakes and Crosley engine with rugged cast iron block and 8:1 to 1 compression ratio. Save with a new Crosley when you buy it, while you drive it—up to 30 miles on a gallon of regular gasoline.

STATION WAGON:
Price reduced $105. Seats 4, or 2 with 3-man load. All steel.

SEDAN DELUXE:

CONVERTIBLE:
Price reduced $91. Four passenger. Easy-to-handle top. Big luggage space.

HOTSHOT:
Price reduced $51. A new thrill in motoring. America's own sports car. Two passenger sports roadster at about $50 more than the Hotshot. Crosley Trucks, both Panel Delivery and Pick-up have also been reduced—$83 on each model! Dealers and driver agents wanted!

CROSLEY
A FINE CAR
"You see them everywhere!"

Burr Hand Saw Filer
Makes More
PROFITS

Easy to Operate

Fast, accurate, will file from both sides. Operator controls file arm. No saw carrier or adjusting screws to fuss with. A money-maker in any shop.

Burr Mfg. Co.
8933 Venice Boulevard
Los Angeles 34, Calif.

Lawn Ornament—Novelty Patterns

28 Lawn Ornament Patterns. 25c. Other patterns: 15-20¢ each: Dutch Girl, Dutch Boy, Pirate, Bull Terrier, Mexican Girl, Mexican Boy, Dwarf, Penguin, Flower Girl, 10¢ each. 35 Novelty Patterns. 5¢. All 65 Full Size Patterns, $3.00 postpaid.

Strathmore Pattern Service, Dept. 20-A, Box 158, Bellingham, Wash.

SAgents 300% Profit
SIGN LETTERS


Metallic Letter Co., 430 N. Clark, Chicago 10

Big 6 Horsepower
ROTARY TILLER

$299

No Extras to Buy


Mulsifier Implement Co.
7758 Hamilton, Detroit 2, Mich.

Keep Basement Pipes Dry

Just wrap "NO SWEAT" insulation around water pipes and seal with special "NO SWEAT" Elastic Tape. Pipes will stay dry even in hot, humid weather. Works and dries pipes. Tools won't rust. Easy to apply. No fuss. No mess. No sticky tape. No tools required. Clean, attractive installation, send $1.00 for enough to protect 20 feet of pipe. Full instructions included. We ship postpaid. MON-TU-FRI, if you are not completely satisfied.

Associated Specialties, 10658 Gratiot, Detroit 13, Mich.

Join $2 Merchandise Club
Factory Close-Outs, etc. Amazing Value! Money back guarantee! Be surprised! Send $2 today!

Drum & Drum, Irvington 11, N.J.

No Sparks - No Ashes - No Burns
While Driving
Spilled on Rug
To Clothing

Seal-ett

Holder Has
BUILT-IN ASH TRAY

Eliminates Fire Hazards: You can smoke in bed safely, with a featherlight "Seal-ett" holder! Fine mesh tube holds ashes until emptied. Holder does not alter natural cigarette flavor; you hold cigarette itself in mouth. Smoke will go thru holder wherever shown, be it first to have one! Greatest smoking safety aid since safety match. Not sold in stores. Order by mail, today! 60¢ each, cash or money order. Cash or check (add $1 for postage, 1 for cart) Money-back guarantee. Postpaid. 2 for $1.00.

R. J. Turner, Box 211-B, Montebello, Calif.
NEW POWER FOR YOUR CAR ENGINE!
BY CONSTANT BALANCE OF LUBRICATING OIL SUPPLY

Give Your Car this Tonic—
Add Power, Rep. and Performance

MARVEL INVERSE OILER

Here's the famous, low cost, auxiliary lubricating system that meters MARVEL MYSTERY OIL to critical upper cylinder engine parts, precisely in accordance with engine load. The compact INVERSE OILER functions inversely to manifold vacuum, retarding feed visibly when throttle is closed or at engine idle, an exclusive MARVEL feature! You can keep ring, piston and valve wear down and performance way UP with the sensational MARVEL INVERSE OILER.

Learn about MARVEL MYSTERY OIL too—the famous oil improving Additive for YOUR motor oil that produces a slow idle, faster engine pick-up and an even, power pull. Thousands of car owners are using it in increased volume for engine protection. MARVEL lowers oil drag resistance, reducing frictional wear and increasing effective power. Add it to your motor oil!

The MARVEL INVERSE OILER Is Easily Installed on Most Engines

EMEROL MANUFACTURING COMPANY, INC.
242 West 69th Street (Dept. P. M.), New York 23, N. Y.

MONEY SAVER

BRIGHTEN YOUR BASEMENT

... at surprisingly low cost

Want an easy, inexpensive way to give your basement walls and ceiling a fresh, clean look? FREE BOOK TELLS HOW. Send for your copy of "Paint It Bright"—the 24-page book full of helpful painting hints. And remember, there is a difference in aluminum paints. Basement walls, for example, call for Aluminum Metal & Masonry Paint. It's available from the dealer who displays the Alcoa symbol of quality on the brand he sells.

MAIL THIS COUPON

Paint Service Bureau, ALUMINUM COMPANY OF AMERICA,
1718C Gulf Building, Pittsburgh 19, Pa.

Please send me free copy of "Paint It Bright".

None (please print)____________________________________
Address or RFD No.____________________________________
City____________________________________State______

I want to paint the following:____________________________________

Experts tellin"Paint It Bright" how to obtain best painting results with aluminum paints. For free copy, mail coupon.
Lay Your Own Beautiful Kentile Floor

Save Money!

Easy as ABC!

AS LOW AS

$21.75

FOR A 9' x 10' KITCHEN FLOOR
(PRICES VARY WITH SIZE OF ROOM
AND THE COLORS YOU CHOOSE)

Your Own Designs! Now you can have the most beautiful floors...alive with color, and custom-designed by you alone! Yes, you can create your own floor design with Kentile...lay it quickly, easily, tile by tile!

Wears for Years! Each tile is pure tough flooring all the way through...no felt or other backing. Colors go all the way through, too...can't wear off!

Easy to Keep Clean! Kentile floors resist stains, soil. Stay clean longer. Need only occasional no-rub waxings to keep them beautiful.

Imagine the Money You Save! You can't buy a finer longer-lasting floor than Kentile for any money...and it costs so little when you lay Kentile yourself.

At Your Dealer's Now! Look under FLOORING in your classified phone book for the name and address of your nearest Kentile dealer.

LAY KENTILE IN YOUR SPARETIME HOURS!
ENJOY ITS BEAUTY FOR MANY, MANY YEARS!

Your Kentile floor goes down so quickly...you lay it easily, tile by tile in any design or color combination you like! You can do a section of a room at a time and you can walk on Kentile as soon as it's down!

FREE! COMPLETE INSTRUCTIONS AND COLOR CHART!
Send for easy-to-follow self-installation instruction folder and complete color chart showing all Kentile's 23 lovely tile colors. Start planning your floor now! Write to David E. Kennedy, Inc., 58 2nd Ave., Brooklyn 15, N. Y.

KENTILE
The Asphalt Tile Of Enduring Beauty

MARCH 1950
HOME CRAFTSMEN AND HOBBYISTS!

When you build cabinets, chests, furniture, remodel rooms, redecorate your home — add the distinctive finishing touch by using McKinney Forged Iron Hardware.

Attractive authentic Heart pattern strap hinges, H and L hinges, latches, drawer pulls and knobs, etc. in dull black or Swedish iron finish. Buy them at your local hardware, lumber or paint dealer. Look for the McKinney display.

SHOWING McKinney PERIOD PATTERNS AND SUGGESTED USES.

McKinney Manufacturing Company
1400 Metropolitan Street, Pittsburgh 12, Pa.

Please send free folder on McKinney Forged Iron Hardware to:

NAME

ADDRESS

DO YOUR OWN Calking WITH Nu-CALK

SPEED LOAD

AND THIS NEW SPEED LOADER

Every home should be called and here's the combination that enables you to do the job yourself. Just snap a Nu-Calk SPEED LOAD into the SPEED LOADER Calking Gun and you're ready to calk. You have an easy, fast, economical way to apply the world's finest calking compound.

Macklinburg-Duncan Co., Oklahoma City 1, Okla.

NO MAIL ORDERS

SOLD ONLY THROUGH LEADING HARDWARE STORES, LUMBER YARDS AND BUILDING SUPPLY DEALERS.

WOOD FASTENERS

Don't split wood—Use amazing new "CHEVRONS"—A new type hardened steel (carbon-or wood joining (miter joints). Scientifically designed to draw wood together eliminating doweling, mortise-tenon. Just drive in with-ordinary hammer—"Presta"—a firm joint! No wobble, no distortion. Narrow surface outline of fastener lends artistic appearance. Can easily be counter sunk and concealed with wood fillers. Permits planing of wood on all sides. Can be used in hard wood where others fail. Handy, easy-to-use for mill workers, artisans and HOME CRAFTSMEN for making and repairing screens, doors, sash, frames, cabinets, chests, furniture, molding, etc. Hurry—Order now from your dealer or send only 25c (6 stamps) for box of 30 3/4" depth, suitable for thicknesses of wood up to 1/4" inch, or send $1.00 for our GIANT-size box. NOW! Money back if not delighted.

E. B. PACKARD Co., Inc., Dept. PM3
130 CEDAR ST.
NEW YORK 6, N. Y.

Dealers—Send for our folder "A".

CAPE COD CHAIRS TRELLEIS * ARBORS DUTCH WINDMILLS

Chair style B-C-A PLANS 50c Ex. all 3 for $1.00. 12 different types. Dutch Windmill Detailed PLAN only 75c. Unique 40" sign Light-assembly plastic construction. Made for garden or on lake shore of summer home. Tense detailed PLAN 75c. SPECIAL ALL PLANS ABOVE 50c VALUE ONLY 2.50

SEND FOR CATALOGUE OF MANY NEW PRODUCTS.

CRAFTSMAN'S MODEL CO. DELAFIELD, WISCONSIN

Make Concrete Blocks and Bricks

New superior method makes square, true, easy-to-lay units which will pass any building code. Small investment, high production, big profits. One $30.00 machine will make four 5"X9"12" blocks per minute—1000 per day. Pays for itself in a few days. Sell blocks or save 1/2 building cost by making and laying your own.

POST CARD BRINGS FREE FOLDER

Economy Manufacturing Company
Dept. P Stone Mountain, Georgia

CARBURATOR TOO RICH MAKES MOTORIST TOO POOR

Car owners who are wasting money and not getting proper gas mileage due to over-rich mixtures will be pleased to learn how to cure same by VACU-MATING over-rich mixtures. VACU-MATIC fits all cars, trucks and tractors. It is automatic and operates on the supercharge principle. Easily installed in a few minutes.

