

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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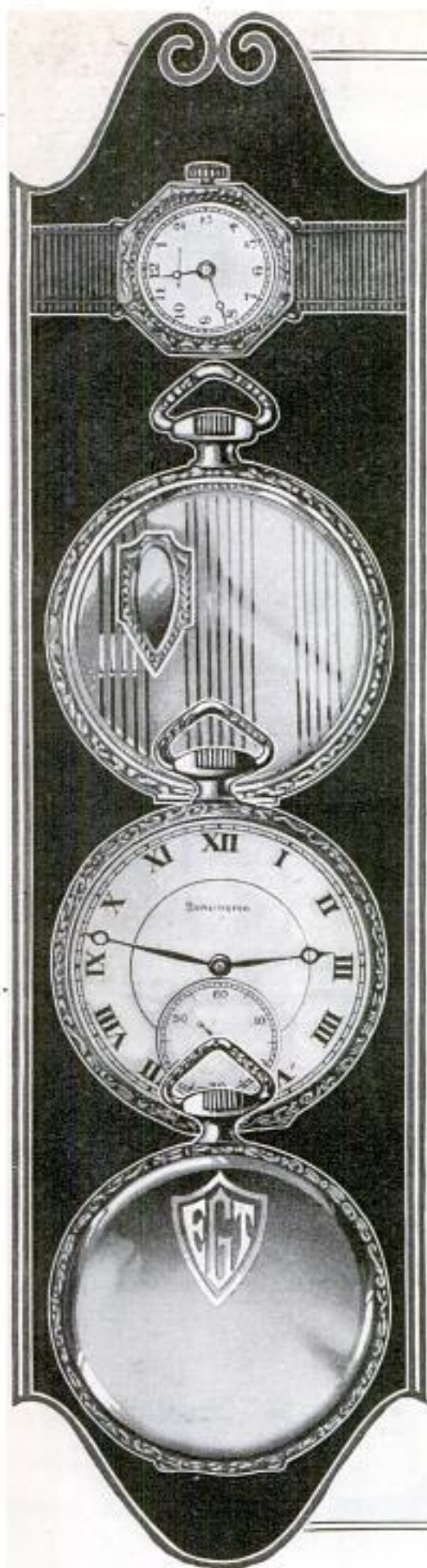
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"As siding it practically wears out before it decays." (Page 29, Vol. 1, Cypress Pocket Library.)

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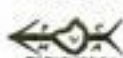
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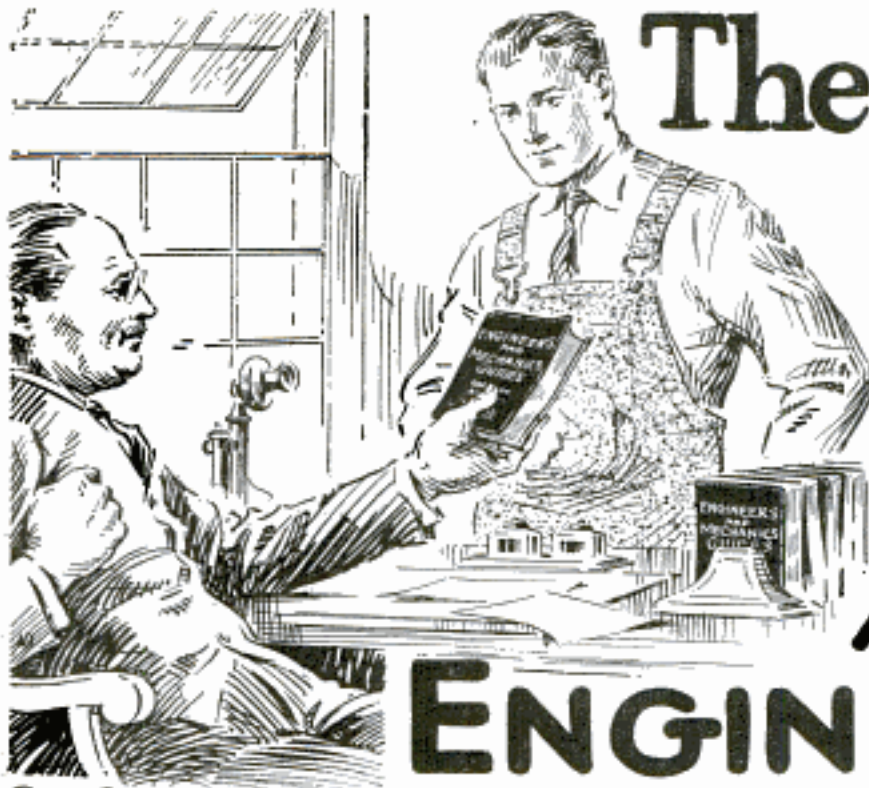
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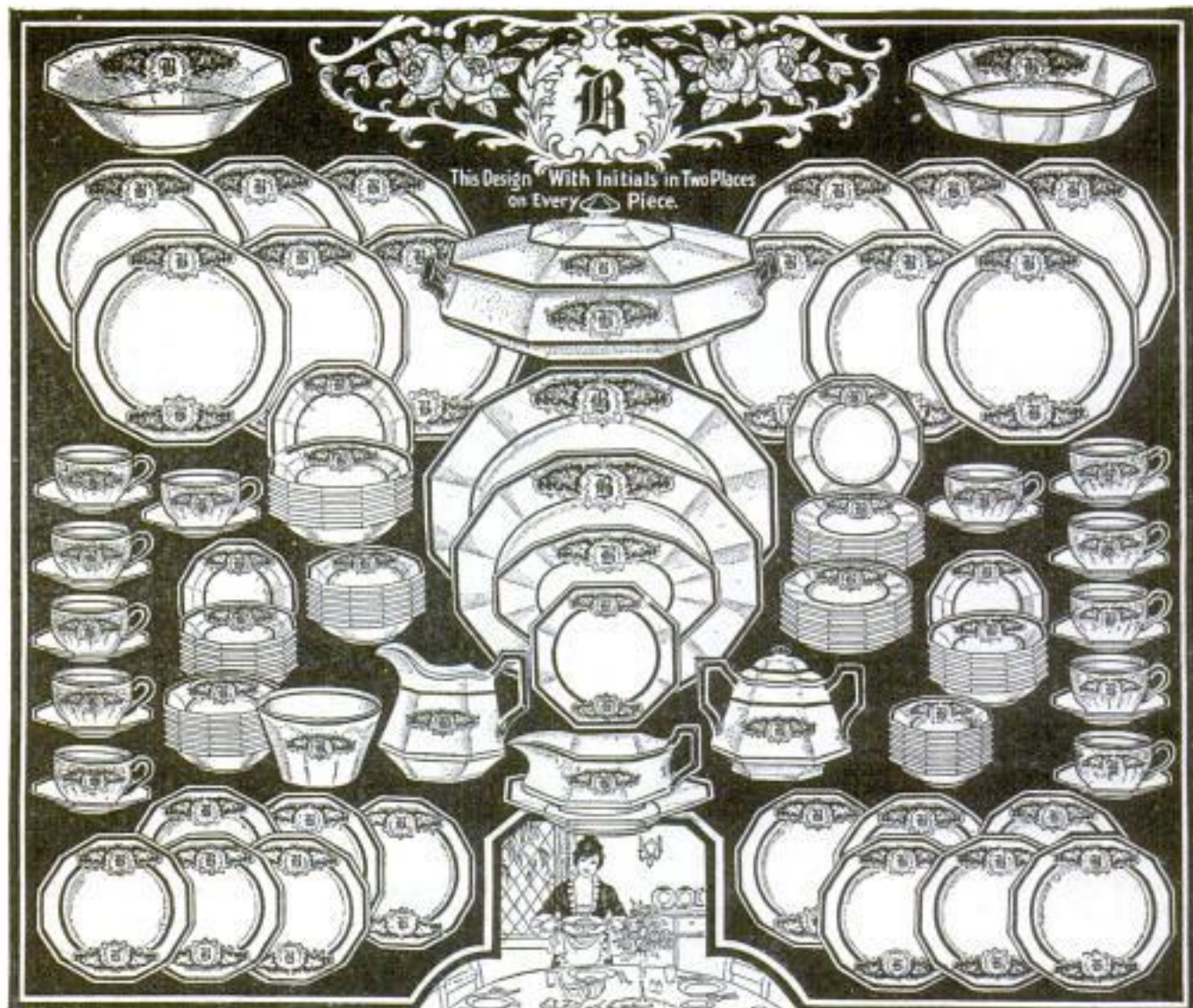


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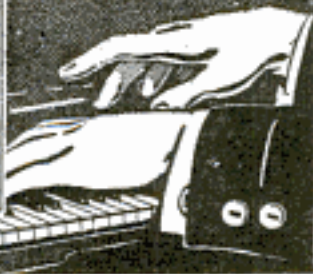
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We guarantee that a graduate of our Automobile and Tractor Course will be qualified to fill a position as assembler, demonstrator, tester, repair man, auto electrician, riveter, tractor operator, or farm lighting expert, or we will refund his tuition fee.

In a Fine Job or in Business for Yourself

With Detroit training at the M. S. A. S. graduates are successful—we have trained more than 18,000 men who are located in all parts of the world, either holding big pay jobs or in business for themselves. Thorough training in our excellently equipped school fits our graduates for success. Men leave our school to go right into business and make money from the start—it's the M. S. A. S. thorough training that makes the successes. There's really no limit to the money that can be made.

11,750,000 Motor Vehicles Now in Use

As many cars were produced in the first six months of this year as in all of 1921. This will be the biggest year in the history of the industry. 11,750,000 cars now in use and only 50,000 garages. Think what this means—an average of 235 cars for each garage. You can easily see the urgent need for more garages. Think of the eleven million batteries to be repaired or replaced, sixty million tires to be repaired or new ones sold. Can you think of a better business to get into? Thousands of repair shops are needed now, thousands of trained men to run them. Now is the time to get started.

\$220,000,000 This Year For Roads

Beginning July 1, 1922, the Government will spend through the Agricultural Department in one year over 220 millions of dollars for good roads. These roads will be built in every state for National Parks and forests' road ways, besides thousands of miles will be added to present roads. This means more touring, more business, more heavy trucking between cities, and best of all, thousands of more trained M. S. A. S. graduates with new garages.

Quality Instruction—Complete Equipment

Our school is thoroughly equipped—we have about \$250,000 in equipment just for students to study and work on; there is nothing slighted in the entire course that could help the student. In fact, our policy is to give the best course in the land and to hold our tuition within the reach of all. Anything that is worth having is surely worth paying reasonably for and at the M. S. A. S. you get the biggest money's worth to be had.

Start Any Time

You start the day you arrive, if you wish. The welfare department arranges for fine rooms and board. You have nothing to worry about—just get right down to business. The instructions are very practical and easily understood—no previous automotive experience is necessary. Now is the time to get started.

Jump on the Train and Come NOW

Hundreds of men have not waited, but after reading our advertisement have jumped right on the train and come to Detroit. The factories say you will make no mistake by coming to the M. S. A. S. The tuition is reasonable and board and rooms moderate in price. There never was such an opportunity as now. If you prefer, just fill in the coupon and mail it at once. It will bring you Catalog, "Auto News" and complete information FREE.

Michigan State

"The Detroit Auto School"

309 Auto Building 3729 Woodward Ave.

the Auto Center

Study and

Learn Now—it is the thoroughly trained men who make the big successes in the auto, truck and tractor business. M. S. A. S. training will make you independent the rest of your life. You will secure in a few weeks of pleasant, practical study and training what hard times or adverse conditions can never take from you. Trained heads and hands always get first call on big money and in business.

Original and Only Factory Endorsed School

The M. S. A. S. is the original and only factory endorsed school. Ours is the only factory outlined course. The manufacturers and their service managers assisted us in outlining our course. They know it is right. They say you will make no mistake in attending the M. S. A. S. They heartily endorse our school and employ our graduates. Write to any automobile factory, business house or bank in Detroit and ask them about us.

Learn in Detroit the Auto Center

What is more logical than to learn autos where autos are made, in Detroit the auto center? 73% of the world's automobiles are made in Detroit, 94% in Detroit and vicinity. You make weekly trips to Packard, Hudson, Cadillac, Buick, Lincoln, Maxwell, Chalmers, Studebaker, Ford, etc. You meet the factory executives, service managers, etc. Study factory methods and service. Nowhere else can you do this. This is only one of the many advantages of learning at the M. S. A. S. in Detroit the Auto Center. When you go back to your home town it will mean more business if you can tell your customers that you trained in the M. S. A. S., in Detroit the heart of the auto industry.

Factory Trained Instructors

Many of our instructors had early training in the big factories—they practically grew up in the business. Those who did not, have gone into the factory methods in co-operation with the factory heads and give you the result of this intense research and training.

Complete Auto, Truck and Tractor Course

Our complete course includes training in the construction, operation, upkeep and repair of automobiles, trucks, tractors, farm lighting plants and stationary engines of every kind. Basically the instructions are alike, but we teach how to apply the knowledge to all motor vehicles. We have a large general garage for actual garage practice. We own a farm with all types of tractors for operation and upkeep practice. The course includes thorough training in automotive electricies with actual practice in overhauling, rebuilding all types of starting, lighting and ignition systems. You get everything from A to Z. We educate the head and train the hand in a thorough, complete way. Approved by the automobile industry.

Radio—Construction, Installation, Operation, Repair

Radio is here to stay. It is estimated that there are between 3 and 5 million receiving sets now in use. This fall 2 or 3 million more will be installed and will need service. There is big money in this work.

We are now equipped to teach a thorough course in addition to the regular Complete Automobile Course without additional charge. This we can do because of the thorough and complete electrical course already a part of the M. S. A. S. training. There is big money to be made in installation and repair. Prepare now for this work.

Tire Repairing

We have a separate course in this branch of the auto business—the best equipment and instructors train you. Our graduates are very successful.

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This important branch of the industry is also taught in a separate and complete course which equips our graduates to go immediately into this big profit business.

Welfare Department Gets Rooms

Our Welfare Department is every student's friend. The day you arrive, it locates you in a nice room and directs you to good table board. It helps you with personal matters, tells you where your church is located, helps you get the best care and attention. The M. S. A. S. Welfare Department is known around the world.

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J. B. Nelson, N. Y., took our course when 17 years old, now has five men working for him.

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Geo. H. Purvis, Mich. "Am now experimental electrician with the Packard Motor Car Company. I give your school all the credit."

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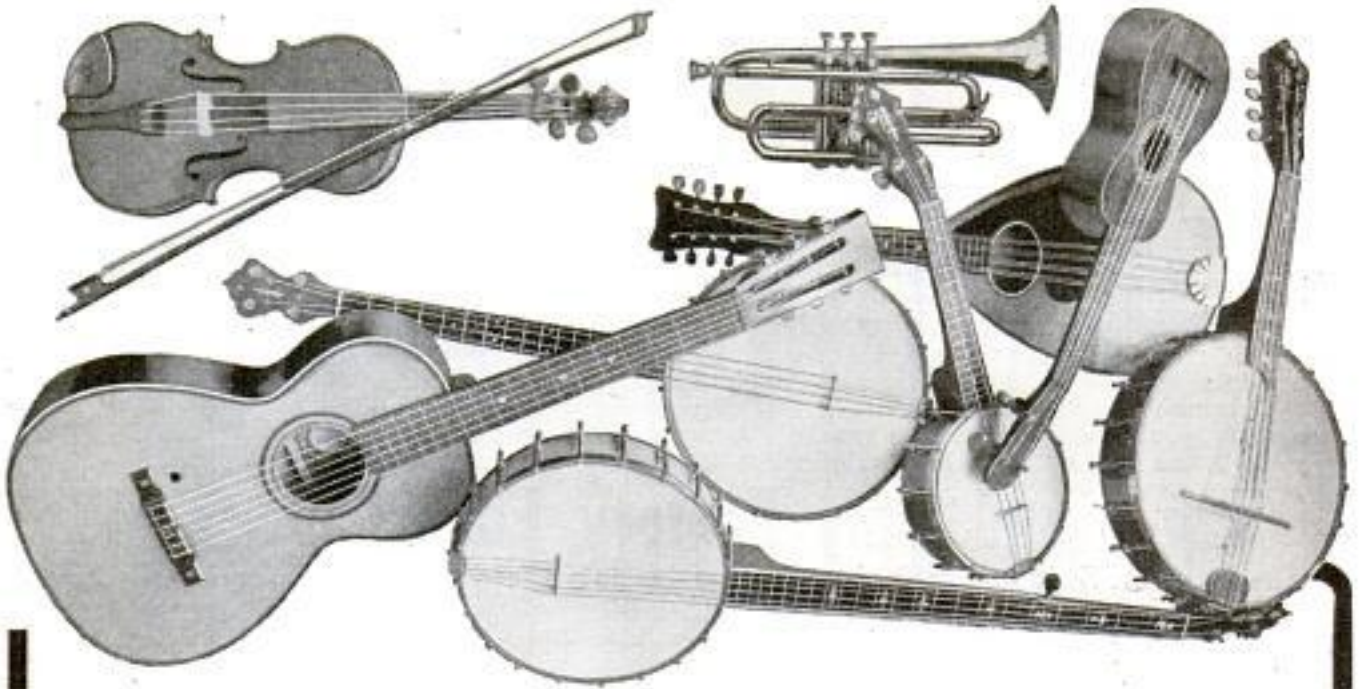
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If only one man had found inspiration enough in this remarkable book to jump to a sudden brilliant success in the selling field—into a job paying him many times his former salary—then you might call it luck. But thousands have done it.

Your One Chance to Make the Biggest Money of Your Life

READ!

Charles Berry of Winter-set, Iowa, stepped from \$18 a week as a clerk to a position making him \$1,000 the very first month. J. P. Overstreet, of Dennison, Texas, read this amazing book, left a job on the Capitol Police Force at a salary of less than \$1,000 a year and in six weeks earned \$1,800. F. Wynn, Portland, Ore., an ex-service man, earned \$554.37 in one week. Geo. W. Kearns of Oklahoma City found in this book a way to jump his earnings from \$60.00 a month to \$524.00 in two weeks, and C. W. Campbell learned from it how he could quit a clerking job on the railroad to earn \$1,632 in thirty days. It is now yours—FREE!

Not one of these men whose records are shown in the panel on the left had ever sold a thing before—not a dime's worth. Yet every one of them through reading this book discovered an amazingly easy way to jump suddenly from low pay to extraordinary earnings in the selling field.

Sounds remarkable, doesn't it? Yet there is nothing remarkable about it. There are certain ways to approach different types of prospects to get their undivided attention—certain ways to stimulate keen interest—certain ways to overcome

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"Modern Salesmanship" tells exactly how the National Salesmen's Training Association will teach you these principles in your spare time at home.

As soon as you are qualified and ready, the Association's Employment Service helps you to select and secure a selling position as city or travelling salesman.

Now Free to Every Man Who Will Act At Once

We are not making any extravagant claims about what we will do for you. We don't have to. All of the amazing proof and many important features about Salesmanship are contained in our new salary-raising book, "Modern Salesmanship." It is yours—FREE. Send the coupon for it today. It will show you how you can quickly become a Master Salesman—a big money maker. It will tell you about the National Salesmen's Training Association system of Salesmanship training—about the National Demonstration method that gives you actual experience while studying—and all about the amazing opportunities that await you in the selling field.

This may be the one big chance of your life to leave forever behind you the low pay of a routine job for a sudden, brilliant success at a big salary.

Is it worth 2c to find out? Then mail this coupon NOW.

National Salesmen's Training Association Dept. 12-M, Chicago, Illinois

National Salesmen's Training Association
Dept. 12-M, Chicago, Ill., U. S. A.

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Every time you talk, every time you write, you show what you are. When you use the wrong word, when you mispronounce a word, when you punctuate incorrectly, when you use flat, ordinary words, you handicap yourself enormously. An unusual command of English enables you to present your ideas clearly, forcefully, convincingly. If your English is incorrect it hurts you more than you will ever know, for people are too polite to tell you about your mistakes.

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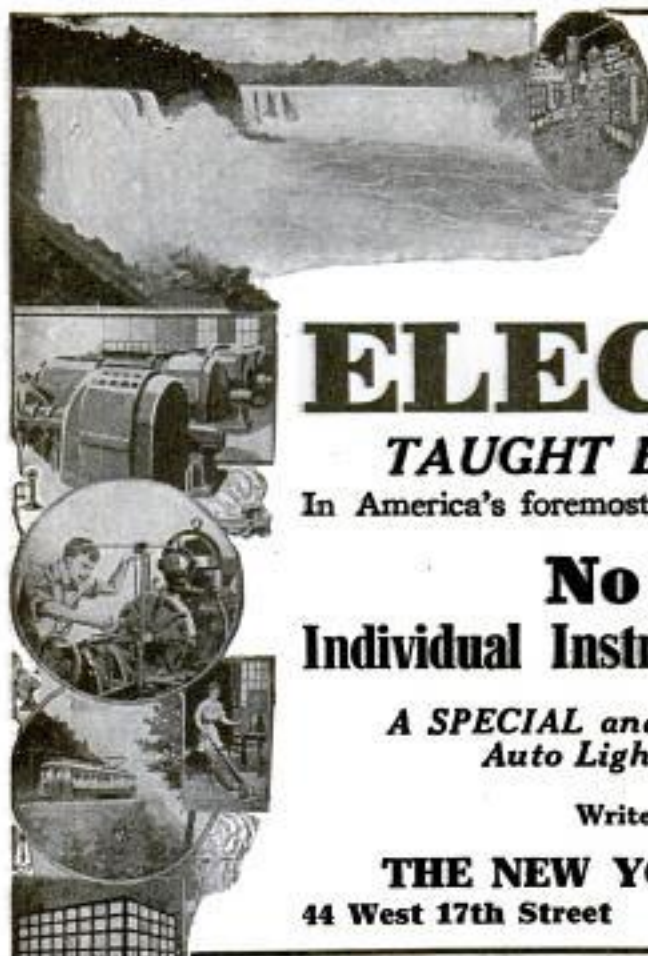
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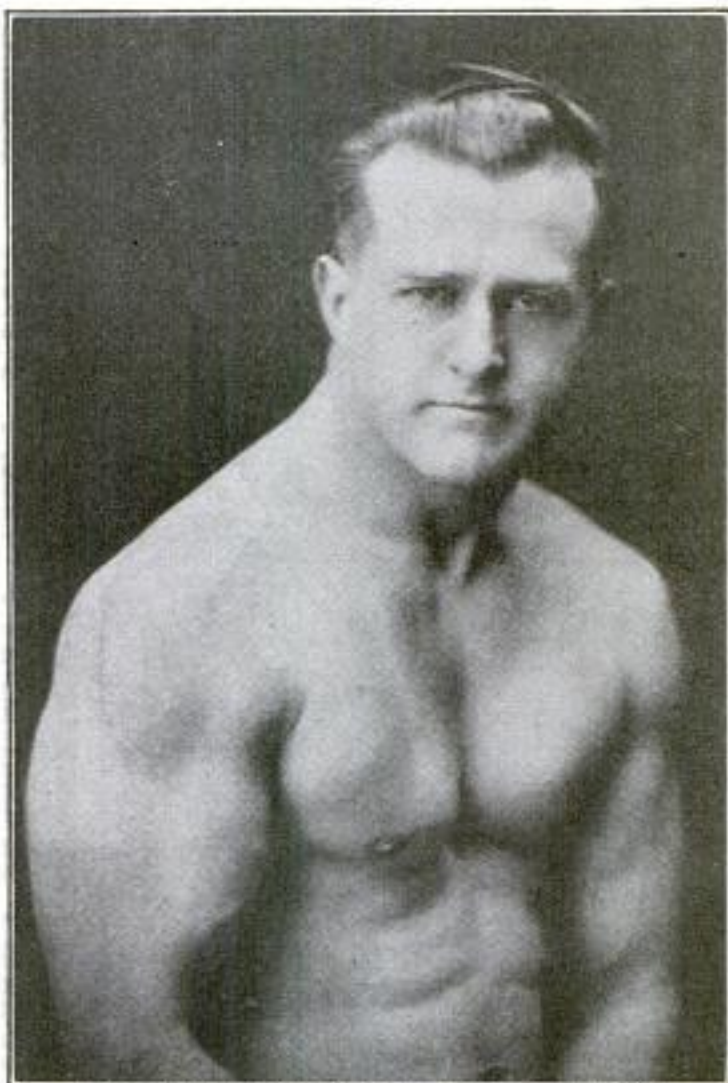
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MAIL Order Business is your opportunity. Brenner's Famous Handbooks teach how to start small, grow big. Sell merchandise, service, ideas; enormous profits. Spare time to begin. Get complete set, 11 books, \$8.00, and be posted. Brenner, 335 Walnut, Philadelphia. Descriptive Catalog and big batch interesting mail order information, 25c. None free.

EXCEPTIONAL Opportunity for Sales Manager capable of handling state distribution. Marvelous new Adding Machine. Retail \$15. Work equals \$350 machine. Tremendous possibilities. Unlimited profits. Write quick for details. Lightning Calculator Co., Dept. B, Grand Rapids, Mich.

\$100,000 CORPORATION wants capable man; open office; manage sales for High Class New Device. Every Home a Prospect. Big money-making possibilities for the right man. Opening in every city. Cost \$2.00, retails \$5.00. \$500 to \$2,000 necessary to finance exclusive agency. Scott Corporation, 82 W. Washington, Desk G, Chicago.

RESPONSIBLE Corporation wants general sales managers to open branch office, manage salesmen. \$500 to \$5,000 necessary; expenses allowed to Baltimore if you qualify. Address Manager, 663 N. Eustaw St., Baltimore, Md.

WE Start You in Business, furnishing everything; men and women, \$30.00 to \$100.00 weekly operating our "New System Specialty Candy Factories" anywhere. Opportunity lifetime; booklet free. W. Hillier Ragsdale, Drawer 4, East Orange, N. J.

"SCHEMER Magazine," Alliance Ohio, prints big profit schemes; one subscriber making \$25,000 from three; another \$10,000 from one. Try your luck. Year, only \$1.00; three months, 25c.

CHEMICAL Expert will furnish Formulas and Trade Secrets. All lines. Lists Free. W. L. Cummings, Ph.D., 228 Gordon Ave., Syracuse, N. Y.

MAKE money at home making toys and novelties. Particulars free. New Specialty Company, 417 East 71st Street, New York.

SIGNS, cards, banners, easily painted with letter patterns. Samples free. Address, Outdoor Adv. Service, Lockport, N. Y.

NO money needed if you are responsible or have excellent reputation; big commissions; prefer men calling on power plants, railways, large factories. You can make plenty of money if you are right; have a real article. We are nationally known and highly rated in Dun's and Bradstreet's. Manufacturers, 1690 Kingsland Ave., St. Louis.

DOLLARS yearly in your backyard. No Mushroom dope. Particulars free. Metz, 313 East 89th, New York, N. Y.

\$3,000 TO \$6,000 Yearly. Want it? Others are making it. Send check or money order today for our invaluable books "How to Sell Real Estate," \$3.00—and "How to Conduct Real Estate and Insurance Business," \$1.50. Absolute satisfaction guaranteed. Free catalogs. Realty Book Co., Dept. 52, Cleveland, Ohio.

BE Independent. We teach by mail how to manufacture unexcelled Toilet Preparations. Earn while you learn. Results guaranteed. Particulars Free. School of Cosmetics, Box K, Omaha, Nebr.

"HOW To Sell Patents" free. Patent News-H, Washington, D. C.

LEARN the collection business. Good income, quick results. Interesting booklet. "Skillful Collecting," free. National Collectors Assn., Long St., Newark, O.

START a Paying Business of Your Own. Be a business man. Any location. 3,000 new Tire Vulcanizing and Repair Stations needed. Business always good. Are you ambitious? \$200 will start you. Write at once. Wonderful opportunity. Equipment Co., 11 Canal, Cincinnati, Ohio.

MARBLE mixing instructions, covering wood or cement flooring 1/2 inch thick, fireproof, waterproof, low cost, sanitary, all colors. Particulars, 209 Illustrations free. Chris Mahler, Box 122, Huntington, N. Y.

SILVERING Mirrors! My exclusive French Tartaric method opens enormously profitable business. Booklet free. H. Barstow, 514 25d Street, Oakland, Calif.

UNLIMITED Possibilities; Formula, Trade Secret Business, Particulars Dime. Co-Operative Service Bureau, Kokomo, Ind.

FREE—Formula Catalog, S. & H. Laboratories, Poplston Building, Chicago.

GOOD money easily earned at home, spare time silvering mirrors; no capital. Free instructive book tells how. Patterson & Co., Brooksville, Ky.

IF you have about \$1,000 and capable of organizing sales force, to sell article needed by every merchant, wholesaler and retailer, which should net you \$10,000 profits first year, write Sales Director, 326 Reaper Block, Chicago.

CHEMISTRY

CHEMICAL Analysis. Chemical and Industrial Formulas. Burson Chemical Laboratory, 227 West Fourth, Ottumwa, Iowa.

FORMULAS AND TRADE SECRETS

500 FORMULAS, 20c. Luminous paint—Resilvering Mirrors—Renewing dry batteries—Mechanics' Soap—Gas Tonic—Carbon remover. Puncture Plugger, 20c each. Entire collection, 50c. Ideal Book Shop, 5501FG, North Robey, Chicago.

500 RARE Formulas for 25c (coin). We can furnish any formula wanted for 50c. Catalog Free. Allen's Enterprises, 1227 Milwaukee Ave., Chicago, Ill.

3,000 FORMULAS. Money-makers, 400 pages, \$1. Bestovall Laboratories, 4049-BK, North Whipple, Chicago.

MONEYMAKING Formulas—Catalogue free. Clover Laboratories, 5501C, North Robey, Chicago.

10,000 SELECTED scientific, chemical, technological and practical recipes and processes including hundreds of so-called trade secrets for every business alphabetically arranged in one large volume of 800 pages. Price \$4 postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

FORMULAS; guaranteed. Catalog free. Bestovall Laboratories, 4049-K, North Whipple, Chicago.

1,000,000 FORMULAS, Trade Secrets, Processes, \$2.00. Jay-Hersheger, Kokomo, Ind.

1,000,000 FORMULAS. Trade Secrets. 1014 pages, \$2.00. Ideal Book Shop, 3501M, North Robey, Chicago.

500 SUCCESSFUL money-making formulas and trade secrets for 50c. Postpaid. Rudolph Berggaard, Bollag, Minn.

1,000,000 FORMULAS and recipes—1014 pages, \$2.00. Englewood Book Shop, 7021A, South Winchester, Chicago.

FREE—Formula Catalog. S. & H. Laboratories, Boylston Building, Chicago.

AGENTS WANTED

NO Dull Times Selling Food. The greatest, surest and safest business in the world today is selling Federal Pure Food Products, and here is your opportunity to get into this business. You can make \$3,000, \$5,000, \$10,000 or more per year—the only limit is your ability to take care of the business. We print your name and address as distributor on every package, thus making sure that you will get the thousands of dollars' worth of repeat orders which will be sent to you. No Dull Times, for the People Must Eat, and our food products are the fastest selling, surest and quickest repeat order getters in the world. Sell on sight in every home where food is used—Repeat orders immediately and every week thereafter. A Real Big Business All Your Own. Every new customer adds a great deal to your weekly income. Your business once established, has a market value just like a store and can be easily sold. The greatest money-making opportunity of your lifetime because you risk absolutely nothing, as we guarantee your sales, and we will not let you fail. Remember! Guaranteed! Best products, biggest sellers, surest repeat orders. No capital or experience is required. We furnish capital and everything necessary for you to become a Federal Distributor. Exclusive territory will be given honest men or women who will write at once asking us to send our "Success Guaranteed" proposition. Address: Federal Pure Food Company, Dept. 15, Chicago, Ill. Largest inventors of and packers of Pure Food specialties in the world. Reference, any bank, Dun or Bradstreet rating agency, Express or Railway Company in America.

WE want men and women who are desirous of making \$25.00 to \$200.00 per week clear profit from the start in a permanent business of their own. Mitchell's Magic Marrel Washing Compound washes clothes spotlessly clean in ten to fifteen minutes. One hundred other uses in every home. Nothing else like it. Nature's mightiest cleanser. Contains no lye, lime, acid or wax. Free Samples make sales easy. Enormous repeat orders—300% profit. Exclusive territory. We guarantee sale of every package. Two other "sight sellers" and sure repeaters give our agents the fastest selling line in the country. No capital or experience required. Baker, Ohio, made \$600 last month. You can do as well. Send for Free Sample and proof. L. Mitchell & Co., Desk 76, 1302-1314 E. 61st, Chicago, Ill.

LIVE Representatives Wanted! Agents, crew managers, salesmen, distributors, side line men and house to house canvassers who desire a splendid opportunity to make big money with "Tearless Minceers." This is a product that every housewife wants. Now on sale at all State Street Department Stores, Chicago, also handled by dealers and jobbers of consequence. Agents working alone are now making \$12.00 to \$20.00 per day. Crew managers are earning at the rate of \$10,000 annually by having a small crew working from house to house. If you have the ability and experience and are looking for something good, write for our Agents Proposition. It is a Big Money Maker. The Ernest Belch Company, 337 W. Madison St., Chicago, Illinois.

MONEY—Money—Money! Make it selling Handick, the new and unbeatable hand-cleanser—the original powdered hand soap! Removes grease, grime, ink, paint, etc., without injuring skin. Spreads like wildfire. Cheaper than all others. Sells in cans (or bulk with dispensers) to garages, autoists, auto supply companies, mechanics, factory and office folks, to housewives, hardware stores. Huge quantities used weekly by mercantile houses. Big repeat business assured. Exclusive agencies, crews working for you, fast sales, splendid profits, permanent business for hustlers. Live ones can clean up \$300 a month. Send 10c (coin or stamps) for liberal sample can. Complete sales plan goes with it. Write quick to Solar Products Co., 124 W. Lake St., Chicago, Ill.

MAKE \$75.00 per week and up selling our fine, made-to-measure, all-wool suits at \$29.50 retail, direct to wearer; biggest value ever offered; positively sell on sight; liberal profits paid in advance. We attend to delivery and collections. Write at once, giving full particulars as to your past experience. Full line of samples and everything to work with will be sent with the least possible delay. W. Z. Gibson, Inc., Dept. J-142, 161 W. Harrison St., Chicago, Ill.

90% PROFIT—Quick, easy seller, Kleen-Rite. New Clothes Washing Compound. No rubbing. Women simply amazed. Free premiums make sales easy. Fast repeater. Distributing samples free. Everybody grabbing for territory. Write quick, Bestever Products Co., 1941-K9, Irving Park, Chicago.

TAILORING Agents: You can make more money with a one-price line than with any other. Ours is a Better one-price line. It offers All-Wool Tailor-Made Suits, regular \$50.00 values, at only \$29.75, including a good profit for you. You get your profit in advance with every order. We supply everything. Can use a few more good men. Write at once. Address: Park Tailoring Company, Dept. 352, Chicago, Ill.

AGENTS—30,000 Miles without a puncture with Inside Tyres. Wonderful invention. Just slip inside casing before replacing tube. No tools needed. Will not heat or pinch. Positively prevent punctures and blowouts. Guaranteed double tire mileage. Old worn out Castings give 3 to 5 thousand miles more service. Biggest thing on the market. Low priced. \$8 to \$20 a day. Write for territory. American Accessories Co., B-978, Cincinnati, Ohio.

TAILORING Salesmen: Make \$75.00 a week selling our strictly All-Wool Made-to-Measure Suits at \$26.50. You collect profits in advance and keep them. We supply finest Selling Outfit in America. Many exclusive money-making features. Tailoring, raincoat and side-line men, part or full time, get in touch with us immediately. Goodwear Chicago, Inc., Dept. 131, 843 W. Adams St., Chicago, Ill.

AGENTS Wanted (in U. S. only). Make your Christmas Money. Sell our exclusive line of engraved Xmas Cards. The very best in design, quality and price. Big commission allowed. No money needed. Write for free samples and particulars at once, as no answers will be considered if received later than November 30th. Knight & Co., Box 276, Riverton, N. J.

\$10 To \$20 daily taking orders for new auto invention that removes carbon, stops oil pumping and saves 25% on gasoline. Sells on sight to every car owner on our money-back guarantee. Everybody can afford it at \$2.00. You make 100% profit. Write for free sample booklet. Address: Warren Mfg. Co., 653 Gray Bldg., Kansas City, Mo.

START in a permanent business of your own selling guaranteed Hosiery and Underwear direct from mills. No capital or experience is needed; many representatives make \$3,000 to \$5,000 per year. Become our district manager—get other working for you. Write for details to Malloch Knitting Mills, 529 Grant St., Grand Rapids, Mich.

WOULD you like to receive a beautiful 21-piece genuine French Ivory manicure set, 26-piece Rogers silverware set, or elegant 21-jewel gentlemen's or ladies' wrist watch? Any of the above given free for only an hour of your spare time; very easy and interesting. Write Weinman Bros., Memphis, Tenn.

HOSIERY Agents Wanted. House to house canvassers, selling Ladies', Men's and Children's Hosiery; capable of earning \$400.00 to \$800.00 monthly. District managers also can earn big money in their territories. Get your application on file now. Write today for particulars. Address, H. & S. Hosiery Mills, Reading, Pa.

AGENTS—\$15 a day—Easy, quick sales—Free Auto—Big weekly bonus—\$1.75 premium free to every customer. Simply show our beautiful, 7-piece, solid aluminum handle cutlery set. Appeals instantly. We deliver and collect. Pay daily. New Era Mfg. Co., 803 Madison St., Dept. 21-C, Chicago.

GREATEST Sensation! Eleven-piece soap and toilet set, selling like blazes for \$1.75 with \$1 dressmaker's shears free to each customer; other unique plans. E. M. Davis Company, Dept. 506, Chicago.

\$1,680 MADE by Wingo in six weeks selling Never Fail Razor Sharpener. Purdy made \$40.50 first day. Other inexperienced men cleaning up big money. Applewhite, La., six orders in thirty minutes. Hurry—investigate—exclusive territory. Write today. Never Fail Co., 126 Allen Bldg., Toledo, O.

AGENTS wanted by large raincoat manufacturer to take orders for our guaranteed made to measure Raincoats, Gabardines. \$75 to \$150 weekly easily earned; commission in advance. We deliver and collect. Write at once for further details and free outfit. Universal Raincoat Co., 607 Broadway, New York.

AGENTS—Quick sales, big profits. Outfit Free. Cash or Credit. Sales in every home for our high-class line of Pure Food Products, Soaps, Perfumes, Toilet Articles, etc. Write today for Money-Making Plan. American Products Co., 5889 American Bldg., Cincinnati, Ohio.

AGENTS For "Hudco-Ford"—new patented Transmission Cover for all Fords—change Bands 20 minutes—sells \$15 Eastern Zone, \$16 Western Zone—your profit \$5.00—easy seller—get circular, Hudco-Ford Co., 1 S. 21st St., Philadelphia.

AGENTS. \$6 a day taking orders for Blue Ribbon Cutlery Set. Stainless steel. Guaranteed. Aluminum handle. We deliver and collect. Pay you daily. Write quick for sample outfit. Parker Mfg. Co., 178 Aul St., Dayton, Ohio.

LIGHTNING—Wonderful new electrolyte charges discharged batteries instantly. Eliminates old Sulphuric Acid method entirely. World has waited half a century for this invention. One gallon, retails \$10.00, free to agents. Address Lightning Co., St. Paul, Minn.

AGENTS: New reversible raincoat. No sold in stores. One side dress coat, other side storm overcoat. Saves \$20. Guaranteed waterproof. Big commission. No capital required. Sample furnished. Parker Mfg. Co., 378 Roe St., Dayton, O.

GREAT Profits Assured capable men joining immediately national selling organization for Everflo Self-filling ink-pen-cil pen. Writes with ink instead of lead. Send for Profit Proposition, Everflo Pen Co., Dept. 58, Grand Rapids, Mich.

WILLIAMS' No Water Hand Soap, in tubes, has taken Auto owners by storm; washes dirtiest hands perfectly clean without water. Easy demonstration makes quick sale; 150% profit. Address W. B. P. Williams, Montclair, N. J.

AGENTS, enormous profits, permanent repeat business, exclusive territory, selling highest quality products at low prices. Coconut Oil Shampoo retails 50c bottles, costs \$1 dozen. Soaps, Perfumes, Extracts, etc. Verdina, A-16, East 13th, New York, N. Y.

GOLD Sign letters for stores and office windows. Photo pillow tops, portraits, frames, sheet pictures, medallions, waterproof aprons, novelties. Samples, catalogue free. Thirty days' credit. James C. Bailey Co., Desk J-B, Chicago, Ill.

AGENTS and Branch Managers—Most complete line wet and dust mops, dusters, polishers and swabs. Earn \$50.00 to \$250.00 weekly. Guaranteed sales. Factory Connection. Exclusive territory. Bartels Hamilton Co., Dept. 15, Toledo, Ohio.

YOU can make \$10 to \$20 daily selling Rex India Fibre Brooms. Outlast three ordinary brooms. 100% Profit. Write Rex Fibre Products Company, 145-C New Jersey Ave., Brooklyn, N. Y.

SELF-THREADING Needles; Needle Books; Needles of all kinds for Agents, Streetmen, etc. Lowest wholesale prices. Write for price list. Address Palmetto Needle Company, Box 312, Dept. A, Spartanburg, S. C.

AGENTS, \$25.00 a week for spare time. Suits \$13.45, pants \$3.45 up. Money-back guarantee. Guaranteed Quality. Line well known. Samples free. Write Chicago Tailors Association, Dept. 106, Chicago.

\$1,600 BEFORE Christmas—you can make it; no experience necessary. Rapid selling \$1.60 household necessity, wonderful gift. You sell, we deliver, pay daily. Address Eastern Kewware Co., Franklinville, N. Y.

REAP harvest selling Lightning Carbon Remover. Guaranteed solution to carbon troubles. Tremendous seller; large profits. Repeat orders build permanent business. Kosmos Chemical Company, 120 E. Sixth St., Cincinnati, O.

REGAL Keyless Spare Tire Lock—newest, greatest auto invention. Quick, easy seller. Tremendous money maker for agents. Baffles thieves. Cannot be picked—forced—sawed—filled or nipped. Opens only by secret combination. Simple for owner—he just moves combination till letters on discs spell secret word and presto! it opens. Safer than a safe. Every motorist buys. Low price. Unlimited guarantee. Nothing like it. Novel features and safety attract customers. Sell motorists and dealers—make \$2.66 per sale. Write quick. Regal Keyless Lock Co., 1308 N. Clark St., Dept. 10, Chicago.

MONEY-BACK guarantee makes Premier Sharpener fastest seller. Hundreds getting rich. You can. Write Premier Mfg. Co., 813 E. Grand Blvd., Detroit, Mich.

AGENTS—Crew men, novelty men, Gloo-Pen, a 50c mucilage fountain pen; everybody buys on demonstration. Write for big profit plan. Gloo-Pen Co., 56-PP Pine St., New York.

LADIES—Cash for spare time. New unique goods. No investment. Enormous Profits. Territory. Enclose Stamp. Experience Unnecessary. W. A. Colby Printing Co., 2447 Park Blvd., Detroit, Mich.

LATEST Invention—my Fuel Economizer saves one-third of your coal. Exclusive territory to live agents. Sample and outfit, 50c. Engineer, 2924 South 66th St., Philadelphia, Pa.

FREE — Custom-made, Year-guaranteed Shirt business. Shirt sells for \$2.95. Will send sample C. O. D., less salesman's commission. Territory assigned. World Merchandise Co., 526D Broadway, New York, N. Y.

SELLS Like Hot Cakes; big profits; new ironing wax pad and asbestos rest; clamps board; perfumes clothes; outfit 10c. Yankee Mfg. Co., 380 Atlantic Ave., Brooklyn, N. Y.

AGENTS wanted for Ford accessory with merit that retails for \$1.50. Saves 15% to 30% gasoline. Write Embler Carburetor Co., Inc., 303 Fifth Avenue, New York.

WE want 50 more representatives to sell our children's and ladies' gingham dresses direct. New, exclusive styles. Loretta Frock Co., Dept. 18, Dayton, Ohio.

TEN Dollars Daily. New toilet specialty. Never sold through agents. Stamp for special offer. Address Manager, Box 38, Newport News, Va.

AGENTS, dollar starts your own business. Full or spare time. Get particulars. Dept. P, Box 1472, Sta. C, Los Angeles, Calif.

AGENTS to sell Kerosene Burners for all purposes. Big Profits. Economy Mfg. Co., 616 W. Monroe St., Chicago.

"POLMET" Polishing Cloth cleans all metals. Retail 25c. Sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

AGENTS wanted; big profits; territory free; sample \$1.10 postage paid. Wendell Washer Company, Galesburg, Ill.

AGENTS—\$5 to \$10 daily selling Snow Dust Washing Compound. Washes clothes without rubbing. Women wild about it. Big repeater. Free samples boost sales. Exclusive Territory. 300% Profit. Sample Free. Norman E. Conrad, Wabash, Ind.

STAINLESS Steel Cutlery; samples furnished; \$17 daily easy; pay advanced; display guaranteed rustless steel cutlery. Absolutely new; no scouring; always bright; no competition; full or spare time; free auto. Cameron Mfg. Co., 1465 Broadway, New York.

AGENTS and portrait men, Crew managers. We give you more for your money. Better and quicker service. Lowest prices on frames and glass. Rejects credited. Catalog free. The Pioneer Corporation, 6395 Yale Ave., Chicago.

CLARKE made \$18 an hour selling vest-pocket windshield cleaner needed by every autoist, motorman, engineer; one rub keeps glass clear 24 hours; 60,000 sold; amazing proposition free. Security Mfg. Co., Dept. 627, Toledo, Ohio.

GET this Brand New Winner. French and Italian Briar Smoking Pipes (patented). Prevents spouts; Tamps automatically; sells on sight to every Autoist. \$6.00 a day easy. Nospark Pipe & Mfg. Co., Montclair, N. J.

100% PROFIT selling our felt rugs to homes, hotels, offices, etc. Everybody buys. We are manufacturers, not jobbers. Prices defy competition. \$75 week easy. Newark Felt Rug Company, 58-C Bergen Street, Newark, N. J.

AGENTS make 100% profit selling Fibre Brooms. Free Sample. National Fibre Broom Co., St. Louis, Mo.

27,000 RECORDS guaranteed with one Everday Phonograph Needle. New; different; no competition, cannot injure records; retails \$1.60; agent's profit 100%. Free sample to workers. Everday (A), McClurg Bldg., Chicago, Ill.

\$15.00 DAILY Easy selling Unbreakable "Golden Beauty" Combs, kind you can hit with a hammer, saw wood with the teeth. Easily demonstrated—quickly sold. 100 per cent profit. Day's supply carried in pockets. Top-notch sellers at fairs, with agents, streetmen, etc. Many street workers selling over \$100.00 worth on Saturday afternoon and evening. You can do as well. 25c Comb and terms, 10c postage. Terms and convincing proof free. Oliver Gandy, Crisfield, Md.

AGENTS—Demonstrators, salesmen, season now on; Owens and Mordant made as high as \$68 in one day selling to auto owners, dealers, garages and housewives; our No-Cement, self-vulcanizing patch repairs everything from a pinhole puncture to a 46-inch blowout; also anything around the home, like hot-water bottles, rubber boots; in fact, all rubber goods; big profits; send for free particulars today. Time-saver Patch Co., 1312 Ontario St., Cleveland, Ohio.

AGENTS: \$60 a week selling guaranteed hosiery for men, women and children. Must wear 12 months or replaced free. All styles and colors, including finest line of silk hose. Mrs. McClure makes over \$2000 a year. Mrs. Schurman averages \$60 a month working spare time. Geo. Noble made \$35 in one day. Write for sample outfit. Thomas Mfg. Co., Class 562, Dayton, O.

ACTIVE Men wanted as general distributors for a Ford accessory that sells at sight; you can clean up \$10 to \$15 daily; one man made \$200.00 in one day. Send for free folder and qualification blank; tells how to build independent, incoming cash business of your own. Hy. J. Otto Mfg. Co., 418 Sycamore St., Evansville, Ind.

AGENTS, Something new. First popular-priced Fire Extinguisher ever made. Every home, garage or car owner needs one. Demand enormous. Over 10,000 ordered by our Territory Salesmen. No experience or capital needed. All you do is take orders. We deliver and collect. Pay you daily. Write for territory. Thurston Mfg. Co., 473 Foe St., Dayton, Ohio.

AGENTS \$3.00 to \$5.00 an hour. Full or spare time. Commissions in advance, no delivering or collecting. Turner \$72 first week. Mrs. Thomas averages \$35 week spare time. New line combination coats going great. Every man, woman and child prospect. Outfit and sample coat free. Write now. Liberty Mfg. Co., 180 Liberty Bldg., Dayton, Ohio.

AGENTS, Good salary and commission for selling "Ratskyl," our new Rat and Mouse Exterminator. Ready for use, no bait required, non-poisonous. Harmless to man, poultry, cat, dog and other animals. Rodents die outside premises. No odor. Exclusive territory, no competition. Empire Specialties Co., 1549 N. Wells, Dept. 301, Chicago, Ill.

HOW to make, bottle and sell all kinds of Food Flavors, both liquid and tubes. Crystallized, greatest washing compound known to science. Maple Syrup at 50 cents per gallon. Our book "How" tells all, 50 cents. Coupon good for this amount on first order. Order today! Mystol Co., Glens Falls, N. Y.

AGENTS make 140% profit. Iridium (luminous) crucifix shines in the dark. Sells for \$2.00. Costs 84c. Complete line religious articles, crucifixes, bulbs, switch plates, house numbers and match boxes. Novel! Ornamental! Useful! Every home a prospect. Big sales. Get free demonstrating outfit. The Pioneer Corporation, 6391 Yale Ave., Chicago, Ill.

IF they wear socks, they need garters. Sell them a pair of our New Serpentine Garters. A real article for a real salesman. Price \$8.50 per gross, \$4.50 1/2 gross, \$1.00 doz. Sample free. Made by The E. Z. Art Needle Co., 513 N. Dearborn St., Chicago, Ill.

MAKE \$50 Daily, Something New! 400% Profit. All Business, Professional Men Need It. Sells \$5. Costs \$1. Brooks, Texas, sold 20 first day, profit \$80. Big weekly repeater. Sells quickly. Experience unnecessary. Write today for territory wanted. Sample outfit free. Federal Association, 71-K Asylum St., Hartford, Conn.

SELL Tire Armor, an inside casing for all auto tires; prevents punctures and blow-outs, saves tire repair expenses and doubles mileage. Costs less than tubes and outlasts several tires. Liberal discounts. Big opportunity in every locality. Write for exclusive agency. Motor Products Co., Lunt Avenue, Chicago.

TAILORING Agents Make \$100.00 a week sure, selling our wonderful all wool tailored to order suits—overcoats. All one price, \$20.00 cheaper than store prices. Collect your own profits. Protected territory. Swatch outfit free. Write J. B. Simpson, Dept. 189, 831 W. Adams St., Chicago.

AGENTS—Steady Income. Large manufacturer of Handkerchiefs and Dress Goods, etc., wishes representative in each locality. Factory to consumer. Big profits, honest goods. Whole or spare time. Credit given. Send for particulars. Address Freeport Mfg. Co., 59 Main St., Brooklyn, N. Y.

AGENTS: Big profits, no competition. Make \$5 to \$15 daily selling our beautiful Scripture Text Calendars. Agents now selling from 10,000 to 50,000 yearly. Write now. Address Messenger Publ. Co., Dept. 116, 314 W. Superior St., Chicago, Ill.

ALADDIN'S Magical Polishing Cloth. New. Every Home Buys. Sales Guaranteed. You cannot lose. Repeats. Big Profits. Make \$60.00 weekly. Free sample. Aladdin Mfg. Co., 9 S. Clinton, Dept. 53, Chicago.

SALESMEN—Agents, sell 15c article, cost 2c; new selling plan; no canvassing or talking required. Plans Free. Sample 15c. H. & E. System, Dept. P2, Lock Box 477, Chicago.

100% PROFIT each 50c sale. Why not make this for yourself? Snap for hustlers. Sell to Auto Owners and Chauffeurs. Territory valuable. Quick action. Perkins, 350 Broadway, New York.

SELL Wilson hats from factory to wearer. Extraordinary commission. We deliver and collect. Every man a customer. Wilson Hat Works, Dept. P, Montclair, N. J.

COMBINATION floor and wall broom going like wildfire. Commission over 50%. Outwears four corn brooms. Convenient shipping points. Address Harnack Co., Keene Building, Fort Worth, Tex.

AGENTS—Six new fast-selling necessities; big demand; unique selling plan; makes dollar an hour; credit given; samples free. Consolidated Portrait Co., Desk E, Chicago.

"SHAKELESS" Salt and Pepper cellars. Everybody buys. Over 100% profit. Easy seller. No competition. Territory offered. Suren Churchill Company, 25 N. Dearborn, Chicago, Dept. 129.

AGENTS—Sell Cresco Raincoats. Best line. Lowest prices. Profits in advance. Outfit free. Big fall season coming. Improved Mfg. Co., Dept. 280, Ashland, Ohio.

AGENTS: Get in—sell Sectional Retreads. Every car owner buys. Guaranteed. Thousands in use. Big profits, \$50 daily. Write Sectional Retread Co., Cherrylee, Kan.

WANTED—District Purchasing Agents, \$250 per month. Steady employment and exclusive territory. Write now. Experience unnecessary. National Instrument Company, 4703 North Hamilton, Chicago, Ill.

AGENTS—Cresco Shopping Bags and Waterproof Aprons sell rapidly. Big profits. Outfit free. Selling experience not necessary. Improved Mfg. Co., Dept. 281, Ashland, Ohio.

MEN—Women—Sell Shopping Bags, Ironing Board Covers, Water-Proof Aprons, during spare time; \$10 day easily made. Write today. Flomar, 2539 Drake, Chicago.

AGENTS—Biggest money-making agencies in America (2 propositions). Exclusive territory. Sample, particulars free. Thayer Consolidated Factories, Armitage and Mangrove, Chicago, Ill.

AGENTS, Either Sex, Sell our Dish Cloths at every house. Sells on sight. Write quick for particulars. Address W. H. Stebbins, Norwich, Conn.

EARN \$10.00 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, headlights. Outfits furnished. E. Deede Laboratories, 1183 Broadway, New York.

SPIRAL Curtain Rods, broom protectors, Ironing Sheet Clips, factory prices. Other fast sellers. Address Hunt Mfg. Co., Box 1652P, Paterson, N. J.

SIGN Specialties that sell good. Leaf-gold Letter Co., 561 1st Ave., New York.

HANDKERCHIEFS. Bedrock factory prices to agent. Get into this staple, permanent, profitable business. Address Turnover Company, 18A East Seventeenth, New York.

800 PERCENT profit. Agents applying Goldfoil Window Letters. Samples Free. Lowest Prices. Luckysign Letter Co., 515 Evergreen Ave., Brooklyn, N. Y.

RUMMAGE sales make \$50.00 daily. We start you. Representatives wanted everywhere. Permanent business. "Crosby Co.," 609 Division St., Chicago.

BIG Proposition to Agents—Penkala Automatic Fountain Pen—awarded Gold Medal 1915. Sample 50c. William Muller, 419 Pine, San Francisco.

HOME employment evenings. Start little Mail Order business anywhere. Stamp brings Instructive Booklet. Alfred Pier, 72 Cortlandt Street, New York.

NOVELTY from Alaska. Over 300% profit. 10c package free postpaid. Voltine Company, 1258 East 61st Street, Cleveland, Ohio.

THE Agent's Guide—Tells where to buy almost everything. Copy 10c. Wilson Publishing Co., 1406 Broadway, New York.

AGENTS: \$5 Hourly. Wonderful \$1 Auto Specialty. Costs 40c. Repeater. Address, Maher Mfg. Co., Dover, N. J.

AGENTS: \$15 Daily. Brand new \$3 Adding Machine. 100% Profit. Address A. Maher Co., Dover, N. J.

I'VE best proposition for making Big Easy Money without Capital. Address Stokes, Box 798, Dallas, Texas.

SUCCESSFUL plan appeals to theatres; nets you \$50 weekly. Theatre Bulletin Company, Washington Building, Los Angeles.

FREE—Twenty big money-making opportunities—Free. Lawrence Products Company, Dept. M, Beaver Dam, Wis.

AGENTS: Wonderful opportunity in Japanese Novelty. Write P. Fencos, U. S. Wholesaler, New Richmond, Wis.

BIG Mail Order Magazine 10c. Thompson Publishing Co., Box 848, Cincinnati.

500 TWO-COLOR Letterheads \$2.65. Samples free. "Adverpress," Station C-3, Milwaukee.

PATENTS. Protect your rights. Before disclosing invention write for booklet and blank form Evidence of Conception, to be signed, witnessed and returned with rough sketch or model of your idea, upon receipt of which I will promptly give opinion of patentable nature and instructions. No charge for preliminary advice. High references. Prompt personal attention. Clarence B. O'Brien, Registered Patent Lawyer, Southern Bldg., Washington, D. C.

AGENTS Wanted—Something New—Fire Fighter sells easily. Makes a spectacular demonstration; car owners, homes, factories, stores, practically buy on sight. Our men make \$10.00 to \$50.00 a day; exclusive territory. If you wish to establish a business of your own with unlimited possibilities for making big money, write us today. Fry-Fyter Co., 93 Fry-Fyter Bldg., Dayton, Ohio.

\$5 TO \$15 Daily Easy—Your pay in advance introducing new style guaranteed hosiery. Must wear or replaced free. No capital or experience required. Just show samples, write orders. We deliver and collect. Elegant outfit furnished. All colors and grades, including silks and heathers. Mac-O-Chee Mills Company, Desk 109, Cincinnati, Ohio.

EVERY Raincoat Agent should get our proposition at once. If you have never sold raincoats and waterproofed overcoats now is the time to start. Any man able to talk is able to sell raincoats. Write for our "profit sharing, collective buying, superior quality" offer. Associated Raincoat Agents, Inc., 448-A North Wells, Chicago.

MAKE \$5,000 every year—\$2,000 in spare time. You share profits besides. Show "Weather Monarch" Raincoats and Waterproofed Overcoats. Ask about "Duel Cost" (No. 999). Get sample raincoat free. Associated Raincoat Agents, Inc., 448-A North Wells, Chicago.

"HOW to Sell Patents" free. Patent News-O, Washington, D. C.

SELL Fraternal Wall Emblems and other money-making novelties. All the rage. Big variety. Write for free sample plan. Kier Fraternal Emblem Co., Dept. C-107, 538 S. Clark St., Chicago, Ill.

BECOME our local salesman selling high grade shoes direct to consumer. Liberal commission. Capital or experience not necessary. For particulars address Tanners Shoe Manufacturing Co., 493 C Street, Boston, Mass.

AGENTS and distributors wanted to sell our Radio-Gaslighters. 25 cent sellers. 300% clear profit. Universal demand. Write for proof. Ignition Products Company, Inc., 122 Union Square, New York.

PROTECT your rights. Write for "Record of Invention" and booklet about Patents. Prompt personal service. Advice without charge. J. Beane Kelly, 612-G Columbian Bldg., Washington, D. C.

MONEY for the Holidays. Plenty of it. Just show and take orders for our line of household and office necessities. Rockford Sales Co., Rockford, Ill.

AGENTS—Signs of all kinds. Big money-making line. Prices right. Address Atracto Sign Works, P. O. Box 100, Chicago.

AUTOMOBILE Specialties Formulas—best, different, dependable. Circular Free. Address V. Thawley Co., Washington, D. C.

\$5 TO \$15 Daily Easy—Your pay in advance, introducing New Style Guaranteed Hosiery. Must wear or replaced free. No capital or experience required. Just show samples, write orders. We deliver and collect. Elegant outfit furnished. All colors and grades, including silks and heathers. Mac-O-Chee Mills Company, Desk 109, Cincinnati, Ohio.

WHY work for others? Make and sell your own goods. We show you how. Enormous profits. Write quick for free book explaining everything. Thos. Steel, President, 624 Main, Richmond, Va.

"\$10 A DAY and More" our new book, shows clearly how you may gain sure success and large profits selling Guaranteed Hosiery and Underwear, factory to family. It is Free. Write today, C. & D. Company, 41-E Grand Rapids, Mich.

EASY, pleasant work for Mechanics. Shop Men, Clerks, during spare hours; will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, O.

AMBITIOUS Men, write today for attractive proposition, selling subscriptions to America's most popular automobile and sportsman's magazine. Quick sales. Big profits. Pleasant work. Digest Pub. Co., 9505 Butler Bldg., Cincinnati, O.

EARN big money fast applying gold initials to autos. Every owner buys—\$1.35 profit on \$1.50 sale—particulars and samples free. Write quick. Lithogram Co., Dept. 17, East Orange, N. J.

YOUR chance to make big money re-silvering mirrors, auto reflectors, metal-plating. Outfit furnished. Write for particulars. International Laboratories, Dept. 26, 309-311 Fifth Ave., New York.

LARGE Shirt Manufacturer wants Agents to sell complete line of shirts direct to wearer. Exclusive patterns. Big values. Free samples. Madison Mills, 503 Broadway, New York, N. Y.

WHY work for others? Make and sell your own goods. We show you how. Enormous profits. Write quick for free book explaining everything. Thos. Steel, President, 624 Main, Richmond, Va.

WANTED—Agents and Salesmen to handle Europe's Famous Wunder Glass, the newly imported Prism "Binoclette." For theatre, hunting, yachting, races, touring, aviation, etc. This is the smallest and of its size the most powerful Glass in the world. Can be carried in vest pocket or ladies' bag. Retail at \$25.00. Confidential wholesale price to agents \$12.50. Sent with privilege of examination, if satisfied pay expressman, otherwise return at our expense. George Mayerle Optical Co., General Importers, established 1894, 900 Market St., San Francisco, Calif. (Order before the new tariff doubles prices.)

A BIG Money Maker and a Pleasure for Men, Women and Children. You can make the most beautiful Marble, Turquoise, Agate, Tile and art work from common Portland Cement, also beautiful pictures, picture frames and scenery. I will also tell you how you can make from twenty-five to one hundred dollars in an hour's time after learning how to do the work. Will pay five dollars if you cannot do the work by following instructions. My twenty-five-dollar course of instructions for twenty-five cents silver. Based on 40 years' experience. B. F. Spencer, Instruction Dept., Elsinore, Calif.

GET our Big Money proposition and Free Samples on Easy Applied Transfer Letters and be convinced. Auto Monogram Supply, 16 Green St., Newark, N. J.

WHY Buy Your Goods. Use Miller's Guaranteed Manufacturer's Reliable Formulas for Manufacturing Agent-Specialty Salesman's Big Selling Specialties—all lines. Free Descriptive Literature Concerning Non-Thermal Ice Cloths, Grape-Oils, and Flavors for all beverages, New Food Specialties. Launderite and New Laundry products. All latest Automobile Specialties including 666 Polish and Amazon Rubber Repair and many other meritorious sellers which can be manufactured in your home, store or office without machinery. Make your start now. Stamp brings Valuable Information. Miller, Chemist, Tampa, Fla.

A WONDERFUL Seller! Any man, woman, boy or girl can make big wages. Some agents make from \$8.00 to \$20.00 per day. Crimp Grip Clothes Line fasteners are a simple, time-saving device for holding a rope—also used for many other purposes. It pays for itself quickly in time saved on wash days. No knots—it fastens and releases quickly. Every home a prospect. Every housewife who uses Crimp Grips—and there are thousands of them—is a booster. There is but one Crimp Grip. Write for particulars, or send 50c for one pair and a mounted sample, with full particulars to agents. Crimp Grip Company, Belvidere, Illinois.

PHENOMENAL Sales! Record breaker! Send postal. Warren & Howell, 441 Eighth Ave., New York, N. Y.

"IDEAL" Sideline. "Sureshot" Selling Method Free. K. Home, 1937 Warren, Chicago.

AGENTS. \$60 to \$200 a week. Free samples gold and silver sign letters for office windows, store fronts and glass signs of all kinds. Anyone can put them on. No experience necessary. Big demand everywhere. Over 500% profit. Fred Foley, Binghamton, N. Y., made \$485.00 first month. Albert Gibbons, Kansas City, made \$212.00 in ten days. Liberal offer to general agents. Write today for sample of our high-grade window letters. Address, Metallic Letter Co., 431-C North Clark St., Chicago, Ill.

WHY work for others? Make and sell your own goods. We show you how. Enormous profits. Write quick for free book explaining everything. Thos. Steel, President, 624 Main, Richmond, Va.

\$8.00 TO \$20.00 per day. A wonderful seller. Any man, woman, boy or girl can make big wages selling Crimp Grip Clothes Line Fasteners. It is a perfect rope holder and can be used for many purposes. Crimp Grips are a simple, time-saving device. They last a life time and will not rust; it holds the line tight, and saves time on wash days. Every buyer is a booster. Send 50c for Mounted Sample and one pair of Crimp Grip Clothes Line Fasteners. Write for particulars. Crimp Grip Company, Belvidere, Illinois.

GERMAN razors for barbers. Hand-made. Manganese steel. Highest quality. Guaranteed. Sell for \$2.25. Cost you \$1.50 doz. Sample, \$1.45. Money Order. Schwartz, Importer, 880 East 141st Street, Cleveland, O.

ASKO—Agents to sell auto accessory. Can carry sample in vest pocket. Exclusive county rights open. Big commission. Send for sample. Allen Spec. Co., 2751 W. Lake St., Chicago.

A BUSINESS of Your Own—Make sparkling glass name plates, numbers, checkerboards, medallions, signs; big illustrated book free. E. Palmer, 511, Wooster, O.

AGENTS—Make 100%. Toilet articles, Perfumes, Extracts, Household necessities. Sample Case Free. LaDerna Co., Dept. A, Main and Walnut, St. Louis, Mo.

ONE Student sells \$24.50 worth of "Success" Products in two hours. Write for information. Sales Department Elms Commercial College, Newark, N. Y.

FORTUNE Maker—The only Thread-Cutting Thimble. Live wires only. Sample 15c. Automote Mfg. Co., 3753 Monticello, Chicago.

AGENTS! A sale in every home for our beautiful dress goods, silks and general yard goods. Quick sales! Big profits! Large book of 1000 handsome fabric samples. Write today. National Importing & Mfg. Co., Dept. 6X, 573 Broadway, New York, N. Y.

AGENTS. Sell lightning needle threaders. \$10 daily. Costs 5c, sells 25c. Address Maher Co., Dover, N. J.

BIG earnings and steady repeat business assured agents selling to women and homes, finest, most complete line toilet preparations and specialties. Sure Success Plan. Get details today. Colonial Chemical Company, 631-N, Penn Avenue, Pittsburgh, Pa.

SELL "Amenz" Shirts: best-looking, biggest value. Manufacturer to wearer. Every order nets profit \$1.50-\$2.25. Write for winning sales plan. Menzin Shirt Co., 3883-A, Third Ave., New York.

AGENTS: Get into a good repeat proposition. Sell our high-grade flavoring extracts. Build up steady income. Liberal terms. Acme Extract Co., 520 West Broadway, New York.

MEN-Women. Sell Yarborough hair products. Quick sales, large profits. Write today. Colored agents preferred. Territory going fast. Address, Yarborough Mfg. Co., Winston-Salem, N. C.

FREE Samples Rolly's Washday Wonder—new chemical dirt solvent—harmless—no rubbing, \$1.00 weekly. Enormous profits, repeat orders. Rolly Chemical Co., Al, Hastings, Nebr.

AGENTS—A demonstration sells our Marvel Can Opener, and doubles your money. Clinch your success with our proposition. Staples Mfg. Co., Mt. Vernon, Ind.

AT Last—World's Greatest Adding Machine. Almost human. Retails \$15; work equals \$300 machine. \$500 monthly easily made, demonstrating to stores, offices, garages, factories. Simple, easy; adds, subtracts, multiplies, divides, automatically. Speedy, accurate, durable handsome. Five year guarantee. Tremendous demand; amazing profits. Liberal trial offer. Protected territory. Write quick, Lightning Calculator Corp., Dept. F, Grand Rapids, Mich.

SOMETHING new! Sixnone. 200% profit. Retails 25c to houses and offices. Gale & Co., Inc., 15 Edinboro St., Boston.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 201, St. Louis.

\$30.75 PROFIT on \$2.50 outfit: gold initials for automobiles, etc. Write National, Station D, Brooklyn, N. Y.

FREE—Formula Catalog. S. & H. Laboratories, Boylston Building, Chicago.

ANY man handy with paint brush or light tools can start new mechanical business on nearly nothing; needed everywhere; nearly all profit; experience not required. John Braceland, 1457 So. Ninth, Philadelphia, Pa.

PORTRAIT Agents—Earn big money selling our Photo Medallions. Everybody buys. You charge \$3.00; make \$2.40 each sale. \$10 daily easy. Big variety designs. 4-day service. Perry Photo Novelty Corporation, Section 16, 360 Bowery, New York.

EVERYBODY uses extracts. Sell Duo Double Strength Extracts. Complete line household necessities. Big repeaters. Write today. Duo Co., Dept. E1, Attica, N. Y.

LARGE manufacturer wants agents to sell guaranteed made to measure raincoats, Gaberdines and Reversible top and raincoat combined. Make \$75 to \$100 weekly. Profit in advance. We deliver and collect. Outfit free. Standard Raincoat Co., 163 West 21st Street, New York, N. Y.

IMMEDIATE Commissions—no investment—no delivering—no collecting. Pay-day every day. Profits larger than usual. That's our proposition No. 1. For the agent that buys to resell—our proposition No. 2 would instantly appeal. 100% profit and Free Goods. High grade guaranteed aluminum cooking utensil specialties and staples. Our Free Goods Offer is unusually interesting. We maintain a 24-hour shipping schedule. Exclusive territories granted and protected. Get yours before it's too late. Perfection Aluminum Mfg. Co., Desk A, Lemont, Ill.

AGENTS—Sell Skimit Kitchen Cream Separator; nationally advertised; sells on sight; attractive terms; big profits; retails \$1. Skimit Mfg. Co., Oskaloosa, Ia.

AGENTS—Send for sample "Fretnot"—the washday wonder. Be convinced you can do a whirlwind business. You can clear at least \$20 to \$100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory guaranteed to agents who can produce. Credits given. Don't call. P. M. Motter & Sons, 20 E. Jackson Blvd., Chicago.

CENTRAL Indiana Manufacturers now marketing an entirely new auto accessory that makes night driving safe, eliminating glare from approaching headlights. Want general sales managers to open branch office, handle exclusive territory and manage salesmen. Some investment necessary. Profit possibilities practically unlimited. Ray Auto Filter Co., Marion, Ind.

\$195 EARNED by Schleicher in first twelve hours. Self-selling proposition establishes new money-making records. Automatic hot or cold running water bath equipment, without plumbing or waterworks, only \$7.50. Exclusive territory. Investigate. Send no money. Terms. Write today. Allen Mfg. Co., 678 Allen Bldg., Toledo, O.

MOST Wonderful Seller. 96c profit every dollar. No stock to carry. License unnecessary. Sample free. Mission, 2421-MP, Smith, Detroit.

BIG Money Makers. Large factory offers you big profits on 150 fast sellers. Toilet gift sets, flavoring extracts, remedies, soaps bring you \$8.00 to \$25.00 daily. Howe of Illinois makes \$4.00 an hour. Sample outfit free to workers. Lincoln Chemical Works, Dept. 155, 2954 No. Leavitt, Chicago.

PORTRAIT Agents—\$50,000 is what "Picture Man Friedman" made canvassing. Free circular "Profits in Portraits" tell how. 24-hour service prints, finished portraits, frames. Samples free. "Picture Man Friedman," Dept. 8, 127 N. Dearborn St., Chicago.

AGENTS—Earn \$50 to \$100 a week selling Marquette Tire Tool. Simple demonstration sells it. Removes tires in a jiffy. Every owner wants it. Thousands in use. Exclusive territory going fast. Agent's sample \$1.25, retails at \$2.50. Write for full particulars or send \$1.25 for sample and particulars. Marquette Mfg. Co., Dept. A, 218 S. Wabasha Ave., St. Paul, Minn.

CALIFORNIA Rosebuds selling like hot cakes. Agents earning money; new stuff. Big profits. Catalog free. Mission, 2421-PM, Smith, Detroit.

AGENTS—Enormous profits selling Genuine Gold Leaf sign letters. Guaranteed not to fade. Establish a permanent business or travel. Anybody can do it. Free samples. Guarantee Sign Service, A 430 South California Ave., Chicago.

MOTOR Ignition Amplifier—A Wonder Invention! Gives new power to an old motor and more power to the new. Sell to garages, accessory dealers and users. Quick action, big money and satisfaction. Write for prices and literature. Motor Ignition Corporation, Mfgs., Albany, N. Y.

SALES Representative wanted every county to give all or spare time. Position worth \$1,200 to \$3,000 yearly. No previous experience or capital necessary. Write for full particulars. A. A. Silver-Chamberlin Co., Clayton, N. J.

GALLAGHER made \$336.00 in one week selling guaranteed Collection Systems, used by all business men. Sayers Mfg., 2815 Sheffield Ave., Chicago, Ill.

AGENTS: Men and women, in spare or full time, make big money selling household necessity. Every home a prospect. Quick sales, big profit. Territory open. Write for particulars. Judd & Leland Manufacturing Company, Box 21, Clifton Springs, N. Y.

AGENTS—Sell Patented Cigar Lighters and Cigar-Case Moisteners. Big Profits. Start making money at once. Write for circulars, cuts and sales plan. Drake Mfg. Co., Dept. M., Milwaukee, Wis.

LIVE Agents make \$10 Day selling Eureka Strainer and Splash Preventor for every water faucet. Takes on sight. Widely advertised and known. Get details today. A. B. Seed Filter Company, 73 Franklin, New York.

MAKE 600% Profit. Free Samples. Lowest priced Gold window letters for stores, offices. Anybody can do it. Large demand. Exclusive territory. Big future. Sideline. Acme Letter Co., 2500-D, Congress, Chicago.

SELFOLITE—Agents, Streetmen—Selfolite lights any fire while user sleeps, or any time. Performs surprising stunts. Newly patented. Sample 25c, postpaid; money back. Particulars. Kaytwo Mfg. Co., C195 Station A, Boston, Mass.

AGENTS: Big Profits. Genuine Gold Leaf Window Letters anyone can put up. Scripts and 57 varieties. Chicago Agency Co., 842 Algeid St., Chicago.

AGENTS—Big Profits. Gold Sign Letters easily applied, samples free. Liberal offer to General Agents. Dept. C Interstate Sign, 2620 No. Halsted St., Chicago.

GOOD income, spare time, refinishing chandeliers, brass beds, automobiles, etc., by new method; producing amazing results; every household possible customer; experience unnecessary; simple plan of manufacturing at home starts you in big money-making business. Write for free samples, showing finishes, etc. Gunmetal Finish Co., Ave. H, Decatur, Ill.

GOLD Leaf Sign Letters; make and sell; profits exceed 1,000%; immense demand; particulars free. Johnston Co., Quincy, Ill.

AGENTS make 500% profit handling Auto Monograms, New Pictures, Window Letters, Transfer Flags, Novelty Signs. Catalog Free. Write Hinton Co., Star City, Ind.

PORTRAIT Agents, who want good work and prompt service and who desire to purchase their frames at factory prices, should write us at once for catalog and price list. W. G. Hannan Co., Dept. A-5, 57 E. 18th St., Chicago, Ill.

AGENTS—New patented curtain rod, necessity in every home; big profit; 4 to 10 sales at every house. Write for free sample. Home Curtain Rod Co., Providence, R. I.

AGENTS—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

AGENTS: Big Money Monogramming By Transfer Method. Catalogue Showing Over 50 Styles and Particulars Free. Motorists' Accessories Co., Mansfield, Ohio.

\$200 WEEKLY. Free samples. Sell gold sign letters to stores, offices. No experience. Big future guaranteed. Can travel. Exclusive territory. Become our general agent. Acme Letter Co., 2800-D Congress, Chicago.

MAKE \$25 to \$50 week representing Crows' Famous Philadelphia Hosiery, direct from mill—for men, women, children. Every pair guaranteed. Prices that win. Free book "How to Start" tells the story. George Crows Company, Desk 31, Philadelphia, Pa.

MAKE \$31.00 Profit With Only \$1.50 Selling Pure Gold Leaf Monograms for Automobiles, Trunks, Bags—Window and Wagon Letters. Applied instantly. No experience necessary. No. 1 Outfit brings you \$32.50—cost only \$1.50—you make \$31.00 profit. Get colored catalog. Full particulars—free samples (36 designs). "Hurry." Nullife Auto Aid, Hartford, Conn.

TAILORING Agents Wanted—Must be big producers—We have snappy Fall and Winter Swatch line at prices you can't help but sell (Union Made). Write for samples. Leeds Woolen Mills, Chicago.

WANTED—Tailoring Sales Agent—Make big money from very start—\$60.00 to \$75.00 weekly. Largest made-to-measure tailoring house, furnishing an equipment of five hundred wools, wants you to take orders. Satisfaction guaranteed. Biggest merchants in many towns have started with our line. If you want to establish yourself permanently in business and make big money write for full particulars, giving your experience as salesman or tailor's sales agent. H. F. Foster, Sales Manager, Lock Box 482, Chicago.

BIG Profits Selling New \$3.50 Automatic Adding Machine. Absolutely accurate. Fully guaranteed. Quick sales. Ten daily easy. No competition. Pocket size. Business people everywhere positive customers. Thousands being sold. Tremendous demand. Here's high-grade money-maker. Bassett Co., 1458-J, Hollywood Ave., Chicago.

AMERICO booster auxiliary water carburetor makes autos burn water, eliminates carbon. Low cost; liberal profits; details free. Americo Co., Dept. 178, Cincinnati, Ohio.

SELL Necessities. Everybody needs and buys the "Business Guide." Bryant cleared \$80.00 in July. Send for sample. It's free. Nichols Co., Box 4-B, Nagerville, Ill.

WHY work for others? Make and sell your own goods. We show you how. Enormous profits. Write quick for free book explaining everything. Thos. Steel President, 624 Main, Richmond, Va.

AGENTS: Big Returns. fast office sellers; particulars and samples free. One Dip Pen Co., 2 Daily Record, Baltimore, Md.

AGENTS—If you are making less than \$300 a month our proposition on Sentinel Burglar Alarms for windows and doors will interest you. Many agents earn \$20 daily. Brand new inventions. No wires, batteries or nails. Instantly attached to any door or window. Handsomely nickel plated. Sell on sight. No competition. Provides cheap burglar insurance. Big money makers. Write today for extremely liberal terms to agents. Sentinel Alarm Co., 140 S. Dearborn St., Chicago, Ill.

BEST Proposition on Earth. Kitchen Specialty Every Woman Wants. Nothing like it in existence. 200% profit. Best Novelty Mfg. Co., Dept. C, 160 N. Wells, Chicago.

MAKE \$2 an Hour. Article that removes iron rust, grass, medicine, fruit, mildew stains. Cleans Panama and Straw Hats. Bleaches clothes. Sells Every home. Write for free demonstrating outfit and start taking orders at once. Christy, 81A Union, Newark, N. Y.

AGENTS make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404-B, Amsterdam, N. Y.

BIG money and Fast Sales. Every owner buys Gold Initials for his auto. You charge \$1.50; make \$1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

OUR Ex-Cel Luminous Crucifix shines brilliantly in the dark. Churches, hospitals and individuals are only waiting for a demonstration before buying. Agents make handsome profits. W. G. Hannan Co., Dept. B, 57 E. 18th St., Chicago.

AGENTS—Stamping names on Pocket Key Protectors; sample check with your name and address. 25c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

YOU can be your own boss with our Key Check outfit. Good for \$5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 20 cents. Pease Die Works, Dept. M, Winchester, N. H.

AGENTS: Big profits. Best and cheapest window letters made. Easily applied. Dime brings five samples. Particulars free. Stalbritte Co., 1115 Second Ave., New York.

PATENTS—Write for our free illustrated guide book and Evidence of Conception Blank. Send sketch or model for our opinion of its patentable nature free. Highest references. Prompt attention. Reasonable terms. Victor J. Evans & Co., 143 Ninth, Washington, D. C.

PORTRAIT Agents: Our goods will make you big profits. Delivery guaranteed. Subjects credited. Prompt shipments. Send for latest catalog and prices. Adam J. Kroll & Co., 605 Blue Island Ave., Chicago, Ill.

AGENTS—Best seller; Jem Rubber Repair for tires and tubes; supersedes vulcanization at saving of over 80%; put it on cold, vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube. Sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Amazon Bldg., Philadelphia, Pa., Dept. 545.

HIGH-GRADE SALESMEN WANTED

SOME people say that high-class salesmen don't answer ads. We don't believe it, for they do answer our ads—and they go to work for themselves on our plan—and they make big money through our aggressive co-operation—they draw down over \$60.00 per average sale—they sell the highest grade motion picture advertising service that is made—they have built the largest business of its kind in the country. If you have a creditable sales record and an ability to work for big results and want to join this happy and aggressive sales force, just mail a post card for the complete story. Alexander Film Co., 1151 Main Ave., Spokane, Wash.

SALESMEN, experienced—or inexperienced if a worker—to sell an article to automobile owners that increases mileage, lessens spring breakage, and adds remarkable riding comfort—convincing, money-saving sales arguments. For every car. Reasonably priced. Average good man is earning \$50-\$75 a week. Rush your application, giving details. R. T. Portal, Room 511, 53 State Street, Boston.

SALESMEN Sell Tailoring—one of the most profitable of all lines. Our better one-price line of Guaranteed All-Wool Suits at \$29.75 sells on sight. Every order pays you a good profit in advance. Experience not necessary. We supply everything. This is a rare opportunity. Get the facts—today. Park Tailoring Company, Dept. 353, Chicago.

A BUSINESS of your own. Aggressive, ambitious men who seek new and larger business opportunities and expect to scratch and hustle to build real prosperity. Such men can secure factory sales connection and exclusive wholesale distribution on high-grade automobile necessities becoming well-known through national advertising. More than sales job; an opportunity to build permanent and profitable business with "Money back" merchandise that sells and repeats. Must have references, financial standing, evidence of past success and business promotion experiences outlined. Waste no time on postal cards or letters that do not state particulars requested. Correspondence with new, wide-awake specialty distributors solicited. Write Robert Bowes Company, Indianapolis, Ind.

ADVERTISING and Novelty Salesmen of ability, experience and large earning capacity can connect with manufacturer leather and advertising specialties in ready demand among banks and big business concerns. Fine contract, commission basis. \$150 on single order not unusual. Selling aid extended. Write us fully about your experience. David H. Zell, Inc., Dept. F, 532 Broadway, New York.

AGENTS, Distributors, Salesmen wanted in every city to handle Arctic Cowl Ventilators, for all makes of cars. Easy to install; sell on sight; practical necessity for all-season driving. \$50-\$100 weekly in this for you. Send for Our Income Plan. National Aluminum Co., Dept. 6, Racine, Wis.

SALESMEN—\$135 to \$420 a week. Salesmen with slight knowledge of motors who can reach car owners can earn \$135 weekly without making single sale. If they can also make sales their profits may reach \$25,000 a year. Phillips, 223 W. 29th Street, New York City.

SELL Auto and Tractor Oils. Regular or part time. Samples free. Get the money making terms. Address The Ivison Company, Cleveland, Ohio.

SALESMEN—Commission salesmen calling on hardware dealers. We have a fast catcher Fly Trap. Address F. Day & Co., Alcester, S. D.

CALENDAR house wants to communicate with experienced calendar salesman, one who can organize sales force. Address Consolidated Company, Erie, Pa.

ONLY one policy a day means \$130 per month profit; same on renewals. Policy pays \$5,000 death; \$25 weekly benefit for injury or sickness. Premium \$10 yearly. Full or spare time. Easy seller. Write quick for territory. Underwriters, Dept. K-33, Newark, N. J.

WE want experienced salesmen to sell our line of advertising materials and service to bankers, merchants, manufacturers, wholesalers, and other well rated concerns. The men we want must have some successful experience selling to business men, and must have ambition and a willingness to work for the development of a permanent and profitable business. Leads and comprehensive sales help furnished. Liberal commissions with weekly remittances. This is no soft snap but a real business proposition for competent men seeking bigger opportunities. Let your letter of application reflect your sales ability. Write fully including references. The American Art Works, Coschocton, Ohio.

MAKE \$50 daily. Something new! 400% profit. All business, professional men need it. Sells \$5. Costs \$1. Brooks, Texas, sold 29 first day, profit \$80. Big weekly repeater. Sells quickly. Experience unnecessary. Write today for territory wanted. Sample outfit free. Federal Association, 71-D Asylum St., Hartford, Conn.

AGENTS—J. B. Simpson, \$29.50 virgin wool tailored to order suits—overcoats are \$29.50 cheaper than store prices. You keep deposits. Protected territory. Beautiful assortment of fabrics—6x9 swatches free. Hustlers write J. B. Simpson, 831 West Adams Street, Chicago, Dept. 190.

SALESMAN-Distributor—Establish permanent business. Household article. Sells readily. Our liberal discount allows distributors handsome profit. Other distributors making good. Write today for exclusive distributor proposition. Crown, Richmond, Ind.

CLIMAX Oil Burners wonderfully successful in residence furnaces and stoves. Also Ozark Filters. Liberal proposition. Address, E. L. Miller Mfg. Co., 3224 West Third, Kansas City, Mo.

SIDELINE: Baby Shoe Specialties to the trade. Little Chick Shoe Company, Chicago.

SALESMEN Wanted—Our suits, overcoats, blankets, work pants, raincoats are made in our own factory from woolsens made in our own mill and sold direct to the consumer at prices that defy all competition. Fabrics and tailoring are the finest. If you have a clean record, stand well in your community and can spare 2 hours a day or more, you can add \$25.00 to \$150.00 per week to your present income. No experience or capital required. For full particulars write Taylor Wells Co., 1735-A Diversey Parkway, Chicago, Ill.

HIGH-GRADE Specialty Salesmen Wanted—Something New—Fire Fighter sells easily. Makes a spectacular demonstration; car owners, homes, factories, stores, practically buy on sight. Our men make \$19.00 to \$50.00 a day; exclusive territory. If you wish to establish a business of your own with unlimited possibilities for making big money, write us today. Fyr-Fyter Co., 950 Fyr-Fyter Bldg., Dayton, Ohio.

SIDE Line for Salesmen: The Kern Card and Label Holder; used in all business having merchandise on shelves as groceries, stockrooms, accessory stores, etc.; outfit carried in pocket. Address John Ph. Kern, Dept. M, 1205 W. Market, Louisville, Ky.

SOMETHING New—a necessity—Zim's Peerless Collection System. Salesmen making big money. Exclusive collecting features aid salesmen. Creditors' Association, 312-E McKnight Bldg., Minneapolis, Minn.

SALESMEN. Local or traveling, can make \$10.00 a day selling our new, practical advertising specialties. Pencils, yardsticks, kites, icepecks, shoeorns, etc. Attractive outfit. Excellent "side." Sell year round. Liberal terms. Pershing Mfg. Co., Southend, Ind.

AMBITIOUS Men, write today for attractive proposition, selling subscriptions to America's most popular Automobile and sportsman's magazine. Quick sales. Big profits. Pleasant work. Digest Pub. Co., 9505 Butler Bldg., Cincinnati, O.

SALESMEN make good side money selling small acetylene torch to garages and shops. Easy to sell. St. Paul Welding & Mfg. Co., St. Paul, Minn.

SALESMEN Can make \$5.00 a day selling our Calendars, Pencils, Signs, Advertising Novelties, Yardsticks, Whistles, etc. Liberal terms. Sells entire year. Fine side line. Local and traveling agencies. Model Calendar Co., Dept. 226, South Bend, Ind.

SOMETHING New, a necessity. All business and professional men need it. Sells \$7.50, costs you \$1.40. Big repeater. Write for sample. Merchants Assn., Minneapolis, Minn.

MAKE big money selling new, self-adjusting Robert Wrench. Most wonderful tool on market. Sells for \$1.85. You make almost 100% on each. No free samples. Robert Wrench Co., 71-C Murray St., New York.

MINUTES pay dollars demonstrating world's greatest specialty. Wonderful new three-pound Adding Machine. Details \$15. Work equals \$300.00 machine. Adds, subtracts, multiplies, divides, automatically. Speedy, accurate, durable, handsome. Five-year Guarantee. Tremendous demand everywhere. Amazing profits, main or sideline. Experience unnecessary. Write quick for liberal trial offer and protected territory. Lightning Calculator Co., Dept. G, Grand Rapids, Mich.

AGENTS—\$60-\$200 a week. Free samples. Gold sign letters anyone can put on store windows. Liberal offer to general agents. Metallic Letter Co., 451-E N. Clark St., Chicago.

EVERYBODY Eats Every Day. You can handle Sugar, Flour, Canned Goods, Dried Fruit, Coffee, and entire line of groceries, as well as Paints, Roofing, Aluminum Ware and Automobile Oils, with no rent to pay; no money invested; take large orders from samples. Goods are guaranteed and proven quality. Selling experience not necessary. Steady, profitable work for "workers." Address Hitchcock-Hill Co., Dept. 206, Chicago, Ill. Reference: Any Bank or Express Co.

57 MILES per gallon made with new patented gasoline Vaporizer. Write for particulars. Vaporizer Co., Pukwana, S. Dak.

CALIFORNIA Rosebuds selling like hot cakes. Agents coining money. Absolutely new. Big profits. Catalog free. Mission, 2421-SP, Smith, Detroit.

EASY to sell Groceries, Paints, Automobile Oils, Roofing, Stock Food to consumers from samples, no capital or experience necessary; steady, profitable work. Commissions advanced. Satisfaction guaranteed. 50 years in business. Write for full particulars. Loverin & Browne Co., Wholesale Grocers, 1775 S. State Street, Chicago, Ill.

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HELP WANTED

WE want a few more men to take orders for our one-price line of Tailoring offering All-Wool Made-to-Measure Suits guaranteed \$50 values at only \$29.75. Every order you take pays you a good profit, in advance. Experience not necessary. Hustlers can clean up big. Write today, Park Tailoring Company, Dept. 354, Chicago, Ill.

WHAT is it worth to you Distributors—District Manager—Salesman or Agent to have the agency for the best line of Rubber Specialties on the market? Hot Water Bottles, Bathing Caps, Combination Shopping Bags, Pure Rubber and Rubberized Aprons, Rubber Gloves, and fifty other fast selling articles needed in every home. Profits range from 100 to 150 per cent. Write B. & G. Rubber Mfg. Co., 618 Penn Ave., Pittsburgh, Pa., Dept. 514.

WANTED: Men and Women Demonstrators to introduce, take orders, make deliveries, 150 household necessities. Food products, spices, extracts, toilet articles, etc. Now used by 20 million consumers. Largest company, most useful products. Large profits. Our system gets the business. No capital required. W. T. Rawleigh Co., 956 Liberty St., Freeport, Ill.

SALESMEN—Become Independent. Own your business; experience unnecessary; selling our \$7,500 Accident Death, \$50 Accident, \$25 Sick Weekly Benefits; \$12.50 yearly; other amounts proportionate. Guaranteed income from renewals. \$250,000 deposited Insurance Department. Registration Dept. A, Newark, N. J.

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MEN—Boys over 17. Get U. S. Government positions, \$92-\$192 month. Quick, sure raise. Steady work. No "layoffs." No strikes. Sure pay. Life positions. Work pleasant. Paid vacation. Common education sufficient. Influence unnecessary. List positions easily obtained—free. Write today sure. Prompt action advisable. Franklin Institute, Dept. H-8, Rochester, N. Y.

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HOME employment evenings. Start little Mail Order business anywhere. Stamp brings Instructive Booklet. Arthur Pier, 72 Cortlandt Street, New York.

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FIREMEN, brakemen, baggagemen, sleeping car, train porters (colored), \$150-\$200. Experience unnecessary. 810 Railway Bureau, East St. Louis, Ill.

DISTRICT managers to appoint salesmen; exclusive rights, sanitary brushes, dusters, mops. Big profits. Neway Brush Co., Hartford, Conn.

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MEN-Boys—Wanted. Railway mail clerks. \$135 month. Write immediately. Franklin Institute, Dept. H-21, Rochester, N. Y.

GOVERNMENT jobs. Men-women. Good pay. Write for information. Secretary, Box 1715-F, Washington, D. C.

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THE creating of a good impression is one of the most profitable forms of advertising, and a very good way to create such result is by the judicious use of Morgan Signs, Morgan Aluminum and Bronze Cast Signs and Memorial Tablets are Ever-lasting, Economical and Artistic. Circular upon request. Morgan Sign Co., Dept. K, 402 W. 27th St., New York City.

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20,000,000 NEW names! Authentic, reliable lists are order pullers. Martineke Company, Corona, N. Y.

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1000 20 LB. Bond Letterheads printed for \$3.75; 5000, \$17.50. Multigraphing: 5000 \$12.50; 5000 envelopes, \$17.50. United Sales Company, Aberdeen, So. Dakota.

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1,000 HAMMERMILL Letterheads or Envelopes, \$4.00. Full Line Samples Free. Quality Printshop, Marietta, Ohio.

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200 NOVEL letterheads and 200 envelopes, \$1.35; 5,000 letterheads, \$10.00; 2,000 envelopes, \$1.40. Postpaid. Champion, Wauwatosa, Wis.

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AMERICAN phonograph parts are best and lowest priced. Write for catalog today. American Phonograph Co., 3513 North Crawford, Chicago.

SAVE records and money. See Everplay Needle advertisement, page 143.

BUILD your phonograph. Quality Phonoparts. Highest quality spring and electric Motors, Tone Arms, Reproducers, Amplifiers, Case Material and Accessories. Free Blue Prints and Building Instructions. Big saving. Wonderful results. New catalog mailed for ten cents. Hessler Manufacturing & Supply Co., Phonograph Supply Department, 213 Baldwin Block, Indianapolis, Ind.

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PATENT application filed on partial payment plan. Trade-marks, copyrights, etc. Milo B. Stevens & Co., 685 F St., Washington; 352 Monadnock Bldg., Chicago. Estab. 1864.

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CUTS anybody can make. Simple, cheap process. \$1. Specimens, particulars, 2c stamp. M. Day, Windfall, Ind.

SAVE incorporating expenses and excess profit taxes and avoid personal liability by organizing your company on the Common Law Plan under a Declaration of Trust. Anyone, anywhere, can fill in Demaree Standard Forms, issue shares and begin doing business same day. Pamphlet B-53 free. C. S. Demaree, Legal Blank Printer, 613 Walnut, Kansas City, Mo.

ARTIFICIAL Eyes, \$3. Booklet free. Denver Optic, 539 Barclay, Denver, Colo.

WANTED—Stamping work for power presses. The W. & P. Toy Mfg. Co., Lawrence, L. I., N. Y.

I Want 235 Salesmen Who Want to Earn at Least \$5000 a Year



B. M. OLIVER

KNOWING that this magazine is read by the progressive type of salesman I take this means to "tell the world" that I want to get in touch with some live-wire salesmen. I am not looking for supermen—just fellows who have confidence in themselves—and particularly the fellow who wants to make real money; say about \$5,000 a year or more.

I want to show you the way to big money. Many of my sales representatives are averaging \$500 a month; others exceed that amount. Right on my desk here I've got a letter from F. W. Bentley of Philadelphia telling how he made \$215 in one day—and one from A. M. Russell of Hartford, Conn., who made \$660 in one month. I have scores of other similar letters in my files—from R. Berger of Ontario who makes \$250 a week, from J. Carnegay of South Dakota telling how he is making \$1,000 a month; from W. Drew of Michigan who makes \$85 a day. There is no reason under the sun why you should not make a minimum of \$100 a week right from the start.

**Oliver Oil-Gas Burner & Machine Co.,
2314-U Oliver Bldg., St. Louis, Mo.**

Please send me full facts about how I can make big money representing you in my territory. Also your plan, if I wish to make big money in my spare time.

Name

Address

City.....State.....

I want you to be the representative of the famous **OLIVER OIL-GAS BURNER**—an invention that instantly turns any stove or furnace into an oil-gas stove, making an even oil-gas fire in any stove or furnace at the turn of a valve, with three times the heat of coal and wood and none of the bother or dirt.

Every Home Wants This New Invention

The Oliver Oil-Gas Burner does away with coal and wood. Banishes all worry about strikes, scarcity and high prices. Turns any range, furnace or stove into an oil-gas stove. 16 different models. Burns 5% kerosene (coal oil) and 95% air. Think of the appeal you can make in every community! Cheaper than coal, wood or gas—absolutely safe.

Does away with drudgery—no fires to make, no ashes, dirt, smoke, chopping, carrying coal and wood. Easy to install. Doesn't change stove. Protects health from exposure and uneven heat. Easy to demonstrate—slips in or out of stove in one minute. Show any woman what it will do right in her own home and the sale is made. Big demand all year—does away with that housewife's dreaded hot summer kitchen.

Write Me At Once

Now, if you are ambitious and really want to connect with a live proposition then just mail-coupon today and I will promptly forward you full details with absolute proof that you can make a minimum of \$5,000 a year as an Oliver Salesman. Address:

B. M. Oliver, President.

OLIVER OIL-GAS BURNER & MACHINE CO.

*Oldest and Largest Manufacturers
of Oil-Gas Burners in the World*

2314-U Oliver Bldg.

St. Louis, Mo.

The Woman Who Wished She Could Play the Piano

And How She Found an Easy Way to Turn Her Wish Into a Fact

A YEAR or so ago this woman didn't know one note from another. Today she plays the piano—entirely by note—better than many who have been playing for years. Here she tells how she learned and why it was so easy. Thousands of others, from school children to men and women of 50 to 60, have also learned music in the same easy way.

FROM the time I was a child I have always had a yearning and longing to play the piano. Often I felt that I would gladly give up half of my life if some kind fairy would only turn my wish into a fact. You see, I had begun to think I was too old to learn, that only some sort of fairy-story magic could give me the ability to play. I was 35 years old—and the mother of a small family—before I knew one note from another.

Until I learned to play, hearing music—especially the piano—always gave me almost as much pain as pleasure. My enjoyment of it was always somewhat soured by envy and regret—envy of those who could entertain and charm with their playing, regret because I myself had to be a mere listener. And I suppose it is that way with everyone who has to be satisfied with hearing music instead of playing it.

Again and again, parties and other social gatherings have been all but spoiled for me. I could enjoy myself until some one suggested music or singing; then I felt "left out"—a lonesome wall-flower—a mere looker-on, instead of part of the party. I was missing half of the fun.

The way I have suddenly blossomed out in music (almost overnight, you might say) has been a big surprise to all who know me, and to myself as well. My friends seem to think it must be that I had a previously undiscovered genius for the piano. But if there was any genius about it, it wasn't on my part, but in the lessons I took—a new and simplified method that makes it remarkably easy for any one to add music or singing to their daily lives.

I learned entirely by home study—in my spare time—from fascinating Print-and-Picture lessons that make everything so simple and easy that one simply can't go wrong on them. I call it a short-cut way to learn—it is so much simpler and so entirely different from the old and hard-to-understand methods. I know that I made better and faster progress than I ever could by bothering with a private teacher or joining a class. In fact, while I don't like to brag, within six months after I took my first lesson, my playing was better than that of many of my friends who had studied two or three years under private teachers—not because I was any more apt than they, but simply because the wonderful Print-and-Picture lessons sent me by the U. S. School of Music were so easy to understand.

Within a year after I took my first lesson, I began teaching my two little girls to play—using exactly the same lessons I myself had studied. And I noticed that both of them seemed to be getting along better than any of their playmates who have private teachers. In addition, I am saving the money it would cost to have a private teacher—I figure it would cost at least \$3 to \$5 a lesson to have a teacher whose instruction could compare with that contained in the printed lessons from the U. S. School. Yet, from the first lesson to the last, the total cost of learning the way I did averaged only a few cents a lesson.

My only regret is that I didn't know of this really wonderful method years before. The ability to play is such a great comfort. No matter how much I am alone, I never get lonesome—I can always turn to my piano for amusement. I am never at a loss for a way to entertain callers. I no longer feel that I am "out of it" at



social gatherings. Do you wonder that I so gladly recommend the method that has brought me so much pleasure and satisfaction?

This woman's experience is by no means unusual. Over 300,000 others—from school children to men and women of 50 and 60—have learned to play their favorite instrument, or learned to sing in the same way this woman did. Largely through the recommendations of satisfied pupils, we have built up the largest school of music in the world.

Whether for beginners or advanced pupils, our method is a revolutionary improvement of the old and hard-to-learn methods used by private teachers, and our method is as thorough as it is simple and easy. We teach you in the only right way—teach you to play or sing entirely by note. No "trick" music, no "numbers," no makeshifts of any kind. Yet it is a short-cut method, simply because every step is made so simple and clear.

The total cost averages only a few cents a lesson, with your music and everything included.

When learning to play or sing is so easy, why continue to confine your enjoyment of the music to mere listening? Why not at least let us send you our free book. Just now we are making a special short-time offer that cuts the cost per lesson in two—send your name now, before this special offer is withdrawn. No obligation—simply use the coupon or send your name and address in a letter or on a post card. Please write name and address very plainly so that there will be no difficulty about booklet reaching you. Instruments supplied when needed, cash or credit.

U. S. SCHOOL OF MUSIC
79 Brunswick Building New York

U. S. SCHOOL OF MUSIC,
79 Brunswick Bldg., New York City.

Please send your free book, "Music Lessons in Your Own Home," and particulars of your Special Offer. I am interested in the following course:

.....
(Name of Instrument or Course)

Name
(Please Write Plainly)

Address

City State

FOR BEGINNERS OR ADVANCED PUPILS

Piano	Mandolin
Organ	Drums and
Violin	Traps
Banjo	Harmony and
Clarinet	Composition
Flute	Sight Singing
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Voice and	Speech Culture
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High-salaried, executive positions are waiting for the men who will master the profession of Traffic Management. No man need stay in a small job when the railroads, steamship lines and leading industrial organizations in America are in urgent need of trained traffic experts—men who are experts in routing, who know how to organize and manage, who are informed on modern traffic methods, who know transportation costs and the laws of interstate commerce, and can adjust important claims and direct large shipping operations. LaSalle's large staff of more than 150 traffic and transportation experts can train you by mail for an important traffic position. By the LaSalle Problem Method you soon become able to handle the actual, every-day problems which come to the traffic executive's desk. And you can get this training in your spare hours at home, while you hold your present job.

Send Coupon Today

Simply mark X in coupon below and we will send full particulars about our training and the attractive opportunities in the field of railroad or industrial traffic management. Also our valuable book, "Ten Years' Promotion in One." Act today.

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The Largest Business Training Institution in the World
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Training for position as Railroad or Industrial Traffic Manager, etc.

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LaSalle is the largest business training institution in the world. It offers training for every important business need. If more interested in any of these courses, check here:

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| <input type="checkbox"/> Higher Accountancy | <input type="checkbox"/> Personnel and Employment Management |
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| <input type="checkbox"/> Law: Degree of LL. B. | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Commercial Law | <input type="checkbox"/> Commercial Spanish |
| <input type="checkbox"/> Industrial Management Efficiency | <input type="checkbox"/> Effective Speaking |
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Name.....

Present Position.....

Address.....

Please Mention Popular Mechanics

LEARN *The* BUSINESS of Advertising



QUICKLY BY MAIL

We guarantee to teach you. It's easy to learn—and easy to get into! Make the start *this week*. This free book tells how.

\$75 to \$100 a Week

—frequently paid beginners. There is no limit to opportunities which men and women trained in advertising meet on every hand.

FREE AD-WRITER'S COMPLETE WORKING OUTFIT

Wonderful outfit of working instruments given free on special offer. Write for details before offer expires. We will also send you free and prepaid this stirring book on advertising. Tells you everything you want to know getting into this fascinating field. Write today. Postcard will do.

PAGE-DAVIS SCHOOL, Dept. A21, Page Bldg., Chicago

Learn Photography at HOME

Make \$75.00 a Week on the Side

Establish yourself as a Photographic Expert quickly—during your spare time—under a leading photographer. I'll show you how to start your own business—on a large salary. Good permanent offer—it's only temporary. Act at once. A postal will do. H. R. VANT.

INTERNATIONAL STUDIOS, Inc.
Dept. 1196, 3601 Mich. Ave., Chicago, U.S.A.



RADIO For Everybody

Thousands of men needed now in Radio. Splendid positions open. You can earn big money as a Radio Expert. Learn by mail, in spare time, how to design, construct, install, repair, maintain, operate, sell and demonstrate complete radio outfits. Write for free 32-page catalog describing our course "How to Learn Radio at Home."

National Radio Institute

Dept. 1293K,

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PLAY PIANO BY EAR in 4 Weeks!

Young and old can now learn to play piano by ear without notes or music by our brand new quick and easy 10 lesson method. Send now for

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and play real chords at once. The World's simplest, easiest method. Nothing else like it. No musical experience necessary, play piano as easy as you hum or whistle a tune. Be a ragtime artist. Send for FREE sample lesson now before edition is gone. Don't delay.

DAVID PIANO COURSE 1500 CUTLER-HAMMER BLDG. CHICAGO, ILLINOIS

ELECTRICITY LEARN AT HOME

Send for catalog which tells how Burgess Home Training enables men and boys to get good jobs and keep them. Burgess Electrical School, Dept. P-9, 744 E. 42nd St., Chicago

Learn Watchwork, Jewelrywork and Engraving.

A fine trade commanding a good salary, and your services are always in demand. Address HOROLOGICAL, Dept. P, Bradley Institute, Peoria, Ill., for our latest catalog.



WANTED—Railway Mail Clerks

\$1600 First Year

Men—Boys
Over 17

SEND COUPON
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FRANKLIN INSTITUTE
Dept. G-179, Rochester, N. Y.

(1) send me, without charge (2) sample Railway Mail Clerk Examination questions; (3) schedule showing places next examinations; (4) list of many government jobs now obtainable.

Name.....

Address.....

**Develop your talent
for drawing**



Big Prices Paid to ARTISTS

YOU are indeed fortunate if you like to draw! Develop your talent—make good money—perhaps become a well-known commercial artist! Thousands of business firms pay millions of dollars yearly for good advertising drawings and designs. Well-trained artists command \$50, \$75, \$100, \$150 a week—sometimes even more. “Top-notch” designers receive \$250, \$500, \$1000 and up for single drawings.

Learn Quickly at Home in Your Spare Time

Get into this fascinating profession which has come into its own, and has a future as big as **modern advertising and modern business**. The Federal “Master Course” teaches you the methods and secrets that make your drawings worth **real money**. It gives you **individual personal criticisms** on your lessons. It brings you rapidly to the producing point, without previous training or experience. And best of all—

Leading Successful Artists are Authors of Exclusive Lessons in the Federal Course. Think of it! Artists, both men and women, whose names are constantly seen in the magazine—whose signatures on drawings are worth hundreds, sometimes thousands of dollars—will give you the benefit of their experience and advice only in this Course. Leading illustrating companies, designers, artists, and hundreds of successful Federal Students the country over have enthusiastically endorsed Federal Training.

Get this Free Book, “YOUR FUTURE”

Training **always** gets the big incomes—and gets them quickest. Invest your spare time and a little money in your ability to draw. Many Federal Students **earn more than the Course costs** while they are studying, from sale of their work. Investigate now—by all means send for this book. It's free to anyone 16 years old or more who is in earnest about his or her future. Beautifully illustrated in colors, it gives facts about the field of commercial art, names of the famous artists who are Federal Authors, and every detail you will want to know about the Course. It is a proven result-getter. Mark and mail the coupon **right now**—kindly stating your age and occupation.



**FEDERAL
SCHOOL OF
COMMERCIAL
DESIGNING**

680 Federal Schools Bldg.,
MINNEAPOLIS, MINN.

Please send me “YOUR FUTURE,”
without charge or obligation.

Age Occupation

Name

(Write your address plainly in margin)



**\$100,000.00 Worth
of Electrical
Apparatus**



**In 3½
Months**

**Forced
Into**

Larger Quarters



H. W.
Cooke, Pres.

Learn

The Great Shops of Coyne with \$100,000.00 worth of electrical apparatus has moved into larger and more spacious quarters. The increasing popularity of the school and the tremendous influx of new students simply forced us to move. Why did this happen? It happened because Coyne has been the most successful institution of its kind in the country. Coyne men were well trained—they learned electricity thoroughly—they went out into the business world and were successful—these men told their friends. With this solid foundation built over a period of years during which time over 10,000 men were successfully trained and graduated, Bennett Wellington Cooke has realized his greatest ambition—a larger and greater Coyne where *all* might be accommodated. Here, in these large, light, airy quarters you will find the finest equipment and best training that money can buy.

Coyne Training Is Complete

You learn quickly because you work in a class of One—with a special instructor to help you—on our immense and modern equipment of dynamos, switchboards, generators, locomotives, etc. This REAL work with REAL tools on REAL machinery trains you five times as fast as studying from books, and enables us to put you through in about one fifth the time—3½ months instead of one to four years. And when you graduate, you KNOW your business, for you have DONE everything in a practical way.

Your Success Is Assured

Remember, we use no books, have no classes and do not teach by correspondence. You do the actual work here the same as you will do later on the outside, only under expert instructors. From the simplest doorbell to the mighty generator—motor—electric locomotive, everything is made simple, understandable. Light—power—heat are mastered easily—quickly—surely. And all at small expense.



In the Great Shops of COYNE

Earn \$65 to \$175 a Week

Hundreds of our graduates are making this big money as Power Plant Operators, Electrical Engineers, Telephone Men, Superintendents, Electro Auto Engineers, etc. Hundreds of others are in the electrical contracting business for themselves and making from \$3,000 to \$20,000 a year. I want you to drop your present line and come to Coyne now and let us prepare you for big opportunities.

Earn While You Learn

Our Employment Department helps place students in jobs to earn a good part of their expenses while studying. No charge for this service. The catalog explains fully.

SEND COUPON NOW

Don't delay a minute—send that coupon in **right now** for our big free catalog and full particulars of this wonderful offer.

Free Radio Course

Besides the regular electrical course, we include the following:

- (1) A complete course in auto, truck and tractor electricity and storage batteries. Greatest outlay of auto electrical and battery equipment in the country.
- (2) Course in radio—the marvel of the age. Constructing, installing and operating. You can build your own wireless telephone set.
- (3) A life scholarship in the Coyne School. You can stay as long as you wish and return for further training at any time in the future. The aim of the Coyne School is to turn out men completely trained in all branches of electricity—capable of succeeding in the highest paid positions.

Bennett Wallington Cooke,
President

COYNE TRADE AND ENGINEERING SCHOOLS

Dept. 19
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CHICAGO,
ILL.

**COYNE
TRADE &
ENGINEERING
SCHOOLS**

B. W. COOKE,
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Dept. 19, 1300-1310 W.
Harrison St., CHICAGO

Dear Sir:—Please send me free your big catalog and full particulars of your special offer of 2 extra courses free.

Name.....

Address.....

Town.....

State.....

He Mailed This



He was a young Ohio business man. He realized that in order to get ahead he had to put more into his head. He wrote to the United Y. M. C. A. Schools, telling of his work and his ambition. The Schools advised enrolling for the very practical course in Salesmanship—a course of study that gives the student the benefit of the experience of scores of successful salesmen and sales managers.

20 months later he writes:

"The Course has done me a world of good. I have been made sales manager of a \$300,000 corporation."

You have as good a chance to get ahead as this young Ohioan—maybe better. Let us counsel you. We will tell you, free of obligation, about a new type of correspondence instruction that emphasizes an educational service to ambitious men that has brought thousands of appreciative letters from a group of more than 30,000 students enrolled during the last two years.

The larger responsibility, the better pay, the positions of leadership that these men are winning with our aid, may be yours also.

Mail This Coupon

United Y. M. C. A. Schools' Correspondence Courses

Business Courses

Accountancy
Advertising
Banking
Better Letters
Bookkeeping
Business Arithmetic
Business Administration
Business English
Business Finance

Business Law
Complete Letter Writing
Office Management
Practical Speaking
Salesmanship
Secretarial
Show Card Writing
Stenography
Traffic Management

Technical and Other Courses

Agricultural Courses
Applied Psychology
Architecture
Automobile Courses
Building Construction
Civil Engineering Courses
Drafting Courses
Electrical Courses
English Courses
Factory Management
Foreign Languages
Foremanship
Highway Engineering
High School Subjects
Illustrating

Insurance Courses
Mathematical Courses
Mechanical Engineering
Own-Your-Home Course
Plan Reading
Plumbing
Poultry Husbandry
Radio Engineering
Radio Telegraphy
Radio Telephony for Amateurs
Steam Engineering Courses
Structural Drafting
Surveying
Use of the Slide Rule
Vocational Courses

Are you an ex-service man?

United Y.M.C.A. Schools, Dept. 74-S, 375 Lexington Ave., New York City
Without obligating me, please advise regarding the course in

Name.....

Full Address.....

(Please write plainly.)

FORTUNES in a single year

The real truth of how they are made and how you, too, now have the same opportunity

DO YOU sometimes wonder why some people with only ordinary brains and intelligence make such astonishingly large incomes?

Take, for instance, many salesmen in the paint industry. Over \$60,000 was made in a single year by a salesman for one well known paint company; Mr. B, representing another, earned over \$50,000; Mr. G, representing a third, made over \$25,000. Yearly earnings of from \$4,800 to \$12,000 are common.

What is the secret of such amazing success? How can you—how can any one with average intelligence and the willingness to work make big money, too? There is only one answer—

Choose work with great opportunities and then become a specialist in that work

We can cite you many examples of the big incomes made in the paint industry—prove to you beyond the question of a doubt the wonderful opportunity—the almost unbelievably large incomes it offers.

But only men with real paint knowledge can enjoy these extraordinary incomes. Paint is a semi-technical product. A man must be a trained paint specialist to know how to advise his customers. That knowledge is his power. With it he renders real service. Because of this he gets the big orders and earns an amazingly large income.

