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WRITTEN SO YOU CAN UNDERSTAND IT

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Auto-Bandit Chaser for Denver

BY E. C. MACMECHEN

WITH the widespread use of the automobile the motor bandit has come into existence as the modern successor of the old-time knight of the road. The auto bandit is the most daring, ingenious, and swiftly moving hold-up of all time, and pay-roll messengers, banks, and trains are his prey.

The city of Denver has made special provision for the construction of an auto-bandit chaser, a 90-hp. armored car with racing ability. This car is under construction now. The manager of safety procured a standard chassis and engine, and the special body is being built in the city shops.

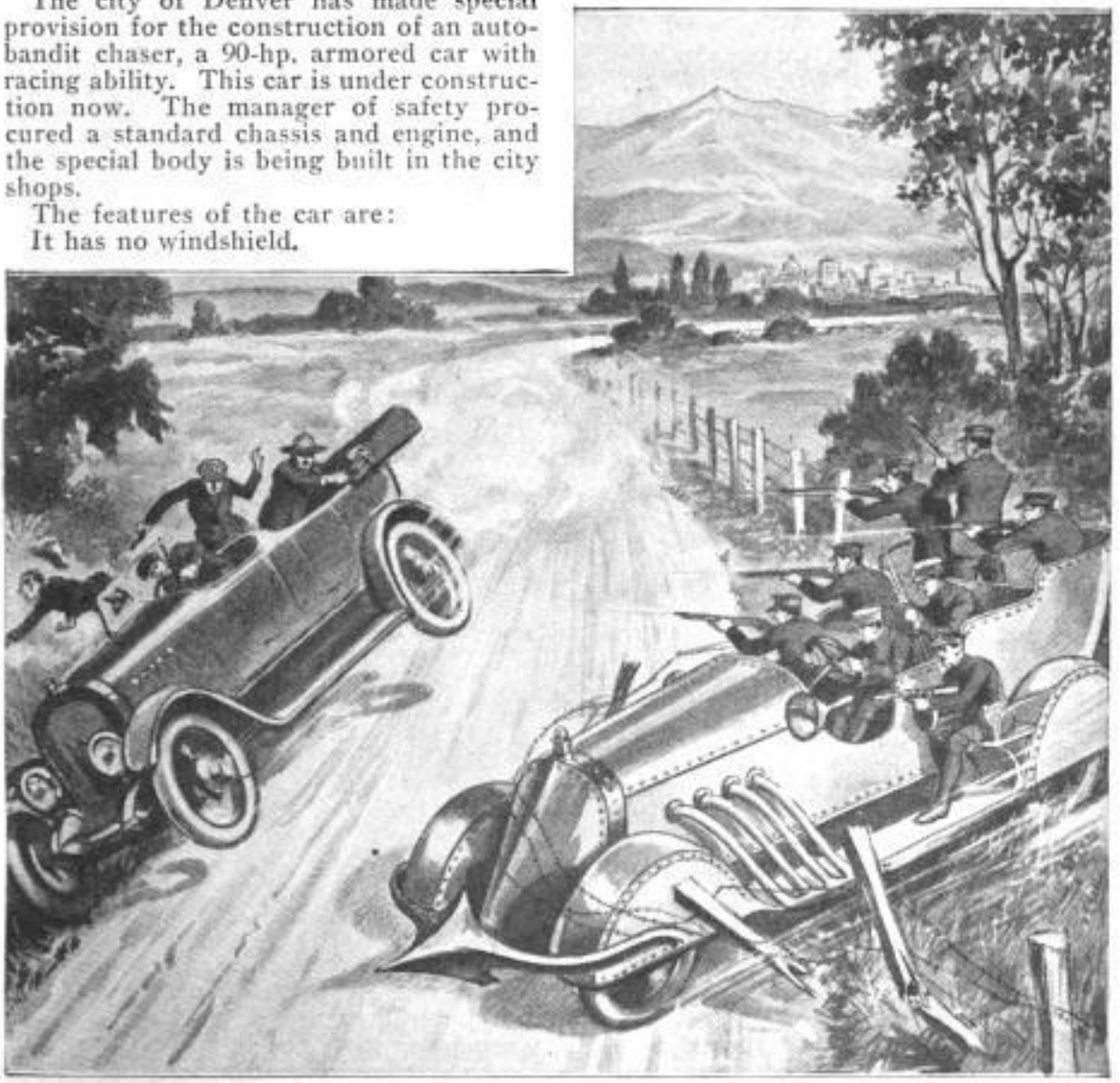
The features of the car are:

It has no windshield.

There are three tiers of seats, each holding officers armed with trench guns.

On wide running boards, just in front of the rear fenders, are single chairs with shoulder rests, each holding an officer with a trench gun.

The wheels are protected by armor-plate fenders, reaching well toward the



The Auto-Bandit Chaser in Action: Approaching from the Right, Ready to Cut Off the Flight of the Bandit Car, Is the New Armored Police Auto, with Its Steel Ram, Fenders of Heavy Plate, and Crew of Eight Officers Armed with Trench Guns

axle, so that the bandit chaser may run against a fleeing car and force it into the ditch.

The radiator is guarded with steel plates, and the car has a steel ram, capable of knocking down a board fence, or breaking through a barbed-wire fence, if the bandits take to the open prairies to the east of Denver.

The tiers of seats—each enabling its occupants to shoot over the heads of those in the seat before them—and the side seats, allow eight officers to shoot at a car ahead with high-power rifles. The car has no top to obstruct vision.

The idea of the car germinated after numerous auto bandits had escaped pursuing officers because the latter had to lean around the windshield to shoot. The car will come into greatest use after robberies of unusual magnitude, the bandits in such cases usually leaving the city in high-power cars and taking to the prairie or mountain roads. Nearly always it is possible to get trace of their route from filling stations.

MIDGET MOTORCYCLE CAN BE GARAGED IN THE HOUSE

Reduced-scale vehicles seem to have become the rage in Europe. The reason for this is the nearly prohibitive price of

This Midget Motorcycle Weighs Only 32 Pounds and Takes Up No More Space Than a Bicycle

fuel. One of the latest designs, offered by a German manufacturer, is a diminutive motorcycle, weighing only 32 lb., which is lighter by several pounds than the early models of safety bicycles. The power plant of the little cycle is a single-cylinder air-cooled engine of small bore and stroke. Drive is by means of sprockets and one chain to the rear wheel. No claims of excessive speed are made for the vehicle, which is rated at only about 25 miles per hour. No special garage space is needed, as, owing to the small size and light weight of the machine, it can be easily carried into the owner's dwelling.

¶An aerial mail and passenger service between Manila and other large ports of the Philippine Islands will soon be begun with five recently purchased seaplanes.

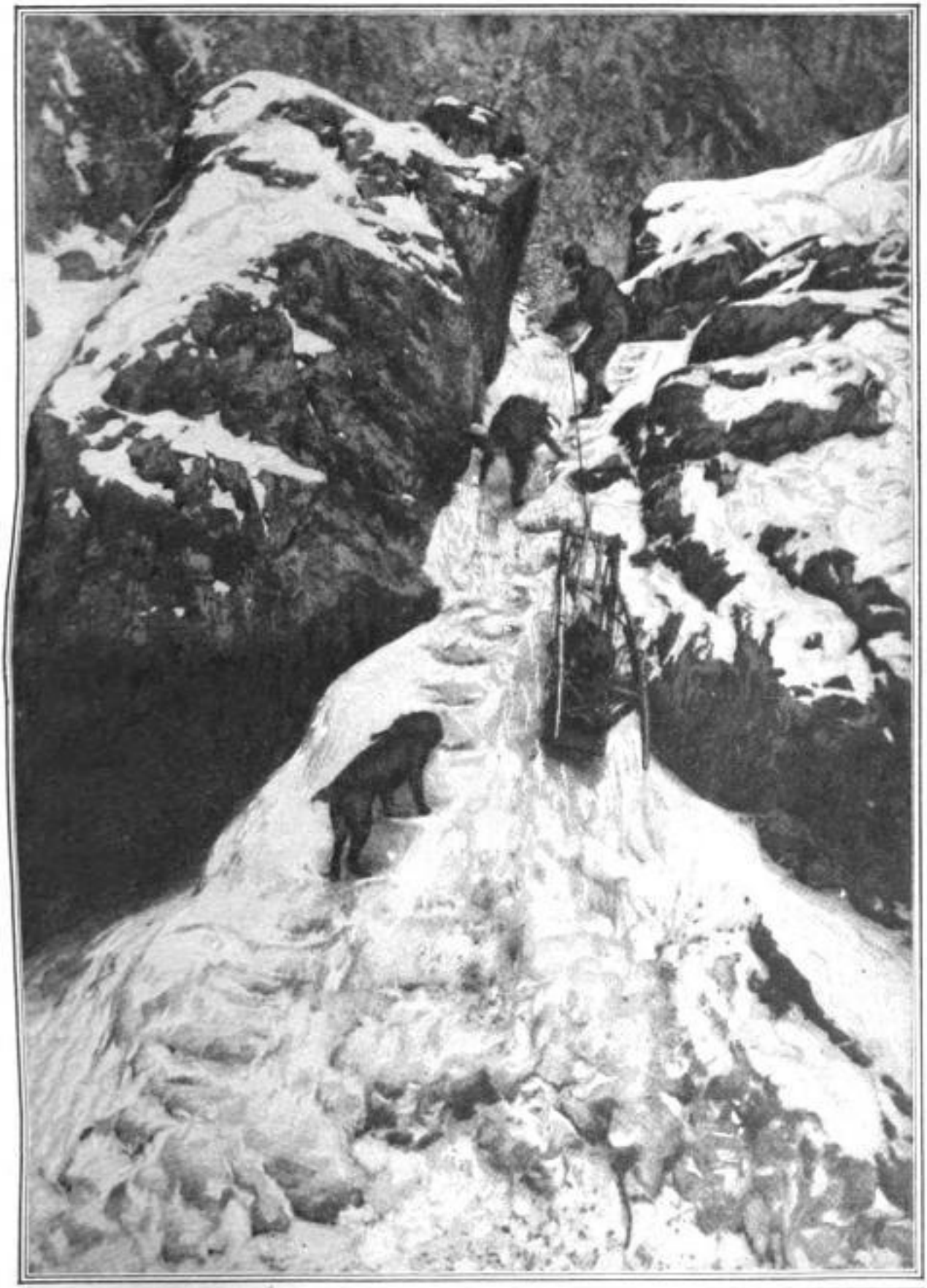
SINGING-FLAME LAMP WARNS MINER OF DANGEROUS GASES

The standard type of miner's lamp has been improved by an Austrian mining engineer so that it acts as an infallible detector of the presence of inflammable gases in the atmosphere and gives warning by emitting a loud singing note. The action of the device is dependent upon the fact that a gas flame, inclosed within a tube, both ends of which are open, will "flutter" and emit a high-pitched note if the gas is fed in too great quantities. The feed in the new lamp is so regulated that the supply of gas is held just below the point at which singing would occur. Should the atmosphere suddenly become charged with inflammable gases, these will enter the tube of the lamp, and, burning, cause the flame to flutter and sing.

CONCRETE BLOCK FORMS BASE OF ROAD-MARKING LANTERN

The highway commissioners of a western state have found a way to prevent the breakage and theft of the red lanterns used to mark road obstructions. The base of each lantern is molded into a solid concrete block, weighing 150 lb. As running over the lantern is almost certain to result in serious damage to, or wreckage of, the car, the motorists allow a wide margin of safety when passing all red lights. A steel bar running completey through the block facilitates the handling of the lamp by road workmen.

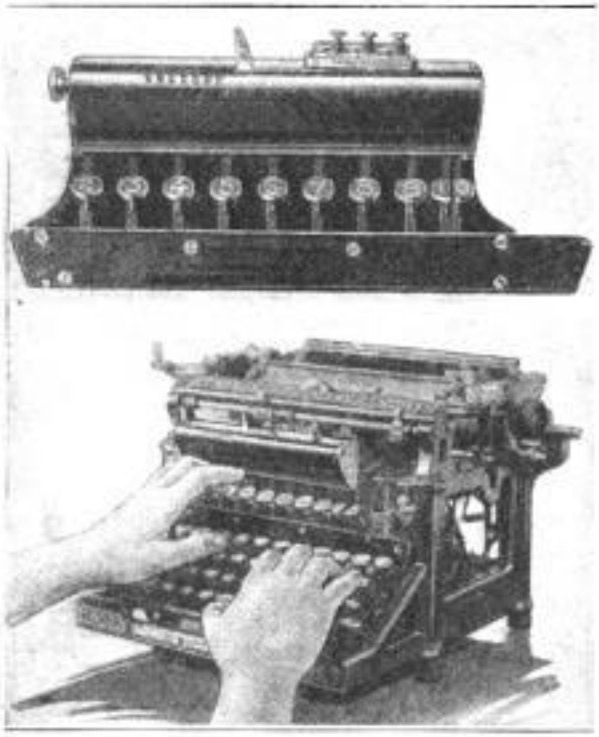
ICY CATARACT IS STAIRWAY FOR ALASKAN MINER



REGIONS where waterfalls freeze solid are not desirable wintering places, and the end of every summer finds thousands of miners and trappers "mushing" over the long trails of the Alaskan hinterland, on their way to the southbound boats. The miner in the picture is saving a 12-mile detour by using a frozen cataract as a stairway, up the chopped treads of which he is accompanied by his Husky sledge dogs.

COMPLETE ADDING MACHINE IS TYPEWRITER ATTACHMENT

Simplification of the once complicated adding machine has now progressed to the point where one may be attached to



Top: The Adding-Machine Typewriter Attachment Alone. Below: As It Appears Installed on a Typewriter

the front of a standard typewriter, and used in conjunction with it. The device made for this purpose is so small, weighing little more than 1 lb., that it does not interfere with the regular use of the typewriter. It has its own row of numeral keys, which rest just above and back of the standard keyboard when the attachment is screwed or clamped in place. Depressihg these auxiliary keys actuates the corresponding type bars and lists the figures, at the same time adding them and recording the total in a small window.

ITALIAN TRACTOR CARRIES EXTRAORDINARY LOADS

Direct loads of 30 tons, and trailer loads of 70 more, are hauled by a type of tractor recently developed in Italy for carrying marble over rough roads, with grades up to 40 per cent. A four-cylinder 70-hp. engine is used, with gear shift of four speeds and reverse, and a completely inclosed chain drive. The rear wheels have steel tires with belts attached, and one brake is divided so as to work on them separately.

NEW HIGH-EFFICIENCY BOILER "BURNS" ELECTRICITY

In a recently developed boiler of a new type the steam is generated by passing heavy currents directly through the water from one electrode to another. A claim of 95-per-cent efficiency is made for the apparatus. In structure the boiler is quite simple, being a rugged, vertical cylinder containing the vertically arranged electrodes. Steam pressures of up to 220 lb. are generated with a voltage ranging from the minimum to a maximum of 3,000. The quantity of steam is ingeniously controlled by means of automatic valves which reduce the water level as the demand for steam decreases. Immediately the top electrode is uncovered generation ceases. These boilers are recommended for intermittent service.

PRIMA DONNA ENTERTAINS U. S. SAILORS VIA RADIOPHONE

All sailors on U. S. ships within a radius of 400 miles of the city of New York on the evening of Dec. 3, last year, were privileged to listen to a concert rendered by a world-famous singer via wireless telephone. The artist was the grand-opera prima donna, Mme. Louisa Tetrazzini. The telephone in her apartment was connected to the naval radiophone transmitting apparatus, and the receiving sets on the several ships connected to amplifiers and loud-speaking telephones. At 9:30 p. m. all instruments were tuned to the same wave length and, previously issued orders having suspended traffic for 30 minutes, the great diva sang four numbers which were clearly heard and enjoyed by a great part of the Atlantic fleet.

Madame Louisa Tetrazzini Singing, via Radiophone, to Every United States Sailor within 400 Miles of Her New York Apartment

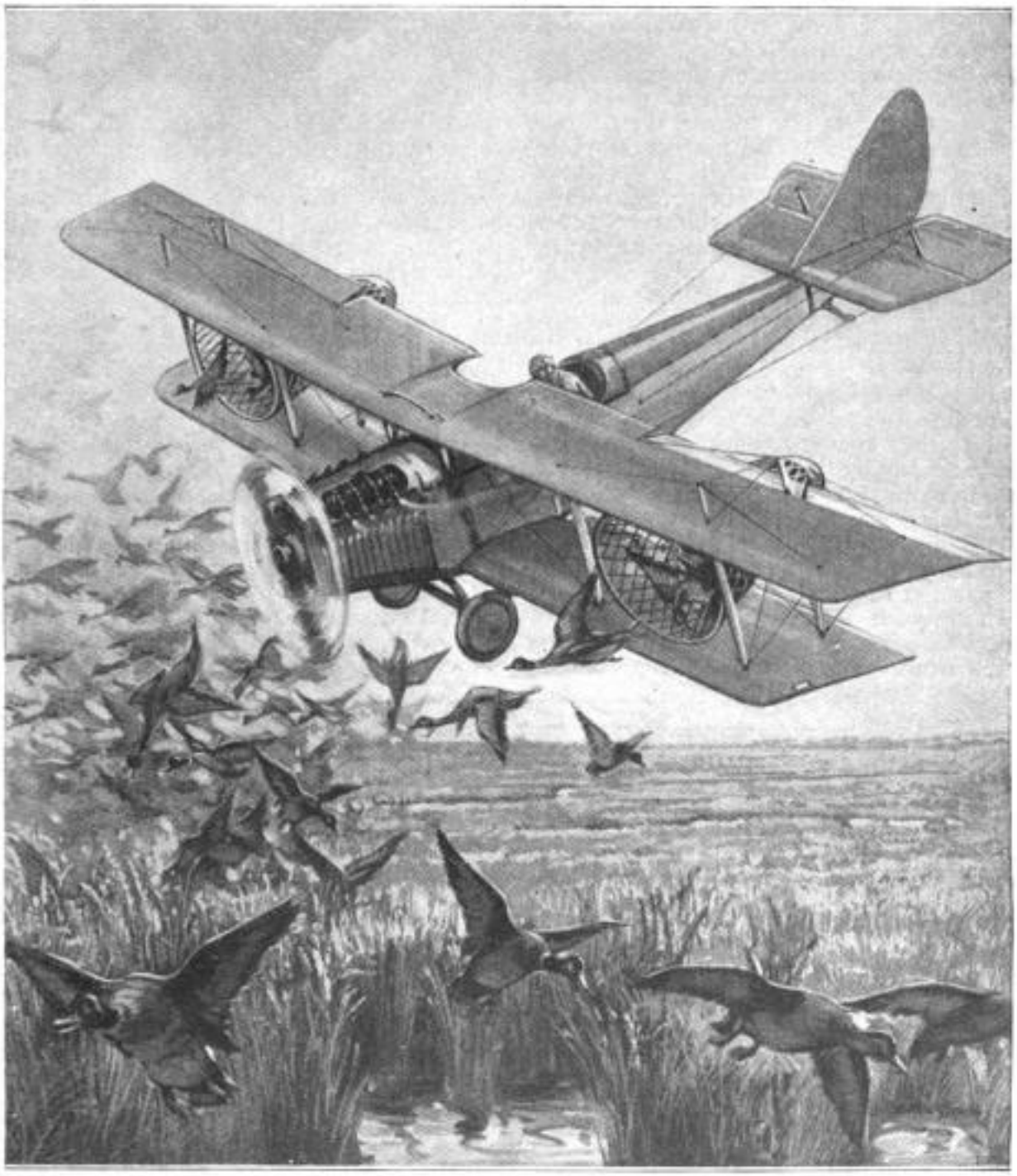
SEINING WILD FOWL OUT OF THE AIR BY AIRPLANE

BY JOHN EDWIN HOGG

CATCHING wild waterfowl alive by seining them out of the sky with nets carried through space by an airplane—this is the royal sport recently indulged by a trio of sportsmen above the rice fields of the Sacramento Valley in California. They needed live wild ducks, geese, and brant, for use as decoys when the hunting season opened, so they rigged up an airplane with two halibut trammel nets, and proceeded to sein the wild fowl out of the skies. In three days of the most thrilling and exhilarating of all outdoor pastimes devised by man they captured all the fowl they needed.

Under the California game laws it is illegal to shoot wild fowl from an airplane, but nothing is said about netting them alive with the aid of an aircraft that can outfly the fastest-flying ducks and geese.

With a crew of three men, the plane was flown from San Francisco to Willows,



The Two Halibut Trammel Nets Used for Snaring Wild Fowl in the Air were Mounted between the Wings of the Biplane, and Held Outstretched by the Air Pressure against Canvas Disks in the End

which is in the center of the rice country, where the wild fowl are so numerous that they are a plague to the rice growers. Two large steel hoops were made, and fitted between the wings of the airplane, and from these hoops two nets were strung. These nets are funnel-shaped, and in the small end of each a circular piece of canvas was placed.

When the airplane is on the ground the nets hang limply between the wings, but as soon as it gets into the air, the rush of air through the nets and against the piece of canvas at the small end holds them straight out their full length. The airplane was fitted with a heavy propeller strong enough not to break when flying through a flock of fowl.

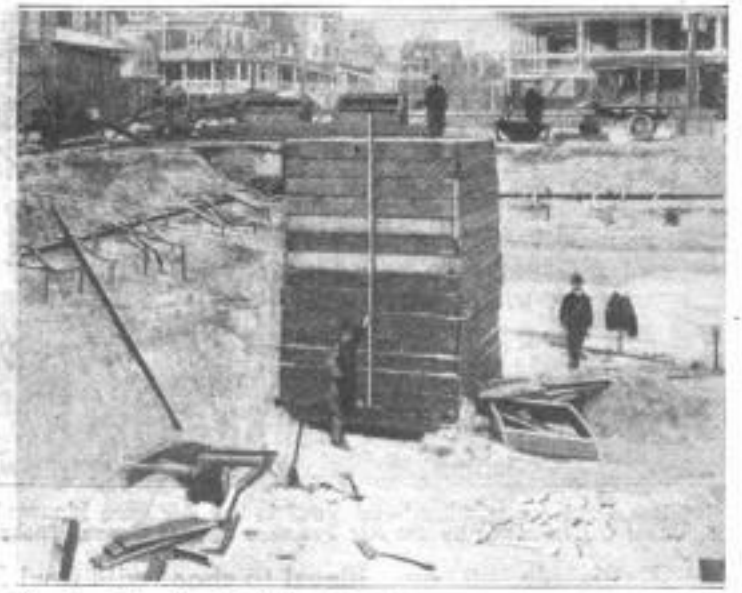
With the nets in place, the airplane was flown over the rice fields, and whenever a flock of ducks were sighted, it dived straight through them as they rose from the fields below. Dozens of ducks went into the big open ends of the nets, and as they reached the small end were held securely by the wind pressure. When the nets were filled, the fliers pulled a drawstring which closed the nets. Then they landed on the aviation field without the slightest possibility of the catch being able to get away.

In three days of flying, more than 500 ducks and geese were caught in this manner. From this number the sportsmen selected 50 of the kind they wanted—mallards, pintails, teal, and Canada geese. Only the young birds were retained, and the remainder were liberated. From the nets the birds were transferred to a decoy cage, their wings were clipped, and later, when the waterfowl-shooting season opened, the hunters had a fine flock of live decoys.

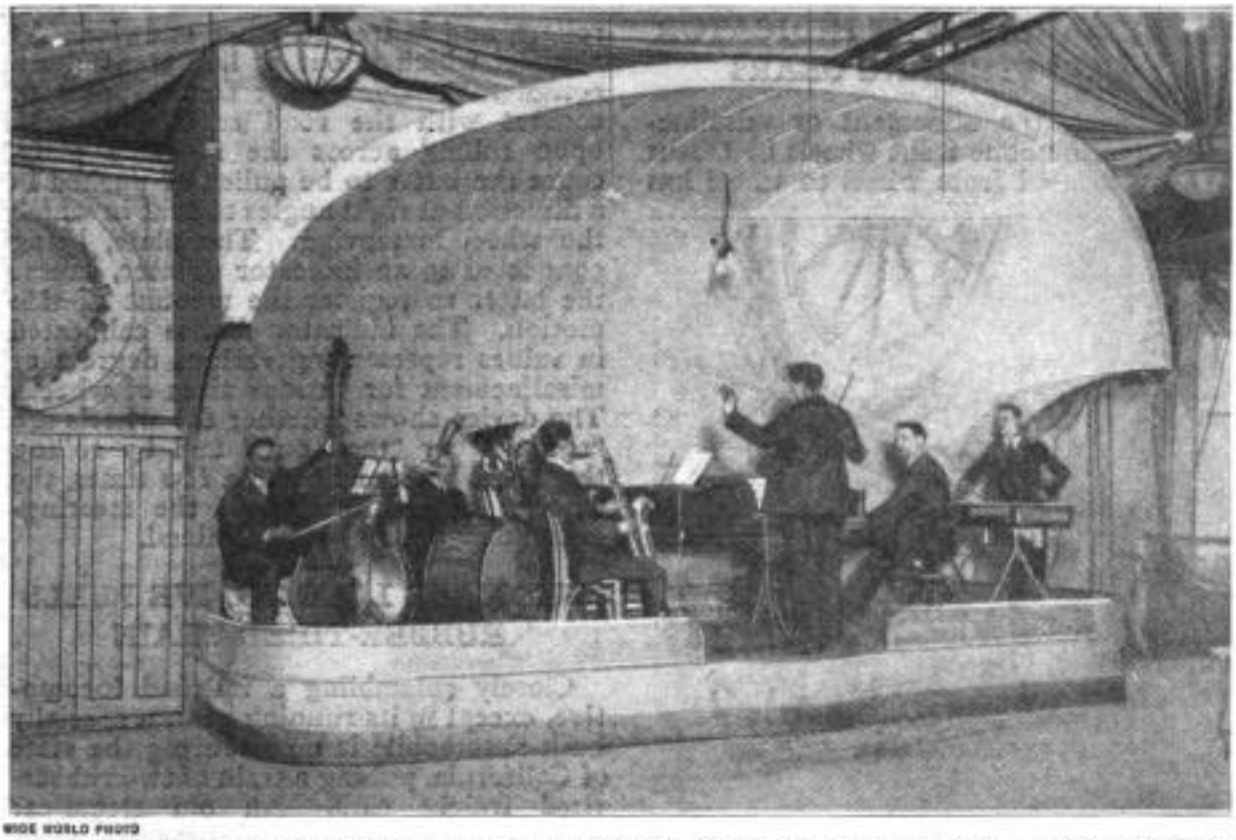
For genuine thrills and sport, netting wild fowl in the air makes other outdoor sports pale into insignificance. The ducks cannot outfly, but can easily outmaneuver an airplane. In consequence, catching a desired bird in the nets called for acrobatic flying that has seldom been seen since the armistice was signed. It was nothing uncommon for the birdmen to dash into a flock of retreating wild fowl, and then do a barrel roll in an effort to scoop a few more birds into the nets. Often the wild fowl plunged downward straight for the rice, with the airplane after them in a nose dive. In all it was sport that probably outrivaled the sport of shooting, and was almost as thrilling to spectators on the ground as it was to the men in the airplane. Possibly, another year, the game laws may be amended to prohibit netting wild fowl with airplanes. As it is, the wild fowl have no chance, and with an increasing number of sportsmen taking to the air, such a law may become necessary.

BUILD LARGE HOTEL ON SAND WITHOUT USE OF PILING

The "house built upon sand" of scriptural injunction might have been perfectly safe if supplied with spread footings, after the latest engineering practice. A large hotel just erected on the fine sand of Atlantic City, about 300 ft. from the beach, depends entirely on this kind of foundation, no piling whatever being used. Preliminary tests with a large box loaded with 47 tons of rock showed that a weight of six tons per square foot caused a settlement of only 1½ in. in three days, and the load on the finished building foundation is only three tons to the square foot. The spread footings are 16 ft. below high-water level, and drainage is taken care of by 1½-in. well points driven a few feet apart on the lot, and connected by horizontal piping to a pump, which removes all water as fast as it enters.



The Box Test for Building Foundations on Sand: Loaded with Rock, It Exerts a Pressure of Six Tons to the Square Foot, or Twice the Load of the Finished Building



WIDE WORLD PHOTO

A New Form of Sounding Board, Called a "Vacuum-Shell" Resonator, is Shaped like a Huge Half Clam-shell. The Top Edge Projects 18 Inches beyond the Stage, Thus Preventing the **Production of Echoes by Sound Waves Striking the Ceiling**

CLAMSHELL SOUNDING BOARD PROJECTS MUSIC CLEARLY

An eastern student of acoustics has, after much experimentation, evolved a new type of sounding board for band stands, stages, etc., which he styles a "vacuum-shell" resonator. The chief points of difference between the new and the older type of reflector is that the former is lower in proportion to its width, and that it extends 1½ ft. beyond the front edge of the platform. These peculiarities of design have the effect of projecting the sound waves outward in a solid mass, like a searchlight beam, thus preventing any great volume of them from striking the ceiling of the room and being reflected as confusing echoes. It is said that fine shades of tone difference can be appreciated at a distance of 230 ft. directly in front of the board. The clam-shaped reflector is 21 ft. long and 13 ft. in height.

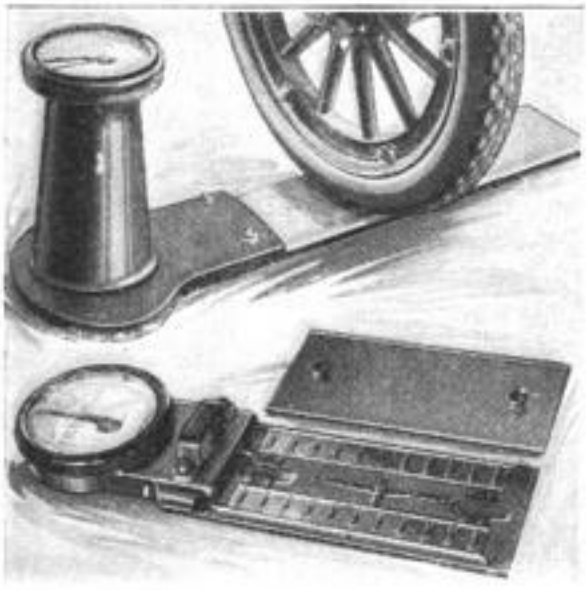
PLANE COMING TO VISIT HOME SMASHES THROUGH IT

When an aeronautical student recently invited his officer-instructor to accompany him to his Oklahoma farm home, the plane in which they traveled entered into the spirit of the occasion in entirely too enthusiastic a manner. The landing was made safely enough in the farmyard, but the machine declined to stop there. It went right on through the wall of the house, carrying away a good half of it, crossed the room inside, broke through the opposite partition, and finally came to rest with its nose on a bed. The whole house was moved 8 in. on its foundation.

The Big Plane Still Protruding from the Corner of the Farmhouse, after Smashing through Two Walls

WHEEL-ALINEMENT INDICATOR TESTS STEERING GEARS

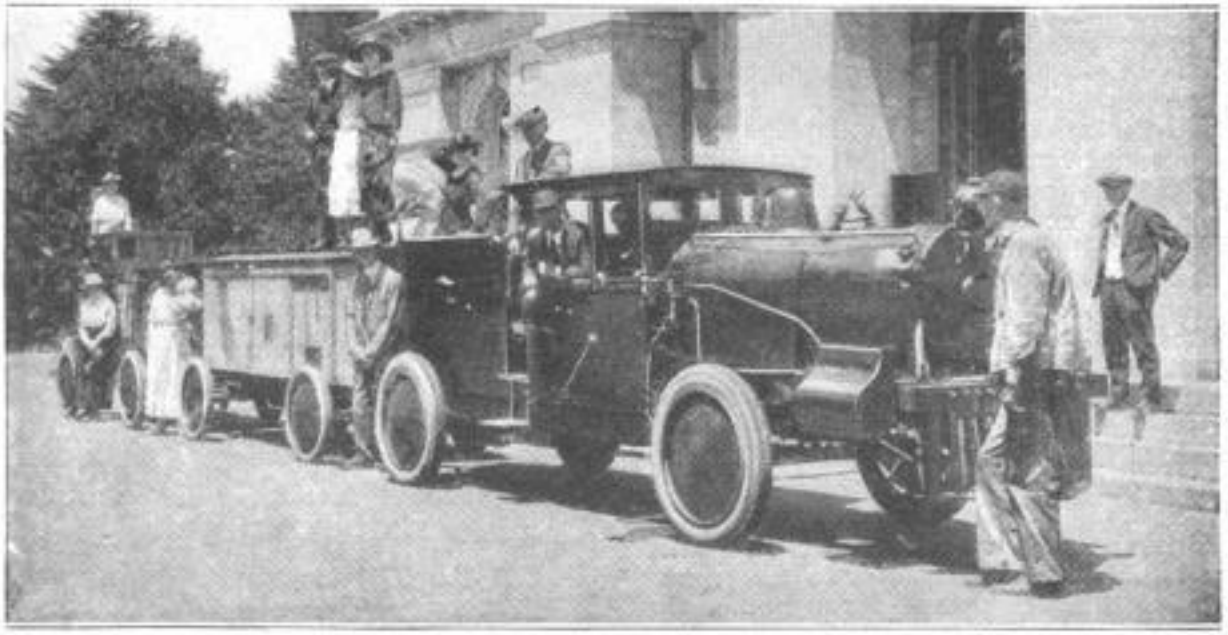
Measuring the alinement or misalinement of automobile front wheels by means of a rod passed from wheel to wheel has always been a dirty, disagreeable job, and the findings are not always accurate. A new apparatus measures the amount and direction of misalinement when the car is simply driven over it with the suspected wheel making a straight track across a plate forming the platform of the device. The plate is supported by hardened-steel rollers, and is free to move endwise. As a wheel which is out of line transmits a considerable side thrust at the point of contact with the road surface, it will, upon rolling across the movable plate, cause the latter to be pulled or pushed in a direction at right angles to that in which the wheel is moving. The plate, being connected to an indicator pointer, causes the latter to register the amount of side motion. The indicator dial is calibrated in values representing various degrees of misalinement for various sizes of wheels. The device shows whether the wheels are "toed in" or "toed out," and by rolling the wheel back and forth a few times, the amount of lost motion in the steering-gear linkage may be determined.



The Top View Shows the Wheel-Alinement Indicator in Service. Bottom: The Top Plate Removed. The Hardened Rollers Form an Almost Frictionless Bearing for the Plate

AUTOLIKE LOCOMOTIVE PULLS RUBBER-TIRED TRAIN

Closely resembling a railroad locomotive, except in its running gear, a specially built automobile is now touring the state of California, pulling a train of two rubber-tired freight cars. An old steam-car chassis forms the base of the auto, water being carried in the tender and gasoline under the cab floor. A yellow box car and a red caboose, each with a load capacity of 900 lb., complete the 40-ft. length of train, which runs over the highways as though on rails. Besides the service brakes of the auto, the box car is fitted with a hand brake. The whole equipment is designed to advertise a certain make of tire, and a set of electric chimes in the caboose aids in calling attention to it.



A Road Locomotive Built on the Chassis of an Old Steam Auto, Pulling a Box Car and a Caboose Mounted on Rubber-Tired Wheels: The Whole Train, Which Is 40 Feet Long, Advertises a Brand of Tires

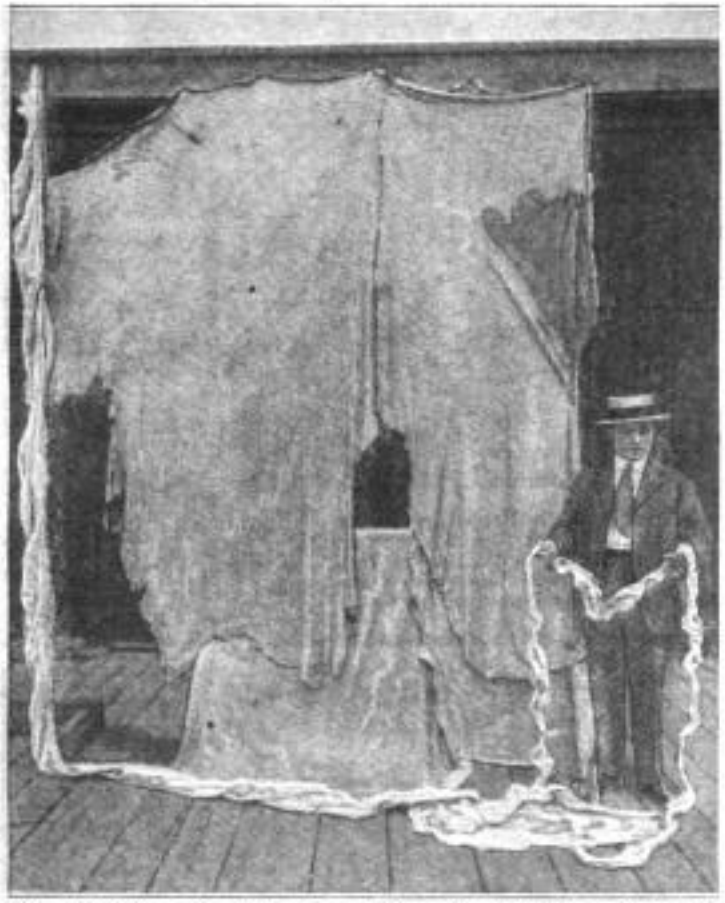
KID GLOVES FROM WHALE INTESTINES

BY LAWRENCE WILLIAM PEDROSE

SOFT, pliable "kid," that is as strong and durable as its genuine prototype, from the intestines of the whale; thick sole leather of excellent quality from the lining of the whale's mouth; five or more huge split sides of tough leather from the skin of the beluga, the common dolphin of the North Pacific: these are only a few of the many revolutionary products obtained from aquatic leather, the manufacture of which has become one of the new important industries of the Pacific Northwest.

From an embryonic idea three years ago to a practical method of utilizing annually millions of dollars' worth of otherwise wasted by-products, and supplying a new source of sorely needed material, the development of the industry has been phenomenal.

The hide of a steer or horse—of any land animal, in fact—has only a small area in the middle of the back which can be called good leather. The rest of the skin is either weak or thin, and on the stomach is spongy and practically worthless. Aquatic leather, on the other hand, is uniform. It excels ordinary leather in that every part of the skin is strong and of equal grain and thickness. For shoes, harness, traveling bags, gloves, trunks, belting, harness, etc., it has been found to be incomparable.



The Intestines of a Whale and Four Great Strips of Leather Made from Its Stomach: The Intestines of a 60-Foot Whale Are About 75 Feet Long, and When Opened and Laid Flat, 18 Inches Wide. The Leather Made from the Lining of the Whale's Stomach Is Very Much Like Alpine Chamois, or Kid

The latest development of the industry is the utilization of the skins of sea lions and seals, and the intestines and mouth skin of the whale. The intestines of a 60-ft. whale measure 60 to 75 ft. in length, and about 6 in. in diameter, or, when opened and spread out flat, about 18 in. wide. A satisfactory process has been found to tan this material, producing a fine substitute for kid.

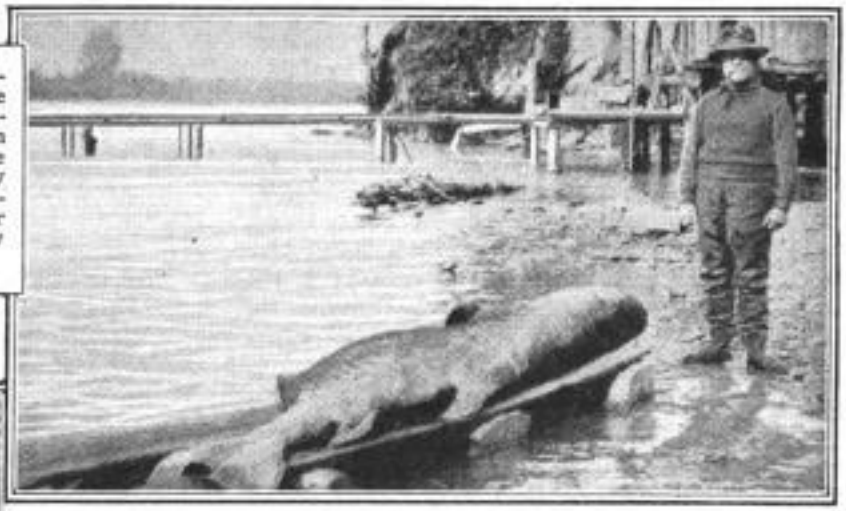
The lining or wall of the whale's stomach, in some species a huge sack several feet in diameter, is converted into a leather, which in thickness, texture, and strength resembles the Alpine chamois or kid, but is superior to it in being of uniform strength throughout. The machine which splits this has 10-ft. rolls and works with remarkable precision.

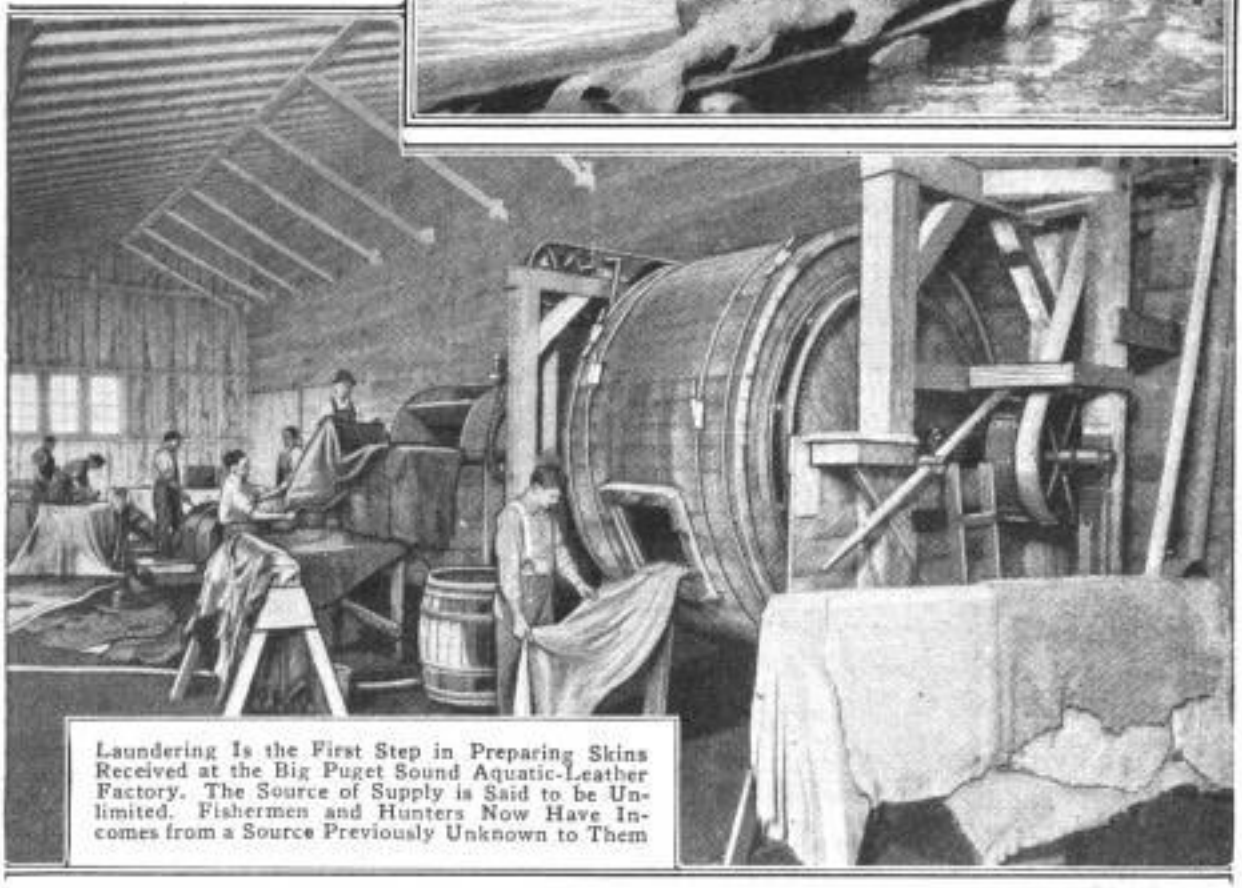
The inside of the whale's mouth furnishes a skin which is tanned and finished into a material that resembles a side of sole leather from a bull's hide, differing only in a "rib" which runs through it at intervals of a half inch. This makes an artistic and practically indestructible bag leather.

The beluga measures 18 to 25 ft. in length and weighs around 1,000 lb. Its hide can be split five or six times, each resulting layer the thickness of calfskin, with the added advantage that all parts of every split are strong and pliable, and capable of being worked up and utilized in practicallly every manner that calfskin can.

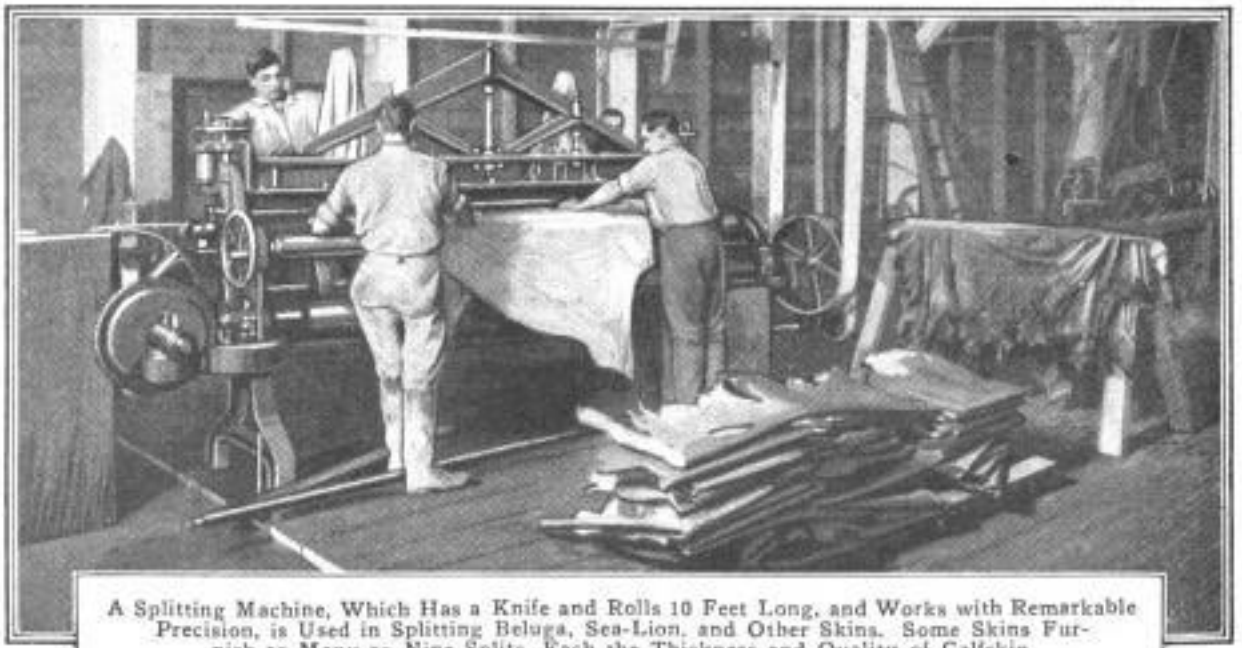
All types of sharks—mud, sand, hammerhead, white, basking or giant shark—furnish valuable leather, and the grain of this tough product makes it prized for upholstering, bag and trunk covering, etc. The skin of the average deep-sea shark, which is 10 to 12 ft. in length, measures about 35 sq. ft. This is split as many as eight times.

Sharks, from the Common Mud Variety to the Man-Eaters and the Great Basking Shark, Are Common in Many Climes. Their Skin can be Split from Five to Nine Times and Is Unexcelled for Many Purposes. Aquatic Leather Is Uniform All Over, While the Leather from Land Animals Is Good Only from the Spinal Area





Laundering Is the First Step in Preparing Skins Received at the Big Puget Sound Aquatic-Leather Factory. The Source of Supply is Said to be Unlimited. Fishermen and Hunters Now Have Incomes from a Source Previously Unknown to Them

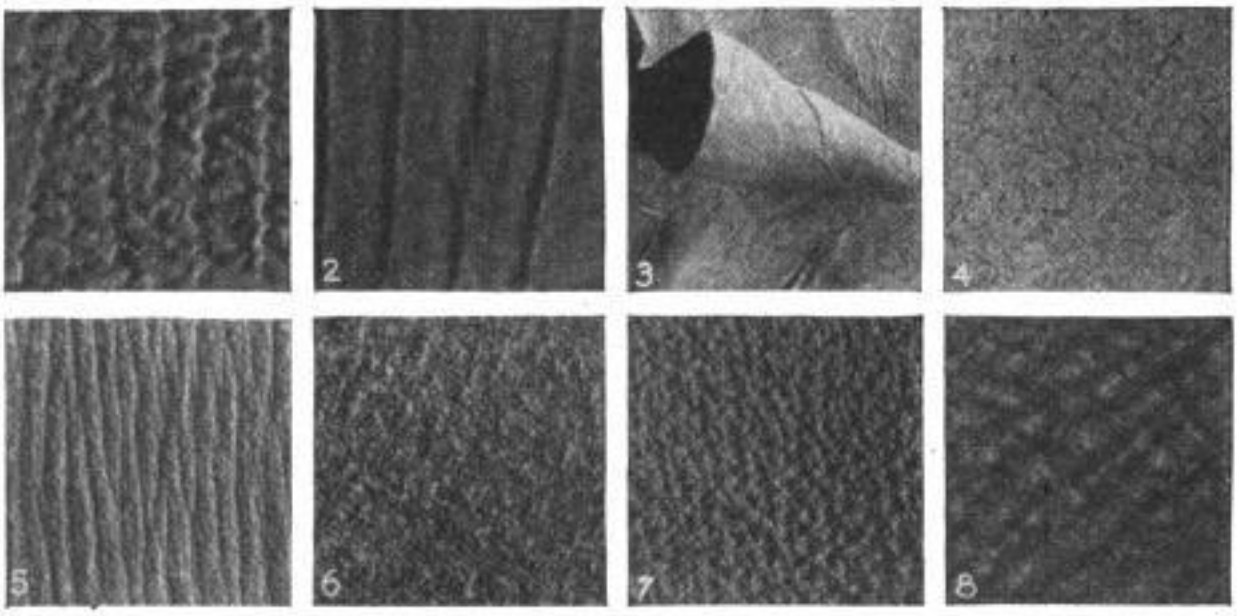


A Splitting Machine, Which Has a Knife and Rolls 10 Feet Long, and Works with Remarkable Precision, is Used in Splitting Beluga, Sea-Lion, and Other Skins. Some Skins Furnish as Many as Nine Splits, Each the Thickness and Quality of Calfskin

Numerous Machines Are Necessary to Prepare the Various Hides from the Sea Mammals and Fish. Many New Natural Grains have been Developed and Any Domestic Grain can be Imitated

Permanent Dies and Finishes are Applied by the Hand Process. In This Final Touch the Grain—Natural, Pigskin, Goatskin, Calf, Seal, or Walrus—is Attractively Brought Out

Finest Aquatic Leather is Obtained from Sea Lions and Seals of the Common Hair Variety. **Because of the Enormous Amount of Food Fish They Destroy, State and Territorial Governments Coöperate with Fishermen and Hunters to Exterminate Them**



Samples of Aquatic Leather: 1, the Thick, Rough Skin from the Mouth of a Whale; 2, a Similar Product from the Sperm Whale's Mouth; 3, the Thin, Kidlike Membrane of a Whale's Intestine; 4, Undressed Leather from a Whale's Stomach; 5, Sea-Lion Hide in Its Natural Grain; 6, the Unfinished Skin of an Ordinary Shark; 7, White Shark's Skin, with a Walrus Grain; 8, Common Sand-Shark Leather

With the establishment of the new industry and its expansion, it is possible to utilize the hides of sea lions and seals, which Pacific Coast fishermen, with the coöperation of state or territorial governments from Alaska to California, are determined to destroy because of their destruction of food-fish resources. The Puget Sound plant was opened in August, last year. Within 30 days, hundreds of inquiries from fishermen and hunters who had sea-lion and seal skins, and the hides of sharks, blackfish, and other fishes and mammals of the sea, were received.

The resources of raw materials for the new industry seem to be unlimited. Whaling stations off the coast of Alaska alone last summer caught several thousand whale. On the Pacific coast in general, and off the Columbia River and along the rocky shores of British Columbia in particular, there are hundreds of thousands of sea lions and millions of seals. A full-grown sea lion measures 16 to 18 ft. in length and weighs approximately 3,000 lb. Its hide compares in usefulness with that of the beluga. The walrus of the Arctic comes within the same classification as the sea lion. Thousands of these are slain each year, but their hides were heretofore considered worthless.

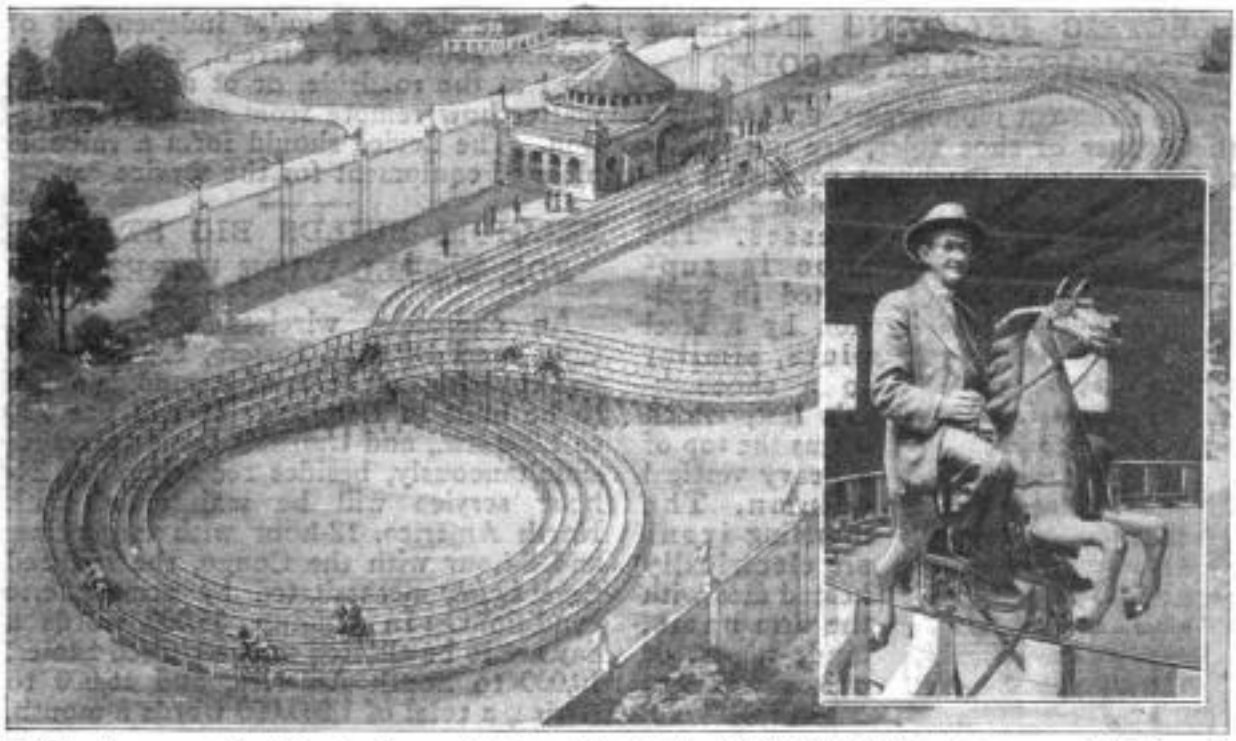
As yet, the field of aquatic leather resources has been barely touched. If scientifically surveyed, its possibilities would perhaps stagger the imagination. Pioneers in this industry confidently predict that the new leather will in many instances replace domestic leathers, the supply of which fluctuates widely, and serve to stabilize prices, because aquatic leather can be produced more cheaply than that from land animals.

THRUST INDICATOR ON SHIP TELLS ACTUAL POWER USED

The actual thrusting force exerted by a ship's propeller in action is revealed by a form of indicator attached to a new British liner. The invention has previously been used on battleships, but not on commercial craft. A gauge which measures the torsional power of the propeller shaft is combined with the new instrument, enabling a direct comparison to be made between the applied horsepower and the useful result, and giving a means for determining the mechanical efficiency of the propeller itself.

NEW AMUSEMENT-PARK DEVICE HAS A SPORTING ELEMENT

The gaming propensity being strong in the majority of people, a new amusement-park riding device, which satisfies the craving for speed and, at the same time, the inherent competitive instinct, should be well received. The vehicles, the bodies of which are in the form of wooden horses, do not depend upon gravity or other outside power for motion, but are propelled by the riders through the medium of sprockets and chains. Thus the speed attained is entirely dependent upon

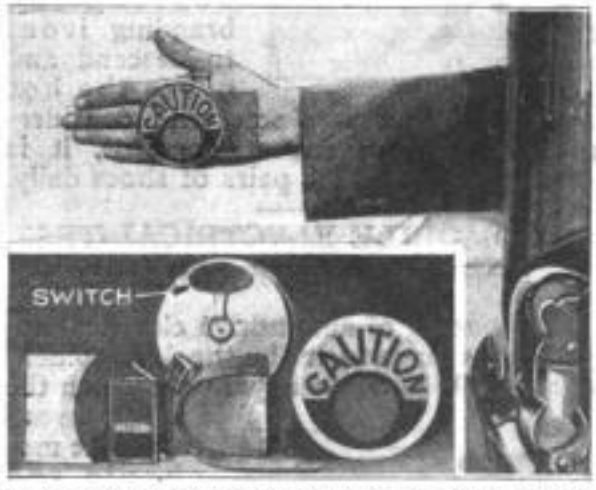


In This Amusement-Park Racing Course, the Speed Attained by Each Rider Is Dependent upon His Strength, as He Supplies the Motive Power. The Tracks Being of Equal Length, All Riders Have an Equal Chance of Winning. Right: A Rider and Mount. Propulsion Is by Means of Hand Levers

the strength of the riders. The horses also are caused to rock, which heightens the equestrian effect. The main track for each vehicle is a monorail, and tipping off is prevented by two rigid braces which extend from the sides of the car and bear upon secondary rails, one on each side of the main rail. Two or more tracks are arranged parallel with each other in such a way that a double figure "8" is formed, with the curves so calculated that each rider must travel exactly the same distance from start to finish. In making the complete circuit, each rider passes over and under all tracks 10 times, which has a somewhat bewildering effect upon the spectators. Impromptu speed contests may be expected in parks where this device is featured.

AUTO HAND-SIGNAL DEVICE IS WORN LIKE A GLOVE

The extended hand, while the simplest method of warning a following motorist that one intends to stop or turn, is not the best, as many times, especially on dark nights, it cannot be seen. To overcome this, a New Jersey inventor has produced a simple signaling device which is worn on the back of the hand and can be illuminated by pressing a small switch with the back side of the index finger. A round glass lens, appropriately colored and lettered, has a miniature electric-light bulb placed behind it. A small dry battery, contained in a special compartment, lights the bulb when the switch is



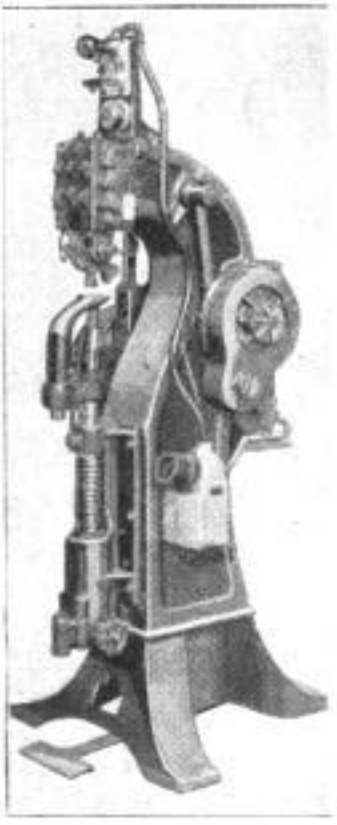
The Extended Hand Becomes Very Conspicuous When the Latest Kind of Signal Device is Strapped upon It

pressed. The whole device is held in place by a strap which passes around the palm of the hand. It is claimed that the contrivance is so compact and light that it in no way interferes with the manipulation of the steering wheel.

¶Commercial development of the wild jute that grows as a weed in many parts of South Africa is the purpose of a company recently formed. India's jute industry is based on this same plant.

ELECTRIC BRANDING MACHINE MONOGRAMS SHOE SOLES

The clean-cut monograms, branded into the leather of shoe soles, are put on by rather elaborate machines somewhat resembling punch presses. The shoe is supported in position by a steel plate, similar to a shoemaker's last, which forms the top of a heavy vertical column. The branding irons are electrically heated dies with the firm name, trade-mark, or other design, cut in their face. After placing the shoe on the last, the operator manipulates a pedal control which causes a sliding carrier, bearing the branding iron, to descend and press the hot die against the shoe sole with considerable force. An expert operator, it is said, can brand 2,500 pairs of shoes daily.



AUTOMOBILE ELECTRICAL-TEST UNIT IS EASILY CARRIED

The testing of automotive electrical apparatus is made easier by the development of an easily portable apparatus, which the builder, an automobile mechanic and electrician, claims is capable of locating faults anywhere in the generating, lighting, or ignition system. An ammeter, test leads, and batteries, in series, are used to locate short circuits, open circuits, and grounds. As the current for testing is supplied by dry cells, packed in the case, the device is quite independent of outside sources of current, and may be used at the roadside, or at any point no matter how remote from the service station. The device should form a valuable piece of equipment for the service car.

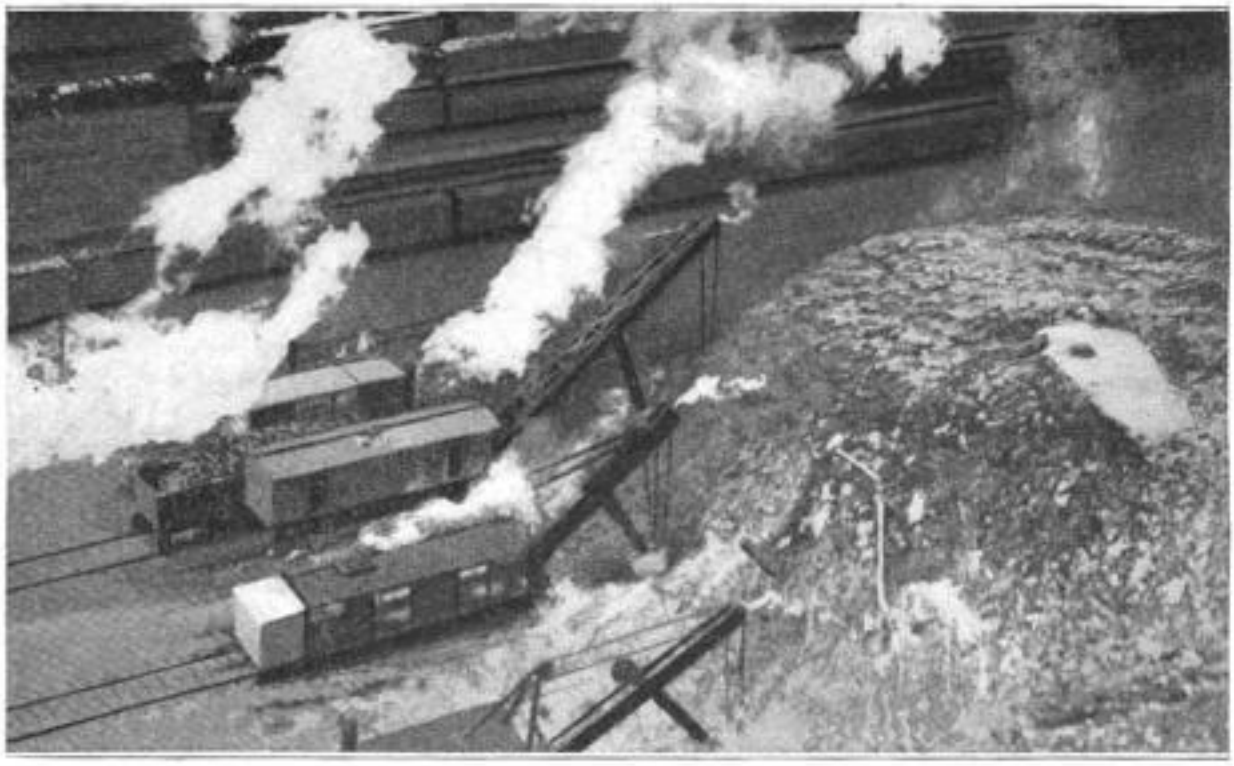
BELGIUM BUILDS BIG STATION FOR WORLD-WIDE WIRELESS

An enormous wireless station, with eight steel antenna towers, 820 ft. high, and covering 250 acres of ground, is about to be built in Belgium. It will use 750 to 1,000 kw., and transmit three messages simultaneously, besides receiving. A 24-hour service will be maintained with North America, 12-hour with Argentina, and 8-hour with the Congo, the reduced time being necessitated by atmospheric conditions. In sending, 35,000 words a day are to be allotted to the United States, 10,000 to South America, and 15,000 to Africa, a total of 1,800,000 words a month.

NEW LOCATION FOR ELECTRIC HEATER ADDS TO COMFORT

Placing a radiant electric heater in an open fireplace, not forgetting to block up the flue, combines the elements of coziness and comfort in a most gratifyfying manner. To many persons there is a garishness about electric fixtures, particularly heating apparatus. The new arrangement should subdue this to a marked degree. It was originated by an Indiana dealer in electrical appliances. The fitting up of a part of his establishment as a cozy corner resulted in many customers for the heaters and other merchandise.

¶A complete automatic-telephone system, with 101 stations and 1,227 miles of line, is to be built for the sole purpose of communication between the dams and hydraulic works now under construction by the War Department along the Ohio River. There are 132 of these dams, designed to maintain 9 ft. of water.



Big Steam Shovels of the Pennsylvania Railroad, Working to Uncover the Eight Tracks Buried under 40 Feet of Earth by the Huge Pittsburgh Slide, Which Issued from a Precipitous Hill

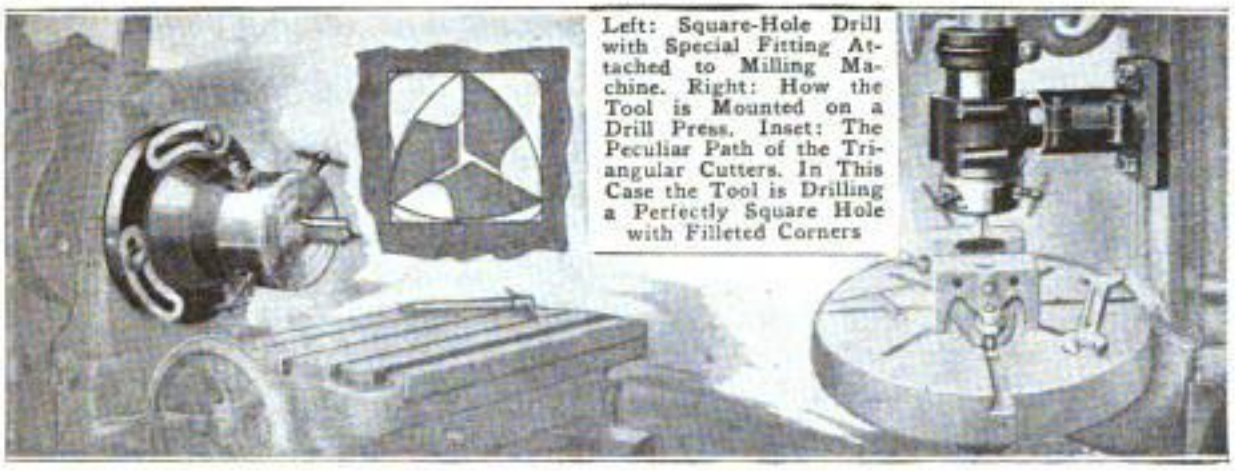
GIANT EARTH SLIDE BURIES RAILROAD MAIN LINE

Eight tracks of the Pennsylvania Railroad, two of them main lines, were buried under some 40 ft. of earth in a slide of gigantic proportions that started a few weeks ago in the city of Pittsburgh, just east of the Union Station. The slow but resistless movement of earth started in a natural hollow of the steep hillside that runs from the railroad right of way up to Bigelow Boulevard, some 250 ft. above, in which waste material had been dumped for years. The nose of the slide, creeping out over the tracks at a rate varying from ½ in. to 1 ft. an hour, carried away a masonry retaining wall, 63 ft. high and 21 ft. thick at the base, and an old rock-filled wood cribbing designed to protect the wall. A large railroad building at the bottom and a frame structure at the top were wrecked, and some of the tracks were thrust as much as 10 ft. vertically upward.

Though the railroad engineers kept a battery of nine huge steam shovels busy night and day, the slide continued to gain on the workers for some time, necessitating extensive rerouting of trains. The boulevard above cracked in several places, and one section sank a number of feet. Over this break the city engineers constructed a wooden trestle, on anchored piling driven to bedrock, and though this structure shifted slightly as the slide progressed, it remained intact. General Goethals of Panama Canal fame, called into consultation, expressed the opinion that nothing could be done, beyond removing the out-thrust earth, until a permanent "angle of rest" had been reached.

COMBINATION TIRE CHAIN AND SIDE-GRIPPING MUDHOOK

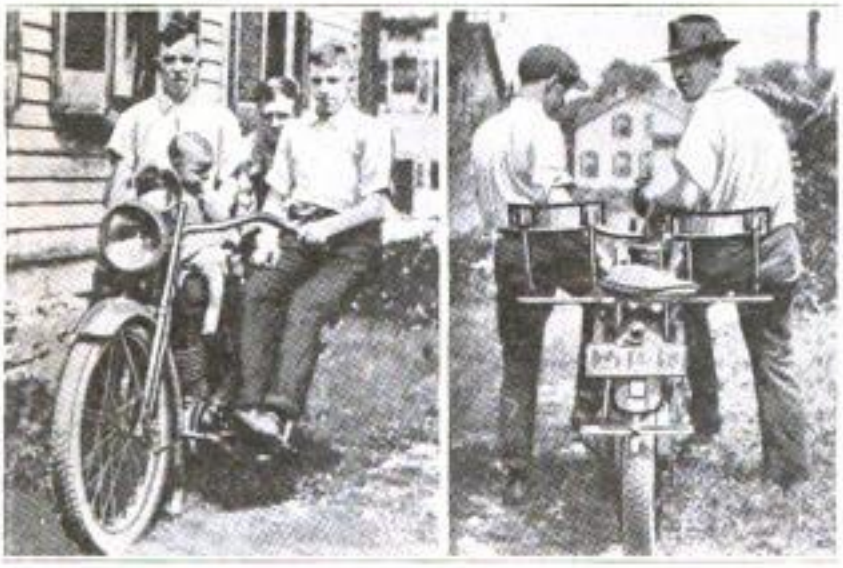
Many times road conditions are such that, even though an automobile wheel is equipped with a nonskid chain, the traction is not satisfactory for the reason that the tire does not sink to the bottom of a mud or ice rut, but merely rides the sides. To remedy this, a combination side-gripping mudhook and cross-chain device has been brought out. The hook projects from the outside surface of the tire and engages with the sides of the ruts. The cross chains serve the regular purpose of preventing skidding. It is not necessary to jack up the car in applying the device.



Left: Square-Hole Drill with Special Fitting Attached to Milling Machine. Right: How the Tool is Mounted on a Drill Press. Inset: The Peculiar Path of the Triangular Cutters. In This Case the Tool is Drilling a Perfectly Square Hole with Filleted Corners

ODD SIDE-BY-SIDE SEATS PLACED ON MOTORCYCLE

Three passengers, though often carried by a sidecar machine, are an unusual load for the solo motorcycle. One cyclist is now able to burden his machine with this number, however, thanks to the use of an ingenious double seat of his own conception. It consists of a metal strip, about three feet long, which is bolted in place of the regular saddle. On coil springs at either extremity is mounted a comfortable seat, with broad back rest. Behind these seats and over the rear mudguard is placed, of course, the usual tandem saddle.



A Special Seating Arrangement Converts a Motorcycle into a Three-Passenger Vehicle. The Passengers' Seats are Placed Ahead of the Driver, and are Provided with Comfortable Backs

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¶A new four-year course in "fishery engineering," embracing all the technical details of the fishing business, is being considered by a large eastern technical institute.

A NEW DRILL-PRESS TOOL DRILLS SQUARE HOLES

An improved square-hole drill, which will, so states the claim made for it, cut and finish square or rectangular holes in one operation, has been placed on the market by an eastern manufacturer. The tool proper is a three-sided cutter on the order of a reamer having both side and end cutting edges spaced 120° apart. The shank of the tool is also triangular, with the sides of the angles curved instead of flat. Peculiarly slotted recesses in the top of the shank permit the whole tool to move freely in any direction sidewise, while at the same time forming a positive connection with the driving member, which may be either a drill-press or milling-machine chuck. A heavy fitting, designed to be bolted to the drill-press upright, carries a hardened-steel bushing through which is a perfectly true, square hole bearing a direct relation, as regards size, to the hole it is desired to drill. The bushing acts as a guide for the drill shank, causing it to move sidewise in such a way that the edges of the triangle follow the contour of the hole in the bushing. This forces the tool to move sidewise with perfectly regular and exact motions while it is revolving. This peculiar compound motion being duplicated at the cutter end of the tool, the result is a square hole with a perfectly true, square bottom. Either sharp or filleted corner holes can be drilled in solid stock.

QUARRY BLASTS PREMATURELY FIRED BY ENGINE SPARKS

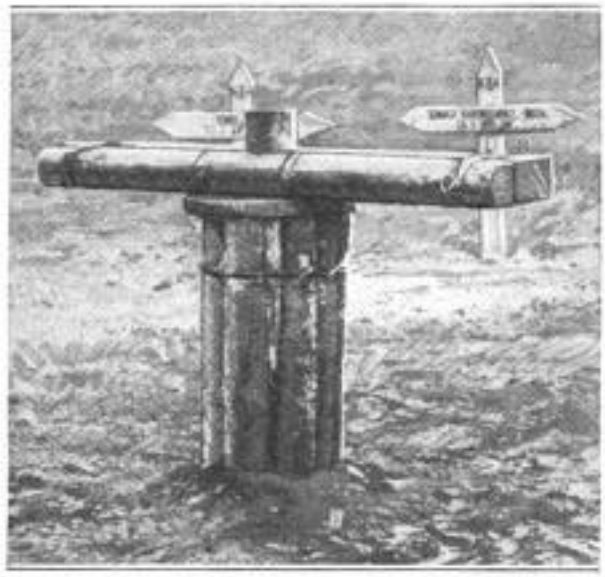
Investigations by the Bureau of Mines of a number of premature explosions in stone quarries revealed the fact that every one of them had been caused by sparks from locomotives or steam shovels reaching and igniting the blasting powder or dynamite. In view of these findings, a number of rules have been formulated for the guidance of quarry workers and owners. The simplest of these is that locomotives should be removed to a safe distance and that steam shovels remain inoperative while the explosives are being transported from fireproof containers and loaded into the blast holes.

CONCRETE RAILROAD BRIDGES HAVE UNUSUAL FEATURES

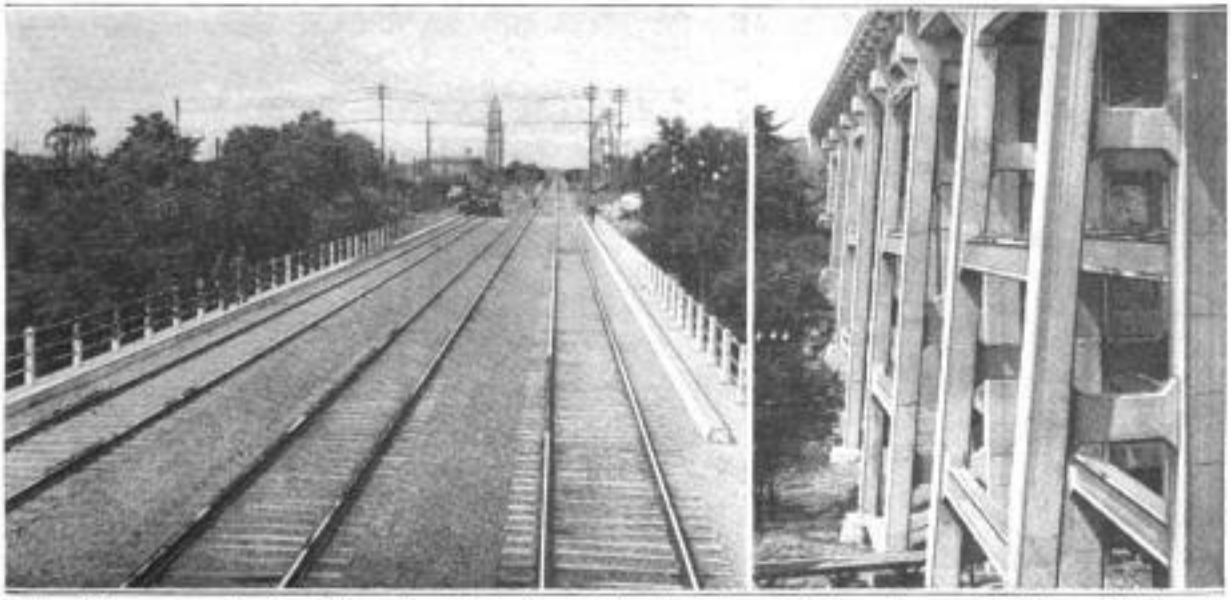
In the work of double-tracking an eastern division of a Canadian railroad a short time ago, two unusual bridges of reinforced concrete were built in shorter time than would have been required for all-steel structures. Both bridges, one with two and the other with three tracks, were 386 ft. long and 90 ft. high. The individual concrete beams of each span were cast in the remarkable length of 35 to 37 ft., with a unit weight of 55 tons, a limit set by the capacity of the 100-ton wrecking crane used in the construction. This crane handled a total of 110 of these slabs, weighing more than 6,000 tons, with no trouble of any kind. The task was completed in about 13 months of continuous work, without interrupting traffic on the railroad.

EMERGENCY ANTI-AIRCRAFT GUN MOUNTS OF THE BOLSHEVISTS

Being badly harassed by the airplanes of the allies and having no means of retaliation or adequate defense, the Bolshevist army, in the vicinity of Archangel, constructed crude, turnstilelike contrivances having revolving platforms large enough to accommodate machine guns with their tripods. A number of these were placed at strategic points. When a plane was sighted, guns were mounted on the platforms, and the target practice began. The records of the allies indicate that the contraptions were ineffective, no hits being recorded. Their instability was fatal to accuracy of aim.



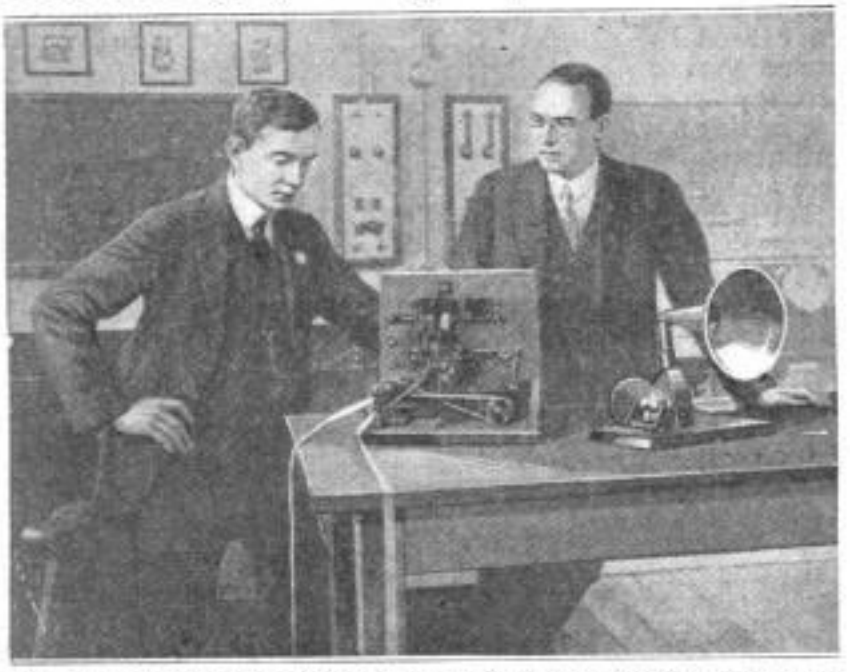
Russian Machine-Gun Mount Designed to Convert a Machine Gun into an Anti-Aircraft Weapon: The Platform Revolves



Left: View across the New Three-Track Canadian Railroad Bridge, 386 Feet Long, of Reinforced Concrete. Right: Side View Showing Some Details of the Construction, in Which Beams Up to 37 Feet Long Were Used

DANISH ENGINEERS FIND NEW ELECTRICAL ACTION

Interesting, though technically incomplete, reports from Denmark signal the recent discovery, by two engineers, that an electric current passed through such a substance as lithographic stone sets up attraction phenomena of an apparently new order. A novel form of electroscope of extreme sensitiveness and simplicity has been built, and a number of curious wireless experiments performed. Use of the new principle in constructing radio apparatus is declared to increase the speed of both transmission and reception about 20 times, and a special receiving instrument developed a capacity of 600 words a minute. Wireless-telephone messages were made to record themselves on paper, and a loud-speaking wire telephone was arranged with two violins as the transmitter and receiver, one of them loudly repeating the words spoken into the other.



Some of the Wireless-Receiving Apparatus Developed by Two Danish Engineers, Which Increases the Speed of Sending and Receiving 20 Times; The Experimenters have Discovered a New Form of Electrical Attraction, Caused When Current Passes through Stone

A DEFLECTOR DIRECTS SOUND OF RAILWAY-CROSSING BELL

In a western city the tracks of three independent railroads cross one of the streets within the length of one block. Each crossing is protected by a bell, but owing to the fact that it is next to impossible to determine which of them is ringing, the crossings constitute a considerable menace. To reduce the hazard, one of the railway companies has placed a sound deflector on the side of its crossing bell, next to the track, which directs the sound toward the street traffic. The result is that, after crossing this track, the sound of this particular bell is cut off, and does not interfere with the bells at the other crossings.

STUNT FLIER, HUNG ON ROPE, SAVED BY PILOT'S SKILL

Aerial misadventures are apt to do their work thoroughly, and hairbreadth escapes are not common. For that reason the recent thrilling experience of Dick Seal, movie-stunt flier, is especially interesting, because it was not the proverbial luck of the rashling, but the unusual skill of his pilot, Capt. O. B. Freeman, that saved his life. The plane was about 2,500 ft. above a Chicago field when the performer, with a 30-ft. rope tied to his body, jumped off the wing, intending to climb back up the rope. The waiting pilot, finally looking down, was horrified to see a helpless figure, with bleeding hands, twisted into the swinging rope below, where a landing seemed certain to dash him to pieces on the hard ground. The pilot flew distractedly about for 20 minutes before he hit upon a plan of rescue. Then, dropping down some 1,500 ft. and studying the field, he started on a circular course calculated to swing the living pendulum clear of the plane's underworks. He finally landed with a long glide, and though the inert passenger was dragged for 100 ft., he escaped with slight injuries.