SALESMEN WANTED! Big Profits! Send name, address on penny postcard for free particulars and how to get price for introducing.

VACU-MATIC CO. 7617-1566 W. State St., Wauwatosa, Wis.

BUILD YOUR OWN REVERSE CYCLE SYSTEM

Heat and Cool Without Fuel

Complete blueprints for building your own residential REVERSE CYCLE heating and cooling system are now available. One unit both heat and cool. Send for free information.

Blueprints, $1.00 ppd.

WEST COAST TRADES INSTITUTE
745 N. RUSSELL ST.
PORTLAND, OREGON

POPULAR MECHANICS
Do Nearly Every 'Round-the-House Job...

FASTER... EASIER... BETTER...
with this amazing

PORTER-CABLE Guild

COMBO-TOOL

$44.50

POLISHES
GRINDS

for real quality

You can't find a more useful tool for jobs about the house, shop and garage than this sensational Guild Combo-Tool. By simply changing attachments on this light, vibrationless tool you can do the widest variety of jobs imaginable. You can grind, sand, sharpen, drill — even through steel. You can remove rust, cut stone, polish everything from your car to the brass candlesticks. You can remove paint — or mix it — and do every job quickly, easily, professionally. Makes your wife's tasks easier, too — takes the drudgery out of scouring, polishing floors and furniture. Mounted on a bench stand (see picture below) the Guild Combo-Tool makes a perfect wheel grinder and buffer.

These are only a fraction of the countless jobs made easy by this power-packed little tool. You can do almost a week's work in a day with it. No gadget this — but a heavy-duty production tool that will give you years and years of service because it's precision made. Try one today at your hardware or tool supply dealer. May be purchased separately or in your choice of three versatile kits full of attachments.

Other Guaranteed Guild Electric Tools

- Saw
- Belt Sander
- Hedge Sheer
- Bench Ball Grinder

Send me literature on Combo-Tool and other Guild tools for home shop. Also, name of my nearest dealer.

Name: ____________________________
Address: __________________________
City: ___________________ State: _______

PORTER-CABLE MACHINE COMPANY
2283 N. Salina St.
Syracuse 8, N. Y.
**ROTADRILL**

The new rotating twist-drill stand that keeps your bits in place, speeds production, makes for faster, more accurate work. It is perched in the top of the column, your bits are always at finger tips, never misplaced. Stand rotates for quick selection and can be lifted off for use at the workbench. Fits any popular home workshop drill press having a 1/4" or 2/16" inside-dia. column. Cased in aluminum, stand comes drilled to hold a complete set of 42 twist drills, 1/16 to 1/2 in. Only $3.00. Plus 20c postage.

**STANDARD PARTS CO., P. O. BOX 6211, CHICAGO, ILL.**

**ACE TOOLS**

Be permanently tool-ed up for every operation on your Metal Cutting Lathe.

No. 8: A Ace Tool Set for 9" and 10" Swinging Lathe—fits shank size 3/4" x 4", includes Turning, Cutting-Out, Boring, Knurling and Threading Tools with high speed cutters, blades and wrenches. Complete tools in fitted steel case—nothing else to buy. See your local dealer or order direct.

**ARMSTRONG BROS. TOOL CO.**

$268 W. Armstrong Ave, Chicago 30, Ill.

**MAGNETS**

OF ALL TYPES—10c UP
AMAZINGLY POWERFUL!
5 oz, Ahico Magnet, lift 10 lbs...

**BUILD 3 RM. HOUSE FOR $500**

Long lasting, good looking, insulating. Garages and barns built low as $80.00. No previous experience needed. Complete PLANS and valuable Catalog 35c.

**CONVERT HAND MOWERS TO POWER MOWERS**

Takes less than 3 hours

The Handy-Dandy Lawn Mower Kit fits any hand mower from the 16 to the 20 inch size. Comes complete with all necessary parts. Kits can be purchased separately, complete with engines or complete with Pennsylvania Mower. Also manufacturers of a complete power mower and garden cultivator attachments.

**LE CLAIR MANUFACTURING CO.**, Le Claire, Iowa, Dept. PM
NOW Martin MASTER MOTOR
CRAFTSMEN GIVE YOU YOUR CHOICE OF 4

"Best Outboards Ever Built!"

Best For Speed...
Best For Trolling...

Best because every Martin Motor is "Performance Tested" to assure perfect performance at all speeds! Among the many exclusive Martin Motor features are:  
✓ Improved mechanically-controlled poppet valves  
✓ "Aquematic Control"  
✓ Full 360 degree steering  
✓ Vertical stem adjustment  
✓ "Depend-A-Pull" starter  
✓ Centralized, streamlined controls  
✓ Matched, diamond-bored connecting rods  
✓ Improved carburetion and cooling systems and many others...exclusive features that have made Martin Motors "The New Standard of Performance."

FREE! Beautifully illustrated booklet packed with complete news about the 4 NEW "Best Outboards Ever Built" and the name of your nearest Martin Motor dealer. Write: Martin Motors, Dept. 507, Eau Claire, Wis., today!

Martin OUTBOARD MOTORS

Canadian Sales by: Martin Motors, Division of National Pressure Cooker Co. (Canada) Ltd., Wallaceburg, Ontario.

ZIP through hobby projects, home repairs

... with this low cost Duro 8" Ball Bearing Table Saw

This precision saw may easily double your woodworking skill and enjoyment. You'll be able to cut mitres, simple and compound angles, do ripping and cross-cutting and many other operations with "professional" ease and accuracy. Its many features and advantages include: rugged cast iron table and base; spindle mounted on New Departure ball bearings; super size 20¼" x 25" work table; maximum cut of 2¼" at 90°; dual lock safety rip fence; exclusive rubber cushioned anti-kickback; mitre gauge with adjustable cut-off rods; safety blade guard—plus many other features you'd expect to find only on high priced saws!

Duro's thirty years of building precision tools makes possible "today's greatest power tool values."

Write for FREE illustrated catalog of new 1950 Duro precision-engineered, economy-priced power tools. Shows complete Duro line—saws, drill presses, jointers, lathes, sanders and accessory tools.

Duro Metal Products Co.
2676 N. Kildare Ave.
Chicago 39, Ill.

Duro Metal Products Co.
2676 N. Kildare Avenue
Chicago 39, Illinois

Gentlemen: Please send me details on your new 8" table saw... also the complete new Duro Power Tool Catalog.

Name. ___________________________________________

Address. ___________________________________________

City. ____________________________________________ Zone. ______ State. _______

MARCH 1950
INTERLOX...THE TELESCOPIC WOOD RULE!

An accurate measuring tool with all the sturdiness and utility of a folding rule...plus the convenience of spring and direct reading inside measure. Exceptionally smooth, fast action for all measurements saves time every time.

Each stick slides easily and securely with overlapping telescopic action at the touch of a finger...locks automatically into measuring position. INTERLOX is made entirely of the finest straight-grain maple finished with glass hard lacquer for permanent legibility. Fittings are of solid brass.

INTERLOX is the aristocrat of wood rules. See it at your local dealer...or use the coupon to order by return mail.

CASH IN YOUR SPARE TIME
MAKE BIG MONEY IN OWN BUSINESS
EXPERT SAW GRINDERS EARN BIG MONEY.
Easy to learn. No experience required. All instructions furnished. Sharpen circular saws for woodworkers, lumber yards, farmers, others.

NEW BELSAW POWERED SAW GRINDING MACHINE
115-volt, precision work on all sizes 4 to 12-in. blades. Quickly cuts, for wood, lumber, hardwoods, etc.

BELSAW MACHINERY CO
370 Field Bldg., 313 Westport Road, Kansas City, Mo.

SAVE $55.00 ON THE PRICE OF THIS VERSATILE HEAVY DUTY TOOL!

ONLY $42.50 Direct from mfgr.
Get this bargain now! Limited offer from surplus stock. No need to “catch” Brand new A-1 Spinner and chuck or CO. today. (No C.O.D.) Money refunded within 10 days if not satisfied. CALIFORNIA and 3% State Sales Tax.

HOLT MFG. CO., 272 BADGER AVE., 651 21st STREET, NEWARK 8, N. J. OAKLAND 12, CALIF.
Get 'em out or drive 'em easily in tight places with a "Yankee" Offset Ratchet Screw Driver! Lever action gives more power than a regular 8" screw driver. No. 3400 illustrated has 1/4" and 3/8" blades for slotted screws; other models for Phillips Recessed Head Screws. At your Stanley dealer. Write for free "Yankee" Tool Book.

**YANKEE** TOOLS NOW PART OF STANLEY THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO., Philadelphia 33, Pa.

BUILD YOUR OWN POWER LAWN MOWER

WHY BREAK YOUR BACK MOWING FIELD OR LAWN?

WRITE FOR FREE Building Instructions The Rite-Way Mower Attachment Ball Bearing

SAVE MONEY

Now anyone with a 1/2 hp. engine can save time and effort mowing field or lawn by building their own whirl type power mower. Build according to your own ideas and needs at small cost. Cut close to fences, walls, boundaries, etc., Build in short time with parts and instruction manual. Can save hours of time and back breaking labor.

WRITE TODAY FOR FREE INFORMATION T & H MFG. CO., Dept. MPB-3 811 E. 31 St., Kan. City 3, Mo.

REAL ENGINE VALUE

$4.95

A miniature gas engine that really operates. Thousands of Buzz "B" gasoline engines have been sold at twice the price. Now is your chance to buy a real 1/2 hp. gas engine for only $4.95. Turn up over 15,000 r.p.m. For Boats, Planters, Fodder Carts, etc. Guaranteed and ready to run, including Champion spark plug and tank. Send for free special catalog for balance. Same day service.

Write for FREE CATALOG OF THOUSANDS OF HOBBY ITEMS. America's Hobby Center, Inc., Dept. B-30, 156 West 22nd St., N. Y. 11

2 DRILLS IN 1

This attachment gives you two drills in one. It converts any 1/4 inch electric drill to 1/2 inch capacity. Reduction gears reduce the drill speed 5 to 1, the average speed of a 1/2 inch drill, and thereby increases the power. Absolutely indispensable for all shop work and home craftsmen. Satisfaction guaranteed. Order yours now. $11.95 post paid. Send check or Money Order with order. Jobbers write for special information.