Easy to Gain Knowledge That Brings Rich Earnings

You can easily acquire the knowledge that makes possible such rich earnings in the paint industry. The Cleveland Paint Salesmen's Training School offers a course easily mastered by anyone of only average intelligence. You need no previous experience—only the ability to read and write and the ambition to be a great success.

This course has been worked out by a master paint sales manager in conjunction with one of the most able paint chemists in the country. It is endorsed by leading paint manufacturers. They want to secure men who have completed it.

You will be placed with one of them immediately upon your completion of the course. This is without any cost to you whatever. No fees. No extras of any kind.

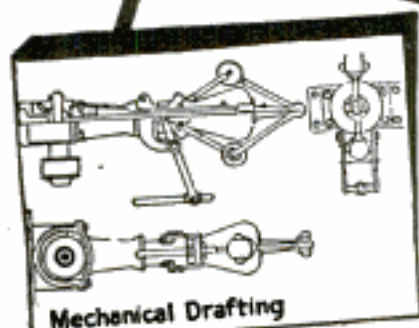
OPEN THE DOOR TO OPPORTUNITY

Opportunity is knocking at your door now in the shape of this announcement. Tear it out; write your name and address on the margin; mail it to us and it will bring you details of the wonderful possibilities for trained paint salesmen. It will show you the path to knowledge and success—perhaps fortune. Opportunity knocks but cannot enter unless you open the door. Don't let opportunity slip away from you. NOW! While it's here—within your grasp—Let it enter! Write your name and address on this announcement and mail it at once.

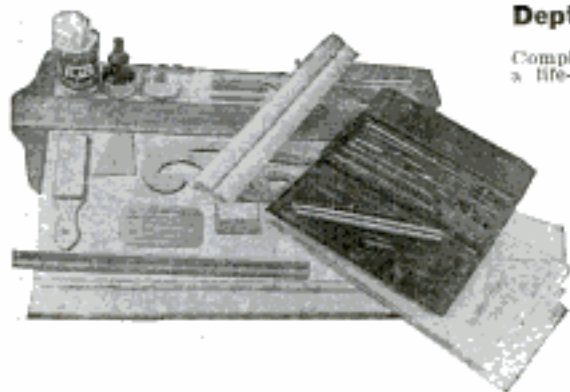
CLEVELAND PAINT SALESMEN'S TRAINING SCHOOL
336 Bangor Bldg. Cleveland, Ohio

Bank THE STATE BANKING & TRUST CO.
References CLEVELAND OHIO

This Professional Drawing Outfit FREE



All these Free to
Columbia Students
and Graduates



Good tools go a long way toward making a good draftsman. The set shown is of highest quality, and comprises the identical articles used by thousands of draftsmen holding top-notch positions. Consists of 16 pieces and 11-piece instrument set in plush-lined case. You get the COMPLETE OUTFIT FREE.

Make Drawings With this Set and Get \$35 to \$100 a Week

This FREE drawing set, together with the instruction we furnish will enable you to do expert drafting work—mechanical, architectural, map, radio, automobile, electrical, etc. We'll make a real draftsman of you. And we'll send this complete drawing outfit FREE with your first lesson.

You don't need artistic talent or "pull" to get a draftsman's job paying \$35 to \$100 a week. Our training has put thousands of men in these fine jobs. We teach everything you need. Never mind what work you've been doing all your life—we can fit you for these big, BETTER jobs.

Draftsmen Get Quick Promotions

Columbia graduates climb fast. We have hundreds of letters on file from graduates who have been promoted to Assistant Chief, Chief Draftsman, Production Manager, Engineer, etc. It is because the training we give is the very best. We promote initiative in our students, and that in turn promotes them to bigger jobs. The training we give is more complete than you'd get in many years work in the ordinary Drafting Room. Our instruction covers all the phases of drafting, while the draftsman who tries to learn at "the school of experience" gets training along only one line.

Easy Money "On the Side"

A draftsman can make a lot of money "on the side." Many of our graduates make as much and more than their large salaries this way. There is always a lot of side-issue work to be had. Many graduates have built up businesses of their own this way. Wouldn't you like to see your name on the door of an office of your own as a Drafting Engineer or Consulting Draftsman? You CAN! We show you how.

Get the Right Training

"Training" is the whole secret of success as a draftsman. Columbia training is simple, sure, complete, PRACTICAL. Roy C. Claffin's method of practical mechanical drawing will make a Master Draftsman of you in a few months of home study. Mr. Claffin personally supervises your instruction—personally criticises and corrects your work. He makes the study pleasant and easy. You get plain, commonsense, brass-tack instruction.

Columbia Draftsmen in Big Demand

The largest concerns in America, and the U. S. Government, employ Columbia draftsmen. We help you get a position. We have constant demand for our graduates. We keep employers advised as to your abilities, and thus help you get quick promotion.

Send for this Book

Send the coupon to-day for illustrated book, "Your Future in Drafting." It tells all about the Columbia Course. SPECIAL OFFER FOR THOSE WHO SEND THE COUPON NOW. Do it.

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Roy C. Claffin, President

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Complete Drawing Outfit free. Employment service free. Consultation privilege for a life-time free. Diploma free. Publication for Draftsmen, "The Compass" free.

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Without obligation to me, please enter my name to receive "The Compass," and send me your illustrated book, "Your Future in Drafting," telling me about your complete home study course and your help in securing me a position as draftsman.

Name.....Age.....

Address.....

City.....State.....

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you
clipped this
coupon

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 5666-C, Scranton, Penna.

Without cost or obligation, please send me full information about the subject before which I have marked an X in the list below:

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| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Foreign Trade |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Nicholson Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Business Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |

TECHNICAL AND INDUSTRIAL DEPARTMENT

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| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Plumbing and Heating |
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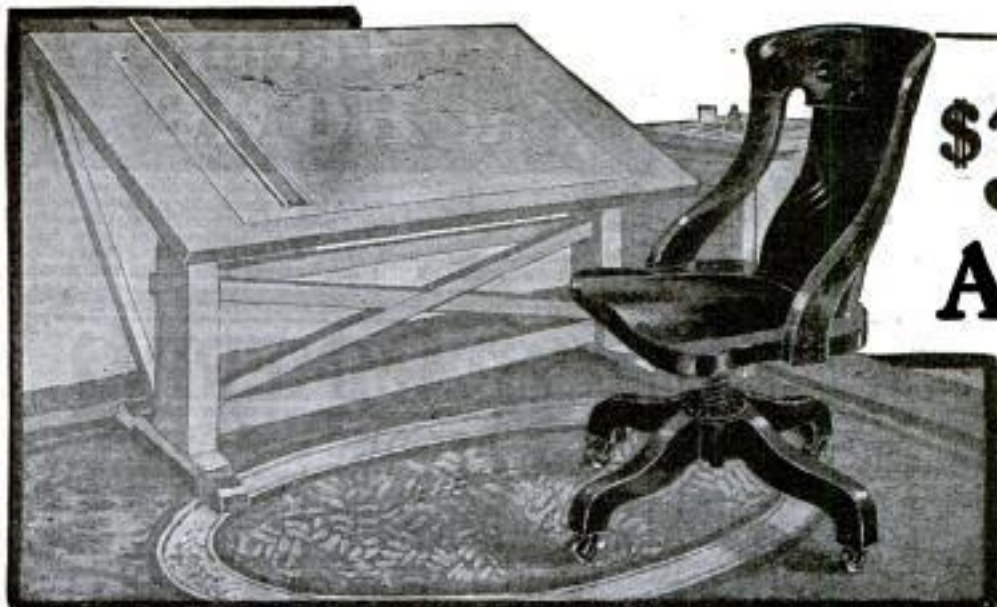
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Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 38

SEPTEMBER, 1922

No. 3

“Human Gopher” Recovers Master Bushing 9631 from Deep Oil Well

BY FRED A. HERR, 333

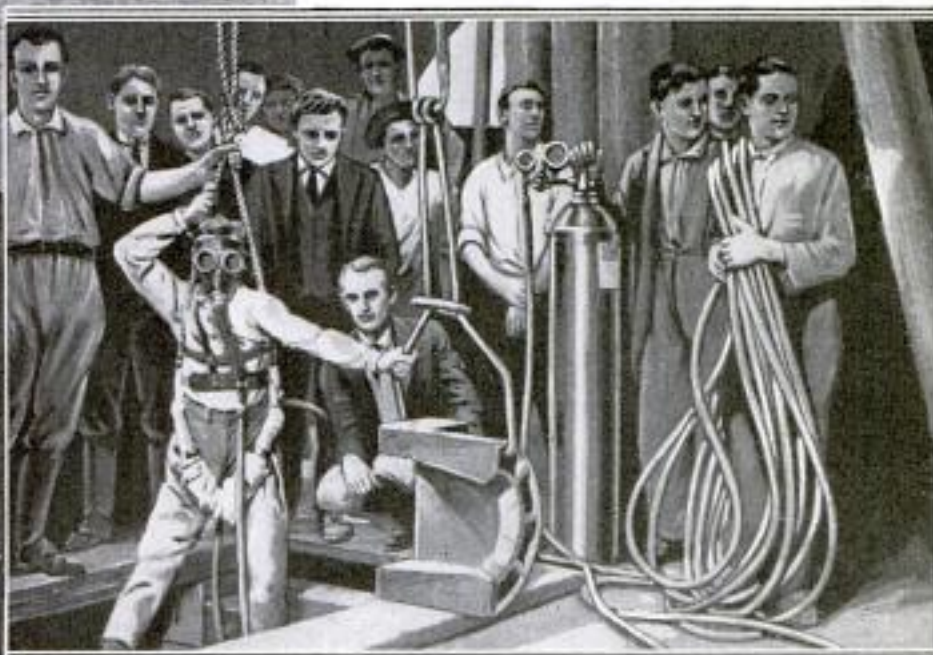
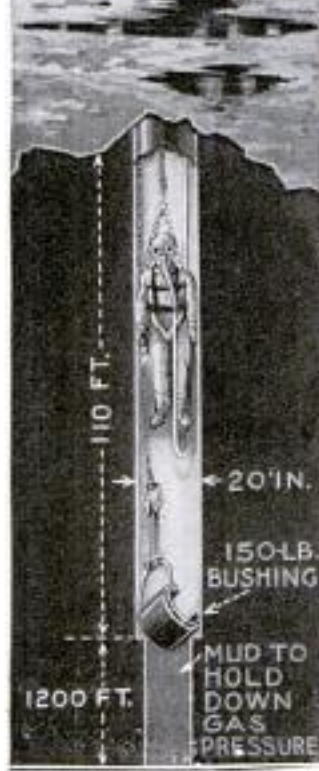
*Lowell Ave.
Long Beach,
Calif.*

WHEN the Interstate Oil Company of Los Angeles lost a master rotary bushing down the casing of Jonah No. 1 well in the Signal Hill oil field, three alternatives were available for continuing operations at the well. The lost tool could be dynamited out of the casing, the

rig could be “skidded” over a few feet and a new well started—or a man could be let down the hole to bring up the bushing.

Dynamiting involved the virtual destruction of the well, and skidding the rig meant the sacrifice of approximately \$25,000 spent in drilling the hole to its present depth. Then some one mentioned the name of Walter McCay, of Taft, Calif. McCay is known as the “human gopher” in the west coast fields. He was brought to Los Angeles, examined the well, and agreed to go down the hole and bring up the lost tool.

The bushing had lodged at the 110-foot level in the 20-inch casing. Below it for 1,200 feet to the bottom of the hole the well was filled with mud, pumped in to counteract the heavy gas pressure. Sinister bubbles on the surface of the mud indicated the presence of much gas, making the attempt to enter the well a hazard-



Left: The Sectional Diagram Shows How the Man was Lowered to Fasten the Grab Hook to the Bushing Lodged Where the Large and Small Casings Join. Right: Walter McCay in a Special Rope Harness and Equipped with Oxygen Breathing Apparatus as He Appeared after the Recovery of the Bushing.

ous undertaking. It was McCay's pleasant job to get down the narrow 20-inch pipe and attempt to "hook" onto the bushing with a pair of iron tongs.

A harness, constructed of 1-inch hemp rope with loops for the insertion of the legs, was prepared to suspend him in the gas-filled hole. The sides of the harness were padded with cotton. The man sat suspended in the loops in the manner of an aerial performer sitting in the iron-rings of a trapeze. Wearing a gas mask, attached by a rubber hose, 150 feet long,

to an oxygen tank, and carrying a flashlight, the man was suspended from the cat-reel line over the cavernous well opening and lowered slowly into the narrow, muddy, gas-filled pipe. Oxygen was continuously pumped down to him. Six trips were made down the casing before a satisfactory connection was made with the tongs. Finally the bushing was "hooked," and the human gopher was drawn out of the well, pulling the bushing up after him. He spent more than 45 minutes in the hole.

9781

TRAP CATCHES FUR-BEARING ANIMALS HUMANELY

To take the place of the steel-jawed leg trap, the cruelest means of catching fur-bearing animals on account of the

HIGH-CARBON GRINDING BALLS GIVE GOOD SERVICE

The grinding balls used in tube and ball mills are subject to most severe conditions of abrasion and shock and must be especially made in order to render good service. It has been found that grinding balls made of an alloyed steel-base white iron of high-carbon content give excellent results. These balls are cast in such a way that the crystals radiate from the center of the ball, reducing wear and breakage to a minimum.

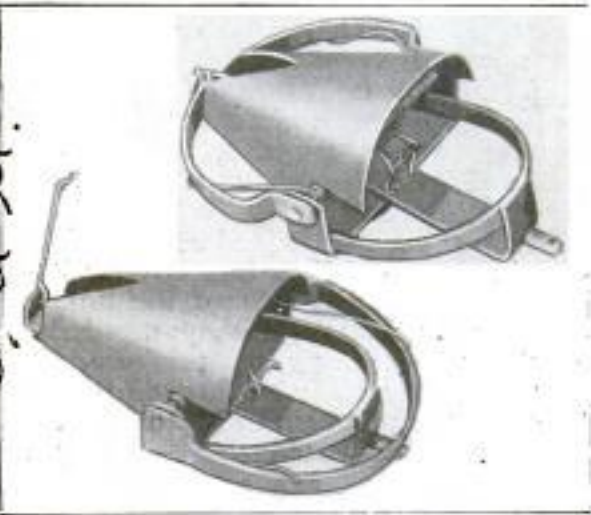
mining & Scientific Press

NEW CONVERTIBLE FIXTURE FOR GAS BURNERS

9702 FOR GAS BURNERS

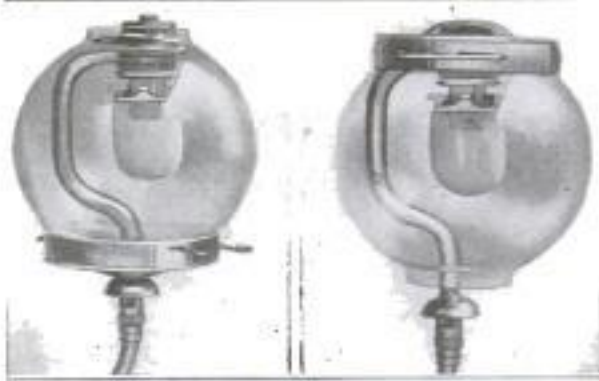
For converting the open-flame gas burner to the mantle-type of burner, there is now being placed on the market a fixture that has several interesting points. The fixture may be screwed on in place of the open-flame burner, and the "gooseneck" is of such dimensions that it will fit inside the standard shades or globes. The shade holder may be placed at the top or bottom of the globe adapting the fixture for either direct or indirect lighting, a threaded knob being provided at the top of the fixture for supporting the holder.

U. W. Ernest Cole 413 S. Church St. Belleville, Ill.



Trap for Catching Fur-Bearing Animals Humanely: The Upper Jaw Swings Over Rapidly When the Bait is Touched by the Animal, and Breaks Its Neck

length of time that may elapse before death, a trap has been invented that breaks the neck of the animal, killing it instantly. The trap is composed of two jaws, one stationary and the other movable. The stationary jaw is connected rigidly to the horizontal framework of the trap, and is raised slightly above the ground in front of the hooks that hold the bait. Outside this jaw, pivoted on a spindle on which is a strong coiled spring that operates it, is the movable jaw. When set, this jaw is swung clear back to the rear of the trap, where it is held by a trigger. When the bait is touched by the nose of an animal the jaw is instantly released, and the spring swings it over so that the animal's neck is clamped between the two jaws and broken. It is claimed by the makers that a 10-year-old boy can easily set the strongest trap.



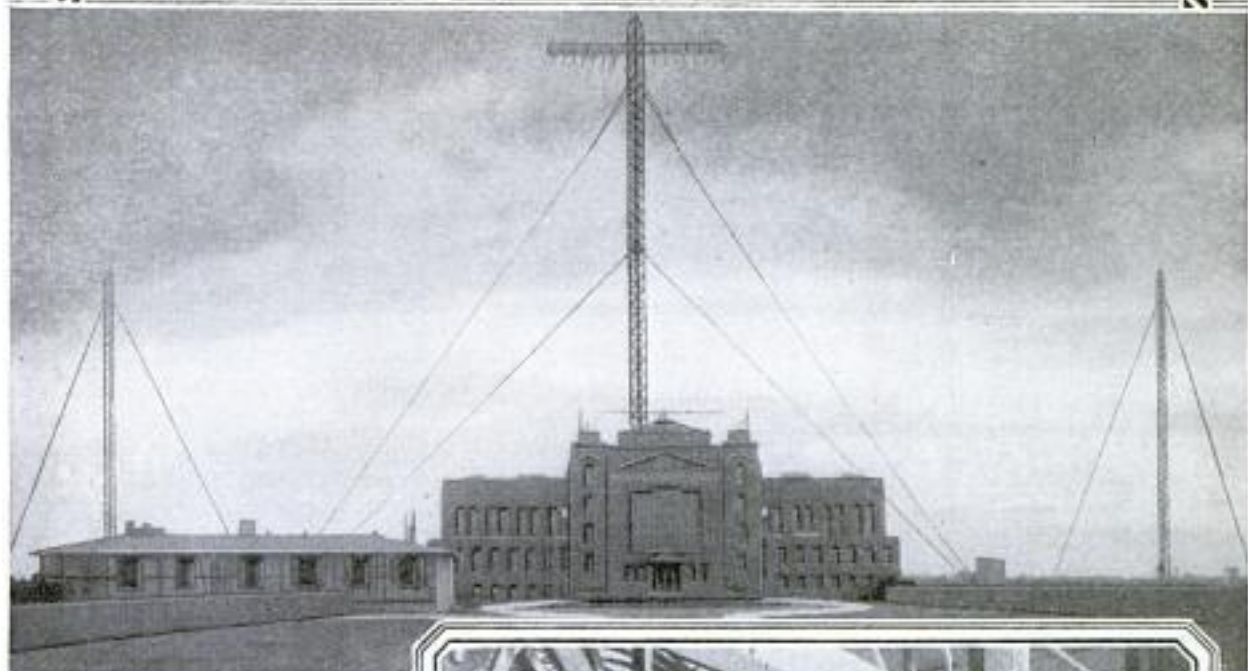
Left: Burner and Shade Holder Arranged for Indirect Lighting. Right: Same Fixture Used for Direct Lighting

The General Gas Light Co. St. Charles Hotel Bldg. Pittsburgh, Pa.

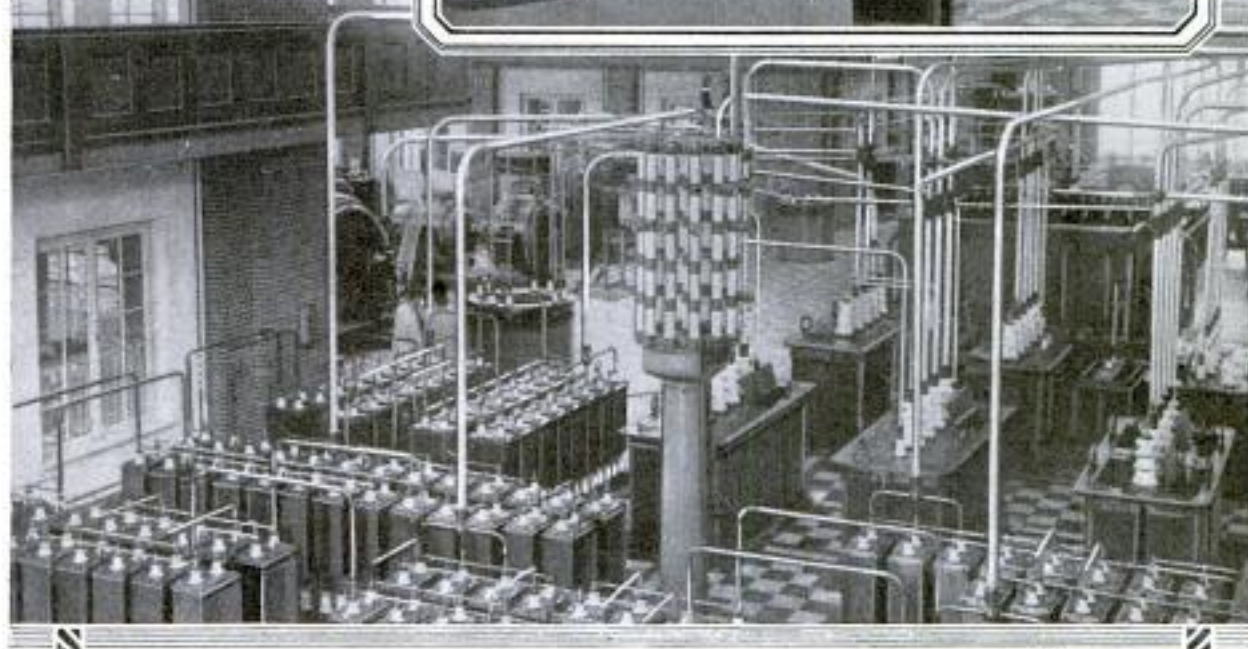
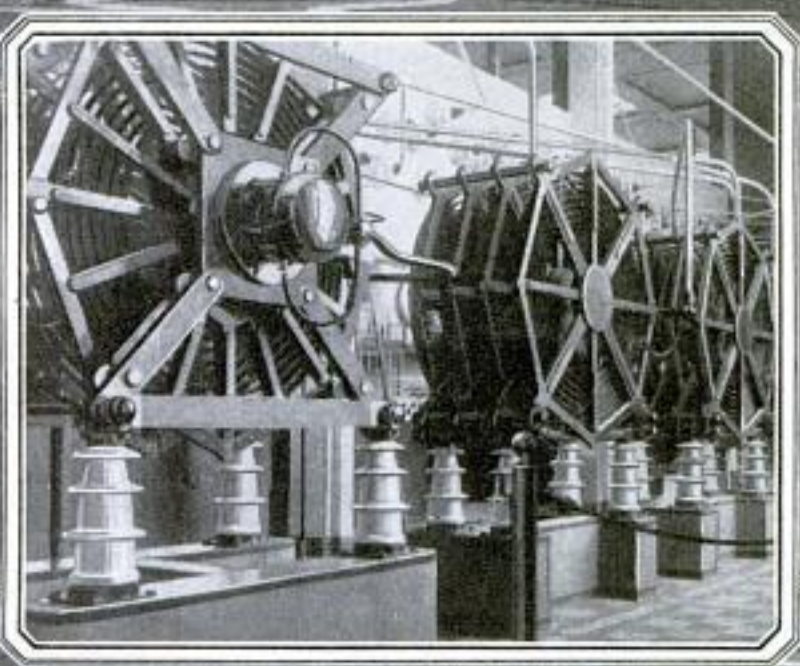
Los Angeles Laundry Co. 7 Calif. St. Alameda, Cal.

6/10/2

GIGANTIC RADIO STATION OPENED IN GERMANY



At the Top is Seen the Exterior of the Large Wireless Station Recently Opened at Nauhen, Germany, Showing the Three Gigantic Towers Constructed to Support the Antenna. In the Center is Shown Some of the Mammoth Tuning Coils with Which the Station is Equipped, and the Method of Mounting Them upon Insulators. Below can be Seen the Sending Room, Containing the Large Installation of Storage Batteries Necessary in This Powerful Radio Station. The Opening of This Station Graphically Illustrates the Way Germany is Endeavoring to Keep Abreast of the World's Progress



Chas. J. Es. Allen, Carshalton,

106 Victoria St. London, Eng.

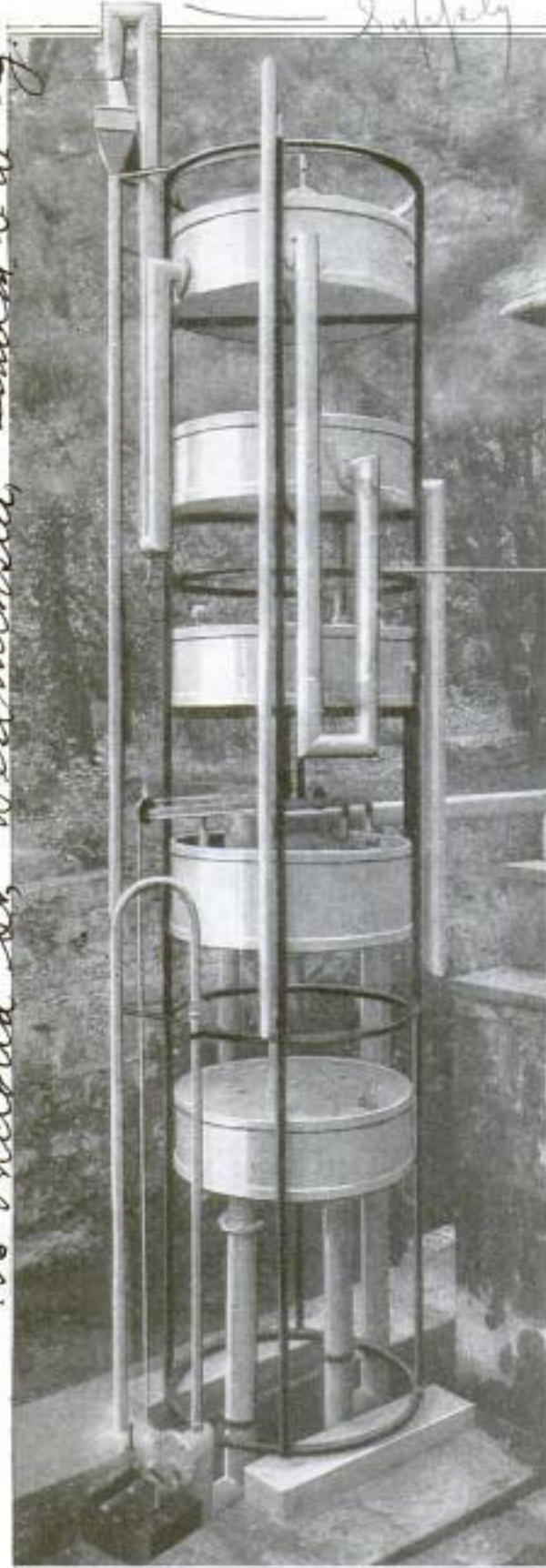
POPULAR MECHANICS

NEW WATER-LIFTING MACHINE SELF-OPERATING

332

9676

Chas. J. Es. Allen, c/o Messrs Liversidge & Co. Ltd., 106 Victoria St., Westminster, London S.W. 1, Eng.

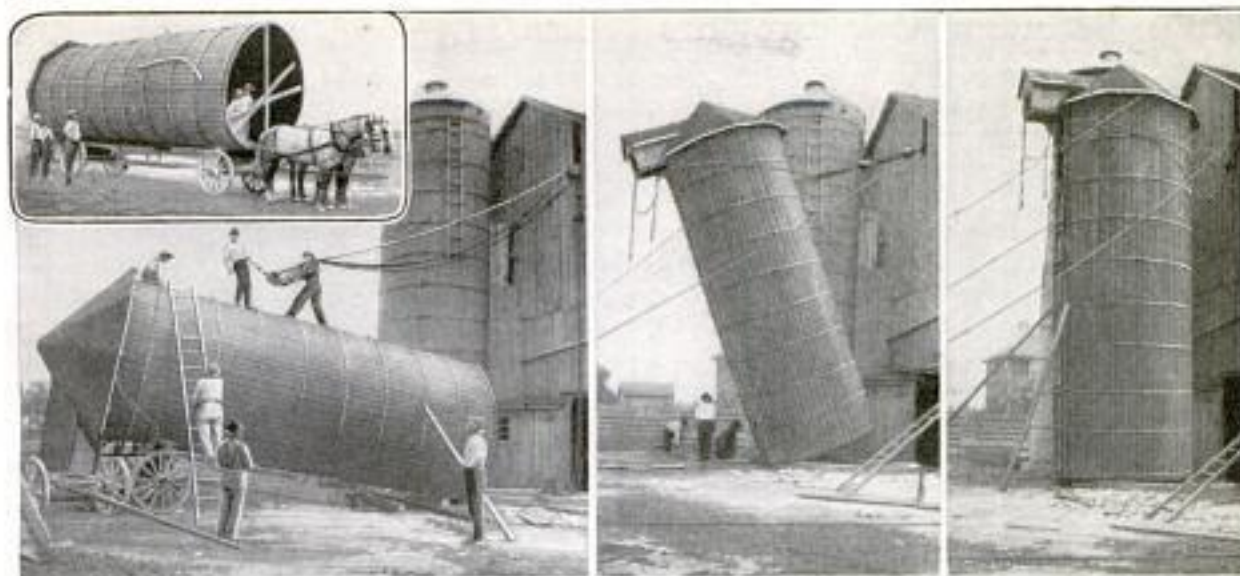


A machine that is entirely self-operating, and that lifts water in any quantity to any desired height, has been installed on the river Wandle, England. To operate the machine there must be an available fall in the river between an upper level, which may be called the headrace, and a lower level or tailrace. Halfway between is a closed tank which is the operating chamber of the apparatus, and which is connected by an inlet pipe to the headrace, and to the tailrace by a discharge pipe in the nature of a siphon. Above this operating chamber are a series of alternately open and closed tanks, one above the other, at equal distances, to the required height. Each pair of closed and open tanks are interconnected by pipes, and each closed tank is connected by an air-conducting pipe to the operating chamber below. In operation, first by means of an automatic valve the water from the headrace is admitted to the operating chamber, which at that time is full of air. The filling of this chamber with water under pressure forces the air, also under pressure, into the overhead closed tanks, which at that time are full of water. This, therefore, in each case is forced into the open tank above it. The valve then cuts off the water supply to the operating chamber, and its contents are discharged to the tailrace, leaving a vacuum in the chamber. This vacuum is communicated by the air pipe to each of the closed tanks, and thus the water in each open tank, filled by the previous stroke, is sucked up to the closed tank immediately above it. The machine is now in the same condition as before the first stroke, and each of these strokes—one a pressure and the other a suction stroke—is alternately repeated by the operation of the automatic valve.

9682
SILO MOVED FROM ONE FARM TO ANOTHER ON A WAGON

Recently a silo of 3-ton capacity was moved intact from one farm to another in Ohio, and was reerected on a new foundation without injuring it in any way. At its original location, the silo was loaded onto a lumber wagon, and was then hauled to its new site. Here the rear wheels of the wagon were removed, and the bottom of the silo was placed against the side of the new foundation. Then, by means of a block and tackle connected to its top, the silo was

Automatic Water-Lifting Machine: From Bottom Up, the First and Second Tanks Are the Operating Chamber and Headrace, Respectively; the Third and Fifth are Closed, and the Fourth Open. The Open Lower End of U-Pipe at the Left Is the Tailrace



Insert Shows the Silo being Moved along the Road. The Other Views Give a Clear Idea of the Means Used to Erect and Place It in Its New Location

hoisted from the front wheels into an upright position, and properly adjusted upon the foundation. It was a matter of only one morning's work to remove the silo, and erect it ready for use in its new position. The method was found to result in a considerable saving, but is advisable only when the silo is in good condition.

¶ To aid the retail lumber dealers, the National Lumber Manufacturers Association has started a correspondence course on "Lumber and Its Uses and the Merchandising of Lumber."

W. Moore Chicago

SPEEDY FRENCH HYDROGLIDER LOOKS LIKE A GIANT FISH

9551
 With a speed of 63 miles an hour, claimed to be the world's record, a new French hydroglider has much the appearance of a giant fish. Its air propeller is driven by a 300-horsepower motor that is supported and strongly braced above the craft at about its center and just behind the small compartment in which the passengers ride. It glides on horizontal planes, and is steered and controlled like a flying boat, which in other respects it very much resembles.



New French Hydroglider That Has a Speed of 63 Miles an Hour: The Motor, Directly Connected to the Air Propeller, Develops 300 Horsepower. In Every Respect It is Built Very Much on the Lines of a Flying Boat

International Newsreel Corp
 New York City

Inquiries to: J. H. Wood,
 706 Flanders Bldg., Philadelphia
LIGHT SPEAKS! Pa.

9810

Little Selenium Cell Provides Voice for Motion Pictures—Old Inventor Pioneers in New Field—Vast Possibilities for Research Opened Up by Perfected Coil

BY H. A. LANE

NATURE seems to have decreed that stupendous results in scientific research shall always emanate from the most meager beginnings. Also, that long struggles shall have been put forth before she consents to relinquish any of her secrets. Any inventor will testify to this from the facts of his own experiences. Many of these inventors or experimenters have been interested for some time in the wonderful properties of selenium.

This substance, belonging to the sulphur family, displays peculiar characteristics when exposed to light rays of changing intensities. Due to its mysterious nature, selenium has been made the basis of extensive experiments in the electrical field. Coils of wire, when treated with a compound of selenium and connected in an electrical circuit, can have their resistance raised or lowered by exposing the treated portion of the coil to light. From this basic principle, numerous adaptations of this astonishing material have arisen. Chief among these, in the past few years, has been the attempt to obtain a synchronous rendition of sound and motion which would be applicable in the motion-picture field.

One of the pioneers of this talking-movie idea is a Chicago man who, some six or eight years ago, began to experiment along this line. Carefully reviewing such possibilities as were commonly known at that time, the experimenter concluded that, to achieve results, a selenium coil, or cell, was a necessity. Casting about for one of these, he learned that no satisfac-

tory cells were available. Refusing to be halted by the circumstances, he hunted up an old friend, L. A. Brinkman, also of Chicago, who had tinkered with numerous small inventions for the greater part of his life. Unceasingly the worried man burst upon the old inventor one day abruptly pronounced: "You've got to make a selenium cell."

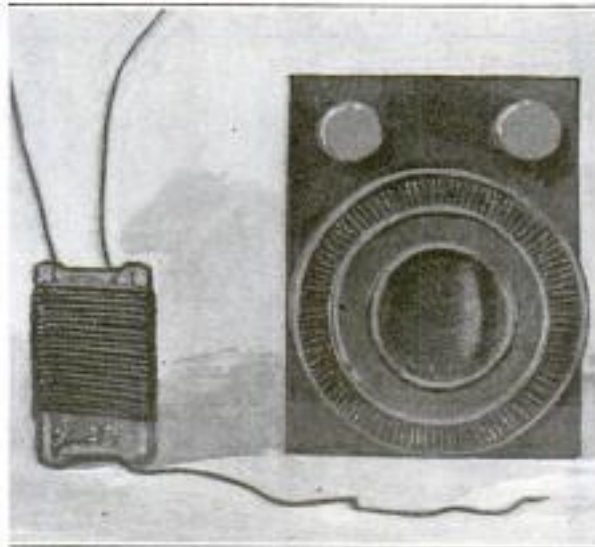
His gray-haired friend smiled quietly and queried: "Selenium? What is it?—I've never heard of it."

Nevertheless, Brinkman, in his peculiar way, strove to oblige his life-long friend and immediately began to work on his new problem. Pamphlets from various universities and advice from scientific sources caused him to try elaborate mixing and baking methods in order to produce the proper compound for creating a satisfactory cell. But after many months of unsuccessful trials, he impatiently brushed aside all the proffered formulas, and acting under a sudden impulse, mixed a compound of his own. Then, taking a tiny coil of wire, he spread, or to quote his term, "smeared" the mixture over the surface. Placing the coil in an electrical circuit, he was astonished to observe the extreme sensitiveness of the midget cell when light of varying intensity was directed upon it.

By the time Brinkman had succeeded in producing a satisfactory selenium cell, his friend had been obliged, through financial obstacles, to put aside his talking movies, and the old genius promptly lost interest in his discovery. Vague accounts of the



Miniature Lamp (Exact Size) Which Aids in Changing Sound Waves to Light Waves When Voice Variations in the Transmitter Vibrate the Filament



Left: One of the Wonderfully Sensitive Selenium Cells, Showing, in Actual Size, the Winding of Copper Wire upon a Soapstone Core. Right: Selenium Cell Inclosed in Its Case



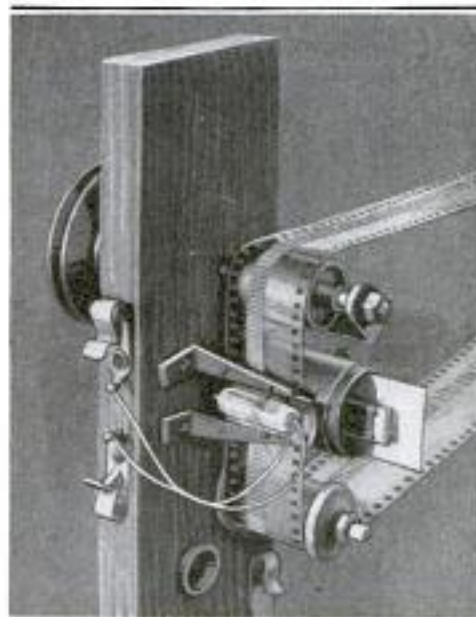
Tuning the Radio Amplification Apparatus to Obtain a Reproduction of the Tones of the Human Voice from a Strip of Motion-Picture Film: This Picture, Taken during the Development of the Talking-Movie Idea, Shows the Inventor behind the Table, being Assisted by His Friend

cell found their way into print, and though it was known that he had produced the article, no one seemed to have a use for it. This was the state of things up to the latter part of last year. At that time another man was searching the country for a selenium cell to aid in the work of photographing the sound waves of the human voice. Finally, through devious channels, he was directed to Brinkman, and requested by mail one of the tiny treated coils for experimental purposes. The inventor obligingly presented him with one, and he quickly realized the possibilities of the amazing sensitive-to-light qualities of the small cell.

In six months' time, they had reached the stage of comparative success. The underlying principle of their labor was to change the sound waves, or vibrations of the human voice, into light waves, and then obtain a photograph, or record, of these light

waves upon a strip of ordinary motion-picture film. Then the light waves, which appear on the film as fine lines of different shadings, were to be detected, or "taken off," amplified by radio apparatus, and the voice thereby reproduced in its natural tones.

In brief, their method of procedure is as follows: The vibrations of the voice are carried into a telephone transmitter and from there, as electrical impulses, they pass through a miniature lamp connected in a battery circuit. The variations of the sound waves change the impulses in the battery circuit, and cause a vibration of the tiny light. These vibrations, invisible to the naked eye, are recorded through a narrow slit which permits the light to fall upon the swiftly moving film. The film is then developed in the usual manner, the



Close-Up of Reproducing Mechanism, Showing How the Film Passes between the Light and the Selenium Cell

vibrations appearing, as stated above, as lines of different shadings. For reproduction, the film is passed between a

selenium cell and a bright light. The lines or shadings on the film cause a change in intensity of the light which is shining through them and on the selenium cell, thus causing a change in resistance of the sensitive coil when it is connected in an electrical circuit. From this point, by proper radio-amplification methods, these variations in the electrical circuit are transformed into sounds, which are the exact duplicates of those carried into the transmitter at the beginning of the operation.

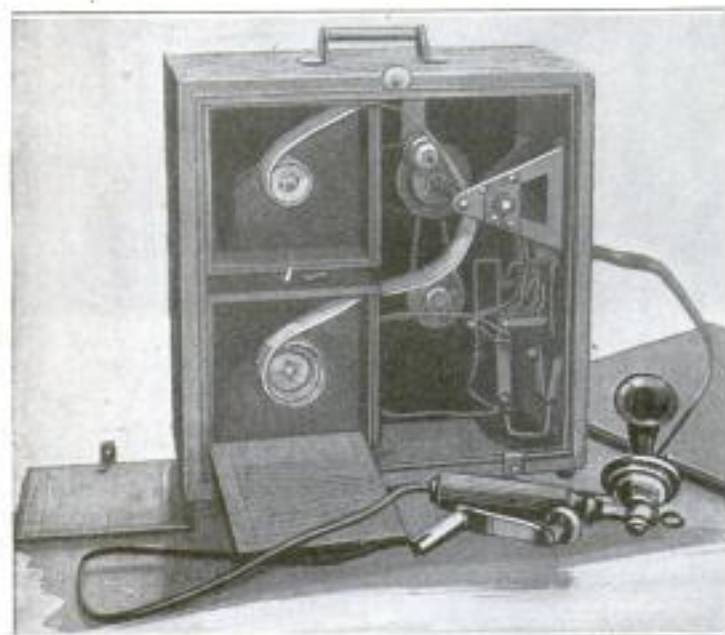
By being able to record the voice at the same time the pictures are filmed, on the

the screen, there is no possible chance for the voice and action to get "out of step," which fault has been the stumbling block of all other systems of this kind, heretofore.

Taking into consideration the fact that sound waves, which travel at the approximate speed of only 1,100 feet per second, can be changed into light waves having a velocity of 186,000 miles a second, the possibilities of the tiny selenium cell are inconceivable. This fundamental fact alone opens broad fields of theory. The three men responsible for the bringing forth of the marvelous discovery, however, are concentrating upon the talking motion picture.

Other uses to which the innovation can be put, are the making of films, or records, of entire operas, and symphony concerts. These will be recognized as being greatly superior to the four or five-minute records now available on the common talking machine. In addition, the metallic, or "tinny," sound will be entirely eliminated, owing to the absence of any mechanical contact between the record and the reproducing mechanism.

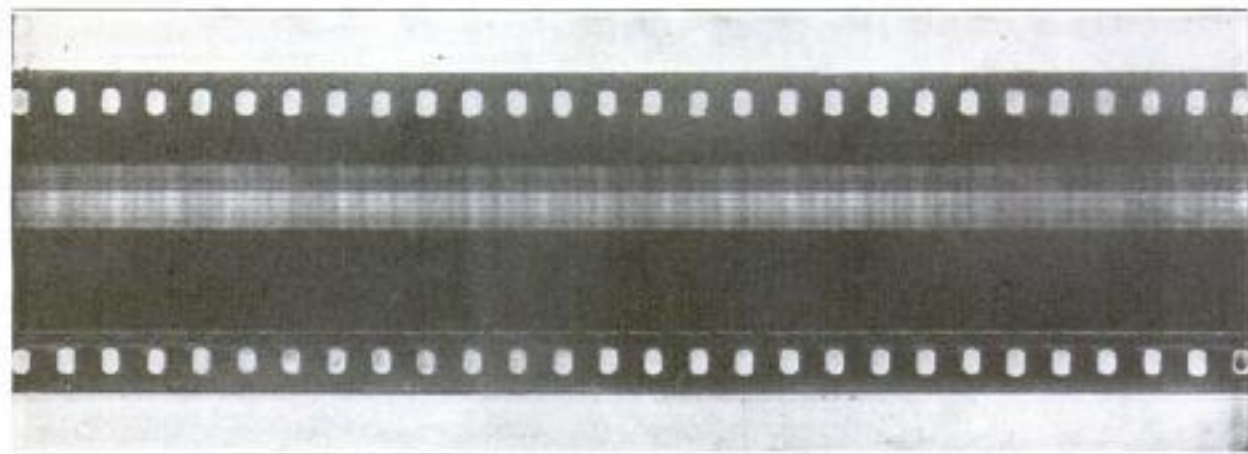
Further adaptations based upon the merits of the selenium cell are: fire alarms, by giving notice of the glare of flames; burglar alarms, by indicating the presence of flashlight beams; the measurement of light intensities; the testing of materials or substances by colors; the recording of entire court proceedings without error, and the switching on and off of lights in isolated places by the automatic action of daybreak and nightfall upon the supersensitive little cell.



Portable Outfit for Obtaining a Record of the Voice at the Same Time the Pictures are Taken: The Crank for Turning the Reels, and the Transmitter, are Seen in Front

margin of the same strip of film, and with the developing process being exactly the same, the absolute synchronism of the sound and action is clearly apparent. And when the film is eventually projected on

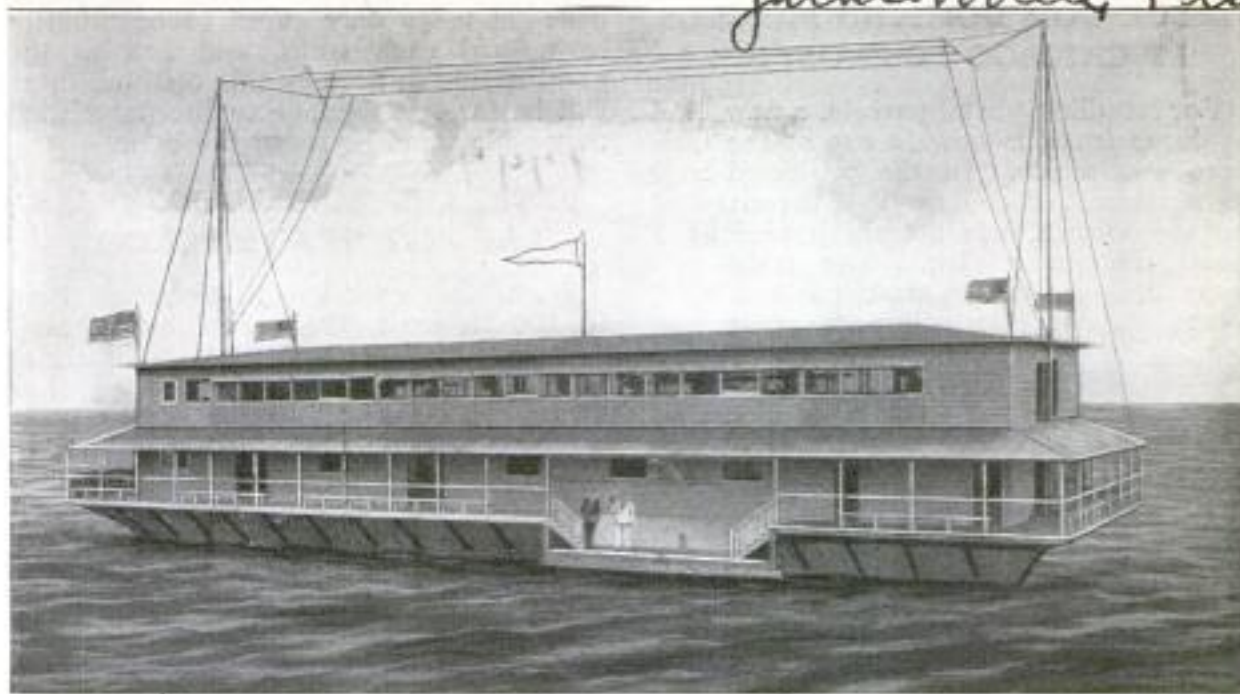
of entire court proceedings without error, and the switching on and off of lights in isolated places by the automatic action of daybreak and nightfall upon the supersensitive little cell.



Section of Motion-Picture Film Used during the Early Experiments, Which Shows, by Means of the Shaded Lines, How the Record of the Human Voice Appears on the Finished, or Developed, Surface

9736

P. E. Peck, Peck's Dancing Pavilion
Palm Garden
POPULAR MECHANICS
Jacksonville, Fla. 337



Floating Dance Pavilion Which is Anchored but a Short Distance from Jacksonville, Florida, and is Used as a Popular Resort by the People of That City

9736

FLOATING DANCE PAVILION AND PALM GARDEN

Anchored in the beautiful St. Johns River, a short distance from the city piers, a floating restaurant and dancing pavilion is the novel pleasure resort for the people of Jacksonville, Fla. A large barge was used as a foundation for the pavilion, which is built to accommodate 1,500 persons. The dance floor, on the main deck, is probably the most popular feature of the boat. An orchestra stand is in the center of the floor, while at one end are found check rooms and rest parlors for guests.

Double stairways lead from the main to the upper deck, which is devoted to a palm garden, attractively decorated and furnished, where is served sea food fresh from the Atlantic. Loud-speaking radio-receiving sets are also installed on this deck. Numerous small launches run from the pavilion to the shore dock at frequent intervals. The venture is proving successful.

9619

COLLAPSIBLE VIOLONCELLO PORTABLE AND QUIET

As portable as a violin is a knockdown violoncello invented by a woman musician in Paris, France. The instrument has a skeleton body so constructed that it is sufficiently mute to be heard only in the room where it is played. Thus it can be carried about, giving the musician the

opportunity of practice, anywhere at any time, without danger of disturbing people in the vicinity. There are three detach-



Violoncello Shown Dismembered at the Left, While at the Right It is Seen in Use

able parts to the instrument, and it is also partly collapsible, so that the whole can be folded together to form a moderate-sized package.

Shipped from London, England, in 1914, a trunk went astray and journeyed from place to place for eight years, being finally delivered in New York City, its proper destination.

Inv. Mademoiselle Adèle Clement
Paris France
Copyrighted material

**TRUCK FOR DUMPING PARCELS
AT CHICAGO POST OFFICE**

For handling postal parcels, a new kind of dump truck is now in use at the Chicago post office. In the projected new terminal post office 8 or 10 of these trucks will be formed into a train hauled by a small electric tractor. The train will carry the parcels to a trough in the floor, where an operator will release the tilt-

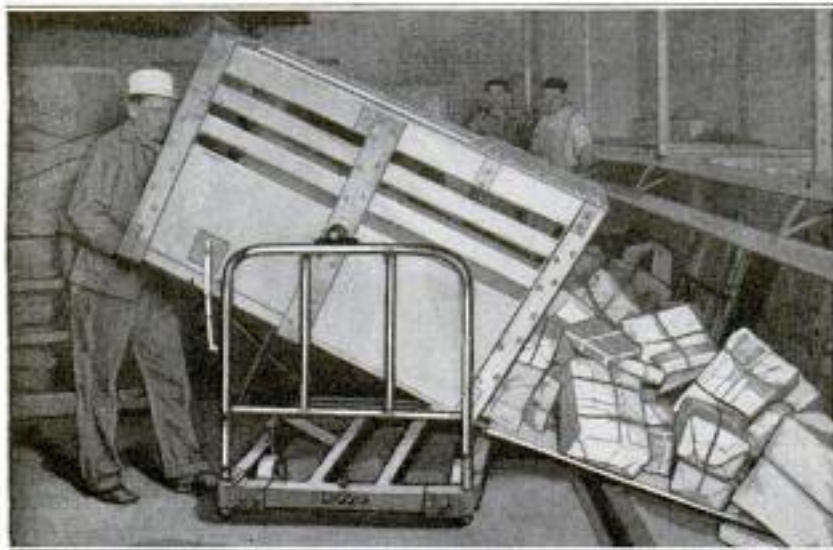
belt. It takes only about seven minutes to unload each train, and besides the great saving in time by this method, there will be far less damage to the parcels, as they slide smoothly onto the belt.

9747
**VETERANS' BUREAU BECOMES
LARGEST TRADE SCHOOL**

With the enrollment of more than 130,000 students, the rehabilitation division of the United States Veterans' Bureau has become the largest trade and industrial school in the world. The students are scattered all over the country and are being trained in the leading colleges, technical and commercial schools, as well as in business establishments, in shops, and on farms. Practically every vocation is represented in the training, and the courses selected for the men are such that their disabilities will not prove a handicap. Contrary to general opinion, only a small percentage of the

men receiving vocational training suffer from amputations.

Washington, D.C.
N.P. 3800



New Parcel Dump Truck Now in Use at the Chicago Post Office: The Parcels Slide onto a Conveyor Belt That Operates in a Trough in the Floor in Front of Them

ing device, dumping all the packages in each truck successively onto a conveyor

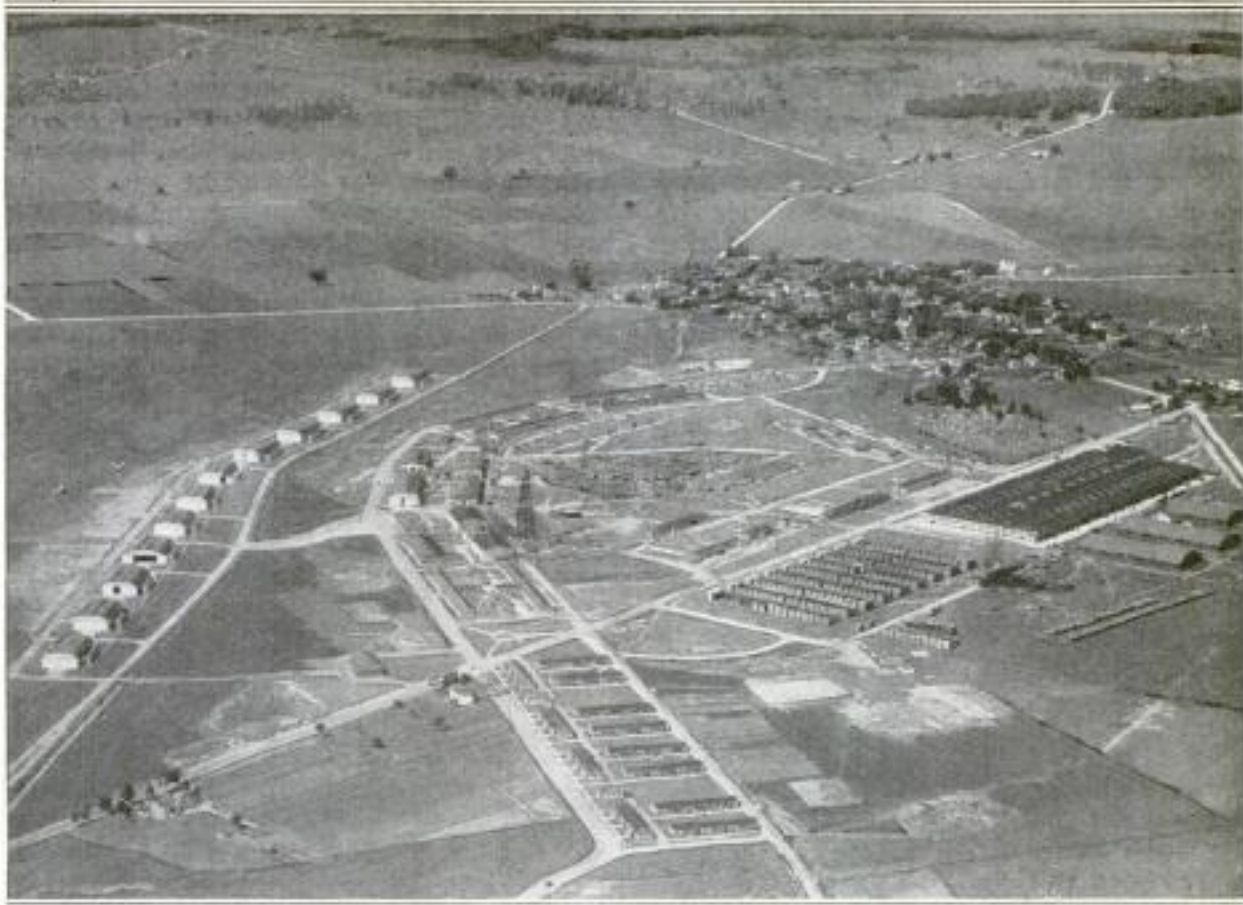
9638



KENTUCKY BLUE-GRASS SEED IS VALUABLE BY-PRODUCT

BECAUSE of the nature of the famous blue grass of Kentucky, cattle can be raised and fattened on it all during the year, yet, at harvest time, the seed can be harvested and sold at a good profit. Advantage has been taken of this peculiar property, and many large stock farms annually sell thousands of dollars' worth of the seed. There is always a good demand for it for lawns and pasturage, and also for seeding the fairways of golf courses.

Wide World Photos
Chicago
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This Aerial Photograph was Taken over the Wilbur Wright Aviation Field and Shows, to the Right, the Town of Fairfield, and below It the New Site for Osborn, Not Yet Laid Out

TOWN MOVES ITSELF AT A PROFIT

Old Site Menaced by Flood Waters of New Retarding Basin of Big Dam—
Unusual Plan Adopted for Moving and Rebuilding at New
Location on Higher Ground

BY IVAN E. HOUK, *City Engineer*

IN southwestern Ohio there is a small town named Osborn. This village of about a thousand population grew up along the banks of Mad River some 12 miles northeast of Dayton, not far from the scene of the Wright brothers' world-renowned aviation experiments. Prior to the great flood of March, 1913, Osborn's existence had been comparatively uneventful. Up to that time there had been no unusual circumstance to distinguish it from the several thousand similar villages scattered throughout the United States. Today, however, the situation is different. Its people are now doing something out of the ordinary: they are moving their entire town from its present location in the bottom of the valley to a site on higher ground about two miles away.

There have been instances before where it was necessary to move entire towns. Clinton, Mass., was moved because of the Wachusett Dam. Sulphur, Okla., was moved because of the drainage of the

town wastes into the mineral springs near that place. The moving of American Falls, Ida., in connection with the Snake River development and the construction of the American Falls Dam took place a year or so ago. In no instance, however, so far as can be learned, was the actual moving carried on by the residents themselves as is the case at Osborn.

Osborn is being moved because its original location is within the retarding basin formed by the Huffman Dam, one of the recently completed Dayton flood-prevention dams. Although Osborn did not suffer serious flood damage in 1913, it would have if the dam had been built, since the calculations of the flood-prevention engineers show that in the future the original townsite will be covered with backwater about once in 40 years, and this is enough to prohibit the future existence of the town in such a location, especially when it is considered that the next flood of great enough proportions to flood the place is just as likely to come

this year, or next, as 40 years hence. The village was acquired by the flood-control authorities in 1918, about 75 per cent of the property being obtained by direct purchase and the remainder by condemnation. Inasmuch as there was at that time no need for haste in wrecking or otherwise disposing of the structures, owing to the fact that the dam had been barely started, the homes and business houses were rented to their former owners. The intention of the flood-prevention directors was to hold the property until they could dispose of it advantageously, either as a whole or piece by piece, with the stipulation, of course, that it be either wrecked or moved out of the flood zone. It was then the leading men of the village got together and worked out a plan for buying back their town and moving it in its entirety to higher ground — the plan they are executing today.

These men, headed by the mayor and the city attorney, organized the Osborn Removal Company and incorporated it under the laws of Ohio as "a corporation for profit." While the incorporators hope to make a reasonable profit, their real purpose is to preserve the town of Osborn. They assured the people when they formed the company that there would be no profiteering, that the interests of the people would come first and the matter of profit second; and they have adhered to their original intentions.

The company was capitalized at \$100,000, and stock was sold at par to the residents of Osborn. Each block of 10 shares entitles the owner to buy a lot at the new

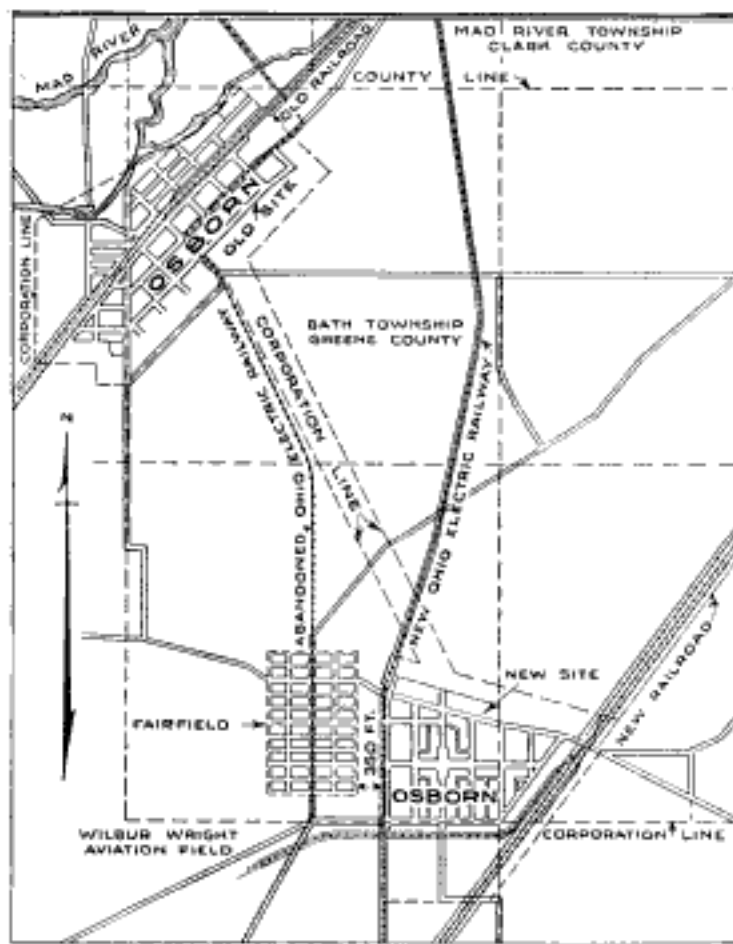
site. The new site, covering 129 acres, and all of the movable property at the old, were purchased from the flood-prevention authorities at a price which represented a fair valuation for the new land and the actual wrecking value of the property to be moved.

Besides the new site it was necessary to purchase a strip of land running between the two locations. The reason for this was that the Ohio laws provide no method for moving a town. They do, however, provide for the annexation of

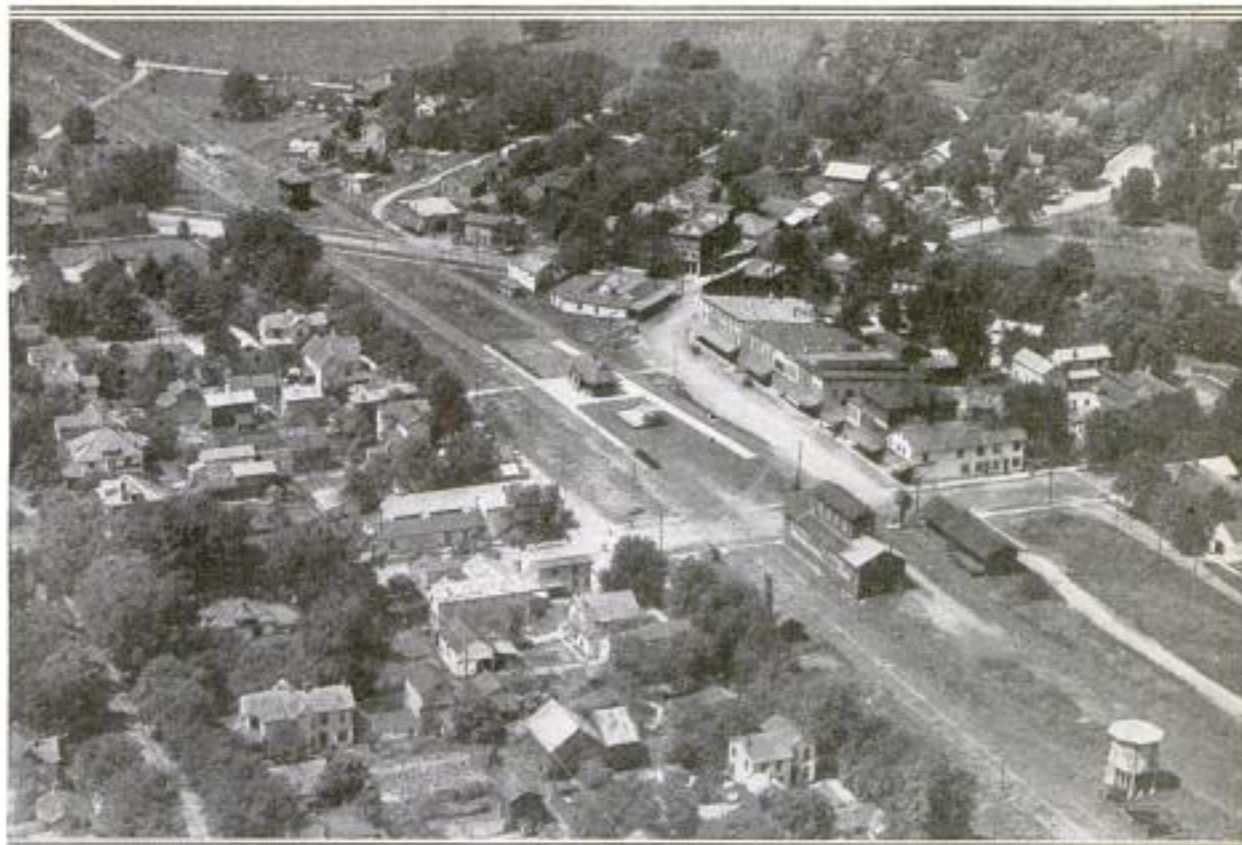
contiguous territory and for the separation of unnecessary lands. Consequently the strip of land leading to the new site and the new site itself were annexed by the village council, according to law, and as soon as the moving is completed, the old location will be given up by the same process. It was necessary to comply with the laws in this way in order to retain the original charter, and thus keep possession of the money in the town treasury and in the school fund. If the original charter had

been surrendered and a new one granted for the new site, this money could not be transferred but would revert to the township.

Having secured the village, the next step was to sell the individual properties back to their former owners. Here was where the sincerity of the removal-company officials was put to the test. They might have sold the properties to the highest bidders, but they did nothing of the kind. They assessed a fair valuation against each property and then offered it to its former owner at that



This Map Shows the Old Townsite in the Upper Left Corner, and the New Site Below, with the Strip of Purchased Land Joining the Two. This Purchase Was Necessary in Order to Comply with the Law and Retain the Original Charter of the Town

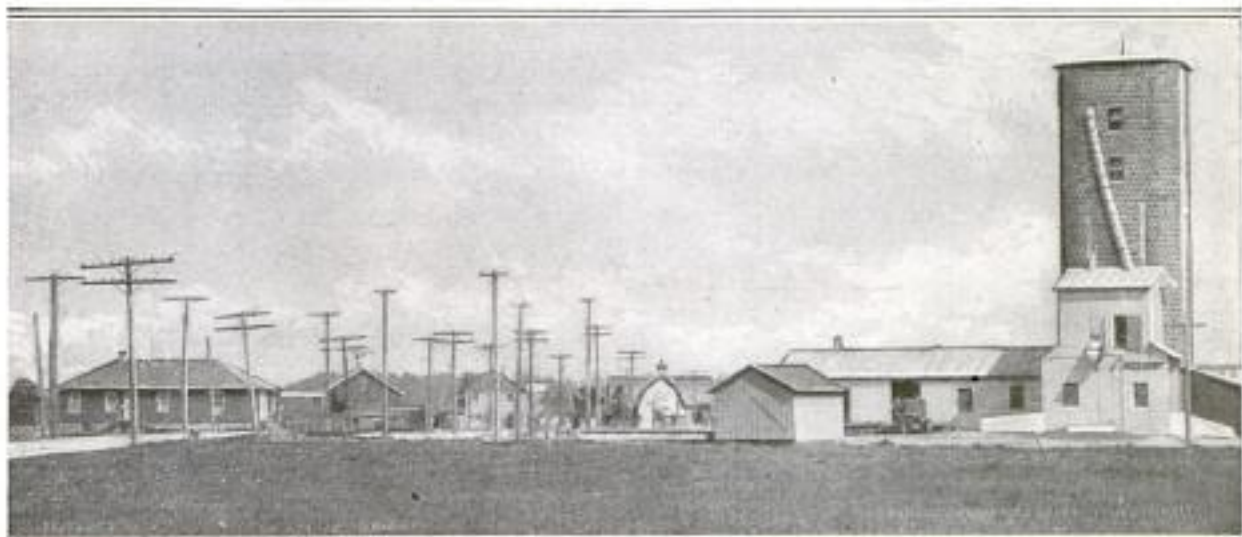


This Location of the Old Town of Osborn is Menaced by the Backwater Created by the Construction of One of the Dams Built near Dayton as a Flood-Prevention Measure

price. They paid no attention whatever to the people who came along and offered twice the assessed valuation for some other man's house, unless the former owner had advised them that he did not care to buy it and there was no one else who had a personal claim on it. If the former owner did not care to purchase a given house, and there was a renter who had lived in it for some time and become attached to it, the renter was given

the same opportunity to purchase it as was given the former owner. If neither the owner nor the renter cared to purchase, it was offered to anyone who did.

The next step was to sell the lots at the new location. Since there were no personal ties involved in this case, it was decided to sell the lots at auction. The lots were numbered and a minimum price placed on each. The only lots reserved were those to be occupied by the four



The New Location as It Appears Today: A Few New Houses have been Built, and Some have been Moved from the Old Townsite. An Elevator has been Constructed near the Railroad, and Curbs, Sewers, Gas Mains, and Electric-Light Lines have been Installed

churches and by the business houses. The lots in the business block had been platted with special reference to their use, and therefore could not be sold for residential purposes. The churches could be located almost anywhere outside the business block, but it was believed that the people would be better satisfied if they knew before buying their lots where the churches would be built.

Before starting the auction, which was an invitation affair attended only by the stockholders and their immediate relatives, a vote was taken to determine the comparative value of the various lots, each stockholder voting for the lot he preferred. The lot receiving the highest number of votes was then auctioned first. The disappointed parties were then permitted to vote again, a new poll was taken, and the new lot having the highest number of votes sold. This process was continued until the stockholders had all obtained lots, after which the remaining lots were placed on the open market and sold to anyone who desired to purchase.

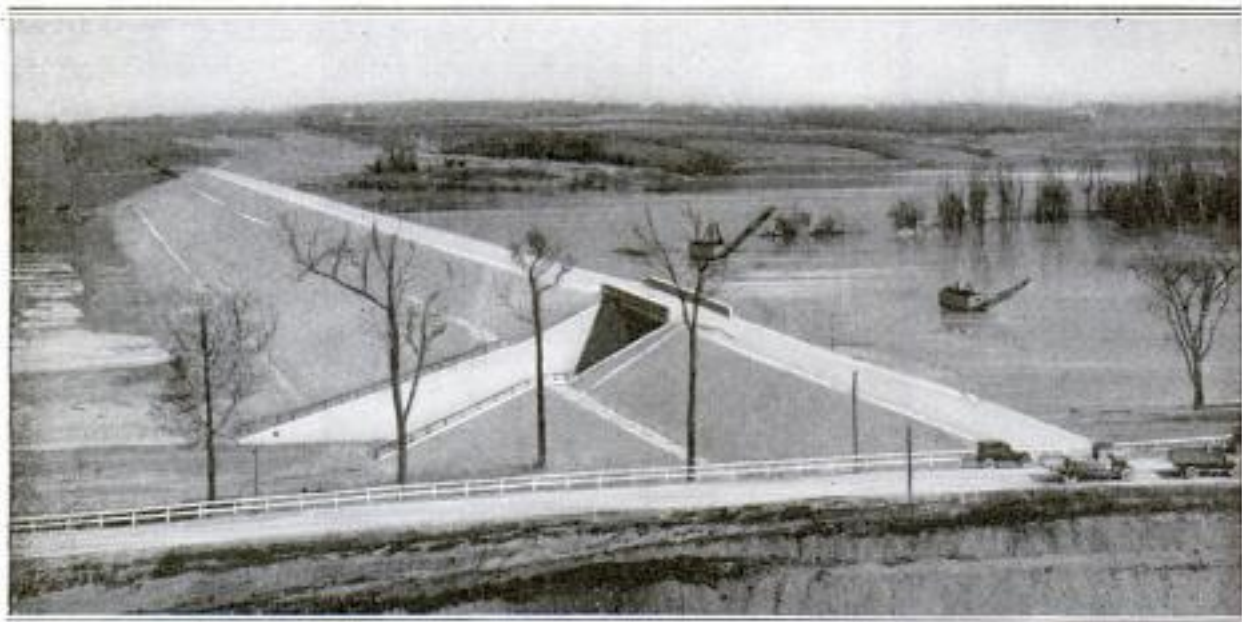
One of the most noteworthy things connected with the project was the care with which the new town was planned. Generally town plans, if made at all, are made in one generation and carried out in another; but here was a case where a town could be planned and also built, all within a period of one or two years. The incorporators, recognizing the importance of careful town planning as well as the unusual opportunity afforded in this instance, engaged an engineering

firm to lay out the streets, subdivide the blocks into lots, and take general charge of the construction activities. Consequently the new Osborn will be a well-proportioned village, with large lots, playgrounds, and parks.

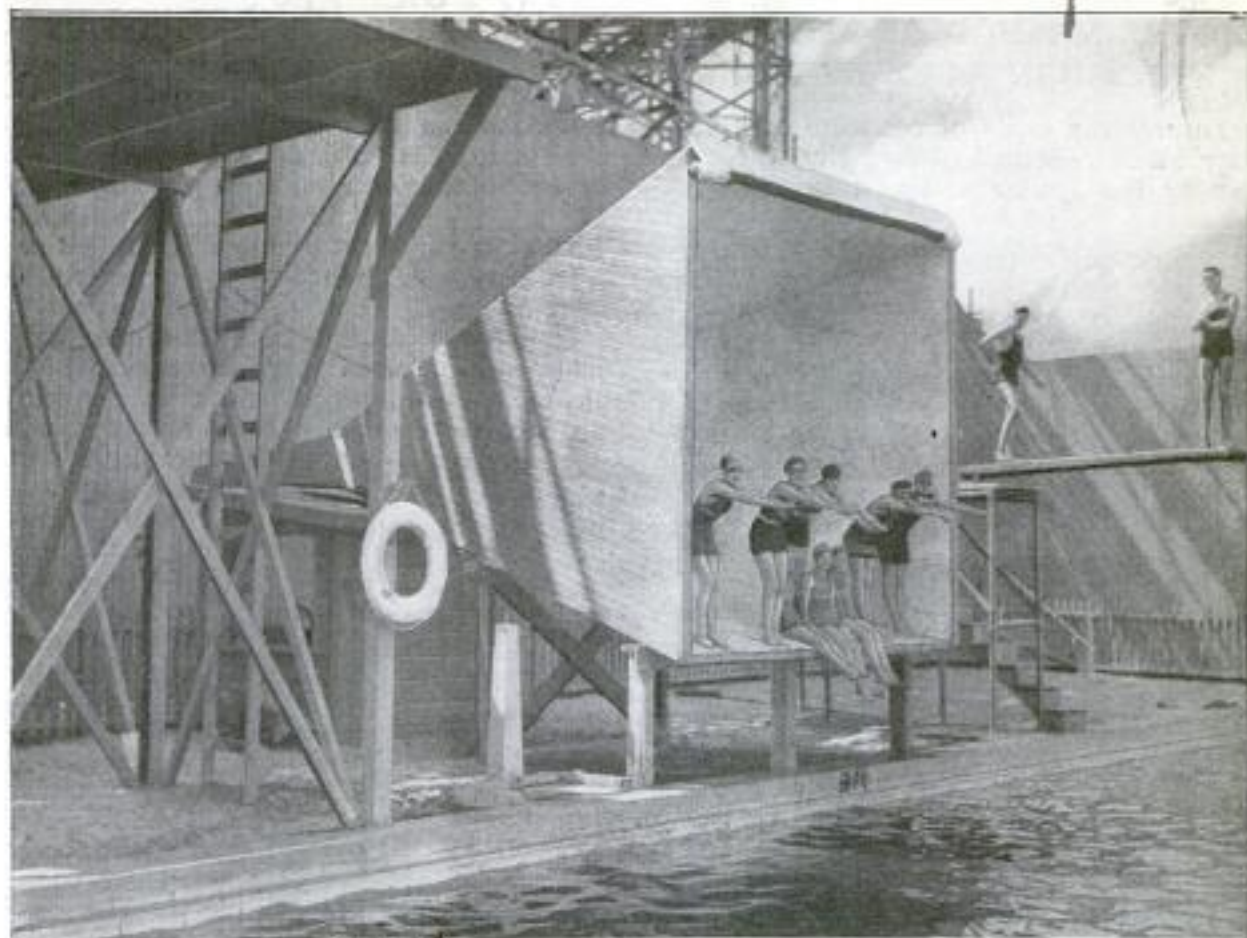
About 200 houses will be moved, practically all of which are residences. Business houses will not be moved, but will be built new at the new site. The same is true of the schoolhouse and churches. The waterworks system will be moved so far as it is practicable to do so.

Combined cement curb and gutters, and cement sidewalks will be built soon. An elevator and railroad station have been built at the new railroad location, and trains are now making regular stops.

From the financial standpoint the work is progressing nicely. Contracts have been let for practically all the work yet to be done, so that the officials know where they stand. It now seems certain that the people will get their houses moved to their new locations, all of their lot grading and sidewalks completed, and their houses repainted, repapered, repaired, and refinished in first-class condition at a total expenditure of about 75 per cent of the prices they received from the flood-prevention authorities. In other words, they will be established in their new locations and will have about 25 per cent of their money left to pay them for the mental anxieties they suffered in being forced to move, which seems very reasonable. Besides, the stockholders of the removal company will have a fair profit to pay them for their work.



The Huffman Dam, About Five Miles from Dayton, Shown during a Spring Freshet: It Is the Backwater from the Dam That Threatens the Town of Osborn at Its Original Location



COPYRIGHT UNDERWOOD & UNDERWOOD

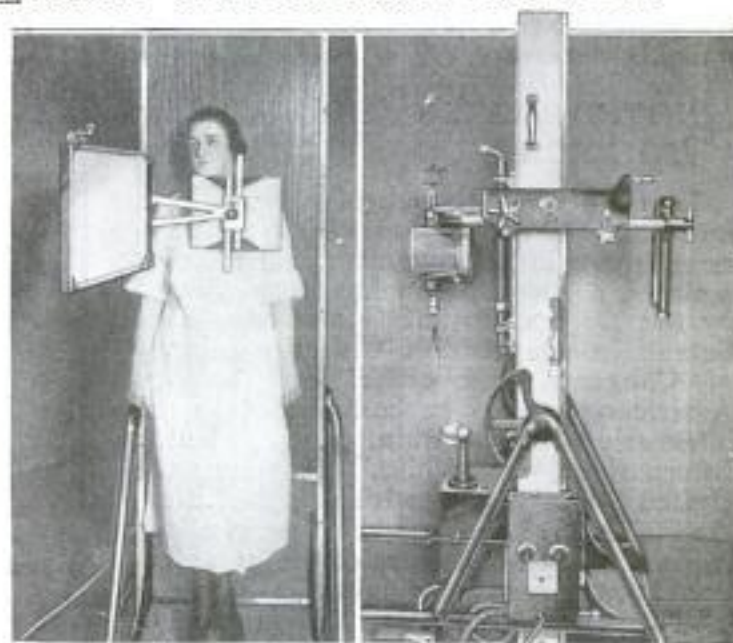
RADIO MEGAPHONE IS LARGE ENOUGH FOR A DIVING PLATFORM

TERMINATING at the edge of the pool, a radio megaphone has been constructed at a California bathing resort, that, for size, eclipses anything of the kind that has been built, up to date. The opening of the megaphone is rectangular, and is so large that it can be used as a diving platform by at least seven persons at one time. The music coming from the loud speaker is of such volume that, on a quiet night, it can be heard for several miles. When radio concerts are not being given, a phonograph may supply the music.

8991

FRAME FOR X-RAY TUBE AND PLATE HOLDER

In order that an X-ray picture may show the same conditions as disclosed by an examination through a fluoroscopic screen, it is necessary that the plate holder should occupy the exact position formerly held by the screen. To insure this condition, a frame has been devised for holding the screen and plate holder interchangeably in a bracket. This bracket and the X-ray tube are supported on an arm in such a way that they are always the same distance apart and in exact line. The bracket holds the screen or plate exactly centered with the X-ray tube. The tube and bracket can be moved together along the supporting arm to accommodate fat or thin persons, the focus always remaining the same.



Left: The Fluoroscopic Screen and Photographic Plate-Holder Bracket in Use. Right: The X-Ray Tube and Bracket are Adjusted by a Rack and Pinion

Roentgen appliance Co,
San Francisco
Calif.

344
9677
Novel Method of Stringing Mortar in Masonry Work
In erecting walls of concrete or hollow clay blocks, instead of stringing the mortar by hand with a trowel in the usual

Cml. E. F. Lange, Brownell Bldg
POPULAR MECHANICS
Lincoln, Neb.

NOVEL METHOD OF STRINGING MORTAR IN MASONRY WORK

In erecting walls of concrete or hollow clay blocks, instead of stringing the mortar by hand with a trowel in the usual

9768

Alcohol as a motor fuel has recently been made the subject of extensive tests by a British commission to determine its

IN ALCOHOL AS FUEL

value, and interesting facts have been established by the experimenters. Some of these are, that the thermal efficiency obtainable is higher than with petrol or benzol; that there is no evidence whatever of corrosion in the engines; that the power output is increased by the low temperature of the circulating water; that supplying heat to the carburetor reduces the power output, but at the same time slightly increases the thermal efficiency, and that under all conditions of mixture or throttle, alcohol requires a more advanced spark than is the case with gasoline or benzol.



Above are Shown Two Forms of the Mortar-Stringing Apparatus Which was Designed for the Purpose of Speeding Up the Work of the Stone Mason. At the Left can be Seen a Row of Concrete Blocks That are Standing on End and upon Which have been Laid Two Symmetrical Strings of Mortar Preparatory to Placing Them in the Wall

way, a builder in Nebraska makes use of a device for stringing the mortar on the top and the ends of each block before placing it in position on the wall. With this device any unskilled laborer, it is claimed, can lay a string of mortar on a block as rapidly as it could be done with trowels by three skilled masons, and with such evenness that very little trimming is necessary.

A further series of experiments is being carried on at the present time with a view to determining the effect of alcohol when used in conjunction with gasoline, benzol, and other motor fuels.

ATTRACTIVE BUNGALOWS MADE OF HOUSE BEE FAMILIES

Attractive beehives, modeled after bungalows, have been built by an apiarist of Sioux City, Ia. A porch, a front door,



Two of the Attractive-Appearing Beehives Which have been Constructed to Represent Tiny Bungalows

and several windows help make the small houses faithful miniatures of human dwellings, in addition to which the tiny structures are carefully painted.

UNITED STATES AND EUROPE TO EXCHANGE CIVIC DATA

To facilitate exchange of data with an international association of cities interested in civic improvement, and similar matters, a new bureau has been created by the Department of Commerce. This bureau in coöperation with the Library of Congress, will collect and arrange American data to be contributed to the international association, called "l'Union Internationale des Villes." In return the United States is to receive valuable information from Europe and other civilized lands. The headquarters of the organization is at Brussels, Belgium, and members pay a small fee for the support of the central office there. Great expense will thus be saved by eliminating local investigation committees.

The American City
April 1922
P. 348

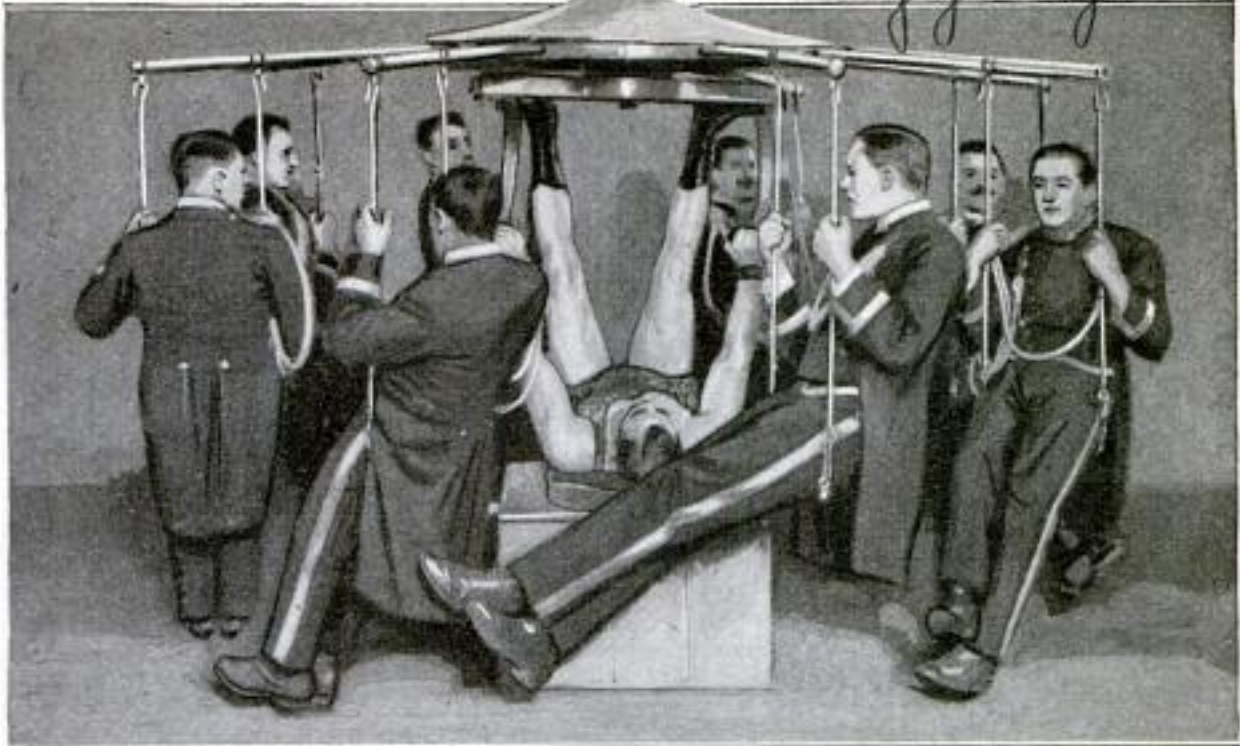
Cml. H. M. Blomig.
1700 Jackson St.
Sioux City, Iowa.

983

6/22

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Königsplatz Strasse 62.



This Strong Man in a German Circus Supports on His Extended Legs the Framework of a Merry-Go-Round upon Which Eight Full-Grown Men Ride

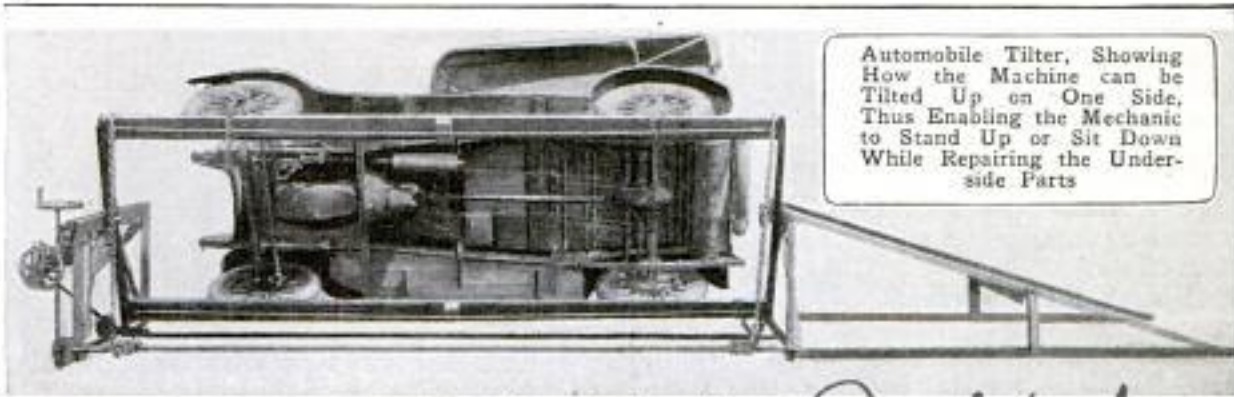
9698 STRONG MAN SUPPORTS EIGHT MEN AND FRAMEWORK

In an effort to excel in their chosen profession, performers are constantly devising new ways of showing their skill or strength. As an example of this nature, a circus performer of Berlin makes himself the center support of a merry-go-round on which eight full-grown men ride. The strong man lies on his back on a raised pedestal and supports the frame on his feet.

☐ Built in honor of seamen who lost their lives in the World War, a memorial tower, standing 180 feet above the water at Victoria Pier, Montreal, Canada, has recently been completed. It comprises a clock and signal tower for harbor use, and is electrically operated.

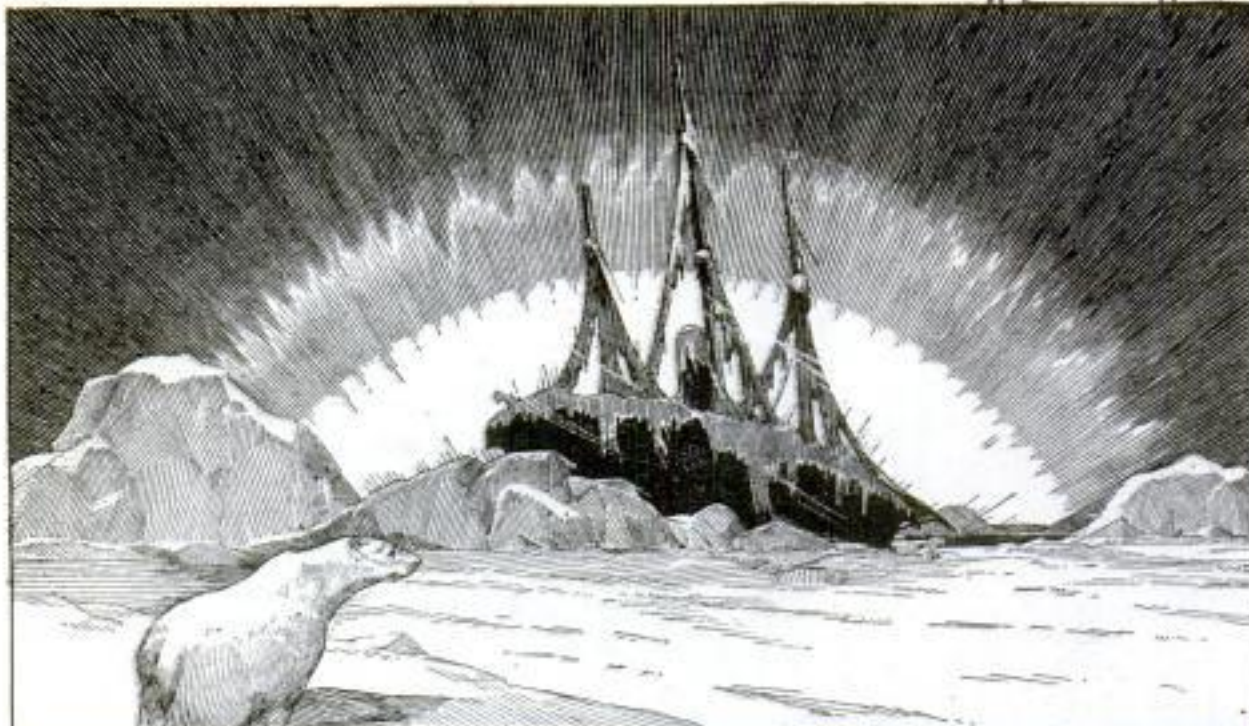
9557 TILTER FOR AUTO REPAIRING GREAT AID TO WORKER

Automobile repairing has been facilitated by the introduction of a tilter which does just what its name implies—tilts the car over on one side, exposing the bottom—thus greatly aiding the repairman. With the use of this outfit, the workman can stand upright, or sit down comfortably in the open air, and work naturally to the best advantage. This method will be quickly recognized as being far superior to the old way of lying on one's back, or crawling into a dirty pit beneath the machine. The apparatus will lock at any angle without strain to the car, and the raising or lowering mechanism can be operated easily by one man. The outfit is 2 feet high and about 8 feet longer than the usual car.



Automobile Tilter, Showing How the Machine can be Tilted Up on One Side, Thus Enabling the Mechanic to Stand Up or Sit Down While Repairing the Under-side Parts

Wm. A. J. Halle, Rushford, Minn.



PHANTOM SHIPS of the ARCTIC

Sighting of Old Side-Wheeler Revives Story of Polar Mystery
Fleet—Other Lost Ships may have Drifted
North—Find "Teddy Bear" Safe

BY STRATFORD F. CORBETT

EVERY winter deserted ice-locked ships are seen in the mists of the polar seas, drifting at the mercy of wind and current, their broken masts and crumbling rigging hung with ghostlike icicles, and their decks and cabins buried in drifts of snow. At least, so run the stories of Eskimo narrators.

A Russian side-wheeler, the "Polotofski," built 70 years ago, is the latest addition to this "phantom fleet." She was discovered, toward evening, by a party of Eskimos hunting walrus. Plans were made to board her next morning, but during the night the changing wind swept the ship far north into the unexplored wastes.

The "Polotofski," according to the only accounts available, was caught in the ice at St. Michael, in December, 1915, and disappeared the following spring in the great storm off Cape Nome. It was thought that she had been ground to kindling and sunk.

Vessels have been disappearing in this great unknown ever since the beginning of arctic navigation. In 1845, the "Erebus" and the "Terror," of the British navy, sailed with 129 souls on board to attempt the northwest passage. They were last seen by civilized men in Baffin

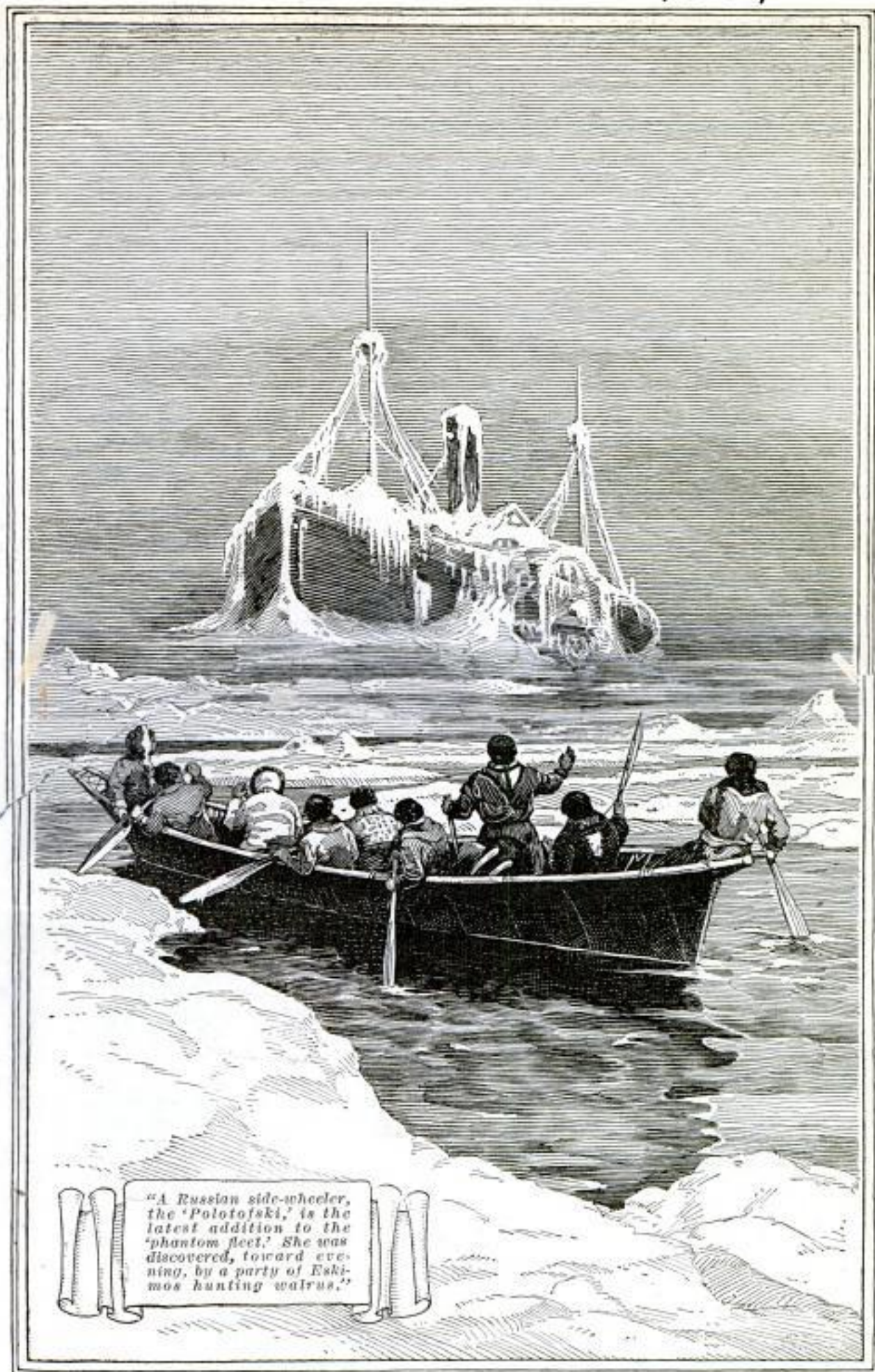
Bay. More than a score of ships, with crews of nearly 2,000 men, at an expense of millions of dollars, vainly sought, between 1847 and 1853, news of the missing squadron. The fate of the vessels is shrouded in mystery.

One dread night in the autumn of 1897, a gale carried off eight ice-locked whaling vessels. Most of the men escaped and reached Point Barrow and other points along the coast. A few refused to leave their ships, and, holding men and ships in its relentless grip, the great pack swept them far out into the vast uncharted polar basin.

Were these ships crushed? Have they been battered to pieces, or are they still afloat? Did the men die from starvation and cold, or can it be that somewhere in the frozen north there still exists a remnant of the men who stuck to their ships?

These questions have never been answered. Only seldom is it that any definite trace is left. The "Polotofski's" name plate could be made out. The ship had a distinctive build. Usually the Eskimos can do no more than guess at the ships' identity. It is impossible to be certain.

Before the days of wireless a number of large ships were swallowed up, per-



"A Russian side-wheeler, the 'Polotofski,' is the latest addition to the 'phantom fleet.' She was discovered, toward evening, by a party of Eskimos hunting walrus."

haps the victims of a floating iceberg, a heavy gale, a tidal wave, or fire. One of these was the "City of Glasgow." In 1845, she sailed from the Mersey for Philadelphia with 480 passengers. Port was never reached. The captain of the "Westmoreland," a vessel that preceded the "City of Glasgow" by a few days, reported that on the third day out he became entangled in ice floes and was imbedded in them for 30 hours. His evidence, and that of other captains, indicates that this extraordinary ice mass extended in one direction for 347 miles, almost compact, and that it was studded with numerous icebergs of gigantic size. What had become of the "City of Glasgow" was never learned.

Loaded with passengers, the "City of Boston," in 1870, left Liverpool never to return. Months afterward bits of wreckage were sighted with her name on them. Why, how, when, or where she entered the "Port of Missing Ships" has never been discovered.

Another mystery is that of the "President." She was due in Liverpool from New York in November, 1841. Severe weather had prevailed in the Atlantic and unusual quantities of ice were reported in low altitudes. For months the owners queried adjacent ports in a vain effort to get some news of her. Years later there was found in the logbook of a Portuguese sailing vessel an entry which stated that a large steamer, resembling the "President," with her machinery ap-

parently disabled, had been sighted. This entry was dated a month after the disappearance of the "President."

Could these ships have drifted northward? Are they, too, part of that fleet of silent ships held hard and fast in the great ice pack, white with frost and manned by frozen crews?

Sometimes a vessel is found abandoned at sea without any trace of accident or other means of discovering the cause of her condition. Such was the case with the "Yula Maru," a Japanese steamer found in mid-ocean with eight dead men on her deck. What had become of the rest of the crew was never known.

The "Marie Celeste" was discovered with all sails set, clipping along toward Labrador. Not a man was on board the vessel nor was there any evidence of a struggle; nothing in the log to tell of storm, disease, fire, or other disaster.

The little schooner, "Teddy Bear," missing eight months and believed lost, was found this June frozen in, near the mouth of the Potem River, 12 miles south of Emma, a village on East Cape, Siberia. All on board were well and required no assistance from the coast-guard vessel which discovered them. The captain was waiting for the ice to clear out of the river. When this should happen he intended sailing back to Nome.

Only miraculous luck saved the "Teddy Bear" from joining the phantom fleet, of which the "Polotofski" remains the sole materialization.

946 MOUNT WILSON OBSERVATORY GROUNDS IN MINIATURE

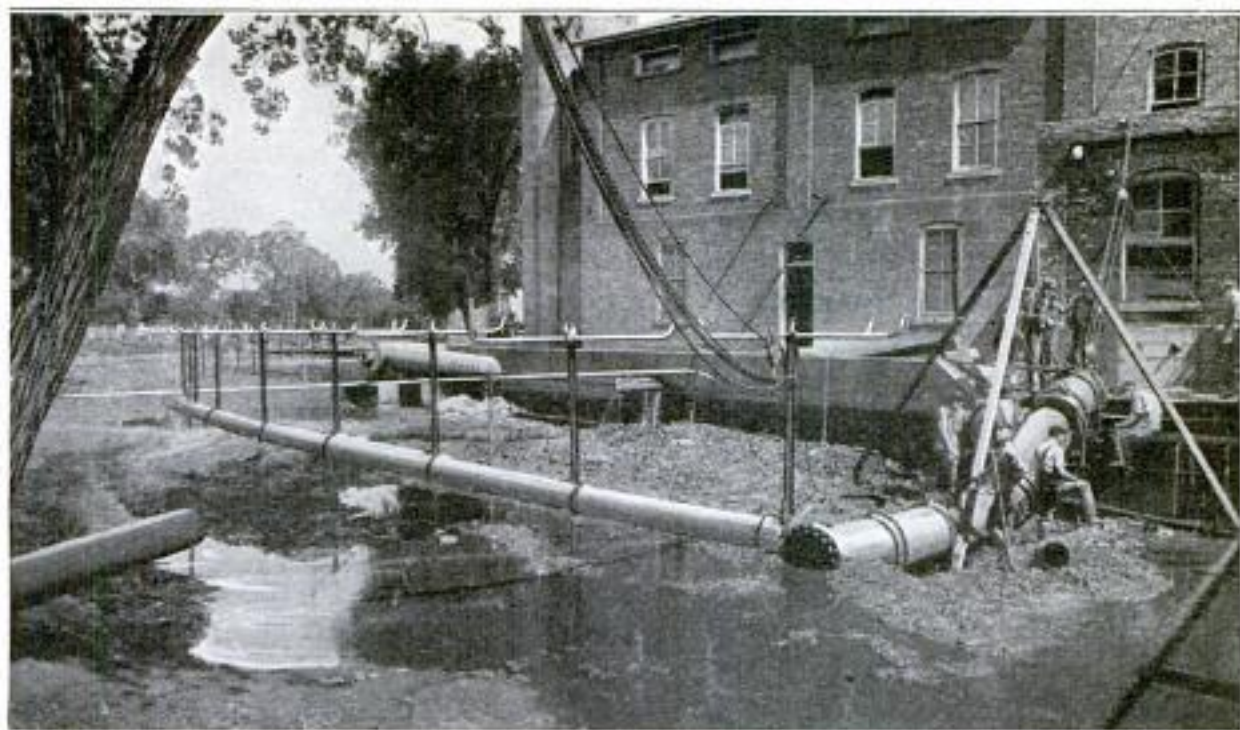
An accurate reproduction, on a miniature scale, of the Mount Wilson observatory grounds located in the southern part of California, has recently been completed by Ferdinand Ellerman of that state. The model clearly shows the shel-

ter for the 100-inch Hooker telescope, the 60-foot tower for the Snow telescope, and the 150-foot tower on which is mounted the 60-inch reflector. Imitation snow on the ground around these and the numerous small buildings, together with many tiny pine trees which are scattered over the work, give the whole a natural and attractive appearance.



Model of the Mount Wilson Observatory and Grounds, Showing, from Left to Right, the 60-Foot Tower with the Snow Telescope, the 150-Foot Tower and 60-Inch Reflector, and the Structure Housing the 100-Inch Telescope: Among the Other Buildings Is a Monastery, at the Extreme Left

Carl H. Ellerman, Pasadena, Calif.



Spray System for Cooling Water being Installed at Hutchinson, Kansas: Water is Passed to the Sprinklers by Pipes on the Bed of the Creek; after Cooling, the Water is Caught by an Intake Earthen Downstream

CREEK DRIED UP FOR 276 FEET DURING ENGINEERING JOB

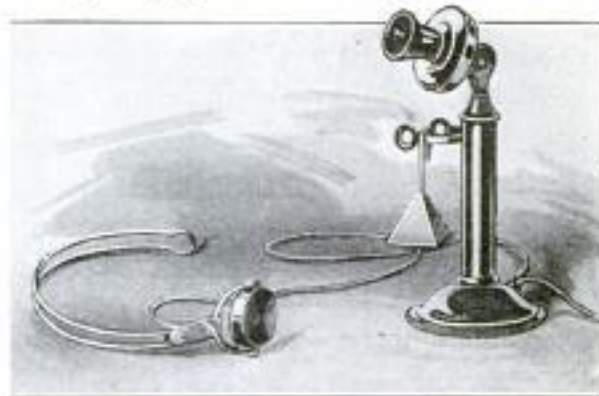
To install a spray water-cooling system in the water plant of the United Water, Gas & Electric Company, at Hutchinson, Kan., the engineers in charge of the work dammed up the creek and dried the bed for a distance of 276 feet. The water was held back for two weeks while the pipes were being laid and connected by a dam consisting of three thicknesses of 1-inch planks dovetailed so as to be water-tight.

The spray system was installed to enable water taken through the plant once, to be cooled and drawn into the pipes again, instead of being emptied into the creek below the intake and allowed to flow away. This precaution was thought necessary because, although there is a dam below the plant to hold water for use, the hot water could not be emptied above the dam for use again. In the summer, the operation of the plant was endangered by water shortage.

The water is now pumped back above the dam through a large 16-inch pipe. At intervals of 13 feet, there stand 2-inch pipes, 9 feet high, at the top of which are five nozzles. The surface of the creek is about 5 feet above the main pipe. The water is forced up to the nozzle, and projected for 15 feet into the air. The drop of 19 feet sprays the water and cools it sufficiently for use in the cooling system of the plant another time.

"REWRITE MEN" GAIN TIME USING PHONE HEADPIECE

Planning to gain the time ordinarily used in taking the telephone receiver from its hook, a large western daily recently equipped the telephones of its



Headpieces are Attached to the Telephones Used by the "Rewrite Men" on a Western Newspaper

editors and "rewrite men" with simply constructed headpieces. The receiver now used is about the size of a radio receiver and is attached to a wire bracket. A paper weight with the tip of its spindle curved, holds the telephone hook when the phone is not in use.

Ⓐ fleet of motorcycles whose riders sweep up glass has been put into service by the Chicago Motor Club. The motorcycles respond quickly when notified of an accumulation, and carry the glass away.

S. Clinton, Chicago

500

Western Electric Co.

HAND CAMERA FOR SNAPSHOTS OR MOTION PICTURES

9704 There is now being manufactured a camera which can be carried in the pocket, operates automatically with the precision of a high-grade watch, and



Contact Prints from Two Sections of Film Which Show the Type of Pictures Obtained with the Pocket Camera

takes either motion pictures, snapshots, or time exposures simply by pressing a button. No tripod or hand crank is required, the camera being held in the hands and the image located by either of the two methods provided. A metal spring propels the film, at the same time opening and closing the shutter. Loading is accomplished in daylight by means

of special metal magazines, six of which are supplied with each camera.

The camera weighs less than 4 pounds, measures 4 by 5 by 6½ inches, and is fitted with a high-grade lens capable of producing results equaling the professional motion-picture outfit. Standard-width films are used, and each picture is ¾ by 1 inch. There are four perforations on each side of each picture, making it possible to project the pictures on any standard motion-picture machine. The camera accommodates 15½ feet of film, allowing 248 exposures, or 16 to the foot. The film is moved from one magazine to the other at the rate of 1 foot per second.

INVASION OF U. S. TREES BY EUROPEAN MOTHS

9842 Immigrated from its native haunt in Europe, a species of moth, commonly known as the satin moth, has been doing great damage to the poplars, willows, and cottonwoods of the New England states. The new pest has become thoroughly established within the last few years, but was not discovered until recently. It is exceedingly difficult to control the insects. They fly readily, often in swarms, and flit from one place to another. Both male and female have pure-white wings and their bodies are covered with long white hairs, giving an appearance of a coat of satin.

COVER FOR REAR AUTO SEAT

9636 USED AS WINDSHIELD

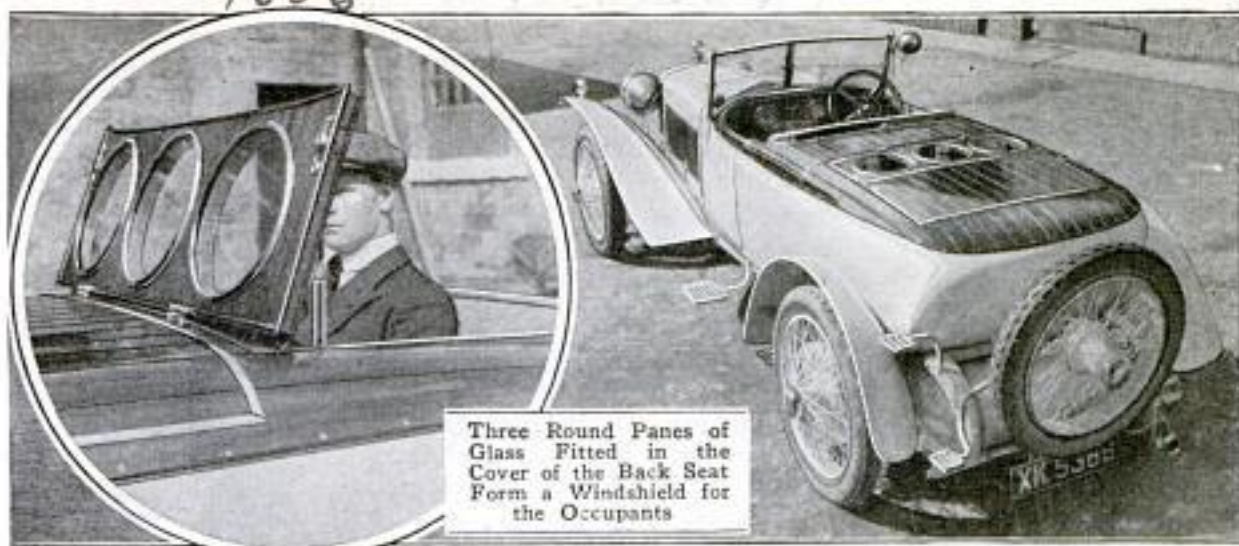
The development of the sports body for an automobile that is mainly used as a roadster, but can upon occasion provide seats for passengers in the rear, has brought some interesting problems to



Left: Rear of Camera, with Release Button on Top, Winding Handle and Timing Mechanism at Side. Center: Interior, Showing Film Magazines. Right: Front; Lens in Middle and View Finders at Upper Right

9636

The Albany Carriage Co.
174 Spring Street
St. Albans, Vt.



Three Round Panes of Glass Fitted in the Cover of the Back Seat Form a Windshield for the Occupants

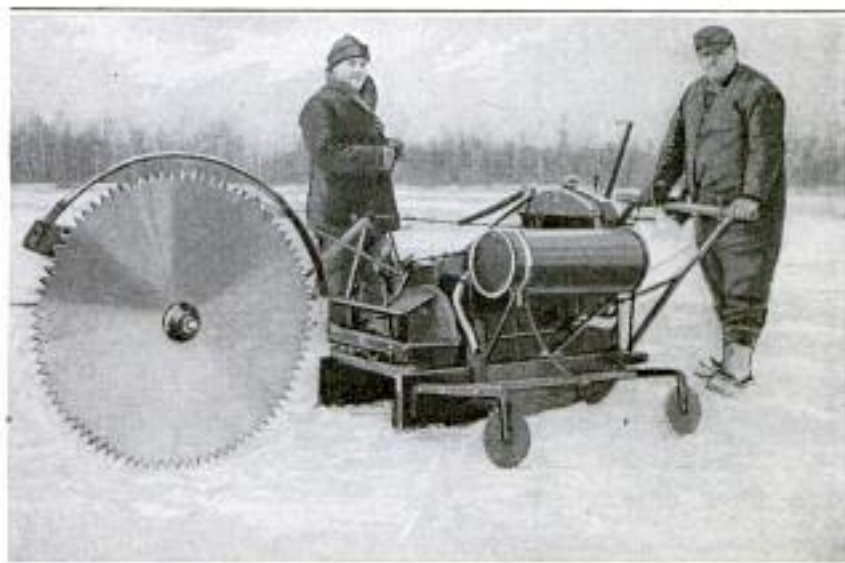
the designers. The disposal of the cover, when the rear seat is in use, was one of the most difficult questions, but has been answered by one manufacturer in a neat and attractive manner. It is made in two portions, the front part being hinged at the forward edge and supplied with three round panes of heavy glass. When the rear seat is to be used, this part of the cover is raised and locked with brackets on the sides. In the raised position, it forms a serviceable windshield for the occupants of the back seat.

8739 **OLD MOTOR-CAR ENGINE HELPS WITH ICE HARVEST**

Ingenuity played an important part in the harvesting of the ice crop at the village of Mascoda, Wis. Two brothers who do automobile-repair work decided that they might just as well as not put to work during the ice harvest one of the engines that they had salvaged from a wrecked motor car. After some planning and experimenting, they rigged up a power ice saw that cut its way through the ice, running at high speed. They used a saw 40 inches in diameter and found that they could cut ice 16 inches in thickness. The machine proved so compact that one man could operate it, and thus take the place of several men working with ordinary handsaws. It is thought

9780 **CLEVER CONTROL VALVE MADE FOR ISOLATED LIGHTS**

For use in marine or aerial lighthouses where the lighting of the lamp is to be automatic, a new control valve has been devised that has some marked advantages over older instruments of this character. Two glass bulbs, filled with volatile liquid and vapor of the same, are connected and supported on a carrier. This is free to rock on pivots and is connected to the valve supplying gas to the light. One of the bulbs is blackened and the other left transparent. When exposed to daylight, the blackened bulb absorbs more light than the transparent bulb with a consequent increase in temperature. This causes liquid to move to the transparent bulb, and the carrier rocks on its pivots, thus closing the gas-supply valve.