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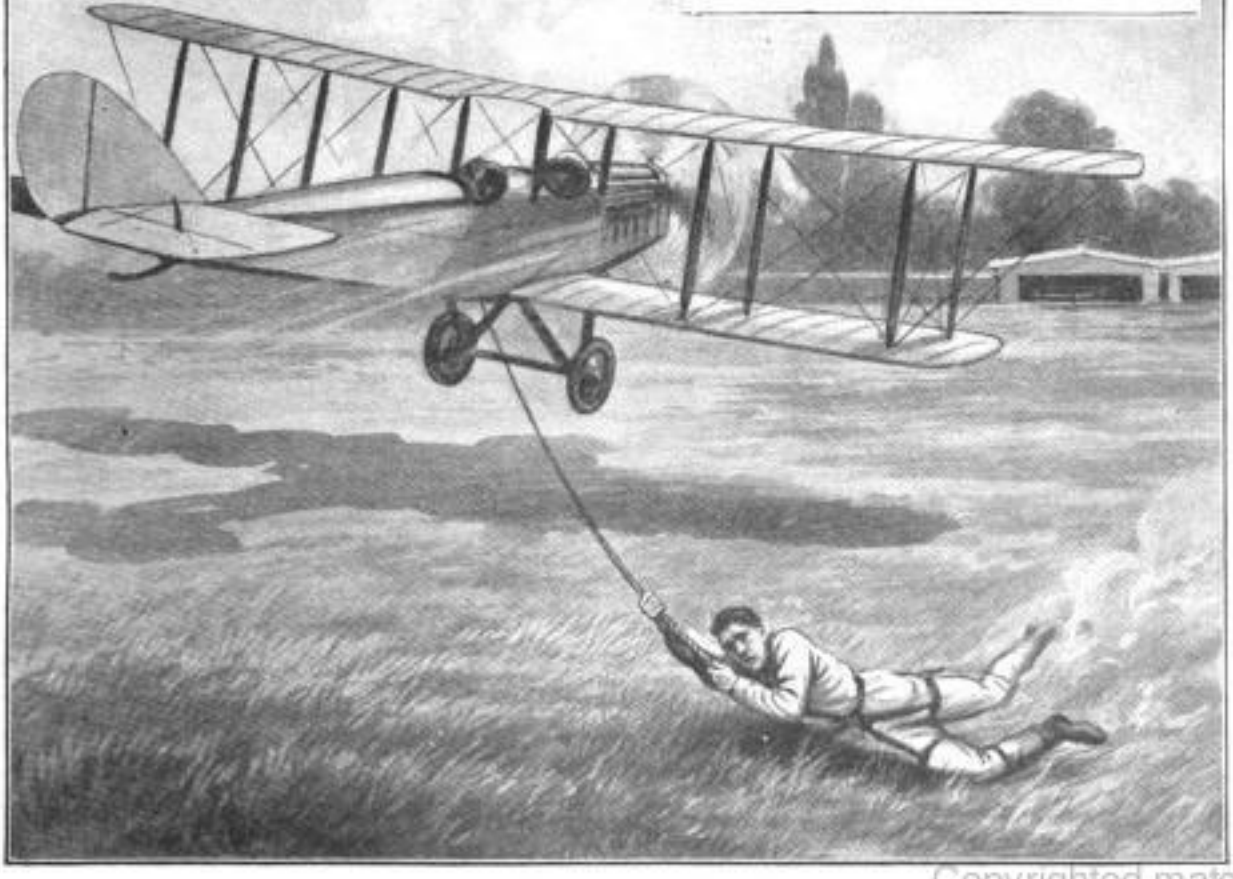
Dick Seal, the Movie Stunt Flier, Who Hung on a Rope from the Plane, and Captain O. B. Freeman, Whose Skillful Landing Saved Him

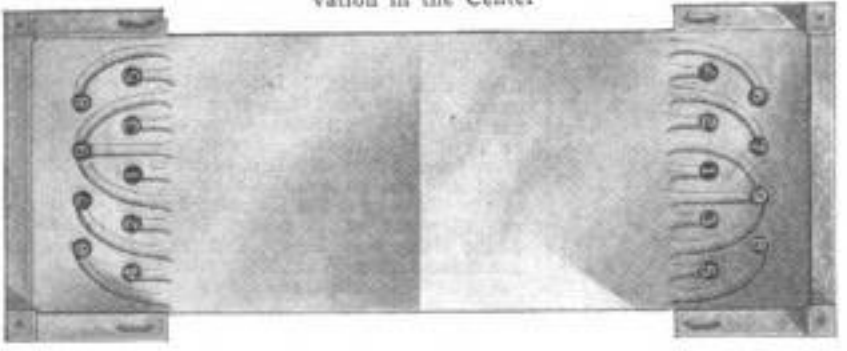
Above: A Pictorial Diagram of the Unusual and Skillful Landing That Swung the Imperiled Performer Clear of the Plane, as It Circled about the Field, and Saved Him from being Crushed between the Tail Skid and the Ground. Below: A Close-Up of the Plane and Its Helpless Passenger at the Moment of Landing, in Which the Stunt Flier was Badly Cut, and Bruised, but Saved from What Appeared to Be Certain Destruction



NEW PUTTING GAME DEVISED FOR LAWN OF HOTEL OR HOME

An interesting game for the lawn of a hotel, residence, or golf club was patented lately, and was quite popular last summer at a southern beach resort. The game is played on a course measuring 6 ft. wide by 18 ft. long, and sloping gently from the center line down to either end. At each end are nine holes, five of them in a front row, and four in the rear. Around these four the surface is so dished that a ball, passing the first row, rolls unavoidably into one or the other. The game is played by any number of golfers, each equipped with a putter. Each player putts three balls from one end to the other, attempting to place them in the holes of the front row. These holes are of low value; the inescapable holes in the rear are of high value. As in golf, the lowest score wins.

At the Top, a Group of Players are Seen Engaged in the New Putting Game, and Just Below It Is a Longitudinal Section of the Putting Green, with Holes at the Ends, Side Pockets for Storing Balls, and a Slight Elevation in the Center



A Plan View of the Putting Green, Indicating the Numbers of the End Holes, the Channels Running to Them, and the Double Slope

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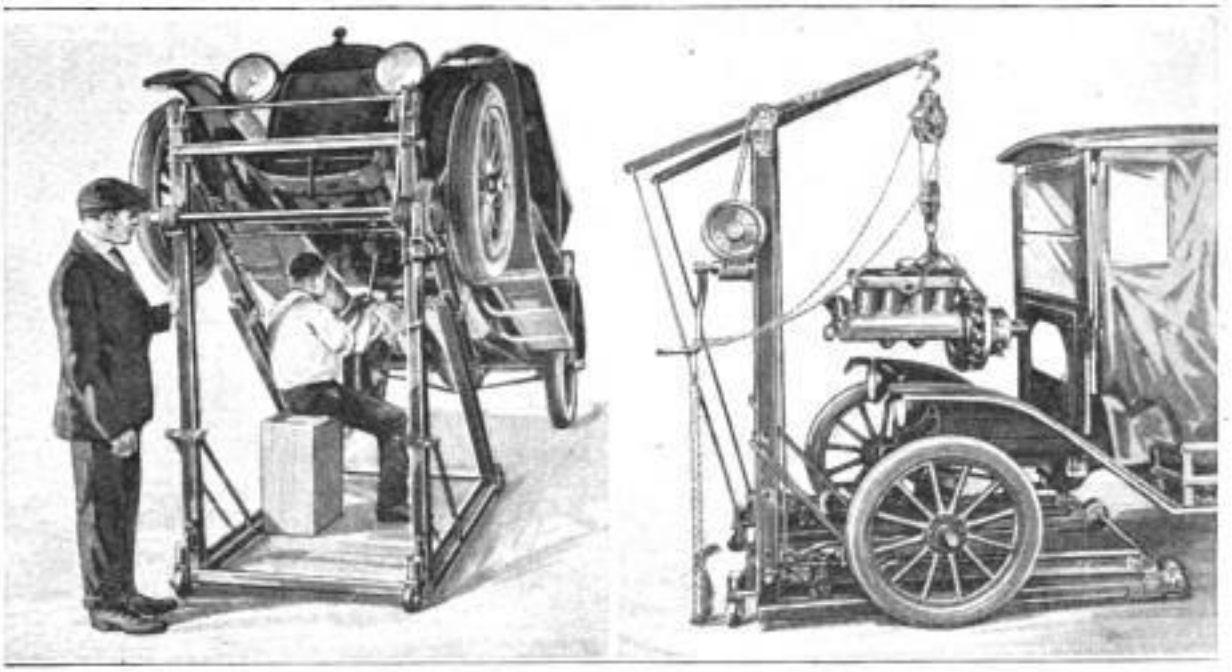
¶Iron ore in the form of high-grade hematite has been found in large quantity near Stanford, Mont., in the northern Rockies, where such deposits are unusual. A belt at least seven miles long and of considerable depth has been traced.

WASHING OF COAL RESULTS IN GREAT SAVINGS

The washing of low-grade coal to remove clay, slate, shale, etc., is a method that is superseding the older one of hand picking. The washing fluid is one having a high specific gravity so that the coal, being lighter than the impurities, will float to the top. This is known as the "float-and-sink" method. During recent experiments of the Bureau of Mines in the northwest coal fields, where the output contains as high as 50 per cent of impurities, it was demonstrated that, approximately, 5.8 per cent of the coal now being wasted in the mine dumps can be recovered. In treating an experimental quantity of 250 tons, the washing method saved about 17 tons which would have been lost by hand picking. The value at $4 per ton was $68. As the services of two hand pickers, whose wages amounted to $13.60 per day, were dispensed with, the total saving on the day's work was $81.60, a most worthwhile economy when the small amount of fuel treated is considered.

PORTABLE CRANE AND HOIST FOR AUTO-REPAIR SHOPS

Improvements in auto repair-shop equipment follow each other thick and fast. One of the latest devices is a combination portable crane and hoist which may be used for the simpler lifting jobs or to raise cars, weighing up to 13,000 lb., to heights of from 48 to 53 in., and hold them firmly and safely in position while the various repair operations are done from the bottom. It is in the method of performing the latter task that the manufacturers claim novelty for their apparatus. It is constructed in such a way that either end of a car may be elevated without danger of marring the paint or damaging the radiator or lamps. The points of purchase are the axles instead of the spring hangers, as is the case when the



Left: Automobile Hoisted into Position on New Service-Shop Apparatus. The Front Axle is Securely Held by Clamp Hooks Which Are Part of the Top Rails of the Angle Pieces. Right: The Overhanging Boom Facilitates Engine Removal. Tipping of the Device is Prevented by the Broad Four-Point Floor Contact

older method of the straight bar and the chain tackle is used. A four-point contact with the floor is made at the widely separated corners, so that it is impossible for the device to tip over. Lifting is done by a hand-power winch, which is geared so low that one man can easily raise any weight within the capacity of the apparatus. When used as a crane, two channel-section beams are arranged across the uprights in such a way as to form a boom of sufficient overhang to permit making a straight lift when removing engines or transmissions.

SEED-GROWN EASTER LILIES REPLACE IMPORTED BULBS

As a result of successful experiments conducted at the government farm in Virginia, the Easter lily has now become a wholly domestic plant, grown from seeds instead of from imported bulbs. Furthermore, the home-grown lilies, reaching full flower 15 months after planting, carry five to 15 blossoms to a stalk, as compared with four to five for the average bulb-grown plants. It is reported that good seed may be procured by anyone, by pollinating the flowers as now obtained. The importation of lily bulbs is large, some 10,000,000, valued at about $2,000,000, being brought from Japan last year. The experiments have proved that the Easter lily is really a very hardy plant, wintering well in the average temperate climate with the bulbs only 4 in. under ground.

ADJUSTABLE HANDLE ON MOWER HELPS CUT SLOPING LAWNS

Landscaped grounds and terraced lawns, presenting grassy slopes at all sorts of angles, are difficult subjects for the ordinary lawn mower, designed only for flat surfaces. The trouble lies, of course, in the handle, and is successfully overcome by an adjustable extension now on the market. This device, clamped to the regular mower handle, not only increases its length, but extends back at an angle that enables the user to mow down the sides of a slope while standing at the top.

Cutting Grass on a Slope Is Easy with a New Angular Extension for the Handle of the Lawn Mower, Which is Attached with Adjustable Clamps, and Enables the User to Stand at the Top of a Terrace and Mow down Its Side

DAMMING THE STREAM OF OIL FROM A "GUSHER"

Many times when a new oil well is "brought in," the oil comes with a powerful rush, and the well is called a "gusher." The loss of oil before the well can be capped often runs into thousands of barrels. The superintendent of a western oil company, being confronted with this problem, had workmen plow trenches at the bottom and along the sides of a gentle slope, leading down from the well, in such a way that about 12,000 bbl. of the oil were impounded in the shallow reservoirs. The prompt installation of an emergency pipe line completed the job, and most of the oil was saved before it had time to overflow the hastily thrown-up trenches, or make its escape by seeping into the soil.

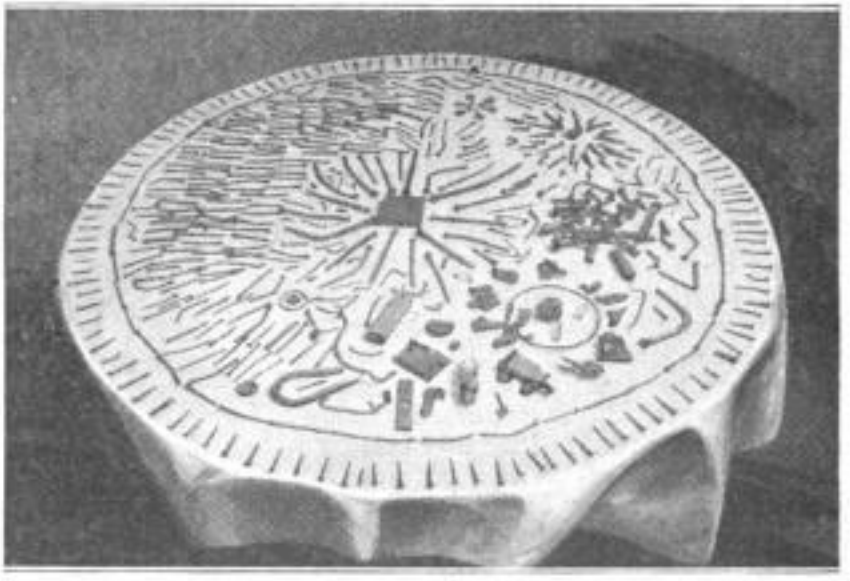
Pools of Petroleum, the Result of a Sudden Rush of Oil from a New Gusher: By Prompt Action Most of the Estimated 12,000 Barrels of the Fluid was Saved

EARLY AMERICAN AUTOMOBILE IS PRESERVED AS RELIC

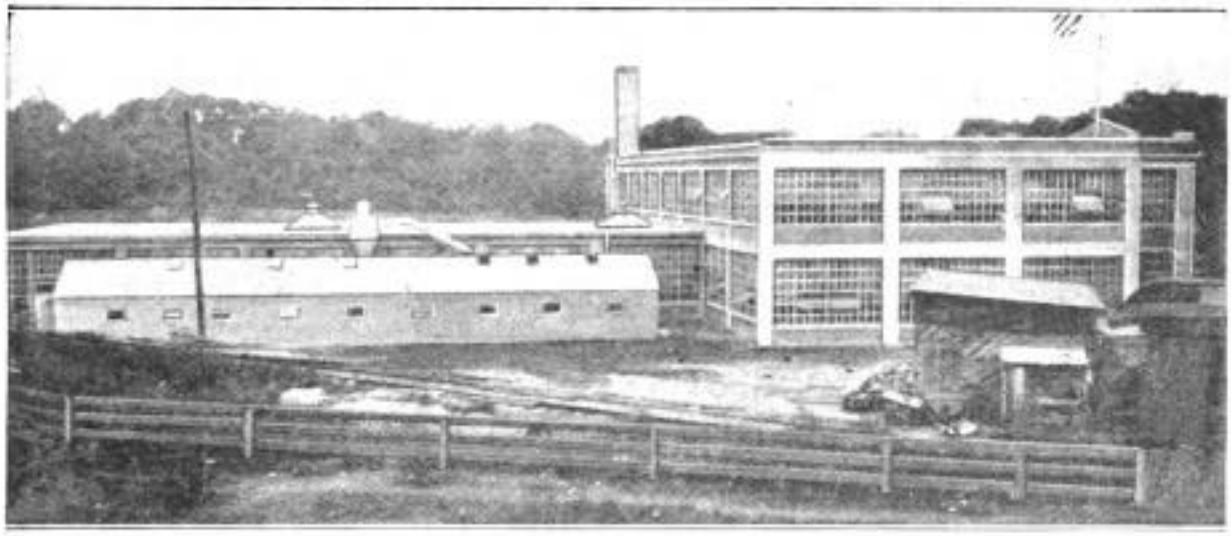
That future generations may have an opportunity to appreciate the broad vision of one of America's earliest, if not the pioneer of, automotive engineers, the National Museum has accepted and placed on exhibition the second successful horseless carriage built and driven by Charles E. Duryea, between September, 1892, and September, 1893. The old machine had many points in common with the latest of latter-day models, such as a water-cooled engine, three-point motor and transmission suspension, cambered front wheels and knuckle type of front-wheel mounting. It is a true "horseless carriage," the body, axles, and wheels having originally served as what was known as a lady's low phaëton. This was Mr. Duryea's second successful creation, the first having been constructed between August, 1891, and September, 1892.

NAILS COLLECTED FROM ROAD REPRESENT TIRES SAVED

The instinct of the collector works in altruistic channels as it is exercised by J. S. W. Burpee, of Rockland, Me. In the course of some nine months, aided by a habit of close observation, he has gathered from the highways of his home vicinity a total of 501 small articles, each of which constituted a potent threat against the efficiency of at least one auto or bicycle tire. Most of these objects are various sizes of common nails—entirely too common, indeed, for the peace of mind of those who ride the inflated rubber; but more curious specimens are not lacking. The collector reports the discovery, in one instance, of a blind man with a curbstone phonograph, throwing his discarded needles into the street. Motorists will wish there might be some way of popularizing this form of hobby, so that each town could have at least one collector.



An Odd Collection of Articles Picked Up in the Streets of an Eastern Town in the Course of Nine Months: There Are 501 Pieces in the Display, Consisting Mostly of Common Nails in Various Shapes and Sizes, the Border Alone Containing 118 Small Nails. The Collector's Work Represents a Saving of Vast Amounts of Potential Tire Trouble for Motorists and Bicyclists



The Modern Massachusetts Factory in Which Wireless-Telegraph and Telephone Receiving Apparatus is Being Produced on a Standardized Basis, with a Capacity of 3,000 Units a Month

WIRELESS-INSTRUMENT CONSTRUCTION STANDARDIZED

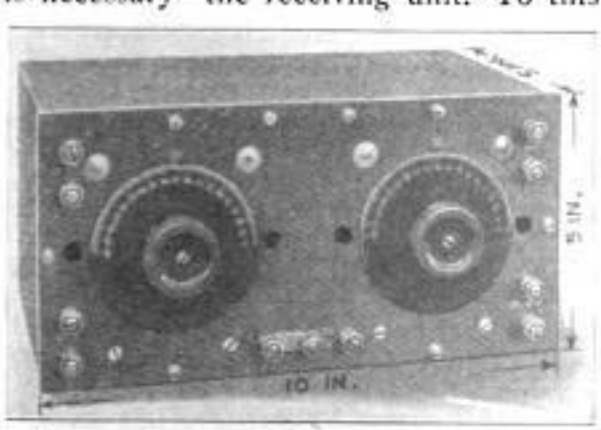
BY BERNARD G. PRIESTLEY

OUT of numerous intricate machines in a new $300,000 plant in Massachusetts are flowing streams of standardized parts that are being assembled, in much the same manner as are automobile parts, into complete sets of combination wireless-telegraph and telephone receiving units. The capacity of the plant is 3,000 units a month.

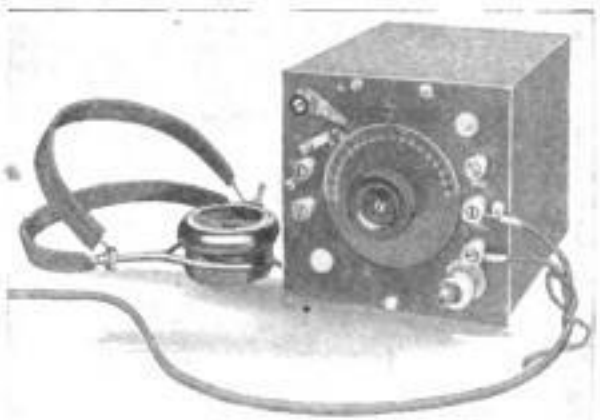
Thus, for the first time in America, machine manufacture of wireless-telegraph equipment is under way in capacity quantity. Heretofore, as the average layman knows, the human hand has been the main cog in the process of making these instruments.

Each of the 11 units that make up a complete set is standardized as well as every part of the units. As any part of an automobile can be replaced, so can any of the parts of these 11 units that make up the sets.

In order to receive wireless-telephone or telegraph messages only one of the 11 units is necessary—the receiving unit. To this unit can be added one, or any number, of the remaining units, each addition making the whole more efficient. The other 10 units include a vacuum-tube detector and



The Two-Stage Amplifier. One of the Standardized Units of the Set: It Measures 5 by 10 by 5 Inches



The Complete Receiver, Basic Unit in a Set of 11 Parts That may be Built Up to Any Desired Efficiency

detector-amplifier, one and two-stage amplifiers, short-wave coupler, medium-wave coupler, short-wave variometer, medium-wave variometer, variable condenser, and "B"-battery.

Each unit, with the exception of the two-stage amplifier, is housed in a wooden box, 5 in. square. The two-stage amplifier requires a box 5 by 10 by 5 in. The complete set can be carried in a dress-suit case. The receiving unit is being sold at slightly less than $25, and the other units at correspondingly low prices. Each unit has been reduced to the minimum number of parts commensurate with efficiency.

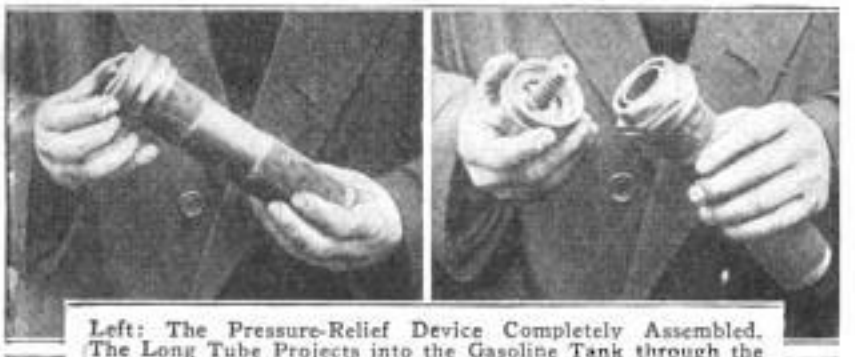
The sets are being made expressly for "young America." In the past, the boy who began delving into wireless telephony and telegraphy found it necessary to cast

aside his first instruments and buy entirely new outfits whenever he wished to advance a step in the subjects. The new sets allow him to build onto his equipment at any time without discarding the old units. He can also obtain any number of parts of any unit and build his own instrument.

The range of the sets varies from 100 to 1,000 miles, depending on the size of the receiving antenna and power of the transmitting station. Before leaving the factory, each individual part is inspected by experts, who compare each item, no matter how small it is, with specifications and standards.

SAFETY VALVE FOR GASOLINE TANKS PREVENTS EXPLOSIONS

During a recent demonstration of a safety filler cap for gasoline tanks it was proved that, if the pressure in a tank can be released as rapidly as it develops, many disastrous explosions and fires will be avoided. The device is quite simple, consisting of a valve controlled by a spring which may be varied in tension. The whole is contained in a tube, which is designed to project into the tank through the filler hole. It is held in place by a cap, which takes the place of the regular filler cap. The demonstration consisted in building a bonfire around a tank, containing 10 gal. of gasoline, which was equipped with one of the safety devices. Instead of accumulating, bursting the tank, and scattering the boiling fluid, the pressure opened the valve and the liberated gas simply burned until the fuel was all consumed.



Left: The Pressure-Relief Device Completely Assembled. The Long Tube Projects into the Gasoline Tank through the Filler Hole. Right: The Cap and Valve Removed, Showing the Valve Spring

The Demonstration: Ten Gallons of Gasoline in the Barrel Failed to Explode as the Gas was Freely Liberated, and Burned Harmlessly

ADVERTISING SIGNBOARDS OF THE AERIAL WAYS

Now that the aerial transportation of passengers is rapidly approaching the dignity of an established industry, publicity experts are giving much thought to the best ways in which to bring their messages to the attention of the constantly increasing host of travelers of the air lanes. Ground signs have been tried, but the results have not been of the most encouraging nature, as to be legible at an altitude of several thousand feet, they must be of enormous proportions. The vicinity of landing fields is the logical location for such signs, but these areas will likely be prohibited for the purpose, as too many signs about a landing field have a decidedly bewildering effect upon pilots strange to the locality, the signs being easily confused with the field markings. Likewise, banners carried by kites or captive balloons are frowned upon, as it is feared that the cables would be fouled by the planes. Another angle of the problem is that of illuminated signs for night-advertising purposes. Altogether the new field presents a wonderful opportunity for the exercise of ingenuity, and it is reasonable to suppose that before long the aerial routes will be thickly strewn with immense garish signs extolling the virtues of one manufacturer's macaroni and another's bacon and hams.

Searchlights are mounted in a protected position in the hulls of certain German warships, the beams being projected upward through the hollow steel masts, and directed by means of two plane mirrors.

COMMENT AND REVIEW

[These pages were printed December 27, 1920]

THE "Confessions of a Shipping Board," or "What Became of the Money," which affords the subject for considerable copy for the press these days, tempts me to relate an example of this kind which occurred at a charming village on the Maine coast that I visit many times each summer. While rapidly passing into history, with other more important events of like nature, still it is interesting and instructive as an object lesson on how costly simple undertakings become when the Government attempts the work.

How Government Built a Ship

We had fairly entered the Big War, and the cry was going up frantically for more ships. T—— had had a shipyard for upward of 100 years; its vessels were known on every sea, but the building was done in a quiet, simple way. Almost the same day we declared war, a keel was laid in this yard for a fair-sized schooner, one of a type of which scores had been successfully launched. They were all good ships. Only a few knees had joined the keel, when an official appeared, and after one glance announced the Government would build the ship.

The owner had barely turned the yard over, when in rushed a lobsterman, who had evidently mistaken a porpoise for a submarine, and sounded the alarm, "The Germans are coming to destroy the [embryo] ship." A council of war resulted in a decision to protect the ship by the erection of a high board fence of two-inch material. To do this, most of the ship carpenters were required for some days. Old-timers modestly suggested the yard was several miles from the ocean and that the little river which connected the two was only navigable for a short time at high tide; but no attention was paid to them. The fence—a good one—cost $1,800.

For a few days work proceeded on the ship, and then another lobsterman saw another porpoise, and again the Germans came—this time to burn the fence which protected the yard. There was no doubt of it, and so a call was made for a fire engine for the yard, and soon a new gasoline engine arrived. Being a nice one, with plenty of red paint, it cost $4,800.

No occasion to use the engine occurred, but it seemed a pity to let such a good machine remain out in the open with nothing on but a piece of canvas, so the decision was to build an engine house. Again old-timers mildly suggested that in the 100 years past there had never been a fire, but they were scorned. That was in peace times; now was war. So the men again left the ship to build the engine house. It, too, was a good engine house. It cost $5,000.

Resuming work once more on the keel, a rumor sprang up that the enemy had designs for a night attack, so it was decided to appoint a night watchman—in fact, three of him—and as one crew could only watch eight hours, it was obvious that three crews were necessary for the full 24 hours. The fact that for three generations it had been unnecessary to employ even one watchman was discarded in favor of the nine, as out of date. Meantime the old residents were being importuned to buy thrift stamps and win the war.

Quite a few ribs had been inserted in the keel by this time, and apparently some progress was due to be made, when another lobsterman appeared. He had seen a big one this time, and a frantic "S O S" was sent the fort in Portland for troops to repel boarders. They came post-haste, an officer and 25 men. They camped in the yard, set up some tents, became the admiration of the young ladies, and proceeded to guard the watchmen. All went well until the latter part of August, when the tent dwellers took to blankets on warm nights. On cool nights they took a pair, and then two pairs. The natives reluctantly admitted that the previous winter the thermometer hung around 20° below for a week or so, but that was an unusual winter. As some of the soldier boys hailed from Arizona and Texas, the prospect of 20° below in tents did not remind them of home. The matter was the subject of discussion, but unfortunately there was no vacant house in town. As something had to be done quickly, a large but long unused colonial mansion was discovered in the country, which had been vacant and deserted for a long time. The heirs had gone west and disappeared. The doors and windows were mostly gone. However, the ship carpenters rallied 'round the flag once more, and when the house was rebuilt with new everything, and the steam heat and hot and cold water, and shower and tub baths, and new roof and floors, it became one of the show places of the county.

While the work was progressing on the house, it was decided to exercise greater care than ever at the shipyard, and so great wooden piles were assembled

and driven in the form of a semicircle in the water at the entrance to the yard. To make them solid, they were driven about 20 ft. into the bottom, with the tops just below water at low tide. What would happen to the submarine which ran into these piles was something awful to contemplate.

The house was now almost done, but little more than a good start had been made on the ship, when they up and signed the armistice—and spoiled everything. In due time the soldiers went away without even a housewarming; the watchmen looked for other jobs; the carpenters quit. The fire engine and the high fence remained. After many days the owner recovered his shipyard, and taking down the fence, proceeded to finish his schooner, according to good old methods. At last it was done.

Sequel No. 1. When all was made ready for the launching, some one remembered the row of piles. If subs could not come ashore, neither could launchings go into the water. First one and then another floating machine was brought, and "shears" erected, but all to no avail. So deeply driven were the piles and so fast imbedded in the bottom, nothing could budge them. Here, then, was a ship without a sea, and something had to be done. The Government was importuned to help, and finally a big dipper dredge, a real mammoth, was found in Portland. It took two seagoing tugs several days to tow the big scow the 100 miles through waters where the tides run strong and heavy seas are always found, but at last it arrived and was rigged to pull the posts. The piles came hard, but finally they were all up, and the schooner floated proudly.

Sequel No. 2. And in the light of thousands of just such experiences, some people profess to favor the enlargement of government activities in the operation of industrial undertakings.

PERHAPS a comparative idea of the actual danger of the Japanese invasion, of which some papers wax so vehement, may be gained from the immigration figures. From Europe we receive millions yearly; from the West Indies came 107,000 in 10 years; from Mexico, 39,000 in 1 year; from Japan to the United States and to all of its possessions, 18,879 in 10 years, or an average of 1,887 per year.

AND now the reformers have decided a Blue Law Sunday is what we need. The Sabbath of the Puritans, who with all their solid qualities were at the same time among the most narrow-minded bigots of any time, is no more to be compared with our modern Sunday than was the "Mayflower" to the "Mauretania" as a vehicle of transatlantic travel. The 17th-century life was so entirely different. A man had his store or shop on the premises or even in the same house in which he lived; he did not travel an hour morning and night to and from his work. Time was the one thing of which he had plenty. In these days the hours the head of a household actually has to himself, or for enjoyment, are very few. In those days city life was unknown, for there were no cities. If a man wanted a little recreation he went out in the back yard and shot a bear, or deer, or maybe an Indian or so. There was no need to keep places where milk and food are sold open on Sunday, for the cow provided fresh milk twice daily, and the butter and meat were hung down the well. The millions of city dwellers today can do neither. There were few bakeshops then; now more people buy bread than make it themselves. The needless multiplication of Sunday work should be frowned on; in fact, the labor unions have accomplished great good in this respect, by imposing double time for Sunday work. We all agree there is more Sunday work and merchandising than is necessary. This can and should be made the object of public opinion, but to impose the Sunday of the reformers would be to turn the clock back 200 years, and would be cruel and harmful. Even if it could be enforced, the hatred of religion, in whose name it is asked, would outweigh all possible advantage gained. Religion and its tenets cannot be legislated into the human heart; and Christ himself, least of all, sought to do so. Unquestionably a larger attendance at church services, and a deeper respect for religion than exists at present, are to be desired. But blue laws will not win the unbeliever any more than the Inquisition with all its power and physical punishments was able to do. A so-called blue law would not be as extreme as the Inquisition, but it would rest on identically the same selfish, narrow basis.

The Blue Laws

The uplift of religion, and the one-day-in-seven physical rest, admit of no argument; on these two essentials the great majority of our citizens agree. The effort seems to be directed chiefly against the dwellers in cities, for in the majority of country towns there is already little or no occasion for blue laws. The last thing the dweller in a country town needs, or thinks of, would be a game of golf on a Sunday afternoon, which same golf is a veritable life-saver to the city man. The Rev. Jeremiah Crafts doubtless means well, although the milk of human kindness must have been wiped from his lips before his latest picture was taken.

Probably the ideal Sunday, spiritually and physically, is the one approved by Theodore Roosevelt. Let the morning be devoted to attendance upon some public place of worship; and for those who are debarred from such relaxation during the week, let the Sunday afternoon be spent in open-air recreation. For myself, I cannot see any greater sin in the engineer who runs a Sunday train which enables a son to reach the bedside of his dying mother, than the labor of the janitor who cares for the fires, rings the bell, and otherwise makes a congregation at church possible.

Alarm Boxes on Small Ships

SCARCELY a day passes but records the saving of some ship and cargo, and usually lives also, by means of wireless.

At present this involves, of course, not only a wireless equipment on board, but a wireless operator also. The big ocean passenger steamers carry usually two operators, or more, to insure continuous service day and night. But what about the thousands of coastwise vessels which cruise along our own and foreign coasts? Vessels of a few hundred tons' burden up to 2,000 tons. Few, if any, of these craft can afford a wireless operator; in fact, many of them carry only three or four men all told.

It would seem not difficult to adapt, out of the present wireless systems, a simpler and more condensed apparatus to be carried on board, and which would respond automatically to one or possibly two signals, which could be sent out either from lighthouses or by special stations, established for the purpose at intervals of a few hundred miles.

The instrument on board could register much on the principle of a kitchen annunciator. When the shore station sent out a signal, a bell would sound on board, and the skipper would read "Make Port," or "Big Blow Coming," or something of the sort. A coaster, for instance from Boston to Bangor, or St. John's, which lays a course well out at sea to lessen distance, on receiving such a warning, would usually have time to make some safe harbor within 50 miles before the storm broke. Every skipper has his barometer, of course, but many storms which make up 1,500 miles away could be announced in this way long before the barometer began to drop.

Eventually a sort of ticker service will undoubtedly be developed, which will print messages on a tape, and the captain will be in touch with shore news hourly. Messages and orders from owners could be transmitted by this one-way wireless, which it would not seem superdifficult for many of our electricians to work out.

A Painful Transition

THE rocket ascends amid a tumult of applause, but the stick is apt to come down with a dull thud; and the prices which went so merrily soaring during the past few years, are, many of them, beginning to return to earth, and others are preparing to do so.

The deflating process, like coming out of an anesthetic, is both uncomfortable and painful. We breathlessly climbed the cliffs of high prices without much thought about how we might get down again, but down we must come, for there is neither standing room nor permanent foothold at the top.

The decline is something like the turn of the ocean tide. At first, it shows but little, if any, fall, but there comes a time when the distance between high-water mark and present level is evident. Prices are falling, and in most lines, if not all, will fall more before the bottom is reached.

To defer all buying until the tide has reached its lowest ebb, is, however, not the act of wisdom, for it is safe to assume that the pendulum, having swung to its extreme low, will then work back to what will be the new normal level. The first two months of 1921 will, in all probability, be strenuous ones for every line of activity. Some of these, who have let their business ambition outreach their

business discretion, are apt to be hard hit. Strained financial conditions exist throughout the world.

Now, having visualized the dark side, what do we find on the other?

Good Times Ahead

IT may be doubted if even those financiers of most experience and widest opportunities for observation fully comprehend the colossal financial evolution now in progress. Certainly the most of us do not. The disturbances and upheavals have never known their equal. But the tidal wave will not sweep away the mainland, even though some of the docks are wrecked, and the volcano has about ceased its outpour and surprisingly few are reported as overwhelmed, when the magnitude of the disaster is considered. Our granaries are filled to bursting with the unused crops of 1920, while sowing for this year's harvest is already begun. We have no fear of famine, which is a matter of prime importance.

Factories which were closed down for want of orders will soon have orders pouring in; not at war-time prices, to be sure, but now there is no war. Peace has returned and we must adjust to peace-time prices. To accomplish this everyone must help. The employer must regard the well-being of his employes, and keep wages as high as business conditions will warrant. Labor has already, in many places, shown a spirit of coöperation in offers to accept lower wages. We hear less of the absurd, and inexcusable, strikes, such as recently tied up all progress on a big building and threw hundreds out of work, while the steamfitters and plumbers wrangled as to which should install a small pump which had a steam cylinder at one end and a water cylinder at the other. A general disposition is seen also to return to a fair day's work, and this is one of the most promising signs of a return to sane living. The clerks in stores are getting away from the "take it or leave it" of not long ago; many of the railroad clerks who come into contact with the traveling public are losing that haughty air of superiority, and are beginning to reveal signs of being human.

The world is full of raw materials, ready for manufacture. Millions of pounds of copper are on hand at prices of 20 years ago. Australia has the wool clip of two seasons, only waiting for ships to bring it to the mills of Europe. Shipping charges are falling. Brazil has enormous supplies of coffee and rubber on hand; and so one finds great quantities of raw materials in every country outside the war zone. And even there recovery has progressed to an astounding extent, and is gathering force daily.

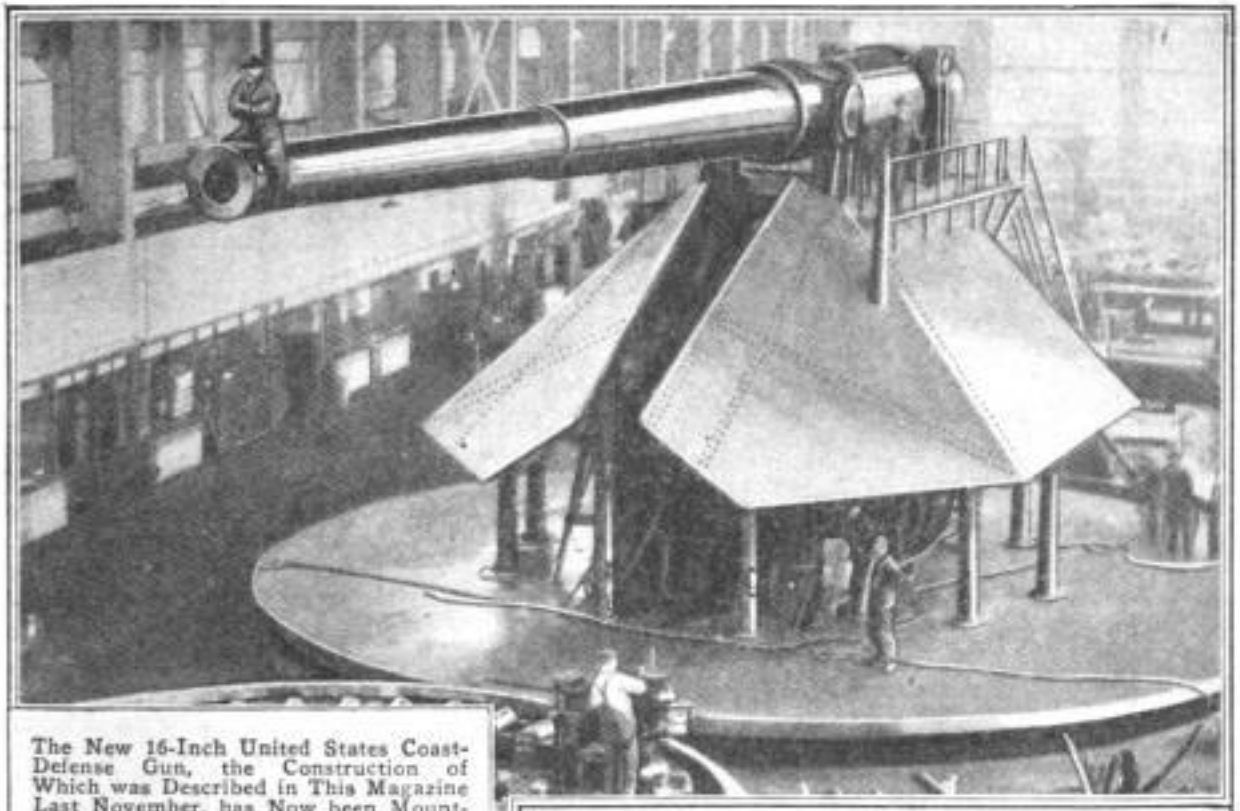
The man to whom the sight of possibilities is an inspiration, finds himself at a loss where to commence, so great are they in this country. All of our railroads require freight cars of every kind, passenger and sleeping cars, and locomotives by thousands are needed at once; much rebuilding and even some extensions. Thousands of miles of good roads are an immediate necessity. Skyscrapers, homes large and small, factories, schoolhouses, stores, warehouses, cold-storage plants; all these are required by the hundreds of thousands. The items recited, while large, suggest countless others, the need for which is also imperative.

And as all these things can only be accomplished by the effort of human hands and brains, it means employment for millions, and the wheels of industry and commerce turning busily. The spirit of achievement, which brings the greatest reward in life, finds a most unusual and inviting prospect before it. The world calls for work; America does the same; and whether 1921 shall prove a good year or otherwise, largely depends on how earnestly and faithfully the nation works. If we can cut out the friction, and expense and delay wasted in the dispute over nonessentials, and red tape, and get down to good common-sense methods, we should have in 1921 one of the best years, constructively, this country ever saw.

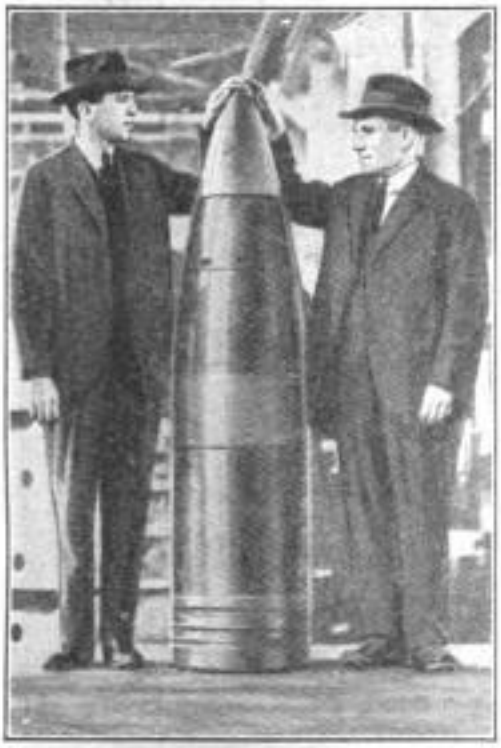
Just now we are up before sunrise, things are a bit uncertain in the dim light, and there is a dark rim around the horizon, but the sun will soon rise and dissipate the phantom forms of doubt. Then, if we keep our heads, and there is no reason why we should not, and walk straight, and work hard, there seems no present reason why Dec. 31, 1921, should not mark the end of one of the most prosperous years in all the history of this country.

H. H. WINDSOR

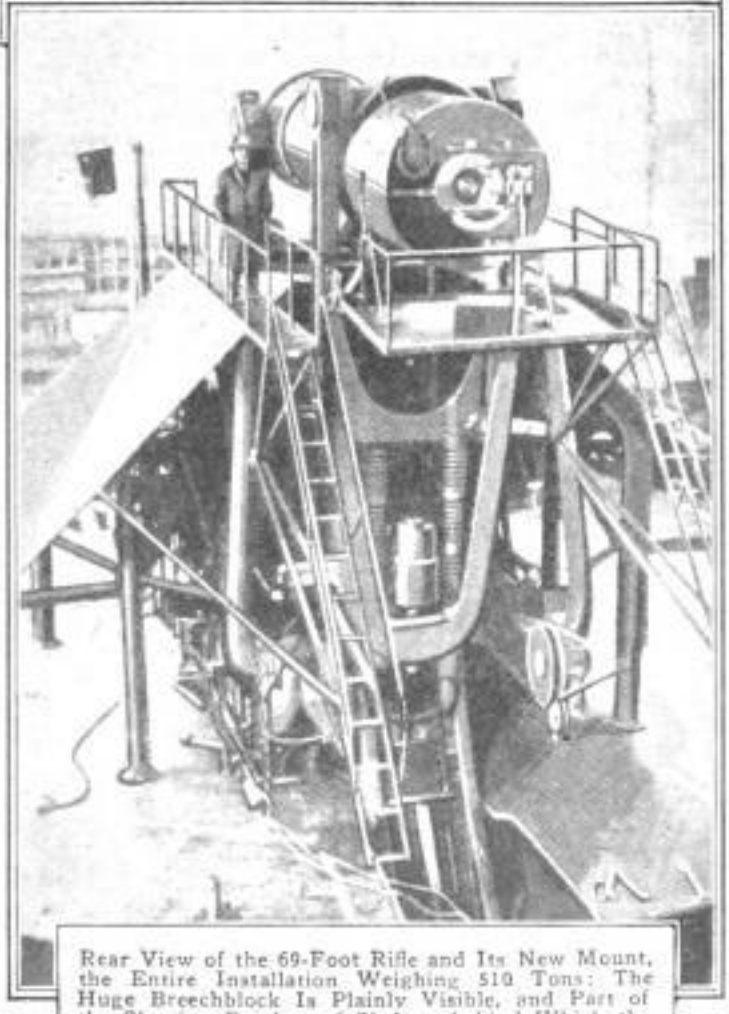
SIXTEEN-INCH DISAPPEARING GUN IS COMPLETED



The New 16-Inch United States Coast-Defense Gun, the Construction of Which was Described in This Magazine Last November, has Now been Mounted on Its Disappearing Carriage, Which is Provided with a Novel Bombproof Shelter of Armor Plate, Arranged at an Angle. Mechanical Tests for Retraction, Traverse, and Tripping Were Entirely Successful



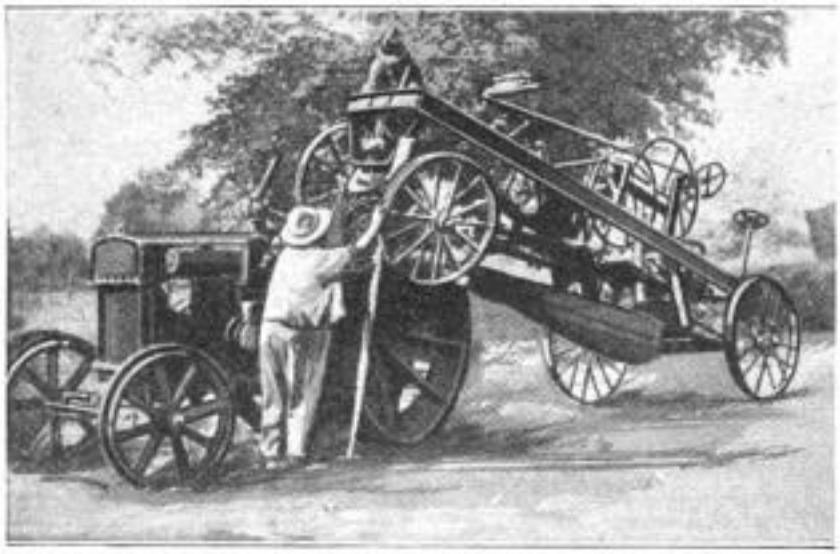
A 2,700-Pound, 16-Inch Shell for the Monster Gun, Which can be Fired Once a Minute, and will Have a Range Variously Estimated Up to as High as 35 Miles



Rear View of the 69-Foot Rifle and Its New Mount, the Entire Installation Weighing 510 Tons: The Huge Breechblock Is Plainly Visible, and Part of the Slanting Bombproof Shelter, behind Which the Gun Disappears in Its Recoil

ROAD GRADER UNCOUPLES FROM TRACTOR WITH ODD RESULT

While a road grader was being hauled along a country road by a tractor it became uncoupled and, running up onto the tractor, its left-front wheel was caught by one of the traction cleats on the tractor's left-rear wheel. This resulted in the lifting of the front end of the grader to a position on top of the tractor. The driver was unaware of his danger until he saw the grader towering over him. Making a quick stop, he escaped injury to himself and avoided damage to the machines. However, they were so badly entangled that the services of a derrick were required to get the grader down and straighten the snarl out.



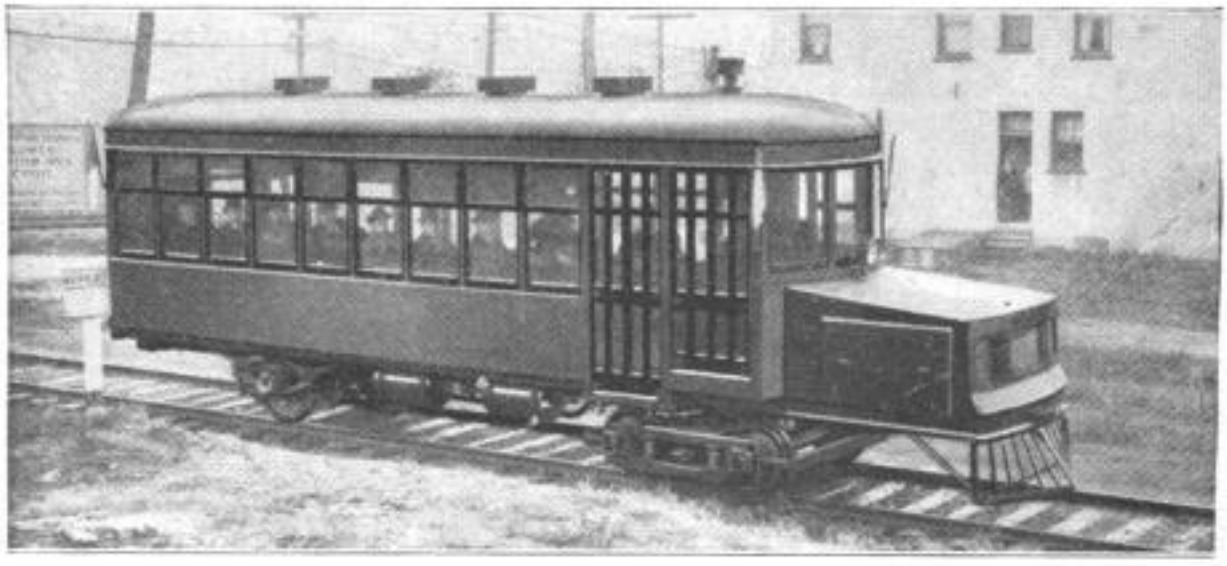
A Road Grader, becoming Uncoupled from Its Tractor, Entangled Itself with One of the Tractor's Cleated Wheels and was Hoisted into the Position Shown

AIRPLANE FLOATED ON SEA TO TEST BUOYANCY

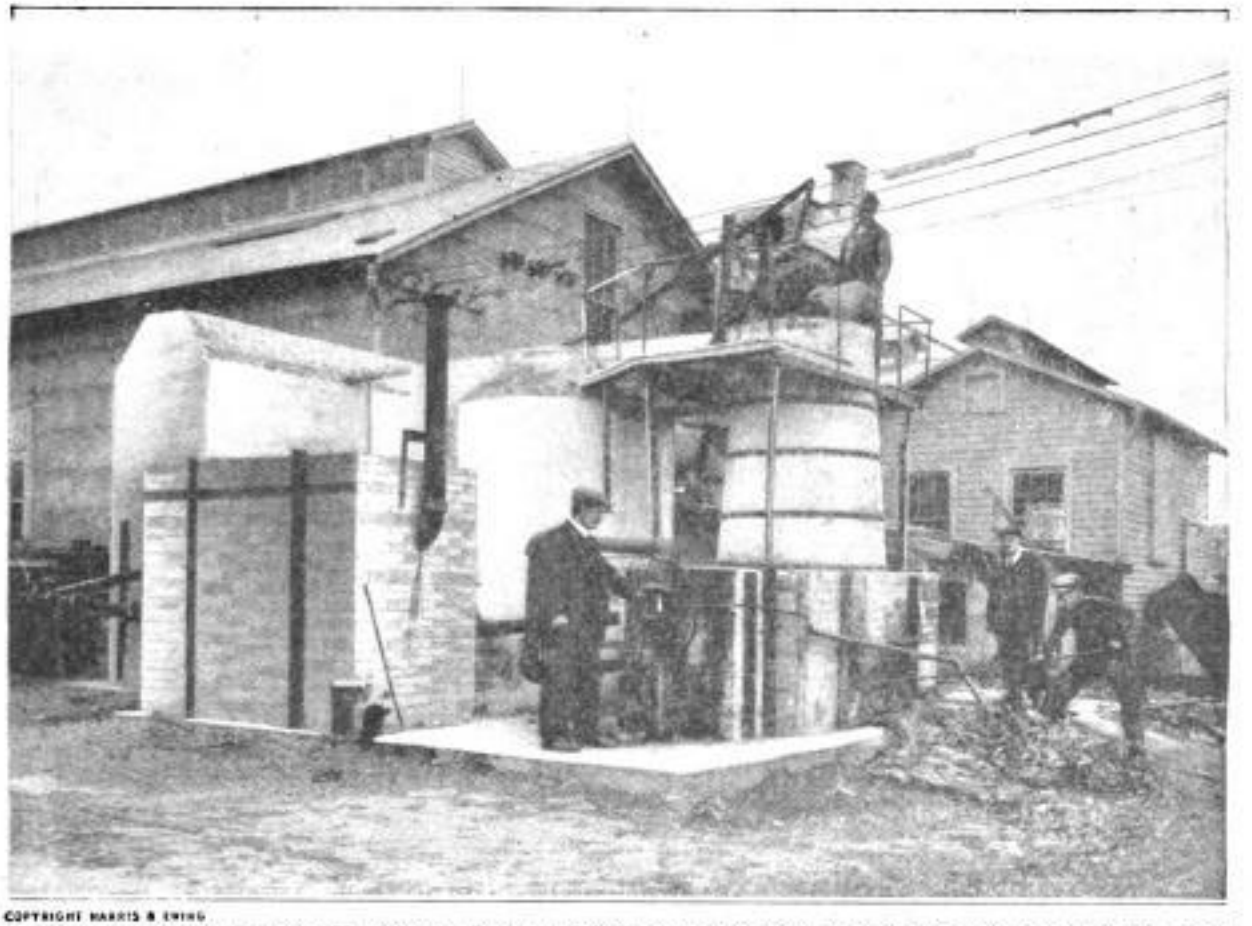
Airmen of the Hawaiian Islands, constantly facing the possibility of an involuntary landing in the sea, recently decided to determine once for all the floating power of a standard DH-4 airplane. A machine properly charged with gasoline and water was loaded with two sandbag "passengers" and towed into the bay. At the end of 45 minutes only half the fuselage, the tail surfaces, and part of the upper wing remained visible. After 2½ hours it had sunk little farther, however, and the rudder and half the stabilizer were out of water. When the plane drifted aground in four hours, its rudder still showed, indicating a considerable degree of buoyancy.

GASOLINE INTERURBAN CAR HAS HOOD LIKE AUTO

Mechanical arrangement similar in many respects to that of an automobile is the distinguishing feature of a new form of gasoline-driven interurban car now making demonstration runs in St. Louis. Though the body, seating 35 passengers, is like that of a standard modern street car, there is a long hood extending in



The New Gasoline-Driven Street Car Has Its 50-Horsepower Engine in a Hood, like an Auto, and the Shifting Gears and Shaft Drive Also Are Similar. It Operates Economically with 35 Passengers



The New Crude-Oil Furnace Used in the Bureau of Soils for Extracting Phosphoric Acid from Native Phosphate Rock: The Briquettes of Rock in the Shaft are Heated by Two Water-Cooled Oil Burners

front, in which the 50-hp. engine is mounted. An auto-type gear shift is provided, and a shaft transmits the power to the rear wheels. Air brakes, electric lights, and a hot-water heating plant are other details of the equipment. The car makes a round trip of 40 miles in a little more than 2½ hours, consuming about 5½ gal. of gasoline, or seven miles to the gallon. With a crew of two, the cost per mile is only about 9½ cents, and the car can, of course, run on any standard track.

CRUDE-OIL FURNACE EXTRACTS ACID FROM PHOSPHATE ROCK

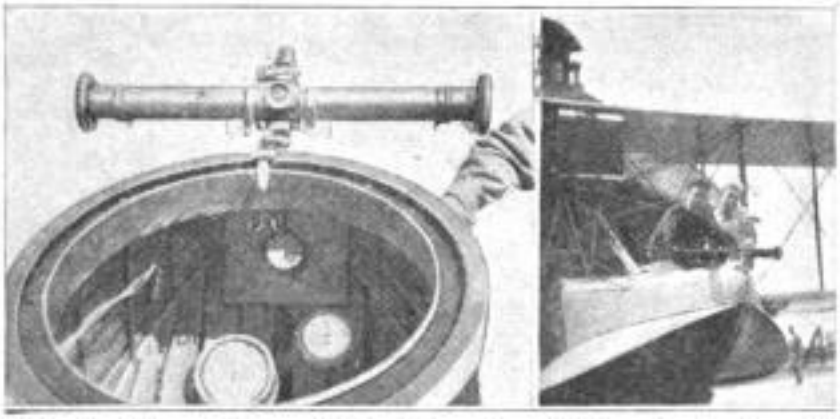
Extraction of phosphoric acid from phosphate rock by the heat of a crude-oil furnace, designed by the Bureau of Soils, promises to supply highly concentrated fertilizer at two-thirds the cost of the usual sulphuric process. The rock, briquetted with coke and sand, is charged into a vertical furnace shaft above a long hearth, over which play the flames from two oil burners, water-cooled to prevent melting in the heat of 2,800° F., or more. The acid escapes from the mass in fumes, which are easily condensed to liquid or solid form, or may be combined with ammonia gas to form solid ammonium phosphate. In either case, the maximum yield of the rock is obtained, and by mixing the acid with raw phosphate rock, a 50-per-cent fertilizer is made, as compared with the usual 16-per-cent commodity, effecting a corresponding saving in transportation.

BUNGALOW, LAWN, AND GARDEN ON PIANO-FACTORY ROOF

All the components of an attractive suburban home, including an English bungalow, a lawn, trees, flowers, gravel walks, and hedges, are to be properly combined in a curious installation on the roof of a large piano factory now being built in Ohio. The bungalow will contain a huge living room with a fireplace, an inclosed dining porch, a kitchen, and bath and shower equipment, and is to be used as a meeting place for the officers and directors of the company. It and the garden surrounding it will be solidly supported by I-beams resting on columns of reinforced concrete that extend down through the factory building to the ground, so that the roof itself bears none of the extra load.

MEASURING ALTITUDES WITH A RANGE FINDER

More exact methods by which fliers may determine their height from the earth are being sought by aerial engineers. The present method depends upon a variation in pressure between the air at ground level and at the various heights. This method can never be exactly accurate, as the pressure is never perfectly constant at any level. The Bureau of Standards has attacked the problem and recently sent an extemporized apparatus, consisting of a range finder, aloft with an observer. The results were satisfactory over land, but not all that was desired over water, due to the difficulty of finding stable objects between which to draw base lines. However, it was found that the range finder served as a very valuable means of checking and verifying the altimeter indications.

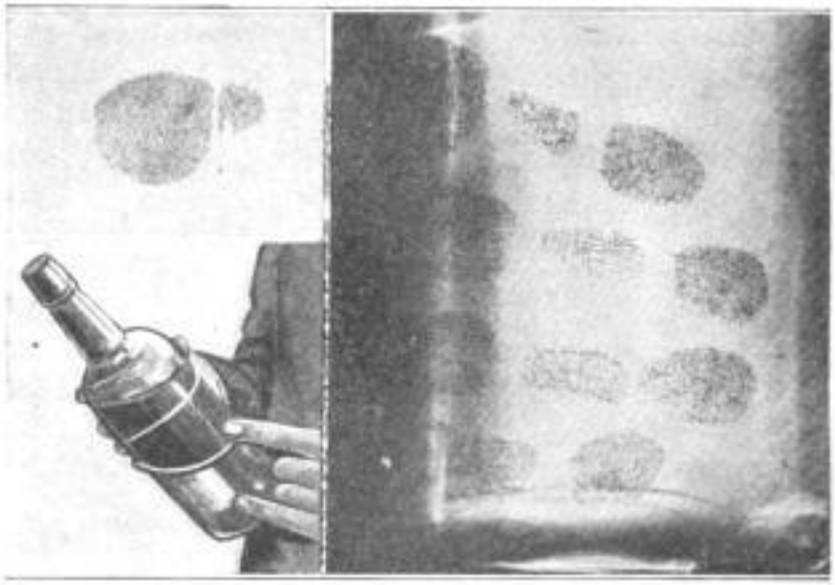


A Standard Type of Range Finder Mounted on the Bow of a Seaplane: It was Found That Altitude could be More Accurately Determined with the Aid of This Instrument

PHOTOGRAPH FINGER PRINTS WITHOUT CAMERA

An important contribution to the standard methods employed in securing finger prints for purposes of identifying criminals has been made by one of the country's oldest and best-known experts in this line, namely, Detective Sergeant Frederick G. Sandberg, of Washington, D. C., who has devised a method of making negatives of finger prints found on transparent objects, without the use of a camera.

While in many cases criminals leave prints on objects that are not transparent, and to photograph these a camera is required, yet the proportion of prints which can now be copied without the introduction of a camera is surprisingly large and to a corresponding amount simplifies the work of the detective securing this form of evidence. The Washington expert's method is to dust the finger prints found on transparent objects such as bottles, paper weights, window glass, table glassware, bookcase doors, etc. For this purpose aluminum dust is used, which if applied by an experienced person brings out sharply all the details of the curving lines in the skin which make a print a sure means of identification. The next step is to lay a process negative (film) over the prints after putting the object in a dark place, or if it is not movable, surrounding it with canvas or other means to protect the film from the light. To make the exposure, a lighted match is held for an instant in such a position that its rays will shine through the transparent object onto the film, where a perfect negative is secured. Sometimes an electric bulb at the



Left, Top: A Thumb Print on a Bottle, Photographed without a Camera. Bottom: The Method of Wrapping a Sensitized Film around the Bottle in a Dark Room, after Which a Burning Match is Dropped into the Bottle. Right: The Complete Record of Finger Prints on the Glass

end of a flexible wire is used to supply the light.

Not only does this improvement in copying finger prints eliminate all measurements and camera adjustments necessary in getting camera-made negatives the exact size of the original, but in many cases only by the new method can a full

Lieutenant C. C. Moselev, Winner of the Pulitzer Trophy, and His Winning Mount, The Verville-Packard Plane: This Plane, Driven by the 600-Horsepower Engine, Shown Above, is Thought to Be Capable of a Speed of Three Miles per Minute

record of the prints of all fingers and thumb be secured on the same negative and at the same time. Thus a whisky bottle, which a criminal has grasped in committing his crime, will leave prints extending two-thirds around the bottle, and to photograph them with a camera necessitates making several negatives. Such a procedure always involves a possible element of error, which, though slight, must be taken into account, since the proper order of the prints might be altered, or one or more of the set become detached from the rest.

ALL-AMERICAN AIRPLANE WINS THE GREAT PULITZER TROPHY

Last Thanksgiving Day marked an important event in American aeronautical history. On that day Lieut. C. C. Moseley, U. S. A., won the Pulitzer trophy race in an all-American plane in the elapsed time of 44 min. 29 57/100 sec., over a course something over 132 miles in length, or at the rate of 178 miles an hour. He expressed regret at not attaining the speed of three miles a minute at which he had aimed, and attributed his failure to faulty carburetion. That the victor won his honors with no time to spare is evident, as the official figures show that Capt. H. E. Hartney, also an army flier, ran a close second, in the time of 47 min. flat, and that Albert Acosta, civilian, won third place in 51 min. 57 sec. Although handicapped by much slower planes, the navy made a creditable showing with two machines in the first ten to finish. Of these, the leader was piloted by Lieut. A. Leverents, in the time of 55 min. 39 sec. Lieutenant Moseley's mount was a Verville-Packard, powered by a 600-hp. 12-cylinder engine of practically the same design as the famous Liberty engine developed during the war.

JAZZ BAND AND SHOW CARRIED AND PLAYED BY ONE MAN

Drums, both bass and snare, a tambourine, cymbals, and an accordion compose an extraordinary "jazz" band as-

The Whole "Jazz" Band, Including the Performing Toys, is Played and Carried by One Blind Musician

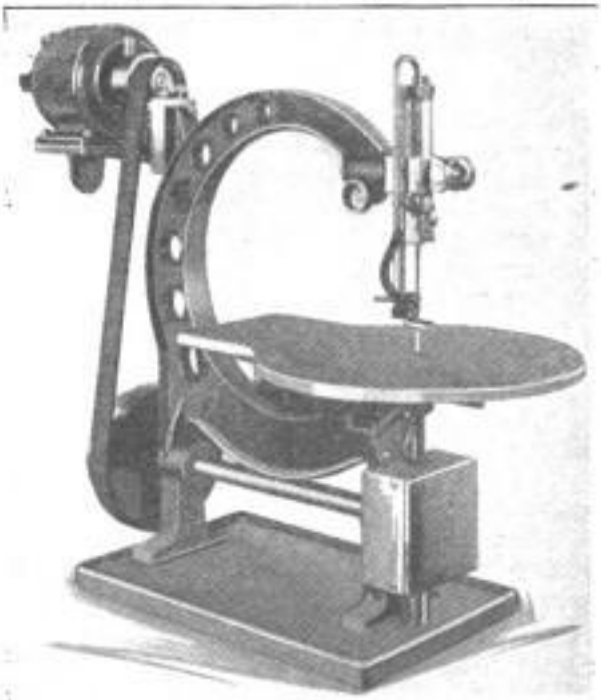
sembled by a blind Parisian musician, who carries the whole combination on his back and plays it unassisted. The snare drum, tambourine, and cymbals, mounted on the bass drum, are played by means of wires from the bandmaster's feet, and a pair of dolls and a tiny merry-go-round perform at the same time. Sticks attached to the player's arms actuate the bass drum, only the accordion requiring the use of his hands. A light two-legged stand supports the band while in use.

NEW FABRICATED STEEL SHIPS ARE MADE BY CASTING

An advance in shipbuilding was recently consummated when the first cast-steel ship was launched. The frames, both longitudinal and transverse, are cast on large steel plates to form the main sections of the hull. These sections, which are tongued and grooved, are later assembled on the slips and electrically forged into one solid unit. The resulting seams are arc-welded. The plates, forming the bilges, are next applied by bending them into the correct shapes and electrically welding them to the main sections. It is claimed that the processes of electric forging and arc-welding make 100-per-cent perfect connections. This is, of course, more than can be claimed for riveted joints. Further claims for the new process are that it effects a saving of 30 per cent in labor costs and 20 per cent in the weight of material. The expectations are that when the supplementary bracing, now required, is dispensed with, the ships will have a load ratio of six tons of dead weight per ton of steel.

PORTABLE JIG SAW FOR BENCH HAS MOTOR ATTACHED

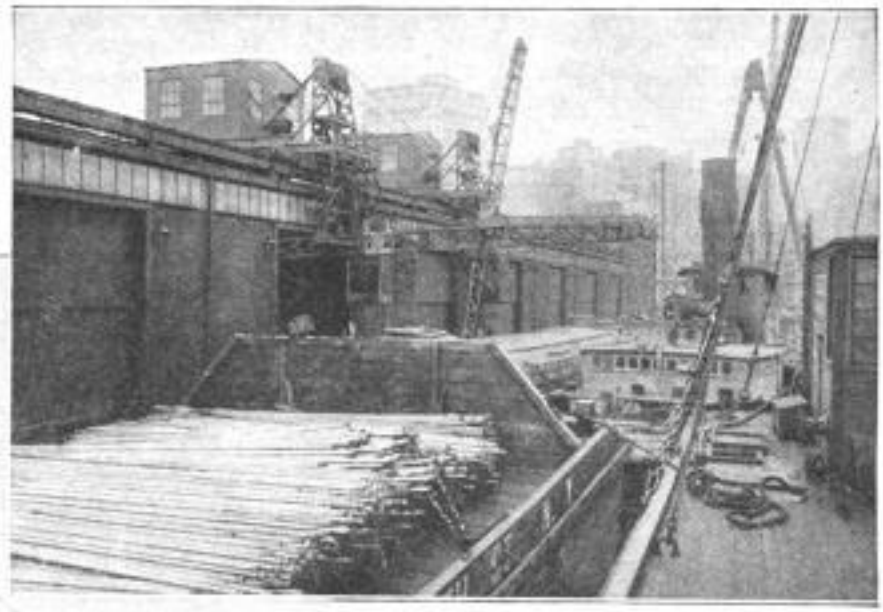
A small bench-type jig saw with all the refinements of a large floor machine, driven by its own motor, and cutting wood stock 3 in. thick up to the center of a 27-in. circle, has been placed on the market by an eastern manufacturer. The tool stands 27 in. high, occupies space 14 by 32 in., and weighs 125 lb. It is belt-driven from a ⅙-hp. electric motor mounted adjustably on the upper frame, with two-step pulleys for speeds of 500 and 800 r.p.m. The table tilts to 45° either way, and the quick-acting chucks hold saws up to ⅛ in. thick and 3/16 to ½ in. wide, with a 3-in. adjustment for length. Metal, fiber, leather, rubber, wallboard, and many other materials, are readily cut.



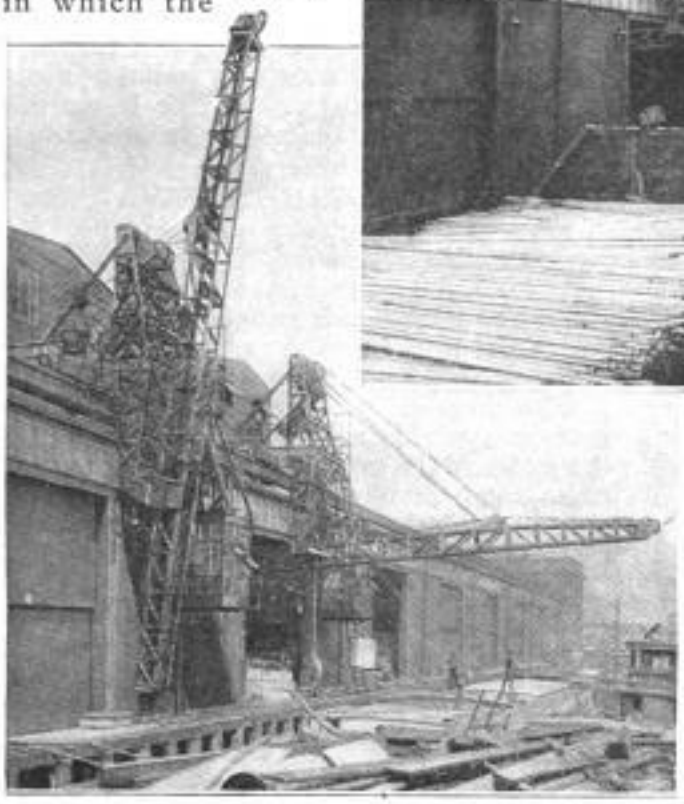
The New Portable Bench-Type Jig Saw, 27 Inches High, Driven by a One-Sixth Horsepower Motor, and Cutting a Variety of Materials

NEW TRAVELING CRANE SHOWS MANY IMPROVEMENTS

An interesting improvement in the construction of traveling-cranes is embodied in a new type recently placed in the service of unloading ships, in which the boom does not swing laterally, but is confined to an up-and-down movement. The fore-and-aft movement of the load is accomplished by a trolley traveling lengthwise of the full length of the boom. This member, being over 42 ft. long, has a reach of over 23 ft. outside the pier edge and 10 ft. inside the storage shed. It is pivoted about 10 ft. from its inboard end in such a way that, when it is lowered to the horizontal position, this end extends that distance into the building. The main track of the apparatus is laid along the roof of the pier shed, thus utilizing this otherwise waste space, and leaving the pier apron clear of impediment. When traveling up or down the length of the pier, the boom is raised to the extreme vertical position, bringing its inboard end outside the shed.



Unloading Canal Barges: The Trolley Travels along the Horizontal Boom, as Seen in the Nearest Crane, and Enters the Door of the Pier Shed with Its Load



The Near Crane is Seen Raised Almost to Its Extreme Vertical Position, in Which It can be Moved Laterally along the Track Laid on the Edge of the Pier-Shed Roof

GATE SERVES AS ADVERTISING SIGN FOR VILLAGE STORE

Attracted by an unusual sign, many motorists stop to patronize a combination drug store and refreshment stand in a small Pacific-coast town. The advertisement is in the form of a gate, hinged near the top of a tall post. Painted on the crosspieces of the former is an invitation quaintly beseeching approaching travelers to "refresh and rest, then travel on," coupled with the statement that "this gate hangs well, and hinders none." The place of business is known as "The Gate," this appropriate name being placed on a board of semicircular contour which surmounts the post.

The Trade of This Store, Which is Located in a Pacific-Coast Village, is Increased by a Novel Swinging-Gate Advertising Sign

NEW REVERSE-READING SCALE WEIGHS SUBSOIL'S HARDNESS

Construction engineers have recently adopted springless scales as a method of determining the compactness, and consequent bearing strength, of the subsoils upon which it is desired to build railway lines. The dial of the scale is marked to give a reversed reading, so that when the bucket is loaded with 30 lb. of shot, the pointer will rest at zero. This figure is chosen as the standard for the reason that, if the subsoil sustains this weight upon a ½-in. diameter area, it will safely bear a weight of approximately 11 tons to the square foot. Directly underneath the scale bucket is another bucket mounted on the top end of a vertical rod, the bottom end of which is exactly ½ in. in diameter. The shot is allowed to drop into the lower bucket through a hole in the upper one. The penetration of the lower end of the rod into the soil for any given weight gives a correct indication of the soil's compactness. The scale shows how much weight the rod is sustaining.

The Reverse Reading of the Subsoil Compactness Scale Shows That 18 Pounds of Shot have Passed from the Scale Bucket into the Lower One. The Small Dials Show the Penetration of the Vertical Rod into the Soil

SUPERVISE DRINKING WATER OF RAILWAYS AND BOATS

A comprehensive system of inspection of all drinking water supplied on railway trains and passenger boats, and its sources, is being undertaken by the U. S. Public Health Service. The work already has been organized in about half the states, the country being divided into nine districts, each in charge of a sanitary engineer. Regulations are to be prepared covering the methods of water supply.

TYPHOON SUBMERGES TRACTORS AWAITING DEMONSTRATION

Tractor dealers in the Philippine Islands appear to have some tribulations not commonly known elsewhere. A short time ago a big demonstration was arranged near Manila, and the machines were left in the field the first night, ready for the second day's work. That evening a typhoon of unusual violence raged across the land, and by daylight the partly plowed field lay under from 4 to 10 ft. of water. As the flood receded, and parts of

The Demonstration Tractors Gradually Emerging from the Flood That Caught Them Overnight in a Partly Plowed Field: After the Magnetos had been Dried, the Machines Returned to Town Unharmed

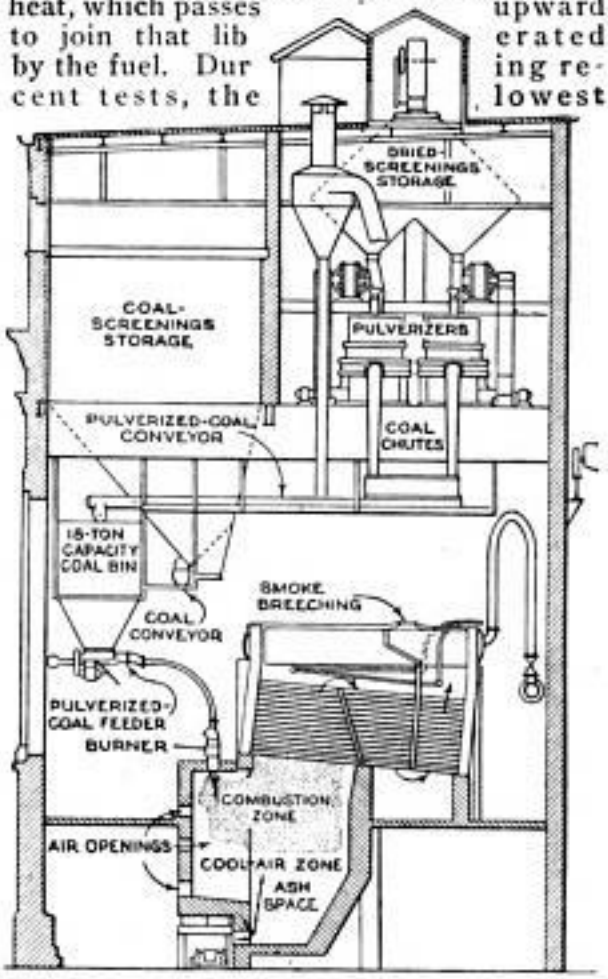
tractors gradually became visible, the mechanics removed, carefully dried, and replaced the magnetos in the machines, which then abandoned the now impossible field of mud, and journeyed back to headquarters.

NEW METHOD DOUBLES SPEED OF ELECTROPLATING

More than 100-per-cent increase in the output of electroplating vats is gained by the recent discovery of an English metallurgist. The method of applying the new process, as used at Sheffield in silverplating, is merely to add potassium carbonate to the plating bath, instead of neutralizing that already present by introducing barium cyanide, as is ordinarily the practice. This enables a much stronger current to be used, with a corresponding increase in the rapidity of deposit, without resulting in the rough, crystalline form of surface that commonly attends rapid plating with a high current, and which cannot be polished. The principle of the discovery is therefore somewhat paradoxical, in the light of previous knowledge of the art, in that quantities of free cyanide and potassium carbonate that would usually be considered disastrous are found to be actually beneficial. The silver deposit obtained the new way is declared to equal, if not surpass, in quality any accomplished by the old method.

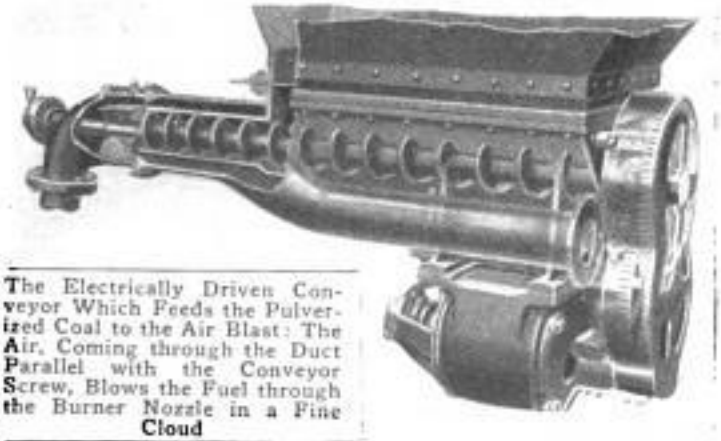
LOW-GRADE COALS SHOW HIGH EFFICIENCY WHEN PULVERIZED

Some surprising and gratifying results have been attained in the burning of low-grade coals by means of a recently developed pulverizing and combustion system. The coal is first ground until it is fine enough to pass through a screen of a fineness of 100 meshes to the inch. It is then conveyed to the burner, which is simply a nozzle, and blown into the combustion space, under the boiler, by means of an air blast, entering in the form of a cloud of fine dust. No grate is used, as the fuel burns completely and with intense heat while suspended in the air. In the earlier models of pulverized-coal burners considerable difficulty was experienced on account of the ashes fusing to form slag. This has been overcome in the new type by arranging the combustion chamber with a cool-air space below the fire zone through which the ashes must pass before reaching the ash pit. Here they part with most of their heat, which passes upward to join that lib erated by the fuel. Dur ing re- cent tests, the lowest



Arrangement of Pulverized-Coal Burning Apparatus in a Boiler House: The Feeder Is a Worm Conveyor with a Supplementary Air Blast

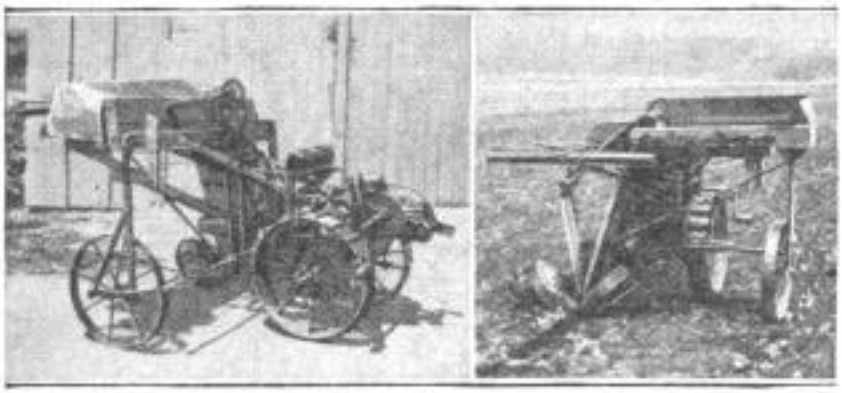
grades of fuel developed efficiencies of 79.62 per cent and over, and first-class fuels showed a better efficiency than that attained with oils. The new process opens the field to the heretofore worthless Korean and other low-grade graphitic fuels, of which there is an abundance.