G. M. CO. MANUFACTURING, INC.
1308 43rd Ave.
LONG ISLAND CITY 1, NEW YORK

Motor Oil Changes

ENTIRELY UNNECESSARY after attaching

RECLAIMO (Cast Aluminum) HEATED OIL-FILTER and RE-REFINER!!

Makes short work of solids and liquid impurities—after 150 miles you won't believe it's the same oil REMEMBER—"Oil does not wear out mechanically," states U. S. Bureau of Standards. Convince yourself—just read our "Oil Facts", 32 pages, FREE on request.

RECLAIMO MFG. CO.
5083 Elston Ave., Dept. 22, Chicago 30, Ill.
Dealers Wanted

EARN
$150 to $300 extra profit monthly with
Hobart SIMPLIFIED
Arc Welding

Own Your Own Business on "Pay Out of Earnings Terms"

With good, up to date, ample capacity welding equipment, you can get the big pay jobs that save customers costly replacement parts and expensive delays.

The new Hobart Arc Welders make you independent of any electric company or power supply. Gasoline engine driven, electric self-starting and auxiliary power, if you wish, for making your own current for lights, tools, motors, etc.

You can quickly get into big paying welding service with practically no outlay on your part. There is a site and model suitable for all welding requirements in AC Transformer or DC Generator equipment—or you can save $50 to $300 by building your own arc welder, using the Hobart Generator Only and belt or coupling to a used gas engine.

Free catalog and data. Write today.
Oscillating Motion is the Only Motion for a Perfect Finish!

The DU-FAST \* Sander and Polisher produces quick, easy, perfect finishes at low cost. It requires no special skill or knack. You get an industrial type finish on wood, metal, plastics, plaster and composites materials the first time and every time you use DU-FAST. Use DU-FAST to remove disc scratches.

Model BH10J attaches in seconds to either the Home Utility 1/4" Electric Drill or the Home Utility 5" Disc Sander-Polisher. (Products of Black & Decker Mfg. Co.) Model SKT fits the Skill Home Shop 1/4" Electric Drill manufactured by Skilsaw, Inc.

ONLY
$14.95

(Average or See Below Model)

CAR OWNERS—Meet Master Glaze—the sensationally different finish for new and used cars! Not a wax—not an oil polish—not a paint!—nothing that "smears" over the surface. Master Glaze is a unique discovery—a creamy liquid—quick and easy to apply! Gives a hard, glass-like surface. Even gasoline cannot dull it! Lasts six months to a year! Amazing luster—beautiful, sparkling clean and brilliant! Doesn't finger-mark—doesn't smear! A match box full glazes an entire car. Seals the pores—protects! NOTHING LIKE IT!

FREE SAMPLE
Just send your name and address to

MASTER GLAZE CO., 7720-682 W. Harwood Ave., Milwaukee, Wis.

GET HIGH COMPRESSION!

In your 1939-48 Ford V-8 or Mercury with Rocket Cylinder Heads

CAST IRON
7.5 or 8.0 to 1 compression ratio. Increase horsepower and gas mileage. 20,000 test miles. One thousand tests. $39.50 each. Write for details.

WESTERN SALES & MFG. CO.
2225 S. Maple Ave., Los Angeles 13, Calif.

Hull Automobile Compass

Best Friend in the World

When You Need It

Beaconite illuminated $5.95
Streamline standard $3.95

At your dealer's. Write for literature.

Hull Mfg. Co., P. O. Box 246-D3, Warren, Ohio

Drains Cellars, Wash Trays Circulates Oil

Pumps 1800 GPH 300 gal. 30" high, use 1/8 to 1/2 HP motor. Will not dog.

Postpaid if cash with order. (Add 50c for west of Missouri.)

Thousands in use since 1936

LABAWCO PUMPS, BELLE MEAD 7, N. J.

Take the work out of Gardening—

WITH THE Little Farmer POWERED CULTIVATOR

COSTS LESS THAN $100.00

At last, an effective powered cultivator in the low-price field. Little Farmer is ideal for corn and garden use. Compact design and fine balance make it easy to operate. Just right for narrow rows where large equipment may damage plants. Write NOW for complete information. Dealer inquiries also invited.

The Will-Burt Co.
DORRIVILLE, OHIO

POPULAR MECHANICS
Local Manufacturing of this Modern Masonry Has High Earning Power

Several hundred territories are being opened up for local Brikerete manufacture by men of vision and aggressive-ness. Brikerete ties in with today's huge building program. Makes possible better construction at lower cost. Truly better than brick; actually cheaper than lumber. Combines strength, safety, insulation value, colorful beauty that fits today's styling.

Brikerete is made in locally owned plants, using local materials and local labor. That's why high quality and low price still permit a 100% to 150% mark-up. We supply complete equipment; easy terms if required. Generous cooperation. Exclusive manufacturing privileges in protected territory.


Serrated Jaws for Positive Grip

Seymore Smith "Snap-Lock"

Plier-Wrench

All-Nickel Finish

Capacity Indicator

No Thumbing

3-Way Spin Control

is the Reason!

This Shakespeare Wonderpole exclusive feature prevents backlash, gives you long, perfect casts without even thumbing. The reasons are:
1. Oversize tail end bearing
2. Adjustable head end spool cap
3. Lightweight spool for easy starting, quick stopping.

This means spool starts easy, stops fast, line doesn't tauten. No backlash "birds nests" to untangle. You cast more times, have more fun, catch more fish. In three models:

No. 1920—$10.00 No. 1921—$11.00 No. 1922—$13.50

Both Free—1950 Tackle Book and Fishing Calendar—Show best days to fish, best ways to fish, best rods, reels, lines, bait. Mail coupon!

Shakespeare

Rods, Reels, Lines, Bait

Honor Built Since 1897

M-SCOPE TREASURE-MINERAL LOCATORS

WRITE FOR FREE, ILLUSTRATED 16-PAGE BOOKLET


YOU CAN PURCHASE THESE INSTRUMENTS ON A MONTHLY PAYMENT PLAN


BUY the BEST — Buy Darra-James

POWER TOOLS

TOOLKRAFT CORP., SPRINGFIELD, MASS.

DEPT. MS: Rush Darra-James Brochure!

NAME

ADDRESS

CITY, STATE

SEND FOR FREE BROCHURE NOW

MARCH 1950
Ride Anywhere for LESS!

75 MILES PER GALLON

No wonder you see so many Cushman, everywhere! Thousands ride 'em because they're so Amazingly Economical! Think of getting 75 miles to the gallon! Cheaper than shoe leather! Far less than bus fare and no long waits.

Even more impressive is Cushman's advantage in traffic—its ease of handling, fast get-away, its ability to slip in and out of narrow places. You get there quicker and easier—then, you park anywhere! Wonderful for getting to work, school, market, doing errands, making deliveries. Dependable, safe, comfortable. Powered by famous long-life Cushman "Husky" engine. Powerful quick-acting brakes.

FREE See your Cushman dealer for demonstration of new 1950 models. Or, mail card to Dept. M3.

CUSHMAN MOTOR WORKS, INC.
LINCOLN, NEBRASKA USA

An Amazing Tool!

THE APEX PUTTY PLow

• For faster, easier removal of putty
• Cleans all 4 sides and corners
• Pierces hardest of putty without splitting sash or endangering glass
• Allows you to remove window glass without removing sash
• Eliminates expensive heating tools
• Also handy for driving glaziers points

Made from high grade tool steel with 45° angle cutting blade. Sturdy hardwood handle.

$150 Postpaid Anywhere in U. S. A.

Write to APEX MFG. CO.
33 Franklin St.
Buffalo 2, N. Y.

HANG IT UP OR STAND IT AT ANY ANGLE

MAGNETIX DROP LITE
STIX WHERE YOU FIX

LIGHT ON THE JOB!

Fastens by magnet to any iron or steel surface or hang it up. Gives you close lighting at any angle. Magnetix is ruggedly constructed... built to take punishment and give years of service... features a lifetime powerful alnico magnet that grips thru paint, enamel, grease, etc. No mechanic or shop can afford to be without it. Indispensable in the repair shop, garage, home, faster. Saves time, saves labor, make the job easier—GET MAGNETIX, the strongest most convenient service light ever made.

No. 825 Magnetix (25 foot card) $4.50 ea. prepaid
No. 850 Magnetix (50 foot card) $5.50 ea. prepaid
Order by mail. Send check or money order. We pay postage anywhere in U. S. A. C. O. D. orders also. Ask C. O. D. fee. Your money back if not satisfied.

MAGNETIX, INC., 212 E. VAN BRUNT ST.
ENGLEWOOD, N. J.

PLYWOOD BOAT KITS
$87.50 (Freight included)

Build this 12-ft. sport runabout from ready-cut parts. The kit includes all hardware, paint, etc., to complete the boat shown. Send for free folders of all models as low as $29.95. Freight included.

TAFT MARINE WOODCRAFT
Dept. L, 636 39th Ave., N. E., Minneapolis 21, Minn.

ELECTRIC SHEAR SHARPENER

Over 65,000 Sold—It Must Be Good!

Genuine Carborundum wheel ideal for shop or home use. Send remittance with order and shipped to you at once, prepaid to your door, complete with electrical goods catalogue.

$9.75 complete with wire

WILLIAM MARYV COMPANY
477 St. Peter Street
St. Paul 2, Minn.

WARM SURPLUS

Below are just a few of the many items we have in stock at sensational low prices:

- Pumps
- Grinders
- Air compressors
- Air tanks
- Spray outfits

A TERRIFIC BUY!

GAS ENGINES

Briggs & Stratton NEW in original cartons. Model 45-992-9, List Price $108.50, Year Price $75.50. Model 22, with "A" belt pulley, List Price $64.95, Year Price $49.90. Write today for our free catalog listing thousands of money saving bargains.

C & H ELECTRIC CO.
424 W. JUNEAU AVE.
MILWAUKEE 3, WISCONSIN

WRITE FOR CATALOG

POPULAR MECHANICS
EASY WAY to BUILD a TRAILER Save Money!

with complete FAYETTE Undercarriage Assembly

Save money, buy direct from America's leading builder of trailer undercarriages. Units designed for simplest installation. Fayette precision built tubular type axles eliminate up to 40% needless dead weight. Heat treated alloy steel spindles, precision ground, provide smooth, long wearing bearing surfaces. Rubber mountings contribute to Fayette's famous Glide-Ride. You'd pay much more if you bought parts separately without getting Fayette's engineered performance.

SPECIFICATION DRAWINGS and DATA
Send for engineering drawings, state size, use, type and approximate weight of trailer you wish to assemble. Send 10c for postage and handling.