Ice-Harvesting Outfit, Showing the Large Circular Saw Which Cuts through 16 Inches of Ice, Rigged Up in Conjunction with an Old Motor-Car Engine

that outfits similar to this could be operated at a profit on any ice field.

Built by: Kratchowill Bros., Mascoda, Wis.

920 VARIOMETER FOR RADIO SET
IS NEATLY DESIGNED

Variometers—those little coils sometimes so necessary for the correct "tuning in" of a radio set—are being manufactured after a neat pattern by a Missouri company. Two coils of the usual concentric design, the inner one pivoting on a fiber shaft, are fastened to a wooden base by a fiber strap. The whole is then screwed onto



a brass strip which contains holes for the proper mounting on the panel of the receiving set.

COMMODIOUS RIVER LAUNCH
OF FAMOUS SURGEON

9996

What is said to be the largest pleasure craft ever built on the upper Mississippi has just been completed for Dr. William J. Mayo, the famous Rochester, Minn., surgeon. The boat, christened the "North Star," measures 120 feet in length, 23 feet

vided with the most modern equipment, the "North Star" has cost close to \$100,000. The framework is of white oak. The woodwork of the cabins, staterooms, and deckhouse is of mahogany, which is light and yet extremely durable. The boat was designed especially for cruising along the Mississippi, which is not always deep, particularly along its upper reaches, and for this reason draws only 30 inches of water. Twin screws, 32 inches in diameter, are fitted in tunnels in the bottom of the boat, so that they will not strike obstructions in the shallows. This saves about 20 inches on the draft, and means but a slight loss in efficiency. The boat also has twin rudders.

The power is derived from two 200-horsepower gasoline motors, which drive the launch at a speed of about 14 miles downstream and 7 miles upstream. Eight fuel tanks having a total capacity of 2,500 gallons have been installed. In normal cruising, the consumption will be about 45 gallons per hour.

A spacious salon occupies the forward end of the main deck, with piano, built-in bookcases, and other attributes of comfort. The dining room has built-in china closets, and the galley likewise has all the latest conveniences, including a gas cookstove and an electric iceless refrigerator. There are 11 staterooms and an office for the owner. In all, eight guests may be accommodated in addition to the crew of from four to six. Sleeping quarters for the crew also are on the main deck. The staterooms and the salons, as well as the pilot

house and the observation cabin, have windows covered with bronzed screen. Thus the sides may be thrown open to the breeze, or closed entirely when the weather is bad. The windows are of the Pullman type.



Doctor Mayo's New Boat Tied Up along the Bank of the Mississippi just after the Launching



The Mayo Boat from the Stern, Showing Workmen Putting on the Final Touches Before the Boat Took Its Initial Cruise

in width, and displaces about 75 tons.

Built of the finest imported woods, and pro-

End. Carri Christmas
Door 155, St. Paul, Minn.

9756

Hahl Autoaster Corp.
 224 N. Sheldon
POPULAR MECHANICS

353

Chicago



Above: One of the New Play Cars for Children, Which, Except for the Large Pneumatic Tires, is Constructed Entirely of Steel. Underneath the Handlebar can be Seen the Lazy-Tongs Motive Arrangement to Which is Attached the Small Fourth Wheel. Right: Lazy-Tongs Apparatus Extended by Operation of the Handlebar

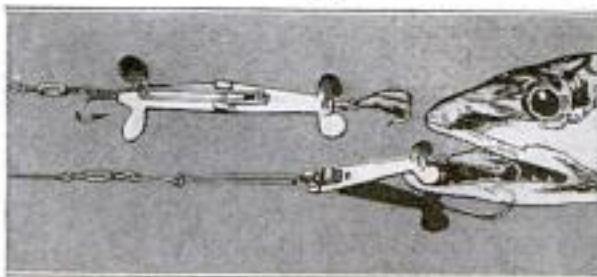
The boat is equipped with a complete filtration system, and after going through it, the drinking water is cooled by the refrigeration system, two 5-kilowatt generators furnishing the current. Each stateroom has access to a bathroom. All auxiliaries, such as pumps and capstan, are electrically driven. There is also an electric-light system, and a hot-air heating system operated by oil.

Provisions have been made for cruises lasting up to six or seven days. Though built for the Mississippi, the boat is large enough for short coastwise trips.

9732

**FISH BAIT SNAPS LIKE TRAP
 USED FOR WILD ANIMALS**

By a slight pull on the tail hook of a new bait, the fish that nibbles it is caught both in and outside the jaw, so that it cannot get loose. A second hook, swung back and attached to a trigger on a small metal frame, catches the fish



The Bait, as It Looks with the Hook Swung Back, is Seen Above, and Below, as It Appears When the Trigger has been Released

from the outside. The trigger is released automatically by a slight pull on the tail hook. The bait is swiveled and revolves by means of propellerlike vanes.

Info. C.A. Carlson

11124 S. Russell Los Angeles

Vehicles for Children
**MAKE ATTRACTIVE PLAY CAR
 WITH CLEVER DRIVE**

9756

Adapted for the use of boys or girls from 7 to 15 years of age, an attractive play car is now being manufactured that has several striking features. The car has three ball-bearing wheels equipped with pneumatic tires, and is of steel construction, including the wheels. Steering is accomplished by turning the front wheel with a foot lever operating through a parallel-motion device. The car is propelled by a small fourth wheel fastened to a lazy-tongs arrangement. A handlebar is used to operate the lazy tongs, and the little wheel is so constructed that, when force is applied to the handlebar, the wheel is locked. In this way it acts as a pusher, giving the maximum push at the beginning of the stroke and the maximum speed at the end of the stroke. The most surprising feature of the car is the ease with which it moves ahead, a speed of 12 to 15 miles per hour being possible.

**EXTENSIVE SAFETY CAMPAIGN
 TO REDUCE INJURIES**

9855

Reducing injuries—not accidents—is the aim of the Chamber of Commerce in a western city, where an extensive campaign against carelessness is now being carried on. Personal inspections are made of industrial plants, business houses, garages, gasoline stations, etc., with a view of eliminating unnecessary fire hazards, while cards and booklets containing safety hints and traffic rules are distributed by mail through information bureaus of factories, stores, and schools.

The American City 7/1922

Invincible Vacuum Cleaner Mfg. Co

354 *Power* POPULAR MECHANICS

9772 *Cheio*
POWERFUL VACUUM CLEANER
CAN BE EASILY MOVED



Mounted on two large rubber-tired wheels, a powerful vacuum cleaner which can be moved quickly and quietly from place to place is now attracting the attention of building superintendents.

The machine is designed to clean the heaviest of floor coverings thoroughly. By the use of a brush or felt attachment, it cleans tile or wooden floors equally well.

AUTOMOBILE LOCK INSTALLED
ON STEERING-WHEEL HUB

9678

A new safety lock for automobiles is attached to the steering wheel in such a manner as to make the latter inoperative.



Made of hardened steel that resists filing or cutting, it covers the hub of the wheel, and grips all four spokes. Above the wheel and in front of the driver is the keyhole. After removing

the steering-wheel nut, it can be installed with a wrench and hammer in about five minutes.

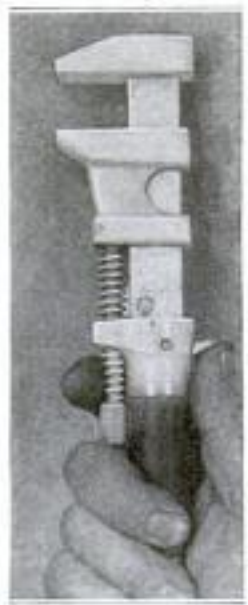
DURABLE PAVEMENT OF WOOD
DUSTLESS AND SILENT

954

That it will last three times as long as the usual pavement, is but one of the many merits claimed for a road material introduced by an Englishman. It is of wooden-block construction, the blocks having dovetail-shaped slots in them, of which one extends the length of the block

and three others reach across it at an angle of 30 degrees. These slots range from 5/16 inch at the top, to 3/4 inch in width at the bottom, and are 1 1/4 inches in depth. When placed in the road, the slots are filled with a special bituminous rubber, or asphaltum, composition, which is said to be unaffected by either extreme heat or cold, to provide a firm footing for horses in all kinds of weather, and to eliminate skidding of motor cars.

9798
QUICKLY ADJUSTABLE JAWS
ARE WRENCH FEATURE

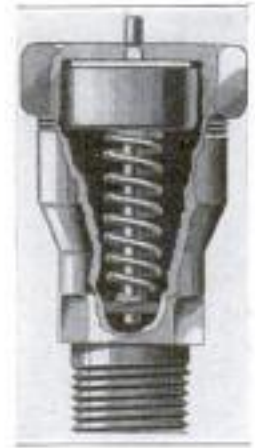


Quickly adjustable jaws are the main feature of a monkey wrench, introduced by a Chicago man, which can be opened or closed by a pressure on a trigger. Besides the innovation that permits the rapid operation of the jaws, the tool also has incorporated in it the usual knurled thumbscrew attachment, with which the wrench can be manipulated in the ordinary manner, for the accurate adjustment of any size nuts.

AUTOMATIC VACUUM VALVE
IS EASILY REMOVABLE

9335

A self-contained automatic vacuum valve, now on the market, has a cylindrical valve body cast from highest-quality copper and tin, machine-finished, and with a threaded nozzle. Inside this body, above the nozzle, is a cross-bar perforated in the center to act as a guide for a plunger rod, the other end of which, above the plunger disk, slides in a similar perforation in a cap connected to the top of the valve body. In this cap is an air opening, and on it is machined a small seat for the plunger disk. On the plunger rod is a spiral spring, so light that the least suction will open the valve.

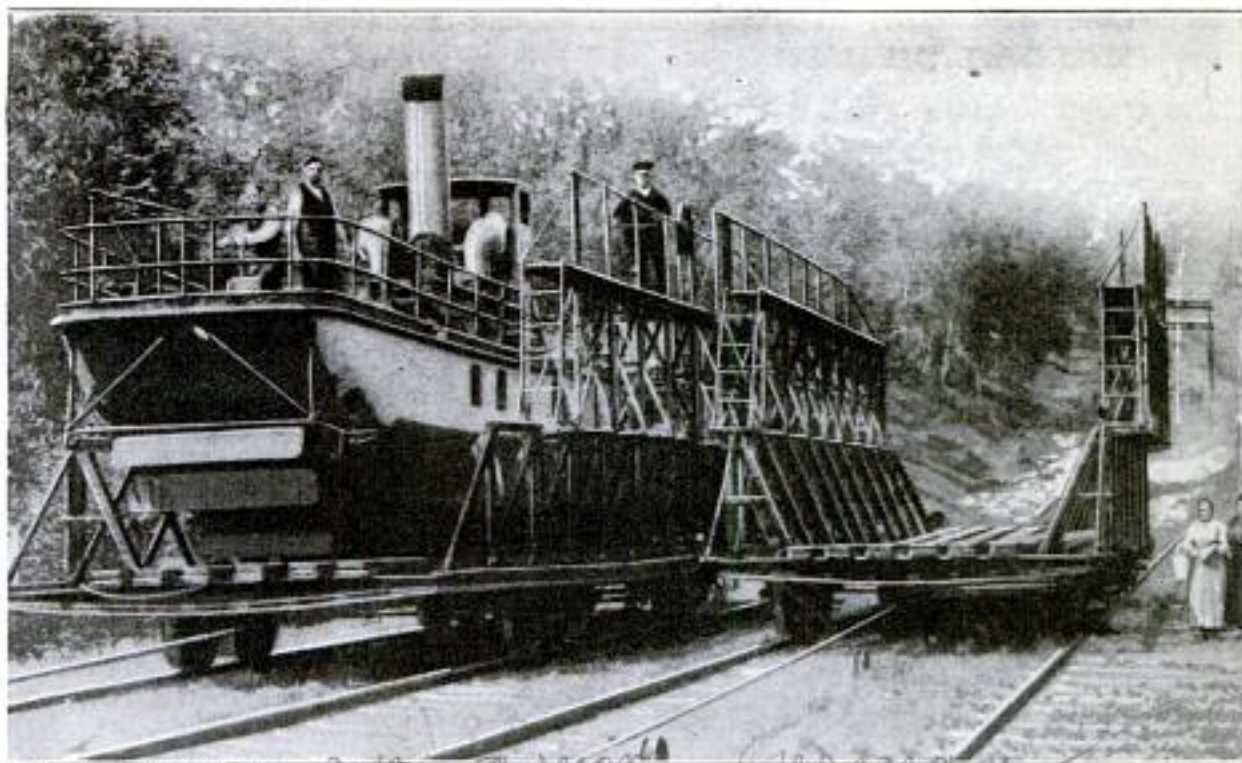


*Chicago
 220 E. 34th St.
 George C. Korb
 Chicago*

*Packard Engineering Co
 Cleveland, O.*

*Sold by: J. R. D. Nelson, 10. High St. Boston, Mass.
 Strawberry Hill, Wickham, England.*

9685

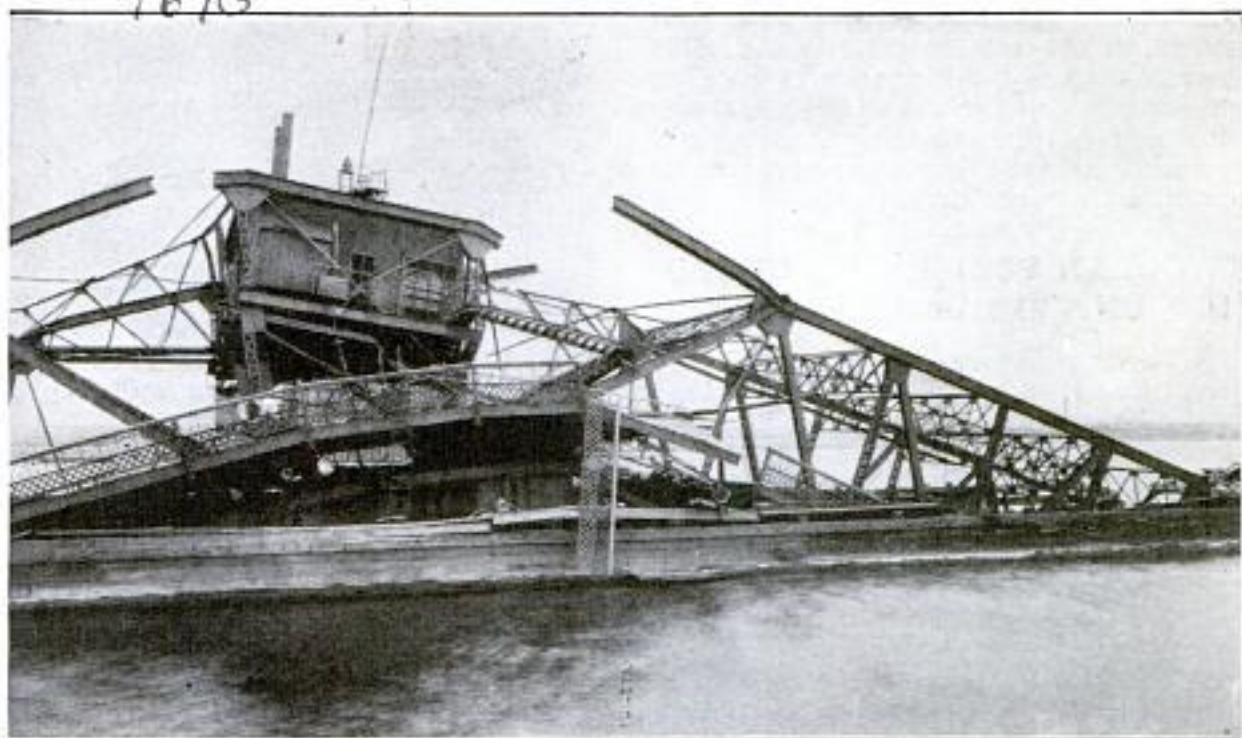


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ref. Foreign
STRANGE RAILWAY CARRIES BOATS FROM LAKE TO SEA

AT one point in East Prussia, when passengers book their passage for a trip by boat, they also receive a rail-road trip for good measure, yet at no time leave the boat. The small boats with their passengers run on an inland lake and are then transferred on special cars overland to the sea. The cars run on rails laid under the water, to take up the boats for the cross-country journey.

9693



STEAMER RUNS INTO OPEN DRAWBRIDGE AND WRECKS IT

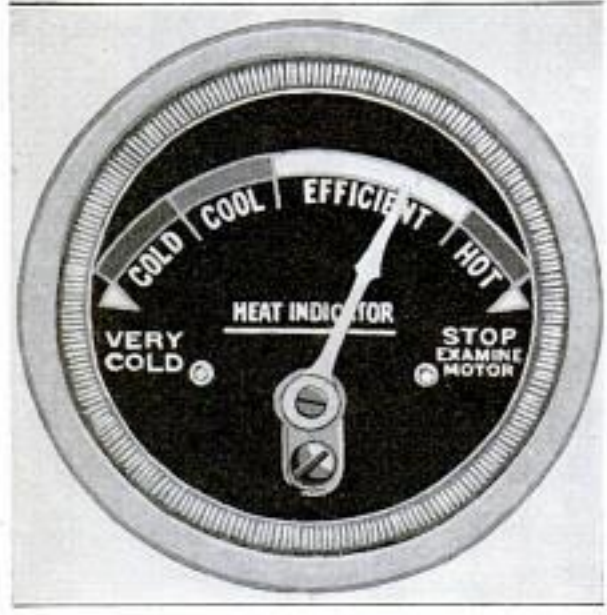
THE swing span of the drawbridge over the Hackensack River, between Jersey City and Newark, N. J., was wrecked recently when a 2,100-ton steel steamer ran into it while the span was fully open and in position directly above the fender piling. As seen, the span broke in two at the center pier, and each half fell upon the piling. Five men in the operating tower escaped unhurt. Ferry service was established immediately after the destruction of the bridge, which was the crossing for the Lincoln Highway traffic, and a temporary crossing erected pending the construction of a new draw span. There was a strong tide running in at the time the vessel came up the river, and it is believed that this might have been the cause of the accident.

*Comd. Thomas K. Flanagan
5 Virginia Ave., Jersey City, N.J.*
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Borg & Beck Co.
 914 S. Michigan Ave
 356 Access Chicago POPULAR MECHANICS

AUTO-TEMPERATURE INDICATOR HAS DIAL ON DASH

9776 The temperature at which a gasoline motor operates has an important bearing



Dial of Temperature Indicator for Automobiles Which can be Mounted on the Dashboard of the Machine

on its economy and upkeep, and should be known at all times to insure best results. There is now on the market a device, consisting of a control unit, that fastens to the motor and has a flexible shaft leading to the instrument board. It is there connected to a pointer that shows on a colored dial whether the motor is operating at an efficient temperature or is running too hot or too cold.

"WOODEN POLICEMEN" GUARD UNIVERSITY CAMPUS

4694 "Wooden policemen" brandishing heavy spiked clubs on which is written "Keep off the Grass!" are used by the University of Wyoming to keep pedestrians from



Students of the University of Wyoming Made a Number of These Wooden Figures to Keep Pedestrians from Walking on the College Campus

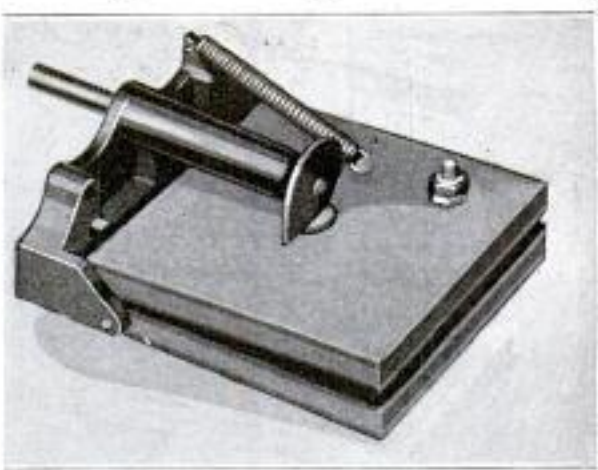
trampling the college lawns. The effigies are 26 inches high and mounted on a stake about 10 inches long. They were made by a student organization.

9853 **SPRAY DRAINS WITH ASPHALT TO CONTROL MOSQUITOES**

Finding the use of ordinary water drains inadequate in a fight to control the breeding of mosquitoes, the health department of Trinidad, British West Indies, is spraying the drains with liquid asphalt. It was found that clearing the drains of grass was not only expensive but ineffective; for the heavy tropical rains often washed down the banks, leaving little pools of water, in which mosquitoes bred freely, scattered along the sides. Asphalt is spread along the drains and burned, while a combination of oil is thrown on to provide the heat necessary to volatilize its lighter constituents.

9759 **RADIO VARIABLE CONDENSER OF NEAT CONSTRUCTION**

One of the neatest of the many variable condensers for use with radio apparatus, is the type now being manufactured by



Variable Condenser for Radio Set, Showing the Two Wooden Plates with Spring Tension on Top and the Specially Designed Cam

a concern in Cincinnati, Ohio. The essentials of the condenser are two thin sheets of copper—one of them covered by a sheet of mica—fastened on two small laminated wooden plates. The plates are so arranged that they are opened from the side with a booklike action which is controlled by a specially designed cam and spring tension. There being no friction between the different parts, these last indefinitely, and are said to be absolutely proof against voltage punctures or showering.

Crosley Mfg. Co.,
 Cincinnati, Ohio

The American City
 July, 1927

Encl. Agnes W. Spring
 Box 324, Laramie Wyo

9552

Lake Torpedo Boat Co.,

POPULAR MECHANICS

357

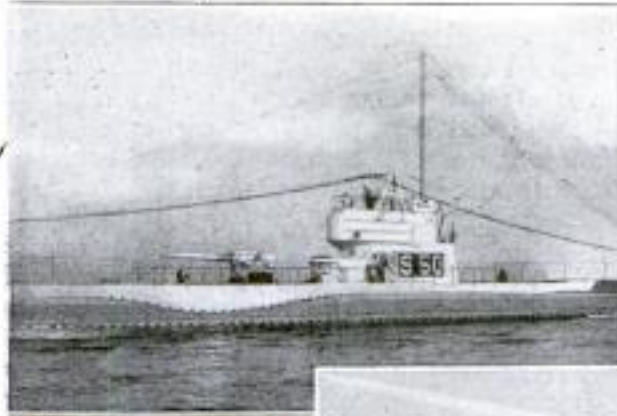
Bridgeport, Conn.

TWO SUBMARINES ADDED TO U. S. NAVY

Having passed all acceptance tests, with new records established, the submarines "S-49" and "S-50" have been commissioned, and are now a part of the under-sea flotilla of the United States Navy.

are powered by storage batteries through motor-driven reduction gears.

The vessels are also equipped with a complete high-powered wireless outfit. Experiments on these boats with under-



The Submarine "S-50" Leaving Brooklyn Navy Yard after being Provisioned for Regular Service: New Records were Established in the Preliminary Tests

The addition of these two underwater craft provides the last word in submarine defense for the United States. They are two of four sister ships, the others being the "S-51,"

which is now undergoing preliminary acceptance trials, and the "S-48," which sank off Bridgeport Harbor in Long Island Sound during acceptance trials, but was later raised. All four S-boats have an average length of 240 feet, with a surface displacement of over 900 tons. They have a cruising radius of 3,000 miles under normal conditions, but it is estimated this can, under duress, be extended to a greater distance.

The sting of these wasps of the sea is provided for by the mounting of a 4-inch rifle on the forward deck and the installation of five torpedo tubes, four in the bow and one in the stern. To take up the recoil from the rifle fire, special steel framing reinforces the deck below the gun-mounting platform.

According to unofficial reports the speed of the latest S-boats is between 22 and 23 miles an hour on the surface. Propulsion is by the latest-type Diesel engines, designed by the navy engineering department. Under water the craft



Formal Acceptance of the "S-50" at Bridgeport, Connecticut, by Officers of the United States Navy: Note How the Breechlock of the Rifle is Made Water-Tight

While on a Two-Hour Run during Trial Tests, the "S-51" Kept in Touch with Its Base by the Use of Carrier Pigeons. Wireless was Not Installed Yet

water communication by wireless have resulted in valuable data for further development of the equipment required for this purpose.

During the official tests of the Navy Department, constant communication with land was kept up by the use of carrier pigeons which were periodically let loose with messages to be returned to the test base. This step was taken to prevent a repetition of the "S-48" mishap which nearly resulted fatally. The two remaining boats, now being prepared for final trials, will complete the program of the United States Navy in the S-boat class.

SOCIETY TO AID CHILDREN

9841 IN STUDY OF BIRDS

Thirty thousand dollars has been received by the National Association of Audubon Societies to be used in aiding teachers and pupils in the study of wild birds. Teachers who form clubs are to be given free material to help them in their work. More than 1,700,000 children are already enrolled in schools throughout the United States and Canada. The headquarters of the association is in New York City.

The American City
4/1922

Charles J. Gilbert, President, National Audubon Society, New York, 1924

1 no. M. Holst, 1335 Esrant St.

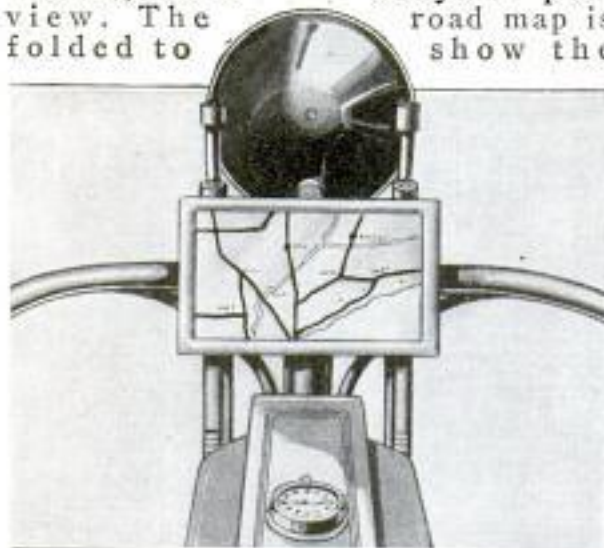
358

Blender. Colo. POPULAR MECHANICS

**MAP HOLDER FOR MOTORCYCLE
FASTENS TO HANDLEBARS**

9718

Motorcyclists will appreciate a handy and inexpensive map holder which can be fastened to the handlebars of the machine, and is always in plain view. The road map is folded to show the



Motorcycle Road-Map Holder Which Fastens to the Handlebars, Showing How It is Placed Directly before the Eyes of the Rider

route to be traveled and then inserted in the holder, which has a transparent celluloid cover. The rider thus has the map before his eyes at all times, and need not stop every few miles to take it out of his pocket for consultation.

Aeronautics
**NATIONALITY AND REGISTRY
MARKS FOR AIR CRAFT**

9785

As part of a comprehensive program to assist in assuring safe practices in aircraft operation, an airship register has been devised. This movement is fostered by the National Aircraft Underwriters' Association. That organization has felt

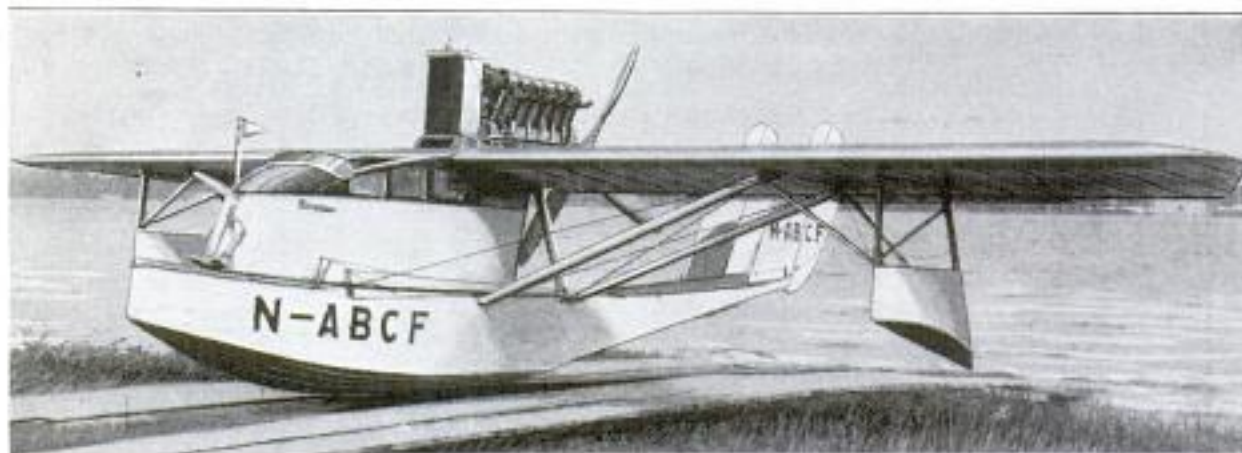
the pressing and growing need for nationality and registration marks for private and commercial airplanes.

The nationality mark is represented by a capital letter, as, for instance, "N" for the United States. Its use is not required for air craft that remain within the United States, but only for those following international routes.

The registration mark consists of four capital letters, at least one of which is a vowel; for this purpose the letter "Y" is considered a vowel. On air craft other than state and commercial, the registration mark is underlined with a black line.

Specific rules govern the painting of the nationality and registration marks. They must be in black on a white ground, painted once on the lower surface of the lower main planes and once on the upper surface of the top main planes, and also along each side of the fuselage, between the main planes and the tail planes. It is provided, in addition, that the nationality mark be painted on both sides of the rudder. The letters on the wings are to have a height of four-fifths of the chord, and in the case of the rudder, to be as large as possible. The prescribed width of the letters is two-thirds of their height, and all letters are to be in plain block type and uniform in shape and size. A hyphen separates the nationality and registration marks. In general, the marks should be displayed to the best advantage, and must be kept clear and visible. The registration marks will also serve as the "call signs" of the air craft in all radio or other signaling.

Whenever an owner or operator applies for registration of his air craft, he must give all essential information regarding it. This information, as abstracted in the register, will have an important bearing upon many phases of insurance.



Hydroplane, Showing the Markings Which the National Aircraft Underwriters' Association has Designed to Appear on Flying Craft, and Which will Serve as a Ready Means of Identifying the Owner

Cvt. George F. Paul, 900 Ellworth Bldg
Chicago

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9938

COMMENT AND REVIEW

[These pages were printed July 25, 1922.]

STORIES are not wanting of locomotives with no one aboard suddenly going into action and dashing off down the line, to the consternation of trainmen and dispatchers and danger of collision with other trains. Machinery also will start or stop at times without human intervention. Derelicts at sea frequently accomplish voyages of thousands of miles before they are reported, sought out, and sunk. It is impossible to convince the old salt-water seaman that ships do not possess certain mysterious powers of action over which captain and crew have no control.

A Runaway Ship

A curious instance of this kind happened recently in the Boston harbor. The Shipping Board steamer, the "Wakanna," had been condemned to end her days by being taken to a lonesome beach far from the busy lanes of vessels, and burned. She had been for some time securely anchored, while the nature of her fate was being considered. Finally it was decided. Then, at night, she slipped her moorings, and without captain, pilot, or crew on board, silently threaded her way through the harbor, out among tortuous channels, and around dangerous rocks and reefs, to navigate which, even in daytime, requires experienced pilots to pass in safety, and out toward the great ocean.

Early next morning the escape was discovered, and government tugs chased out after the truant. Finally she was overtaken, and towed back to await the ordeal by fire which occurred a few days later. Old salts shook their heads and declared, "She knew what was coming," and one might as well try to convince them the ocean is fresh water as to reason them out of their belief.



AFTER the petition for independence of the Philippine Islands, which has been so strongly and ably urged by a distinguished delegation to Washington from the islands, and all the arguments for and against, which the politicians so confidently declare, it is informing to have the views of an American who is now and has been in successful business there for several years. During our interview he explained why it is not practical at present, and in his judgment cannot be for many years to come.

Independence for the Philippines

He paid the highest tribute to the educational, judicial, and financial systems which the United States has established and maintains there. Our government of the islands has been excellent, and in the larger cities and a considerable zone about them the natives have developed to a point where they could doubtless stand alone in many respects, for the Filipino is possessed of no small amount of natural ability, which education quickly develops. The great difficulty is the want of solidarity, and the huge task of bringing about any such condition. Conditions there are comparable to those small European mountain states where the people of one province have centuries-old customs and habits, each peculiar to itself; and where the inhabitants of one cannot read, speak, or understand the language of another, perhaps only a few miles away. The same is true in the islands, with the additional handicap that as yet the great majority of the people are very ignorant, and many of them semi-savage or worse. There are scores of tribes numbering thousands of members each, who still maintain their hatred of certain other tribes, and it is only the presence of our forces there which restrains many tribes from warfare and plunder of others. The Spaniards made little or no effort to prevent these periodical incursions, and, he said, with American restraint removed, it would be a matter of only a few days, or even hours, before many tribes would be in action again, so overwhelming is the preponderance of what may be designated as "wild men" over the civilized. Then, too, distances between the various islands, of which there are hundreds, are much greater than we here at home realize, and there are periods of days, at times, when travel between certain islands is impossible.

By no means do all the islanders want to be educated, and thousands of adults are quite incapable of learning even what we call the rudiments. They love their wild state, in which they and their ancestors have lived for centuries; it satisfies every want, then why make the radical change to the white man's mode of life?

The difference in mentality among different tribes is more pronounced even than the social status of the classes was in European countries 50 years ago.

In many, probably most, ways we would be better off had we never acquired these possessions. It is doubtless a matter of indifference to most of our citizens whether we have them or not.

We may fairly ask ourselves the question, "When will all the islanders become civilized?" in our sense of the word.

We may also ask ourselves, "When will the millions of square miles of useless and now waste land in the United States become productive?"

Some day, perhaps, but not in our time.



IT is not so long ago that lepers were scarcely thought of except as connected with incidents in the Bible. Even with a better knowledge of what are now the Hawaiian Islands, and increased travel among oriental lands, we unconsciously thought of lepers as something a long, long way off. Certainly we never entertained the idea that it was anything which immediately concerned us personally, and least of all as ever becoming a danger and menace here at home.

*What
about the
Lepers?*

But like many other things which could not happen, it has. We have lepers in 25 states. In spite of the research and noble efforts of the medical profession, and the confident claims from time to time that a cure had at last been found, the terrible fact

is that as yet there is no certain remedy to remove the curse or prevent it if one is effectively exposed.

The very best that medical science has as yet to offer is the absolute quarantine of the afflicted, that their living death be not communicated to others.

The Federal government has but one leprosarium, in Louisiana, and its limit of 200 patients is already filled to capacity. Something must be done, and at once, or like a deluge or forest fire, it will get beyond control.

The Red Cross, with its national organizations, which functioned so promptly and efficiently in the great war, might well lend itself to this growing menace here in our own midst. It is not a matter which villages, towns, cities, or even states can handle effectively by themselves. It requires an organization of national reach and strength such as the Red Cross already has. Aid to the needy and suffering on the other side of the globe is commendable, but not more so than the care of the 1,000 lepers who at present are properly denied admittance to almshouses, hospitals, and sanitariums. Dr. C. H. Lavinder, assistant surgeon-general, declares isolation is at present the only way.



THE cyclonic-minded captain of the vastest pirate crew ever assembled, is now in a fair way to lose that mind, and with it his grasp on the soviet government of Russia.

*Russia
the
Helpless*

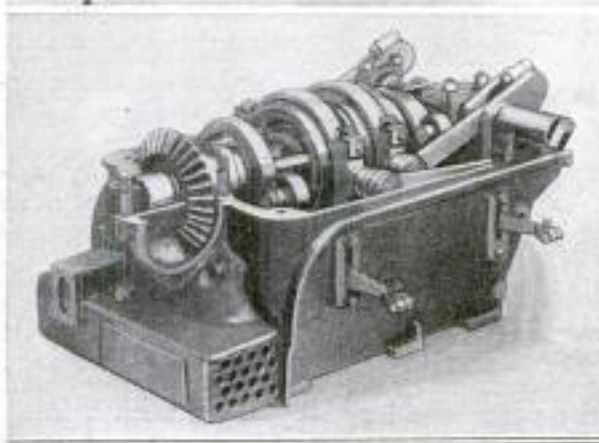
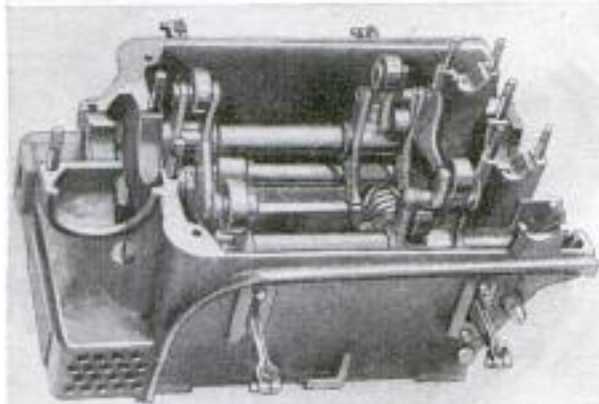
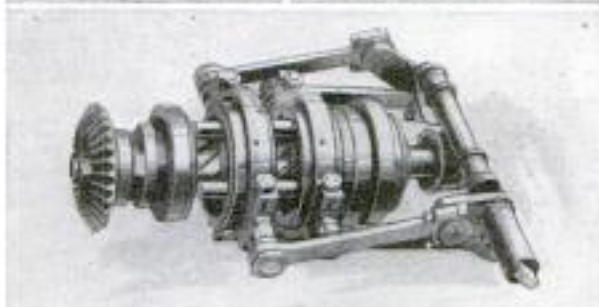
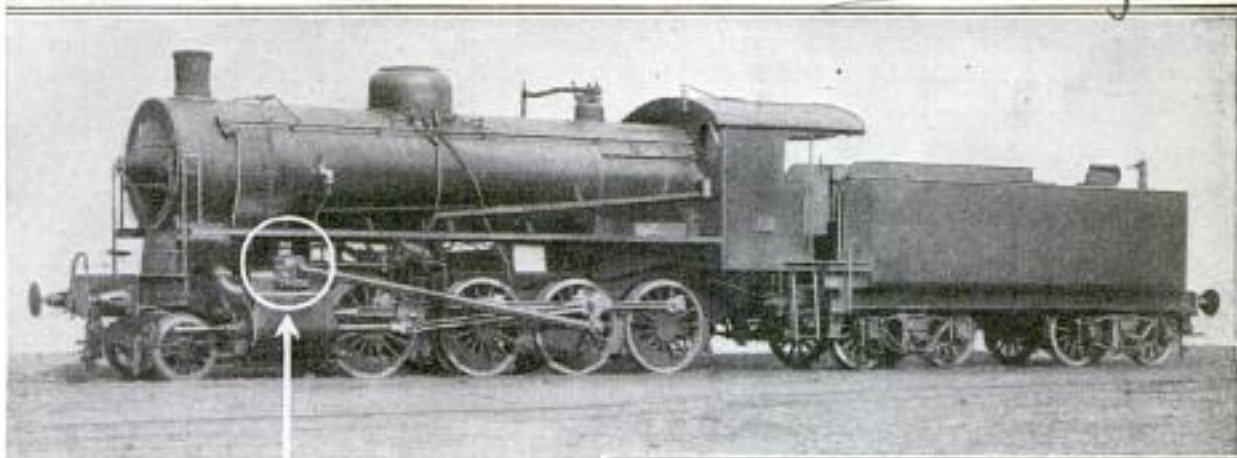
Exhausted are the fabulous hoardings of the czars; stripped of gems and gold, the Russian churches are as bare as a barn; banks and the possessions of merchants are alike looted; granaries which could be located are empty, and the husbandmen refuse to plant more than enough to supply their smallest actual needs. The proverbial drunken sailor in his wildest excesses is a miserable piker to the debauch of a whole nation. And now, after sending millions to spend in bolshevistic propaganda in other

lands, the gold basis of a monetary system which Lenine declared to despise finally is recognized to the extent of asking a gold loan, at the Hague, from any nation which will lend.

The structure of centuries, with tremendous power and apparently inexhaustible resources, that great tower of strength, has been steadily falling, piece by piece, and now like the man who tore it down, is a monstrous wreck.

Some day a real leader, using brain force instead of brute force, will be raised up. What most glorious opportunity of the centuries to redeem and rehabilitate a great empire!

H. H. WINDSOR



Above: Italian Locomotive Fitted Experimentally with a New System of Poppet Valves, Installed in a Box Connected with the Steam Chests of the Cylinders. Left: The Driving Gear, Cams, Reversing Shaft, and Rods Removed from the Box, Leaving It in the Condition Shown Below; and Below That Again Is the Whole with the Box Cover Removed

the new system, poppet valves are used, to avoid the faults of both the flat slide valve and the piston valve. The operation of the poppet valves is controlled by cams located on a short shaft incased above the steam chest, the shaft being driven, through bevel gears, from the driving axle of the engine. The angular position of the cams on the shaft may be changed while running, through the use of a screw and sliding sleeves. Advantages claimed are that no strangulation of the steam occurs, and more effective use of the power of expansion of the steam is possible.

9911
NEW EXPLOSIVE COMPOUND HAS IDEAL QUALITIES

A Minnesota inventor has compounded an explosive which has demonstrated remarkable qualities in recent experiments. While appearing to have great disruptive powers if closely confined, as in a shell or drill hole, it can then be exploded only by means of a blasting cap or electric detonator. It is reported to give off no noxious fumes, that it will not explode when heated to 212° F., that it will not freeze, and that it cannot be accidentally exploded by shock.

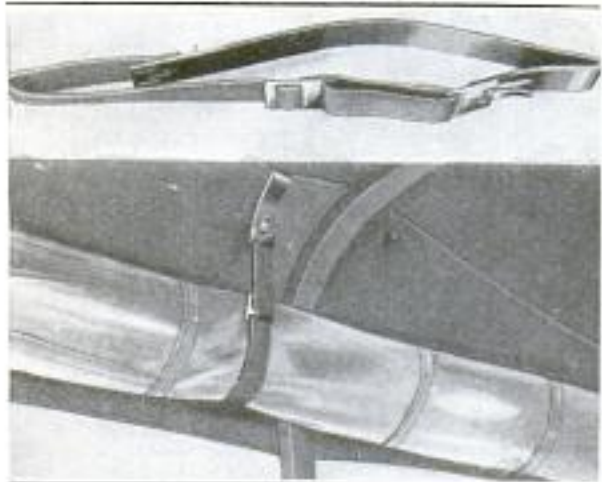
In an effort to overcome the faults common to the standard types of link-motion valve gears used on locomotives, a new gear has been designed that, in trials, has shown marked economy of coal and water for the power developed. In

☞ To suit different kinds of glass, it is recommended that the limes used in their manufacture be divided into three classes, containing, respectively, 96, 91, and 83 per cent of oxides of calcium and magnesium. The variation from day to day should not exceed 2 per cent.

*dr. John R. Crosson
 Kenyon, Iowa*

**DEVICE HOLDS AUTO CURTAINS
READY FOR INSTANT USE**

Auto side curtains are held ready for instant use by means of a new device,

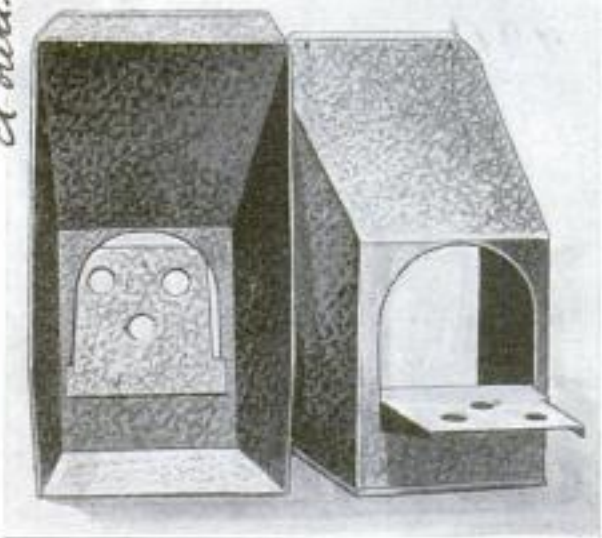


Above: Strap for Holding Side Curtains of an Automobile. Below is Shown the Manner in Which the Straps are Used

consisting of a metal clasp which fits under the padding strip, and a web strap that goes around the rolled curtain and hooks to the clasp. To let down the curtains it is only necessary to unhook the straps holding them.

9724 **SANITARY HEN'S NEST
MADE OF METAL**

The old-fashioned dirty hen nest seems to be doomed to extinction by a metal



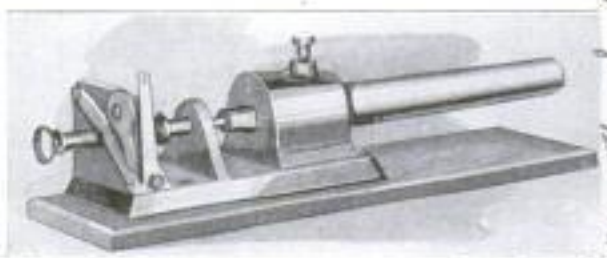
Two Views of Sanitary Hen's Nest. Made of Sheet Metal, So That It can be Scalded to Keep It Clean

nest—the recent invention of an Iowa farmer—which can be scalded periodically. A false bottom is another feature of the nest. It consists of a metal frame

with holes, through which the eggs roll out of sight. This prevents the hen from sitting on the eggs, eating them, or getting them dirty. The nest can also be used as a coop. It is hung on two nails and is easily moved.

**BURGLAR GUN IS EFFECTIVE
TO FRIGHTEN OR KILL**

Burglars or other prowlers may be effectively guarded against with the aid of a contrivance resembling a small cannon, which has been produced by an Alabama man. The invention consists of about 10 inches of a shotgun barrel, mounted in a substantial breech and so arranged that a plunger spring, which fires the shell, is loosed by a disarrangement of the thread or string attached thereto. The outfit is especially adapted for the protection of isolated buildings in small towns or villages, and may be loaded with deadly buckshot to kill, or with merely a blank



This Burglar Gun may be Loaded with Blank or Loaded Shells, and is Operated by the Breaking of a String

shell to frighten away the would-be intruder.

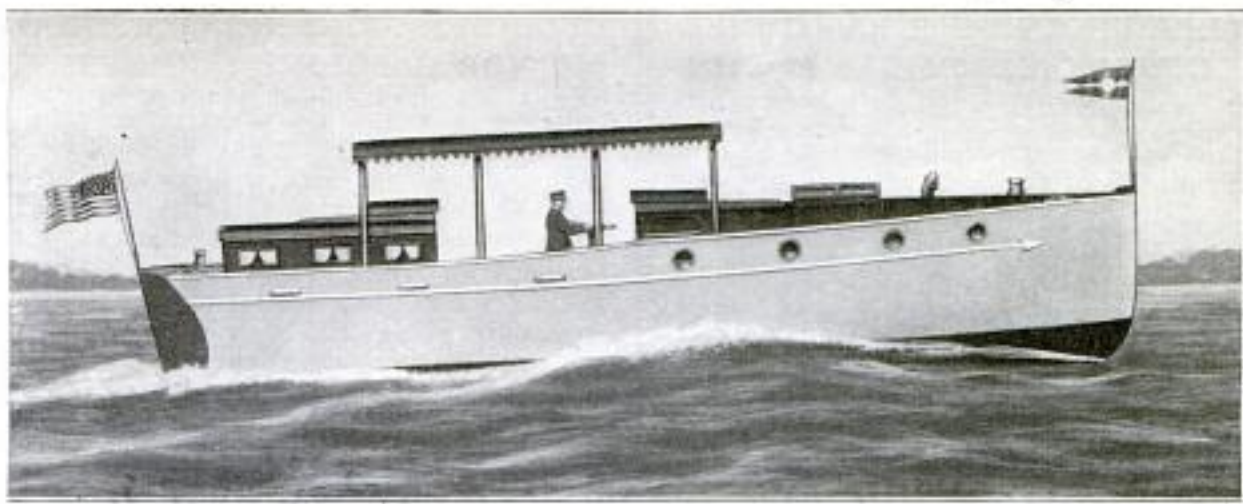
**GASKETS FOR FLANGE UNIONS
IN THE FORM OF A PASTE**

Every man may be his own gasket maker by using a paste, now on the market, which is applied with the fingers to any flange union where a gasket or washer is required. It is specially applicable for use on gasoline engines, as it will stand high pressures and temperatures, and it is leakproof against gasoline, kerosene, oil, and water. Although the paste permanently seals the union, it does not cement it. The parts can be readily separated, whenever desired, and the paste can be scraped off with a knife blade. "Tom-a-gasket"

We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

The Perfect nest + Coop Co.
P.O. # 3, Box 29, Magnolia,
Iowa.

F. D. Johnson, Mentone, Ala.
d.w. (P)
E. Hepperhead, Day, N.C.



Gasoline Cruising Launch with Fore and Aft Cabins, and Single Control under the Awning Amidships: The Boat Is 36 Feet 6 Inches Long, 9 Feet 10 Inches Wide, and with a 35-Horsepower Motor Makes 15 Miles an Hour. There Are Sleeping Quarters for 8 to 10 Passengers

9775

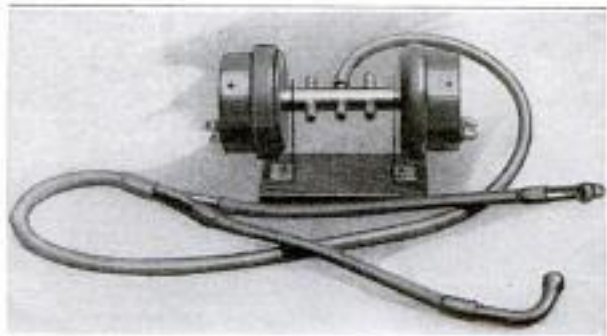
**GASOLINE CRUISING LAUNCH
 BUILT WITH TWO CABINS**

Constructed particularly for use on inland waters is a cruising launch that is 36 feet 6 inches long, 9 feet 10 inches wide, and that normally has a 35-horsepower motor, giving it a speed of 15 miles an hour, but is so rigidly built that any motor up to 100 horsepower can be installed in it, giving the launch a proportionately greater speed. The boat has fore and aft cabins, electrically lighted, a lavatory, and sleeping quarters for 8 to 10 passengers. Under an awning amidships is a single-handed control.

9795

**SIX PERSONS MAY LISTEN IN
 WITH RADIO ATTACHMENT**

Six persons may listen in to radio concerts, simultaneously and with rubber-tube ear pieces instead of the more expensive amplifiers and loud-speaking horns. A Pennsylvania man has designed a nicked-brass attachment that fits into the ear apertures of two receivers and possesses six branch tubes, to which the half dozen listening contrivances are affixed.



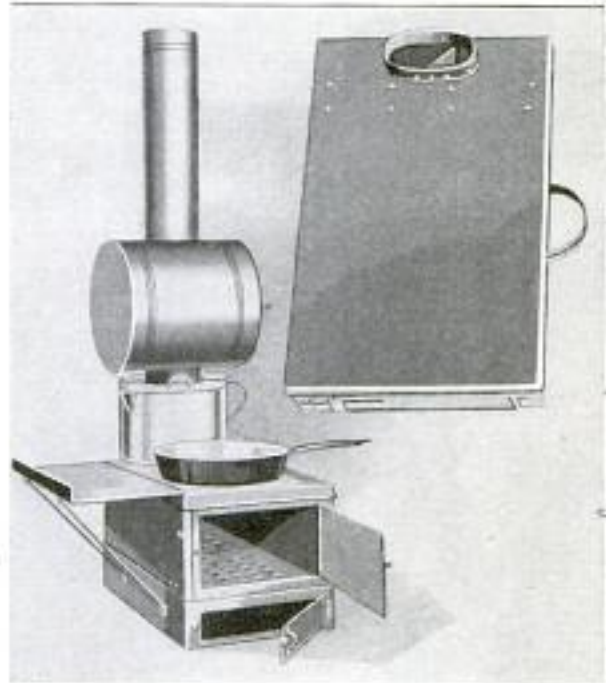
Simple Radio-Receiver with Attachment Enabling Six Persons to Listen In at Same Time

Chas. W. K. Thomas,
 963 Liberty Ave.
 Pittsburgh, Pa.

**CAMP STOVE THAT FOLDS
 HAS BAKING OVEN**

9675

Designed to burn either wood or charcoal and equipped with a baking oven, water container, and coffeepot, a seem-



This Practical Camp Stove, Which Is Collapsible and Burns Wood or Charcoal, Has a Water Heater and a Baking Oven. It Folds into a Flat Package, That is Easily Carried in the Rear Seat or on the Running Board of a Car

ingly very practical camp stove is now being marketed by an eastern concern. Its chief advantage, however, lies in the fact that it can be folded into flat compact size with its largest measurement 20 1/2 inches, so that it is easily carried in the back seat or on the running board of an automobile, or packed with other camp equipment.

Mr. R. S. Livingston,
 Elverade, Pa.

Mr. R. S. Livingston,
 Elverade, Pa.

LIFELIKE DOLLS FASHIONED OF WAX AND PAPIER-MÂCHÉ

Lifelike dolls, of which the head and shoulders are modeled in wax, while the remainder of the body is made of papier-



Two Samples of More Than Usually Lifelike Dolls, Fitted with Real Human Hair and Artificial Eyes

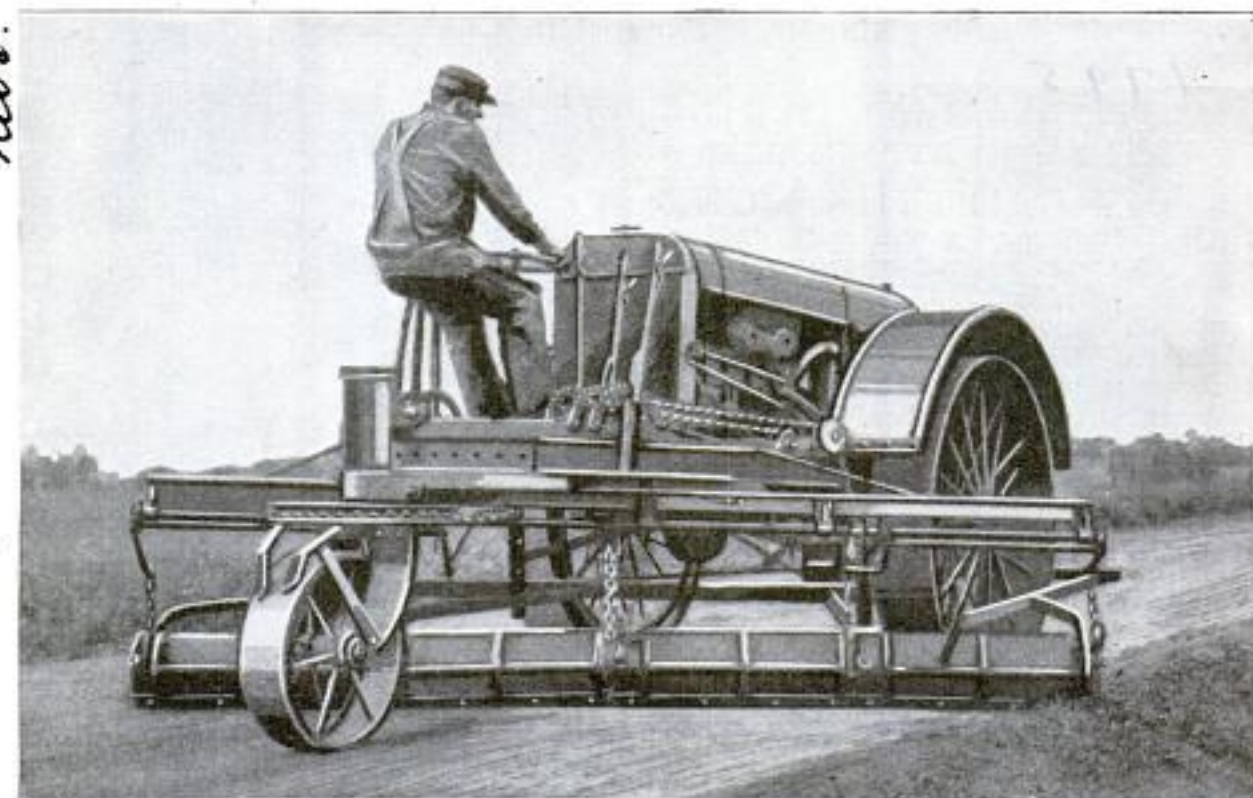
mâché, are the product of a Chicago manufacturer. Human hair adorns the heads and is also used for the eyebrows and eyelashes. The eyes are of glass, such as are sometimes used by persons who have lost an eye, and the teeth are constructed of the same material as the false sets made for dentists.

CYLINDER-GRINDING COMPOUND FOR GASOLINE ENGINES

For gasoline motors there is now available a cylinder-grinding compound that is mixed with the lubricating oil, and it is claimed for it that when the engine is run, it grinds the cylinder walls and the piston rings to a perfect fit. The compound is fast-cutting at the start, but it gradually pulverizes to a polishing fineness, and then escapes from the cylinders altogether. The work of regrinding cylinders can therefore be done speedily and by an unskilled operator.

Agent - Edward A. Cassidy,
 ROAD-MAINTENANCE OUTFIT
 OPERATED BY ONE MAN

Road-maintenance work on the rural highways has been benefited by the introduction of an outfit which is constructed as an attachment for a tractor. The implement has but one pivot wheel at the rear, thus permitting the workman to execute a square turn, and four blades instead of the customary single cutting edge. The blades are operated by power from the motor and are controlled by pedals under the driver's feet, the whole contrivance being manipulated by one man.



This New Road-Maintenance Machine Consists of a Three-Wheeled Tractor and the Scraper Attachment, Which Has Four Independent Blades Instead of the Customary Single Cutter. The Blades are Adjusted to the Road Surface by Means of Foot Levers

mfr. The Square Turn Tractor Co
 Norfolk, Va.

Law Schmitt & Son,
 1201 E. Chicago

Edw. A. J. Colwell, Norfolk, Va.

U. S. Products Co
 127 Elmiston Ave
 Pittsburg, Pa.

BUZZARDS AND HIGH-VOLTAGE TRANSMISSION LINES

By NORMAN C. McLOUD

1717 St. Paul St.
Baltimore Md

BUZZARDS are getting educated. They are rapidly learning that it is poor and dangerous business to attempt to take liberties with high-voltage transmission lines charged with electricity.

The buzzard is a born sentry, for it finds the carrion flesh which is its food by the sense of sight rather than by the sense of smell, and with the building of the first long-distance electric - transmission lines, the buzzards hailed the steel supporting towers as something new in the matter of sentry stations. But in taking advantage of this man-made improvement they created a new hazard for themselves and, incidentally, a new problem for the engineers of the electric - power companies.

Engineering charts kept by the Pennsylvania Water and Power Company show that the buzzards have been no mean factor in the interruption of current transmission. The so-called turkey buzzard is the largest of the native birds in Pennsylvania and Maryland, with a normal height of 2 feet, and a wing spread of from 5 to 6 feet. The towers of the transmission line range in height from 60 to 130 feet, and it is not surprising that the buzzards should choose these vantage points for their lookout stations. As long as they sat still on one of the crossarms,

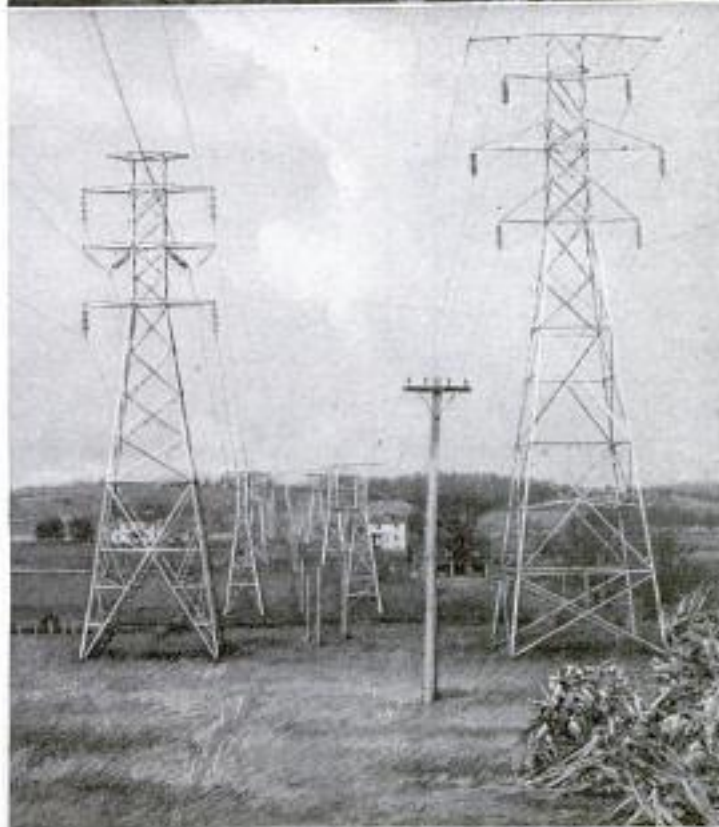
they were perfectly safe, but when it came to spreading their wings for flight, something was quite certain to happen. The space between the perch and the wire was not sufficient to accommodate their wing spread without establishing contact, and a short circuit was inevitable. This mishap invariably killed the buzzard and sometimes resulted in placing the transmission lines momentarily out of commission.

In seeking a remedy, the engineers were more concerned for continuity of power flow than for saving the lives of the birds. The results have been of importance to both sides, however, for by increasing the clearance space between wires the company has reduced the likelihood of interference by the buzzards. From 26 inches the clearance space has been increased to a maximum of something over

40 inches, thus giving the birds a better chance to escape without being killed.

Two army airmen recently made an unusually long flight from San Antonio, Tex., to Washington, D. C., during two days of ten and eight flying hours, respectively. Leaving Kelly Field early one morning, they made stops at Houston, Tex., and Pensacola and Jacksonville, Fla., arriving at Bolling Field that evening.

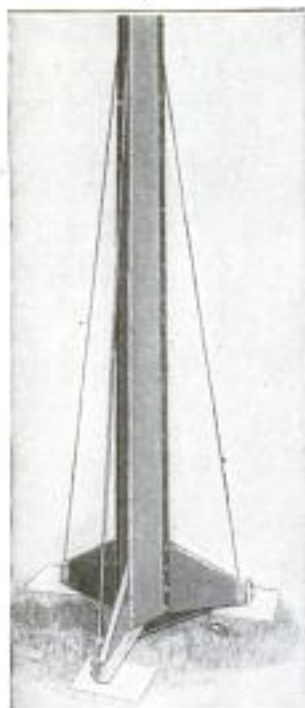
Copyrighted material



At the Top is Shown One of the Buzzards Which was Electrocuted When Its Wings Came in Contact with the High-Tension Transmission Lines. At the Bottom are Seen Different Types of Towers with Increased Clearance Space between the Wires

9689
**POLE FOR WIRELESS AERIAL
 ERECTED BY ONE MAN**

Easily erected by one man and standing 30 feet 3 inches above its base, a pole



for supporting a radio aerial that is being manufactured by a Cincinnati, Ohio, concern, commends itself to the wireless enthusiast. The pole is shipped in knock-down form, consisting of four sections of bent sheet steel, each section 7 feet 10½ inches in length, and the necessary bolts, etc., for assembly. When assembled and ready to erect, the total weight is only 140 pounds, and by means of anchor lugs on the base,

it can be placed on flat-cement or composition roofs as well as on the ground.

9714
**WISCONSIN ROAD-MAINTENANCE
 SYSTEM EFFICIENT**

Until that day in the far future when all roads in the United States are hard-surfaced, dragging of dirt roads will continue to be, as it is now, a matter of paramount importance.



Many states maintain a force of "patrolmen" who give their entire working days to dragging, and in no other state, perhaps, is this service better organized than in Wisconsin. "They drag

the roads in Wisconsin," any motor tourist will tell you who has toured through the state. The white signs with black lettering every few miles along all the

main dirt highways suggest how this efficiency of service is obtained. When once a patrolman is appointed to take charge of a certain section of road, he alone is responsible for the proper maintenance of that section. He is given a number which he must wear on the front of his hat, and his name, number, and territory are inscribed on the signboard. The effect of these signboards in getting good service has been excellent.

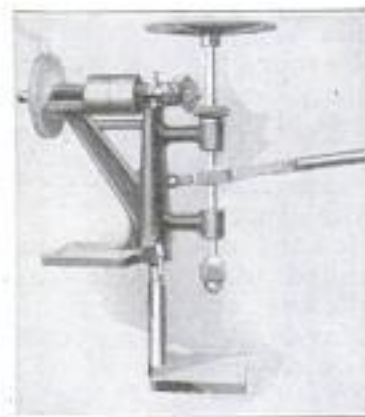
9735
**PLUG-TYPE REFILLABLE FUSE
 SIMPLE AND EFFICIENT**



Plug-type refillable fuses, which can be handled freely by the novice in replacing any "dead" ones in the circuit, have been introduced by a Chicago manufacturer. The innovation resembles the ordinary plug fuse, and when "blown," is unscrewed from the circuit, its top removed, the old filler dropped out, a new one put inside, and then screwed back into the circuit, the whole operation requiring but a few seconds.

9670
**COMBINATION SHOP MACHINE
 HAS VARIETY OF USES**

Designed to be equally well adapted for use in the small or large shop, a new combination power tool is now being manufactured that can be used for many operations. In general appearance, it resembles a drill press, but in addition to this, there is also a rip saw and horizontal disk grinder, driven from the horizontal and vertical shafts respectively. An emery wheel or a surface wheel sander may be substituted for the rip saw.



9735
 Littleford Bros. Co., 7 S. Dearborn Chicago

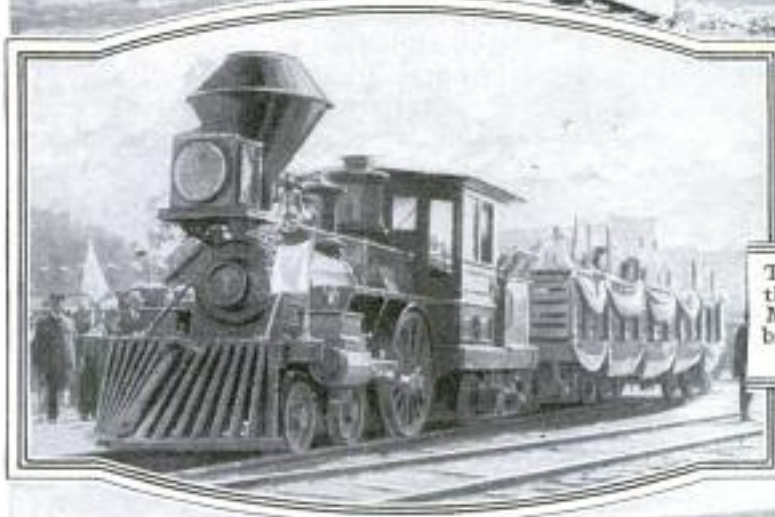
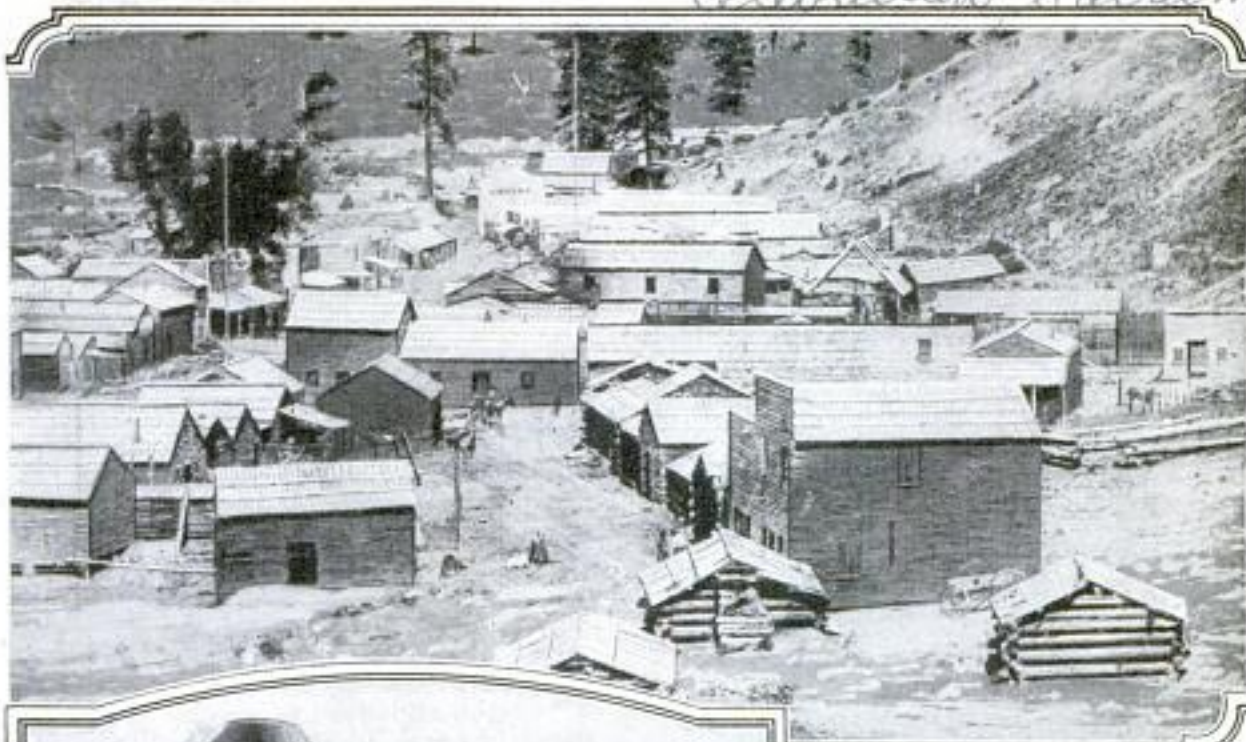
*Emil Florence L. Clark
 Mc Gregor, Iowa*

Littleford mtd. 10/28/12

*Star O. Lock Mfg. Co
 417 S. Dearborn, Chicago*

9845. Combs. } Chas. W. Seiger, Powell & Sutter St
 San Francisco, Calif.
 Mr. Marvin Ingler, Director, News Bureau,
 Celebration Sacramento,
 Calif.

ROMANTIC "DAYS OF '49" ARE COMMEMORATED



This is the Typical Mining Camp with Exact Replicas of the Miners' Shacks during the Process of Construction for the "Days of '49" Celebration. Recently Held in Sacramento, California

This Antiquated-Appearing Engine, One of the First in the West, Made Regular Six-Mile Trips around the Scene of the Celebration and Hauled a Flat Car Fitted with Seats for the Passengers



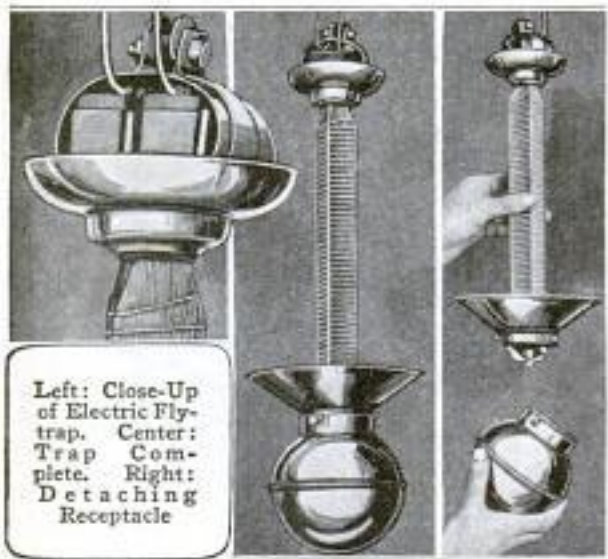
This Shows the Difference in Transportation in 1849 and 1922, the Modern Motor Bus Furnishing Quite a Contrast to the Old-Time Stagecoach, Many of Which were Used as Much as Possible during the Picturesque "Days of '49" Celebration

Mr. E. Homaine
 126, Rue Saint-maur, Corp. 78.42nd St.
 Paris (XI) France
 POPULAR MECHANICS
 SLIGHTLY ELECTRIC FLYTRAP
 FRENCH INVENTION

The Butler Vaporizer
 78.42nd St.
 New York City

4786

An electric flytrap, invented by a Paris electrician, is distinguished by its almost ornamental appearance. It consists of a

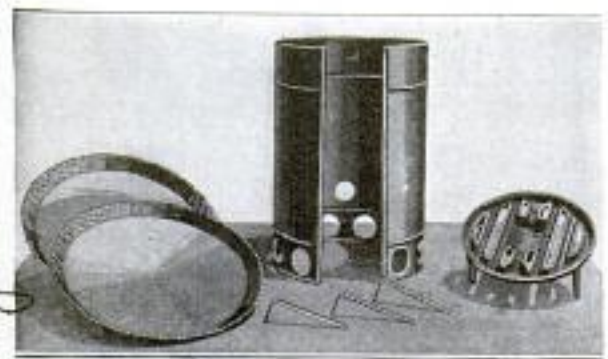


Left: Close-Up of Electric Fly-trap. Center: Trap Complete. Right: Detaching Receptacle

four-sided piece of wood with grooves in which is wound a wire connected with the electric current. This live wire is coated with a waxy preparation which attracts the flies by its peculiar odor. The coating must be removed twice a month. When a fly settles on the coil, a short circuit is produced and death follows. At the bottom is a detachable spherical receptacle into which the dead flies fall, and from which they are removed from time to time.

HEATER FOR ORCHARDS BURNS CARBON BRIQUETTES

Briquettes of carbon are used as fuel in heaters which have been installed recently in California fruit orchards as an improvement upon the smoky crude-oil smudge pots employed heretofore to pre-

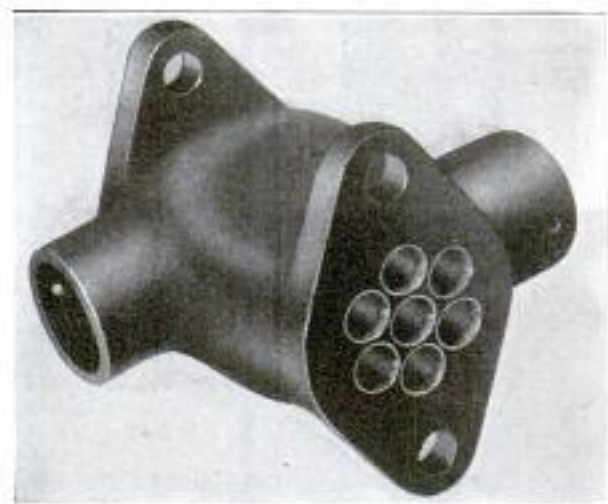


Orchard Heater, Showing, at Left, Heat Deflectors; Center, Sheet-Iron Shell and Deflector Holders; Right, Cast-Iron Grate

vent damage by frost. The outfit consists of a cylindrical sheet-iron shell, a cast-iron grate, and heat deflectors in the shape of inverted pie pans. The grate contains an oil reservoir with an asbestos wick to burn coal oil for the purpose of igniting the carbon briquettes. Ten pounds of these, which cost but 7½ cents, provide sufficient heat for five hours.

ACCESSORY TO HEAT GASOLINE VAPOR GOING TO ENGINE

If the low-grade gasoline being distributed today can be thoroughly vaporized, it makes a satisfactory motor fuel, but considerable heat is required to prevent liquid-gasoline spray from finding its way into the engine cylinders. To supply this heat, a vaporizer has been designed that may be placed between the carburetor and the intake manifold. The vapor is conducted through thin copper tubes, while a portion of the hot exhaust gas is circulated between the tubes and the cast-iron shell of the device. Tests



This Gasoline Vaporizer Leads the Gasoline through Thin Copper Tubes, Heated by the Gases from the Exhaust Manifold

have shown a surprising increase in power and mileage, and a greater flexibility of the motor.

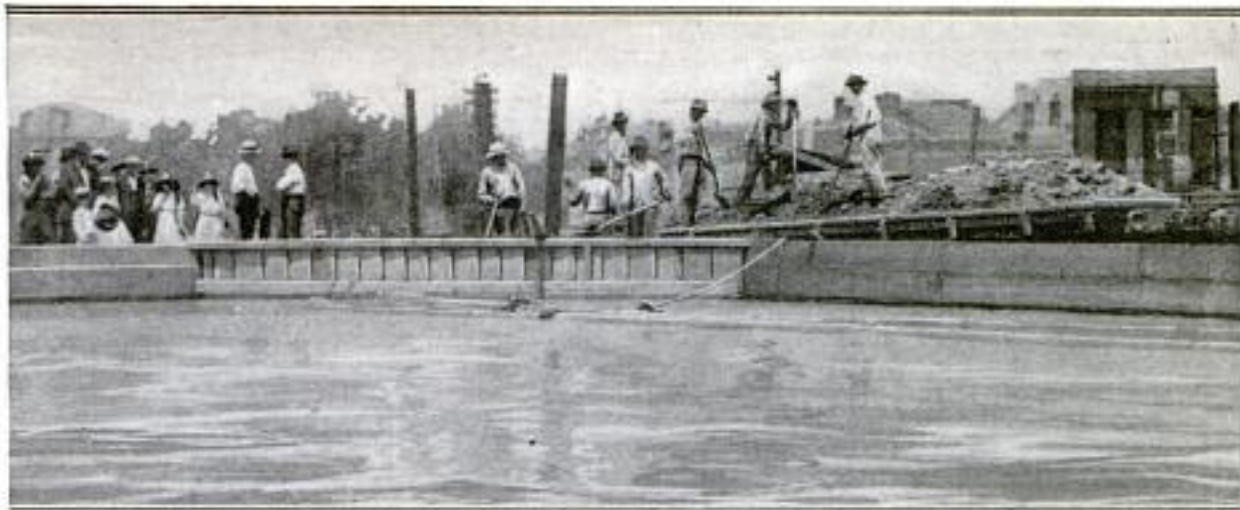
STARS AND STRIPES WASHED ON PACIFIC STEAMSHIPS

Started by the steamship "Kennedy," which runs between Bremerton, Wash., and Seattle, a custom has spread among ships on the Pacific to give Old Glory a regular weekly washing. Heretofore flags have usually been burned when too soiled for use.

Times Picayune 7/10/22
 Copyrighted material

Mr. C. S. Vance,
 Los Angeles Gas & Elec.
 Corp.
 Los Angeles
 Calif.

Flag
 P. M. V. Co.



Scene during the Record-Breaking Flood at New Orleans, This Year: The Workers are Building an Improved Sheet-Piling Levee at a Point Where the Actual Levee Was a Foot below the Surface of the Water

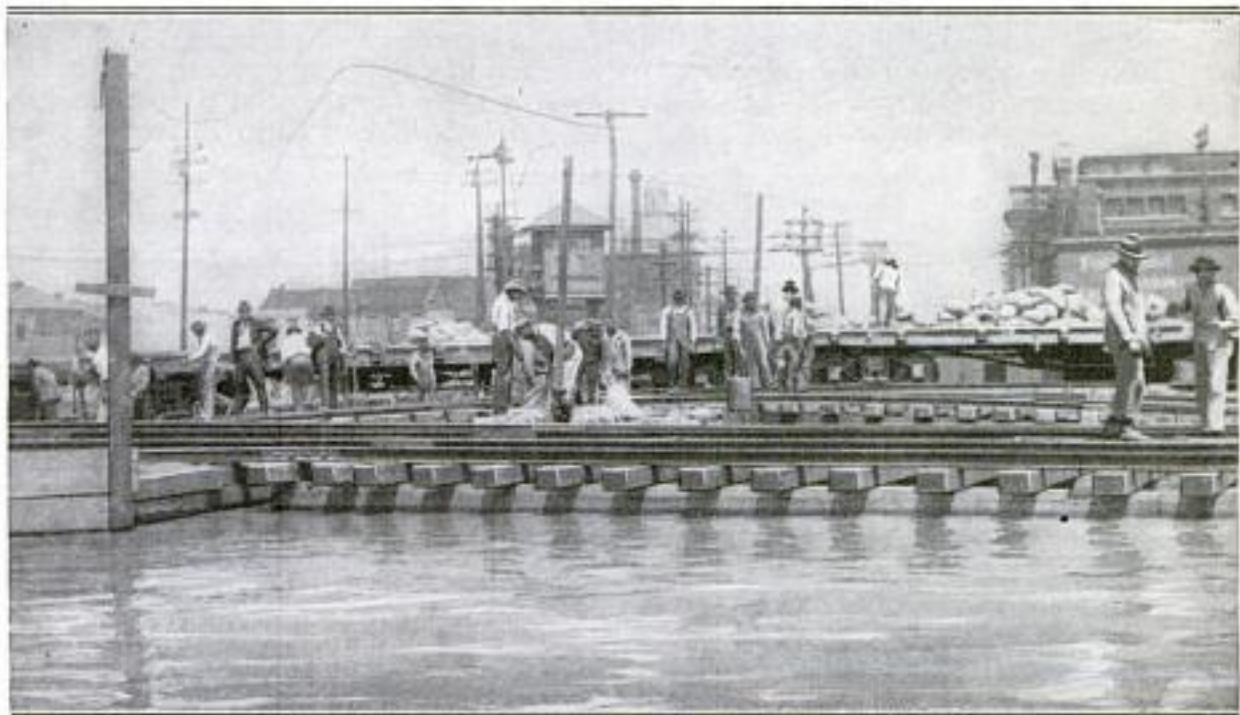
NEW ORLEANS LEARNS THE LESSON OF THIS YEAR'S FLOOD

By THOMAS EWING DABNEY

NEW ORLEANS' entire commercial river front is being raised so that the city may be given better protection against the flood waters of the Mississippi. This means that, besides the wharves, the network of railroad tracks, street-car lines, streets, and other facilities immediately behind the wharves—representing millions in investment—must be raised to conform to the new levee grades that have been prescribed by the state authorities.

It would seem reasonable to expect that, if any part of the country had ade-

quate levees, such as recommended by the Mississippi River Commission, it would be New Orleans, a city with a population of 400,000 and a property valuation in excess of \$800,000,000; but the fact is that the levees of New Orleans are lower than in many country districts, and of a cross section that compares with the commission's specifications as scaffolding does with the finished building. The city has been trying to avoid the inescapable logic of the situation by denying the premises, written in many past flood warnings, but the experience this



Another View of One of the Threatened Places during the Flood-Water Fight at New Orleans: This Shows the Water at the Foot of Esplanade Avenue, Where a Rise of But a Few Inches would have Flooded the City

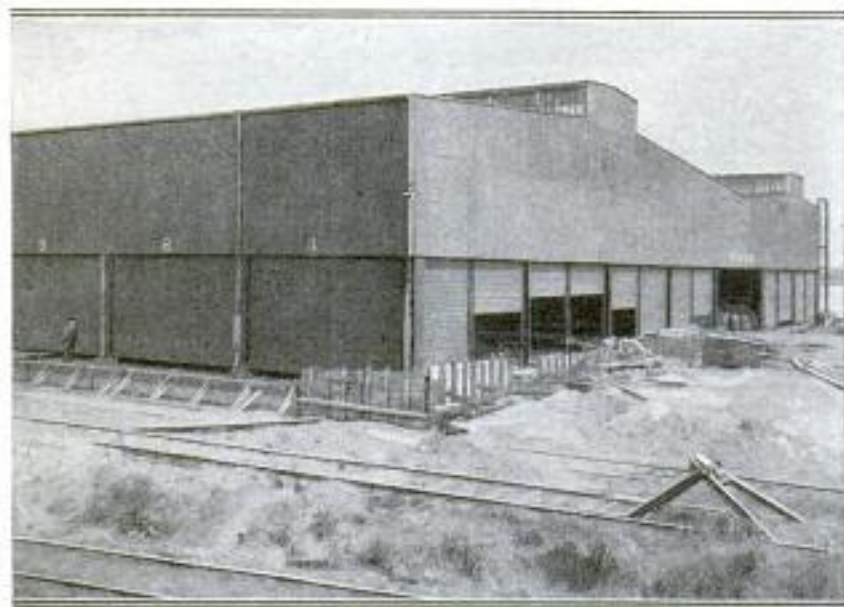
year finally killed the old "hush-hush" policy, by which the people were lulled into a feeling of false security, and orders have been issued by the levee board, in accordance with the demand of the

the elevation of the public belt and all other railroad tracks, as well as all intersecting city streets to the same grade, removal of all pipes running through the levees, the raising of all railroad-crossing inclines and terminals, the closing of all existing gaps in the protection levees, and the removal of any and all objectionable matter and materials from any levees built within this district for the protection of the public in general."

New Orleans' commercial front is about three miles long. It is in this section that the protection is least adequate. The remaining 23 miles of levee, on both banks of the river, are higher and stronger than those in the region indicated. Wharves in the outlying districts are built at proper grade, and the

strengthening of the levees in these sections is a comparatively simple matter.

The practically unbroken line of wharves on the commercial front extends over the water on the river side, and is built upon earth-filled, concrete-enclosed embankments on the land side, that take the place of the usual type of levee. Because of the height of the river banks, due to overflows of past generations, and a general building-up process, it is necessary to raise the artificial protection here only to a height of 10 to 15 feet, varying

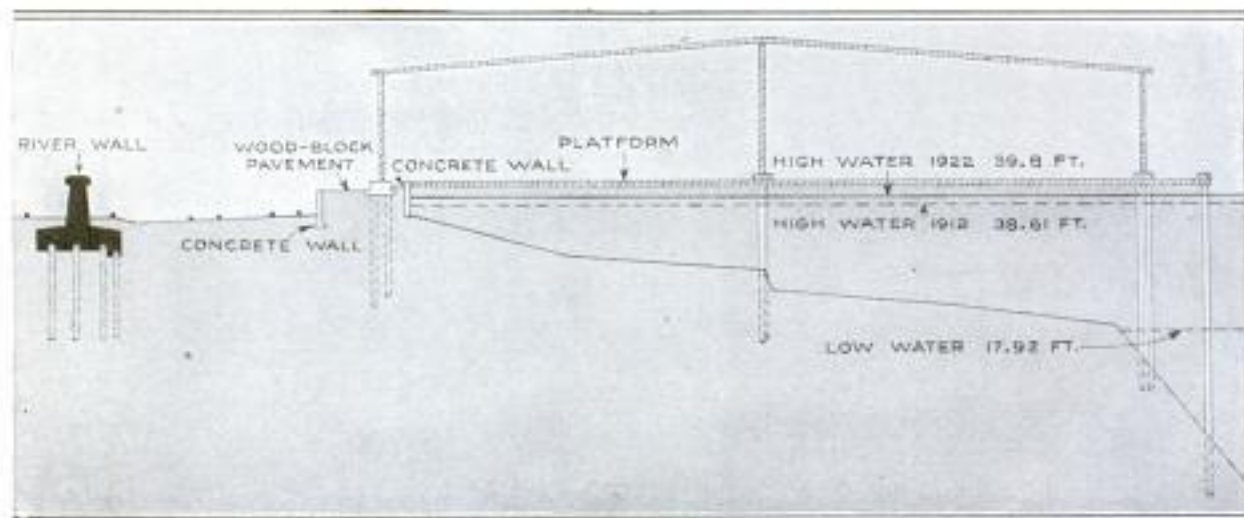


Typical New Orleans Wharf, Showing the Usual Manner of Erecting These Structures: Under the Provisions of the New City Ordinance Several Miles of These Wharves will have to be Raised

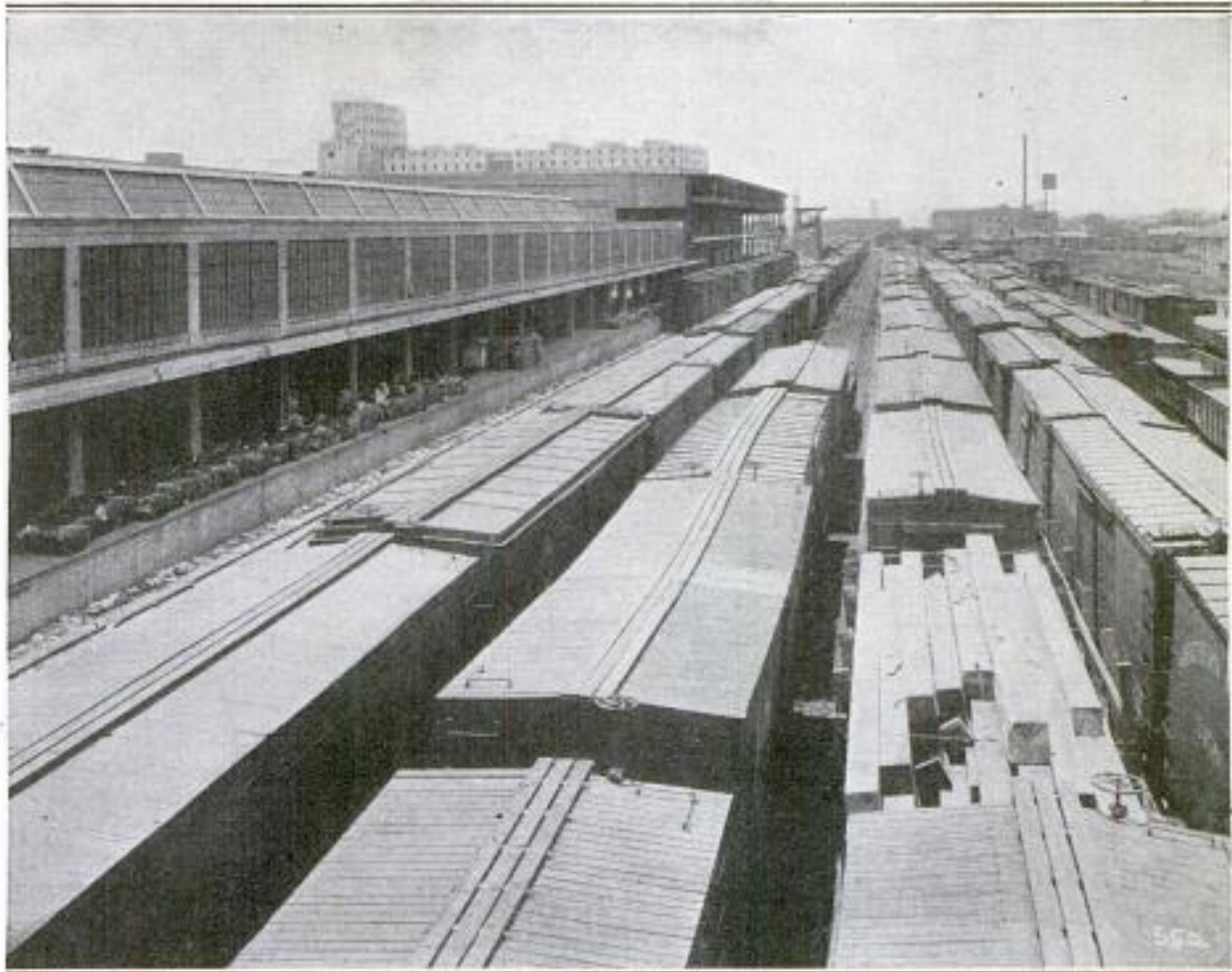
whole community, to give the city the absolute protection it should have had years ago.

The levee board's orders, as expressed in recent resolutions, give some idea of the magnitude of the problem:

"All interests located on, crossing through, or over and along, said levees [are] required to arrange their appliances so affected to meet the policy of the board in the premises, the rearrangements necessary being the raising of all dock-board wharves to standard grade,



Sketch, Showing the Reinforced-Concrete River Wall Which has been Proposed by the Board of State Engineers of Louisiana as a Substitute for Dirt Levees and Embankments along the Commercial Waterfront of New Orleans: The Estimated Cost of the Improvement Is \$1,000,000 a Mile



Behind the Wharves of New Orleans, Showing the Railroad Yards, Loading Platforms, and Industrial Plants Located There: This Illustrates the Magnitude of the Task the City is Obligated to Undertake in Raising the Waterfront with Its Wharves and Transportation Facilities

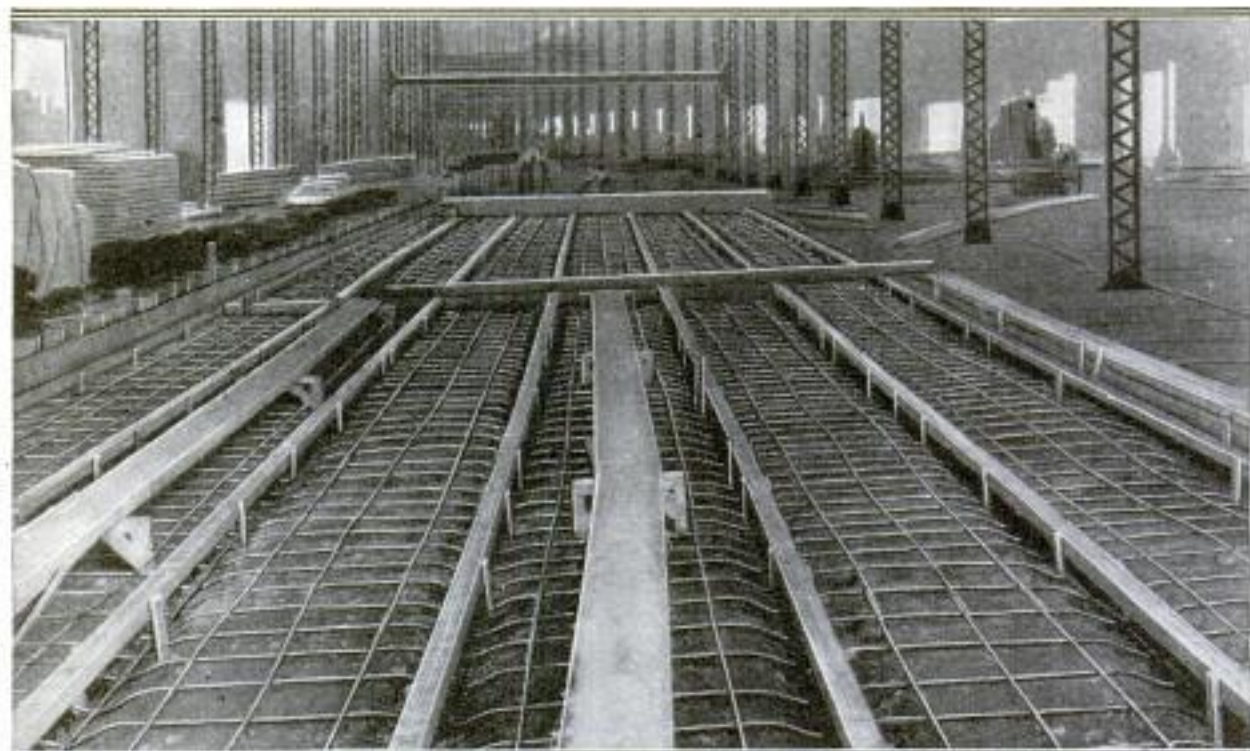
with local conditions, whereas in other river sections, the levees must be 25 feet high. But New Orleans did not go to even this trouble. As a result, several of the wharves this year were under water; the flood was a foot higher than the levees along two miles of the river front, and within a foot of the top for two miles more. Engineers declare that 3 feet is the least margin of safety that should be considered.

Likewise, little effort has been made to build reinforcing embankments to support the levees against the terrible thrust of the flood river. For instance, there was a levee at one place barely 15 feet wide to hold a head of water of 5 feet. A large manufacturing plant was immediately behind it. At another place a box levee less than 15 feet wide held a head of 6 feet of water. The city met the flood crisis by sandbag levees; by improvised piling; by small dirt embankments, protected by tarpaulin, down the center of the wharf sheds; by eleventh-hour strengthening of weak spots up and down the line—weak spots that appeared

as by magic, and some of which were discovered by the merest chance.

The actual raising of the wharf levels will be comparatively simple, from an engineering standpoint, though somewhat costly. The concrete-inclosed embankments will simply have their levels raised to grade height, the iron pillars supporting the sheds will be jacked up, new sills will be laid over the entire wharf area, and the new flooring built. This work will be done gradually, to avoid interrupting the foreign-trade movement. The first wharves to be raised will be those at Robin Street, Celeste Street, Seventh Street, Market Street, Erato Street, and St. Andrew Street.

This work will cost about \$1,000,000. The other wharves will be raised as soon as possible. The section at the foot of Canal Street—which is the “water gate” of the Mississippi Valley—will be raised in connection with the elaborate development work the dock board contemplates there. Probably the cost of raising the entire river front will be around \$5,000,000—though this is only a rough estimate.



Interior of One of the Large Wharves at New Orleans, Showing How the Reinforced-Concrete Levee Protection is being Raised for the Purpose of Preventing a Recurrence of the Flood Danger That Caused the State Authorities to Issue Orders for the Raising of the Waterfront

But the building of the embankment or its equivalent presents a more difficult problem because of the railroad tracks and other facilities that now occupy the ground. Two methods of making the cross section of the levee conform to government standards have been suggested: Building an embankment, at least 300 feet wide, with a river-side slope not steeper than 1 in 3, and a city-side slope not steeper than 1 in 10; this embankment would be raised by material dredged from the river, or hauled from inland points; or building a reinforced-concrete river wall behind the wharves and as near to them as conveniently possible. This wall would rest upon creosoted pilings sunk 15 feet into the river bed, to withstand the pressure due to the 20-foot variation in the height of the river; the pilings to be 4 feet apart, and the base of the wall 15 feet wide, and 10 to 15 feet high, according to local conditions.

The advantage of the latter alternative lies in the fact that it would disturb established facilities less than the making of a fill 300 feet wide and rebuilding everything on top. Under proper safeguards, tracks could parallel and cross the river wall. On the other hand, this type of construction has the disadvantage of higher cost, which is estimated at \$1,000,000 a mile.

No decision has yet been reached as

to which method will be adopted. It is, of course, obvious that the river-wall type is ideal, and ultimately this, or something resembling it, will have to be built.

The need of immediate action, however, is emphasized by the facts that, at flood stage, about 2,000,000 cubic feet of water a second pass New Orleans, and that, as measured on the Canal Street gauge, the flood level has jumped from 15.8 feet in 1882 to 22.8 feet in 1922—a rise of 7 feet. According to the city engineer of New Orleans, the trend is toward still higher flood elevations, as proved this year, when the ultimate high-water elevation predicted by the Mississippi River Commission was reached at Vicksburg, Miss., and points below, and the lower river broke all previous high-water records, although the stages reached at Cairo, Ill., at Memphis, Tenn., at Helena, Ark., at Louisville, Ky., and at Cincinnati, Ohio, fell below that record by amounts varying from 1 to 20 feet.

To meet the past and future rise of flood levels, the Federal and state governments have spent something like \$186,000,000 on levees. Many of these are up to standard, but many are not. The remarkable part of the entire situation is that New Orleans, in which is concentrated one-third of the wealth of Louisiana and a fourth of the population, should have been content to drift along with a levee protection of such a

temporary character. With a concrete river wall, the city could meet, economically and quickly, the danger of floods if the water should rise higher than the engineers now think it will, because this type of construction lends itself readily to emergency work.

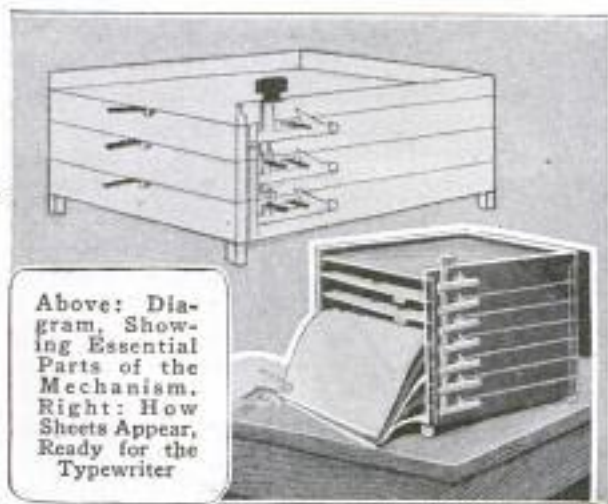
With its decision to set its own levees in order, New Orleans has launched a movement that bids fair to become nation-wide, to secure the highest and strongest levees possible for the entire river and such other supplementary relief as may be possible. This relief is to be determined through a survey made by nationally known engineers, who will be employed by a Safe River Organization, the nucleus of which has been formed in the Committee of One Hundred in New

Orleans. This committee is now organizing the entire Mississippi Valley. If the engineers declare the plans feasible, the additional relief on the lower river will take the form of spillways, or other artificially built outlets into the Gulf and into swamps, through which the surplus water will run when it reaches a certain stage, say, 18 feet on the Canal Street gauge at New Orleans. Such outlets above and below New Orleans would prevent the water from rising to dangerous levels. After this year's levee breakages the river dropped 2 feet in a few days. But it is recognized that these preventive measures cannot be put into effect for several years; and in the meantime, New Orleans is building levee bulwarks equal to those in other sections of the country.

9642 *Supplies*
**PAPER AND CARBON SHEETS
FED FROM OFFICE DEVICE**

Soiled fingers, creased carbon sheets, and smudged letterheads are avoided by the use of a new office appliance which ejects paper and carbon sheets in proper order, ready for insertion in the typewriter.

The machine is a small steel cabinet having compartments for supplies of paper and carbon sheets. By operating a central lever, a fine steel point in each compartment engages the top sheet of its pile and pushes it forward. The sheets appear simultaneously and in order. After typing, the carbon sheets are deposited on a cardboard tray under a hinged cover on the top of the cabinet. When the supply of carbons in a compartment is exhausted, the empty tray is



Above: Diagram, Showing Essential Parts of the Mechanism. Right: How Sheets Appear, Ready for the Typewriter

exchanged for the full tray from the top. The capacity of each compartment is about 100 sheets of average weight.

Best
**ATMOSPHERIC PRESSURE USED
IN NEW DISHWASHER**

9721
Utilizing the atmospheric pressure is the principle employed in the operation of a new portable dishwasher which



Above: Dishwashing Machine Which Utilizes Atmospheric Pressure in Cleansing the China and Silverware. Left: Interior View of Machine, Showing How Dishes are Packed

sterilizes and dries the dishes in 10 minutes. The only moving part inside the machine is a small suction fan that creates a vacuum at the top of the tank above the water. This causes air to rush in at the bottom and up through the water, agitating it so as to speed the washing process. The fan is driven by an electric motor, mounted outside of the outfit and connected by an extension cord to any light socket or base plug.

Letter returned 5/29/24

The Ejectafoil Co. 70 Cortlandt St. New York.

Order - Van Horn. Parker Co, Cleveland, O. 5100 Superior

No price

9864

Wide World Photos, New York City
The Sphere, London, England

MOUNT EVEREST SUMMIT STILL UNTROD BY MAN

N.Y. Times 6/2/22 P. 1

By HENRY S. WHITE

Washington Post 6/25/22 P. 10

THE highest point above sea level ever reached by a human (being afoot—

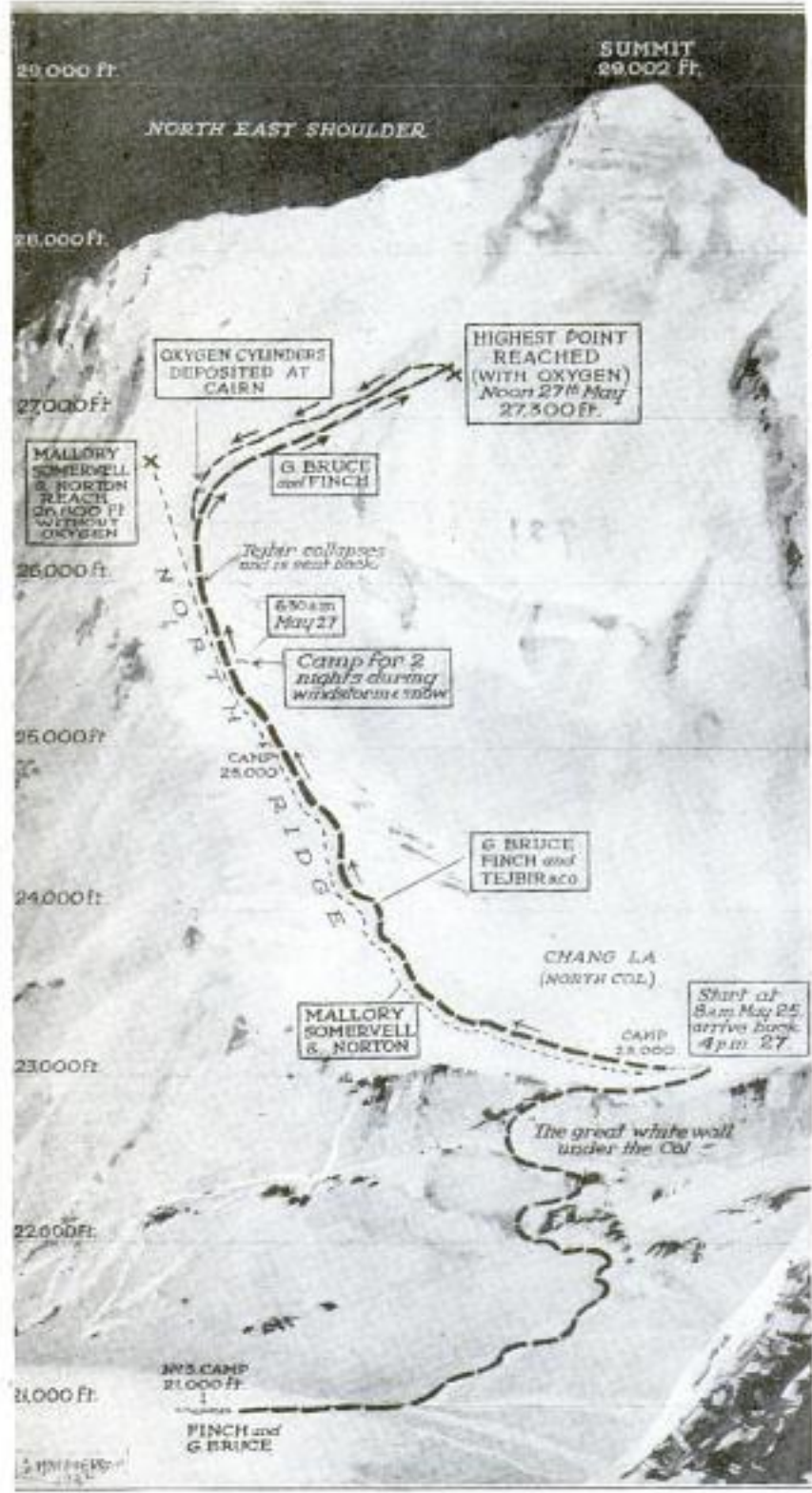
bers of the Mount Everest expedition, at noon, the 27th of last May. This brought

the explorers within 1,702 feet of the summit, the highest point on the earth's surface. The final attempt was to have been made June 6, but the monsoon broke June 3, definitely frustrating any further efforts for this year at least. When the monsoon breaks on Mount Everest, there is no alternative but to get off the mountain as soon as possible.

It has now been definitely proved that the mountain itself at the highest points reached is not difficult to climb, and the two explorers who came so near to reaching the actual summit were able to proceed along the north face without ropes. The one and only obstacle that made the summit unattainable was the bad weather, and with the monsoon left out, it is certain that the summit will be reached at the next attempt.

An altitude of 26,800 feet was reached without any oxygen. The oxygen apparatus consisted of four specially light oxygen cylinders similar to those used by airmen. These are carried on the back and the oxygen is piped to a box respirator that fits over the mouth and nose. Some idea of the rarefied condition of the air may be conveyed by a comparison of the barometric pressures at sea level and at the summit of Everest, the former being about 30 inches, according to the temperature, and the latter being only 10.6 inches. At this altitude the average temperature

is about 25 degrees below zero, another indication of what the explorers had to



Notated Diagram Divided into 1,000-Foot Sections, Showing the Route Taken by Two Parties up the North Face of Mount Everest in Their Attempt to Reach the Summit of the Peak

27,300 feet—was attained, with the aid of oxygen-breathing apparatus, by two mem-



The Baggage Connected with the Mount Everest Expedition Packed Ready for Transportation by 50 Coolies and 350 Yaks, the Central Asian Beast of Burden

contend with. The two explorers who reached this highest point were Capt. Geoffrey Bruce, one of the leaders of the expedition, and George Finch, a scientist attached to it.

By careful organization, and after continued coöperation of all members of the expedition, the indomitable pluck of the two highest climbers brought up the record at one bound from 24,000 to 27,300 feet, and this in spite of the fact that, when carrying the oxygen apparatus, the load of each of the explorers at the start weighed 28 pounds. Such an effort would have been impossible without the aid of the oxygen, but even so, reports show that the climbers suffered actual torture from the rarefied atmosphere, the cold mists, and the biting winds. The comfort of a really hot drink was denied them for the simple reason that at that altitude water boils at about 170 degrees.

Much of the success of the expedition depended upon the exertions of the coolies who acted as porters. These were native Sherpas from the southern face of the Himalayan range, and Tibetans from the northern face. Although virtually untrained to snow and ice, they carried loads up to an altitude of 25,500 feet, some actually making four trips a day, and one beating all records by carrying a load of 40 pounds in spite of the rarefied atmosphere. All this was done by them without a murmur or a complaint of hard work.



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The Two Members of the Everest Expedition Equipped with the Oxygen-Breathing Apparatus That Enabled Them to Reach an Altitude of 27,300 Feet

The three members of the expedition who reached 26,800 feet were Messrs. Mallory, Somervell, and Norton.

9549

Wide World Photos
New York City

Chemical Age
1/1922

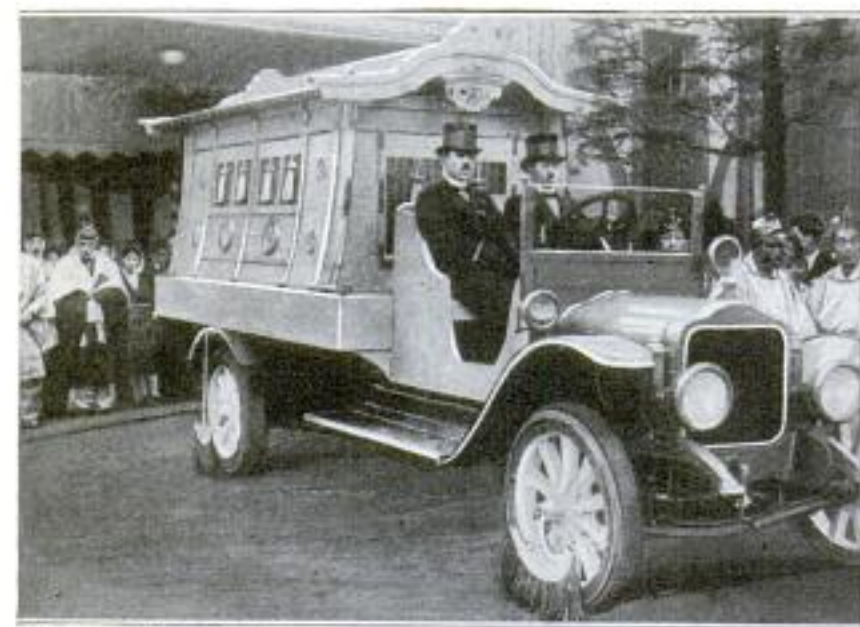
376

P. 39

Patent owned by: Ed Swenitzer by Co.
Patent, Switzerland

ELABORATE COFFIN PROVIDED FOR JAPANESE DIGNITARY

Extremely elaborate coffins are used for the burial of Japanese dignitaries, the one provided for the late Marquis Okuma be-



Elaborate Casket Which was Used for the Burial Services of the Late Marquis Okuma, at Hibiya Park, Tokyo

ing representative of the type. Resembling a small fantastic pagoda, highly ornamented with scrollwork, the coffin was carried on a motor truck to Hibiya Park, Tokyo, where a public funeral service was held, according to Japanese custom.

SIMPLE PROCESS FOR MAKING SULPHURIC ACID

One of the greatest sources of initial expense and costly upkeep, are the lead-lined chambers necessary in the manufacture of sulphuric acid by the contact process. Many attempts have been made to work out a process for making this essential acid without the use of the lead chambers, but none of these has proved successful. Now, a patent has been granted for a process in which the sulphur-dioxide gases are brought into intimate contact with a large amount of nitrosyl acid, of determined strength, present in a finely divided state. The chambers in which the sulphur-dioxide gases are mixed with the nitrosyl acid may be arranged separately, in parallel, or in series. The process is, to a great extent, regenerative, it being only necessary to denitrate daily an amount of nitrosyl acid equal to the daily production of sulphuric acid. The complete plant is very simple and requires only limited space.

9653

Well drawing

WATER-DRAWING GEAR RELIC OF ANCIENT DAYS

Primitive wells may still be found in everyday use in China. An interesting example is that shown in the accompanying illustration. The well gear, constructed by the great-great-grandfather of the present owner, consists of a slender tree trunk supported by two crudely built tripods and running through a drum which serves as a wheel for the rope by which the water is drawn. The well, about 25 feet deep, is cased from top to bottom with sandstone. Any improvement of the gear would be considered disrespectful to the original builder.