The Electrically Driven Conveyor Which Feeds the Pulverized Coal to the Air Blast: The Air, Coming through the Duct Parallel with the Conveyor Screw, Blows the Fuel through the Burner Nozzle in a Fine Cloud

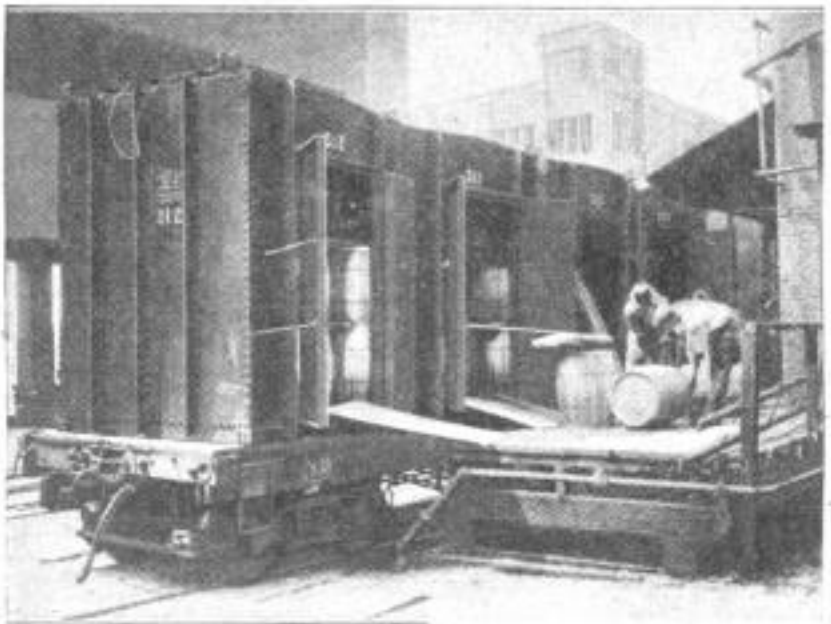
CELERY-PLANTING MACHINE IS SELF-PROPELLING

By the ingenious application of a discarded two-cylinder opposed motorcycle engine, a New York farmer has devised a celery-transplanting machine that automatically sets the plants as close as 5 in. apart in 8-in. rows, while propelling itself. The motor, hung between the front wheels, transmits its power to them through friction and worm gearing, and also operates two endless belts. While one man guides the machine, two others at the back place the small plants on marks on one of the belts, as it crosses a feed table. The other belt holds them in position, roots forward, until they enter a furrow made by a small plow on the machine, and two following disks then turn the earth back around the roots. The odd implement has proved very successful.



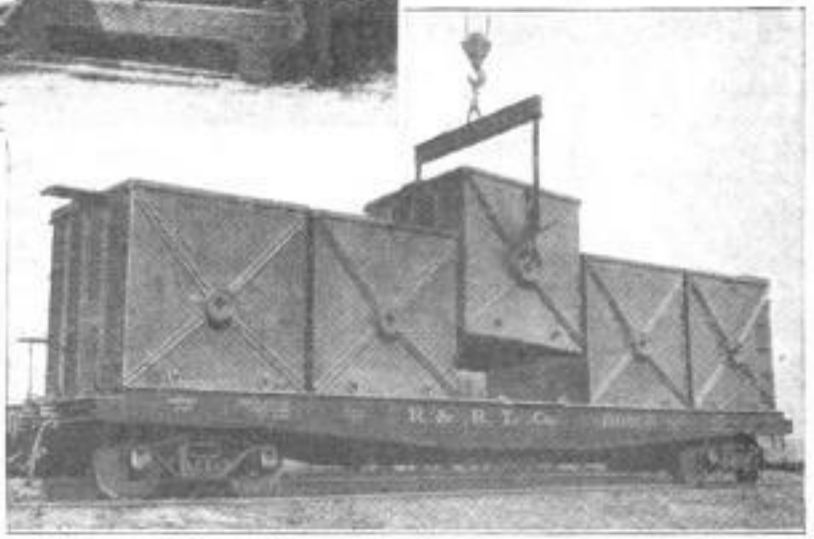
Left: Front and Side Views of the Motor-Driven Celery-Planting Machine, Which Utilizes an Old Two-Cylinder Motorcycle Engine, Hung between the Front Wheels. Right: Rear View, Showing the Feed Table for the Plants, and the Disks That Turn the Soil around the Roots

MULTIPLE-UNIT CARS TO RELIEVE FREIGHT JAM

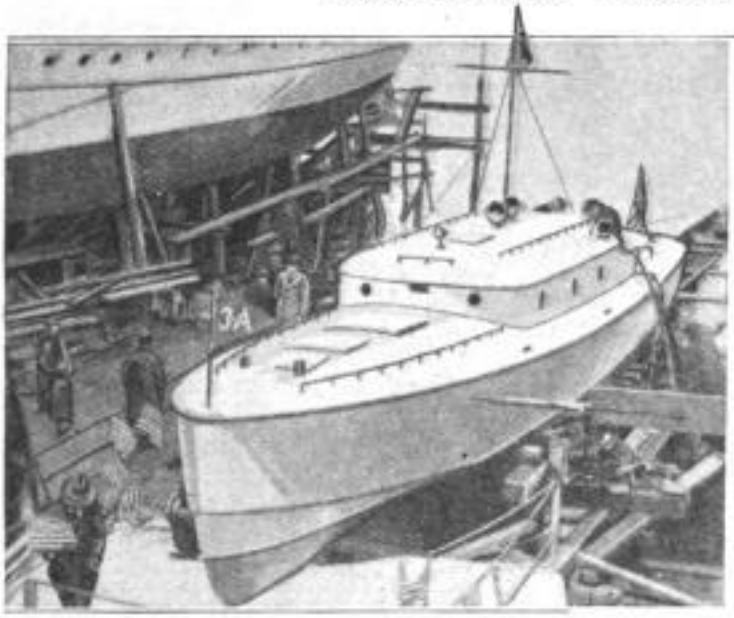


Unit Containers for Freight Handling with a Side Door for Loading by Hand Trucks

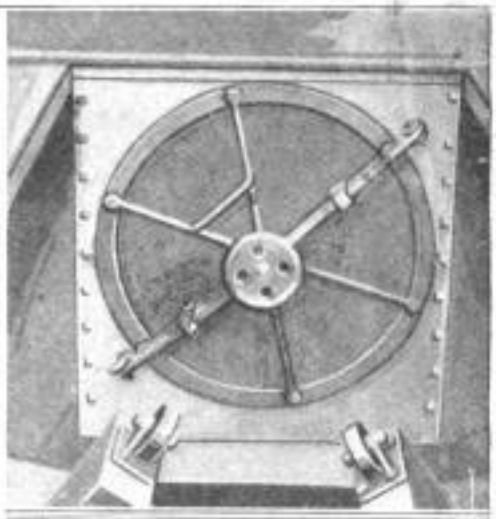
A multiple-unit system of freight handling, which has proved most successful in South Africa and in our own southern and central-western states, is expected to go far toward relieving the congestion at railway terminals and transfer points, and eliminating the evil of the idle car, which now stands for days upon a siding waiting its turn to be "spotted" and unloaded. The new system contemplates the disuse of the box car and the substitution of standard flat cars of 50 tons' capacity. The freight-containing units are constructed of steel plate and in two capacities, 2½ and 10-ton, so designed that 20 of the former or five of the latter will exactly fit the standard flat car. To facilitate the handling of various kinds of materials and



Five of the 10-Ton Units Make a Load for a Standard Flat Car. Those Illustrated are Designed for Quick Dumping of Grain, Sand, or Gravel



The First of the New U. S. Navy Auxiliaries, Designated as "Type A-3 Sea Hornets": During Peace Times These Boats will be Carried on the Decks of the Battleships and will be Used as Service Launches



Breech of the 21-Inch Torpedo Tube with Which the Sea Hornets are Equipped. The Armament Consists of Three Torpedoes, a Number of Depth Bombs, and the Dropping Mechanism

The 600-Horsepower Engines of the Little Sea Fighters Are Capable of Driving Them at Speeds Which should Prove Most Discouraging to Hostile Submarine Boats

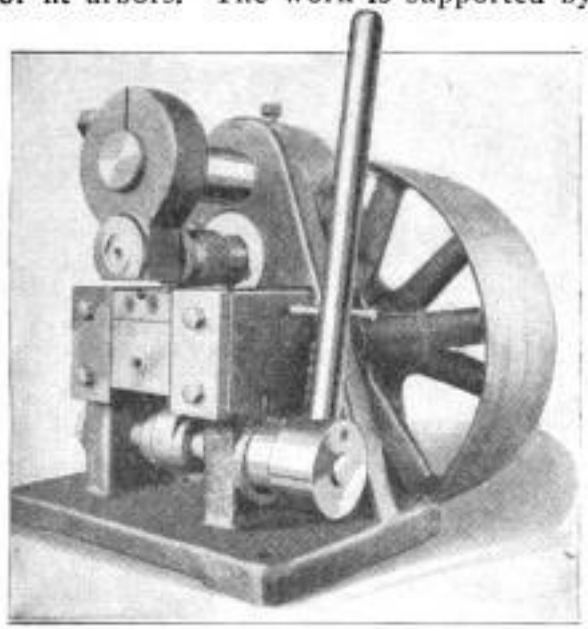
packages, grain, liquids, barrels, boxes, etc., the containers are equipped with side and top-opening doors, and with drop bottoms and fittings to permit quick dumping. In service, the units are packed, locked, and sealed by the shipper, or the transportation company, then loaded on the flat car by means of a derrick, and securely clamped in place. Arrived at the destination, the units are unloaded from the car and the latter immediately released for further service.

NEW U. S. NAVY SEA HORNETS ARE SUBMARINE CHASERS

The first of the new naval auxiliary craft, officially designated as "Type A-3 Sea Hornets," was lately launched at an eastern shipyard. These boats were designed during the war and, like many other engines of warfare, their construction was kept secret. Their utility is not confined to purposes of destruction only, as during peace times they will be carried on the decks of the battleships and perform the duties of service launches. The displacement has been so calculated that the craft may be sunk so deeply that only a foot of the hull is above the water, thus presenting a most difficult target. Another feature is the hinged bow, which may be lowered to uncover a 21-in. torpedo tube. The name "Hornet" is well chosen, as the fighting equipment consists of three 21-in. torpedoes, each loaded with 600 lb. of high explosive, and a further armament of depth bombs. Powered by 600-hp. engines, the 58-ft. boats are capable of high speed, and when hunting in swarms, will constitute a greater menace to hostile submarines than did their prototypes, the original sub-chasers. The "mosquito fleet" becomes the "hornet swarm."

CYLINDRICAL PARTS KNURLED WITHOUT USING AN ARBOR

A new bench machine knurls cylindrical and other round pieces in which it is impossible or inadvisable to drill center holes or fit arbors. The work is supported by



In a Bench Knurling Machine the Work is Pressed against the Tool by Two Rollers Which are Raised by a Lever-Operated Cam

two smooth hardened-steel rollers, which may be raised and lowered by a hand lever and cam action. The knurling-tool arbor is driven by an inbuilt reduction gearing placed on the pulley side of the machine. Upon raising the rollers carrying the work, it is brought into contact with the knurling tool, which, simultaneously, marks and turns it. Knurled rollers may be substituted for the plain ones when it is desired to knurl the work for its full length. This is, in effect, the simultaneous application of three tools, and, of course, results in saving time.

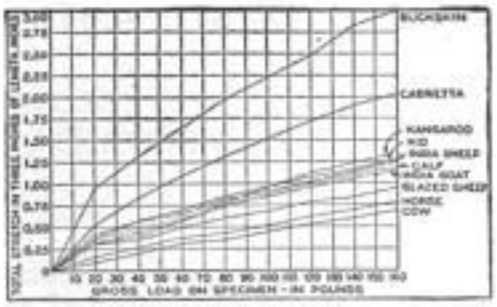
GREEN ORANGES MADE YELLOW BY ENGINE-EXHAUST GASES

Ripe oranges are commonly expected to show a yellow skin, but the variety known as "Satsuma" has the peculiar characteristic of remaining green outside during its most delicious stage, and turning yellow several weeks too late, thus hampering its marketability. Government experimenters now have discovered, however, that exposure to the fumes from imperfect combustion of petroleum will ripen the skins in three to five days, putting the appearance of the fruit on a par with its interior. The exhaust gases from a stationary gasoline engine are found to be quite efficacious in this work of artificial coloration, and the oranges so treated rapidly assume the tints of complete ripeness.

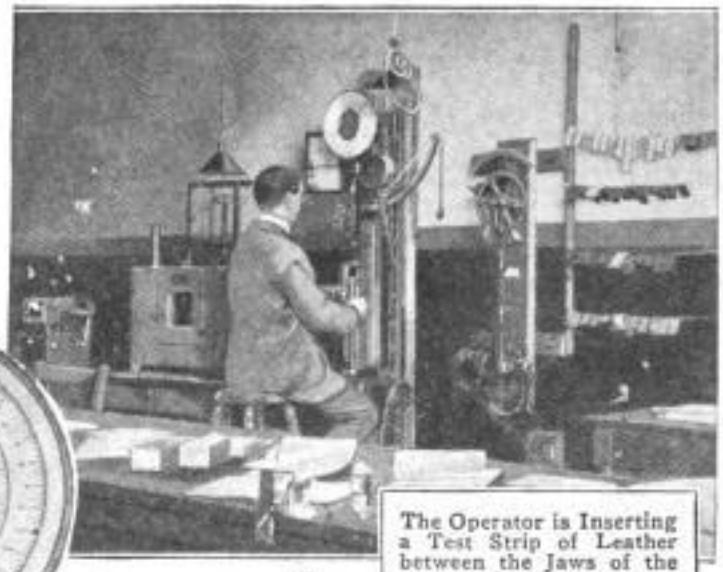
VERSATILE DUMP-TRUCK BODY HAS MANY NOVEL FEATURES

The highway commissioners of an eastern state recently designed and adopted a uniform type of dump body to be installed on all motor trucks used in road maintenance. The body may be used as a simple platform for boxes, barrels, etc., or the side sections may be quickly assembled, converting it into the box type. By removing one or more of the side sections, sand or gravel may be dumped on either side and in as large or small piles as may be desired. Two independent doors, in the end gate, and an adjustable chute permit material to be dumped in a pile the full width of the body or in narrower piles, in the center or to the right or left side of the road. A hydraulic hoist tilts the body from front to back or to either side, making it rear or side-dumping. The available load space is 12 ft. in length and 6 ft. in width.

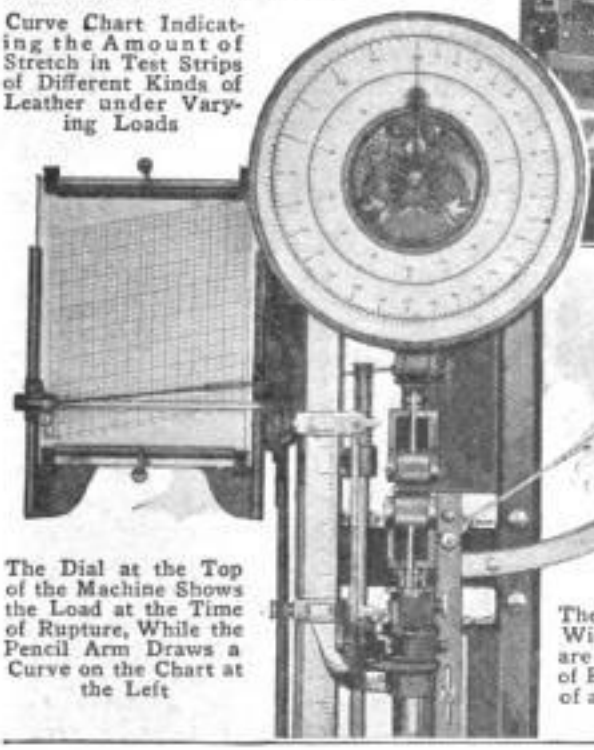
Above: The Multi-Purpose Truck Body with One of the Side Panels Removed. Right: Arrangement of the End-Gate Chute through Which the Load of Sand, Gravel, or Other Loose Material is Dumped at the Roadside, Out of the Beaten Track



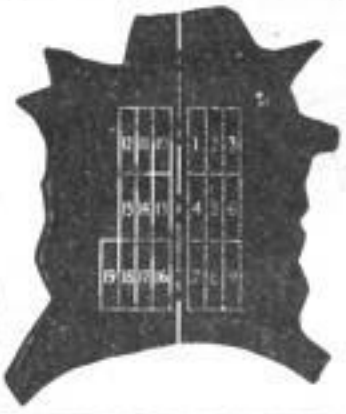
Curve Chart Indicating the Amount of Stretch in Test Strips of Different Kinds of Leather under Varying Loads



The Operator is Inserting a Test Strip of Leather between the Jaws of the Machine



The Dial at the Top of the Machine Shows the Load at the Time of Rupture, While the Pencil Arm Draws a Curve on the Chart at the Left



The Test Strips, 1½ Inches Wide and Six Inches Long, are Cut from the Same Part of Each Hide, on Both Sides of a Restricted Center Strip

STRETCH AND STRENGTH TESTS OF SHOE LEATHER

By R. FRANKLIN MUNDORFF

STRENGTH is one of the important qualities in shoe leathers. If the leather used for uppers is brittle rather than tough, it cracks where the shoe bends, just back of the toe cap, and at the seams, where the strain is greatest, the pieces will tear apart; and then, too, shoes of tough leather will stand more resoling. For comfort, shoe leather should be flexible and should stretch to some extent, but not too much. Excessive stretch weakens the construction of a shoe and shortens its life. It will also destroy the trim lines which add much to the appearance of footwear. Therefore there must be a medium, a degree of stretch just enough for comfort but not enough to harm the shoe.

These general principles have, of course, been long and well known, but until the recent scientific tests, undertaken at the Massachusetts Institute of Technology, with specially designed apparatus, there has never been any method of accurately measuring the relative values of a large variety of leathers.

For the purpose of testing, strips, 1½ in. wide and 6 in. long, are cut from leathers, taken from the same part of the animals; kangaroo, kid, glazed-horse, India-goat, calf, glazed-sheep, cabretta, cow-side, India-sheep, and buckskin leathers being tested. After all the strips have been brought to a uniform temperature and condition as regards moisture absorption, and measured for thickness by means of a micrometer, reading to .0001 in., each strip is clamped between the upper and lower jaws of the testing machine. The jaws are slowly drawn apart, stretching the leather until the breaking point is reached; a dial and pointer at the top of the machine registering, in pounds, the tension applied to the strip at the moment of rupture.

Twelve tests were made with each kind of leather and the average calculated. Taking the strength of kid as 100, the strengths of the other leathers, thickness for thickness, were found to be: kangaroo, 117; glazed horse, 98; India goat, 87; calf, 86; glazed sheep, 85; ca-

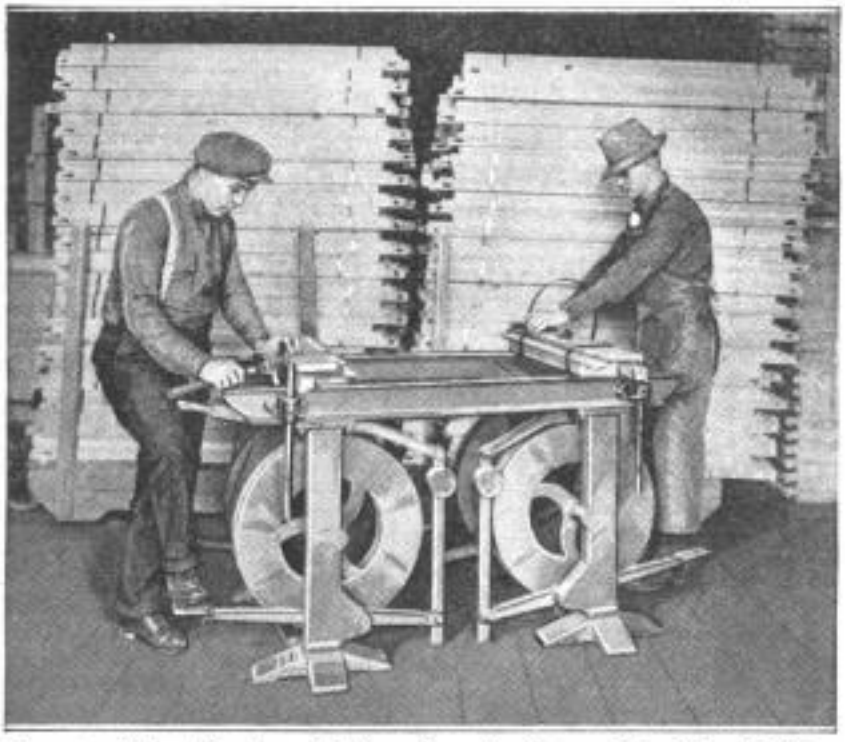
bretta, 75; cow side, 72; India sheep, 69, and buckskin, 32.

Attached to the machine which measures the tensile strength is a device for automatically recording the stretch of the material while under load. As the jaws are drawn apart, a sliding pen marks on diagram paper the amount of stretch for any given tension applied. Thus, for instance, at 100-lb. tension the stretch in 3 in. of cabretta was just 1½ in., or 50 per cent. Cow hide, and glazed horse, at 160-lb. tension, showed little elasticity, stretching only 25 per cent. On the other hand, buckskin was found to stretch as much as 100 per cent.

The results confirm the opinion that side leather is too rigid to be very comfortable; that cabretta stretches so much that it quickly loses its shape, and that, though kid is much more comfortable, it stretches but very little more than calf and the other leathers whose test behavior places them in the medium group.

MACHINE USES IRON STRAPS TO TIE LUMBER BUNDLES

Tying up bundles of lumber, such as parts of door and window frames, is made a rapid mechanical operation by the invention of a Washington mill worker. The lumber to be tied is laid across two table-high parallel bars, each end of this frame constituting a complete machine, and enabling two operators to work at the same time. The strap iron for tying is carried on four large reels below, one for each end of each bundle. The end of the strap is brought around the lumber, clamped with a small steel angle, pulled tight with a foot lever, and fastened with a ¾-in. nail. A blow of the hammer then cuts the strap against the edge of the angle, leaving the free end ready to be pulled around another bundle.



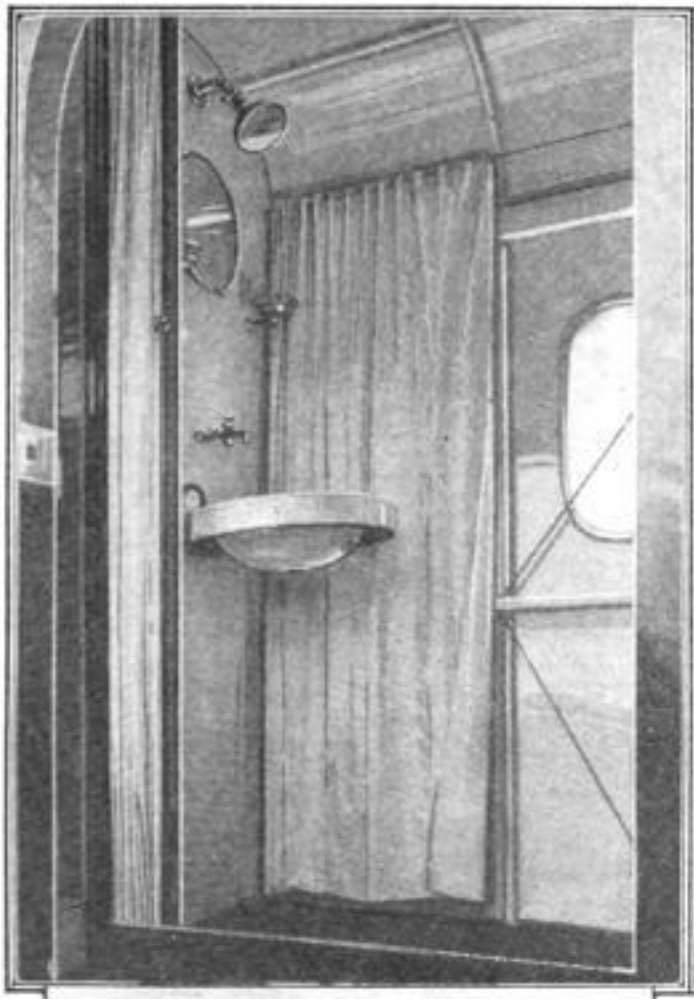
Operators Tying Bundles with Strap Iron, by Means of the New Machine: The Strap is Cut by a Hammer Blow against the Edge of the Small Angle

AMERICAN TRIPOLI MINES USE INTERESTING PROCESSES

Improvements recently completed in the equipment of mines and mills for the production of tripoli, on the Missouri-Oklahoma line, reveal many interesting processes used in preparing this useful mineral. Occurring as a light, soft, porous, siliceous rock, generally white, but sometimes colored cream or pink by iron, it is used as a scouring and polishing powder, a parting sand for iron molds, and a filler for paint and rubber. The solid material, mined separately, is made into water filters. The deposit, stripped of its top dirt, is quarried with powder, trucked to the mills, dumped into steam-heated concrete bins, dried, and crushed. The abundant dust is drawn off by fans, and collected in "cyclone" tanks and cloth bags. In another process, the tripoli is ground with water, and dried in concrete settling tanks. For filter making, the expansion of slaking lime in the drill holes is used instead of powder for cracking off the large blocks of soft stone. These are first sawed roughly to shape, and then turned by machine.

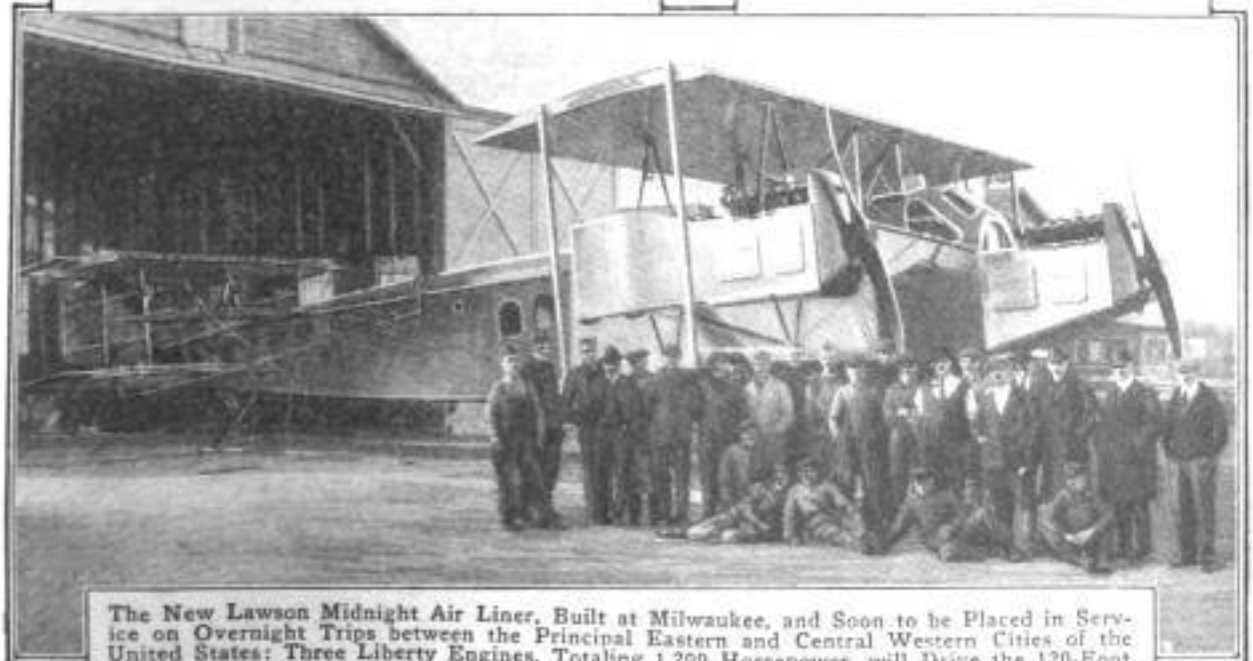
¶ Once each year the Harvard Lampoon—the oldest humorous journal in this country—selects some other publication for a burlesque number. Last year Popular Mechanics was so honored, and after running through three editions, the supply was still many thousands of copies behind the demand.

BIG AIR LINER TO MAKE 1,000-MILE NIGHT FLIGHTS



Considering the Limited Space, the Toilet Facilities Provided Are Remarkable. They Are More Complete, in Some Particulars Than Those of a Railway Sleeping Coach, as They Include a Shower Bath. Hot and Cold Running Water Is on Tap in the Shower and at the Stationary Washbowl

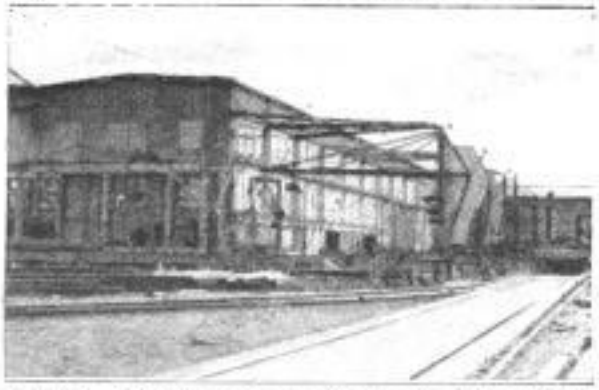
Thought has been Given to the Comfort of Passengers as Well as to Efficiency. Hammock Berths are Provided, and If One Is a Sound Sleeper, He may Enjoy the Usual Eight Hours of Slumber While Making the High-Level Trip from Chicago to New York



The New Lawson Midnight Air Liner, Built at Milwaukee, and Soon to be Placed in Service on Overnight Trips between the Principal Eastern and Central Western Cities of the United States: Three Liberty Engines, Totaling 1,200 Horsepower, will Drive the 120-Foot Ship at a Rate of 120 Miles an Hour. Any One of the Engines Alone will Sustain a Speed of 80 Miles an Hour

WINDSHIELDS ON CRANES LOOK LIKE JIB SAILS

In a west-coast shipyard, the hoisting cranes are equipped with roughly triangular windshields which, at a distance,



Sail-Like Extensions on the Cranes Are Windshields for the Protection of Workmen

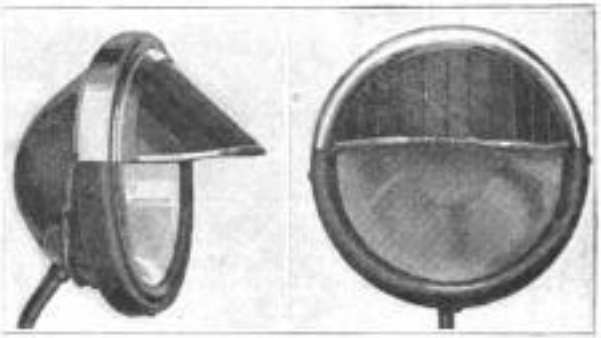
resemble the jib sails of a yacht. The cranes handle a considerable quantity of red-hot metal, and the shields provided are to protect workmen from flying sparks as well as from strong winds which might cause accidents.

HOMELESS FRENCH SHELTERED BY BUNGALOWS ON WHEELS

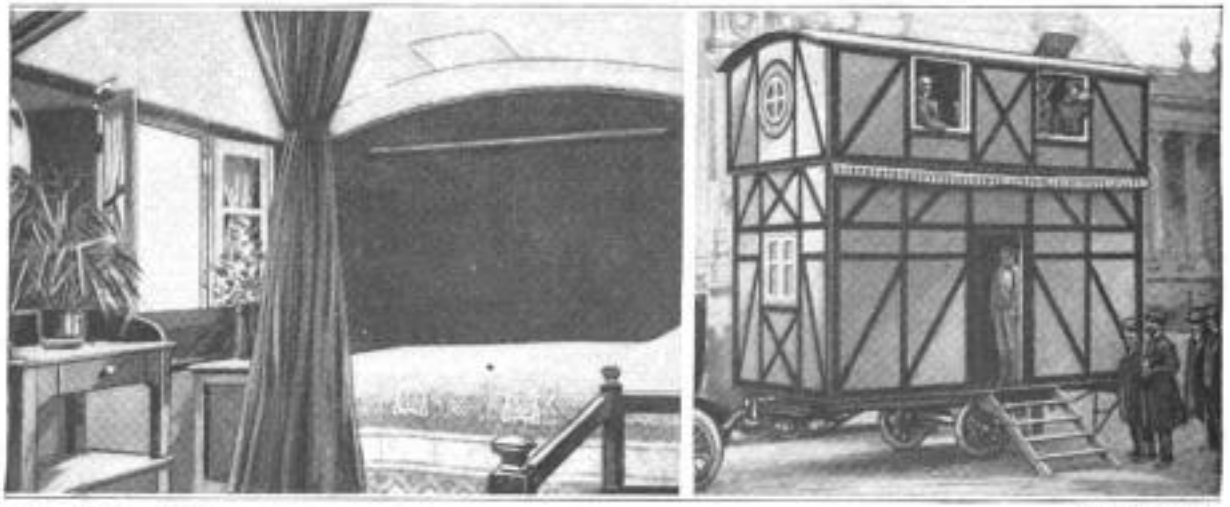
As an attempt to solve the housing-shortage problem in his country, a French engineer is building complete two-story bungalows light enough to mount on two-wheeled trailers for quick transportation to any point desired. The structures contain four rooms, bedroom, kitchen, etc., and heating plant. Access to the second floor is by way of a central staircase. The total height of the building is 15 ft., but as this would make it top-heavy and awkward to haul over the roads, telescoping walls permit the top story to be lowered until the height is only 9½ ft. The other dimensions are, width, 8 ft., and length, about 12 ft. The complete outfit is quite inexpensive, selling for about $835. Those now under construction have been ordered by the French government and will be used to house destitute families in the war-desolated sections. It is within the bounds of possibility that these compact houses may become popular with motor tourists.

VISOR FOR AUTO HEADLIGHTS STOPS THE GLARE

The glaring of automobile headlights is said to be eliminated by a visor-shaped device designed to be attached to the top of the lamp in such a way that it covers most of the top half of the lens. The fitment is made up of strips of cathedral glass, set in a sheet-metal frame, which is curved to correspond to the contour of the lamp rim. A steel spring holds the device in place and permits it to be turned to any angle desired.

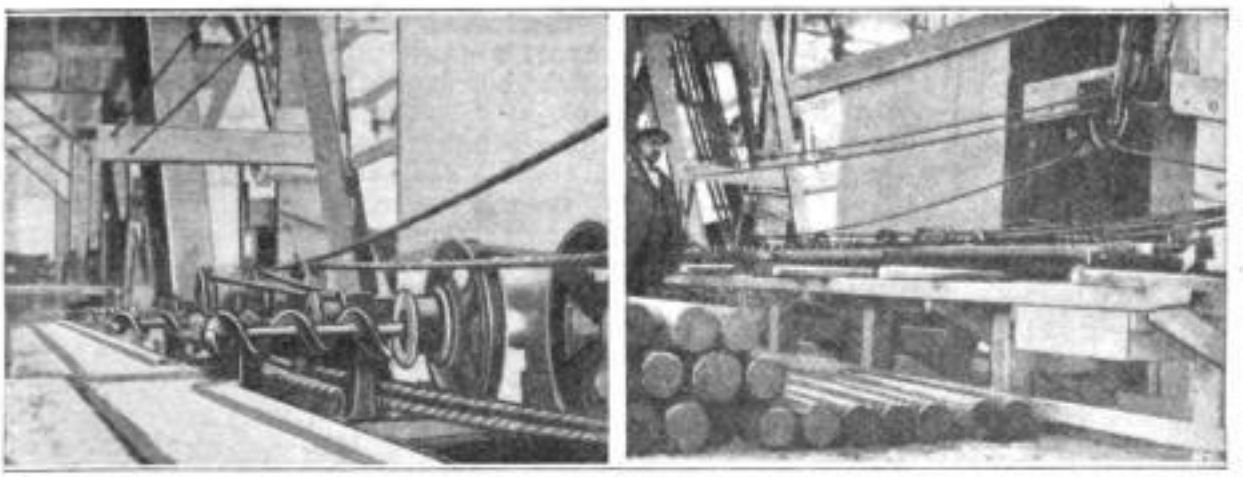


Left View Shows the Spring Holding the Headlight Visor in Place. Right: A Head-On View



WIDE WORLD PHOTOS

Left: A Cozy Nook on the Second Floor of the Traveling Bungalow—the Combination Library and Bedroom. Right: The Bungalow and Trailer: the Lower Story Telescopes within the Upper, Permitting the Height of the Building to be Lessened from 15 Feet to 9½ Feet



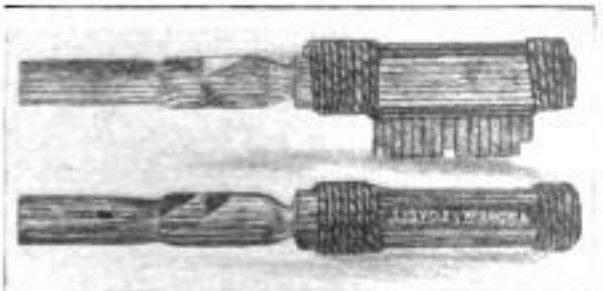
A Machine of Simple Design for Drilling as Many as Eight Holes at a Single Operation in Telegraph-Pole Crossarms, Bridge Timbers, and Other Work of a Similar Character. Rope Belts are Used to Drive the Eight Chucks

MACHINE FOR DRILLING POLE CROSSARMS

For the purpose of boring as many as eight holes at a single operation in telegraph-pole crossarms, bridge supports, etc., with the holes at any distance apart, a simple machine has been designed. The apparatus consists of eight wheels, each provided with a chuck for the auger bit used, and driven from the main motor by rope transmission. The holes are bored almost as fast as the work can be pushed against the bits. Auger bits of any diameter and almost any length can be used.

COMMON TYPE SET IN HANDLE WAS EARLY "RUBBER STAMP"

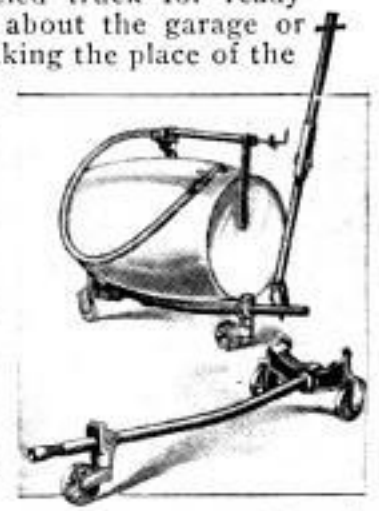
Rubber stamps, despite their widespread use, are a relatively modern invention, with which business men of a half-century ago were not familiar. There has recently come to light an interesting signature stamp of metal, which was used by a Massachusetts official of about that period. It consists of a straight hickory handle, squared and mortised at one end, and set with ordinary printer's type, bound in with waxed cord. It was inked with the finger or from a saturated blotter.



Side and Face Views of an Early Signature Stamp, Made by Binding Printer's Type in a Wood Handle

TONGUE OF BARREL TRUCK IS USED AS PUMP HANDLE

Wood or steel barrels of either the 25 or 60-gal. size may be quickly loaded on a low three-wheeled truck for ready transportation about the garage or factory, thus taking the place of the portable tank. A cylinder pump, part of the outfit, can be applied to the barrel in such a way that the plunger may be attached to and operated by the truck tongue without detaching the latter from the truck body. This makes possible the rapid handling of heavy greases, as the combination tongue and pump handle exerts a powerful leverage.

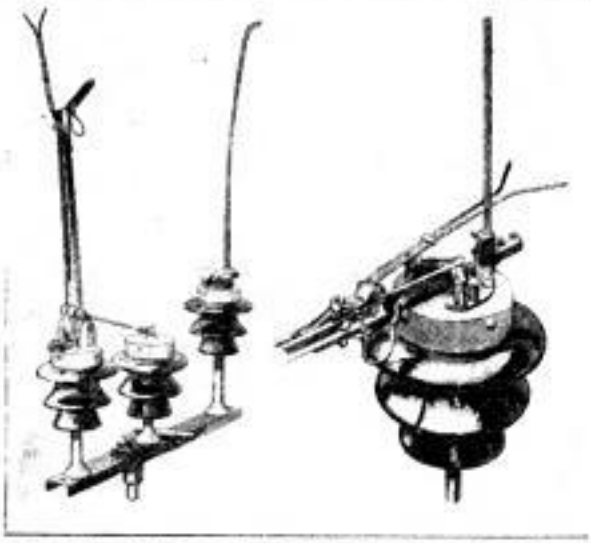


AMERICAN ENGINEERS SOLVE ITALY'S CABLE PUZZLE

To increase communication facilities between Milan, Genoa, and Turin, the Italian government is preparing to install a new cable line, paralleling a Y-shaped railway that is being electrified with three-phase current. The element of inductive interference from the railway lines to the cable proved so great a problem that two American engineers were called into consultation. After three months' study of the situation, they have succeeded in laying out a route that will assure complete freedom from trouble of this kind.

INSULATION IS EXTRA-HEAVY IN HIGH-VOLTAGE SWITCH

In a new air-breaking, high-voltage switch the designers claim that the necessity for magnetic blow-outs, and other complicated arc-suppressing devices, is eliminated, as the arc set up at the time of opening the switch is, mechanically, forced to travel upward over a constantly increasing air gap between two rods, carried on the switch arm, and a stationary, vertical rod, attached to the stationary part of the switch. These rods are called horns. The effect of the arc traveling across a constantly increasing air gap is that it automatically blows itself out. The unit is designed for installation on the top of poles and is carefully weatherproofed. The handle by which the switch is turned extends down the pole and is effectually grounded, so that any person having occasion to open the switch will be protected from dangerous or fatal shocks. As these switches are designed for use on large-power transmission lines, they are very heavily insulated, it being claimed that the insulators are capable of withstanding a breakdown pressure of 70,000 volts.



Left: The Air-Breaking High-Tension Switch Open. Right: Closed. As the Horizontal and Vertical Rods Separate the Arc Blows Out

FLOATING POWER HOUSE AIDS RIVER-IMPROVEMENT WORK

Government engineers engaged in straightening the channel of the upper Mississippi River use great barge loads of willow mattresses which they sink with rocks to form dams. Little or no mechanical power has been available for this work, because of the inaccessibility of fixed sources of supply. Now, however, a complete electric plant has been built on a barge, which accompanies the rest of the outfit. This floating power house is placed between the barges of rock and willow, and an electrically driven winch on its deck pulls them along the line of the dam, greatly facilitating the construction.

The Floating Power House Used in the Work of Straightening the Mississippi River Channel: The Barge of Rock is Seen at the Left, and the Load of Willow Mattresses at the Right, behind the Power House, from Which Both are Controlled by Winches and Cables on the Deck

Tractors Used in the Wet Rice Fields are Prevented from Miring by Extension Strakes Attached to the Drive-wheels. Not Only do These Serve Perfectly to Support the Heavy Machines, They Also Assure Adequate Traction

EXTENSION STRAKES SUPPORT TRACTORS ON SOFT GROUND

In the southern rice fields the problem of using tractors on the wet, soft soil has been solved by attaching extraordinarily wide treads to the drivewheels, thus increasing the bearing surface by many square inches. The treads are made of rings of steel, two to each wheel, connected together, transversely, by long strakes, or cleats, of wood. One of the rims of each set is cut across and provided with a clamping arrangement, by means of which it may be readily applied to the tractor wheel. The supplementary treads are removed when the tractors are used on hard ground.

STRAWBERRIES KEEP WELL IN COLD STORAGE

Experiments conducted in England have resulted in the finding that ripe strawberries can be kept in satisfactory marketable condition over periods of six to seven days by holding them at a temperature of 34 to 36° F. The time may be increased to three or four weeks if the atmosphere be kept heavily charged with oxygen, soda lime being used to absorb carbon dioxide and liberate the vital gas. The berries must be dead ripe, as green berries will not mature after once having been subjected to the chilling temperature. Good results were obtained from a method of drying the fruit. It is said that the desiccated berries keep well and retain their flavor for several months.

UTILITY GARMENT FOR WOMEN HAS ATTRACTIVE FEATURES

Purely utilitarian as is the purpose of the one-piece trousered working garments that came into favor among women during the war, a western inventor now has demonstrated that they need not lack attractive qualities. A distinctive feature of her design is that the back of the waist terminates in a coat-skirt effect, so that the rear view gives practically the appearance of a suit. The garment buttons down the back, and two buttons at the neck allow the collar to be turned up around the

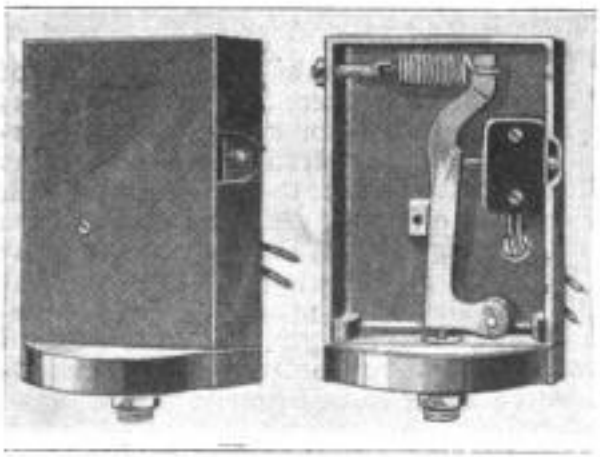
Front, Side, and Back Views of a New One-Piece Trousered Working Garment for Women, Made Attractive by the Coat-Skirt Effect and the Convertible Collar

throat, or rolled down. The front, as befits a working suit, is perfectly plain except for the three pockets, two at the sides and one at the breast.

This Peculiarly Shaped Building Is a Snowshed Inclosing a Locomotive Turntable. In the Left Background is Seen One of the Snow Fences Which Line the Right of Way and Serve to Break the Full Force of the Drifts

AUTOMATIC DIAPHRAGM SWITCH STOPS PUMPING ENGINE

An automatic switch, which opens the ignition circuit when the water reaches a predetermined height in the storage tank,



The Lever of the Automatic Switch Presses the Push Button When Moved by a Diaphragm in the Base

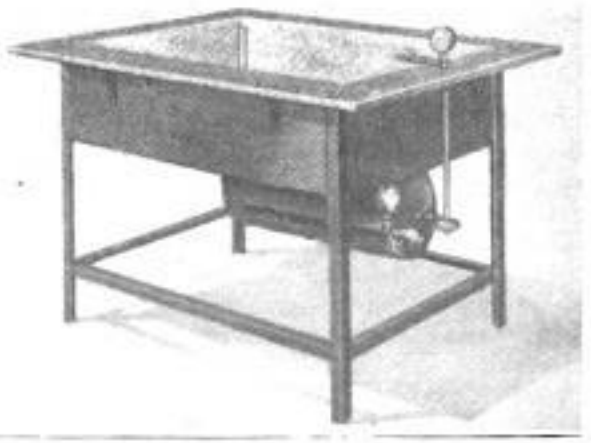
has been designed to be used in connection with gas or gasoline-burning pumping engines. The switch lever is actuated by a pressure diaphragm of the double corrugated-metal type. When the water pressure becomes heavy enough the diaphragm expands and, pushing the lever against the plunger of the switch, causes the latter to be moved to the "off" position. The diaphragm is built into the base of the device.

LOCOMOTIVE TURNTABLE IS HOUSED IN SNOWSHED

Railroading in Alaska has its difficulties, chief among which are the heavy snows. In one locality, where the conditions are particularly aggravating, it has been necessary to house the locomotive turntable in a shed built like the well-known snowsheds. The roof and walls of the structure are sharply pitched, in order that the snow may slide off as rapidly as it falls, thus avoiding a heavy accumulation which might become of sufficient weight to crush the building.

SPECIAL TANK FOR TESTING AUTOMOBILE RADIATORS

To locate leaks in automobile radiators they are immersed in water, in shallow tanks, and filled with air under low pressure. Heretofore the air has been supplied by hand pump or, in large establishments, taken from a supply line. In a new test unit, a strong storage tank, built integral with the apparatus, is charged to a pressure of 150 lb. The pressure of the air passing to the radiator undergoing test is regulated by an automatic diaphragm

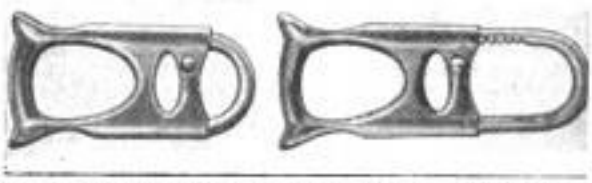


A Completely Self-Contained Automobile-Radiator Test Unit Has a Storage Tank Which Holds Air Enough to Make Several Tests

valve. One charging of the tank, by hand pump or portable compressor, is sufficient to test several radiators.

THE "FINGER CUFF" IS A NEW AID TO THE POLICEMEN

The old-fashioned handcuff may become obsolete and be supplanted by the "finger cuff," the invention of an officer on the police force of an eastern city. The new cuff is made to grip one finger only and is, therefore, of small dimensions and light weight, being less than 3 in. long when closed, and weighing 1¼ oz. No key is used to lock or unlock the device, as a simple ratchet-and-pawl arrangement constitutes the lock. To unlock it, the pawl is disengaged from the ratchet by a small protruding knob. Culprits being led to jail by means of the finger cuff are not humiliated to such an extent as is the case when the much more conspicuous handcuff is used.



Left: The Finger Cuff Closed. Right: Open, Showing the Ratchet Lock

WRECKAGE OF ILL-FATED SEAPLANE FOUND

Members of the Michigan coast patrol found all that was left of the seaplane "HS-2L" on Saturday, Nov. 13, last. The craft had left Great Lakes Naval Training Station the preceding Wednesday to make a photographic survey of the west coast of Lake Michigan, and was caught in one of the terrific storms which sometimes make the Great Lakes more dangerous and deadly than the oceans. When it was realized that something was amiss, all lake boats, coast-guard stations, and life-saving crews were immediately notified, and requested to use their efforts in locating the unfortunate airmen. The response was splendid. Most of them volunteered to brave the 70-mile gale, the fierce waves, and the freezing temperature, until exhaustion forced them to desist. Upon recovering strength, they returned to the dangerous work. The search was carried on unremittingly by government ships, regular and volunteer life-saving crews, and fliers from various parts of the lakes region.

The Pontoon of the "HS-2L" was Washed Up on the Michigan Shore, and Was Apparently in Fairly Good Condition

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The Engine of the Seaplane, Which Weighed Several Hundred Pounds, was Also Cast Up on the Beach, So Great Was the Power of the Waves

When found, parts of the plane were badly burned, giving rise to the theory that the desperate navigators had sacrificed them to make distress signals. The pontoon portion was apparently in good condition and would probably have

floated indefinitely in smooth water. However, buffeting and rolling in the fierce breakers has been known to founder much stancher craft. Lake sailors assert that even had the fliers been able to retain their places in the hull, they would certainly have perished of the cold, as the rescue ships came in coated in ice.

CENTRAL HEATING MAKES GOOD IN WISCONSIN

BY PAUL H. WOODRUFF

HEATING residences and business houses from a central plant is so attractive in principle, especially as fuel difficulties increase, and so often fails in practice, that an analysis of one thoroughly successful installation of this kind is well worth while. In the unusual undertaking under consideration, success has attended the financial as well as the service side of the operation; and further interest is contributed by the fact that it is a municipally owned and conducted utility, which takes care of the electric-lighting demand and the local water supply as well as the community heating.

The village of Waterloo, Wis., in which this service is installed, has a population around 1,600, and boasts three blocks of business buildings, mostly two-story. The central plant is about 300 ft. from the center of this group. In it is a 150-hp. Corliss-type engine, belted to a 100-kw., 2,300-volt generator, and a duplex tandem-compound water-supply pump of 9-in. stroke. Steam for all three services is supplied by two 125-hp. tubular underfeed boilers. The low-pressure steam of the engine and pump exhaust is used for the heating, employing the vacuum system, and a pump of 7-in. stroke with a 5½-in. steam cylinder and an 8-in. vacuum cylinder, maintains a constant vacuum of 5 to 7 in. in the mains during the season of September 1 to June 1. This keeps the back pressure against the engine down to about ½ lb. average. Provision is made for supplying live steam, through a reducing valve, to the heating line when the exhaust steam becomes inadequate.

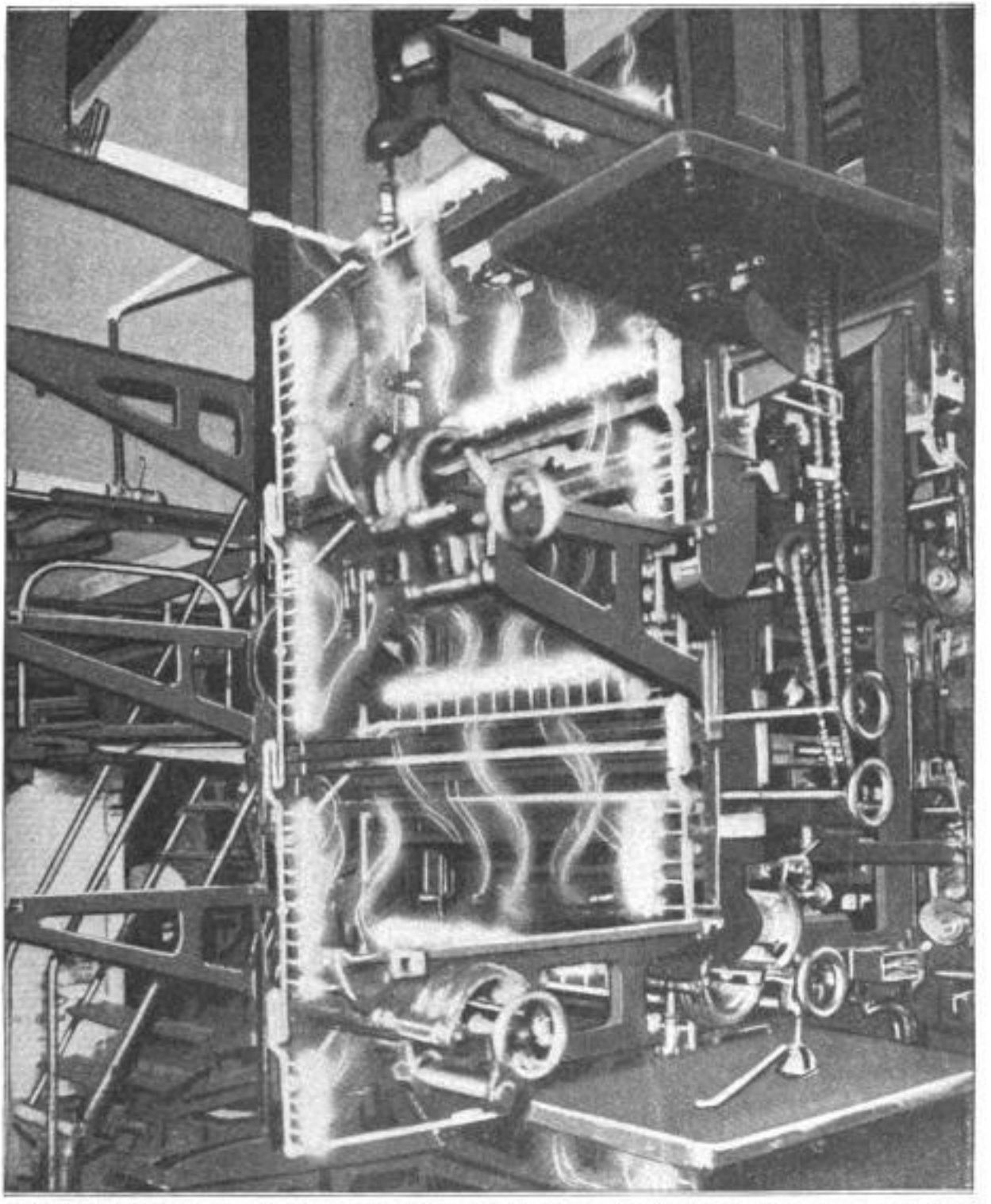
From the plant to the distributing center are an 8-in. low-pressure steam pipe, a 4-in. return for condensation water, and a 2-in. high-pressure pipe for booster purposes and to supply consumers desiring 100-lb. steam. Branching and extending one block in each direction from the distributing center are a 4-in., a 2-in., and a 1-in. pipe—a total of 1,100 ft. of heating mains. All these lines are covered with 1½-in. asbestos with a canvas jacket, wrapped with bare copper wire, coated with asphalt paint, and run through a duct buried in a concrete-lined trench, with a dead-air space around each pipe. Manholes and drains are arranged to prevent any accumulation of water.

The entire cost of this plant, ready for service, was $12,200. For the first season the heating division of the utility had only four customers, but they were large, and paid in $508 for five months' service. Now there are 46 heating customers, including two who use high-pressure steam. The low-pressure consumers pay 60 cents per 1,000 lb. of water condensed from the steam, and their individual meters automatically weigh and register the condensation. No charge is made during June, July, and August, though the users heat their water, as well as their radiators, with the central supply. High-pressure steam is sold at 85 cents per 1,000 lb., measured by a flow meter. Additions of connections and meters for the new subscribers have brought the plant valuation up to $13,197, and the total net income last season was $14,285. On these figures, it is calculated that the plant now has paid for itself after four years of operation, and that consumers have enjoyed a price for their heat equivalent to $4.80 a ton for the best grade of Illinois coal, if used in their own furnaces. This is computed to represent a saving of about $3,600 a year.

The remarkable success of this installation is attributed to the fact that expert engineering attention was given to its design and arrangement, based on a critical study of local conditions. And conversely, it is argued that the numerous failures of similar attempts, large and small, are due solely to the common lack of that technical consideration demanded by any public-utility undertaking as the reasonable price of satisfactory service and investment returns. It is interesting to note, in conclusion, that an installation of the same kind is now being made in Belvidere, Ill., a city of some 5,000 population.

¶The United States battleship "Kearsarge" is being equipped with a 250-ton revolving crane of unusual height and reach, for service in various ports. The crane is mounted on a steel-deck foundation, 60 ft. in diameter, necessitating the removal of guns, turrets, and armor.

STEAMING DEVICE SAVES PRINT PAPER AND INK



A Three-Deck Vaporizer Attached to a Newspaper-Printing Press: The Steam, Fed to the Attachment by a Small Boiler, Saturates the Paper, Reducing Breakage, Preventing Static Electricity, and Saving Ink. In Four Days' Trial a Saving of 1,456 Pounds of Paper and 200 Pounds of Ink was Effected

Newsprint paper saturated with steam vapor will not generate static electricity in running through the press, does not break or tear readily, and prints clearly with much less ink than when dry. A Texas inventor is able therefore to gain all these advantages by a single attachment for the printing press, consisting of a vaporizer fed with steam at 10 to 15-lb. pressure from a small gas-fired boiler of 8 to 18 hp. Such an attachment, tested on one of the presses in the office of a prominent Texas daily, demonstrated in four days' use a saving of 1,456 lb. of

paper, 200 lb. of ink, and the time of six men ordinarily wasted during breakage periods, or a total saving of $256, as compared with the parallel operation of a similar press not equipped with a vaporizer.

COIN-IN-THE-SLOT MACHINE SUMMONS TAXICABS

No more will the late wayfarer be compelled to hunt for an all-night drug store or lunch counter to find a telephone with

Depositing a Coin in the Slot of the Taxi-Call Machine Brings a Cab Promptly, Provided One is to be Had

which to order a taxicab, if the system installed in Hamburg, Germany, is generally adopted. An enterprising taxicab company of that city has erected a number of coin-in-the-slot machines at various well-known points. Depositing a coin signals the nearest cab stand that a taxi is wanted, and brings prompt service, if a car is available.

HONOR AMERICAN ARMY MULE BORN ON BATTLE FIELD

Fame and honors literally have been thrust, though not unearned, upon a certain far from humble army mule, now serving as the regimental mascot of the 15th U. S. Field Artillery. The proud animal is named "Mademoiselle Verdun," because she was born on that historic battle field in the midst of a heavy artillery action, where her mother was helping the cause by hauling shells. She marched 10 miles with the battery a few days later, and continued to take part in many important offensives, ultimately going to the Rhine with the army of occupation. Finally she was shipped home by mysterious processes, despite the edict against animals, and is now the pampered and coddled pet of a Texas camp.

LENGTHEN NAVY PATROL BOATS FOR MERCHANT SERVICE

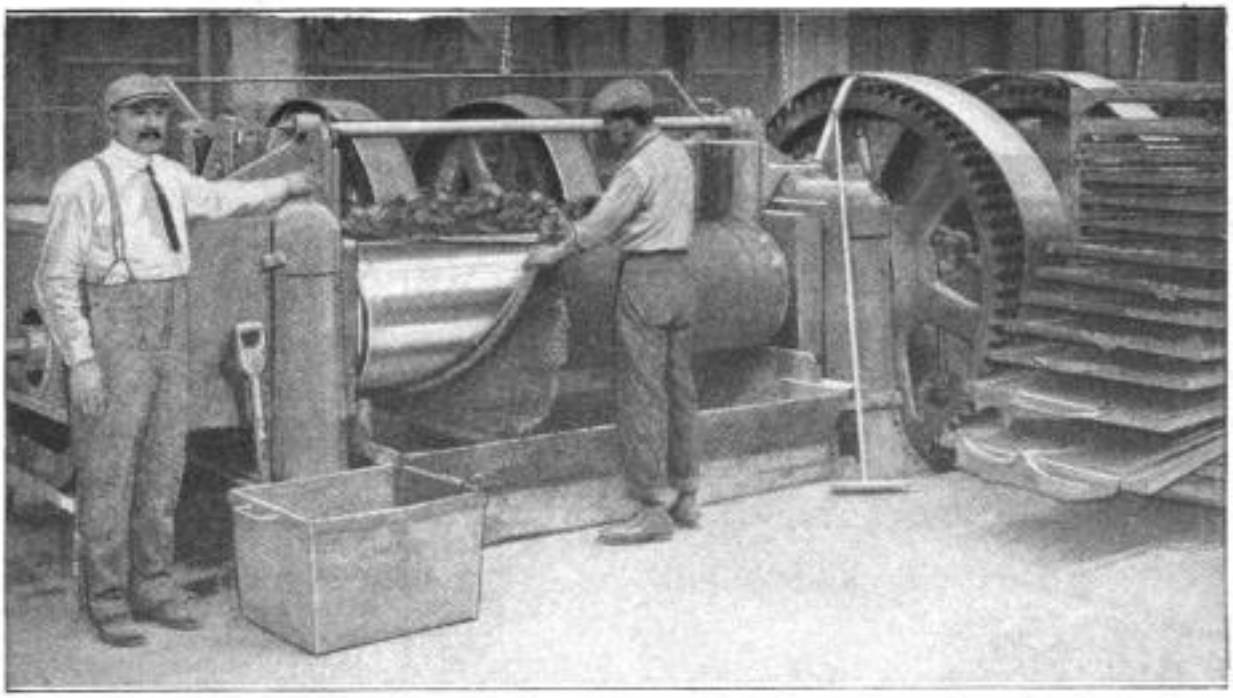
One of the curious tasks involved in Great Britain's conversion of superfluous naval craft into merchant ships was the recently completed lengthening of 170-ft. convoy and patrol boats into 213½-ft. freighters. Both drydocks and launching ways were pressed into service for this work, which included changing the hull and the shape of the bows, reducing the boiler capacity, and building new superstructures. The commercial steamers, of 1,600 tons' displacement, so obtained can make about 11½ miles an hour.

BRIDGE BETWEEN HOUSES IS FIRE ESCAPE FOR BOTH

In a western city live, side by side, two property owners who believe that, while one may some day have his home destroyed by fire, it is highly improbable that the other will suffer simultaneously. So the fire escape takes the form of a bridge about 20 feet long connecting the two houses. When Jones' house burns he

This Odd Bridge Fire Escape Is the Result of an Unusual Agreement between the Owners of the Two Buildings

will escape to Brown's; if Brown is the unfortunate one, he will hurry across the bridge to Jones'. It is not unlikely that the span has its social uses also.



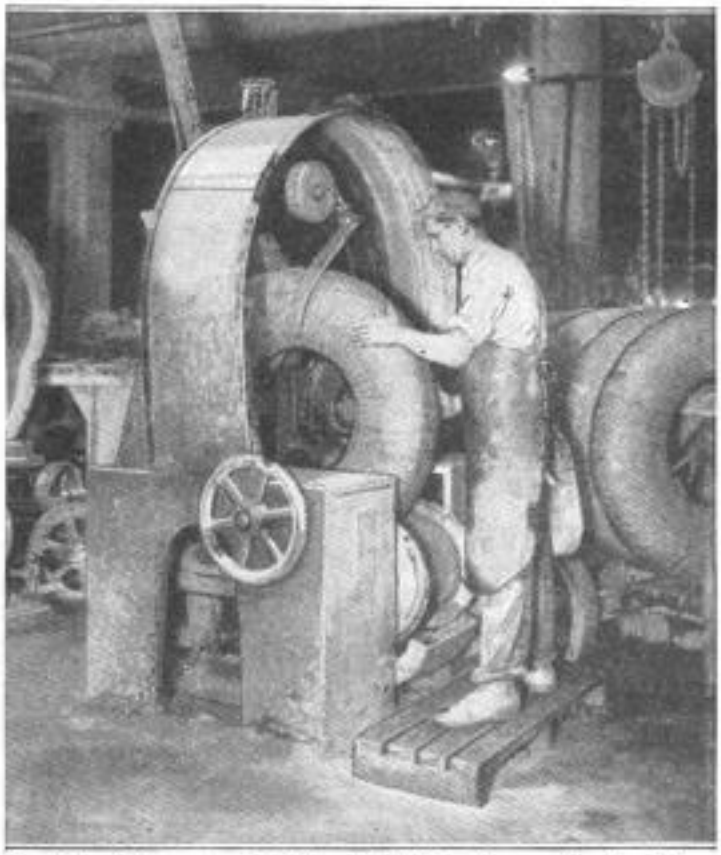
After Compounding with Sulphur, Zinc Oxide, Lampblack, or Other of the Toughening and Hardening Ingredients, the Rubber is Run through Heavy Roller Presses, Called Calenders, to Insure a Thorough Mixing

A PNEUMATIC TIRE IN THE MAKING

BY HAROLD F. BLANCHARD

THE pneumatic tire easily outdistances all competitors as a mechanical masterpiece. Broadly speaking, it is a machine just as much as a lathe or a locomotive, but the fact that it is not made out of wood and metal and does not possess gears, cranks, or shafts, has largely obscured its right to the title.

There is point in calling a tire a machine. It is more than just a combination of rubber and cotton. Rubber of various qualities, from hard to very soft, is found in its make-up, each kind being put in a certain place to perform a specific function, just as much as a gear or a crank in a machine built of metal.

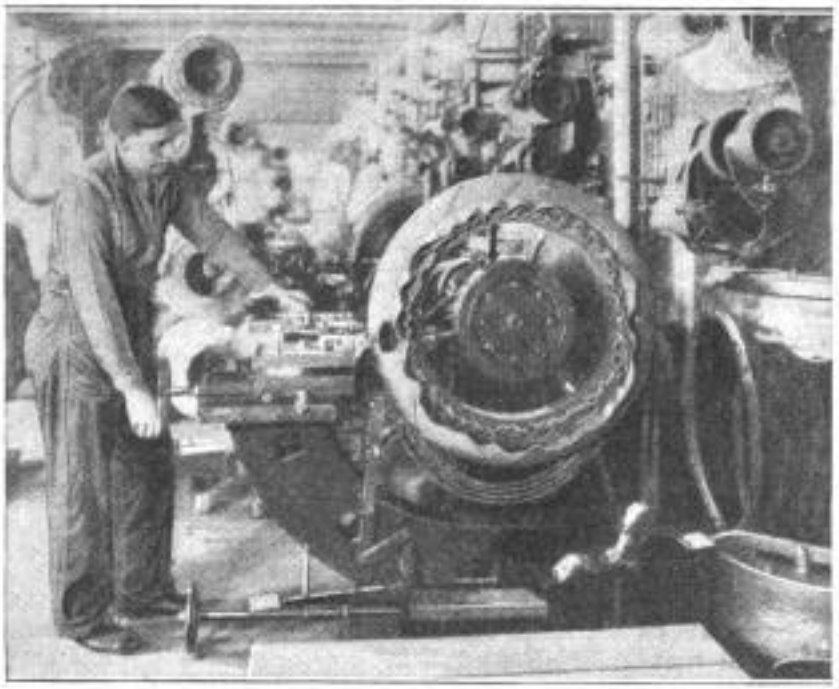


The Tread-Wrapping Machine Is Entirely Automatic in Action. It Applies Several Layers of Strong Canvas Tape 1½ Inches in Width. All Layers Are of Equal Tension

The construction of a tire is interesting. Its foundation is its beads, which may be straight-side or clincher. The layers of fabric, running from bead to bead, may be correctly considered the structure of the machine. On this structure the tread is laid.

Going further into detail, we find that rubber of several different qualities of hardness and toughness may be used. Pure rubber is very soft and elastic—too soft for use anywhere in a tire. Sulphur is added to the rubber to increase its hardness and to permit vulcanization. The more sulphur added, the harder the product, a fountain-pen barrel being about the limit

of hardness. Vulcanization may be roughly likened to boiling an egg. If it is not cooked a sufficient time, the interior will be soft. But if it is cooked until very hard, it will be brittle, weak, and crumbly.



The Tire-Building Machine Applies the Various Layers of Fabric, Breaker Strip, and Cushion Gum, Rolling Each One into Tight Contact with the One Preceding. This is Called "Stitching"

The sulphur combines directly with the rubber to form a new chemical compound, the reaction taking place during the vulcanizing process. The greater the sulphur content, the harder the resulting product, and with increase of hardness elasticity decreases. Consequently if the tread rubber, for example, were made hard enough by the addition of sulphur alone to stand up under the severe wear of the road, it would not be sufficiently elastic to withstand the constant bending that the tread is naturally subjected to as it rolls over all manner of obstructions. Furthermore its lack of elasticity would give a tendency toward brittleness which would cause the tread surface to break rather than to bend and to cut rather than to resist cutting.

Clearly, then, the addition of sulphur is not enough. It becomes necessary to find some other admixture for the purpose of making the tread tough without seriously reducing its elasticity. For this purpose zinc oxide or lampblack is used. The remarkable thing about these materials is that they do not combine with the rubber in any way. The particles of zinc oxide or lampblack, as the case may be, simply lie in the rubber as such. Nobody seems to know why they act as toughenerers, but there is no disputing the fact that they do, and one or the other is used in all tires. Light-colored tires, of course, use zinc and dark-colored ones lampblack. Red tires use zinc with coloring matter added, such as red oxide of iron.

At the base of the tread is found the breaker strip. It is a very strong but coarsely woven piece of fabric, and rests on a layer of cushion gum, about $\frac{1}{8}$ in. thick. This cushion in turn is mounted on the fabric carcass, or structure. The purpose of this arrangement is to distribute the blows. When a tire runs over a sharp stone, the impact is transferred to the tread and the tread is pressed in. This naturally causes a strain in the foundation of the tread. In many cases, if this sharp thrust were transmitted directly to the layers of fabric, these layers might be strained so badly

Building Tires by Hand: This Is the Older, Slower Method, but Many Manufacturers are Still Using It. The Workman to the Right has Thrown the Strip of Fabric Which He is Applying over His Shoulder to Keep it Clean

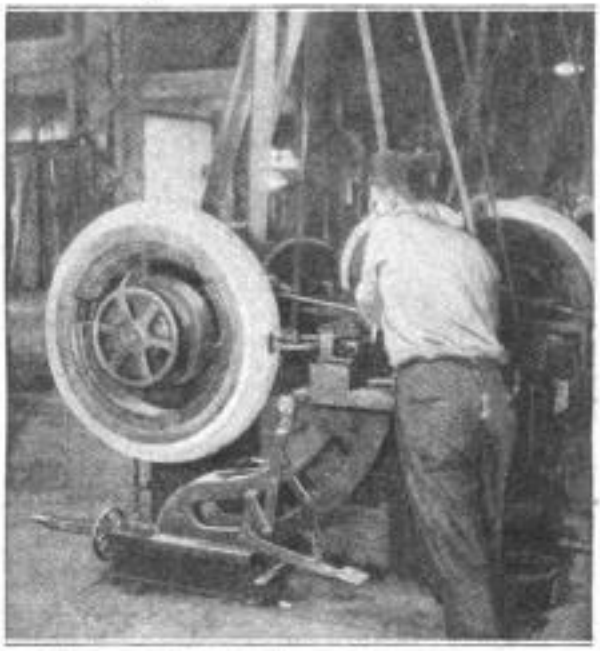
that a break would occur. However, in the average case the blow reaches the breaker strip, where it is spread out and absorbed by the cushion underneath.

The cushion gum is nearly pure rubber with just a little sulphur in it, and perhaps a trace of zinc or lampblack. Its virtue lies in its softness and elasticity, and since it is subjected to no wear except the give and take between the carcass of the tire and its tread, its softness is an advantage. This cushion also serves as a desirable coupling between the tread and the layers of fabric. This is necessary because of the widely different characteristics of the two latter constituents of the tire.

A tire has four or more layers of fabric, the number depending somewhat on the size and quality of the tire. A large truck pneumatic may have as many as 16 layers, but as a rule passenger-car tires do not have more than seven layers. The various layers of fabric are held tightly together by thin sheets of cushion gum between them, to permit greater flexibility of the layers of fabric.

Very hard rubber is sometimes used in the construction of the beads. In regular clincher tires the beads must possess a certain amount of stretch in order to permit them to slip over the tire rim. Consequently the beads are made of a combination of rubber and fabric, the rubber being fairly hard yet sufficiently elastic to allow the bead to stretch over the rim. Stretch, however, is undesirable in quick-detachable clinchers, or in straight-side tires, and so it is usual to make the beads with a hard-rubber or wire core, the latter consisting of perhaps a score of strands of wire about 1/32 in. in diameter.

The construction of a tire proceeds as follows: It is built on a form which is roughly the size and shape of an inner tube. A layer of fabric is placed over this form, the ends being cut on the bias and allowed to overlap about 1 in. Previously the fabric had a layer of cushion gum applied to one surface. The fabric is wrapped around the form with the cushion gum on the outside, and then rolled or stitched in place, whereupon a second layer of fabric is applied, with the rubber surface out, of course. This layer is rolled down, and the process is continued until all the layers are in place.



Applying and "Stitching" a Tread Which has been Built Up Separately and Partly Vulcanized: It will be Thoroughly Welded to the Carcass by the Final Vulcanization

The heavy layer of cushion gum is applied, then the breaker strip, and finally the tread and side walls. Sometimes the tread is built separately and partially vulcanized and applied to the tire carcass as a unit. Then again the tread may be applied layer by layer. The tread design is obtained in one of two ways. If the completed tire is fully inclosed in a metal mold while it is being cured, the tread design will be formed by the pattern of the interior of the mold. But if the wrapped-tread process is followed the method is a little different. In this case, after the tire is built it is wrapped round and round with canvas tape, about 1½ in. wide, preliminary to being put in the vulcanizer. The process, just as described, will produce a smooth-tread tire. To give a non-skid design, metal pieces of suitable shape are set in the tread surface just before the tire is wrapped.

PLAN SIX ENORMOUS PIERS FOR JAMAICA BAY

Working on the hypothesis that proposed improvements in Jamaica Bay, Long Island, should be made by the city of New York, and not by private capital, the dock commissioner has prepared a set of plans contemplating some unusual facilities. Six new piers, no less than 2,000 ft. long and 800 ft. wide, are included in the proposal. Each of these mammoth installations would give simultaneous docking room for seven ships, and afford space for the most modern of warehouse and terminal equipment. A dredged channel, 1,000 ft. wide and 30 ft. deep, also is projected.

LOCKING COVERS PROTECT IRRIGATION PIPES

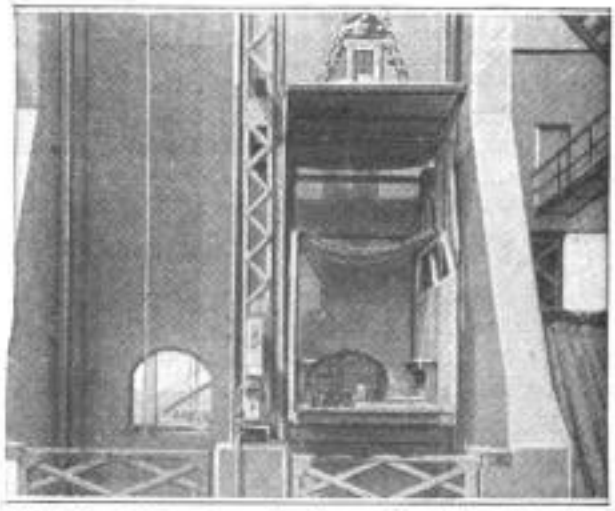
Dotting the rice fields of Arkansas are the outlet ends of the pipes which convey the irrigating water. A popular pastime

Closing One of the Outlet Pipes of an Irrigating System with a Lock Cover to Prevent Youngsters from Filling It with Rocks

of the mischievous boys of this locality is the dropping of stones and rubbish into the pipes, thus clogging them and damaging the pumps. To circumvent the youngsters, and also older vandals, the management of one of the plantations has fitted all the outlets with covers which may be locked in place.

QUANTITY-PRODUCTION IDEAS APPLIED TO COAL MINING

What is destined to become one of the largest coal mines in the world, from a production standpoint, is located in southern Illinois. Modern factory methods are being followed in the mine with the aim of economizing in time and labor. Some of the improved machinery has already been installed, among other items being four-ton dump cars, which are automatically loaded onto the cage at the bottom of the shaft and tipped through an angle of 140° upon reaching the top of the 90-ft. tipple. By this arrangement the car does not leave the cage for unloading, as it can be tipped more quickly than it can be pushed on and off. From the tipple the coal passes into a storage bin, thence over the screens, and falls into railway cars in the correctly assorted sizes. This last operation is also automatic. When the installation is finally completed, the coal will be handled at the rate of 10 tons per minute, or 8,000 to 10,000 tons per day, with a force of about 800 men. This will about double present production schedules. A few years ago $100,000 was considered a large sum to expend for mine equipment. The estimated expense of this, the last word in installations, was $500,000, but, owing to rapid advances in all cost items, a revision of the figures shows that over $1,000,000 will have been disbursed before the work is completed. Although this is an advance of more than 100 per cent over the previous estimate, it is still considered to be a good investment, since the value of the daily output will be, approximately, $35,000 to $40,000, estimated at present wholesale prices for the commodity.

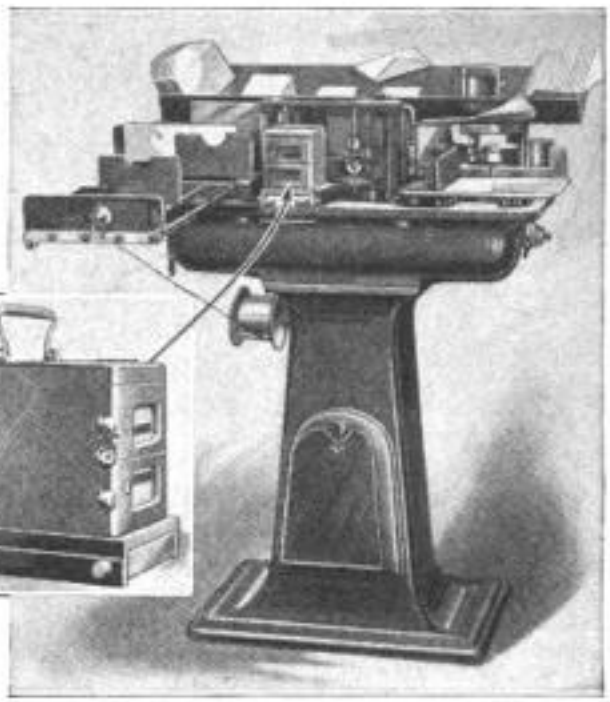


The New Mine Cage Carries a Four-Ton Car That is Automatically Filled at the Shaft Bottom, and Dumped by Tilting at the Top

The $1,000,000 Equipment of an Ultramodern Coal Mine Now being Completed in Southern Illinois; Loading, Unloading, and Many Other Operations Are Automatic. A Bathhouse for 50 Miners Is at the Right

METERED-SERVICE POSTAL PLAN SAVES TIME

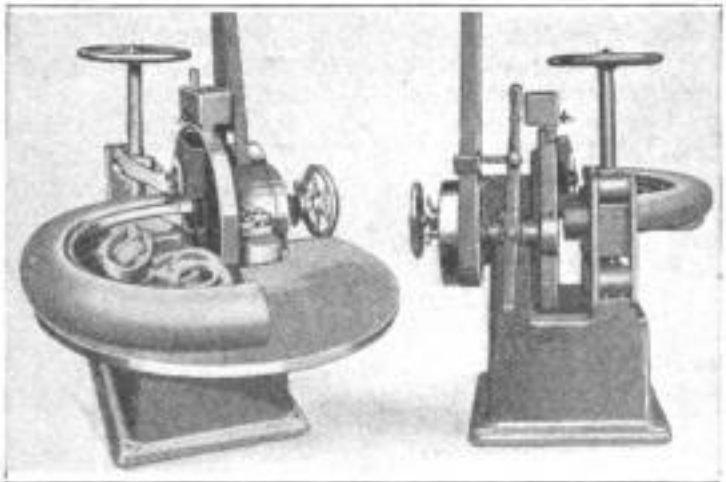
Since the adoption of the new postal regulation extending the permit system to cover first-class mail matter, a postal metering machine, for the use of large concerns which send out thousands of form letters, bills, statements, invoices, etc., monthly, has been placed on the market. The apparatus seals envelopes, prints the postal-permit number and postmark, and counts and stacks at the rate of 250 pieces per minute. The counting and printing head is quickly detachable from the main body of the machine in order that it may be taken to the local postmaster for setting. The predetermined number of pieces, which must be identical in weight, though not necessarily in shape, are paid for in advance at the rate covering their weight. The head is set by the postmaster, who alone possesses the keys, to imprint only the number paid for. When this number of pieces has been passed through the machine, the printing head automatically locks and must be reset. The postal employes will be largely relieved of the necessity of counting, weighing, and sorting millions of pieces when the metering machines are installed by the large mercantile houses. These concerns will also effect a great saving in labor, as they will no longer have to hand stamp the greater portion of their mail.