FAYETTE MFG. CO., 600 FRONT ST., FAYETTE, OHIO

DELTA HOME CRAFT

Only $995

Miter gauge, motor and belt extra

New! Low-cost Delta HOME CRAFT 8½" Disk Sander

Helps you get a smooth finish easily and quickly. Sand any surface - on wood, plastics, ivory, and non-ferrous metals. Extra value features include tilting table. Quality made by Delta. Have your dealer demonstrate this new Delta HOME CRAFT Disk Sander today!

POWER TOOL DIVISION
Rockwell Manufacturing Company
8025 E. Vienna Ave., Milwaukee 1, Wis.

FREE BOOK!
"How to Start Your Home Workshop." Write for your copy today.

SAY YOU SAW IT IN POPULAR MECHANICS

THE BIGGEST VALUE ON THE MARKET

DYNAMIC ARC-WELDER

Does Welding, Brazing, Soldering, Cutting

This is one of the finest scientifically designed and precision-built genuine heavy duty transformer-welders on the market today! Made by an old-established firm. High efficiency, heavy-duty cost does work you'd expect from costlier machines. It's EASY TO OPERATE. Does work in a jiffy by following the simplified instructions furnished. Works on steel, brass, bronze, aluminum or other metals. OPERATES from any convenient property wired with 200A. G. LINE. SAVE TIME AND MONEY...build or repair your own auto, home, farm, or shop equipment and apparatus, etc. Makes ready money doing work for others in spare or full time. OVER 50,000 SATISFIED USERS IN CARPENTRY, HEATING, REPAIR MEN, FARMERS, TINSMITHS, ENGINEERS, HOME AND AUTO OWNERS. Order today on 19-day trial or send coupon for full details.

DYNAMIC WELDER CO., Dept. D2-CA4, 15 E. 23rd St., Chicago 16, Ill.

MARCH 1950
WELDING MADE EASY!

With LEJAY'S

Powerful
NEW D.C. ARC WELDER

This amazing machine delivers 200 amperes continuous duty and up to 250-300 amps, intermittent duty. The SUPER smooth operation is accomplished by a dialed-type control. It easily mounts on your tractor or elsewhere.

NO JOB TOO HARD

for this super duty LEJAY Welder and one or two welding repair jobs could easily more than pay for it. Even handles 3/8" rods.

Money Back 10-Day FREE Trial

is our liberal offer—in addition the welder is guaranteed for 1 year. Over $300 value at less than 1/3. Free literature. ORDER YOUR WELDER FROM THIS AD.

OR. Send 25c for PLAN "Build your own Arc Welder from Aircraft Generator", we'll include the literature.

LEJAY MFG., 847 LeJay Bldg., Minneapolis 8, Minn.

Fine Power Tools Only $8.00 Each

Do turning, drilling, sawing, grinding and sanding on ONE machine, with motor. Complete, only $30.00 each, or on Easy Time Planments. 68 lbs. of REAL machinery. Handles Big Work. 10-Day FREE Trial. Money-Back Guarantee. Write for FREE literature. ERIE TRACTOR, INC., 1501, Clinton Avenue, Kalamazoo, Michigan

The JIFFY metal CABINET

YOUR ANSWER TO SMALL ITEMS STORAGE
at home, office, and shop

(INDEAL GIFT, TOO)

So handy to keep nuts, bolts, screws, nails, parts, washers, stamps, hobbyists' needs, etc., at your fingertips.

THIS 21 DRAWER UNIT ONLY $5.95 POSTPAID

Stop searching, get a 32 or 64 drawer JIFFY to keep those small items that usually get mislaid. Spot welded steel, galvanized enameled finish, metal drawer guides. Dividers included with aluminum drawers make possible three compartments per drawer. Looks good anywhere. Send check or money order, please—no C. O. D.'s. Prices below. Your money refunded if not satisfied. Dealers write for quantity discount.

SPECIFICATIONS

32 Drawer Unit

6" Deep
121/2" Wide
151/2" High

64 Drawer Unit

6" Deep
251/2" Wide
151/2" High

Drawing Size

11/2" Deep
21/2" Wide
8 Long

WITH ALUMINUM DRAWERS

Dividers and Index Cards Included

WITH CARDBOARD DRAWERS

Suitable for most home uses. Heavy board trestle covered. Metal drawer pull.

1. 32 drawer - $8.95
2. 64 drawer - $15.95

3. 32 drawer $5.95
4. 64 drawer $9.95

MARCOT KEY MACHINE

MARCOT No. 8 KEY MACHINE, mounted on Cabinet, less motor, $85.00, A. J. M. Key Machine, 6th Ave., Chicago, Ill. 10 cents. Delivery Orders over 50 add 10 cents per key. Shipping weight, 40 lbs. per box.

A. J. MAROTTE CO., 1200 N. Keeler Ave., Dept. FG, Chicago 51, Ill.

WHITTLE CIRCULAR SAW

Chucks into Any Electric Drill

Only $9.95 Postpaid

Makes up to 11/2" cut. Will cut dressed 2 x 4. Has adjustable depth gauge. No oiling necessary. Handle and frame, 12" long. As power comes from the drill, it includes 4" combination cross cut and rip saw blade made of high quality chrome-nickel saw steel. Extra blades $3.00 each.

ORDER THROUGH LOCAL DEALER OR DIRECT FROM J. D. WHITTLE CO., Dept. M-3, 1056 Wellington Ave., Chicago 3, Ill.
increased “gas” mileage?

FREE TRIAL
in your car
SEND NO MONEY

GAINE
Air-Flow NEEDLES
NEW air-bleed idling jet. Replaces present SOLID-IDLING
ADJUSTMENT SCREW in your carburetor. (8 cyl. cars use
1.) The objective is to lessen the vacuum and thus try to INCREASE YOUR GAS
MILEAGE. About ½ MILLION NOW IN USE!
Most users who write swear by them and report up to
25% MORE MILEAGE
and many comment on: SMOOTHER MOTOR;
EASIER STARTING; FASTER PICKUP.
But FRANKLY, some swear at them and curl our
hair with "NO IMPROVEMENT!"... and fire them back
AT OUR EXPENSE — proving Gaanes CAN sometimes FAIL. Therefore, we invite YOU to TRY the
"LITTLE STINKERS"
WITHOUT COST to see what they will do for you. Send NO money. Pay postman NOTHING.
Try Before You Buy — 10 Day Free Trial Offer
Just send us your name, Address, Make of Your Car,
No. of Cyls., and Make of Carburetor by postcard or note. Gaanes with literature will be promptly sent you. ANYONE can install them in ONLY 5 MINUTES.

USE GANES 10 DAYS
Check for INCREASED "GAS" MILEAGE, which
must average 2, OR MORE, EXTRA MILES PER
GALLON, or else NEEDLES are NOT worth buy-
ing. End of 10 days, send us only $1.50 per Ganne Needle; or you, too, can fire the Little Stinkers back home at OUR EXPENSE — AND YOU'LL OWE
NOTHING — AND WE'LL ASK NO QUESTIONS.
SEND FOR GANES TODAY
National Automotive Research Co.
350 W. Washington Blvd., Dept. J-3, Venice, California

TWO CYLINDER BRAND NEW
AIR COMPRESSORS
Fully Guaranteed, Backed By 44 Yrs. Air Equipment Experience
FULLY AUTOMATIC—BEST BUY IN YEARS!
TWIN CAPACITORS for stronger starting power against pressure.
FULLY AUTOMATIC PRESSURE regulators adjust from 0 to 100 lbs. Safety valve, drain valve and 12"/30° horizontal tank with 3/4" hose connections.
TWIN GAUGES, 1 reserve tank gauge and 1 gauge with adjustable pressure regulator.

89.85

SAVE UP TO 25% ON QUALITY BALL-BEARING WHEELS!
Bilt-Rite wheels roll smoothly and easily, are pneumatic, ball-bearing, painted red; guaranteed top quality — and you save up to 25%! Compare Bilt-Rite’s quality and price — then get your order in today! Dealer inquiries invited.

BILT-RITE BARGAINS on BALL-BEARING WHEELS
(For 1/4-inch axle)

| Size | Bilt-Rite Price | Save | Grist | Bilt-Rite
|------|----------------|------|-------|----------
| 6 x 1.00 | $1.30 | 10 x 1.25 | $1.45 |
| 8 x 1.25 | 1.65 | 10 x 1.75 | 2.15 |
| 8 x 1.75 | 1.80 | 10 x 2.00 | 2.45 |
| 6 x 1.50 | 1.50 |
| 6 x 2.00 | $3.75 | 8 x 2.50 | $4.45 |

Bilt-Rite Guarantees
No better wheels are made regardless of price; 10 day return privilege.

MARCH 1950
SAFE JIG SAW

At last—a revolutionary, new electric jig saw small children may use. Safe, powerful enough to be the basic tool in Dad's workshop. Makes "Stunning Photo Silhouettes" of favorite snapshots...fancy wall-hangs, toys, fun and profit! Just plug in! No notor to buy—no plugging. Thousands sold. Use in bedroom, kitchen, parlors, etc. Patented. Nothing else like it! Mail ordering now for illustrated, free circular. Dealers Write SYNCRD CORPORATION, Dept. 11, Rochester, N.Y.

PERSONALIZED HOUSE, LAWN MARKER $3

ETCHING YOUR NAME ON A LITTLE HOUSE, LAWN MARKER IS A novel idea, and makes a fine gift. Specialized in engraving with white enamel lettering, alphabet numbers, never $1.00, posted. Money back guarantee.

AUTO ACCESSORIES WANTED

From manufacturers for direct-mail campaign—Send full details—prices, terms, discounts—all facts to POWER SALES CO., WHITING, IND.

SCREW YMIX—BEARINGS

Mixture of all sizes of ball bearings, washers, screws, washers, nuts, bolts, etc. Mixed size—25 lb. barber. 50 lb. barber. BARGAIN OFFER $2.40 for 10 lb. each, of above 7 mixtures—2.95. 

F.O.S. Screw Mix. Add 10c for per order. Minimum order $1.00.

JAY-CEE SALES CO., 4519 Grand River Ave., Detroit 8, Michigan

G.P.C. COVER CLOTH

Plasticized, lightweight, pliable. Use for dust cover, storage wrapping, wash stands, etc. Send $1.45 for 8 ft. $4.75 for 9 ft. x 15 ft. size. C.O.D.'s accepted.