This Well Is Still in Everyday Use in China. The Owner is Shown Raising the Pail with the Same Apparatus His Forefathers Used Several Generations Ago

Carl Ray C. Bennett 1208 N. 3rd St. Philadelphia, Pa.
Copyrighted material



This Shows Excavation and Construction Work Progressing on the Outfall Portion of the Main Sewer, Where It Empties into the Kansas River, and Gives Some Idea of Its Immense Size

KANSAS CITY BUILDING WORLD'S LARGEST SEWER

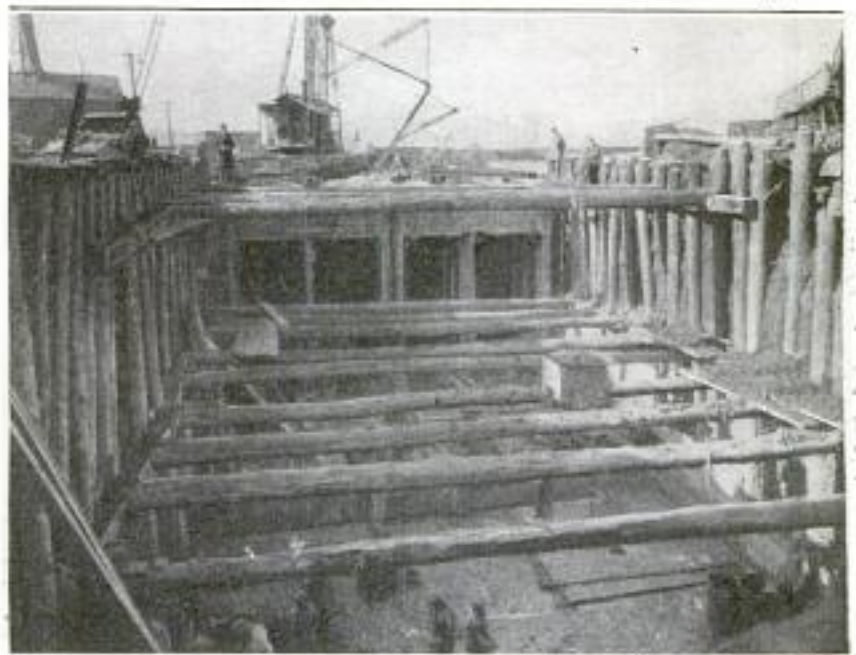
By GEORGE F. PAUL

*900 The Worth Bldg
Kansas City Mo*

THE Turkey Creek Sewer, which is now being built at Kansas City, is declared to be the largest ever constructed on this continent or abroad. The great size of the main section can be judged from the fact that there are twin boxes, each 17 feet in width and 18 feet in height, containing 13.5 cubic yards of concrete and 1,975 pounds of steel per lineal foot. It will discharge approximately 1,000,000 gallons every minute.

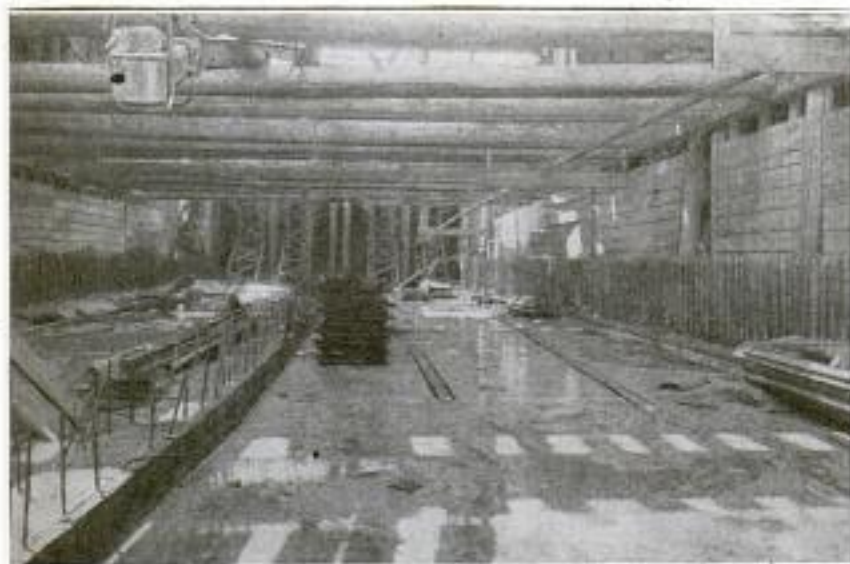
This sewer, which will involve a total expenditure of more than \$2,000,000, has been planned to protect vast terminals and great industries from flood waters. In months past the Kansas River and Turkey Creek have combined to threaten the

western portion of Kansas City. Turkey Creek itself is a very crooked stream and



This Gives an Idea of the Amount of Bracing That Was Necessary in Places Where the Channel Passed through Soft or Swelling Ground, as a Proper Foundation could Not be Found Even below Hardpan

has a gradient of 40 feet per mile. When a cloudburst or heavy rains start it on a rampage, it rushes down with overwhelming force. After it reaches Rosedale, it



View Looking down the Main Concrete-Lined Twin-Box Sewer: This was Taken at a Point Where It Passes under No Less than 15 Railroad Tracks

is obstructed by many railroad trestles and bridges that cause it to leave its channel and tie up traffic and shut down industries. Water has been known under some circumstances to rise to a height of 16 feet at 28th Street and Southwest Boulevard.

Many construction difficulties have been encountered in pushing this work. While building a portion of the 7-foot section lying in the old bed of Turkey Creek, a

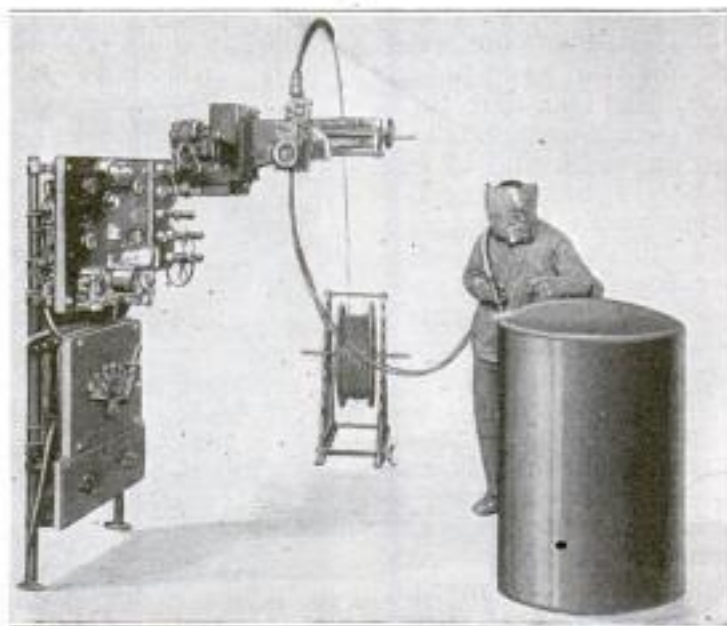
proper foundation could not be found for a depth of 17 feet. Piling was resorted to, and after the piles had been placed in leads, an ordinary steam hammer was allowed to rest on the pile, but the weight alone caused a penetration of 17 feet without a blow being struck. The piling was then driven through 3 feet of hardpan to solid rock, but the subgrade was too soft to allow steel to be placed, and certainly it was too weak to support a concrete footing. A lumber grillage helped to solve this difficulty.

The main sewer, in traversing its total distance of more than 8,000 feet, intersects and crosses 36 railroad tracks. In the case of main-line tracks that had to be kept in use, 60-foot piles were first driven on a line with the outer dimensions of the sewer. These were capped, and three 24-inch I-beams, 60 feet long, were bolted together and placed under each rail. As the excavation proceeded downward, it was necessary to use many piles.

New difficulties have been encountered at almost every turn, yet the work has been pushed vigorously, and should be completed within a few months.

ELECTRIC-ARC WELDER IS EQUIPPED WITH AUTOMATIC FEED

Welding operations on objects having an irregularity of shape or seam contour, and also on those of unusual bulk, may be efficiently accomplished by the use of a new electric-arc welder which has an automatic feed. The metal electrode, or wire, which is melted into the seam is fed through a tool in the hands of the operator, the speed of the wire being controlled by a small electric motor. This motor, in turn, is regulated by the voltage across the arc at the welding point, thus assuring a constant and correct feeding of the electrode from the coil on the reel to the operator's hand.



Electric Arc-Welding Outfit, Showing the Automatic-Feeding Apparatus Projecting from the Top of the Control Panel, While the Reel of Electrode is Seen Below

9701 Cmt L. W. Pedrose, 1453 W. 54th St

Seattle Wash.



This Shows the Simple Process of Preserving the Excess of the Strawberry Crop. The Berries are Mixed with Sugar in Proportion of Two Pounds to One, and are Packed in Casks

PROCESSING SAVES OVERFLOW OF BERRY CROP

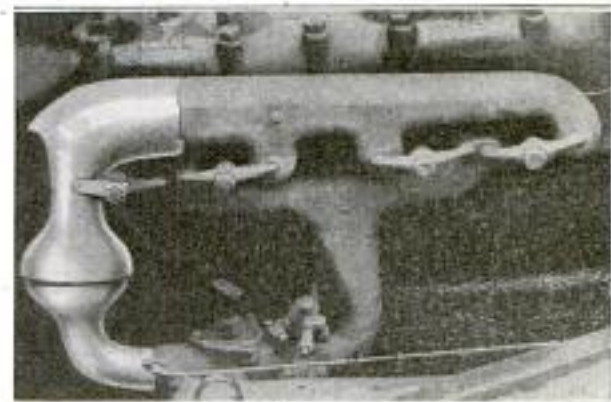
AIR-CLEANSING DUST TRAP FOR AUTO CARBURETORS

Through the recent discovery of a practical method of preserving fresh strawberries and other soft fruits, berry growers of the Northwest this year saved the overflow from the retail markets, worth millions of dollars, which heretofore had been lost every season. In previous years, if the berry growers produced more than the retail market and the canneries could absorb, they either took for part of the crop whatever prices were offered them—usually not more than enough to pay for the crates—or let the berries dry on the vines.

After suffering severe losses last year, the growers decided to provide a safety valve for their market by devising a method of preserving the fresh fruit, which can be utilized in this country and abroad as fresh-fruit coverings for ice cream.

The new method is very simple. It consists merely of packing the berries in sugar in the proportions of 1 pound of sugar to 2 pounds of berries. Casks of wood holding 500 pounds are used for packing. If for export to foreign countries, the casks are given a thick coating of wax inside, or are lined with porcelain. After the heads are put on the casks, the berries are placed in cold storage and will keep in a fresh state indefinitely.

If the air in the vicinity of an automobile carburetor is permeated to any extent with dust or dirt, this will certainly be sucked into the motor cylinders, where it may do considerable damage. A dust trap for use on a popular-priced car takes the place of the hot-air pipe that connects the carburetor with the exhaust mani-



Dust Trap for Use in Place of Regular Hot-Air Pipe That Connects the Exhaust Manifold with the Carburetor on a Popular-Priced Light Automobile

fold. Above the carburetor a bulb-shaped enlargement of the pipe contains a special composition that traps the dust and prevents it from reaching the carburetor.

Henry Auto Part Co
Milwaukee, Wis.

National Fruit Canning Co
1720 W. Spokane St.
Seattle Wash.

North Pacific Cooperative
Berry Growers, Pier 9,
Seattle, Wash.

9706

San Diego, Calif.



One of the Dams Constructed by the San Diego Zoological Society for the Double Purpose of Displaying Wild Life in Water and the Type of Barrage Used to Impound the City's Water Supply

ZOOLOGICAL SOCIETY'S DAMS SERVE DUAL PURPOSE

Miniature dams built by the San Diego, Calif., Zoological Society, served in a dual capacity recently, when they were displayed to the public. The society has constructed outdoor pools in which are kept seals, alligators, birds, and other animals. The tiny dams required to impound the water, were made in exact replica of the huge structures in the neighboring mountains from which the city's supply of water is drawn, thus demonstrating the construction of the water-supply dams as well as providing other education in the form of wild life in the water.

4683 TWO CLOUDBURSTS IN A WEEK AT SYRACUSE

Although in the past the city of Syracuse, N. Y., had never experienced anything in the nature of a cloudburst, recently not only one occurred there, but

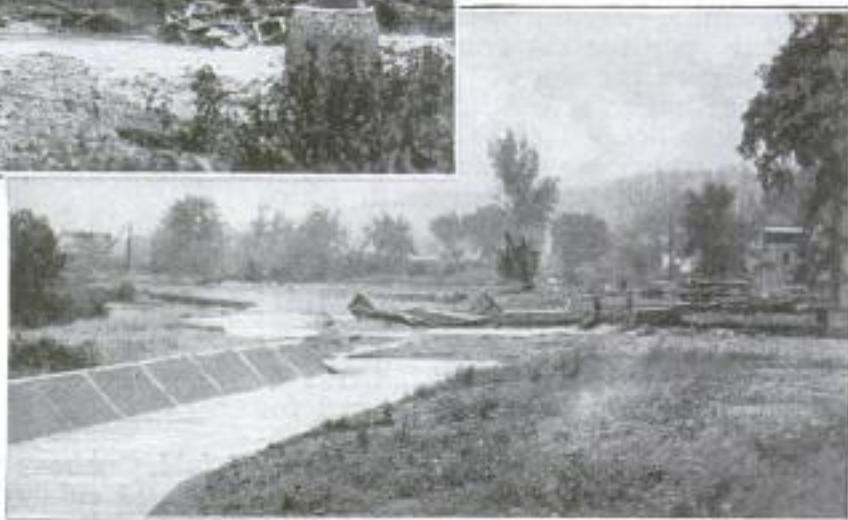
at the junction of Furnace Brook and Onondaga Creek where a street runs parallel with the latter and crosses the former on a concrete bridge. The banks

of the creek were lined with reinforced-concrete walls. After destroying the bridge, the torrent of water tore away the street, until it undermined the wall of the creek, of which it cut off a huge section, that was rolled over and deposited, upside down, across the channel.



Part of the Wreckage Caused by the First Cloudburst That Syracuse, New York, Ever Experienced and Which was Followed in a Week by a Second

actually two in less than a week. Being entirely unprepared for such an emergency, the city suffered a great deal of damage. The most remarkable of the results of the destructiveness of the cloudbursts occurred



This View, Taken after the Second Cloudburst, Illustrates the Havoc Wrought by the Water; Houses, Bridges, and Tunnels being Destroyed. Part of the Walls of the Creek was Carried Across the Channel

Emil A. Waters 203 E. Levee St. Syracuse, N.Y.



This Moving Van Displays on Each Side an Elaborate and Artistic Painting of an Historic Incident. One Side Shows the Crossing of the Delaware and the Other Side the American Eagle on a Field of Draped American Flags

MOVING VAN PATRIOTICALLY AND SKILLFULLY ADORNED

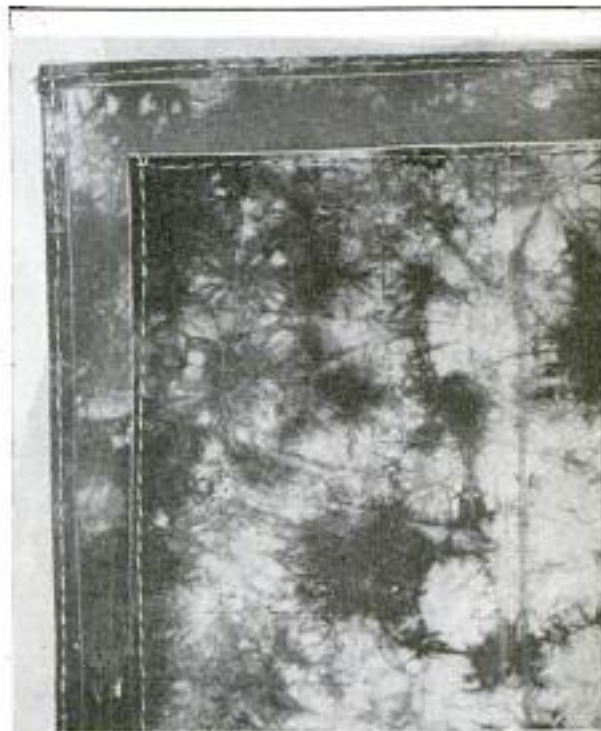
Decorated in a manner that certainly cannot fail to attract the attention of the public, a motor truck used as a moving van has recently made its appearance in Buffalo, N. Y. Each side of the van is entirely covered with a framed painting, elaborately and artistically depicting a patriotic subject. One, entitled "The Dawn of Freedom," is a reproduction of the well-known picture of George Washington crossing the Delaware. On the other side a picture, called "Pride of the Nation," portrays an American eagle with widespread wings across the front of two star-spangled banners, and standing upon a shield bearing the American coat of arms.

9697

JAPANESE MAKES NEW PAPER THAT CAN BE WASHED

Many possible uses suggest themselves for a special paper recently produced and patented by a Japanese inventor. The paper is remarkably strong and can be crumpled up and washed with soap and water, much as one would wash clothes. So durable is this paper that it can be used as a covering for umbrellas, and when soiled, can be easily cleaned at home. As a wrapping paper, it could be used over and over, being washed when

soiled. No special precautions are necessary in washing, and the paper is dried in the usual manner. It is said that the



This Japanese Paper Is Waterproof and can be Crumpled Up and Washed with Soap and Water

product can be made at a very reasonable price. It has a texture somewhat like cloth, and is not to be confused with oiled paper.

Saito Infg. Co
 Tokyo, Japan
 Takato + Co.
 1110 Seachome
 21 Yamachi
 Kajimachi, Ky. Tokyo, Japan

BURN "MOUNTAIN OF BARRELS" AT BOSTON CELEBRATION

9742 Fifty thousand persons witnessed a monster bonfire in Boston on July 4, when a "mountain of barrels," more than



"Mountain of Barrels" Which was Burned to Celebrate July Fourth in Boston, as It Appeared Shortly Before the Torch was Applied

100 feet high, built in 30 tiers, and containing just 3,500 barrels, was sent up in smoke and flame as part of the Fourth-of-July celebration.

The "mountain" was built up in a remote part of the city, and no damage of any kind resulted from the fire. It is proposed to hold a similar event next year.

UNUSUAL METHOD OF LAYING SUBMARINE CABLE

9779 Recently, when laying seven submarine cables under the Harlem River in New York, unusual methods were adopted to meet the special conditions encountered. The cables were each 700 feet long and were laid beneath the Park Avenue drawbridge. Because of the center pier of the bridge, it was not advisable to lay the cables from a barge in the usual way. It was decided, therefore, to pull the cables

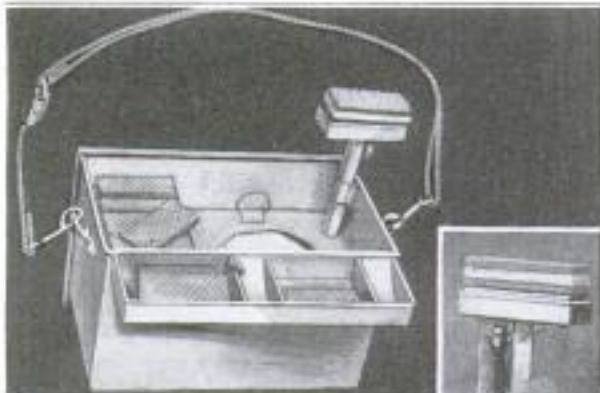
across the river by placing the reels on one side and a hauling winch on the other side of the river. A hauling cable was run across the river and threaded between the piling supporting the center of the drawbridge. The cable reels were jacked up, and the engine on the opposite bank hauled the free end of the cable across, each cable being hauled separately. Special precautions were taken to seal the free ends of the cables.

9745 PEACHES RESEMBLE PUMPKINS ON OHIO FRUIT FARM

Among the strange varieties of fruit grown by an Ohio orchardist who makes a hobby of grafting, are garden huckleberries which are as large as small grapes, peaches that look like small yellow pumpkins, and strawberries thriving on raspberry bushes.

9660 HANDY OUTFIT FOR VENDING ICE-CREAM SANDWICHES

For use at fairs and carnivals, a portable outfit has been made for dispensing ice-cream sandwiches, the vender strapping it about his shoulders and circulating where the crowds are thickest. In the center of a metal case is an insulated icing chamber with a capacity of a half gallon of ice cream. A compartment at one side holds 150 of the small sugar wafers used in making the sandwiches,



This Portable Outfit for Serving Ice-Cream Sandwiches Has Space for One-Half Gallon of Ice Cream and 150 Sugar Wafers. The Insert Shows How a Sandwich is Raised Out of the Former, for the Customer to Pick Off

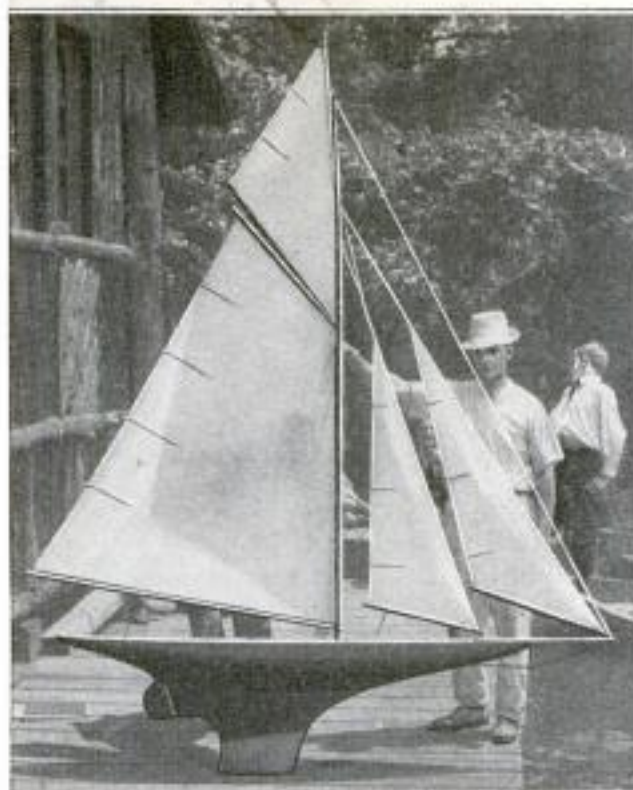
and the forming machine is held upright in one corner of the case. All parts of the outfit are removable for cleansing.

*Emd. C. M. Langman
Piqua, Ohio.*

*The Times...
Inquirer...
5/20/12*

*Wm. George F. Hess
& William Stender
Louisville, Ky.*

9720



Left: Model Yacht "Polka Dot" and Its Owner, E. A. Bull of the Prospect Park Yacht Club, Brooklyn.
Right: The "Endeavor" and Its Owner, W. J. Daniels of London, England, Which Sailed and Lost a Series of Three Races against the American Craft

9720
AMERICAN MODEL YACHT WINS IN INTERNATIONAL RACE

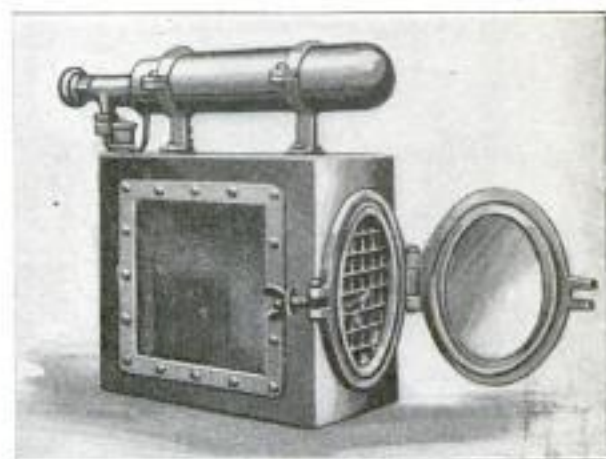
The international model-yacht race for a cup offered by the magazine Yachting, sailed in three matches at Bayside, L. I., was easily won by the American yacht "Polka Dot." The model is full sloop-rigged, with a sail area of 3,000 square inches. It is 47 inches long, and weighs 34 pounds. Its only rival was an English model called "Endeavor," Marconi-rigged, with a sail area of 2,700 square inches, measuring 52 inches in length, and weighing 44½ pounds. The course in each race was 3 miles long, sailed in different directions, and the best time made by the winner was 1 hour 33 minutes 22 seconds, nearly 10 minutes better than the English boat.

9739
OXYGEN-EQUIPPED CAGE USED FOR MINE-RESCUE BIRDS

Because the canary bird is easily overcome by the poisonous gases found in coal mines, one of them is carried into the workings by mine-rescue crews to indicate the presence of dangerous gas. The cage used for carrying the little bird is equipped with a glass door and an oxygen tank. When deadly gas is encountered and the canary is overcome by it, instead of being allowed to die, the door is closed and oxygen is administered until it revives.

9822
RESUME WORK ON ELEVATOR TO TOP OF MONT BLANC

Work, halted by the war, has been resumed on an aerial cableway which will run from Chamonix, France, to the summit of Aiguille du Midi, some 3,000 feet lower than Mont Blanc. Eighty passengers will be carried by the cableway. Instead of a difficult journey of from 13 to 14 hours afoot, the tourist will now have a brief comfortable ride.



This Cage, Used for Carrying Canaries Employed in Mine-Rescue Work, is Equipped with an Air-Tight Glass Door and Oxygen Tank

Detroit Free Press
7/11/22

Emil. Alan Mc Cowan,
Box 40, Copyrighted material
Sault Ste. Marie, Canada

no information as to maker

9650

DEEPEST ROCK EXCAVATION FOR NEW YORK STORE

BY T. BENJAMIN FAUCETT

*492 Parkside Ave
Brooklyn, N.Y.*

EXCAVATION operations in New York offer a variety of obstacles seldom found in any other city. In the

cañon of Broadway, quicksand requires that these structures be anchored upon concrete. The Woolworth Building foundation is sunk through 115 feet of quicksand to bedrock and consists of 69 reinforced-concrete piers. Within three blocks a new municipal-court building is under construction. Here the excavation contractors found themselves up against the problem of an underground stream that ebbed and flowed with the tide of near-by East River. By the use of many high-power pumps and caissons, the concrete piers were sunk to bedrock in a manner resembling that of bridge construction.



New York's Deepest Solid-Rock Building Excavation: It Goes to a Depth of 42 Feet. An Addition to a Large Store will be Erected Here

But Manhattan Island gradually loses its "soup soil" with every block toward the north, and before reaching 34th Street, it consists of solid rock that may reach hundreds of feet below the surface. Still farther north, and especially in University Heights, the rocky outcrops resemble miniature mountains that must be blasted away before even the shallow excavations for houses and apartments can be made. Here the caissons of the downtown section are superseded by the steel drill and dynamite. New York's deepest foundation through solid rock is for an addition to one of the city's largest department stores. Thousands of persons daily stop and marvel at the prodigious job of blasting out a 42-foot



Raising the Wire-Cable Matting after a Blast: Under It Is Another Mat of Two-Inch Rope, and at the Sides Heavy Log Buffers

depth in the 100-foot front extending from 33rd to 34th Street, between Sixth and Seventh avenues. And they have plenty of time to observe every detail of the work, as the removal of this huge "underground mountain" will require almost four months of constant effort. After about a month of work only a deep crevice had been blasted in the unyielding rock. The shovel hasn't picked up a handful of soil since it began work in this unwelcome quarry, broken rock and heavy gravel forming the loads that the derricks hoist to the trucks above, while the workmen at the 42-foot level

downtown section, where the tallest buildings in the world make a narrow

look like pigmies laboring in a giant mine.

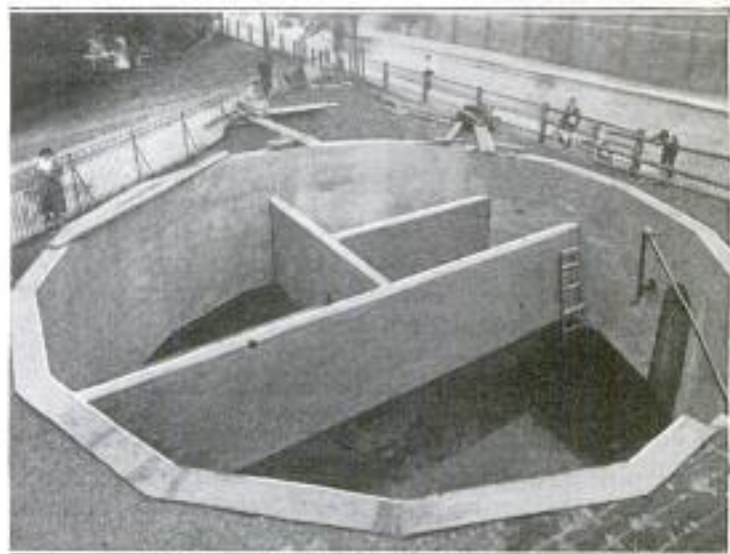
Just a little over five blocks distant, on West 39th Street, near Fifth Avenue, another foundation has been blasted out of the solid rock, but its depth is only a trifle more than half that of the 34th Street excavation. Several other smaller excavations are being made in the immediate neighborhood, and the air has been thick with the pungent dust that arises after

every blast. The explosions are muffled by a heavy matting of 2-inch hemp rope, over which is placed another matting of 1-inch steel cable, while the sides are protected by log buffers. The largest pieces of blast rock are broken into suitable sizes by dropping a 1-ton iron ball from the derrick arm. This rock can be used in foundations of smaller buildings.

8242

NOVEL ASH-REMOVAL SYSTEM FOR POWER PLANT

It was found difficult to remove by normal methods the ashes from the boiler house of an electric generating plant at Bedford, Eng., so the engineers decided to utilize the condenser discharge to assist in this removal. The condensers discharge water to a reservoir under the stoking floor, and this reservoir discharges flushes of about 5,000 gallons by means of a swinging weir. A duct leads beneath the road beside the plant to a sump. The ashes are dumped into the water duct and thus conveyed to the sump, where the water is filtered and returned to the river. The ashes remain in the sump, and are periodically removed by a grab crane.



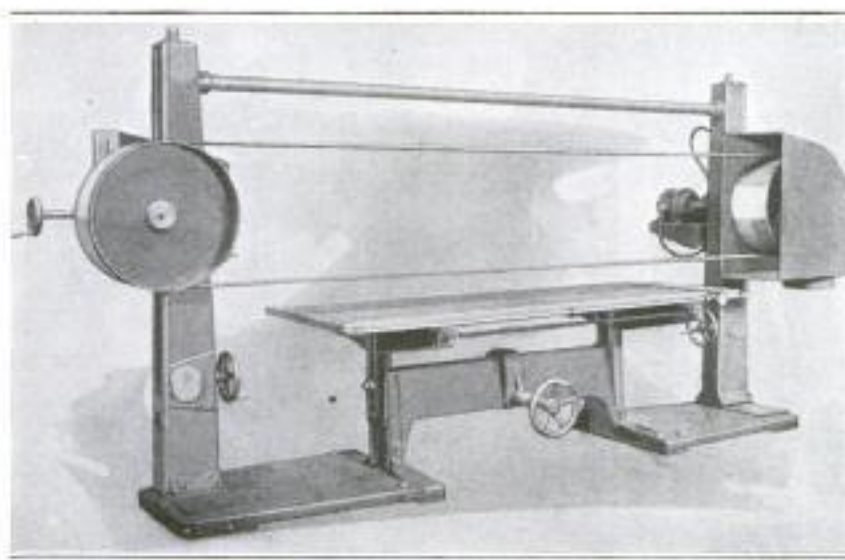
Sump beside a Road, on the Other Side of Which is an Electric Generating Plant: The Ashes from the Boilers are Removed by Dumping Them into a Duct That Carries Them to This Sump

9625

MOTOR-DRIVEN BELT SANDER OF NOVEL CONSTRUCTION

Self-contained in every respect, a new motor-driven belt sander consists of two

pulleys that drive a horizontal belt and are mounted in ball bearings upon upright stands connected to a base that supports a table beneath the belt. Directly connected to the driving pulley is an electric motor. Each pulley has a vertical adjustment of 48 inches, and the idler can be adjusted to take up slack in the belt. The table has a vertical adjustment of 14 inches, a horizontal travel of 36 inches, and runs on ball bearings. It is 96 inches long and 32 inches wide, constructed of planed wood strips with gaps between them to allow the dust to fall through, thus keeping the table clean. The machine is designed for sanding rapidly all kinds of woodwork, and can also be used for polishing metal surfaces.



Motor-Driven Belt Sander with Belt About 31 Feet Long and with a Vertical Adjustment on the Pulley Brackets of 48 Inches: The Table Travels Horizontally 36 Inches, and Adjusts Vertically 14 Inches

9625

Oliver Machinery Co.
 Grand Rapids, Mich

Engineering Staff at Electricity Generating Station of Corporation of New York, England

East Pittsburgh, Pa.

9403 SIMPLE ELECTRIC GLUEPOT HAS RHEOSTAT CONTROL

Persons doing extensive work with a gluepot will appreciate the development of an electric pot which is fitted with a rheostat control.



The appliance need not be affected by changing room temperatures, climatic conditions, different grades of glue, or various kinds of work, as the rheostat is easily adjusted to meet any changes, thus continually supplying the contents with a uniform heat.

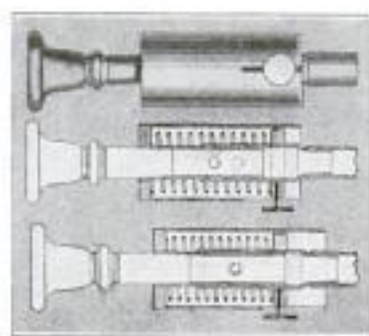
9198 COMPACT AUTOMATIC MACHINE FOR MAKING HAIRPINS

Hairpins are made very rapidly and entirely automatically with a motor-driven machine that is only about 6 feet long, 30 inches wide, and 20 inches high. The hairpin wire is first fed through straightening rollers to a die that splits the wire so as to form sets of six small diamond-shaped loops. Then the wire is cut off at points between these sets of loops, and each of

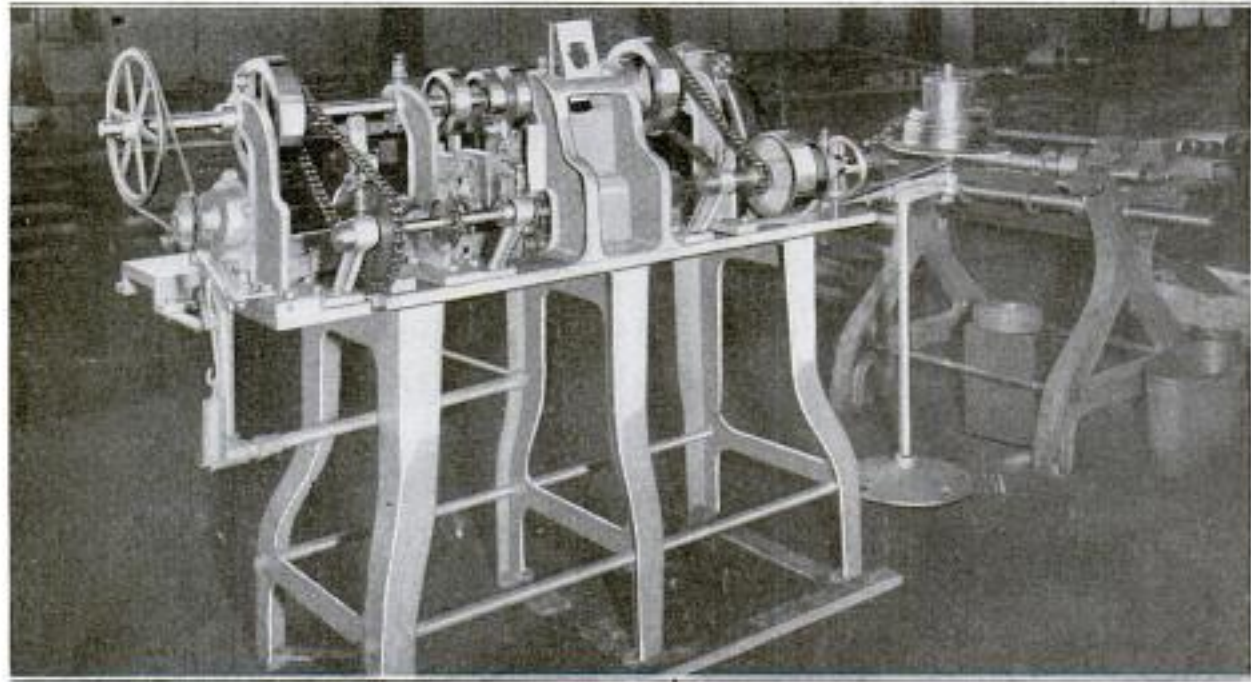
the lengths is bent U-shaped, leaving three of the loops on each prong of the "U." The points are then sharpened, and each "U" is a hairpin. They are then dipped in a cleansing solution, enameled, and baked in a temperature of about 350° F., when they are ready for use.

9470 NO-PRESSURE ATTACHMENT TO CORNET MOUTHPIECE

The inexpert cornet player is likely to put so much lip pressure on the mouthpiece, particularly in trying to get a high note, that the lips are hurt and strained.



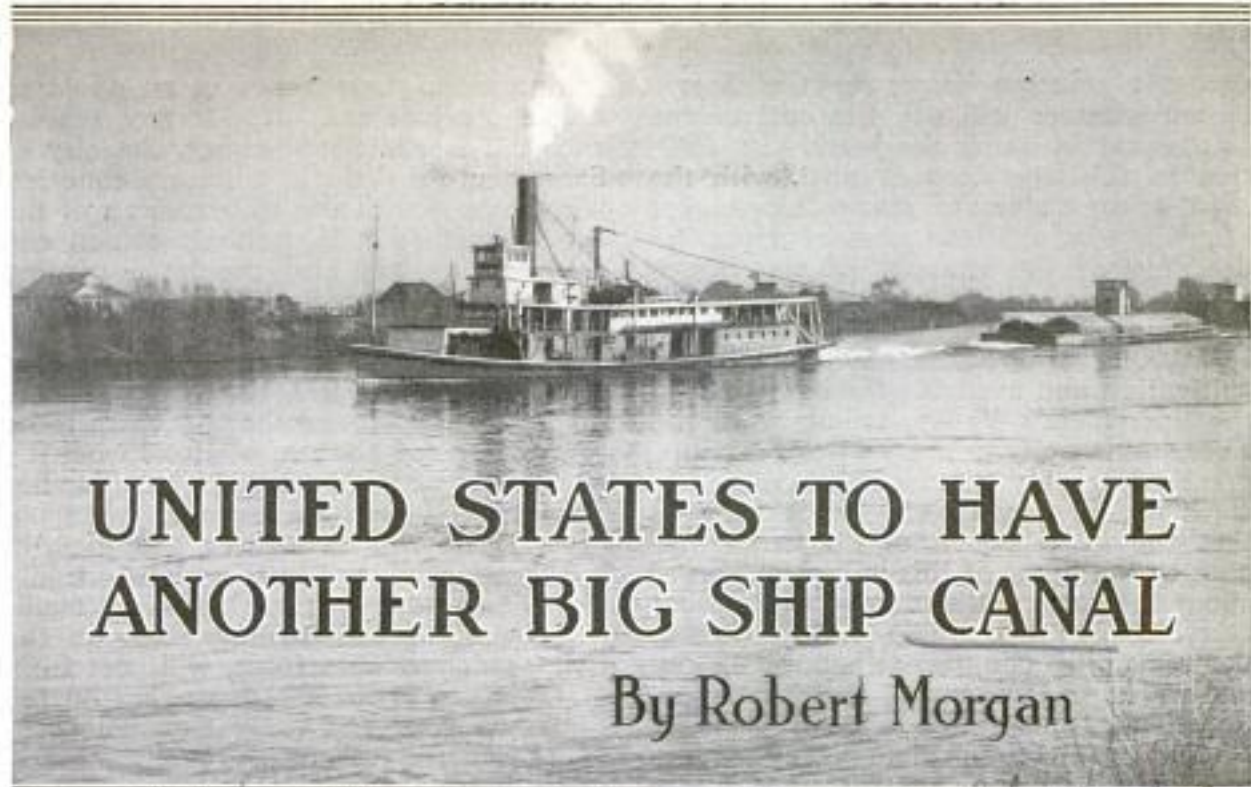
To make this impossible and to train the beginner to avoid this excessive pressure, an attachment has been constructed that is placed between the cornet and the mouthpiece. Inside a small cylinder, which is connected to the tube of the mouthpiece, is a coiled spring that, by compressing, absorbs any excessive pressure, and at the same time allows the tube of the mouthpiece to slide into the cornet until a hole in the former registers with a hole in the latter, causing a discord that warns the player to relieve the pressure.



Motor-Driven Automatic Hairpin-Making Machine That Runs About 80 Revolutions a Minute, Each Revolution Making a Finished Pin Ready for Enameling: The Hairpin Wire is Split and Formed into Loops on a Die, and There Are Tools and Bending Fixtures for Cutting and Bending the Pins

The Diamond Hair Pin Co. 711 Franklin St., Chicago

9686



UNITED STATES TO HAVE ANOTHER BIG SHIP CANAL

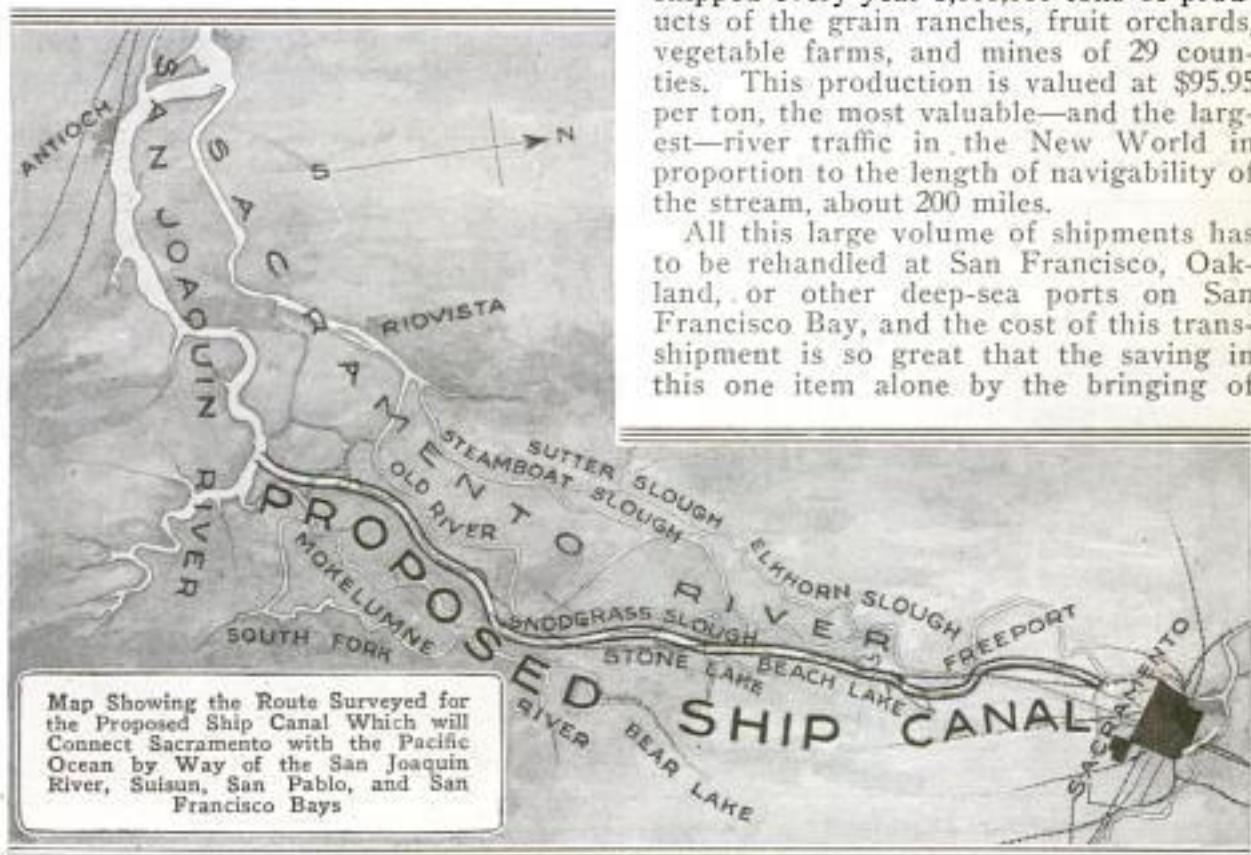
By Robert Morgan

H. H. Munro, 2722 Prince St., Berkeley, Calif.

SURVEYS have been completed, and a report is being prepared for presentation to the Federal government for another of the world's large ship canals, to be located in California, and to connect Sacramento, the capital of that state, with the Pacific Ocean, by way of San Francisco Bay. The canal will be 35

miles long, 150 feet wide at the bottom, 350 to 360 feet wide at the surface of the water, and 30 feet deep, capable of floating all but the very largest of deep-sea vessels, and is designed to convert Sacramento, which is 90 miles from the Pacific, into an ocean port. Out of Sacramento, on steamboats, barges, and schooners, are shipped every year 1,000,000 tons of products of the grain ranches, fruit orchards, vegetable farms, and mines of 29 counties. This production is valued at \$95.95 per ton, the most valuable—and the largest—river traffic in the New World in proportion to the length of navigability of the stream, about 200 miles.

All this large volume of shipments has to be rehandled at San Francisco, Oakland, or other deep-sea ports on San Francisco Bay, and the cost of this transshipment is so great that the saving in this one item alone by the bringing of



Map Showing the Route Surveyed for the Proposed Ship Canal Which will Connect Sacramento with the Pacific Ocean by Way of the San Joaquin River, Suisun, San Pablo, and San Francisco Bays

9686

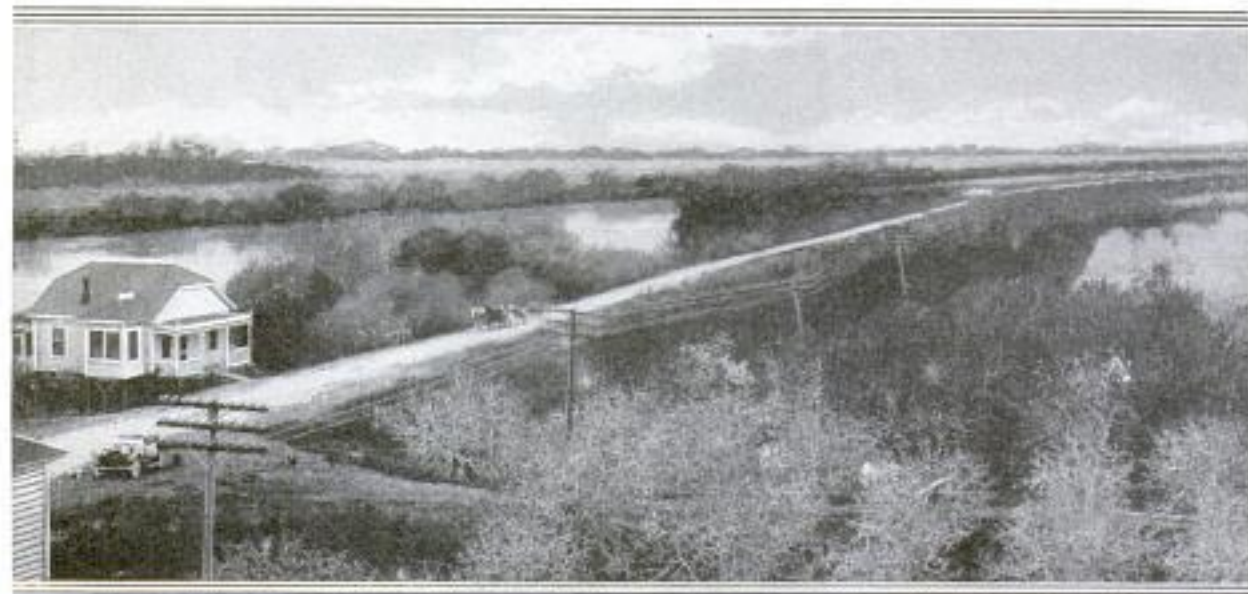
deep-sea tonnage direct to the Sacramento wharves will pay the cost of the ship canal in about 10 years. In addition to this, the deep channel, with the silt-bearing waters of many streams cut off, will eliminate the present expensive dredging of the channel of the Sacramento River, which has to be kept up continuously the year around. There are 3,000,000 acres of arable land, suitable for cultivation and available for irrigation, in the Sacramento Valley, tributary to the river and the city of Sacramento. Of this great area, only about 25,000 to 30,000 acres are in production. It is believed that the introduction of deep-sea shipping to the heart of this valley will bring about the early cultivation of these other acres. How much arable land lies idle in the remaining counties tributary, by rail and water, to Sacramento it is impossible to estimate, but it must be nearly as large as that in the immediate valley of the Sacramento River.

For 55 miles of the 90 which separate Sacramento from the Pacific Ocean, there is deep water—from 40 to 80 feet—so that only 35 miles of the canal need be excavated, and these through soft delta land, with no complicated engineering problems, and no difficulties to overcome other than the walling out of the silt-bearing streams, and the establishment of crossings for railroads and highways. Under direction of the ship-canal committee of the Sacramento Chamber of Commerce, which is the prime mover in the plan, a complete survey has been made of the canal route, and cost estimates have been made for presentation to

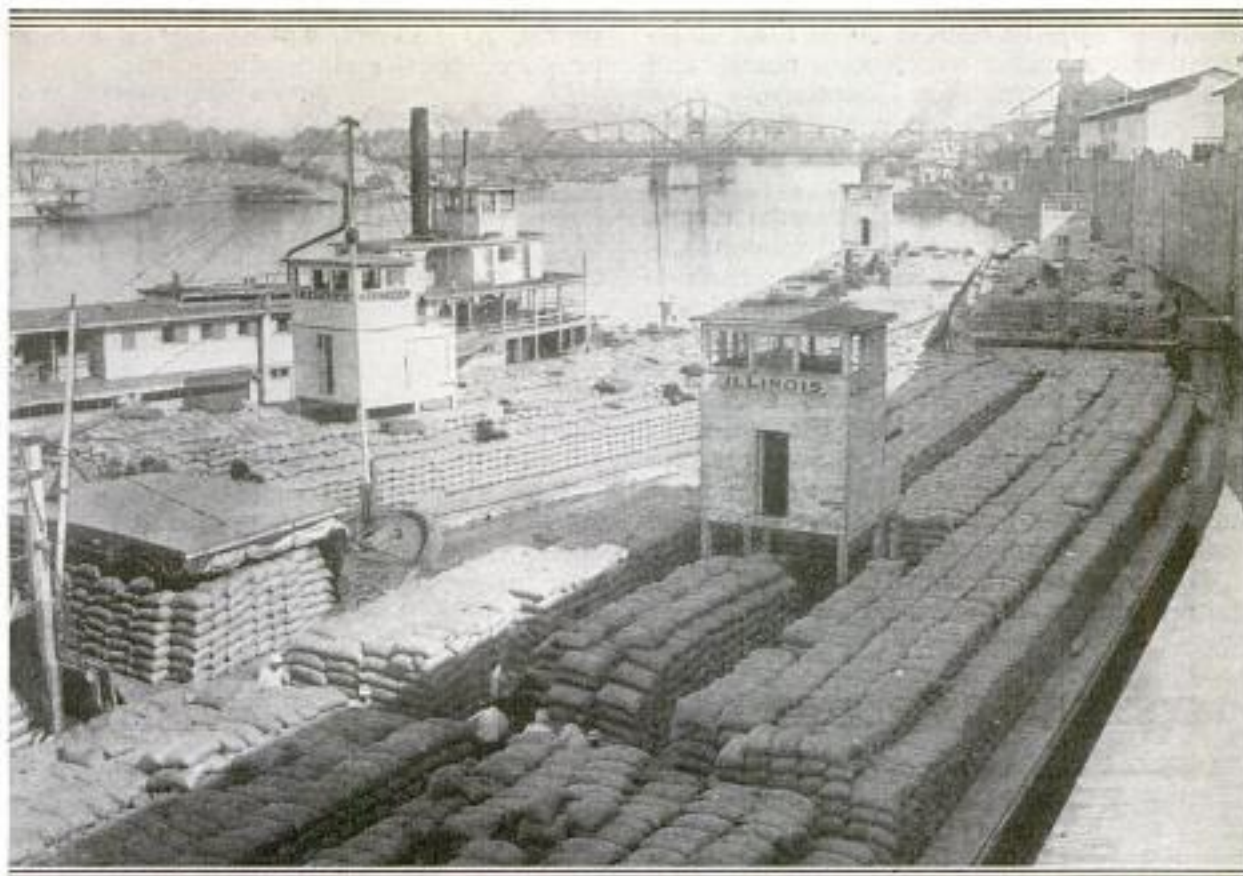
the national government, in an effort to obtain Federal aid. If, for any reason, such aid is not forthcoming, the city of Sacramento and the 29 tributary counties, will proceed with the construction of the canal, which will be publicly owned and operated, as will also the large turning basin and the port facilities to be established at the Sacramento end.

The cost of excavation is estimated at \$825,000 to \$1,000,000, the comparatively low cost being due to the soft earth to be moved and the absence of stone from the course selected. Much of this course lies through sloughs and bayous, which in some places will have to be deepened, in others widened, and in some left virtually as they are today. The waterfront facilities, including the turning basin on the San Francisco waterfront, will cost from \$1,000,000 to \$1,500,000, depending on the prices of labor and materials. The proponents of the plan believe that the maximum figure for total cost will be within \$3,000,000, a comparatively insignificant sum considering the economies gained in the handling of freight and elimination of the dredging of the channels.

The route of the new canal, which is longer than the Welland Canal, as long as the famous Manchester Ship Canal, and wider and deeper than either, will not follow the course of the Sacramento River, which is maintained at a minimum depth of seven feet for barge and shallow-steamer traffic, but runs for two-thirds of its length south from the city of Sacramento, and then turns west of south, through Georgiana Slough and into the wider and deeper San Joaquin River a



Sacramento River Bottoms, Showing Some of the Rich Fertile Lands Which could be Easily Cultivated So as to Produce a Great Many Shiploads of Fruit, Grain, and Vegetables for Shipment on the Proposed Canal



River-Front Scene at Sacramento, Showing Several Barges Loaded with Grain, and Illustrating the Enormous Quantity of This Commodity Which is Handled Every Year at This Point, Coming down the River from the Interior

short distance above Antioch, which, incidentally, also will become an important deep-water port for the San Joaquin Valley when the canal is completed. This route was selected as the best after an exhaustive survey of several proposed routes. It will start at the southern part of Sacramento city, follow substantially the line of the city drainage canal to Snodgrass Slough, thence down the latter channel to a point near its junction with the Mokelumne River. Thence it will cut through to Georgiana Slough. At this point, the natural channel will be abandoned, and a straight cut made into the deeper waters of the San Joaquin River. The low-water depth of the San Joaquin at the proposed point of entry is 31 feet, and all the way down to Antioch this depth is maintained as a minimum, though much of the water is 60 to 80 feet deep. The depth off Antioch is 54 feet, but a short distance below this place the river divides into several channels which shoal, in places, to a depth of only 18 feet.

The canal is to be constructed in five sections of varying lengths, which can be easily identified by a glance at the map. These sections are outlined by the engineers as follows:

Sacramento to Snodgrass Slough, 17

miles; in Snodgrass Slough, 5 miles; cut to Georgiana Slough, immediately to the south of Snodgrass Slough, 2 miles; in Georgiana Slough, 9 miles; and the last cut direct to the deep water of San Joaquin River, 2 miles, a total of 35 miles. Of this, at least 14 miles are in river and slough channels which already are in use by river craft, and will require only so much excavating as may be necessary to straighten bends and to increase the depth to 30 feet. The other 21 miles will be in original excavation, but in soft earth, the surface elevation of which varies from about 5 feet below to 10 feet above mean tide level, and, in several places, is some feet below sea level.

Investigation by the ship-canal committee shows that the large majority of ports of the world are not accessible to vessels drawing more than 30 feet of water, and that considerably more than half these ports offer only 27 feet of water. The record of bottoms entering and leaving San Francisco Bay shows that 45 per cent of the deep-sea traffic to and from that port is borne in vessels of 20-foot draft or less, and that 80 per cent of it is carried in ships that draw not more than 25 feet of water. Thus it appears that a ship canal offering 30 feet of water

would be able to handle more than four-fifths of the traffic which now comes and goes to and from San Francisco.

The plan adopted for the new ship canal provides that no waters shall be admitted to the canal from either the Mokelumne or the Sacramento rivers, except through gates that will prevent the ingress of sand silt or debris. To so exclude the sands and silts of these streams, locks will be required at the head of Georgiana Slough; otherwise, the canal will be at tide level. Protective works also will have to be constructed at the point of entry of the canal into the San Joaquin River, and estimates of these have been included in the figures of the cost of the completed waterway.

The Sacramento Ship Canal will compare with the other great canals of the

world, as follows, according to a table prepared by the state engineers:

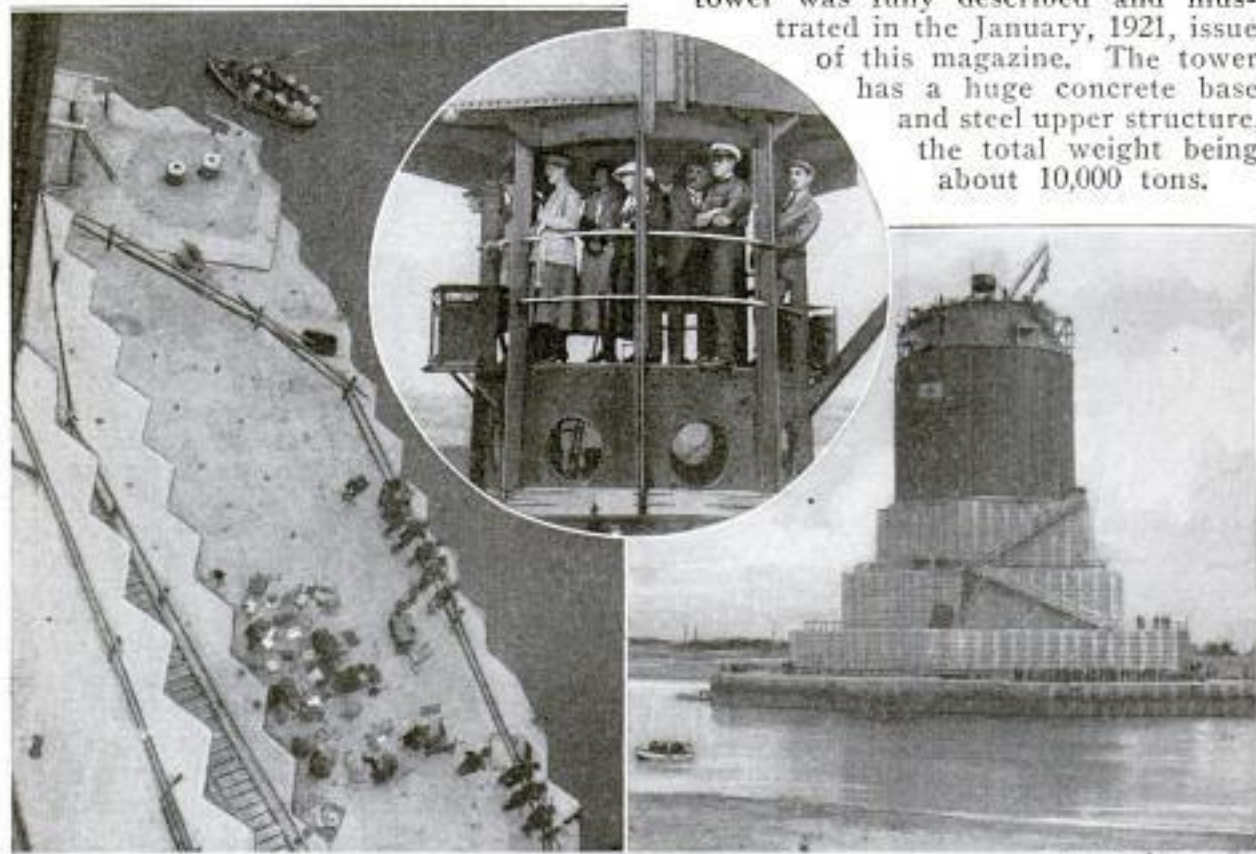
Canal.	Length in Miles.	Bottom Width in Feet.	Surface Width in Feet.	Depth in Feet.
Panama	40	350-650	500-1,000	40-50
Suez	100	108	254	36
Manchester ...	35.5	104	220	28
North Sea ...	60	164	394	32
Kaiser Wilhelm	61	144	361	35
Welland	22	150	260	25
Sacramento ...	35	150	350-360	30

Traffic this year on the waterways which will, in part, be replaced by the ship canal, will total approximately \$100,000,000 in value and will considerably exceed 1,000,000 tons in volume. The growth of this traffic in the past decade has been enormous, since it amounted, in 1910, to only 400,000 tons. When the canal is completed, it is estimated that this traffic, both in volume and in value, will be increased by at least one-third.

9616 *see ship salvage*
MYSTERIOUS FLOATING FORT OPENED TO VISITORS

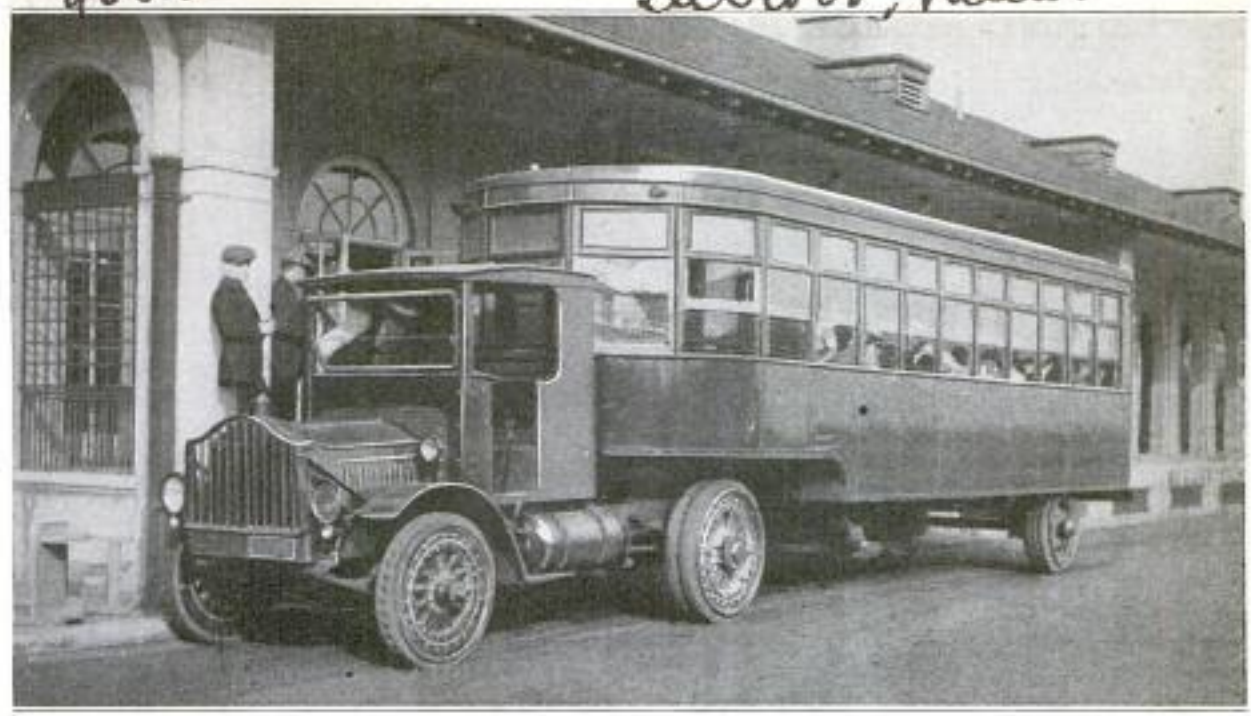
One of the mammoth British naval floating forts that have been the subject of so much mystery before and since the completion of the first one, and from which the mystery of their real purpose has never yet been dispelled, is now located at Shoreham on the south coast

of England. Recently it was towed to Southwick, a neighboring seaside resort, where it was thrown open to visitors, who were allowed to climb to its upper tower, about 170 feet above sea level, whence they had a bird's-eye view of the whole structure. The mammoth mystery tower was fully described and illustrated in the January, 1921, issue of this magazine. The tower has a huge concrete base and steel upper structure, the total weight being about 10,000 tons.



Left: View Looking Down from the Top of the Tower to the Huge Concrete Base, 170 Feet Below. Center: Visitors Enjoying the View from the Observation Tower. Right: The Mystery Tower as it Appears at Southwick on the South Coast of England

9687



This Huge Passenger-Carrying Motor Bus Provides Accommodations for 135 Persons. The Power Plant and Body Are Separate Units; When the Passenger Body is Detached, It Rests on Folding Legs, and the Power Plant can be Used with a Truck Body

9687

LARGE-CAPACITY MOTOR BUS HAS DETACHABLE BODY

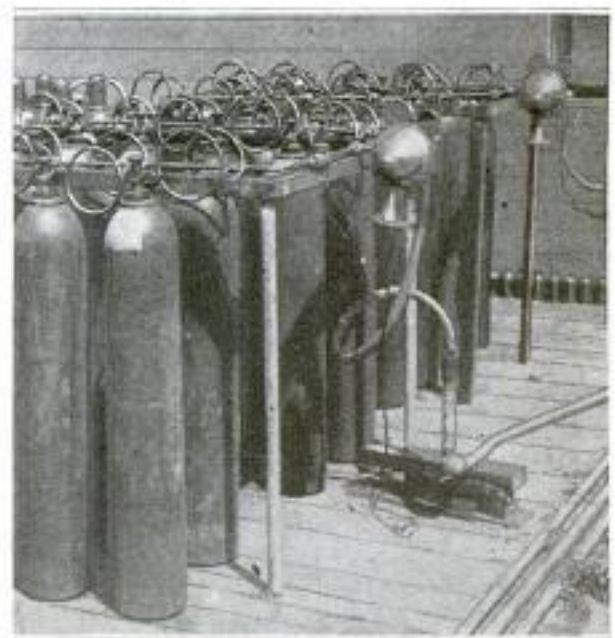
The size of passenger-carrying motor busses has continued to increase until now there has been placed in operation in Detroit, Mich., a bus that has a capacity of no less than 135 passengers. The power plant and body of this huge vehicle are separate units, and when the passenger body is not in use, the power unit may be used with a truck body. The former is designed along the lines of a street car, and is supplied with folding legs at the forward end, on which it rests when detached from the power unit. Only one man is required for the running of the bus, and the doors are operated by compressed air. The gasoline consumption is claimed to be only slightly greater than that of the smaller busses seating only 28 passengers.

9652

FROST IN OXYGEN CYLINDERS PREVENTED BY HEATERS

In the oxygen cylinders used in connection with oxyacetylene-welding torches, the great amount of expansion that takes place in the reduction valves lowers the temperature of the gas to such a degree that the moisture in it often freezes and clogs up the ports of the valve. To prevent this, electric heaters are now being used on the reduction valves at several places on the Pacific coast. An ordinary reflecting electric heater is wired beside

the reduction valve, and is kept in operation while the oxygen is being used. Besides the prevention of frost, a natural



Battery of Oxygen Cylinders in an Oxyacetylene-Welding Outfit, with Electric Heaters Mounted beside the Reduction Valves

result is a slight increase of pressure in the service line.

Paris police are instructed to seize all automobiles figuring in accidents or serious collisions. If the driver is found guilty, he is put in prison and the car sold. If acquitted, the car is returned to him.

No data on maker.

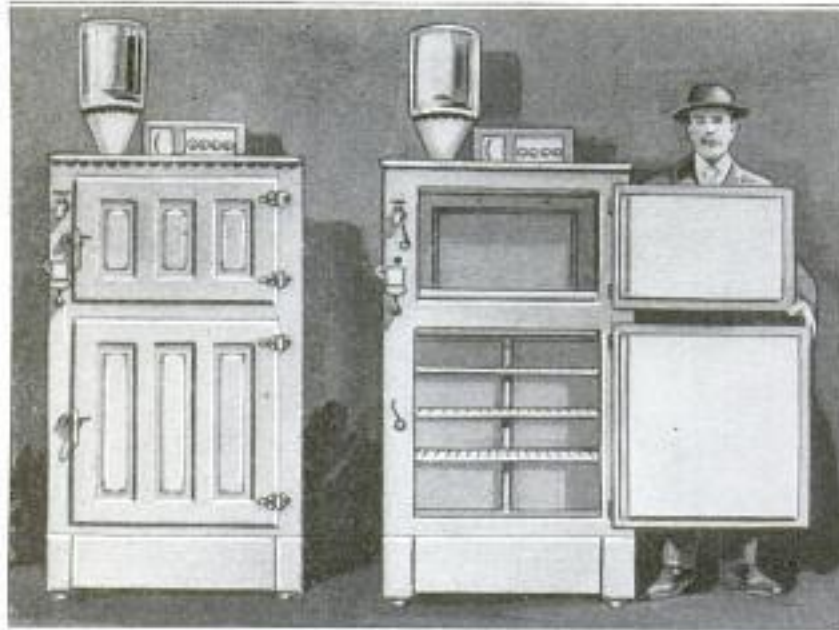
Dr. W. Mr. Langehening, 310 W. 13th St. Oklahoma City Okla.
POPULAR MECHANICS

SCALE AND METER MEASURE ICE IN REFRIGERATOR

Automatically indicating the quantity of ice in the box, and also registering

the amount consumed in any given period, are features incorporated in a refrigerator

produced by an Oklahoma man. The innovation appears not unlike the ordinary style of container except that the scale and meter are mounted in plain view on the top. When ice is placed in the chamber, the scale is operated like the common spring type, while the meter is actuated from the scale shaft by means of gears. Thus the householder can learn the weight of the ice in the box without opening the door, and also has a record of the total number of pounds that have been used. A water bottle and cooling coils are also incorporated in the refrigerator.



Left: Refrigerator Closed, Showing Water Bottle, Scale, and Meter on the Top. Right: Door Opened, Displaying the Ice Scale in the Upper Compartment and Usual Complement of Shelves in the Lower

9665
FLOATING HOSPITAL TREATS FOOT TROUBLES

9749
EXHIBIT SCIENTIFIC TRUTHS FOR BENEFIT OF PUBLIC

For treating injuries to the feet of boatmen, dock workers, and bathers, a

Educational and interesting sights will be witnessed in a magnificent building



Floating Hospital That Makes Regular Trips around Manhattan Island Treating Injuries to the Feet of Boatmen, Dock Workers, Bathers, or Others

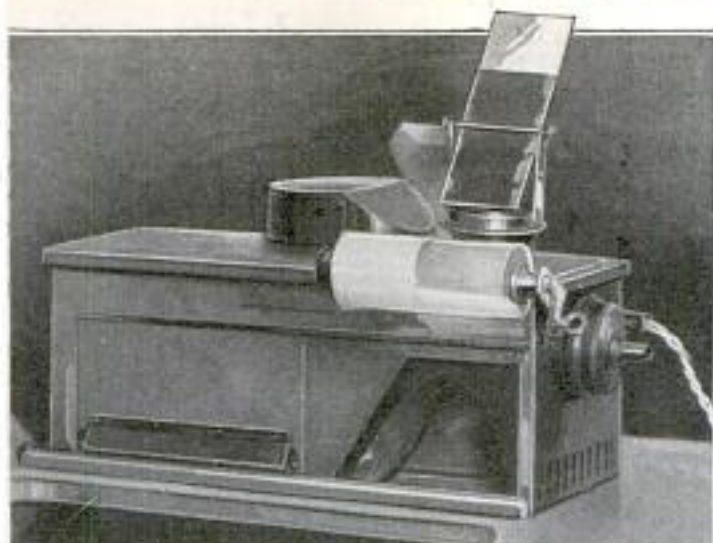
boat, suitably outfitted for the purpose, will make regular trips around Manhattan Island, N. Y., stopping at various points. Patients may board the vessel at any stopping place, and will receive treatment by a staff of doctors.

latest discoveries in the mathematical, physical, and biological sciences, the latest results in industrial research, and will contain laboratories and observatories, in which the displays will change with the progress of science.

Traded at foot of 86th St. East River, N.Y.

Paver 5/16/12 p. 496 Vol. 55 Copyrighted material

Mfr. M. Hussard, 19, Rue Guillaume Tell,
Paris, France



Apparatus in Use at the Art School of the Louvre, in Paris, That Projects the Image of an Object onto a Screen in a Room Sufficiently Lighted to Allow the Writing of Notes by the Students: The Apparatus will Project Greatly Enlarged Reproductions of Insects, as Shown to the Right, Where the Magnified Image of a Moth is Reflected by the Inclined Mirror onto the Screen.

9476

PROJECTION APPARATUS USED FOR THE STUDY OF ART

An apparatus for the direct projection of the image of an object onto a screen in a room sufficiently lighted to permit the writing of notes, has been applied at the art school of the Louvre, in Paris, for educational purposes in very large classes of students, and has given very gratifying results. This apparatus will project enlarged reproductions of drawings, engravings, or moldings, and also of such objects as living animals or insects, the latter magnified so that they resemble prehistoric animals. The object to be projected is placed upon a small table which is adjustable, by a wedge under it, to the required elevation. Above this table is a lamp of five candlepower, suitably adjustable for illuminating the object to be projected, which is placed upon the table. An inclined mirror above the apparatus reflects the projected image of the object onto a screen, about 20 feet square, located at some distance from the apparatus. The projections show the objects in relief, and with their colors, all with an elaboration of detail impossible by any other method.

☐ Congress has authorized an expenditure of \$1,000 for the purchase of trophies to be conferred by the Bureau of Mines at the International Mine-Rescue and First-Aid Contests, upon miners who have performed noteworthy feats.

NEAT DEVICE FOR HOLDING PHONOGRAPH RECORDS

9594

Believing that there is room for improvement in the methods of keeping phonograph records, a Canadian inventor has patented a holder that has several good features. An upright rod is fastened to one side of the cabinet, and the records are held, in a horizontal position, on light plush-covered arms that swing on the rod. Each arm has a pin that fits the hole in the center of the record, and small spacers are provided between the arms to keep the records apart.



This Device Holds Phonograph Records in a Horizontal Position, and can be Used with a Cabinet, or as a Sales Device for Displaying Records

Chas. Philip Morgan
Lindsay, Ont., Canada

4 no Francis Cottle, Riverside, Calif.

9512

DÉBRIS REMOVER FOR IRRIGATION CANAL

Removal of débris from the water of irrigation canals is efficiently done by a

contrivance introduced by a western man. The apparatus has a revolving cylinder



Débris Remover of Irrigation Canal. Showing Fingers of Cylinder Supporting a Man's Weight: In the Background is Shown the Paddle Wheel

composed of metal strips bent to a circular shape and placed about one inch apart, which is set in the concrete side walls of the canal. The water flows freely through this screen but the rubbish is retained against the sides. Extending through the strips from the inside of the cylinder, are fingers which pick up the débris and deposit it on a conveyor at the top, by which it is carried to one side of the canal. A paddle wheel, installed a short way downstream, provides the motive power to operate the mechanism, and can be lowered or raised to start or stop the cylinder.

EAR CORN LOADED IN CARS BY AIR-BLAST OUTFIT

9976

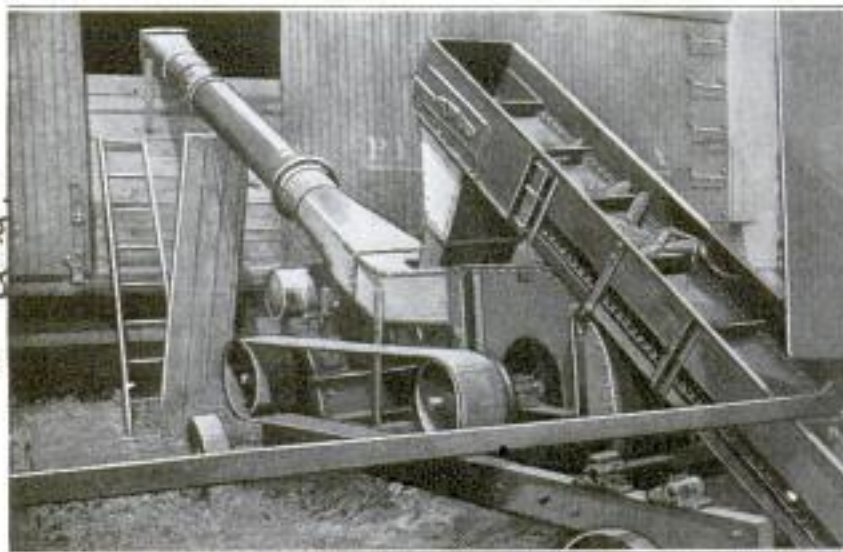
Loading ear corn into box cars has been facilitated by the production of a portable air-blast outfit, which is manufactured by an Illinois concern. When the front end of a wagon is elevated by a jack, its contents fall upon an endless belt that conveys the grain to a powerful blast of air, which blows the corn inside

the car. Both ends of the car are filled simultaneously by means of a two-way spout, and it is claimed that a 60-bushel wagon can be emptied in approximately five minutes.

STAMPS WORTH 200,000 RUBLES ON LETTER FROM RUSSIA

9446

The first letter to have sufficient Russian postage came to the Minneapolis post office late last June. It had stamps in 100, 500, and 1,000-ruble denominations, and so great was their number that they were attached to sheets which in turn were connected with the envelope. The sheets of stamps fastened together were 5 feet in length. The total value of the stamps was 200,000 rubles which in American money amounts to about 10 cents. According to pre-war exchange rates, this sum would have been equivalent to a little under \$100,000—a striking illustration of depreciated money.

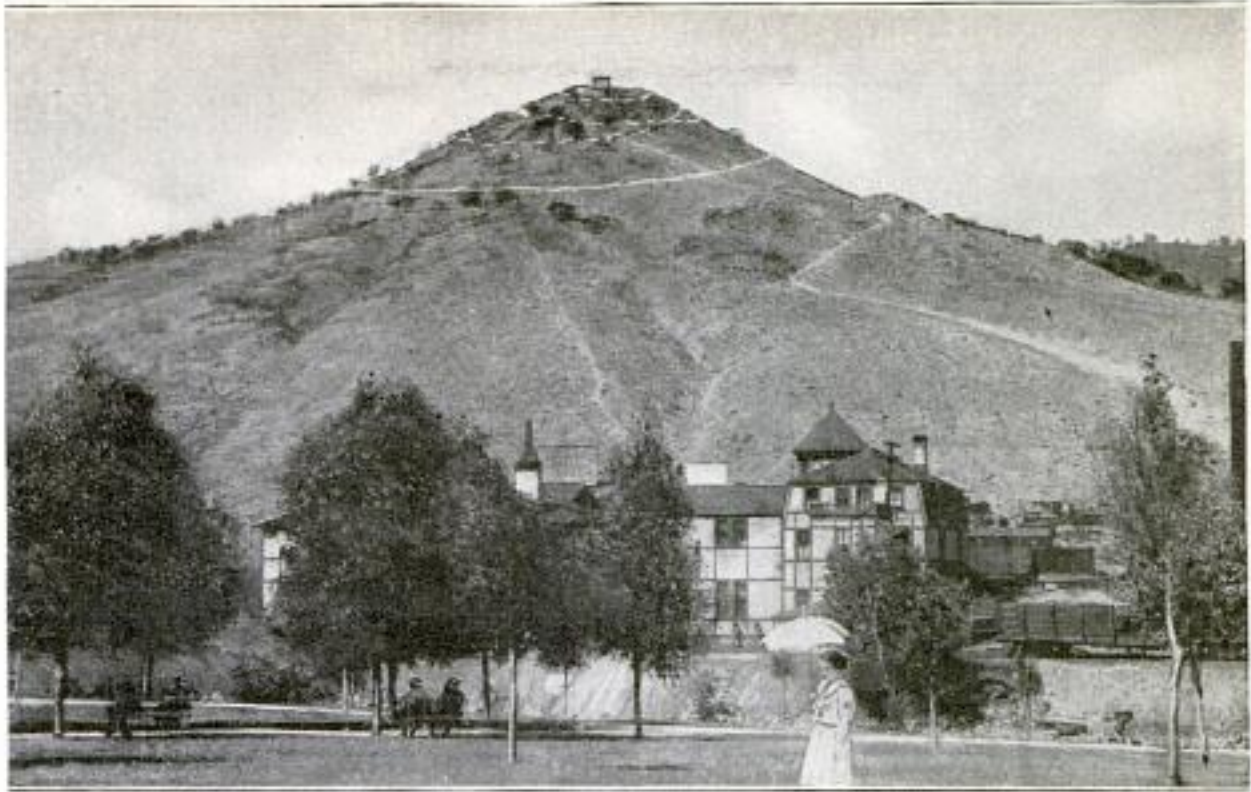


Pneumatic Ear-Corn Loader, Filling a Railroad Car: The Conveyor Is in the Foreground, and the Air Blast is Located Below the Hopper at the Near End of the Delivery Spout

The Maroon Mfg. Co. n. d. l.

George J. Meda, 3606 Dearfield, Minneapolis, Minn.

9544



View of Tenderfoot Mountain Taken from City Park, Showing the Spiral Drive to the Summit as It will Appear When Completed: It can be Plainly Seen How the One-Way Road Crosses Itself on Its Way to and from the Top of the Mountain

THE TENDERFOOT SPIRAL DRIVE

By J. H. FREEMAN

Salida, Colo.

PERHAPS the most unusual road in the world, is the Tenderfoot Spiral Drive, now nearing completion, at Salida, Colo. It is so named, because one spirals four times around Tenderfoot Mountain in traveling over it to the top and back. Its entire length will be less than 2½ miles, of which 2 miles already are in use, being finished, except for the removal of a few rocks. This portion of the road is 18 feet wide, and the grade is six per cent.

The first mile and a half constitutes the approach from the county

road to the mountain, but even this part describes some wonderful curves to gain altitude. At the so-called "double-back,"

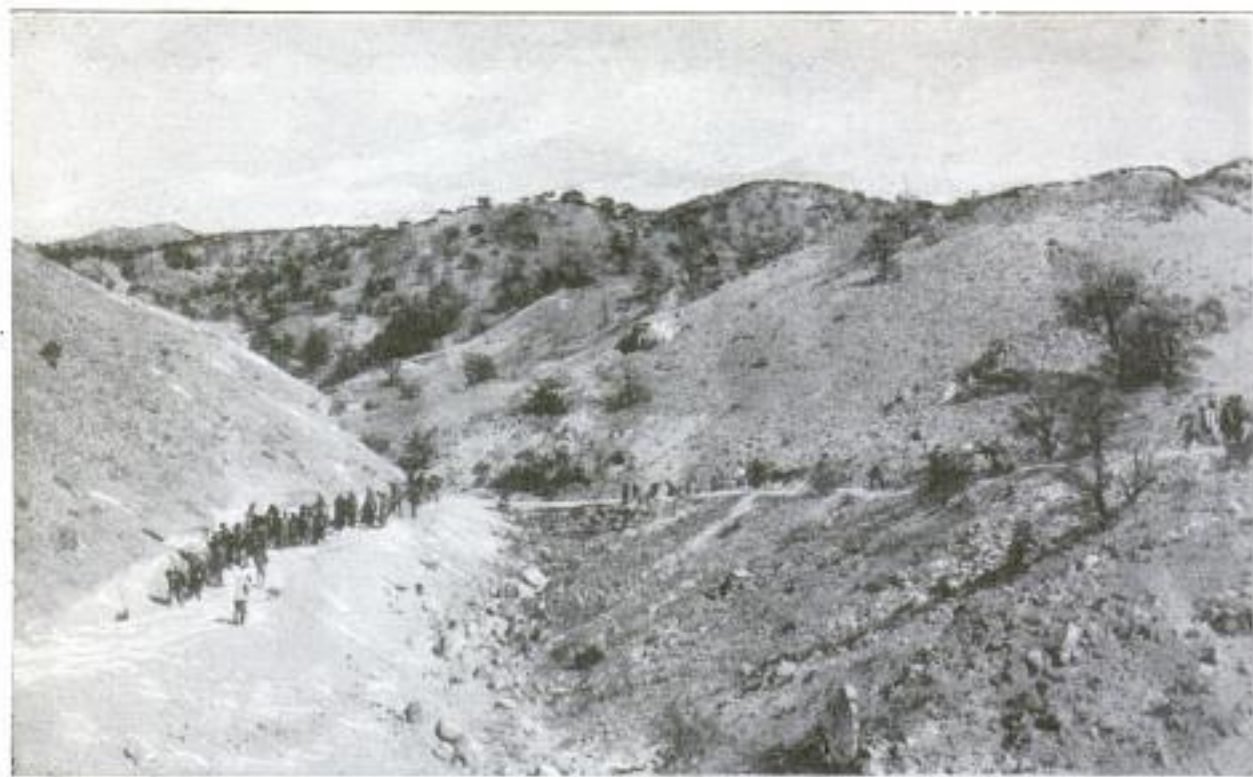
the road cuts through the ridge into Monument Gulch, close above Jiggs and Maggie, runs up along one wall of the cañon, turns round in the Punchbowl, and climbs back along the other wall, high overhead, finally leaving the cañon just opposite the point where it entered.

The last half mile of the double-track road is almost a perfect circle, around Tenderfoot to the turn-around, at the back of the



Diagram of the Tenderfoot Spiral Drive: As Far as the Turn-Around, the Road Is Full-Width, and from There On It Is Only Wide Enough for One Car

9544



Some of the Prominent Citizens of Salida Working on the Part of the Great Circle Road Where It Crosses One of the Gulches on the Way to the Turn-Around

mountain. Here ends the section of the road that is now open to travel.

Tenderfoot Mountain rises more than 500 feet above the railroad station, at the north end of the main street of the city, and the great circle is more than halfway up its steep side. Its summit is a mile and a half above the level of the sea.

Above the turn-around, the road will be a single-track or one-way road, spiraling three times round the cone-shaped peak, to a point near the summit and returning to the starting point. The first circle will ascend spirally once around. The second will pass around the top nearly on a level, rising slightly in the first half and descending in the second. The third circle will spiral down again to the turn-around, crossing the ascending circle halfway down.

The traveler will go up one, and down the other to the starting place, traveling all the time in the same direction around the mountain. Hence there will be no danger of "meeting a fool," and the road need not be made more than 9 feet wide. Each driver will have as much right of way as he has on the 18-foot road, and will be in no danger of meeting a "road hog," who will not keep on his own side. At no point on the mountain road can an approaching vehicle be seen more than a few lengths away, owing to the continual curve, and

this increases the danger on the two-way road.

Aside from the novelty of the double spiral, the single-track road has a great advantage over the double-track, in cost of construction, since much less material must be excavated in building it.

The supervising engineer says in his report: "To make a safe easy road without destroying the rugged beauty of the mountain, it was necessary to run it in a spiral, to a point within 25 feet of the summit, once round the top (less than 500 feet), then descend spirally to the turn-around. The top is too small to accommodate cars, and the mountain too precipitous to allow a turning place; hence the return road. The narrower cut thus allowed, will not interfere with the fill from the next circle close above (as the double-track cut would), nor make an unsightly excavation around the sides of the mountain.

"The constantly changing panorama of grand vistas from all parts of the road is unexcelled. Every turn brings to view some new scene of beauty or grandeur."

The Tenderfoot Spiral Drive will be safe, but the motorist will instinctively hug the mountain side, and try to avoid dropping a monkey wrench into the busy streets far below.

It is proposed to erect a silent guide on the summit of Tenderfoot. A large dial will be cut on top of a pedestal, 4 or



Working on the Road at the Turn-Around: This has Appropriately been Called "The Punchbowl." From Here the Motorist may Follow the One-Way Spiral Road to the Summit, or may Retrace His Path to the Foot of the Mountain

5 feet high. There will be a raised point in the center, and other raised points in a circle near the circumference, marked with the names of prominent mountain peaks, and other places of special interest within view, with distances to them. These points will be so placed that by sighting along the center and one of the

points, the object named at that point will be in the direct line of sight. This will make it possible for any visitor to identify all the points of interest by consulting the silent guide.

This is important, as a great many places of historic interest are visible from the elevated summit of Tenderfoot. A



Grading a Portion of the Great Circle Drive: In the Center Is Tenderfoot Mountain with the Spiral Drive Showing at Two Places on the Side, as It Winds up the Mountain

dozen or more peaks above 14,000-foot elevation—the highest in the state—can be seen along the main range of the Rockies. Many of the highest passes are also visible, as well as the peaks of the San Gre de Christo, or Snowy Range.

The Tenderfoot Spiral Drive is being built by labor donated by all classes of citizens. Most of the business and professional men of Salida have blistered their hands, and "cricked" their backs by their ardent attacks, with pick and shovel, on the rocky sides of Tenderfoot, and many who have not even a burro to drive over the road, have joined heartily in the good work. Merchants have donated a specified per cent of their sales for a day to the enterprise. Besides, some 150 of the state-reformatory boys have worked

on the road for four days. The Rio Grande Railroad donated a train, and the train men donated their services. Wednesdays were designated as railroaders' days, and Thursdays as business men's days, and there was an interesting rivalry as to which should accomplish the most. The women, too, have done their share, by serving hot meals to the laborers regardless of wind and dust, and by giving home-cooking sales to raise money to buy explosives for the road work. So far, about \$8,000 in labor has been donated, and another \$2,000 ought to complete the road as originally planned.

In short, the Tenderfoot Spiral Drive is a fine example of what can be accomplished by a whole community pulling together in a common cause.

HUGE ORGAN PIPES VOICED OUTSIDE THE FACTORY

Some of the organ pipes made by a California manufacturer were so huge that the process of voicing them had to be done outside the factory building. The approximate length of the sound wave produced by the largest of these pipes is 64 feet, and there are only 16 vibrations per second. The tone produced is hard to distinguish, and to the average hearer sounds like a low murmur or continually repeated sound, but the vibrations are so powerful that they cause reciprocal vibrations in ceilings and walls.

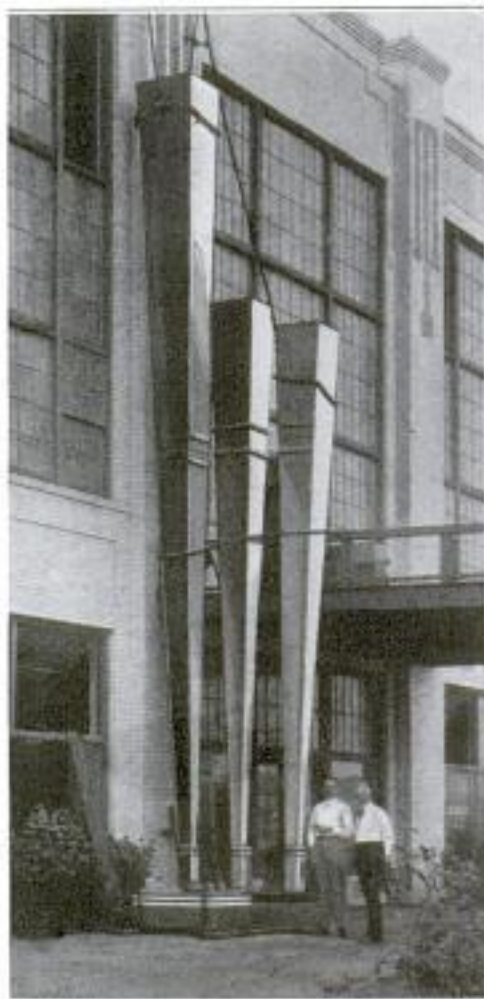
GOVERNMENT REMEDIES FOR RADIO STATIC

Static, that bugbear of radio enthusiasts during the summer months, has recently been made the subject of an explanatory discussion by the U. S. Bureau of Standards and different methods advanced to overcome as much as possible, these annoying disturb-

ances. The installation of a coil, or loop antenna, consisting of a suitable number of turns of wire wound upon a wooden frame about 4 feet square, is one of the ways suggested. Another is the

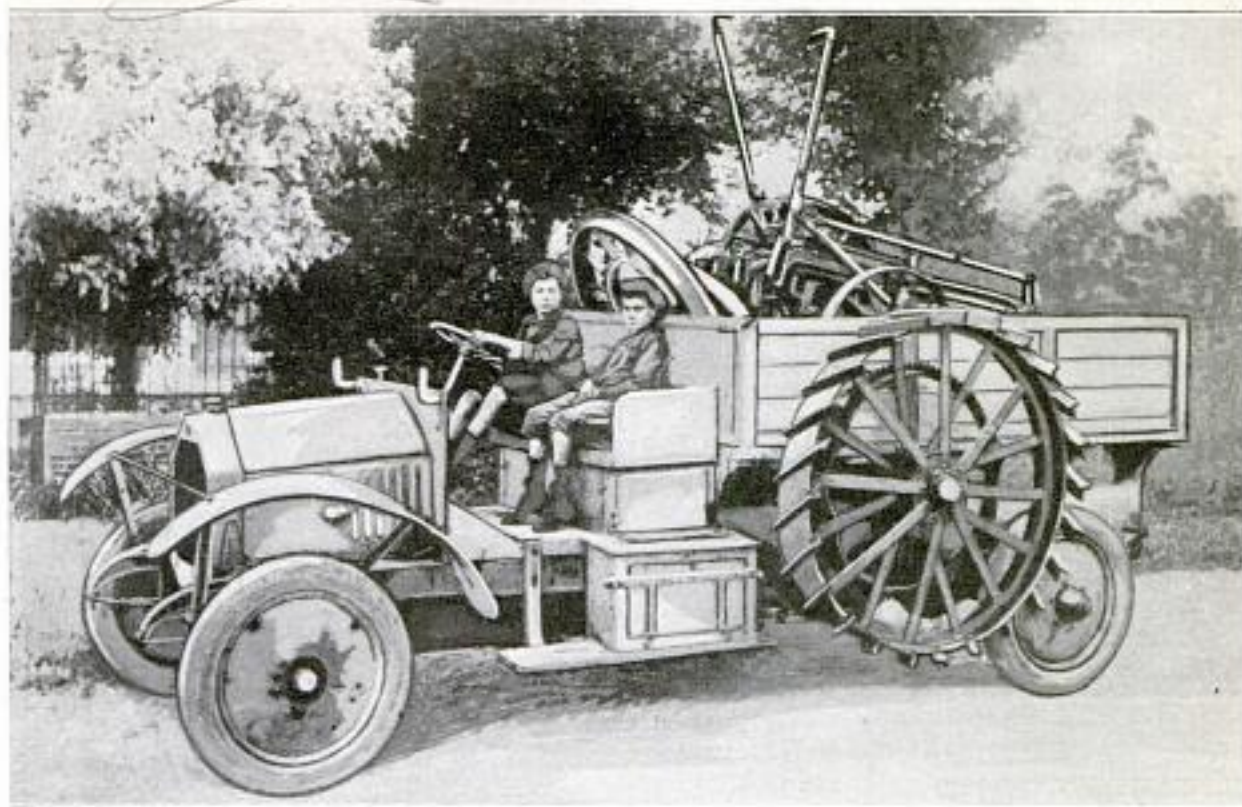
"ground antenna" consisting of an insulated wire laid on top of, or buried in a shallow trench in, the ground, for a distance of several hundred feet in the direction of the station from which the greater amount of broadcasting is to be received. The amateur should bear in mind, however, that in sacrificing the familiar elevated, or roof, antenna, he also loses considerable strength of the signals or waves received, and consequently must use a higher stage of amplification to obtain anywhere near the same results.

ⒸA building which is expected to be the finest and best equipped laboratory for the study of iron and manganese ores is now in process of erection at Minneapolis, to be used jointly by the University of Minnesota and the U. S. Bureau of Mines.



Three Organ Pipes That Were So Huge That They had to be Voiced outside the Factory: In the Largest Pipe the Sound Wave Is 64 Feet Long

The American Photo Player 9633
Co. 108 S. 1st St. Denver, Colo.
H. H. Jones 7/17/22 P. 6.



Interchangeable Power Car in Use as a Road Truck: The Rims for the Front Wheels When in Use as a Tractor, are Seen behind the Driver's Seat. In Front of the Rear-Truck Wheels Are the Upraised Tractor Wheels

A motor vehicle that is interchangeably a truck or a tractor is in use on farms in France. To transform the truck into a tractor, a wheel rim of considerably larger diameter than the front-truck wheels is mounted around each of them, with rigid connections formed of radial struts. Just in front of the rear-truck wheels are a pair of tractor wheels on a special axle that can be lowered to bring these wheels to the ground when the tractor rims are on the front wheels. The rear-truck wheels are then taken off, and

on their driving axle a sprocket wheel drives a chain which engages a second larger sprocket on the tractor wheels. The change can be made in a short time, and does not require the service of a machinist.

Five coal-mining companies, whose properties are located close together in Utah, have formed a coöperative mine-rescue association, which maintains eight sets of mine-rescue apparatus and a combined motor rescue truck and ambulance.



Interchangeable Power Car in Use as a Tractor, Shown Hitched to a Plow Ready to Start to Work on the Stubble: The Rims are Mounted on the Front Wheels. The Rear-Truck Wheels have been Removed, and the Sprocket on Their Axle Is for Driving the Tractor Wheels

Built by: U. S. Playing
Card Co., Norwood Ohio
400 POPULAR

Wm. H. M. Pitman
4223 Bryan St.
Dallas, Texas
MECHANICS

**BIRD MANSIONS CONSTRUCTED
ON ELABORATE LINES**

9608

Bird mansions of artistic and elaborate structure, each having in the cupola a



clock with faces in four different directions, are to be seen on the lawn surrounding the factory of an Ohio manufacturer. The miniature "hotels," which are "seven stories" in height and contain many "rooms," measure approximately 3 by 3 feet and

are mounted on high iron poles. Bird lovers have expressed themselves in admiring terms concerning these houses, in which, it is said, numerous species of feathered families dwell in harmony.

back far enough to allow the man to climb into the hammock, when it is pulled up and tightly closed by a drawstring. To keep the net away from the sleeper, spreaders are provided for the bags, the use of which is said to have greatly reduced the number of fever cases.

9611

**NUTCRACKER IS POWERFUL
—AND EASILY CONTROLLED**

Perfect control of the power exerted on a nut in cracking the shell is possible



with the use of a nutcracker invented by a Texas man. The appliance has a solid felt-lined base and a ratchet, or gear, arrangement operated by a long handle, that gives the user ample leverage in breaking the hardest shells. The regulation of the

crushing power is valuable in that the nuts can be cracked to any desired degree, without scattering the shells in all directions, or smashing the kernels into little bits.

9621

**VENTILATOR BASE ADJUSTABLE
TO PITCH OF ROOF**

By making the flue base adjustable to the pitch of the roof, an Indiana man has

produced a ventilator which should be popular among poultry raisers. The contrivance, which is constructed of tin, has a setscrew attachment in its base that permits the flue to be raised or lowered, so that the ventilator will always be in a vertical position.



Wm. Cyril J. Jettel
Alexandria, Ind.

**AUTOMOBILE PARKING LAMP
HAS NEAT APPEARANCE**

For the motorist who must, at times, park his car in dark places, a parking lamp has been placed on the market that seems to be the last



word in simplicity and neatness. The lamp has the usual full-size red and white lenses. The light bulb is easily accessible, and it is only necessary to press down and turn the ferrule to cause the lenses to part.

**NEW AND BETTER NET PLACED
LIKE BAG OVER HAMMOCK**

A new and better net for protection against mosquitoes carrying deadly malarial-fever germs has been designed by an English medical officer stationed on the west coast of Africa. The white men at this place all sleep in hammocks, and before retiring, a tube of netting is slipped over the hammock, one end being tied at the foot. The other end is rolled

The Lancet 6/17

Allan Parking Lamp Co.
Baltimore, Md.
Box 305

9726

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9443

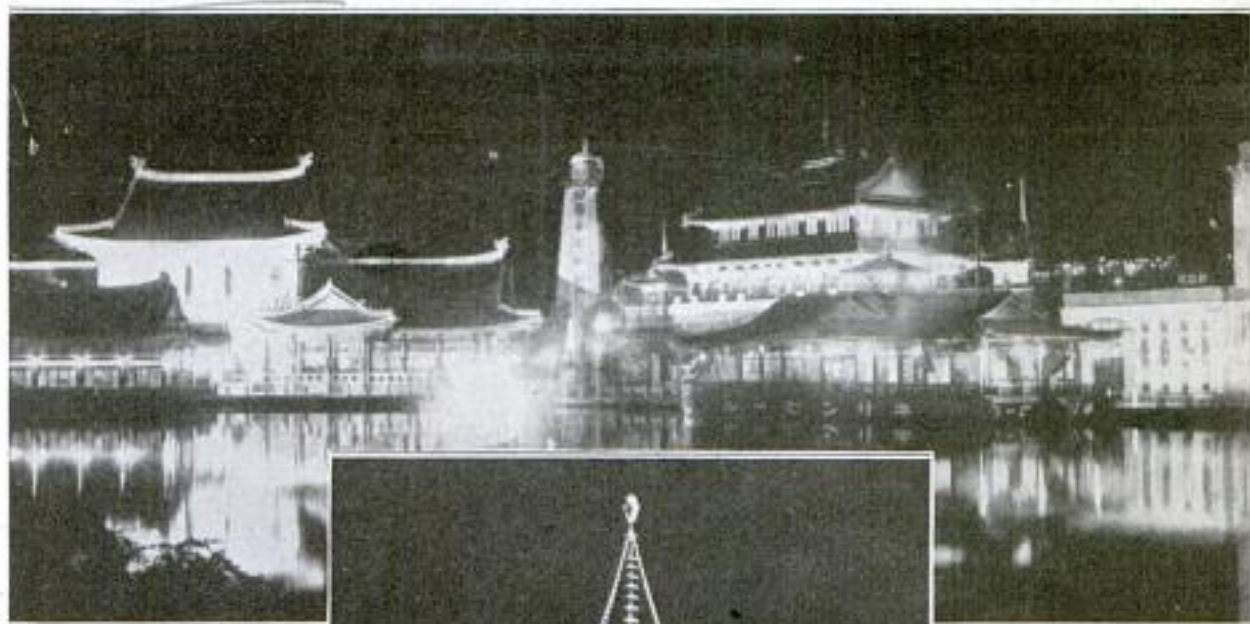
Mikimoto & Co. Tsingtao, Tokyo

POPULAR MECHANICS

Japan

401

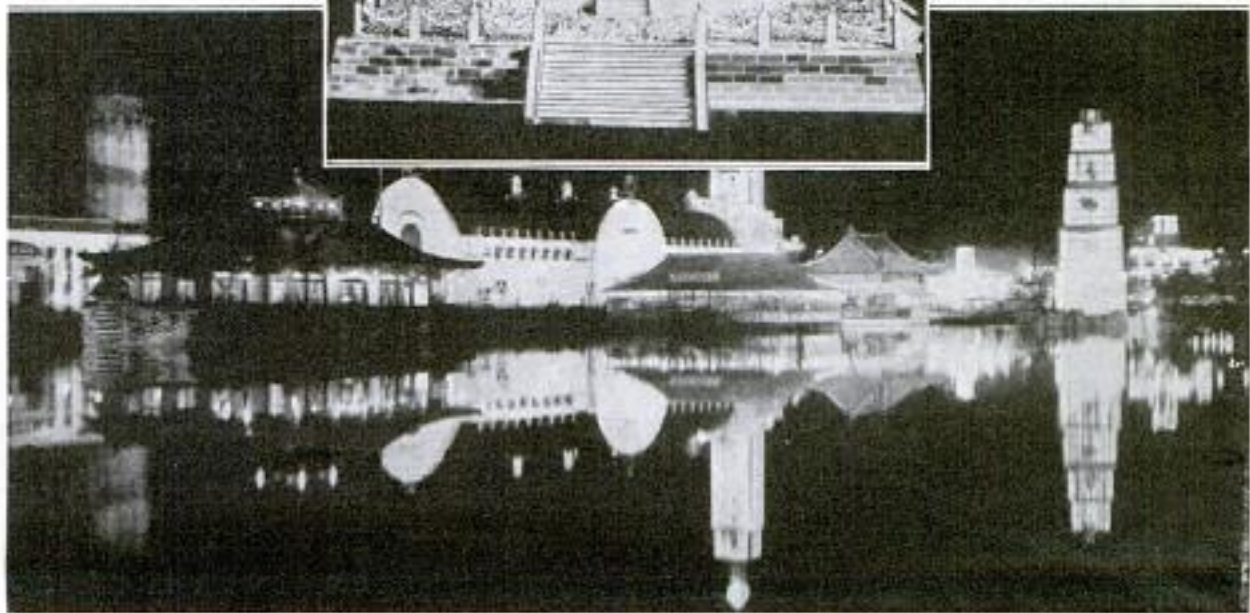
JAPANESE HOLD BEAUTIFUL PEACE EXHIBITION



There was held recently in Tokyo, Japan, a peace exposition, that for size and beauty far surpassed anything of like nature done in that country. The exhibition buildings were lighted during the evenings with searchlights throwing beams of various colors. Among the many marvelous exhibits there



was a jewel pagoda, 2 feet 4 inches high, made of mother-of-pearl, and decorated with real pearls. Some 120,000 small pearls were scattered about the base of the pagoda to resemble pebbles. This little model, besides its rare beauty, represented a value of about \$150,000 at the present market price of the jewels.



The Upper and Lower Views of the Buildings and Grounds of the Tokyo Peace Exhibition were Taken at Night. Center: One of the Exhibits; a Pagoda Made of Mother-of-Pearl and Real Jewels

Onl. N. Sakata, #10, 5-Chome
Tadamachi, Kojimachi-Ku, Tokyo, Japan

Copyrighted material

no data + Iserman

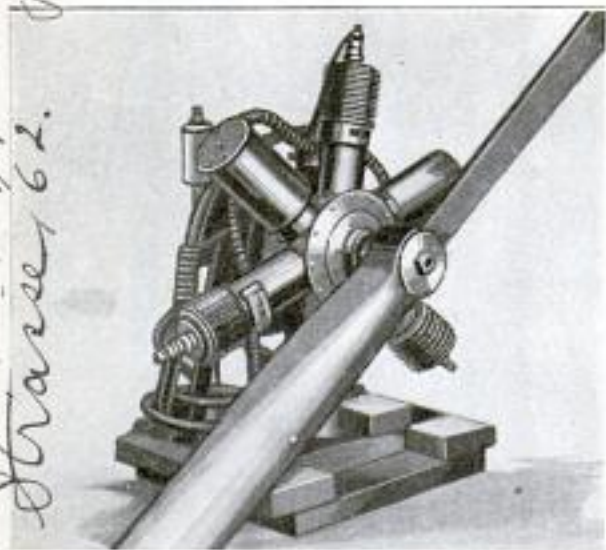
402

9690

Engine

NEAT ROTARY MOTOR WEIGHS ONLY TEN POUNDS

A small rotary gasoline motor has recently been developed that would be par-



This Little Rotary Gasoline Engine Develops 1½ Horsepower, Yet Weighs Only 10 Pounds without the Magneto. It Operates on the Two-Cycle Principle

ticularly well suited for use in airplane gliders. Without the magneto, this

motor weighs only 10 pounds and develops 1½ horsepower. It operates on the two-cycle principle, giving one explosion in each power cylinder at every revolution. The engine is supplied with three power cylinders and three cylinders in which the explosive charge is compressed before going to the firing cylinders.

BORING OF CHANNEL TUNNEL WILL SEE NEW METHODS

If the boring of the tunnel under the English Channel is decided upon, new methods may be inaugurated for doing this kind of work, according to recent announcements. An excavating machine is now being assembled which, it is thought, will have a far greater output than any hitherto used for tunnel boring, and to further insure speed in construction, a considerable number of working points are under consideration. Removing the borings has been made the subject of special study, the way most likely to be employed being that of converting the refuse into semiliquid form by adding water and then discharging it through pumps.

London Times Weekly 6/15/22

CEDAR STUMP IS RESERVOIR FOR WATER SYSTEM

Probably no cedar stump was ever put to more original use than the one which forms the reservoir of a perfectly service-

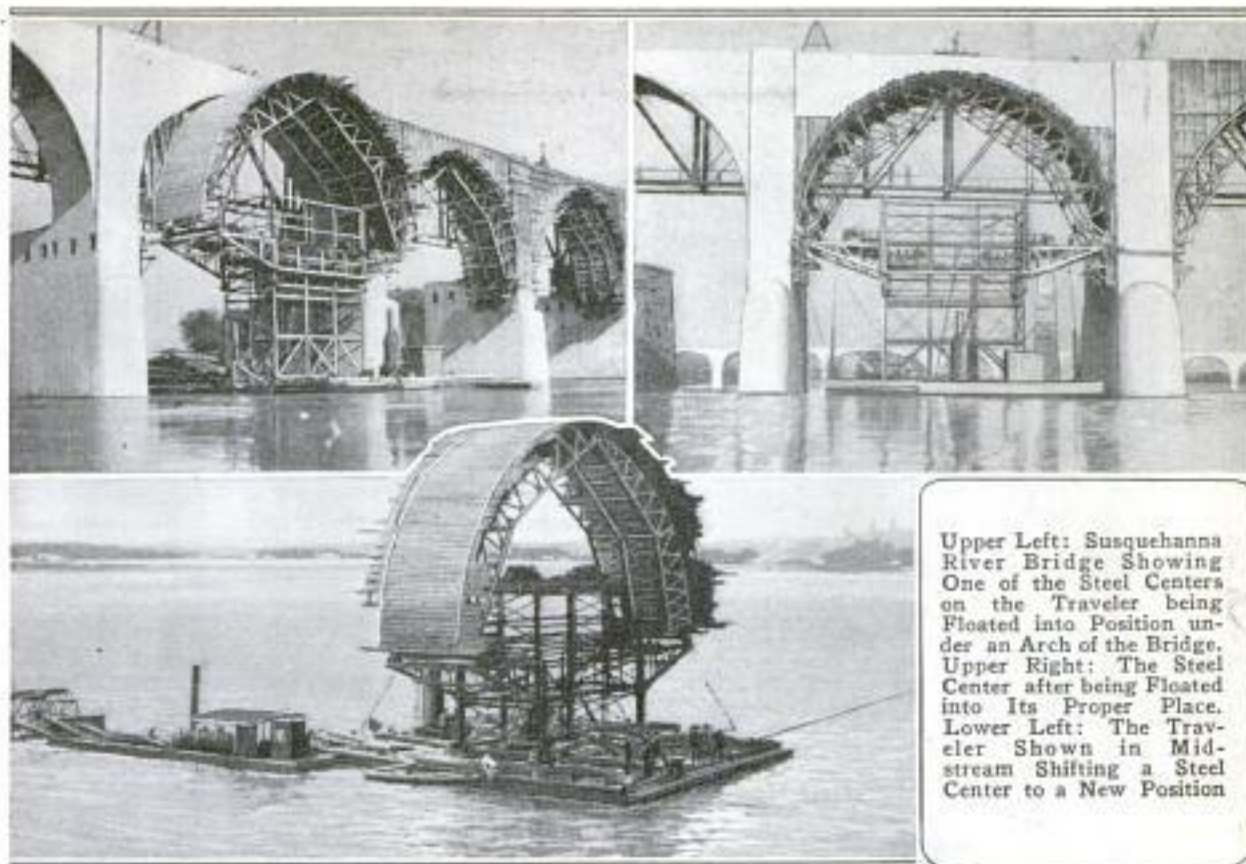
able waterworks system constructed by an Indian living in the very hottest part of the dry belt in British Columbia.

Some little distance behind his house, a small mountain stream winds its way through a low range of hills. This stream the Indian tapped on the hillside above his house with an aqueduct which he extended down to the cedar stump. The stump was hollowed out to form a reservoir, and from this he ran one pipe into a trough. The water being always cold from a distant glacier, the trough served the purpose of a refrigerator. A second pipe brought water to the house for all sanitary and culinary needs, while a third, attached to a long hose, made possible the cultivation of an extensive tract which would otherwise have been barren in this dry region. Stock can also be watered at the trough.



Water is Brought by Gravity from a Near-By Stream to This Cedar-Stump Reservoir and Distributed through Pipes for Refrigeration and Household Use

Atlantic Photo Co.
Berlin S.W. 11, King Street
Traces 62.
9522
Cnd. A raggs Collicie, Herald Bay.
B.C. Canada



Upper Left: Susquehanna River Bridge Showing One of the Steel Centers on the Traveler being Floated into Position under an Arch of the Bridge. Upper Right: The Steel Center after being Floated into its Proper Place. Lower Left: The Traveler Shown in Mid-stream Shifting a Steel Center to a New Position

9571 / STEEL TRAVELER ON BARGE LIGHTENS BRIDGE WORK

In building the concrete arches for the new bridge across the Susquehanna at Harrisburg, Pa., good use was made of a steel traveler mounted on a barge and carrying steel centers. The entire bridge is more than 3,000 feet long and is over the water for nearly its whole length. It was decided that, under the circumstances, the centers could be handled to the best advantage in this manner. While the work on the new bridge is in progress, it has been necessary to keep traffic in operation on the existing steel bridge. A part of the new bridge is being built first; then the track will be moved over to the new portion, and the rest of the bridge will be concreted.

Between the two ends of the bridge there is a difference in elevation of over 20 feet. For this reason, it was necessary to design a traveler that had sliding parts, enabling it to reach the centers at the high end and yet pass readily under the centers at the low end.

When all is in readiness for placing a center, the traveler is towed underneath, and then the sliding frames are hoisted until they engage the heel of the steel ribs. Worm-gear safety winches are used to raise or lower the centers. Whenever it is necessary to move the

centers, they are pulled in horizontally by means of ratchets, lowered with the winches, and towed to position at the next span, where the operation is repeated.

The forms and reinforcing steel are handled by a derrick boat. The whole structure calls for a total of 92 set-ups of the arch ribs.

9222 "SANITARY-BREATHING" PIPE PLACED ON TRACTOR

"Sanitary breathing" for a tractor is possible with a special pipe which is fitted into the crankcase and extends above the top of the implement. Oil-soaked steel wool is placed in a container at the top of the pipe to keep out the dust and grit encountered during the day's work, thus preventing any foreign matter from reaching the internal parts of the engine.

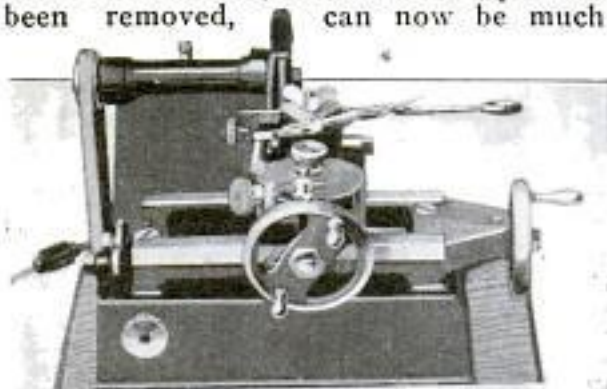


Eng. Ed. E. Palfrey
Esplanade Club
St. Louis, Mo.