A Machine That Seals Envelopes and Prints Post-Office Permit Numbers on First-Class Mail Matter: The Counting and Printing Head, Set and Locked by the Postmaster, is Seen in the Insert at the Left

AUTO TIRE-SECTION SAMPLES CUT BY NEW MACHINE

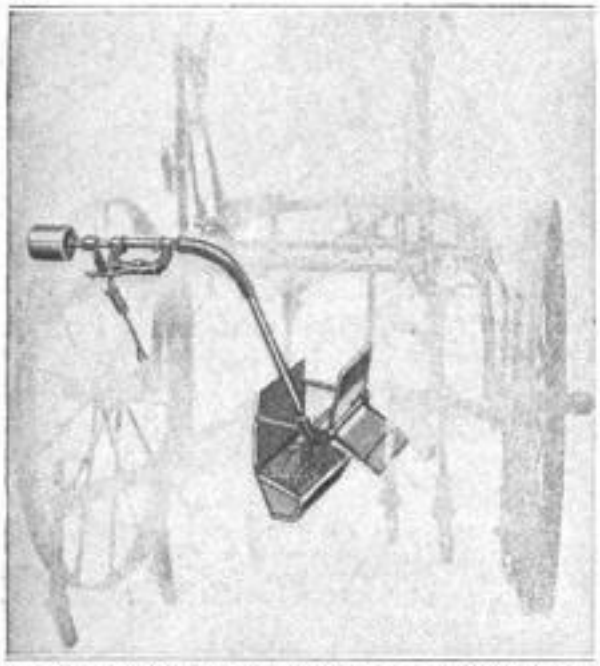
It seems rather remarkable that there should be sufficient demand for sample cross sections of tire casings to make the construction of a special cutting machine worth while. Nevertheless this is the case, and such an apparatus has been designed for use in tire factories. The active element of the machine is a plain-disk rolling cutter, which moves around the casing transversely and cuts out a section of any length desired. In order that the work may be held firmly in place, a steel mandrel, placed inside the tube space, and quickly adjustable clamps, bearing on the beads, stretch the casing into its normal shape and prevent slippage while the cutting operation is being performed. The disk is carried near the rim of a large gear wheel, and makes 60 turns per minute around the tire when the machine is belted to a ½-hp. motor running at 1,800 r.p.m. The claim is that, owing to the low speed of the cutter, it easily cleaves through hard rubber or wire beads as well as the softer fabric and rubber of the casing, resulting in a smooth, clean-cut job. The knife is kept lubricated with water from a drip pan.



In a Tire-Casing Sample Cutting Machine the Cutter Disk is Lubricated by Dripping Water. A Wet Knife Cuts Rubber Easily

SIMPLE BOLL-WEEVIL TRAP GOES AND GETS THEM

The latest development in the battle against the cotton boll-weevil pest is an



Drowning in Kerosene Is the Fate of the Boll Weevils Caught by This Cultivator Trap Attachment

apparatus consisting of a three-bladed fan, a friction roller, a flexible shaft, and a receiving pan. The whole is attached to a cultivator and driven through the infested fields. By means of the flexible shaft the friction roller, which bears upon and is turned by one of the cultivator wheels, drives the fan, which beats the tops of the plants and the cotton bolls with sufficient force to sweep the weevils into the receptacle. The latter contains kerosene, which is fatal to the insects. The inventor, a resident of Texas, claims that the plants are not injured by the treatment.

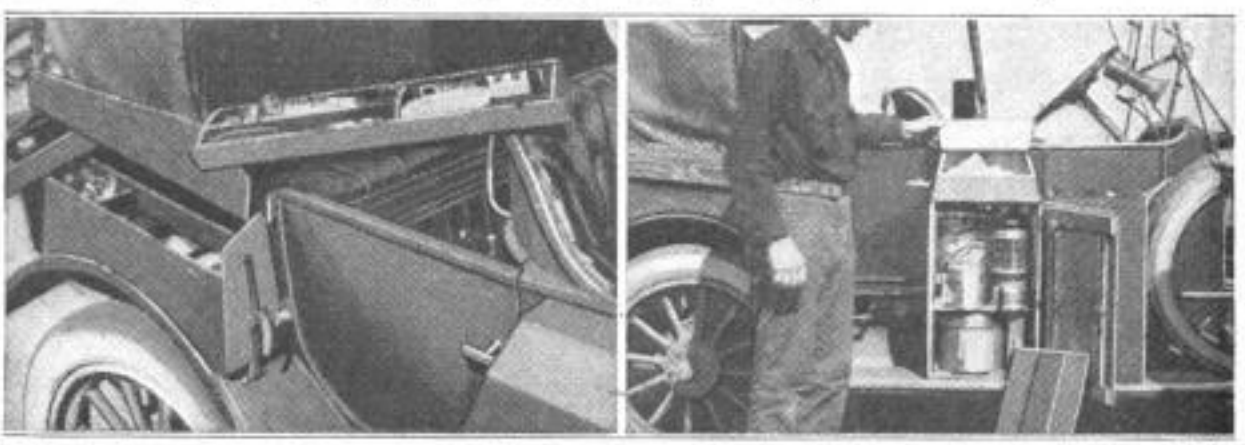
TALL BUILDING COLLAPSES IN HEART OF NEW YORK

Crashing down in a vertical avalanche of bricks that buried a business street for its entire width under 12 ft. of débris, one side of a nine-story apartment building in New York collapsed without warning a short time ago. The structure was unoccupied except for an office on the first floor and a few workmen on the second, but one fleeing victim was caught by the falling strip of wall, and a dozen others received minor injuries. Subsequent examination revealed that the fracture extended almost through the building, leaving only one wall, facing Broadway, intact.

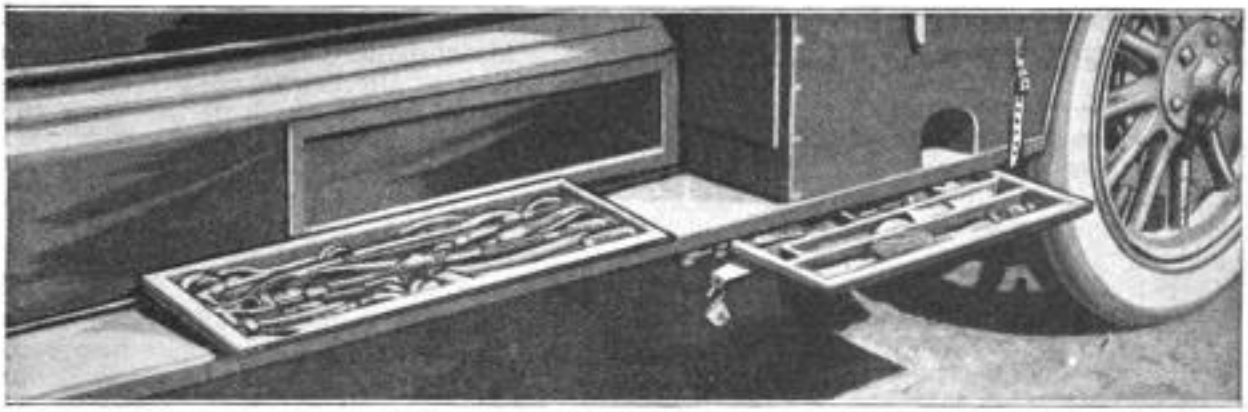
¶One of the captured German submarines has been put to performing a useful service by an English firm engaged in the dismantling of ships. The electrical system of the U-boat was tapped, and the powerful Diesel engines and generators are supplying ample current to operate the motors and lights of the whole plant.

CABINETS ON AUTO CARRY VACATION SUPPLIES

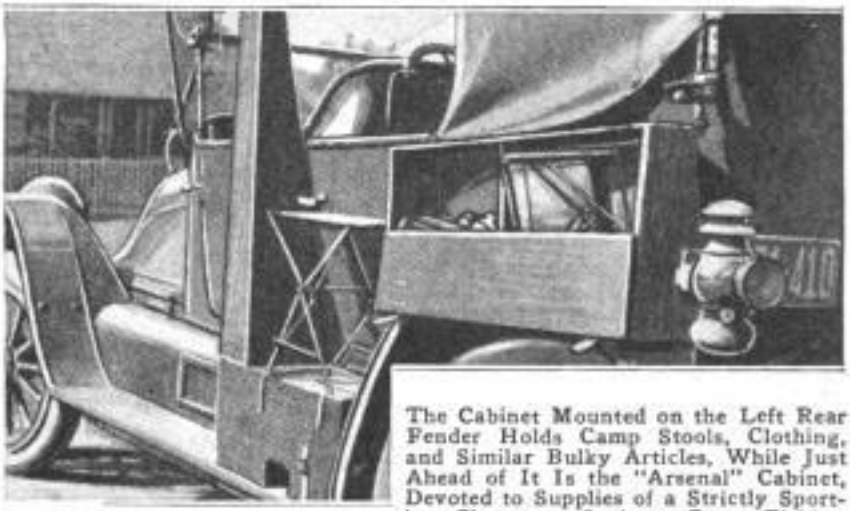
By an ingenious use of waste space, a western motorist has fitted his car to carry unobtrusively a load of vacation paraphernalia that would make an ordinary auto look like a prairie schooner. He stores the larger camp equipment under the car body on a metal pan, accessible through an oblong door cut just above the running board. Shallow slides for tools and small articles are arranged under both running boards, and made secure by straps and padlocks. A tall, narrow case



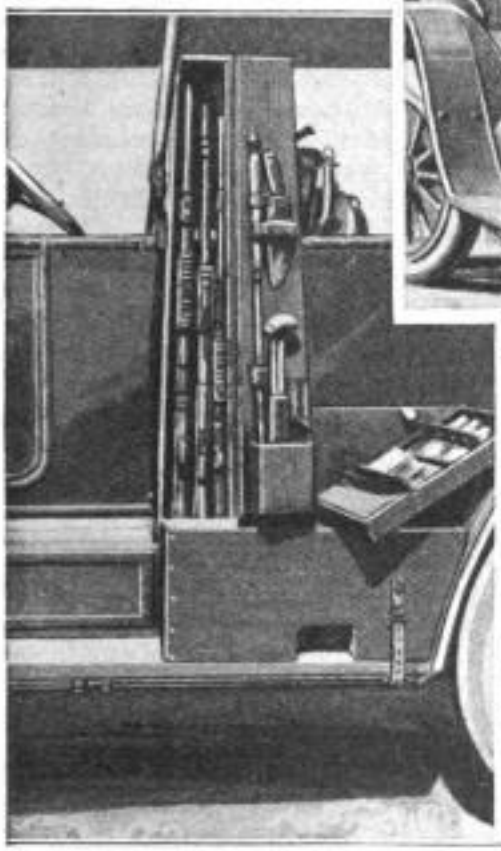
Left: The Compartmented Cabinet on the Right Rear Fender, Carrying Medicinal and Toilet Articles. Right: The Culinary Compartment, Open, and Just Ahead of It the "Pantry," on the Right Running Board

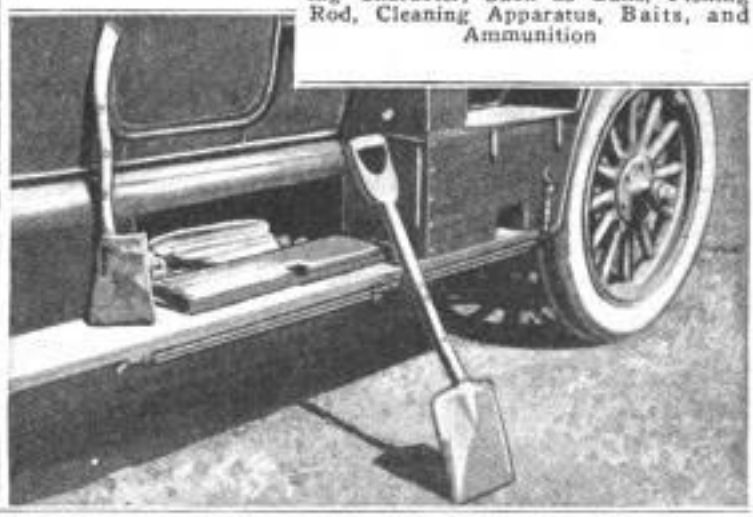


Shallow Removable Trays, Held in Place by Straps and Padlocks, Slide in Runners Attached to the Underside of Each Running Board, and Make Convenient Carrying Places for Tools and Small Objects



The Cabinet Mounted on the Left Rear Fender Holds Camp Stools, Clothing, and Similar Bulky Articles, While Just Ahead of It Is the "Arsenal" Cabinet, Devoted to Supplies of a Strictly Sporting Character, Such as Guns, Fishing Rod, Cleaning Apparatus, Baits, and Ammunition





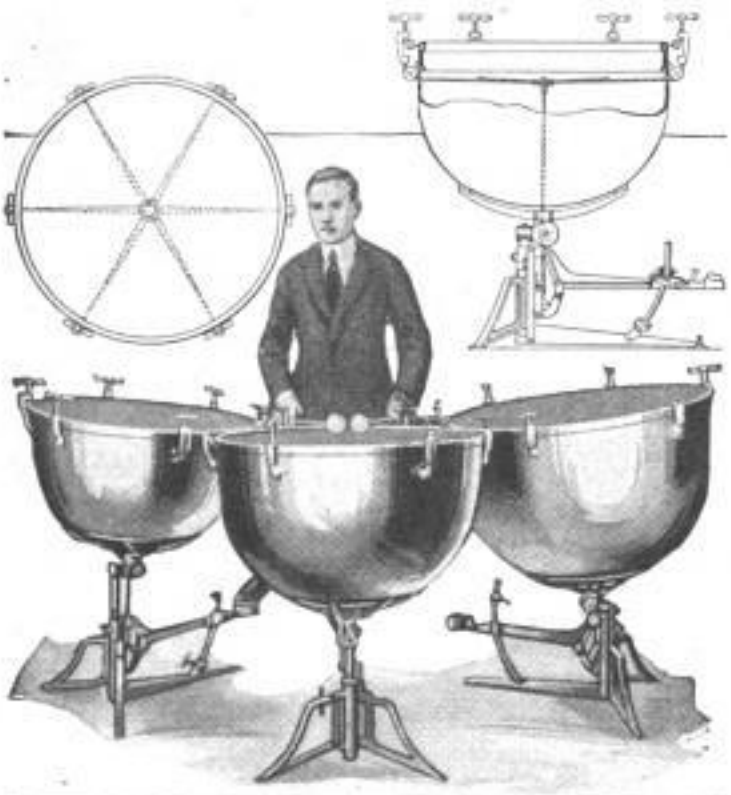
Left: The Gun and Tackle Cabinet, Open. The Toe Hole at the Bottom Helps in Entering the Car on This Side. Right: The Door above the Left Running Board, Opening into the Space underneath the Car

at the driver's left holds two rifles, a shotgun, a fishing rod, and all the necessary accessories and ammunition. There is a commodious compartment at the top of each rear fender, one containing camp stools and clothing, the other toilet and medicinal articles. Side by side on the right running board are two more cabinets. A folding stove and culinary utensils are carried in one, while the other is a pantry for canned goods and food supplies. All the cabinets are arranged to avoid interfering with entering or leaving the car, one door to each seat being left entirely unobstructed.

¶Prehistoric birds resembled the early airplanes in their small wing expanse and large tails, according to a British engineer, indicating that man's and nature's development work have been parallel. Flying fish are more likely than birds to yield information about soaring flight, in the opinion of another observer.

PITCH OF KETTLEDRUMS IS VARIED BY FOOT LEVERS

A new development in the manufacture of kettledrums makes it possible to play a full octave and a half of the chromatic scale, with three drums, without the necessity of altering the head tension by means of the hand clamps., According to the manufacturers, this has never been practicable before the advent of the new drums. Another assertion of the makers



Above: Details of the Mechanism of the Variable-Pitch Kettledrum. Below: A Battery of Three Drums Has a Range of 1½ Octave of the Chromatic Scale

is that any full or half step, within the range of any particular size drum, may be instantly sounded without a change in the adjustment of the hand clamps after the preliminary tuning has been accomplished. The variations are made possible by a pedal and a system of cables which, pulling upon the hand clamps, increases or decreases the tension of the drumhead. The pedal may be locked in any position, corresponding to a desired tone, or it may be moved up or down to allow the sounding of any note of the full range. Learning to manipulate the pedal is on the order of the muscle training gone through in mastering the slide trombone. The drums are made in three sizes, the largest being 35 in. in diameter. This, said to be the largest kettledrum produced, has a range from low C, below the staff, to A, in the staff. The variable-pitch attachment does not interfere with the tilting of the drums to any angle desired, or to revolving them to locate the favorite beating spot.

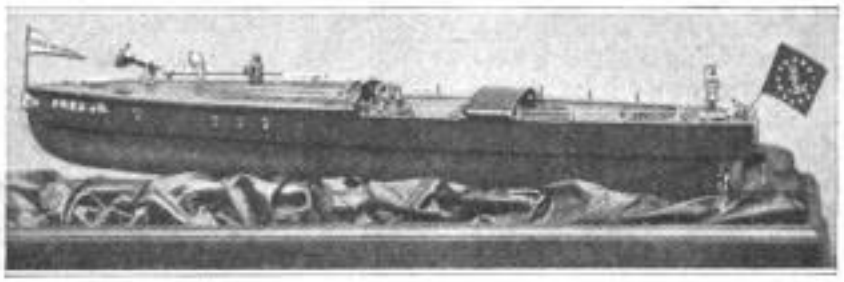
WHY INVISIBLE LIGHT RAYS WEAKEN FABRICS

The deterioration in the strength of cloth fabrics as a result of exposing them to the direct light of the sun has been recognized for years, and various theories have been advanced to account for the phenomenon. Recent experiments seem to have determined the cause to be the absorption and pronounced chemical effects of the ultraviolet rays. In the experiments a new type of mercury-vapor arc lamp was used, the light from which is as rich in the chemical rays as is sunlight at high altitudes. For this reason the effect on test specimens of fabric was as great, after exposures of from one-half hour to 10 hours, as though they had been exposed to direct sunshine for 50 hours. The results showed a maximum decrease in the breaking strength of pure-white test specimens of Japanese silk of 45.2 per cent and an average decrease of 34.9 per cent, the strength of unexposed test specimens of the same dimensions being taken as a basis of comparison. Colored specimens showed a less deterioration than undyed ones, the loss in breaking strength being only 11.9 per cent for the red shades as compared with the average 34.9 per cent for the pure white. In the order of their degree of resistance, the reds lead, with the blue, orange, violet, green, and yellow shades following. Analysis of the quantity of the violet rays absorbed by the various specimens showed that white leads with the colors following in an order reverse to that of their protective properties. In the light of these findings, the experimenter reached the conclusion that the degree of deterioration and that of absorption bear a distinct relation to each other, the light shades leading in absorptive power and resultant disintegration.

¶Seven years are to be devoted, by the city of Manila, to enlarging and improving its water-supply system, with engineers in the United States assisting.

MOTORBOAT WORKING MODEL SHOWN IN CHICAGO MUSEUM

Amateur model makers are seldom more successful than a commission merchant of Chicago, Ill., who recently completed for his small son a miniature motorboat, measuring 31 in. over all. It is a working model, in the first place, containing a dry battery and a small motor which turns the single propeller. On the bow, also, is a movable searchlight. The hull was made of wood. Most ingenuity was shown, however, in the construction of the fittings, all of which, except the bell and railing chains, were made from miscellaneous and valueless articles. The porthole rims, for example, were made of shoe eyelets; the bone handles of the steering wheel from crochet needles. Other equipment includes cushions of real leather, life preservers, a fire ax, a fire extinguisher, two tiny sets of tools, and a megaphone. During its exhibition at the Art Institute of Chicago an offer of $250 was refused.



During Its Exhibition at the Art Institute of Chicago This 31-Inch Motorboat Attracted an Offer of $250. The Model was Made for His Son by a Business Man of That City

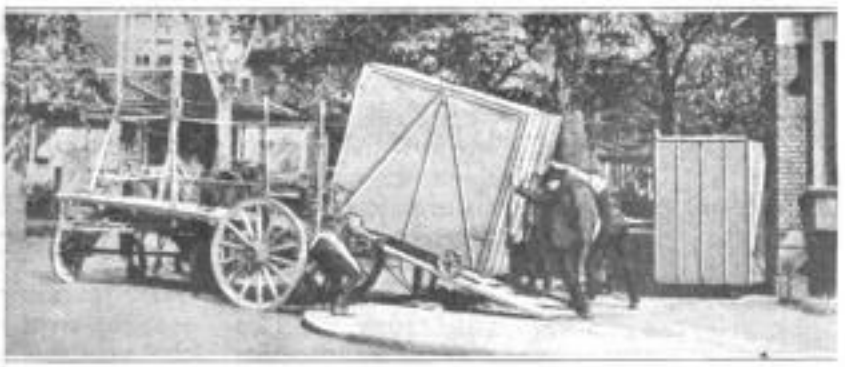
A Picture Carved on the White, Soft Surface of a Bit of Lichen, of the Mountain-Top Variety

CARVES PICTURES ON SURFACE OF MOUNTAIN LICHENS

Fungus of the variety that has a flat, hard, white under surface has long been used by ingenious artists as a medium for the carving of intricate designs and pictures, and now a Virginia woman has extended the interesting process to lichens. These curious growths, partaking of the fungus nature, are particularly adapted to receive the delicate traceries of the artist's knife, and some of the effects produced are extremely pleasing. Mountain-top lichens, being white and soft, have proved best for the purpose.

HOUSEHOLD GOODS SHIPPED IN HUGE STEEL CASES

Shipment of house furnishings long distances, generally a highly uncertain speculation in durability, is made eminently safe by a new method of packing, in which huge steel cases are used. Four of these big furniture safes will hold the household goods of an ordinary five-room apartment, padded in the usual way. Their stout sheet-iron sides are mounted on a steel frame, braced at the centers with V-shaped truss members that maintain their rigid resistance against the roughest treatment. The cases are not sold to the shippers, but merely rented, and are returned to the local representative of the packing-case concern at the end of their journey.



Loading a Wagon with Big Steel Packing Cases Containing Furniture for Long-Distance Shipment: The V-Shaped Braces Are Interesting

ALUNDUM FILTERING ELEMENT IS USED IN NEW EXTRACTOR

In making extracts from fats, oils, and other complex compounds, it is quite necessary that none of the solid portions be allowed to pass with the desired solutions. Heretofore this has been prevented by the use of paper, glass wool, asbestos, and other filtering mediums, which are troublesome and not always satisfactory. A new filtering element, in the form of an alundum cup, is said to overcome the difficulties formerly experienced, as the material is insoluble in most chemicals and is easily cleaned when it becomes clogged. Alundum is an electric-furnace product made by subjecting some of the earthlike aluminum ores to an intense roasting process. It is porous and readily molded into forms. The apparatus in which the new-type filter is used consists of a flask, the filtering chamber containing the alundum cup, and a condenser, placed one above the other and connected by glass tubing. The sample from which the extract is to be taken is placed in the cup, and heat is applied to the flask which contains the solvent. The latter vaporizes, passes up into the condensing chamber, where it is condensed, and drips into the cup, where it dissolves the sample. The resulting solution seeps through the microscopic pores of the alundum, leaving the solid parts of the sample behind. The extract next siphons back into the flask, and the process is repeated until a sufficient quantity of the desired component of the compound has been obtained.

POCKET BOOK AND CANE MAKE RADIO-RECEIVING SET

With an ingenious tuning device arranged in the form of a small book, and using a walking stick as a mast for the antenna wire, a British officer has contrived a radio-receiving set of extreme simplicity and portability. By opening the pocket-size book to greater or less degree, and varying the antenna length, reception is adjusted to wave lengths between 300 and 2,500 meters. With this equipment, using a regular head telephone, messages have been received from stations more than 500 miles distant.

PHOTO, GILLIAMS SERVICE

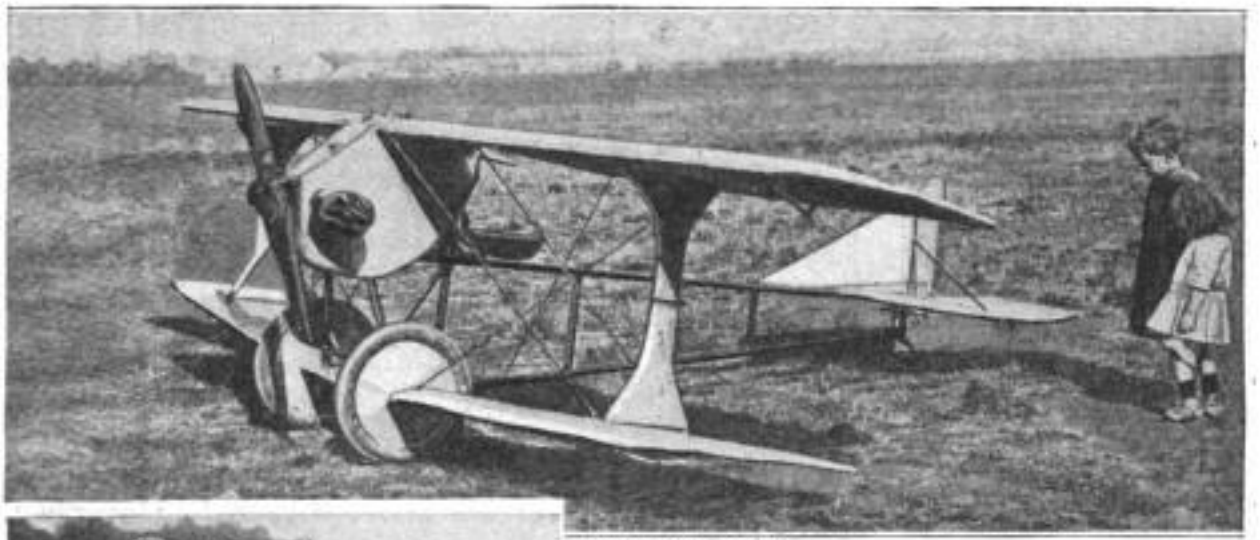
Receiving Radio Messages with a Walking-Stick Antenna and a Booklike Tuning Device

DIESEL-OIL ENGINES DRIVE BIG FREIGHTER

The largest ship to be equipped with internal-combustion engines has been recently completed and launched in Germany. It compares quite favorably, in point of size, with many of the steam-propelled craft, being 541 ft. long with a beam of 60½ ft., and a total displacement of 22,000 tons. The main power plant consists of two six-cylinder Diesel engines of 22.7-in. bore and 40-in. stroke, which, at a normal speed of 102 r.p.m., develop 4,400 h.p. and drive the ship at a speed of about 13 miles an hour. A secondary power plant, which is to be superseded by a full electrical equipment at some future date, consists of steam pumps, hoisting engines, etc., with the necessary boilers. Except when docking, the ship is steered by compressed-air machinery.

USES CARBON ARC TO ANALYZE CHEMICAL SUBSTANCES

By placing samples of chemical substances in a small cavity hollowed out of the positive carbon of an electric arc, and projecting the image, magnified 20 times, on a screen, an American chemist asserts that the constituent elements are readily identified. He has determined the characteristics of some 65 elements in this manner, by observing the nature of the color, smoke, sparks and odor emitted.



The Latest Ideas in Wing Bracing are Embodied in This Tiny Flier. The Single Struts and the Wheels are as Carefully Streamlined as Those of the Larger Machines

Two Views of What is Said to Be the Smallest Practical Airplane in the World: The View to the Left Conveys a Fair Idea of the Dimensions of the Little Machine. On the Right, the Little Girl is Occupying the Airman's Seat in the Toy Plane

LILLIPUTIAN AIRPLANE IS EFFICIENT FLIER

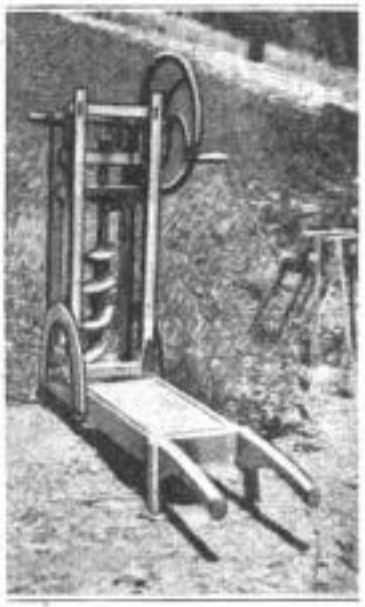
What purports to be the smallest practical airplane in the world was recently constructed by a French airman. The tiny machine weighs but 200 lb. and has a spread of only 12 ft. The supporting surface is about 80 sq. ft. The wings may be folded back upon the frame. When so folded, the plane occupies so little space that it may be housed in the minimum-size private garage. The over-all dimensions of the diminutive craft are: length, 11 ft.; width, folded, 3 ft. 1 in., and height, 4 ft. 2 in. The power plant is an air-cooled, twin-cylinder opposed gasoline engine with a rating of from 16 to 40 hp. During trials, the little machine developed a speed of 60 miles an hour and climbed to an altitude of over 6,000 ft. When dismantled, it may be packed into two comparatively small containers for easy handling and transportation. The designer is so thoroughly convinced of the reliability of the machine that he contemplates the building of the model on a quantity-production basis within the near future.

SURFACE-PLATE MICROMETER CHECKS PISTON FITS

That pistons may be checked as to accuracy of machining, a new precision device, consisting of a steel surface plate and overhanging arm, has been brought out. As the arm carries a micrometer, the dimension of any article placed upon the plate, and in vertical alinement with the arm, can be measured to .001 in. The plate may also be used to determine the wear in split bearing halves.

TIME AND EFFORT-SAVING POST-HOLE DIGGER

A hand-power post-hole digger, designed to be operated by one man, has as noteworthy features a method of quickly and easily lifting the digging screw, with its load of earth, and ease of portability. The movement of a lever engages a small pinion with a rack on the vertically sliding framework that supports the screw. By continuing to turn the hand-wheel in the forward direction—reversal is not necessary—the framework is raised to its full height, and the screw withdrawn from the hole. To make transportation easy, the screw-supporting frame, which is hinged to the hand truck, is folded back upon it and secured. The whole may then be wheeled to the site of operation.



QUICK-ACTION CHANGE TRAY IS WORKED BY ONE HAND

An advertising novelty possessing utility, and certain to attract favorable attention to the advertisement upon it, is a new change tray which may be operated by one hand and eliminates the tedious process of picking up small coins one by one. The tray proper is a light metal pan hinged on one side of the bottom to a heavy base. When the customer depresses a small lever, projecting from the side of the pan directly above the hinge, the pan is tipped and the change deposited in his hand. The lever is always kept pointed so that the customer can tilt the tray with the little finger of his right hand.

A New Advertising Novelty Is a "One-Armed" Change Tray Which Deposits the Coins in the Customer's Hand

SOUTH AMERICAN CITY HAS QUEER "SANITARY" SYSTEM

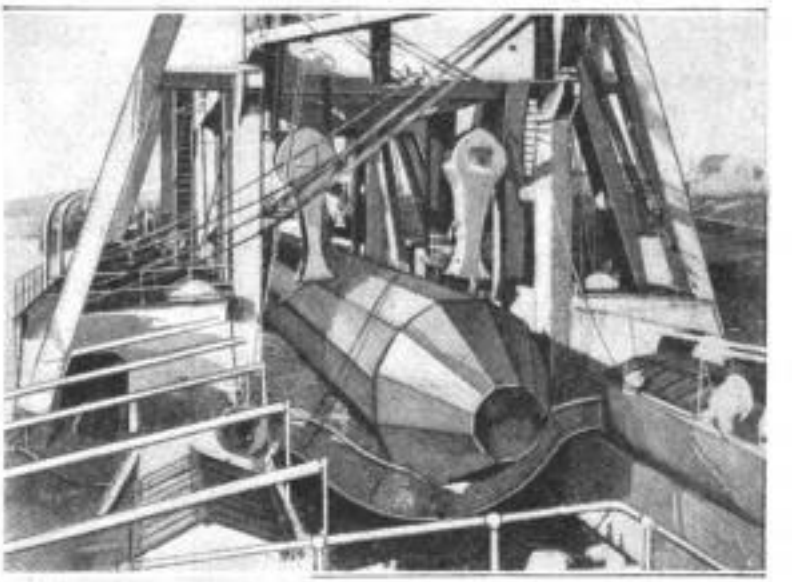
Fashionable residence streets and boulevards bordered by open sewers, whose repulsive contents are caused to overflow at intervals by dams of garbage and refuse, make a picture impossible to North American civilization. Yet in South America, even cities of some pretension to modernity and culture are still strangers to the art of sanitary engineering. Pasto, a Colombian community of 30,000 population, has a sewage system of the kind described in the first sentence, its little ditches, a foot wide and 8 in. deep, being expected to carry all manner of waste, including tin cans, down to the river. This situation is made more interesting by the fact that the city water supply flows in through the same kind of canals, covered, but not closed, by flat rocks. When the outgoing fluid becomes crossed with the incoming, much sickness results.

AERIAL-WIRE NETWORK SAVES CHICKENS FROM HAWKS

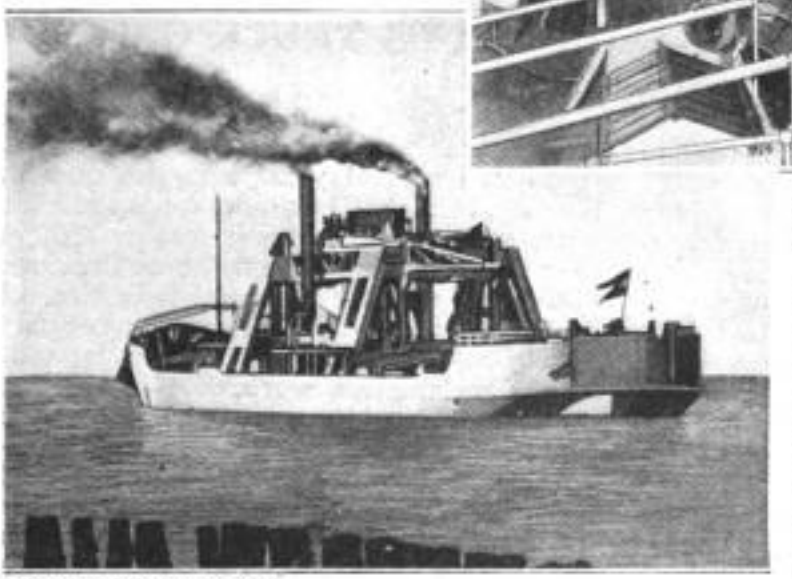
Faced by the necessity of protecting his poultry from the attacks of hawks and other birds of prey infesting the near-by mountains, a Washington rancher has now equipped his chicken yard with an arrangement that is practically as effective as a roof, yet excludes neither light nor air. The protection consists of nothing more than a number of parallel wires strung at close intervals above the yard. This installation has proved effective.

SPANISH CRADLE SHIP FOR SUBMARINE REPAIRS

A repair ship especially designed for working on submarines, and built on the twin-hull principle, containing a long open channel into which a defective underwater boat can be hoisted, has recently been acquired by the government of Spain. The new vessel, named the "Conrad," was constructed in Holland. Intended to be used for the one purpose, most of its deck space is taken up by the frame of the huge hoisting apparatus, by means of which the cradle is lowered until a submarine can be run onto it, and then raised to a working level. The craft thus functions as a floating drydock, equipped for making all the repairs and tests ordinarily required in the maintenance of a fleet of modern submarines.



A Close-Up of the Repair Ship's Deck, Showing the Use of the Hoisting Apparatus in Tests Made at a Holland Port

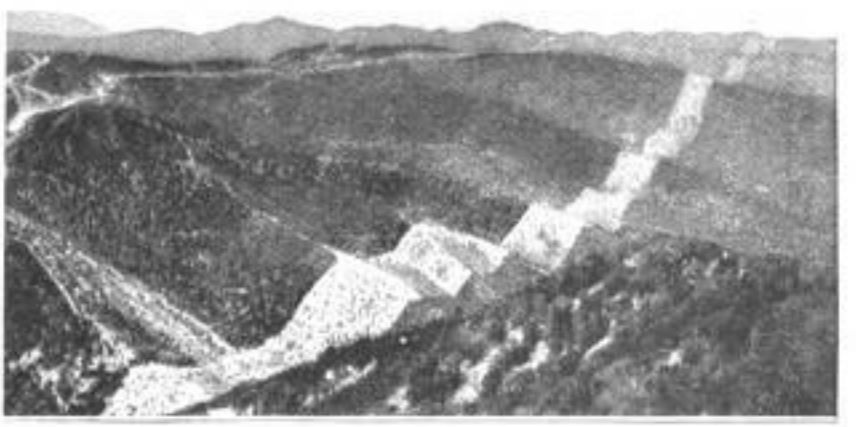


PHOTOS COPYRIGHT, KEYSTONE VIEW CO.

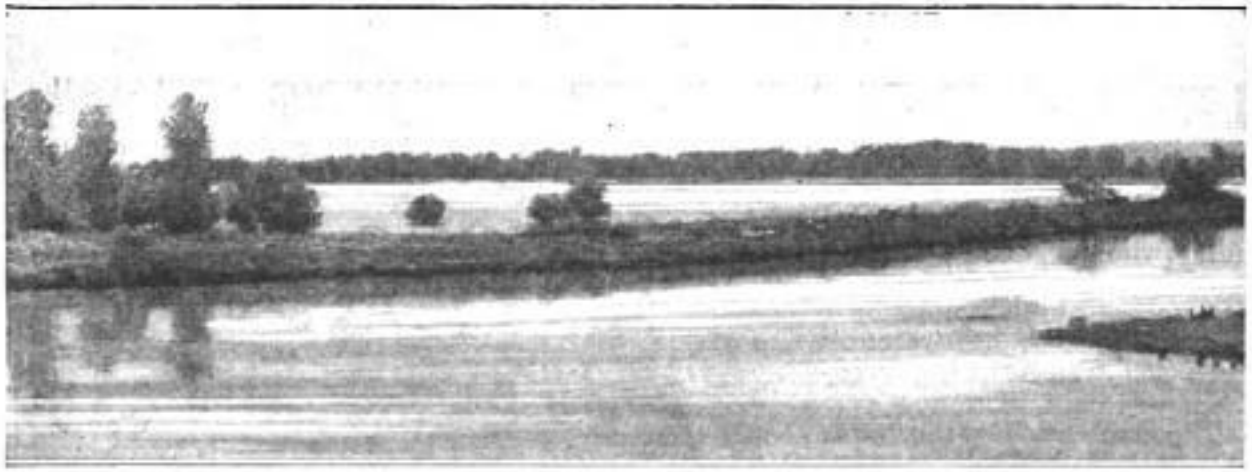
A Side and Stern View of Spain's New Repair Ship for Submarines, Which Carries Powerful Hoisting Machinery between Its Twin Hulls

BIG FIREBREAK TO PROTECT HIGH-TENSION LINE

By creating a 125-ft.-wide firebreak for 65 miles through the Santa Barbara national forests, a high-tension transmission line is protected against fire. The line carries electric current to California coast towns, and should it be broken or destroyed by forest fires, both commercial and domestic activities would be seriously interfered with. Consequently the utility company obtained permission from the United States Forest Service to make the firebreak, which also helps to prevent the spread of forest fires, providing an open, barren gap, across which the most furious flames cannot pass.



The Broad, Barren Streak of the Firebreak, 125 Feet Wide and 65 Miles Long, Makes a Conspicuous Mark against the Forested Mountain Sides



A View of Overflowed Lands in Peninsula Drainage District Number Two, near the Junction of the Willamette River with the Columbia: The Neck of Land in the Foreground Is One of the New Dikes

RECLAIMED LAND TO BECOME CITY'S TRUCK GARDEN

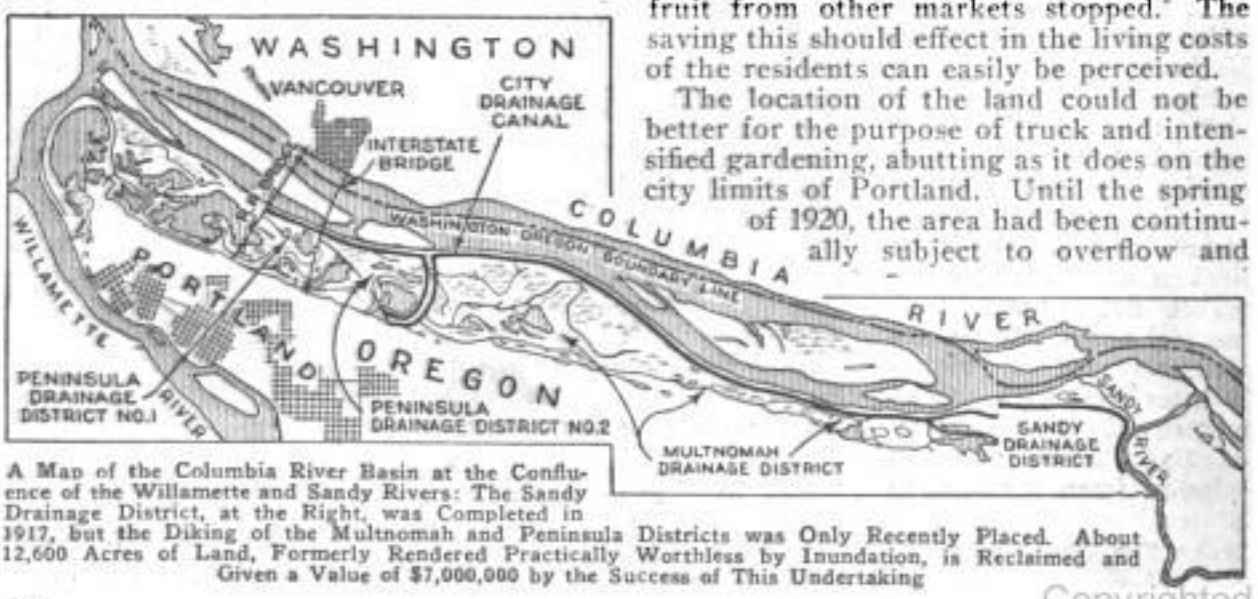
BY DE WITT L. HARRY

BY a simple solution of a diking problem at the junction of the Willamette and Columbia rivers, near Portland, Ore., some 12,600 acres of land, previously held as practically worthless, are being given ample protection from river floods and freshets, and converted into the highest type of land for diversified-farming purposes. The rich silt forming this land, being the deposits left by the two rivers on their journey to the sea, settled in still waters and therefore is not of a sandy nature.

Ten years ago, or even less, the whole area was considered worthless. It is only since the formation of the diking districts that its value is being realized. Most of the sales before these districts were created were at a rate of $5 per acre, and the cost of the reclamation work is expected to reach not more than $50 per acre, making a total outlay for land and protection of about $55 an acre, or approximately $700,000 for the entire district. Similar lands in one of the sections of the project, completed several years ago and now in bearing, bring $500 or more an acre in the open market, and already some sales in the new areas have been made on the same basis, this making the total valuation of the entire area under protection roughly $7,000,000, or an increase of 1,000 per cent by the reclamation work.

Not only does the creation phase of the work make a vivid appeal to the investigator, but the ease of the operations and the simplicity of the scheme of caring for the drainage and flood waters, as well as the expected reduction of living costs in the largely populated area adjacent, command equal interest. Multnomah County, the county that contains Portland and a population of 300,000, has but 21,000 acres of cultivated land at present. This means that the productive area of the county will be increased by over 50 per cent, and the importation of high-grade vegetables and fruit from other markets stopped. The saving this should effect in the living costs of the residents can easily be perceived.

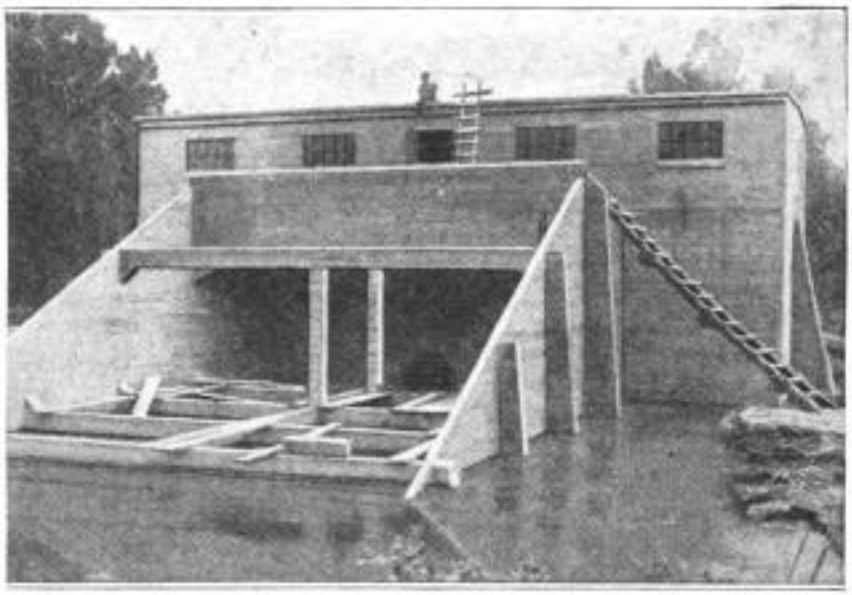
The location of the land could not be better for the purpose of truck and intensified gardening, abutting as it does on the city limits of Portland. Until the spring of 1920, the area had been continually subject to overflow and



A Map of the Columbia River Basin at the Confluence of the Willamette and Sandy Rivers: The Sandy Drainage District, at the Right, was Completed in 1917, but the Diking of the Multnomah and Peninsula Districts was Only Recently Placed. About 12,600 Acres of Land, Formerly Rendered Practically Worthless by Inundation, is Reclaimed and Given a Value of $7,000,000 by the Success of This Undertaking

traversed by sloughs with numberless stagnant lakes scattered about. These have been prolific breeding places for mosquitoes, and the dead waters have hidden land worth millions.

Under the state diking act it is possible for the property owners of districts, situated as is this, to organize under the control of a board of supervisors with state direction. It is necessary for all the owners in the district to sign and indorse the project before the work can be begun, and then the district is allowed to finance itself, always under state supervision, by means of bond issues. The necessary funds becoming available, the diking is carried out, and the land then placed in cultivation.

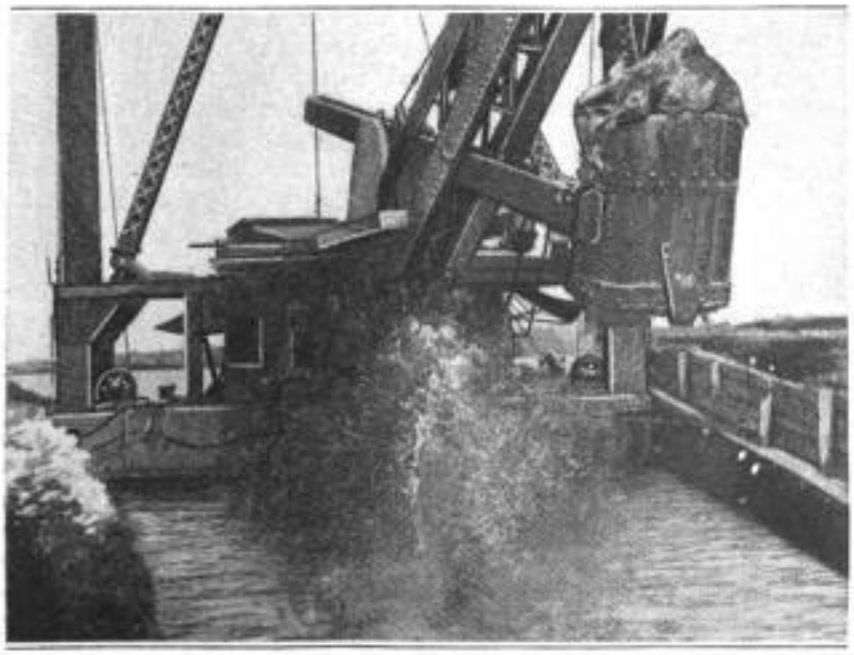


A Pump House of Reinforced Concrete, Built into a Dike in the Multnomah District: The Pumping Equipment of This Installation Has a Capacity of 90,000 Gallons a Minute, and Cares for the Drainage of 8,100 Acres

At the delta of the Willamette, four drainage districts have been formed. The Sandy with an area of about 1,500 acres, the Multnomah, 8,100 acres, and the two peninsula districts with a combined area of about 2,900 acres. The Sandy District was the first formed, and the work there was completed in 1917. This land is now all under cultivation and producing bumper crops. The other districts are just now getting their protection, some of the diking having been done in 1919, and the rest being completed this year.

The average height of the dikes is such as to protect the land from a flood stage of 30 ft. above low water. Only once in the history of the rivers has that mark been exceeded. This was in 1894, when it reached 34 ft., and only five times since the government gauge records have been kept has it been more than 20 ft. Last spring the stage registered at 15 feet.

The main dike for the Multnomah District along the Columbia River, from Fairview to McBride's Slough, near the junction with the Willamette, is 13 miles in length, and has been firmly sodded. It is thought that riprapping will have to be done only in very few spots along any of the river faces of the dikes. The other dikes mostly lie in still waters, as the main current of the Columbia, at this place approximately a mile wide, seems to be near the Washington shore. In the Multnomah District there are about 100 property owners.



One of the Big Steam-Shovel Dredges, with a Dipper Capacity of Three Cubic Yards, Working on the City of Portland's Open Sewer Canal

One of the main sloughs in the region is being converted into an open sewage canal by the city of Portland. This is the McBride's Slough, and it is being deepened and

One of the New Dikes under Construction in the Multnomah District: The Work is Done by the Big Barge at the Left, Which Takes the Material from the Dredges, Brings It to the Dike Location, and Dumps It

cleaned to take the necessary flow to dilute the sewage of a population of 250,000, according to estimates of the Portland city engineer's force. As there are but 25,000 persons now residing in this district, and the majority of them have no sewage connections, it will be readily seen that this canal should care for the needs of the district for some time to come.

In the construction of this open sewer, in which work the city and the drainage districts are coöperating, the material from the bottom of the cut is taken up by dipper dredges, handling 3 cu. yd. to the scoop, and the mud is deposited in barges for removal to levee points. Scrapers, operated by drags, also work on the shore sides, throwing up the material, and the combined work is making it an exceedingly fast job. The earth being a fine silt, it readily lends itself to making a wall impervious to fluids, and as the foundations have been thoroughly grubbed, and all woods and decayed matter removed, the engineers expect the dikes to last.

The districts are all separate undertakings, and the equipment of each will likely be different as it is installed, but the manner of caring for the waters in the largest of the four areas, the Multnomah District, is interesting. This district is 13 miles in length, and at places two miles wide. The river fall is about 3 ft. in 10 miles, and the land to be drained is well covered with natural laterals that will be preserved in the ultimate scheme. By this means it is possible to drain the land by gravity, the waters making their way to the lower end, where the pump house is situated, without forcing, and the one plant caring for the entire area. The pump house, of reinforced concrete, is set in, and is a part of, the dike. It has two pumps, one a 48-in. screw pump, which with a 7-ft. head will lift 50,000 gal. per minute, the capacity increasing as the head decreases, or decreasing as the lift is greater, until at the 12-ft. stage it goes out of commission. The speed of the pump is 230 revolutions per minute.

The second unit is a 36-in. centrifugal pump with a capacity of 30,000 gal. a minute and an operating range up to a 25-ft. head. Its capacity also increases at a low head with the result that the two pumps working at a 7 or 8-ft. head lift 90,000 gal. a minute. Place has been made in the pump house for the installation of another unit if the two pumps now being set are not sufficient.

In order to obtain a greater efficiency at low heads, provision is made to operate the centrifugal pump at two speeds by means of pulleys on the belt-driven pump shaft. The 48-in. pump is operated by a 150-hp. motor, and the 36-in. centrifugal by one of 250 hp. Both are arranged to pump through the face of the dam.

Valves in the discharge pipes are operated by hydraulic pressure, which is controlled by a low-voltage relay circuit on the main switchboard, and the same switches are operated in case of power failures or temporary shut-offs.

Flap valves are so arranged that they will ring an alarm bell when the water in the sump reaches a point so low that the pumps cannot safely operate, and when no attention is paid, the circuit breaker automatically stops the motors. At low-water stages, the drainage passes beneath the pumping station by gravity, flowing through valves that are arranged to close when the outside water rises.

BATTLING LEGION OF POLISH WOMEN LIVED IN BARRACKS

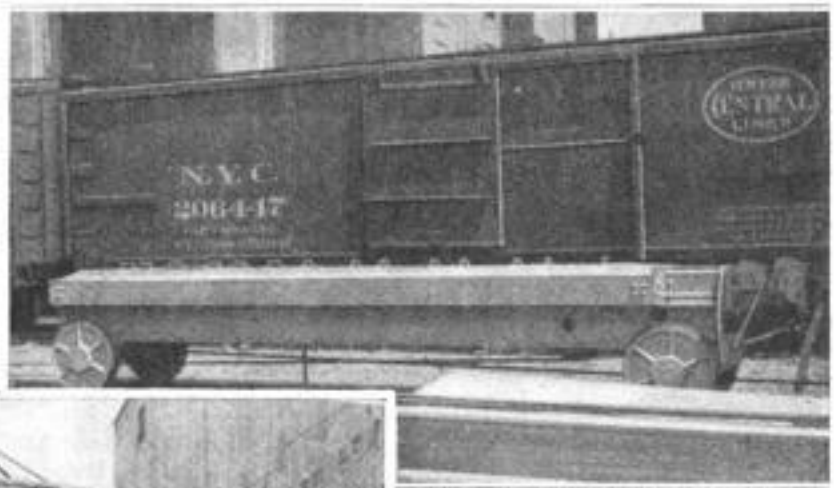
Emulating their sisters of the Russian Battalion of Death, the Polish women formed an army to assist in resisting the threatened invasion of Warsaw. They willingly submitted to the inconveniences and hardships of barrack life, and army drill and discipline. While in barracks, they strove to relieve the monotony by carrying on their home tasks of mending and sewing. The furnishings of the sleeping quarters consisted of only the necessary bedding and rude bunks. These latter were arranged in tiers.

Members of the Polish Women's Regiment, Recruited as a Desperate Measure in the Defense of Warsaw, Pursuing Their Regular Home Tasks during the Intervals between Drill and the Other Activities Incident to Life in Barracks. Though the Living Quarters Were Rough, the Women Suffered the Inconveniences without Complaint

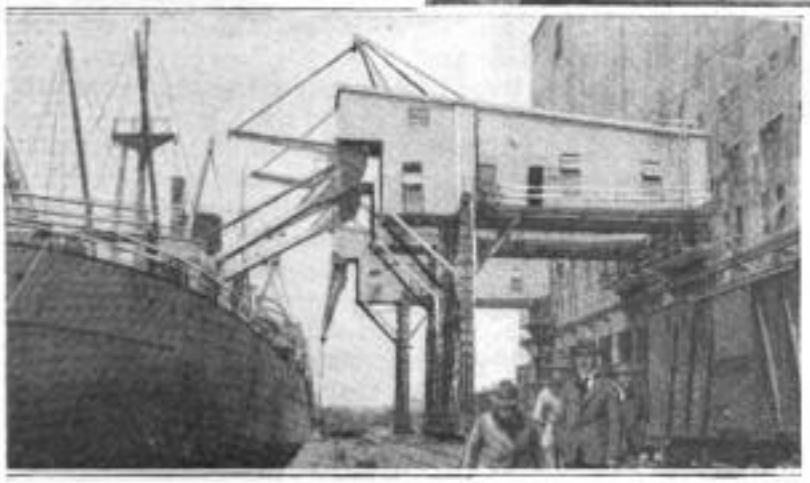
STRANGE DEVICE USED TO SHIFT LOADED CARS

The ordinary practice of moving loaded cars of grain or coal at an elevator or coaling dock is by means of cables that run alongside the track and are hooked to the cars. This system is more or less unsatisfactory and fraught with potential danger.

An improved arrangement involves a narrow-gauge track between the rails of the siding for a four-wheeled car having a heavy concrete bed and equipped with a standard car coupler. This car is operated by cable, and as it is coupled to a string of freight cars it is possible to move the load in either direction. When a new string of cars is to be run onto the siding, the handling car is pulled to the far end of the track, where it passes into a pit between the rails, ready to be raised and go to work again when the locomotive has backed out.



This Four-Wheeled Car Handler can Move Loaded Cars of Grain in Either Direction



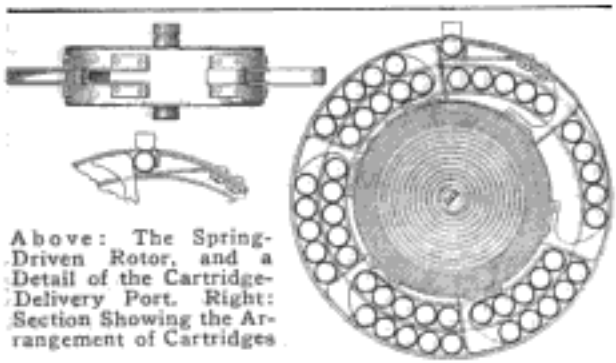
Loaded Grain Cars are Moved over the Grain Pits by the New Car Handler and the Load is Shoveled Out. From the Pits, the Grain is Elevated to Spouts Which Conduct It to the Ship's Hold

THE SUBMACHINE-GUN MAGAZINE

BY MAJ. A. B. RICHESON

THE drum-shaped cartridge magazine for the .45-caliber submachine gun, described in Popular Mechanics last November, is regarded as the answer to all the perplexing problems that have confronted gunmakers since this general type of magazine was first evolved.

In operation, 100 rounds of automatic-pistol ammunition are lifted against gravity and fed into the gun. The mechanism



Above: The Spring-Driven Rotor, and a Detail of the Cartridge-Delivery Port. Right: Section Showing the Arrangement of Cartridges

of the magazine is so cleverly designed that the delivery of each cartridge is perfect in itself, thus enabling the gun to attain its tremendous rate of fire, which is about 1,500 rounds a minute. With this rate of fire, the gun actually discharges several hundred shots per minute, depending on the speed with which the operator is able to replace empty magazines.

The compact, easily portable, and easily adjustable drum-shaped magazine was chosen as the type which would enable the weapon to attain its maximum possibilities. However, the existing models all possessed one or more defects, especially those adapted to hold the large number of cartridges required. This caused a special study of the problem that led to the invention of the magazine adopted for the submachine gun.

The features of the magazine are: the movement of the cartridges in groups along a spiral passageway, each group moved by a separate rotor arm attached to the main propelling spring; the mainspring itself, which can be wound with the magazine either loaded or empty, and which moves the cartridges in a clockwise direction, and the second motive-spring device, which takes the cartridge away from the heavy pressure of the main propellant and delivers it, with only the exact force required, into the gun.

This procedure never varies. Regardless of the number of rounds fired, or the tremendous rate of fire, each cartridge is delivered to the gun in this same exact, perfect manner, which in part must account for the smooth operation of the weapon for considerable periods.

The movement by groups, each by its rotor arm, eliminates entirely the binding and friction that were serious faults in earlier forms of drum-shaped magazines, where the propelling force was applied against the rearmost cartridge, thence successively to those in front, tending to force them outward against the magazine walls, especially where a spiral passageway was used. The pressure exerted by the rotor arms, distributed at regularly spaced intervals throughout the mass of cartridges, readily overcomes their inertia.

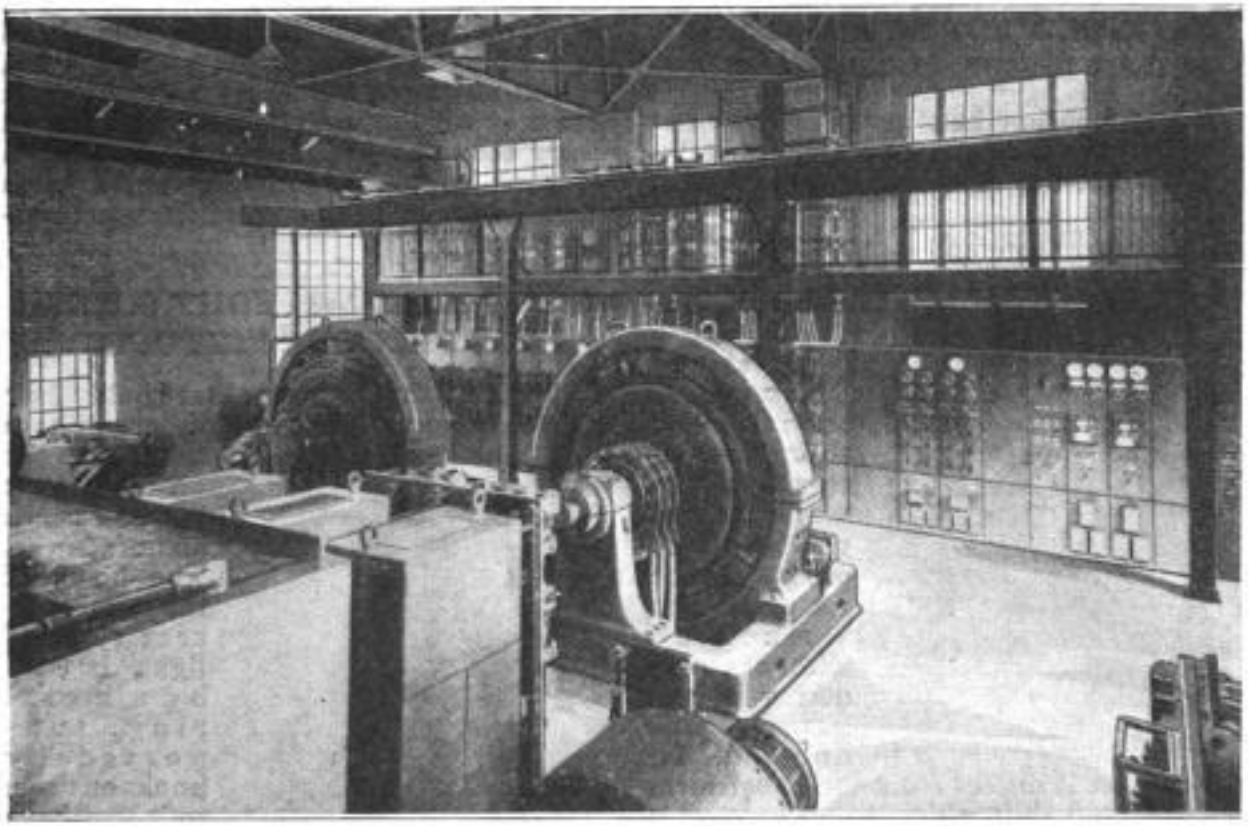
The utilization of the second motive-spring device does away with the objection in older models, that, as the magazine became relatively empty, each succeeding cartridge was delivered to the gun with increasing force, which in some cases became excessive, causing jamming and other malfunctions. This, of course, was due to the application of the propelling force to the last cartridge, throughout the operation.

In the submachine-gun magazine the mainspring ceases to act on the cartridge after it reaches the delivery position.

This magazine, besides being most ingenious in design, is both simple and substantial, no characteristic having been sacrificed, and in addition, has been so constructed as to obviate the disproportionate amount of waste space that made older models bulky and ill-shaped.

CLEVELAND POWER STATION RUNS AUTOMATICALLY

By means of a system of automatic overload and underload relays and cut-outs, two 1,500-kw. rotary converters in a power substation of the Cleveland street-railway company are so accurately governed that they are caused automatically to start, at the proper times, come up to speed, carry their loads as long as may be required, and finally stop when they are no longer needed. All these complex operations are performed without interfering with any other apparatus in the whole power system and without supervision. One of the converters starts as soon as the street cars begin to run at 4:00 a. m. and runs continuously until midnight. The other, acting as an auxiliary, cuts in, upon occasion, and carries half of the peak



Interior of an Automatically Controlled Electric-Converter Station: The Two Big Rotary Converters Start and Stop, at the Right Times, and Divide Their Loads Equally without Attention Other than a Periodical Cleaning and Oiling

loads. This cutting in takes place after the first machine has been running at full load for 15 minutes. The peak load varies with lighting conditions and also with the street-car traffic. There are never less than two peak-load periods during the day, and there may be several. Fifteen minutes after the load on the second machine drops 50 per cent below its capacity, it cuts out, and the full load is transferred to the constant-service machine. Besides controlling the operation of the converters, 18 subsidiary relays and devices prevent their being started or put on the line, should there be any abnormal condition, which might cause damage, anywhere in the whole system.

LOG CABIN ON STILTS MAKES BEAR-PROOF STOREHOUSE

Everybody has read of the sagacity of the Yellowstone Park bears. It is difficult to contrive a storage place for meats or sweets which these intelligent animals cannot find some way of entering or demolishing. The latest attempt has been made by a park ranger, and, so far, it is said to have withstood all attacks. A small log hut is built upon 5-in. stilts, or posts, at a height of 12 ft. from the ground. The posts are not only carefully smoothed, but are protected and rendered claw-proof by sleeves of stovepipe placed near the top. These discourage climbing.

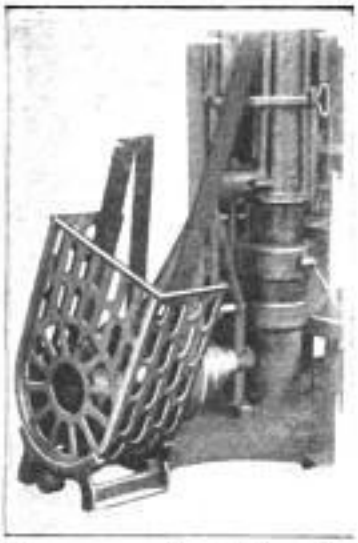
This Bear-Proof Storehouse has, So Far, Withstood the Assaults of the Intelligent Beasts

Access to the cabin is had by means of a ladder and trapdoor.

¶ Automobile fuel and various oils for the paint trade are now being produced from New Zealand's kauri-gum deposits.

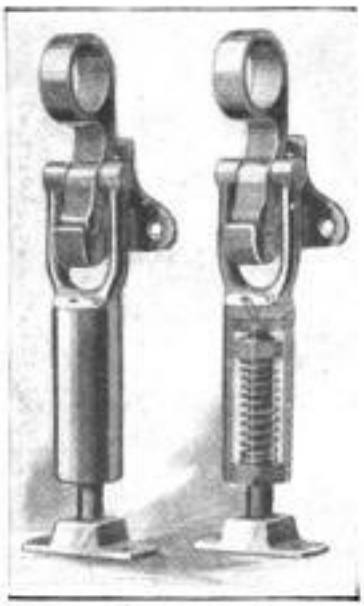
UNIT BELT GUARD AND SHIFT HELPS PREVENT ACCIDENTS

A combination belt guard and shifter of cast iron, which assures ample protection against the catching of the skirts of female employes by the belts, is used on the machinery of a large eastern shoe manufactory. The belt shift is an integral part of the device, and neither of the parts can be removed from a machine without rendering it useless for production. In this respect it differs from the usual form of guard and shift which, being independent units, may be removed without rendering the machine inoperative.



NEW AUTO-HOOD LOCK STOPS RATTLES

An Indiana manufacturer of brass articles offers an improved, self-lubricating motor-hood lock, which is designed to apply pressure in two directions, thus preventing rattling. The device consists of an anchor bolt surrounded by a heavy brass cylinder carrying the finger-operated eccentric lock at the top. A compression spring, inside the cylinder, exerts a steady, downward pull of 50 lb. The cylinder may be adjusted for height by turning it to right or left as a screw, an internal nut being run up or down on the threaded anchor bolt when this is done. Not only does the lock pull down on the hood; it also applies a sidewise pressure which keeps the hood pressed tightly against the end supports. An oil-saturated absorbent pad, placed in the top of the cylinder, is compressed every time the lock is released. The oil squeezed onto the moving parts keeps them in easy working condition, preventing corrosion.



GLASS HELD WITHOUT SCREWS ON ELECTRIC FIXTURES

Electric-light fixtures that hold their glassware without the use of screws have now been put on the market by an eastern manufacturer. The bowl, of the semi-indirect type of light, is held by a metal ring, supported by hooks on three rods that have the appearance of small chains. One of the hooks holds the joint of the ring together, and by releasing a hook the bowl may be tilted for cleaning, or removed, but it will not fall if fractured. A ceiling light is also made, in which the glass globe is supported by a hinged metal flange inside the neck, instead of outside.

LAMPS ON ORNAMENTAL DAM ARE SET IN NICHES

On the big Kensico dam of New York City's water-supply system, the builders have adopted an interesting method of lighting that harmonizes unusually well with the ornamental character of the new work. Square niches, faced with paneled prismatic windows, are set in the stone parapet of the dam at intervals of 15 ft., with padlocks to keep the inclosed electric bulbs safe yet accessible. No lamp-posts are used.

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THE MECHANISMS OF WAR ON DUTY IN IRELAND

Following the British Policy of Suppressing Insurrection with a Firm Hand, Members of the Royal Irish Constabulary Here are Raiding a Dublin House, Suspected of Harboring Enemies of the Government. Most of These Raids Occur at Night, but the Object of the Search is Made as Bright as Day by Army Searchlights on Motor Trucks

The Placard Hung upon This Dejected, Tied, and Manacled Figure Signifies That He has Been a Member of the "Irish Republican Army," but is Now Suspended in Disgrace for Some Infraction of Rules

The Royal Irish Constabulary, Auxiliary Corps, What Time It is Not Actually Engaged in Warlike Action, Practices Diligently for the Occasions When It will Be. The Formidable Armored Cars of Modern Military Work are Employed, and All the Other Paraphernalia of Real Battle. In the Dublin Street Scene Here, a Heavy Smoke Screen is being Laid Down in Broad Daylight

Left: The Irrigation Ditch Responsible for the Shifting of Neighboring Soil, Graded for the Installation of a Steel Flume. Right: A Five-Acre Barley Field Shifted Downhill and Banked Up 20 Feet by the Upheaval

AIDS DISTRIBUTION OF CARDS BY MECHANICAL SORTING

Sorting large numbers of file cards into classified groups is considerably accelerated by a new form of compartmented tray. Each longitudinal row of compartments, having front and side partitions but no back, is a separate unit, hung on pivots at the ends so that the back edge may be raised. A spindle extending back under the compartments carries cams that press against the bottoms and, when turned, raises them. Cards rapidly distributed by hand, some of which fail to drop accurately into the compartments, are so agitated by this movement that

The Card Compartments, Raised by Turning the Button, Shaking the Cards into Their Proper Positions

they settle at once into their proper places, forming compact and easily removable packs.

STRANGE SUBTERRANEAN SHIFT FOLLOWS IRRIGATION DITCH

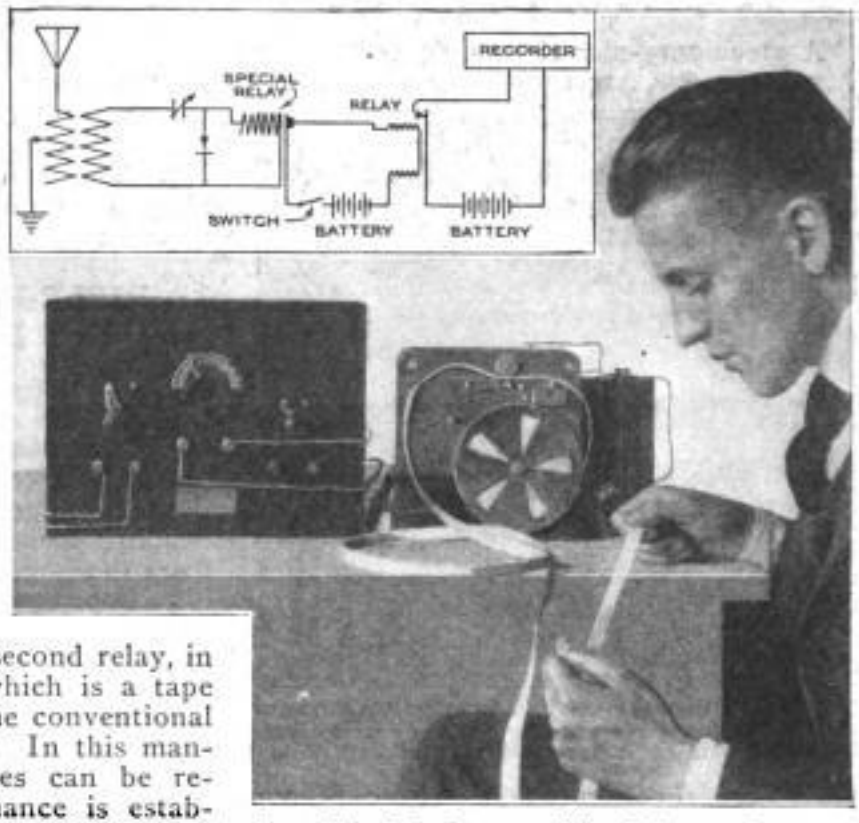
Digging into the ground a few feet does not ordinarily give rise to any strange phenomena, but an irrigating project in the Snake River valley of western Idaho is proving an exception. After the ditch had been dug, and some 8,500 gal. of water a minute were flowing in it, a queer wave of soil began a slow progress alongside, its crest moving 3 ft. a day or less, and the land behind it cracking and sinking. In one place a five-acre barley field was thrown into confusion and moved downhill, while in another the upheaval reached a height of 20 ft., comparable in effect to an ice jam. Meanwhile nearly all the water is disappearing into the ground, and engineers believe the whole trouble is caused by subterranean movement due to softening of a sandy subsoil. A 400-ft. steel flume is to be installed to insure the permanency of the ditch and its surrounding territory.

NEW ALUMINUM ALLOY IS USED IN ARTIFICIAL LIMBS

The manufacturers of artificial limbs have long been seeking a material which would combine lightness and strength. Although these requisites are found in aluminum and the commoner alloys of this metal, these have proved unsuitable for the reason that they are rather badly corroded by perspiration. An English manufacturer claims to have overcome the objection by the development of a new aluminum alloy which is said to be proof against this corrosion. As in the well-known types of limbs, the joints of the new variety are of steel and bronze, the wearing parts, bushings, etc., being of the latter metal and of sole leather. This is permissible, as these parts do not come in contact with the user's skin.

NEW RADIO RELAY OPERATES ON WEAK CURRENTS

A recent advance in wireless-receiving apparatus development is a supersensitive electromagnetic relay, constructed on a new principle, which is actuated by the extremely faint currents generated in the secondary coil of a wireless-receiving transformer. The device is said to work well in connection with one or a series of amplifier tubes. It was developed particularly for use on shipboard, for the purpose of closing a secondary circuit carrying sufficient current to close a heavier, less sensitive relay. This second relay, in turn, closes a circuit in which is a tape recording instrument of the conventional type used in wire systems. In this manner, long-distance messages can be recorded after proper resonance is established by means of the regular telephone set. As all distress signals are sent out at the same wave length, the apparatus may be set to that length with the assurance that all impulses will be recorded. This will permit the operator to absent himself from his post of duty without fear of missing any call, or, at least, relax from the strain of concentrated attention.



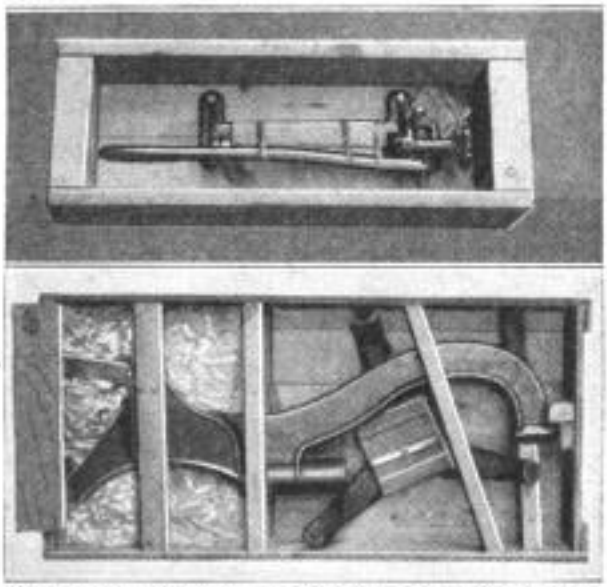
Top: The New Supersensitive Relay as Connected into the Radio-Receiving Circuit. Below: The Message is Recorded on a Moving Tape

HUMAN TUG PULLS TWO HEAVY TOURING CARS LOADED WITH CHILDREN

A STRONG man, resident of Coney Island, recently performed a most unusual feat of strength and endurance upon a wager. Tying the ends of a rope to the bumpers of two touring cars and using the center of the rope as a harness over his shoulders, he hauled the two cars, loaded with children, a distance of five miles in the phenomenal time of 44 minutes and 39 seconds, or at a rate of speed of approximately 6¾ miles an hour. It will be noted that the side pull on the rope is very heavy. More energy was required to pull the load in this way than would have been expended if he had hitched the cars one behind the other.

PHOTOGRAPHS PROVE PROPER PACKING OF SHIPMENTS

A machinery-manufacturing concern in Massachusetts has found a new and valuable use for commercial photography. Before putting on the cover of a box the contents are photographed to show that they are securely and properly packed. One of the prints is kept by the shipper. The other is forwarded to the consignee. In the event of damage in transit, both the shipper and the customer have proof that it was not due to negligence in packing. The consignee's print is valuable, also, as a guide in unpacking complicated machinery.

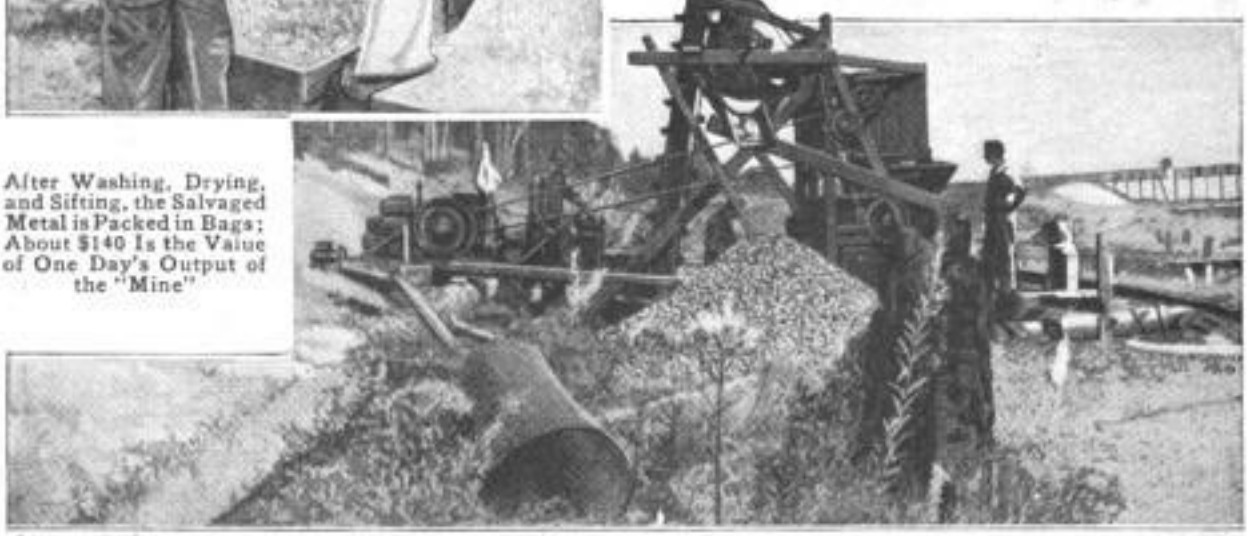


Photographs Showing the Details of Packing Operations. Top: How a Piece is Placed in the Packing Box. Bottom: Securing It against Movement with Cleats

RIFLE-RANGE LEAD MINE PAYS LARGE DIVIDENDS

The thought having occurred to a western ore specialist that there should be a considerable quantity of valuable metal, lead, copper, etc., reclaimable from the rifle ranges of the various abandoned training camps, he obtained permission from the government to work one of the old camp sites on a percentage basis. The results were quite up to his expectations, as he is daily reclaiming about 1,200 lb. of nickel, copper, and lead, formerly the component parts of the bullets used in target practice. It is expected that about 100 tons of metals, worth $200 per ton, will be recovered from the one range in three months' time. The operation will probably be repeated at the other abandoned camps. As billions of rounds of cartridges were fired by the troops in training, the value of the reclaimed metal will run into the hundreds of thousands of dollars. A point worthy of comment, as it is pertinent to the question of the marksmanship of the men, is that the strip being mined, situated on a hillside directly in the rear of the site of the targets, is only 15 to 20 ft. wide from top to bottom, and that

After Washing, Drying, and Sifting, the Salvaged Metal is Packed in Bags; About $140 Is the Value of One Day's Output of the "Mine"



A Full-Fledged Mining Machine Set Up on the Site of a Former Rifle Range: It is Reclaiming Lead, Copper, and Nickel at the Rate of About 1,200 Pounds per Day from a Hillside That Formed the Back Stop to the Range. The Metal Is the Remains of Government Ammunition Expended in Training Our Fighting Men

most of the metal, sometimes great masses welded together, is found on a dead line with the targets. The work consists of wheeling the earth to a gas-engine-driven washing and sifting machine in wheelbarrows. After the coarser dirt has been removed by a revolving barrel screen, the metal and remaining soil pass through a flume where the latter is washed off. Then follows another sifting through finer-mesh sieves. After drying, the reclaimed metal is packed in bags.

TEA-WAGON TYPE STEAM TABLE IS ELECTRICALLY HEATED

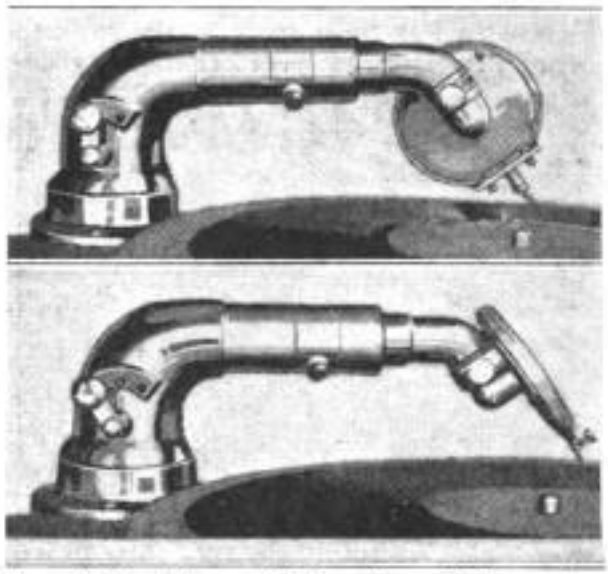
A recent addition to special equipment for hospital and similar work is a portable electrically heated steam table, built like a tea wagon. The nickel-silver top, 57 by 25 in., contains two meat pans, four vegetable jars, one gravy jar, and a 3-gal. coffee urn, all of aluminum. The heating element is mounted under the angle-iron frame of the 6½-in. deep copper water

A Portable Steam Table with an Electric Heating Element in Its Water Pan, and Aluminum Utensils

pan, with a three-heat switch at the handle end. A 6-in. folding carving shelf runs the length of the wagon. The weight is about 350 lb. complete.

NEW PHONOGRAPH TONE ARM ADJUSTABLE THREE WAYS

A new phonograph tone arm and reproducer has recently been placed upon the market which may be adjusted to play the vertically indented "hill-and-dale" type of record or the laterally cut variety. This is accomplished by turning the reproducer disk to the two different angles. As some records are designed to be reproduced by sapphire points, others by diamond points, and still others by steel needles, and as the pressure brought to bear upon the



Top: A New Phonograph Reproducer Playing a Laterally Cut Record. Bottom: Playing a "Hill-and-Dale" Type. The Small Lever on the Column Varies the Pressure on the Point

record should be varied with the kind of point used, the new tone arm is equipped with a small lever, in the upright portion, which may be instantly set to apply the recommended pressure. The claim is that the new device will play all brands of records with an exceptionally faithful adherence to tone qualities and values.

TWO-LEVEL GARAGE AND HOME IS A REVERSAL OF RULE

Chauffeur's living quarters on the second floor of private garages are common, and having the garage built into the owner's home is not unusual, but an arrangement whereby the chauffeur occupies the first floor, while the motors are housed in the second story, is something of a departure in design. This odd garage is built upon the top of a steep natural terrace in a western city.