TRAILER PARTS

Write for FREE Catalog

BULL DOG Hitches, Parking Jacks and Axles for all types of trailers. Wauzau 13, Wisconsin

1950 Shop Notes Now Ready!

Popular Mechanics SHOP NOTES is always sought after and this year it is better than ever. 240 interest-packed pages for electrician, carpenter, mechanic, painter, auto-worker, welder, farmer, plumber, or home enthusiast. The 1950 issues contains data on drilling, reaming, batteries, temperature, ramps, oil grader, auto-gage, salesman, etc. Hundreds of practical ideas. See your dealer or order direct from POPULAR MECHANICS PRESS — $1.00

Ranger Road - Glendale 4 - California

Use Easter Seals

AMAZING OIL FILTER - SAVES $$$

LIFETIME POROUS METAL CARTRIDGE—Saves replacement costs. Gives positive oil cleaning action. Non-oil-laden, save full strength of oil in every oil change. Fits all cars. $1.00 post paid.

Easy installation - free literature. MONEY-BACK GUARANTEE. FilterCo. Inc., 502 San Fernando Road - Glendale 4 - California

POPULAR MECHANICS

308
Here's the Handgrinder you've always wanted... for HOBBYWORK... HOME USE... PROFITS

More power, capacity, versatility than any other handgrinder

With the Dumore Duplex you get an all-around tool for your workshop... not just a one-purpose tool. 1/4 h.p. gives you extra power for heavy jobs... extra chuck capacity lets you handle all standard 1/4", 1/8" sec. 3/2" chuck tools... 4 low cost attachments (extra) quickly convert to flex-shaft, bench or lathe use, permit purchase budget of this 1-kit tool shop.

DRILLS  BUFFS  CHAMBERS  CARVES
SANDS  POLISHES  SANDS  ROUTS
SAWS  BURLS  SHARPENS  ETC

Perfect for your shop, for odd-jobs, as a gift, the Dumore is the best buy in handgrinders. See it today at your hardware dealer, or send in coupon below.

The DUMORE COMPANY
Dept. C-51 Racine, Wisconsin

Send New Dumore Hobby Catalog.

Send me Dumore Duplex Kit (as illustrated): $29.75 enclosed.

Send me Standard Duplex Kit (9 accessories);

(Name check or money order — we'll pay postage.

Send 10%, and we'll ship C.O.D. plus postage.)

NAME

ADDRESS

CITY  .......  ZONE  STATE  .......  DD-

SPECTACULAR SALE
OF WAR SURPLUS
and Other Items...
Prices Cut to the Bone!

Save $$$$ on Current Needs, and for Months Ahead! All Items BRAND NEW... Never Used!

WRIGHT HI-SPEED, 3-TON SPUR Chain Hoist GEAR

Book-type, ideal for garages, shops and industry. Operates with maximum mechanical efficiency. Holds load at any point, will not pull loose. Equipped with 40 ft. of chain. LIFETIME GUARANTEE $85.00

110V/220V TRANSFORMERS

Built for Hartman Quick Battery Chargers, industrial use, 110V/220V AC, Output 18V, 100 amperes. Perfect for charging your own electric welders, quick battery chargers, etc. 36" long, 18" long, 18" wide. (Signed 18") size 703 x 5 x 2 1/2, Mitchell bracket, 40 lbs. Original cost $292.00 OUR LOW PRICE. $117.75

RECTIFIERS — Full wave. 1 amp. Converts 115V AC to 115V DC. Mounting brackets, OUR LOW PRICE. $125.00

Stewart-Warner TACHOMETERS

Checks speeds up to 5000 R.P.M. Burns clockwise. Size 3 1/2" dia. x 4 1/4" long. Luminous dial, has cups up for reading shaft. Mounting bracket. OUR LOW PRICE. $35.00

Order by mail from this ad. Send bank draft, cash, or money order. All merchandise guaranteed to be as represented. These prices are subject to change without notice.

MAIN SURPLUS & Supply Co., 11 So. 3rd St., St. Louis 2, Mo.

Handy Flexible SHAFT

Converts any motor, drill press, electric drill, electric fan (10 inch or larger) into a handy rotary tool

Attach ROTA-SHAFT in a jiffy. Use for grinding, polishing, sharpening, centering, engraving, cooling, making tools, carving on metal, plastic, wood, glass. Convenient handpiece for easy handling... with 1/4 inch Adjustable Chuck. 40-inch overall length. Complete with bush and sanding disc ready to use in a full press chuck. Order today!

SEND NO MONEY! Mail your order only $2.95 plus postage on delivery. Try 10 days—if not delighted, return for money-back. For use on motor, add $3.50 for Special Coupling and state shaft diameter.

STRADER PRODUCTS CO.
DEPT. P-101
298 Strader Ave., Cincinnati 26, Ohio

INSTANT FLAME with PREPO TORCH

Only $9.75 COMPLETE WITH FUEL

Additional CANS of PREPO FUEL

Single cans 95 each
Lot of 6 cans 85 each

NO PUMPING * NO PRIMING
NO POURING
PREPO TORCH FEATURES:
1. No real problems—just empty PREPO container and slip in new one.
2. Instant blue flame—just open the valve and light, Hot flame—2200° F.
3. Long life—3000 B.T.U. in single container. Under ordinary use one container lasts over 5 hours.
4. Versatile—charge of burners (two are furnished)—regular, throws pointed taper tools; duty, throws bushy flames makes PREPO Torch adaptable to any job, indoor or out.
5. May be used in any position. Especially handy for soldering, loosening nuts, soldering, cutting, burnishing, etc.
6. Positively safe—Time tested and approved. No old fashioned torcho hazards.
7. Stainless steel guaranteed against rusting.

Send your check or money order to—
J. N. TOOL SALES, P. O. Box 3511
CHICAGO 54, ILLINOIS
F.O.B. Chicago — Shipments Express

MARCH 1950
ATTENTION ALL MEN!

AMAZING VALUE!

UNBELIEVABLE BUT TRUE!

BRAND NEW, GENUINE

ARMY AIR FORCE

FLYING JACKET and TROUSERS

Both FOR ONLY $4.98

A PRIZE "FIND" FOR HUNTERS, FISHERMEN, FARMERS, TRUCKERS, MECHANICS—EVERYONE!

Unbelievable, but true. These brand new, genuine government surplus Army Air Force Flying Jackets and Trousers just obtained by us. Actually cost government many times this price. Individually packed in original boxes—never opened. Full zipper front jacket and knit cuff, coverall type trousers. Of genuine olive green NYLON with satin sheen finish. Extremely wind and weather resistant. Maximum warmth with free body movement. Made for real rugged wear. A value that cannot be duplicated anywhere. Supply limited. When they're gone, there will be no more. These NYLON Jackets and Trousers were made for government as electrically heated flying suits. A few wires attached but can be removed. Hurry—Jacket, Trousers and Postage only $4.98 plus postage and C.O.D. fee or $4.98 plus 40c postage if money sent with order. State size (34-44). ALLYN & CO., DEPT. PM, 271 VANCE, MEMPHIS, TENN.

SUPPLY LIMITED!

HURRY!

[Image of a rotated and shifted illustration]

FURNITURE MAKING and CABINET WORK

By B. W. PELTON

Complete Step-by-Step Directions for making Every Type of Furniture—Including Built-in Conveniences and Home-remodeling Jobs

MAIL THIS COUPON FREE!

Send Name and Address for a copy of 'Furniture Making and Cabinet Work.' Within 10 days I will either return the book, or send you $2.00, plus postage, as a down payment, and $2.00 a month for two months until the total price of $6.00, plus postage, is paid. (If you send entire amount of $6.00 with this coupon, we will pay postage.)

D. VAN NOSTRAND COMPANY, INC., Examines This 380 Fourth Avenue, New York 3, N. Y. Great New Book Please send me a copy of 'Furniture Making and Cabinet Work.'

MAIL THIS COUPON FREE!

Send Name and Address for a copy of 'Furniture Making and Cabinet Work.' Within 10 days I will either return the book, or send you $2.00, plus postage, as a down payment, and $2.00 a month for two months until the total price of $6.00, plus postage, is paid. (If you send entire amount of $6.00 with this coupon, we will pay postage.)

D. VAN NOSTRAND COMPANY, INC., Examines This 380 Fourth Avenue, New York 3, N. Y. Great New Book Please send me a copy of 'Furniture Making and Cabinet Work.'
World's strongest patented pliers NOW at your dealers

Not to be confused with ordinary pliers, the WELLOCT specially patented plier is scientifically heat-treated from drop forged chrome steel, triple polished. A jewel in your workshop, it affords you protection in every task. Light pressure on handles gives amazing results. Because of sharp teeth and patented lock, up to 900 extra gripping power is assured.

WELLOCT pliers are hand-made.
WELLOCT pliers will stand serious over 900 lbs. and every plier is tested.
WELLOCT pliers requires a 12" screw and can be used to produce one piece.
WELLOCT makes a plier for every purpose.

All-Vegetable

makes the difference

Thousands of modern men and women in all parts of America have turned to Nature's Remedy, NR Tablets for dependable, yet gentle relief, when a laxative is needed. They know that the all-vegetable idea is so right. They find an NR at night produces thorough morning regularity with no purgative effects. It's so kind to the system.

Try NR at our expense, 25 tablets only 25¢. Buy a box at any drug store. Try them. If not completely satisfied, return box with unused tablets to us. We will refund your money plus postage.

Easter Seals Help Crippled Children

Scientists say "SUCCESS depends on HEALTH and KNOWLEDGE"

Comfor-Reader

is the key!

- Enables easier, faster, longer reading.
- Gives complete comfort, better concentration, doubled efficiency.

Write for Catalog
Pat. No. 2354998

All prices FOB—N.Y.C.
Money Back Guarantee

Adjusts in 8 directions, to any angle, height.
Stops eye strain, "study slump," poor breathing.

MODELS

"Standard"—maple.
"Super"—walnut.
Aluminum poles & Joints...$24.95
"Standard"...$6.95
"Super"...$9.95

Swing Lamp Attachment Sold Separately

Send--Make $10 on each set you finish

COMFOR-READER, INC. 5 BEEMAN ST., N.Y.C. 7

MARCH 1950
Extra Special only $6.50

2 Way Hydraulic Cylinder with approximately 29 inch stroke, over all length 37 inches. Equipped with a swivel pivot and mounting bracket. Complete assembly as in picture. Just $6.50. All postpaid.

MICHIGAN RESIDENTS ADD 3% SALES TAX

N. SILVERSTONE CO.
6352 E. McNICHOLS
DETROIT 12, MICH.

World's Largest Stocks of Jeep Parts

Write For Your Special Requirements—We Can Fill Any Order!