9618

**SHEAR-SERRATING GRINDERS
SPEEDY AND ACCURATE**

Serrations on the edge of a shear blade that heretofore have usually been made with a hand file, after the temper has been removed, can now be much



Shear-Serrating Grinder Seen at Work on the Blade of a Shear: The Small Knurled Wheel in Front Adjusts the Machine to Cut a Plain Edge When Desired

more efficiently ground by a machine specially designed for the purpose. The machine is self-contained and has a framed base, inside of which is a small motor. This drives a combined oscillating bed and traveling carriage in such a manner that the grinder will impart to a

shear blade any desired number of serrations per inch. A slight turn of a knob in front of the machine will throw out the serrating mechanism, and a plain edge will then be obtained.

H.A. Wood,

**PHOTOGRAPHIC FILMS RUINED
9674 BY CARNOTITE ORE**

Recently a photographer had the unpleasant experience of having some exposed films ruined because he placed some samples of high-grade carnotite ore in the safe where the films were stored. The radioactive properties of the ore caused peculiar designs to appear on the films when they were developed.

**COAL TRAIN BADLY WRECKED
9678 WHEN DESERTED BY CREW**

On a steep grade on a rocky hillside of a western mining camp a loaded coal train, consisting, besides the locomotive, of 20 steel gondola cars, was left standing recently while the conductor went to a telephone to get orders, and the engineer and fireman seized the opportunity to go for some cigars. While thus deserted, air leakage released the brakes, and the train went full-speed down the steep grade. After traveling two miles, the heavy train crashed through an open switch and was entirely wrecked. The locomotive and most of the cars crumpled, and great masses of coal were scattered over the hillside.

Denver to Rio Grande R.R.

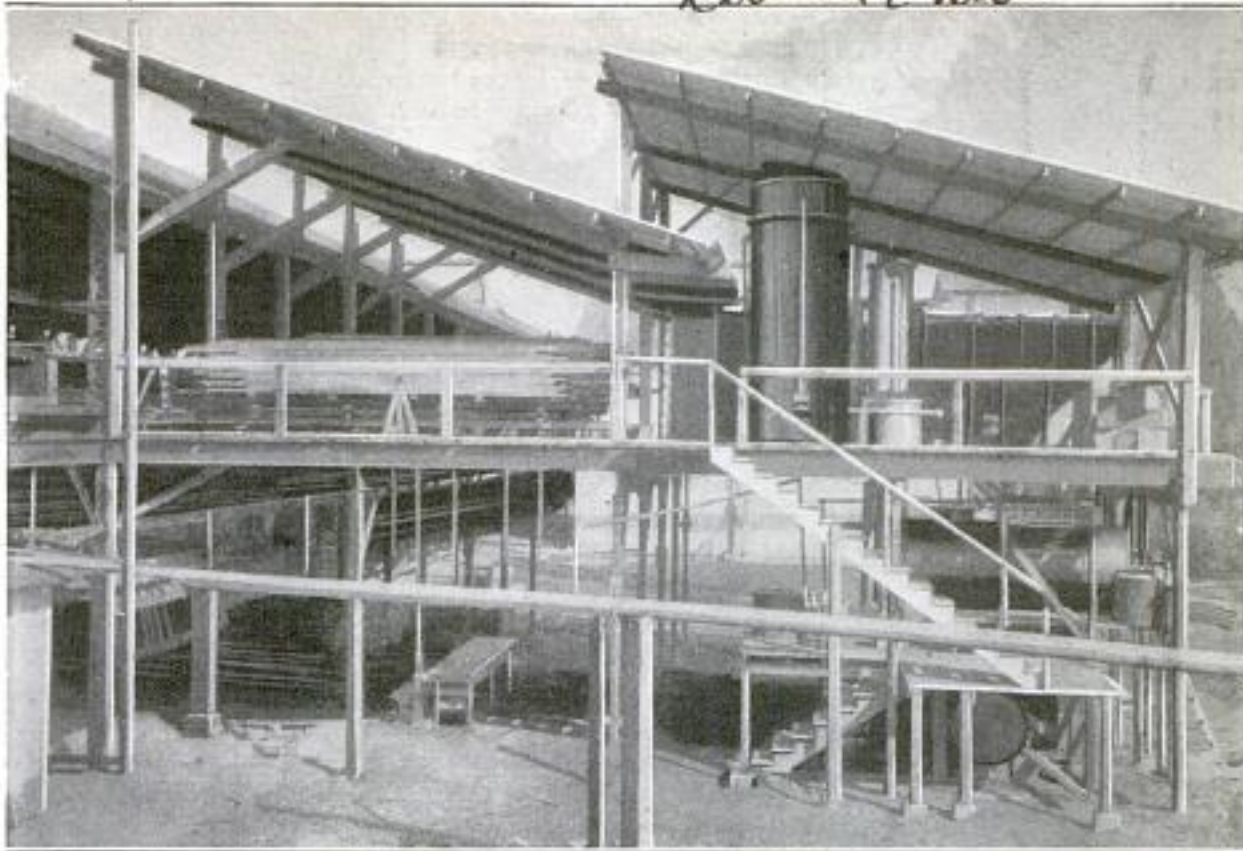


Wreckage of a Train of 20 Gondola Cars, Loaded with Coal, That Ran Uncontrolled for Two Miles down a Steep Grade in a Western Mining Camp: The Locomotive and Most of the Cars were Completely Smashed, and the Coal was Scattered over the Ground

Emb. H.J. Lundy, Palmdale, Calif.

Spring Canyon, Carbon County, Utah.

9432 Mrs. William H. Mason,
Laurel, Miss.



9432 This Shows One of the Pitch-Extraction Plants Where a Large Percentage of the Turpentine and Pine Oils are Removed from the So-Called "Fat" Lumber. The Still, Condenser, and Steam Kiln Are on the Second Floor, and the Storage Tanks Below

SAVING OF BY-PRODUCTS IMPROVES LUMBER

THE tendency of modern times is to eliminate waste of all sorts and to recover by-products once considered of no value. Many a flourishing business today owes its prosperity to the fact that some waste product has been converted from a source of expense to one of revenue. In the southern lumber industry this principle is now being applied in such a way that not only are valuable by-products recovered, but the value of the lumber is also increased.

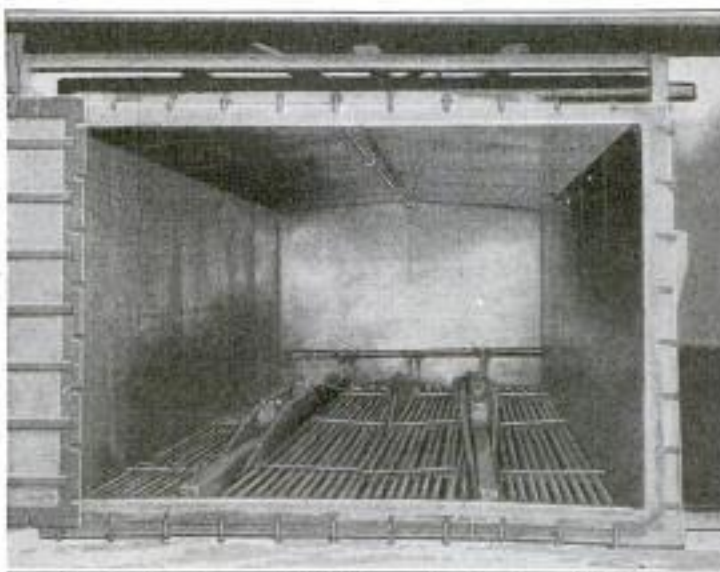
The process that is being adopted is a method of extracting from lumber a considerable portion of the contained resin, turpentine, and pine oils. Lumber that has a high percentage of these substances is of low commercial value for

several reasons. It will not hold paint; it is hard to work; it splits easily; the pitch boils out in hot weather, and it costs more to ship because of its extra weight. At the mills, this so-called "fat" lumber has a value of only about one-third that of first-grade lumber. Yet the

substances that lower its value have a considerable value of their own, and their removal increases the value of the lumber itself.

The recovery process, developed at two southern mills, is extremely simple and requires the labor of only two men to operate a commercial-size plant. The

lumber as it comes from the saw, is loaded on cars and run into kilns, which are then closed and sealed. Heating coils in the floor of

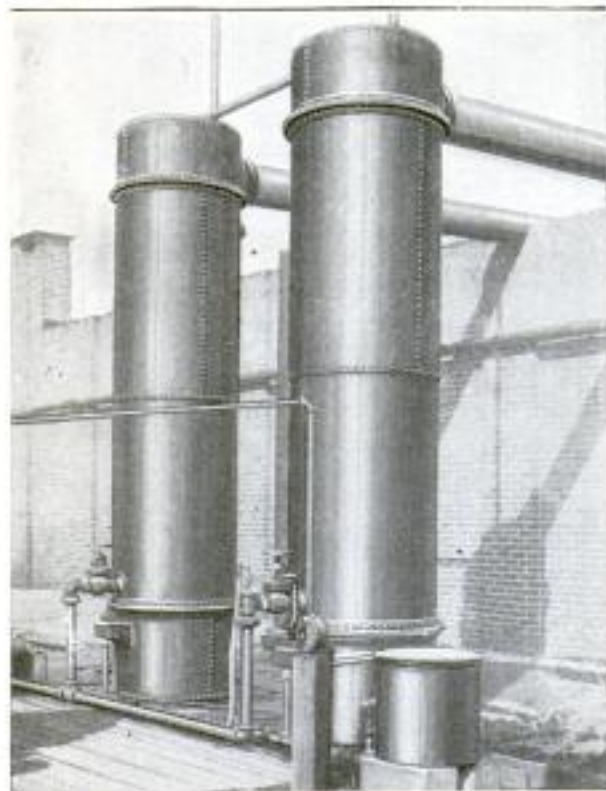


Interior of the Steam Kiln Where the Lumber is Run In on Cars and Subjected to Heat from the Steam Pipes in the Floor

Used by: Wausau Lumber Co } Laurel, Miss.
Marathon Lumber Co.

9432

the kiln serve to keep the temperature at the required degree, and live steam is circulated around and through the lumber. As the temperature in the kiln increases,



In These Stills the Crude Resinous Liquid is Subjected to Further Heat and the Turpentine and Pine Oils Separated from the Water

the moisture in the lumber boils out, carrying with it, in the form of vapor, much of the resin and turpentine. The live steam that is introduced into the kiln aids materially in speeding this extraction and carrying it to completion. The kiln treatment lasts 24 hours, and the lumber is then sent to the usual drying kilns. The treated lumber dries out much more rapidly than the untreated lumber.

The vapors coming from the treatment kiln go to the refining plant, which consists of a still, condenser, and storage tank. The still is charged with the mixture of crude turpentine, pine oils, and water, and is heated by live steam introduced through a spray pipe. As the temperature is raised, vapors are given off, consisting of approximately 60 per cent turpentine and 40 per cent water. This vapor is condensed, and the liquid passes to an automatic separator that removes the turpentine from the water. Toward the latter part of the run, the percentage of turpentine decreases and the percentage of pine oils increases. The turpentine produced by this method is high-grade, water-white, and can be used for any purpose to which gum turpentine is suited. The pine oil recovered finds use in the mining industry, where it is applied in the flotation process for the recovery of finely divided mineral particles from the worthless gangue.

The extraction process is not confined to the treatment of cut lumber, but can be used for the treatment of stumps that have been left on cut-over land. These stumps usually contain a higher percentage of resin and turpentine than is found in run-of-mill lumber, and the value of the extracted products should go far toward the cost of clearing the land.

It is believed by persons in a position to know, that the process can be economically installed in any mill having a capacity of 70,000 feet of lumber a day. Actual tests have shown that the weight of the lumber treated by this method is reduced from 20 to 30 per cent with a consequent saving in the freight charge for shipment. The value of the recoverable products, based on the total cut of the southern mills, runs into startling figures.

9490

PACKING PLANT LARGEST IN AUSTRALIA

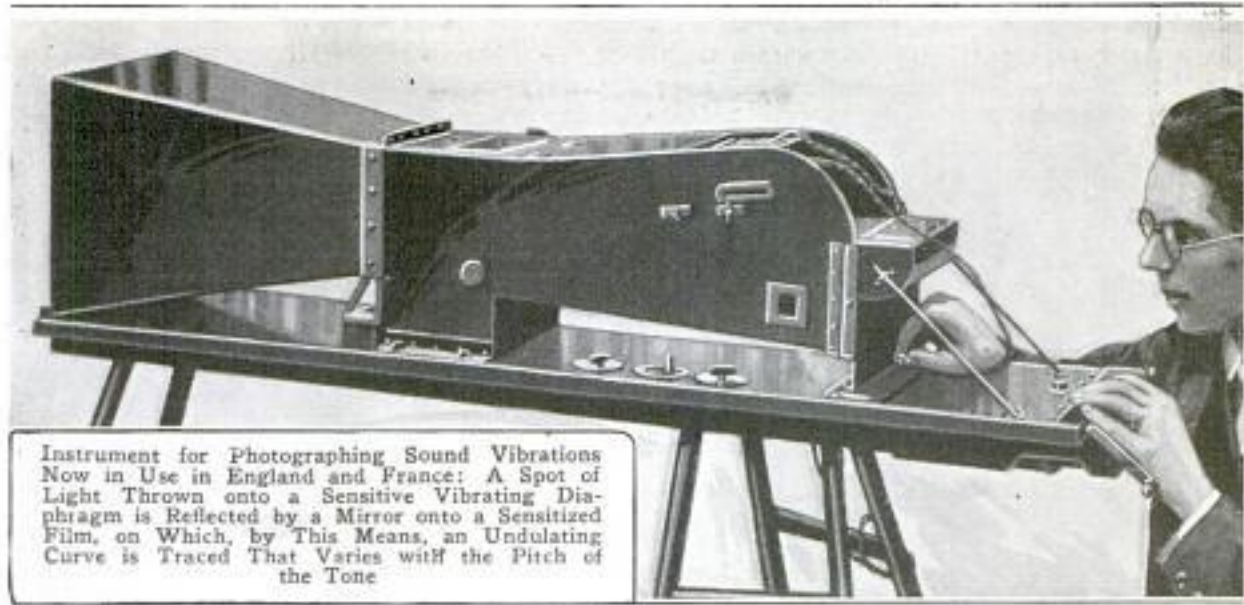


Airplane View of the Largest Packing Plant in Australia, Situated on the Banks of the Ross River, at Townsville, Queensland

The largest packing plant in Australia, known as the Ross River Meatworks, handles annually from 50,000 to 90,000 cattle and 50,000 sheep. The plant covers an area of five acres. During the operating season, which lasts about seven months, from 500 to 600 men are employed. It is located in Townsville, Queensland, on the banks of the Ross River. Large quantities of tallow and other by-products are exported from this plant.

Carl George Oliver of Townsville, Queensland, Australia. Hubberts Ltd.

Dr. Mrs. A. M. Low, Woodstock Road W. London, England.



Instrument for Photographing Sound Vibrations Now in Use in England and France: A Spot of Light Thrown onto a Sensitive Vibrating Diaphragm is Reflected by a Mirror onto a Sensitized Film, on Which, by This Means, an Undulating Curve is Traced That Varies with the Pitch of the Tone

PHOTOGRAPHIC RECORDS MADE OF SOUND VIBRATIONS

9629

An instrument for photographing tones, or sound vibrations, called an "audiometer," has recently come into use in England and France. Inside the apparatus is a sensitive diaphragm that responds precisely to any sound vibrations. In connection with this is a mirror which reflects onto a sensitized film a spot of light from an electric bulb. This spot of light moves with the vibrations of the diaphragm, and therefore, when the film is rolled along in a direction at right angles to this movement, an undulating curve, which varies with the intensity of the sound, is traced upon the film. This then passes into a tank below the apparatus where the film is automatically developed. Without the film, the spot of light may be observed on a ground-glass screen, in the way observations are made with any ordinary camera.

SIMPLE RULES FOR TESTING HOME GAS BURNERS

Simple home tests have been outlined for the householder who wishes to determine if his gas burners are properly adjusted. If they light easily and turn off quietly; if they burn in sharp blue cones with purple edges; if they can be turned down and still burn evenly, and if cooking utensils keep clean where the heat from the burner tips strike them, then the burners are all right. If the burners do not come up to these tests, it is well to have experts from the gas company make proper adjustments, as this plan will insure the best results.

*Illinois Committee on Public Utility Information
125 S. Clark, Chicago*

FLOCK OF PIGEONS HOUSED IN ARTISTIC BUNGALOW

1523

Believing that even the pigeon house should harmonize with the surroundings, a California man built his in the form of an artistic bungalow. The house rests on a stone pillar that rises from the center of a fishpool, both the pool and the pillar being made of cobblestones set in cement. At a point about halfway up the pillar, a circular bath for wild birds has been constructed where the birds will be safe from prowling cats.



This Bungalow-Type Pigeon House Rests on a Pillar Made of Cobblestones That are Set in Cement

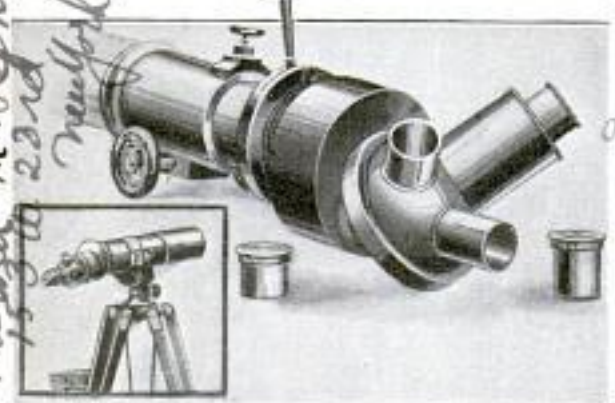
*Emb. Howard C. Pegley, Los Angeles, Calif.
1349 Larcia Terrace*

For sale by: Watry & Heidekamp,
17 W. Randolph St. Chicago.
408
9572

POPULAR MECHANICS

TELESCOPE ATTACHMENT GIVES THREE MAGNIFYING POWERS

A new attachment for portable telescopes furnishes three magnifying powers instead of only one. The attachment

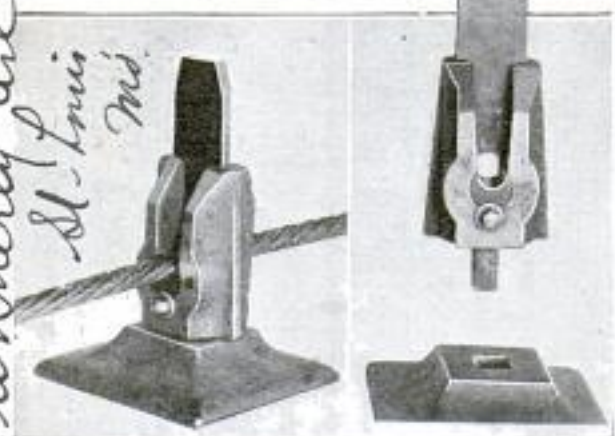


Attachment for Portable Telescopes That Has Interchangeable Eyepieces Furnishing Three Magnifying Powers: Its Position on a Telescope is Shown in Inset

has the same general appearance, and operates on the same principle as the revolving objective of a microscope, but instead of being at the objective end of the instrument, it is clamped over the barrel at the eye end of the telescope. When used on a telescope having a normal magnification of 12 powers, the three eyepieces of the attachment make it possible to view objects magnified either 12, 20, or 40 times.

HANDY TOOL HOLDS AND CUTS WIRE CABLE EASILY

Anyone who has had occasion to cut a piece of wire cable with a cold chisel and hammer knows what an exasperating job it is, and will appreciate a tool recently introduced.



This Cutter Holds the Cable in the Body Casting, and the Cutting is Done between the Lower Die and the Bar, Which is Struck with a Sledge

The device consists of a body casting, base plate, and cutter bar, and is so made

that it can be used on an anvil or other solid foundation. The cable is held securely in the body casting, and is cut between a lower cutting die and the cutter bar, when the latter is driven down by a sharp blow with a sledge.

SIMPLE PIPE OR NUT WRENCH ENTIRELY SELF-ADJUSTING

For gripping objects such as pipes and nuts, a very simple wrench is so constructed that it is entirely self-adjusting. At the base of an opening in one handle, near its jaw, is a fulcrum for the other handle, which acts as a lever as it slides through the opening, until it grips the pipe or nut-between its own jaw and that of the other handle. The wrench is made adjustable to widely varying sizes by means of an auxiliary fulcrum, which can be swung into position so as to bring the jaws closer together for smaller-sized



Self-Adjusting Wrench: In Lower Views Where Handle is Cut Away, Movable Fulcrum is Shown in Position, at Left for Small Objects, and at Right for Larger Ones

objects. It has a hammer head on the back of one jaw, and a screwdriver at the end of one handle.

TWO JAPANESE SWIM GREAT YANGTZE RIVER

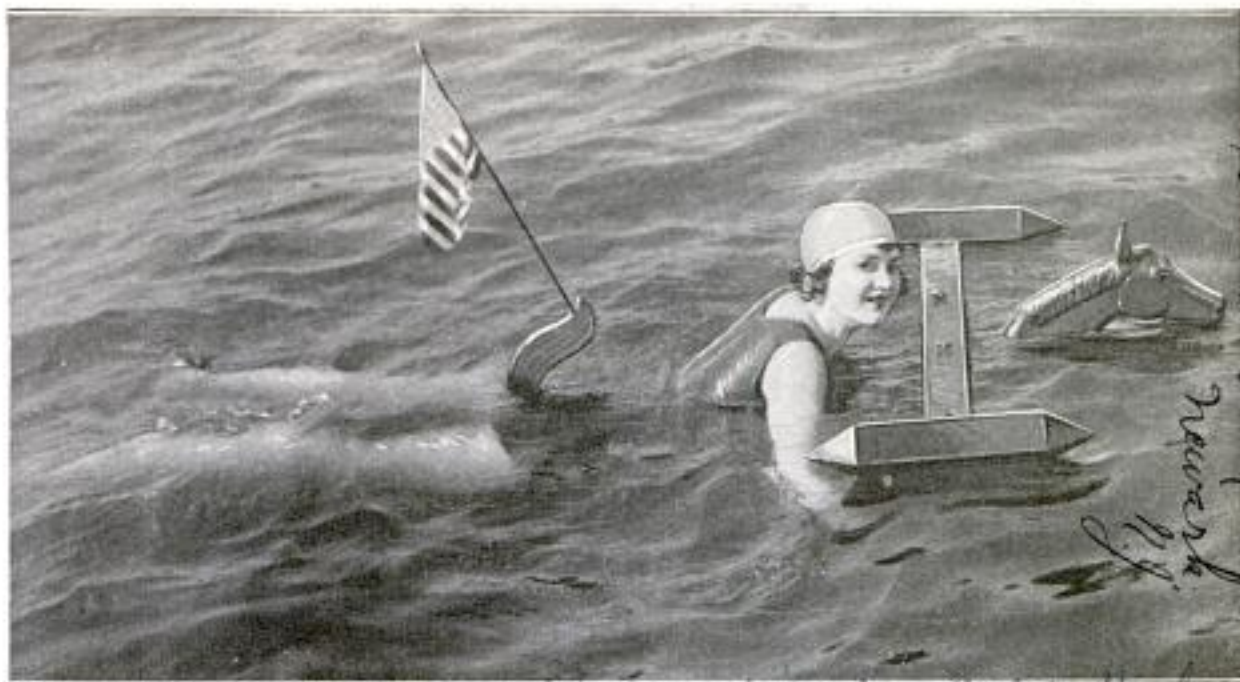
On May 21, two Japanese swimmers, named Nishimura and Urakami, succeeded in establishing the record of swimming the great Yangtze River of China at a point between Hankow and Wuchang. This is the first crossing to be made at this point. The hazard of such a swim does not lie in the distance, seven miles, but in the strong uncertain currents and the submerged rocks in the river.

Laboratory tests have demonstrated that bituminous-clay pipe can be used for drainage and sewerage in place of cast-iron pipe. A special bituminous compound is used in the joints.

Carl Zeiss Optical Works Jena. Germany. Sold to Harold W. Pynch. 150 to 23rd Street New York.
A. Larcher & Sons Refr. Co. 5909 Kennerly Ave. St. Louis Mo.

9471
Wrench + Tool Co
Cliffenbaugh Wrench + Tool Co
Paraboo, Wis.
Japan Tokyo.
Allan. Beichime
Kojimachi, Japan
Sahata #10

95.1

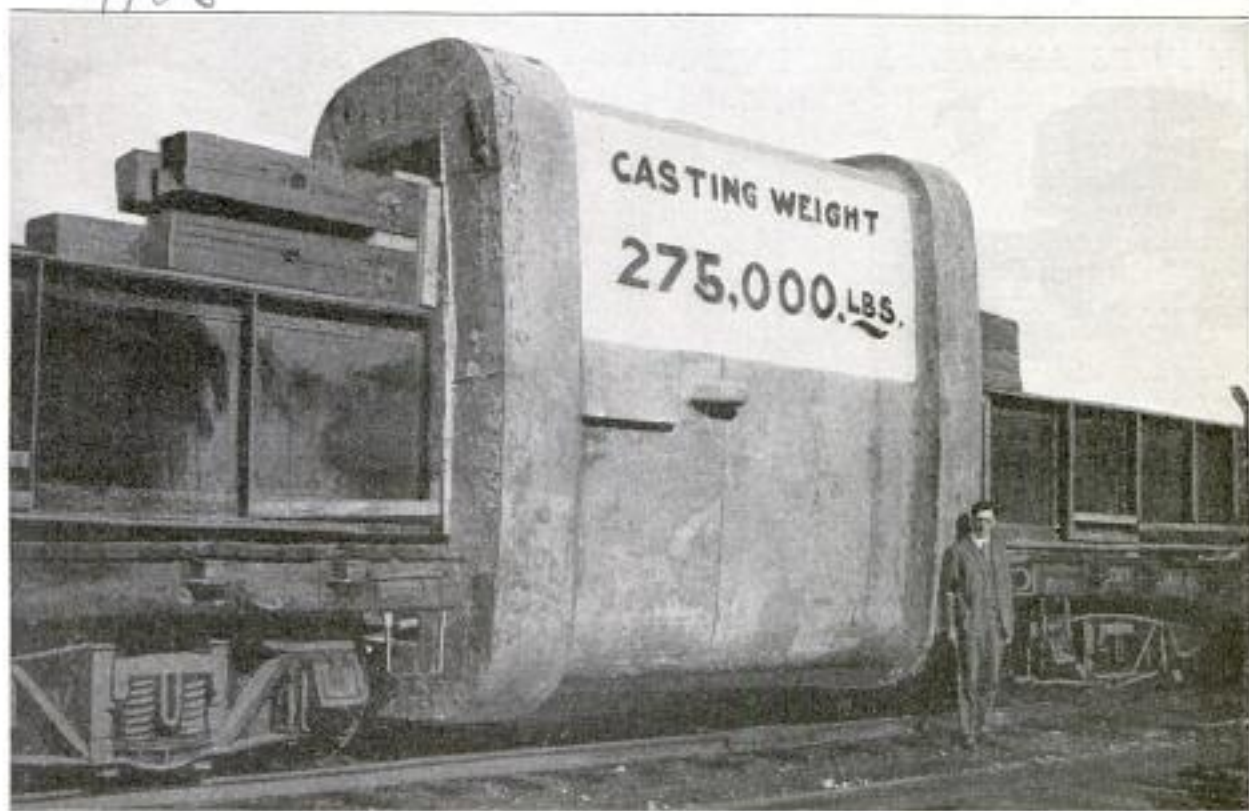


ms. of similar device
American Water Sport & Recreation Co.
New York City

Aboul. "SEA HORSE" IS LATEST PAD AT BATHING BEACHES
*Accessories made by Herbert
New York City*

RIDING "sea horses" is the latest fad introduced at the beaches at New York City, and the illustration shows one of the fair mermaids enjoying a "canter" through the surf. The novelty is constructed of light wood having strong buoyant qualities. Although originally designed as a means of teaching beginners to swim, the innovation has become exceedingly popular with feminine bathers who already have conquered the art.

9436



HUGE CASTING IS SHIPPED HANGING BETWEEN TWO CARS

WHEN the time came to ship a large ingot mold from a West Virginia foundry, special arrangements had to be made because of its great size and weight. By placing bridge girders, made for the purpose, inside the casting and allowing the ends of the girders to rest on two 75-ton-capacity cars, the casting was hung between the cars and shipped to its destination without mishap. A special train was required for the trip. The shipping weight of the casting was 275,000 pounds, and when it was made, it had to be left lying in the sand for eight days before it was cool enough to be removed. It took only four minutes to pour the molten metal when the casting was made, the iron being melted in six furnaces and poured from four ladles.

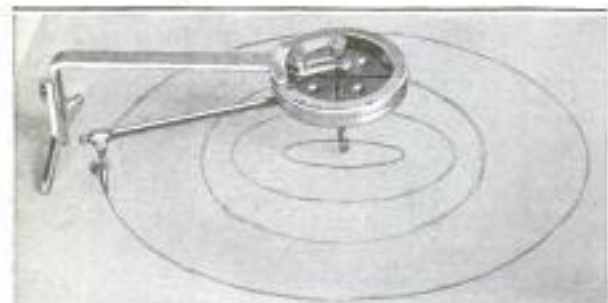
Send to Naval Ordnance
plant, Sand Charleston.

Wheeling Ingot & Foundry Co
Wheeling, W. Va. Copyrighted material

Draw. David Lorieve, Chicago Tribune
 2696 Ferry Park Ave. 6/26/22
 410 POPULAR MECHANICS

9626 **INSTRUMENT FOR DESCRIBING ANY KIND OF AN ELLIPSE**

For describing an ellipse of any shape within its scope, an instrument for the use of draftsmen or machinists has been



Instrument for Describing an Ellipse of Any Shape and at Any Desired Point: In Place of the Pen, a Pencil or Scriber may be Used

recently patented. By placing the center point of the instrument at the desired center of the ellipse and alining its supporting bracket parallel with the major axis, the scribing point may be adjusted to the required distance from the center, and will then draw an accurate ellipse. An ordinary drafting pen, a pencil, or a scriber may be used with the instrument.

9600 **ARMY'S AERIAL "BUS" BUILT LIKE FOREIGN PLANES**

The Army Air Service at McCook Field, Ohio, recently added to its equipment a passenger-carrying monoplane designed and built by Fokker of the Netherlands Airplane Company. The plane has a cabin with a seating capacity for 10 persons, and is fashioned along the lines of the planes used in Europe on the air route from Berlin to Moscow. The wing spread is 78 feet, and the flying speed ranges from 41 to 95 miles per hour. The plane is powered by one standard Liberty engine, located in the very front of the fuselage. The pilot's cockpit is above and just behind the engine.



This Fokker Monoplane, Recently Delivered to the Army Air Service at McCook Field, Ohio, Seats 10 Passengers Comfortably and Has a Flying Speed of 41 to 95 Miles an Hour

Netherlands Airplane Co

9661 **AUTO-LOCKING DEVICE CAUSE OF FATAL ACCIDENT**

A recent fatal automobile accident in Wisconsin shows that one demand that should be made of any steering-wheel lock, is that it be inoperative except when intentionally locked. While two men were driving along a country road, a patent lock on the steering wheel became locked, making the car unmanageable. Before the brakes could be applied, the car crashed into a post and overturned, killing one of the occupants.

9602 **ATTRACTIVE NOVELTIES MADE FROM POLISHED COAL**

That coal—plain ordinary coal—can be used for making ornamental novelties has been shown by an eastern manufacturer. Match holders and ash trays have been machined from lumps of coal, and after having been polished and buffed, have the appearance of black glass. Two surpris-



This Ornamental Match Holder was Machined from a Solid Lump of Coal and Buffed to a High Polish

ing features of the articles are, that they may be handled freely without soiling the hands, and that they will stand nearly as much rough handling as though made of solid glass.

Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics, Chicago.

Mr. S. Longwood Fifth Ave. Arcaded Bldg. Pittsburgh, Pa.



Scene in a Rock-Salt Mine, Showing One of the Electric Drilling Machines Boring a Hole in the Salt: The Machine is Clamped to the Vertical Bar, and the Augerlike Steel is Fed Forward through the Center of the Electric Motor That Drives It

A VISIT TO A ROCK-SALT MINE

BY DAVID H. LEVINGSTON

Lake Charles La.

THERE'S a thrill in being lowered down through a black hole into the earth 600 feet. One becomes used to it, they say, but, believe me, not at once.

One morning recently, the big elevator lowered in the shaft at the salt mines on Avery Island, nine miles southeast of New Iberia, La., having on board a camera man, who was going down on a special assignment to try out a new light. With him were the superintendent of the salt mines, some of his office force, and the writer.

There are no preliminaries nor ceremony about the descent. The shaft is a very uninviting affair, and has an appearance of "come down if you wish; I'm not promising you anything." The elevator is not a handsome brass or steel-netted cage nor is there a boy in attendance. After all got on, it just went down.

The elevator consists of a suspended plat-

form, large and commodious. On that downward trip the trick is to stand as near the center as possible and remain still while the bottom gradually sinks from your feet. There's no handhold for the nervous, nor any place to lean against for those whose knees wilt.

When the elevator starts below there's no noise nor purring of a motor. A faint sound of dripping water reaches the ear occasionally, but it's imagination; there's no water. You suddenly feel yourself leaving, and instantly realize that you are going down a hole, made like a large, square, concrete smokestack, and then blackness comes—not mere darkness. You get a splendid definition of the word dark. Not a thing can be seen that even suggests light, and a strange feeling of absolute loneliness comes over you. You can't feel the presence of any but yourself and you wonder if all the origi-



The Rock Salt as It Appears after having been Broken Down by the Charges of Dynamite

nal party are still aboard. It's very quiet. There isn't much laughter nor talk; the others feel about the same way you do. All the jokes have been left up on the surface of the earth. Then in that black, downward drop there comes a rush of cool, salt air. One member aboard exclaimed, when he felt the weird change of temperature come up his legs, "My goodness! I believe my pants came off!" He had the correct sensation, all right.

But, when the bottom is reached, what a change! And what a surprise to find down there that the temperature is pleasant, standing around 72°. The atmosphere is as balmy as early summer. A cleaner spot could hardly be imagined. The long avenues, as I would call them, with their strings of electric lights hung on the walls, the arches spanning 60 feet overhead, form an inspiring and beautiful sight. On every hand there's salt and nothing but salt, rock salt, hard as flint, dry and warm. There is not the slightest suggestion of damp or chill.

Accustomed to the behavior of salt as we are in this southern climate, expecting it to drip and cause everything around it to be messy, one has constantly to remind himself that he is down in a solid rock of salt, with nearly 500 feet of the mineral above and 1,000 feet of it below. Tests have proved this bed of salt to have a depth of exactly 2,999 feet in places.

A minute or so after we landed at the foot of the shaft, there came a rumbling noise as of distant thunder. It seemed

to roll on and on, reverberating down the long corridors, in and out of those tall arches, sometimes increasing in its growl, then diminishing as it entered one of the lower-roofed cavities. It was not a noise that would fill anyone with dismay, fear, or anxiety, but something that seemed, in a way, to be expected in this strange underground cavern. It was all so new and different that it thrilled one with a pleasing satisfaction of having entered upon an adventure worth while. No questions were asked. The natural supposition was that the summerlike thunderstorm had been caused by a blast away back in one of those dark channels.

The camera man wanted to "shoot" a scene showing how the salt was torn from its bed. This led the party down one of those long avenues, with the small lights strung alongside, just as though they were so many tiny street lamps, and the tall arch glittering overhead. A narrow-gauge railroad ran down the center, reminding one of a miniature street-car line, laid flat in the hard, dry salt that crushed under the foot.

About halfway down this aisle, one of the party remarked, "Gee whiz! Let's go back; I can't breathe."

"That's just imagination," the superintendent said, laughing.

The party marched on toward a strong light in the distance which foretold of some operation going on. At the spot, there was a crew of men drilling, with



The Broken Salt is Loaded into Small Cars Which are Drawn to the Bottom of the Shaft and are Then Raised in the Cage to the Surface of the Ground



Where the Salt has been Recently Blasted, the Surface Is a Glittering, Silver-White Mass. At This Point, a Drill Operated by Compressed Air is being Used to Make the Holes That will Receive the Charges of Dynamite for Breaking Down the Salt

long steel drills driven by electricity, into the solid rock. They bored deep holes into the sides for the charges of dynamite, and overhead to test if any loose salt from the last blast remained. Every measure for safety is observed before another blast is set off. A million and a half tons of salt have been mined to date, and no accidents, caused by lack of precaution, have happened.

Then they guided us to another of those long lanes, perhaps 50 feet across and 50 to 60 high. We were taken to a spot that showed the loading of the shattered salt after the dynamite had done its work. They load the small cars with a shovel that is driven by electricity instead of steam. That's one wonderful thing about the operation of these salt mines. Everything below is controlled by electricity; the large wires lie harmlessly at your feet everywhere, running over the dry pebbles and chips of bonedry salt. The shovel operates on a continuous-tread base and walks around the mines at the will of its driver, swinging easily from side to side, noiseless—no smoke, no ashes, no dirt.

Where the salt is blasted away, the walls are silver-white and glitter like millions of diamonds. The beauty is amaz-

ing. The salt falls off sometimes in perfectly square layers, measuring from one to three or four inches thick, and is transparent. One cake, measuring just about an inch thick, was so clear one could read through it. The old walls become a little discolored in time, because there is some trifling condensation during the summer months, but they are not black and there's no dirt nor dust down there—and no mosquitoes!

Mules are used to haul the cars to a central point where they are picked up by electric cars. The crew worked hard and fast to load their cars, and then a small, fat mule was brought forward, attached to the front car, and told to pull away. Just as the nervous animal started off, the camera man signaled for the touching off of the light.

It came on ablaze!
The mule, having been down in those mines longer than we, knew that no sudden light could be natural, and when the flash came, he made a noise that sounded much like stepping on a ripe tomato. He turned right around and started for the rear to hide behind the train, and we caught a view of his retreat.

The men arranged the loading of three cars on the elevator. From away off,

some place in those dark lanes, the small train could be heard approaching over its steel rails. Echoes came from everywhere of the rumbling and bumping cars. Soon, from around the corner of one of the large columns of the immense lobby, a trolley pole was seen flashing sparks from the wire, pushing its loaded train. The cars went up, and, as they left, the camera man cranked his machine. A moment later the rattling noise of the auto-

matic machinery, in the rear of the shaft, that takes care of the "empties," could be heard, and, by the way, this is the only noise-making machinery in the mines.

A few minutes later we were again on the surface and in the midst of a cold drizzle that had been coming down in New Iberia and the island for a solid week. It was quite a change and rather disagreeable compared with the snug, warm atmosphere 600 feet below.

FEAST OF THE FLYING FISH JAPANESE BOY DAY

BY A. G. CLUTTERBUCK

ON the fifth day of the fifth month of each year, in Japan and among the Japanese in foreign countries is celebrated the Tango-No-Sekku, or the Feast of the Flying Fish, known to the white people as Japanese Boy Day. Swaying in the wind and flirting their tails gaily, thousands upon thousands of paper and cotton fish, resplendent in flesh pink and vermilion, fly from myriads of poles, from clotheslines, and from roof tops. They are of all sizes from 2 to about 5 or 6 feet long.

Tango-No-Sekku is a big feast with the Japanese—especially the Japanese



These Gaudy Paper Fish Are Only Some of Thousands That are Flown in Japan on May 5 Each Year, to Celebrate Tango-No-Sekku, or Japanese Boy Day

boys. To them May 5 is set aside as an occasion of honor to the first-born of every family, and to Japanese boys in general. The flying fish are but a small part of the feast, for besides that, there are presents and gifts of images, toys, statuettes, and manikins of Japanese legendary heroes, all given with the idea of teaching the youngsters lessons of courage and manliness. It is a kind of Christmas season for the Japanese youth.

Sometimes the number of fish on the pole indicates the number of males born in the house, and sometimes it indicates the number of friends the family has. It

is customary to present a paper fish to the Japanese family to which a boy has been born since the previous festival.

The living rooms of all homes having male heirs are specially decorated for the occasion. Out from heavy wooden chests, where they have been hidden until that day, come the toys and gifts. Flowers are used in profusion.

There is nothing of a formal nature in the festival. The boys spend the afternoon visiting one another and comparing their gifts, and many picnics are held. Special foods are served at the Feast of the Flying Fish. One is the chimaki, which is composed of beans and red rice wrapped in lily leaves. Another is the kashiwa mochi, a rice cake wrapped in oak leaves—the oak leaves being a symbol of strength and endurance.

Games played by the boys on that day differ from those of other days. The lads arm themselves with shobu leaves, and with these long swordlike blades they have exciting battles.

The principal toys given usually take the form of images or manikins which represent famous characters of Japanese history. The chief of these is Jimmu Tenno, the first mortal emperor of Japan, and direct descendant of the sun goddess. Benkei, a sacred bull, is the second favorite. The third favorite is Kato Kiyomasa, the son of a blacksmith, who commanded an army sent to invade Korea in 1592. He is celebrated because of his feats of strength and daring. Another hero, also a favorite with the boys, is Kintaro. In appearance he is a nude little fellow, not unlike Cupid. He is a fabled strong boy who lived in a mountain cave years ago.

The carp is the patron fish of the Japanese boy, and is a symbol of strength, being the only fish that can swim against the swift currents of the mountain streams of the island empire.

Emt. A. G. Clutterbuck U. S. A.
Kawai, S. H.

9474



This Power-Driven Scraper Scoops the Gravel from the Bank and Delivers It to the Elevator Which Carries It to the Storage Bin, and from There It Goes to the Waiting Railroad Cars

9474

DEMAND FOR GRAVEL MAKES WASTE LAND VALUABLE

The road-building era is responsible for many new developments, and among other things, it is turning a lot of the nation's waste places into wealth. Rock bluffs have become quarries to supply the crushed stone for concrete paving. Gravel banks that have been considered of practically no value now suddenly have become little gold mines for their owners. An example is the big gravel bed at Prairie du Chien, which Wisconsin road builders are now utilizing. A big stretch of high bank along the Mississippi, so gravelly that it has not even been good for pasture land, let alone for farming, has become of high value, because the gravel there is classed one of the finest in the country. Big power-driven scrapers are scooping out the gravel and delivering it to elevators that drop it into railway cars ready to be shipped to places where road building is in operation. The "poor land" of so many years has become "rich land."

For the use of the city-planning committee of New Orleans, La., an aerial map of the city is to be made. The photographs will be taken from an elevation of 8,000 feet, a special camera being used. Two previous attempts to make such a map have failed due to adverse weather.

COMBINED AUTO STEP PLATE AND SUITCASE CARRIER

9575 A combined aluminum step plate and suitcase carrier, which is attached to the running board of a car by four screws, has just been placed on the market. The tread of the step is hinged, so that part of it can be raised, a strap passed through



Combined Auto Step and Carrier as It Appears When Mounted on the Running Board of a Machine and Holding a Suitcase

a special opening, and the suitcase or traveling bag held securely on the running board, while the machine is traveling at high speed or over rough roads.

McGregor, Iowa
Brinch Mfg. Co.

Chas. E. Es. Kingon,

416 *eras* POPULAR MECHANICS

Valley Calif
TREATMENT FOR ROOT FUNGUS
TO SAVE CITRUS TREES

963

Heroic treatment is sometimes necessary to save orange and lemon trees that have been attacked by root-fungus dis-



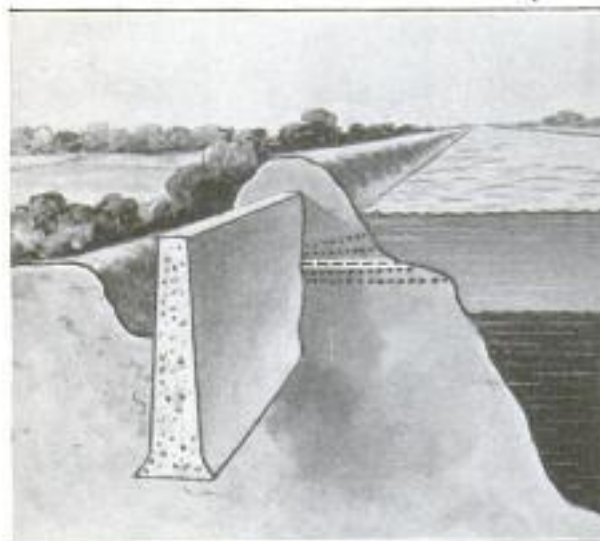
This Lemon Tree is Supported with Braces, and has Had Its Trunk and Remaining Roots Treated to Kill the Root-Fungus Germs

cases. In some cases, the taproot and lateral roots must be cut away to such an extent that the tree must be supported by staging and braces. The affected portions of the remaining trunk and roots are then thoroughly scraped and treated with powerful solutions to kill the fungus germs.

SOLID CORE WALL PREVENTS UNDERMINING OF LEVEE

969

The failure of protecting levees along rivers subject to excessive high water, has been traced, in some cases, to the activity of crayfish and other borers that burrow into the embankment and open



The Concrete Core Wall in This Levee Prevents the Borers from Opening Channels through Which the Water might Pass

Capt. Hugh Watson,
New Orleans, La.

channels through which the water may pass. To guard against this difficulty, a levee has been designed with a concrete core wall extending well below the bed of the river and reaching almost to the top of the levee. This wall stops the progress of the borers and prevents the undermining of the levee by water passing along porous strata of ground.

"ROMAN CHARIOTS" ARE MADE FROM WINE BARRELS

9542

Burlesquing the ancient Roman chariot races, members of a western motorcycle club entertained the spectators at one of their recent gatherings with an exhibition of extraordinary riding. The "chariots" were constructed of wine barrels which were cut obliquely in two, each half providing the body for one equipage. Automobile wheels were then mounted on the strange bodies, and to heighten the ef-



One of the Outfits Which Furnished Entertainment in the Burlesque Roman-Chariot Races Conducted by a Motorcycle Club

fect, the "charioteers" donned costumes reminiscent of the old Roman days. Hitched behind motorcycles, the chariots were towed at high speed around the arena, affording genuine excitement.

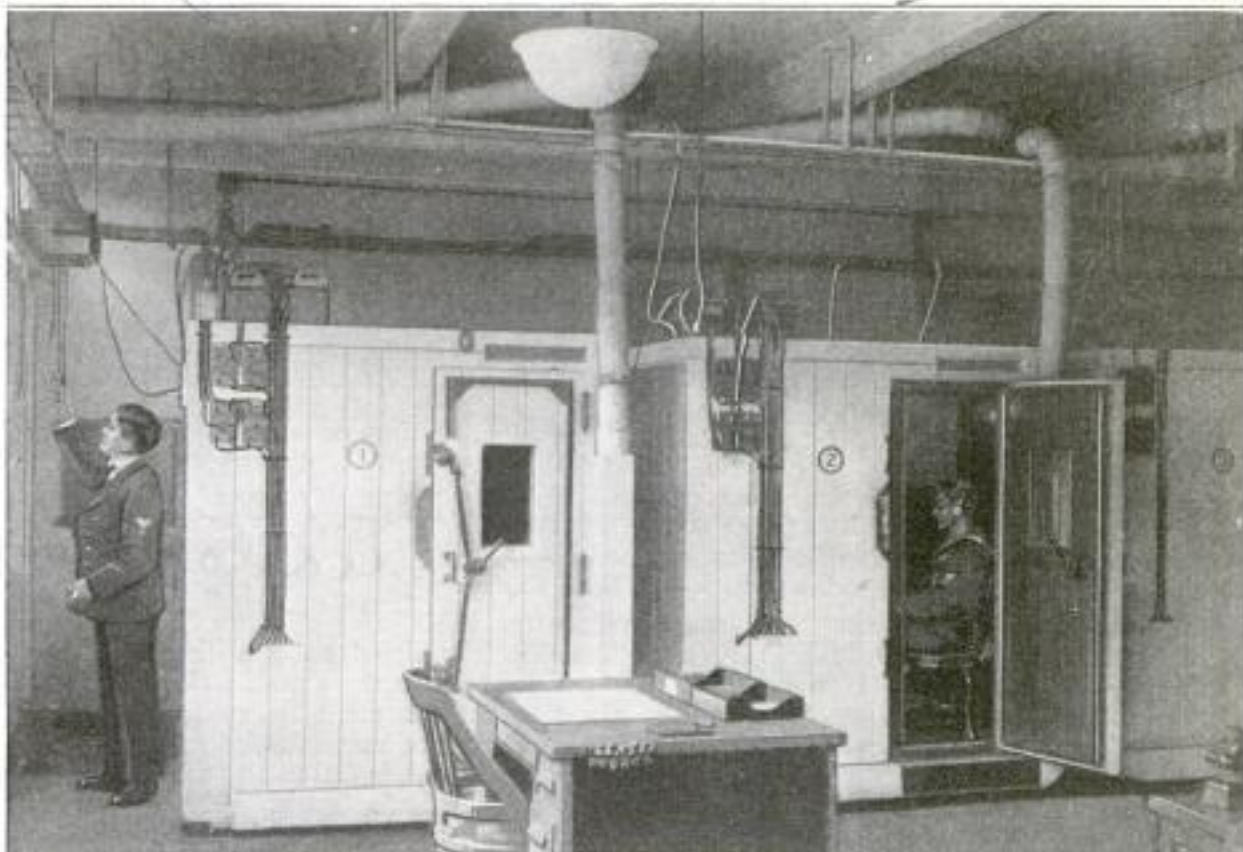
9729
WOOLENS MADE MOTH-PROOF BY NEW GERMAN PRODUCT

Of special interest to manufacturers of woolen goods is an announcement that a concern in Germany has placed on the market a product that makes wool immune to the attacks of moths. By its use, cleaners and dyers can give their goods, at a small additional cost, a moth-proof finish, and all woolen fabrics can be successfully treated. The goods are immersed in a cold solution of the product, and afterward rinsed,

Indian *cont.* Journal
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REMOTE-CONTROL BOOTHS FOR ARLINGTON STATION



These Are the Remote-Control Booths for the Arlington Radio Station: They Have Double Walls to Make Them Soundproof, with a Grounded Copper Screen between the Walls to Absorb Stray Induction from Outside Electric Circuits. At the Extreme Left Are the Antenna Switches

Situated in the coastal radio room of the Navy Department Building, at Washington, are two small booths from which the transmitting apparatus of the famous Arlington radio plant, four miles away, is manipulated by remote control. An ordinary telegraph circuit is used between the control station and the sending station, and pressing a key in one of the control booths automatically sends the dots and dashes from the Arlington antenna.

Each of the control booths resembles, in general appearance, a refrigerator, and the construction is, in many respects, quite similar. The booth has double walls, with a copper screen between them, and completely surrounding the booth. The screening is grounded and serves to absorb any stray induction from outside electric wires and motors. The booths are of soundproof construction and are ventilated by fresh air drawn through large pipes from outside the building.

The batteries for the receiving apparatus are placed above the booths. There are two sets of batteries for each, and they are so connected that, while one set is in use, the other is being recharged.

Above the transmitting station at Arlington there are several antennae that radiate from a central tower, like the spokes of a wheel. The switches that make the connection with these antennae are located in the remote-control office. They are so arranged that when an operator wishes to tune in for any distant station, he selects the antenna that most nearly points toward that station, and throws in the proper switch. It is possible to work with any one of the antennae in either booth.

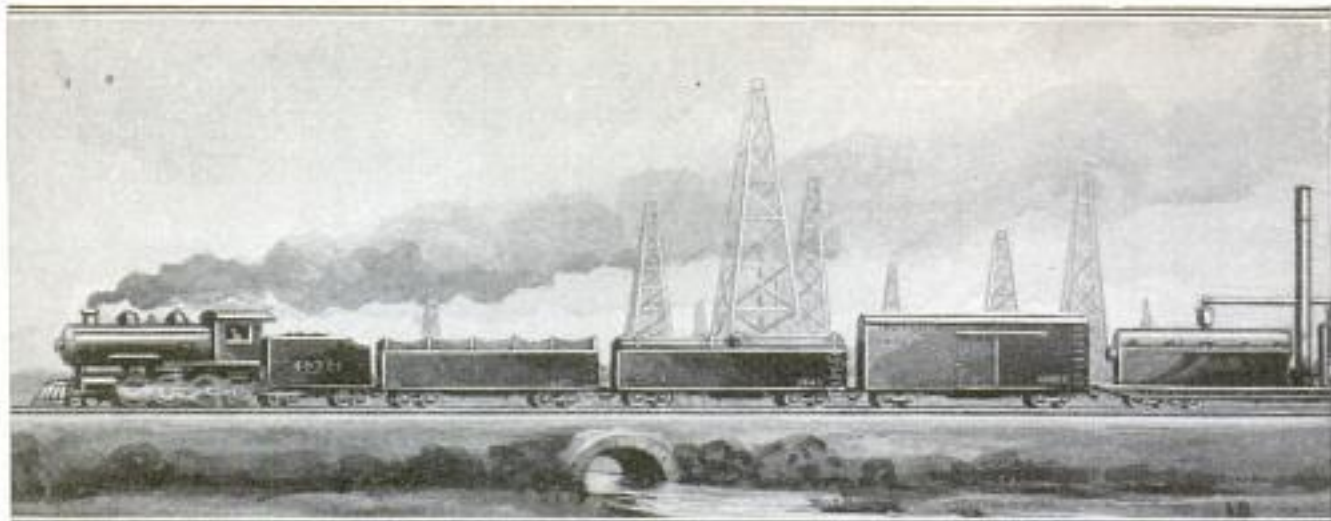
9746
EXPECT TO BUILD HUGE STEEL-MAKING PLANT IN INDIA

Plans are already well under way for the erection of a large-capacity iron and steel works and rolling mill in India. The plans call for the use of the most modern improvements and labor-saving devices. Iron ore of high quality, suitable fluxes, and excellent coking coal occur close together, and in large quantities. This condition, in connection with the low-priced labor available in India, should contribute to the production of steel at a remarkably low figure.

Indian For-life
 Journal 1/1922

England
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 Laird & Co,
 17% Cannon, India
 Calcutta.
 United Steel Corporation of India Ltd
 % Bird & Co,

9612 d.w. J. W. Dowell, Dallas, Texas



The Portable Oil Refinery as It will Appear When Moving to a New Oil Field: The Different Units are Built on Special Cars for the Operators. The Capacity of the

PORTABLE REFINERY FOR USE IN NEW OIL FIELDS

BY CURTIS VINSON,

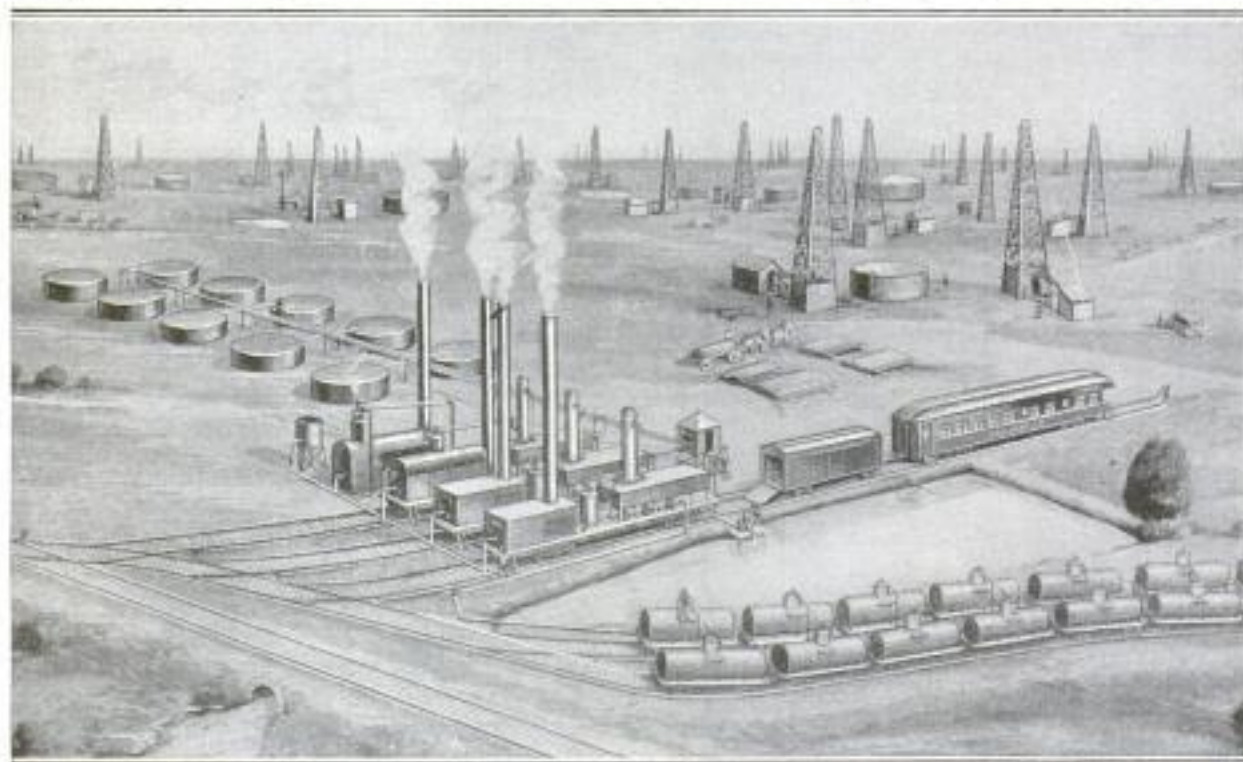
*Dallas News
Texas*

A CRUDE-OIL refinery that moves on wheels from one field to another is the recent invention of an oil man of Dallas, Tex. The inventor has been in the business for years, being associated in the industry with his three brothers. Application for patent rights on the new invention has been made jointly by the four brothers.

The portable refinery is designed to meet the needs of new oil fields where pipe-line facilities are lacking. It will supply the pioneer producers with a mar-

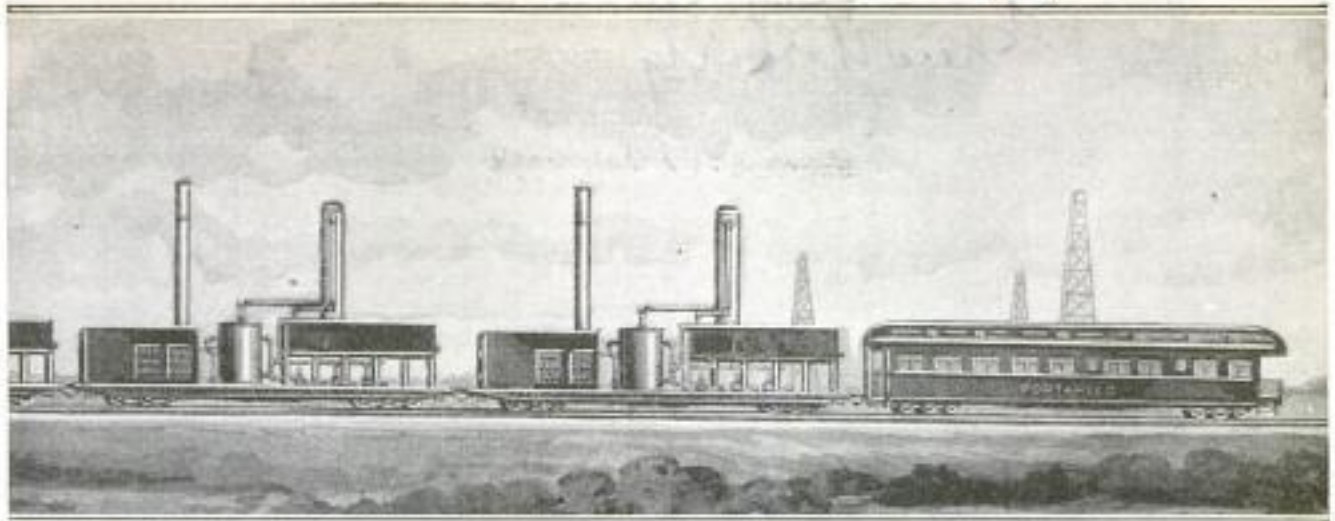
ket for their oil while the big companies are laying lines to the field and independent refiners are building plants. Units of the portable refinery are built on specially constructed steel flat cars, 65 feet long and built to carry loads of 110,000 pounds each. These cars are mounted on six-wheel trucks and are specially constructed and insulated.

The first refinery of this type is now being built at East Chicago, Ind. This particular plant has three stills, with an estimated daily capacity of 4,000 barrels.



After Arriving at the New Oil Field, the Cars Carrying the Stills are Run on Parallel Switch Tracks and Connected Up, and the Refinery Is Ready for Business

9612



cial Flat Cars, and There Are Also Tool and Equipment Cars in Addition to an Office Car Arranged to Provide Living Refinery may be Easily Increased by Adding More Units

Each car is a separate unit, and plants of this type can be built to any required capacity by adding more units. In addition to the cars carrying the stills, the plant includes a tool car, and an office car, which latter is equipped with sleeping and dining quarters for the men who will operate the plant. A standard 60-horsepower boiler is used for supplying power to the plant when it is in operation. When set up in the oil fields, the stills are run on parallel switch tracks

and are then connected, and the work of extracting gasoline, kerosene, and other petroleum products begins. It is estimated that such a plant can begin operations in a new field within 10 or 15 days after oil is first found. When its activity in one field is finished, it can be readily moved to another field, thus eliminating the loss sustained by stationary refineries when they are forced to close down because of the exhaustion of the oil supply.

9644
PRIVATE WIRELESS STATION OWNED BY EIGHT FIRMS

Eight business firms of Minneapolis have decided to cooperate in the erection of one of the largest privately owned radio stations in the world, according to recently announced plans from that city. The broadcasting station will have a 500-watt transmitter and the biggest antenna to be found in the northwestern part of this country. An elaborate studio for the entertainers, connected to the broadcasting station by means of the usual microphone and cables, will also be included in the project.

9550
HEEL-PEDAL CONTROL PLACED ON ELECTRIC AUTOS

Heel pedals placed close to the front of the driver's seat are the latest addition to up-to-date electrical coupés, and were demonstrated at the recent auto show in New York City. By simply shifting the foot, which is usually kept on the forward control, to the heel pedal, the car is thrown in reverse without any danger of stripping the gears, thus making it a comparatively easy matter for an inexperienced driver to handle a car correctly.



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Electric Coupé with Door Open Showing, Close to the Seat, the Heel Pedal Which Reverses the Car without Shifting Any Gears, Thus Eliminating the Possibility of Stripping Them

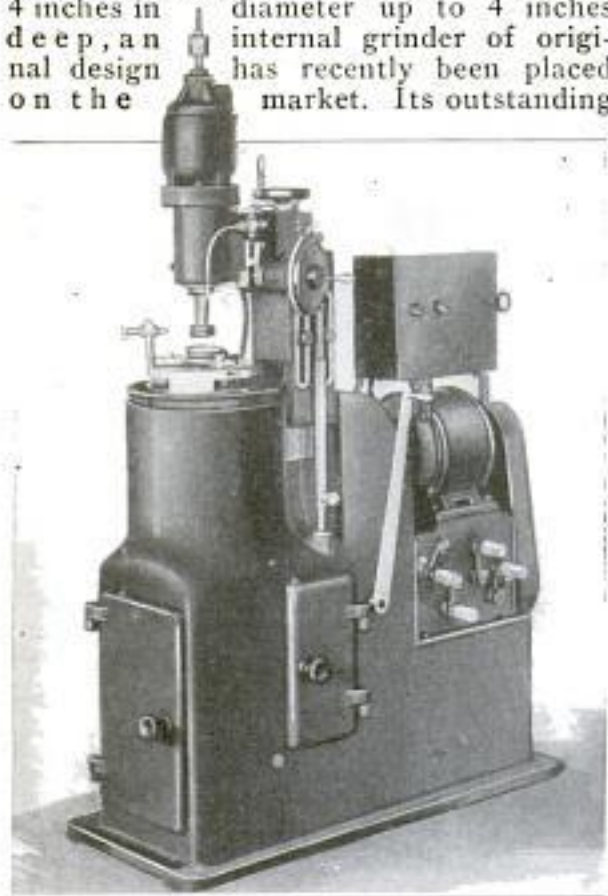
Encl. George Smedal
360 6 Bearfield Ave
Minneapolis, Minn.

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The Harwin Machine Co.
Spring + Vanck St.
New York City
 420 POPULAR MECHANICS

9630
**INTERNAL-GRINDING MACHINE
 FOR QUANTITY PRODUCTION**

For the rapid and accurate grinding of straight, round holes of from 1 inch to 4 inches in diameter up to 4 inches deep, an internal grinder of original design has recently been placed on the market. Its outstanding



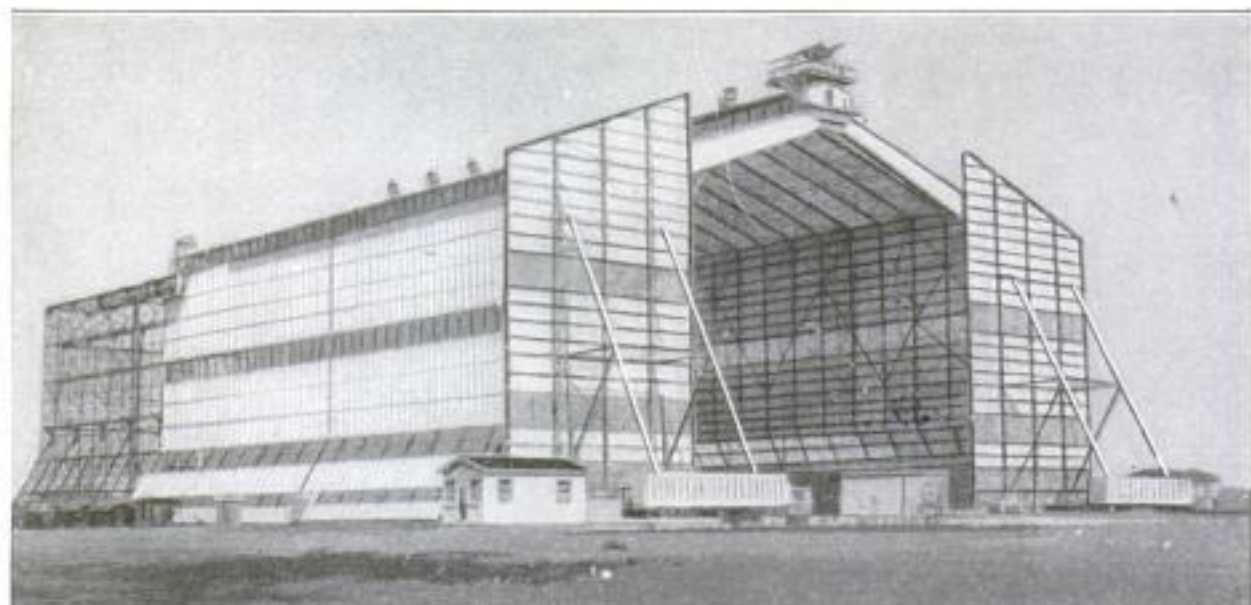
Internal Grinder for the Accurate Grinding of Straight, Round Holes on a Production Basis

feature is the revolving and reciprocating of the work-carrying spindle in one

bearing, thus eliminating the necessity of its exact alinement with other essential parts of the machine. The work spindle as well as the grinding-wheel spindle are vertical, and the latter, which is uppermost, is directly driven by a motor having variable speeds of from 7,500 to 12,000 revolutions per minute. A separate motor at the rear of the machine drives the work and the feed mechanism, which are under control of speed and stroke-change handles. The operating control of the machine by a hand lever is very simple, a single movement forward or backward throwing the machine into its work position or out of it. The machine occupies a floor space of 20 by 45 inches, and weighs 1,250 pounds.

9593 — *Germanis*
**GIANT HANGAR FOR AIRSHIP
 COMPLETED IN TEXAS**

The huge airship hangar at Brooks Field, Tex., has just been completed, but is without a tenant. The structure was intended for the ill-fated "Roma" that was destroyed in February of this year. The building has a clear height of 125 feet, and is 450 feet long by 125 feet wide at the base. Each of the sliding doors weighs 360 tons, and is supported on two six-wheeled trucks. A five-horsepower motor is used for opening and closing each door. The sides of the building are of corrugated asbestos with three rows of wire-ribbed glass panes for lighting. The roof is of gypsum base, covered with felt laid in asphalt. A solid concrete floor extends under the entire building.



This Great Airship Hangar at Brooks Field, Texas, was Intended to House the Ill-Fated "Roma." The Building Is of the Most Approved Construction, and Has a Clear Height of 125 Feet

Emb. Miss. Hanora Vought, 528 E.
Essex St.
San Antonio, Texas
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9476



One of the Fireproof Dormitory Buildings of New York State's Great New Hospital: The Building Is of Brick, Steel, and Concrete Construction. Even the Floors Being of Concrete Covered with Linoleum. Large Airy Rooms, Wards, and Broad Screened Porches are Provided for the Patients

BUILDING A \$10,000,000 HOSPITAL

BY CHARLES MARTEL NILES, *Oriskany, N.Y.*

ONE of the largest and best equipped hospitals in the world is now under construction at Marcy, N. Y. The institution stands on a plateau overlooking the beautiful Mohawk Valley. It will be a city in itself, with its own water-supply system, power plant, streets, and sewers. This great hospital, which the state of New York is building at a cost of \$10,000,000, will accommodate from 3,000 to 5,000 patients, in addition to physicians, nurses, and other employes. Free treatment will be given to men and women who suffer from mental and nervous troubles.

Everything has been planned to promote the health, safety, and comfort of the patients in the most efficient and economical manner. The institution will comprise 48 different buildings, some of which will be connected by inclosed passageways. The three principal hospital units are of imposing size and massive construction. The main building, where the most severe cases will be treated, stands in the center of the group, flanked on the east by an immense dormitory for chronic male patients, and on the west by a similar building for chronic female patients. Behind each of the "chronic" buildings will stand a semicircular group of six "cottages," each of which will house 100 patients. There will be a separate dining hall for every three cottages. Food will be prepared in a large central kitchen.

In the rear of the main building will stand a large assembly hall for lectures and entertainments. The institution will

have a fully equipped laundry. There will be a nurses' home, and a home for the other employes. Two large shops will furnish occupation for the hands and minds of patients who are well enough to work. Separate dwellings will be erected for the superintendent, chief engineer, and steward. The mammoth power plant will be located in the rear of the other buildings, near a convenient railroad siding.

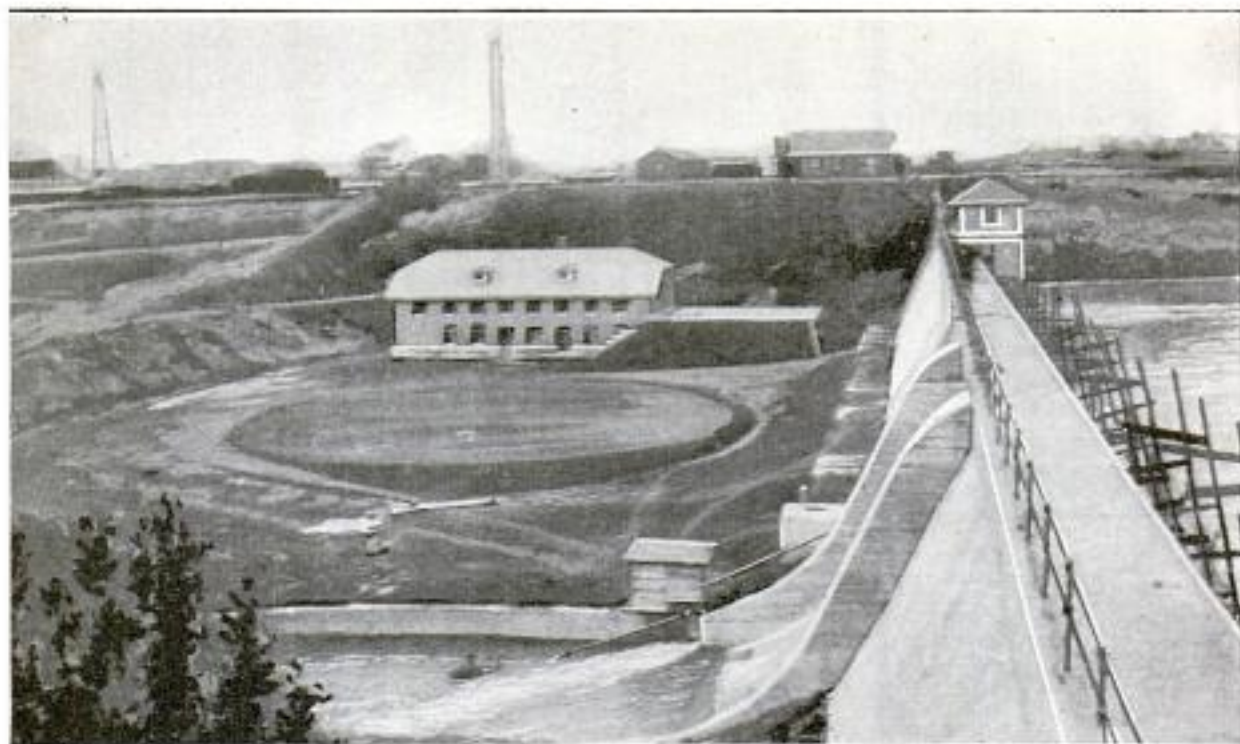
The hospital grounds cover more than a square mile and include a fine farm, which will supply fruits, vegetables, eggs, poultry, pork, and dairy products. Macadam roads and concrete walks will traverse the grounds.

All buildings will be constructed of brick, steel, and concrete, absolutely fireproof. Roofs will be of slate or tin. The main and chronic buildings will be three stories in height and measure 100 by 300 feet on the ground. They will contain large, airy, well-lighted wards, as well as cheery and comfortable private rooms. Each building will be provided with living quarters for the attendants, and an apartment for the resident physician. The floors will be of concrete, covered with linoleum. All heating and plumbing fixtures will be hung from the walls, leaving the floors unobstructed. Broad screened porches will adorn the front of the principal buildings, making a safe place for the patients to enjoy fresh air and sunshine.

An abundance of water will be procured close at hand. A massive concrete dam, 500 feet long and 40 feet high, has

marcy division, Utica State Hospital

9476



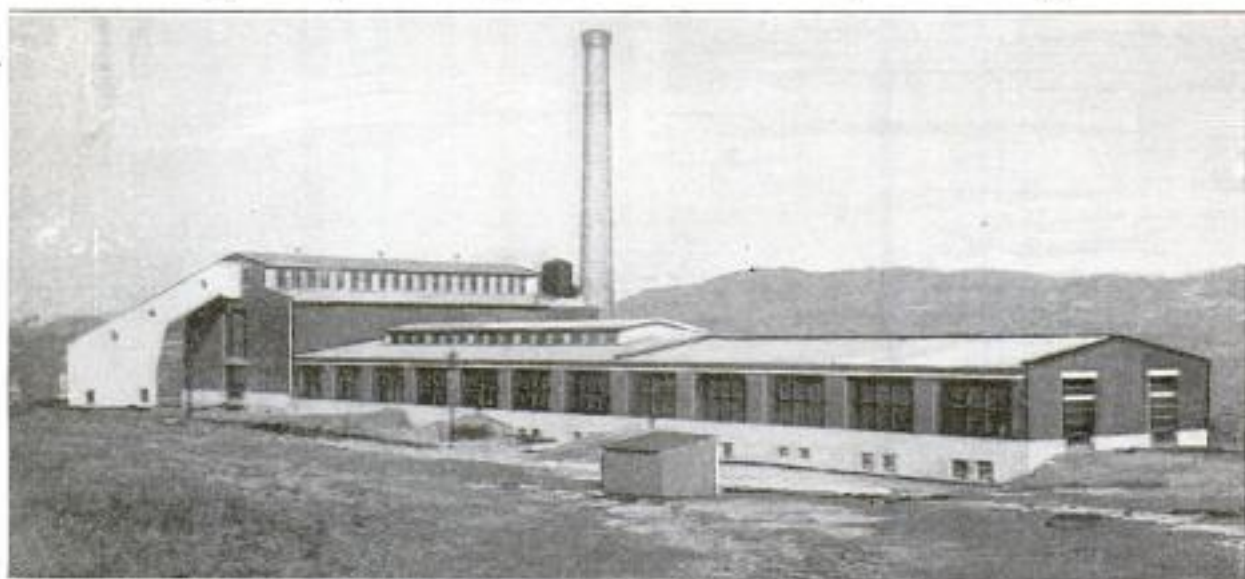
This Gives a Good Idea of the General Arrangement of the Institution's Water-Supply System; the Storage Reservoir Is at the Right with the Filter Beds and Pumping Plant in the Center. Powerful Pumps will Raise the Water to an Elevated Service Tank

been built across Crane Creek, which flows through the hospital grounds. The reservoir thus formed will impound about 45,000,000 gallons of water—three months' supply for the hospital. Before being used, all the water will pass through filter beds located in the gorge below the dam. Powerful pumps will lift the water to a tower tank, 160 feet above the highest point on the grounds. The tank has a capacity of 150,000 gallons.

The power plant will be a marvel of mechanical engineering. The big steel-

frame building will provide space for the installation of eight 500-horsepower watertube boilers. Coal will be dumped from railroad cars into a receiving hopper, from which a belt conveyor will carry it to the crusher. A bucket conveyor will elevate the coal from the crusher house to the top of the boiler room.

All the buildings of the institution will be heated from the power plant by means of a forced hot-water system. In addition, the power plant will be equipped with three dynamos having a combined



This Central Power Plant will Furnish the Big Hospital with Light, Heat, and Power. The Most Modern Mechanical Appliances will be Used for Handling the Coal and Ashes

capacity of 500 kilowatts. Power will be furnished for the refrigerating plant in the storehouse. Hot water for domestic uses will be piped from the power house to all buildings where it is needed. One end of the big building will be fitted as a machine shop and garage.

There will be over four miles of separate storm and sanitary sewers on the grounds. The sewage will be conducted to a disposal plant at the foot of the hill, where it will be treated by the most modern methods and converted into fertilizer as a source of saving or revenue.

The construction of this great institution has been in progress for over three years. At times the number of men employed exceeded 800. The present construction program will provide for the care of 3,000 patients, but the hospital can be expanded to accommodate 5,000 without much additional expense, as the principal service units have been designed with that object in view. The facilities and conveniences provided for the patients are almost innumerable. The Marcy Hospital will, indeed, be a splendid example of man's humanity to man.

9730

FLYING FISH FOUND TO HAVE BEST SOARING WINGS

By studying the wing structure of flying fish, a scientist, who is an authority on the flight of birds, has found that their wings are some four or five times as efficient, for soaring flight, as the wings of birds. He attributed this to the fact that the fin rays formed projected ridges on the under surface of the wings. By experimenting with models fashioned on similar lines, he found that the fin ray caused a sheltered area to appear back of the ray when the model moved through the air. His conclusion is that this sheltered area acts as a force to drive the wing ahead when soaring. It seems that the exact shape of the rear portion of the fin ray has little effect on the soaring ability. He also believes that atmospheric conditions largely govern soaring flight.

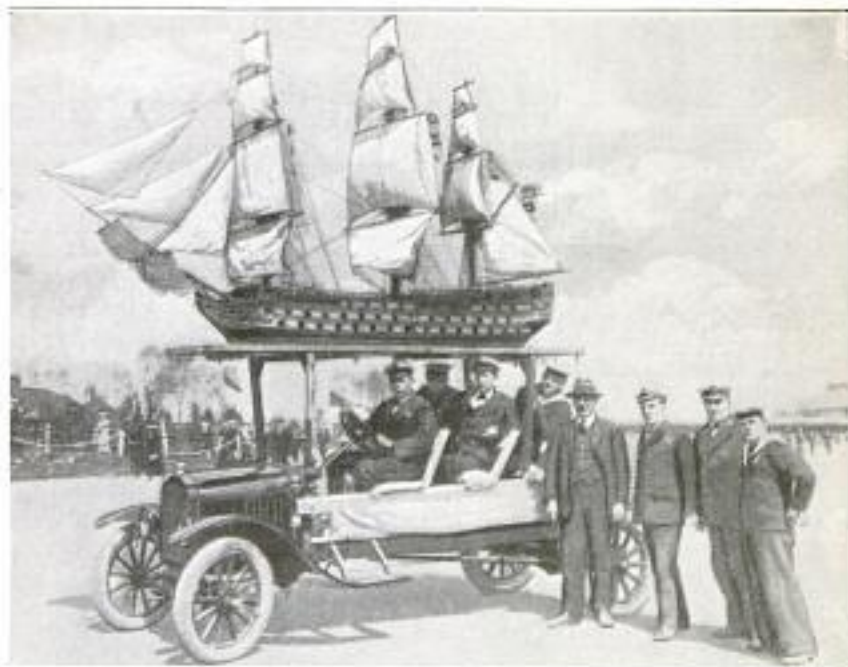
TWO METHODS TO PRESERVE DECAYING SANDSTONE

To preserve sandstone against decay, two methods have been suggested that have proved effective. If a piece of rotten sandstone is treated with certain chemical compounds of alcohol and silica and then exposed to moist air, the silica is deposited and forms a protective cement coating. Lime wash has also been found very effective for the same purpose.

9554

MODEL OF BRITISH FLAGSHIP ON AMERICAN AUTO TRUCK

In a recent naval parade in England, a well-known light American automobile, converted into a truck, was used to con-



Full-Rigged Model of Lord Nelson's Famous Flagship "Victory," Conveyed by Auto Truck in a Naval Parade Recently Held in England

vey a model of Lord Nelson's famous flagship "Victory." The model was about the same length as the truck, and was supported by a platform above the heads of the passengers. It was a very complete reproduction of the ship, full-rigged, with sails set, and the flags flying that denoted Nelson's famous signal at the battle of Trafalgar, "England Expects That Every Man will Do His Duty."

The average time required by a ship to find its position by means of the present system of wireless telegraphy, is five minutes.

Christian Science Monitor 6/23/22

9469

The Engineer 6/16/22

*Col. William M. Myers
679 Bergen Ave
Jersey City, N.J.*

**STRONG SWIMMER TOWS BOAT
WITH SEVEN PASSENGERS**

9666 An English swimmer who is planning an attempt to swim the Channel, performs an unusual stunt, to show his power in



International
This English Swimmer, Who will Attempt to Swim the Channel, is Here Seen Towing a Small Boat Containing Seven Persons

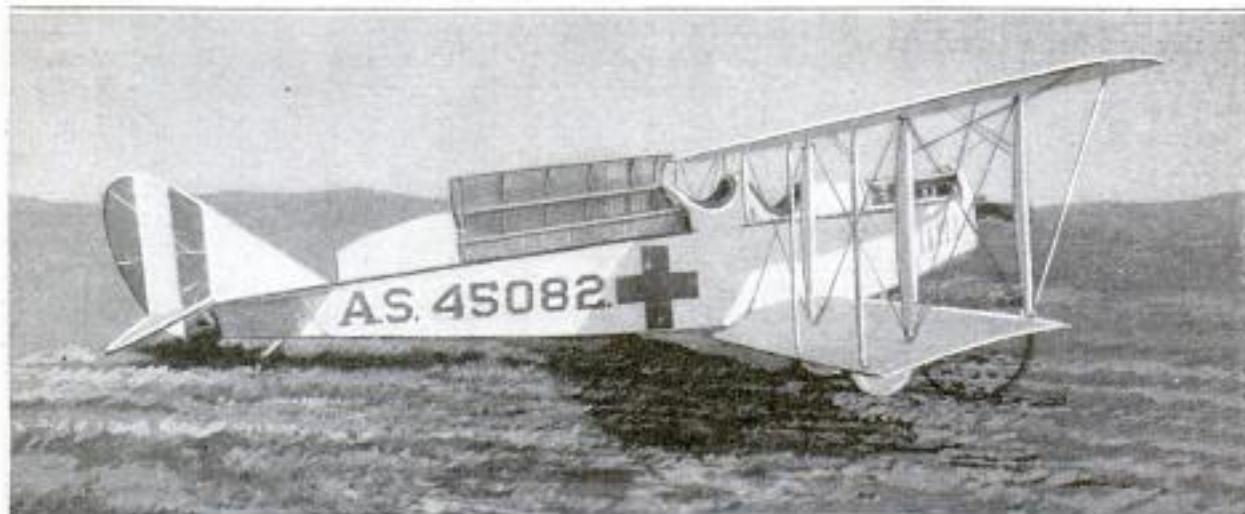
the water and as a means of developing his endurance. Using a canvas harness and a short length of rope, he tows a small boat containing seven persons a distance of a mile. As a demonstration of strength and endurance the performance ranks high.

**SOUND MADE VISIBLE BY USE
OF RADIO VACUUM TUBE**

7737 One of the most remarkable developments growing out of the widespread interest in radiotelephony, is the construction of an apparatus for making sound vibrations visible. An adaptation of the vacuum tube is the basis of the new apparatus, and one of the most striking advantages is that it overcomes the lag occasioned by the mechanical inertia of devices formerly used for this purpose. The new tube is pear-shaped, about 8 inches long by 1 inch diameter at the socket end and 4 inches at the other end. The large end of the tube is covered with a fluorescent screen. The filament is about 1/4 inch long. Four platinum plates around the filament direct a beam against the fluorescent screen. The current fluctuations caused by sound vibrations cause this beam to move up and down the screen with great rapidity, and it is then possible to record these movements in the form of a moving-picture film.

9553
**TO EQUIP ALL FLYING FIELDS
WITH AERO AMBULANCES**

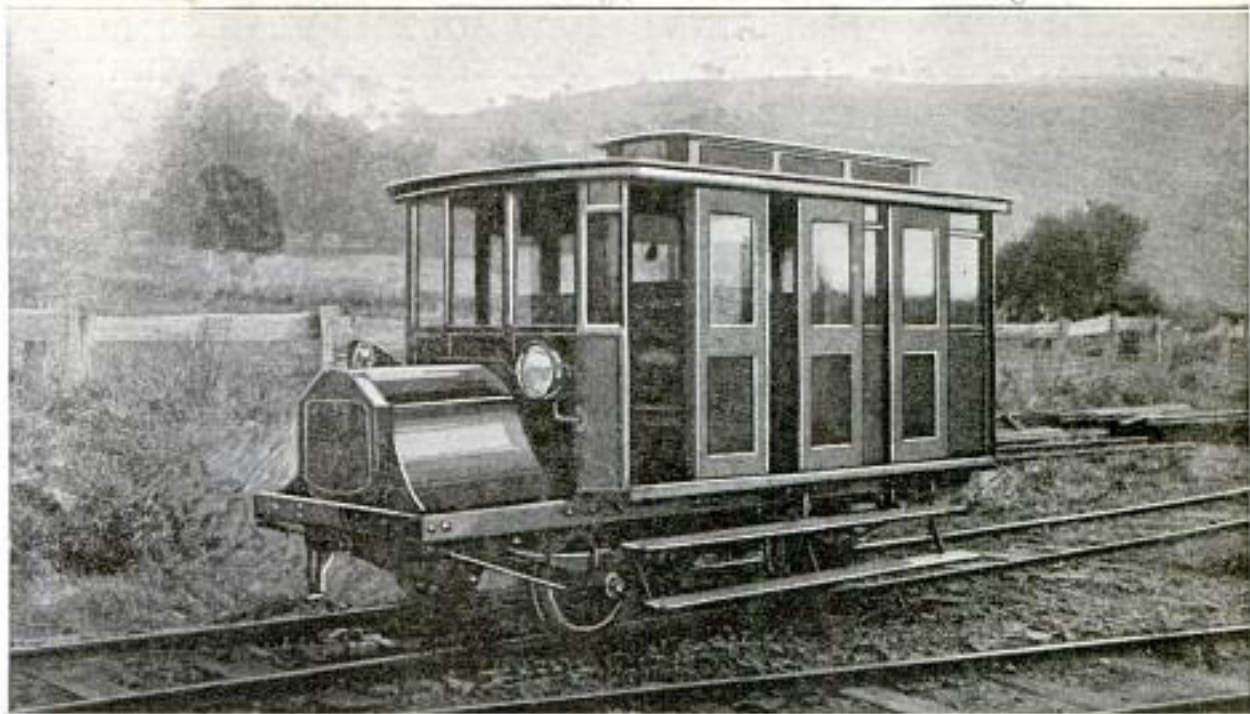
Because airplane ambulances have proved so efficient in transporting injured persons, the War Department has ordered all flying fields in the United States to be equipped with them. The type of ambulance chosen is the one that was shown and described in the November, 1920, issue of this magazine, at the time it was first tried out. There is room for two stretcher patients in the fuselage. The physician's cockpit is located just in front of this compartment, so that he can observe the patients at all times.



This Is the Type of Airplane Ambulance, with Room for Two Stretcher Patients, That has been Chosen by the War Department to be Used at All Flying Fields in the United States

*U.S. Army Air Service
Wilbur Wright Field Dayton, O.*

Copyrighted material



One of the Strange-Appearing Railway Cars That are to be Seen along the Rights of Way in Australia: These Conveyances, Which Resemble Oversize Toys, are Equipped with Special Gears to Enable Them to Climb Steep Grades with Ease

9510
**RAILWAY CARS IN AUSTRALIA
PRESENT STRANGE SIGHT**

Strange-appearing motor cars for handling passenger traffic are to be seen on some of the railways in Australia, one of these having a seating capacity of but 12 persons. Designed to negotiate steep grades, this odd conveyance, which is equipped with a 15-horsepower four-cylinder engine, chugs merrily along the right of way at the none too startling speed of 12 to 15 miles per hour.

9519
**FREE TELEPHONES INSTALLED
TO AID MOTORISTS**

No more will the distressed motorist in Pennsylvania be required to trudge wearily for miles back or ahead of his broken-down machine for the purpose of asking aid from the nearest garage. The Highway Emergency Service Company of that state has placed, at intervals of approximately one mile, telephones in special boxes which are mounted on poles at the roadside. These boxes are painted white, having in black lettering the distances in miles to the nearest towns, so that the traveler-tourist can see just where to call for help. Locks are placed on the boxes, the keys for which can be had by anyone at a small fee per year, or in the event of a stranger motoring through the state, a key can always be obtained at the house nearest to a box.

Harrisburg, Pa.

Long-distance calls can be made where the called party agrees to pay the charges, all other service being free within



Left: Close-Up of the Telephone Box, Showing the Lettering. Right: Box Shown Mounted on Pole at the Side of the Highway

the zone of the exchange making the connection.

Passengers in an automobile equipped with a concealed radio outfit, distinctly heard a musical concert and the returns of a prize fight while enjoying a ride along the boulevards of New York City recently. "Listening in" was accomplished with the usual head set and a loud-speaking horn, the absence of a visible antenna and ground being the principal features.

~~no information~~
as to maker.

Christian Science
Monitor - 6/22/22

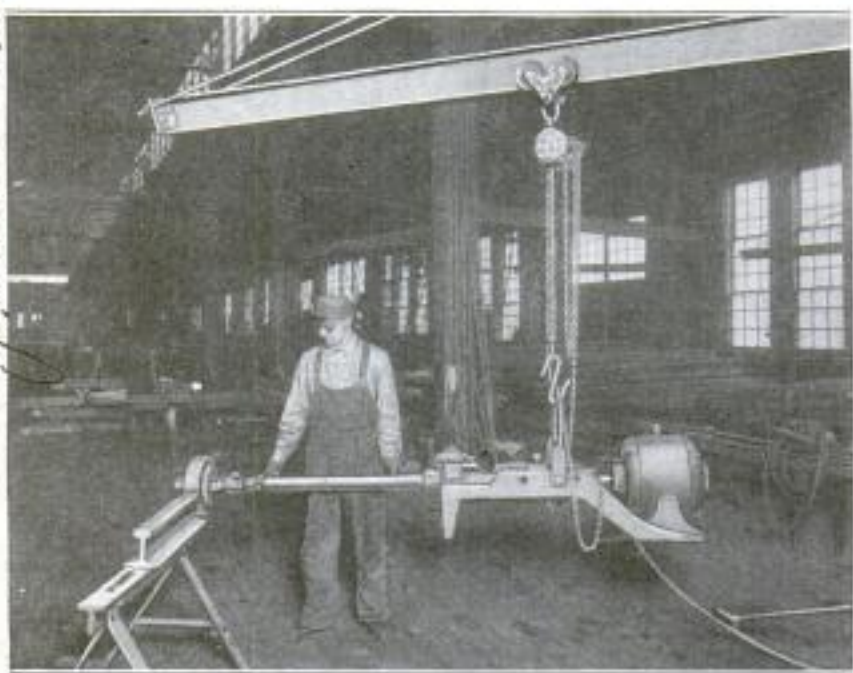
426
9223

POPULAR MECHANICS
PORTABLE GRINDING MACHINE OPERATED BY ONE MAN
NEW HOUSING PLAN COMBINES LUXURY AND LOW RENTS

Ent. Es. C. P. Alfrey St. Louis, Mo.
Inventor

A portable grinding machine that can be handled by one man has an independ-

To relieve the housing shortage, and reduce the existing high rents in New



Portable Grinding Machine with Motor Attached, That can be Operated by One Man: It can be Moved and Used in Any Part of a Factory

York, a bill has recently been passed by the state legislature that permits insurance companies to invest up to 10 per cent of their assets in apartment-house construction. Taking advantage of this, the Metropolitan Life Insurance Company is about to erect three blocks of houses in Long Island City, and one in Astoria. The project is intended to combine beauty and comfort as well as economy. Each block of houses will have a large interior court, and every room will have an outside exposure. There will be interior gardens with a lawn common to all tenants. These first four blocks will house 1,950

ent motor at one end, and the grinding wheel at the other end, of a long horizontal frame. In connection with a trolley running on an overhead beam, is a block and tackle from which the grinder is suspended in balance, so that it can be raised or lowered, and swung into any position, thus proving a valuable and flexible arrangement for any factory.

families, in apartments of four, five, and six rooms and bath, and by the law the average rent of each room may not exceed \$9 a month.

There has recently been discovered near Dryden, Ontario, an extensive deposit of soapstone, which occurs on a low ridge only 500 feet from the railway.

9499

CLEVER WINDOW DISPLAYS FOR FISHING SEASON

Two clever window displays were shown recently by rival hardware merchants at Montrose, Colo., in advertising their camping and fishermen's supplies.

One was a representation of a mountain cabin made of spruce logs. In the cabin were the usual settings, including a stove, skillet, coffeepot, fishing supplies, camp stool, keg, and washbasin, firewood, hand ax, rubber boots, hunting knife, etc. On the walls were an alarm clock, a jumper, an old rifle, revolver with holster, dishpan and cloth, fish basket, deer-hide towel, and a calendar on which the opening day of the fishing season was circled with red crayon. A candle in a bottle was on a box near the stove, burned biscuits in a pan under the stove, a pan of nicely browned biscuits in the oven, and

eggshells, and other miscellaneous articles were strewn on the floor in a very realistic manner.

The other display showed a fishing scene along a mountain stream. In the distance were snow-capped mountain peaks, while the course of a mountain stream could be followed down a cañon, in which spruce and aspen trees were seen. An old cabin was visible through the trees, near a waterfall. In the foreground stood the effigy of a man with a fishing rod, in the act of pulling out a fine trout. The bank of the stream was strewn with sand and gravel.

The two displays created much attention and materially aided in stimulating the trade of the merchants who made them.

Lathrop Hardware Co., Montrose, Colo. Copyrighted

9499



Attractive Window Displays in Two Rival Hardware Stores at Montrose, Colorado, for Advertising Camping and Fishermen's Supplies: The One Above Represents a Log Cabin with All the Various Paraphernalia That Delight the Heart of a Camping Fisherman. That Below Shows a Fishing Scene at a Mountain Stream with Snow-Capped Peaks in the Distance



428
 9623

**GAS-FIRED MELTING FURNACE
 HAS THREE BURNERS**

For the smaller shops, a low-priced furnace for melting soft metals is now being

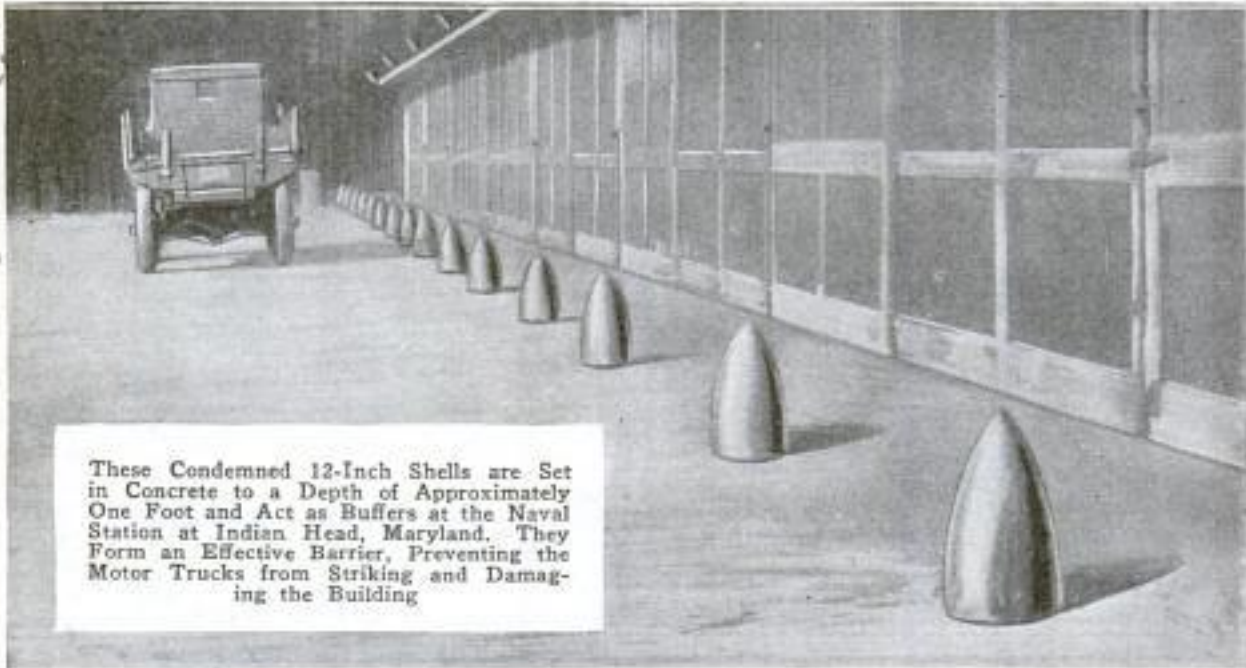


manufactured that has several noteworthy features. The removable cast-iron melting pot holds 150 pounds of metal, and is heated by three special gas burners. Each burner has a shut-off valve and pilot light, and no auxiliary blast or blower is required. Two burners develop sufficient heat for keeping the metal in a molten state. Regulators are provided that can be adjusted for different pressures or qualities of gas.

For the smaller shops, a low-priced furnace for melting soft metals is now being manufactured that has several noteworthy features. The removable cast-iron melting pot holds 150 pounds of metal, and is heated by three special gas burners. Each burner has a shut-off valve and pilot light, and no auxiliary blast or blower is required. Two burners develop sufficient heat for keeping the metal in a molten state. Regulators are provided that can be adjusted for different pressures or qualities of gas.

**OLD SHELLS FOUND USEFUL
 AT U. S. NAVAL STATION**

With partial naval disarmament assured, condemned shells are being put to a constructive use at many U. S. Naval Stations. At the Naval Proving Grounds, Indian Head, Md., 12-inch shells are



These Condemned 12-Inch Shells are Set in Concrete to a Depth of Approximately One Foot and Act as Buffers at the Naval Station at Indian Head, Maryland. They Form an Effective Barrier, Preventing the Motor Trucks from Striking and Damaging the Building

now used as buffer guides to keep trucks in the right path in entering the garage. As they are set to a depth of about a foot in concrete, there is little danger of a truck striking the building. At the same station, other shells are used at street intersections as curb markers to keep careless drivers from injuring the grass.

**SIGN MADE OF INLAID GLASS
 GIVES ARTISTIC EFFECT**

Representing a swan floating on the water, a sign constructed of inlaid glass



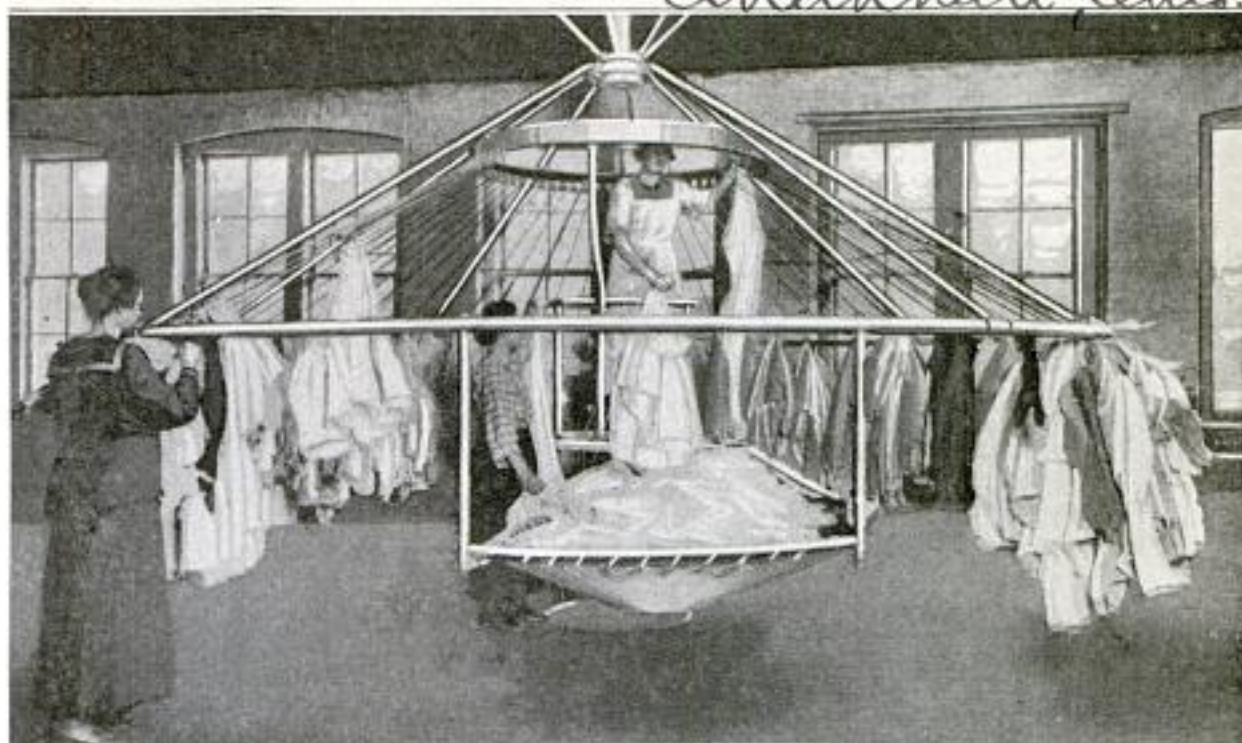
has been cemented into one of the stone pillars ornamenting the automobile entrance of the grounds belonging to a club at Schroon Lake, N. Y. The sign, the work of an artist, is made of varicolored glass in the same manner as the ornamental church window, and yields a beautiful effect.

Reckless auto drivers are to be called "flivver-boobs" according to the judges in the American Automobile Association's contest to pick the best name for the reckless driver.

Cmd. P. J. Charles Naval Proving Grounds Indian Head Md.

Cmd. Harry A. Blanchard 65 1st Ave on St. with telms 71 alle. h. h.

Cincinnati, Ohio



The Worker in the Center of the Reel Hangs the Identification Pin on the Proper Rod, and the Clothes Slide to the Outer Edge of the Reel to be Removed by the Checkers and Wrappers. This System Greatly Facilitates the Operation of Sorting, and Also Effects a Considerable Saving of Floor Space

9322

REEL FOR ASSORTING ROUGH-DRY WORK IN LAUNDRY

In laundries handling any quantity of rough-dry work, the problem of sorting the clothes for the different bundles is a serious one. To facilitate this work and also save floor space, an assorting reel has been devised in which the identification pins are slipped over inclined bars that carry the various garments to the outer edge of the reel, where they are removed by the checkers and wrappers. The worker doing the sorting stands on a circular raised platform in the center of the reel and can reach any of the inclined bars with but little moving about.

4285

ITALIAN LOCOMOTIVE SHEDS WITH ASBESTOS ROOFING

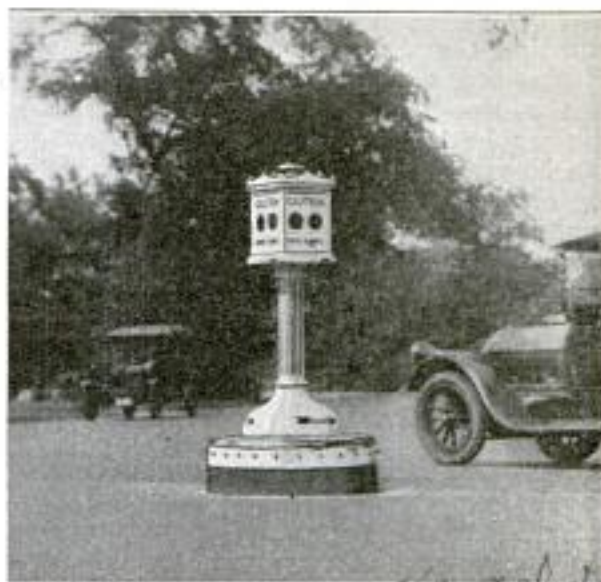
Protection against the destructive influence of smoke and gases from the locomotives is provided in a series of reinforced-concrete engine sheds recently built at Milan, Italy. The structure is 656 feet long, 314 feet wide, and is divided into five longitudinal bays, two on either side of the central one, which is 79 feet wide and 46 feet high. The roof framework, like the rest of the building, is of reinforced concrete, and the roof covering is composed of asbestos-cement sheeting, with steel-framed glazed lights.

Engineering Supplement 4/22/02

9615

TRAFFIC SIGNAL HAS SPIKES FOR CARELESS DRIVERS

Traffic signals mean nothing to some motorists, but one of these recently installed in Central Park, New York City, possesses numerous "pointed reminders." The usual red and green lights are incorporated in an artistic cement pedestal, in the base of which are set sharpened and protruding spikes that mean ruin to any tire driven against them.



Traffic Signal Which Has Sharp-Pointed Spikes in the Base as a Reminder for Careless Motorists Who Disregard the Lights

Local Herald

*Cml. George F. Paul,
900 Ellsworth Bldg*

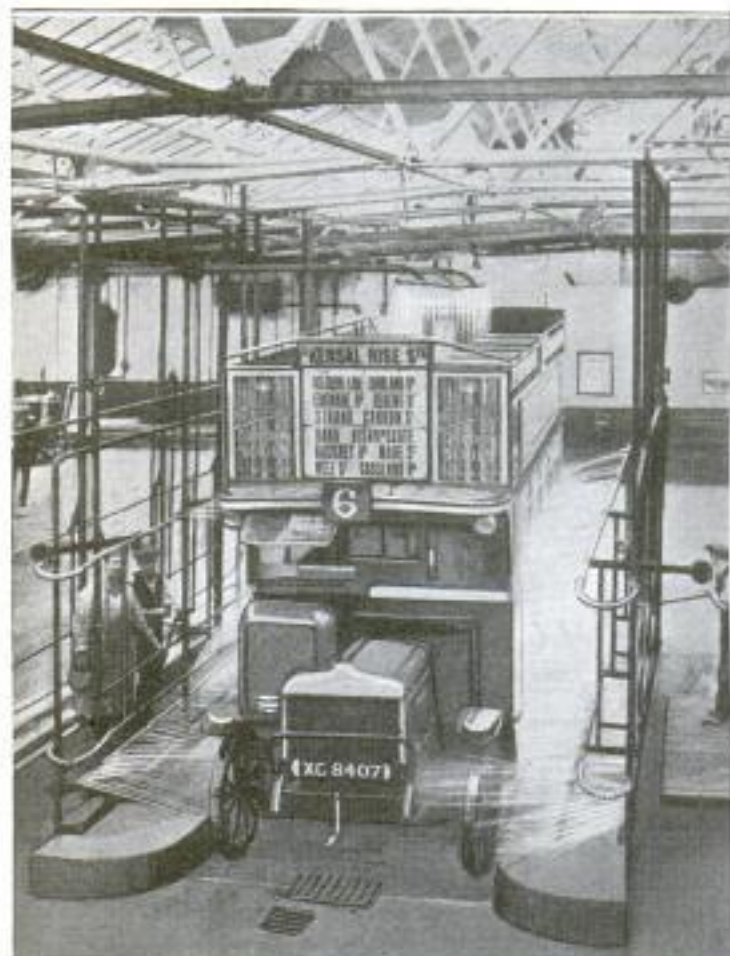
*Cml. Bogg + Ford
416 Union League
Bldg. Los Angeles
Calif*

**SHOWER BATH SPEEDS UP JOB
OF WASHING MOTOR BUS**

**COPPER HORSESHOES TO HELP
PREVENT FOREST FIRES**

9430 Because the patrons of motor busses insist that these conveyances be kept spick and span, the washing problem is

9601 Copper horseshoes as a means of preventing forest fires have recently made their appearance in several of the national



The Motor Bus is Driven into the Space between the Two Banks of Spray Pipes and Receives a Thorough Washing in a Few Minutes

one that cannot be ignored. As a means of speeding up this task, one of the London motor-bus companies has built a shower bath by means of which a bus can be washed very quickly. Spray pipes on either side direct streams of water against the bus, while a pipe above it can be lowered to wash the top.

forests of the West, and, if the plans of certain forestry officials are carried into effect, this metal will supplant steel upon the hoofs of all horses to be used on public domains, where there is any measure of fire hazard.

According to the supervisor of the Angeles National Forest, in southern California, steel horseshoes used in flinty mountainous regions may have been the cause of some of the mysterious fires that have started in the forest reserves. Heavy steel horseshoes striking against flint or hard granite may readily be the source of sparks, which, falling into dry grass or other inflammable material, would quickly cause it to burst into flames if fanned by a breeze.

The new horseshoes were given their first try-out recently in Calaveras County, Calif., when a motion-picture company sought permission to use the Calaveras National Forest as the background for making a film which called for the employment of a large number of horsemen. Permission to so use the forest was granted on condition that all the horses to be used should be shod with copper. The film was made, the horses being shod with shoes

made from copper alloyed with tin, to give the desired degree of hardness. This metal produces no sparks when struck against flint or other rock, and is said to wear quite as well as horseshoes of steel or iron. The cost, of course, is somewhat higher, but the prevention of one small fire more than offsets this.

9594

SINGING LEADERS SPEED CHINESE PILE DRIVERS

No visitor to China who once hears it ever forgets the chant of the pile-driver coolies. The lilting chorus that has come down through the ages and was sung by the toilers who built China's great wall, still is raised over every piece of construction work that brings into service this particular guild of workers. Ordinarily, contractors employ singing leaders

with each gang of pile-driver coolies, and while it is the particular function of these leaders to speed the work, they also extemporize words for the ancient chant, often at the expense of the foreign onlooker.

From the hammer of the human pile driver, which may weigh several hundred pounds, as many as a score of ropes run

*Cml. C. J. Laval, The China Press
Shanghai China*



These Coolies are Working on Shanghai's First Sewer System, Singing, as They Work, the Ancient Pile-Driver Chant under the Leadership of a Special Overseer

to as many workers stationed above on a staging. As the coolies heave in unison, lifting the hammer, the chant is begun by all the workers, and with each line of the song a blow is delivered as the hammer is dropped. Other coolies below control the movement of the hammer which rises and falls more and more rapidly until a swelling climax is reached with a shrill outburst from the throats of the workers.

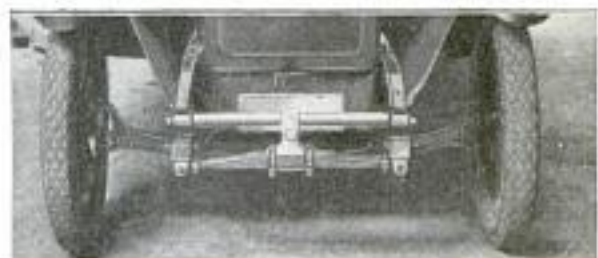
FOUR-POINT CAR SUSPENSION CHANGED TO THREE-POINT

For converting a car with a four-point frame suspension into three-point suspension, an accessory that also acts as a compensating spring and a shock absorber, is now on the market. The device consists of a six-leaf semielliptical spring that is fastened by a shackle and auxiliary spring, at each end, to the front axle of any passenger car. Pivotaly attached to the center of the elliptical spring, and directly above it, is a cylindrical crossbar, the ends of which engage steel flanges



Three-Point Suspension Device: The Shackles on the Ends of the Spring Connect to the Axle, and the Cylindrical Crossbar Above Connects to the Car Body

projecting from each side of the base of the car body. This pivotal suspension of the front end of the body keeps the car



Three-Point Suspension Accessory as It Appears When Attached to the Front End of an Automobile

always level transversely, no matter what the position of the wheels may be, and the action of the shackle springs makes a shock absorber unnecessary.

USE ENAMELED UPHOLSTERING NAILS TO MAKE FLAG

An enterprising Minneapolis firm presented something new recently in the way of a flag display. The face of the United States flag was composed of 2,797 enameled upholstery nails. The gold fringe was made of 386 copper nails, placed on three sides. The 48 stars were represented by 144 white nails, and the blue field by 487 nails. The 13 stripes were composed of 841 white and 939 red nails. The nails were inserted into a fiber doormat which was used as a base for the flag.