This Garage Gives the Chauffeur a Ground-Floor Residence. The Cars Occupy the Top Floor

SMALL-SCALE DENTAL CHAIR IS BUILT FOR CHILDREN

The importance of caring for the teeth of children has been so strongly realized during the past few years that many devices have been brought out to facilitate the work. The latest of these is a special dental chair, as complete in appointments as is the regular adult size, but constructed on a reduced scale. As the back is low and the seat short, it is much more comfortable, and the support more solid and secure than can be the case with the large chairs, no matter how many special fittings and adjustments there may be supplied with the latter. Besides the regular footrest, the child's chair is fitted with an auxiliary rest for the comfort of the smallest patients. Height adjustment is accomplished by means of a pedal acting upon a mechanism in the pedestal base. The headrest is also adjustable.

Left: Child's Size Dental Chair Raised to Full Height and Showing the Auxiliary Footrest. Upper: Chair Set to the Low Limit

NORTHERNMOST ALASKAN POINT TO HAVE MODERN HOSPITAL

Taking advantage of unusual weather conditions, a tiny power schooner, carrying lumber for buildings, equipment for a modern-hospital operating room, and a large furnace, succeeded in reaching and unloading its cargo at Point Barrow, the most northerly tip of the American continent, last summer. Winds sweeping westward had packed the ice of the Arctic Ocean against Siberian shores, leaving the water open off the coast of Alaska. The little schooner drove northward, facing the possibility of a change of wind, which would reverse the action of the ice and hem it in on the Alaska coast. Point Barrow was reached on August 26, after a voyage of 62 days from Nome. With the aid of 75 Eskimos and white men, the boat's cargo was discharged in the record time of seven hours. Fearing the ice menace, the captain immediately headed back for Nome. Throughout the dangerous trip the master of the ship was accompanied by his wife.

The hospital at Point Barrow will be constructed this winter with native help and operated by a church home-missions organization of the United States.

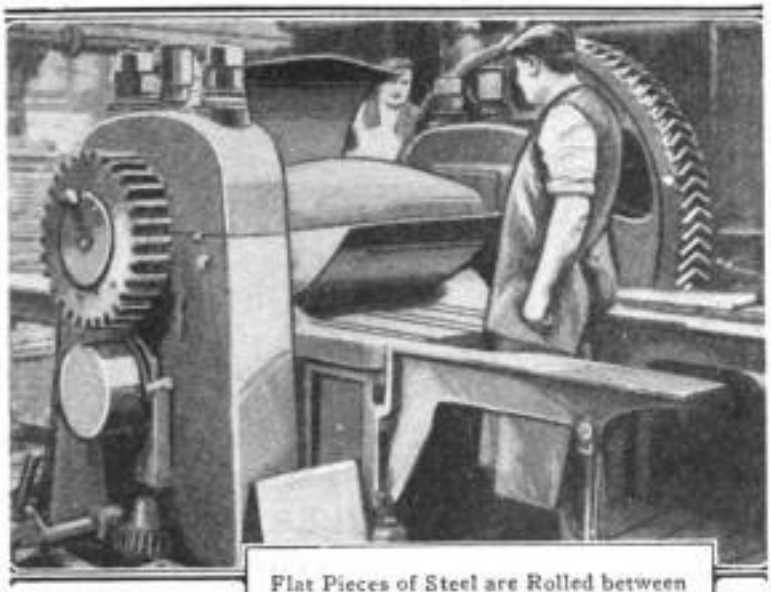
WOODEN MASTER KEYS HOLD ODD CHAIRS TOGETHER

Two chairs, assembled without the use of nails, screws, or glue, the handiwork of a Pennsylvania artisan, are believed to be the only ones of their kind extant. They are built up of many parts so accurately fitted together that each interlocks with its fellow, the whole assembly being locked together by master keys which are put into place last. The larger of the chairs contains a total of 50 pieces, four of which are keys. The smaller is not quite so elaborate, containing only 48 blocks, including two keys. The idea is the same as that employed in a puzzle, popular a few years ago, in which a key piece held a number of peculiarly cut blocks together in the form of a double Maltese cross.

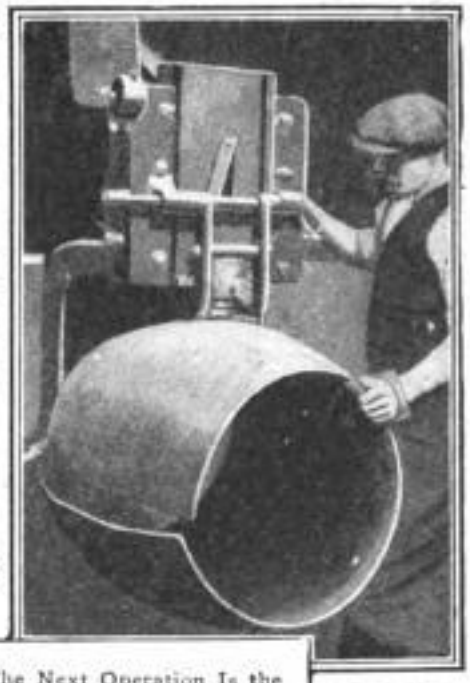
These Chairs were Assembled without Nails, Screws, or Glue. The 50 Parts Composing the Armchair are Locked Together with Four Master Keys

¶ The name of America's air pioneers is to be given to all American-built engines of the Hispano-Suiza design used in the army air service. Henceforth these engines are to be known as the "Wright" models "E-2" and "H-2." They are being so listed in the official records.

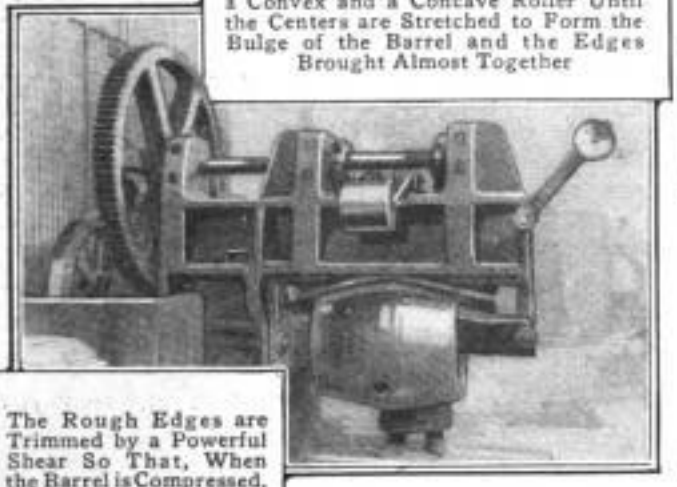
INDESTRUCTIBLE STEEL BARRELS IN THE MAKING



Flat Pieces of Steel are Rolled between a Convex and a Concave Roller Until the Centers are Stretched to Form the Bulge of the Barrel and the Edges Brought Almost Together



The Next Operation Is the Punching of the Hole for the Bung. This is Done by One Movement of a Die in a Heavy Press



The Rough Edges are Trimmed by a Powerful Shear So That, When the Barrel is Compressed, They will Come Together Perfectly True. The Seam is Electrically Welded

The Rim of the Bunghole is Welded in Place. The Steel Bung is, Later, Screwed into the Rim, Which is Internally Threaded to Receive It

The Edges of Round Plates are Upset by a Press, Forming Rims. After the Plates are Forced into the Ends of the Barrels, Forming the Heads, Their Edges and Those of the Barrels are Solidly Welded Together

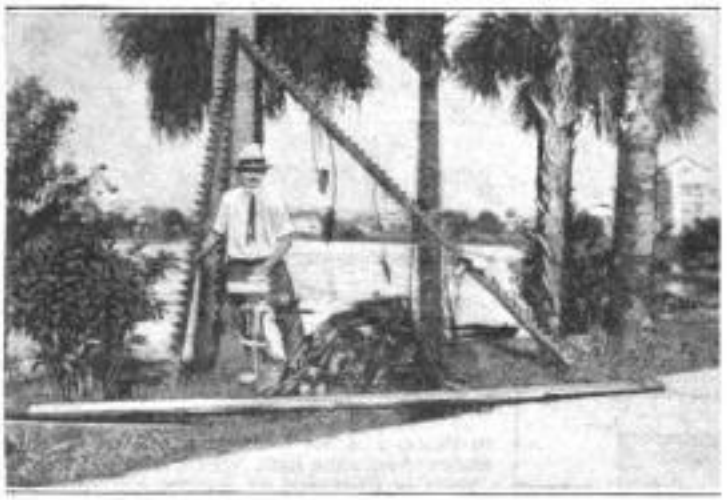
Arc-Welding a Head into a 1,000-Gallon Gasoline Tank: As in the Heading of Barrels, After the Heads are Pressed In, Thin Rings of Steel are Placed on Both Sides of Them. These, the Head Rims, and the Barrel Edges, are Fused into a Solid Mass by the Welding Arc

PHOTOS BY THE FLEET AGENCY, LONDON

One of Florida's Inland Lakes, Infested with the Overluxuriant Toad Lily, a Ten-Acre Bed of Which Is Visible in the Picture: These were All Removed with a Total Expenditure of Two Gallons of Gasoline, by Means of a Simple Improvised Cutter Drawn by a Motorboat

LAKE CLEARED OF LILIES AT LOW EXPENDITURE

With the aid of a homemade cutter and an outboard-type rowboat motor a park official of St. Petersburg, Fla., recently cleared Mirror Lake, in that city, of 25 tons of toad lilies at an expenditure of two gallons of gasoline and some time. The cutter consists of two 15-ft. lengths of angle iron bolted together at one end so as to form an acute angle. Riveted to these are the cutting teeth used on a mowing-machine sickle bar. It is supported fore and aft by a rowboat. Upon being dragged through lily or weed beds, it cuts the growths off well below the surface.



Leaning against the Tree Is the Plow That Removed the Lily Beds: A Pair of Angle Irons Bolted Together in a "V," with Toothed Sickle Bars Riveted to Them

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¶Sea water will be made to yield 100 tons of metallic magnesium a year by electric power, in the new saltworks at Bergen, Norway.

GHOSTLY RIDER IN THE SKY DEFIES EXPLANATION

Just after Francisco Villa, Mexican bandit and "general" extraordinary, made his well-remembered raid on the town of Columbus, N. M., a government surveyor made an exposure with his camera. When the negative had been developed and printed, it was observed that there was a well-defined image of a horseman in the sky. The photographer emphatically states that the photograph is not the result of a double exposure, and as the horseman is cleanly decapitated by the white margin around the print the possibility of an accidental double printing can hardly be considered. The theory has been advanced that the horse and rider got into the picture as the effect of a mirage. This hypothesis suggests the possibility that light rays of the invisible range, but possessing actinic quality, might create a mirage that would readily impress its image upon a photographic emulsion.

A Curious Snapshot Photograph Taken in New Mexico, Revealing a Phantom Horseman in the Sky

TEMPORARY CENOTAPH HONORS CANADIAN WARRIORS

Eager to do honor to Canadian men who fell in the World War, and unwilling to await the proposed erection of a great permanent monument, club women of Winnipeg recently dedicated, with appropriate ceremonies, a temporary but imposing cenotaph. "The Glorious Dead: Their Name Liveth for Evermore" is the legend, and below it are the names of battles in which the Canadian troops made their immortal sacrifices. It is significant of the earnestness with which the northern country carries its heavy war burden, that the placing of flowers on the monument, intended only as a dedication-day rite, still continues from day to day; and the spectacle of bowed figures, kneeling before the grim marker, is not at all unusual.

Three Thousand Citizens of Winnipeg, Canada, Witnessing the Unveiling of the Temporary Cenotaph in Honor of the City's Fighting Men Who Fell in the World War

MINIATURE CANTEEN PERPETUATES MEMORY OF PLEASANT HOURS BEHIND THE LINES

THAT the memory of the most pleasant hours spent overseas be kept green in the minds of World War veterans, a reproduction of the first Red Cross canteen to be established in France is being created by a noted sculptor, member of the staff of the National Museum. The figures in the reproduction are being modeled to a miniature scale, and the furnishings, benches, tables, stoves, piano, etc., are all in keeping. Not only are the figures faithful to the human models, as to minute details, but the sculptor, aided by the first director of the famous original canteen and another well-known Red Cross canteen worker, has succeeded in expressing spontaneous action and life, and also in catching and fixing that mysterious something generally known as atmosphere. When finished, the model will be placed in the Red Cross building in Washington.

ACETYLENE WELDING SAVES SHIP'S OLD HAWSEPIPE

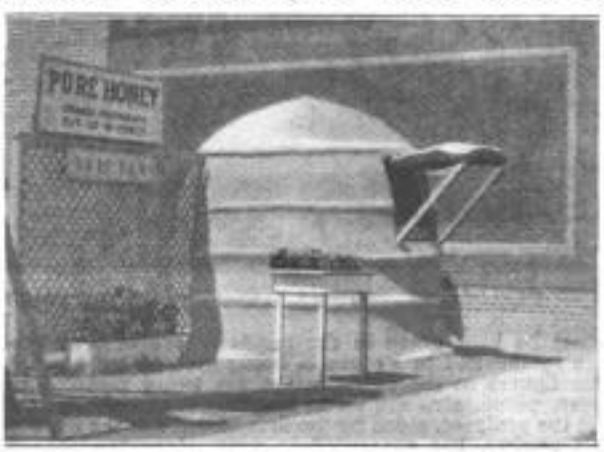
After a score of years of use, subjected to constant wear and erosion, the iron hawsepipe of a certain ship in eastern

The Acetylene-Welded Repair on the Ship's Hawsepipe, with the Deck Cut Away to Accommodate the Torch

waters recently reached a condition that appeared to demand a $4,000 replacement job. At this juncture, however, an expert acetylene welder came to the rescue. By cutting away the adjacent part of the deck planking to permit safe application of the torch, a complete repair was made in 16 hours' work on the pipe, which was thus, at an insignificant cost, prepared for probably another 20 years of service.

HIVE-SHAPED BUILDING HOUSES HONEY SHOP

A merchant who deals exclusively in honey so thoroughly believes in "sticking close to his work" that he has had his store shaped into the form of an immense beehive. The idea is designed to be a business stimulator, an effect which it probably has. A lattice alongside the building heightens the suggestion of honey, as it slightly resembles a crosscut section of comb.



An Exclusive Honey Store Built like a Beehive, with a Comblike Lattice Alongside to Complete the Effect

ARMY EXPERTS SOLIDIFY AND CAN POISON GASES

Canned, solidified poison gas, which is claimed to be absolutely foolproof and mobile, has been perfected for use by the American soldier, according to Brig. Gen. A. A. Fries, head of the Chemical Warfare Service in Washington, and officials at the Edgewood (Md.) arsenal.

That two studies—defensive and offensive-gas research—go hand in hand already has been demonstrated, for, in addition to the development of new forms of gas, army experts at Edgewood have had to improve the gas masks to make them effective against some of the new gases brought into existence there. In technical military progress, every new weapon means a call upon the armorer for a new defense.

As a result, this country today has not only gases which surpass anything used during the World War, but a mask which, in recent tests, was worn 24 hours a day for a week, except at mealtime, without any discomfort whatever. Breathing was normal, speaking was simple, and it kept out all the gases thus far known.

The biggest achievements that General Fries felt at liberty to make public at this time are the development of the mobile cloud poison gas, and a new form of sneezing gas, which forced the experts to strengthen their own masks to keep out the gas.

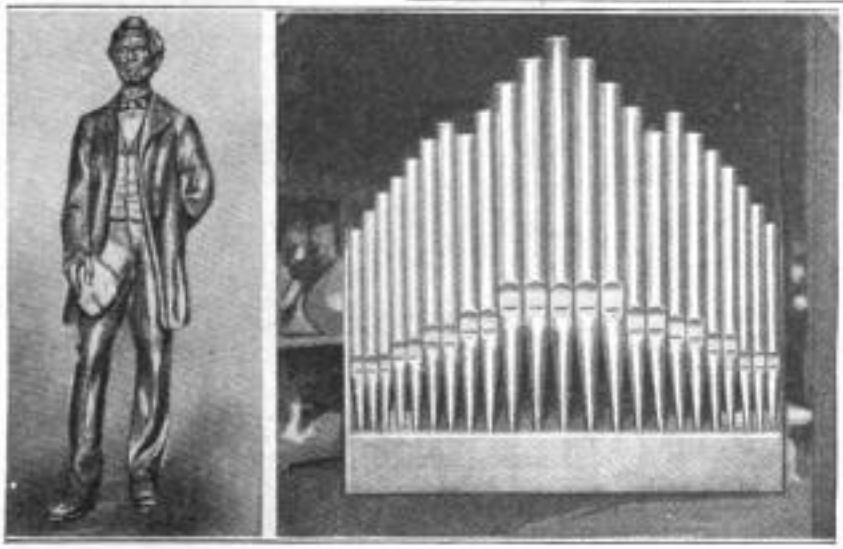
The innovation brought about in the use of cloud gas is that now the units required for generating a flood of destructive vapors are confined, in a solidified state, in small canisters that can be carried by each soldier without adding more than a pound or two to his load. During the war, the only method of setting loose a gas cloud was to connect up a series of tanks, each weighing about 200 pounds.

The operation now is for each man to take from his pack, at the propitious meteorological moment, his package of gas, apply heat, and the poisonous vapors roll away on the wings of the wind into the heart of enemy territory. No other agent, except intense heat, can release the gases, and instead of a host of experts and days of planning to make a gas attack a success, a mere handful of officers trained for the work can pick the time for miles of front-line trenches to belch forth destruction.

A Bucolic Scene in Which Every Article and Figure is Molded from the Highly Versatile Papier-Mâché: The Minutest Details of the Most Intricate Objects can be Mimicked and the Spirit of Life-like Action can be Expressed in the Figures of Persons and Animals

PAPIER-MÂCHÉ UTILIZED IN MULTITUDE OF WAYS

ONE of the effects of the ever-mounting price of lumber has been to stimulate tremendously the papier-mâché industry. Formerly decorative panels, thin partitions, stage properties, and a thousand and one other inconsequential or temporary things were made of thin sheets of wood veneer or laminated boarding. As the cost has made it prohibitive to continue this practice, those having need of the articles enumerated have, in casting about for a lumber substitute, discovered heretofore unthought-of possibilities in papier-mâché. It is now molded into all sorts of shapes, many of them being reproductions of extremely heavy objects, such as ship's anchors,



Above: Papier-Mâché Takes the Place of Composition Board in the Making of Light Panels, and of Plaster for Ornamental Pieces, Such as Urns, Vases, Artificial Flowers, Fancy Columns, Pedestals, and Capitals. Left: St. Gaudens' Famous Lincoln Reproduced in Papier-Mâché; Also Imitation Pipe-Organ Tubes Which Mask the Real Tubes Placed Behind

church bells, bronze statues, and, in one case, the pipes of a large pipe organ. The smaller, finer things, such as flowers, foliage, vases, trellises, and exquisite stat-

Other Examples of the Uses of Papier-Mâché in Decorative Schemes: Every Article Illustrated, Even the Bells and Trellis, is Molded in the Accommodating Medium

uettes, are also reproduced by the papier-mâché designer's art.

It has become evident that the forms into which this accommodating medium may be worked are myriad, one adaptation usually suggesting another of equal importance.

EASTERN COAL MINES FIRED BY VOLCANIC ACTION

After a thorough investigation of three serious coal-mine fires in the Pennsylvania fields, experts have given it as their opinion that they were caused by volcanic activity. It is supposed that a series of eruptions of mild intensity liberated and fired gases imprisoned in the coal seams and pockets. Another theory is that the liberated gases ignited spontaneously upon coming in contact with the oxygen of the atmosphere.

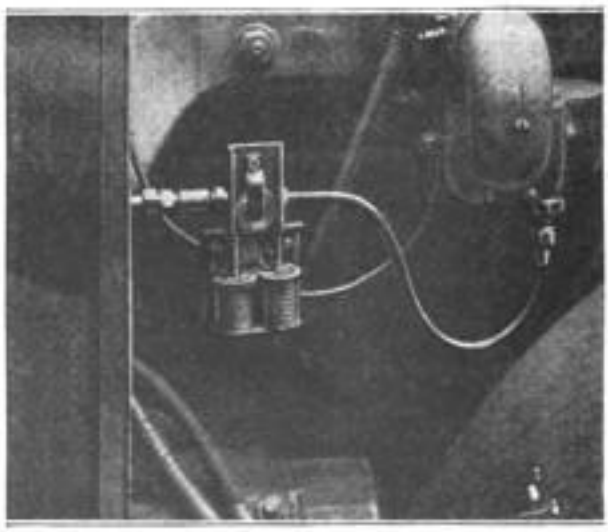
¶A material resembling cork in lightness, firmness, insulation, and the sound and damp-proof qualities necessary for building work, has been developed by a European chemical manufacturer from common peat.

HUGE AVALANCHE DEVASTATES SLOPES OF MONT BLANC

An avalanche of unprecedented magnitude, in itself a small mountain, recently crashed down into Italy when a part of Mont Blanc's lofty summit, 15,782 ft. in air, tore itself loose and dropped through a sheer two miles onto the Brenva Glacier. The incalculable mass of rock and ice traveled for 10 miles down the valley, demolishing an old and famous pine forest, damming up the torrential Doire River, and stopping miraculously at the very gates of the village of Pourtoud. The roar of the cataclysm was audible, and its vibrations sensible, for 50 miles, and near by the earth trembled perceptibly. Prolonged drought, depriving the peaks of the usual cementing action of the snows, is held responsible for the vast debacle.

IGNITION SWITCH ON DASH SHUTS OFF GASOLINE

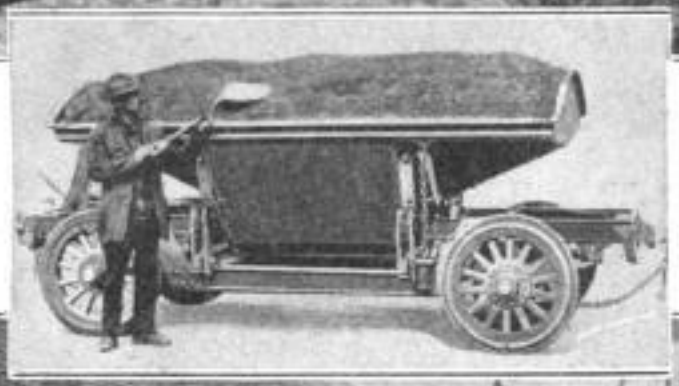
A new motor lock consists of a valve, let into the fuel line, which is turned to the on or off position by two opposed solenoids, operating on the battery current, and the solenoid cores, ending in racks which mesh with a small pinion on the valve stem. The controlling switch is a dash attachment locked with a small padlock instead of the conventional type of key. When the switch is turned to the on position, one of the solenoids is energized and opens the valve. Turning the switch to the off point causes the other solenoid to act, closing the valve.



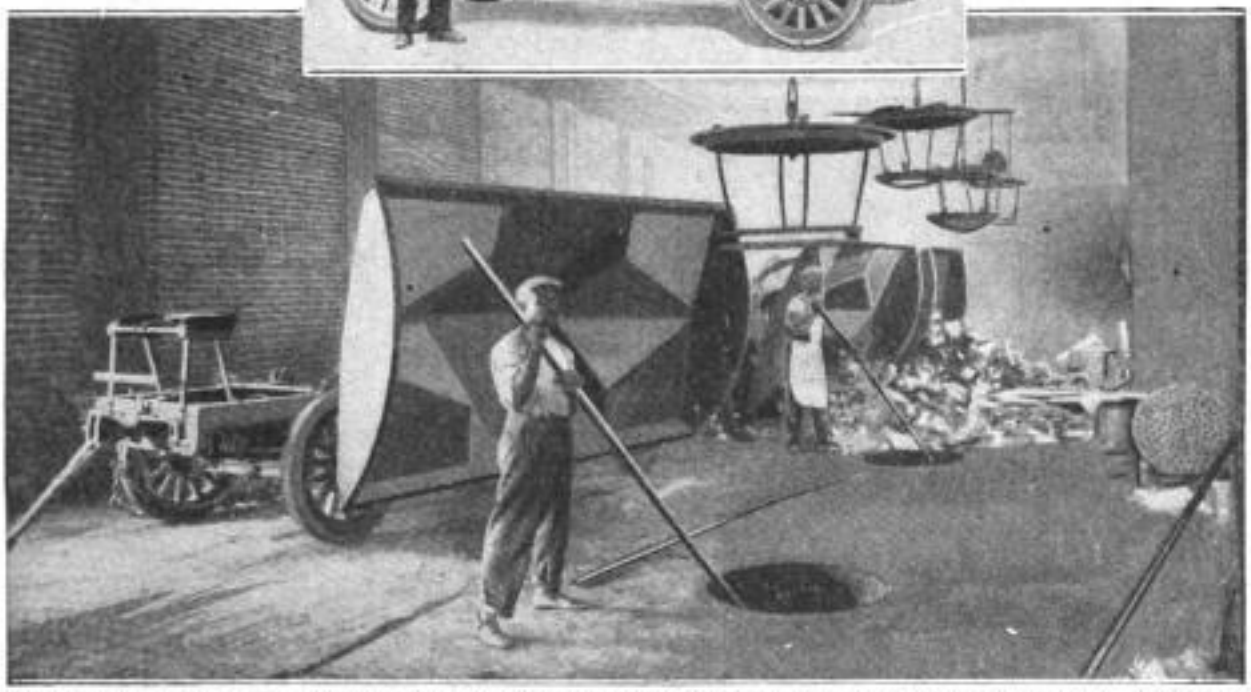
A New Dash-Controlled Electric Gasoline Shut-Off with the Cover Removed, Showing the Solenoids, Cores, Racks, and Pinion

No current flows when the switch is in either position.

A Train of Drop-Frame Self-Dumping Trailers, Loaded with Garbage, being Hauled to a Municipal Incinerator: Each Trailer is Hauled through the Alleys by Horses and the Train Made Up at a Central Point



Left: The Low Side of the Trailer Facilitates Loading. This Construction is Made Possible by the Use of a Double-Drop-Frame Chassis. The High Ends of the Body Prevent the Spilling of Loose Materials



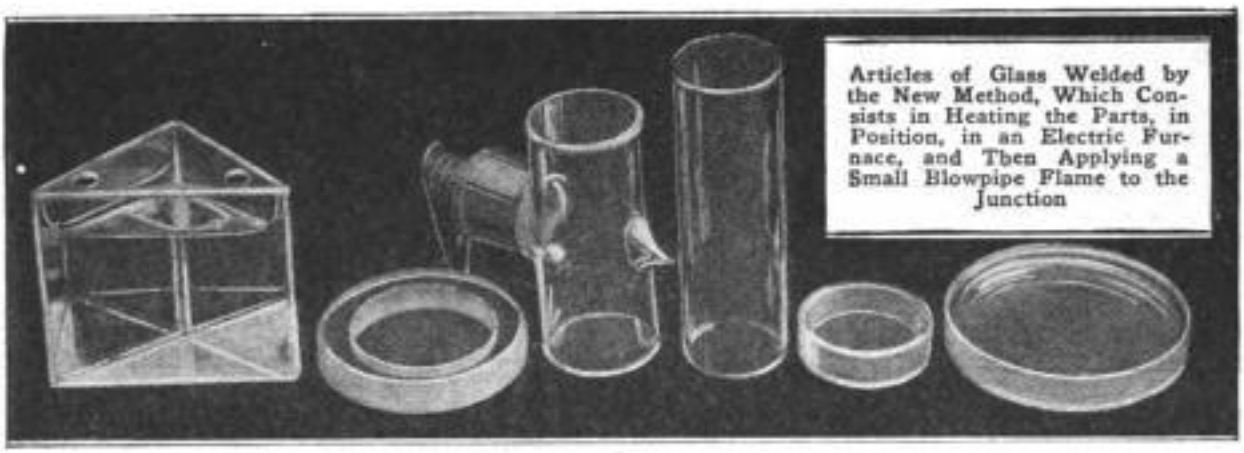
Upon being Unlocked the Bodies Tilt, by Gravity, Unload Their Contents, and Return to Position. The Load is Discharged Well outside the Line of the Wheel Hubs

IMPROVED-DESIGN DUMP-BODY TRAILER HAS A DROP FRAME

Believing that it is desirable to sacrifice road clearance in favor of ease of loading in the design of refuse-collection vehicles, an Ohio manufacturer is marketing a heavy-duty trailer, in which the top edges of the body sides are only 60 in. from the ground, this being considered as a comfortable lift for the average shovel wielder. The object is attained by building the chassis with a very decided drop in the frame. No power of any sort is necessary in unloading, as the body is so balanced that, when unlocked, it is tipped sidewise by the weight of the load, and returns to the vertical by its own weight when the load is discharged. As all materials are dumped several inches beyond the outside line of the wheels, the likelihood of abrasive substances, such as cinders, sand, ashes, etc., getting into the bearings, is largely obviated.

NEW-TYPE ARMY CART CARRIES BOTH WATER AND RATIONS

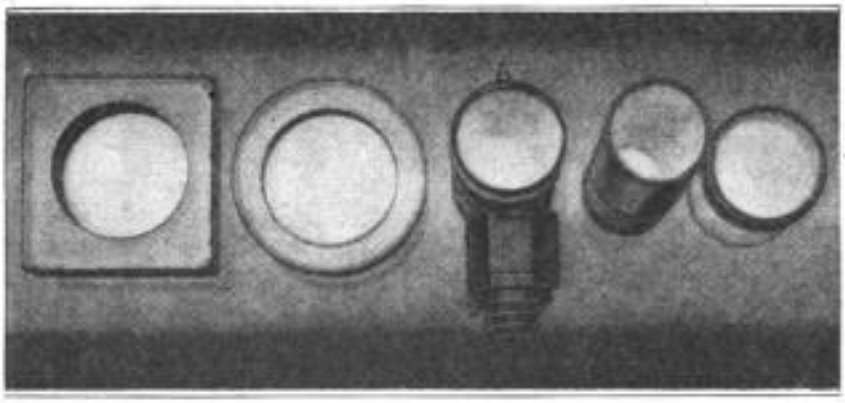
Several improvements are visible in a new form of army cart, which carries both water and rations. The improved vehicle has auto-type brakes, saving tire wear, and a three-piece bow, easily repaired, supporting the cover. The cart makes a short turn, and is usable as an auto trailer or a horse wagon.



Articles of Glass Welded by the New Method, Which Consists in Heating the Parts, in Position, in an Electric Furnace, and Then Applying a Small Blowpipe Flame to the Junction

NEW METHOD OF WELDING OPTICAL GLASS

A new and valuable process for welding glass optical parts has been developed by a member of the Bureau of Standards. This will be useful for the construction of glass cells, hollow prisms, glass tubes hermetically closed with accurately flat, ground, and polished ends; for the joining of lenses; for providing windows of plane optical glass for incandescent lamps for special uses, and for numberless other purposes, of great value in scientific and technical work and in the products of certain industries.



Photographs of Welded-Glass Optical Apparatus Illuminated with Mercury Light: Interference Patterns can be Seen Which would Not Be the Case If the Glass Was Not Quite Perfect

Other methods for welding glass are known and used, but this method has advantages in that the welding can be accomplished with an inappreciable distortion of the main surface of the glass, and the cost of preparing the parts is less. Such a method has long been sought. The method used consists in heating the parts, in position, in an electric furnace to the annealing temperature, and then applying a small blowpipe flame to the junction, which causes the welding to be effected rapidly, an operation similar to the autogenous welding of metals.

PIGEONS REPORT BASEBALL SCORE AS GAME PROCEEDS

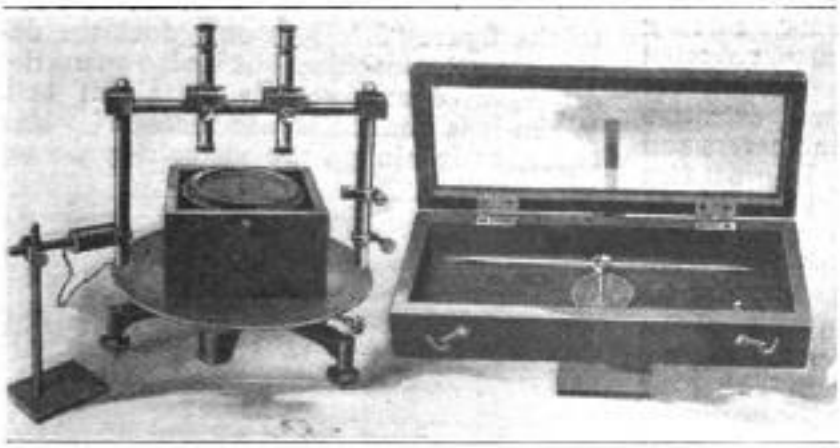
The services of pigeons as valuable agencies in war, as bearers of tidings between widely separated sections of the country, and as messengers of death, are achievements already credited to these sensible creatures of flight. But for the first time, they were recently employed in the conveyance of sporting news. Army officers, detained from attending a baseball game between the army and navy, detailed carrier pigeons, sent by special pigeon motorcycle, to keep informed as to the progress of the game. At the conclusion of each inning the score was written on a strip of paper, the message placed in the container, and the bird released. The progressive changes in the deciding game of the service baseball series were thus revealed to the absentees, inning by inning.

SPRAY OIL ON SHIFTING SAND TO PROTECT WESTERN ROADS

Highway builders in the West have a serious problem in the presence of fine, light, volcanic sands that slide or blow onto the road constantly, often blocking it completely. On a 53-mile stretch of the Columbia River Highway, government engineers are now spraying the sand with crude oil. A trailer carrying two oil tanks is drawn by a tractor, which supplies steam to heat the oil and force it through a ½-in. nozzle in a fine spray that carries 100 ft. or more. This method is proving quite effective in keeping the powdery sand immobile.

TURNTABLE TESTS ACCURACY OF AIRPLANE COMPASSES

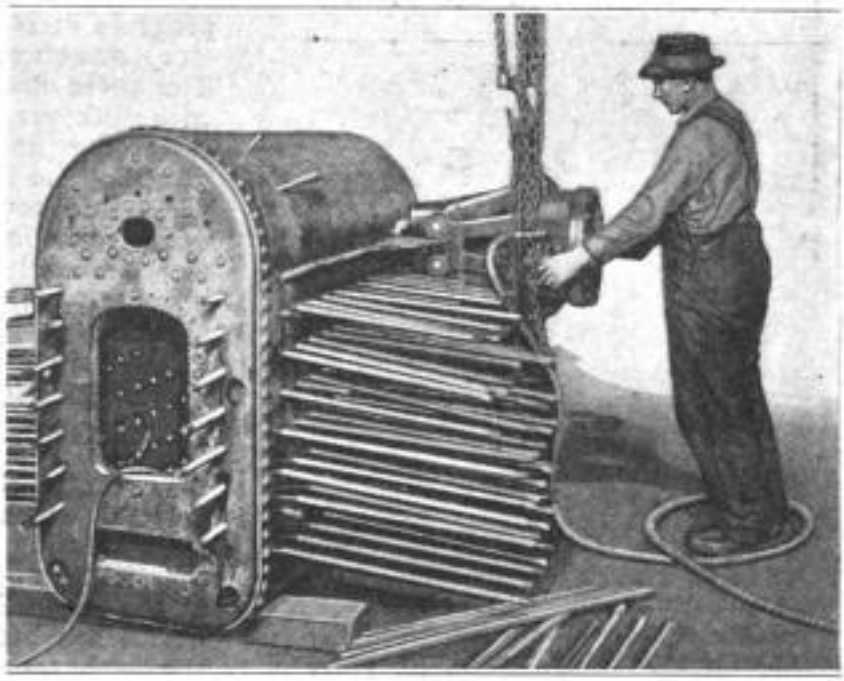
Among interesting instruments of precision, designed for special purposes at the Bureau of Standards, a stand for testing airplane compasses is worthy of note. A turntable graduated to .1°, with an adjustable index, carries two upright posts with a crossbar at the top, on which two telescopes slide. The compass to be tested is placed on the turntable, and the telescopes focused on its north and south points and clamped. A standard compass is then substituted, consisting of a magnetized steel bar with a diamond pivot resting in a sapphire cup. A fine line on the bar, denoting its true magnetic axis, is focused in the telescopes, and the adjustable index turned to zero and clamped. The compass under test is then replaced, and all its card points examined through the telescopes, by turning the table. The accuracy of their correspondence with the scale determines the calibration's correctness.



Left: The Compass-Testing Turntable with Its Telescopes and Removable Magnet. Right: The Standard Compass in Its Case

STAYBOLT ENDS QUICKLY CUT BY COMPRESSED-AIR TOOL

Where staybolts are used in large numbers, as in boiler construction, the work of cutting off the ends represents a considerable item of time. The process now has been greatly simplified, however, by a machine that is virtually a mammoth pair of cutting pliers driven by compressed air. This mechanism is suspended by chain tackle at the level of the work. The operator admits the air by means of a small valve at the left, and the powerful jaws immediately clip off the staybolt, which may be as large as 1⅛ in., like a piece of wire. The machine and one man are declared equal in production to 25 men with hand tools.



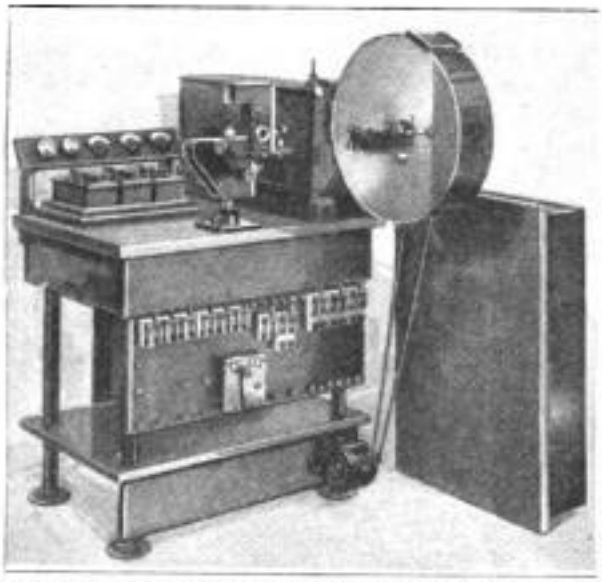
The Compressed-Air Cutting Tool, Chipping Off the Ends of 1⅛-Inch Staybolts in Boiler Construction

HOTHOUSE PLANTS TRANSPLANTED WITHOUT POTS

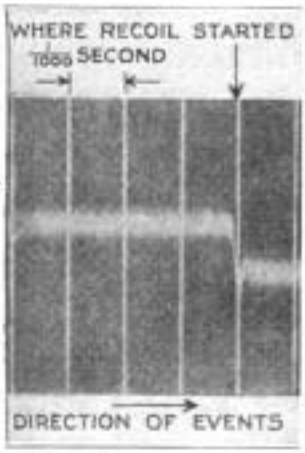
The officials of the New York botanical gardens last year tried the experiment of actually transplanting specimens native of the temperate zones instead of simply burying the containing pots in the soil of the greenhouses, as formerly has always been the springtime custom. Although it had for years been observed that the plants always showed marked appreciation of the treatment, the results of the new plan came as a distinct surprise. Freed of the restraint of the pots, the plants absorbed nourishment from the new soil to such purpose that all exhibited great increase in growth.

HIGH-SPEED TIMING DEVICE FOR MINUTE INTERVALS

A new apparatus, utilizing two vibratory rates of differing and extremely high frequency, has been designed to time exceedingly minute intervals. A tuning fork with a rate of 1,000 vibrations per second actuates a shutter which exposes a moving, sensitive film at .001-second intervals. A secondary light in the form of two fine beams of exceeding brilliance, reflected from the mirrors of two sensitive galvanometers and playing on the film, is used to make the actual elapsed-time records. Any change in the value of the current passing through either of the galvanometers will cause a most decided movement of the reflected beams in a vertical plane. Intervals of .0001 second are measured with ease and accuracy to .00001 second is claimed. The apparatus was designed to measure projectile velocities and big-gun recoil intervals, but it may be adapted to practically any high-speed timing purpose.



Thousandths of Seconds are Registered on a Moving Photographic Film Contained in the Circular Drum. High-Voltage Sparks Supply the Light



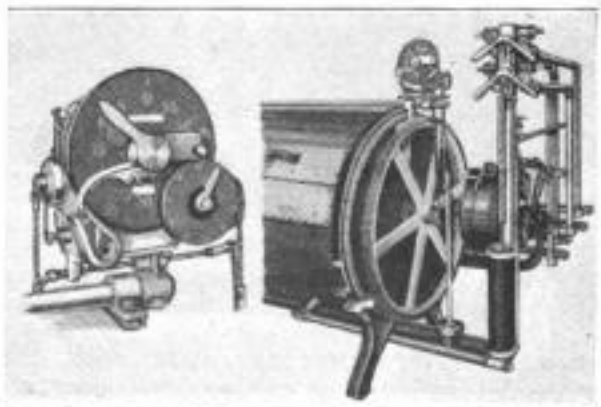
¶ Installing oil-burning equipment has added one knot to the big British liner "Olympic's" speed, which averaged 29 miles an hour on a recent record trip.

HIGHEST CONCRETE BUILDING IS SEVENTEEN STORIES

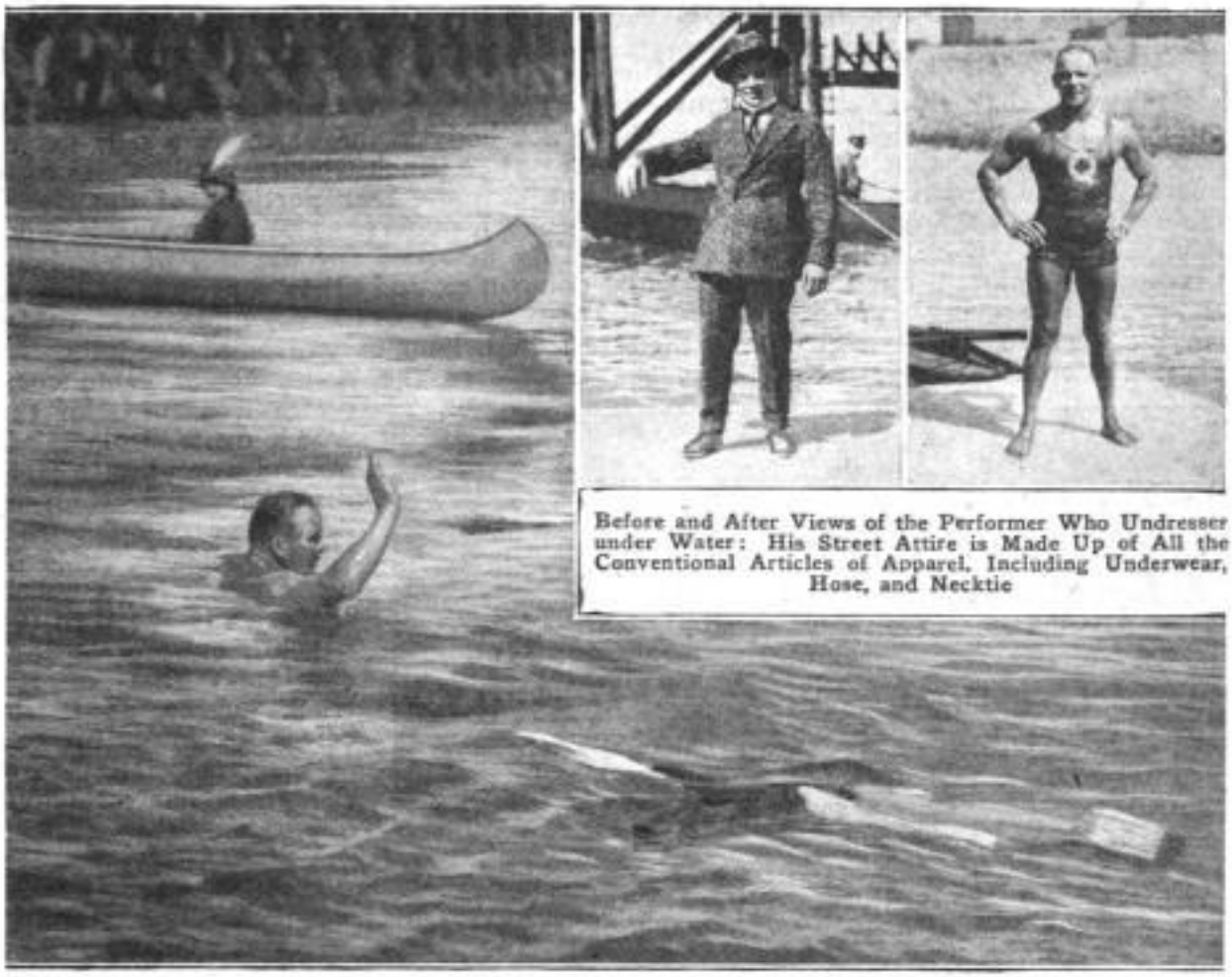
What is declared to be the first use of concrete as the exclusive construction material of a high office building is now in progress in New York City, where a 17-story structure is in course of erection. The three lower stories are being faced with pink quartz, applied by a novel process at the time the structural concrete is placed. The first six floors are to be divided into rental offices, and the others occupied as lofts or offices by the leather merchants who are putting up the building, the top floor being reserved for club purposes.

METERING DEVICE CONTROLS LARGE LAUNDRY MACHINES

A clockwork mechanism has been developed which may be attached to the large washing machines used in laundries, that will stop them and drain the water at the expiration of whatever period the device has been set for. Before starting the washer, the hands of two dials are set at the proper figures. One of the dials is a counter, and registers the number of times the washer has been in operation during the day. The other dial is the actual timer. If it is desired to stop the machine after it has run for five minutes, the hand on the main dial is set to point to the figure "5." Not only does the device stop the machine, but it also opens the drain valve and sounds an alarm bell. When it is desired to use the same water twice, as in bluing, the meter may be set to stop the operation without opening the drain valve. A record of the time consumed in washing each filling, and also of the idle time, is printed on a moving tape.



A Metering Attachment for Laundry Machines Which Stops and Drains Them When a Loading has been Washed. Left: Timing and Counting Dials. Right: The Drain Valve Operated by the Mechanism



Before and After Views of the Performer Who Undresses under Water: His Street Attire is Made Up of All the Conventional Articles of Apparel, Including Underwear, Hose, and Necktie

Finish of the Underwater-Disrobing Act: The Diver has Just Come Up and is Striking Out Vigorously for the Attendant Canoe. In the Right Foreground, Various Articles of His Clothing may be Seen Floating

UNDERWATER-DISROBING FEAT IS AN ENDURANCE TEST

An exhibition diver performs the novel feat of entering the water completely dressed, remaining submerged until every piece of clothing is removed and emerging clad only in a bathing suit. His apparel, at the time of making his dive, consists of all the conventional items, including collar, necktie, shoes, and underwear. It is difficult enough to disrobe against time under normal conditions, but when to these are added the difficulties presented by wet shoestrings and heavy, soggy, water-logged garments, and the fact that respiration is impossible, the feat becomes a rather remarkable trial of endurance.

¶By all available information, the world-wide production of cane and beet sugar during the 1920-1921 season will be 17,085,500 tons, or 1,774,676 tons greater than the preceding season. The 1913-1914 figure—the largest on record—was 18,667,399 tons.

HAND-WOVEN COTTON AND TOYS ARE PRODUCT OF ODD PLANT

Cotton cloth woven on old-fashioned hand looms is the unusual product that is winning renown for a queer manufacturing plant consisting of two cottages in the mountain country of North Carolina. The establishment, owned and operated by two women who have settled there, is turning out a high-grade fabric, 60 in. wide, in various patterns, used for interior decoration and for making "sport" clothing. Unusual value for the latter purpose is contributed by a process recently discovered in New York, which renders the material completely waterproof without reducing its softness and flexibility, making it especially suitable for golf and outing clothes. As a side line, toys of remarkable interest are produced, many of them reproducing "Mother Goose" characters with fascinating fidelity. The work of the plant is done by young people of the mountain districts, who are taught both weaving and carving and given opportunity to develop special talent.

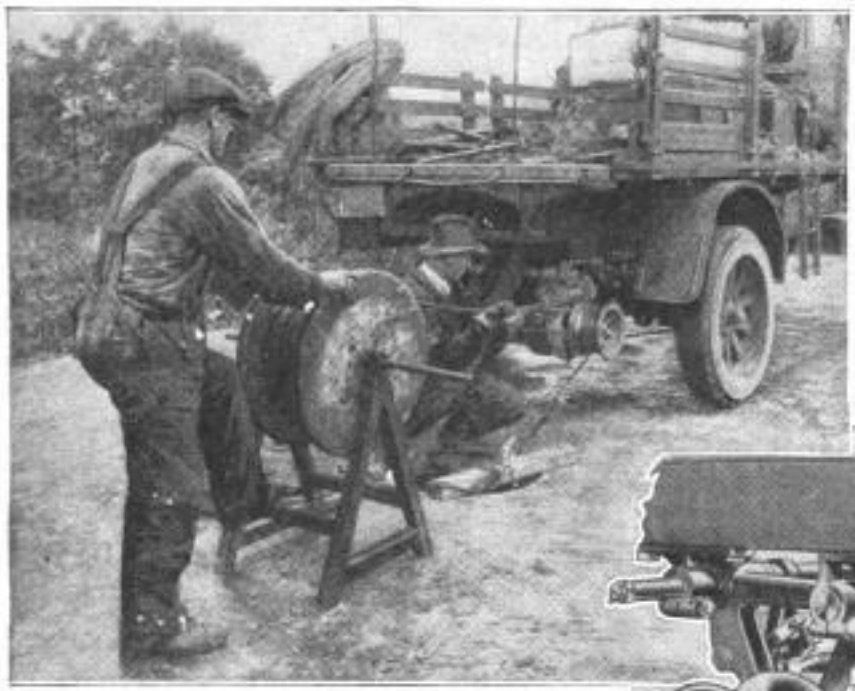
NOVEL READ-AS-YOU-RIDE SIGNS ARE EFFECTIVE

Realizing that the swiftly moving motorist has not time to read the long text of the old-fashioned roadside signboard, the enterprising merchants of an Ohio city have originated a clever advertising scheme. Each word of an advertisement is painted upon an individual signboard measuring from 8 to 10 in. in length. These small signs are then planted alongside the right of way, at right angles to the road, in the proper sequence to form complete sentences. As they are spaced from 50 to 75 ft. apart and supported by uprights about 3 ft. high, they are easily read at any speed.

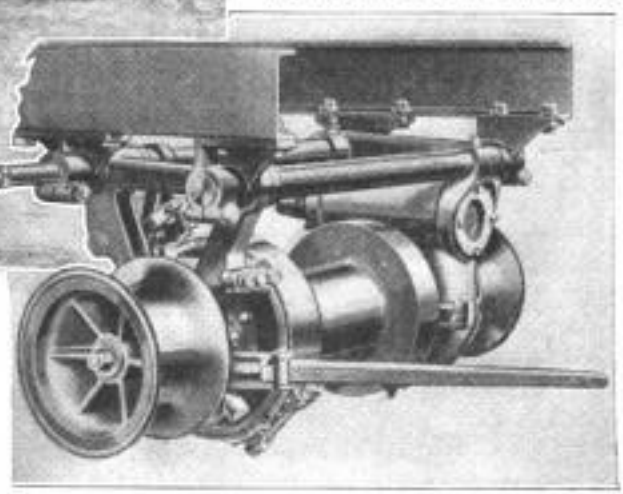
The Multiple-Unit Road Sign Excites Curiosity, Which Begets Interest, and, in Turn, Results in Sales

UNDERSLUNG MOTOR-TRUCK WINCH SAVES BODY SPACE

The saving of load space in the motor-truck body is the object in a new design of power winch which is underslung from the extreme rear portions of the truck-frame members. The apparatus is especially designed for the use of telephone companies, and other concerns, who have occasion to draw large insulated cables through long underground conduits. As rapidly as the 7/16-in. power cable completes five turns of the winch drum, it is taken off and wound on a cable drum mounted on an independent stand. This allows a 425-ft. cable to be carried in a small space. The speed of the winch is entirely dependent upon that of the truck engine, as it receives its power by way of the transmission. Although it has a pulling power of 5,000 lb., it is said that the control is so delicate that the operator can detect by the "feel" when an obstruction which would damage the insulated cable is encountered.



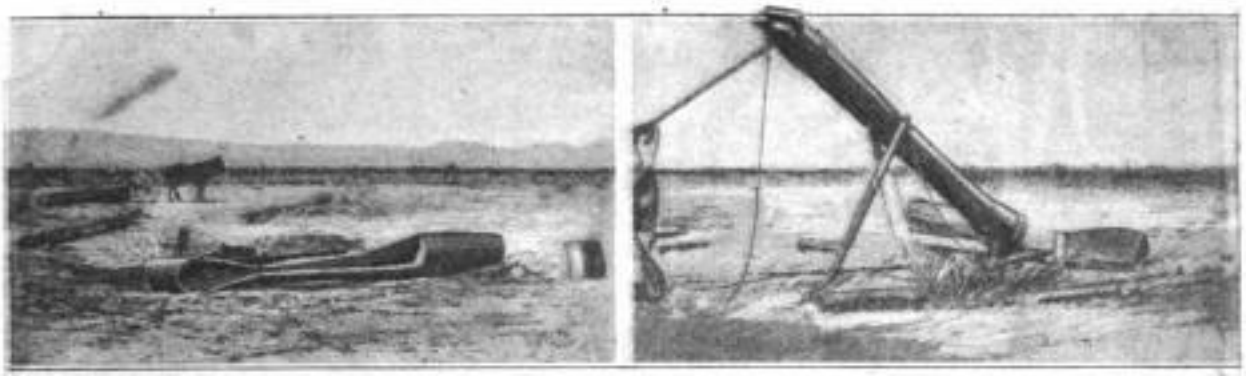
An Underslung Motor-Truck Power Winch Driven by the Engine, Pulling Telephone Cables through Street Conduits: Should the Insulated Cable Meet with an Obstruction, the "Feel" of the Off-Coming Power Cable Warns the Operator to Ease the Pull



Details of the Underslung Power Winch for Motor Trucks: The Drive Is by Shaft from the Truck Gear Set, through a Slow-Speed Reducing Gear

WATER-PIPE-LINE AIR INLET REPLACED BY FOUR MEN

A sudden rush of water through a large pipe line, supplying a western city, having wrecked an air inlet, it became necessary that the vent be replaced quickly. The work was easily performed by four men with the aid of some timbers crossed in the form of one side of a sawbuck. As

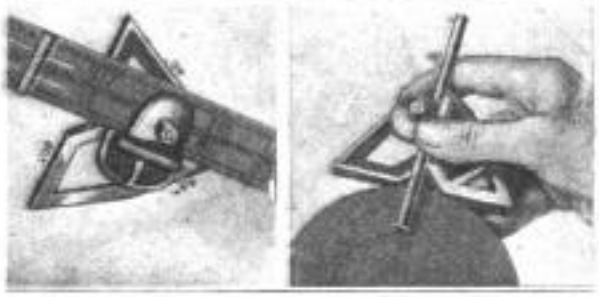


When the Water was Suddenly Admitted to a High-Pressure Supply Line, the Air Vent, Shown at the Left, Collapsed from the Air Pressure. Right: The New Vent, Weighing 700 Pounds, being Raised, Preparatory to Installation, with the Aid of a Simple Rig Made of Cross Timbers

one end of the pipe was raised to a sufficient height, the crossed timbers were placed under it in such a way that the weight was supported until another grip could be secured. That this was a rather clever manipulation will be realized when it is known that the pipe is 20 ft. long, 30 in. in diameter, and weighs 700 pounds.

POCKET TOOL FOR MECHANICS HAS VARIETY OF USES

A little angular piece of steel, only about 3 in. long, is made by an eastern inventor into a combination tool that takes the place of much cumbersome equipment. It clamps firmly to a common rule or straightedge, and may be used as a T-square, a try-square, a miter, center or inside square, a level, a depth or scratch gauge, or a gauge for transferring measurements. It will form or bisect any angle, and find the elements of a circle.



Left: The Tool and a Ruler, Forming a Square. Right: Using the Tool for Circular Work

INVALID'S WHEEL CHAIR ADDS TO COMFORT

An improved wheel chair which should go a long way in aiding the recovery of the afflicted has many comfort features. Each part, so it is claimed, is adjustable, independently of all other parts. The back may be tilted to several angles, as may also the leg and footrests. The cushions are a combination of hair, air, and spring construction. They may be strapped into place to avoid slipping. By a clever method of shifting about, the large back and seat cushions can be made to conform to bodily contours and positions, thus assuring restful relaxation for the patient.

Improved Invalid's Chair: To the Left is Shown the Decided Curvature in the Seat Cushion When the Chair is Completely Extended. The View to the Right Shows the Unusual Length of the Back Cushion

MODERN PRODUCTION OF LIFE-SIZE WAX FIGURES

The Heated Wax is Poured into the Molds, Allowed to Harden into a Wall About Two-Thirds of an Inch Thick, and the Remainder Poured Off Again

Anatomical Accuracy Is a Primary Requirement of the Art, and the Plaster Molds for the Hand and Arm are Made from a Living Model, upon Whom the Plaster is Shaped in Sections

Casting a Delicate Member like a Hand and Arm of Wax, in a Plaster Mold, Necessitates Cutting Away the Plaster to Release the Wax without Injury

After the Wax Busts are Cast, They must be Thoroughly Washed and Dried Before the Faces are Retouched, Preparatory to the Final Tinting, and the Hair Selected and Fastened in Place

In Casting a Bust, the Mold of Clay or Plaster is Cooled with Water, and the Wax Figure Is Hollow, as Explained in the First Picture. When the Wax Walls have become Thoroughly Hardened, the Cast is Removed by Separating the Sections of the Mold, Which are Tied Together during the Pouring Operation

A WORK OF PAINSTAKING DETAIL AND ARTISTRY

The Most Important Detail Work Comes, of Course, After the Wax Casting is Finished. In This Picture the Artist is Seen Finishing an Arm and Hand, the Accurate Shaping and Tinting of the Finger Nails Receiving Painstaking Attention

To Complete the Familiar Figure, as Revealed in the Luxurious Setting of a Display Window, Requires That the Shopkeeper Draw upon His Stock for Its Rarest Raiment—the Final Touch of Artistry

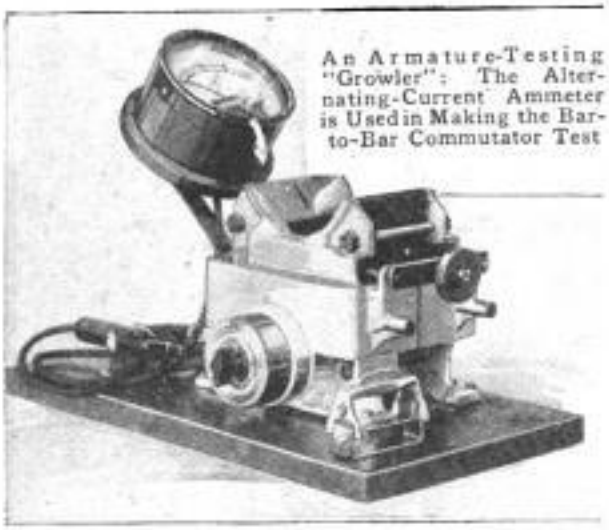
Selecting the Hair for the Wax Head and Fastening It in Place Is Another Task Demanding Artistic Taste, for the Hirsute Adornment must Suit the Type and Complexion of the Model, and Its Arrangement, as the Strands are Applied and Grouped Together, must Be as Natural as Possible

The Real Art of the Entire Process Lies in the Creation of a Lifelike Face, and This Work is Intrusted to an Adept Armed with a Small Brush and a Supply of Delicate Colors. For Convenience, the Color is Commonly Applied Before the Model is Assembled

KEYSTONE VIEW CO.

ARMATURE-TESTING "GROWLER" LOCATES GENERATOR FAULTS

To remove the guesswork from the most puzzling operation in automotive electrical



An Armature-Testing "Growler": The Alternating-Current Ammeter is Used in Making the Bar-to-Bar Commutator Test

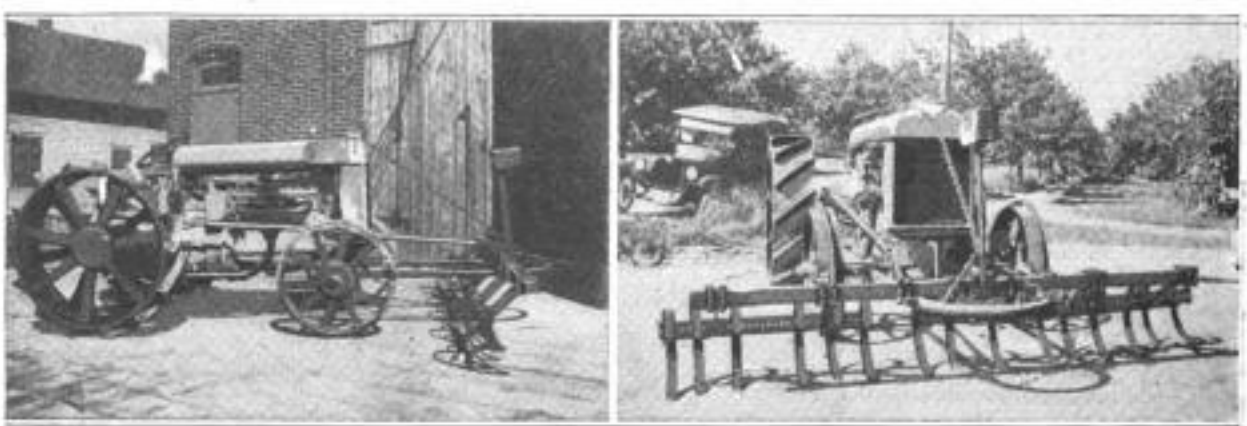
repairing, namely, the location of short and open circuits and grounds in generator and starting-motor armatures, commutators, and field coils, a device, known as a "growler," has been placed on the market. The apparatus derives its peculiar name from the fact that, while in action, it emits a growling, or even a howling sound. It is designed to be operated on current from the standard commercial lines. In structure the device consists, principally, of a laminated core, open on one side, and carrying a winding. Current passing through the winding sets up a heavy alternating magnetism in the core. This, acting upon the armature or field coil undergoing test, induces currents in them and also sets up secondary magnetic effects. Both these currents and magnetic effects may be measured with sufficient accuracy to determine not only in which coil the fault may lie, but even in which turn of the wire. That the results of the tests may be accepted without reservation, there is no reason to doubt, since the principles underlying the operation of the device are well understood. It is merely the adaptation, with important refinements, of similar apparatus which have been used for years in making the same tests on large commercial generators and motors.

HIGH WATER HEAD SUPPORTED BY HOLLAND DOCK GATE

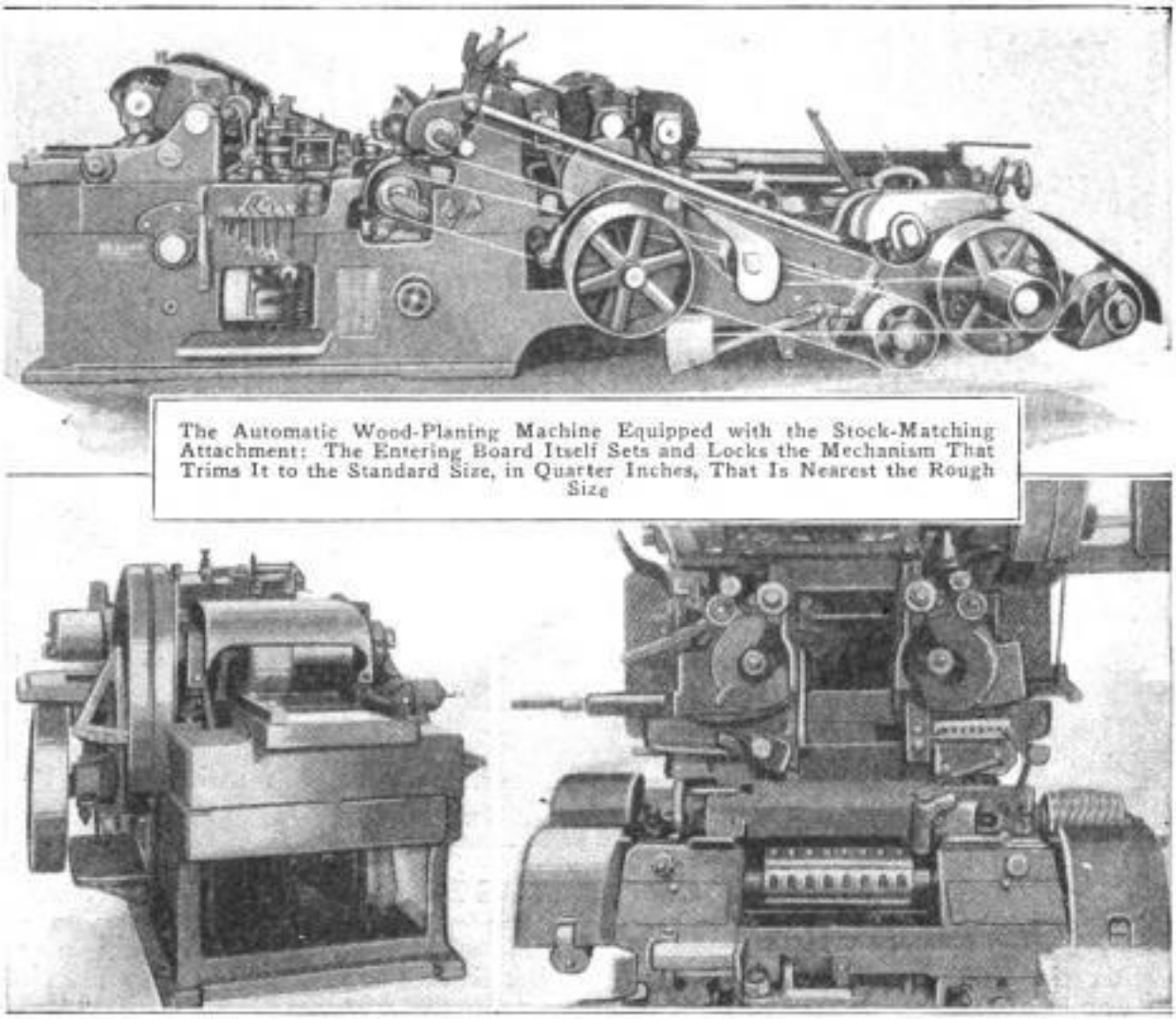
A maximum head of water of 65½ ft. is supported by a new 36-ft. dock gate at Ymuiden, Holland, with unusually light construction. The gate is divided horizontally into eight compartments, the four upper ones being filled with air, the three lower with water, and the remaining one connected with a pump that empties it when the gate is being opened, and fills it during closing. This method so equalizes pressure on the lower parts of the gate that much construction material is saved. Horizontal bowstring girders, 6½ ft. deep at the center, spaced 8 ft. 10 in. apart, and connected by vertical posts that support the sides of the entrance wall as well as the plating, compose the gate frame.

CULTIVATOR PUSHED IN FRONT OF FARM TRACTOR

A recent adaptation of tractor cultivators places the latter implement in front of the tractor instead of behind. This arrangement makes it possible for the operator to see what he is about at all times without turning his head. The implement is bolted to the front axle of the tractor, and thus any movement of the front wheels is instantly communicated to the cultivator.



Left: Side View of a Tractor with the New Cultivator Attached to Its Front End, Keeping It Constantly under the Eye of the Driver, and Allowing It to be Steered with the Wheels. Right: Front View of the Machine



The Automatic Wood-Planing Machine Equipped with the Stock-Matching Attachment: The Entering Board Itself Sets and Locks the Mechanism That Trims It to the Standard Size, in Quarter Inches, That Is Nearest the Rough Size

Left: The Feeding-Out End of the Machine, Showing the Swinging Indicator That Tells the Operator the Size of the Outcoming Boards. Right: Plan View, Showing the Cam Set by the Incoming Board

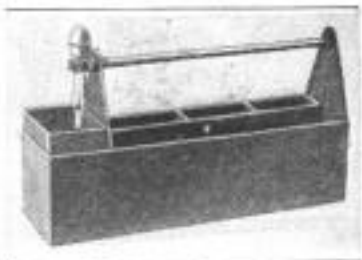
WOOD PLANER AUTOMATICALLY DRESSES STOCK TO SIZE

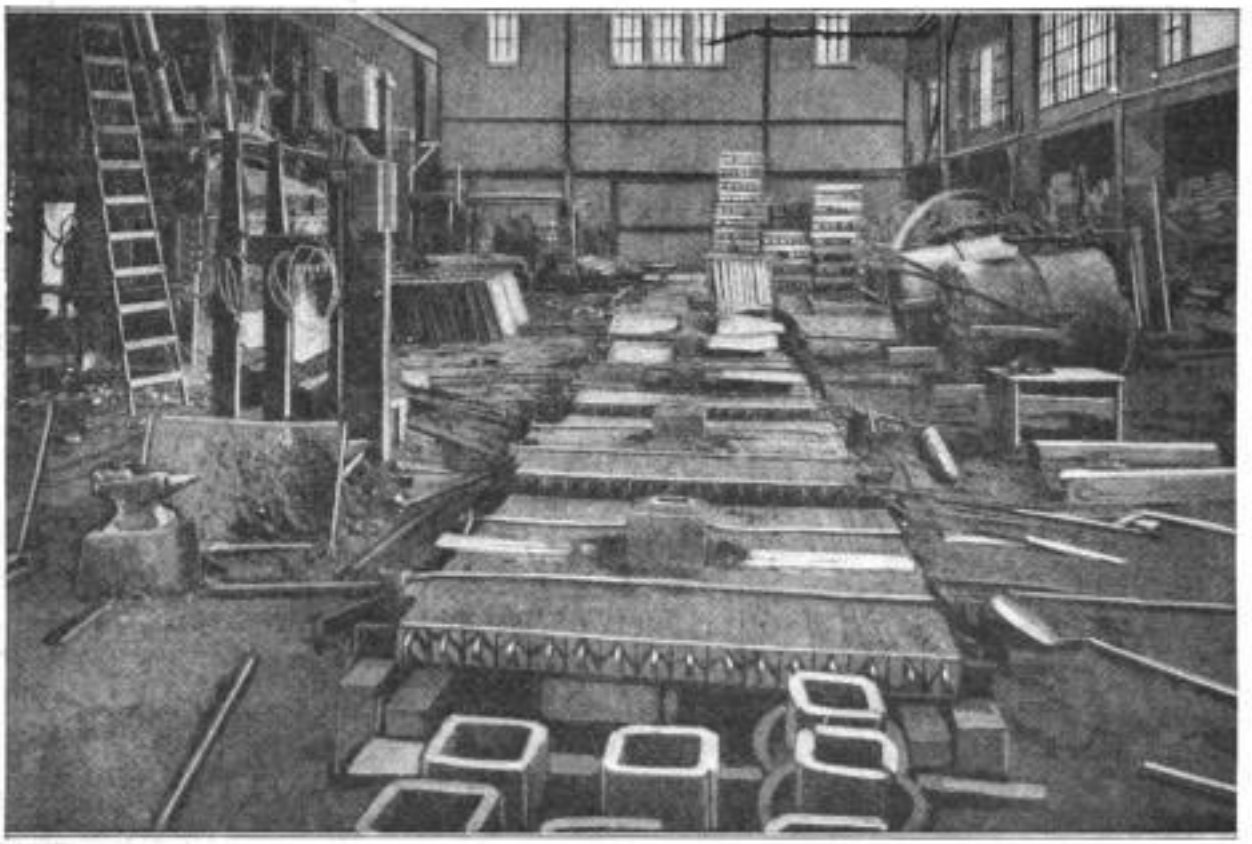
In a new model, fast-feed, wood-planing machine, used for dressing stock to match, the entering boards are trimmed to the standard width, in quarter inches, that is nearest the rough width, without attention from the operator. The mechanism is automatically set and locked by the entering stock, the width of which may vary as much as 1½ in. without resetting the head. At the feeding-out end, an indicator needle, swinging on a scale reading in quarter inches, constantly informs the operator at that end of the width of outcoming boards. The machine weighs 17,100 lb., occupies a floor space of 16 ft. 9 in. by 9 ft. 2 in., and takes stock up to 15 by 6-in. size.

¶ A new steam-turbine locomotive, built in Switzerland, is being tested on the Romanshorn-Winterthur line in that country.

AUTO-BATTERY SERVICE KIT KEEPS SUPPLIES READY

All the necessary paraphernalia for giving service on automobile storage batteries are kept conveniently together, ready for use, by means of a portable kit recently placed on the market. The enameled-steel case, 22 in. long, 12 in. high, and 6½ in. wide, contains a rubber jar for distilled water, a hydrometer safely held in a clip, a three-compartment sliding tray for extra terminal nuts and vent caps, and a full set of tools. The kit, which weighs 10 lb., is easily carried by the long bar handle at the top, and may be set conveniently on a running board or car floor.





Foundry Room Where Small Steel Ingots for Making Horseshoe Blanks are Cast: In the Center Are Groups of Molds Ready for Pouring; in the Background Stand Inverted Molds Emptied of Their Castings

CEMENT AND STONES REPAIR CRACKED AQUARIUM WALL

After the plate-glass walls of an aquarium at Los Angeles, Calif., had been set, and the cement had hardened, a crack developed across the front side. Instead of replacing the glass, it was decided to repair it by building a buttress of stone and cement on the outside. The glass was held from springing by a brace from the

Rockwork Cemented on the Outside of an Aquarium to Repair and Conceal a Crack in the Glass: The Corners were Added for Harmony

crack to the opposite side. The additional work at the corners was added to make a more harmonious effect. The repair was a complete success.

MAKE BLANKS FOR HORSESHOES BY CASTING SMALL INGOTS

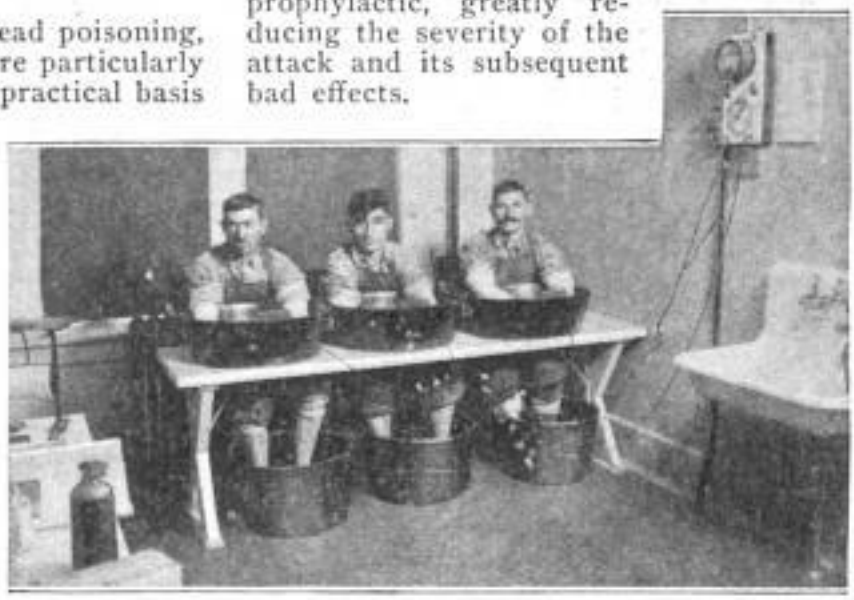
Small steel ingots, only about 2 in. square and 28 in. long, suitable for making horseshoe blanks in special rolls without further reduction, are now cast by a new process at a southern steel plant. Multiple molds, clamped together, enable 30 ingots to be cast at each opening of the ladle, and by inverting the group of molds the castings are quickly shaken out. Use of high-temperature electric furnaces explains the mill's success in pouring ingots of small cross section instead of the 5 to 7-in. squares of the older processes, and the saving effected, in the manufacture of horseshoe blanks, is estimated as at least $10 a ton.

ITALIAN FLYING BOAT SETS LONG-DISTANCE RECORD

To an Italian military flier belongs the credit of having established the long-distance record for seaplanes. His route was from Sesto Calende, Italy, to Stockholm, Sweden, touching Riga, Reval, Helsingfors, and the Aland Islands, and including a tour of the Swedish coast. The total distance was a trifle over 2,600 miles. An observer was carried throughout the trip.

VICTIMS OF LEAD POISONING HELPED BY ELECTRICITY

Electrical treatment for lead poisoning, to which smelter workers are particularly subject, has been put on a practical basis since its experimental discovery in England, announced in this magazine in February, 1914, and hospitals in the northern Idaho mining districts have been equipped for its application. The patient's feet are placed in a large pan of salt water, and his arms in another. Then a direct electric current, limited to 75 milliamperes at 110 volts, is passed through his body for one hour. Not only does this treatment appear actually to remove the lead, by some curious electrolytic process, but, if used early, acts as a prophylactic, greatly reducing the severity of the attack and its subsequent bad effects.

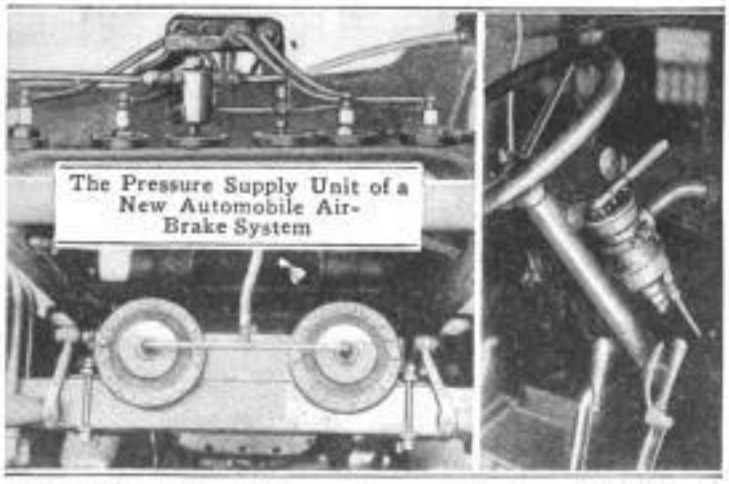


Three Victims of Lead Poisoning Taking the Electrolytic Treatment Together, with 110 Volts Passing through Their Bodies

AIR BRAKE FOR MOTOR CARS AND TRUCKS

That the objectionable features in the early designs of automotive air-braking apparatus have been largely eliminated is the assertion of a western manufacturer of an air-brake system designed for installation on passenger cars, trucks, and trailer trains. Due to a multiplicity of more or less delicate and intricate parts, such as pumps, pistons, cylinders, valves, piping, tubing, etc., and the fact that smooth gradations of control seemed impossible of attainment, the brake action being either sluggish and uncertain, or sudden and severe, all previous attempts at air or vacuum braking have proved unsuccessful and have been abandoned.

The source of pressure in the new system is one of the engine cylinders, a part of the compression or expansion pressure being trapped by a simple valve which replaces the standard petcock. The brake-actuating units are diaphragms of heavy rubberized fabric, frictionless and sensitive to varying degrees of pressure. They are supplied in three sizes and variations in length of stroke. Two types of apparatus are furnished. One is a straight-pressure system for application to passenger cars; the other is built on the balanced-pressure plan, similar to that used on railway cars. This type is recommended for installation on trailer trains, since each trailer can be equipped with brakes and the whole train controlled by the tractor driver. Also, if a hose connection or pipe, anywhere in the system, should break, all brakes throughout the train would be applied automatically. The control valve is mounted on the steering column, directly under the steering wheel or on the dash, within very easy reach of the driver. A light touch moves the lever.



Left: A Pair of the Diaphragm Pressure Chambers Which Apply the Brakes. Each Diaphragm Brakes on One Wheel Only. Right: The Control Valve Mounted on the Dash

¶ Extensive deposits of rich platinum ore are reported in Cape Colony, Africa.

STEEPLEJACK-TRAINING SCHOOL TEACHES DANGEROUS TRADE

A British former airman, steeplejack by trade, has opened a school to train aspiring high-level workers in the fine

Steeplejacks in the Making: The Instructor, an Ex-Airman, is Demonstrating How to Ascend or Descend a Rope

points of repairing questionable smokestacks and flagpoles and at the same time retain their health. There is not a great deal of competition in the calling, as the steeplejack, like the ship rigger, is not called upon until a structure, in need of attention, becomes dangerous to workaday people, and doubly so for him. To be sure, he has his easy jobs, such as the painting of a 200-ft. smokestack or the dome of some sky-towering building.

HEARING OF SHRILL SOUNDS DEPENDENT ON PRACTICE

That portion of the mechanism and nervous system of the ear by means of which shrill sounds are perceived, appears to be somewhat independent of the part which receives sounds of lower register.

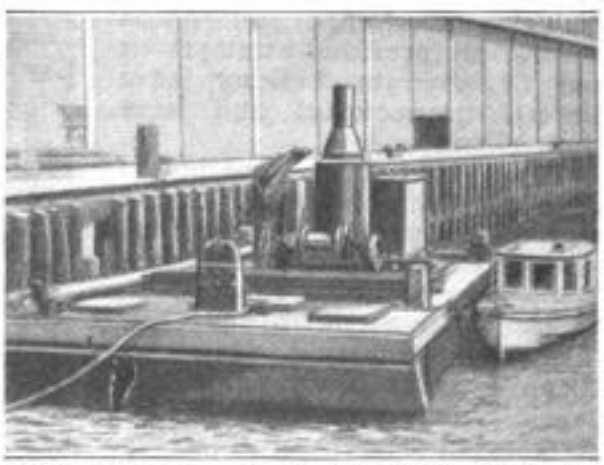
The practical application of this fact is the traffic policeman's whistle. The shrill note of the whistle comes out clear above the din, crash, and roar of the street. Such whistles are also used on the battle field where similar confusion exists.

A more recent application of this principle has been in the reception of wireless-telegraph signals. It is found that, by adjusting the receiving telephones so that the note heard will have a very high pitch, it can be heard and recognized in the midst of confusing sounds which come from other sources, such as "static," stray signals, and the like.

In this connection one wireless expert had an experience which threatened to be very embarrassing. He was giving a demonstration on the use of wireless signals, in which, according to his custom, such a high-pitched note was employed. The adjustments were made to pick up the desired signals, and the listening device was given to one of the members of the party in whose interest the matter had been arranged. This man failed to hear anything at all. So it was with the next listener, and the next again. The demonstrator checked up the apparatus and had no difficulty in hearing the signals. He then realized that his ability to hear them was accounted for by his practice with them. Finally, however, one of the members of the group was found who heard the signals clearly and definitely; and this relieved what was fast becoming, under the circumstances, an extremely awkward situation.