GUARANTEED REBUILT JEEP MOTOR BLOCKS
COMPLETE WITH PAN (Less Head) $88.50
EXCHANGE $107.50

This motor is completely rebuilt, completely assembled, with new parts for up to 4000 miles of operation. You must pay freight on return of old block.

New RADIATOR ASSEMBLY Complete with tank, core, and fasteners.

$24.95

BUMPER SNOW PLOW $69.50

Easy to install. Fits all Jeeps. Complete.老人, F.O.B. Older, N. Y.

BIG, FREE CATALOG Write For Your Copy Today

Thousands of other Jeep accessories available. SHOP BY MAIL—Order direct from this ad today.

BERG TRUCK & PARTS, INC.
1601 S. WABASH AVENUE, Dept. M-3
CHICAGO 13, ILL.

Cable Address ... JEPKING

AIR COMPRESSORS
Lowest-Ever Closeout Price!

WESTINGHOUSE
Reg. $60.50
$18.50

Model 7-1 Complete
Brand New Surplus Special at an amazing low price! Westinghouse Double-piston Type, 63 1/2 cu. in. per min., 1 1/2 horse-power motor. Ideal for farm, home, industry. Insulated and staggered copper coils. Mounts on truck or car engine—or operate with 1 HP motor. Complete with 2 pair rams. Flyball governor. No Tune-up ever. $25.00. We carry a complete line of spare parts. Air hose — 10 ft. $1.50. wagonizing trucks $1.00 per wagonize.

DEALER'S WANTED

NATIONAL STORES

ALL 5 Only $39.95
WORLD'S LOWEST PRICES

EMRICK WORKSHOPS gives you everything listed at right—$50 lbs. of REAL machinery. Five Big Complete power tools using ONE motor. Many new 1850 features. 18-Day Free Trial. MONEY-RACK Guarantee. Only $29.95 cash, or on Easy Time Payments. Get FREE literature today showing how you can save up to $200 a year. power tools you'll be proud to own.

EMRICK, INC., 1494, Clinton, Kalamazoo, Michigan

AMERICA'S BIGGEST KAYAK VALUABLES!
BUILD Your Own

Complete easy-to-assemble kit with instructions, pre-cut parts, and everything you need to trim & hardware. Nothing else to buy. No seamanship or bending. Gives enough space for you and all your toys.

DEODAH KAYAKS
DEODAH MASSACHUSETTS

295 EACH

NOW! FILE YOUR OWN SAWS


THE SPEED CORP. PM-3

BURIED TREASURE, MINERALS
AMAZING NEW GOLDYAC LOCATORS

SENSATIONAL NEW MODEL!
ONLY 11 pounds weight! One hand operation. Money-back Guarantee of Superiority. Write for full details.

THE GOLDYAC CO.
1542 WEST GLENOAKS BLVD.
GLENDALE, CALIFORNIA

TORQUE WRENCHES
(At Real Bargain Prices)

New Torque Wrenches at a fraction of the usual price. All are guaranteed new and unused. Surplus stock must be sold. Take Advantage Of These Prices. Write or Phone Today. Write for catalog.

KENT: 8 1/2 inch drive. 25 pound used largely by Chevrolet Service Departments. Real Bargain! 

$1.85

KENT: 8 inch drive. 25 pound. Used largely by Chevrolet Service Departments. Real Bargain! 

$2.45

KENT: 8 inch drive. 20 pound. Used in heavy-duty engine work. 

$5.85

KENT: 8 inch drive. 100 pound. Used in heavy-duty engine work. 

$8.95

KENT: 8 inch drive. 150 pound. Used in heavy-duty engine work. 

$10.95

KENT: 8 inch drive. 200 pound. Used in heavy-duty engine work. 

$15.95

KENT: 8 inch drive. 250 pound. Used in heavy-duty engine work. 

$20.95

KENT: 8 inch drive. 300 pound. Used in heavy-duty engine work. 

$25.95

KENT: 8 inch drive. 350 pound. Used in heavy-duty engine work. 

$30.95

KENT: 8 inch drive. 400 pound. Used in heavy-duty engine work. 

$35.95

KENT: 8 inch drive. 500 pound. Used in heavy-duty engine work. 

$40.95

KENT: 8 inch drive. 600 pound. Used in heavy-duty engine work. 

$45.95

KENT: 8 inch drive. 700 pound. Used in heavy-duty engine work. 

$50.95

KENT: 8 inch drive. 800 pound. Used in heavy-duty engine work. 

$55.95

KENT: 8 inch drive. 900 pound. Used in heavy-duty engine work. 

$60.95

KENT: 8 inch drive. 1000 pound. Used in heavy-duty engine work. 

$65.95

KENT: 8 inch drive. 1100 pound. Used in heavy-duty engine work. 

$70.95

KENT: 8 inch drive. 1200 pound. Used in heavy-duty engine work. 

$75.95

KENT: 8 inch drive. 1300 pound. Used in heavy-duty engine work. 

$80.95

KENT: 8 inch drive. 1400 pound. Used in heavy-duty engine work. 

$85.95

KENT: 8 inch drive. 1500 pound. Used in heavy-duty engine work. 

$90.95

KENT: 8 inch drive. 1600 pound. Used in heavy-duty engine work. 

$95.95

KENT: 8 inch drive. 1700 pound. Used in heavy-duty engine work. 

$100.95

TERMS: Net cash with order. Open account to rated firms only. C.O.D.'s should have 25% deposit with order. All prices F.O.B. our yards, Illinois, unless otherwise shown.
YOUR CHEAPEST INSURANCE
AGAINST A DAMAGED MOTOR

"OIL-SPY"

YOUR "PRIVATE EYE" ON
YOUR OIL SUPPLY

Measures Oil Level
Accurately & Automatically

Your car needs one. OIL-SPY the only
Manual-Tamper-Proof automatic oil
level indicator that shows instantly the oil
level and warns you of engine damage.

You know when your oil level goes
down too low. The OIL-SPY new look lets
you down. An amber light flashes when oil
is 1 qt. low, and a warning red light
when oil falls 2 qts. low. A factory
safeguard, accessory, OIL-SPY
thoroughly tested on the proving
ground of five leading automobile
manufacturers.

Most Valuable Car Accessory
Since Automatic Transmissions

FOUR EAST STEPS FOR INSTALLATION
1. Replace original crankcase drain
plug with OIL-SPY plug unit. 2. Install
OIL-SPY light unit in instrument panel.
3. Connect lead line to ignition switch.
4. Thread cable through floor wall and
connect to OIL-SPY plug unit.

Order Now! Fits All Cars
State Make, Model, Year of Car

We pay postage when check, cash, or money order is mailed with order. Post
charges by registered mail only. When or-
dereiving C.O.D., send $2.50 with order. Pay
postage balance on arrival. Ships complete
with full directions for installation.

GARBISCH-EDGINTON
465-M-3 Hippodrome Annex Cleveland 14, Ohio

B-M POWER MOWERS

FOR MODERN LAWN CARE

Choose from three models of our fine rotary
mowers for your special cutting needs. The
D-3 (picted here), the self-propelled PD
mower, or our light VD mower with
vertical shaft engine and direct blade
drive. Dependable 4-cycle engines,
lifetime construction. Price com-
pared to engines, $89.00

B-M MOWER CO., Box 60-PM, Blue Mound, Kansas

CRESCENT TOOLS

Give Wings to Work

ASK YOUR HARDWARE DEALER

WORKSHOP MOTOR BARGAIN

1/4 H. P. ONLY $6.50

Leland, Delco, Westinghouse, Sun-
beam, and others. Induction type
motors. Alternating current, 110 Volt, 60
cycle single phase. Like New, Fully Guaranteed, some shop
work, does not appear to be new. Every one a
warranty of a bargain. F.O.B.

THE VAPORITE Automatic HUMIDIFIER for Warm Air Furnaces

Thermastically
controlled water supply
puts more moisture in the
air. Easily installed
in your furnace

Complete with THERMO
Water Control Valve
Tubing and parts for com-
munication, GIVES Fresh-
HEALTHIER AIR.

WE have large stock of
& Special Motors; all sizes. Write
for BARGAIN MOTOR CIRCULAR
and SAVE MONEY.

C. MARSHALL SALES
3546 W. Fullerton Ave., Dept. P-3, CHICAGO 47, ILL.

MARCH 1950
ALL-PURPOSE SMALL MOTORS

D-2 Converts to 110 V AC in ten minutes, diagram included. Supplies all types and gauges of metals, turning simultaneously at the following speeds:

4000 RPM - Grinders, cutters, flexible shaft tools.
5000 RPM - Wrapping fishing rods, bows, small tools, cookware.
2500 RPM - May order for fast, accurate, secret, 6 V. MOTOR A real beauty, removed from aircraft. Used for auto fan. Makes ga 98c.

RM-23 PORTABLE TELEPHONE An ideal portable field telephone. Complete in a rugged steel case for years of wear. Rugged circuit and battery. Operates on 110 v AC. 15 miles distance and up. Can be used for television installation. Price Construction Guaranteed. Complete and Made in America. $19.95 $17.95

No experience required. Simple instructions tell how to operate this Champion Photomaster. This portable photo studio weighs only 6 lbs. Size 4 x 5 x 10.

YOUR PROFIT OVER 700% Pictures cost you only 2¢. Sell for 5¢ to 25¢. Folks just grab for 'em. They are amazed to see their own photos come to life in broad daylight. Photomaster "shouts" every subject—individuals or groups—buildings and scenes. This new and fascinating business offers unheard-of money-making opportunities everywhere—every day throughout the year. DETAILS FREE! WRITE

PDQ CAMERA CO.
1161 N. Cleveland Ave., Dept. PM, Chicago 10, Ill.

PARTS FOR MILITARY TRUCKS

4 or 6 Wheel Drive at a SAVINGS—
½ ton to 20 ton.
Parts List Available on Most Makes Military Trucks and Jeep Models

Write stating model of Truck.

Brand New — Weatherizing Kits JEEP TOPS and CURTAINS

Fits all military jeeps, also adaptable to civilian jeeps. Complete top, with back curtain in side. Curtains with doors and 5 windows. Waterproof O.D. color. Shipping wt. 40 lbs. Less Steel. Bows. Our list price for complete set only...

$49.50

Also available Tops only with back curtains attached...

$29.50

Side curtains to match with doors and windows, only...

$20.50

HOLLER AXLE

Heavy duty trailer axle suitable for many types of trailer construction. Also excellent for building of heavy farm trailers and wagons. It is a 12,000 lb. capacity square type straight axle. Complete with Timken roller bearings, hub, and 6 hole 750 x 29 Budd Wheels. Without brakes. Axle is 10 inches square and 60 inches between mounting flanges. Std. width.