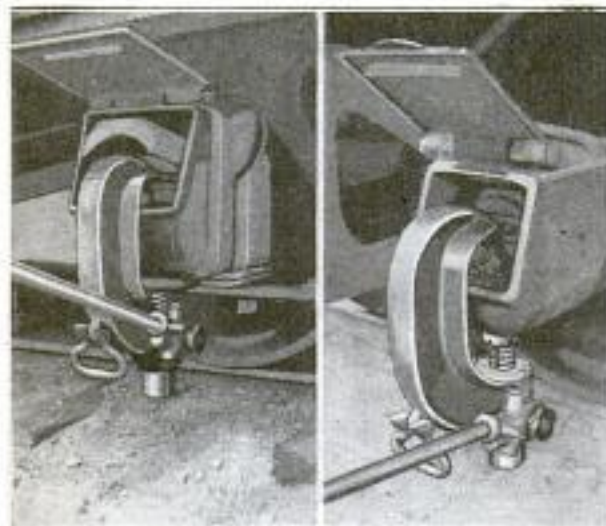
% H.H. Blum, 2722 Prince St. Berkeley, Calif.

Medal for Warfield Co. Minneapolis, Minn. 2606

Christian Anderson, 2722 Prince St. Berkeley, Calif.

**NEW TYPE OF JOURNAL JACK
 IS SIMPLE AND COMPACT**

Designed for use in the inspection of journal boxes and the rebrassing of journals in all classes of railroad freight



Two Views of Jack That does Not Touch the Ground: Its Head Clamp is Applied on the Journal Collar, and can be Used on Any Standard Journal

and passenger cars, a new clamp type of jack operates without having to touch the ground. It is applied on the axle collar, thus holding the wheel firmly down against the track. Only a short rise of the screw is required to lift the journal box sufficiently to remove and replace the brass, and only one size, as the head cap is adjustable and the jack can be used with any standard journal. The ratchet operates so easily that a 24-inch lever suffices to give the needed power, making it very handy at close quarters.

**SUPPORTING RIG FOR HORSE
 IN WEAKENED CONDITION**

After an exceptionally hard winter in North Dakota, a farm horse was reduced to such a condition that if it fell down



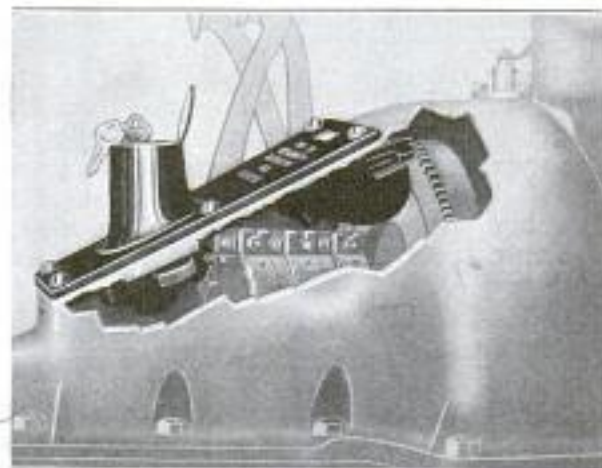
Four-Wheeled Rig Carrying a Strong Bellyband That Allows a Horse in a State of Exhaustion to Feed on the Prairie without Danger of Falling

Cmt. Wm. S. Neal,
The Tribune, Bismarck, N. D.

it could not get up again. It was thought that, after a few weeks' feeding on the prairie, the horse would recover its strength, so the farmer made a four-wheeled rig with a frame and supporting brackets that carried a strong bellyband, in which the horse was slung to prevent it from falling. The horse could get its mouth to the ground and could wander over the prairie at will.

9634
**AUTOMOBILE LOCK REPLACING
 TRANSMISSION-CASE COVER**

As a protection against automobile thieves, a positive lock is now available for use on a popular car. It replaces the regular transmission-case cover, and projecting from it, just above the floorboard near the brake pedal, is a small tube containing the keyhole. A quarter-turn of the key causes a steel forging, which is snugly housed below the cover, to slide so that teeth on its end mesh into the ring gear of the flywheel. At the same time an iron arm is caused to slide under



Lock That Replaces the Transmission-Case Cover on a Low-Priced Popular Car, and Blocks the Flywheel

the edges of the transmission case, making it impossible to remove the lock, even if its connecting screws are taken out.

Hercules Mfg. Co., Indianapolis
AMERICAN COAL-MINING FILM
TO BE SHOWN ABROAD

A motion-picture film, "The Story of Coal," made by the Bureau of Mines, is to be shown in Czecho-Slovakia and Jugo-Slavia. It has been exhibited extensively in this country, and was recently widely circulated in India. It seems destined to carry the story of American coal-mining methods to all parts of the world and should act as a trade stimulator for the sale of mining machinery.

916 4



Extracting the Oil of the Eulachan, That Is a Substitute for Butter among the Natives of British Columbia: At the Left Are the Bins in Which the Fish are Left to Soften. To the Right Are the Vats in Which the Oil is Extracted by Heat from the Softened Fish

THE FISH THAT TAKES COW'S PLACE

BY FRANCIS DICKIE

*Herbert Gray,
B. C., Canada.*

MARCH is the month when the Indians on the British Columbia coast put up their butter for the entire year—and it is gathered from a fish, which appears only once a year, for about three weeks' time. It sounds ridiculous to tell of a butter-giving fish, but that is actually what the eulachan, or candlefish, is, for the fats derived from it serve the Indians as an equivalent for the life-sustaining material which Anglo-Saxons get out of butter, and Italians and the people of the south of France out of olive oil.

The eulachan is the Indians' most precious fish, and is quite as mysterious in its ways as the much told-of salmon. Like the latter, it comes yearly from the unknown deeps of the Pacific and goes up fresh-water rivers along the Pacific coast. On the Columbia the run is in February; farther north, it lasts from two to three weeks in March. The eulachan of the Nass River is said to produce the best oil; but perhaps it is that the people there are more expert at extracting. The fish swim in a thin line, the first layer close to the bottom—a wonderful sight. Unlike the salmon, the eulachan goes back to sea after spawning; at least that is the supposition, since no dead fish are seen later, as in the case of the salmon. The eulachan is from 6 to 8 inches long, a silvery fish that is almost pure oil.

The Indians are on the lookout for the beginning of the run, and take millions of the fish in nets; some, too, are caught with a long pole with a line of very sharp thin spikes, like the teeth on a comb. This pole is passed through the water, as one would a paddle, and the fish are caught upon the sharp spikes.

The fish are dumped in great bins of cedar logs and left to soften. As the weather is usually cold at this time of the year, this softening process, though really a sort of decaying, has no bad effects on the product. It simply makes for easier rendering of the fat later. Of course, great care must be taken not to let the process go too far, which would result in rancid oil and grease. Eulachan grease, when well made, has no taint of fishiness.

When the eulachan have softened from a week to 10 days—or other periods, a great deal depending on the weather—they are transferred to great vats and boiled in hot water. The Indian method of heating the water is to drop hot stones into the vats; and though this is a much more laborious way than boiling in modern kettles, many of the Indians today, though they have adopted the white man's phonographs, drag saws, motor-boats, etc., still stick to this method. They claim that the grease produced in their own way is superior in flavor and

4164
434



Some of the Large Cedar Boxes into Which the Oil of the Eulachan, after Extraction from the Fish, is Poured: It Hardens into a Lardlike Substance, and Is Then Ready for Use or Shipment. Some of the Fish are Also Shipped after being Smoked and Dried

texture to that boiled in the white man's way. And this is true. A parallel may be cited in the old and modern ways of making maple sirup.

The oil is skimmed off and transferred to water-tight cedar boxes of remarkable make. The joining done on these is very fine work. Into the boxes the grease is poured and soon hardens, taking an appearance very much like good lard. It is also kept in the liquid state, and I have seen it used on porridge by many natives. The eulachan butter is used in cooking, as cow's butter is used by white people. And, be it noted, there is just as wide a variety of eulachan butter as there is of cow's. The best quality is pleasant-tasting, without rancidness, and keeps this way for 12 months. Strong eulachan

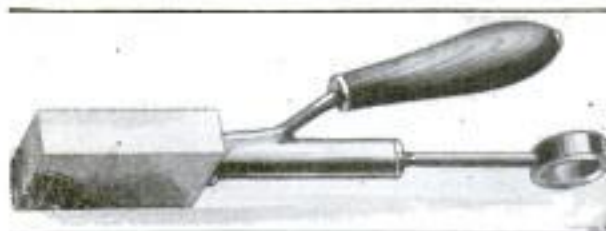
grease results from too much or too little boiling, or from leaving the fish too long in the sun. Among the Indians of British Columbia certain tribes were noted for their eulachan grease, and for hundreds of years they traded it with Indians of the interior for various products they did not themselves possess.

The fish are also smoked and dried; but it is as a producer of a staple fat they are most valuable, or rather invaluable, to the natives of the Pacific coast. Oddly enough, though these fish have been taken by the Indians for centuries, it is only in the last five years that the fish have been taken commercially by the white man, and as yet in very small quantities. Today they are sold fresh in small quantities in Pacific coast cities.

MAKING INDIVIDUAL ICE-CREAM BRICKS AS REQUIRED

9620

The popularity of individual bricks of dipped ice cream has resulted in the in-



This Soda-Fountain Device, Forced into a Container of Ice Cream, Forms a Small Brick Ready to be Dipped

vention of a device for shaping the ice cream at the soda fountain as required. The forming case is forced into the ice cream and then withdrawn, and the small brick is then forced out of the case by a plunger and spring. It can then be dipped, wrapped, and handed to the customer, the entire operation taking only a few moments. One of the advantages of this system is that the customer may order any flavor of ice cream desired.

Our Bureau of Information will answer all questions regarding articles appearing in this magazine.

*Wm. James B. Garris,
Desandria, Ind*

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9728
 Science
 6/23/22
 P. 667

Hawaiian Dredger Co
 Honolulu, I. H.

POPULAR MECHANICS

435
 Hawaiian

AGENCY TO SEND LITERATURE TO RUSSIAN SCIENTISTS

Because of the many appeals that have come from Russian scientists for recent literature of a scientific nature, a committee has been formed in this country that will attempt to meet the requests of these men, who have been almost completely cut off from such literature since 1914. The committee will work in conjunction with the American Relief Administration and will collect and cause to be forwarded, scientific books and periodicals, authors' reprints, publications of scientific bureaus, and other technical information that has appeared in this and other countries since that year.

DREDGING OUTFIT CUTS CANAL ACROSS BOULEVARD

Cutting a canal across the picturesque and palm-lined Kalakaua Avenue at Hon-



Palm-Lined Boulevard in Honolulu as It Appeared After the Large Dredger had Partially Completed the Task of Cutting through the Pavement

9673
 MAKE FILTER FOR CATCHING FINE POWDERED GLASS

Annoyed by the clogging of the water pipes leading from the trough in which a manufacturing optician's grindstone revolved, a young mechanic of Sheboygan, Wis., has developed a filter that catches the finely powdered glass and stops the trouble. While no details of the construction can be given at this time, it is stated that the filter consists only of a



This Is a Block of Finely Powdered Glass, Caught by a Filter Placed in the Water Pipes Leading from an Optician's Grindstone

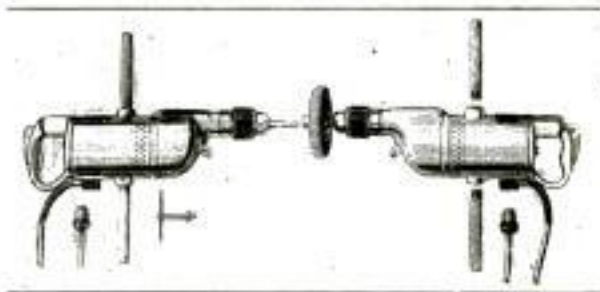
series of pipes and baffle plates. It has been found that the powdered glass that is trapped makes a good polishing agent for materials other than glass.

The engineer *W. J. ...*
 Word comes from Australia of the discovery of a process for the extraction of copper from low-grade ores. It is said that oxidized ore containing as little as two per cent copper can be treated at a profit.

olulu, in the Hawaiian Islands, was the unusual task recently assigned to a dredging company. The draining of marshes in the vicinity of Waikiki caused the waterway to be constructed through the beautiful boulevard, thereby interrupting all traffic, which, however, will soon be accommodated as usual by the erection of a temporary bridge.

9454
 COMBINED DRILL AND GRINDER HAS WIDE RANGE OF SPEED

A recently developed combination electric hand drill and grinder is so constructed that, with the use of one motor, the speed can be varied to suit either drilling or grinding. The 1/2-horsepower motor is of the universal type that can be operated by either alternating or direct current, and the speed change is of simple design. Its drilling capacity is 1/8 to 5/8-inch steel, and it has a 6-inch grinding wheel. The complete tool weighs 18 pounds.



Combination Electric Tool, Shown in Use as Both a Drill and a Grinder: With One Motor Its Speed can be Changed to Suit Either the Drill or the Grinder

Recovery Bld
 Minerals
 Australia
 Super Separator Co., Perth

Woodach Electric Tool Corp.
 Chicago
 23 S. Jefferson

Eugene Pelkafer
 c/o A. & M. S. Co., Sheboygan, Wis.

Art Department.
Miss Peabody.

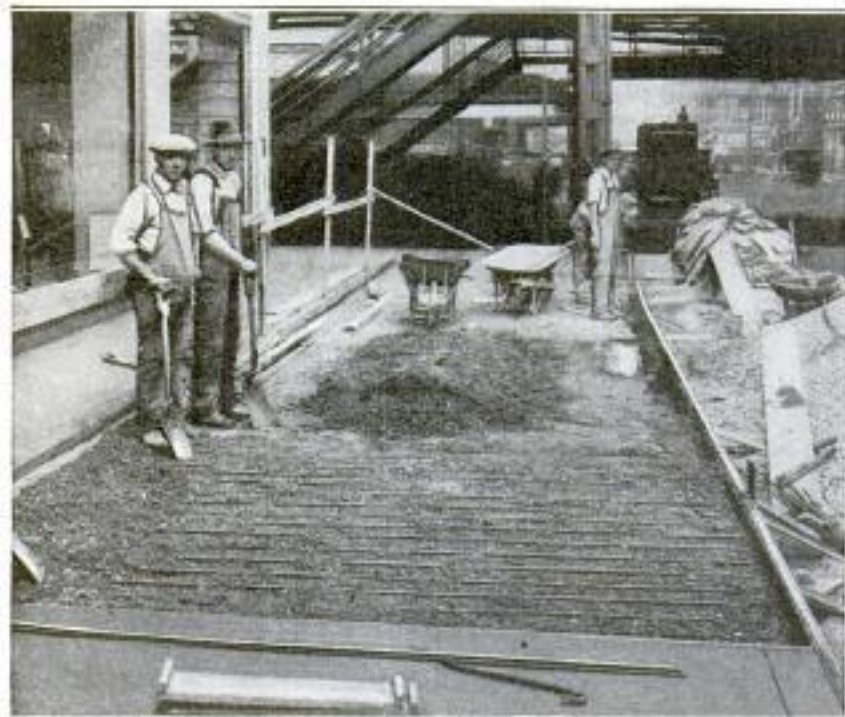
W.A.S. Electrical Mfg. Co.
402 Notre Dame Ave
Winnipeg, Canada

436

DAMAGED SIDEWALK REPLACED WITHOUT DISTURBING IT

9530

In laying a new cement sidewalk without removing the old one, a series of steel reinforcing rods, spaced a few inches



Laying a New Sidewalk on Top of an Old One: When the Steel Reinforcing Rods are Laid in a Thin Bed of Gravel, the Cement is Poured and Suitably Finished

apart, were laid across the top of the old sidewalk and buried in a layer of fine gravel. The cement was poured onto this and smoothed down to the required level, giving to the old sidewalk a new surface that will not crack and that is of a permanent nature.

TRANSATLANTIC TELEPHONY SOON TO BE ACHIEVED

9752

Telephone conversations between New York City and London, or Paris, are predicted as a common occurrence within a few years, due to the recent successful experiments with the electron tube. A set of these tubes of exceedingly high power is being installed in the great wireless station at Carnarvon, in Wales, England, while an even more powerful set is ready to be placed in the mammoth station at Port Jefferson, Long Island, in this country. These tubes will first be tested in wireless telegraphy as the dot-and-dash signals are the most simple sounds to transmit, and as their development progresses, they will be used in the attempt to send the varied tones of the voice across the thousands of miles of water.

N.Y. Times 6/30/22
P. 4

NEW LIGHTWEIGHT ELECTRIC STORAGE BATTERIES

9734

Almost simultaneously, two storage batteries have been invented, one in Winnipeg, Can., and the other in England, which, if the claims of the inventors are valid, mean something of a revolution in all the uses of electricity which require the storage battery. The Winnipeg battery is of the ordinary sulphate type, but by incorporating the insulation used with the positive plate, the plate is made so much stronger that only one-third of the inactive metal is required. It is claimed that this new construction makes it impossible for the active material to leave the grid. At the same time it provides for the free circulation of the electrolyte. The net result is that the weight of the battery, per unit of capacity, is reduced to one-third that of the ordinary battery. This

means that the electric automobile, with all its simplicity, cleanness of operation, and balancing of weight, may become common.

The claims made for the English battery are that the output is increased per unit weight 300 to 800 per cent; that it will not sulphate, that it can be charged in 15 minutes, and that it may stand idle any reasonable length of time without deterioration. This battery is now being tested by the experts of the national laboratory, London.

The inventors of both batteries claim that the construction and assembly of the parts are very simple, and the entire battery is not costly. The commercial development of these two batteries will be awaited with interest.

TRACTOR SPEEDS UP DIFFICULT TREE-REMOVING JOB

920

The erection of an addition to a bank building at Alhambra, Calif., recently, necessitated the removal of a large tree in the adjoining parkway. The tree could not be felled in the usual manner because it might damage surrounding property.

Winnipeg, Canada
Sibley, Leachman & Co., 187, West Winnipeg Road, S. D.

9207

Cmt. Hagg's Ford 476 Union League Bldg. Los Angeles, Calif 437
POPULAR MECHANICS



After Pulling the Tree Out by the Roots, the Tractor with a Single Mighty Heave Rolled the Stump and Trunk, Weighing Four Tons, onto a Sledge. It Then Towed the Whole Load to a Local Woodyard, Accomplishing the Entire Task in 20 Minutes

Accordingly, the branches were cut off and hauled away until nothing was left but the main trunk and roots. The disposal of this larger portion of the tree offered another problem. The trunk of the tree was about 20 inches in diameter, and, with the roots, weighed about four tons. The removal was greatly simplified by the use of a powerful endless-tread tractor. After workmen had dug around the roots to loosen the stump and trunk, the tractor was attached to the upper portion of the trunk with a heavy log chain. With a single mighty heave the tractor pulled the stump and trunk out, roots and all. The chain was then wrapped around the trunk, and by another pull of the tractor rolled upon a sledge previously placed for the purpose. The tractor then took the sledge in tow, and dragged the whole outfit to a local woodyard. The use of the tractor made the entire job the work of only about 20 minutes.

9751 — Subway

FLICKERING OF CAR LIGHTS REMEDIED BY NEW SHOE

Fitting some 200 of their subway cars with a special shoe, was the means employed by the Interborough Transit Commission of New York City, to eliminate the annoying flicker of the car lights. The new shoes contain a spring which keeps them in constant contact with the third rail, and thus insures a regular flow of current to the lamps.

N.Y. Times 6/30/22 P. 1

9613

ELECTRICAL SKINNING TOOL FOR PACKING HOUSES

Skinning a steer of ordinary size in the incredibly short time of five minutes is possible with the use of an electrical tool invented by a Frenchman and recently introduced in a Paris packing house. The appliance has three small blades of clover-leaf design mounted at the end of a flex-



Above: Close-Up of the Electrical Skinning Tool. Showing the Blades of Clover-Leaf Design Which are Revolved at a High Rate of Speed. Below: Skinning a Steer with the Electrically Driven Tool



ible driving shaft, which is turned by a motor at a speed of 2,800 revolutions per minute, thus yielding a seemingly solid cutting edge for the worker.

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d no. M. Cercé Paris, France

no further information.

CIVIC FEATURES THAT PROMOTE THE COMFORT



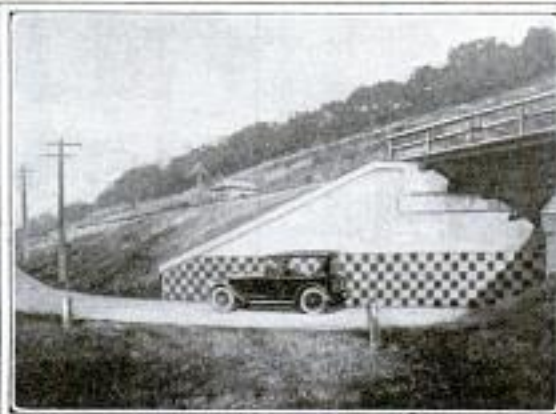
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UNSCREWED

Above: This Picturesque Japanese Bridge is Located in the Tea Garden in Golden Gate Park, San Francisco, and is Only One of Many Artistic Features in This Beautiful Spot

Below: Because of the Dangerous Curve under This Bridge, the Base of the Retaining Wall has been Painted a Vivid Checkerboard as a Warning



Above: Located near New Oxford, Pennsylvania, on the Lincoln Highway, This Artistic Spring House is Not Only Useful but Ornamental as Well. The Concrete Base Effectually Protects the Spring, While the Structure Itself Blends Pleasantly with the Surrounding Landscape



Above: This Type of Street Sign is being Erected in Detroit, Michigan, and Shows Not Only the Names of the Intersecting Streets but the Block Number Also. The Lettering is Large and Clear enough to be Easily Identified from a Passing Automobile

AND ENJOYMENT OF VISITORS AND RESIDENTS



Above: Scene at Pageant of Virginia, in Richmond, Which Represents the Landing of Captain John Smith, Portrayed by the Central Figure in Chains



Below: At Venice, California, These Concrete Blocks Containing Electric-Light Connections have been Erected So That Temporary Light Posts may be Placed on Them and Connected

To Combat the Fly Pest, Many Cities have Passed Ordinances Requiring That Flytraps be Placed on the Street in Front of Places of Business Where Flies are Likely to be Attracted. The Merchant is Obligated to Install and Care for the Trap at His Own Expense

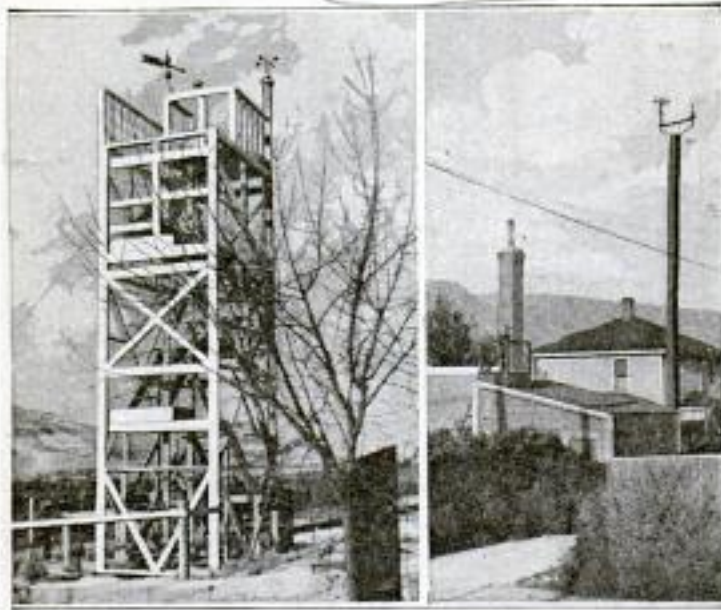


This Apple Tree, Blooming in Its Wire Inclosure near Vancouver, Washington, is Supposed to Be the Oldest in the Northwest. The Story is That It Grew from a Seed Brought from England by One of the Captains of the Hudson's Bay Company, Nearly 100 Years Ago

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*Modern
carpenter*

AMATEUR WEATHER BUREAUS DO GOOD WORK



These Observation Towers have been Erected by Amateur Weather Prophets and Equipped by Them with Reliable Devices for Recording Atmospheric Conditions

Desire on the part of the owners to work with precise and delicate instruments as well as to compile useful and interesting data, with no other remuneration than the satisfaction realized in the accomplishment, has culminated in the construction of two well-equipped weather bureaus. Vanes, wind gauges, barographs, thermometers, sun meters, and rain gauges, all of the best quality, are part of the equipment. The amateur bureaus are located on suitably constructed towers and furnish local newspapers as well as the central weather bureau with reliable information. They form links in the continental system of weather bureaus, and all the records established are tabulated.

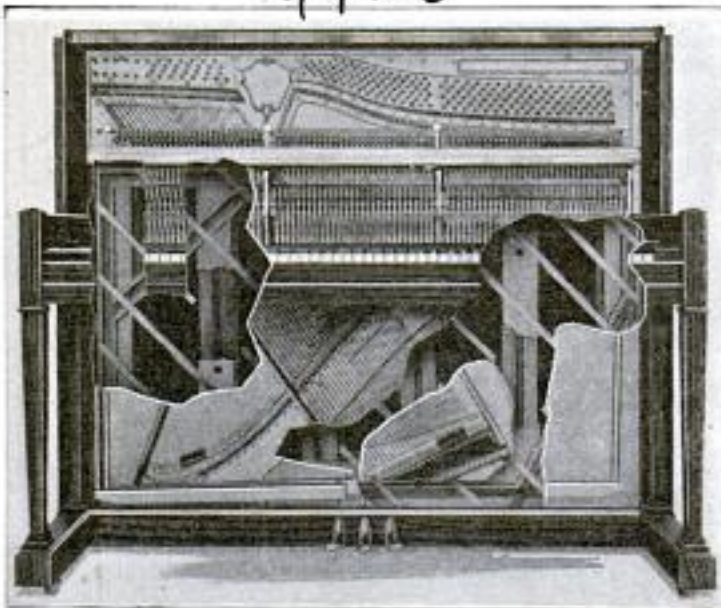
9365

EFFECTS OF HIGH ALTITUDES ON HUMAN BEINGS

The increasing migrations to high altitudes of men who have been accustomed to the conditions of the lower altitudes, has led to some interesting studies on the effects of the changed conditions. At an elevation of 14,000 feet, such as is found in the Andes of Peru, the oxygen tension is very much lower than at sea level. The first effect of this changed condition

on a person moving to this altitude, is the imperfect aeration of the arterial blood, causing quick fatigue and dizziness. It has been found, however, that once a person becomes acclimated he can perform a fair amount of mental work for long periods, but this does not hold true as regards sustained muscular effort. On the other hand, natives of these high altitudes can perform remarkable feats of work if allowed frequent periods of rest to make up the deficit of oxygen.

9426



Tone Amplifier in an Upright Piano: Parts of the Plate and Soundboard are Cut Away to Show the Air Channels

UPRIGHT PIANOS FURNISHED WITH TONE AMPLIFIERS

Upright pianos are now being fitted with tone amplifiers that act somewhat in the same manner as the horn of a phonograph. A series of air channels extending through the various parts of the wooden frame of the piano, behind the soundboard, are so connected that they act like a single horn, having a length of some 50 or 60 feet. The effect of this method of amplification is said to improve the tone and increase its sustaining qualities 50 to 100 per cent. The construction can be used with good effect on player pianos as well.

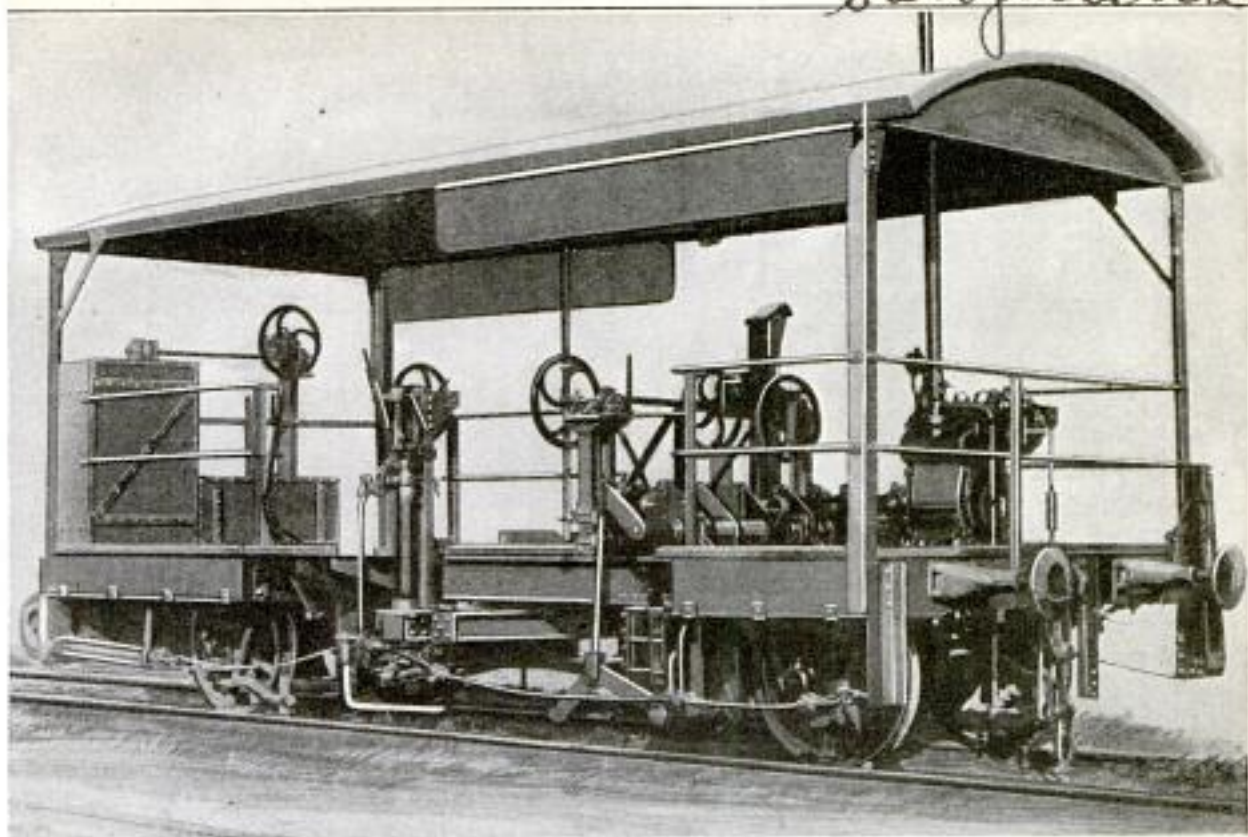
*Journal American Medical Assoc.
 Vol. 78 No. 23, P. 1722, 6/3/22*

*United Piano Corp.
 20 W. 45th St. New York City*

*of Story & Clark Piano Co.
 J. A. Williams*

Baltimore, Md.

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Machine for Uprooting Weeds on Railway Roadbeds: The Motor in Front of the Truck Operates Cutters beneath It, for Uprooting the Weeds in the Ballast between the Rails, as Well as Other Cutters outside the Rails. Brushes at the Rear Level the Ballast and Clean the Ties

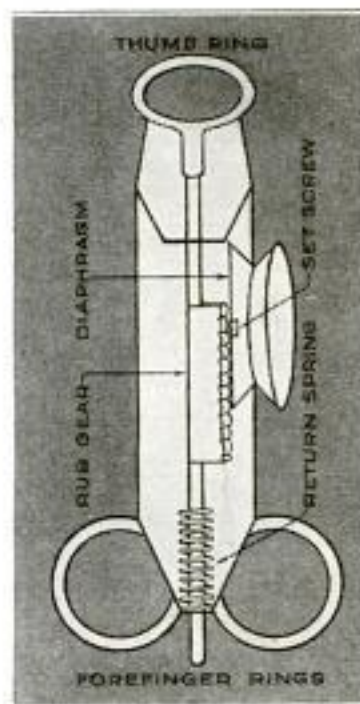
9459
WEED-UPROOTING MACHINE OPERATES ON RAILROADS

A machine for ^{cutting} uprooting weeds or any vegetation from railway roadbeds is in operation in Switzerland, and is giving satisfactory results. The weeding devices are all attached to the frame of a truck that is mounted on railroad-car wheels. On the front part of the truck, under its frame, are a series of cutters, parallel with the railroad ties, which are operated by a motor. As the machine is pushed along by a locomotive at a speed of about four miles an hour, these cutters are driven into the ballast between the ties. At each tie the cutters are automatically lifted, and pass the tie without touching it. Similar cutters on another part of the truck are so constructed that they operate on the ballast outside the rails. At the rear of the machine are rotating brushes which level the ballast and clean the ties. The machine can be adapted to suit any gauge or roadbed.

Popular Mechanics Magazine does not publish the name of maker or seller of any device described in its pages, but this information is kept on file and will be furnished free by addressing our Bureau of Information.

9489
HAND-OPERATED HORN USED INSTEAD OF WHISTLE

Mailmen and traffic officers now have available a hand-operated horn which has been designed by a New Jersey man to take the place of the familiar whistle. Direct contact of the lips with dust and germs accumulated on the whistle, to say nothing of chapped lips in winter, may be avoided by the use of this small horn, which is sounded by pressure of the thumb and two fingers. Being small, the instrument permits the freedom of both hands while using it.



*Mr. H. E. Mende
 8790 S. 15th St.
 Newark N.J.*

9568

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



These Bathing Slippers are Made Entirely of Rubber and Have No Seams to Chafe the Foot. The Sole Is of Double Thickness for Protection from Sharp Stones



This Window and Mirror-Cleaning Bag, Filled with a Fine, Granular Substance, is Soaked in Water and Rubbed over the Glass



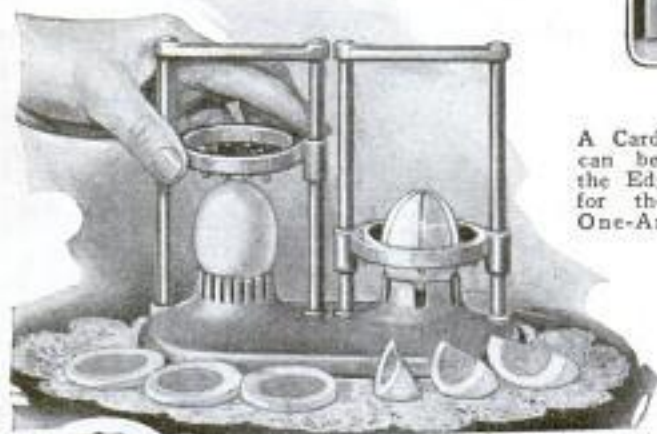
Safety Folding Ladder That cannot Collapse and Whose Sides Extend above the Top Step, Giving a Brace for the Limbs: It Weighs but 15 Pounds, Folds into a Space $23\frac{1}{4}$ by $7\frac{1}{2}$ by 52 Inches, and is Easily Hung on the Inside of a Pantry Door



Glass Salt Shaker Which Has Small Saw Blades Inside, to Cut Any Crust and Control the Flow of the Salt



Onions may be Cut and Chopped Freely without Causing Tears, or Staining the Hands, with the Use of This Glass-Covered Mincer



Egg-Cutter Which Slices the Egg Thin Enough for Sandwiches, or Cuts It into Six Parts for Garnishing Salads

A Card Holder That can be Fastened to the Edge of a Table for the Benefit of One-Armed Players



INTENDED FOR THE HOME AND ITS MEMBERS



A Fruit Strainer That Eliminates Burned and Stained Hands: The Hollow Hand Grip is Placed over the Bag and Merely Pushed Down as Far as It will Go



Knife or Scissors Sharpener with Two Steel Cutting Rolls between Which the Blades are Drawn



Kitchen Cabinet That is Compactly Built, Requiring but a Small Amount of Space: The Chair Slides Out like a Drawer, and the Seat is Curved to Conform with the Body. If Desired, a China Cabinet can be Mounted on the Top



Toothbrush Which is Handy for Travelers, Because the Paste can be Carried in the Handle of the Article



This Fruit-Jar Cap is Slotted for the Insertion of a Knife, Ice Pick, or Can Opener, to Aid in Turning the Cap in Tightening or Loosening It



Glass Cake Baker with Hole in Center, Which Permits Even Distribution of Heat to the Cake



Expanding Cuff Links Which Allow the Sleeves to be Pushed Quickly Up over the Elbow without Removing the Links from the Cuffs



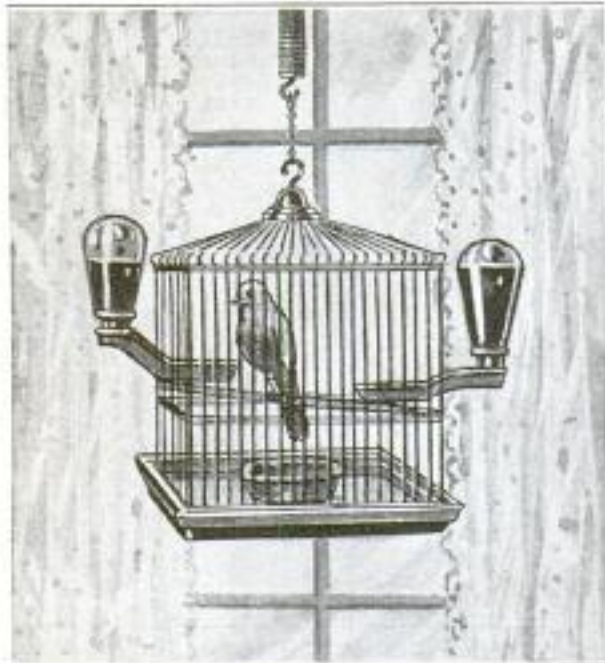
This Clothes-Boiler Basket is Placed at the Bottom of the Boiler with the Clothes on Top of It. The Handles Permit Easy Removal of the Clothes

Dr. Hatcher Henry Eummelen,

444 Santa Ana, Calif. POPULAR MECHANICS

9260 HOLDERS SUPPLY CLEAN FOOD AND WATER TO PET BIRD

If the family is to be away from home for a day or two, the pet bird will not

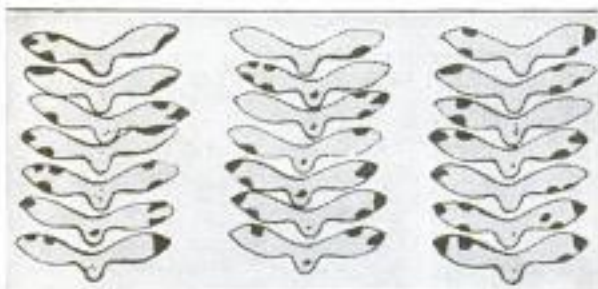


The Containers, Clamped to the Sides of the Cage, Hold Sufficient Food and Water for Nine Days and Supply These to the Bird as Needed

have to depend on the good memory of neighbors for his supply of fresh food and water, for a container has been devised which stores and distributes a supply sufficient for nine days. The containers are shaped like electric-light globes and connect with troughs extending into the cage. These troughs are narrow enough so that they cannot be fouled by the bird, and the seed trough is supplied with bars to prevent wasting of the food.

9555 BRAND REINDEER BY CUTTING NOTCHES IN THE EARS

When the native reindeer herder of Alaska wishes to brand the animals of his herd, he does not employ the branding iron with which we are all familiar. In-



Ears of Reindeer: The Black Marks Indicate Notches Cut in the Ears as a Means of Branding the Animals

emb. a word or words, such as intelligence, strength, Wash.

stead, he cuts notches in the ears of the reindeer, the size, location, and arrangement of the cuts serving as a means of identification. By running his hand along the ears of an animal the herder easily determines to which herd it belongs.

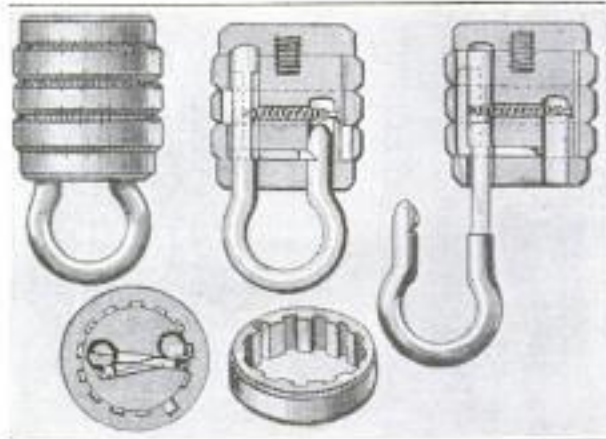
9598 CEMENT SUCCESSFULLY USED AS A FIRE EXTINGUISHER

Recently a fire that had obtained a strong hold on some timber sheds and piles of lumber was prevented from spreading and was finally extinguished by means of cement. Piles adjacent to the fire were made fireproof by first coating them with dry cement, and then throwing water over them. Cement was also thrown over the timber that was ablaze, thereby preventing sparks from flying. Another use of cement as a fire extinguisher was in connection with a tank of 400 gallons of oil that was ablaze in the basement of a building, where sacks of dry cement thrown into the burning oil aided in reducing the damage.

The Engineer 6/2/22

9333 PADLOCK OF SAFE TYPE HAS NUMBERED COMBINATIONS

A padlock, recently patented, operates by any given combination of numbers in the same way as a safe lock. It consists



This Padlock Consists of Five Movable Metal Disks with Numbers on Their Outer Faces, and Operates like a Combination Safe Lock

of five superimposed disks wide enough to allow the inscription on their outside faces of a series of numbers and graduations. The top and bottom disks are somewhat smaller than the other three, which are in the nature of tumblers that can be rotated to bring any given series of numbers into line. With the required combination, a series of grooves are set in line so that a pull on the shackle of the

Dr. H. O. Nielsen
Redmond, Utah

*Civil. Norman C. McLeod,
1717 St. Paul St
Baltimore, Md.*

lock releases its latch, and allows the shackle to be withdrawn and turned in any direction.

ment from the smaller to the next larger step on the other cone. The belt tension

964 EXPECTED TARIFF REVISION REVERSES RAG TRADE

Recent consular reports indicate that the United States has become a heavy importer of woolen rags from England, whereas ordinarily the trade in this commodity has been in the opposite direction. At the present time, rags are admitted to this country free of duty, but it is expected that a duty will be established by the new tariff bill, and manufacturers of shoddy cloth appear to be accumulating a stock of woolen rags before the time this action is taken.

9538 FLUTED EXPANSION REAMER HAS AN ALINING PILOT

A recent addition to metal-cutting tools is a spirally fluted expansion reamer, with alining pilot, that is particularly adapted to the reaming of piston-pin bushings. The flutes are milled to a true spiral angle and give a smooth accurate hole without chattering. The alining pilot is slightly smaller than the size of the reamer, and is long enough

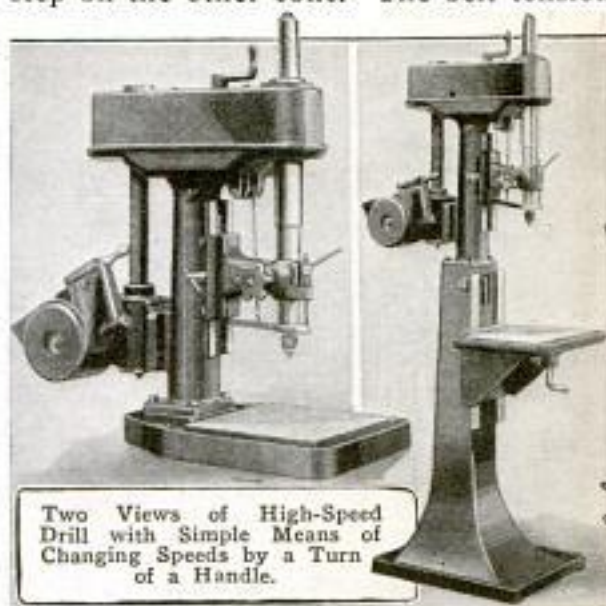


Spiral-Fluted Expansion Reamer, with an Alining Pilot, for Use in Reaming Piston-Pin Bushings

to bear in both bushings in the piston before the cutting begins, thus securing accurate alinement. At the front end of the pilot is a fluted cutter, to remove excess material in cases where the hole in the bushing is too small to allow the pilot to enter.

9486 NEW SPEED-CHANGING DEVICE ON HIGH-SPEED DRILLS

Drilling machines built in two types, bench and pedestal, and in combinations of from one to eight spindles, having three speeds of 5,700, 8,000, and 12,000 revolutions per minute, are now on the market. The outstanding feature of the machine is the speed-changing system. A turn of a handle automatically relieves the belt tension, shifts the belt first from the larger to the next smaller step on one cone pulley, and then by a similar move-

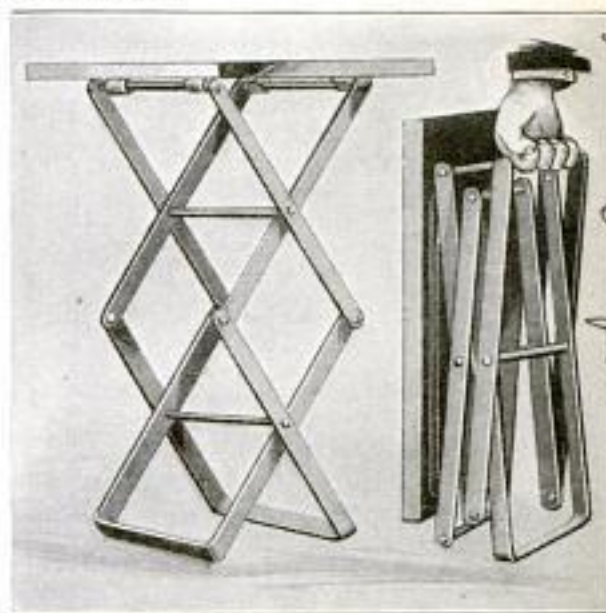


Two Views of High-Speed Drill with Simple Means of Changing Speeds by a Turn of a Handle.

is then automatically adjusted to the new position.

9264 LIGHT, COLLAPSIBLE STOOL FOR CARS OR OUTINGS

That extra seat in the automobile, or relief from the back-tiring effect of sitting on the ground during an outing trip, may be obtained by the use of a light, collapsible stool. The seat when collapsed is 13½ inches in length, 7 inches in width, 2¾ inches in thickness, and though weighing only 3½ pounds, is claimed to be strong enough to sustain a weight of 300 pounds.



Light, Collapsible Stool, Extended, and Folded for Carrying: It may be Used in the Motor Car, at Picnics, or in the Camp

*Alford Reamer & Tool Co.
Millersburg, Pa.*

Alhambra, Calif.

*Box 463
Co.*

The Munchie

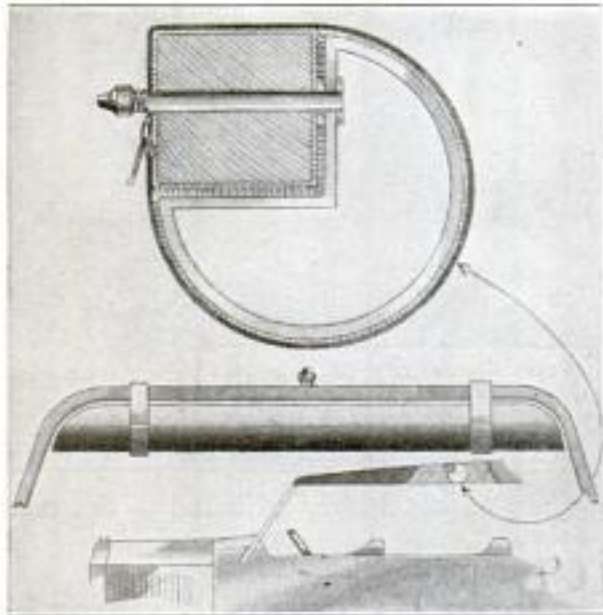
*Hosdick Machine Tool Co.
Cincinnati, O.*

Mr. E. W. Sawyer

446 POPULAR MECHANICS
North Anson, Maine

8997 ON AUTOMOBILE TOPS

In driving over a rough road in an automobile with the top up, the rebound of the springs is sometimes sufficient to

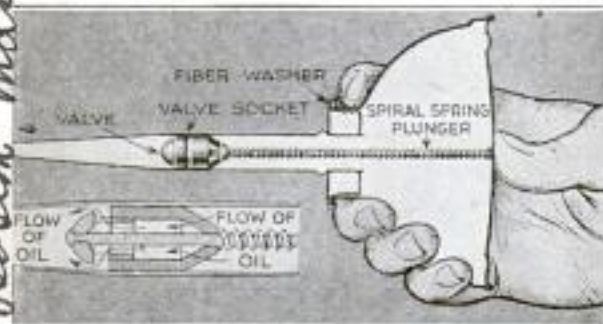


Inflated Rubber Tube Strapped to the Top Bow of an Automobile, to Act as a Head Protector: Above Are Two Detailed Views of the Device

bump the head of an occupant of the car against the hard top bow with force enough to cause severe injury. To guard against this danger, a new invention provides an inflated rubber tube that is strapped to the bow clear across the top of the car, and forms a cushion that will break the force of the severest blow.

9308
OILCAN THAT IS LEAK-PROOF FOR USE OF MOTORISTS

To avoid the annoying consequences of an upset oilcan, particularly in an automobile tool box, an oilcan has been devised that makes leakage impossible even if the can is reposing upside down. Fitted tightly in the brass spout of the can is a



Leak-Proof Oilcan: Notations Explain Its Construction, and the Enlarged View Shows How the Oil Flows When the Valve is Opened

*Arthur Harding
Boston, Mass.*

*Carl S. Smedal
3506 Earfield Ave
Minneapolis, Minn.*

socket, with a valve which opens in the direction of the outlet of the spout and is normally held closed and oil-tight by a spring coiled on the valve stem. This extends to the bottom of the can, so that a little pressure opens the valve and allows the oil to flow down the spout.

9645
RUM RUNNERS USE ARMORED AUTOMOBILE

A rum-runner's armored car was wrecked recently near Canby, Minn., and one of the occupants of the car was killed. This machine had three gasoline tanks, which were connected separately with the carburetor, to guard against possible piercing of one of the tanks. Each tank was well protected with sheet-iron armor. Also there were special hoods of sheet-iron that were made to fit under the fenders, and could be dropped over the rear wheels by means of a lever, to protect the tires. The car carried a high-powered rifle and an automatic revolver. When captured, 280 quarts of whisky were found in the machine. The driver said he was paid \$150 a month to run between Winnipeg, Can., and Omaha.

9453
HOMEMADE STENCILS USED IN SELF-INKING STAMP

Stencils made at home can be used in a new self-inking stamp which resembles the ordinary hand rubber article, but instead of the usual wooden base a reservoir holding sufficient ink to print 1,500 copies is incorporated in it. The appliance was designed to afford an inexpensive means of obtaining a small stamp for return envelopes, letterheads, statements, shipping tags, labels of all kinds, short announcements, and similar articles.



To protect their messengers by making them as conspicuous as possible, is the scheme to be tried by New York brokerage firms. The messengers will wear bright-red coats and carry five-pound portable safes which will be chained around the waist, the chain being padlocked inside the safe.

*The Multi Stamp
232
Norfolk, Va.*

New York City
**STEEL GOLF CLUBS ALLOWED
BY WESTERN ASSOCIATION**

In the matter of steel-shafted golf clubs the United States Golf Association's disallowance of their use is meeting the same fate that was accorded the action of the association in barring Francis Ouimet from amateur competitions on the ground that he was engaged in the sale of golf supplies. Both rulings were ignored by the western association, and, in the former case, the famous Bostonian was allowed to compete for, and actually won, the western-championship title, while, in the latter, it has been declared that steel-shafted clubs may be used in the tournaments of the western association. It is thought that on more mature consideration the U. S. association will reverse its ruling, and allow the use of steel clubs in this year's national-championship tournaments.

9564

**ALL-STEEL RADIATOR COVERS
TO MATCH FURNITURE**

To convert the ordinary steam radiator into a window seat, cozy corner, or book-rack, an all-steel cover has been designed that is not only useful, but ornamental as well. It is substantially built, and there are no rough edges to catch and tear draperies or clothing. The cover can be tinted and grained to match the furniture or woodwork in a room. The efficiency of the radiator is not impaired,



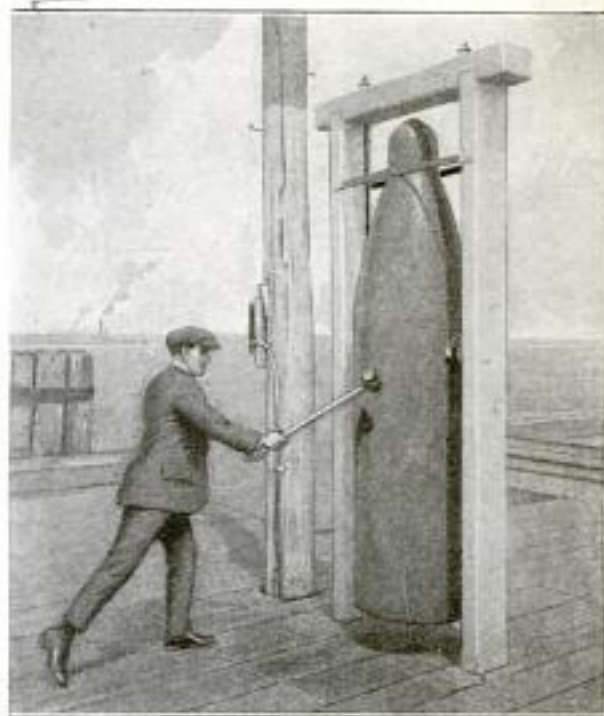
This All-Steel Radiator Cover is Tinted and Grained to Match the Furniture or Woodwork in a Room

as a deflecting plate in the top of the cover directs the heated air to a series of large openings in the front.

**OLD-TIME CANNON NOW USED
AS QUEER FOG SIGNAL**

Built originally as a cannon for throwing a lead shell containing a charge of gun cotton, but abandoned after one trial, a queer old piece of ordnance was considered junk until some one proposed using it as a fog signal. The barrel of

the gun is about 2 feet in diameter and the metal is 1 inch thick. For its present use, on a pier at the Naval Proving Ground, Indian Head, Md., it is supported



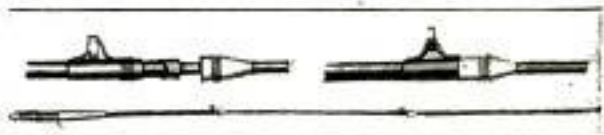
This Old Cannon is Now Used as a Fog Signal, and When Struck with a Sledge, Gives Out a Deep Resonant Tone, Audible at Great Distance

by its trunnions between two upright posts, and when struck with a sledge, gives out a deep resonant tone that can be heard a long distance. The sledge is kept hanging on one of the posts so that it is always at hand when needed.

9576

**NO SLIDING OR SIDESWAY
WITH NEW FISHING ROD**

A thorn in the side of the fisherman who depends upon casting for his amusement has been removed by the invention of a rod which eliminates sliding or sidesway at the pole joints. Because of this common annoyance the guides of the average rod are seldom in alinement. In the new pole, which is made of steel, the female joint is threaded at the lower end and the male joint has a loose ferrule,



Above: Detail of the Improved Fishing-Rod Joint, Open and Closed; Below: The Complete Rod

which is screwed down onto the threads after the joints have been fitted together, making them absolutely immovable.

Holland Rod Mfg. Co.
St. Joseph, Mo.

Frank & Betts Co
Hammshnd Blvd.

9567

CHILDREN'S PICTURE-STORY DEPARTMENT



In Front of the New York City Hall, with Mayor Hylan Acting as Supervisor, a Tournament of Marble Players was Held to Select the Champion Who is to Play against the Champions of Baltimore and Philadelphia

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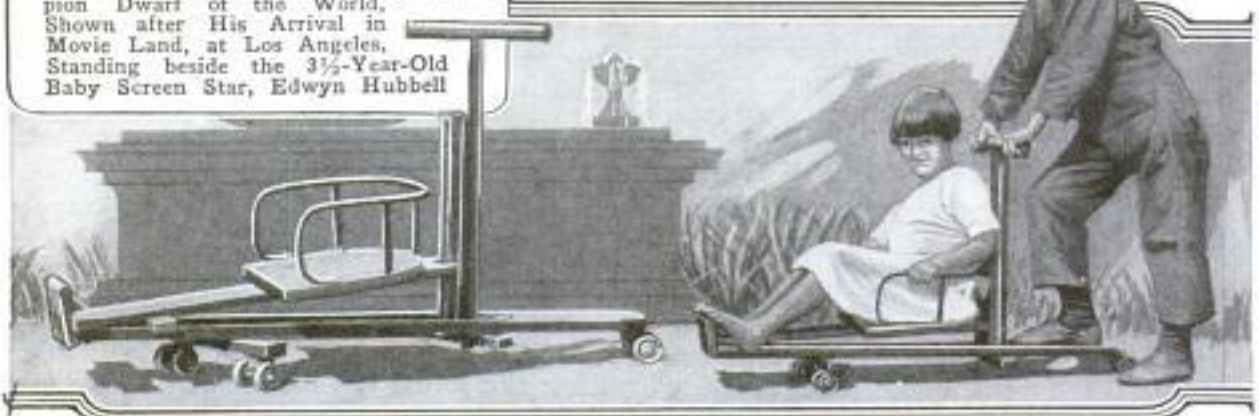
Major Mite, 18 Years Old, 28 Inches Tall, Weighing Only 18 Pounds, Champion Dwarf of the World, Shown after His Arrival in Movie Land, at Los Angeles, Standing beside the 3½-Year-Old Baby Screen Star, Edwyn Hubbell



Above: Cake, Six Feet in Diameter, Six Feet High, and Weighing 1,200 Pounds, Made by the Baking Department of the Lane Technical School, Chicago, and Mounted upon a Float Made by the Students, Which in a Recent Boys' Parade in That City Won the Silver Loving Cup

Below: Two Views of Patent Scooter, ing the Spring Passenger Seat Unoccu Other with a Kiddie in the Seat and a at the Rear Doing the Propelling and The Car Runs on Roller-Skate

One Show-pied, and the Boy Friend Steering Wheels



George F. Eastman
4021 Holmes St.
Kansas City, Mo.

OF MODERN ACTIVITIES AND INTERESTS



Squad of Native African Boy and Girl Scouts: Obviously, There Is Considerable Difference between Their Costumes and the Trim Uniforms of American Scouts. The Picture was Taken at Sierra Leone, and the Leaders are Seen Seated, with Their Silk-Hatted Chief Counselor behind Them



A Boy-Sized Clubhouse Built by Four Youngsters in a Huge Buttonwood Tree, near Hallam, Pennsylvania. Each Stair Riser Bears One Letter of Its Name "Brookleaf Nest"



This Little Cincinnati Girl does Not Allow Herself to be Handicapped by Physical Disability. With the Help of the Roller Skates and the Crutches She Gets About Just as Briskly as Her More Fortunate Companions. The Result Is That, Apart from Her Disabled Leg, She Is as Robust as Any Other Girl



This Team of Billy Goats will Celebrate the Opening of the New Road from St. Louis, Missouri, to Glacier Park, at Havre, Montana, by Hauling the Little Prairie Schooner the Whole Distance of 1,800 Miles

**STEAM SUPPLY IN RADIATORS
CONTROLLED AS DESIRED**

For regulating the heat of a steam radiator, so that it may be made suitable to varying weather conditions, a one-pipe installation connects to a supply valve at the top and to an automatic return valve at the base, on the same end of the radiator. At the supply valve is a lever handle by which the supply of steam can be controlled as desired. Any condensation flows out of the radiator through the

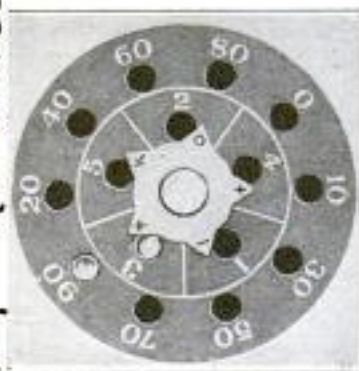


automatic return valve, and goes back to the boiler.

9561

**CHILDREN LEARN ARITHMETIC
FROM SPINNING TOP**

Children may be taught the different signs of arithmetic through the medium of a spinning top having on its surface two series of figures in circles above small holes. Inside the top, two small steel balls are rotated under the numbered holes, coming to rest, as the top stops, directly beneath certain of the openings. By means of an indicator which moves freely on the spinning handle, the indicated figures are then either added, subtracted, multiplied, or divided, as the case may be.



top stops, directly beneath certain of the openings. By means of an indicator which moves freely on the spinning handle, the indicated figures are then either added, subtracted, multiplied, or divided, as the case may be.

Our Bureau of Information is for your benefit. Use it as often as you please.

**NEW CAPTIVATING METHOD
OF CHILD PORTRAITURE**

A very charming method of child portraiture has lately come into vogue in England. The sitters are depicted in fancy costumes, actively occupied in some childish way, such as playing with toys, or petting "bunnies," all most delightfully colored. Several examples of these portraits, with fanciful settings, have been on exhibition in London galleries, and have been much admired.

9573

**ODDITY OF NAME MADE BASIS
OF ADVERTISING SLOGAN**

Profiting by the oddity of a name, an advertising club in the northwestern part of this country has adopted the following slogan: "Walla Walla, the Valley They Liked So Well They Named It Twice." This slogan will be placed on all products



of this country has adopted the following slogan: "Walla Walla, the Valley They Liked So Well They Named It Twice." This slogan will be placed on all products

from that section, on the windshields of all the motor cars in the locality, and on road-marking signs, and local business men will use it on their letterheads.

9560

**ANY TALKING MACHINE USED
AS RADIO LOUD SPEAKER**

Any talking machine can be utilized as a radio loud speaker by the addition of an easily adjusted attachment, introduced by an eastern concern. The innovation has three ends, or connections, one of which is attached to the arm of the machine



after the sound box has been removed. To the other two ends, the receivers are affixed, the sound coming out of the instrument in the usual manner, thus making use of the tone amplifier to secure a mellow and clear tone.

Mrs. Wm. A. Mills
103 Park Ave.
New York

Jay Ball Bearing Co
457 N. Racine, Chicago

Walla Walla Advertising Club



Refacing Old Pulleys and Flywheels

By J. S. HAGANS

WOODEN pulleys sometimes warp so that they do not run true, which causes the belts to flap, and causes a great deal of strain and vibration on the shaft. Aside from the mechanical disadvantages, such a pulley is unsightly. This condition, in the case of wooden pulleys, is usually caused by dampness and heat. Occasionally, also, a slipping pulley that has been tightened up a number of times will not run true. Pulleys in this condition can be trued without removing them from the shaft, by using the device illustrated in Figs. 1 and 2 of the drawing. The toolrest part of the fixture is made from a piece of flat iron, bent into the form of a "U," and drilled with a number of holes for attaching the supporting legs. In use, the device is clamped to the sides of a ladder, with the legs or brackets resting on one of the rounds. After the ladder has been placed in position firmly, the fixture is adjusted so that the front edge is close to the rim of the pulley and serves as a rest for the wood chisel, or turning tool, used to true up the wheel.

A similar dodge is used by shopmen engaged in the rebuilding and overhauling of old machinery, for refinishing the faces of flywheels and steel pulleys, to remove nicks and make them like new. Even were it possible to remove the wheels and do the work on a boring or turning mill, this would increase the labor cost, which, on this class of work, must be kept at the

lowest possible figure. If the work is done in a small shop where power is available, set up the engine near a lineshaft. Place a suitable pulley on the shaft to revolve the flywheel at a rate of about 30 ft. per minute; this will turn the wheel quite slowly, but the slow speed is desirable. A

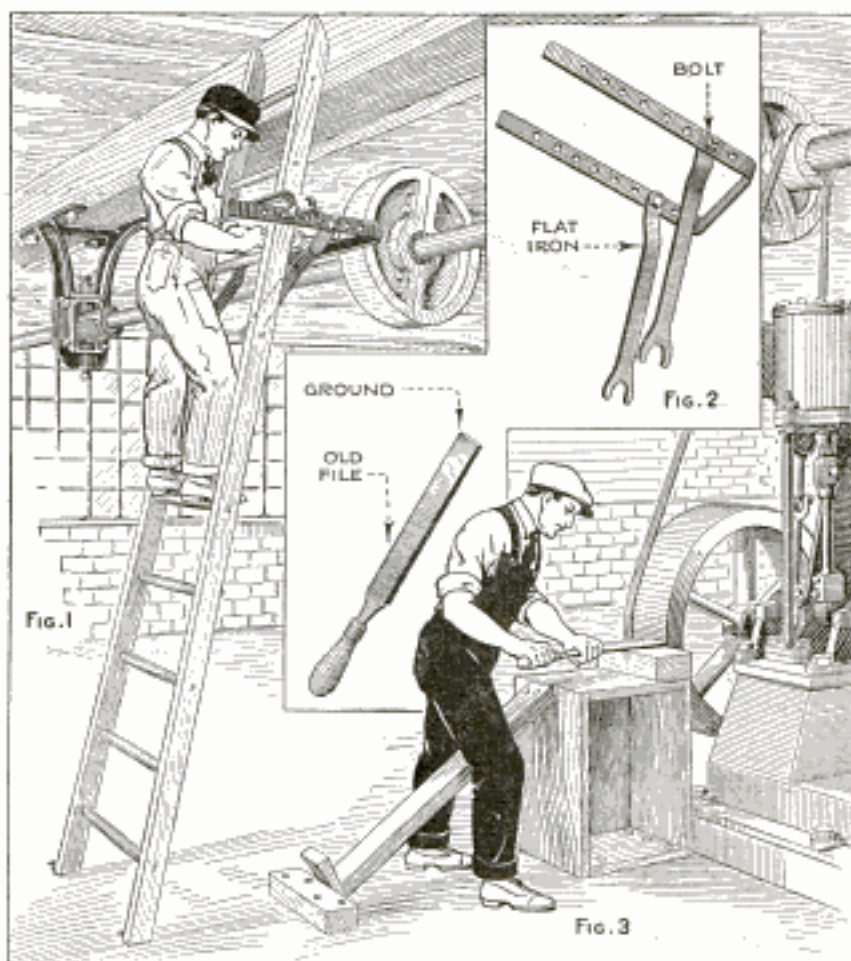


Fig. 1 Illustrates the Fixture Used to Turn Down Wooden Pulleys That have Warped. Fig. 3 Shows How the Faces of Steel Flywheels and Pulleys are Finished to Look like New

box is nailed to the floor near the rim of the wheel, and well braced, as in Fig. 3; this arrangement provides a rest for the tool. A narrow belt is then run on one side of the pulley, and wood strips are used to hold the belt near the edge.

Old files make good facing tools for

such work, and are ground as in the drawing, with a square end. By using such a file as a cutting tool and holding it so as to produce a minimum of clearance underneath, like a scraper, a cut can be taken across the face of the wheel that will remove all the surface nicks, paint, and rust, and give a bright new surface. When one side of the wheel has been finished, the

positions of the belt and box are reversed, and the operation repeated on the other half.

For finishing, the workman can use a regular mill file, or if an extremely high finish is desired, it can be obtained by using emery cloth tacked to a block of wood and pressed against the revolving wheel; a little oil should be used with the emery.

Hay Hook Used to Pull Staples

A rancher, finding it necessary to remove about four miles of old fence, tried several methods of pulling the old staples



Using a Hay Hook to Pull the Staples from Wire Fence Greatly Reduced the Labor Involved

without breaking the wire. It was found that a hammer or fencing pliers would not take hold of the staples, as they were deeply imbedded in the wood. As the wire had to be used again in a new fence, it was desirable that there be as few splices as possible. After trying several schemes, the idea of using an ordinary hay hook was hit upon. It was found that the point of the hook could be driven into the wood under the staple, the curve of the tool providing just the proper leverage. Using this tool as illustrated, no time was lost, no more wires were broken, and it was found that the staples could be pulled almost as fast as they could be driven.—W. W. Parker, Firestone, Colo.

Cleaning Platinum Filings

To remove dirt from platinum filings, spread them thinly in an iron pan, and heat to burn out the dust and other inflammable matter that may be present. After cooling, pass a magnet through the filings a number of times to gather up any fragments of steel and iron that are mixed with them. At this stage the filings can be washed before melting them into a button. As some of the metal may be lost in the melting process, it is suggested that the particles be reduced to a button of pure metal with an oxyhydrogen blowpipe.

A Rest for the Soldering Iron

Soldering irons, which are necessarily heavy, have a tiring effect on the user's arm when the job takes any great length of time; especially is this so when the work requires frequent turning, so that the tool must be lifted away from the seam repeatedly. The soldering-iron attachment shown in the illustration has a double use, as it forms a convenient means of holding the iron while it is being heated in the flame of a blowtorch, as well as a rest when in use. The device can be made in a few minutes by bending a piece of flat steel, about $\frac{3}{4}$ in. wide, into a semicircle and sawing out a slot in each end to clear the shank of the

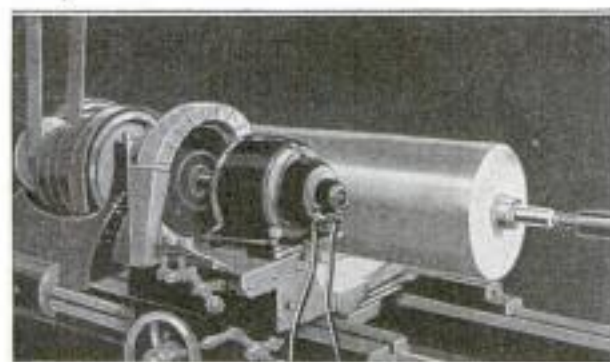


This Attachment for the Soldering Iron Removes the Weight of the Tool from the User's Wrist and Serves to Support the Iron in the Flame

tool. The sides or ends of the slots are doubled over to take pins or screws, which hold the attachment to the iron, leaving the latter free to turn if desired. With this attachment, the full weight of the tool is removed from the arm of the user, the iron being raised or applied to the work by rocking the rest as required. As the rest is intended for repetition work only, it can be slipped on or off in a few seconds. Blocks of wood are used to raise the iron to a height most convenient for the work in hand.—Harry Moore, Montreal, Can.

Guard for Lathe Grinder

The illustration shows a simple sheet-metal guard, applied to a grinder used on the lathe. This is an attachment that is usually overlooked when grinding in the lathe, but it is a very necessary one, as it not only prevents injury to the operator's eyes, but keeps particles of the abrasive from lodging in the ways of the lathe. The grinder is simply a small bench



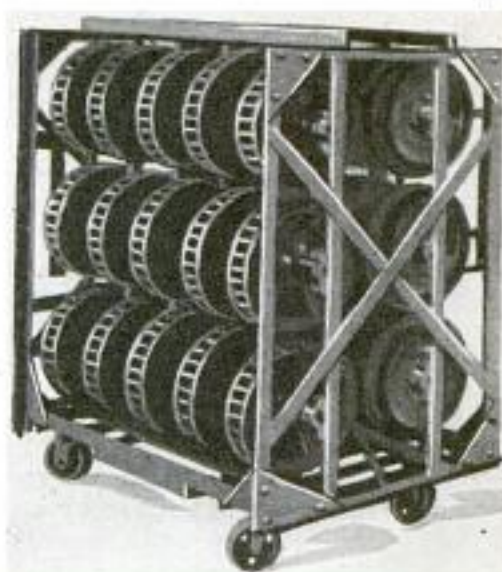
A Simple Sheet-Metal Guard Used When Grinding in the Lathe: A Clamp Holds It in Place, Making It Instantly Detachable

grinder, bolted to the cross slide, and the guard is attached to the cross slide by a clamp.

Steel Truck for Enameled Flywheels

The problem of handling 80-lb. cast-iron flywheels, after they have been enameled, and placing them in a drying oven, without touching the enameled surface, was solved by a large manufacturer by using the steel truck shown in the illustration. The flywheels are given a coat of black enamel, which is sprayed on in a spray booth, and must be carried from it to a baking oven, where they are baked for two hours at a temperature of about 250° F. The special truck designed to handle these flywheels is made from steel angles and will hold 30 wheels at one time, making a total load of about 2,400 lb.

Owing to the weight of each flywheel, it is necessary to handle them one at a time from the spraying booth, so uprights

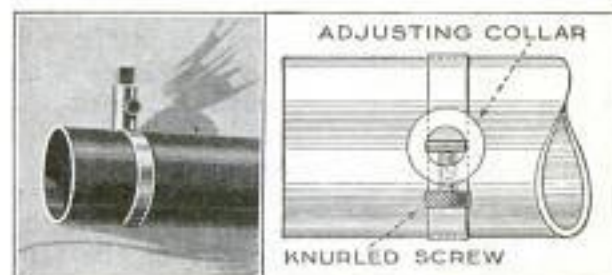


A Steel Truck Used in a Large Manufacturing Plant to Carry Enameled Flywheels from Paint-Spraying Booths to the Baking Oven

are placed in the framework of the trucks at the proper distance apart, and lugs riveted on to hold six rows of flywheels. Short lengths of 1-in. iron pipe are put through the shaft holes of the wheels before spraying, and the wheels are placed on the truck with the ends of the pipes resting on the lugs attached to the uprights. When the truck is full, it is pushed on its own casters to the baking oven. The casters have wheels about 6 in. in diameter.—Ed. H. Tingley, Dayton, Ohio.

Gauge for Marking Tubes

To facilitate the drilling of a circle of holes in tubing or cylindrical work, the marking gauge shown in the illustration will be found useful. Generally, if a shaft has to be drilled with any number of holes around the circumference, it is first "nicked" with a tool while it is running



A Simple Gauge for Scribing a Line around Tubing or Other Cylindrical Work: The Device Consists of a Strip of Spring Steel and a Clamping Collar

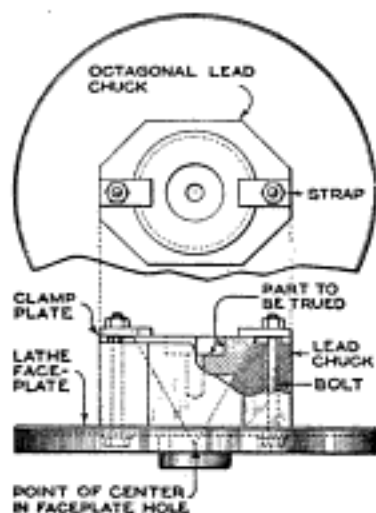
between centers, but this method is not always possible in the case of tubing, as it may not run true enough.

To make this gauge, a piece of flat, flexible steel, long enough to fit around the various sizes of tube, is required. A long collar, of small diameter, is tapped in the side for a knurled tightening screw, and drilled in the center to take the double thickness of spring steel snugly.

In using the gauge, it is slipped over the work, the two ends of the steel band are pulled through the collar and the screw tightened. A scriber is then run around the work, the point bearing against the edge of the gauge, and if the gauge is properly made, this line will be exactly true and at right angles to the bore. It is apparent that the same gauge can be used for shafts as well as tubes, as, in many cases, the appearance of the former is spoiled by a mark such as made by a lathe tool.

Boring Out Pipe-Center Base in Lead Chuck

A pipe center that required boring out to take a new thrust bearing offered a rather difficult problem, as its shape made it hard to hold it true for machining in the lathe. To accomplish this, a lead



chuck was made, the center clamped in it, and the whole bolted to the faceplate. A roughly octagonal mold was built of wood, a little larger inside than the outer diameter of the center. This was placed on a flat, level board, the center placed within it, base down, and two bolts were driven into holes bored in the board to receive them. The top of the mold was finished level, so that when filled with lead both faces of the chuck would be approximately parallel and square with the center. A smooth board, with a hole for pouring and a small vent hole, was clamped over the top of the mold, with the point of the pipe center and the two bolts projecting, and the mold poured full of lead.

When cool, the mold was removed, the

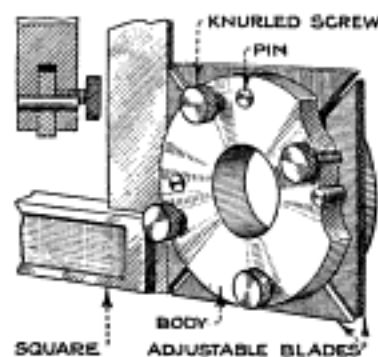
pipe center driven out, and the chuck bolted to the faceplate and trued up as nearly as possible. Then a light cut was taken along the side of the cavity, using the compound rest, at the same angle as the face of the pipe center, until the center, when placed therein, was found to run true. It was then clamped in place by a couple of short straps, and the boring continued, taking light cuts so as not to throw the chuck out of true. The point of the center projected through the chuck and into the center hole of the faceplate.

Driving Nails to Prevent Splitting

French cabinetmakers have a simple method of preventing large or small nails, when driven close to the edge, from splitting the wood. The nails have their points blunted by tapping the ends lightly with a hammer while resting the heads on a piece of iron. Treated in this manner, the nail, when driven, pushes the wood fiber before it, preventing splitting, whereas the sharp-pointed nail pushes the fibers of the wood to the sides, causing a tendency to split.—Edson E. Shatto, Serena, Ill.

A Precision Testing Block

Many shops often feel the need of having something absolutely square for testing purposes, yet very few have facilities for machining a piece so accurately. The drawing shows a testing block that is made up of several parts, and is so constructed that it can be made in any shop, however meager the equipment. The round



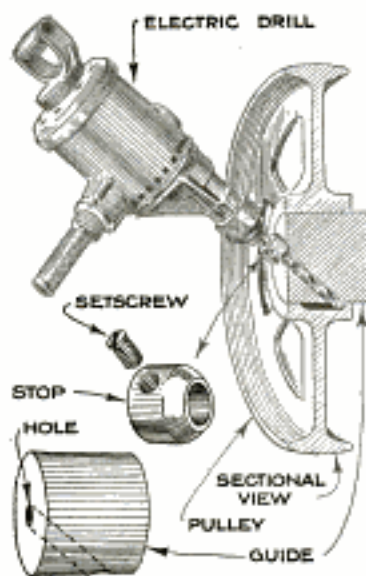
body is made of machine steel, a hole being drilled or bored through the center for convenience in handling, and a groove cut around the circumference to take the four adjustable blades. The latter, which should be made of tool steel, need not be accurate except on the outside edge, which should be perfectly flat. They are attached to the body, at right angles to each other, by snug-fitting pins through their centers, which allow them to rock against the bottom of the groove.

Each blade is tightened separately by a knurled screw, threaded into the body a little to one side of the pins. To set the block square, place the tool on the surface plate and bring an adjustable-blade square, bevel gauge, or similar device that is capable of being adjusted out of square, against one blade. With both pieces set approximately square, set the four blades alternately, adjusting them and the square or bevel until the block can be turned to all four positions, and the contact between blades and square is light-tight; then tighten all the screws. It will be seen that both the block and the other testing piece must be absolutely square when this result is reached, and that the fixture can be used to prove the squareness of any work, with confidence as to accuracy.

Cutting Oil Grooves in Pulleys

The drilling of an oil groove in the bearing of a loose pulley, or similar part, is a simple operation when a loose-fitted drill guide, of the type illustrated, is used.

The guide consists of a piece of round bar stock, of approximately the same diameter as the hole in the pulley, with a diagonal hole extending from the center through the side. A stop, to be clamped to the drill, has one edge beveled off to correspond with the angle of the hole in the guide, against which it bears. As the drill is fed forward, the bearing metal is cut away to form a V-bottomed groove. As the guide is free to move in any but a perpendicular direction, variations of the operation described make it possible to cut grooves in a variety of patterns.

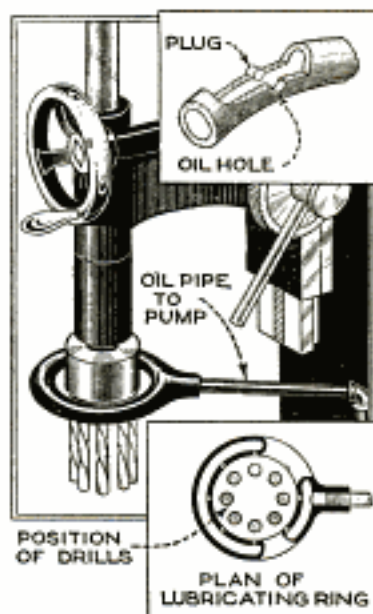


☐ To clean scale from gray-iron castings, pickle by immersing in water containing not more than one per cent of sulphuric acid and let stand for two or three hours; rinse in cold water, and scour with sharp sand and a fiber brush.

Supplying Lubricant to Drilling Head

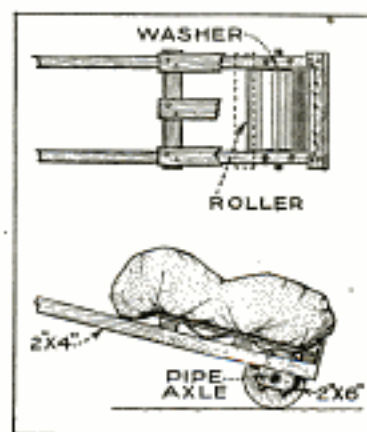
To supply lubricating and cooling compound to the eight spindles of a drilling head, the arrangement illustrated was successfully used.

A hollow casting served as the lubricating ring. The holes through which the lubricant flowed were drilled entirely through the walls of the casting, the superfluous orifices in the outside diameter being closed with plugs. The completed lubricating ring was placed around the drilling head, and connected to the oil pump on the machine with pipe. In use, the lubricant is pumped through the holes and runs down the drills.



Roller Truck for Farm or Factory Yard

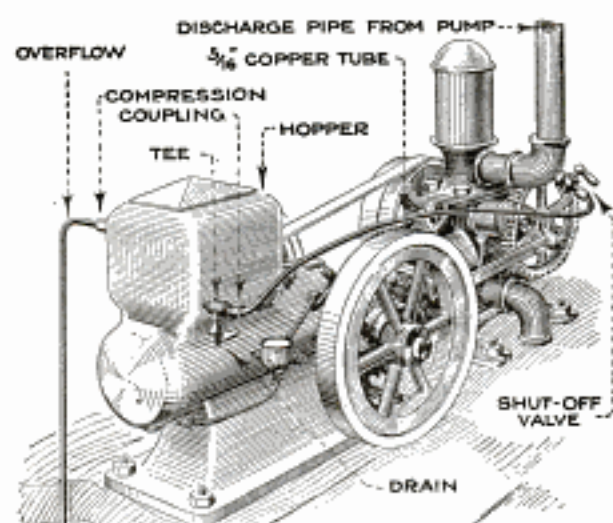
A truck, built after the style of a baggage truck, but with a long roller instead of wheels, is handy about the farm or factory yard for transporting tools, sacks of grain, and other heavy and bulky loads, the roller permitting use of the device on soft ground. The construction is simple



and may be modified to suit the particular use to which the truck is applied. The roller can be made from a piece of large-diameter pipe, provided with wooden ends, which are drilled to accommodate the pipe axle. For a more elaborate truck, a cold-rolled steel axle, running in cast-iron bearings, can be used to make the truck run easier. Washers should be placed on the shaft between the ends of the roller and the bearing blocks.

Cooling System for Hopper-Type Pumping Engine

A 1½-hp. gasoline engine with a hopper-cooled cylinder was used to operate a well pump that elevated water to a tank.



By Connecting a Hopper-Cooled Gasoline Engine to the Discharge Pipe of the Pump, It Operates by a Small Pipe Line. It Is Almost Impossible for the Hopper to Boil Dry

The hopper required periodical filling, and it was feared that this might sometimes be overlooked, so that dangerous overheating might develop. Accordingly, a continuous-flow system was installed by bringing a 5/16-in. copper pipe from the discharge pipe of the pump to the lower end of the water hopper. A shut-off valve was provided in the line, to cut off the supply of water or regulate its flow. A drain cock was also fitted, close to the hopper. Near the top of the hopper, a hole was drilled and tapped; a compression coupling was screwed into this hole, and another copper tube carried off the overflow. Of course, any other size of pipe and type of couplings can be used, but 5/16-in. pipe and fittings will generally suffice, as only enough make-up water is required to keep the hopper filled, the temperature of the water usually being kept close to the boiling point.

Annunciators for Group Machine Operators

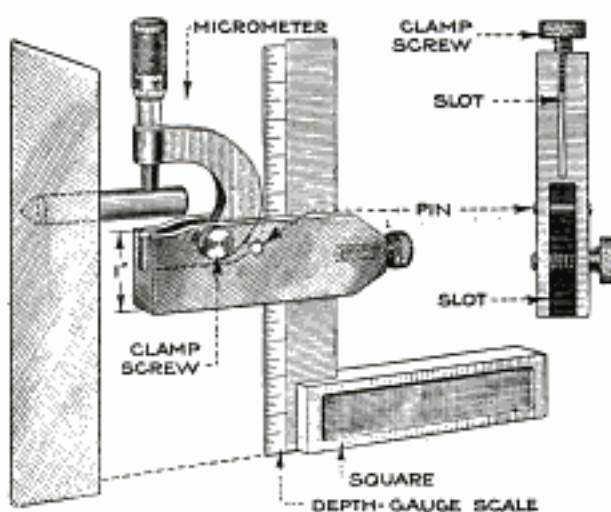
Where a single operator is responsible for the output of a group of machines, such as screw machines, gear cutters, millers, and the like, an ordinary electric-annunciator and bell system can be used to call to the immediate notice of the workman the machine that requires attention, as when it runs out of stock.

Electrical contacts are arranged on the machines thus equipped, in such a man-

ner that, on the completion of a particular operation, the needle on the annunciator will point to the number of the machine to which it is wired. The contacts, in most cases, can be attached to the bed and table, to automatic stops, or to other parts of the machine. One of the contacts must be insulated from the machine by mounting it on a fiber block.

Micrometer Height Gauge

The height gauge, although a very useful tool, is beyond the reach of many mechanics by reason of its cost. However, a very serviceable instrument can be easily made from the tools found in most kits—a micrometer, square, and depth-gauge scale, held together by the attachment shown in the drawing. The clamping device for holding the micrometer to the perpendicular scale is made from a piece of ½-in. flat steel, slotted at the top for the micrometer frame, and at the rear for the square blade and scale. The slot at the rear is the same width throughout, as the blade of the square and scale will be alike, or nearly so, in thickness. Before this slot is cut, however, the attachment is tapped for the screw which holds the square and scale parts together. The micrometer is held to the attachment by a clamping screw which binds the instrument tightly. When the micrometer has been lined up squarely, a small hole is drilled and a pin inserted; thus, when the tool is to be assembled, it is only necessary to slide the micrometer



A Substitute for the High-Priced Micrometer Depth Gauge: The Mechanic can Make It Himself from the Tools That Already Form a Part of His Kit

along the slot until the frame touches the pin, when the screw is tightened.

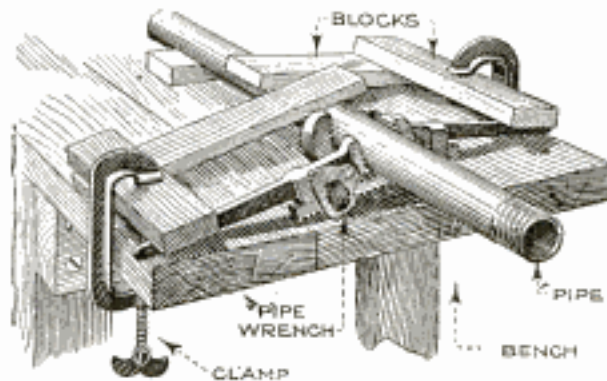
The distance from the top of the micrometer anvil to the bottom of the clamp should be exactly 1 in. Then,

when measuring the height of a plug 4.560 in. from the surface plate, the attachment would be set so that the bottom was exactly on the 3-in. line of the scale; this, plus the 1-in. thickness of the attachment, gives 4 in., the height of the anvil face. The micrometer spindle is now raised .560 in., which is the correct height of the plug. If care is taken in reading the scale, accurate results will be had. However, if 1-in. measuring blocks are at hand, the insertion of three of these would give the highest accuracy much more easily.

An Improved Pipe Vice

When pipe is to be threaded or cut, and there is no pipe vise handy, a pair of pipe wrenches can be rigged up to serve the purpose. The wrenches are applied to the work so that they face in opposite directions, which prevents the pipe from turning either way; both the wrenches and the work are clamped to the bench with blocks.

Pipe to be cut or threaded can be held as securely by this method as in a regu-



Threading and Cutting Pipe in an Improved Substitute for a Pipe Vise: Two Pipe Wrenches are Used to Hold the Work, the Whole being Clamped to the Top of the Bench

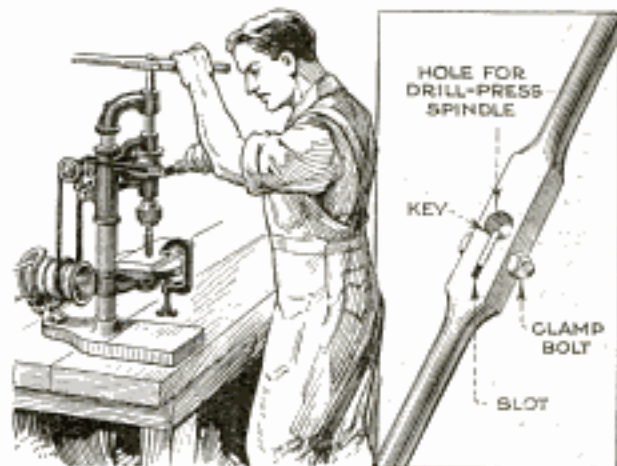
lar pipe vise, if the wrenches are properly secured and adjusted, although, of course, more time is required to clamp and release the work.

Hand Tapping on a Sensitive Drill

The drawing shows an arrangement for tapping by hand, with the tap held in the chuck of a sensitive drill, the spindle being turned by a handle attachment clamped to the upper end. This method insures a true start of the tap into the hole, especially if the hole is drilled and tapped at a single setting of the work; there is also less chance of tap breakage. If much repetition work is to be done, it would be well to cross either the main

drive belt or the speed-changing belt on the drill press so that the tap can be backed out by power.

The handle attachment may be either a

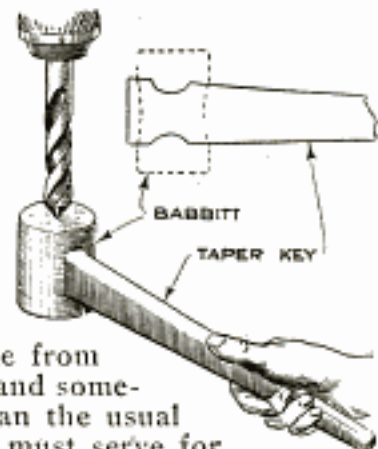


Holes can be Drilled and Accurately Tapped at a Single Setting of the Work in a Sensitive Drill. A Handle Attachment Clamped to the Spindle Makes the Tap Enter Accurately

casting or forging, or it may be turned from rectangular stock. A key is provided, which fits into the spindle keyway, and the slot in the handle into which this key fits also serves to secure it tightly to the spindle. In starting the tap into the work, pressure is applied to the feed lever with one hand, while the other hand is used to turn the handle. After the tap is started, the feed handle is allowed to work freely, and both hands are used.

A Combined Hammer and Drift

For the particular use of drill-press operators, the combination lead hammer and drift not only saves the operator's time, but he always has at hand the means of driving a drill firmly into its socket without damage. The taper key



or drift is made from flat-steel stock and somewhat longer than the usual key, because it must serve for the handle of the hammer, as well. The lead or brass hammer head is cast around the large end of the key, which protrudes about $\frac{1}{16}$ in., to form a convenient projection to strike when the key is used for driving out the drill.—M. E. Duggan, Kenosha, Wis.



A CHEAP CONCRETE MIXER

By W. S. BETTS

THE farmer would use much more concrete construction than he does, were it not for the difficulty of mixing any large quantity by hand. A very satisfactory mixer, which should not cost more than \$15, may be made by following these plans; it will mix about two wheelbarrow loads at a batch.

The mixer proper is a lime-sulphur barrel, tar barrel, or any other heavy-stave barrel with one good head, that is, a head that is perfectly flat and is firmly attached to the barrel. This barrel rotates around its long axis in a frame that is arranged to tilt within another frame, thus dumping the batch.

The gears, sprockets and chain, shafts, bearings, etc., can be salvaged from a garage junk pile, or purchased from one of the junkmen who make a specialty of wrecking cars. There should be no difficulty in finding the materials, as they are all common automobile parts.

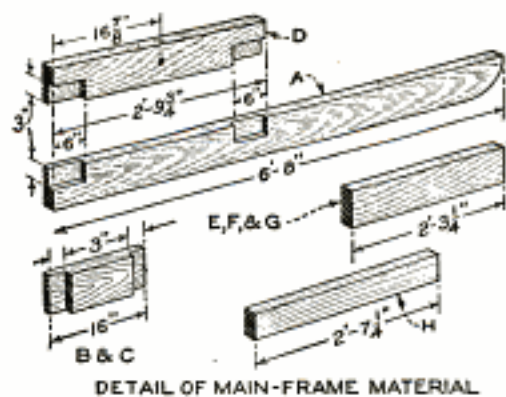
Obtain a bevel gear, about 12 in. in diameter, and its pinion; the pair should have a ratio of about 4 or 5 to 1. This gear will be in the form of a ring bolted to a flange. Remove the flange, and bolt the ring gear to the best head of the barrel, first knocking out the other head. Be very careful to center this gear exactly on the barrel head. From the plumber, get a 3-in. boiler flange union, a 3 to 1-in. bushing to fit the union, and a 1-in. long nipple. The flange union is in two identical members, fastened together by bolts. One member should be centered on the head of the barrel and bolted to the other member on the inside of the head, sandwiching the head between the two members, as in Fig. 4. The bushing and nipple may now be screwed in. It is well to smooth the surface of the nipple with a file, or to skim it in a lathe, if one is available, as it is to turn in a bearing.

Three 14-ft. and one 10-ft. 2 by 6-in. timbers will suffice for the entire frame. It is better to get these dressed on all four sides. The dimensions of the main-frame pieces are shown in Fig. 1, and the manner of framing in Fig. 2. The half-lap joints should be carefully cut, and the inside of each joint should be painted before bolting together. The crosspieces

E, F, and G, may be fastened by means of heavy lag screws if desired, although the method shown is the better. It will be necessary to strengthen the frame in front by two angle irons, shown in Fig. 2. The inside frame, which tilts within the main frame, is shown in Fig. 3. This is pivoted in the main frame, on the right side, by means of a heavy bolt turning in a piece of pipe, as shown in Fig. 7, but the left side is somewhat different. The pivot shaft must extend beyond the main frame, and be held fast, so that the pulley, shown in Fig. 5, may turn upon it. This is best accomplished by means of a flange through which the shaft passes, and by which it is rigidly held, the flange being securely bolted to the outside of the main frame. The hub of a discarded automobile wheel will furnish the flange, and an automobile axle the $1\frac{1}{4}$ -in. shaft. As the inside frame turns upon this shaft, it is well to use a piece of $1\frac{1}{4}$ -in. pipe for a bearing. The inside frame may now be put in place, when it will be found that the projecting end of the board M, Fig. 3, will strike on the back left-hand corner of the outside frame. Cut this corner off so that the inside frame will be nicely seated.

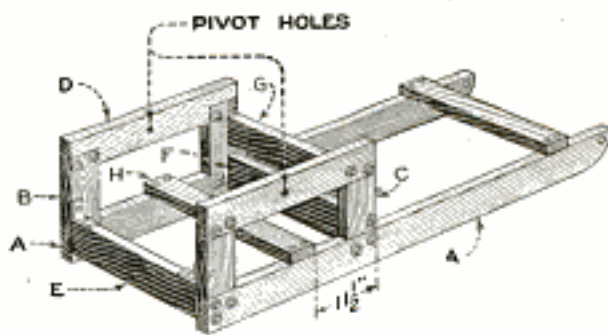
The pulley that takes the belt from the engine should be of such size that the mixer will rotate 40 or 50 times per minute. This is a simple calculation, as the gear ratio at the barrel head is known, and also the speed of the engine, and the size of its pulley. Simply multiply the speed of the engine by the size of the driving pulley, and by the number of teeth in the pinion. Divide this result by the product of the number of teeth in the bevel gear and the number of revolutions the barrel is to make.

For example, supposing that the engine makes 300 r.p.m., the engine pulley is 8 in. in diameter, the bevel gear has 40 teeth, and the pinion 10, and that the speed of the barrel is to be 40 r.p.m.: The speed of the engine, 300, is multiplied by the size of the pulley, 8, and by the number of teeth in the pinion, 10. The result is then divided by the product of the number of teeth in the bevel gear, 40, and the r.p.m. of the barrel, 40; the result is 15. This is



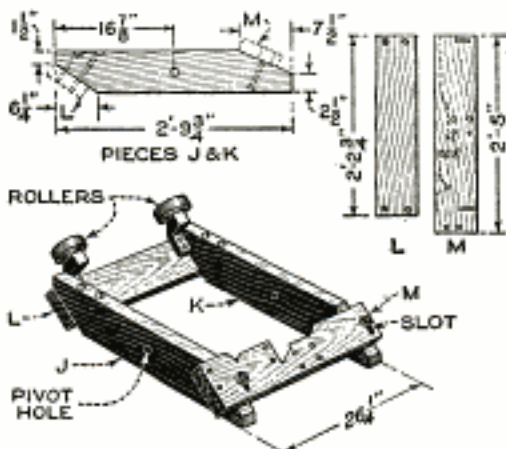
DETAIL OF MAIN-FRAME MATERIAL

Fig. 1



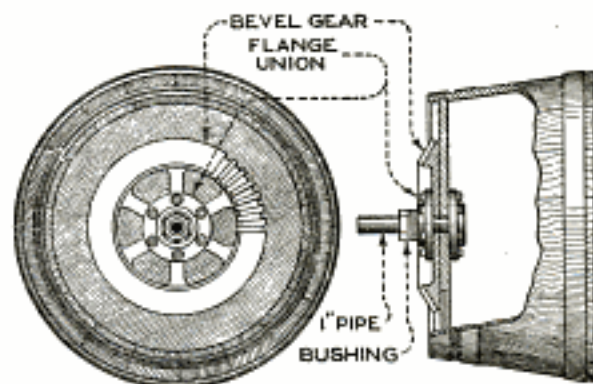
MAIN FRAME ASSEMBLED

Fig. 2



DETAIL OF INSIDE FRAME

Fig. 3



DETAIL SHOWING GEAR CONNECTIONS

Fig. 4

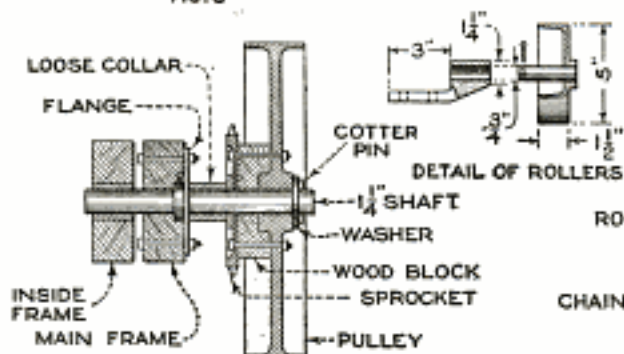


Fig. 5

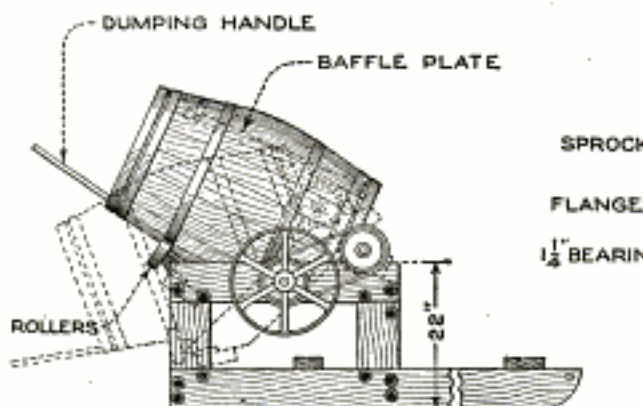


Fig. 6

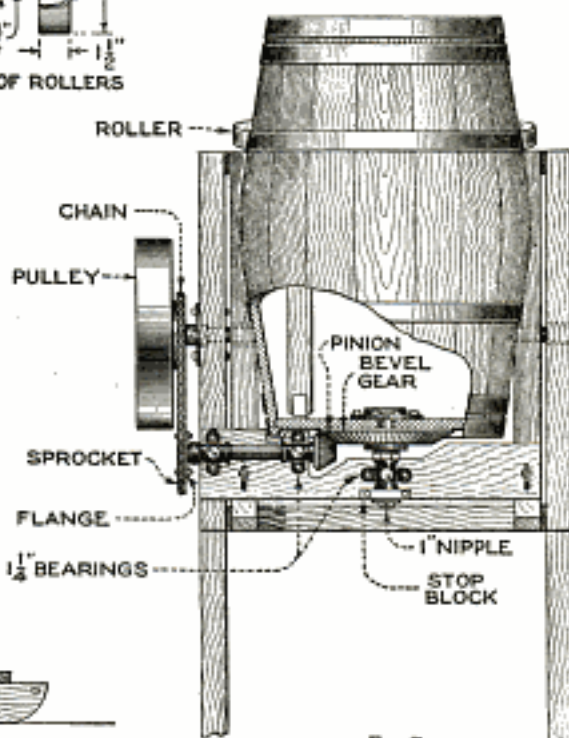


Fig. 7

Complete Details for the Building of a Cheap but Strong and Durable Concrete Mixer for the Farm: All the Mechanical Parts may be Obtained from the Automobile Junk Dealer, and the Necessary Lumber will Usually be Found around the Farm

the size of the necessary pulley, in inches. There is no reduction of motion in the sprockets, as they are of equal size. The pulley should be bored to take the $1\frac{1}{4}$ -in. shaft.

From the junkman obtain two sprockets, such as are used for chain-drive trucks, and about 5 ft. of sprocket chain. These sprockets are in the form of rings bolted to flanges. Remove the flange and bolt the ring to the belt pulley, as in Fig. 5. It will be necessary to block the sprocket out from the pulley, so that the chain may clear, and this is best done with a wood block. Bolt the sprocket through the wood to the spokes of the pulley. The pulley and sprocket may now be slipped onto the shaft, where they should turn easily, first inserting a collar of $1\frac{1}{4}$ -in. pipe and a washer for the pulley to bear against. Fig. 5 shows the complete details.

The builder is now ready to transfer the motion from the pulley and sprocket to the barrel. The motion is received from the pulley by the second sprocket, which is fastened to a $1\frac{1}{4}$ -in. shaft, at the other end of which is keyed the bevel pinion. This pinion engages the bevel gear on the head of the barrel. The details are given in Fig. 7. The shaft turns in two $1\frac{1}{4}$ -in. bearings, such as are used for automobiles. It will be seen that the board M, Fig. 7, is cut away to clear the barrel chine, gears, etc. No dimensions can be given for this, as the amount cut

will probably differ in every case. The best way to do this is to put the barrel in place with the nipple resting on board M. Block up the front of the barrel $2\frac{1}{2}$ in. from the board L, Fig. 3. Line the shafts up carefully, and cut away board M, so that the bevel gear may engage with its pinion. Bolt the shaft bearings into place, also the bearing for the nipple. A hardwood stop block, bored to accommodate the nipple, should now be bolted to board M, and a washer and pin inserted. This is to prevent the barrel from sliding forward when tipped.

The front end of the barrel is supported and rotates on two rollers, or casters, shown in Fig. 6. If two heavy discarded ball bearings can be obtained with the other parts, they will make splendid rollers, if protected from the cement and dirt; it will probably be necessary, however, to have these rollers cast in the nearest foundry. The cost should not be over \$3 each. The measurements are shown in Fig. 5. These rollers should be bolted to board L, so that the barrel will rotate between them, and so that they will keep the nipple at the head of the barrel central in its bearing.

A dumping handle bolted to the inside frame, and a baffle plate fitted inside the barrel, as indicated in Fig. 6, complete the machine. If the work has been carefully done, the machine should give as good service as commercial types costing five times as much.

Clamp for Squaring Ends of Belts

The successful use of any of the various devices intended for joining the ends of belts requires that the ends be perfectly



square. If a belt is repaired with its ends uneven, the strain will naturally be unequal, which tends to pull the belt more or less out of line and shorten its life. Many belt repairers use an ordinary square to mark off the broken ends and after-

ward cut down to the line, but it is a difficult job to cut straight across a belt,

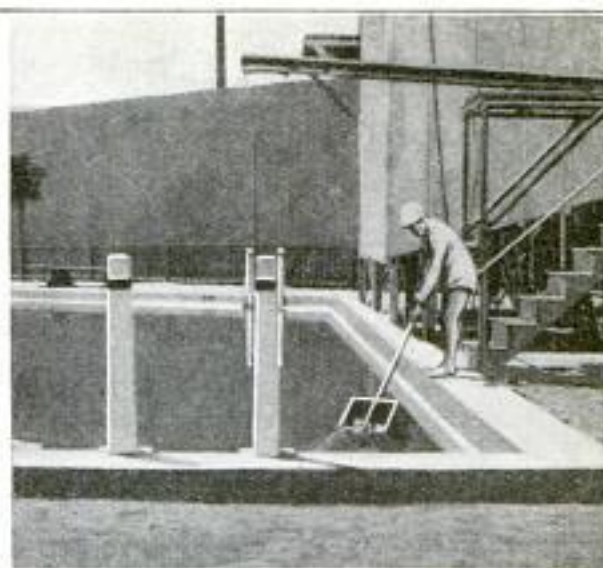
the knife always showing a decided tendency to run off.

For such work, the spring clip illustrated is well worth making. The material used is heavy, flat spring steel, annealed and formed as shown, after which it is tempered lightly. It is apparent that no matter what thickness of belt is used the inner ends of the clip always lie flat against the sides. When in use, the belt is laid on one edge and the clip sprung over until the ends rest on the bench; the end of the belt is then sliced off, with the knife held against the side of the clip. Little time and no fuss are required to trim the ends of a belt in this way, as the clip can be sprung on or removed almost instantly.

Ⓞ Milling cutters with helical teeth are better for use on wide surfaces than straight-toothed cutters, as the former shave off the metal at an angle and less power is required; they also leave a more finished surface.



A Simple Method Used by a Swimming Instructor to Keep the Surface of an Open-Air Swimming Pool Free from Dust, Sticks, Paper, and Other Débris Blown into the Tank: Left, the Device in Use; Right, the Débris is Collected at a Corner of the Tank



Keep the Surface of an Open-Air Swimming Pool Free from Dust, Sticks, Paper, and Other Débris Blown into the Tank: Left, the Device in Use; Right, the Débris is Collected at a Corner of the Tank

Skimming Flotsam from Surface of a Swimming Pool

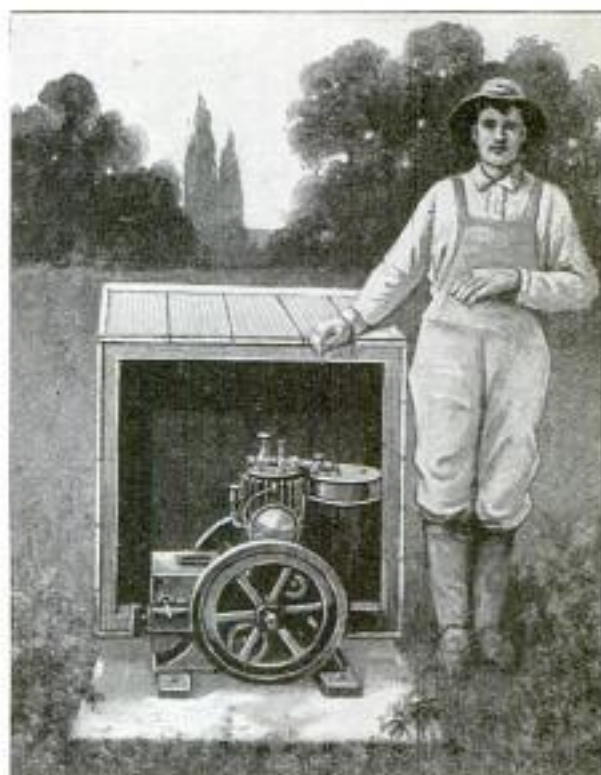
At a California amusement park, the Hawaiian instructor at the big outdoor swimming tank has a clever system of keeping the surface of the water free of flotsam, such as dust, twigs, paper, and the like, blown into the pool by the wind. He does the work of cleaning the pool in a few minutes from the edge of the pool without the aid of a boat, and leaves the pond as clean as a sheet of polished glass.

He ties a long rope to the ends of a long stick or scantling, so that when he grasps the middle of the rope a triangle is formed. This allows him to keep the wooden base of the triangle constantly on the surface of the water as he draws it along by the apex, the flexibility of the rope allowing the user to keep ahead of the "drag" and remain on the edge of the pool. The stick always floats with most of its surface well above water, and if dragged at an angle to the sides of the tank, with its inside end in contact with the wall, and not too fast, a perfectly clean area is left behind. In this fashion the device is pulled to a corner of the pool, where the débris is easily and completely gathered up with a fine-mesh wire scoop, as shown in the right-hand photograph.—L. R. Perry, Berkeley, Calif.

Shelter for Small Engine

Many farmers, or dairymen, have a pump and small engine at some distance from the house, the engine being protected, if at all, only by a tarpaulin, or similar covering, to avoid the expense of

a pump or engine house. In such cases, a shelter of the type illustrated can be built at a trifling cost for time and materials, and will afford complete protection. The engine is bolted to a concrete-block base, and the box shelter is fastened to one side of the foundation with hinges,

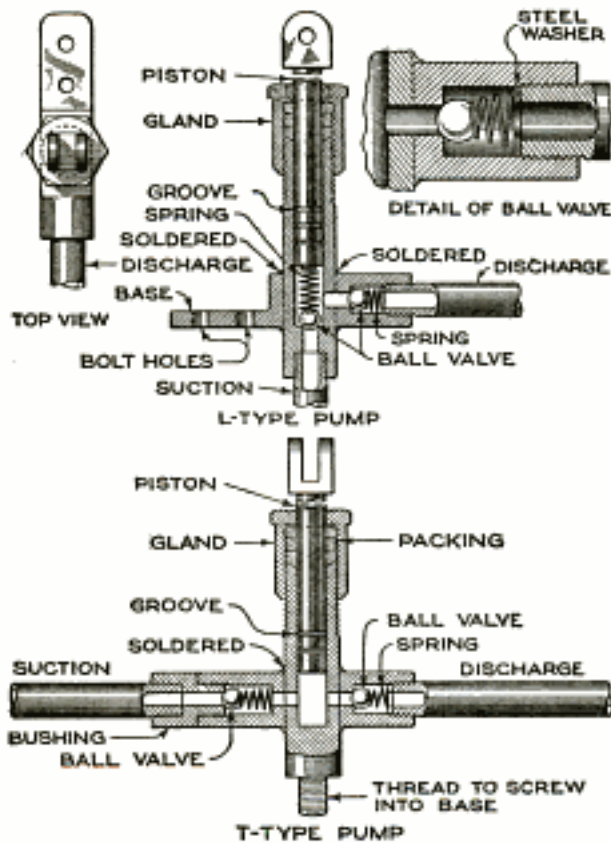


The Life and Usefulness of a Small Farm Gas Engine can be Greatly Increased by Providing Adequate Protection from the Elements

which are held by bolts set in the block. Thus, it is a very simple matter to cover or uncover the engine.—H. J. Engel, New Braunfels, Tex.

Small High-Pressure Pumps

The handicap of being unable to obtain small high-pressure liquid pumps often holds up the work of the experimenter;



Two Forms of High-Pressure Pumps That will Meet the Requirements of the Experimental Mechanic: Of the Two Types, the L-Type Is the Simpler to Make

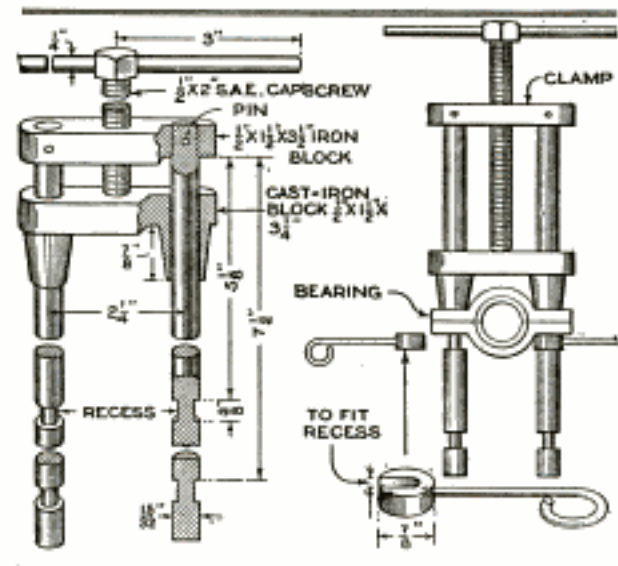
pumps of the styles shown, however, can be made at small expense. In these pumps, steel balls taken from ball bearings are used for the valves; where water is to be the element pumped, the use of brass throughout is recommended. The L-type pump is the simpler to make, as it requires a minimum of time and material. The pump cylinder is made of brass, with a carefully reamed hole for the bore. At the bottom of the bore is the suction-valve seat, on which the ball is held by a spring attached to the bottom of the piston. The discharge is through the side opening, which is fitted with a ball valve working outward. The cylinder and piece carrying the discharge valve are made separate, then assembled and soldered or brazed together, making a strong, tight joint; the discharge-valve piece is extended, as shown, to form a base for the attachment of the pump to the rest of the machine. The piston should make a snug fit in the cylinder, and should have two or three grooves cut in its lower end; these grooves hold the liquid and help to

seal the piston. A stuffing box at the upper end carries the packing, which can be adjusted to the proper tightness by screwing down the gland nut.

In the T-type pump, the suction is opposite the discharge, instead of at right angles to it as in the L-type, and in order to make the machining of the suction-valve seat an easy matter, it is cut in a bushing screwed into the valve body. The springs should be well fitted, with the end placed against the ball small enough to prevent it from slipping over the ball, and with the base large enough to center it in the cavity. To make a neat job of these spring seats, small steel washers, with holes in their centers, can be used to hold the springs in place. The pistons or plungers may be operated by eccentrics, cams, or small crankshafts.