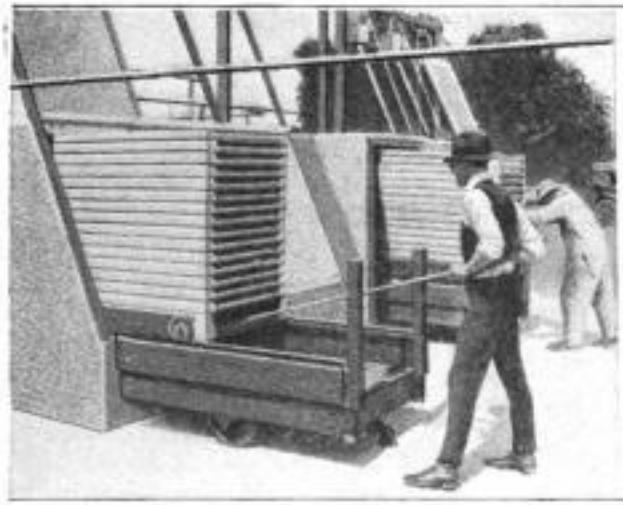
FLOATING DONKEY ENGINE IS DOCK "HANDY MAN"

Of use in a multitude of ways, a floating donkey engine is dragged to all parts of a western harbor to exert its power wherever needed. A shelter is provided for the operator, and consequently the rig

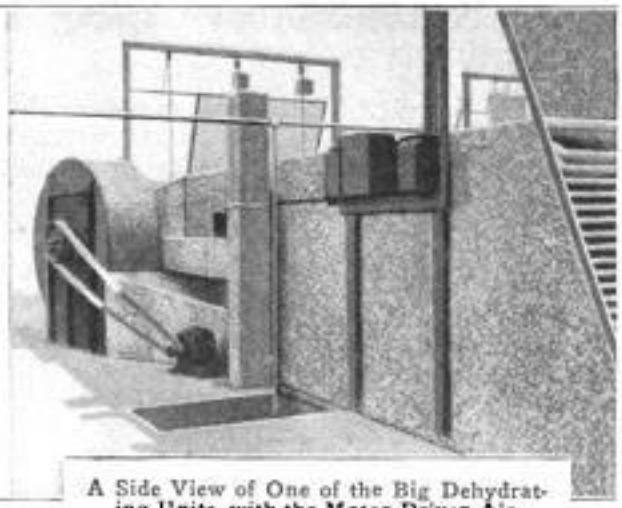


A Floating Donkey Engine That is Hauled to Any Part of a Western Harbor Where Its Services are Required: It Sits upon a Barge and is Towed from Place to Place by a Tug or Motorboat

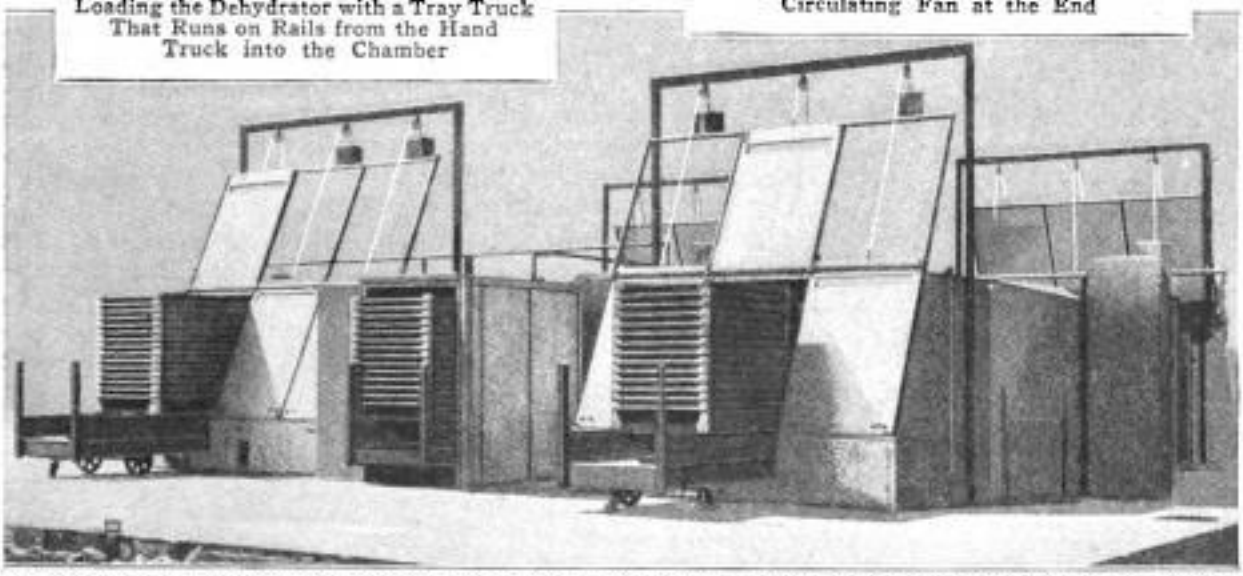
can be used in any kind of weather. A tug or motorboat is used for towing the barge.



Loading the Dehydrator with a Tray Truck That Runs on Rails from the Hand Truck into the Chamber



A Side View of One of the Big Dehydrating Units, with the Motor-Driven Air-Circulating Fan at the End



A Battery of the New Dehydrating Machines, Each 32 Feet Long, 16 Feet Wide, and 6 Feet High, with Stacks of Drying Trays on Their Double Trucks About to be Rolled into the Lift Doors of the Chambers

DEHYDRATING COSTS REDUCED BY NEW MACHINE

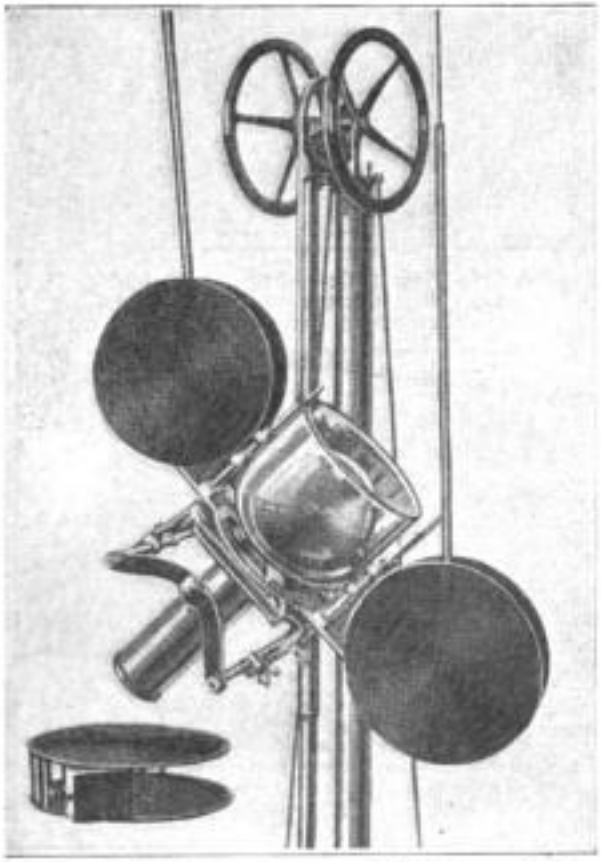
Machines for the dehydration of fruits and vegetables are customarily built on the ground by the operator of the plant, and have the usual faults of "homemade" apparatus. A standardized machine has now appeared on the western market, however, introducing a number of new and valuable elements. Each unit of this modern dehydrator measures 32 by 16 by 6 ft., and handles eight to ten tons of produce every 24 hours, at a cost as low as 45 to 90 cents an hour.

Double walls around the dehydrating chamber exclude all air except that which is used continuously in circulation, properly regulated as to moisture and temperature. A blower and suction fan maintain the circulation, the reused air effecting a considerable saving in fuel. Near the bottom at one end of the machine is a condenser consisting of a series of water-cooled baffles, through which the air passes on its way to the trays, absorbing an adjusted amount of moisture. This retards the drying process sufficiently to prevent the common trouble of too rapid surface drying. Bleaching is avoided, and much of the original color retained, by the production of carbonic-acid gas through the oxidation of the vegetable matter, tending to displace the air and become, to some extent, the circulating medium.

The dehydrating chamber accommodates 294 trays at one time, with a drying surface of 3,528 sq. ft., and a total of 350 trays are supplied with the machine. For the interesting process of loading and unloading, a hand truck with longitudinal rails on its platform is used. In the drying chamber are rails mounted at the same level. On these a smaller truck runs, carrying 15 trays. While these are being run into the chamber at one end, others are being removed at the other end.

X-RAY TUBE INSULATORS PREVENT FATAL SHOCKS

The high-voltage current used with X-ray tubes may be deadly under certain conditions. It is not necessary to come into direct contact with a wire, as the current will jump a gap of 4 in. or more. In order that patients and operators may be amply protected, large shields of insulating material, to be placed on the terminals of the tubes, have been brought out. Supplementing the shields are two long bushings of great insulating strength through which the lead-in wires are run.



Strong Insulating Bushings and Shields, to be Applied to X-Ray Tube Terminals, Prevent Shocks to Patients and Technicians

PRECISION WEIGHING IS DONE WITH SCALE BEAM MOVING

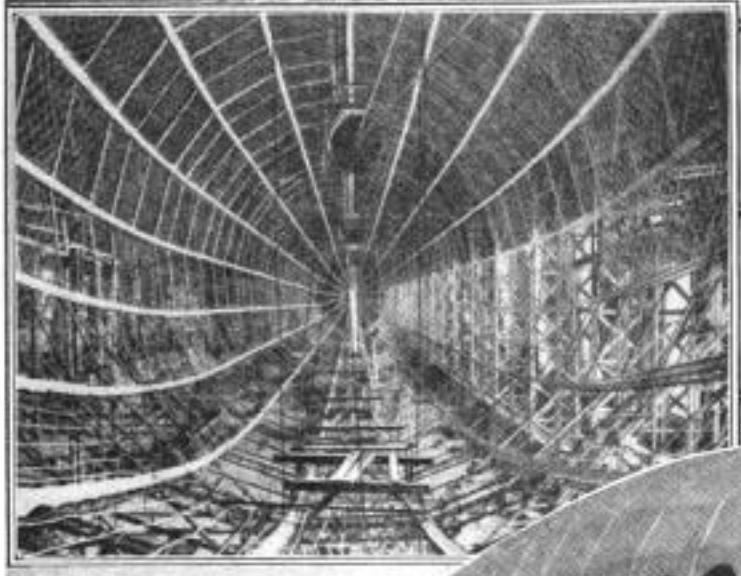
The most precise weighing in the world is done with the beam of the balance moving. Readings are taken of the indication of the pointer at the ends of its swings, from which is deduced the position in which the beam would remain at rest, if, by a delicate operation of some kind, it could be placed stationary in that position. After one rest point, as it is called, is determined, a small change is made in the weight on one of the pans, and a new rest point is determined. From the change in the rest point of the beam, and from the known value of the small change in weight, the exact weight in the counterpoise pan required to bring the beam to balance in its zero position, can be determined by a simple computation, and the weight of the object being measured can thus be established.

This method of using the balance is important for three reasons: First, it is generally impossible to bring a fine balance to rest, the vibrations of the building, in many cases, being sufficient to give it perceptible motion; secondly, the effects of friction are practically eliminated, and thirdly, by using the moving pointer, the indication can be obtained quickly.

LATEST IDEAS IN DIRIGIBLES TYPIFIED IN "R-80"

The new all-British, rigid dirigible "R-80" has successfully completed its trial flights. A maximum speed of 65 miles an hour was attained, and it is estimated that a constant cruising speed of 50 miles an hour can be maintained for a distance of 7,200 miles. No attempt has been made to surpass other craft in point of size. The aim has been, rather, a bettering of efficiency, and it is conceded that this has been accomplished. The hull of the new ship is said to be the most perfectly streamlined that has ever been produced, and the streamline idea has been applied, in the extreme, in the construction of the cars. There are four of these, three of which contain the power units, while the fourth is the navigator's car. As is to be expected, the last-named compartment is placed well toward the front, in order that the navigator may have an unobstructed view. Directly to the rear of and connected to it by a flexible vestibule, is the second car containing two of the 240-hp. engines. These are gear-connected in such a way that either or both may be used to drive the main propeller. Two more engines of the same size are carried, one each, in two secondary cars suspended side by side toward the extreme rear of the ship. These engines drive direct-connected, independent propellers. The principal specifications of the "R-80" are: length, 530 ft.; diameter, 70 ft.; height, 85 ft.; gas capacity, 1,250,000 cu. ft., and gross lifting capacity, 38.2 tons.

The Gas Containers Are 15 Ballonets Made of a New Exceptionally Light and Gas-Tight Material. This Illustration Shows the Inflation of the Containers While Undergoing Test. The Small Framework Is That of the Combination Navigator's Cabin and Main Engine Room

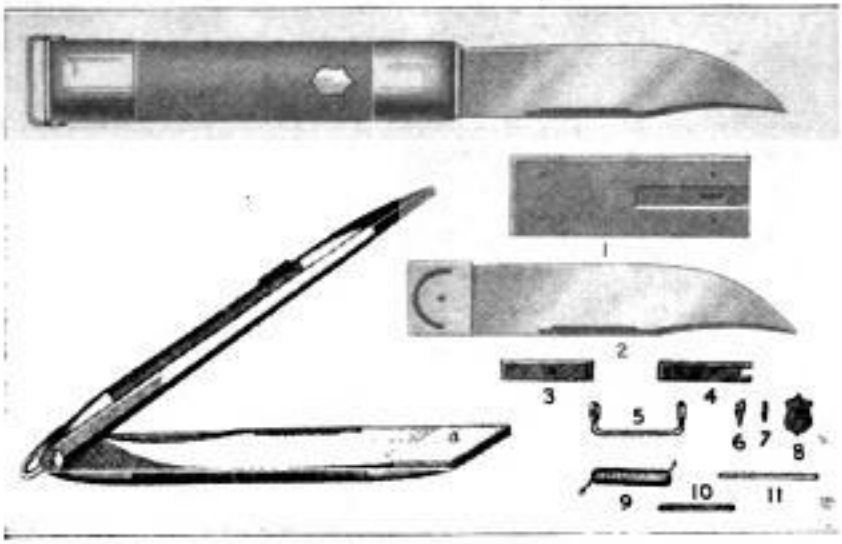


Looking down the Interior of the Aluminum-Alloy Frame: The Close-Mesh Latticework of Wire Forms the Net Which Supports the Cars. Thus the Envelope Carries No Weight, but Merely Forms a Smooth Surface to Cut Down Wind Resistance and Skin Friction

The "R-80" Undergoing Trial: A Gun Platform, on Top, Mounts One Two-Pounder and Six Lewis Machine Guns. All Cars are Provided with Buffers Which Are Buoyant Enough to Support the Machine on Water. The Steering Cables and Rods are Inclosed by a Shaft Which Connects the Ship's Hull and the Forward Car

IMPROVED POCKETKNIFE HAS NOVEL FEATURES

A new knife, perfected by a Pacific-coast inventor, is made in various types



Top: The Complete Knife, Opened. Left: The Handle Opened, Showing the Blade Folded Within. Right: The Disassembled Parts. 1, The Button Side of the Handle; 2, the Blade; 3 and 4, Lock Parts; 5, Huge Yoke; 6, Handle Catch; 7, Blade Pin; 8, Handle Shield; 9, Hinge Spring; 10 and 11, Hinge Bushing and Pin

from the long, heavy hunting knife to the tiny watch-chain knife. It may be best described as a device wherein the blade, when in use, is held rigidly in position, and when not in use, is completely concealed. When closed, the knife is dust-proof, and can be made waterproof if desired. An important improvement, from the angles of utility and manufacture, is the elimination of the steel back-spring, which constitutes a large part of the cost of the ordinary pocketknife. Also, blades are interchangeable. By the simple method of unscrewing the pin holding the blade, another blade can be quickly substituted. Thus a hunter can, in a moment, substitute a skinning blade for the ordinary blade in his knife.

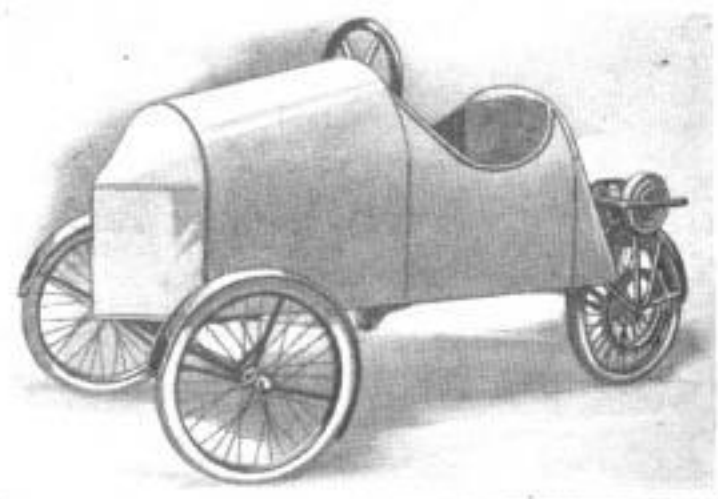
The ordinary-size knife has two blades, or one blade and a utility tool. The watch-chain knife has a blade and scissors, blade and file, or file and scissors.

The knife is very simple and efficient in operation. The usual shield decoration on the handle serves as a lock catch. When pulled back slightly, the catch permits the handle to fly apart about two inches, a movement actuated by a small coil spring in the joint at the butt of the handle. The blade is then pushed out with the thumb or forefinger, and when in line with the handle, the latter is closed, locking itself and holding the blade absolutely rigid by the aid of shoulders. A channel groove in the base of the blade, which operates on an imbedded pin, prevents the blade from going beyond its proper position in opening or closing it, thus practically eliminating all danger of the user's cutting himself. It is claimed that, grade for grade, the improved knife can be manufactured at from one-third to one-half less cost than ordinary knives with blades that open and close.

NEW EUROPEAN CYCLECAR HAS AIRPLANE FEATURES

Owing to the gasoline shortage in Europe the demand has become so strong for an automotive vehicle combining extreme lightness and economy with comfort and reliability, that the designers, in attempting to meet it, have evolved some odd creations.

One of these is a monocar, reminiscent of the cyclecar stage through which the American automobile industry passed a few years ago. It consists of a light single-passenger body, a front-axle mounting, two motorcycle wheels, and one rear wheel driven by a diminutive air-cooled, two-cylinder engine, such as is used extensively in this country to convert bicycles into motorcycles. A push-pedal starter



Three-Wheeled Monocar, the Latest European Automotive Creation: The Drive Is on the Rear Wheel, a Diminutive Air-Cooled Engine, Mounted above It, Supplying the Power

Left: The Homemade Overshot Water Wheel by Which a Tiny Creek is Made to Supply Power for Farm Lighting. Center: The Long Wooden Flume. Right: The Big Wooden Pulley Driving the Dynamo. The Plant Operates Continuously, Employing No Storage Battery

enables the passenger to take his seat before starting the engine. The stock models, so states the claim, are capable of a sustained average speed of 20 miles an hour, and in trials a maximum of 47 miles an hour has been attained. The influence of aerial engineering is seen in the streamlined body and the spring suspension, which is an adaptation of the shock-absorber principle used in airplane landing gears. It is said that, owing to the efficiency of the springing, the little cars will outstrip a motorcycle of similar power in rough going.

TREATED LODGEPOLE PINE IS USED FOR RAILROAD TIES

Practically inexhaustible supplies of railroad ties are declared to be made available by a special process of preservative treatment for lodgepole-pine timber, developed by a western road. This slim species of tree, heretofore debarred from extensive use by its lack of breadth and durability, grows in enormous quantities over the vast forested areas of the Northwest, and is easily handled. A plant for treating lodgepole-pine ties by the new method is to be erected by the railroad in southern Montana.

TINY CREEK SUPPLIES POWER FOR FARM LIGHTING

One of those tiny creeks that abound, unnamed and almost unnoticed, in nearly all farming districts, has recently been put so effectively to work by a Washington farmer that it lights 17 lamps in his house, heats his electric flatiron, and runs his churn and washing machine. A small dam across the creek turns a stream of water into a 200-ft. length of wooden flume, 14 in. wide and 5 in. deep, leading to a homemade overshot wheel, 12 ft. in diameter and 24 in. wide. On its shaft, inside a little power house, is a 9-ft. wood pulley, belted to a 16-in. pulley that in turn drives a 7-ft. wheel, and this turns the ½-hp. dynamo, giving it 1,800 r.p.m. when the water wheel makes 12 r.p.m. The plant operates continuously, employing no storage battery, and its owner is so well pleased with it that he contemplates building a bigger one.

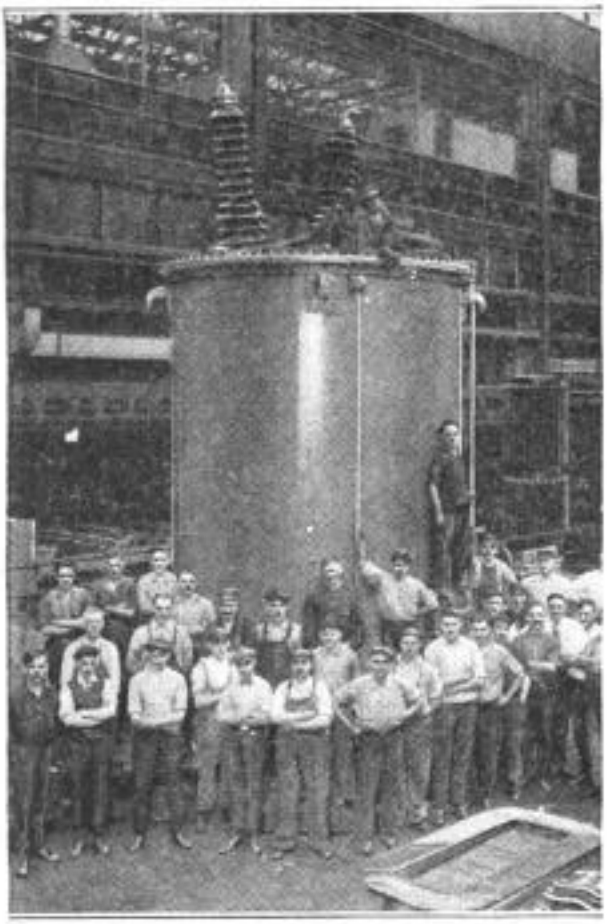
MAKES GLASS EYES TO ORDER WHILE CUSTOMERS WAIT

Making a profession of an art she learned while doing war work, an English girl has recently opened an office in Paris specializing in the production and fitting of glass eyes. The remarkable feature of the undertaking is that the artificial optics are finished from the raw material while the customers wait in the anteroom. A gas blowtorch mounted on a small workbench, and a few simple tools, constitute the outfit with which the adept artist fashions the imitation eyes from glass tubing.

Transforming a Glass Tube into Artificial Eyes with a Gas Blowtorch, While the Customers Wait

LARGEST TRANSFORMER IS RATED AT 66,000 VOLTS

What are claimed to be the largest transformers ever produced were recently constructed at a large eastern factory.

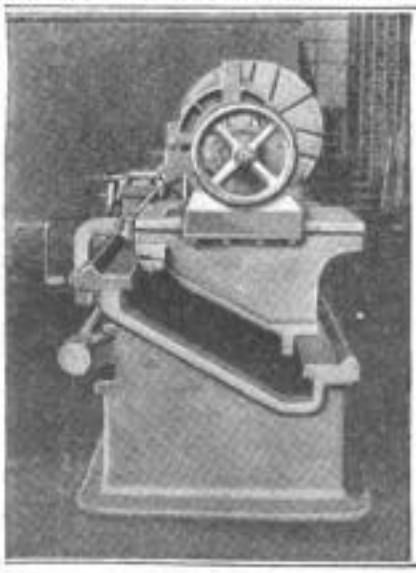


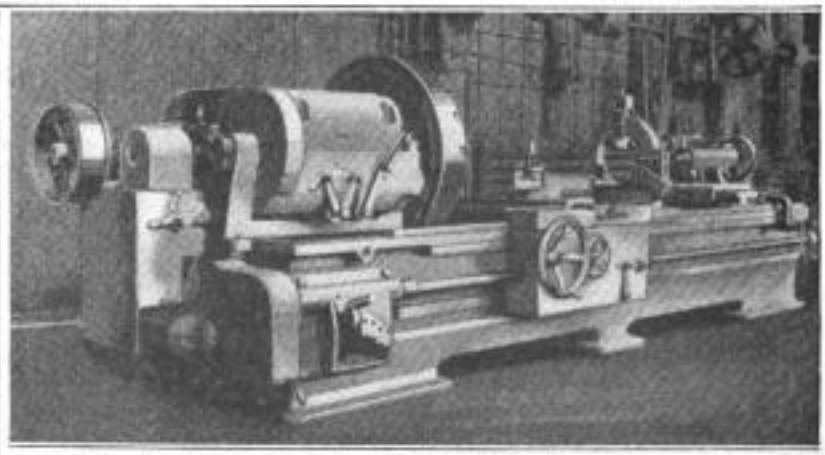
One of Three Enormous Transformers, Built for a Western Power Company: Each Is Nearly 10 Feet in Diameter and 22 Feet High over the Insulating Bushings

Each of the mammoth units is incased in a steel tank of an approximate diameter of 10 ft. and a height of 16 ft. The windings are immersed in oil, of which each tank contains 18 tons, to prevent deterioration from moisture and also to insulate them, the insulation of the coils proper being insufficient to confine the enormous voltages which are generated. Including the oil, the weight of each unit is 63 tons. Current is taken in on the primary side at a voltage of 11,500, and is stepped up and delivered to the transmission lines at a pressure of 66,000 volts. It is expected that the pressure will later be increased to 132,000 volts. The ends of the high-tension windings are brought out through very heavy insulating bushings, approximately 6 ft. in height, mounted on the tops of the huge coils.

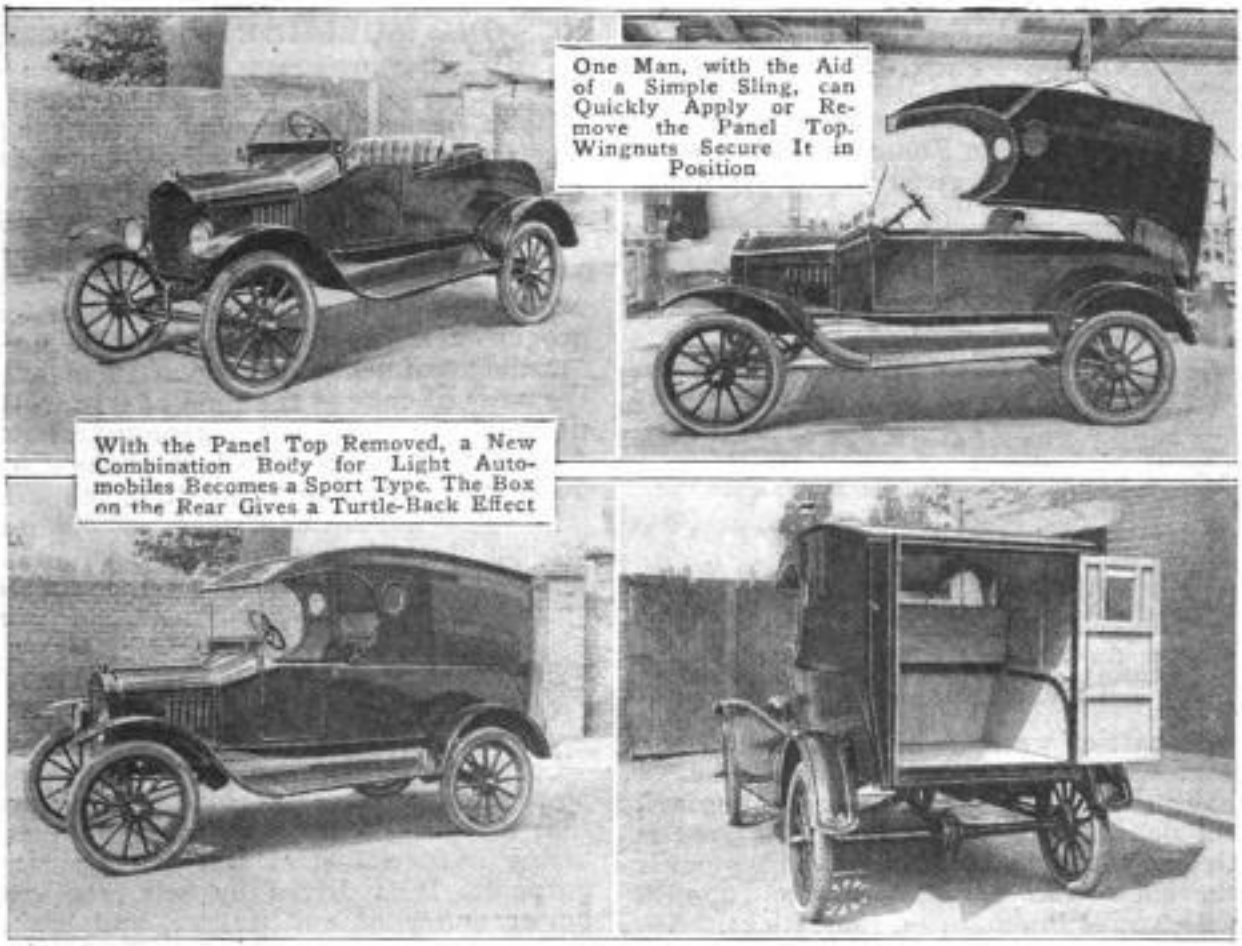
DOUBLE-SWING HEAVY-DUTY LATHE HAS NOVEL FEATURES

A new multi-purpose lathe has been produced which may be used on work requiring either a 26-in. or a 40-in. swing. Primarily designed for the turning of railway-car wheels, in which case the maximum swing is required, the tool is of sufficient accuracy, so claim the manufacturers, to permit the successful performance of smaller turning operations as well. The back side of the bed is several inches lower than the front side. This design allows an unusually large clearance from bed to center without undue width, which is a desirable feature on account of the economy in floor space effected. In order that the maximum capacity may be used, both the head and tailstocks may be shifted, transversely, from front to rear of the bed, until the distance from the centers to either rail is sufficient to accommodate work requiring the maximum swing. The design differs from the standard pattern of lathe in that, were it possible to shift the headstock transversely





Left: Details of a Double-Swing Car-Wheel Lathe, Showing the Dropped Back Side of the Bed and the Method of Shifting the Tailstock Transversely. Above: View of the Massive Headstock, Which can Also be Shifted from Front to Back



A New Combination Passenger and Commercial Automobile from Two Angles. Left: Evidences of Thoughtful Designing are Seen in the Proportioning of the Two Parts and the Absence of Abrupt Lines. Right: The Load Space Is Ample for the Requirements of Small Merchants and Salesmen Who Make Their Own Deliveries

in the latter, the effect would be to decrease rather than increase the swing. The difference in the height of the front and rear sides of the bed makes possible the variation in capacity.

AIRPLANE SURVEY MAY AID IN CLIMBING MT. EVEREST

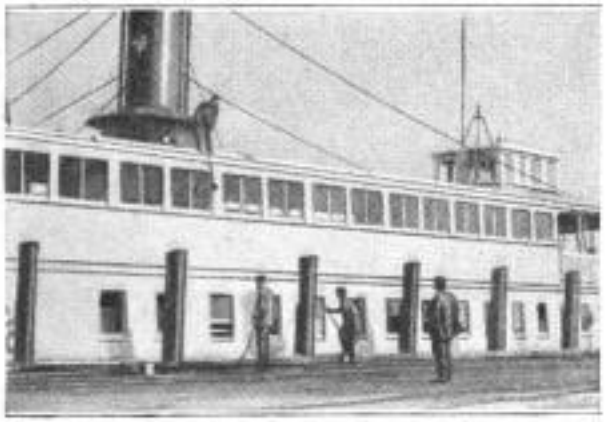
Preparatory to a projected attempt at the scaling of Mt. Everest, the world's highest mountain, whose top has never been trod by human foot, a suggestion has been put forth that an airplane survey of the approaches, possible routes, and camp sites of the summit would prove of immense value. The height of the mountain is 27,000 ft., or about 9,000 ft. less than the airplane altitude record. So, there is hardly a doubt that planes could be flown straight across without stops. However, there are the problems presented by unknown treacherous air currents and the lack of landing spots to be considered. Now that the project has been suggested, it may be supposed that some daring airman will shortly attempt the flight.

DETACHABLE PANEL-TOP BODY FOR LIGHT CARS

A combination passenger and panel-top commercial body for mounting on light chassis is the offering of an English concern. The under body consists of the conventional two-passenger seat with an open box in the rear. The sides of the box are exceptionally high and have the rearmost top corners rounded off to a smooth curve. A light panel top, which may be quickly mounted and demounted, as the occasion may require, completes the assembly. The body is designed for the service of small merchants and salesmen who solicit orders three or four days during the week and make deliveries the remainder of the time. When the car is used as a roadster, the top is demounted and the box body covered by a deck. This serves as a disguise and tones down the commercial appearance. The one-piece windshield is strongly hinged to the cowl, and may be raked when the machine is used as a roadster, or set vertically when the panel-top body is applied. The panel body is held in position by wingnuts.

SOAP-AND-WATER METHOD KEEPS FERRIES CLEAN

The job of washing the huge ferries that ply across San Francisco Bay is about the same as that given to the small boy



Washing the Outside of a Big Ferryboat with Soap Solution Applied with Long-Handled Swabs, and Washed Off Again with a Hose

who carries water to the circus elephant. Many methods have been tried, but it has been decided that the only successful one is soap and water. The boat is tied up to the dock, and deck hands go over the sides with a soapy solution, applied with swabs mounted on long sticks. Another man then turns a hose on the boat and the soap is mopped off. It takes all day to wash a ferryboat in this manner.

PLAN ELECTRICAL TRUNK LINE FROM BOSTON TO WASHINGTON

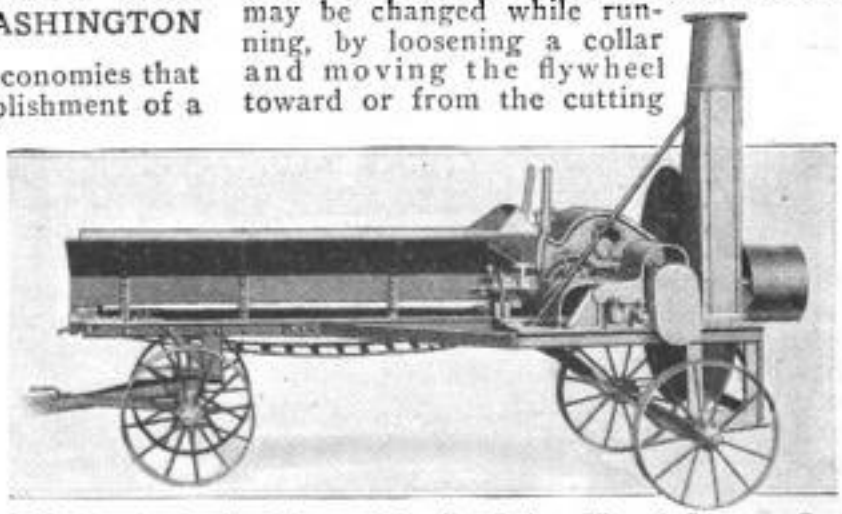
The investigation of the economies that would result from the establishment of a general system for the generation and distribution of electrical power is the object of an 18-months' survey now being conducted by the U. S. Geological Survey in the industrial region between Boston, Mass., and Washington, D. C. It was for this work, it may be remembered, that congress at its last session appropriated $125,000. Having studied the present and probable future demands, and all possible sources of power in the area, the investigators will develop the details of the general plan. This calls for a main trunk line of electrical power, which will be fed by all the large generating plants along the route, and will be tapped wherever industrial power is required.

REMOVE SULPHUR FROM COKE BY TREATMENT WITH GAS

Coke cleansed of its sulphur content is a better fuel for both household and steel-furnace use, and a scientist of the Bureau of Mines has found that treatment with hydrogen gas is the simplest desulphurizing process. Since by-product coke-oven gases contain about 50 per cent hydrogen, it is proposed that they be used for the treatment, by passing them over the mass of coke at the time of its formation. By this means the removal of the sulphur would become a part of the manufacturing process, and be quite economical. The impurities in the gas do not prevent its action, as it was shown that hydrogen experimentally used could be made to serve satisfactorily a second time.

MACHINE FOR FILLING SILO IS DRIVEN BY TRACTOR

So many farmers nowadays are using power to cut silage and load it into their silos that an Illinois manufacturer is marketing a special steel machine for that purpose. It is driven by belt from the power pulley of any tractor, and has a self-feed conveyor in its low feed table to carry the stalks to the cutting knives, which are large and cannot become choked with material. The cutting angle of the knives is adjustable, and the cut may be changed while running, by loosening a collar and moving the flywheel toward or from the cutting plate. A blower carries the silage up a canvas chute and into the silo as fast as it is cut.

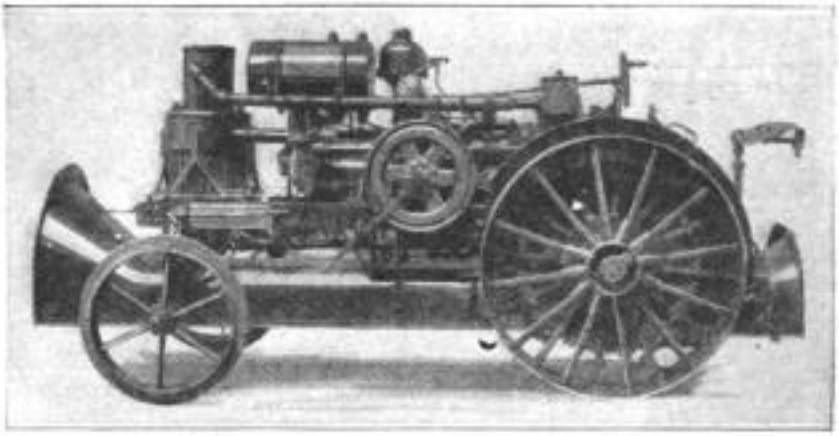


A Machine for Cutting Silage and Loading It into Silos: A Conveyor Carries the Stalks to the Cutter and the Silage is Then Blown up a Chute

¶No less than 494 forest fires have been located, in less than two and a half months, by patrol airplanes in California and Oregon.

NURSERY TRACTOR DESIGNED TO RUN OVER TREE LIMBS

Now that tractors are being specially designed to meet various peculiar requirements, even the nursery operator may obtain a model adapted to his difficult needs. While it may be used for all ordinary purposes, the nursery tractor is primarily intended to haul a tree-digging machine for uprooting rows of stock. Running the whole length underneath it, with a 2-ft. clearance, is a half-round tunnel, or inverted chute, with a flaring mouth like half a funnel at each end, the front one being 3 ft. wide. Thus equipped, the tractor passes readily over trees and limbs on the ground, without danger to machine or operator. It uses gasoline or kerosene, and gives 8 hp. at the belt and 16 hp. at the drawbar.



The Special Tractor for Hauling Tree Diggers in Nurseries, with a Tunnel Underneath, to Permit It to Pass over Limbs and Branches Lying on the Ground: The Machine may be Applied, Also, to Ordinary Tractor Uses

SIMPLE KEROSENE BURNER ADAPTED TO HOME NEEDS

A new kerosene-gasifying and burning unit for which great economy is claimed has been announced by a Nebraska inventor. The burner is supplied in various sizes suitable for cooking and heating stoves, furnaces, etc. As the parts of which the burner is composed contain no very delicate or moving elements, reliability and certainty of operation are claimed. Fuel feed is by gravity or air pressure.

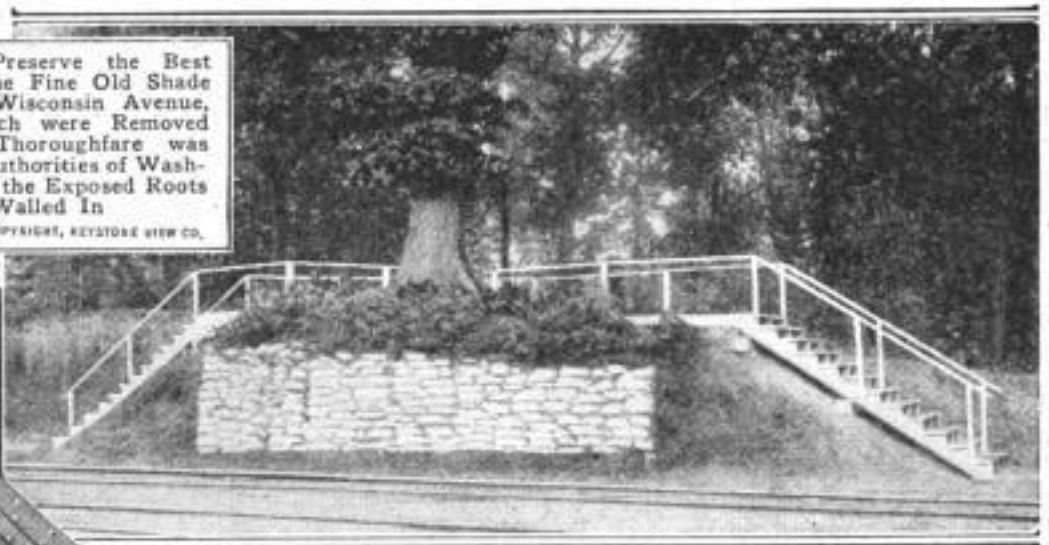
The Large Burner to the Left Is for Furnace Installation. Center: A Kitchen-Stove Burner. Right: A Small Element Disassembled, Showing the Circular Plates Which, after Becoming Hot, Convert the Kerosene into Gas

WOOD-REFUSE CUTTER SAFE FROM INJURY BY METAL

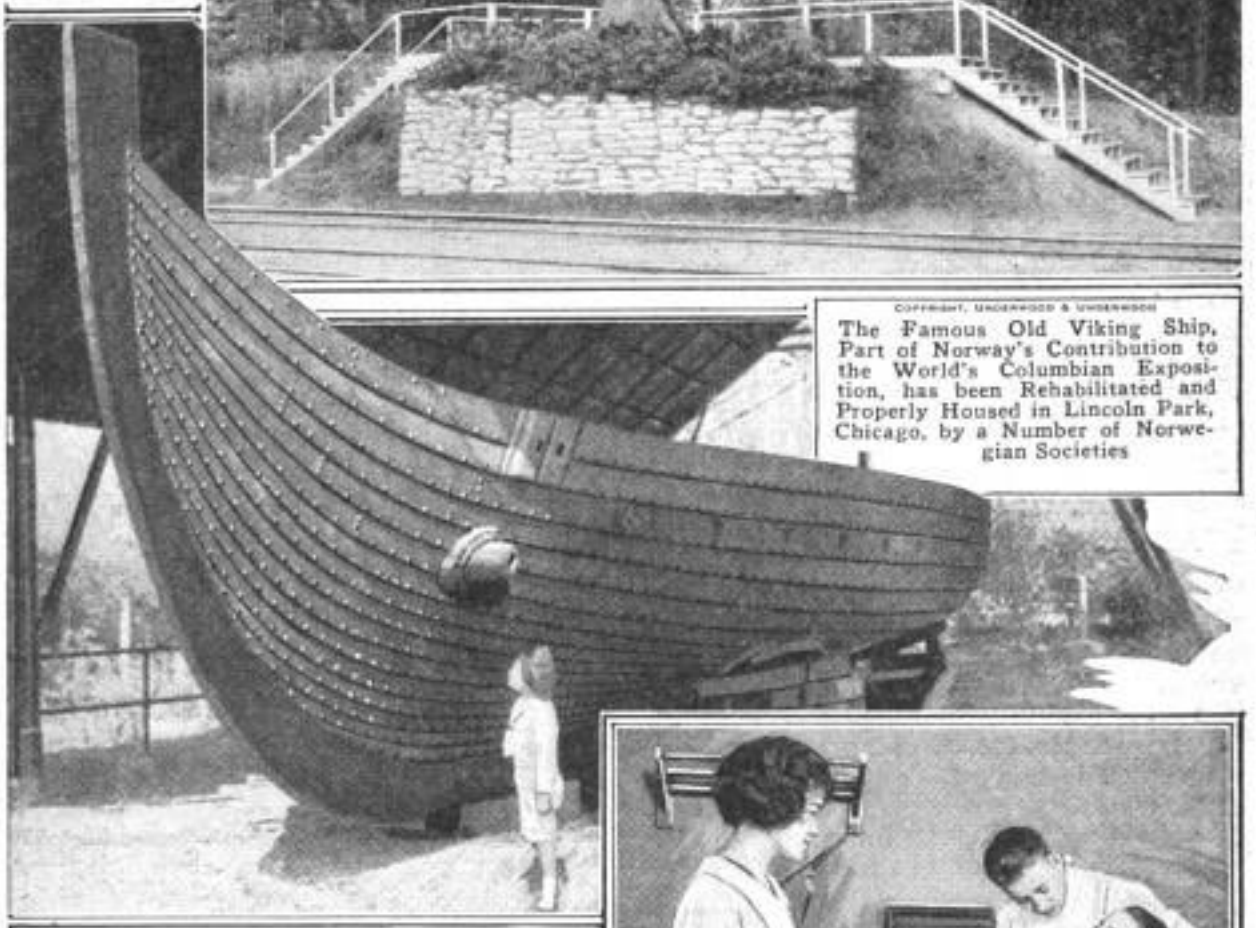
Machines of the "hog" variety, for cutting up wood refuse, are frequently subjected to damage by stray tools and fragments of metal that seem bound to get into the waste stock fed into the hopper. In a machine of this kind, recently put on the market, the shaft of the revolving disk that carries the cutter blades has a thrust collar at the rear, held in place by two small lugs, whose ends bear against it. This support is strong enough to resist any pressure from wood, but as soon as a piece of metal is caught against the disk, the lugs break. The freed disk slides back and gives a 6-in. clearance for the metal to drop out, and the cutter mechanism remains uninjured. Extra lugs, furnished with the machine, are easily installed. The capacity is 24 or more cords of slab refuse an hour.

Left: The Wood-Refuse Cutting Machine Open, Showing the Knife Disk Held by Breakable Lugs. Right: The Machine Ready for Work

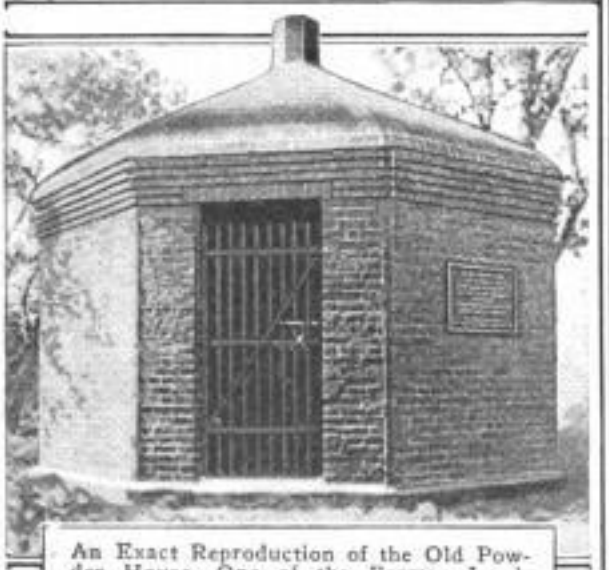
CIVIC FEATURES THAT PROMOTE THE COMFORT



Desiring to Preserve the Best Specimen of the Fine Old Shade Trees Lining Wisconsin Avenue, Many of Which were Removed When That Thoroughfare was Widened, the Authorities of Washington Ordered the Exposed Roots to be Walled In



The Famous Old Viking Ship, Part of Norway's Contribution to the World's Columbian Exposition, has been Rehabilitated and Properly Housed in Lincoln Park, Chicago, by a Number of Norwegian Societies



An Exact Reproduction of the Old Powder House, One of the Former Landmarks in the Rich History of Plymouth, Massachusetts, has been Constructed by the Society of the Sons of the American Revolution. The New Structure Occupies the Site of the Original Building

Public-Spirited Citizens of Portland, Oregon, have Subscribed to a Fund and Engaged the Services of Dental Surgeons and Assistant Nurses to Care for the Teeth of the Children in the 55 Public Schools, Free of Charge

AND ENJOYMENT OF VISITORS AND RESIDENTS

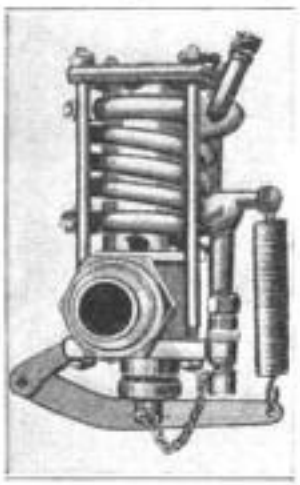
The Locations of the Valves in the Water Mains in the City of Detroit, Michigan, are Mapped and a Power-Driven Wrench Is Part of the Equipment of One of the Fast Fire Trucks. Any Section of the City may be Quickly Cut Off, and the Water Diverted to Any Other Section

Springwood Farms, York, Pennsylvania, Is the Site of the First Monument to be Erected in Honor of an Achievement in Apple Culture. An Eight-Foot Native-Limestone Shaft Commemorates the Propagation of the Variety of Apple Known as the York Imperial

As a Concrete Example of the Meaning of the Term 6,000 Dozen, the Chamber of Commerce of Petaluma, California, had an Enormous Basket Constructed and Filled with Eggs Produced in the Locality. The Big Basket Is 14 Feet Long, 7 Feet Wide, and 4½ Feet Deep

FROST CAUSES THERMOSTATIC VALVE TO OPERATE

A thermostat depending for positive actuation upon a drop in temperature is something of a departure from the general conception of such devices. Such a one has been developed to operate the drain valves of water-pipe lines, radiators, tanks, etc., just before the water begins to congeal. The expansion chamber consists of a coil of small pipe, containing water, closed at one end and terminating in a cylinder at the other. The cylinder contains a piston. The water in the small coil will reach the freezing point several minutes in advance of that in the main system, and, expanding, will exert a pressure in the cylinder which forces the piston to travel outward and open the drain valves. The valve is normally held closed by a spiral spring.



NEW BATTERY-CHARGING CLIP HAS SAFETY INSULATION

A quick-action connecting clip made of lead-coated bronze spring, of heavy gauge, has two disks of hard fiber applied in such a way that they form an insulated grip by which the device may be compressed and applied. It may be used to advantage by linemen, power-line "trouble shooters," or other electrical workers who have occasion to test and work with live wires. However, it was primarily designed for use in storage-battery service stations, and it is for this reason that the bronze wire is lead-coated, the lead affording protection against the corroding action of the sulphuric-acid fumes. The insulating disks protect the battery man from the shocks which are experienced every time a battery is put on or taken off charge. These are always unpleasant, or even painful, and, under certain conditions, may be dangerous.

POOL PLAYER'S CHECK TELLS TIME AND AMOUNT DUE

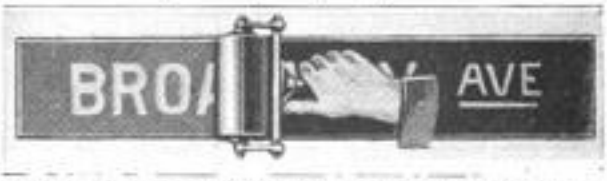
In the pool rooms of a Massachusetts club, a simple check system for players, invented by a member, is now being used with great success. A numbered cardboard slip, the stub of which is given to the entering players, is punched for the hour and nearest five minutes of starting, and hung on a hook representing the table used. At the end of the game, the cashier punches the finishing time, and notes the elapsed minutes. Opposite this figure, in columns for two, three, or four players, the amount due the house is read directly. Players rack their own balls, saving the labor of several boys.

MACHINE WASHES OR SPRAYS WITH WATER OR SOLUTION

Throwing either a solid stream, or a spray, of clear water, soap solution, or disinfectant, at the will of the operator, is the performance of a small machine now offered for a variety of uses, from cleaning autos and windows to disinfecting trees. A nozzle equipped with a special valve control, and a connector for an ordinary hose, are mounted on top of a cylindrical container, 7½ in. high, the whole weighing 2½ lb. The change from soapy spray to a rinsing stream of clear water is made instantly by a turn of the valve handle.

RETOUCHING OF STREET SIGNS BY NEW METHOD IS RAPID

Street or other signs in which the letters are sunk below the surface may be quickly brightened by retouching with a roller device recently introduced. The letters are first brightened with aluminum paint and a brush. By passing the paint-bearing roller over the sign, a strongly contrasting, black or other shade background may be quickly applied.



Street Signs are Quickly Brightened by Applying New Background Paint with a Composition Roller

The Flag, Drawn through Space by an Airplane at the End of a 1,000-Foot Cable, was Bathed in a Flood of Illumination by Searchlights Below, the Plane Remaining Concealed by the Darkness

SEARCHLIGHTS PLAY ON FLAG FLYING THROUGH SPACE

Apparently gliding through space of its own volition, a huge American flag recently swept across the night sky of a western city, 1,000 ft. above the heads of astonished observers, yet visible to the finest detail in the beams of many searchlights focused upon it. This spectacular presentation of the Star-Spangled Banner was the successful result of an interesting aerial experiment, in which an airplane was used to draw the flag across the firmament at the end of 1,000 ft. of fine steel cable. A steel cross rod, weighted at one end, held the flag outspread in the flood of light, the plane itself remaining invisible in the darkness.

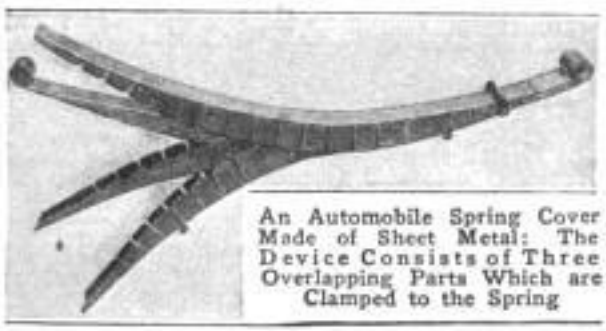
LEVER-LOCKED PISTON VISE HAS BABBITT-LINED JAWS

Those who realize the difficulty of securely holding a piston while removing or replacing wristpins, bushings, or rings, will be interested in a new piston vise designed to extend past the front of the workbench, thus giving ready access to the piston in either the upright or the inverted position, and avoiding the necessity of mutilating the bench with a large hole. A babbitt lining of the jaws assures a firm grip and prevents nicking or other injury. The manufacturers assert that, as the jaws are not rigidly connected, but are free to give, ring breakage is prevented. One move of the lever locks or unlocks the device.

The Babbitt-Lined Vise Holds Pistons, or Other Round Parts, Firmly without Danger of Nicking or Crushing

STEEL SPRING COVER KEEPS LEAVES LUBRICATED

Ever since automobiles have been equipped with springs, their lubrication has been a problem that has kept engineers and inventors planning some device for keeping the lubricant in the spring and the dirt out. What appears to be a promising idea involves the use of a three-piece steel jacket which is clamped onto the spring and filled with grease. The spring cover is stamped from sheet metal, and is flexible. As the flanges overlap each other, the escape of lubricant is practically impossible. Grease cups are provided underneath the covers which require refilling but once or twice a year.

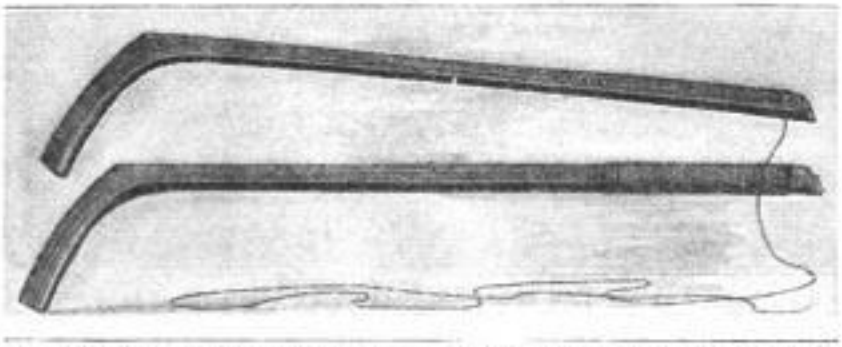


An Automobile Spring Cover Made of Sheet Metal: The Device Consists of Three Overlapping Parts Which are Clamped to the Spring

¶ One of the huge tanks at the Atlantic end of the Panama Canal now contains Diesel oil, instead of ordinary fuel oil, for the benefit of ships using Diesel engines. Only enough is sold to enable a ship to make the next oil station.

CORD GRIP ON HOCKEY STICK IS LIFE PRESERVER

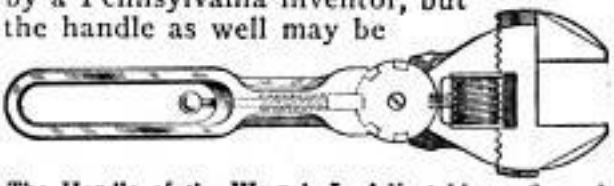
No doubt the hockey player has never thought of his stick as a life preserver; certainly not, if, in his youth, he has played the perilous "shinny on your own side." Yet a hockey stick intended for just this use has recently been devised by an American inventor. Around the upper end of any ordinary stick he wraps 30 ft. of the heaviest fishing line. During play this serves as an excellent gripping surface for the player's hands. In case a comrade falls through a hole in the ice, the player quickly unwraps the line, retains one end, and throws his stick to the endangered one. As the other end of the line is fastened to the stick, rescue is now easy. On the upper extremity of the stick the inventor provides, also, a pivoted metal calk, or prong, by means of which the wielder of the stick can pull his own person to safety in the event of a similar accident.



The Life-Saving Hockey Stick, Shown at the Top with Its Rescue Cord Unwound, and at the Bottom with It Wound on the Handle

MANY ADJUSTMENTS POSSIBLE WITH NEW-TYPE WRENCH

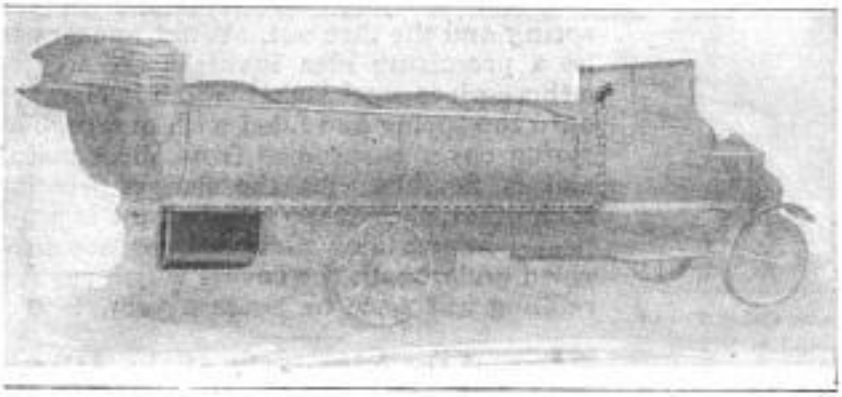
Not only is the opening of the jaws adjustable in a new type of wrench devised by a Pennsylvania inventor, but the handle as well may be set at any of five different angles to the head. A spring plunger, operated by means of a knob in the opening of the skeleton handle, and engaging notches in the disklike joint of the head, permits the jaw opening to be set in line with the axis of the handle, or at 45 or 90° on either side. The movable jaw, sliding transversely, is operated by an adjusting screw set in an opening in the fixed jaw. All adjustments are easily and quickly made while the wrench is being applied to the work.



The Handle of the Wrench Is Adjustable at Several Angles to the Head by Means of the Plunger Bolt

NOVEL SOUND INTENSIFIER ATTACHED TO REAR OF AUTO

When a motor car is moving at a fair rate of speed, engine and chassis noises, blended with the rush of air, create a grand chord which drowns all lesser sounds unless these are of an unusually penetrating, harsh, or shrill nature. For this reason motorists, failing to drive well over to the right upon signal from an overtaking car, are, many times, accused of a perversity of which they are not guilty. To remedy this condition a European inventor has developed a sound-collecting chamber to be attached to the rear of the car, pointing from front to back, connected with the front of the car by means of a conveying tube ending in an earpiece on a level with the driver's ear. The feature of the device is a pair of cones in the collecting chamber. One of these is arranged with the large end to the rear, the other with

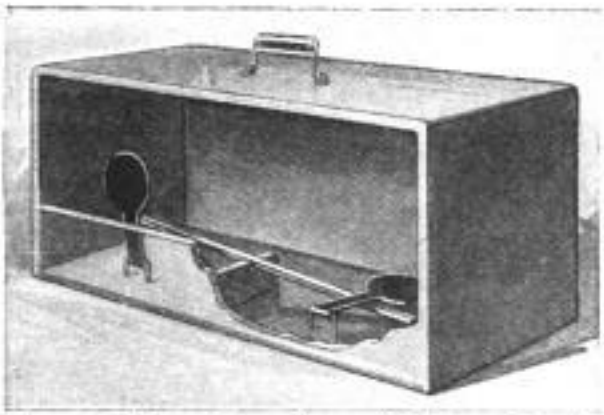


A Sound-Collecting Chamber Attached to the Rear of Automobiles Catches and Intensifies the Signals of Overtaking Vehicles

the large end toward the front. The air, rushing into the forward cone, called the intensifier, is diverted into the conveying tube, actually tending to create an air movement in the tube from rear to front. By reason of this, sounds caught by the collector cone, instead of being drowned, are intensified.

MINIATURE RIFLE RANGE HAS AUTOMATIC TARGETS

In a new device, serving the purpose of both bullet-proof back stop and automatic target setter, the knocking down of one bull's-eye instantaneously sets up another at the opposite end of the containing box. The mechanism consists of one simply arranged lever. When one bull's-eye is hit, it drops forcibly upon one end of the lever, and the other bull's-eye is thrown

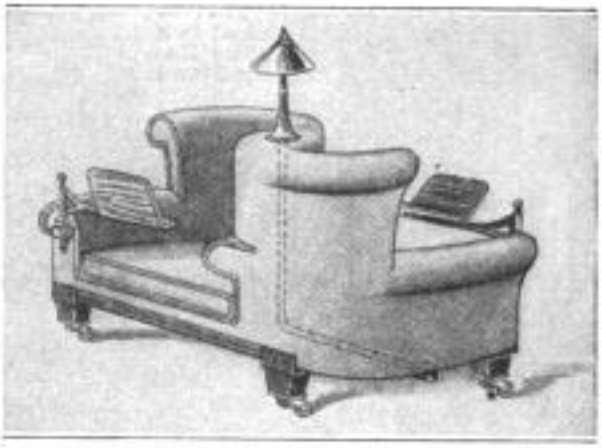


Cutaway Section of an Automatic Target, Showing How Knocking Down One Bull's-Eye Raises Another into Range

up into range. As it is unnecessary to enter the line of fire to set targets, danger is greatly minimized. Although bullet-proof, the device is easily carried, being little larger than a suitcase. It is the invention of a former exhibition marksman.

TWIN ARMCHAIR IS EQUIPPED WITH LIGHTING FIXTURE

Twin armchairs of the "tête-à-tête" variety frequently involve their occupants in illumination difficulties, because they face in opposite directions. A British ophthalmic surgeon has supplied a remedy for this condition by inventing a lighting fixture, in the form of an ornamental lamp, to be installed on the dividing arm between the two seats. In this position the light falls equally over the left shoulders of both occupants. A regulation steel conduit carries the electric wires down through the frame to an attachment socket in the base. To com-

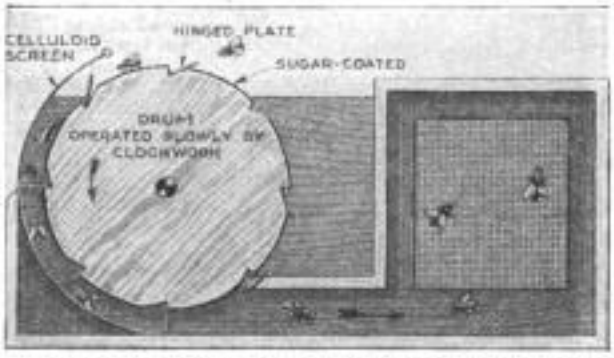


An Electric-Light Fixture Designed for Attachment to a Twin Armchair, with Connection Socket in the Base

plete the usefulness of the arrangement, each chair is equipped with a book rest.

HUGE JAPANESE FLIES CAUGHT BY MECHANICAL TRAP

A variety of fly, indigenous to Japan, attains such heroic proportions that mechanical traps are used for catching them. A wooden drum is slowly revolved by mechanical means. The surface of the drum is sugar-coated to attract the insect. Lighting on the drum to partake of the free lunch, the guileless fly takes the "first downward step." As the drum continues to revolve, a light metal flap



Diagrammatic View of the Mechanical Flytrap, with the Drum at the Left and the Cage at the Right

drops and effectively prevents the escape of the insect, which passes on into a screened cage at the opposite end of the device.

¶Excursion rates for Sunday and holiday trips through the Panama Canal are now announced. A first-class round trip is $3, and a second-class $2, while short trips are five cents a mile, and mileage books are $40 a thousand miles.

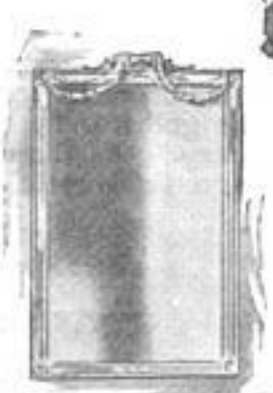
SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

A Household Safe That is Disguised as a Charming Mahogany Stand

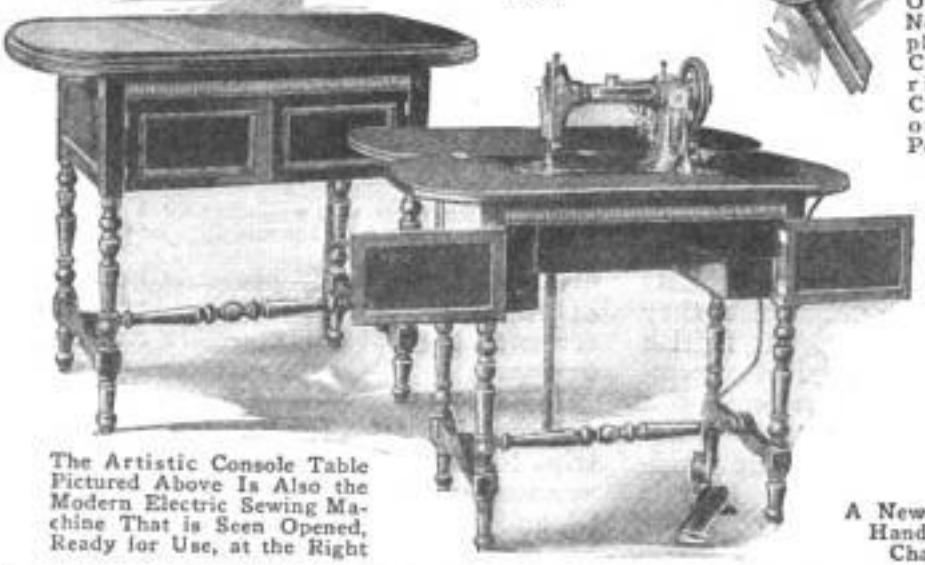
Exceptionally Brilliant of Color and Natural-Looking Are the Artificial Flowers Now Cleverly Made of Parchment

A Handy Ash Receiver for Closed Autos, with a Holding Socket That is Easily Attached Anywhere

Children Who are "Taking Music" Form the Great Body of Piano Users in the Homes, and for Their Benefit There Is Now a Folding Pedal, That Lifts Up So Little Feet can Reach It. Folded Down, as on the Bass Side in the Circle at the Right, It Looks like Any Other Pedal



Ordinary Keys Now may be Supplied with Gold Cases, and Carried as Watch-Chain Ornaments, or in the Vest Pocket like a Match Safe



The Artistic Console Table Pictured Above Is Also the Modern Electric Sewing Machine That is Seen Opened, Ready for Use, at the Right

A New Mechanical Desk Calendar, Handsomely Nickelplated, That Changes the Date at a Touch

A New Ornamental Metal Egg Cup Has a Disk Knife Pivoted at the Center, Which Cuts the Egg in Two, and Keeps One Half Hot While the Other is Eaten

A Ladle with a Strainer Forming a Half Cover over Its Top Is Particularly Useful for Handling Soups, Jellies, and Similar Foods

Worktable and Sewing Bag are Combined in a Recent English Invention, the Hinged Cross Frame of Which Holds the Bag Partly Open When in Use as a Table, and Closed When It is Carried on the Arm

Collapsible Tube and Carton are Made One in a New Variety of Cement Container. Puncturing the Top with a Pin, Releases the Contents

The Latest Form of Smoking-Pipe Reamer Has a Spring That Makes It Self-Expanding as Its Work Progresses, and It Fits Any Size of Pipe Bowl

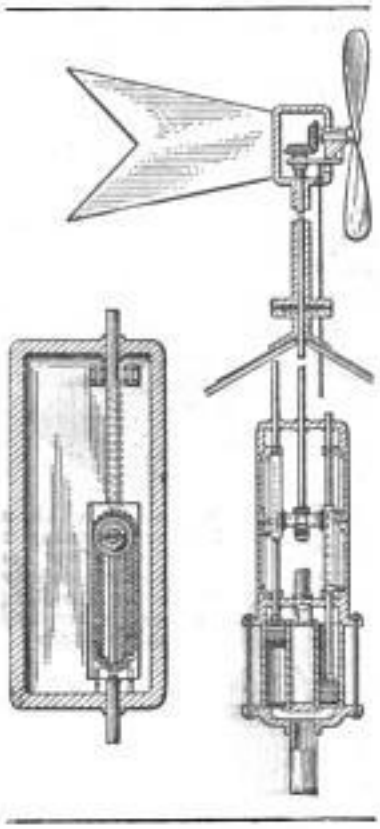
The Articles That Look like Fancy Hair Combs Are Shoe Tongues, Ornamented with Cut-Steel Beads, as Now in Style in London

A Circular Shape Distinguishes a New Form of Rubber Heel, Which Screws, like a Plug, into the Heel-Shaped Center Part, as Above, or is Attached Directly to the Shoe in the Manner Seen at the Left

Delicate Fabrics are Easily Ironed by Passing Them over an Inverted Electric "Flatiron" That Is Not Flat, but Rounded, and Mounted on a Stand

CONSTANT-PRESSURE PUMP DRIVEN BY WINDMILL

Patents have been issued to an Indiana inventor covering a new type of windmill pump drive. The pump pistons work independently of each other and on opposite strokes, each being actuated by a continuous internal rack in mesh with a bevel gear which alternately lifts it up and forces it down. The racks are caused to oscillate partially at the end of each stroke. As the main power shaft is a rotating instead of a reciprocating member, power is saved in moving it. As the water is delivered at practically constant pressure, and there are no dead points in the pumping cycle, destructive water hammer is avoided.



NONSKID DRIVING GLOVES HAVE RUBBERIZED PALMS

Motorists will welcome a new glove which relieves the fingers and wrists of the strain and fatigue caused by unconsciously gripping the steering wheel tightly, to prevent its slipping through the hands. This annoyance is aggravated by a leather glove after it has become smooth and glazed from wear. The new glove is of fabric into which serrated, grooved, or otherwise roughened, rubber patches are vulcanized in the palm and finger portions. Mittens of the same design are also offered. Both gloves and mittens should be of value also to those out-of-door workers, linemen, woodsmen, etc., who must place dependence in a firm grip on their tools.

BUY CHINESE QUEUES TO MAKE HAIR FILTERS FOR SOUP

Because long-strand human hair makes an almost ideal filter for straining soup, and other liquid foods, in preparation for canning, a certain manufacturer is reported to have bought recently some $800,000 worth of Chinese queues. These will be used in place of the goat-hair filters formerly employed because of their comparative cheapness. Human hair for various purposes has long been an article of Chinese export, but when the wearing of "pigtails" went out of fashion in the celestial land several years ago, an enormous supply of the material was created. The enterprising buyer was able to obtain for his money a total of 2,450,000 of the long plaits, composing a load for about 28 freight cars.

SANITARY DRINKING-FOUNTAIN ATTACHMENT FOR FAUCETS

A clever novelty, lately placed on the market, is an attachment which may be applied to practically any type of water faucet to convert it into a sanitary drinking fountain. The device clamps to the body of the faucet just back of the valve. By depressing a small lever, the gasketed inlet of the attachment is brought into register with the faucet outlet and pressed tightly thereto. The outlet tube of the device is pointed toward the front at an angle of about 60°. This permits one to drink without coming in contact with the metal parts.

CUTTING OILS AS A MEDIUM OF SKIN INFECTION

As a result of an employes' welfare investigation by one of the large manufacturing concerns, it has been found that the oil pimples, sores, boils, and other skin infections prevalent among lathe and other metal workers exposed to the action

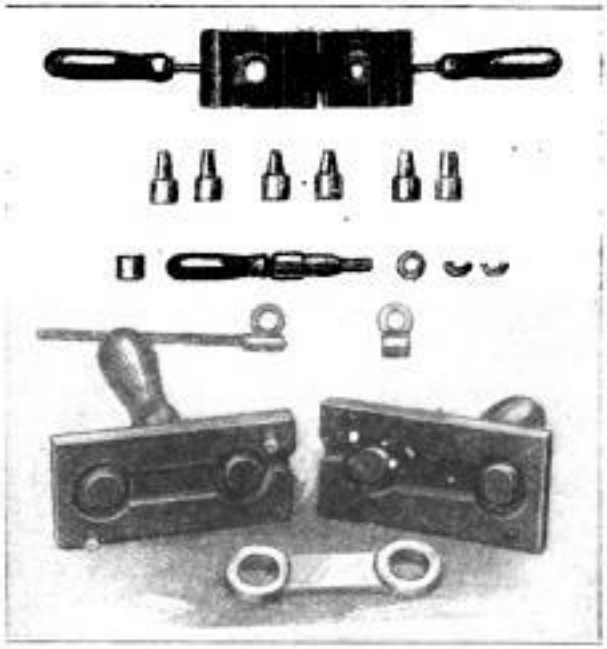
of cutting compounds, are due to several causes. Among these are the irritating effects of the oils coupled with the pore-clogging action of the paraffin, the scratching action of microscopic particles held in suspension in the compound, and, in many cases, the unhygienic habits of the workmen. It was also found that the compounds were free from bacteria when put in service, but very quickly became contaminated by the organisms thrown off by infected workers. Suggested remedial agencies are the chemical or thermal sterilization of the compounds, filtration and sterilization, and a combination centrifuge and thermal-sterilization process which was found to be almost perfect. However, any system is doomed to failure unless the employes will coöperate, observing reasonable rules of personal cleanliness.

TYPEWRITER TAPE ON REELS EFFECTS ECONOMIES

By a new method of marketing typewriter ribbons the cost of the small spools is saved as they need not be thrown away. It is also claimed that if the spools are filled only two-thirds full, bunching is prevented and the whole length of the ribbon is used. The ribbons are supplied in lengths of 144 yd., wound on reels. The winding of the spools is done on a simple hand-power machine, loaned to the purchaser. All shades, widths, and varieties of ribbons may be had.

SCRAP BATTERY LEAD RECAST INTO NEW SMALL PARTS

The conversion of scrap into valuable products is the keystone of many large industries. This principle may be applied to the automobile storage-battery service-station business by the conversion of scrap lead of a value of from 2 to 4 cents per pound into new battery small parts, taper terminal receptacles, pillar, post, and plate straps, cell-to-cell connectors, screw heads, etc., worth up to 35 cents per pound. This is accomplished by recasting the scrap lead in molds especially designed for the purpose. The claims of the manufacturers of the molds are that, as the work requires no high degree of skill, almost anyone can cast two new parts in the time required to clean an old one preparatory to burning into place. This saves the time of the high-salaried battery mechanics. Also, new parts are always available when and as wanted.



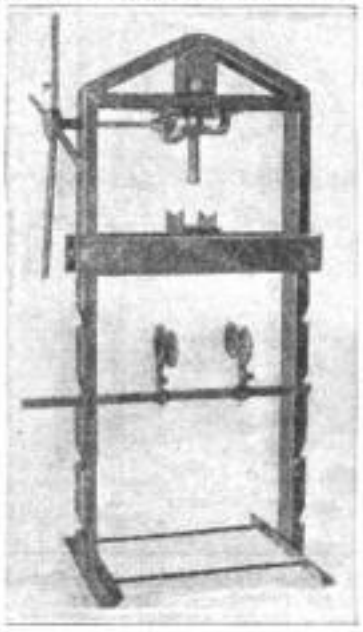
Top: This Mold Makes Taper Receptacles, Also Cable-Type and Lighting Terminals. Bottom: Cell-Connector Mold and Part

SMALL MARINE SEARCHLIGHT USES GAS-BULB LAMP

A nitrogen or argon-filled incandescent bulb is the light source used in a launch searchlight recently developed. It is claimed that the use of the incandescent bulb in place of the arc effects a current saving of nearly 50 per cent, with no diminishment in the volume or intensity of the beam. The bulb is placed in such a position midway between a condensing mirror and lens that most of the light is reflected and condensed, very little being lost in diffusion. By an ingenious system of distant control, located in the pilot house within easy reach of the helmsman, the beam may be varied from the far-reaching ray to the semi or full-flood.

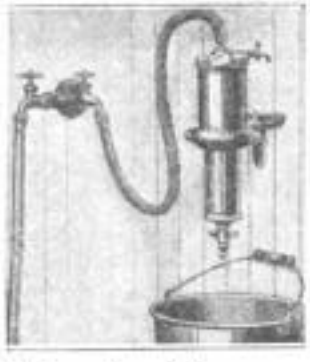
COMBINATION ARBOR PRESS AND TRUING STAND

A timesaving article of automobile-shop equipment is a combination tool consisting of a heavy-pressure arbor press, V-blocks, truing centers, and knife-edge truing disks. The leverage exerted by the handles of the press is multiplied through a reducing gear until, so it is claimed, a force of only 150 lb. applied at the end of one lever is translated into a pressure of over 100 tons at the end of the screw. Straightening of cam, crank, and other shafting is accomplished with the aid of the V-blocks. The result of the work may be checked by swinging the shaft between the centers, or revolving it on the truing disks. This avoids the necessity of centering the job in the lathe. Pulling or replacing of gears is done in the usual manner.



NEW WATER-JET SOAP MIXER DISSOLVES SOAP QUICKLY

The erosive effect of jets of water at a pressure high in relation to their size is the basic principle of a simple soap mixer for the use of garages, automobile laundries, and other establishments using large quantities of soft oil soaps. The device is supported by a wall bracket and is placed close to a water faucet. A length of hose connects the faucet to the soap reservoir. To use, the valve of the mixer is opened and the rush of the water through the reservoir is said to make a sudsy mixture in any proportion from one pound of soap to two gallons of water to as weak as may be desired.



CENTRIFUGAL SEPARATOR RUNS AT VERY HIGH SPEEDS

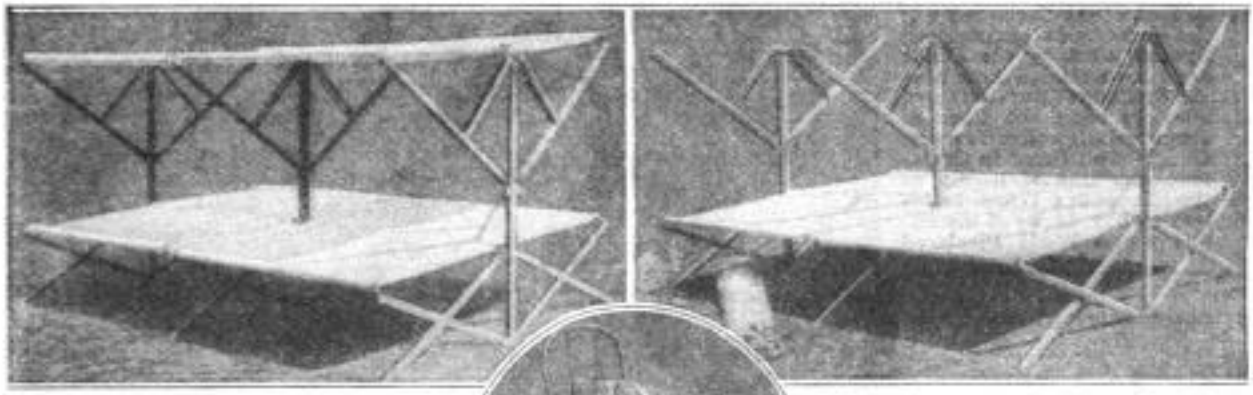
Cream separators and spinning extractors, such as are used in laundries to dry clothes, are fairly well known to most persons. They depend for their operation on the fact that when anything is spun rapidly the heavier particles tend to fly toward the outside and away from the center. This action is due to what is known as centrifugal force, and the machines are called centrifuges. As butter fat is comparatively easy to separate from milk, the speed at which the separator must be driven is well within the limit of the strength of metal to withstand, being from 5,000 to 9,000 r.p.m. This, however, has been considered the practical limit.

An English concern has now developed a new centrifuge with a safe operating speed of 18,000 r.p.m., especially designed to separate the water particles held in suspension in what is known as emulsified oil. So intimately are the minute particles of water, and other foreign substances, mixed with the oil, that heretofore there has been no efficient method of separating them. This waste, amounting to many thousands of barrels of the oil annually, may now be stopped, thanks to the superspeed centrifuge. Another use of the centrifugal separation process is the extraction of the edible fats from the so-called soap stocks left as a residue in the refining of cottonseed, peanut, and other vegetable oils. Up to two years ago there was no way in which these by-products could be efficiently salvaged in an edible form. The centrifuge is now recovering them at the rate of 285,000 lb. per day.

The high-speed machine has found still another use in the filtration processes in which porcelain and other fine filters have always been used. As these are subject to clogging and the centrifuge is not, the latter should prove much more efficient. For laboratory use the same concern builds a centrifuge capable of withstanding a speed of 40,000 r.p.m. This apparatus serves in the field of delicate analytical experimentation.

¶That ancient satirical saw about "carrying coals to Newcastle" has lost all its usefulness. The famous English colliery town recently imported 100,000 tons of high-grade coal from China as an experiment, and it is asserted that the cost, with larger shipments, would be lower than that of the local product.