With Single Wheels $95.50 With Dual Wheels $99.50

GAS Tank Utility 5-gal.—New Surplus...

$2.10

Brand New HYDRAULIC JACkS Walker, 3 ton. Complete, limited supply, ea...

$9.95

WINCH CABLE, 3/8, 250 ft...

$30.00

Hundreds of Other Truck & Jeep Parts and Supplies All prices quoted good 30 days FOB, Kansas City, 25% Deposit Required on All Orders.

American AUTO PARTS CO
1830 LOCUST—DEPT. P M KANSAS CITY, MISSOURI
PESCO ELECTRIC PUMP
For farm, home and shop
Brand new complete self contained, explosion proof electric pump for 3/4 HP electric motor. Ideal for pumping gasoline, diesel fuel, and lubricants with maximum gas content. Includes the necessary fittings, strainers, and control box. All parts are made of metal. Price includes installation.

$8.95

WEATHERVANE ELECTRIC PUMP
For farm, home and shop
Brand new complete self contained, explosion proof electric pump for 3/4 HP electric motor. Ideal for pumping gasoline, diesel fuel, and lubricants with maximum gas content. Includes the necessary fittings, strainers, and control box. All parts are made of metal. Price includes installation.

$8.95

TREMENDOUS GEAR BAG
Brand new. This 24 V.C. D.C. motor has been designed specifically for gear reduction. Has 1 horizontal and 1 vertical toothed shaft. Overall gear ratio to motor 4-in-1. Unit can be used for any type of heavy duty machine. Ideal for small machine shop or garage. Price includes installation.

$7.95

SPEED REDUCER
Brand new. This is a 24 V.C. D.C. motor for gear reduction. Has 1 horizontal and 1 vertical toothed shaft. Overall gear ratio to motor 4-in-1. Unit can be used for any type of heavy duty machine. Ideal for small machine shop or garage. Price includes installation.

$7.95

AMPLIFYING MOTOR GENERATOR
Brand new. This is a 24 V.C. D.C. motor for gear reduction. Has 1 horizontal and 1 vertical toothed shaft. Overall gear ratio to motor 4-in-1. Unit can be used for any type of heavy duty machine. Ideal for small machine shop or garage. Price includes installation.

$7.95

SENSATIONAL FASCINATING MYSTERIOUS SELBY
Two more or connected together can be used for washing, oiling, and cleaning. Ideal for heavy duty machine. Price includes installation.

$3.95

THOMPSON BOOSTER PUMP
Brand new. This is a 24 V.C. D.C. motor for gear reduction. Has 1 horizontal and 1 vertical toothed shaft. Overall gear ratio to motor 4-in-1. Unit can be used for any type of heavy duty machine. Ideal for small machine shop or garage. Price includes installation.

$7.95

CUNO OIL FILTER
BRAND NEW. Aircraft quality oil filter designed for all cars, trucks, buses, and tractors. Ideal for industrial use. Price includes installation.

$4.95

CUNO OIL FILTER
BRAND NEW. Aircraft quality oil filter designed for all cars, trucks, buses, and tractors. Ideal for industrial use. Price includes installation.

$4.95
PARACHUTE. 24 foot, white nylon, with harness, nylon straps, etc. $60.00, paid for in 15 installments, only.

AVIATION SUN GLASSES
Large: 4 base ground, polished reduced green glass, Fragn: gold plated, cable temples & sweat band. Stores: large or medium. Guaranteed against breakage: paid.

AIRPLANE WIRE ROPE
EXTRA FLEXIBLE, CORROSIVE RESISTANT

<table>
<thead>
<tr>
<th>Size</th>
<th>Strands</th>
<th>App. Break Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8&quot;</td>
<td>7 x 67</td>
<td>920</td>
</tr>
<tr>
<td>1/16&quot;</td>
<td>7 x 70</td>
<td>300</td>
</tr>
<tr>
<td>1/8&quot;</td>
<td>7 x 1/16</td>
<td>2000</td>
</tr>
<tr>
<td>5/32&quot;</td>
<td>7 x 19</td>
<td>2000</td>
</tr>
<tr>
<td>7/32&quot;</td>
<td>7 x 19</td>
<td>2000</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>7 x 19</td>
<td>1000</td>
</tr>
</tbody>
</table>

CO. Extinguisher. Tripod brackets, mnt.; order $2.00.

CO2 FLEX EXTINGUISHER
Hard type. Aided with CO2 and reconditioned. Shipped Express only.

FAIRCHILD A10 SEXTANT
A&P's sale price. All with C.O.D. and reconditioned. Shipped Express only.

FLAP ACTUATOR W/DC MOTOR
24V DC, 0.1 hp. rpm 7500, torq: 900, rpm reversible. Lofton's price: $2.40. In stock now.

AERO PARTS SUPPLY, Dept. PM-2
8102 Lockshead St.
HOUSTON 17, TEXAS

EASY PROFIT IN PAINT SPRAYING
Paints walls, ceilings, screens, furniture and machinery faster, better. All complete as shown has been money-making. Fully guaranteed. Could be used with 11 HP motor or less. Price $85.00 less motor. F.O.B. Chicago. $5.00 deposit return if C.O.D. or see dealer. Write for offer.

IDEAL AUTOMATIC PUMP CO., Dept. PM-8
601 W. Washington Blvd.
Chicago 7, Ill.

WELD BRAZE, SOLDER, CUT

FREE

Four-Way Welder Co., Dept. F-2-C.
2326 So. Michigan Ave. • Chicago 16, Illinois

Full Details Send TODAY

FOUR WAY WELDER CO., 2326 South Michigan Ave. • Chicago 16, Illinois
Dept. F-2-C. Please send as ordered.

Four-Way Welder on 10-day trial, I enclose $9.95, or 1 envelope for deposit, $10 D.D., for balance.

WELD REBAR WITH EASE

Super Drill Grinder

All Manual Equipment

FREE

Sharpens lawn mower blades, garden tools, lawn mowers, auto equipment, etc. $4.95 each. Order now.

Reynolds Circular Saw Grinder

Increase Saw Sharpening Profits!

Sawperts
Saws 5-39"
Wellworth Sensational Offer! Reg. $60.50

WESLEY HOUSE AIR COMPRESSOR

Compressor, pressure tank, air gauge, air chuck, 20 ft. hose, pop valve, copper tubing with 4 brass flared fittings for connecting compressor to tank, 4-way cross and 3 nipples. COMPLETE OUTFIT, wt. 52 lbs.

Equipment less Compressor, $12.50. Compressor separately, $21.50.

Compressor has 2 1/4 in. steel, ball bearing, 3 1/2 CFM at 600 R.P.M. Capacity up to 6.0 CFM. Size 10 x 3 1/2" x 3". Wt. 26 lbs. Ideal for spray painting, insecticides, etc., inlinging tires, operating air tools, and other uses. All new equipment. U.S. government surplus. Replacement part available. Amazing buy. Don't miss it.

PORTABLE SPRAY OUTFIT

1/4 H. P. HEAVY DUTY MOTOR EXTERNAL ATMOSORMING GUN

Paint Sprayer mounted on 6 x 24 inch tank. 1/4 H.P. 110 V. 60 cy. Heavy duty motor with overload relay. 10 ft. cord and plug. Y belt drive. Piston type Compressor with 2 Compression rings, 1 oil ring, 2 inch Bore, 1 1/2" Stroke, displacement 2.86 CFM, at 60 lbs. pressure. Safety Valve. Gun external atomizing. Flat and round spray. Quiet operation. 35 lbs. pressure. Includes pressure gauge, 20 ft. hose, air filter, 2 braid air hose carrying handle.

With lead proof fittings, complete with

Net weight 54 lbs., ship. wt. 60 lbs... $47.50.

Outfit less motor. Wt. 30 lbs. $17.50.

Compressor 1/4 hp. 110 volt. $12.95.

Spray gun and 20 ft. hose. Wt. 7 lbs. $11.95.

COMPLETE OUTFIT $57.50

PNEUMATIC AIR TOOLS

USED, GUARANTEED LIKE NEW.

Chicago Pneumatic Lever Type AIR DRILL

With 1/4" Jacobs Chuck, Wt. 2 lbs. $8.50. Only. $14.95.

CHICAGO PNEUMATIC RIVETER & DRILLING HAMMER

CPM Plated strip handle. Takes up to 5/16" sheet. Weight 6 lbs. List price $75.00.

Ideal for work on fenders and auto bodies.

SPECIAL PRICE.

Same as above, new. $10.95.

AIR TANK and ACCESSORIES

Air receiver, stainless steel, 120 lb. pressure, 1-1/2 gal. in. test ideal for carrying compressed air in all applications. Made in U.S.A. Combined with 600 lb. air, tank will output 325 lb. of air. Tank back air hose, air receipt valve with cone for retaining pressure in tank and fitting.

Complete outfit $6.95.

Shipping wt. 20 lbs. 2-1/2" 1500}{14.50.}{/14.50}

60 CFM Blower. 2 1/2" discharge $6.95.

68 PAGE BOOK!

Motor guide, air compressors, home and factory workshop tool catalog. Send 10c to cover postage and handling.

Portable Automatic Paint Spray Unit

Spray paint your home, car, garage, etc.

Complete outfit, including spray gun, $150.00 Value.

$89.50.

One unit, stationary, $79.50.

Use also for spray painting insects on plants and flowers. 1/2 H.P. heavy duty capacitor motor. AC 110/220 volt. 60 cycle. 2 x 1 1/2" inch thin line type compressor, splash feed lubrication. 12" x 24" inch tank, automatic pressure switch. CFM 2.6 at 100 lbs. pressure, or 150 lbs. pressure for intermittant duty. Check valve, safety valve, air regulator with gauge and filler, spray gun with 10 ft. air hose and air filter for filtering tires. Y belt drive. Mounted on 2 wheels, ball bearing, with 2 x 10" pneumatic tires. Portable, with handle. Shipping wt. 99 lbs. Regular $150.00 value. ONE YEAR GUAR.

PARTS SOLD SEPARATELY

Compressor, Blower. $12.50 wt. 10 lbs. $12.50. AUTOMATIC PRESSURE SWITCH 7.50 wt. 1 lbs. $7.50. REGULATOR, WHEELS AND FILTER 10.50 wt. 6 lbs. $10.50. SPRAY GUN 10.95 wt. 4 lbs. $10.95. TOOLS 8.50 wt. 4 lbs. $8.50. 20 ft. HOSE 2.95 wt. 6 lbs. $2.95. 1 1/2" Adaptor 1.75 Adjust. pol. valve 1.50.