Clamp Aids in Fitting Bearings

In all the larger repair or service shops for the most popular make of light automobiles, the bearings of the engine are "burnt in," or fitted with a machine. As these burning machines are quite expensive, the small shop must still use the time-honored method of hand scraping. After the babbitt in the cylinder block and in the bearing cap has been scraped to an approximate fit, the cap is bolted down and the crankshaft revolved. Often the cap bolts must be loosened and tightened several times before a correct fit is



A Fixture for the Automobile-Repair Shop That Cuts Down the Time of Fitting the Main Engine Bearings of Light Automobiles

obtained or the proper number of shims inserted.

By using the tool shown in the draw-

ing, about two-thirds of the time used in fitting the shims can be saved. The two pieces of steel rod, each 9 in. long, are turned and assembled with the other parts, the form and dimensions of which are shown. Two washers are made from tool steel, slotted to fit neatly into the recesses on the rods, a handle is screwed into each, and the washers are then hardened.

To use, place the bearing cap in position, with the estimated correct number of shims under it, place the cast-iron block upon the cap so that the holes coincide, and slip the rods through the holes. If in the first, or center, bearing, the recess near the upper end will extend beyond the upper end of the hole about $\frac{1}{8}$ in. If in the rear bearing, the recess near the middle of the rods will be the one to use. Slip the slotted washers into the recesses in the rods, tighten the cap-screw, and try the shaft. If it needs more or less shims, loosen the setscrew, pull out the slotted washers and lift off the cap. Repeat the operation until the shaft is just right, then insert the proper bolts, tighten the nuts and insert cotter pins.—Vernon Orr, Pomona, Calif.

Auxiliary Tip for Micrometer

The drawing shows an attachment for micrometer calipers that will be found very useful when caliper narrow slots, or places that are not easily measured without their use. Either or both anvil and rod can be fitted with these caps, which are turned, hardened, and ground to the form shown. The inside diameter is a trifle smaller than the diameter of the parts they fit over, but by slotting them as shown,

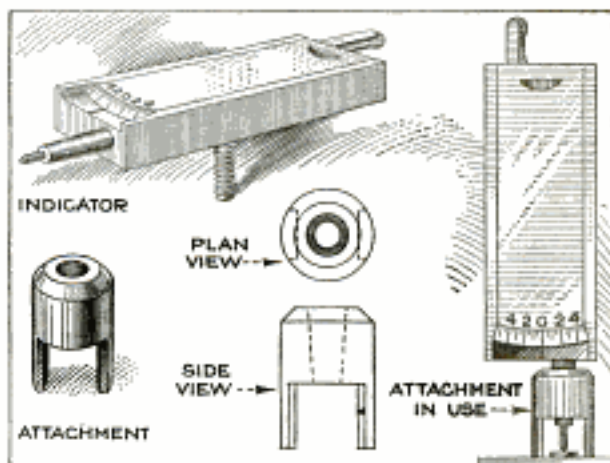


fit over, but by slotting them as shown, they make a close fit.

Attachment Increases Usefulness of Test Indicator

The drawing shows a fast and accurate way to gauge the height of projecting parts with a familiar type of test indicator to which a simple little attachment is applied. The attachment is turned from machine steel, and taper-bored to fit over the stem of the indicator. If the device is to be used for gauging a large number

of parts, it would be advisable to case-harden the points of contact. The indicator is particularly useful for grinding

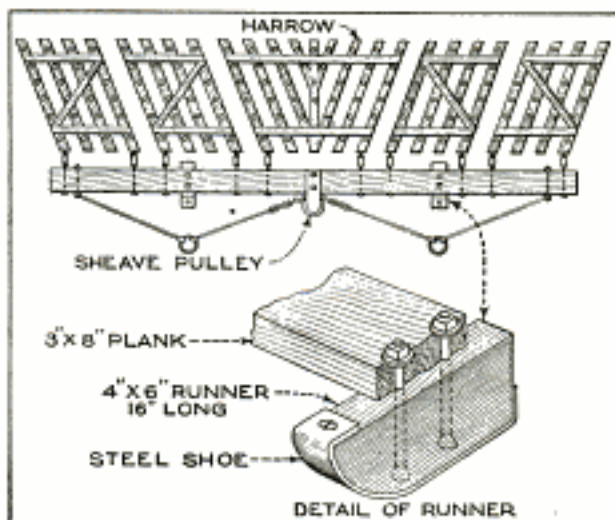


A Simple Attachment, That Slips over the Stem of a Test Indicator of a Familiar Type, Makes the Latter a Direct-Reading Height Gauge

operations. The great advantage gained by using this type of gauge is that the indicator shows how much more metal is to be removed.—T. Rod, Montreal, Can.

Drawbar for a 24-Foot Harrow

As generally equipped, the drawbars of tractor-drawn harrows have a tendency to pull the forward end of the implement either up or down. If the drawbar is made from a single heavy timber, the harrow can be made to run evenly. It is placed on steel-shod runners, which may be made of wood and shod with pieces of tire iron. The width and depth of the



Preventing a Large Power-Drawn Harrow from Pulling Up or Down at the Forward End by Attaching the Harrow to a Single Heavy Timber Mounted on Iron-Shod Runners

runners will vary according to the character of the soil on which the outfit is used and the length of the drawbar. A little

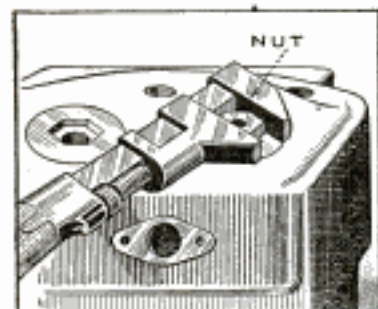
experimenting may be necessary to get the right height, but after this is obtained, no further trouble will be experienced. The harrow is attached to the tractor drawbar by means of the equalizing arrangement shown attached to the forward edge of the beam.—L. A. Krider, Hatton, Wash.

Removing Cylinder-Head Plugs

Many types of automobile engines have plugs inserted into the cylinder head so that they can be unscrewed for inspecting, grinding, or removing the valves. Such plugs are usually made to be un-

screwed with a hexagonal key or wrench, and this is sometimes lost, broken, or otherwise unavailable when most needed. In such an emergency the plug can be

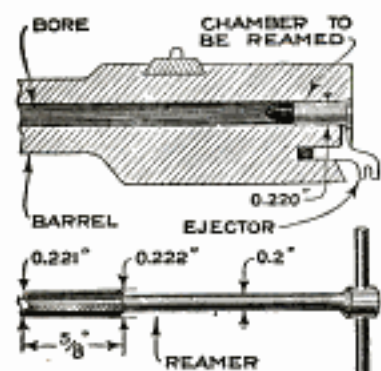
removed or screwed down by a simple method. A hexagonal nut, of a size that will fit into the wrench seat of the plug, is selected and put in place so that about half its thickness projects above the surface, providing a grip for a wrench.—Stephen Gladis, Forestville, Conn.



Rechambering a .22-Caliber Rifle

Those who have done considerable target shooting with a .22-caliber rifle have probably been annoyed at some time or other by the frequent sticking of the shell after it has been discharged. This occurs only in rifles that have been in long and continued use, and the sticking is due to the wearing of

the cartridge chamber from the lapping action of the copper on the steel barrel. This wears the forward end of the chamber a trifle larger, and as the fired shells expand to a tight fit, they will not eject on account of the taper in the chamber. The reamer shown in the drawing was

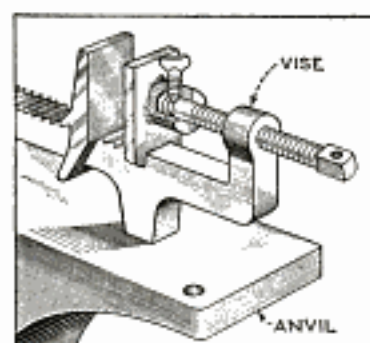


made for rechambering a rifle in which the trouble described had developed. Drill rod was used for the reamer, four flutes were milled out, and the shank turned to the dimensions given in the illustration. The original diameter at the rear of the chamber was .22 in. and the reamer was made .002 in. oversize at the back and .001 in. larger at the front. As the chamber was only 5/8 in. long, the reamer was limited to the same size. In using such a reamer, apply a little lard oil as a lubricant, and turn the tool slowly. The same idea can be applied to rifles of larger caliber when similarly worn.

The ejector is usually blamed when a shell sticks, yet, as often as not, in an old rifle, it is blameless, and the sticking can be traced to the cause assigned.—J. V. Romig, Allentown, Pa.

Vise for the Blacksmith's Anvil

Fitting into the hardy hole of the anvil, a vise such as the one illustrated makes it possible for the smith to do single-handed a variety of work that ordinarily requires the assistance of a helper. The body of the vise is provided with a series of notches along its horizontal extension,



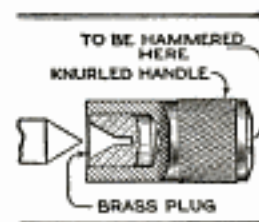
into which the tooth on the back of the rear jaw fits, making the tool quickly adjustable for work of different sizes. The vise screw is grooved on its inner end and is held to the

front jaw by means of a screw, the end of which fits in the groove.

A Lathe-Center Driver

The drawing shows an easily made convenience for tapping into place the live and dead centers of a large lathe. A hardwood block is commonly used for the purpose, but this soon splits up.

A heavy body is made up from either machine or tool steel, knurled if desired, and with one end drilled a drive fit for a brass plug, which is drilled and reamed out to fit the 60°



lathe centers. A large, combined center drill and reamer should be used for the purpose; in any event a hole must be drilled beyond the conical bore in order not to injure the point of the lathe center while driving it into the spindle. If the brass plug is set in slightly, as shown, it will help protect the center hole from accidental damage.—H. H. Parker, Oakland, Calif.

Chipping Tough Steel

Every mechanic knows the difficulty of cutting or squaring off the ends of keyways in a tough steel shaft. Also, he knows from long experience

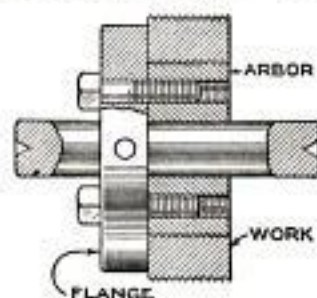
that the ordinary cape chisel does not hold out long. The idea illustrated by the drawing shows how a short piece of high-speed steel may be used in a holder to make a thoroughly worthwhile chipping chisel.

The holder is made from a piece of cold-rolled rod, with a square opening broached in the end, into which the high-speed tool bit is inserted and held by means of a set-screw on the side.—John Aures, Buffalo, New York.



A Special Threading Arbor

Cutting an outside thread on work that is already provided with a thread inside, usually results in marring the outer



threads when attempting to remove the work from the arbor. With the arbor illustrated, when the cap screws are released, the work may be unscrewed with the fingers.

It consists of a flange, pinned to an arbor, and drilled for two or more cap screws. These cap screws hold to the flange a piece threaded to fit the internal screw on the work, bored an easy push fit on the arbor, and drilled and tapped for the screws.

The work is screwed on when the screws are tight; when the thread has been cut, the screws are loosened, and the work, being no longer screwed up tight against the flange, may be easily removed.—Harry Moore, Rosemount, Que.

Pencil Holder Made from Paper

Draftsmen, shopmen, and others who have occasion to use pencils for any length of time will appreciate the idea shown in the engraving, which allows short pencil stubs being used to give the utmost in service. The chief objection to the use of pencil stubs is the tight and tiring grip that must be used to hold them



in the fingers. This objection is overcome by rolling a cylinder of stiff paper around the short pencils, one in each end, and binding securely with cotton thread, tape, or an adhesive strip. If the paper is glued along the unbound edge of the cylinder, it will outlast a good many stubs before it must be thrown away.

Babbitt Ladle Made from Wagon Skein

As the illustration shows, an excellent babbitt ladle for use around the farm or lumber camp can be made from an old wagon skein

and a piece of iron rod, to serve as a handle. The larger end of the skein is cut square across, heated, and a lip or spout formed on the edge for convenience in pouring the metal. The lag-screw hole at the small end is filled up with a short bolt, with the head



inside and the outside end riveted. One end of the rod used for the handle is flattened, bent around the skein, and welded to the opposite side, making a continuous eye, and a small eye is turned in the other end by which the ladle is hung up when not in use.



A Homemade Utility Bench Grinder

By J. V. ROMIG

THE grinder illustrated and described in this article is an ideal type of machine for use in the experimental shop, small assembly department, or even the home workshop. The construction is simple, as the parts are easily obtained, and a minimum of machine work is required. Users of a grinder of this type have the benefit of two machines combined in a compact unit without sacrifice of strength.

The head of the machine requires two 1-in. pillow blocks as bearings for the grinding-wheel arbor; these bearings can be bought for a small sum from any machinery-supply house. The spindle, or arbor, is made of good tough steel, and grooves are turned in the bearing surfaces, as shown in Fig. 3. These grooves take the thrust, and prevent the shaft from moving endwise in its bearings. This feature of construction will, of course, make it necessary to reabbitt the boxes, to make the simplest and strongest bearing. The ends of the spindle are threaded with right and left-hand threads, as shown, for the wheel flanges that hold the grinding wheel to the shaft. The driving pulley is fastened to the spindle between the bearings, and oil cups of adequate capacity are fitted to the bearings to insure proper lubrication.

Four-inch pipe is used to make the pedestal of the machine; this pipe is turned down to an outside diameter of $3\frac{1}{16}$ in. and threaded at each end for screwing into the flanges. The flange at the bottom end of the pipe should be of the largest diameter obtainable, to make a solid base for the machine. The upper flange is shaped into rectangular form, as a base to which the two pillow blocks are bolted, and it may be necessary to have this cast.

In order to use the machine as a surface grinder, a special tee, fitted with an arm to carry the table, is added. A 4 by 4 by 2-in. tee serves as the body; it is chucked in the lathe, and the threads bored out to $3\frac{1}{16}$ -in. inside diameter,

making it a neat sliding fit on the turned pipe column. Ears, or lugs, are then welded to the rear side, as shown; these are drilled and tapped for the clamping screws, after which the lugs and tee are split, to make a clamp for holding the support at any position on the column. A section of 2-in. pipe is screwed tightly into the side of the tee; this horizontal piece of pipe is turned down to $1\frac{1}{16}$ -in. outside diameter. This arm must be perfectly square with the main column, when assembled, as it supports the pillow-block base of the pivoted worktable.

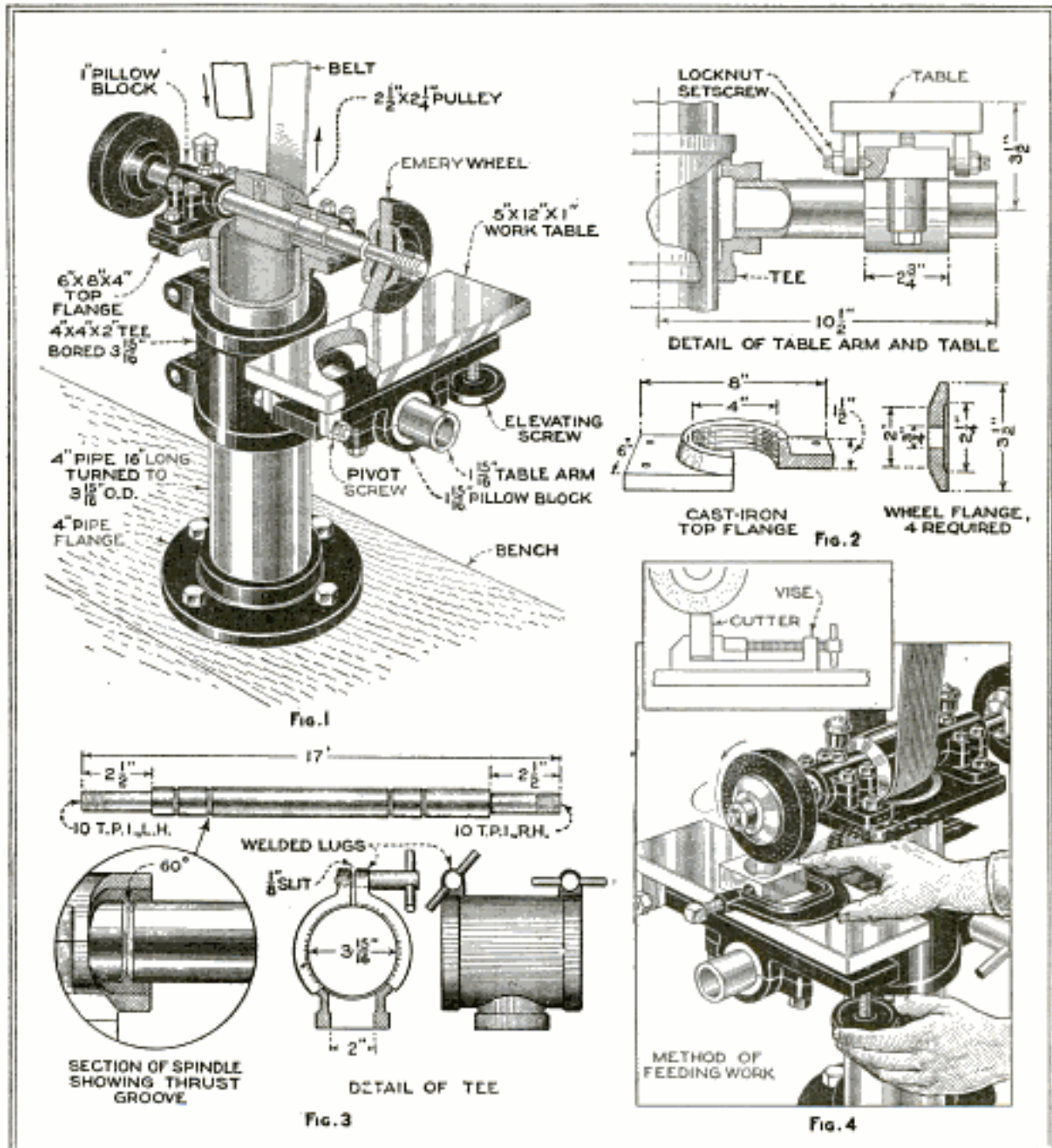
The worktable is made from a slab of flat steel, with pivot lugs welded to the underside of the rear end; the pivot arrangement for tilting the table is clearly shown. Holes are drilled and tapped through the lugs for taper-pointed screws, the points of which fit into 60° counter-sunk holes in the pillow-block base. Locknuts hold the screws, when tightened. This pivoting arrangement, together with the elevating screw shown, makes an accurately working mechanism. The weight of the table keeps it down tight and firm while grinding. The horizontal arm is made sufficiently long to allow the work to be moved laterally; the height of the pedestal is also sufficient to permit the use of jigs and fixtures. Since the table has no longitudinal travel, it is necessary to move the work itself, passing it back and forth under the wheel, feeding it in or across with each pass, until the whole area has been surfaced. Bent-wire frames are used to hold work that is too small to be fed by the hand, and on thin, flat stock, masks made of thin metal are used. Large work can be held and moved by C-clamps, as in Fig. 4, while a small toolmaker's vise comes in handy for holding many odd-shaped pieces of work.

As the work is slid back and forth under the wheel, it can readily be seen that the parallelism of the two surfaces must be exact. This feature is the most valuable characteristic of the machine, and makes for accurate quantity work.

For properly dressing and truing the grinding wheel, a diamond dressing tool is clamped in a small vise, held on the table, and brought against the wheel. The diamond point can be guided parallel

at a speed of about 2,500 r.p.m., which may be considered an entirely safe and efficient one.

An addition to the machine, which may be looked upon as a refinement,



A Small Bench Grinder of a Very Convenient Type for the Small Workshop: All the Parts are Easily Obtained, and the Finished Grinder Is Capable of Accurate Work

with the wheel by clamping a steel square to the table.

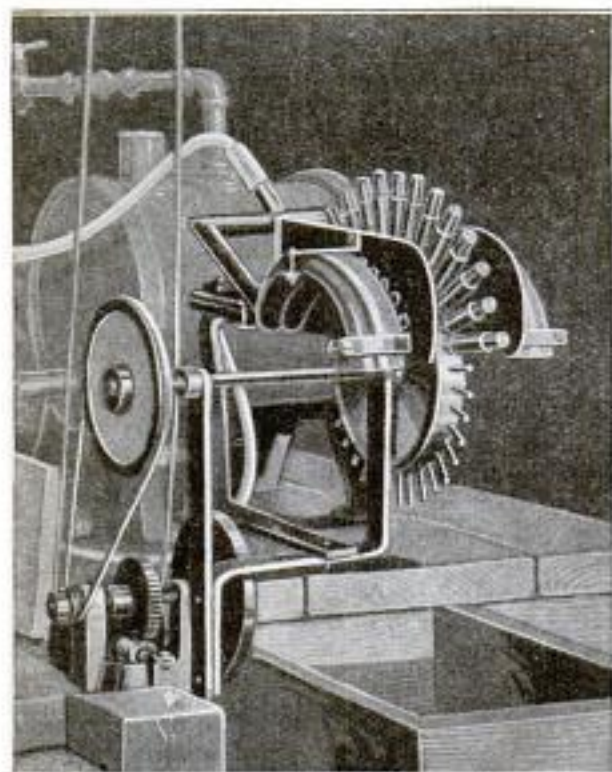
Work must always be fed under the wheel from the rear, against the direction of rotation, as in milling-machine practice and for the same reason—to prevent the wheel or cutter from pulling the work in. A 6 by 1-in. grinding wheel is a suitable size for use with this machine.

The spindle or arbor should be driven

would consist of a vertical screw for adjusting the height of the table accurately. This would operate in exactly the same manner as those used for elevating the bed of a drill press. The addition of the screw would, of course, require that a lug be welded to the side of the tee and another to the flange base, the lug on the tee being drilled and tapped to serve as a nut for the screw.

Machine Anneals Parts Rapidly

The machine illustrated is used for annealing the ends of cas hardened shackle bolts, which are afterward inserted into



A Machine for Annealing the Ends of Cas hardened Shackle Bolts Used in Automobile-Spring Suspensions: The Bolts are Placed on the Radial Pins of a Slowly Revolving Disk and Pass between Gas Flames

the shackles and headed over in a punch press. The operation is practically automatic, and it is only necessary for the operator to place the bolts on the projecting pins of the revolving disk.

This disk is a casting, into the rim of which the pins are driven radially; these pins are just large enough to fit inside the hole drilled through the center of the parts to be annealed. The disk is driven at a slow speed by the worm reduction gear seen at the left in the illustration. Gas and air pipes are arranged at each side of the disk so that an intensely hot flame is directed against the ends of the pieces as they slowly revolve. The operator places the parts on the pins at the front of the disk, and only a few seconds are required to bring the parts to be annealed to a red heat, which is maintained for the period it requires to pass between the double flame.

As soon as the parts have passed below the center of the disk, at the rear, they drop off into a box, where they are allowed to cool.—J. Brandstetter, Chicago, Illinois.

Miscellaneous Uses for Linseed Oil

In the spring, before putting up the door and window screens, give the screens a very light coat of linseed oil on both sides. This treatment will add to the life of the screens by preventing them from rusting.

When there are so many coats of paint on tin roofs that the heat causes it to blister and peel, discontinue the painting and apply an annual coating of linseed oil; this applies also to tin valleys and gutters.

Galvanized-iron downspouts from the gutter troughs begin to rust first on the inside. To prevent this, pour a small amount of the oil into the top of each spout once a year, just after a rain and while the inner surface of the spout is still wet. The oil will distribute itself quite evenly over the wet surface and provide a rustproof coating.—Arthur Thornton, McKeesport, Pa.

Perforated-Pipe Lawn Sprinkler

Along the edge of the pavement, in front of the city hall of a small town, runs a $\frac{1}{2}$ -in. pipe that is practically invisible, being half buried in the earth of the parkway. Holes, at intervals of 1 ft., are drilled through the wall of the pipe at an angle of 45° to the pavement. The first



The Grass Plot along the Walk in Front of a City Hall is Kept Sprinkled during the Summer by a Perforated Pipe, the Water having First been Used to Test Water Meters

impression is that the arrangement is installed primarily for watering the lawn but the sprinkling system has another use. A pipe line runs from the basement of the building, where the water meters used within the municipality are tested. When a meter is to be tested it is inserted in the line, the connections tightened, and the water, which would otherwise be wasted, is used for sprinkling. During the winter months, the water from the meter-testing bureau is run into the sewer.—Dale R. Van Horn, College View, Neb.

Hardening Small Coil Springs

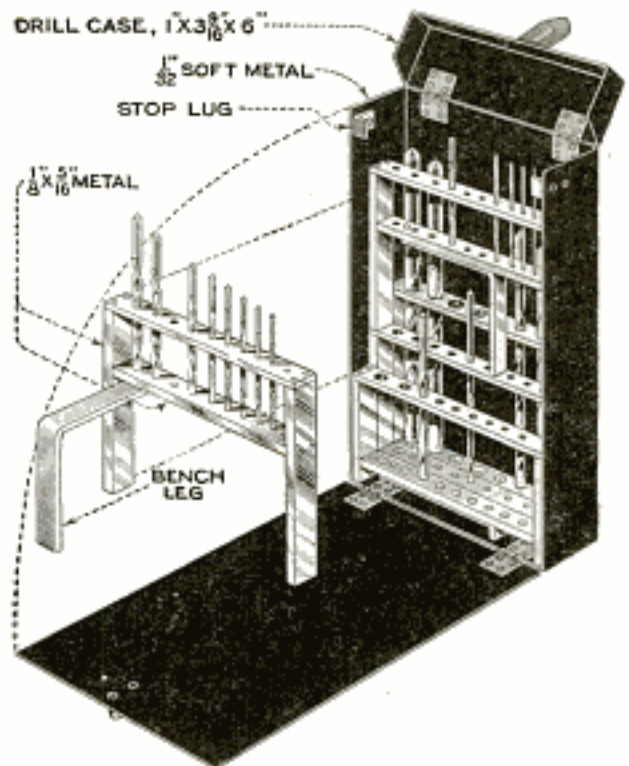
Small coil springs made of annealed steel wire should be hardened and tempered while held on an arbor. A process successfully used by jewelers is the following: The soft wire is wound on a threaded arbor of the proper diameter; two small holes are drilled through the arbor, at a distance apart equal to the length of the spring to be wound, and tapped and fitted with large-head screws. One end of the wire is fastened under one screw head, the wire wound on the arbor, and the other end is fastened as the first. The assembly is heated to a cherry red and quenched in cottonseed oil. To temper, the assembly is removed from the oil, held over a flame until the oil on it ignites and burns off, then quenched again.

To blue a spring after hardening, it should be polished thoroughly, and be free from grease or finger marks. It should then be placed, while on the arbor, on a small metal plate, copper being best for the purpose, and the plate placed over a flame. The spring is rolled back and forth until a deep-blue color appears, then quenched in water. The finished spring is removed from the arbor, washed in soap and water, and rinsed and dried in hot sawdust.

Case for Small Drills

Twist drills, especially those of the smaller or numbered sizes, are difficult to keep in proper order when dumped into a compartment of a tool box; besides, time is consumed in hunting for the size wanted, and the drills are liable to injury from contact with other tools. To make all the drills readily accessible, so that the proper size can be selected without hesitation, and prevent them from damage, the case illustrated provides a neat addition to the mechanic's tool kit.

It is made of sheet metal, to any dimensions desired, although the size indicated is convenient for the tool chest. The top and front flap of the case are hinged and provided with a small hasp so that a split ring, or lock, can be used to keep it closed. Two angle pieces are fas-



The Numbered, or Smaller, Sizes of Twist Drills are Kept in Order, So That the Proper Size can be Selected without Delay, and the Tools are Protected against Damage

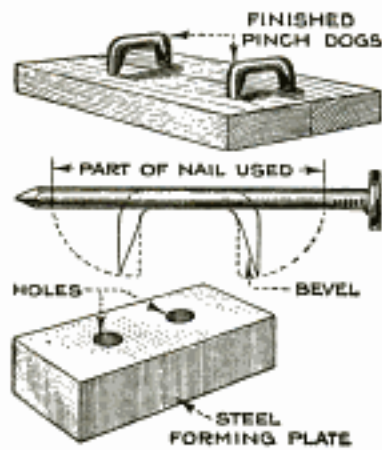
tened to the sides, inside and near the top, to serve as stop lugs for the flap cover.

The drills are held in their proper order in a series of graduated drill benches, made of flat stock. Each of these benches is provided with a leg that folds underneath, so that a series of drill sizes can be taken from the case and stood on the bench. Five benches, as shown, will hold drills from No. 1 to 80, although the last bench, which holds the sizes from 56 to 80, can be dispensed with if extremely fine work is not done. The size of the drills may be stamped on the upper cross-pieces of the holders, or the numbers may be stamped on a piece of sheet metal to be attached a little below the top shelf.—P. A. Daschke, Astoria, L. I.

As a rule, timothy should be harvested for hay after the plants have passed out of full bloom, before any of the heads of the earliest plants have begun to turn brown, and before the seed has begun to mature.

Pinch Dogs Made from Nails

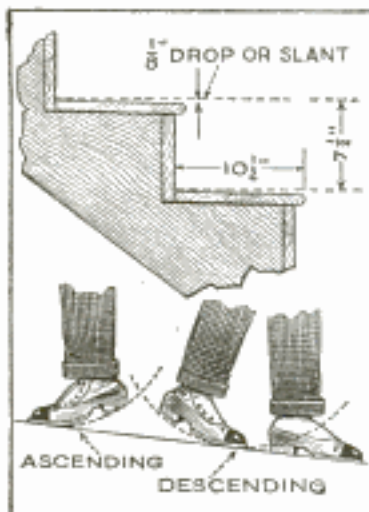
Inexpensive pinch dogs can be made from common nails by cutting off the head and end with a hacksaw, and bending



them into the desired shape and distance between the prongs. The prongs are filed on the inside to a flat sharp edge. Most pattern-makers desire their pinch dogs to be interchangeable, and in this case, a simple forming fixture can be made from a piece of flat steel. Two holes are drilled the desired distance apart and a little larger than the nail or rod used. The pinch dogs are then bent to the approximate size in a vise, after which the ends are placed in the holes of the fixture and driven down with a hammer.

Proper Angles and Dimensions for Steps and Stairs

Even the most casual observers have noticed that some stairways are much easier to ascend or descend than others, but why this is so, is not easily discovered. A stairway is only a man-made hill used to connect planes at different levels. By referring to the lower part of the accompanying drawing, it will be seen that the human leg swings in an arc, which necessitates a certain amount of "clearance" or drop to the incline or hill the person is ascending or descending. This principle, if applied to the building of steps, makes them easy to climb. A slant of $\frac{1}{8}$ in. given to the individual steps will be sufficient, and this is the secret used by expert stair-

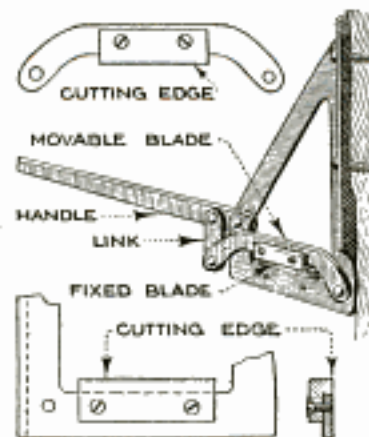


builders for producing what is known as an "easy tread." A flat, or perfectly level, step, or one having a slant toward the back, compels the person to lift the foot high to clear the front edge, and then lower it again to make contact for support. Besides being tiresome to climb, such a stairway is the cause of accidents due to tripping. Tripping is usually experienced on the descent, and the feeling of unnecessary fatigue on the ascent. The height of the steps is another important feature of a properly designed stairway. To be at their best, the steps should not be lower than $7\frac{1}{2}$ in. nor higher than $7\frac{7}{8}$ in. The width of the step, or tread, should be approximately $10\frac{1}{2}$ in. The pitch of all stairs should be governed by these dimensions when the layout or design is made.

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Powerful Shear Made of Bar Stock

The shears shown in the drawing were made in a sheet-metal shop, for cutting material too heavy for the usual cutters. The design is of special interest, as the method of supporting the fixed cutter



blade, and that of providing a powerful leverage with a simple linkage, are quite novel. The main frame is made from a triangular piece of structural plate, cut out to leave a diagonal support for the

outer end. The long side of the frame is bent at right angles, and drilled for lag screws, by means of which the device is attached to a post or other support. The movable blade is attached to a lever pivoted at the rear of the frame, while the hand lever is attached to the outside corner of the triangular frame; a link to connect the hand and blade levers completes the shear. The blades are made of tool steel, hardened and tempered, and are removable, so that they can be sharpened or replaced easily.—G. A. Luers, Washington, D. C.

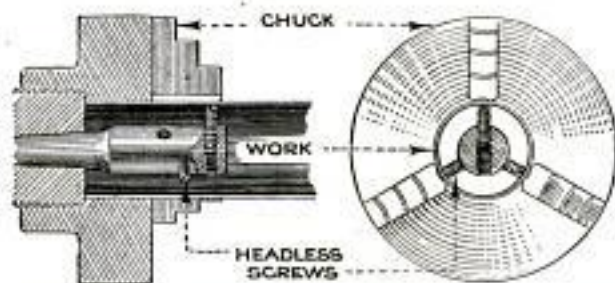
Blueprints that have been slightly "burnt" can be brought out clearly by light sponging with peroxide of hydrogen.

Chuckling Thin Tubes without Distortion

Thin brass or copper tubes are often distorted when held in a three-jaw chuck for facing or threading the ends. For this reason many lathe operators turn up pieces of scrap stock to fit the bore of the tube; this takes the thrust of the jaws, but a better method is shown in the drawing, whereby tubes of any diameter, from 1 in. up, can be adequately supported with very little extra work.

The body of this support is a piece of 1-in. steel turned on one end to fit the taper in the headstock spindle. The front end is tapped for three $\frac{3}{8}$ -in. headless screws, the holes for which are tapped clear through the piece and are equidistantly spaced around the circumference, to suit the position of the chuck jaws. The device is set in the following manner:

A piece of tubing of the size to be turned is first gripped lightly in the chuck. The support is then held in the tailstock and advanced, each screw being set in turn to touch the inside wall of the tube. The piece is then removed



Support for Preventing the Distortion of Thin Tubing When the Jaws of the Lathe Chuck are Tightened Up

from the chuck, and the supporting device is placed in the headstock, after which it is necessary only to slip the work over the screws and tighten the chuck firmly. Care should be taken to have the three screws beyond the face of the chuck, so that large-size tubing, that will not enter the chuck bore, can be handled. Longer screws are used to support tubing of larger diameters.

Lathe Used to Saw Logs

A lot of back-breaking labor in sawing logs can be saved by harnessing the end of the crosscut saw to the faceplate of a lathe. The necessary attachment for the one-man saw is made by forging an eye on the end of a $\frac{3}{4}$ -in. rod, the opposite end of which is flattened and drilled to fit bolts for attaching it to the saw. A $\frac{5}{8}$ -in.

bolt is used to fasten the rod to the lathe faceplate, the bolt being an easy fit in the eye, to allow it to serve as a crankpin. The stroke of the saw can be adjusted by sliding the bolt closer to or away from



A Log-Sawing Attachment for the Engine Lathe That Relieves the Owner of a Lot of Back-Breaking Labor

the center, and its speed regulated in the ordinary manner; a weight, hung on the connecting rod, may be found necessary for rapid cutting.—Harry J. Bernhard, Pasadena, Calif.

Skid Used to Remove the Soil from Unbraced Excavation

When excavating material from a deep, unbraced sewer trench, two inclined poles were used to remove the soil to the surface. Planks were placed between the poles to form a smooth sliding surface for the drag scraper. The power for hauling the scraper was supplied by a team of horses hitched to the end of a rope; the poles served as guides for the scraper and supported the plank runway.



Skid Arrangement Used to Remove Excavated Material from an Open Sewer Trench: The Soil was Wheeled to the Bottom of the Runway and Dumped into a Drag Scraper, Which was Drawn to the Surface by a Team of Horses

The earth was wheeled to the foot of the skid in wheelbarrows and dumped into the scraper.—Allen P. Child, Kansas City, Missouri.

Blueprinting without a Frame

Good blueprints can be made without the use of a regular printing frame. It is

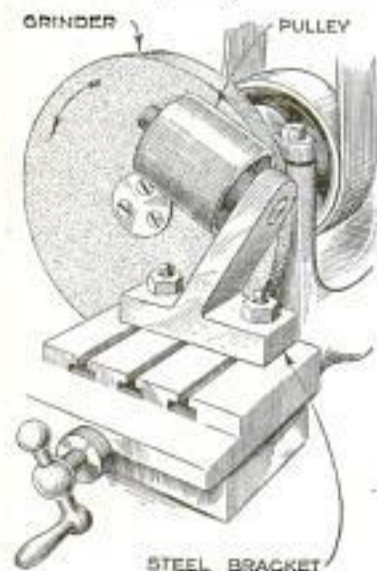


advisable to have at least one sheet of glass a little larger than the print, and another sheet of the same size for backing will make the job easier, although in its absence a piece of stiff cardboard can be used. A few paper clips around the edges of the glass will hold the im-

proved frame together and the blueprint paper in close contact with the tracing, or negative, whichever is used.—H. K. Randall, Chicago, Ill.

Disk-Grinding Pulleys

Instead of the slow method of turning flat-faced pulleys in the lathe, the drawing



shows a quick and satisfactory method of doing the work that will equal the results obtained on the lathe. Place a steel bracket of the type shown, with a spindle onto which the pulley fits, upon the grinder table, fastening it so the pulley cannot come off

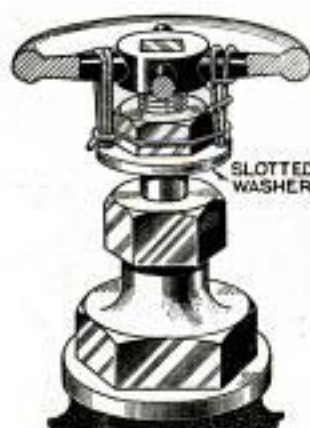
but can revolve freely in contact with the face of the grinder. When the machine is started, the table is fed in until the pulley makes contact with the wheel. The result is that the pulley revolves according to the speed of the abrasive disk and in a few minutes the work is done.

Loosening Sticking Screw Caps

The screw tops on cans, jars, and similar receptacles, have the bad habit of sometimes becoming so firmly stuck that force sufficient to damage the cap is necessary in order to remove it. If it is desired to take off the cap easily and without damage so that it can be used again, a simple method consists in soldering two pieces of wire, or nails with points and heads cut off, across the center of the cap about $\frac{1}{8}$ in. apart. This will produce a channel or groove, into which any straight-edged piece of metal can be inserted, so that sufficient pressure can be exerted to start the cap.—Leighton Powell, San Francisco, Calif.

Securing a Loose Valve Wheel

The usual method of fastening the valve wheel to a cast-iron valve is by means of a nut and washer, or a single screw on the end of the stem, but when either is ac-



identally broken off or lost the wheel may roll off and possibly become lost when urgently needed. To make a proper repair, the valve should be taken down and the broken part machined, but as this is impracticable in many cases, the valve is either left "as is," or some

effort made to fasten the wheel. As shown, a nut and washer, and piece of wire can be used to make a serviceable repair. Run a thread-cutting die down the stem for a short distance; then file a slot on opposite sides of the washer and slip it on, followed by the nut. The wire is now twisted around one of the handwheel spokes, brought down through the slot on one side of the washer, up through the slot on the opposite side, and around a spoke on the other side of the wheel. These operations are then reversed, the wire pulled tight and twisted, after which the nut is given a turn or two to stretch the wire. The nut is then locked by a turn of wire around it.

☞ To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434.



Amateur Mechanics

Information as to where to obtain any specified materials or parts for making objects described in the following pages may be had, on request, from our Bureau of Information.—Editor.

Combination Tent and Pack Cover

By C. S. TAYLOR

PORTSMEN and vacationists "roughing it," and carrying their own bed and board on their backs, or in a canoe, will appreciate the obvious advantages afforded by a tent that also serves as a cover for the owner's camp effects when not used as a shelter.

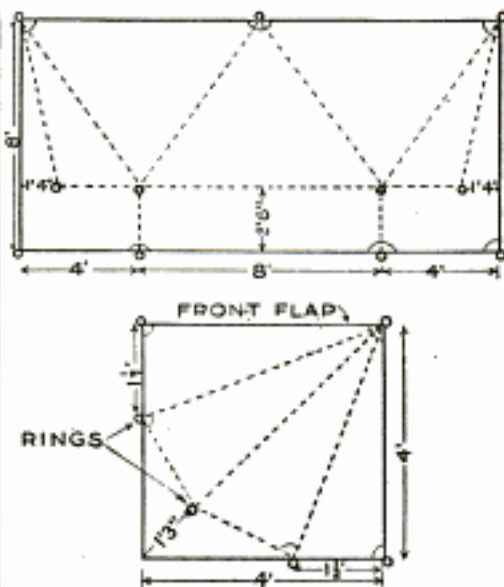
There are two methods of making the tent illustrated: One is to use a rectangular tarpaulin, or other suitable material, which is twice as long as the width. Make a strong hem around all edges and sew brass or iron rings, as indicated, at the ends of the dotted lines. The fly, or front flap, is made separately, from a square piece of material, the dotted lines showing the folds of the shelter when it is set up. It is unnecessary to do any cutting of material in making a tent of this type.

The alternative method requires more or less cutting of the material, which is cut along the dotted lines as a pattern. The separate pieces are sewed together, with the seam inside. This makes a regulation tent, and by making a few paper models of different sizes, it is an easy matter to get the right proportions

for a tent of different dimensions from that illustrated. The tent in the drawing is a good average size, and for making it, a piece of material 8 ft. wide and 16 ft. long is needed. It is not necessary to have the cloth in a single piece, but this is an advantage. In using yard-wide goods the strips are sewed together with heavy waxed thread, the seams running lengthwise of the 16-ft. piece. To reinforce the tent at the corners, where the greatest strain comes when the tent is pegged and the guys in place, it is a good plan to sew patches of cloth on both sides, where the rings are sewed on. The tent is amply large for two occupants, and when set up is 8 ft. wide, 6 ft. deep, 7½ ft. high at the front, sloping to a height of 2½ ft. at the back wall.

For a light summer tent a heavy grade of unbleached cotton cloth is a good choice, although if heavier material is wanted, regulation canvas duck of several weights can be used.

If a light nonwaterproof material is used, it can be processed and made to shed water by the following treatment: In 4 gal. of boiling soft water dissolve



For the Sportsman or Vacationist "Roughing It" in the Woods or Traveling "Light" in a Canoe, the Tent Shown in the Drawing Not Only Provides a Shelter at Night, but Serves as a Cover for His Personal Effects

$\frac{1}{2}$ lb. of powdered alum; also dissolve $\frac{1}{2}$ lb. sugar of lead in another 4 gal. of water in a separate vessel, and when both chemicals are completely dissolved, pour the alum solution into a tub, and then add the lead mixture; let this stand for several hours, and pour off the clear liquid. This is used to saturate the tent material thoroughly. To make the cloth entirely waterproof, it is necessary to fix the acetate of aluminum in the fibers of

the cloth, and this cannot be done unless soft water is used. Finish the process by light rinsing in clean soft water, and hang up to dry. The sugar of lead used is a virulent poison, and should not be taken internally. Also, as some persons show a peculiar tendency to absorb poisonous lead salts through the skin, with accompanying bad effects, it is suggested that a stirring stick be used instead of the hands for saturating the cloth.

Novel Rubbish Box for Park

Receptacles for waste in public parks would not be such an eyesore as they usually are if made to represent animals,



like the one in the illustration. The outline of the animal is first drawn on a piece of wall-board, which is then used to mark the design on the sides of the receptacle. The sides are made of 1-in. boards, glued edge to edge,

and strengthened by flat-iron crosspieces. A good size for a receptacle of the type illustrated is 4 ft. high by 10 in. wide. The opening for rubbish is at the top, in the piece connecting the sides, and an opening, covered by a sliding board, should be cut in the bottom also, for convenience in emptying. Careful painting will add considerably to the effect of these novel boxes.

File for the Brief Case

An index file filler, of a size to fit the brief case, can be obtained from many stationers. This, when fitted into the case does not add appreciably to the weight, and letters, papers, and other documents are readily found under their proper index letter, and in perfect order, so that no time is wasted in hunting for what is wanted.

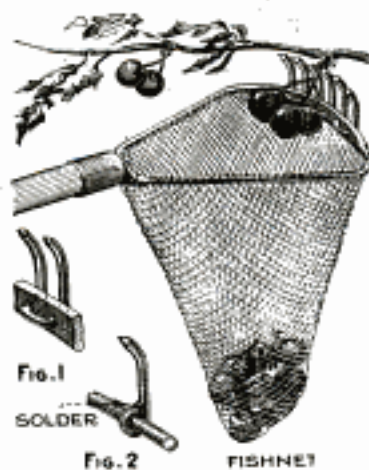
☐ A mark at the top of the automobile steering wheel to show when the wheels are straight ahead will be found of much assistance in maneuvering the car.

Replacing Cylinder-Head Bolts

The last two bolts on the light-automobile cylinder head are located directly underneath the dash, and must be in place while the head is inserted on the engine block. To push the head into place, with these bolts protruding, results in the gasket being bent, torn, or disarranged. The usual practice is to have a helper who holds the bolts while the cylinder head is being put on or taken off. A simple solution to this problem consists in stretching a rubber band, made by cutting a piece from an old tube, around the two bolts, underneath the heads.—A. W. Michener, New York City.

An Effective Cherry Picker

For picking cherries rapidly with a minimum of climbing, an effective implement can easily be made. A frame is



made of stiff wire or light iron rod, the ends being brought together and forced tightly into a handle of the proper length. On the front of the frame a series of picking fingers, or hooks, are fastened about $\frac{1}{4}$ in.

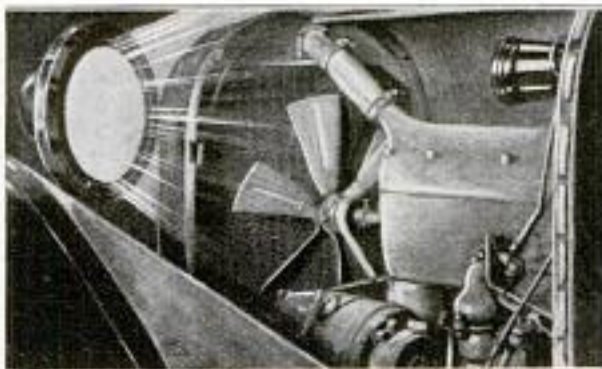
apart, so that the fruit cannot pass between them. Figures 1 and 2 illustrate two methods of attaching the hooks. Solder should be used in both cases, to make the fingers rigid. The device is completed by attaching a bag of close-woven fish netting to catch the fruit as it is plucked from the tree.—Wm. Melas, Philadelphia, Pa.

Auto Rim Incloses Flower Bed

To form an inclosure for a circular flower bed, a discarded automobile tire rim can be used. The rim is merely placed in the location desired, the central space filled with earth, and the seeds or plants put in. A larger flower bed of this character can be made by using the broad tires from wagons. By allowing about $\frac{1}{2}$ in. of space at the top, the rim will hold water until the soil inside absorbs it completely.

Trouble Light on the Auto

The headlamps of several makes of automobiles may be turned about on their brackets to illuminate the entire space underneath the engine hood, and make repairs or adjustments to the engine at night almost as easy as in daylight. If the light is so built that it is not braced to the body of the car, it is very simple to turn it around. This is done by loosening the lamp-bracket nut, and turning the whole assembly around, or by removing the two nuts that hold the lamp to the bracket, lifting it off,



By Reversing the Position of One of the Headlamps of an Automobile, So That the Light Shines Backward, the Space under the Hood is Lighted

turning it around, and replacing it on the bracket. Of course, the method of mounting the headlamps will differ on various cars.

Homemade Garden Cultivator

A member of an Ohio garden club built the hand cultivator illustrated, at a total cost of a little over a dollar, obtaining with it results fully equal to those obtainable from the manufactured and higher-priced hand cultivators. Practically the only expense was the cost of having the cultivator shovels forged by a local blacksmith. The adjustable wooden frame that holds the cultivator shovels is arranged

so that the implement can be set for shallow, medium, or deep cultivation. The handles are $5\frac{1}{2}$ ft. long and 22 in. apart

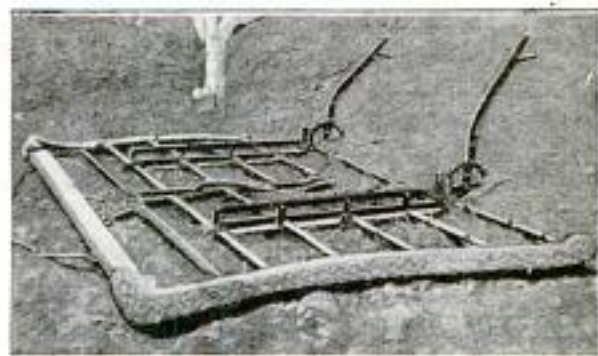


For Use on an Allotment in a Garden Club, One of the Members Built This Efficient Cultivator

at the outer end. The wheel, which may be one taken from an old baby carriage, or, better, from an old wheelbarrow, should be lined up exactly midway between the handles.

Harrow Prevented from Injuring the Bark of Orchard Trees

Under some conditions of fruit culture, particularly in regions where rainfall is scant during the growing season, constant harrowing is necessary to maintain the moisture-preserving mulch. In order to make a good job, it is desirable to work as close as possible to the trunk of the tree, but in doing so, the bark is fre-

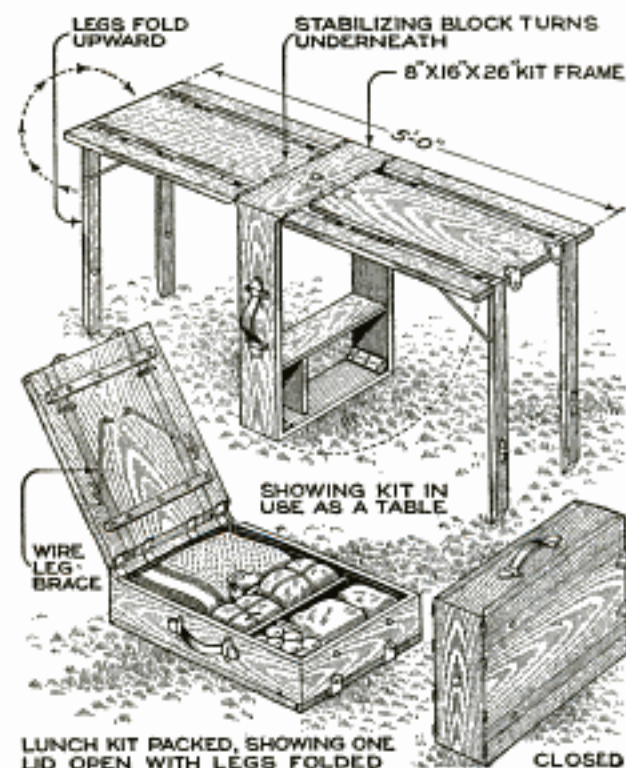


Old Automobile Tire Secured to the Sides of the Iron Harrow Frame, to Prevent It from Injuring the Bark of Fruit Trees

quently injured by contact with the harrow. The illustration shows the means used in one orchard to prevent this. Old automobile tires are cut and lapped over the sides and corners of the iron harrow frame, to which they are secured with wire.—W. L. Salvage, Beaumont, Calif.

Motorists' Folding Lunch Box and Table

For the automobile outing, when lunch is taken along, a compact and substantial combination lunch box and table can be



LUNCH KIT PACKED, SHOWING ONE LID OPEN WITH LEGS FOLDED
A Cleverly Designed Combination Table and Lunch Box for Automobile Excursions

made along the lines of the one illustrated. In use, the top and bottom hinged covers open horizontally, and a pivoted block, attached inside one end of the box frame, helps to stabilize the outfit. The legs are pivoted on a small iron rod and open downward; they are held rigidly vertical by means of wire braces, attached to the underside of the cover, the ends of the wires fitting into a hole on the outside edge of each leg. The legs are provided with buttons on the underside so that, when folded up in their slots, the buttons can be turned, locking the legs and forming a continuous cover.—Frank E. Leitch, Brooklyn, N. Y.

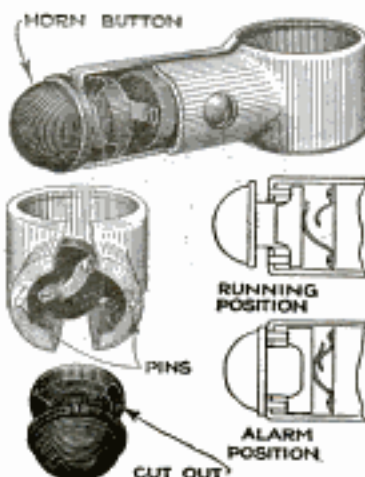
☞ To remove plaster and lime stains from floors and woodwork, wash with a solution made by adding 1 pt. strong vinegar to 1 gal. hot water.

Making Enamel Flow Easily

Our handy man taught me to keep the can of enamel in a pan of warm water when using, so that it would flow easily. Also, when enameling such articles as a bedstead, to do all of one rod or spindle at once, so that the finish will harden evenly. Fewer coats of the warmed enamel are required than by the usual method of thinning it to the desired consistency with turpentine. By keeping the enamel warm and doing the work in a warm room, the finish will flow more easily and smoothly, and the danger of getting a lumpy finish will be greatly reduced. In all cases, where enamel is applied, it will be found better to apply two or more thin coats than a single heavy one.—Mrs. James Doremus, Passaic, N. J.

An Automobile Burglar Alarm

An alarm that sounds when the automobile is started is easily made for the light car, provided the original magneto-operated horn is used. The end of the case on the steering column, which carries the horn button, is drilled on opposite sides to take two short pins, and the inner flange on the button is cut out to about one-half of its original thickness at two places, as shown. When the button is in the running position, the pins fit into the cut-out sections of the flange. In this position there is no electrical contact. When leaving his car, the driver presses the button and gives it a quarter-turn. This causes the pins to bear on the higher or thicker part of the flange, keeping it pressed in, and establishing an electrical contact. When the engine is idle and the button is depressed, as shown in the alarm position, the horn is not affected, since it receives no current from the magneto. As soon as the engine is started, the flow of current from the magneto to the horn will cause the latter to blow, notifying the driver that some one is tampering with his car.—R. H. Kasper, Philadelphia, Pa.



Applewood for Smoking Meats

As a rule hickory is preferred for smoking meats, but as this wood is rapidly growing scarce, and does not occur plentifully in all regions, maple, birch, and other hardwoods are widely and satisfactorily used. It is not generally realized that applewood produces excellent results. Either the trunks or boughs of the trees are used. Thus, when old trees in an apple orchard are cut out, they should be sawed up and laid aside for use in the smoke house. Applewood produces a smoke that has a tendency to sweeten the product treated, and gives an excellent flavor.

Harness from Auto Tires

Since no stitching is required, and the material used is part of a discarded auto-

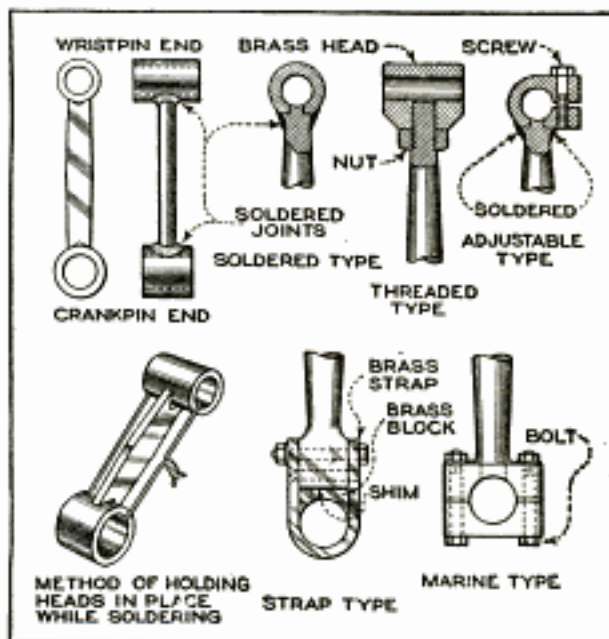


mobile tire, the halter illustrated can be easily made. Only the fabric part of the tire is used, the rubber tread being peeled off. The material thus obtained is then cut into strips of the proper length and width. The metal parts can be obtained from any hardware store; the buckles and rings are riveted on. If bit straps are used in the metal loops on the cheeks of the halter, it can be used for driving or plowing. The appearance of the finished halter can be improved by a coat of black paint.—John Fowler, Regina, Can.

Connecting Rods for Model Machinery

Model builders and experimenters are often at a loss as to the best and easiest method of making the connecting rods and pitmen for models and machinery. To have them forged or cast is generally out of the question on account of the expense and time. The built-up connecting rod clears the way for quick work, and is not only strong and serviceable but it

also presents a good appearance. One of the simplest types of connecting rod is made by soldering or sweating tubing ends onto a notched shank. The design is laid out on paper and the exact dimensions found for the notched shank, or arm. Square or round stock, either solid or tubular, may be used. The notches in the end are of 90° and are made with a square file. To make sure of the squareness of the notches, lay the tubing pieces in them and square them up with the eye. To solder the three parts, fasten them together with wire as in the drawing, and



Methods of Making Small Connecting Rods for Model Machinery, from the Simplest Possible Type to the Exact Reproduction of the Original

then apply the solder, allowing it to fill up the notch and build up a fillet in the angle between the shank and the tubing.

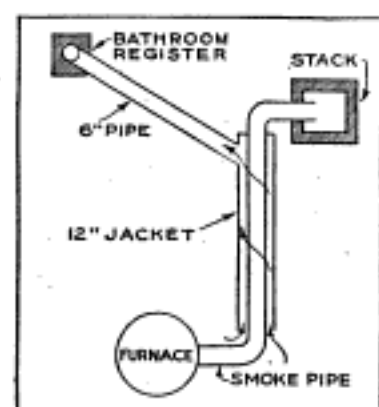
When using taper-turned pitman rods, turn a small nub, or teat, on the rod ends and drill the bushings accordingly.

A rod that is adjustable for length can be made by using a threaded arm and solid brass heads; a locknut is used to hold the setting and keep the parts tight. A connecting rod with semisplit bearing ends, which are adjustable for wear, is made by sweating the brass ends to the rod arm, splitting the heads and placing a screw as illustrated. The strap form of connecting rod is much used for engine work and is strong and of good appearance. It is also adjustable, shims being laid between the solid-rod end and the half-bushing. The rod proper may be made of brass or steel, and the strap and bushing of brass. The strap is held to the rod end by two flat-head screws, the bushing and strap forming the whole cir-

cumference of the bearing. Where a solid and strong type of bearing is wanted, without regard for cost, a connecting rod is turned from rectangular stock and fitted with a lower cap, as shown for the marine-type bearing. This rod is adjustable for wear, shims being placed between the bearing halves, which are held together by bolts. When possible, it is advisable to insert two pieces of rod in the eyes of the bearing and square them up previous to soldering, in order to insure an accurate alignment of the bearings. If this is not possible, then check after soldering and bend until the eyes are square.

Auxiliary Radiator for Pipeless Furnaces

In houses that are heated by so-called pipeless furnaces, there is usually a spot,

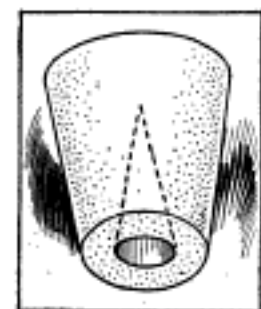


such as a bathroom, that fails to get its share of heat, and the diagram illustrates how an additional amount of heat can be conducted, under most circumstances, to that room.

A 12-in. jacket, around the furnace smoke pipe, has a 6-in. pipe joined to it near the upper closed end. The smaller pipe serves to carry the hot air to a register in the floor of the room it is desired to heat.—Jos. N. Parker, Richmond, Va.

Repair for Vacuum-Bottle Corks

The action of hot coffee and other liquids contained in a vacuum bottle will cause the cork to lose much of its spring,



and allow the contents to leak after continued use. The old cork may be made as good as new by making a hole in the center of the small end with a six-penny nail, or pointed lead pencil; this will expand the cork and make it fit tightly inside the neck of the

bottle. A small wooden plug, driven into the hole, will make the repair permanent.—William Mallet, Olympia, Wash.

Watering Young Trees

Thousands of young fruit and shade trees are set out only to die every year, not through neglect, but killed by kindness. In one instance, a number of apple trees were planted at the same time, and under identical conditions, and perhaps half the number were within spraying distance of a hydrant. Naturally, these trees received plenty of water at all times. The remainder were so located that it was necessary to carry water to them, and this was obtained from a rain barrel. During a prolonged dry spell, I was greatly amazed to find that the trees nearest the hydrant did not thrive, regardless of the amount of water supplied, while those watered from the rain barrel showed no signs of withering. In due course the first trees died out, and the elderly gardener who came to aid in replacing them explained that they had been killed by the frequent applications of cold water. The water in the rain barrel was usually warm, and for that reason, the trees upon which it had been used thrived as from natural showers. It is not necessary that the temperature of the water be more than 65° or 70°; this may be obtained quite naturally during the summer by allowing a barrel of water to stand in a sunny place. If the barrel is refilled in the evening, the water will as a rule be ready for use the following afternoon.—G. E. Hendrickson, Argyle, Wisconsin.

Carrying an Automobile Tire

An automobile tire is not the easiest thing to carry for any great distance. Although the initial part of the trip may be made without undue strain on the hand or arm, the latter stages usually find the carrier casting about for ways and means to carry his load more comfortably and distribute the weight more evenly.

The drawing shows a method of carrying such a load conveniently and with a minimum of discomfort and fatigue. The idea is simple and consists in the mere insertion of a stick of suitable length and thickness inside the tire so that the ends will bear against the tire walls.—H. C. Rose, Newport, R. I.



An Improved Vertical Enlarger

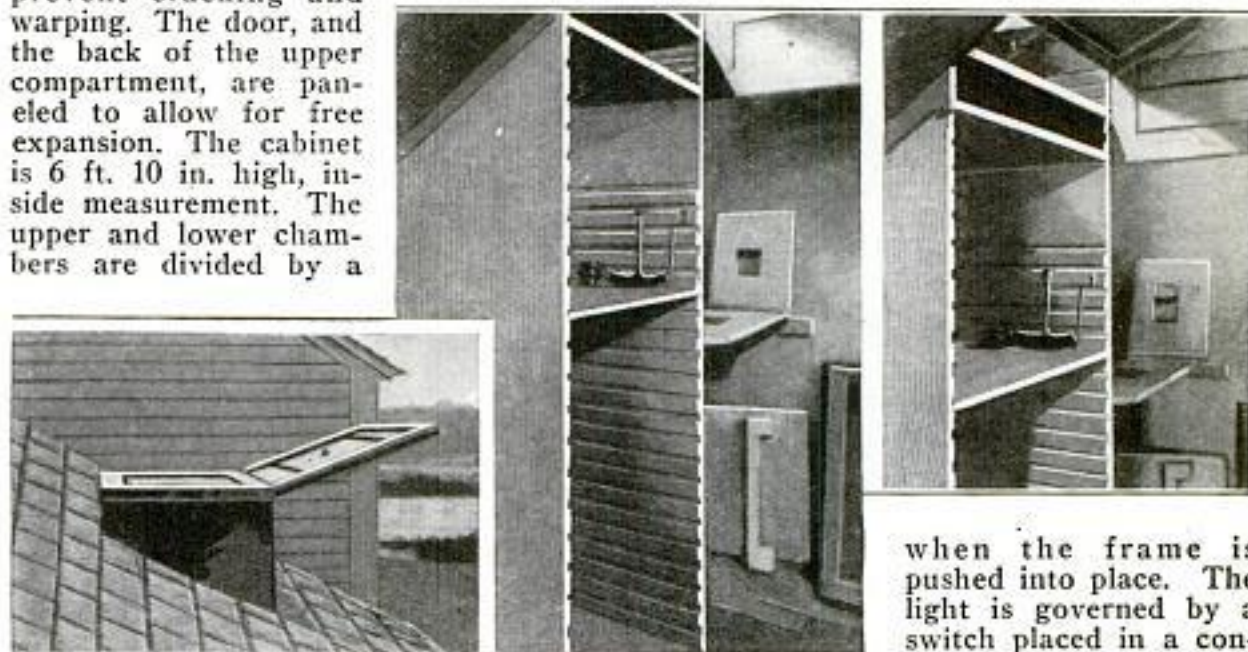
By F. E. HINKLEY

BY using the essential features presented in a vertical enlarger that I had once seen, and supplementing them with others for convenience in working, I made an instrument almost ideal in its adaptability for varying kinds of work.

The enlarging cabinet is made of 1-in. well-seasoned pine, grooved, and with particular attention given to have the grain of the sidepieces exactly similar, so that the contraction and expansion will be all in the same direction. This will prevent cracking and warping. The door, and the back of the upper compartment, are paneled to allow for free expansion. The cabinet is 6 ft. 10 in. high, inside measurement. The upper and lower chambers are divided by a

straight-filament lamps, and a crown of seven sockets for concentrated-filament lamps at the top. This arrangement gives good distribution with whatever lamps used. I prefer, however, the concentrated-filament lamps.

In the wall directly back of the light frame are two flat brass springs, corresponding to two similar springs located in the frame. These sets of springs are for the purpose of automatically connecting the lamp circuit to the exterior wires,



Left: The Light Hood on the Roof of the Laboratory. Center: A View of the Cabinet, Showing the Frame Grooves. Right: Interior View of the Roof Opening; Part of the Focusing Mechanism may be Seen on the Printing Frame

permanent shelf, 24 in. from the top of the enlarger.

The apparatus is erected in a low-roofed building, used as a laboratory, with the upper chamber joined to a short extension, leading out through the roof, as shown in one of the photos. I arranged for cutting off the light from the sky whenever desired, and, by means of a removable frame, holding electric lamps and placed in grooves at the top of the cabinet, am able to convert the enlarger into an instrument that can be used at night, and for purposes to which the daylight enlarger is not adapted.

This light frame, E, Fig. 2, occupies the grooves at the extreme top of the cabinet. It is made for the use of lamps in either a horizontal or vertical position, according to the kind available. There is a row of three sockets on either side of the frame, with one at the front and one at the back for regular 100-cp.

when the frame is pushed into place. The light is governed by a switch placed in a convenient position.

The next lower frame, D, Fig. 1, holding a 14 by 17-in. glass, ground on both sides, has also one fixed position in the center of the upper chamber, and is supported in grooves. By having the glass ground finely on both sides, I obtain good diffusion, and this also aids in cutting out undesirable reflections. The distance between the ground glass and negative frame is always sufficient to prevent the granulated appearance in the projected image that is observed when the ground glass is too near the objective focus. Between the frames E and D are some light-trapped holes to provide ventilation.

Three inches below the ground-glass frame, there are seven grooves, 1 in. apart, the last one being 3 in. above the permanent partition dividing the upper and lower chambers. These grooves accommodate the negative-adjusting frame C, Fig. 3. This frame is an assembly of three frames. The base frame has tongues on both sides to slide in the main grooves,

below the ground glass; it has also fixed guides at front and back, for holding in place the second thin frame, which moves from right to left. The latter has also fixed guides, at right angles to the first ones, for holding in place a third frame, which moves from front to back. The third frame has a rectangular opening for plates, or auxiliary frames, up to 8 by 10 in., and is self-centering by means of special spring clicks arranged to

shelf A, are cut at intervals of $1\frac{1}{2}$ in., beginning with No. 1, 13 in. from the top of the lower chamber, and extending to No. 31, at the bottom of the cabinet. The printing shelf, Fig. 4, is a plain, flat, parallel board, 1 in. thick, provided on one side with an adjustable frame working as follows: A brass bar, shown at the top, revolves on its axis by means of pins through lugs, or ears, at both ends. The two vertical arms, sliding on this

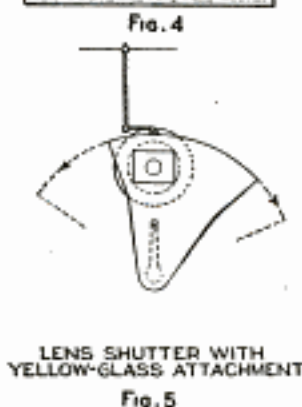
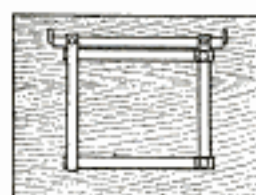
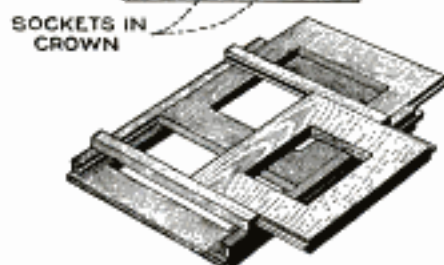
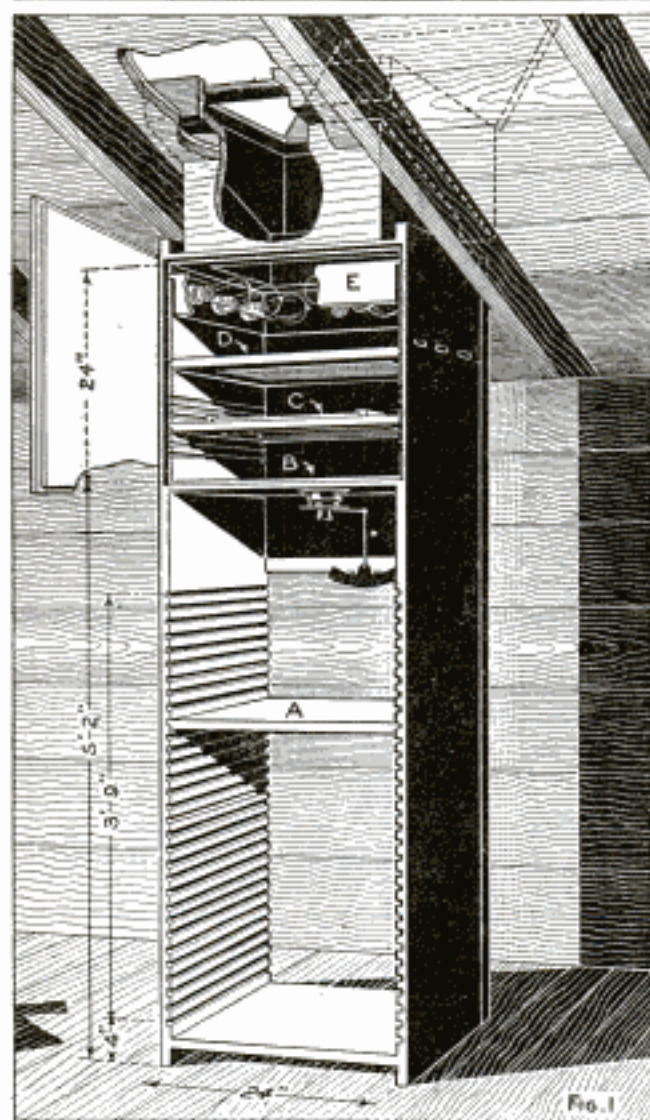
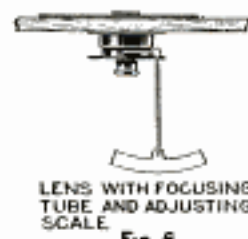


TABLE OF SETTINGS LENS $5\frac{1}{4}$ f			
MAGN. OR REDYN	NEG. SHELF	FOCUS SCALE	SHELF NUMBER
1 TO 1	e	.5	1
1 " 2	d	.5	5
1 " 3	c	.4	9
1 " 4	c	.8	12
1 " 5	b	.1	16
1 " 6	b	-.2	20
1 " 7	b	-.3	23
1 " 8	b	-.4	27
1 " 9	b	-.5	30



A Homemade Vertical Enlarger of Wide Range: The Construction of This Instrument Is Well within the Ability of the Earnest Amateur, and It Affords a Means of Making Very Accurate Enlargements and Reductions. By Means of Adjustable Printing Frames, Any Part of a Negative may be Brought into a Central Position for Enlargement

engage in notches. This whole arrangement is very convenient for bringing any selected portion of a negative into a central position for enlarging. The grooves in which the base frame slides are marked "a" to "g," from the lower one upward, for use in connection with the table of lens settings.

The grooves in the lower compartment, for the accommodation of the printing

bar laterally, and the two horizontal arms, sliding on the first pair, give an adjustment in all directions. These arms are locked in place by thumbscrews, and their own weight is the working pressure on the paper. The frame is adapted for 10 by 12-in. paper, and smaller; for other sizes, the shelf is reversed, and the paper held in position by thumbtacks.

In the center of the partition B, which

divides the upper and lower chambers, is set the objective, mounted in the smaller of two focusing tubes, which screw one inside of the other, with the screw threads common to focusing mounts and arranged to be held where wanted by a clamping screw. These tubes are approximately 3 in. in inside diameter, and give a lens movement of 1 in. The starting point being made at the center adjustment, there is an available focusing movement of $\frac{1}{2}$ in. in either direction. This movement, in connection with the movable negative shelf, in grooves "a" to "g," forms the means of focusing, and, with the focusing scale and table of settings about to be described, gives a simple and accurate means of obtaining any range of enlargement or reduction with certainty.

The front, or what becomes the lower end of the inner focusing tube holding the objective, carries a projecting flange on which revolves a small wheel, or roller, in connection with a pointer extending in front of the focusing scale, shown below partition B, at the back of the cabinet, and in Fig. 6. The construction is as follows: On a horizontal shaft extending from the lens to the back of the cabinet, are attached two arms at right angles to each other, forming a bell crank; the smaller arm carries the wheel, or roller, and the other, or pointer, ends just in front of the index scale below, at the back of the cabinet. The proportional length of the lever arms is very nearly 1 to 5, to facilitate reading, a movement of .01 in. in the objective being clearly indicated on the scale. A spiral spring, not shown in the drawing,

holds the wheel always against the lens flange when moved in either direction.

On top of partition B, above the lens, is located a shutter, Fig. 5, in a segment of thin tinplate, holding a frame containing a square piece of yellow glass. This is attached at the center of rotation to a pivot passing upward through the board, and at the lower end of this pivot is placed a hand lever, indicated by dotted lines in Fig. 5, which extends toward the outer edge to facilitate working. Three studs or stops are arranged on partition B, to limit mechanically the movements of opening and closing of the shutter, when focusing or exposing the lens.

The lens employed is one of $5\frac{1}{4}$ -in. focus, and the table of settings is arranged as follows: The first column gives in full numbers the magnification or reduction; the second gives the grooves for the negative shelf; the third gives the number representing the lens focus, obtained by turning the thumb flange of the focusing tube either to the right or left, until the proper number is reached on the scale below, and the fourth column gives the grooves numbered from one downward, in the lower chamber, for setting the paper shelf A in its proper position. By means of this table, the settings are made mechanically and with ease and certainty. When the necessary tests and adjustments of the figure on the scale have once been made, an error in focusing is impossible.

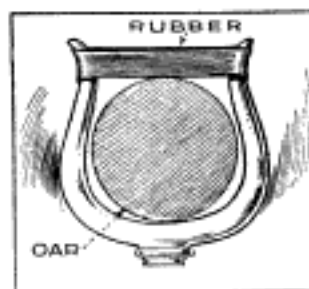
The arrangement of this enlarger permits almost endless variations in adjustments between "natural or same size," to enlargements or reductions from one to nine times.

Cleaning Soiled Leather

Soiled leather articles, such as puttees, shoes, traveling bags, and the like, can be cleaned by applying saddle soap with a moist sponge and rubbing with a clean, dry cloth. Oxalic acid, which is sometimes used alone and sometimes in preparations, for cleaning and bleaching leather, is injurious, and should not be used. Although it is almost impossible to remove oil or grease spots from leather, in some cases satisfactory results may be obtained by coating the spot with a thick and quick-drying rubber cement, then peeling off the coating when it is almost dry. It may be necessary to repeat this operation several times to clean the leather thoroughly.—A. C. Cole, Chicago, Ill.

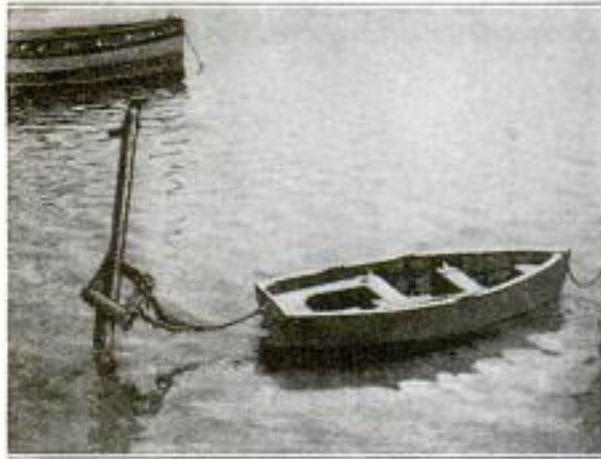
Keeping Oars in Rowlocks

When the beginner goes rowing he usually has the unpleasant experience of pulling the oars from the rowlocks just at the time when it is most inconvenient. To overcome this and make learning to row easier, a heavy rubber band, cut from an old inner tube, can be placed across the ends of the rowlocks. These prevent the oars from jumping out, although the rubber will stretch considerably without coming off the horns of the rowlocks.



Mooring Boats in Tidal Waters

The square object hanging from the mooring post in the illustration is a wooden float. The post is driven into the



A Mooring for Small Boats in Tidal Waters: The Square Wooden Float Slides Up and Down on the Mooring Post as the Water Rises and Falls

bottom of a tide-water channel, and the float rises and falls with the tide, but is prevented from getting away by a cross-piece at the top of the stake. This arrangement provides a short-line mooring of constant length, serves better than the anchored buoy and rope for keeping small craft head-on to the wash of passing vessels, and is well adapted to places where wind and wave conditions are known to be quite regular.—L. R. Perry, Berkeley, Calif.

A Window-Ledge Guard

In many apartment houses it is the custom to set vegetables, milk, and other foods on the window ledge, particularly



when the weather is cool. It frequently happens that these articles are knocked or blown off. Even if the windows do not face a street where falling objects might hurt pedestrians, there is always the danger of breaking a skylight or other windows in their descent through a light well or court. To prevent this, a towel, or curtain, rod can be fastened in the window frame as shown in the drawing.

Killing Dandelions

While beautiful in itself, a dandelion is a nuisance in lawns where a close, green turf is desired. The removal of the dandelions by cutting off the roots is a laborious and expensive process where they are at all numerous, and may do more harm than good. The dandelion is a perennial, and perpetuates itself by means of a long deep-growing taproot. To cut this root off a few inches beneath the surface of the ground does but little damage to the pest, and within a few days new shoots will appear. The cutting is also very likely to split the crown, and two plants will appear where but one grew before. However, if a tablespoonful of salt, or a half cupful of gasoline is applied at the cutting point when each root is cut off, the eradication may be made complete. This method is impracticable where the dandelions are numerous.

If the dandelions are very thick, they can be controlled and practically eradicated by spraying them with a solution made by dissolving 2 lb. of iron sulphate or 2½ lb. of common salt in a gallon of water. The iron sulphate, which is known under a variety of other names, the commonest being copperas and green vitriol, comes in either granular or crystal form, and dissolves easily. One gallon of solution will spray 860 square feet.

On small lawns, the solution may be applied with a sprinkling can having very small perforations, care being taken to see that all plants are thoroughly wetted by the liquid. On large lawns or golf links, a hand spray pump, which is fitted with a nozzle for throwing a fine, mistlike spray, may be used. The fineness of the spray is important, as the finer it is, the better it will settle over all portions of the plant. Hand sprayers can be bought at varying prices, but the sprayer itself is not so important as the nozzle with which it is fitted. Insist on getting a nozzle that will give the necessary fine spray.

The spraying should be done after the dew is off, in the forenoon of a day when the weather indications show fair weather to be probable for 48 hours. Rain inside of 24 hours will undo the results, and make it necessary to spray again. Wait until three days after the lawn has been mown, as the iron sulphate injures new-mown grass. Do not sprinkle or mow the lawn for three days after spraying, but give the sulphate a chance to work. It may be necessary to spray

three or four times during the season, or even oftener, if the dandelions are very thick and have been allowed to go to seed once or twice. Scattering plants, which the spraying treatment has failed to kill, may be destroyed by placing a tablespoonful of the granulated iron sulphate on the crown of each plant.

Fertilizing the lawns to thicken the grass, and reseeding of the thin spots, will help to prevent reinfestation. Finely rotted barnyard manure is preferable as fertilizer, but the application of 100 lb. of sodium nitrate to 1,500 sq. ft. of lawn will be helpful.

The salt solution referred to has at least two distinct advantages over the sulphate solution; it is cheaper, and will not stain walks, fences, or clothing with which it comes into contact.

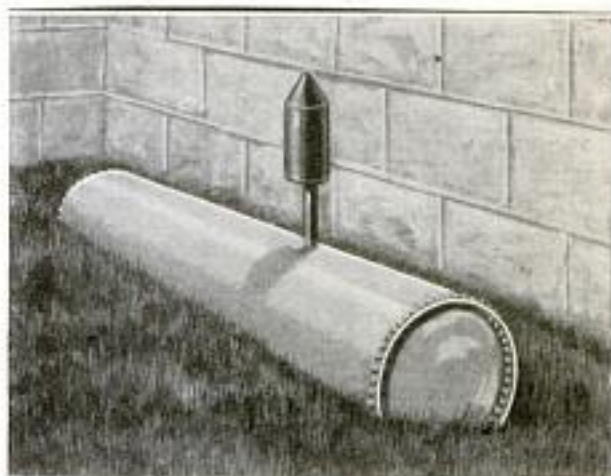
While this method of destroying dandelions has been found successful at the Wisconsin College of Agriculture, and has been shown, by seven years of investigation by the New York station, to be a dependable method, no permanent effects can be expected from spraying, so long as dandelions are allowed to go to seed unchecked on adjoining lawns, in fields, and along roadsides. It is undoubtedly true, that by community action in some form, either by agreement or ordinance, dandelions may be eradicated in an entire community, but it is useless for an individual to expect to keep the dandelions out of his lawn after the first treatment, unless he is willing to spray his lawn at least once in three years.—University of Wisconsin, Madison, Wis.

Testing the Vacuum System for Leaks

A small leak between the intake pipe of the carburetor and the filling chamber of the vacuum tank of an automobile is revealed by the difficulty experienced in maintaining the proper fuel level in the tank, especially on heavy pulls or when climbing hills. A small air leak is difficult to find because of the loud suction through the carburetor. To concentrate the suction at the point of leakage in the fuel-tank connections, a simple and positive means is to loosen the bolts connecting the carburetor to the engine and insert a piece of tin or sheet brass, large enough to cover the intake opening; then tighten the bolts to hold the tin in place over the intake. By turning the engine with the crank, the increased vacuum in the intake produces a positive sound at the point of leakage, so that the location is readily determined.

Muffler for Electric-Lighting Plant

The owner of an electric-lighting plant, located in the basement of his home, used the arrangement illustrated for muffling



To Muffle the Exhaust from an Electric-Lighting Plant, the Owner Attached the Muffler of the Engine to a Discarded Water Tank

the exhaust from the small engine used to drive the dynamo. The exhaust pipe was led to the outside and screwed into one of the openings in a discarded water tank, the regular muffler that formed a part of the engine equipment being screwed on top of the tank, as indicated. To prevent possible explosion when starting, a two-way valve, or cut-out, is installed in the line; this is opened at first, allowing the gases to escape before they reach the tank. Then, after the engine is running smoothly, and no unexploded gas goes through it, the valve is turned, diverting the exhaust into the tank where it expands and passes, with little noise, to the air through the muffler.

Portable Feed Box

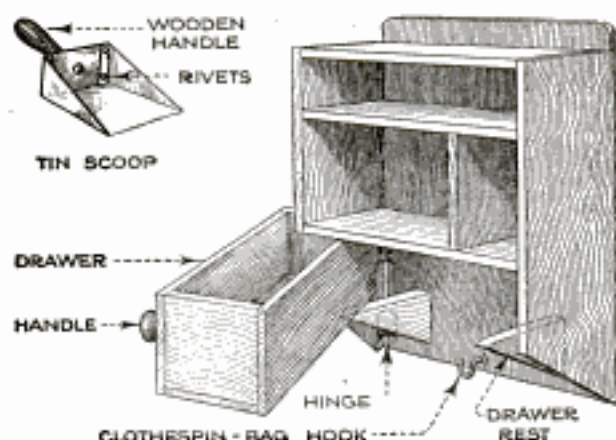
A teamster who is obliged to feed his horses at noon away from the barn uses the feed box illustrated, which can be slipped over the edge of the wagon box or a fence.



This box prevents the waste of grain attendant on the use of a nosebag, and does not occupy much more space.—Maggie A. Cromlich, Carlisle, Pa.

A Handy Laundry Cabinet

A cabinet in which all necessary washing materials, such as soap, bluing, soap powder, and the like, may be kept in one



A Cabinet for the Laundry, in Which All Washing Materials are Kept Together

place will be appreciated by the laundress. The over-all dimensions of the cabinet illustrated are 5 by 12 by 20 in., and the swinging compartment, or drawer, which is used for soap powder or chips, is 4 by 5 by 10 in. If desired, a door can be fitted to cover the upper compartments. A hook is screwed underneath the soap drawer, from which the clothespin bag is hung. A simple scoop for handling the washing powder is easily made from a piece of tin and is kept in the drawer.

Jack Head Saves Blocking Car

Sometimes it becomes necessary to make tire or other repairs on the road when the car is standing on a slight slope, and, unless the brakes are in exceptionally good order, one is then obliged to find something to block one wheel while the other is jacked up.

To eliminate the need of scouring the roads and fields for a rock or piece of wood, and to prevent the car from moving and dropping off the jack, the special head shown was formed from a piece of steel bar and attached to the jack. The use of this attachment makes it possible, when making repairs on a sloping surface, to throw the center of weight ahead or back by placing the front or back part of the head under the axle.



Adjusting Vacuum Tubes to Voltmeter

If indicating instruments are used to adjust the filaments of vacuum detector tubes used in amateur wireless-receiving sets, a voltmeter should be used instead of an ammeter. Tungsten filaments show a decrease in current throughout their life, and if a constant current is maintained, rather than a constant voltage, the life of the tubes will be shortened, and the signals will be no better. The normal filament-terminal voltage for most standard tubes is from 5 to 5.4 volts.

Improving Pack-Sack Straps

The common method of carrying the hiker's shelter and provisions is in a pack sack. When light loads are carried, no great strain is imposed by the sack, but when the weight is upward of 75 or 80 lb., the pressure on the shoulders becomes quite irritating. An improvement that will make its carriage easier and less fatiguing is shown in the drawing. This consists in using a short strap with a har-



ness snap on one end. The short cross strap is riveted to one of the pack straps, and the snap hooks over a ring fastened to the opposite shoulder strap. Instead of the shoulders taking the whole strain, it is distributed over the entire upper part of the body. If desired, the cross strap may be left unfastened until the load begins to feel "heavy," when it can be snapped in place and the shoulders eased.—Robt. P. Lincoln, Minneapolis, Minn.

Blackening Brass

To blacken the brass work of cameras and similar fittings of the same metal, clean the pieces thoroughly, so as to free them entirely of grease, and dip into a solution composed of 200 gr. of copper nitrate to the ounce of water. After allowing them to remain for a few minutes in the bath, remove and heat until the desired color is obtained.

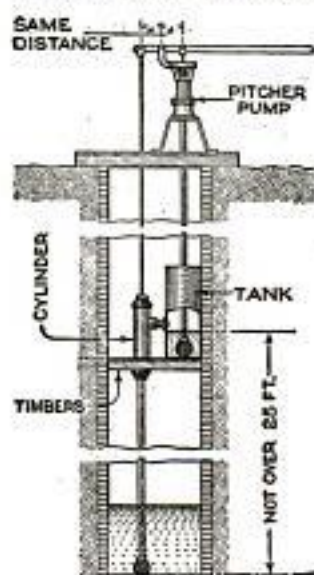
Preventing Jars from Cracking during Canning

Some of the least-known reasons why glass jars crack in canning, when the containers are placed in the boiling water, and their remedies, are:

Overpacking the jars; such products as corn, pumpkin, peas, lima beans, and sweet potatoes expand, so that if the jar is completely filled it will be almost sure to crack. Do not fill the jars quite full. Placing cold jars in hot water or vice versa; as soon as the jars are filled with hot sirup or water, place in the canner. If the top cracks during sterilization, the wire fastener used on some types of jars was too tight. In a steam canner, cracked jars are often the result of too much water; the water should not come above the platform on which the jars are placed. Cracking is also caused by allowing a cold draft of air to strike the hot jars.—Mrs. Mary F. Scott, Albany, N. Y.

Novel Pump Arrangement for Deep Wells

As the common pitcher pump will not pump water to a height of more than 20 or at the most 25 ft. above the water level, it is not generally known that such a pump can be used for pumping water



from a 50-ft. well by raising the water in successive stages. A pump cylinder, set half-way between the pump and water, is operated by the upper-pump lever and delivers the water into a tank set at the same level, from which it is drawn up in the usual manner by the upper pump. The tank is supported on timber crosspieces, and has one end open to admit the upper-pump suction pipe. The lower-pump cylinder is similar in bore and stroke to the upper one, and is attached to the upper end of the lower suction pipe. This is lowered into the well and connected to the tank. The plunger of the lower cylinder is connected to a rod fastened to the pump handle. In this manner, one cylinder discharges at each stroke of the handle.

Photographing Small Articles with a Folding Camera

Flowers, and other small articles that are to be photographed, generally must be supported in some manner, and the



Small Articles can be Photographed More Easily with the Camera Arranged as Shown

materials used to hold the object in a vertical position usually form an undesirable part of the picture unless blocked out on the negative. Practically all the trouble of arranging the articles can be avoided by placing them in the horizontal plane and making the photograph vertically, as in the illustration. The ends of the camera, the lens pointing toward the floor, are supported on the backs of two chairs, which should be of the same height. The object being photographed is placed on a cardboard background that is raised by a stack of books to the proper level for focusing.

"Swimming" in Wading Boots

Many fishermen have lost their lives by wading into water beyond their depth, and, burdened with wading boots, being unable to swim or keep afloat.

The drawing illustrates a method of keeping afloat used by a British sportsman. It should be learned by all fishermen, as very little practice is sufficient to master the idea so completely that it will be found possible to "shoot" rough waters.

Immediately the fisherman gets beyond his depth or trips, he should draw the

knees up to the body, face downstream, and assume a sitting posture in the water. While the head is kept above water, there is, naturally, no danger even in rough,

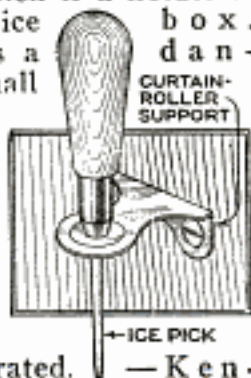


Method of "Swimming" for the Fisherman in Wading Boots Who Goes beyond His Depth

rocky water. To keep direction, paddle with the hands on either side under the water, and if a rock is struck, the first contact is made by the feet and lower part of the thighs. Don't struggle or change posture, for the wash off the rock will help the body to clear it. On no account try to swim, for if this is done, the head goes under and the legs will come to the surface, and unless there is aid at hand there is great danger of drowning. Paddle with the hands, always facing downstream, until shallow water or a landing is reached. This method should be practiced in a pool about waist-deep, that runs downstream into shallow water.

Holder for the Ice Pick

There is no particularly good reason for misplacing the ice pick if a holder is provided for it near the ice box. Since the instrument is a dangerous plaything for small children, it is essential that a holder be used that will keep the pick beyond their reach. Probably the simplest, yet most convenient, holder is one made from a window-shade roller bracket as illustrated. — Kenneth Coggeshall, Webster Groves, Missouri.



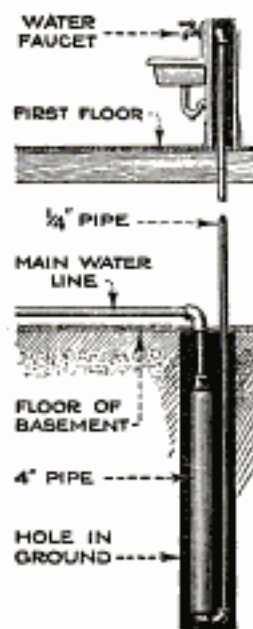
Why Films should be Soaked in Water before Developing

Exposed photographic films, particularly those in a strip or roll, should always be run through a dish of clean water before placing the negatives in the developing solution. The reasons for first washing the undeveloped negatives are good, and the operation will prevent many spoiled pictures. The amateur photographer generally makes the mistake of using too little developer, so that the film cannot be completely and uniformly immersed in the solution. Unless the developer is evenly distributed over the surface of the film, streaks are bound to result. However, if the negatives are first washed, a thin film of water will adhere to the surface, and this will retard the action of the developer, so that the person doing the work will have time enough to get the negatives uniformly covered with developer before development really begins. Dry materials placed in liquids generally cause the formation of air bubbles, and these, on sensitized materials, show up as circular transparent spots on the negative, which, in turn, show black on the prints. Both of these troubles are avoided by the preliminary washing.

Cooling City Drinking Water

Consumers of city water for drinking purposes are usually bothered by the high temperature of the water as it comes from the faucet during the summer months, which makes it almost unfit for drinking unless cooled with ice. In order to lower the temperature of the drinking water, and make it palatable without the use of ice, the idea illustrated was successfully used.

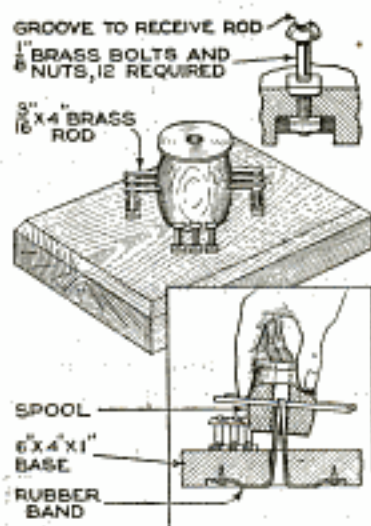
A spot was located directly beneath the faucet, and a small section of the flooring was removed. Then, with a post-hole auger, a hole was bored about 15 ft. deep. The hole was about 8 in. in diameter. An 8-ft. length of 4-in. pipe was connected into the water line as shown, so that the water entered at the



top of the large pipe and passed into the faucet connection at the bottom. After all connections had been made and tested, the hole was refilled with earth, and the flooring replaced. The coolest water is, of course, to be found at the bottom of the cooler, and is drawn off first. What little water is contained in the $\frac{1}{4}$ -in. pipe must be drawn off before the cooler water begins to come through the faucet; for this reason the small pipe is used, so that little water is wasted.—D. C. Stephenson, Augusta, Kan.

Homemade Three-Pole Double-Throw Switch

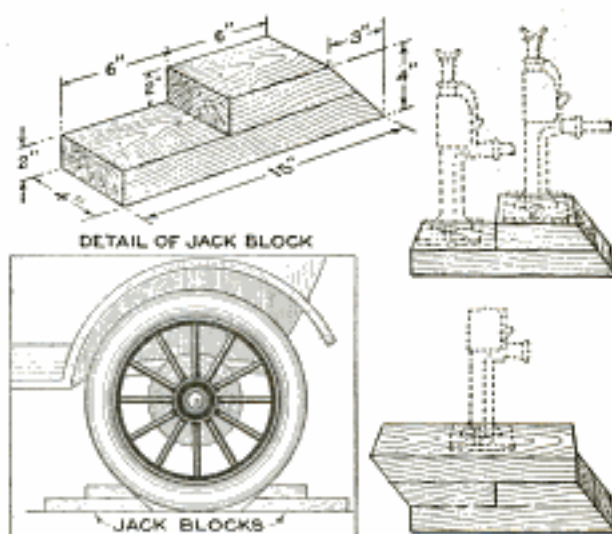
Needing a three-pole double-throw switch for a wireless set, at a time when a commercial one was not easily obtainable, a very satisfactory article was improvised, the materials being a spool with the flange on one end sawed off, three brass rods about 4 in. long, some



$\frac{1}{8}$ -in. brass bolts, a rubber band, two thumbtacks, and a piece of hardwood. Three holes, a little smaller than the diameter of the rods, were drilled in the spool, parallel with each other, and at right angles to the center hole, as shown. The brass rods were pressed into the holes so that about an inch of each end extended beyond the spool. In the center of the hardwood block, which was used as the switch base, a $\frac{1}{4}$ -in. hole was drilled. The rubber band was run through this hole, through the central vertical hole in the spool, and over the middle rod, the ends of the band being fastened to the underside of the base with the thumbtacks. This arrangement held the spool down tight, yet permitted it to be lifted and revolved through 90° . The brass bolts forming the contact points were set into the base in four sets of three each, opposite each other. The heads were a trifle higher than the rods in the spool, and semicircular grooves were filed as seats for the rods. The necessary connections were made on the underside of the base.

Blocks for Automobile Jacks

The handy pair of blocks shown in the drawing will more than repay the slight cost and trouble of making them, in the

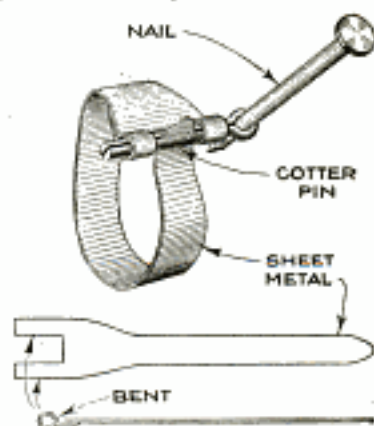


A Set of Jack Blocks, to Provide a Firm and Even Base for the Jack on Soft or Uneven Ground, and to Speed Up the Work

convenience that attends their application as indicated. The blocks can either be made from solid 4-in. timbers, or may be built up from 2-in. planks in the manner shown, and besides serving as a base for the jack on soft or uneven ground, they may be used for blocking the wheels of the car.—C. C. Spreen, Birmingham, Mich.

A Universal Hose Clamp

For simplicity, the hose clamp shown in the drawing can hardly be excelled, as it consists of nothing more than an ordinary cotter pin and a strip of sheet metal. It can be used on any size of radiator hose or wherever such a clamp can be applied. A strip of light sheet iron or other metal is cut to the proper length and provided with ears at the outer end, as shown; they may be soldered or not as preferred. The opposite end of the strip is inserted through the slot in the cotter pin and pulled through as far as possible, after which it can be drawn up as tightly as desired by means of a nail.



A Simple Radio-Transmitting Set

By F. L. BRITTIN

A SIMPLE spark-coil radio-transmitting set can be used where messages are to be sent over a short distance. The complete outfit can be put into a small suitcase, and is well adapted to the needs of outers in motor cars or boats, and for boy-scout field work.

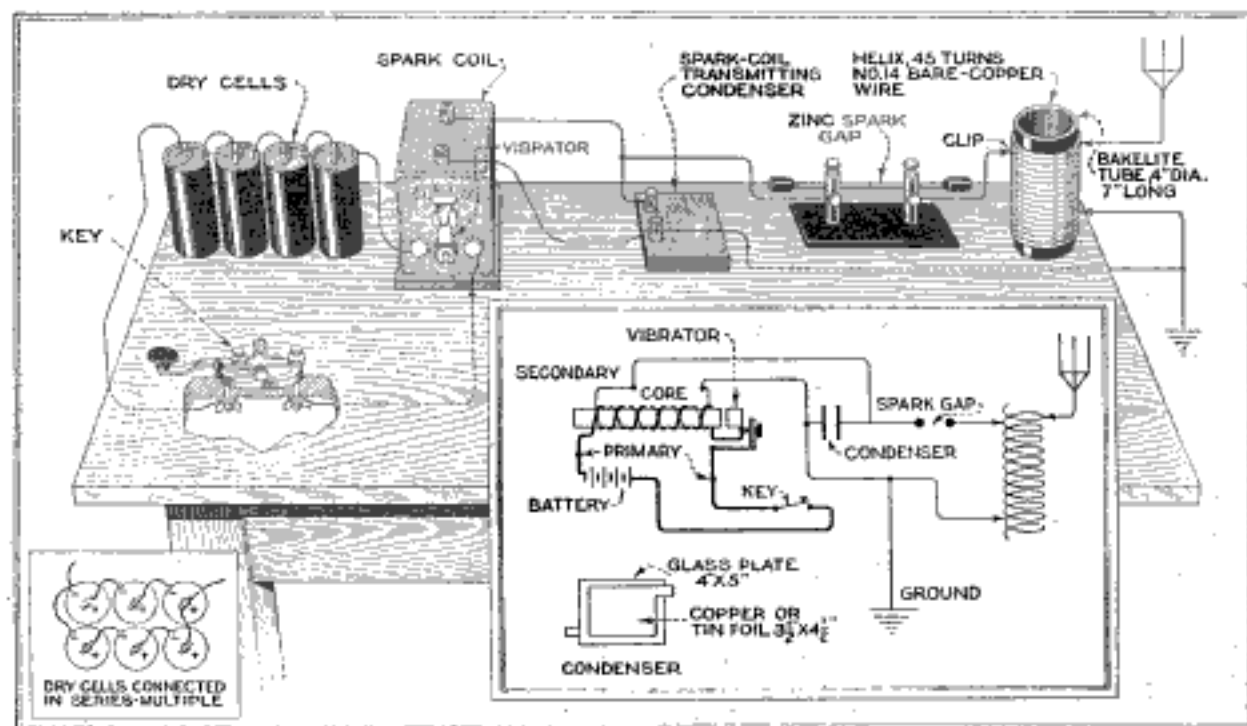
The necessary instruments composing the set are the following: a high-tension jump-spark coil, of which different sizes can be purchased, good results having been obtained for distances up to 16 miles with the ignition coil from a standard light automobile; a key, an ordinary telegraph key answering the purpose, and a spark gap, which may be made from two zinc-battery electrodes mounted in two upright fiber posts. A condenser and helix will also be needed; the condenser stores up the energy, which is then discharged across the spark gap, and produces the oscillations that are thrown into space from the antenna in the form of waves.

The condenser can be made from a number of glass plates with sheets of tinfoil between them. Old 4 by 5-in. or 5 by 7-in. photographic negatives, from which the emulsion has been removed, will answer the purpose; the tinfoil sheets are cut $\frac{1}{2}$ in. smaller than the plates, and a tab, or ear, is left projecting for connecting the lead wires to each sheet. In assembling the condenser, the

tinfoil sheets are placed between the glass plates so that the tabs of alternate pieces will project from opposite sides. The condenser unit may consist of five sheets of foil and six glass plates. After assembling, bind the unit together and place in a cigar box, filling the surrounding space with melted insulating compound, or paraffin, to make a compact article for a portable set. If the transmitter is to be stationary, the condenser may be supported on wooden blocks in a pan, into which enough insulating or transformer oil to cover the unit is poured. Any desired capacity can be obtained by adding the proper number of condensers.

The helix consists of 45 turns of No. 14 bare-copper wire, which is wound around a grooved bakelite tube, 4 in. in diameter and 7 in. long. Spring clips are soldered to the wires from the aerial, ground, and spark gap, as shown in the diagram. Four dry cells give good results for short-distance work. When these are used, they may be connected in the series, as shown in the upper part of the drawing; another method of connecting them is in series-multiple, as shown in the insert. This distributes the load, and makes the battery last longer.

At the present price of materials, and assuming that all the parts are bought, the total cost of such a set will be about



A Very Simple Transmitting Set for the Radio Amateur: It can be Packed into a Suitcase, Making It Suitable for Boy Scouts or Similar Organizations. All the Instruments may be Made at Home, if Desired, Making This a Very Cheap Set, and One Well Adapted to the Needs of the Beginner

\$15, but this amount can be considerably cut by using materials that are usually available around the average workshop.

The aerial should be well insulated from the ground, but not with porcelain cleats, which should not be used for the aerial of a transmitting set. Solder all wire connections and make all leads short. The ground is important; have the ground wire as short as possible, and fasten it to a water pipe, if convenient, first filing the pipe bright, and either

soldering the wire to it or using a ground clamp.

If the set is to be used in the house as a stationary outfit, a lightning arrester, or ground switch, must be installed on the outside, to prevent lightning from following the wire into the building.

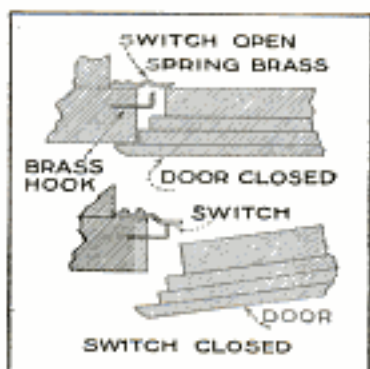
To operate a transmitting station, an operator's license is necessary. Full details of the necessary examination can be obtained from the radio inspector of the district in which the builder resides.

Making Sure of a Sharp Focus

Many photographic exposures, which were apparently sharply focused, turn out to be more or less "fuzzy," because, in fact, they were not properly focused. A simple remedy for this, which makes it possible to focus the image as sharply as possible, consists in using a small magnifying glass, or strong spectacles. This idea can be applied to getting a better view of the subject in the finders of small box cameras, particularly on cloudy days when the image does not show clearly.—Mrs. A. K. Hinkley, Rowley, Mass.

Electric Light for the Refrigerator

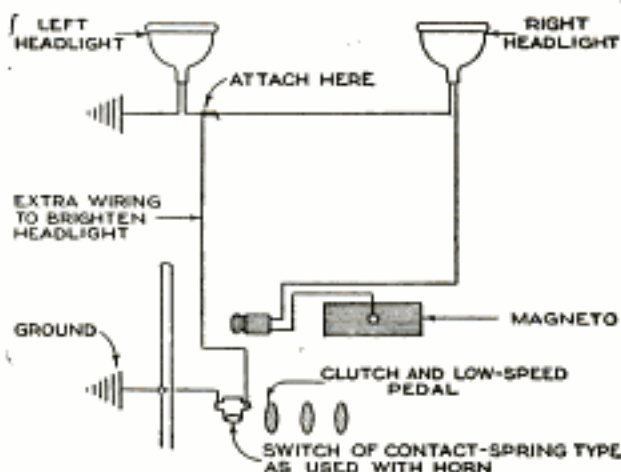
Most refrigerators and ice boxes are so located that it is necessary to grope around in total or semidarkness to locate the article desired. All this can be easily overcome by fastening the socket for a miniature dry-battery lamp anywhere inside the food compartment. The light is turned on and off automatically by the simple contact shown in the drawing.



A piece of spring brass is fastened to the inside wall of the food compartment, and a brass hook is screwed into the edge of the door opening, in such a position that, when the door is closed, the spring contact will be separated from the hook, thus opening the battery circuit and turning off the light. As soon as the door is opened, the two parts of the contact come together and complete the circuit, causing the lamp to light.

Switch to Brighten Auto Headlights

On a light automobile where the headlights are supplied with current generated by the magneto, the lamps usually burn



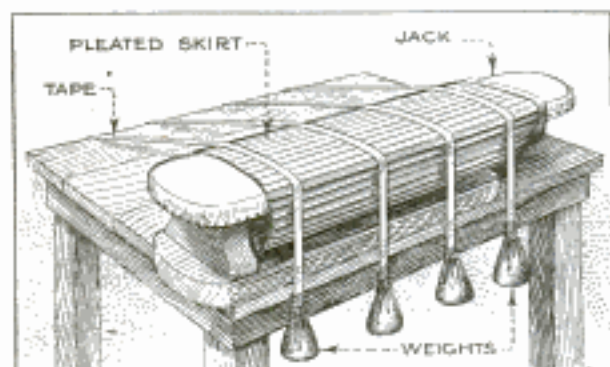
With This Wiring, One Headlight of a Light Car will Burn Brightly While the Car Runs at Slow Speeds

brightly when the car is running in high gear at slow speeds. For country driving, or wherever a bright light is desired with the car traveling at moderately slow speed, a simple arrangement for lighting one headlight brilliantly may be made by placing a push button, such as used for the horn, on the left side of the clutch pedal, running one wire from the button to a ground on the car frame, and another to the light, as shown in the diagram. When this button is pressed, the current flows only through the right lamp, causing it to burn brightly. The position of the button requires the use of the left foot to depress it, and consequently the car cannot be placed in low gear and the motor raced without releasing the pressure on the button, as otherwise the heavy current would burn out the bulbs.—G. A. Luers, Washington, D. C.

☛ A paper cone, slightly moistened inside the large end, can be used to remove small lamp bulbs that are difficult to grip with the fingers.

Pressing Pleated Skirts Easily

An easy way to press a pleated skirt, without the trouble of pinning, is shown in the drawing. Strips of tape are fas-



Pressing Pleated Skirts, Capes, and Similar Articles of Wearing Apparel, is Made Easy by Means of the Arrangement Illustrated

tened to the wall or edge of the table, at the desired distance apart, behind the pressing jack. A weight is fastened to the free end of each tape. The pleats are laid in order and held in place by drawing the tapes across the top, allowing the weights to hang over the edge of the jack. The iron can be run over the tapes. This method can be used successfully for either hand or machine pressing.—Alex Mackey, Powers, Ore.

How to Protect Lighting Fixtures When Using Vacuum Cleaner

Many a lighting fixture, to which a vacuum cleaner has been attached, has at some time or another been nearly pulled



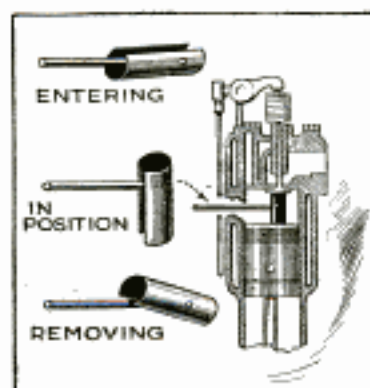
from its fastenings because the machine was pushed farther than the wire would permit. The idea illustrated is designed as a "brake" on the wire, and to give warning to the user before any strain falls on the wire. A large rubber band is fastened across a loop made in the wire, 6 in. below the plug. The proper size to make the loop is found by stretching the rubber band as far as it can be done without breaking, and making the length of wire in the loop the same as the extended length of the band.—Mortimer V. Tessier, Nyack, N. Y.

Emergency Gasket Made of Lamp Cord

While on an automobile trip the owner was annoyed by the blowing out of the copper gasket between the exhaust manifold and exhaust pipe, so that the smoke and exhaust gases blew into the tonneau of the car. No stock gasket could be obtained, so a piece of flexible copper wire was used; this was braided into a circular gasket, and served well until a new copper gasket could be obtained.—Chas. H. Willey, Concord, N. H.

Tool Aids in Work on Overhead Automobile-Engine Valves

As the overhead valve with which certain makes of automobile engines are fitted drops down into the cylinder when



the valve spring is released, the usual practice is to unscrew the valve cage and do the work at the bench. But by using the little tool shown in the drawing, the cage need not be removed, as

the valve is held in place through the spark-plug hole; this makes it possible to remove weak or broken springs and replace them with a minimum of time and trouble. The tool is made from a piece of sheet brass, about 2½ in. long, rolled into an open-sided cylinder, pivoted near one end on a handle, so that when inserted through the spark-plug opening, it will fall into an upright position under the valve. The engine is then cranked by hand until the piston comes up and holds the tool against the valve. When the handle is turned upside down, the cylinder falls forward over the handle so that it can be withdrawn. A wooden handle is suggested to prevent injury to the threads of the spark-plug hole.

☞ Cut a hole in the side near the bottom of a wash boiler a trifle smaller than the hexagon on an ordinary faucet, and fasten the faucet to the boiler with solder. A locknut and washer on the inside will give additional strength. This arrangement makes it a very simple matter to empty the vessel.

PRIZE OFFERS AND ANNOUNCEMENTS

9843
DOUGHBOYS URGED TO RETURN SOUVENIRS TAKEN FROM RHEIMS CATHEDRAL

"Our doughboys went overseas with the sole and primary purpose of collecting souvenirs," laughingly declared a famous war veteran on his return from France. While the statement was made in fun, it is nevertheless true that great quantities of souvenirs were brought back. In an appeal to Yankee fighters, the American Legion requests every member of the Expeditionary Forces who may have "salvaged" a fragment of the Rheims Cathedral to send it back to Rheims. The French government has undertaken to reconstruct the historic church, but cannot replace the priceless bits of statuary and other elements which have been taken by souvenir hunters.

9647
HORSESHOE-PITCHING TOURNAMENT TO BE HELD THIS YEAR AT IOWA STATE FAIR

The annual National Horseshoe Pitchers' Tournament for the championship of the world will be held this year at the Iowa State Fair and Exposition, Des Moines. The men's national tournament will be August 29-September 1; the women's will be August 30, and the Iowa State tournament for men will be August 28-29. A cash prize of \$250, with trophies valued at \$850, and other cash prizes, down to \$20 for sixteenth place, are offered for the men's events. The women's prize list includes cash prizes from \$25 for first place, down to \$5 for eighth place, with trophies valued at \$300. All entries, accompanied by a fee of \$2 for men, and of \$1 for women, must be sent in not later than Aug. 24, 1922.

9527
STUDENTS OFFERED PRIZE FOR BEST ESSAY ON A HISTORICAL NOVEL

To promote a better knowledge of one of the greatest achievements in American literature, Kenyon College offers a prize of \$100 for the best essay, written by a student of any college or university in the United States or Canada, on "Gorgo, a Romance of Old Athens," by Charles Kelsey Gaines. Three typewritten copies of the essay, which must not be more than 4,000 words in length, must be submitted, and must reach Kenyon College, Gambier, Ohio, not later than Dec. 1, 1922.