COLLAPSIBLE CANVAS BED IS DOUBLE-DECKER



The Double-Decked Canvas Bed as It Appears When Set Up, Ready to Accommodate Four Sleepers

The Folded Frames and Canvas Roll of the Bed as Packed for Transport

Made Up as an Ordinary One-Story Bed, with the Canvas Sheet That Forms the Upper Berth Omitted

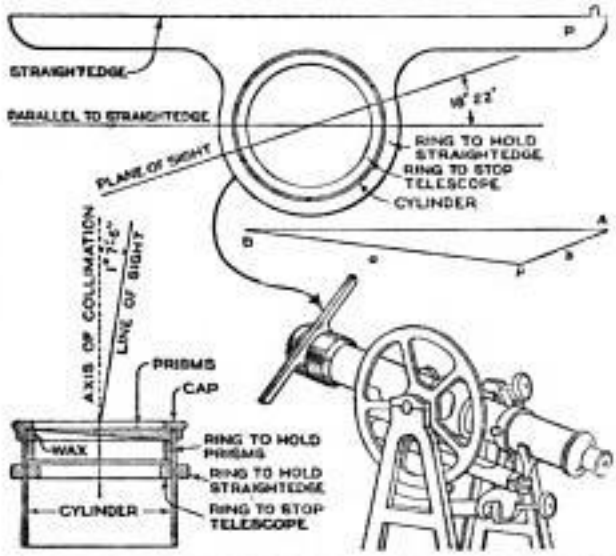
Heretofore the collapsible canvas cot has been built for the accommodation of only one person; now there is made a double-decked, collapsible bed which holds four, two above and two below. As carried on the automobile running board, the bed measures only 7 by 10 by 42 in. When unfolded for use, it is seen to consist of three folding frames and two pieces of canvas with wooden bars sewed into the longitudinal seams. Without instruction, anyone is able to unfold the frames, and lock them in rigid connection by attaching the bars. Obviously, it is possible to increase the capacity of the bunk by adding frames and canvas to either or both ends of the bed, without greatly affecting its folded size.

EASY TO LUBRICATE ENGINE WITH NEW-SHAPE OILCAN

Discovery at the wrong time that the oil supply in the crankcase has run low is a common experience of motorists. A standard grade of lubricating oil is now obtainable in a two-quart can, of easily carried form, with an oblique conical top, terminating in a nozzle. The contents are easily emptied directly into the crankcase, without a funnel, and without soiling the hands.

SIMPLE TRANSIT ATTACHMENT DETERMINES TRUE NORTH

A simple attachment for a surveyor's transit, developed in an American university, determines true north at night without reference to time, latitude, or tables. A rotatable sleeve slips over the end of the transit telescope, and contains a pair of plain glass prisms whose optical angle equals the distance of the North Star, Polaris, from the north pole (1° 7′). Across the top of the sleeve is mounted a straightedge about 6 in. long. This is lined up with Polaris and the star at the head of Ursa Minor by rotating the sleeve,

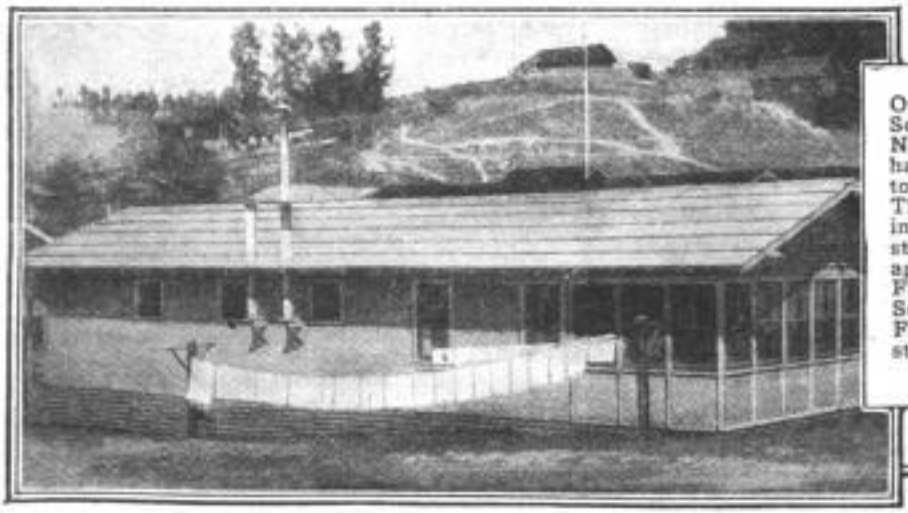


Top: End View of the Attachment. Left: Section Showing the Optical System. Right: The Instrument Complete

and the cross wires of the telescope are sighted on Polaris. The attachment is then removed, and the telescope is pointing to the true north.

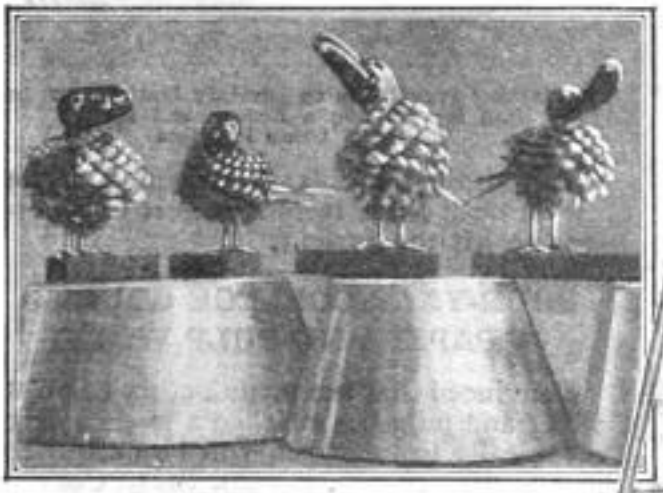
A Part of the Ceremonies in the Observation of American Speech Week by the Pupils of an Iowa High School Was the Sticking of Red-Bordered Plasters upon the Face of Any Person, Pupil or Teacher, Guilty of an Error in Grammar, the Use of Slang, or the Misuse of a Word. Needless to Say, Many of the Pupils were Well Plastered

The Landing of the Pilgrim Fathers, 300 Years Ago, was Celebrated by the Pupils of the New York City High Schools. The Most Interesting Part of the Program Was a Costume Play Showing the Actual Landing. History Tells That the "Mayflower's" Boats Came as Close to the Shore as Possible, and That the Fearless, Strong Settlers Completed the Trip by Wading, Carrying Their Wives in Their Arms

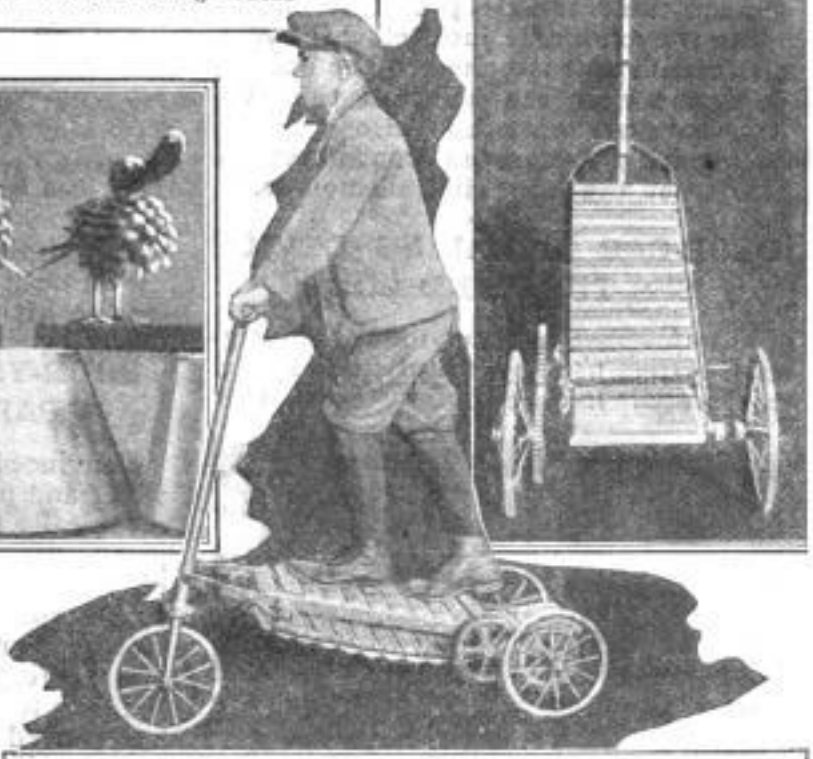


One of the California Public Schools, Attended by a Large Number of Mexican Children, has been Fitted with an Up-to-Date Laundry. In Order That the Value of the Teaching may be Better Understood, the Pupils are Encouraged to Bring Part of the Family's Weekly Wash to School. By This System the Family is Made to Understand the Value and Enjoyment of Cleanliness

Nearly Every Child Who has Ever Seen a Motor Fire Truck Making a Run in Answer to a Call has Felt That It would be Glorious to Take One of the Hair-Raising Rides. This Feeling being Understood by the Chief of the Fire Department of a California City, He Recently Declared a Half Holiday and Gave All His Young Friends a Fast Ride on the Big Trucks



This "Bird" Is a Native of California and Is the Result of the Originality of a Local Artist. Its Body Is a Pine Cone Painted in Startling Designs and Gorgeous Hues. At a Distance, the Scales of the Cones Closely Resemble Feathers. The Tail Feathers Are Small, Thin Strips of Wood Stuck into Slots. The Heads are Whittled from Solid Blocks and are Attached So That They Are Free to Turn



An Oregon Inventor has Brought Out What may be Called a Tread Car or Cycle. The Motor is Built on the Plan of the Old-Fashioned Treadmill. The Rider Supplies the Power. As Soon as He Steps upon the Endless Track It Begins to Move toward the Rear and, being Geared to One of the Rear Wheels, Drives the Car. After the Car has Reached a Fair Speed the Rider may Coast by Standing on a Broad Step at the Rear of the Car

TANDEM ATTACHMENT DEVISED FOR SMALL BOY'S TRICYCLE

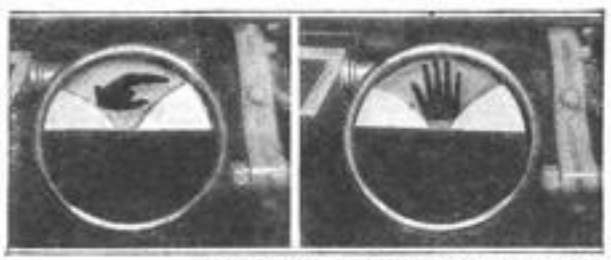
The youngster's fondness for his tricycle will be increased tenfold if it is equipped, just like big brother's motor-

An Auxiliary Tandem Seat Attached to the Boy's Velocipede Makes It a Two-Passenger Vehicle

cycle, with a tandem seat. An attachment of this kind has recently been patented. As seen from the side, it consists of a V-shaped frame, one end of the "V" resting upon the rear axle, the other clutching the tricycle frame just below the seat. This tandem seat is bolted to the detachable frame near the point of the "V." Handlebars are provided; also a fender wheel which prevents disastrous backward tilting when the front rider dismounts.

MOTOR-CAR SIGNALING DEVICE USES THE HAND CODE

The universally understood hand-signaling system used by motorists has been incorporated in the design of a new

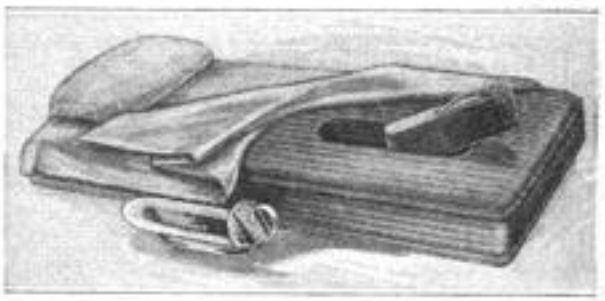


The Hand to the Left is Indicating a Right Turn, and That at the Right is Giving the Universally Understood Stop, or Caution, Signal

motor-car signal of English manufacture. The device, which attaches to the rear of a car, consists of a main body of about the size and shape of an automobile headlamp. The bottom of the lens is blocked off in black, while the top half is left clear for most of its extent. Inside is a white disk upon which is painted, in black, pictures of three hands. One of these points to the right; the second points to the left; the third has the fingers all extending straight up. The last is recognized as the stop, or caution, sign. By means of a simple mechanism any of the three hands can be made to appear behind the clear upper half of the lens. When no change in direction is contemplated, the clear field of the lens is blank. An electric light inside makes the signal very effective at night.

MATTRESS FOR INVALIDS HAS OPENING FOR BEDPAN

A new mattress that is intended particularly for the use of invalids and in hospitals is said to have more than a hundred different uses. An opening is provided a trifle below the center of the mattress, into which a specially made bedpan is inserted by the removal of a "plug"



An Opening Provided in an Invalid's Mattress can be Used for Holding a Bedpan and for a Variety of Other Purposes

which ordinarily fills the opening. The use of such a mattress makes it unnecessary to lift the patient.

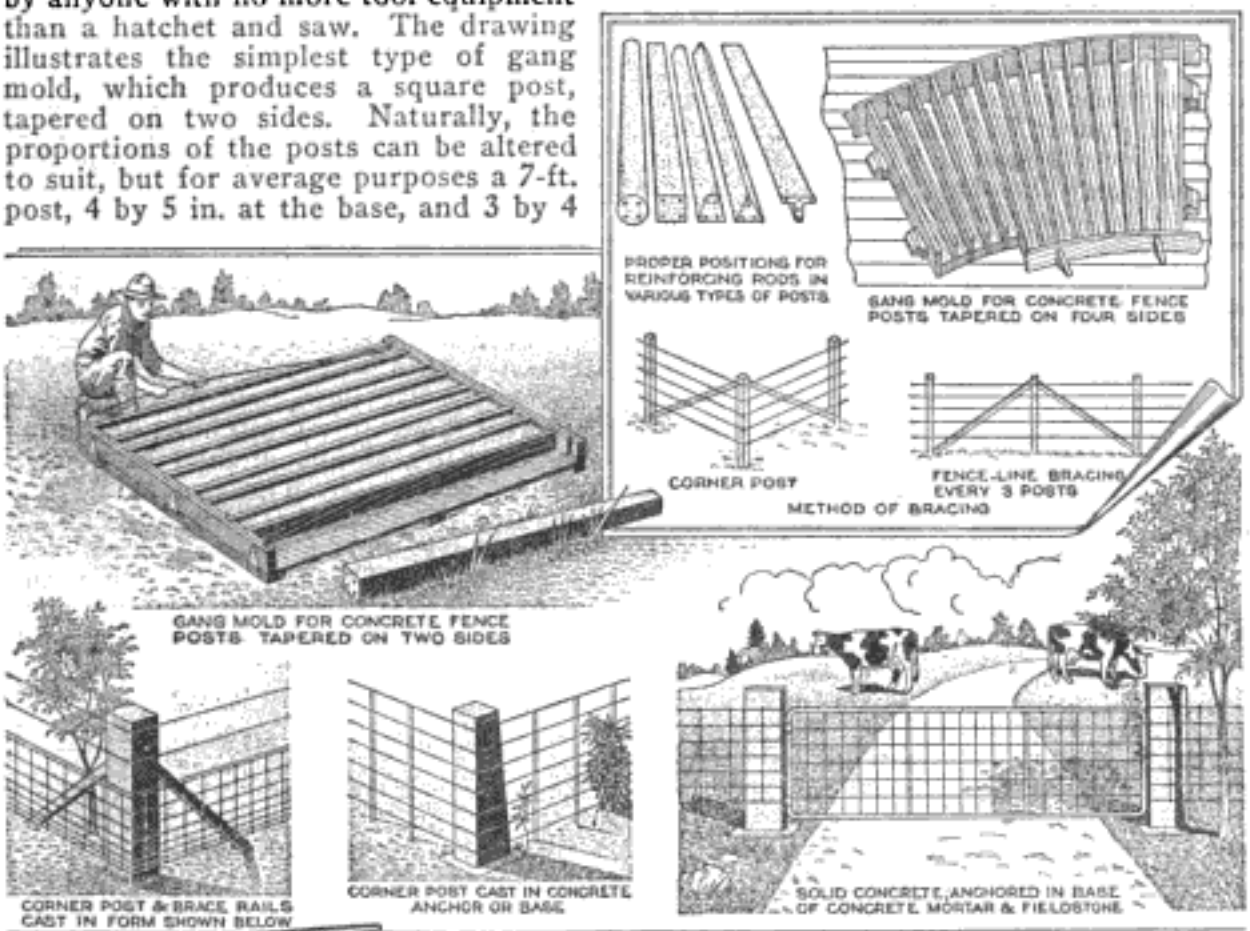
FOUR-YEAR COLLEGE COURSE IN PAPER-AND-PULP WORK

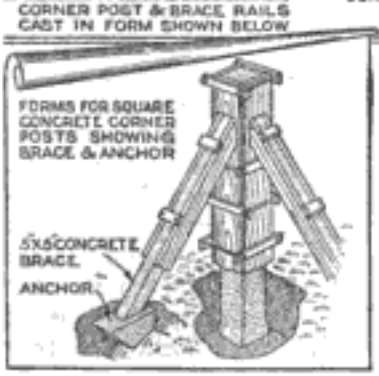
Convinced that the manufacture of print paper and pulp has reached a stage where technically trained men will be needed to preserve it, the New York State College of Forestry has established a four-year course specializing on that subject. Previously arranged special, postgraduate, and correspondence courses have paved the way for the new work, which already has proved so popular that a temporary limit has been placed on the number of students admitted. It is expected that the ultimate effect on the industry of trained technical supervision will be to increase the output of paper by reducing the waste of material.

Making Concrete Fence Posts on the Farm

BY H. K. LANE

NO expensive apparatus is required for the manufacture of concrete posts, as the simple molds can be easily made by anyone with no more tool equipment than a hatchet and saw. The drawing illustrates the simplest type of gang mold, which produces a square post, tapered on two sides. Naturally, the proportions of the posts can be altered to suit, but for average purposes a 7-ft. post, 4 by 5 in. at the base, and 3 by 4 in. at the top, will answer admirably. One-inch lumber should be used in making the mold, which may be stationary or portable, and as large or as small as desired. The lumber should be dressed on both sides. The endpieces are hinged to the bed, and alternate 4 by 5-in. and 3 by 4-in. spacing blocks are attached 1 in. apart, so that the small and large ends of the posts will alternate. Pieces of board are inserted in the grooves formed between the blocks to separate the individual posts.





Casting Concrete Fence Posts Is an Operation That can be Profitably Undertaken during the Winter Months. The Equipment Needed Is Simple, and the Resulting Posts will Prove More Economical, in the Long Run, than Wooden Ones

Another and more elaborate type of mold for forming posts tapered on four sides is shown, but the construction of this mold requires a number of tapered pieces, making it more costly. It will be noticed that this mold takes the outline of an arc to obtain the desired taper.

A 1:2:3 concrete mixture is recommended for concrete fence posts, the fig-

ures indicating that one part of cement, by volume, not weight, to two parts of clean, sharp sand, and three parts of coarser aggregate, such as gravel, are used to form the concrete mixture that is tamped down into the molds, which should be oiled before pouring.

To strengthen the posts and give them additional rigidity, they are reinforced, as indicated, with iron rods. For this type of work the reinforcing rods need not be more than ¼ in. thick; heavy fence wire, if in good condition, either plain or barbed, can be used if it can be straightened economically.

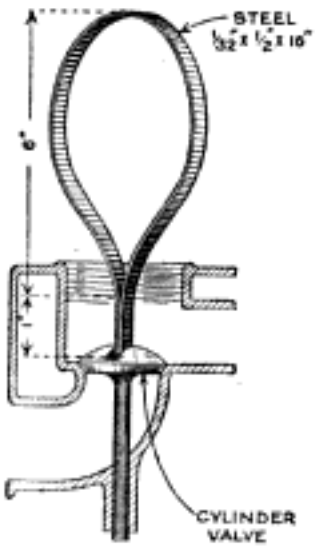
To form the mortises, which are necessary for bracing corner posts or for bracing the fence line, triangular wooden blocks are inserted into the molds before the concrete is put in, if the braces are to be cast separately. Concrete corner posts and gateposts should be made somewhat larger than the others, and if only a few are to be made, they can best be poured on the job in a simple box form held together with clamps, as shown in the lower left-hand drawing. In the case of concrete gateposts, the hinges are inserted into openings made in the form for them, and, after the cement has hardened, there is no sagging of the gate.

After being placed, concrete should be left in the mold two or three days to harden. When the endpieces and partitions are removed, the posts should be left on the bottom board, in the shade, for a week or 10 days, protected by a layer of straw, which should be kept moist.

After this period, posts may be stored outdoors, piled in the same manner as wooden posts; they should be handled with great care, as a slight drop may break a fresh post. Concrete posts may be used when 30 days old, but not sooner. They will increase in strength during the first year.

Sheet-Steel Valve Lifter

Much time is often lost in lifting valves from the cylinders of an internal-combustion engine, either for inspecting or grinding. The tool shown in the drawing has proved its value in several shops; it is made from a piece of flat steel, which is bent into the shape shown in the drawing. The tips should be roughened so that they may take a firm grip on the valve. The tips of the tool are pressed together and placed in the slot on top of the valve head; when pressure is removed from the spring the tips press against the sides of the slot and the valve can usually be withdrawn without difficulty.—S. E. Gibbs, Ames, Iowa.



Mechanics' Hand Cleaner

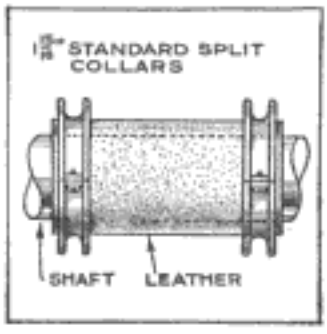
Sawdust, saturated with kerosene, makes a good hand cleaner for mechanics. The oil-soaked sawdust should be kept in a covered metal container to prevent possibility of fire from spontaneous combustion.

Motor Field as Demagnetizer

In one shop where trouble was experienced with inserted-tooth milling cutters, which had been held in a magnetic chuck on the grinding machine, becoming magnetized, a simple method of demagnetizing was used. The end shield and armature of a small alternating-current motor were removed, the magnetized cutter was held inside the field winding, and the current was turned on, removing the troublesome magnetism.—Ralph Wright, Hudson, Mass.

Increasing the Diameter of a Shaft

The belt driving the feed mechanism of a certain machine ran over the shaft, and it was found necessary to enlarge the diameter of the shaft to increase the speed slightly, and to provide means to keep the belt from slipping. The job was accomplished, as shown in the drawing, by using a piece of leather belting, which was held securely to the shaft by a split collar over each end.—M. E. Duggan, Kenosha, Wis.



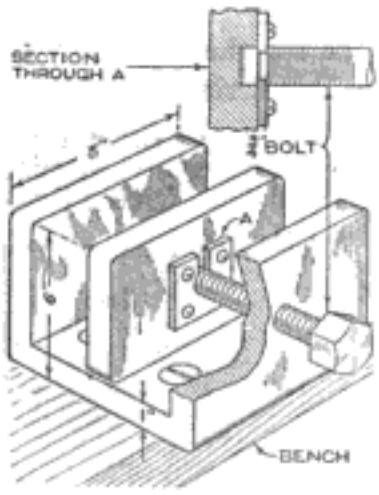
¶An old grate set on rocks makes a good camp stove.

A Substitute for an Air Brush

A sign writer, away from home and his air brush, hit upon the idea of using an ordinary nasal atomizer for putting in clouded and shaded backgrounds. After the letters and figures have been drawn on the cardboard, a sheet of thin layout paper is placed over them, and a tracing is made of the letters, and other parts that are not to be covered by the spray; then, with a sharp knife, these parts are cut around. A small quantity of rubber cement is rubbed on one side of the paper cut-outs, and these are stuck over the letters drawn on the card, so that they will be completely covered. The rubber cement will not soil the paper. After the background has been sprayed on, the cut-outs can be easily pulled off, and any cement that sticks to the card can be rolled up in a ball by rubbing with the fingers, or with a cleaning eraser. —L. C. Shinn, Portland, Ore.

An Easily Made Bench Vise

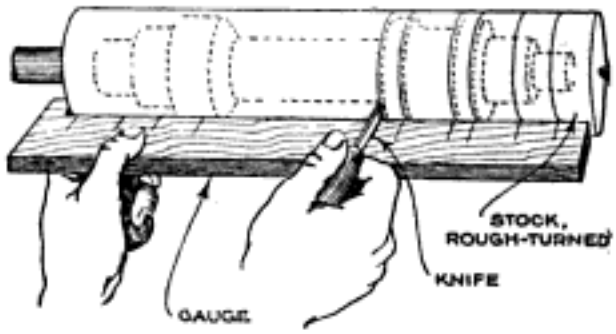
The simple bench vise shown in the drawing can be easily made, and for light or heavy work around the home shop, it will render excellent service. A piece of flat iron, 1 by 5 by 18 in., is required for the body of the vise. The ends are heated and bent at right angles, as indicated. A similar piece of iron, 1 by 5 by 5 in., is used for the movable jaw, four holes being drilled and tapped in it, to take the screws which hold the yoke in place. The screw is made from a long bolt of suitable diameter, and a corresponding hole is drilled and threaded in the vise frame. The end of the screw is grooved to fit in the U-shaped opening of the yoke. Countersunk holes are drilled through the bottom of the frame to accommodate bolts, the heads of which are flush with the metal.—James E. Noble, Portsmouth, Ont.



¶A coil spring makes a good universal joint for light connections.

A Wood-Turning Gauge

A gauge for the wood turner that will be found useful in making match plates

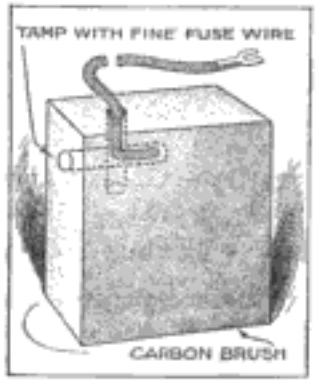


A Wood Turner's Gauge by Means of Which Pieces are Exactly Duplicated with a Minimum of Effort

for automobile patterns, or for accurately reproducing several pieces, is easily made from a wooden strip, about 2 in. wide by ⅜ in. thick, and of any convenient length. A shoulder is provided at the left end, so that the gauge may be held against the work. The stock is turned down to the diameter of the largest section, and marks to indicate the sections are cut on the gauge with a sharp knife, or awl, as shown in the drawing. In use, the gauge is placed on top of the lathe steady rest with the shoulder against the end of the work; then a knife blade, which has been made sharp at the back of the point, is placed in each division line, cutting edge down, and carefully pressed against the stock, thus marking all the pieces exactly.

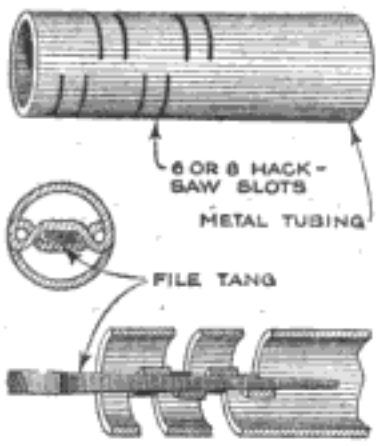
Fuse Wire Secures Brush Leads

A simple method of attaching brush leads to carbon motor and generator brushes is shown in the drawing. Two holes, of a size to admit the bared end of the "pigtail," are drilled in the brush, at top and side, and at right angles to each other, as indicated. The wire is inserted into the top hole, and its end is pushed back into the horizontal hole with a nail or the tang of a small file. The wire is held securely in place by tamping the side hole with fine fuse wire, being careful to avoid cracking the brush. The fuse wire may be melted if desired.—John M. Stroble, McKees Rocks, Pa.



File Handle Made of Metal Tubing

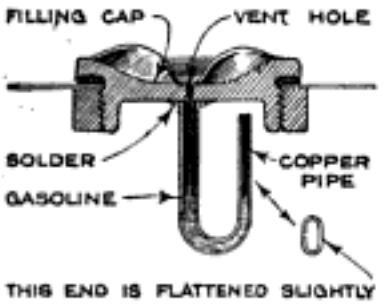
The home mechanic or car owner will frequently work with a file or soldering iron without a handle, because he does not happen to have one handy, yet any piece of metal tubing into which the end of the tool can be inserted, will make a good handle for most purposes. From six to eight cuts are made in opposite sides of the tubing, as shown. The metal between the cuts is bent in, and the handle is driven onto the tang of the tool as indicated.



SECTIONAL VIEWS, SHOWING HOW BENT SEGMENTS ENGAGE FILE TANG

Seal for Automobile Gasoline Tank

The quantity of fuel which splashes through the vent of the tank-filler cap is a direct loss, and there are few tanks that do not show evidence of this splashing by a patch of wet gasoline, or a stain that shows where the fuel has been shaken out when the car was in motion. To overcome this loss, a U-shaped piece of copper tubing is soldered to the underside of the filler cap, over the vent, as shown in the drawing. The bent tube becomes filled with fuel, and acts as a seal, without interfering with the passage of air into the tank, which is necessary when the fuel is supplied direct to the carburetor by gravity.—G. A. Luers, Washington, D. C.



Mixing Concrete in Winter

The aggregate, such as sand, pebbles, or broken stone, must be free from frost; if this is present in the materials they should be thawed before using.

All materials entering into the mixture should be heated, so that the concrete, when placed, will have a temperature of from 75° to 80° F. It should be run into the forms immediately to prevent loss of heat.

Metal forms and reinforcing should be raised to the temperature of the concrete before this is poured, metal forms being heated with hot water, or by turning a jet of steam against them.

Protect the concrete immediately after pouring, to retain as much of the heat as possible. A layer of hay or straw will furnish the proper protection for some work. When the work can be inclosed, coke-burning firepots may be used.

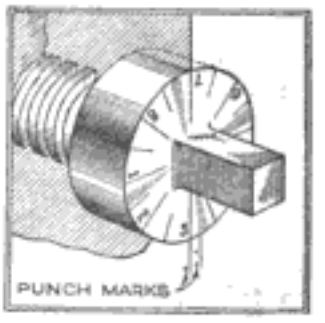
If there is any unavoidable delay in the work, the concrete already poured should be covered at once; this protection should not be removed for at least five days in severe weather.

Forms must not be removed too soon. Concrete sets or hardens slower in cool or cold weather than it does in the summer, and additional allowance must be made.

Examine the work before the forms are removed, by taking off a single board, or a section of the form, and pouring hot water over the exposed concrete surface, to determine whether the cement really has set, or whether the water in the mixture has merely frozen.

An Indicator for the Planer Cross-Rail Screw

A planer operator laid out the end of the cross-rail screw of his machine so that it could be used as a feed dial. On the $1\frac{11}{16}$-in. shoulder of the screw, eight equal divisions were laid out and numbered from 1 to 8, as shown. These spaces were divided in half and marked with shorter lines. Two lines were laid out on the cross rail and marked with punch marks, as shown, so that the first line lined up with a numbered line and the other came halfway between a short line and a numbered one. If a numbered line is in line with the first line and it is desired to set the planer head over $\frac{1}{32}$ in., as one revolution of the screw advances the head $\frac{1}{4}$ in., the handle is turned until the next numbered line coincides with that on the cross rail, finer adjustments being similarly obtained. —Joe Street, Inglewood, Calif.

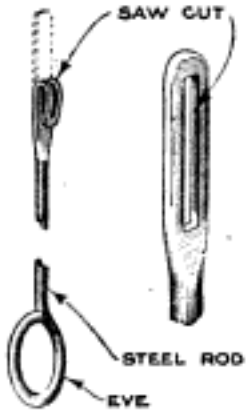


A Compound for Coating and Rust-Proofing Nails

A rust-proofing compound for coating nails is made by mixing 2 oz. of black lead with 1 pt. of linseed oil. The mixture is stirred until the black lead is thoroughly incorporated with the oil. The nails are heated to a red heat and quenched in the oil-and-lead mixture. After cooling, the nails are removed and shaken in a bag until dry. The mixture does not deteriorate.—Leonard Bastin, Bournemouth, Eng.

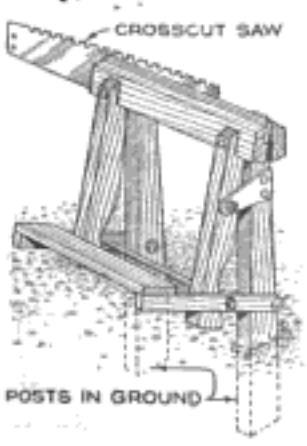
Making a Rifle-Cleaning Rod

Being a missionary, located in a part of the world where my lost cleaning rod could not easily be replaced, I procured a steel rod small enough to enter the bore, and after heating one end, hammered it out flat. The flat end was then doubled over and a slot cut with a hacksaw, as shown, the end being next reheated and straightened out. After an eye had been turned in the opposite end, a perfectly satisfactory cleaning rod was the result. This method saved a delay of several months.—Rev. Lewis B. Rogers, Toungoo, Burma.



Sharpening Vise for Crosscut Saws

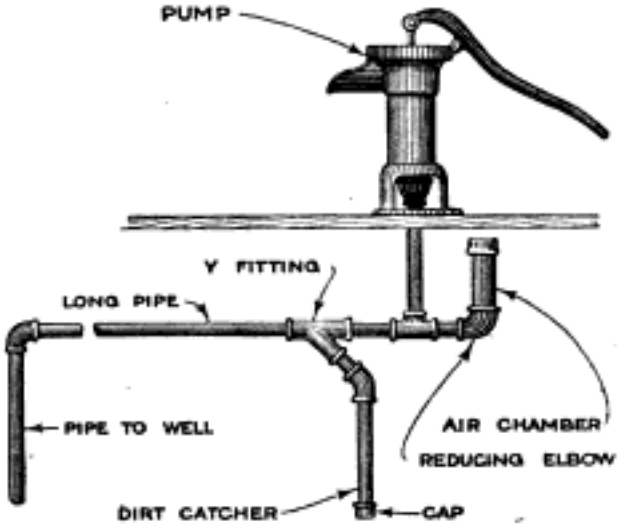
Attempts made on a number of occasions to file the teeth of a crosscut saw by holding it against the edge of a plank, encouraged the early development of the saw-filing vise, or clamp, shown in the drawing, which holds the long saw securely rigid. The vise was built in the open, under a tree, and two coats of paint protect it from the weather. Being outdoors, the operator has plenty of light and can work from either side of the saw without turning it. The vise is equally adapted for holding circular saws or handsaws, and is high enough to prevent tiring of the back.



Air Chamber and Dirt Catcher on Pump Line

Not infrequently sand and other earthy material are drawn up through pump suction pipes, to the detriment of the pump valves. By installing the dirt catcher, shown in the drawing, in the pump line, the foreign matter pumped up with the water can be caught and removed periodically. This catcher is easily made from ordinary pipe and fittings.

If the suction pipe is very long, with a lift at the well of 20 ft., or more, pumping the water by hand is hard work; this labor can be eased by installing an air chamber, such as the one illustrated, which is made by connecting a piece of pipe of somewhat larger diameter to the suction pipe with a reducing elbow, as shown in the drawing.



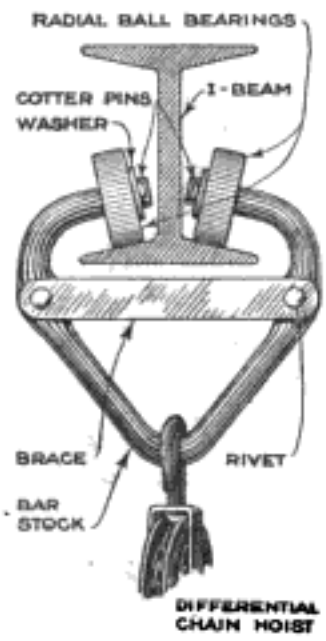
A Sand and Dirt Catcher Installed in the Pump Line will Prolong the Life of the Pump, and, Where the Lift Is High, an Air Chamber Makes Pumping Easier

Preventing Breakage of Glass Graduates

In the test for moisture present in grain, and in many other kinds of technical work, slender graduated glass cylinders are used. These are easily upset, and as a rule, when they fall over, they break. A member of the grain-inspection staff at Minneapolis has found that most of these breakages can be avoided if a thick rubber ring is placed about the top of the graduate. This method has saved something over $100 a year in that one office; and the general adoption of this plan throughout the United States would undoubtedly mean an appreciable lessening in the expense connected with this line of work.—C. A. Briggs, Washington, District of Columbia.

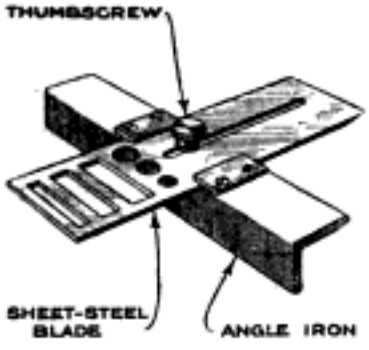
Discarded Ball Bearings Make Hoist Bearings

Two radial ball bearings that have been discarded, if not too badly worn, can be used for the purpose indicated in the drawing. In the mounting shown, a chain hoist is fastened to an I-beam so that it can be moved to any point along its length. The chain block is suspended from the simple metal yoke, to the upper end of which the bearings are secured with washers and cotter pins; round stock is used for the yoke, and a horizontal brace prevents spreading. The bearings must be heavy enough for the load.



A Tenon and Dowel-Hole Gauge

For the woodworker who has occasion to make numerous mortised and doweled joints, the easily made combination gauge and square shown in the drawing is very convenient. A piece of light angle iron, the outer faces of which are finished off smoothly, serves as a support for the sheet-steel blade; this is held at right angles in a groove which is filed or ground in the angle iron, deep enough to prevent lateral movement. A thumbscrew is provided for holding the blade in any position. Openings are cut in the blade for mortises, tenons, and dowels of different sizes.—George Klussman, Long Beach, Calif.



¶Hydrogen peroxide freely applied to the spot will neutralize and remove blood spots from clothes. If applied before the blood becomes too dry, hardly any stain will be left on white goods.

Constructing a Rat-Proof Poultry-House Foundation

Merely providing a concrete floor does not solve the rat problem in the poultry house, as the rats dig under the floor and gnaw through the board walls. Having had this experience, a poultry man adopted an original plan in the construction of some new buildings.

He began by building concrete foundation walls, first excavating a shallow trench and building in it a form which extended above ground about 5 in. The concrete mixture consisted of coal ashes, sand, and cement. The space inside the foundation walls was filled with cinders, well tamped down, and the surface was finished off with a cement mixture of 1 part cement to 4 parts of coal ashes and sand. After the 2 by 4-in. sill had been placed on top of the foundation wall, it was plastered with the same mixture. This floor and wall construction has been found to be effective in keeping the rats out.—Oscar C. Place, Boulder, Colo.

Knurling in the Vise

Handles, thumbscrews, and other parts that must be knurled, or would look better if so treated, can be easily knurled without a lathe and the usual tools. All the apparatus required consists of two files and a vise. As shown in the drawing, the work is clamped in the vise between two files, the knurl being obtained by hammering on the end of one of the files, as indicated. Finer or coarser knurls are obtained by using files of different cuts.

Making Gears of Babbitt

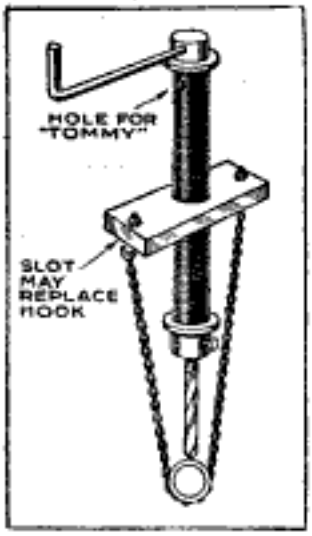
When one gear of a pair has been lost or broken, a new one can be made of babbitt or other soft metal at little or no expense. The remaining gear is set inside a tin can, the diameter of which should be at least an inch greater than the gear; the depth should be about the same as the thickness of the gear. Melted metal is then poured into the space between the gear and the can. After the metal has cooled, the bottom is cut or ground off the can, and the gear is

knocked out. This operation produces a pattern, the inside of which will be the exact shape of the gear. Coat the inside surface with lampblack mixed in gasoline and allow it to dry. The pattern is then set on a piece of flat iron, and filled with the same kind of melted metal. The metal can be prevented from leaking out from underneath by building a dam of putty or clay around the base of the pattern. When cool, the pattern is sawed through at several points and removed. All that now need be done is to drill a hole for the shaft and cut a keyway, or provide for a setscrew, as necessary.

A Simple Chain Drill

An easily constructed chain drill, of great use in drilling holes in pipe, structural steel, or in any position where the chain may be passed around the object to be drilled, is shown in the drawing.

The tube is formed of a 6-in. length of extra-heavy pipe, threaded full length, on which is mounted the ¾-in. bar to carry the chain. A washer is placed at each end of the pipe, the rod passed through, and the collars forming the chuck and the handle bosses are pinned in place. A standard drill chuck may be used in place of the improvised one, if desired. Small holes are drilled through the pipe, under the turning crank, to take a "tommy" for use in feeding the drill. The chain plate may be provided with a hook, as shown, to take the loose end of the chain, or the plate may be slotted so that the chain can be slipped into it.

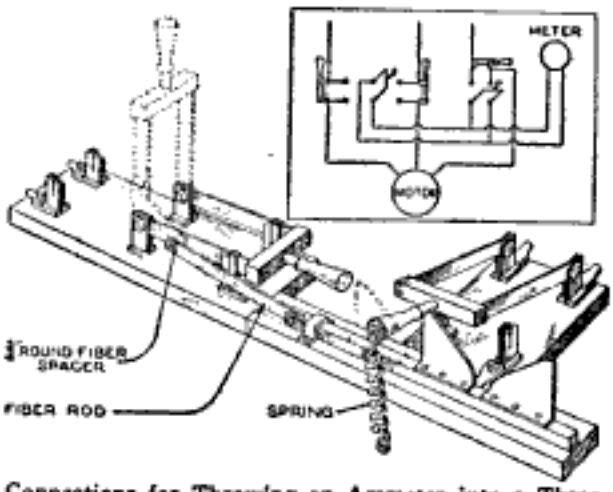


Preventing Barrels from Drying Out

Tight-coopered barrels, such as are used on the farm for salting down meat, or similar purposes, and which have one head removed, should be placed with the open end next the ground when left outdoors. In this manner they will not dry out quickly, as the moisture of the earth condenses inside the barrel and keeps the staves swelled sufficiently to prevent them from falling apart.

Three-Phase Switch Interlock

The drawing shows a simple interlocking mechanism, which overcame the danger of short circuits at a point where an ammeter was connected for reading the current in a three-phase circuit. The diagram shows the three wires leading to the motor, each containing a single-blade knife switch, which can be opened to shunt the current through the meter instead. For throwing the meter into the various wires, two double-pole switches were in this case used, one of them double-throw, and the other single-throw. The danger in such a circuit is that the meter might be connected to two of the wires at once, thus forming a short circuit. The interlock illustrated makes it impossible to do this. The single-throw switch at the right can only be closed when the blades of the double-throw switch are standing upright. Likewise, the double-throw switch cannot be closed in either position as long as the single-throw switch is closed.—Philip G. Bemholz, East Orange, N. J.



Connections for Throwing an Ammeter into a Three-Phase Line were Made "Fool-Proof" by Building In a Simple Interlock

Remedying Squeaky Brakes

Squeaking automobile brakes can sometimes be remedied by applying kerosene to the brake lining with an oil gun. A mixture of soapstone and oil can also be used for the purpose. However, when the noise is caused by rivets bearing against the brake drum, the only cure is the insertion of new rivets, sinking the heads below the surface of the brake lining.

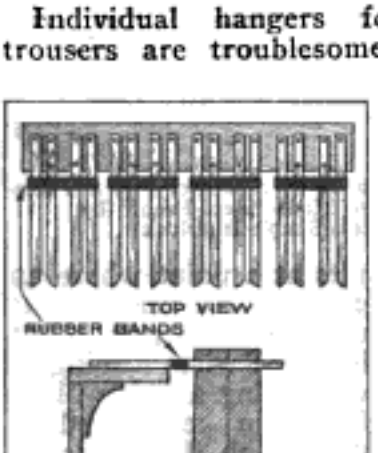
¶Wooden clothespins, or round sticks of suitable size, make acceptable substitutes for hand forms, to prevent gloves from shrinking after washing.

Drain Opened with a Rifle

During the construction of a cast-iron drain, someone dropped a bottle into a long vertical section of the system, and the bottle became so tightly wedged in place that it could not be extracted by ordinary means. In the emergency, one of the workmen borrowed a small-caliber rifle and shot the bottom out of the bottle, so that its removal was then comparatively simple.

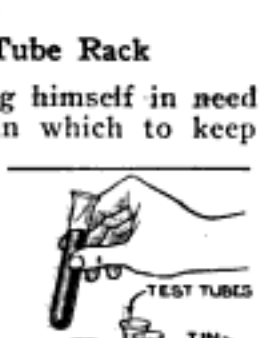
A Novel Clothing Hanger

Individual hangers for skirts and trousers are troublesome because they are easily mislaid, and if several garments are hung on a single hanger, they become mussed and wrinkled. The hanger shown was made to eliminate these objectionable features. A narrow shelf has a number of hardwood strips attached to it in pairs; one strip of each pair is rigidly fastened and the other is permitted to swing on a pivot. By slipping strong rubber bands over each pair of clamps, sufficient tension is obtained to hold skirts and trousers firmly.—G. E. Hendrickson, Argyle, Wis.



A Simple Test-Tube Rack

An oil analyst, finding himself in need of a test-tube holder in which to keep his samples, made a satisfactory article from a strip of tin. The tin was bent into an S-shape, as indicated; the top and middle "decks" were pressed together, and holes for the test tubes were punched by means of a hand punch and hammer. By placing wooden blocks between the decks and drilling the holes, a smoother and neater job may be obtained.



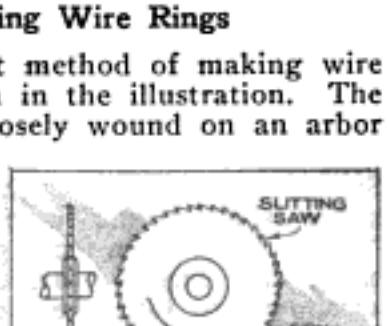
Coloring Cement Work

Mineral colors only should be used for coloring concrete, as other colors are affected more or less by the cement and cannot be considered permanent. The color is only added to the material used in the surface, or finishing, coat to economize on material. The same proportion of materials should be adhered to religiously for each batch mixed, as otherwise the work will have a spotted appearance. The color is best applied by dissolving it in the mixing water before this is added to the cement. Dry coloring matter should not be sifted onto the surface of a freshly laid walk, or other work, as only a thin film is obtained which will rapidly wear off and leave the work spotty. In any case, not more than 10 lb. of coloring material should be added for each bag of cement, and, of course, the less coloring added, the lighter the tint will be.

Grays, blue-blacks, and blacks are obtained with lampblack, carbon black, and black oxide of manganese; various shades of blue can be obtained by using ultramarine blue, while colors ranging from brownish red to a dull brick red are the result of adding red oxide of iron; tints that run from a red sandstone to a purplish red are obtained with Indian red, and brown to reddish-brown tones are the result of metallic brown (oxide); buff, colonial tints, and yellows are obtained with yellow ocher.

Making Wire Rings

A convenient method of making wire rings is shown in the illustration. The wire is first closely wound on an arbor of the proper diameter, and then allowed to expand. A cast-iron block is bored to a free fit for the expanded coil, after which it is slit lengthwise with a 1/32-in. slitting saw, as shown. With the saw revolving in the slot at one end of the block, and projecting into the bore a little more than the diameter of the wire, the coil is pushed into the bore from the opposite end, and fed to the saw by hand, the rings dropping out of the block as they are cut.

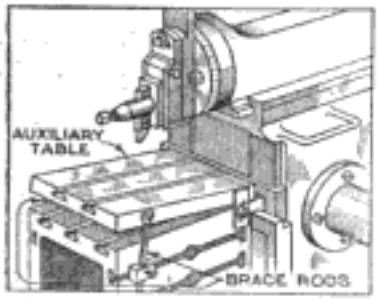


Protecting Edges of Cut Glass

When holes are cut through glass, as, for example, the openings in the ticket booths of theaters, the edges must be smoothed off to prevent them from cutting the hands. Where means of dressing the edges are lacking, they may be protected by a piece of small rubber hose. The hose is slit throughout its length, and the edge of the glass is inserted into the slit. If the hose is cut to the proper length no difficulty will be experienced in retaining it in place.

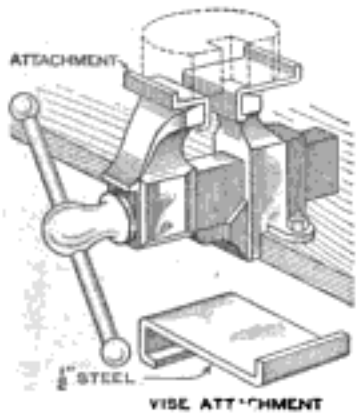
A Tilting Table for the Shaper

Having some taper and angle work to turn out that was too small to be done on a planer, the method shown in the drawing for doing it on the shaper was hit upon. An auxiliary table was made and fastened to the regular table by ears, or straps, on either side; two brace rods were also provided for elevating and bracing the end of the table, and these were fastened by thumbscrews. Apart from the advantage of using the shaper instead of the planer, this scheme is valuable for all styles of taper and angle work.



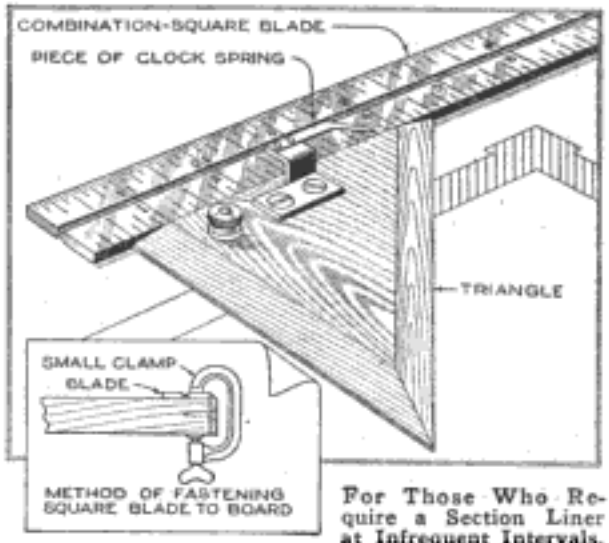
Attachment Increases Capacity of Vise

Owners of small vises, on which the jaws can only be opened a limited distance, may add two light machine-steel extensions, as shown in the drawing, which will enable them to hold larger work when desired. Three different sizes may be made; one long, one short, and one intermediate size. These extensions do not interfere with the usual operation of the vise, inasmuch as they are easily detached.



Section Liner Uses Hardened Scale

A section liner for those who need such an instrument at infrequent intervals, and do not feel justified in purchasing a special instrument, can be made from a steel rule, or scale, and a wooden triangle, as shown in the drawing. A piece of sheet brass is cut and bent to form a support for a steel finger made from a piece of clock spring, the whole being attached to the triangle with small screws, as indicated. In use, the steel scale is secured to the drawing board in the desired position, with one or more clamps, as shown in the smaller drawing. The triangle is placed against the edge of the scale, and, as it is moved along, the flexible finger engages with the graduations in the scale, making it possible to rule uniformly spaced lines. A knob, such as the one shown, may be attached for moving the triangle along the scale.—S. E. Frew, Port Clinton, Ohio.



For Those Who Require a Section Liner at Infrequent Intervals, a Satisfactory Instrument is Made by Combining a Steel Scale and Triangle

Emergency Handle for Milling-Machine Feed

On indexing work in the milling machine, when the work is so long that the dividing head must be set at the end of the table, interfering with rotation of the longitudinal-feed handle, remove the handle, and use a carpenter's brace, tightening the brace chuck onto the end of the screw with a pipe wrench, or other suitable tool.

¶Corks make a good substitute for the wooden knobs on pot lids. The corks are fastened to the lid with a small bolt through the center.

A Simple Relieving Attachment for the Lathe

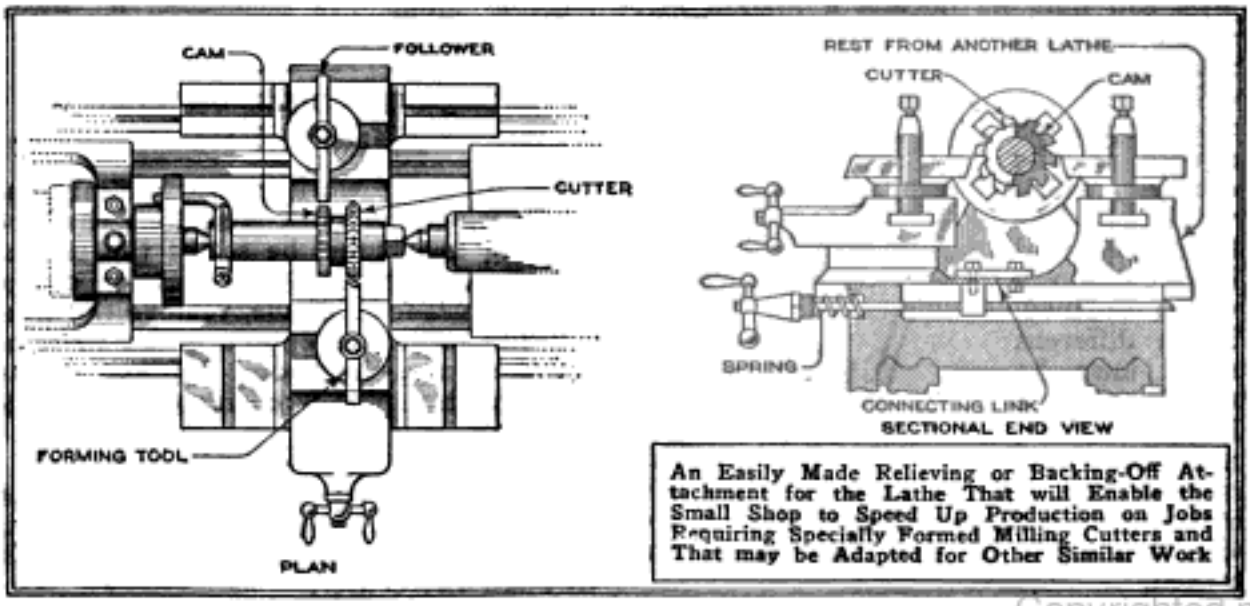
BY JAMES ELLIS

THE small shop, with its limited equipment, is frequently handicappd by the lack of some special tool that would increase production or produce better work, and, as often as not, these tools are required in such a hurry that obtaining them from an outside source is impossible. As an example of such tools, formed milling cutters may be cited; they may be used to effect great economies in production, and some jobs cannot be done without them, save at much expense. The shop with average equipment can easily make a formed milling cutter, but as such shops do not usually have a relieving machine for backing off the cutters, it is often necessary to turn down profitable jobs because of the impossibility of obtaining proper cutters in a limited time.

It was to meet such a need that the writer devised the relieving attachment shown in the drawing. It can be made in a few hours, the material is usually on hand, and it can be used profitably on one cutter or a hundred, and turn out work equal to that of the most expensive machine, provided its capacity is not exceeded, although for most purposes its range is sufficient. Its essential features are a master cam, mounted on the arbor carrying the cutter to be relieved; a follower held in a regular toolpost on a rest borrowed from another lathe, and a link which connects the two rests, for transmitting the motion from the cam, through the follower, the borrowed rest, and the link, to the forming tool.

Usually there are in the shop two lathes whose cross slides will interchange, but if an extra rest is not available it will even be profitable to make one, as it can be used on much other work. The master cam, which should be made of tool steel, and hardened, is mounted on the arbor an inch or so away from the cutter to be relieved. This cam has the same number of rises as the cutter has teeth, and is placed on the arbor just the reverse of the cutter, or so that the lowest part of the cam tooth appears first, while the cutter is mounted so that the cutting edges of the teeth approach the tool. In the borrowed rest is a piece of steel, shaped roughly to the contour of the cam, and hardened. The cross-slide screw is disconnectell from the carriage and a spring put on over it, as shown in the drawing, so as to force the tool out from the work. This spring is adjusted by the cross-slide screw, and is regulated so as to bring the relieving tool out of the way of the next tooth, just as the cam rise passes the follower. The screw is not taken out of its regular nut, but only disconnected where it is fastened to the carriage. The feed to the tool, which is carried in the usual way, is entirely through the compound-rest screw.

The method of operating the equipment is to place the arbor, carrying both the master cam and the cutter to be relieved, between centers, set up the cam follower in the rear toolpost and the relieving tool in front, and then tighten the spring with the crossfeed screw until the follower is tight against the cam. The lathe is set in motion, preferably at its slowest speed, in order to allow sufficient time for the tool to jump out, and to avoid chatter marks. The tool will work in and out for each tooth in the cutter. Of course, the relief of the teeth in the cam must



An Easily Made Relieving or Backing-Off Attachment for the Lathe That will Enable the Small Shop to Speed Up Production on Jobs Requiring Specially Formed Milling Cutters and That may be Adapted for Other Similar Work

correspond to that of the cutter teeth. The forming tool is fed into the work with the compound-rest screw, and the operation will be completed in a few minutes. It is possible to cut right to the tooth edge without trouble, and when the cutter is relieved, it is ready for hardening without further treatment.

Doubtless the method of getting a cam sufficiently accurate for this work will be puzzling, but it is as simple as the rest. The blank is made about the same size as a standard gear cutter, and gashed with the same number of teeth. The gear cutter and the blank are then mounted on the arbor, as described, with the gear cutter acting as the cam, and the cam is generated from the gear cutter. This operation does not injure the gear cutter in any way. For relieving only a few cutters, it might be possible to use the gear cutter directly instead of making a special cam, but its edge will be dulled if used long, though no damage is apparent when using it in making the cam.

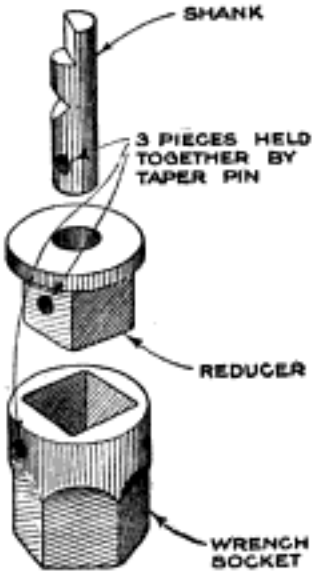
Among the tools that may be turned out by the average shop with this device are cutters for splined shafts, special grooving cutters, corner-rounding cutters, angular cutters, and formed cutters of any kind within the limits of the machine.

Freshening Soft-Wood Floors

To freshen up soft-wood floors that have been painted with oil and turpentine paint, then varnished and waxed, add wax to hot boiled oil, afterward thinning out with turpentine. This will make a thin wax finish that may be applied in the usual way, and then polished with a weighted brush, or by rubbing with a cloth.

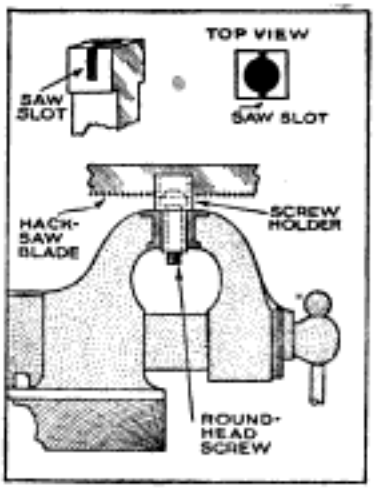
Wrench Attachment Makes Speed Wrench of Spiral Screwdriver

The spiral screwdriver may be converted into a convenient speed wrench by using the attachment shown in the drawing. A reducer is made from a piece of round stock, to fit into the wrench socket, as indicated. The flat end is cut off one of the screwdriver bits, and the shank is inserted into a hole drilled in the top of the reducer. The three pieces are assembled and a hole drilled through them, as shown, to take a taper pin, which holds all three pieces together. Such a wrench will be found very convenient for turning down a large number of bolts or capscrews of the same size, and wrench sockets as large as ⅜ in. can be used in this way with a satisfactory speeding up in operation.—Leslie G. Roller, Humeston, Ia.



Screw-Slotting Fixture for the Vise

The experimental worker must make many of his own screws, and naturally this involves slotting the heads. Squeezing the screws in a vise is unsatisfactory either because the slot is not centrally located, or because the thread is damaged.



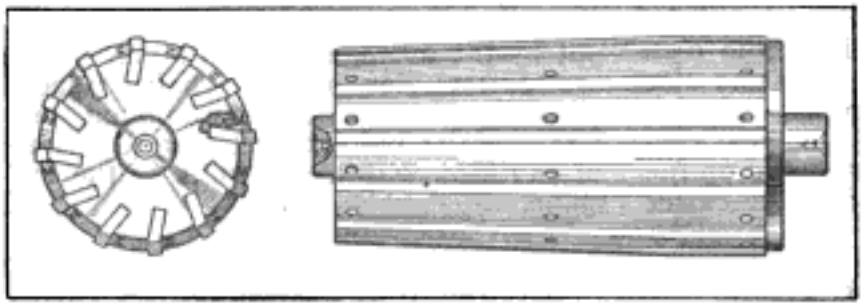
A simple little fixture for this purpose can be clamped in the vise, and the screws slotted quickly and accurately. A block of tool steel is used, and a hole is drilled through it to take the screw, the upper part being counterbored to the size of the heads. A saw slot is then made through the exact center of the larger hole and a trifle lower than the depth required. The fixture is finished by hardening.—J. V. Romig, Allentown, Pa.

Storing Rope in Hardware Stores

An Ohio hardware store, that sells considerable quantities of rope, has made use of an original idea for convenience in retailing this article. The coils of rope are stored in the basement and holes are drilled in the floor, through which the rope ends are inserted from below. A knot prevents the rope from slipping back, and after a length has been cut off, a new knot is tied.—F. C. Gallagher, Cleveland, Ohio.

A Timesaving Grinding Arbor

The drawing shows an arbor that was designed for use in grinding a number of adjustable-reamer cutters at the same time, effecting considerable saving of time over the usual method of grinding one or two cutters simultaneously.



Instead of Grinding Adjustable-Reamer Cutters One or Two at a Time, Production can be Increased by Grinding a Full Set at Once on a Special Arbor

The fixture not only grinds the profile but also the relief on the cutting edge, making each cutter ready for use when it leaves the arbor. It is designed to be used on an engine lathe having a taper attachment in addition to some type of grinding attachment, which may be fastened either to the compound rest or to the saddle.

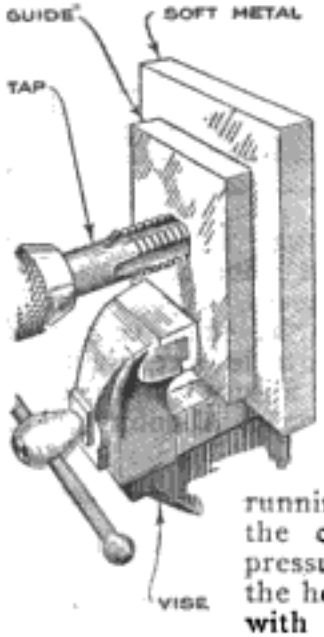
A cast-iron body has twelve slots to fit the cutter blades milled from end to end, at an angle of about 10° to the center line of the arbor, so that the face of the cutter is not radial to the center line, but is at a tangent; this provides the relief on the cutting edges.

A flange is fastened to the body with six flat-headed screws, and forms a positive stop for the cutters, insuring their interchangeability. The center holes in both ends of the arbor should be counterbored, to protect against burrs and consequent uneven grinding.

By making the arbor with an even number of slots, the measurement of the cutters in place is greatly simplified.

Starting Taps in Soft Metals

Tapping small holes in brass, copper, or other soft metals offers some little difficulty to the amateur mechanic, as the tap is apt to ream the hole instead of cutting a thread in it. The device shown in the drawing will eliminate this trouble. A number of steel blocks, about ¾ by ½ by 5/16 in., are drilled and tapped, each for a different size. By clamping the proper size block over the hole it is desired to tap and running the tap through, the correct amount of pressure is obtained, and the hole is tapped square with the surface. The hole to be tapped may be easily located by allowing the nose of the tap to project a trifle from the guide block.—E. J. Calhoun, Chicago, Ill.



¶The spout of an old oilcan makes a good blowpipe for soldering.

How to Tell Woods Apart

Birch, beech, and maple woods are very similar in appearance and have approximately the same weight. Hence it is comparatively easy to mistake one of these woods for another. A simple method of distinguishing them makes use of the relative width of the pores and medullary rays of the three woods.

If the end grain of birch, beech, or maple is cut smooth with a sharp knife and examined with a hand lens, the pores will be seen as tiny holes distributed fairly evenly over the surface, and the medullary rays will appear as narrow lines of a different shade running at right angles to the growth rings.

In beech some of the rays are very distinct, even without a lens. The large rays are fully twice as wide as the largest pores.

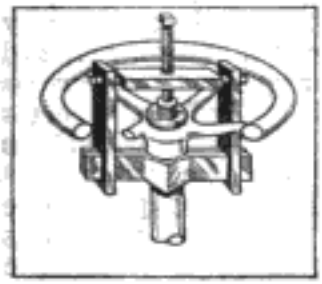
In maple, the rays are less distinct, and the largest are about the same width as the widest pores.

In birch, the rays are very fine, and are invisible without a lens. The pores are several times larger than the rays, usually being visible to the unaided eye, appearing as minute holes in the end grain, and as fine grooves on the dressed faces of the board. The pores in birch are considerably larger than the pores of beech or maple.

The appearance of the medullary rays on a "quartered" surface is also distinctive. Here they appear in beech as distinct "flakes," the largest being between 1/16 and 1/8 in. in height when measured along the grain of the wood. In maple they are considerably smaller, rarely attaining a height of 1/16 in., and in birch they are comparatively inconspicuous.—U. S. Forest Products Laboratory, Madison, Wis.

A Simple Steering-Wheel Puller

Difficulty, loss of time, and sometimes damage, are experienced in removing automobile steering wheels without other tools than a hammer and blocks. A simple puller, that requires no machine work and will pull the wheel with no possibility of damage, can be made from a few odds and ends of iron stock and a long setscrew. A piece of heavy stock is drilled and tapped at its center to take the setscrew. Two slotted arms, made of flat steel, as shown, support the two-piece clamp, which surrounds the steering column and bears against the wheel hub. The puller, being separable, can be readily applied to any kind of steering wheel and will pass the hub without interference. The puller can also be used for removing ball races and gears.



Making Opaque Titles on Tracings

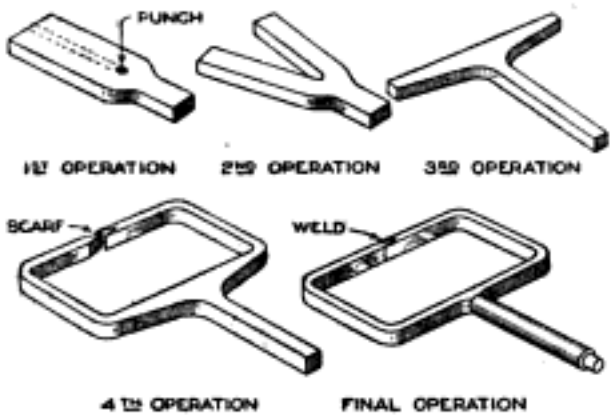
Ordinary stamp-pad ink and rubber stamps may be used to make titles on tracings that show up sharp and white, although rubber-stamp impressions, when made in the usual manner, are not always clear. By dusting the freshly made impression with some yellow powder, such as finely pulverized sulphur, and then permitting the ink to dry, the unsatisfactory results of plain pad ink are largely avoided.—L. H. Georger, Buffalo, N. Y.

Ridding a Room of Flies

In a large drafting room, ventilated by an exhaust fan, a novel idea for ridding the office of flies was devised. A pan was supported on brackets immediately underneath the fan; this was filled with a little molasses, or other bait, and the flies attracted by the sweet were caught in the suction of the fan and swept outside.

Forging Valve Yokes for Strength

Many blacksmiths, making a valve yoke for a slide-valve engine, will make the "box," or yoke, first, and then butt-weld the stem. This is not a very good practice, as there is a danger of making a bad weld, thus leaving a weak stem.

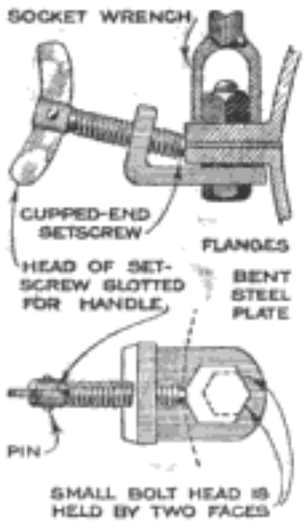


By Making Valve Yokes for Slide Valves from One Piece, a Much Neater and Stronger Piece Results, with Less Labor

From long experience, it has been found that the best method of making a first-class valve yoke is the one shown in the illustrations, which are self-explanatory. By this method, only one weld is made, and the yoke, being one piece, is much stronger.—J. R. Minter, Washington, Ind.

Holder for Crankcase Bolts

Bolts in engine crankcases, and in other flanged connections about a car, frequently require two wrenches, and sometimes a second mechanic to tighten or loosen them.

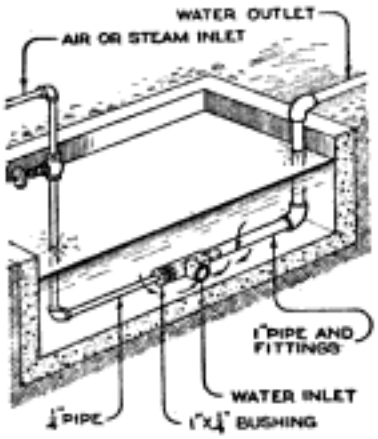


The illustration shows a tool which holds the bolt head firmly, and does away with the necessity for either an extra wrench, or extra mechanic.

While it is desirable to have one of these tools for each size of bolt, the one shown can be used on practically any size that the hexagonal opening will go over. The screw can be set tightly against the flange, which draws two sides of the hexagonal opening against corresponding faces of the bolt head.

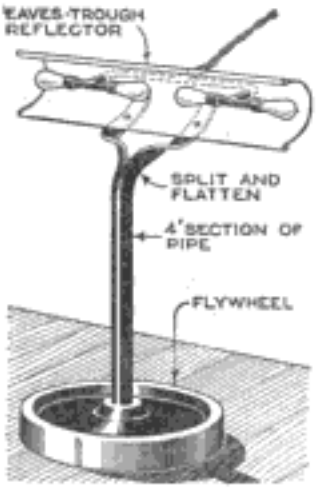
A Simple Water Ejector

When it is not possible to remove water from excavations, sumps, or basements with a pump, the ejector shown in the drawing can be used. It is of extremely simple construction and can be made in almost any shop. In use, a sufficient pressure of air, steam, or water is admitted into the ¼-in. pipe; this creates a vacuum, sucking the water into the open side of the tee and lifting it to the surface. The higher the temperature of the water to be pumped, where steam is used, the higher must be the steam pressure.—Ernest Hauck, Newark, N. J.



Portable Wash-Rack Light

A portable lamp stand, that is advantageous for night use around the garage wash rack, is shown in the drawing. The reflector is made from a section of galvanized eaves trough. The base is made from a scrapped flywheel, while the upright support is a 4-ft. length of wrought-iron pipe, which is secured in the shaft hole of the flywheel and is split and riveted to the reflector, as indicated. Four tungsten lamps are placed horizontally in the reflector. When not in use, a light of this character occupies but little room against the wall.



Simple Materials for Packing

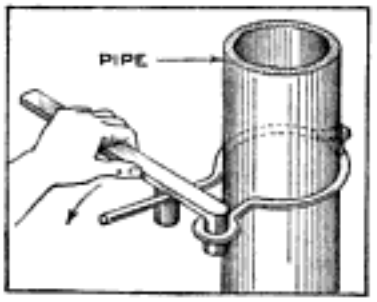
There are certain excellent packing materials that are comparatively unknown and one of these is popcorn—popped. It makes a particularly good material for packing small articles of metal or glass, as it is elastic and, being moisture-absorbing, prevents rust. Popcorn also has the added merit of being exceptionally clean. Eggs packed in oats have been safely transported to market by farmers for years, and buckwheat hulls also make an excellent material for packing.

Removing Wax from Plaster Molds

A long-handled dipper, with a small hole drilled near the bottom, is an excellent device for removing wax from plaster molds. The dipper is filled with boiling water, and, as it is held over the mold, a small stream of hot water issues from the hole. The water can thus be directed easily to the location desired.

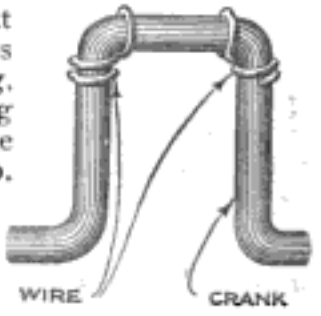
Wrench for Polished Pipe

A novel wrench that is intended only for use on circular work, and on polished pipe, takes a tighter grip as pressure is applied to the handle. The handle forms a separate piece and is provided with studs at right angles to it. The outer stud engages in the eye which is turned at one end of the hinged clamp; the second stud bears against the projecting end of the other half of the clamp. In this manner the wrench automatically adjusts itself to the work.



Making Crankshafts for Model Work

When making light crankshafts from heavy wire or light rod, for experimental or model work, it is usually found that there is more or less sideplay and binding in the connecting rod, owing to the formation of the web. This defect can be overcome by applying coarse wires as shown in the drawing. If facilities are available, the job can be made neater and more substantial by brazing or soldering the wire to the shaft.—J. McCormack, Haliburton, Ont.



¶Muffin pans make fine receptacles for tacks and screws in the workshop.

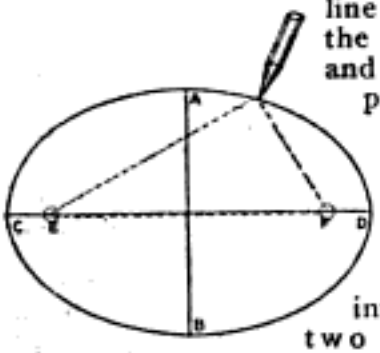
A Protector for Pencil Points

Every time a pencil rolls from the drafting table, it seems to land on the point, breaking it off, and making it necessary to resharpen the pencil. A protector that is used by one draftsman consists of the familiar point protector which fits over the end of the pencil. This cap is partly filled with melted babbitt and placed over the unsharpened end, the weight of the metal being sufficient to cause the pencil, in falling, to strike the floor heavy end first.—L. R. Butcher, Newton, Ia.

Forming Ellipses of Predetermined Dimensions

A simple scheme, that enables anyone equipped with a footrule and a pair of dividers, to draw an ellipse of any given length and width, is described herein.

Having determined the dimensions of the figure to be drawn, make a horizontal line the length of the major diameter and bisect it with a perpendicular line the length of the minor diameter. Place one point of the dividers at the intersection of the two lines and the other point at either C or D. Having set the instrument with this spread, place one point at A and mark the points E and F. Thumbtacks are inserted at the points D, E, and F, and a loop of linen thread is tied firmly around the thumbtacks, after which the tack at D is removed. The point of a pencil is placed in the loop and run around the perimeter of the ellipse.—Henry N. Cary, Chicago, Ill.



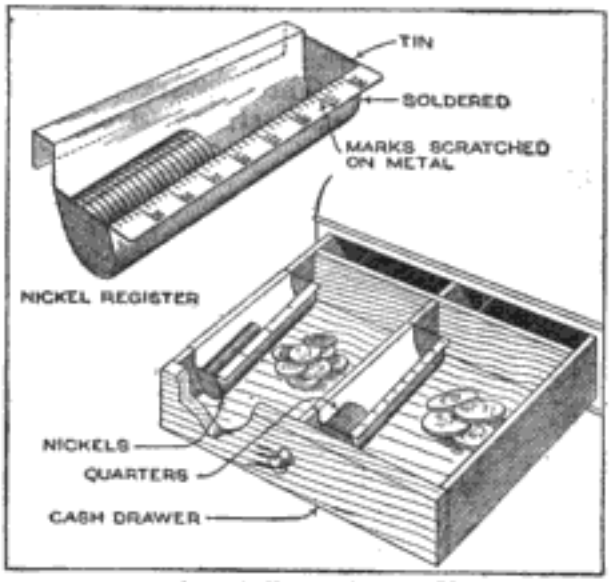
Storage-Battery Connections

When it is necessary to make storage-battery connections, it is suggested that wire solder be used instead of copper wire. The copper will corrode quickly and break, but the solder, being unaffected by acids, will not. The wire solder is used only for the immediate connections, the copper wire being attached to the solder a foot or so from the battery.

¶An emergency brush for many purposes can be made by bending a pipe cleaner and using the point at the bend for the purpose desired.

Coin Troughs in Money Drawer

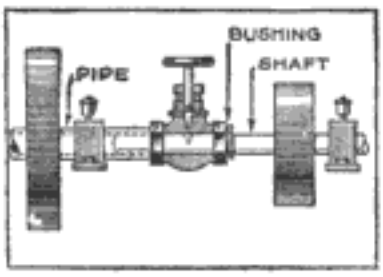
In making change from the money drawer in the ordinary way, the coins are thrown into various divisions for each denomination. When it becomes necessary to count the coins, much time is consumed in handling them one at a time. To facilitate counting, small trough-shaped metal forms, at the side of each division and above the loose coins below, will be found convenient when counting up the total account. The sides of the metal holders are marked to indicate the amount contained, as shown in the drawing.—H. E. Gifford, Medford, Mass.



Trough-Shaped Metal Forms in the Money Drawer Make It Easy to Count Up the Total of the Coins without the Necessity of Handling Each One. The Coins are Thrown into Various Divisions for Each Denomination

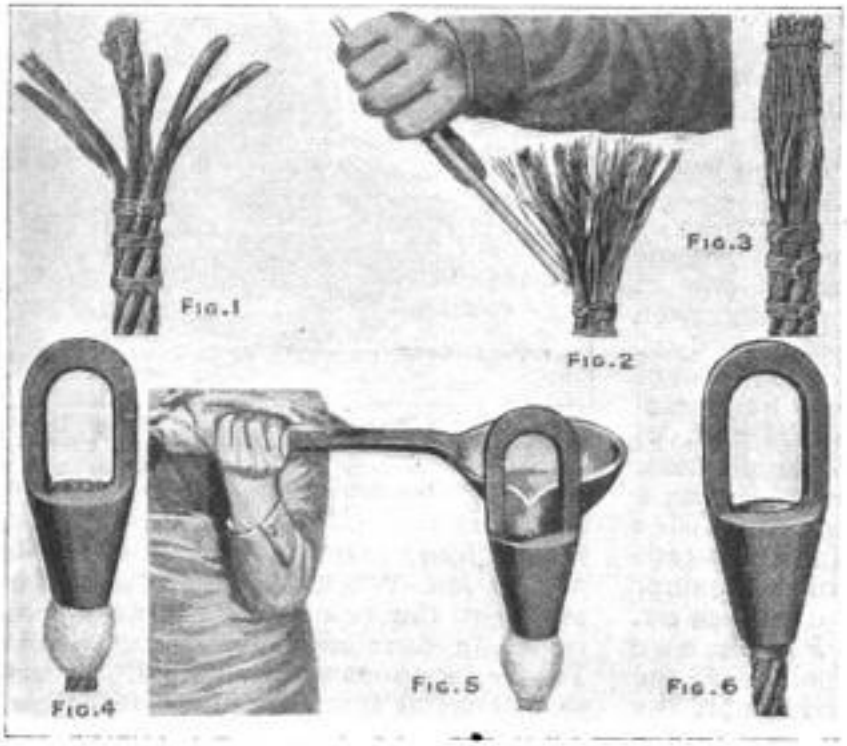
Valve Used as Shaft Clutch

Wishing to install a charging dynamo, and to drive it from a line shaft already installed, it was found necessary to extend the shaft a few feet and to use a clutch, so that the charging plant could be used independently of the other machinery. No shafting was available, but a length of pipe, with a valve on one end, was made to serve as both shaft and clutch. One end of the valve was fitted with a bushing, bored to fit the shaft, while a short length of the pipe was turned down to form a journal to run in the pillow block.



Correct Method of Attaching Wire-Rope Sockets

Measure from the end of the rope a distance equal to the depth of the socket and serve at this point, using wire and taking not less than three wraps, as in Fig. 1; separate the strands and cut out the hemp center. Then separate the individual wires of each strand, straightening them out with a piece of iron pipe, as shown in Fig. 2. Clean the wires with kerosene oil and wipe dry, and dip them into a solution of one-half muriatic acid and one-half water (do not use a stronger acid solution). Keep the wires immersed long enough to be thoroughly cleansed, and then wipe dry. The ends of the wires are brought together and the bundle is then served, as in Fig. 3, so that the socket can be slipped over all the wires.

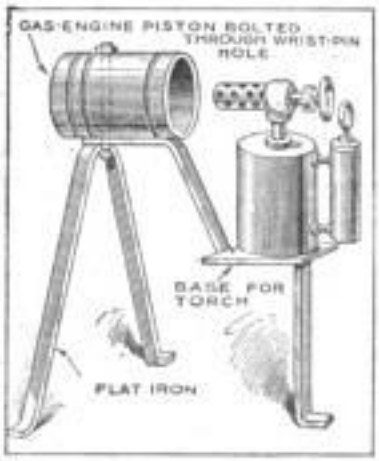


Securing a Wire Rope or Cable to a Socket Is an Operation That Requires No Particular Skill, but There Are Certain Precautions to be Observed If the Work is to be Done Properly and Neatly

After the socket has been placed over the rope, cut the serving wire at the end and distribute the wires evenly inside, so that the ends will be flush with the top. Dam up the bottom of the socket with moist fireclay or putty, as in Fig. 4. Pure zinc is now melted and poured into the basket, as shown in Fig. 5; lead or babbitt should not be used for this purpose. Figure 6 shows the rope in place after the zinc has cooled, and after all the servings have been removed except the one nearest the socket.

An Improvised Rivet-Heating Furnace

An automobile repairman uses the portable furnace shown in the drawing for heating rivets, tempering tools, and casehardening parts. The furnace consists mainly of an old engine piston and a few odds and ends of flat stock, the whole arrangement being held together by a bolt through the piston-pin hole. As indicated, a suitable base is provided for the gasoline blowtorch which is the source of heat.



"Dusting" Concrete Floors

Concrete floors that become dusty under heavy use can easily be renovated by the application of some material that will bind the particles together to prevent the formation of dust. Among such materials are boiled linseed oil and water glass (sodium silicate); these are applied to the dusting surface with a long-handled whitewash brush.

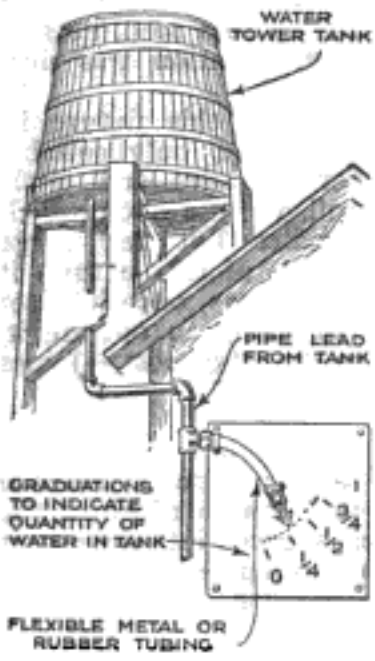
In the linseed-oil treatment the oil is applied "straight." It penetrates the concrete and acts as a binder. While it darkens the color of the concrete, it also prevents, in large degree, the absorption of moisture.