“Wellworth” BLOWER

at a Bargain Price

Quiet operation. Double wheel inlet, double wheel outlet, for heating, ventilating fans, air conditioning, refrigeration, and gas heating. Pressurized 150 lbs. for heating, 220 lbs. for air conditioning. 8" Inlet outlet. 11" dia. 6" x 10". Weight 17 lbs. 8 oz. $30.50. Motor 1/4 H.P. motor with overload relay, 60 cy. AC. Shipt. Wt. 60.

140 CFM “WELLWORTH” BLOWER

One unit, stationary, that gives top performance on heating, ventilating, exhausting, cooling, fans, etc. For use in similar applications. Includes mounting fittings with 2 1/2" square discharge. 8" Inlet outlet. 10" dia. 6" x 10". Weight 14 lbs. Motor connected 1/2 H.P. 110 V 60 H.P. AC. Motor with overload relay and 20" leads. 7/8" wide less than $14.20 for hundreds of new and replacement use. Shipt. wt. 6 lbs.

300 GAL. COOLANT PUMP

A Heavy-Duty Pump at 40% Less

You pay less and get a larger, higher pressure, higher capacity, heavy duty coolant type recirculating pump. Also extensively used on evaporative coolers. Will deliver 60 gal. per hr, at 8 ft. head and 300 GPH at 10" head. Heavy duty 1/3 HP, totally enclosed, 115V, 60C, with long life ball bearing. Motor 1/2" high, 3/4" I.P.T. Shipt. wt. 12 lbs. $15.95.

All items advertised on this page are guaranteed BRAND NEW

SUM PUMPS. ALL SIZES. BARGAINS. SEE CATALOG Prices F.O.B. Chicago. Immediate delivery. All items sold on money-back guarantee. Send check or money order today.

WELLWORTH TRADING CO.

1831 S. STATE ST. DEPT. D-3 CHICAGO 10, ILL.

MARCH 1950 317
BARRON TOOL COMPANY, INC.
869 Archibald Bldg., Detroit 1, Mich.

15 ESSENTIAL WORKSHOP OPERATIONS...

You can convert any standard drill press into your most versatile, useful, low-cost workshop tool. Barron Precision Tools now enable you to perform 13 indispensible shop operations—surface plane wood and plastics—rabbits—tenon—panel—bead—groove—bevel—mortise—route—cut dovetail—saw surfaces and contours—shape—cut moldings—grind and buff. Over 200,000 Barron Tool users, every tool sold on full 10-day money guarantee.

See Your Dealer... Or Write Direct

190 YATES AVENUE
BELoit, Wis.

SPECIAL OFFER!
LOCK-STITCH SEWING AWL

Famous, patented lock-stitch sewing awl comes complete with needles, waxed thread, and direction folder. Hundred uses—sewing, repairing leather goods, canvas, belting, harness, saddles, gun cases, awnings, golf bags. Extra needles and thread available. Satisfaction guaranteed or money back. Bring currency, check or money order.

T & T TOOL
101 WEST ARCHER
TULSA, OKLAHOMA

FLASH FLOOD FLUX

Hard soldering and welding problems solved immediately with this new, improved flux. Guaranteed to work on all metals including Stainless Steel, only exception aluminum and tin metal. If your money is refunded. Send $1.50 today for your Flash Flood Flux or write for free catalog.

LARRY GUTHMAN WHOLESALE
LAKE WORTH, FLORIDA

RETAIL PRICE $125.00
FACTORY TO YOU $99.95

SUPERSHOP includes precision-built 8" tilting table saw, vertical and horizontal drill press, 30" lathe, sander, grinder. 100% BALL BEARING. Write for FREE catalog. full details, trial plan.

Ask Your Hardware Store for:
FULLER'S
Unbreakable Amber Handle SCREW DRIVERS

America's most popular line of moderately-priced screw drivers! Wide range of sizes.
FULTER TOOl COMPANY, INC.
911 First St.
New York 59

FREE "HOW TO ANSWER ADS"

Never before have you seen anything like this. Tells you in simple language the correct way to answer ads. Gives you quicker replies—better results, and greater satisfaction. Will save you time and money and it's FREE. No obligation whatever. Every reader of advertising should have this booklet. Send a postcard for your copy now. Advertising Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

TAPERSHANK DRILLS
CHUCKING REAMERS
HAND REAMERS

Set 1. 8 different sizes High Speed Morse Taper Shank Drills up to 1/8". With No. 1 and 2 Tapers. $5.00 value. New and slightly used surplus. Sharpened. Priced at only $3.85

Set 2. 10 different sizes High Speed Morse Taper Shank Drills from 1/16" to 1/2", value. New and slightly used surplus. Sharpened. Priced at only $7.85

Set 3. 10 different sizes Straight Shank Drills up to 1/2", value. New and slightly used surplus. Sharpened. Priced at only $2.00

Set 4. 10 different sizes High Speed Hand Taps from 1/16" to 1/2", extra-long drills. New and slightly used surplus, Priced at only $4.75

Set 5. 10 different sizes High Speed Hand Reamers up to 1/2", Priced at only $4.50

Set 6. 6 different sizes Straight Shank High Speed Chucking Reamers. Up to 1/4", Priced at only $2.50

Set 7. 6 different sizes Straight Shank High Speed Chucking Reamers from 1/8" to 1/4", Priced at only $4.95

Set 8. 6 different sizes Hand Reamers up to 1/2", Priced at only $3.10

Set 9. 10 different sizes Straight Shank High Speed Reamers. Up to 1/2", Priced at only $3.50

Set 10. 10 different sizes Hand Reamers up to 1/2", Priced at only $5.50

Set 11. 10 different sizes Carbon Steel Morse Taper Shank Drills, value. Priced at only $39.95

All merchandise is sold with money back guarantee and is shipped POST PAID.

POPULAR MECHANICS
Install this fine lathe in your shop now and let it help pay for itself. Capable of a wide variety of operations, this lathe is ideal for general machine work in the small shop and for machining small parts in the large shop. A complete line of practical attachments and accessories simplify the tooling of this lathe for many special classes of work.

All sizes of South Bend Lathes, 14” Drill Presses, and 7” Bench Shapers are available on comparable time payment terms: $25% down, 12 monthly payments. Reasonable finance charges.

Building Better Tools Since 1906

SOUTH BEND LATHE
SOUTH BEND, INDIANA

Send for Information:

☐ 9” BENCH LATHES
☐ LATHE TOOLS AND ATTACHMENTS
☐ TIME PAYMENT PLAN

☐ 10” TO 16” FLOOR LATHES
☐ BENCH SHAPER
☐ DRILL PRESSES

☐ ½” and 1” Collet TURRET LATHES

Name
Street
City
Zone State

Printed by Popular Mechanics Company, Chicago, Ill., U. S. A.
Right now is the time to plan ahead... plan to do your work easier, in less time and at less cost this year. Plan to get a famous SHAW Tractor... the machine that does scores of hard jobs the quick, easy, better way! No other investment will pay you better dividends year after year.

TRIED AND PROVED RIGHT! For nearly a half-century SHAW Tractors have proved their value throughout the Nation and in foreign countries. They are built right... to do the job right... with quality materials and expert engineering. Equipped with high-grade air-cooled gasoline or oil engines. You get a full year guarantee against any defect in material or workmanship. They serve faithfully for many years.

LOW-COST DEPENDABLE WORKERS—SHAW Tractors have proved dependable, versatile, low-cost helpers on scores of jobs...ideal workers on small farms, in gardens, truck farms, nurseries, orchards, cemeteries, golf courses, poultry farms and estates. Great for plowing, cultivating, discing, seeding, harvesting, spraying, mowing; operate cutter bars and lawn mowers. Riding tractors with bulldozer also used in foundries and by building contractors for moving sand, dirt, etc. For power on belt jobs... sawing wood, pumping water, grinding feed and running belt machinery. First cost is low and low operating cost will surprise and please you.

EASY TO OPERATE—You'll find a SHAW "Peppy Pal" or "Du-All" Tractor just fitted to your needs... 1 1/2 to 12 H.P. And you'll find that a SHAW will do things a big tractor can't. Easy to operate by elderly persons, boys and girls. Easy to change from one piece of equipment to another. We can supply many attachments at low prices.

GET FULL DETAILS—Get all the facts and you'll get a SHAW! Plan now to do your hard jobs the easy way. Have a SHAW Tractor to do a better job... easier and quicker. It will serve you well... it will give you years of satisfactory, trouble-free, willing service... at amazingly low cost. Many dealers throughout the U.S. sell SHAW Tractors. See them... see their many great, exclusive features. In the meantime, fill out and mail coupon for FREE folders, prices, etc. Get all the SHAW Facts now!

FREE FOLDERS and PRICES

SHAW MANUFACTURING CO.
4501 Front St., Galesburg, Kans., or 6686 N. 4th St., Columbus, O.

Send me Free Folders and Prices on SHAW Tractors.

NAME ____________________________

ADDRESS ____________________________
NOTED THROAT SPECIALISTS REPORT ON 30-DAY TEST OF CAMEL SMOKERS...

Not one single case of throat irritation due to smoking CAMELS!

YES, THESE WERE THE FINDINGS OF NOTED THROAT SPECIALISTS AFTER A TOTAL OF 2,470 WEEKLY EXAMINATIONS OF THE THROATS OF HUNDREDS OF MEN AND WOMEN WHO SMOKED CAMELS—AND ONLY CAMELS—FOR 30 CONSECUTIVE DAYS!

COLLEGE STUDENT Anne Hogan: "My doctor's report after my 30-day test proved what my own throat told me from the start—Camebs are wonderfully mild!"

MR. AND MRS. RICHARD COLE of Fresh Meadows, N. Y., made the test under observation of a throat specialist. Both agree, "Camebs are the mildest cigarette!"

PERSONNEL DIRECTOR Robert R. Lamkie: "Cameb mildness agreed with my throat from the start. I like everything about Camebs—my cigarette!"

CONNIE SCHWOEGLER Twice winner of National Individual Match Game Championship and 1949 "Bowler of the Year"

THE 30-DAY TEST SURE WON ME OVER TO CAMELS ... THEY TASTE GREAT AND THEY AGREE WITH MY THROAT!

Start your own 30-Day Camel MILDNESS Test Today!

Smoke Camels—and only Camels—for 30 days. Compare them in your "T-Zone" (T for taste, T for throat). Let your own throat tell you about Camel's cool, cool mildness. Let your own taste tell you about Camel's wonderful flavor.