9697
PRIZE OF \$5,000 TO BE AWARDED EVERY FIVE YEARS TO AN AMERICAN WOMAN

As a tribute to M. Carey Thomas, who is retiring from the presidency of the college, the Alumnae Association of Bryn Mawr College is founding a prize of \$5,000, which will be awarded every five years to an American woman who has achieved eminence in some line of work. The award will be known as the "M. Carey Thomas Prize." Address, Publicity Committee of Bryn Mawr College, Alumnae Office, Bryn Mawr, Pa.

U. S. CIVIL-SERVICE EXAMINATIONS FOR VARIOUS VACANCIES

Competitive examinations for assistant examiner Patent Office, will be held Aug. 23, 24, and 25, and Oct. 18, 19, and 20, 1922, in various cities and towns throughout the United States, Porto Rico, and Hawaii. Other vacancies in the Patent Office, with an initial salary of \$1,500 a year and a bonus of \$20 a month, with provisions for promotion to positions paying from \$1,650 to \$3,900 a year, will also be filled from this examination.

Examinations for valuation engineer and other vacancies on the technical staff of the income-tax unit of the Bureau of Internal Revenue, at \$3,600 to \$4,800 a year, are to be held in the near future. Applications for eligibility must reach Washington before Sept. 1, 1922.

The Langley Memorial Aeronautical Laboratory, Langley Field, Virginia, is in need of a wind-tunnel

mechanic. The position pays \$1,800. Receipt of applications closes Aug. 15, 1922.

Applicants for any of the foregoing positions should write at once for Form No. 1312, stating the title of the examination desired. Address Civil-Service Commission, Washington, D. C.

9850
COLORFUL PAGEANT WILL BE STAGED ON BOARDWALK OF ATLANTIC CITY

What promises to be a brilliant and colorful pageant will be staged on the boardwalk at Atlantic City, September 6, 7, and 8, according to plans approved by the local authorities.

"King Neptune"—to be acted by some one of international reputation—will be brought from the sea with his court of beauty, guard of honor, and slaves, on the first day in gayly decorated seaplanes. Among the many events on the program is a beauty contest, a bathers' revue, a rolling-chair parade, automobile road race, swimming meet, and a tennis, trapshooting, and golf tournament.

A statuette, representing a mermaid and wrought in solid gold, is the prize to be won by America's most beautiful bathing girl. The figure reclines on a bowlder of granite which is mounted on a bronze base, molded to represent ocean waves.

9843
INTERESTING PICTURES OF AUTOMOBILE WANTED BY MOTOR COMPANY

For the three most interesting or unusual photographs of the Chandler car, the Chandler Motor Company of Cleveland will pay cash prizes of \$100, \$50, and \$25. The contest closes before the end of the year, the exact date to be announced later. A short description of the scene should accompany each photograph submitted. All prints entered in the competition are to become the property of the motor company.

CONTESTS PREVIOUSLY ANNOUNCED

Medals, Diplomas, and Money Awards: Announced August issue, 1921; awards offered by the Franklin Institute.

For Service to City of Philadelphia: Prize \$10,000; announced September issue, 1921; awarded each year by Edward Bok, former editor of The Ladies' Home Journal.

One Million Francs for Best Motor: Announced January issue, 1922; closes June 1, 1923; address, Aero Club of France, Paris.

Man-Propelled Airplane: Prize 20,000 francs; announced April issue, 1922; closes September 13; address, Maison Peugeot, 80 Rue Danton, Levallois-Perret (Seine), France.

Best Lists of Uses of Shoe Polishes: Prizes \$500, \$300, \$200, 10 of \$25 each, 20 of \$15 each, 50 of \$5 each, 50 of \$2 each, and 100 of \$1 each; announced April, 1922; closes Aug. 31, 1922; address, F. F. Dalley Company of New York, 277 Military Road, Buffalo, N. Y.

Annual Commercial Airplane Contest for "Italy's Great Trophy": announced, July issue, 1922; address, Aero Club of Italy.

For Best Lists of Uses for "Sanlo": Prizes \$50, \$25, \$10, and three of \$5 each; announced June issue, 1922; closes Aug. 31, 1922; address, Contest Department, The Parker Sanlo Co., Inc., Rochester, N. Y.

Research Thesis by a Woman: Prize \$1,000; announced October issue, 1921; awarded annually; address, Dr. Lillian Welsh, Goucher College, Baltimore, Md.

Ideas for New Occupations for Shut-Ins: Prizes, \$100, \$50, and \$25; announced July issue, 1922; closes Nov. 1, 1922; address, Prize Editor, Popular Mechanics Magazine, 6 North Michigan Ave., Chicago.

American Legion National Essay Contest: Prizes, \$750, \$500, and \$250; announced August issue, 1922; closes Oct. 6, 1922; address, The American Legion, National Americanism Commission, Indianapolis, Ind.

Best Essay about Pasteur: Prize, 100 scientific books; announced August issue, 1922; closes, Sept.

*Thos. P. Endicott Director
General, Atlantic City Pageant
P. O. Box 13, City Hall*

1, 1922; address, Fédération de l'Alliance Française, 32 Nassau St., New York City.

Best Backyard Railroads: Prizes, 23, ranging from \$25 to \$2; announced August issue, 1922; closes Sept. 15, 1922; address, American Flyer Mfg. Co., 2219-39 South Halsted St., Chicago, Ill.

Fishing Contest: Prizes, Seven "Model 94" Win-

chester hunting rifles; announced July issue, 1922; no definite closing date.

Best Novel by an American Author: Prize \$2,000; announced August issue, 1922; closes March 1, 1923; address, Harper & Brothers, New York City.

Designs for Chicago Tribune Building: Prize, \$100,000; announced August issue, 1922.

In answering prize offers please mention Popular Mechanics Magazine

9327
FISHING THE ETHER

By George F. Staat

Every night on the stroke of seven,
I go fishing in the pond of heaven,
Hairlike hook and a crystal bait—
And I fish and I fish till the stroke of eight.

I cast a dozen miles from shore,
Cast again a dozen more,
With my thumb upon the reel,
Till a sound-fish bite I feel.

Nibble, nibble—here they come,
Till they make my tackle hum,
Sound fish, wonderful and fine;
Forty million on one line!

Opportunity
School,
Pasadena
Calif.

9394
CONFESSION

By James A. Sanaker

Not like one on the mountain top
Who, gazing down below,
Looks calmly at the shifting throng
Which rushes to and fro.

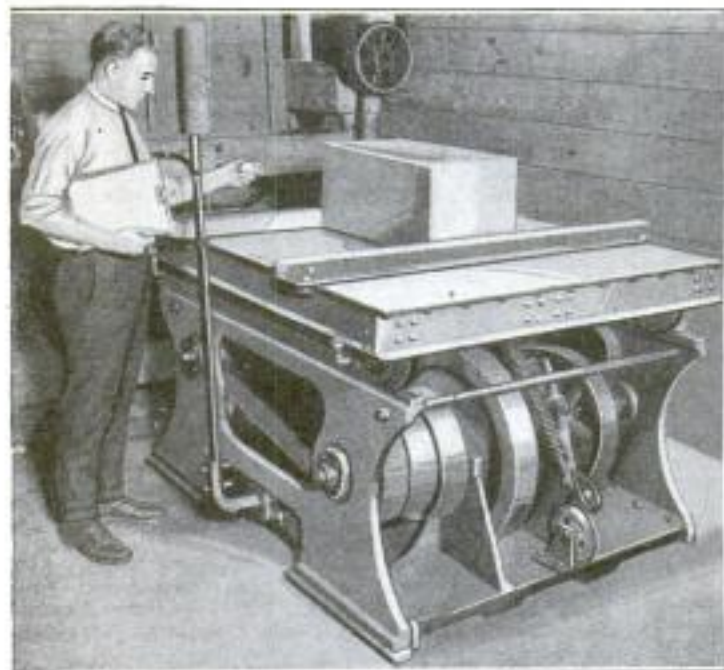
Not like the thinking man who plans
Each move to be just so,
Whose wisdom always bids him wait,
Whose watchword cries, "Go Slow!"

But, like a million other souls,
Quite thriftless here below,
I caught the latest fad and fell,
I bought my radio.

Missouri
Valley
Clara
St. San Francisco, Calif.

9712
**NEW BOX-TESTING MACHINE
AT FEDERAL LABORATORY**

The shaky rough-riding action of a freight car is imitated by a new box-testing machine in use at the Forest Products Laboratory, Madison, Wis. The boxes are placed on a heavy, low steel table, which is then operated by a series of motors "tuned" to reproduce faithfully



A Close-Up of the Box-Testing Machine: The Lever Controls a Series of Motors Which Give the Table the Shaky Motion of a Moving Freight Car

the vibrations of a moving freight car. The machine was designed by engineers of the Department of Agriculture.

9389
**WILL WIRE OFFICE BUILDING
FOR RADIO INSTALLATIONS**

For the first time in the history of Pacific-coast office-building construction, a 15-story skyscraper in San Francisco, erected by a navigation company, will be wired throughout for radiophone installation. Tenants wishing to put in a receiving set will only have to "plug in" to a wall socket, as for a desk lamp, to be connected with the antenna on the roof and receive broadcasting programs from stations in San Francisco and vicinity. Not only will the new building be completely wired as a convenience to tenants who are radiophone enthusiasts, but the company intends to install a powerful sending and receiving set, with which it is expected it will be possible to give orders to the captains of the company's nine freight and passenger ships, which maintain a weekly service between San Francisco and the Hawaiian Islands. Within the next year the company hopes to be able to talk by radiophone with its agencies in the islands.

Navigation
St. San Francisco
Market
Co. 120
A. E.

IN accordance with the editorial policy of this magazine never to accept compensation in any form for what appears in our reading pages, and also to avoid all appearance of doing so, we are obliged to omit the name of the maker or the seller of any article described. This information, however, is kept on file and will be furnished free, by addressing Bureau of Information, Popular Mechanics Magazine, Chicago. [Editor.]

Use it—and you will see the difference



Pocket sun dials tell time, yet you prefer an accurate watch, though it requires winding. Similarly, for 25c or less, you can buy a toy kind of clutch pencil with wobbly, uncertain point—but you prefer a finely made pencil of precision—like EVERSARP.

The principle of operation that makes EVERSARP write with satisfying smoothness and surety depends on the exclusive rifled tip that keeps the lead from slipping and wobbling. The success of this rifled tip is the success of EVERSARP—and no other pencil can use this rifled tip.

Supplementing the perfect EVERSARP tip are other excellent features that contribute dependability, convenience, beauty—all in every EVERSARP, regardless of what you pay.

Select your EVERSARP today—or get an extra one for your desk. Gold, silver and enamel finishes; priced from 50c to \$50. Sold everywhere.

Made in U. S. A. by
THE WAHL COMPANY, CHICAGO
Canadian Factory, THE WAHL COMPANY, Ltd., Toronto

EVERSHARP

REG. U.S. PAT. OFF.



EXCLUSIVE RIFLED TIP

The supreme point of efficient writing. Lead held firmly; cannot slip nor wobble.



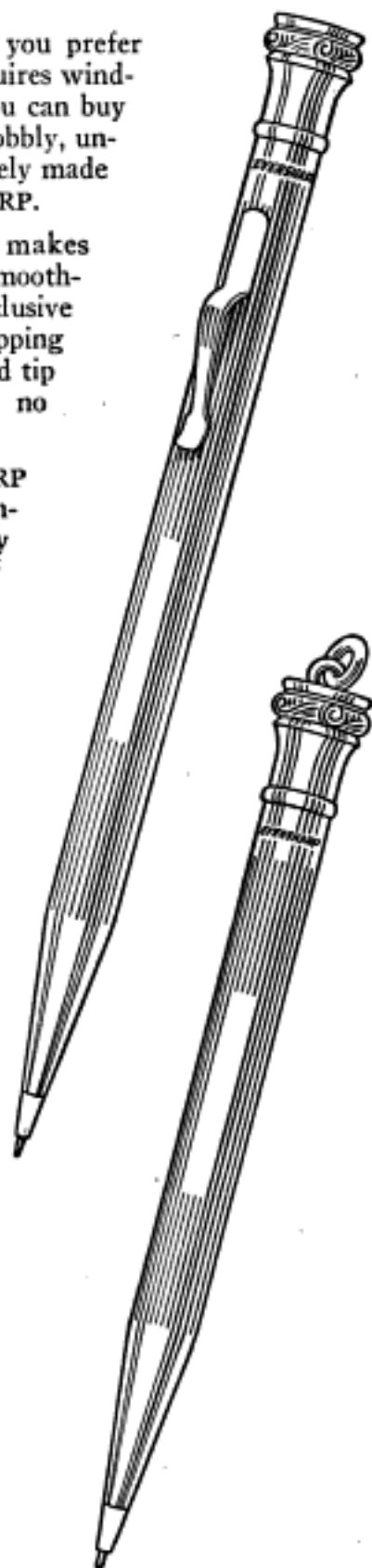
HANDY ERASER UNDER THE CAP

Eraser free with every box of EVERSARP leads.



HOLDS 6 TO 12 LEADS

Sold completely loaded. Extra lead in the Red-top box, 15c everywhere. Seven grades of lead, also indelible.





2400 telephone wires in a cable little larger than a man's wrist.

Science keeps down costs

When the Bell System installed its first successful telephone cable, fifty wires was the largest number that could be operated in a single cable without "cross-talk" and other interference. Today it would require 48 cables of the original type to accommodate the number of wires often operated in one cable.

Without this improvement in cable, the construction of new underground and aerial lines would have cost the Bell System upwards of a hundred million dollars more than has actually been spent. In addition, the cost of maintenance would have been greater by eighteen million dollars a year. These economies in the Bell System mean a saving in telephone rates to each individual subscriber.

In all branches of telephone practice

science has similarly contributed to economy. Even in such a comparatively small item as switchboard cords, improvements have reduced the cost of renewal by four million dollars a year.

Every new telephone added to the Bell System increases the usefulness of all telephones, but this multiplication tends likewise to increase the complications and the expense of service. The scientists of the Bell System, to offset this tendency, are constantly called upon to develop new devices which simplify complications and keep down costs.

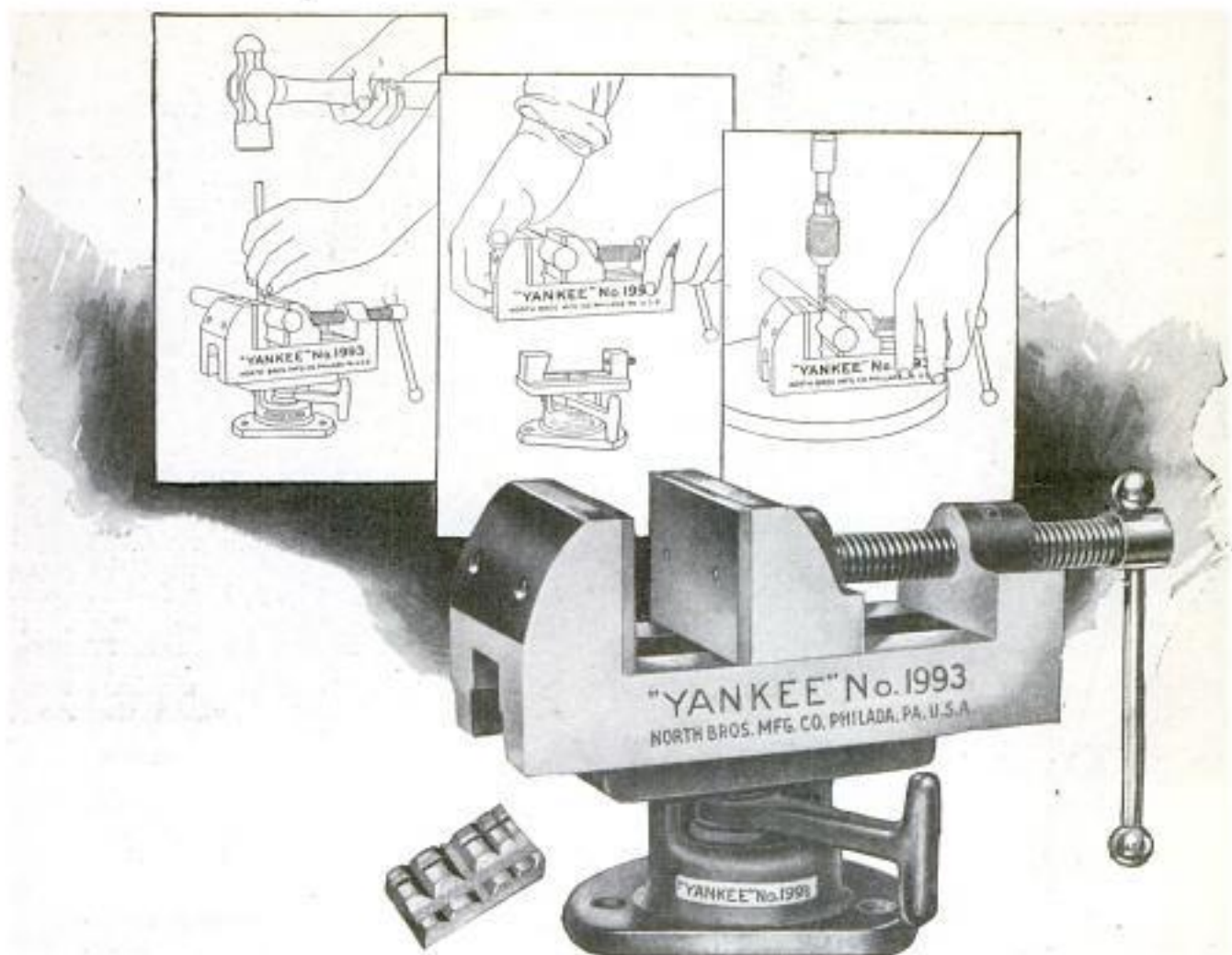
By virtue of a united system the benefits of these improvements are shared by all subscribers—and the nation is provided with the best and cheapest telephone service in the world.



" BELL SYSTEM "

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy, One System, Universal Service, and all directed toward Better Service



The "YANKEE" Vise stands by the job

Some other "YANKEE" Tools

Ratchet Breast Drills
Ratchet Hand Drills
Ratchet Chain Drills
Automatic Push Drills
Ratchet Tap Wrenches
Ratchet Bench Drills
Spiral Screw-drivers
Quick Return Spiral
Screw-drivers
Plain Screw-drivers
1½ to 30 in. blades

Dealers
everywhere sell
"YANKEE"
Tools

"When a job must go through quickly and be absolutely accurate, I lock it in a 'Yankee' Vise. The vise with work in it is detached from base. It goes from machine to machine and back to bench

in the original alignment." Sides, top and bottom of the vise machined true. Can be locked in any position. Removable steel block with V-shaped grooves holds round or irregular work.

"YANKEE" VISES with Swivel Base

No. 1991—Body 3½ in. long, 1½ in. wide, Jaws open 1½ in.; depth ¾ in.
No. 1992—Body 4¾ in. long, 2 in. wide, Jaws open 1¾ in.; depth 1½ in.
No. 1993—Body 7¾ in. long, 2¾ in. wide, Jaws open 3¾ in.; depth 1¾ in.
No. 1994—Body 10½ in. long, 4 in. wide, Jaws open 4 in.; depth 2¾ in.

Without Base

As above: Nos. 991, 992, 993, 994

Interesting Tool Book FREE, Illustrates and describes all the ingenious "Yankee" Tools for saving time and labor. Write today for it.

NORTH BROS. MFG. CO. Philadelphia



"YANKEE" TOOLS

Make Better mechanics



Teeth You Envy

Are brushed in this new way

Millions of people daily now combat the film on teeth. This method is fast spreading all the world over, largely by dental advice.

You see the results in every circle. Teeth once dingy now glisten as they should. Teeth once concealed now show in smiles.

This is to offer a ten-day test to prove the benefits to you.

That cloudy film

A dingy film accumulates on teeth. When fresh it is vis-

cus—you can feel it. Film clings to teeth, gets between the teeth and stays. It forms the basis of cloudy coats.

Film is what discolors—not the teeth. Tartar is based on film. Film holds food substance which ferments and forms acid. It holds the acid in contact with the teeth to cause decay.

Millions of germs breed in it. They, with tartar, are the chief cause of pyorrhea. Thus most tooth troubles are now traced to film, and very few escape them.

Must be combated

Film has formed a great tooth problem. No ordinary tooth paste can effectively combat it. So dental science has for years sought ways to fight this film.

Two ways have now been found. Able authorities have proved them by many careful tests. A new tooth paste has been perfected, to comply with modern requirements. And these two film combatants are embodied in it.

This tooth paste is Pepsodent, now employed by forty races, largely by dental advice.

Other tooth enemies

Starch is another tooth enemy. It gums the teeth, gets between the teeth, and often ferments and forms acid.

Nature puts a starch digestant in the saliva to digest those starch deposits, but with modern diet it is often too weak.

Pepsodent multiplies that starch digestant with every application. It also multiplies the alkalinity of the saliva. That is Nature's neutralizer for acids which cause decay.

Thus Pepsodent brings effects which modern authorities desire. They are bringing to millions a new dental era. Now we ask you to watch those effects for a few days and learn what they mean to you.

The facts are most important to you. Cut out the coupon now.

10-Day Tube Free 947

THE PEPSODENT COMPANY,
Dept. 171, 1104 S. Wabash Ave., Chicago, Ill.
Mail 10-Day Tube of Pepsodent to

.....
.....
Only one tube to a family.

Pepsodent PAT. OFF.
REG. U.S.

The New-Day Dentifrice

Endorsed by modern authorities and now advised by leading dentists nearly all the world over. All druggists supply the large tubes.



The Greatest Musical Catalog Ever Published

Over 3,000 Musical Articles—Every Known Musical Instrument Fully Described

For Professionals — Beginners — Amateurs

WURLITZER will send you any musical instrument known for a week's free trial in your own home. There is no obligation to buy. Not a penny cost to you unless you decide to keep it. You are the sole judge. Send the coupon for this catalog now. Read the details of this wonderful opportunity. This is your chance to buy any musical instrument you wish on *Free Trial*.

Any Known Instrument On Free Trial

Wurlitzer instruments have been used for three generations by famous artists, great bands and orchestras. Wurlitzer sends you any instrument on free trial. Many instruments come in velvet and plush lined carrying cases with all accessories, self-instructor, music, etc., all at factory prices, if you decide to buy. You get the entire outfit practically for the cost of the instrument alone.

Monthly Payments A few cents a day will pay for instrument and outfit if you decide after trial that you wish to keep it.

Send
for this
Catalog
Now!



The Rudolph Wurlitzer Co., Dept. 1776
117 E. 4th St. Cincinnati, O. 329 S. Wabash Ave. Chicago, Ill. 120 W. 42nd St. New York, N. Y.
250 Stockton Street, San Francisco, Calif.

Please send me your FREE 150-page catalog which features over 3000 articles of musical merchandise.

Name

Address

Instrument

(State instrument in which you are especially interested)

The Rudolph Wurlitzer Co.

Cincinnati

Chicago

New York

San Francisco

Dependable
Champions
For Every Engine Everywhere

**Insure
 Your
 Engine**



Type for Ford
 Champion X . . . now 60c
 Champion Regular now 75c

Champion accuracy in construction assures absolute uniformity of spark in each cylinder; consequently a more perfect timing of the engine

Ask your dealer to sell you a full set.

CHAMPION SPARK PLUG CO.

TOLEDO, OHIO



Your Home Is Within Your Reach When You Buy From Us

NOW is the time to build your Harris Home!

And here is a mighty organization of thirty great departments ready to serve you. Managed by expert material buyers, designers and practical builders. We have vast stocks bought at huge quantity price savings which are now at your command. Our sole aim and purpose is

To help you get a home that will prove entirely satisfactory at a price that will mean a substantial saving in actual dollars of your money.

The combined efforts of these great departments in experimenting and testing materials and methods of construction have produced for you a GUARANTEED home, expert machine cut, bundled and marked—the last word in building economy.

Not One Penny in Advance

So sure are we of the super-excellence of our material and our GUARANTEED Ready-Cut System that we will ship you any HARRIS HOME without the payment of one cent down. Our Plan Book explains our liberal terms fully.

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The latest edition is waiting for you, contains our FREE PLAN OFFER and photographic reproductions, with floor plans and specifications of 100 beautiful homes. Mail coupon today.

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For over a quarter of a century, thrifty wise buyers have realized that here is the "open door" to real economy, whether it be a brand new home or material for improvements or repairs. Our big stocks of brand new building material, all purchased in tremendous quantities at savings that are passed along to you are ready for quick and complete shipments.

"PRESTO-UP" Patented Bolt-together Buildings!

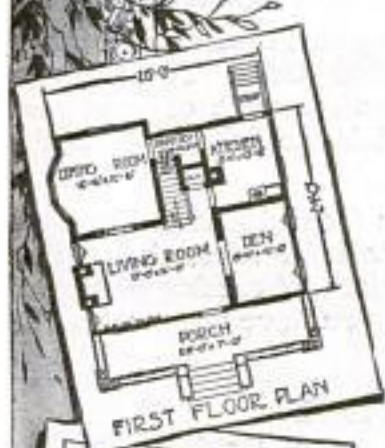
The wonder buildings of the age. Guaranteed buildings, for quick industrial housing. Individual Homes, etc., extra strong, practical and suitable for all year 'round habitation in any climate. 50 different plans. They come to you in easily handled sections—painted and stained, ready to bolt together and move in.

Plumbing and Heating!

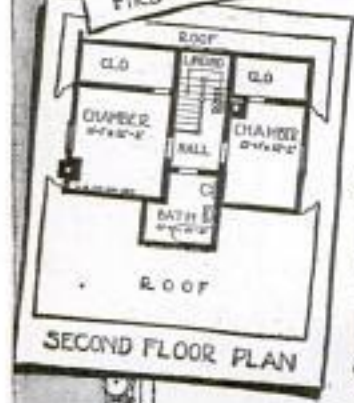
Hot water and heating systems, warm air heating plants, pipeless furnaces and plumbing material of every kind—the product of America's leading makers. Our mammoth plumbing stock offers unlimited possibilities for you to save money. Our heating plants are guaranteed to heat your home in any weather with big fuel economy. Mail the coupon for our Plumbing and Heating Book and get the benefit of our Expert Engineering Service.

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These books are FREE and sent post paid. Mark an "X" in the squares to indicate which ones you wish.

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Address.....

GODELL-PRATT

1500 GOOD TOOLS



Calipers, Steel Rules and Surface Gauges in all the standard styles and sizes.

“Accuracy is my family name,” says Mr. Punch

You've got to buy measuring instruments and precision tools — micrometers, gauges, calipers and steel rules — largely on *faith*. The reputation of the maker is your best guarantee of *accuracy*.

The confidence and faith that mechanics, artisans, and other workmen have in the Goodell-Pratt 1500 Good Tools is *never misplaced*. Before you buy another steel rule, measure it up with a micrometer.

Exceptional accuracy—the result of taking pains

If you could see the infinite pains taken in the making of all Goodell-Pratt 1500 Good Tools — you would realize why so many thousands of workmen have such *faith* and *confidence* in the Goodell-Pratt Tools they use.

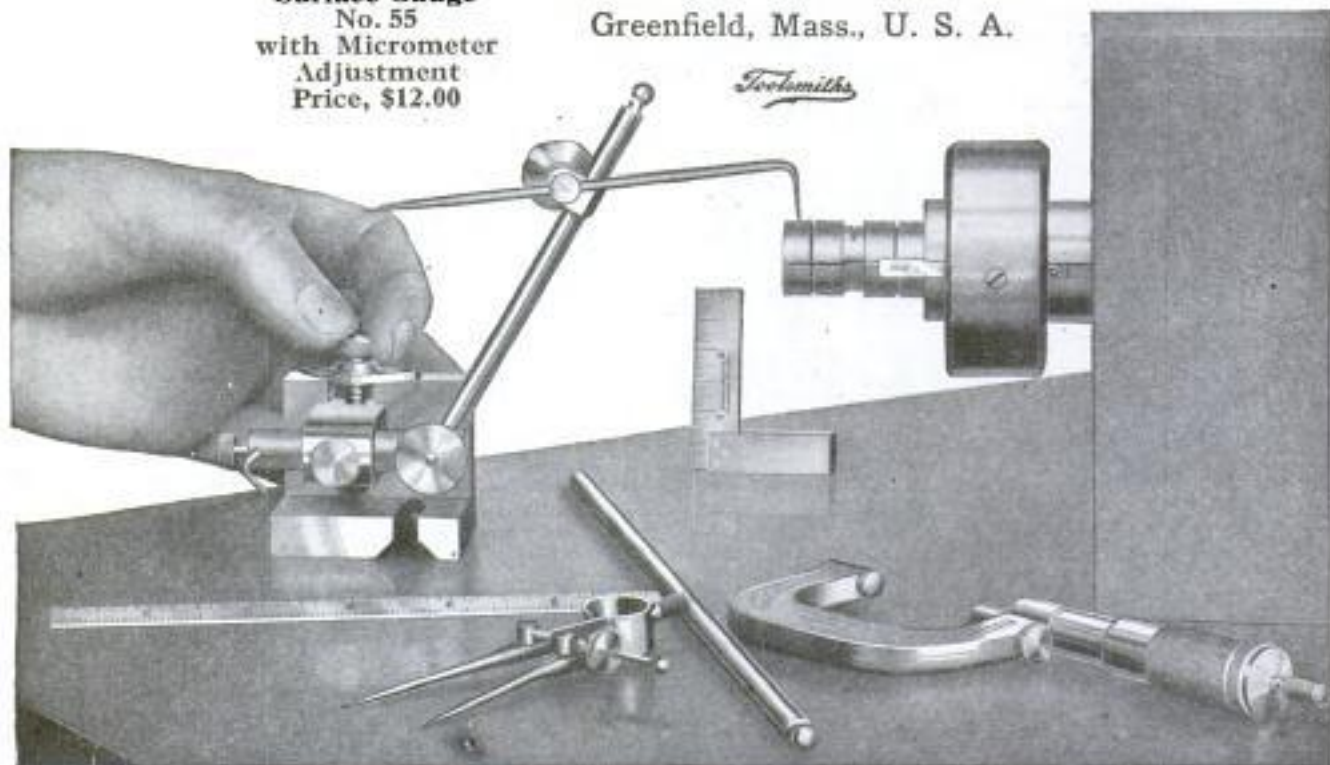
Your hardware dealer has Goodell-Pratt Tools or can get them for you. Talk to him. Meantime, write for a copy of our new machinist tool catalog picturing and describing the very tools you have always wanted to call your own. It's free.

Surface Gauge
No. 55
with Micrometer
Adjustment
Price, \$12.00

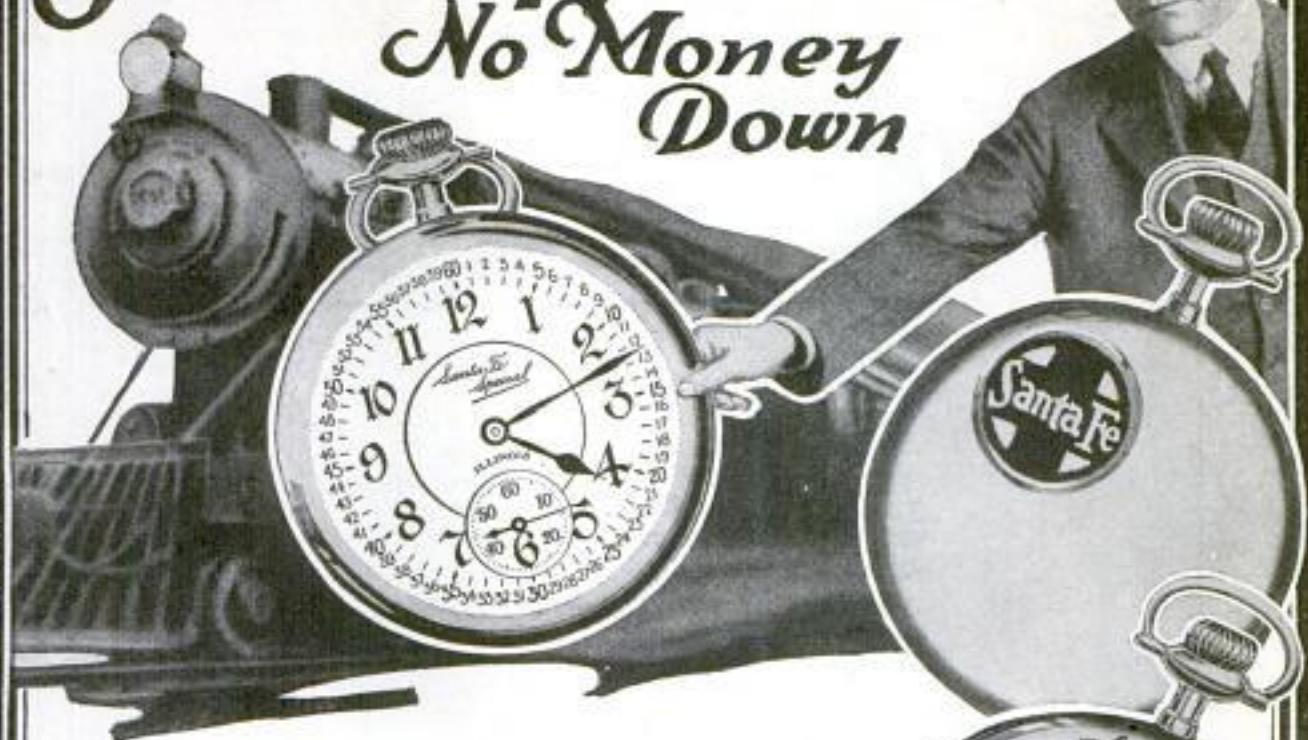
GODELL-PRATT COMPANY

Greenfield, Mass., U. S. A.

Toolsmiths



Sent on Approval No Money Down



21 Jewel Santa Fe Special

21 Perfect Jewels
Adjusted to Positions
Adjusted to Temperature
Adjusted to Isochronism

Adjusted to the Second
New Models. Thin Cases
Montgomery Dial
25 Year Gold Strata Case

Without one penny of advance payment let us place in your hands to see, to examine, to inspect, to admire, to approve a real masterpiece in watch creation.

Our determination to this year double our sales of the world famous *Santa Fe Special* and *Bunn Special* Watches prompts this matchless offer.

While other watch dealers are raising their prices, asking you for larger monthly payments, and making payment terms harder for you to meet, we are offering you our new model *Santa Fe Special*, no advance in price, no money down, easier terms and smaller monthly payments. [WE realize the war is over and in order to double our business we MUST give you pre-war inducements, better prices, easier terms, and smaller payments.]

Page 12 of Our Watch Book is of Special Interest to You!

Ask for our Watch Book free—then select the watch you would like to see, either the famous *Santa Fe Special* or the 6 position *Bunn Special*, and let us explain our easy payment plan and send the watch, express prepaid, for you to examine. No money down.

REMEMBER No money down—easy payments buys a master timepiece—a 21 Jewel guaranteed for a lifetime at about half the price you pay for a similar watch of other makes. No money down—a wonderful offer.

SANTA FE WATCH COMPANY

96 Thomas Bldg.

Topeka, Kans.

SANTA FE WATCH CO.,
96 Thomas Bldg., Topeka, Kans.

Please send prepaid and without obligation your Watch Book free, explaining your "No Money Down" Offer on this *Santa Fe Special* Watch.

Name

Address



1880

1922

First among the things that explain the preference of two generations of skilled machinists for Starrett Tools is the fact that there are no "seconds." A man can rely on the unvarying accuracy of a Starrett Precision Tool as he can on the word of his best friend.

Write for Catalog No. 22AP and the Supplement describing the new Starrett Tools.

THE L. S. STARRETT CO.

The World's Greatest Toolmakers
Manufacturers of Hack saws Unexcelled
 ATHOL, MASS.



Micrometer Depth Gage No. 440
 With Three Measuring Rods
 For those who prefer a one inch movement of the screw. The 440 provides measurements of the depth of holes, grooves, etc., from 0 to 3 inches by thousandths of an inch.

Starrett Tools



42-392

I Want A \$5000 Man in Every Town

This is nothing more than a "Help Wanted" Ad—But it offers you the most amazing opportunity in years. You may not be the man I want—but if you are—I'll Show You How You Can Earn From \$5000 to \$7000 a Year



The Proposition

One of America's largest woolen mills, Taylor-Wells & Co.—for the first time in the history of woolen mill merchandising has decided to manufacture and sell directly from the mills to the wearer all wool products—overcoats, work-pants, bed-blankets, auto-ropes, raincoats and suits, fashioned from their own woolens. An organization of special representatives is now being formed to represent Taylor-Wells & Co. in exclusive territory. In view of the fact that this organization is to be composed of the best grade of men I can secure—I am going to be mighty particular about—

The Man

He need not have selling experience. But he must possess loyalty, honesty, sincerity and a good reputation in his community. I do not want every Tom, Dick or Harry. I want men of whom we will be proud—and who in turn will be proud of us and our merchandise. I know our products to be of the highest grade and I want men of a like calibre.

His Earnings

Conservatively estimated a special representative should earn from \$5000 to \$7000 a year. The demand for our products will be great. Selling direct from the woolen mills to the consumer—we can sell all wool merchandise at a price so low as to be astonishing. Our representative will practically build a business for himself in his territory. Customers who buy Taylor-Wells all wool products stay customers.

His Future

The sales organization now being formed is in its infancy. Within a short time District Managerships will be open. The men who join us now—and who "make good" place themselves immediately in line for a District Managership which should net him \$10,000 a year and more. The ambitious man with the determination to succeed will have no trouble in "landing" one of these openings.

Why You Must Act Quickly

This may be your one big opportunity. Do not delay! Write me immediately and use the coupon below for full details of this amazing opportunity. Territories will be going fast—so if you believe yourself the "right man"—hurry!

Take a Tip From Me

I've been in the selling game and sales promotion field for years—and when I tell you that this opportunity which is now offered you is **absolutely the most amazing selling plan I have ever seen**—I know what I am talking about.

You don't have to be a genius or a "star salesman" to "make good." If you've got grit and determination—you can't help but make good! I know it! Figure it out for yourself. Here is a gigantic woolen mills manufacturing high-grade merchandise from its own **woolens**—and selling them **direct to the wearer**. Can't you see the startling saving that the consumer gets?

I haven't the space to tell you all I want to say to you. But if you are the "right man"—mail the coupon—and let me give you the full details. They will surprise you!

G. H. LINDER,
Gen'l Sales Mgr.



TAYLOR-WELLS & CO.
Dept. 229, 2740 N. Paulina St., Chicago, Ill.
"From the Mills to the Millions"

TAYLOR-WELLS & CO.
Dept. 229, 2740 N. Paulina St.
Chicago, Illinois.

Attention, Mr. Linder: I am greatly interested in your proposition. Would like to represent you, and would appreciate your sending me full details of your remarkable selling plan.

Name

Address

City State

W. L. DOUGLAS

FOR MEN

\$5. \$6. \$7. & \$8. SHOES FOR WOMEN



WEAR W.L. DOUGLAS SHOES AND SAVE MONEY. THE BEST KNOWN SHOES IN THE WORLD

THEY ARE MADE OF THE BEST AND FINEST LEATHERS, by skilled shoemakers, all working to make the best shoes for the price that money can buy. The quality is unsurpassed. Only by examining them can you appreciate their wonderful value. Shoes of equal quality cannot be bought elsewhere at anywhere near our prices.

OUR \$7.00 AND \$8.00 SHOES ARE EXCEPTIONALLY GOOD VALUES. W.L. Douglas shoes are put into all of our 108 stores at factory cost. We do not make one cent of profit until the shoes are sold to you. It is worth dollars for you to remember that when you buy shoes at our stores

YOU PAY ONLY ONE PROFIT

SEE THAT THE NAME AND PRICE IS STAMPED ON THE SOLE. Do not take a substitute and pay extra profits. Order direct from the factory and save money.



Established 1876
Catalog Free

W.L. Douglas
President

W. L. Douglas Shoe Co.,
128 Spark St., Brockton, Mass.

Build and Fly Model Aeroplanes



Build your own Model Aeroplane; make trial flights and learn the principles of Aerostatics. With IDEAL Scale Drawings and Building and Flying Instructions you can easily build exact 3-ft. duplicates of Real Planes. Send now for the Plans for the one you want to build. Curtiss JN4D-2 Training Plane; DeHavilland Battle Plane; NC-4 Naval Seaplane; Curtiss Military Trainer; Bleriot, Nieuport or Taube Monoplanes; also Cecil Puller Racers; 25 cents each, postpaid.

"EVERY-BOYS" Airplane clips together without nails, wire or screws. Ready to fly in 2 hours. The newest idea. Send for catalogue and find out all about it.

Ideal Aeroplane & Supply Co., 119 Wooster St., cor. W. Houston St., New York City

Catalogue IDEAL Model Aeroplanes and Supplies, 5c postpaid

PLANS AND INSTRUCTIONS 25¢

SEND NO MONEY



Try this Portable Typewriter 10 Days FREE

Now you can buy famous, 9-pound National Typewriter direct from the factory, after 10 days' trial—absolutely free. You be the judge. Then we give you

10 MONTHS TO PAY

Same machine as used by thousands of doctors, lawyers, bankers, salesmen, students, writers and business men in 31 countries. Every feature of best, standard size machines. 28 keys.

84 characters. Brand new—not a rebuilt typewriter. Neat, compact carrying case free with every machine. Send today for our 10 Days' Free Trial offer and 10 Months' Easy Payment Plan.

NATIONAL TYPEWRITER CO.

Dept. 7-1.

Fond du Lac, Wis.

34 MILES on Gallon of Gasoline



Wonderful carburetor. Reduces gasoline bills one-half to one-third. Increases power of motors 30% to 50%. Starts easy in coldest weather.

Sent on 30 DAYS' TRIAL

Fits any car. Attach yourself. **Fords** make as high as 34 miles to gallon. Other cars show proportionate saving. Send make of car. Special 30-day trial offer. Agents Wanted.

AIR FRICTION CARBURETOR CO.

3580 Madison Street

Dayton, Ohio

Rider Agents Wanted

Select from the 44 Styles, colors and sizes of **Ranger Bicycles**. Ride and exhibit sample **Ranger** and make money. Delivered free, express prepaid, on Approval. Factory-to-Rider prices save \$10 to \$25.

12 Months to Pay on any **Ranger** if desired. Boys and girls easily save the small monthly payments. Parents often advance first payment.

Best quality, at factory prices, express prepaid. Lamps, wheels and equipment, low prices. Send

Mead Cycle Company
Dept. F108 Chicago

Write today for free **Ranger Catalog**, factory prices and marvelous easy payment terms



EXTRA—The American Duplex

a new Key cutting machine ready set to cut square, angular or round slots. For particulars, address

AMERICAN SHARPENING MACHINE CO.

Dept. 9, 184 W. Washington St.

Chicago

TIRE Agents Wanted

An auto owner in each locality to use and introduce

Mellinger EXTRA-PLY and CORD Tires Make big money part or full time. No capital or experience needed. Sample Sections furnished. **GUARANTEED**

8,000 and 10,000 Miles (No Seconds)

Hand made. Finest materials. Shipped prepaid on approval.

FREE Tires for Your Car to one user in each locality for taking a few orders. Be first to write quick for Special Agents Offer and Low Wholesale Prices.

MELLINGER TIRE & RUBBER CO.
510 North Oak Street
Kansas City, Mo.



Selling Motors Below Cost

because of cancellations



$\frac{1}{6}$ HP.
\$10

Delivers full 1-6 H. P. with liberal overload capacity. Made for 110 volts, 60 cycle current. (Also for 25, 30, 40, 50 cycle or 220 volts if desired at \$1.00 extra.) Just the thing for running washing machine, iron, dish washer, compressor, bench lathe, blower, fan, drill press, scroll saw or any small machine around house shop, garage.

Made and Guaranteed By Well Known House

ing. We had the parts all made when cancellations came. We're closing them out to get our money.

Sold on Money Back Guarantee

New motor or free repairs if anything goes wrong within one year. Parts always obtainable. Net weight 20 pounds, shipping weight 25 pounds. Easy means of reversing direction of rotation. 10 ft. cord with attachment plug, 50c. Pulleys, 1½ inch or 2 inch, 50c.

Send cash or order C. O. D. by express.

REYNOLDS
ELECTRIC COMPANY

2610 West Congress Street

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MONEY IN MUSHROOMS

NOW TIME TO START
BIG DEMAND. HIGH PRICES BEING PAID
An uncrowded occupation. Exceptional opportunities for live men and women. Raised at home. Only small space needed. Small expenditure will start you in a practical money-making enterprise. Big profits. Booklet telling all free. Write Nat'l Spawn Co., Dept. 12, Brighton, Mass.

Try This Typewriter 5 Days FREE

\$3.00 Down — Balance \$5.00 Monthly
Any standard make. Perfectly rebuilt. Guaranteed satisfaction or your money back. Save \$25 to \$50. Pay while you earn. Try 5 days at our expense. Send postcard for special bargain price. Save July 14 to 15. Do it NOW!

WYNN TYPEWRITER EXCHANGE, 12 Reliance Bldg., Kansas City, Mo.

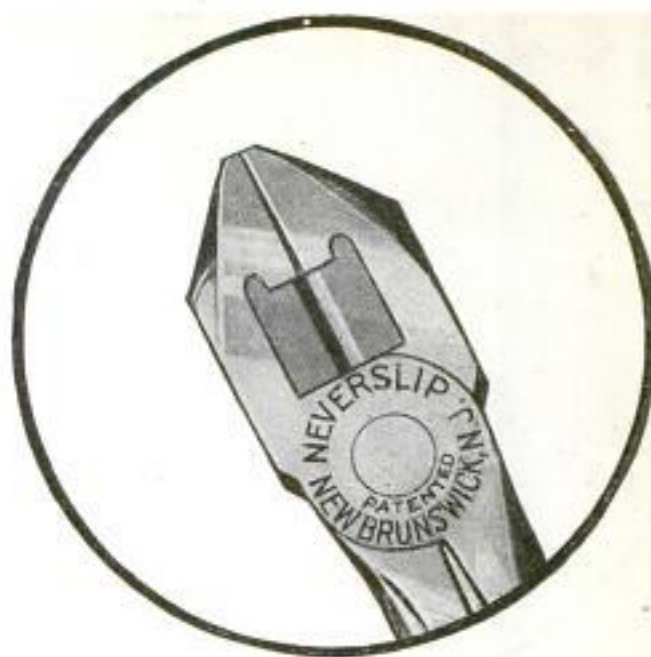
BALBA bouquet perfume

Let Our Money-Making Agency Offer
Balba Sales Machines
Make \$200 to \$1000 Monthly

This new plan of selling high quality perfume has taken the country by storm. Men everywhere are jumping at the opportunity to get into this big money-making field. See page 171 of March Popular Mechanics.

Over 500 Cities Already Taken
Remember the first who qualify get the exclusive sales rights. We do the local newspaper and national advertising. Get full particulars NOW.

BALBA CORPORATION of AMERICA, Inc.
Dept. 44, Adams and Jackson Sts.
TOLEDO, OHIO, U. S. A.



Here's why NEVERSLIP pliers will outcut and out- last any plier made

Most Pliers are made from one piece of steel — pliers and cutting edges all made at the same time. Is it any wonder that they dull quickly and soon have to be thrown away?

It takes time to make a pair of Neverslips. First we make the pliers. Then we make the cutting blades from special high carbon crucible steel. These cutting blades are renewable. When one set becomes accidentally nicked or broken, they may be quickly and easily replaced with a brand new pair.

And remember this: Neverslip Pliers are guaranteed to outcut and outlast any plier made.

Most hardware dealers sell them. Write for leaflet.

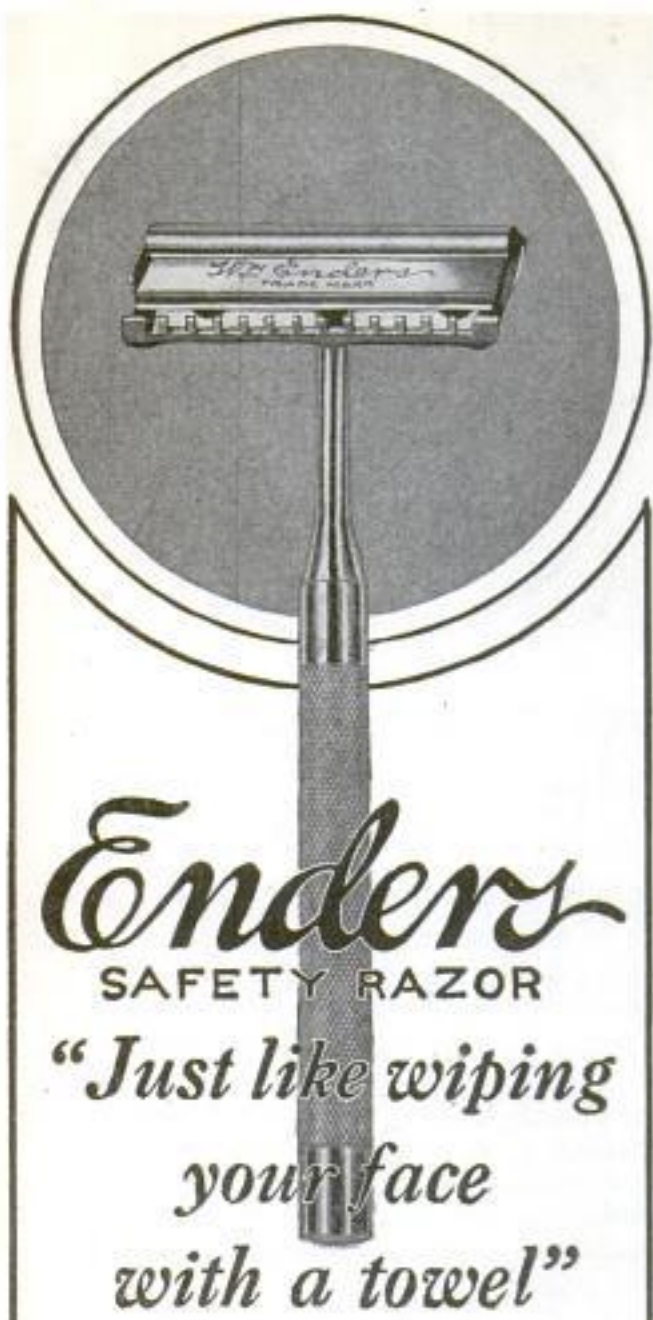
THE NEVERSLIP WORKS
New Brunswick New Jersey

NEVERSLIP side cutting pliers

Neverslip Pliers are furnished in six, seven and eight inch sizes.

If you use pliers you ought to read this interesting leaflet. It's mailed free upon request.





Enders
SAFETY RAZOR


*"Just like wiping
your face
with a towel"*

ENDERS SALES COMPANY
105-111 West 40th St. New York

ENDERS SELLS FOR \$1.00 with six blades of the best quality Swedish-base steel. Packed in black Keratol box, velvet lined. Extra blades, package of 5—35 cents. In Canada—Razor, \$1.50; Blades, 50c.

FOR SALE by All UP-TO-DATE DEALERS EVERYWHERE

Blades—Hand-stropped, Hand-tested



Please Mention Popular Mechanics

**Easy to Play
Easy to Pay**



BUESCHER

**True-Tone
SAXOPHONE**

Saxophone Book Free

Tells when to use Saxophone singly, in sextettes or in regular band; how to play from solo parts in orchestra and many other things you would like to know.



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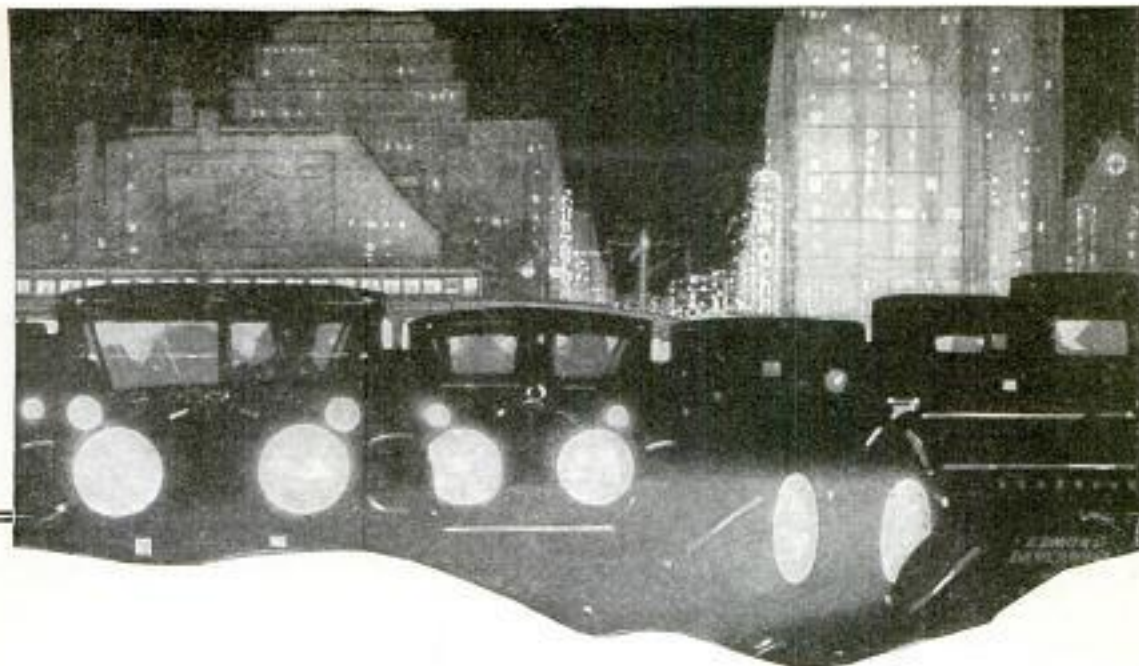
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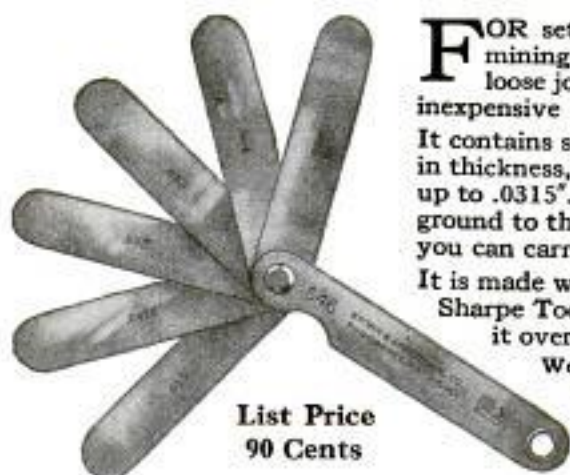
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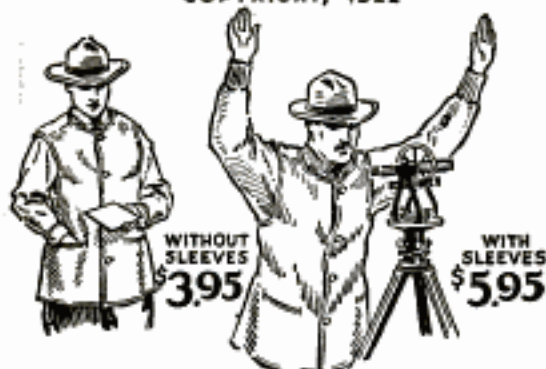
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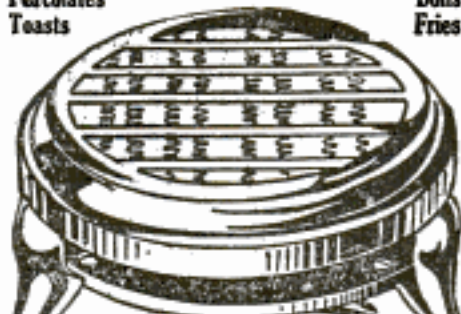
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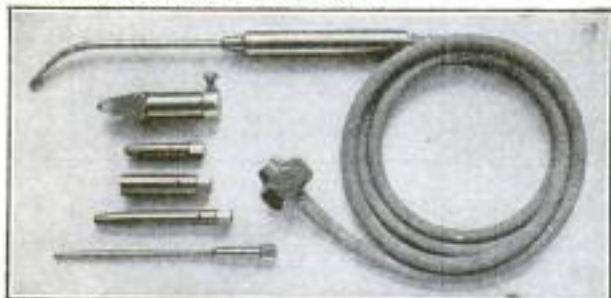

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For quick, accurate and easy drilling in wood or metal, the One-Hand-Y Electric Drill is unsurpassed.
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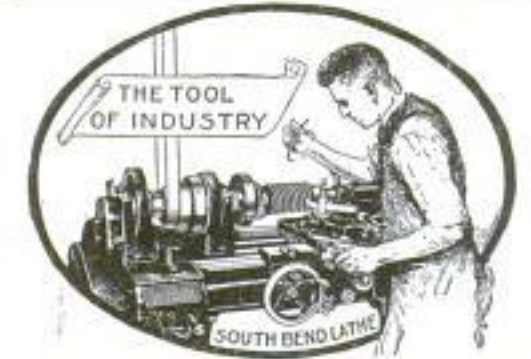
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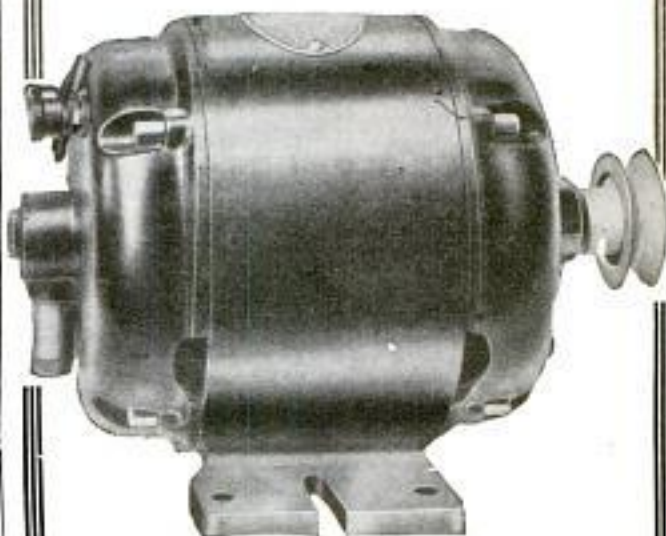


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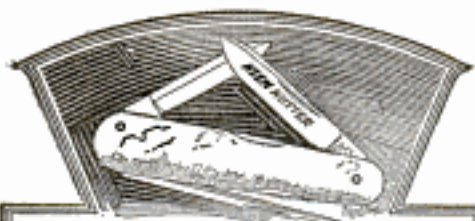
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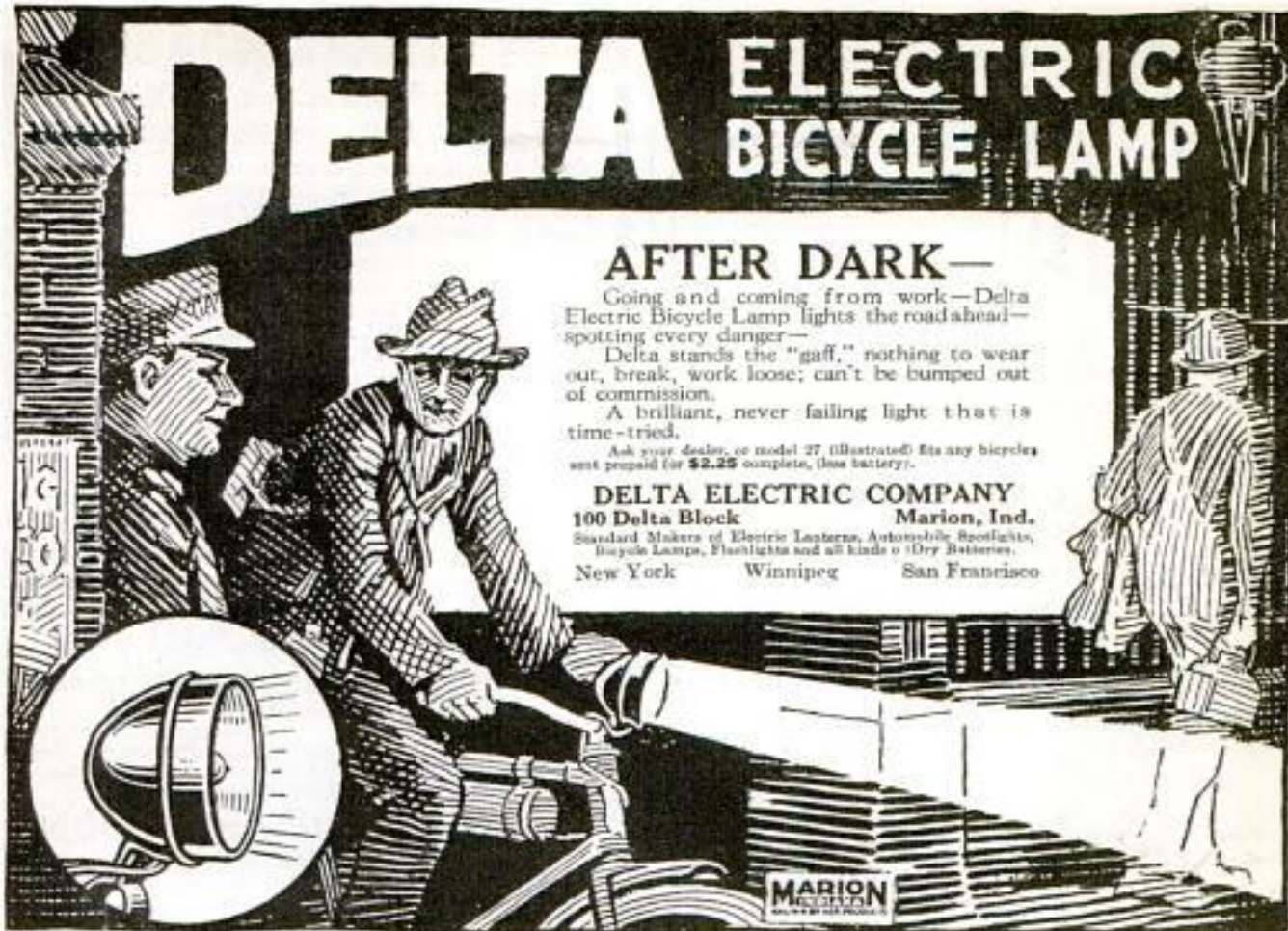
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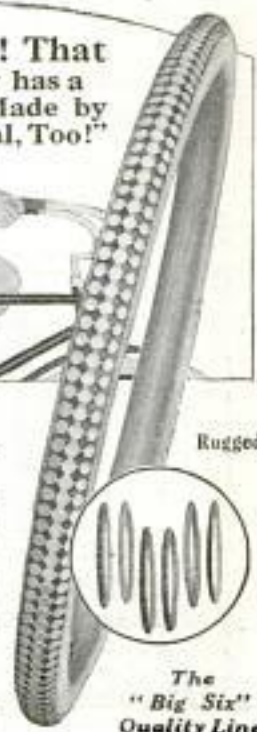
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31 x 4	10.65	16.90	36 x 4 1/2	15.45	25.45
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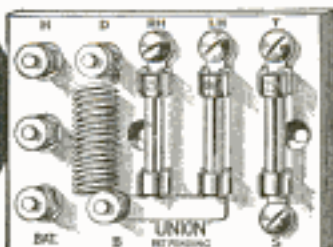
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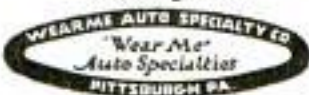

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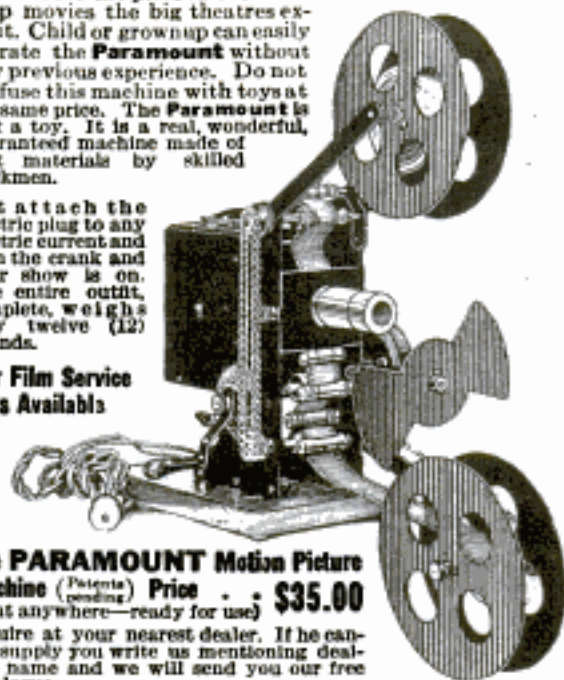
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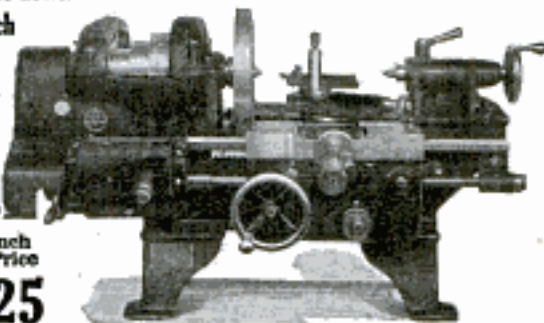
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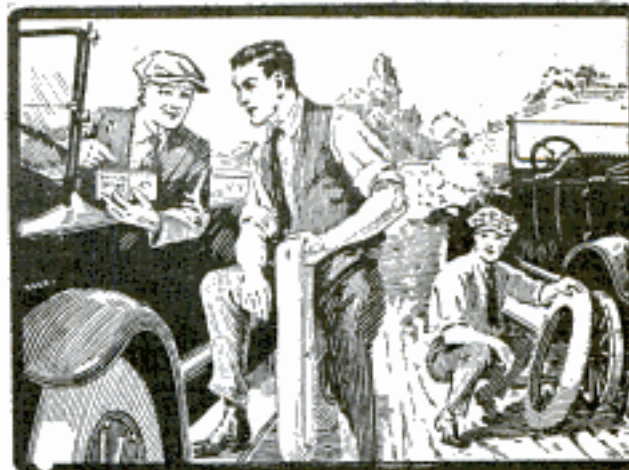
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Get a Shaler 5-Minute Vulcanizer from your dealer. It will soon pay for itself by the saving in time, trouble and tire repair bills.

\$1.50 at All Auto Supply Stores

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The outfit includes the vulcanizer, 12 Patch-&-Heat Units (6 round for punctures and 6 oblong for cuts)—ready to use—with complete instructions. Extra Patch-&-Heat Units 75 cents a dozen.

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SHALER

5 MINUTE VULCANIZER



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TOBACCO slows up your mental activity—that, in addition to other physical effects. Tobacco makes you dull, unresponsive to the opportunities for advancement that are presenting themselves constantly.

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For rheumatism, neuritis, nervousness and many other ailments and for the complexion and hair, use

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Send in the coupon for full information on our liberal trial offer. This entails no obligation on your part.



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Do Away With Steel And Rubber Bands

FREE TRIAL



Inner surface is made adhesive to secure the PLAPAO-PAD firmly to the body, keeping the PLAPAO continually applied and the pad from slipping. No straps, buckles or springs attached. Soft as velvet—easy to apply.

It's the Non-Slipping, yet Non-Rigid Pad and What is Within It That Counts

FREE to 5,000 Truss Sufferers

To the extent of 5,000 sufferers who may apply I will send, ABSOLUTELY FREE, a sufficient quantity of the Plapao to positively convince them that this is the only logical, common-sense way of treating rupture. Plapao is a highly astringent medication placed within the Plapao-Pad and being absorbed through the skin, creates a wonderful feeling of relief and at the same time tends to strengthen the weakened muscles and thus permanently close the rupture opening. The process of recovery is natural, so you'll have no use for a truss—you can throw it away forever! Old and young have testified under oath that the Plapao-Pads cured their rupture—many of them long-standing, aggravated cases—without delay from work. Patent allowed in U. S. and foreign countries. Awarded Gold Medal at Rome and Grand Prix at Paris.

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"Why Many Men Are Old at Forty" may bring a priceless message to you. It tells of a simple sensible way by which thousands have corrected this prostate gland condition. It tells how sciatica, backaches, foot pains, interrupted sleep, mental depression, etc., are so often due to this gland. Sold for over five years upon a money back-if-not-satisfied plan. Do not confuse it with massage, medication, violet rays, etc. No obligation. Write today.

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Just Wash!**

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Name _____

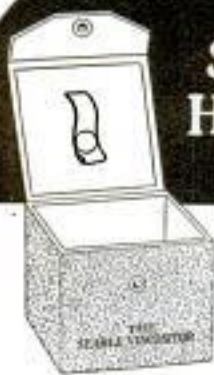
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How long have you had pimples? _____ On what part of the body? _____

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Simply send \$2.00 and receive watch. Full seven Jeweled Elgin in stylish Octagon Case. Thin model, guaranteed 20 years.

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31x4	12.75	1.40	36x4 1/2	24.30	2.00
32x4	13.95	1.45	37x5	26.50	2.15
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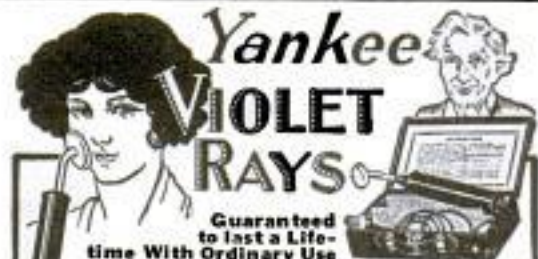
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World's Largest Builders of Motorcycles

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Also Sofa and Chair to match. Made in our own great upholstering factory. 1200 other attractive furnishings and this comfy Rocker shown in our latest, big, 104 page guide to Better Homes. All on convenient monthly payments. Let this Book help you in furnishing one or several rooms. Thousands of home-lovers have profited. Check below offer interested in.

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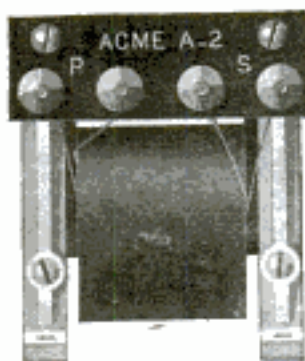
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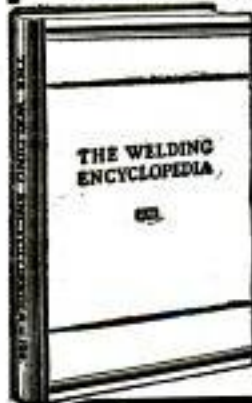
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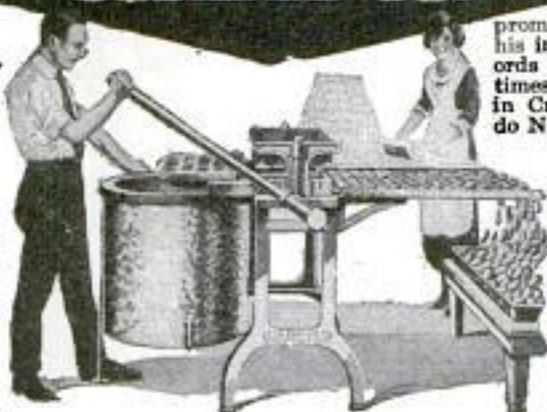
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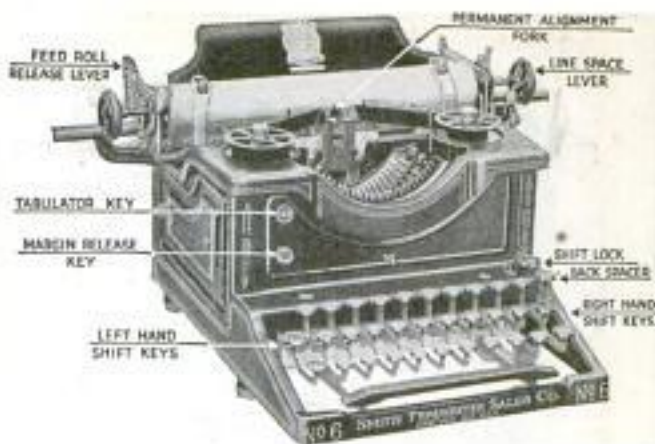
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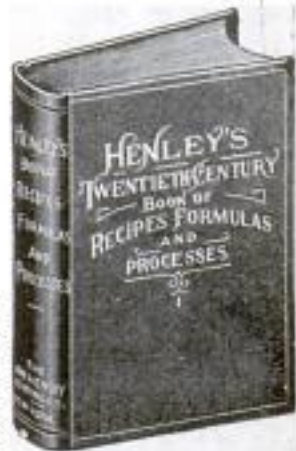
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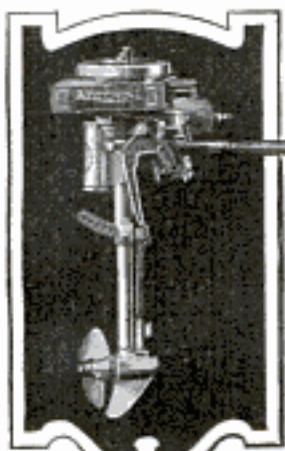
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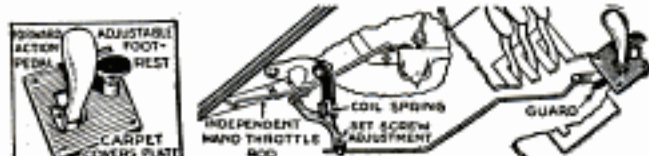
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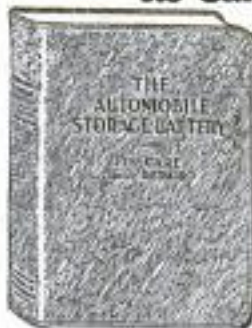
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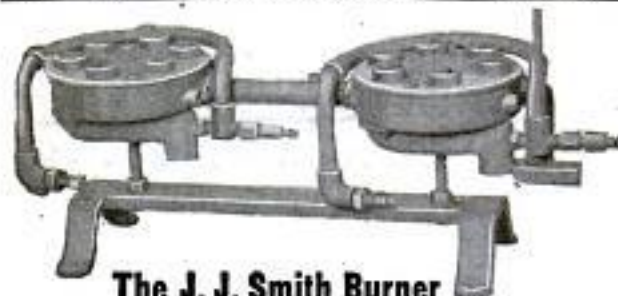
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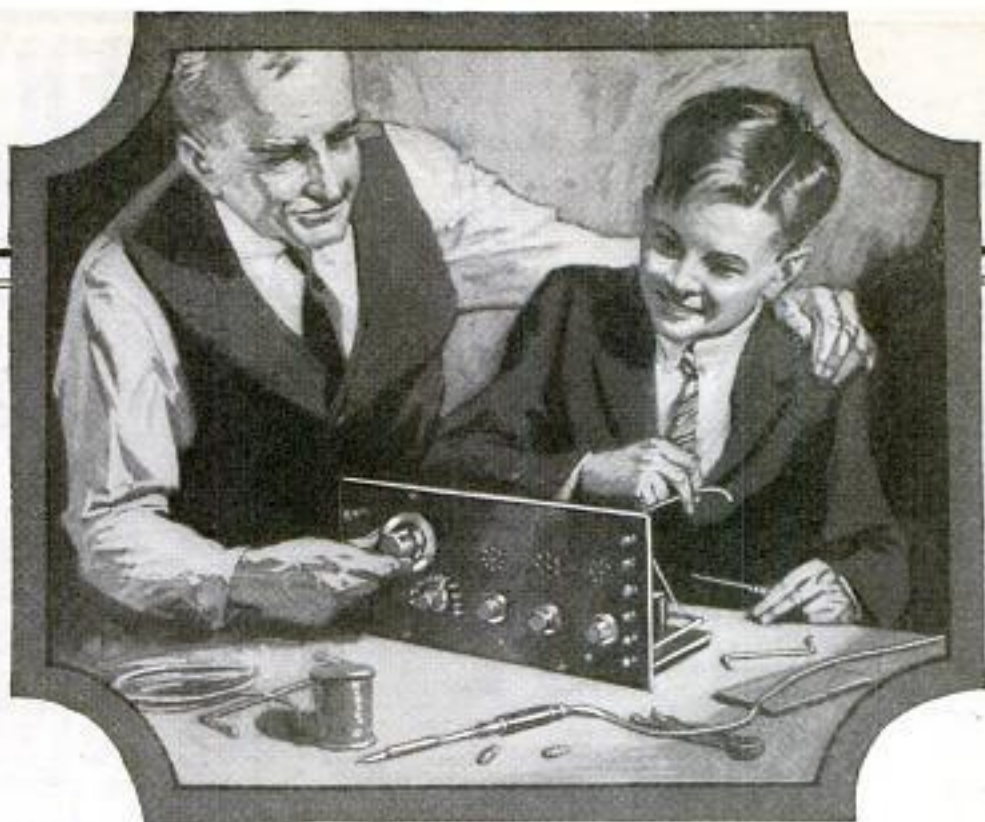
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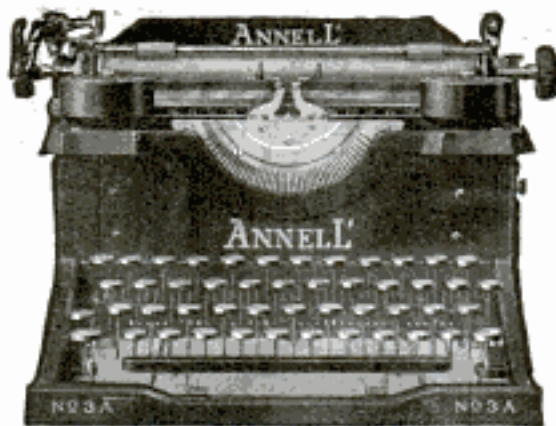
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## The New Air-Way

### Complete Electric Home Cleaner

This new appliance cannot be compared with any vacuum cleaner or sweeper that you have ever seen or heard about. It is fundamentally different, both in its design and its utility. The inventor has disregarded all the accepted standards of vacuum cleaner construction, and has created a device with a multitude of uses, which in addition is so light in weight and so easy to use that a child can carry it and use it from cellar to attic.

Not only does it clean carpets and rugs more thoroughly, quickly and easily, but you can just turn the machine around and clean a hundred different places through the hollow suction handle. Note illustration on the left and description of the amazing advantages derived from this single improvement. Then remember that in this new cleaning device there are four additional and just as revolutionary improvements. Everywhere this new machine is shown, women instantly recognize its multiplied advantages, because it

### Does All Extra Dusting and Cleaning Through Hollow Suction Handle

When you see the new Air-Way you will marvel at this great improvement which uses the handle for cleaning purposes. The Air-Way cleans carpets and rugs on the floor even more efficiently than the best old style electric vacuum cleaner. Yet this is only a small part of necessary house cleaning. With the Air-Way, when you finish the carpets and rugs, you just turn the machine about, reverse the suction, and do all kinds of cleaning through the hollow suction handle.

The marvelous light weight and perfect balance enables you to handle the new Air-Way as easily as you would point a broom handle. You don't have to climb on a step ladder to reach all the high spots, because you can comfortably hold and work the Air-Way at arm's length and clean things with the tip of the handle. With this ingenious improvement you get the dust from the picture frames, and from the tops of mouldings, and get the cobwebs from the corners, of eaves and dirt over door casings, around base-boards, under the radiators, down in the registers, and a hundred and one hard-to-get-at places. In addition you can clean all the upholstered furniture, draperies, tufts of mattresses, etc.

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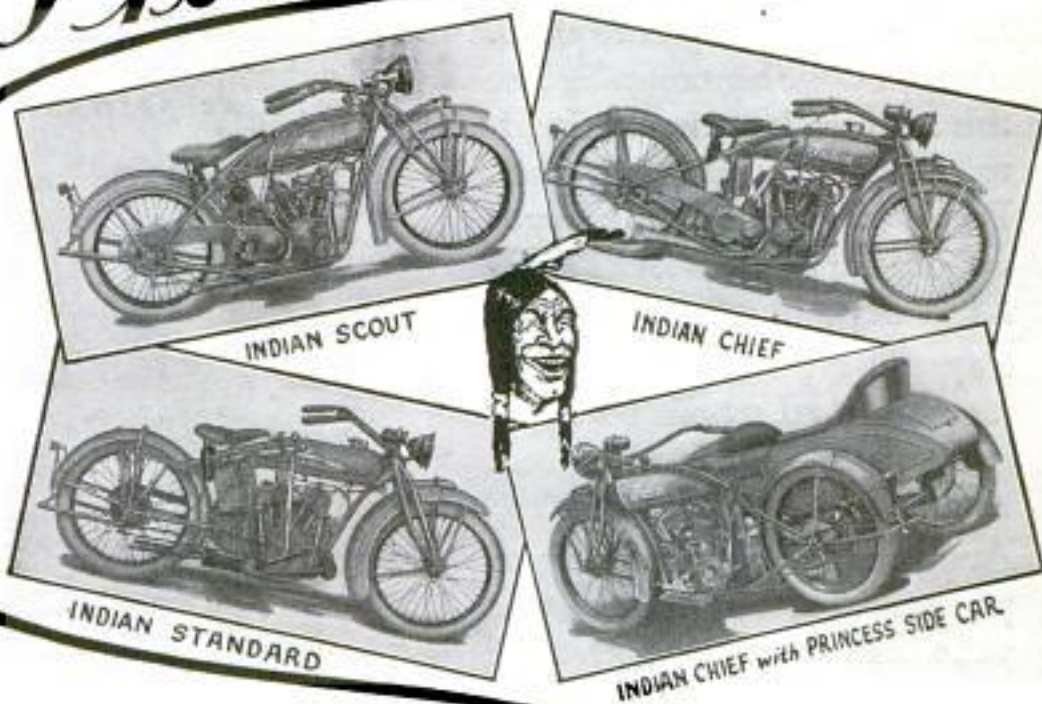
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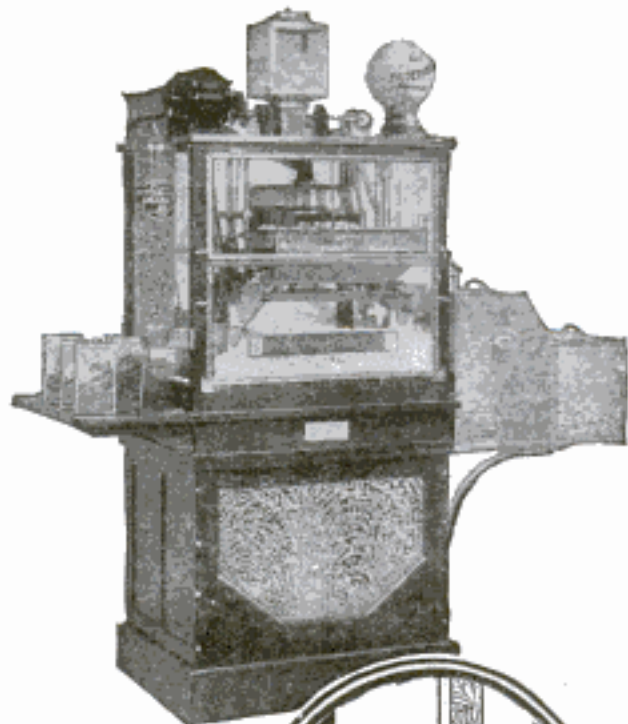
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Let us send you a "Location Survey" that will help you to estimate your possible profits from this machine. Fill in and mail the coupon. It may mean the biggest thing you have ever done to increase the profits of your business.

**BUTTER-KIST Popcorn**  
"America's Oldest Treat"



*The EASY PAY-  
MENT PLAN makes  
it easy for you to own  
one of these money-  
makers. Easy Pay—  
Easy Profits. That's  
the story. Send the cou-  
pon NOW.*

# BUTTER-KIST POPCORN AND PEANUT MACHINES

# These Men Earn \$10<sup>TO</sup> \$40 a Day!



## Demonstrating This Wonderful 300 Candle Power Light

*You have the same  
Opportunity!*



C. E. Hartley, one of our Ohio Representatives, has earned over \$1000 in a few months with The Diamond Light. His daily profits run between \$10 and \$40.



George U. Vivian, one of our Minnesota Representatives, who has found that \$39 profit for one day's effort is comparatively easy. He has made \$400 in 39 days with The Diamond Light sales plan.



James M. Connelly, a Pennsylvania Representative. He earned \$39 the first day he was appointed and in 23 days made over \$300 demonstrating The Diamond Light.

Never has a more practical and convenient light been designed. Its soft 300 candle power brilliance meets the need of millions of homes. Its simplicity, operating economy and beauty wins instant approval wherever it is shown. That is the reason hundreds of our representatives are earning from \$10 to \$40 a day by merely demonstrating The Diamond Light.

### Burns Gasoline or Kerosene

Its convenience and safety are unequalled. It lights with a match as easily as an old style wick lamp and burns gasoline or kerosene giving the same 300 candle power white light with either fuel. Only 4 per cent of fuel is consumed with 96 per cent of air. This saves more than the cost of The Diamond Light in a few months' time.

### Your Big Opportunity

You can do what these men shown here and hundreds of others are doing. It is no trick to make big money representing us. You have no competition. Each representative is given exclusive territory and The Diamond Light makes sales wherever it is demonstrated. You start making money immediately. H. I. Shumard, an Ohio man,

made \$30 his first day as representative; Leonard Leach, a Wisconsin man made \$75 in three days.

### No Sales Experience Needed

You do not need sales experience to make a success as our representative. We give you all necessary help and complete instructions. W. H. Everwine, was an electrician and increased his earnings \$200 a month; J. M. Connelly was a painter and earned \$39 his first day; George Vivian was a carpenter. Instructions are easy to follow and profits are certain.

You can devote either your spare time or your whole time to this proposition and increase your earning power. This is a real opportunity to develop a good paying business of your own.

### Send This Coupon Today!

Through our special sales and advertising plan you can make demonstrations by appointment. Business starts the first day. There is no peddling nor investing. You do not have to bother with collections or deliveries. Our plan is a simple straightforward money-earning opportunity. Fill in this coupon and mail it today. There is no obligation.

**COUPON**  
 THE AKRON LAMP CO., 109 Lamp Bldg., Akron, Ohio.  
 Gentlemen: I would like to know more about your sales plan and how I can earn \$10 to \$40 a day acting as your representative.  
 Name.....  
 Address.....

## The AKRON LAMP CO.

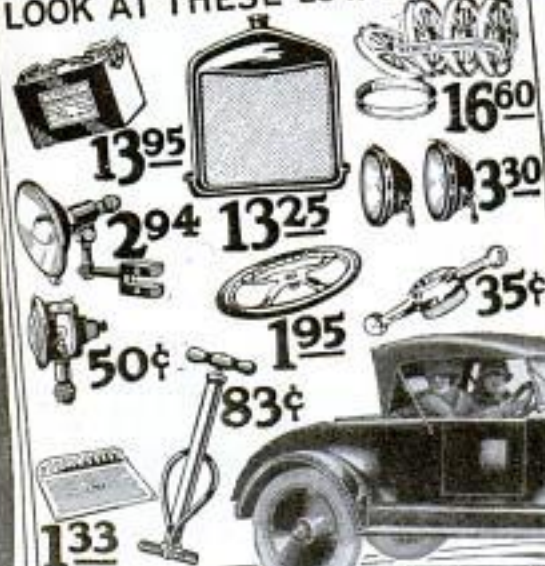
109 Lamp Bldg., AKRON, OHIO

Established 1898

# AUTO SUPPLIES

at the Latest Price Reductions  
in this **BIG FREE BOOK**

LOOK AT THESE LOW PRICES



Radiators, batteries, headlights, spotlights —all kinds of repair parts and accessories for Fords and other cars are listed in this big book. Lowest prices anywhere—all parts standard quality.

### SPECIAL BODIES FOR FORD CARS

We make 12 different styles of special bodies for Fords and Chevrolets. Roadster, speedster, and classy touring bodies at bargain prices. Big free book tells all about them. Send for it today.

Bodies for Ford Cars

**29<sup>85</sup>**  
AND UP

NEMCO BARGAIN SUPPLY HOUSE

1017 W. Van Buren St., Chicago



## CARTER Oil Gauge

If your dealer can not supply you, send remittance, or order by parcel post C. O. D. Easy to screw gauge on instrument board, connect copper tube in place of lower petcock on Ford or Chevrolet. No oil passes thru gauge or tube.

**Accurate—Durable—Guaranteed**  
Order before cold weather; you will need it. It will save its cost many times in oil and wear on the engine.

*Buick Type ready Aug. 15, \$5.00*

**CARTER MOTOR ACCESSORIES, Inc.**  
340 Pearl Street Buffalo, N. Y.

**Ford  
Chevrolet  
Only \$3  
Buick \$5**

### \$15.00 TO \$50.00 PROFIT PER DAY

Outfit cleans, polishes, renews auto finish. Contains chemical duster, polishing mitt, cleansing and renewing liquid. Raises car resale value. Sells on sight. Exclusive territory. 100% profit. Fine street demonstration.

#### Free—Regular 50c Windshield Cloth

To introduce we give free regular 90c Windshield Cloth and spray charges on first order only. Outfit retails \$5.35. Need \$2.00 money order or bill, get complete outfit, FREE Cloth, agents' proposition. Act NOW.

**BARTELLE HAMILTON COMPANY, Dept. 38, Toledo, Ohio**

## RADIO For Everybody

Radio, the new wonder science offers you a glorious opportunity to travel all over the world as an operator on a ship and at the same time earn a fine salary. Wonderful new course prepares you quickly in spare time at home. Famous Radio experts help you. Four wonderful practice instruments free. Write for free book "How to Learn Radio at Home."

**National Radio Institute**  
Dept. 1203B,

1345 Pennsylvania Ave., N. W.

Washington, D. C.

## Great Diamond Ring Bargain

Perfectly cut, genuine blue-white Diamond held aloft on six white gold prongs. Gentleman's 14K Green Gold, hand-carved mounting, trimmed with artistic scroll designs of White Gold.

**Send No Money**—Ring sent FREE for your approval. If entirely satisfied pay only \$10, then \$5 a month, for ten months until the total price of \$60 has been paid.

**Free Gift Book** shows thousands of other bargains in Diamonds, Watches and Jewelry. Send for copy No. 62-P.

**\$5<sup>00</sup>**  
A Month



Buy Today  
10  
Months  
TO PAY

"THE HOUSE OF QUALITY"

**L.W. SWEET INC.**  
1650-1660 BROADWAY, NEW YORK.

ONLY  
\$ **3**  
DOWN  
and you  
keep this  
typewriter



DIRECT  
to you  
from our  
Factory  
Electric  
Desk Lamp  
FREE

## Yes, we will ship you this Genuine Underwood

Rebuilt in our own factory just like new for  
**ONLY \$3 down—NOT ONE CENT MORE**  
Until you have tried the machine 10 full days at our expense



Our Factory

**EVERY MACHINE** is fully guaranteed. New parts wherever needed. New enamel, new nickel, new lettering, new platen, new key rings—a complete, perfect typewriter. Impossible to tell it from a brand new Underwood either in appearance, durability or quality of finished work.

An up-to-date machine with two-color ribbon, back spacer, stencil device, automatic ribbon reverse, tabulator, etc. In addition we furnish FREE waterproof cover and special Touch Typewriter Instruction Book. You can learn to operate this Underwood in one day.

**Electric Desk Lamp  
FREE**



For a limited time only we offer this handsome flexible arm electric desk lamp free with a guaranteed Shipman-Ward Rebuilt Underwood. Lamp has flexible arm, can be moved in any position and comes complete with 6-foot cord, shade, plug, etc., but without bulb. You can have your choice of lamp in four finishes. Send in the coupon quick and learn about this great free offer. Remember, we have only a limited number of these handsome lamps. **Write Now**

**Shipman-Ward Mfg. Co.**  
"Typewriter Emporium"  
Montrose and Ravenswood Aves., Chicago

### Write Right Now

and learn how it is possible for us to ship you this Underwood Typewriter upon our free trial plan and our direct-to-you money saving methods. Get the full details now—just sign the coupon and mail today. Get all the facts—then decide.

### No Obligation

—to buy. You don't have to order. Just sign the coupon, send it to us and we will mail you our big catalog absolutely free, or we will ship the machine at once if you will check the coupon showing you want it without waiting for the catalog.

Send the  
Coupon  
Today

**10 Days'  
Free Trial**

You have ten full days in which to try the typewriter before deciding whether you want to keep it. Give it every test—see for yourself—make the Underwood prove its worth to you. Don't take our word for it—put the Underwood before you and see if you don't think it the greatest typewriter bargain ever offered.

This is the genuine Underwood Typewriter. We offer you the same three models of the Underwood Typewriter being made and sold by the manufacturers today. **Standard 4-row single shift keyboard. Absolutely visible writing—the full line of typewriting is visible at all times.** All the improvements and attachments that any high grade typewriter ought to have.

### Big Saving to You

Our plan of selling to you direct makes possible enormous savings, which are all for your benefit. **Send in the coupon and we will send you prepaid our big catalog, including "A Trip Through Our Factory."** This shows how the Shipman-Ward Rebuilt Underwood is the best that can be produced at our Special Price.

**You** don't have to do a thing except to fill in the coupon and send us only \$3, which will be returned to you

if you decide not to keep the typewriter and return it to us after the **10 DAYS' FREE TRIAL.**

**FREE TRIAL  
COUPON**

**SHIPMAN-WARD MFG. CO.**  
2126 Shipman Bldg., Chicago

Send me your big bargain catalog.  
 Enclosed find \$3. Send me the Shipman-Ward Rebuilt Underwood on 10 days' free trial. If I decide not to keep it I will return it at your expense and you will refund every cent paid by me. If I decide to keep it, I have the privilege of paying for it on easy monthly payments. **Mark the square with a cross.**

Name \_\_\_\_\_

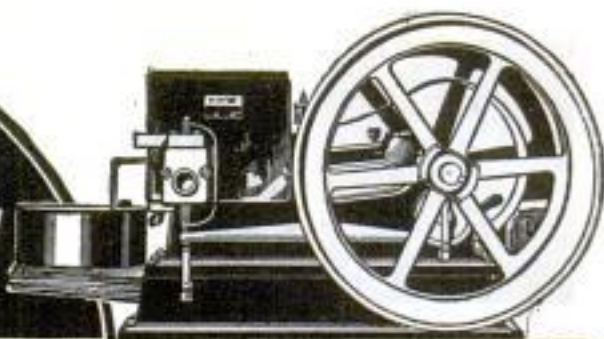
Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

References \_\_\_\_\_  
This is not an order. You are under no obligation.



**"It's  
What You Get  
For Your Money  
That Counts"**



**2 H-P.** Chas. Beallien, Wla.: "Good as the first day I had it."

**3 H-P.** M. W. Kepceky, Tex.: "Easy to start—stop—regulate."

**4 H-P.** Geo. A. Noster, Va.: "Used it 7 years. Not a penny for repairs."

**6 H-P.** Wm. Mittelstadt, Iowa: "Had several makes, but Witte is best."

**8 H-P.** Ralph Milliken, Calif.: "Engine gives splendid service."

**12 H-P.** A. B. Treat, Ala.: "Runs smooth as a sewing machine."

**16 H-P.** J. C. Clark, Va.: "I like the 16 H-P. fine."

**22 H-P.** J. F. Brown, Ark.: "Engine is just what you told me."

**30 H-P.** T. E. Walton, Miss.: "It is surely a fine puller."

**Engine Value Depends On EASY OPERATION,  
LOW FUEL COST and DURABILITY**

Records for 37 years show that WITTE Engines not only stand up, giving long service, but they have big surplus power, operate easy, cost less to operate, and sell for less. No matter what size engine or power outfit you need or where you live, I can supply you direct at a saving—make Immediate Shipment—Cash or Easy Terms, as you wish—in sizes 2 to 30 H-P.—most any style you want.

**WITTE Engines** are sold on a **Straight  
Lifetime Guarantee**

This guarantee applies to every size and style outfit I make—Stationary, Portable, Portable Buzz Saw, Log Saw, Tree Saw, Stationary Cutoff Saws, Power Stump Borers and my New "Power-Lite" Engine used on electric light plant. I furnish this new light plant complete, with engine, generator and batteries ready to attach to your wiring, at a big saving in price. Use it for both power and light. If you need power for any purpose—write to WITTE—get an engine you know is time-proven, reliable and durable. Read what users say.

**WITTE ENGINE WORKS,** 1740 Oakland Avenue, KANSAS CITY, MO.  
1740 Empire Building, PITTSBURGH, PA.

**Tell Me What  
You Want**  
I Guarantee  
Safe Delivery  
Anywhere.  
**CATALOG  
FREE**

**"REEL EASY"  
VARIO COUPLER**

Our **BANK WOUND** Vario Coupler is  
**BUILT FOR YOU**  
Because We Feel it is  
**JUST THE THING**

We Absolutely Guarantee Satisfaction

**YOU ARE THE JUDGE**  
of Its Efficient Operation, Between 150  
and 3000 Meters

Price \$6.00 Shipping Weight 3 Lbs.  
Postage Extra

**I. R. NELSON CO.** BOND ST.  
NEWARK, N. J.  
RADIOPHONE STATION W-A-A-M

**TYPEWRITERS**  
We Save You 50%  
**FREE TRIAL—EASY TERMS**  
Your choice of all STANDARD MAKES,  
UNDERWOOD, ROYAL, SILENT, L. C.  
SMITH, self-starting, BIRMINGHAM, etc.  
Rebuilt by the Famous "Young Process."  
Guaranteed good as new. Lowest cash prices.  
Time payments or rentals with special pur-  
chase privilege. Largest stock in U. S.  
Write for special prices and terms.  
**YOUNG TYPEWRITER CO., Dept. 461 CHICAGO**

**Bowlegged Men**

Your legs will appear  
straight when you wear

**Straightleg Garters**

Combination hose-supporter and pantleg straightener  
— Quickly adjusted to fit various degrees of bow-  
legs; as easy to put on and comfortable to wear as  
any ordinary garter—no harness or padded forms;  
just an ingenious special garter for bowlegged men  
— improves appearance wonderfully. Wearers are  
enthusiastic. You will be too. Write for free booklet,  
mailed in plain envelope.

**S-L GARTER COMPANY**  
606 Davies Bldg. DAYTON, OHIO



**BIG PROFITS CHARGING BATTERIES**

Make \$150 to \$300 clear profit every month with an HB Battery Charger. Get into this money-making business NOW. Charge auto and radio batteries. Big demand, big profits, no experience needed to operate.

**\$20 Cash Brings HB Battery Charger**

balance easily paid from your profits on long monthly terms. Write today for information. Sizes for 8, 10, 16 or 32 batteries. Ask also about HB Automatic Air Compressor, Motor Grinders, Motors, Stock-Keeping Equipment. All sold on easy payments under money-back guarantee. Send postal for illustrated literature.

**HOBART BROS. CO.**

**BOX M91**

**TROY, OHIO**







# Electricity Needs You

## I WILL TRAIN YOU AT HOME

Stop right here. This is YOUR opportunity! Electricity is calling you, and the Electrical Business is in for a tremendous increase. But it needs more trained men—at big pay. By my Home Study Course in Practical Electricity I can train you for these positions.

### FREE!

#### BIG ELECTRICAL OUTFIT

A fine outfit of Electrical Tools, Instruments, Materials, etc., absolutely FREE to every student. I will also send you FREE and fully prepaid—Proof Lessons to show you how easily you can learn Electricity and enter this splendid profession by my new, revised and original system of Training by Mail.

#### Radio Course FREE!

Special newly-written wireless course worth \$45.00, given away FREE. Full particulars when you mail coupon below.

#### Earn Money While Learning

I give you something you can use now. Early in my Home Study Course I show you how to begin making money in Electricity, and help you get started. No need to wait until the whole course is completed. Hundreds of students have made several times the cost of their course in spare time work while learning.

### Earn \$70 to \$200 a Week

You've always had a liking for Electricity and a hankering to do electrical jobs. Now is the time to develop that talent; there's big money in it. Even if you don't know anything at all about Electricity you can quickly grasp it by my up-to-date, practical method of teaching. You will find it intensely interesting and highly profitable. I've trained and started hundreds of men in the Electrical Business, men who have made big successes. YOU CAN ALSO

### Be a Big Paid ELECTRICAL EXPERT

What are you doing to prepare yourself for a real success? At the rate you are going where will you be in ten years from now? Have you the specialized training that will put you on the road to success? Have you ambition enough to prepare for success, and get it?

You have the ambition and I will give you the training, so get busy. I am offering you success and all that goes with it. Will you take it? I'll make you an ELECTRICAL EXPERT. I will train you as you should be trained. I will give you the benefit of my advice and 20 years of engineering experience and help you in every way to the biggest, possible success.

#### Valuable Book Free

My book, "How to Become an Electrical Expert," has started many a man on the way to fortune. I will send a copy, free and prepaid, to every person answering this advertisement.

#### Act Now!

Good intentions never get you anywhere. It is action, alone, that counts. NOW IS THE TIME TO ACT.

L. L. COOKE, Chief Engineer

#### CHICAGO ENGINEERING WORKS

2154 LAWRENCE AVENUE  
Dept. 516 Chicago, U. S. A.

CHIEF ENGINEER  
COOKE

Chicago Engineering  
Works

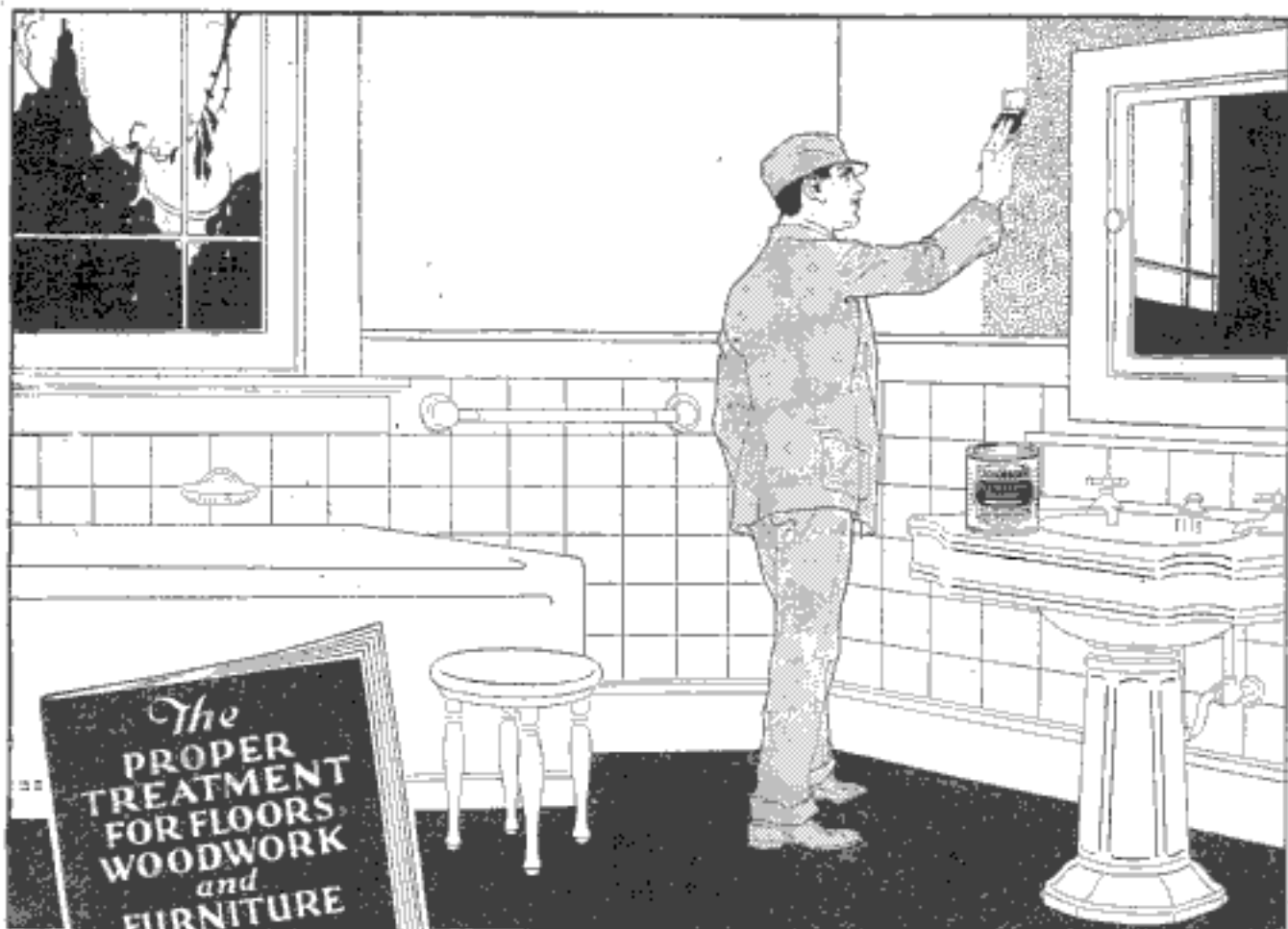
Dept. 516, 2154 Lawrence Av.  
CHICAGO, ILL.

Dear Sir: You may send me entirely free and fully prepaid, a copy of your book, "How to Become an Electrical Expert," and particulars about your Home Study Course in Electricity and FREE Radio Course.

Name.....

Address .....

City.....State.....



## This Beautiful Book on Wood Finishing FREE

**G**IVES complete instructions for finishing all wood—hard or soft, old or new. Explains just what materials to use and how to apply them. Tells how inexpensive soft woods may be finished so they are as beautiful and artistic as hard wood. This book is the work of experts—illustrated in color. Gives covering capacities, includes color charts, etc.

### JOHNSON'S ENAMEL

Johnson's Perfectone Undercoat and Enamel is the ideal finish for wood, plaster and metal. It will not chip, check, crack, peel or change its color. Gives a beautiful, germ-proof porcelain-like finish which is impervious to hot soapy water, iodine, ammonia, etc.

S. C. JOHNSON & SON, Dept. PA9, Racine, Wis.  
Please send me, free and postpaid, your Instruction  
Book on Wood Finishing. The best dealer in paints

here is.....

My Name.....

My Address.....

City and State.....

Fill out and mail coupon for a free copy of  
"The Proper Treatment for Floors, Wood-  
work and Furniture."

**S. C. JOHNSON & SON**

"The Wood Finishing Authorities"

Dept. PA9, Racine, Wis.

Canadian Factory—Brantford

# FREE TRIAL EASY TERMS

To introduce the latest in Olivers, we ship it to you for five days' free trial and inspection. In the privacy of your own office or home, you can put it through every test and make comparisons with other standard typewriters. You will realize quickly that the Oliver Speedster, our latest model, fulfills our policy of "the finest typewriter possible at the lowest price always."

## OLIVER

The Latest Model—No. 11

Celebrating the production of our millionth Oliver, we announce a wonderful new model, the climax of 27 years of development. Its advancements are many. Its superiorities are countless. No description in mere print can do this super-typewriter full justice.

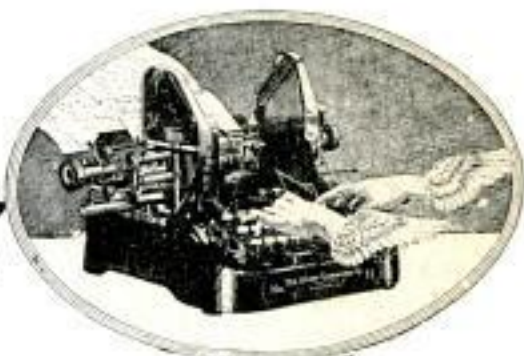
That is why we send it to you. We let it prove its own case. And we send it to you without the slightest obligation on your part to buy.

To see this Oliver Speedster and to operate it is to experience a new sensation in typing. To the operator it brings many welcome surprises.

### No Longer \$100

While this is a standard \$100 typewriter, and while we sold Olivers at that price for years, we now ship direct from the factory to the buyer, eliminating many "in-between" expenses and extravagances.

This new plan of selling saves you \$35, for we price this Oliver Speedster at only \$65. If any typewriter is worth \$100 or more, it is this remarkable new model. Sold the old way we would have to charge \$100. Only by this new short-cut can we save you the \$35 which formerly went into a complicated selling system.



## Speedster

Remember we offer you a brand new Oliver—no second-hand, but our latest and finest model—speedier, quieter, more durable.

Here is our offer: We ship the Oliver to you if you mail us the coupon below. Try it for five days. Then if you agree that it is the finest typewriter, regardless of price, and want to own it, send us \$4 after trial and then \$4 per month.

If you prefer to pay \$100 for some other typewriter, ship the Oliver back at our expense.

That is all there is to our plan. The Oliver must sell itself. You must be the judge. No one need influence you. You deal direct with the manufacturer.

Thousands have bought this new way. Over 1,000,000 Olivers have been sold. It is the favorite of big businesses as well as individuals.

If you prefer further information before ordering, note that the coupon may be checked for EITHER a Free Trial Oliver or Further Information.

## SAVE \$35

Why pay \$100 for any typewriter when you can get our latest and finest for only \$65? Why rent? Why buy a second-hand typewriter? This Oliver offer is famous the world over. It set a new day in typewriter distribution. Mail the coupon at once.

The Oliver Typewriter Company

109C Oliver Typewriter Building

Chicago, Ill.



THE OLIVER TYPEWRITER COMPANY  
109C Oliver Typewriter Building, Chicago, Ill.

Ship me a new Oliver No. 11 Typewriter for five days' free inspection. If I keep it I will pay \$60 as follows: \$4 at the end of trial period and then at the rate of \$4 per month. The title to remain in you until fully paid for. If I make cash settlement at end of trial period I am to deduct ten per cent and remit to you \$58.50. If I decide not to keep it, I will ship it back at your expense at the end of five days.

My shipping point is .....

Do not send a machine until I order it. Mail me your book—"The High Cost of Typewriters—The Reason and the Remedy," the Speedster catalog and further information.

Name.....

Street Address .....

City.....State.....

Occupation or Business .....

# Take the first step - Get my free Catalog

## EARN BIG MONEY NOW IN AUTO, TRACTOR & RADIO BUSINESS



**E.J. SWEENEY**  
— PRESIDENT

### Big Free Catalog and Special Offer

The most important thing you can do today is to clip the coupon below and mail it right now. Get my big FREE 72-page catalog. It shows hundreds of actual photographs of men at work in my magnificent new school. I will gladly send you a copy beautifully illustrated. Also a copy of the Sweeney School News, a most interesting monthly school paper published here. **Get my contract for employment. My Free Radio Course. My offer to rebate your Railway Fare and special low cost tuition offer.**

**MAIL THE  
COUPON  
TODAY**

**Hundreds of good jobs paying \$50.00 a week and more are open to Sweeney Trained Men. You need no previous experience. I train you in 8 weeks with tools not books.**

Garages, repair shops, welding and vulcanizing shops, etc., have written the Sweeney School asking for competent mechanics. Sweeney Trained men are in demand everywhere—their practical training and experience in this great Million Dollar Trade School fits them to fill any position. I also can personally offer several thousand jobs for local branch managers. I will train you for this special work without extra cost.

What I offer the mechanically inclined young man is the COMPLETE COURSE personal instruction, the course that has made the Sweeney School famous the world over. This course includes Auto Mechanics, Welding, Vulcanizing, Battery work, and I have also added a FREE Course in RADIO to those who answer this ad.

## Sweeney System of Practical Experience

The Great Million Dollar School, world famous, and the success of my thousands of graduates are due to the Sweeney System.

That is what you get here and can't get anywhere else. I have taught nearly 50,000 men to be expert repair men, chauffeurs, tractor engineers, etc. I am proud of the fact that I was selected by the U. S. Government to train 5,000 men for mechanical work in the service. I teach by using tools not books. You learn as you do the real work with your hands.

The Sweeney School covers 12 acres of floor space. The building is ten stories high and every foot is devoted to teaching of Automobile and Tractor business. It is filled from top to bottom with tens of thousands of dollars' worth of gas engine equipment for you to work on and there are scores of expert instructors to help you learn. We even own a magnificent, fully equipped farm—our tractor farm—in order to exactly reproduce the conditions under which tractor engineers and farm machinists must work.

**THE SWEENEY BROADCASTING RADIO STATION**—Call WHB—talks all over the U. S. Students learn to build their own Radio sets.

### I PAY YOUR RAILWAY FARE

I want you to come now—not to wait and postpone—I am making it easy for you—I will help you—the first step is to send for my free catalog.

**GARAGE  
\$300**

**MECHANIC  
\$200.**

**WELDER  
\$140.**

**DO THE WORK  
YOU LIKE**

**VULCANIZER  
\$125.**

**DRIVER  
\$100.**

Maybe you have always wanted to work on the Automobile or Gas Engine, but never had the chance. WRITE ME. I have solved the trouble of 50,000 men. I am the "Daddy" of the business, although I am only 39 years old. I have taught more men the automobile business than any other man in the world. Thousands of men have written to me, told me their ambitions and have asked me to help them. Write me—tell me your ambitions. Do not waste your life—but be a LIVE ONE. BUCK UP! Get into a business that you are fitted for and that is one you like.

**Remember I pay your Railroad Fare to Kansas City**



**FOR BIG OFFER AND CATALOG  
MAIL THIS COUPON**

**EMORY J. SWEENEY, President**  
Dept. 1065, Sweeney Bldg., Kansas City, Mo.

Send me your offer of a Guaranteed position, your big Free Catalog and full details of the Sweeney eight weeks' course leading to an immediate money making opportunity.

Name .....

Address .....

**LEARN A TRADE -**  
**Sweeney**  
**SCHOOL OF AUTO-TRACTOR-AVIATION**  
1065 SWEENEY BLDG. KANSAS CITY MO