In the water-glass treatment, the floor must first be thoroughly scrubbed with clean water. The surface is then allowed to become perfectly dry, and is next coated with a mixture of one part water glass, 40° Baumé, to three or four parts of water. The more porous the concrete

the less water should be used. This preparation is swabbed over the concrete surface with a mop, and the floor then is permitted to dry. The surface is again mopped with clean water, and allowed to become thoroughly dry, after which a second and third coat of the water-glass solution are applied. The water glass on the surface is easily washed off, while that which penetrates the surface hardens into an insoluble binder.

Water Level of Tank Indicated by Pressure Gauge

A simple type of pressure gauge, made from a short length of flexible metal or rubber tubing, as shown in the drawing, can be used for determining the depth of water in a tank. The flexible tube is attached to the pipe line, as indicated, in a horizontal position. The normal weight of the tube causes it to sag downward but with pressure inside, the tendency of the tube is to rise to a horizontal position, the deviation from the normal position determining the amount of water in the tank. The extreme end of the tube is provided with a pointer, and as this swings through an arc, a scale is provided, having graduations that correspond with the location of the pointer in relation to the water level in the tank.



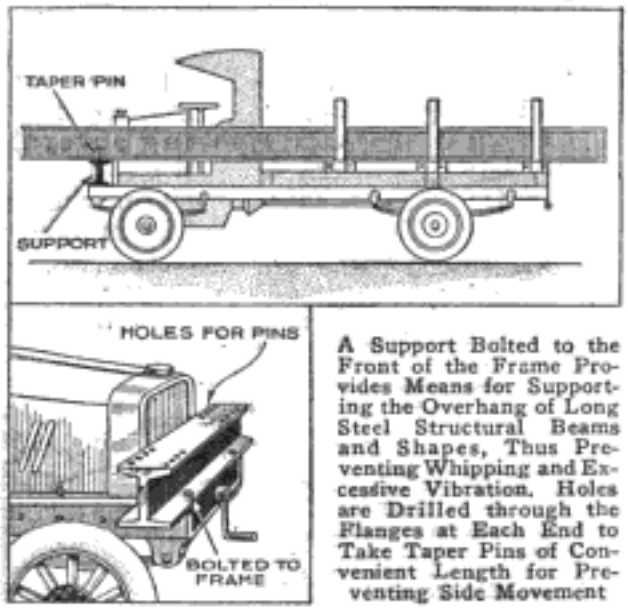
Removing Growth from Stone

The growth of minute vegetable organisms, that are mainly responsible for the discoloration of stone and brick work, can be checked by washing with a 1-percent solution of carbolic acid and water. After a few hours the surface is washed with plain water, and finally with a saturated solution of salt water.

¶Milling cutters are more often ruined by overfeeding than by overspeeding.

Adapting Truck to Carry Long Beams

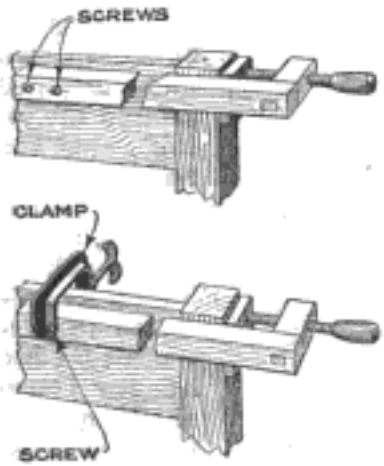
A structural-steel concern has equipped its heavy motor trucks with a front support which is bolted to the frame, as shown, for supporting the ends of long steel beams. The top of this horizontal support is level with the truck bed and bears its share of the overhanging load. The support is drilled at both ends, and tapered pins are provided for preventing the beam from moving horizontally and slipping off or injuring the engine hood.



A Support Bolted to the Front of the Frame Provides Means for Supporting the Overhang of Long Steel Structural Beams and Shapes, Thus Preventing Whipping and Excessive Vibration. Holes are Drilled through the Flanges at Each End to Take Taper Pins of Convenient Length for Preventing Side Movement

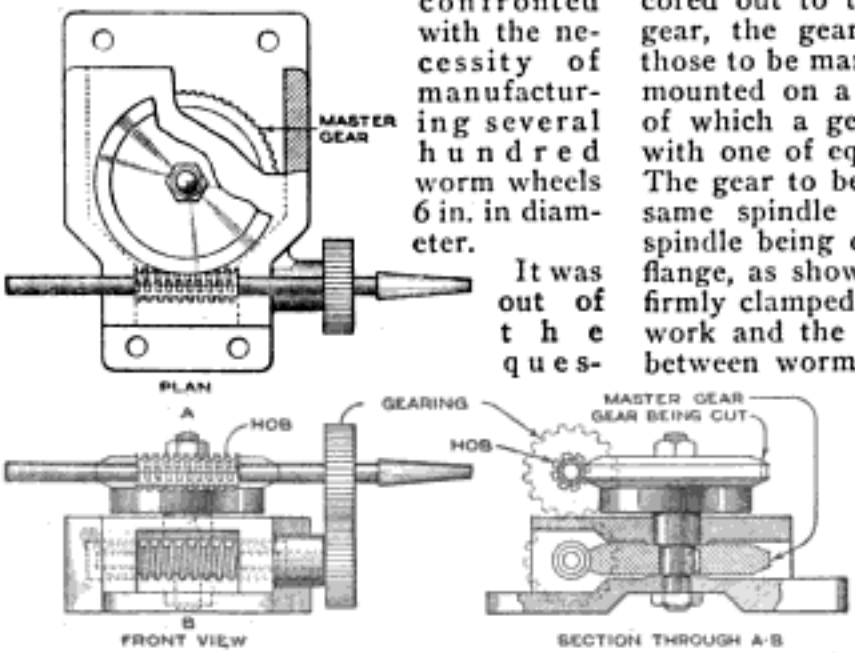
Increasing the Capacity of a Clamp

When it occurs, as it sometimes does in the cabinetmaker's shop, that a mortise-and-tenon joint is to be clamped on some large piece, such as bedsteads, davenports, and the like, and there is no clamp around the shop long enough, the tail of the clamp can, in most cases, be screwed to the rail that is to be glued, the upright piece being pressed tight with the screw, as shown in the drawing. If the clamp can only be put on the outside, where the screws would mar the piece, a small clamp can be screwed to the tail of the larger one.



A Worm-Gear Hobbing Fixture

A small shop, which made what few worm wheels were used by the time-honored method on the miller, was suddenly confronted with the necessity of manufacturing several hundred worm wheels 6 in. in diameter. It was out of the question to purchase a gear hobber for the job, as just then these machines were hard to obtain and there was not enough work to keep such a machine busy when this order was completed. The work was finally done on the milling machine by means of the fixture illustrated, which was made up in the shop. A casting was made, cored out to take the master worm and gear, the gear being the same size as those to be manufactured. The worm was mounted on a spindle, on the outer end of which a gear was mounted, meshing with one of equal size on the hob arbor. The gear to be hobbed was keyed to the same spindle as the master gear, this spindle being of steel and having a large flange, as shown, to which the work was firmly clamped. As the ratio between the work and the hob was the same as that between worm and gear, the work blank turned at its proper speed, and, when once fed up to a stop, no further attention was necessary.

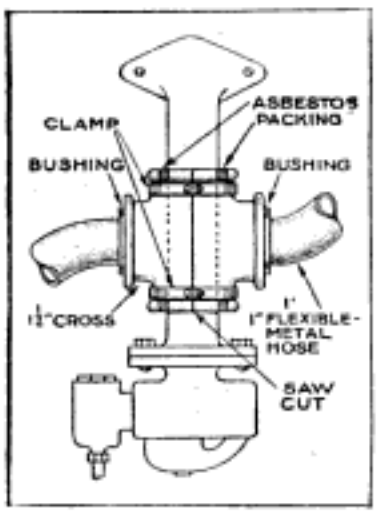


An Easily Made Fixture for Hobbing Worm Gears That Is of Particular Interest to the Small Shop Which does Not Possess a Regular Hobbing Machine: It does Not Demand Skilled Labor to Operate

While this fixture is, of course, only suitable for one size and pitch, still, for the shop which handles but few large orders of this nature, it is ideal, as, once it is set up, the greenest of help can operate it, thus cutting down the labor cost.—James Ellis, Memphis, Tenn.

Heater for Intake Manifold

An intake-manifold heater, which is applicable to some of the older models of automobiles, can be made from a few simple and easily obtained materials. A standard railing cross is sawed in two and fastened around the intake, at top and bottom, with small clamps, asbestos packing being inserted to prevent the heater from shifting before the cross is clamped together. The two parts should make a perfect fit at the cut, to prevent the entrance of cold air. Bushings are screwed into the horizontal arms of the cross to take flexible metallic hose. One end of the hose is attached to the exhaust, and thus a share of the hot exhaust gases is forced into the heater and out through another length of metal hose underneath the car.—W. S. Robinson, Minneapolis, Minn.



Silverplating Brass and Copper without a Battery

Nitrate-of-silver crystals are dissolved in water, and when all the crystals are in solution, the silver nitrate is converted into silver chloride by the addition of strong salt water. The silver chloride will form, on the addition of the salt water, a dense precipitate in the bottom of the container, which should be of glass. Collect the silver chloride on filter paper, by filtering the solution; wash it several times by filtering with clear water, and allow it to dry. When dry, the silver chloride is thoroughly mixed with three times its weight of ordinary table salt, and twice its weight of cream of tartar.

To use, the powder is rubbed on the brass or copper surface to be plated, with a wet cotton rag. After the silvering is

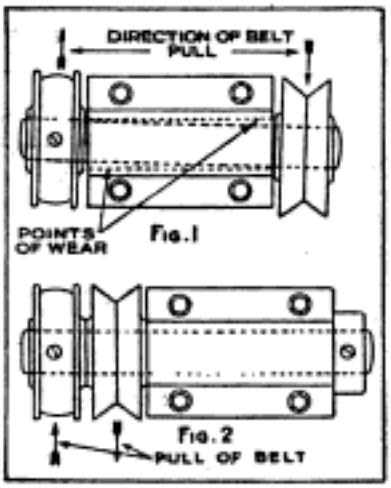
complete, wash the surface with hot water, and lacquer with clear varnish, or banana oil, to prevent tarnishing. The unused compound should be kept in an air-tight bottle which should be inclosed in a cardboard box, to keep it from the light, which will turn it black.

Improvement for a Foot Scraper

Wherever a foot scraper is used for removing mud from the shoes of persons entering a building there is usually an unsightly pile of dirt underneath. If the scraper is mounted on wooden steps, or on a board sidewalk, this accumulation of dirt can be avoided by making a narrow slit in the step or sidewalk underneath the scraper, so that the mud will fall through, and providing a box to catch it.

Wear of Pump Countershafts

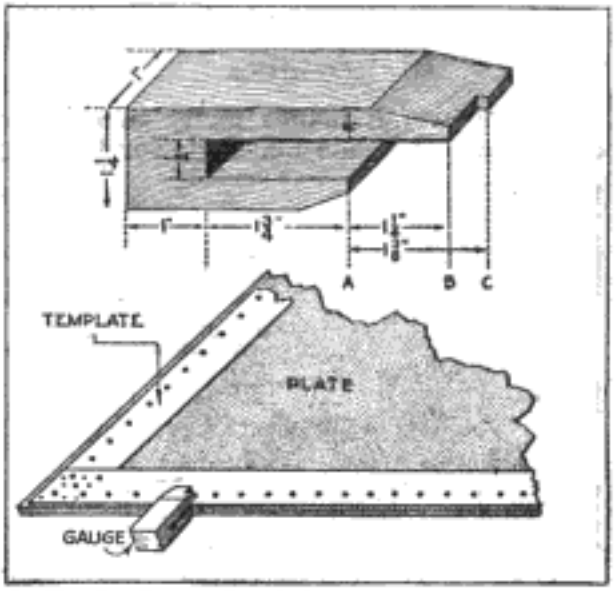
A battery of turret lathes, equipped with small gear pumps for the lubricating compound, was installed in a certain establishment. The pumps were under the rear of the headstock, and were driven by a double-belt arrangement, one belt running from the countershaft proper to a small countershaft on the wall, the other belt running from this to the grooved pulley of the pump underneath the machine.



This angular arrangement of belts allowed power to be taken from the main countershaft, which would have been impossible with a straight belt. The small countershafts were manufactured and installed as shown in Fig. 1. In the course of time, on account of the two belts pulling in opposite directions on the shafts, considerable wear took place in the countershaft bearing, as indicated by the dotted lines. After giving the matter some consideration, it was decided that, by rearranging the shafts as in Fig. 2, each belt would balance the pull of the other and overcome the excessive wear. Since this was done, no further trouble has been experienced from the countershafts.

Gauge for Spotting Templates in Shipbuilding

This device is very handy, and use has proved it to be a timesaver. It is made

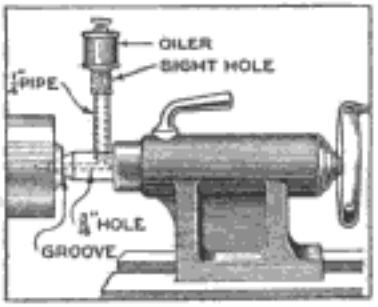


A Simple Gauge for Shipbuilders Which Enables Spotting Templates to be Located Quickly

of any hardwood, to the form and dimensions shown in the sketch. The gauge is designed to spot ¾-in. and ⅞-in. holes, although this detail can be modified to suit any requirement by changing the distance between A and B or C. Additional hole sizes can be accommodated by making more notches. When in use, the lower edge A is held to the edge of the plate. The template is then moved until the centers of the holes show at B for ¾-in. holes, and at C for ⅞-in. holes. The line R is known as the reverser, and it shows at all times where the edge of the plate is.

Sight-Feed Lubricator on Lathe Center

The proper lubrication of a large tailstock center, upon which heavy work is run, is a necessary factor in preserving the accuracy and life of the center, as well as in saving time on the job.

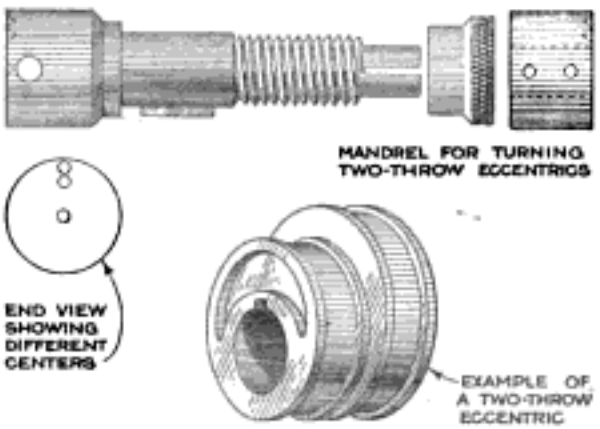


On a big lathe which turns heavy rolls, taking heavy cuts and feeds, the tailstock center is fitted with a sight-feed lubricator. A 3/16-in. hole is drilled through the center, parallel with its axis, and a similar hole is drilled to meet the first one at

right angles. The latter hole is tapped to take a sight-feed oiler. A small oil groove is also cut into the lower face of the center, to carry the oil over the entire surface.

Mandrel for Turning Two-Throw Eccentrics

A shop which makes many two-throw eccentrics has made mandrels for turning

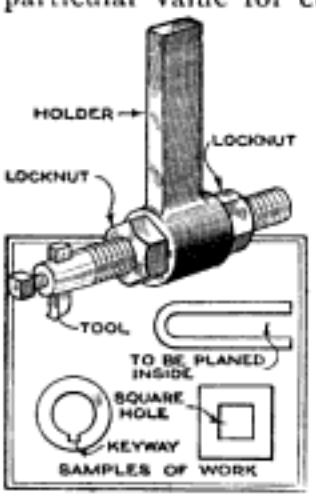


A Quicker Method of Turning Two-Throw Eccentrics than the Old One of Chucking for Each Cut, is Afforded by the Special Mandrel Here Shown

them which are very convenient and great timesavers. The drawing shows clearly the construction of these mandrels, which are used as follows: The eccentric is first bored and faced, the keyway is cut, and it is then placed on the mandrel, the knurled nut screwed tight, and the collar slipped on. This collar has two pins driven into it to engage with the slot in the mandrel body; when one throw is finished, the mandrel is moved to the other set of centers.—A. A. Stafford, So. San Francisco, California.

A Universal Shaper Tool

A universal shaper tool, which is of particular value for cutting internal keyways, square holes, and for many other uses, but which is intended primarily for internal work, is shown in the drawing. This tool can be made without difficulty and is held in the shaper in the same manner as the regular cutting-tool holder, which it replaces.

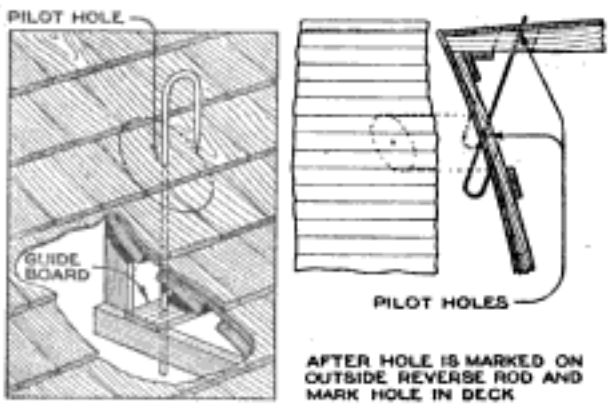


Ripening Fruits in Layers of Hay

A fruit grower has found that the ripening of fruits, such as some varieties of hard pears and apples, is hastened by placing them in hay. A 1-ft. layer of hay is spread in a dry place, and the fruits are laid out separately. Another layer of hay, of equal thickness, is then put on top, and in two or three days the fruit will be ready for eating. Pears, which in the ordinary way do not ripen until midwinter, are brought to maturity soon after gathering by treating in this manner.

Rod for Marking Outlines of Holes on Curved or Slanting Surfaces

The drawing shows how a bent iron rod can be used for scribing the outline of a hole to be cut on a slanting or curved surface, for the accommodation of a round pipe that is to be brought through the surface at an angle. At the left is shown the arrangement of the rod for laying out a stovepipe hole on a slanting roof, the rod being bent to the radius of the stovepipe. The end of the rod is sharpened, and by turning it around and letting it rise or fall with the slope of the roof, the exact shape of the hole is scratched on the roof covering and may then be cut out with a compass saw.



A Simple Arrangement for Laying Out Holes on Angular or Curved Surfaces to Accommodate Round Pipes

In the other sketch is shown an application of the same idea for locating a hole in the bow of a boat for a hawsepipe.—J. A. Stevens, E. Boothbay, Me.

Economizing in Sponges

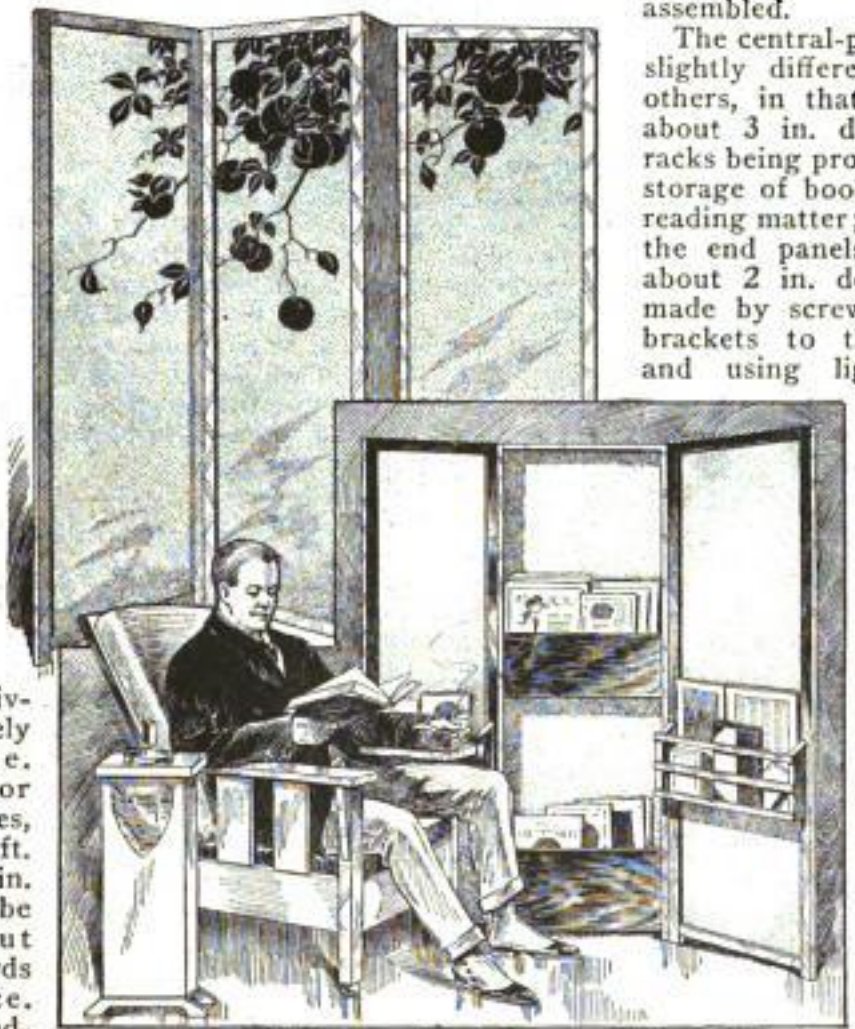
When the sponges used in the garage washroom break up, as they rapidly do, the pieces can be placed inside a bag made from an old Turkish towel and used indefinitely.

A Combined Screen and Magazine Rack

BY DONALD MACKAY

AMONG the home adornments that may be made in the amateur's workshop, is a three-panel combination screen and magazine rack of wallboard, the front presenting the appearance of the conventional decorated screen, while the back is provided with racks for holding books and magazines.

Such a screen may be made of any suitable dimensions, those given being merely suggestive. However, for most purposes, a screen 5 ft. high, with 22-in. panels, will be found about right as regards convenience. The two end-panel frames are made up of ¾ by 1½-in. material, with mortised and tenoned joints at the corners, the horizontal piece at the bottom of each panel being joined to the uprights at a point about 2 in. above the floor. Before the frame is assembled, a groove is routed along the inside face of each strip. This groove should be ¼ in. wide, and from ⅜ to ½ in. deep, to take the wallboard used for the panel. The groove in each piece is given a coating of good glue, and the panel and frame assembled.



A Library Screen with Wallboard Panels That can be Decorated in Harmony with the Room: The Screen Also Serves as a Book or Magazine Rack, and Keeps Reading Matter Where It Is Easily Accessible, Yet Readily Removable from Sight If Desired

The central-panel frame is slightly different than the others, in that it is made about 3 in. deep, suitable racks being provided for the storage of books and other reading matter; the racks on the end panels, which are about 2 in. deep, may be made by screwing wooden brackets to the uprights, and using light wooden strips to hold the books in place. Provision should be made, when building the rack on the right-hand panel, to see that it will clear the sides of the center section, when the screen is folded.

The left-hand panel is attached to the box-like center section by a pair of stout brass hinges on the front edge, while the right-hand panel is hinged to the rear edge.

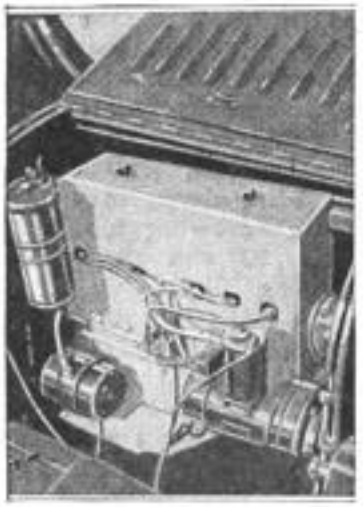
The front of the screen, being wallboard, can be painted and decorated to suit the taste of the builder, or it may be covered with wallpaper to harmonize with the decorations of the room. Naturally,

the wood of which the frame is made should be selected to correspond with the interior woodwork, although oak or birch is preferable; the latter, if a mahogany finish is desired.

The functions of such a screen are threefold: It serves as a library screen, takes the place of a reading table, or makes an appealing cosy corner, the conveniently placed book pockets keeping one's favorite books and magazines where they are accessible, yet readily removable from sight as occasion may require.

Metal Jacket for Automobile Engines

The photograph shows how the overhead-valve mechanism used on some makes of automobiles can be inclosed, to prevent the working parts from accumulating dust and dirt, and, at the same time, reduce operating noises. A metal box to fit over the cylinder block is made, with soldered joints and square corners, as shown. Two studs are screwed into the engine head, and these project through holes in the top of the cover, which is held in place by two wingnuts, as shown.—W. L. Peterson, Denver, Colo.



Etching Glass with Glue

The peculiar frosted appearance of some kinds of glass can be duplicated in the amateur's laboratory by means of strong glue.

Obtain some very strong liquid glue, and apply a thick coat over the inside and outside of an ordinary glass tumbler. Set the glass aside for 24 hours, until the glue becomes dry, and then place it over a heater, or close to a stove. Leave the glass there for another 24 hours, being sure that the heat is constantly maintained during the whole time. When the time is up, remove the glass from the warm spot and place it where it can cool. The glue will begin to crack, and in doing so will break off small pieces of glass from the surfaces of the tumbler. When the glue shows no further signs of cracking, which will be a few hours after cooling, the remaining glue is washed off. It will be found that very peculiar and delicate designs have formed on the surface of the tumbler.

If the first coat of glue does not bring results, apply two more coats, after the first has dried, permitting each separate coating to dry before the application of another; then place the tumbler near the stove.

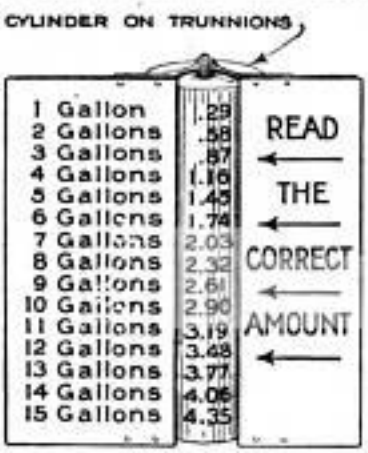
Any glass article having a smooth surface can be etched in the same manner. As no uniform pattern is produced, each piece will have a slightly different design etched upon it.—Mallory Dufur, Baltimore, Md.

Water Colors on Parchment Shades

Most workers find it more or less difficult to apply water-color paints to parchment lamp shades. The slightest trace of grease will cause the color to "ball up," so that it is practically impossible to get the colors to cover, and stick to, the material. The same difficulty is also experienced in the use of India ink. The trouble can be overcome by rubbing the surface of the parchment with powdered pumice stone, applied with a tuft of cotton.

Price Table for Filling Stations

To prevent mistakes and save time in computing the price of any number of gallons of gasoline, at any price per gallon, the calculator shown in the drawing has been installed beside the gasoline pump of a filling station. As shown, the price in dollars and cents appears on a revolving cylinder which is supported between trunnions, while the quantity in gallons appears on the stationary mounting. Any number of prices can be accommodated on the cylinder, depending on its diameter, but unless many grades of fuel are carried, more than three or four will seldom be necessary.—Curtis Ralston, Springfield, Ohio.



Hulling Walnuts with Corn Sheller

The ordinary corn sheller found on the average farm makes an excellent implement for shelling walnuts, and other nuts, without the annoyance of stained fingers. The sheller should be turned slowly, and the walnuts allowed to run in one at a time, just as though they were ears of corn. The heavy nuts will fall down, while the lighter hulls will be thrown out of the machine just as the corncobs are. To make the hulling easy, the walnuts should be turning black, but should not be dried to any great extent. A pair of old gloves will prevent staining the hands when feeding the nuts into the huller

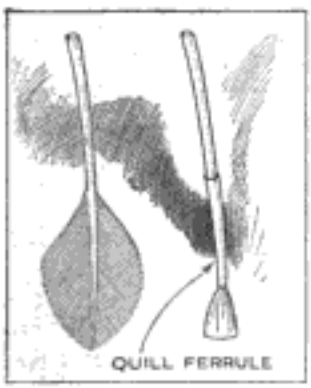
Garden Rake for Sifting Ashes

No one enjoys sifting ashes, hence it is a job that is likely to be slighted. The task is made much easier by the use of the tool shown in the illustration. A piece of strong wire is bound along the teeth of an ordinary garden rake, about halfway up the teeth, thus furnishing an easy means of raking the half-burnt cinders from the ashpit each time the furnace is attended to.

Paintbrushes Made from Feathers

The method one lady used to keep her children supplied with brushes for their water-color work, in the absence of "regular" brushes, is shown in the drawing.

A feather of the desired size is selected, and all but one inch is stripped from the midrib, or stem. The hollow quill at the larger end of the stem is cut off and cleaned out with a piece of wire, and is then slipped over the feather to form a ferrule. Glue may be used to hold the feather in place, if desired.



Staple-Pulling Tool

When renewing the wire on a chicken corral or barb-wire fence, the greater part of the work is represented by extracting the staples which attach the wire to the posts. This tedious and exasperating labor can be pleasantly speeded up by using a special staple-pulling tool, such as shown in the drawing. A pointed hammer is made of 5/8-in. square steel, with its point sharpened in the form of a pickax, as shown, and an eye for a handle. The point of the tool is driven under the staple with a hammer, and an upward pull on the handle withdraws the staple without bending it.

Making Bottle Mirrors

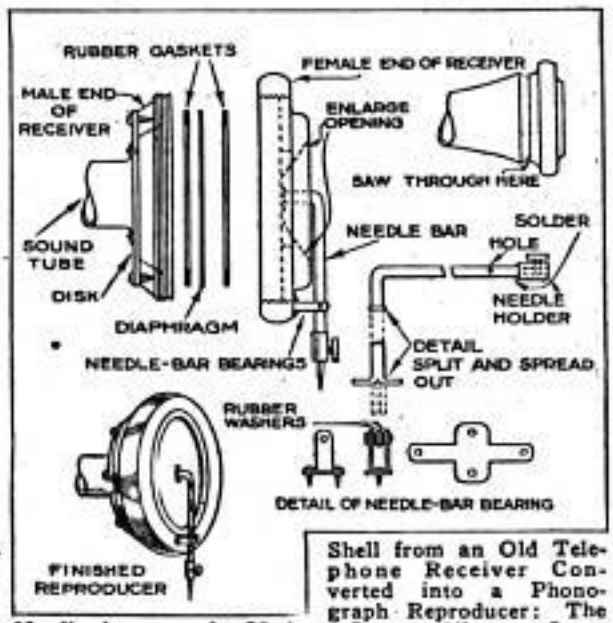
Interesting results are obtainable by coating the interior of transparent bottles with silver. Dissolve a small quantity of tartaric acid in water, and add ammonia until the mixture smells strongly of that chemical. Add calcium chloride to the solution, and warm the whole; continue to add calcium chloride, stirring well until the solution assumes a thick appearance. Permit it to stand until a precipitate is formed; this precipitate is calcium tartrate. Rinse the tartrate in clear water several times, and place it inside the bottle to be silvered. Add two or three drops of ammonia and a crystal of nitrate of silver, about the size of a pea.

Hold the vessel over a lamp, so that it is gently warmed, moving it about so that the chemicals inside will cover all parts of the surface. After a while the heat will cause the whole of the inside to become coated with a film of bright silver. Allow the bottle to cool and wash out the inside. It is then inverted and allowed to dry thoroughly, after which it is closed with a stopper and sealed with wax.

Should the first attempt to silver the bottle be unsatisfactory, it is easy to clean off the silver film by pouring a teaspoonful of diluted nitric acid into the bottle, and warming it slightly. When all the silver has been removed, the bottle is washed and the process repeated.

Phonograph Reproducer from Phone Receiver

An old telephone-receiver shell can be converted into a serviceable phonograph



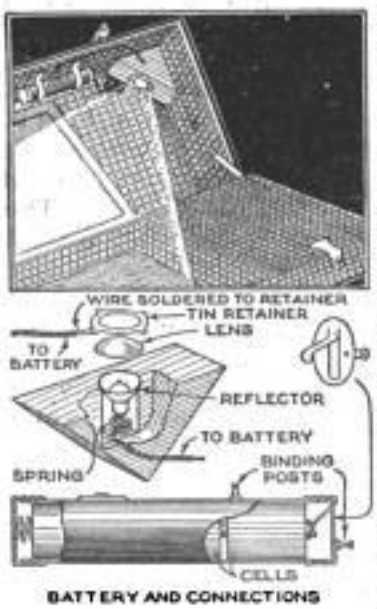
Shell from an Old Telephone Receiver Converted into a Phonograph Reproducer: The Needle Arm may be Made of German Silver or Some Other Light, Stiff Metal

reproducer with little work and expense. The shell is sawed off about ½ in. back of the threaded male end, and the cap, or earpiece, is unscrewed and removed. A metal plate of the same diameter as the severed end is provided and drilled at the center with a hole, ½ or 1 in. in diameter. Over this hole a small tube to fit the gooseneck of the phonograph is attached with small rivets, or solder. Several small holes are drilled around the outer edge of the plate, and corresponding holes are drilled into the rubber, for attaching the plate with small screws. Cut out the beveled opening in the cap to at least 1 in. in diameter. Substitute for the metal diaphragm one made from a sheet of mica, or thin cardboard. A thin rubber gasket, or washer, is placed on each side of the diaphragm, to insulate it from the hard surface, and the cap is tightly screwed on.

The needle arm is made from a piece of stiff, light metal, such as German silver, and should be long enough so that when bent at right angles, as shown, the upper leg will touch the center, and the lower end will extend beyond, and clear, all parts of the cap. Split the upper leg and spread it out to form a flat base, as shown. Solder the lower end of the bar to a piece of round rod, drilled through the center to receive the needle. A small hole is drilled and tapped at the side for a small knurled-head screw, to hold the needle. A hole is also drilled through the bar at the proper location for its attachment to the bearings with a small riveted pin or screw. The bearings are made from a single piece of stiff metal, formed and bent as shown, and attached to the edge of the cap with screws. Place a small rubber washer on each side of the needle arm, and secure it to the bearings. Cement the flattened upper leg of the needle bar to the diaphragm with a drop of sealing wax, and the reproducer is complete. Be sure the needle bar has play on its bearings, but not enough to be loose or rattle. This will require adjustment after the reproducer has been assembled and tested. —L. B. Robbins, Harwich, Mass.

An Electric Light for the Trunk

To facilitate the location of articles in a trunk, where the light usually is insufficient, the trunk can be fitted with a light plant of its own, by utilizing an electric flashlamp. A triangular block is cut from a piece of 2 by 4-in. lumber, and a hole is drilled in one side, about ½ in. deeper than the combined length of the assembled reflector and lamp. This hole is countersunk about ⅛ in., to bring the reflector flush with the surface. A small brass spring is secured to the bottom of the hole by a screw, so that it will bear firmly against the base of the lamp when in position; this spring is connected to a wire from the battery, and another wire is soldered to the edge of the reflector. The lens is set in position, and the assembly is held in place by a retainer made from a piece of tin; this is provided with drilled ears for the fastening screws. The block is then screwed into the upper right-hand corner of the lid, as indicated.



BATTERY AND CONNECTIONS

The battery is retained in the flashlamp shell as usual, with the exception that a metal disk is substituted for the lens. A section of the disk is cut away and bent back to form a spring contact with one element of the battery and one pole of

the switch. Binding posts are attached to the second pole of the switch and disk, as indicated. The battery is held inside the trunk lid with metal straps, care being used to prevent them from contact with metal parts that would cause a short circuit. The lamp is lighted and extinguished by means of the flashlamp switch in the usual manner.

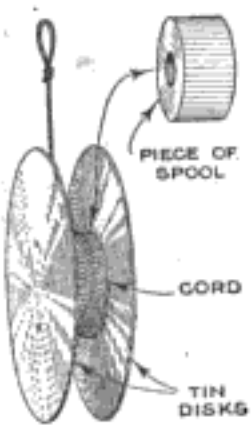
Filling Cracks in Shoes

Cracks in shoes, at a point above the small toe of the wearer, may be easily repaired with gelatin, mixed with hot water to the consistency of glue. The crack is filled with the mixture, and the gelatin smoothed down flush with the leather, whereupon one or two coatings of formalin (40-per-cent formaldehyde) are applied to the patch. The formalin has the effect of hardening the gelatin, making it waterproof, tough, and insoluble in water.—Chas. W. Waller, Chicago, Ill.

Making and Using the "Bandilore"

An East Indian toy, known as a "bandilore," is made from a piece of spool, about ½ or ¾ in. thick, and two tin disks, about 4 in. in diameter.

The section of spool is tacked between the two disks, exactly in the center. Tie one end of a 3 or 4-ft. length of stout cord to the spool. The bandilore is operated by winding the cord around the spool, and holding the free end of the string in the hand. The toy is dropped and descends with great speed; just before the end of the cord is reached, the whole thing is given a quick upward jerk. This increases the speed and momentum of the disks so that the cord is wound in the opposite direction, and the bandilore climbs upward, the process being repeated as often as desired.



Japan Drier as Paint Medium

The use of Japan drier is recommended for mixing the paints used in coloring parchment lamp shades. This is put up and sold under various names, never by its own, as a medium for the paints used in this work.

Push Cycle Converted into Sled

By removing the wheels of a child's push cycle and attaching two sets of runners in their stead, a novel sled is the result, one that the child can stand or sit upon at his pleasure. The sled is guided as is the cycle. Each set of runners is composed of three pieces, the central pieces being made the same thickness as the width of the wheel hubs. The rear upright should be made sufficiently long to form a convenient seat pedestal. The runners are shod with strap iron.—F. E. Leitch, Brooklyn, N. Y.

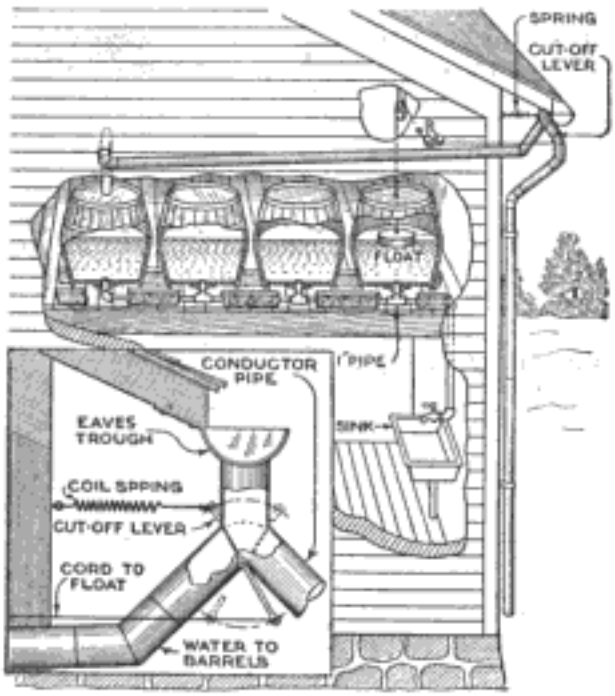
By Removing the Wheels from a Child's Push Cycle and Substituting Runners, a Novel and Serviceable Sled can be Made. The Sled is Guided like a Cycle, with Its Occupant Standing or Sitting

A Homemade Coin Tray

A rural merchant who had noted the difficulty experienced by his patrons in picking small change from the counter or display case, recalled to mind a coin tray he had once seen. As no such article was available in his town, one was made from a cake pan and some 1-in. strips of old inner tube. The rubber strips were cemented to the bottom of the inverted pan, shingle fashion. When the rubber cement used for the purpose had dried, the projecting ends of the strips were trimmed off.—G. E. Hendrickson, Argyle, Wis.

A Soft-Water Storage System

A very satisfactory gravity water system for the isolated dwelling can be installed in the attic at insignificant cost. The water is stored in four or five barrels, as shown; these are supported on two lengths of timber and connected at the bottom by sections of 1-in. pipe. To avoid the use of unions in the pipe line, a hole is drilled in the bottom of each barrel, and a floor flange, with a rubber gasket interposed, is attached with small bolts. Coating the gasket with shellac will prevent any possibility of leaking. Each flange is fitted with a nipple of the proper length. The pipe line having been previously laid between the supporting timbers, the barrels are lined up with the fittings and the nipples are screwed in place by turning the barrels.



A Satisfactory Gravity Storage System That can be Installed in the Attic of the Isolated Dwelling at Insignificant Cost

A cut-off is attached directly to the eaves spout, as shown, and the water is conducted to the barrels by means of a suitable length of pipe from one arm. The regular pipe to the ground is attached to the second arm of the cut-off. To shut off the water automatically when the barrels are full, a stout cord is attached to the lever arm of the cut-off; this cord runs through pulleys to one of the barrels, where the end is attached to a float, as indicated.

The float should be suspended in such a manner that when it is about 3 in. from the top of the barrel, the water will be diverted to the outside pipe. This is accomplished by attaching a light spiral spring to the opposite end of the cut-off lever. When the barrels are empty, the weight of the float will open the gate in readiness for the next rainfall.—F. D. Burke, Lisle, Ill.

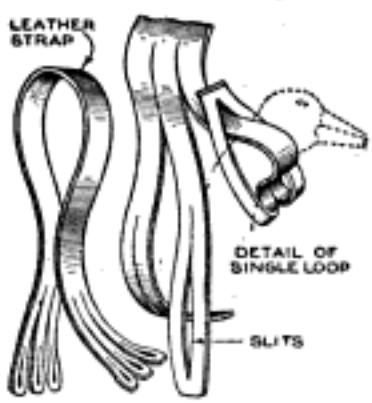
Sizing Prints in Preparation for Coloring

Photographs that are to be retouched, or colored with water colors, often show a tendency to reject the color, this being particularly noticeable on glossy prints. An application of gelatin to the face of the print makes it easy to apply the colors, which will then flow evenly under the brush.

Dissolve a small amount of white gelatin in warm water to make a jelly; this is allowed to harden into a small cake. The gelatin is applied to the print with a wad of cotton, which has been moistened and rubbed over the surface of the gelatin cake. Being colorless, there will not be any marks to show the presence of the gelatin, which is always ready, and requires no mixing.

An Easily Made Game Carrier

A simple game carrier that will meet the needs of most sportsmen can easily be made from a piece of leather. The ends are split at uniform distances apart, a slit being cut into each of the separate straps thus obtained. In use, the slit end of the strap is turned up and the body of the strap is inserted, thus forming a loop through which the head of the fowl is placed.—Clay Hewes, Albany, N. Y.



Bent Handle on Sugar Spoon

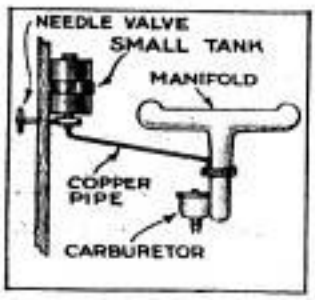
To prevent the projecting handle of a sugar spoon from being accidentally knocked from the bowl, the handle is bent so that it will hook over the edge. The spoon is easily bent by pressing the handle around some curved object, such as the neck of a bottle.—F. H. Mason, Victoria, B. C.

How to Make a Rubber-Stamp Pad

Ink pads for rubber stamps can be made at very little cost, from old felt hats and wooden blocks. Several thicknesses of felt, or similar material, are tacked to a wooden block, around the edges. Rubber-stamp ink, made by dissolving package dyes in glycerin, is rubbed into the pad with a piece of paper, until the pad has absorbed all it will hold. The glycerin will not evaporate.

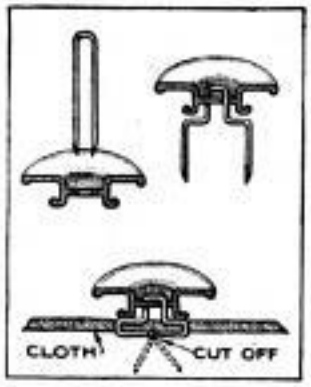
A Simple Engine Primer

A simple device, which enables the motorist to prime his cylinders in cold weather without leaving the seat, is shown in the drawing. A stout can, provided with a needle valve and a filler cap, is clamped to the dash, so that it is higher than the carburetor. The handle of the valve must be long enough to go through the dash; a piece of copper tubing is led from the valve and tapped into the manifold above the carburetor. The small tank is filled either with high-test gasoline, or a half-and-half mixture of ether and gasoline. The needle valve should be closed when the engine is warm enough to run on its own mixture.—J. P. Lewis, Golden, Colo.



Securing Buttons with Wire

A handy way of fastening buttons to clothing is to use light wire for the purpose, copper or galvanized-iron wire being preferable. A piece of wire is cut to the length desired and bent to form a long staple, as shown; this is inserted through two of the buttonholes and bent as shown, the ends of the wire being cut to make sharp points for ease in penetrating the cloth. After the wire has been pushed through the cloth, the ends are bent toward each other, parallel with the fabric, and twisted together, any surplus wire being cut off.



Handles Made from Scrap

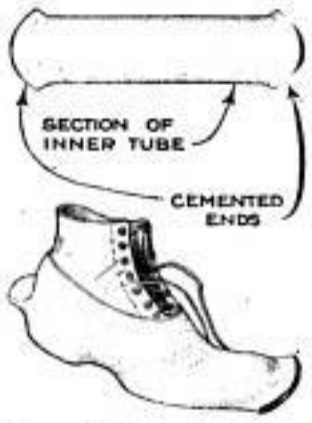
Scraps of different-colored fiber, transparent celluloid, and metals of different color are just the thing for making ornamental handles for tools and other purposes. The material is cut into squares and a hole is drilled through the center of each, the drilled squares being placed on a long bolt and firmly held in place by the nut. The handle is finished by turning in a lathe; after the handle has been turned to the required shape, it is polished with fine sandpaper and finished on a buffing wheel, or by rubbing with a piece of leather and crocus.

The Scraps of Material Which Accumulate around the Amateur's Workshop may be Utilized to Form Ornamental Handles of Various Kinds

Overshoes from Old Inner Tubes

A motorist who often soiled his high-priced footwear when getting out in the mud to crank his car, or to make minor repairs, provided himself with a pair of overshoes made from sections of an old inner tube.

Two 12-in. lengths were cut from the tube, the ends being cemented together and vulcanized. The overshoes were completed by making an opening near one end large enough to insert the foot. Though rather odd in appearance, they are nevertheless serviceable.

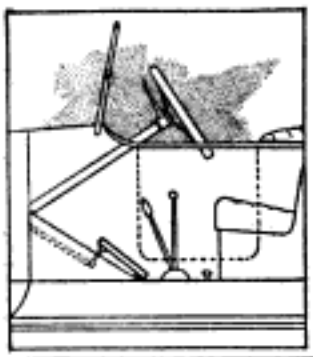


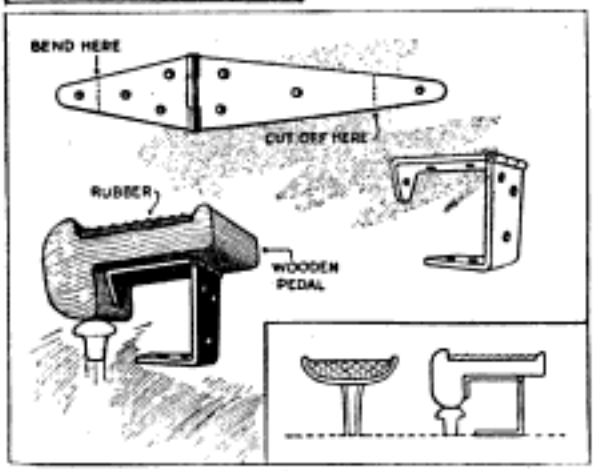
Rejuvenating Worn Carbon Paper

Waste of carbon paper can be largely overcome by applying a small typewriter brush such as used for cleaning the letters. The paper, as ordinarily used, receives all the wear in the center of the sheet, leaving a margin, on all sides, of good carbon. Lay the used paper on a smooth table, or piece of glass, carbon surface up, and hold the sheet firmly at one side; at the same time the carbon on the unused surface is distributed over the worn part with the brush.

A Simple Accelerator Pedal

Holding the foot on the accelerator pedal of an automobile for any length of time is more or less tiresome to the driver. The large drawing shows a neat-appearing pedal made from a common strap hinge, bent as indicated. A rubber-covered wooden block completes the arrangement. The small drawing illustrates a somewhat simpler arrangement, which consists merely of a hardwood block of the proper size, hinged to the floor board, and attached over the pedal as shown.





An Arrangement for the Accelerator Pedal Which Eliminates Much of the Fatigue and Strain of Driving: A Strap Hinge and a Rubber-Covered Block are Used in Its Construction

Portrait Photography in the Home

There is a wide field open to the amateur photographer who specializes in the making of portraits in homes. While the work requires some ingenuity, there is no reason why the average person should not be able to produce pictures of fair quality, which can be sold readily at moderate prices, after a certain amount of experience.

Tracing cloth is useful for directing light where it is needed. The cloth can be suspended from the ceiling, or fastened in collapsible wooden frames. Care should be taken not to supply too much top light, as this has a tendency to accentuate wrinkles in the face. Light is reflected on the subject from above and in front by stretching two widths of tracing cloth from the top of a window casing to a point on the ceiling about 5 ft. from the wall, and then down, at an angle of 55°, to within 6 ft. of the floor.

For side reflectors, tracing cloth is hung over the backs of chairs, or on other pieces of furniture. The strength of side light is increased by placing the subject nearer a window, while the front and top lights become stronger when the subject is moved away from a window. Top light also can be regulated by adjusting window shades.

When a person with a round face is being photographed, a great deal of side light is necessary, and only a small amount of top and front light; for a thin face, the reverse is true. In any case, the subject's head should be turned so that not too much front light strikes the features, as this causes the face to appear flat in the finished picture. Light must fall on the eyes from only one side.

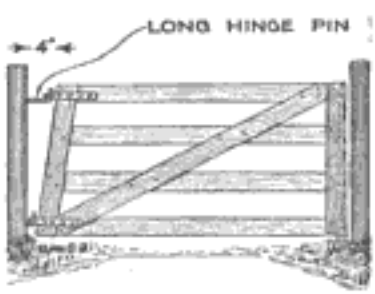
A mirror will serve as a side reflector, if held by an assistant or placed on a chair. In making portraits of children, mirrors are especially suitable.

Proper poses are difficult to obtain. The subject should be made to sit or stand in a natural position, with the head turned slightly to one side. Three-quarter-length portraits probably are the easiest to make, and are generally the most satisfactory. Excellent profile portraits are obtained by placing the subject opposite a window, with the face turned a little away from the source of light. The camera is stationed at the side of the window.

The walls of an ordinary room seldom provide a good background for a bust picture. A wide, light-colored window shade, fastened to a roller, which is mounted in a collapsible frame, provides a satisfactory background.—Charles Olive, Willmar, Minn.

A Self-Closing Gate

A farm gate that is self-closing is made like any similar gate except that the top bar is 4 in. shorter than the bottom one; also, the upper hinge pin is longer than the lower by the same length. It will be seen that whenever the gate is swung open, the latch end will be elevated, so that it will swing shut of its



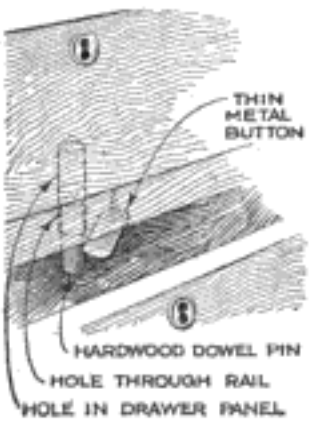
own weight, no matter how much or how little it is opened.—H. F. Grinstead, Columbia, Mo.

A Fly-Screen Clothes Hamper

For use underneath the laundry chute of a residence a fly-screen clothes hamper can be made. A light wooden frame is constructed so that the bottom is elevated several inches above the floor, and covered with screen wire. The original one simply consisted of several window screens fastened together. Such a hamper is large and roomy, and air is permitted to circulate through the soiled linen from all sides.

Drawer Locked by Secret Dowel Pin

The secret lock shown in the drawing was fitted to a drawer whose lock was rendered useless by the loss of the key. Simply drill a hole through the under rail and into the panel of the drawer. Into this hole a loosely fitting hardwood dowel pin, or a steel nail, is inserted. A thin metal button keeps the pin in position. To remove the pin and unlock the drawer, the clip is turned to one side which causes the pin to drop out. Not being easily discovered, such a lock may be applied, for additional safety, to drawers whose locks are easily "jimmied."

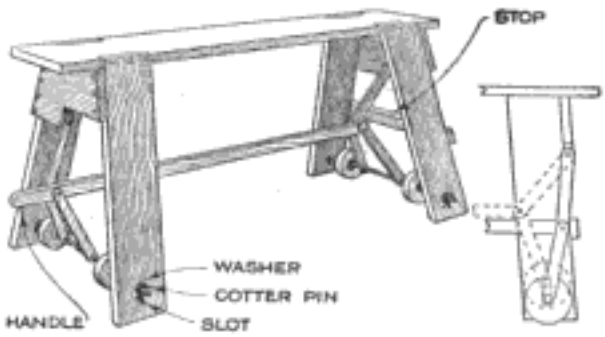


Transferring Carbon Copies

When making carbon copies in the typewriter, it frequently happens that the carbon paper is improperly inserted, and the duplicate is made on the back of the original copy. When this happens, a record duplicate can be made without rewriting the letter, although for the sake of appearance it would be better to do so. The blank sheet is laid on some flat surface and one side is rubbed with the end of a candle or piece of beeswax. The paper is then placed with its waxed surface upon the back of the original and rubbed with some smooth, hard object. A carbon copy of the subject matter will be obtained in this manner.—G. H. Holden, Chesterfield, England.

Sawhorse with Collapsible Casters

To save the labor required to carry a sawhorse from one location to another,

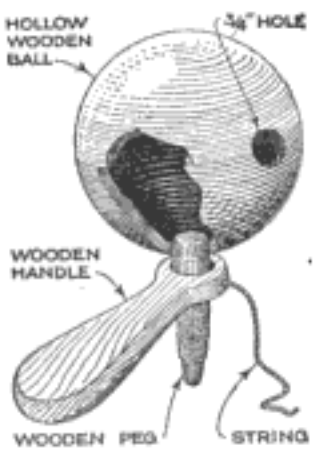


A Sawhorse Equipped with a Set of Casters, That are Brought to Bear against the Floor by Pressure on Toggle Levers, Makes Changes of Location Easy

a workman equipped it with a set of collapsible casters, as shown in the drawing. The caster axles are inserted through slots in the legs of the sawhorse, and washers and cotter pins are used on the projecting ends to prevent sideplay. A simple system of wooden toggle levers raises and lowers the casters from the floor. To lower the wheels, when it is desired to move the horse, the handle is pushed inward, and to remove them from contact with the floor the handle is given an outward pull.—Edward R. Smith, Walla Walla, Wash.

"Wild Indian" Top

A wooden top that will hop across the floor and howl like an Indian in full cry after a "paleface" scalp, can be easily made by the amateur wood turner. The top consists of a hollow, two-piece wooden ball, which is turned from a piece of soft pine. A hole is drilled through the shell of the ball at one of the center marks and fitted with a hardwood peg having a slightly rounded end, as shown. At right angles to the peg, a ¾-in. hole is drilled. To spin this top, a wooden handle, such as the one shown, is required. The top string is wound around the peg, and the end is brought through the hole in the handle, as indicated. A quick jerk on the string sets the top in motion and pulls it free of the handle.



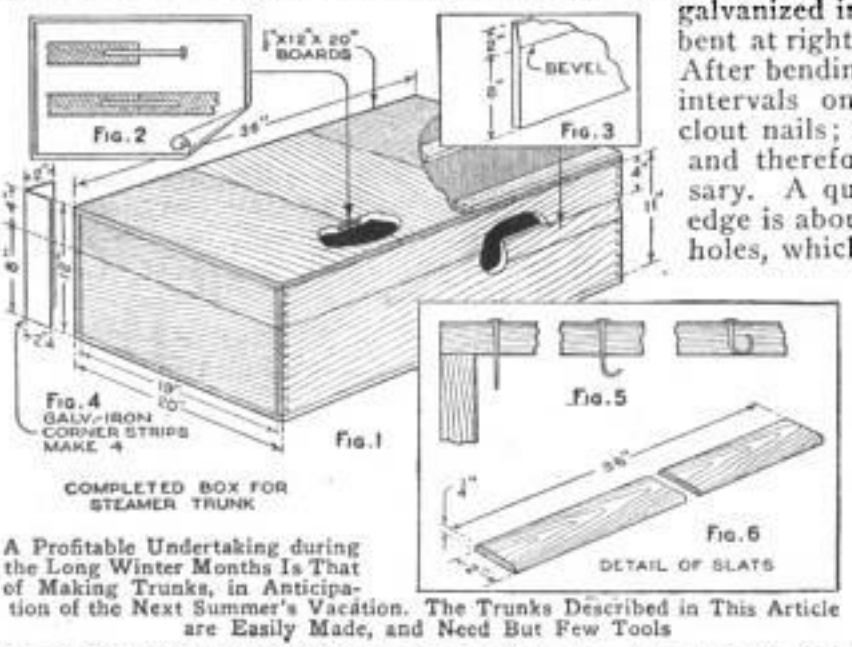
MAKING ONE'S OWN STEAMER AND WARDROBE TRUNKS

By Henri Marcelle

Part I—The Steamer Trunk

ONLY such ordinary tools as a hammer, saw, plane, and an old flatiron, are needed to build the steamer trunk described in this article. In addition, a glue pot is needed, and a brush or two, for gluing and painting the finished trunk.

There are several kinds of lumber that can be used in trunk making, and in the order of their desirability they are: three-ply veneer, basswood, spruce, and sugar pine. The veneer costs a trifle more, but is lighter and more durable, and if used in conjunction with fiber, it is possible to make with it a trunk that is almost indestructible. If any of these woods are used, secure all half-inch material, dressed on both sides, and as clear as possible.



A Profitable Undertaking during the Long Winter Months Is That of Making Trunks, in Anticipation of the Next Summer's Vacation. The Trunks Described in This Article are Easily Made, and Need But Few Tools

In making the steamer trunk, 12-in. material can be used with no waste. A box is made to the dimensions shown in Fig. 1. To prevent the top and bottom from warping where the boards are joined, 1½-in. wire nails are driven into the edges of the boards at about 6-in. intervals. Cut off the heads and butt up the next board, as indicated in Fig. 2; if desired, these joints can be glued before they are driven together.

After the top and bottom are in place, mark a line on each side, 4 in. from the top; then, starting at a corner, carefully cut through the boards and around the entire box, keeping to the mark, until the box has been sawed into two parts—a lid and a bottom. This method assures the absolute matching of both parts. The lower part is laid on its side and a line is marked on each side 2 in. below the edge. Another line is marked in the middle of the edge, and, using the plane, the outside of the boards is beveled off down to the 2-in. mark, as in Fig. 3. Some strips of galvanized iron, as shown in Fig. 4, are bent at right angles between two blocks. After bending, they are punched at 1-in. intervals on the edges to take 1-in. clout nails; these nails are easily bent, and therefore the punching is necessary. A quarter of an inch from the edge is about the distance to place the holes, which should be punched without raising any burrs.

What is known to the theatrical profession as "scenic linen" is used for covering the trunk, and about 2 yd. of this will be needed. This material can usually be obtained from any stage carpenter, or scenic artist, at little or no expense, and even if bought new, the cost is small. A 14-in. strip, the length of the piece, is cut off. A pot of glue is mixed, and the outside of the box is given a light coat; this may be thin, as it is intended only to fill up the pores of the wood. When this has dried, apply a thicker coat as smoothly as possible. While the glue is still hot, lay on the linen and smooth it out, with a rubbing motion. After the sides have been covered, the top and bottom pieces can be cut and glued on in the same manner; these should be cut ½ in. smaller than the surface they are to cover.

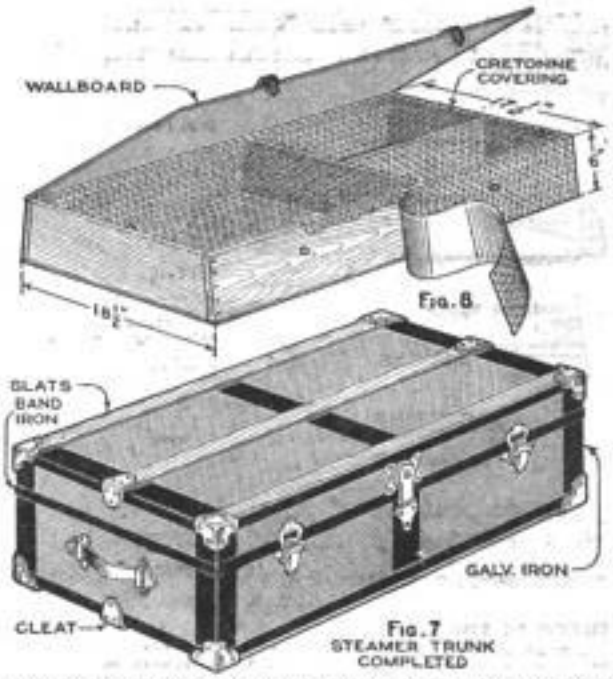
The galvanized-iron corners are now nailed in place, the method of clinching the nails being clearly illustrated in Fig. 5. The nail is driven through the wood, the point curved with a pair of round-

nose pliers; then, holding the old flatiron against the head, the curved point is driven into the wood and clinched by a sharp hammer blow. A strip of galvanized iron, about ½ in. wide, is nailed on each edge of the box, and strips about 2 in. wide across the center of each side and at the ends of the top and bottom, the nails being clinched as described; the black bands in Fig. 7 show the location of these strips.

Eighteen running feet of oak, or hickory, cut and formed to the dimensions shown in Fig. 6, are needed for the slats, which take up a great deal of the wear a trunk is subjected to. Six 3-ft. slats are cut and fastened with clout nails to the top and bottom of the trunk, 6 in. apart. As the wood is too hard to prevent the entrance of the nails without bending them or splitting the wood, it is necessary to drill a hole wherever a nail is to be inserted. A light strip of band iron is run around the whole trunk at the point where top and bottom join; this iron is applied in the manner described for the sheet-iron corners, the nails being inserted every 6 in. Next place a pair of 6-in. strap hinges on one side; three hinges are better, and even four may be used. The following hardware, which can be obtained from almost any hardware store, is required: two strong trunk clasps, four slat cleats, eight corner irons, a pair of trunk handles, and a good trunk lock.

The inside of the trunk is lined with a suitable pattern of cretonne, or similar material, which is applied with ordinary flour-and-water paste. Two ¾-in. strips of wood, 1 by 19 in., are screwed to the inside of the trunk, one in each end of the lower part, and 2 in. from the edge, to support the tray.

The tray is made of material as light as can be obtained; ½ in. for the ends, and ¼ in. for the sides. The top and bottom are made of wallboard, about ¼ in. thick.



This Steamer Trunk, While Not Costing Nearly So Much as a Purchased Article, will be Found Quite as Strong and Serviceable

The tray is built to the dimensions shown in Fig. 8, and is made narrower at the top so as to give the lid freedom in closing. After the tray is finished, and partitions added as desired, the lid is attached with a piece of muslin, which is glued to the tray, and acts as a hinge. The tray is then covered with material similar to that with which the trunk is lined. Small straps and buttons are fastened to the lid and tray, respectively, to keep the lid from opening.

The painting of the trunk, and the necessary instructions for constructing the wardrobe trunk, will be discussed in the concluding article, to appear in the March number.

Roofing Paper as a Stucco Substitute

In parts of the country where the winter climate is not so rigorous as in the North, gravel-surfaced roofing paper may be used in place of cement stucco for the exterior finish of dwelling houses, particularly if the half-timbered style of architecture is used.

The paper is applied to the walls, gravel side out, before the strips which break the wall up into panels are added. The panels should be arranged so that the joints will come underneath the strips, which will thus effectively hide the unsightly junctions. The paper must be stretched tightly to prevent wrinkles, which would expose the trick. As the roofing paper is of standard width, it will be necessary to proportion the panels to conform to the width of the paper. Because of the ever-present odor of naphthalene, which is objectionable to all forms of vermin, although not sufficiently perceptible to be annoying to humans, no vermin will lodge under the paper.

Such a covering, applied over the sheathing of the building, is waterproof, and in warm climates, or where the temperature falls little, if any, below the freezing point, is as satisfactory and as attractive in appearance as stucco.

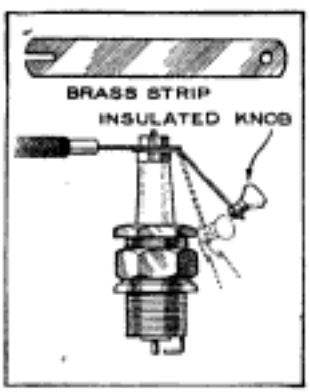
Pistol Shoots Phonograph-Needle Darts

It is generally recognized that "teaching the young idea how to shoot" is dangerous for the neighbors' pet cats, window glass, and other animate and inanimate objects, but given a "gat" of the kind shown in the drawing, the youngster's ability to do harm is reduced to a minimum.

The gun is made from a piece of soft wood after the pattern of an automatic pistol, as shown in the drawing. The design is traced on the wood and cut out with a scrollsaw. The piece is then placed in a vise, muzzle up, and the barrel is drilled out with a ¼-in. drill. An opening is cut in the underside of the gun with a chisel, to take the trigger; this is made from a piece of a steel, or whalebone, corset stay, about 4⅜ in. long, which is fastened to the stock with staples in the manner indicated. The darts are made from a 1½-in. length of round dowel, small enough to slip into the barrel without sticking. A phonograph needle inserted into the end of the dart, as shown, will cause it to stick in the target.—Walter Thompson, Brooklyn, N. Y.

An Individual Spark-Plug Tester

A spark-plug tester that is applied to the separate plugs as shown in the drawing, eliminates the necessity of rooting around in the tool box for the screwdriver, the instrument commonly used for the purpose. The tester is made from spring brass, as shown. One end is provided with a terminal for attachment underneath the binding nut on the plug, and on the other end is an insulated knob. When not in use the knob is held away from the plug, but when it is desired to make a test, the end of the brass strip is pressed against the plug to be tested. By short-circuiting the plugs, the missing one can be located and removed, and the tester placed on the new one.—Orene Cathcart, Winfield, Kan.



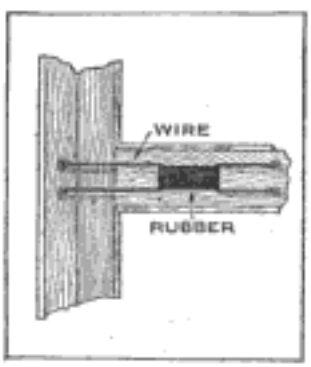
Drawer with Wire-Mesh Bottom Keeps Potato Bin Clean

A bin or drawer, in which potatoes are kept, has to be cleaned out periodically, to remove the accumulated dirt from the tubers. In order to keep his potato bin clean without the necessity of emptying it of the tubers or removing the bin from the built-in fixture, one home builder has arranged a very simple plan.

Below the bin that contains the potatoes is a shallow drawer, the potato bin itself having a bottom made from a piece of heavy wire mesh, held in place by a frame on the inside of the bin, at the bottom. As the potatoes are dumped into the bin the dirt drops through the wire into the shallow drawer underneath, which is easily emptied.—Chas. A. Goddard, Los Angeles, Calif.

A Substitute for a Door Spring

The drawing shows how an ordinary rubber band, plus some stiff wire and four screweyes, can be made to take the place of a door spring, which is not always available. As indicated, two U-shaped pieces of stiff wire are linked together by the rubber band, the device being attached to the door by inserting the projecting hooked ends of the wires into small screweyes at properly spaced intervals.



The Camera as a Range Finder

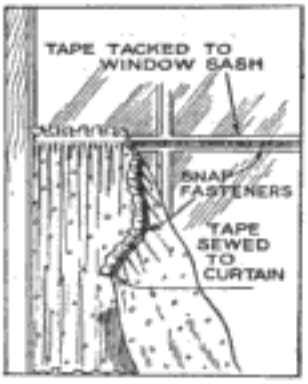
Few camera enthusiasts appreciate the fact that in a camera they possess a range finder of great simplicity, provided that the object photographed is more than 100 ft. from the lens, and that the object is of known length or height.

So long as the object photographed is more than 100 ft. distant, it is an experimental fact that the size of the object, O, is to its distance, X, from the camera, as the size of the image, I, is to its distance from a certain point in the lens combina-

tion, K; that is, O:X::I:K. The latter quantity may be called the lens constant, and its value may be determined once and for all from a known value of X, greater than 100 ft., and for known values of O and I. For example, in one camera, a photograph taken of an object 100 ft. in length, and 300 ft. distant from the camera, shows an image length of 2 in. (⅙ ft.) in the photograph. Whence 100:300::⅙:K. This indicates that for this camera the lens constant is ½. Then the distance in feet of any object photographed may be obtained by dividing the actual size of the object by that of its image and multiplying the result by the constant ½. That is, if one is photographing a mountain whose height is known, say 3,200 ft. above the floor of a valley, and the height of the mountain in the image is 2$\frac{3}{16}$ in., or .192 ft., then the distance of the object is found by dividing 3,200 by .192 and multiplying the result by ½, which yields 8,333 ft., the distance of the mountain from the camera.—L. Pyle, St. Louis, Mo.

Novel Method of Hanging Window Curtains

A method of hanging window curtains, which is at once novel and very satisfactory, is shown in the drawing.



A length of cotton tape, long enough to reach across the window, has small dress fasteners sewed to it every 3 in. This is fastened permanently to the window, either by tacking it to the top of the sash, or by stretching it from one side of the frame to the other. A similar length of tape, having the other halves of the fasteners fitted to it, is sewed to the curtain. The curtains can be quickly put in place by means of the fasteners, and as quickly removed for laundering.—T. W. Benson, Philadelphia, Pa.

Removing Splinters

To remove splinters from the hand, take an ordinary needle and press the eye over the part so that the projecting end of the sliver will stick through the eye of the needle. Then turn the needle so that the splinter will be caught in the eye, and withdraw it.

Fenders for Small Boats Made from Old Life Preservers

Very good fenders for small boats can be made from old life preservers. Remove

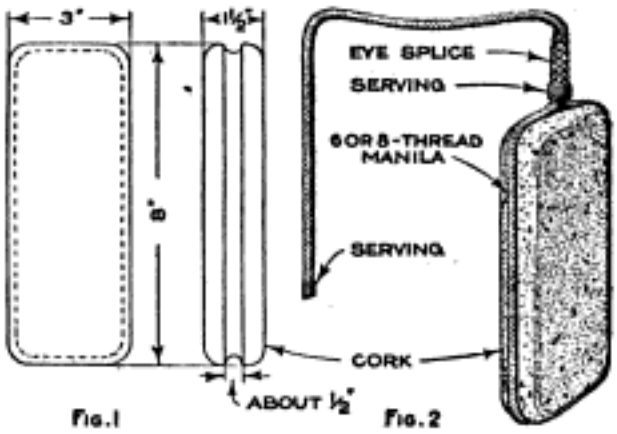


Fig. 1 Fig. 2

An Old Life Preserver will Make a Full Set of Fenders for an Ordinary Motorboat; Such Fenders Are Neat in Appearance and Low in Cost

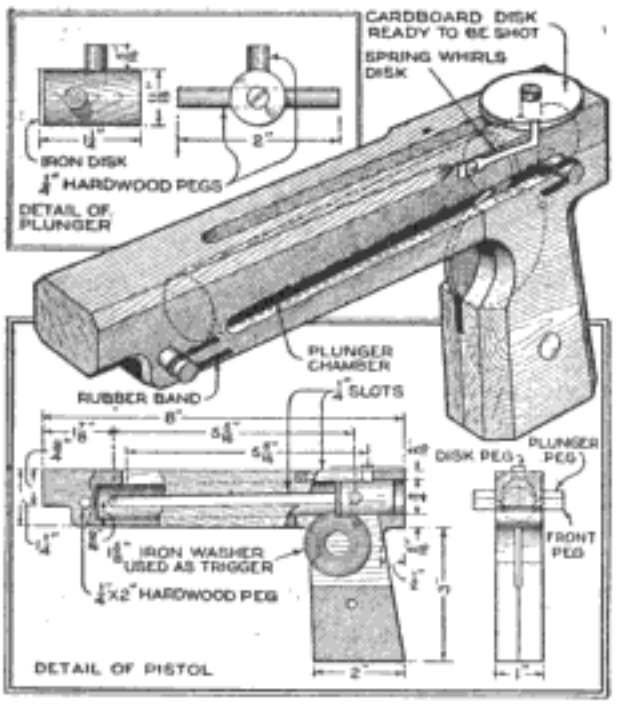
the old canvas from the blocks of cork, and with a fine-toothed saw, or sharp knife, smooth off the blocks on all sides so as to leave the finished block about 1½ by 3 by 8 in. With a sharp gouge, about ½ in. wide, cut a groove all around the block, as shown in Fig. 1, and round off the corners. A piece of 6 or 8-thread Manila rope, with an eye splice worked in one end large enough to pass around the block and fit in the groove, as in Fig. 2, is used for holding the blocks; a small serving of well-waxed sail twine, just below the splice, will hold the rope tight in the groove. The fender should be given at least two coats of paint or varnish, to correspond with the finish of the boat. An old life preserver will make a complete set of fenders for a small boat at insignificant expense.—J. A. Stevens, E. Boothbay, Me.

A Chemical Hot-Water Bottle

Sodium acetate and sodium hyposulphite are mixed together in the proportion of one part of the former to nine of the latter and placed in an earthenware receptacle with a tight-fitting cover, or stopper. The vessel is filled about three-quarters full of the chemicals, and the stopper, or cover, is applied; it is then placed in hot water until, on shaking, it is evident the salts have melted. It will be found that such a bottle will retain its warmth for about 12 hours. When the bottle begins to cool, its heat can be renewed by a vigorous shaking, enabling it to be used for a further period.

Pistol That Shoots Cardboard Disks

Any handy boy with a few tools can turn out the handsome toy pistol shown



Almost Anyone with a Few Tools can Turn Out This Handsome Toy Pistol; It Shoots Cardboard Disks and Is Entirely Safe and Harmless

in the drawing; this pistol uses cardboard disks for ammunition and is quite safe and harmless.

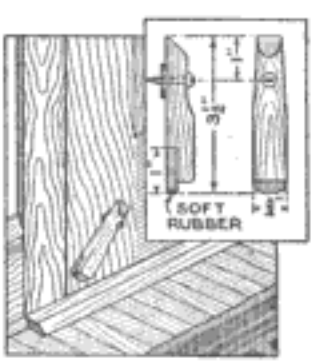
The wood parts should be made of well-seasoned hardwood, a block 1 by 5 by 10 in. being required. After dressing down all sides of the block smoothly, the outline of the gun is laid out; the block is placed in a vise, and the plunger chamber bored with a downward slant toward the muzzle, as shown. When the plunger chamber has been completed, the slots shown in the sides are cut out parallel with the center of the chamber; a similar slot is cut in the top of the gun. The slots completed, a hole is drilled through the block, in front of and directly in line with the center of the side slots, for the wooden peg which holds the rubber bands, as indicated. At this stage the gun is sawed from the block with a sharp fine-toothed saw. A compass saw and a sharp knife will be required to cut out the slot that accommodates the trigger, the latter simply consisting of an iron washer provided with a notch to engage the plunger and drilled with a bearing hole, as shown.

The plunger is made from a piece of round wood; it is first drilled for the pegs, as shown, then finished to make an easy fit inside the chamber, and a small metal washer is attached to the front end to take the wear of the trigger. Three hardwood pegs, each about 2 in. long, are provided; one of these is glued into the hole provided at the front of the gun, and the others are glued into the plunger after it has been placed in its chamber. The vertical plunger peg will be found much longer than necessary and should be cut off flush with the top of the gun when the plunger is at rest at the forward end of the chamber. When pulled back toward the trigger, this peg will project above the surface sufficiently to allow a cardboard disk to be placed over it. The small flat spring, shown attached at one side, presses lightly against the disk and gives it a whirling motion. As shown, the trigger is held in place by a small screw or nail, and some little patience will probably be required to get it into the proper position to engage with the plunger. For the sake of appearance, a small cap of wood is glued over the open end of the plunger chamber, and the gun is ready to be finished as desired. Rubber bands are attached to the pegs of the plunger and the one at the front of the gun, as shown in the drawing, and, as the power of the toy is determined by the bands used, the tension should be, as nearly as possible, the same on both sides.

When cocking the gun, slant the barrel downward so the trigger will swing into position of its own weight. The cardboard disks used for ammunition should be slightly more than 1 in. in diameter, with a hole at the center to fit over the vertical peg of the plunger.—A. L. Long, Springfield, Ill.

An Efficient Doorstop

The drawing shows an efficient device for holding a door open that is easily made from a piece of an old broom handle. This is cut and shaped to the appearance indicated, and a recess is formed on the inner edge of the wood, in which a piece of soft rubber is inserted, as shown. The stop is attached to the bottom of the door by a single screw, with a washer between it and the door, to prevent disfiguring the finish of the latter. A slight pressure of the foot is sufficient to operate the stop.

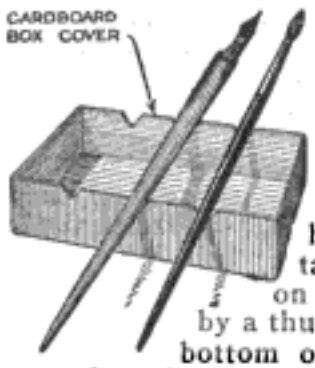


Electric Iron Aids in Starting Auto

An ordinary electric flatiron can be used as an aid in cold-weather starting, by setting it on a suitable support, such as a tin can, on the carburetor side of the engine, with the hood closed and the radiator covered. If the garage-lighting system is connected to the house, it is only necessary to turn on the current an hour or so before the car is to be used, and the carburetor and surrounding parts will be sufficiently warmed up to enable the engine to be started without difficulty.

Penholder for Slanting Surfaces

A convenient holder for pens and brushes when used on a slanting surface, such as a drawing board, is made by cutting V-shaped grooves in the opposite sides of a small pasteboard box, as shown in the drawing. The holder may be attached at any place on the board, or table, by a thumbtack through the bottom of the box. By the use of such an arrangement, the most commonly used pens and brushes may be kept conveniently accessible and without danger of their rolling over the surface of a drawing. The box itself can be used for holding such small articles as thumbtacks, pens, etc., or as an ash tray.

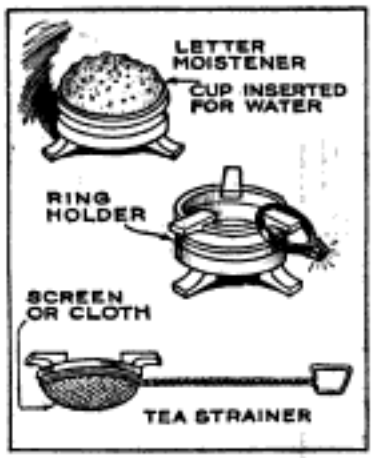


Lawn Mower for Cutting Feed

The lawn mower may be used to advantage for chopping clover or straw for the chickens. It is attached to a box by two small iron screw clamps, in the position shown in the illustration. The cutter blade should rest flush with the top of the box, and it may be necessary to sink it in, to feed the loose hay properly to the mower. The crank is attached to one of the drivewheels by means of ¼-in. bolts. The handle is fastened to the floor.

Utilizing Old Gas-Mantle Bases

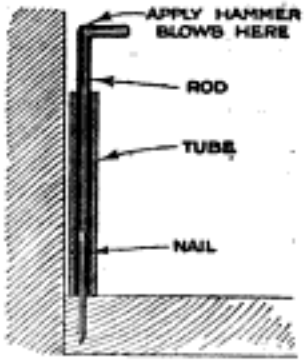
The present-day tendency of reclaiming all forms of scrap may be applied in the home, just as well as in the workshop, and, as the illustration shows, even such unlikely material as gas-mantle bases may be made into something useful, as well as ornamental.



No description of these devices is necessary; suffice it merely to say that the objects illustrate only a few of the many uses to which these hitherto despised articles may be applied.

Nail Driver Assists the Amateur

A handy little addition to the amateur's equipment is made from a piece of thin metal tubing and a piece of iron rod, as shown in the drawing, for driving nails in tight corners. The rod is filed flat on the bottom, and is heated and bent at the top to form a handle. To use this device the tube is set over the place where the nail is to be driven, and the nail is dropped into it, point down; the rod is inserted, and the hammer blows are applied to the top of the rod instead of the nail. This little tool will be found particularly valuable when working close against finished surfaces.

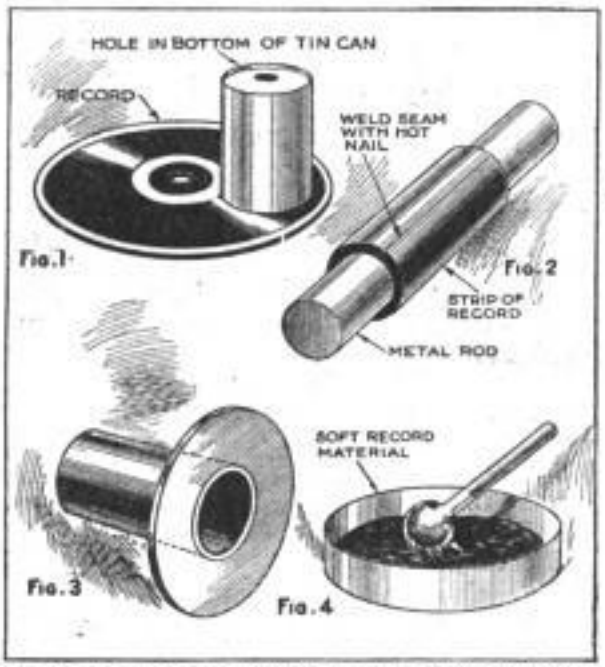


Corset-Steel Handle for Handbag

An old corset steel makes a good handle for a woman's handbag. The steel rib is covered with a suitable gimp, and the ends are sewed inside the mouth of the bag. The tendency of the steel, which is bent into an arc, to straighten itself, keeps the mouth of the bag taut, and there is no need of using a stay of any kind.—Amelia P. McDonald, Woods Cross, Utah.

How to Work Old Phonograph Records into Useful Articles

Old phonograph records provide a cheap and satisfactory insulating material



By Applying Heat and Working the Material While Hot, Old Phonograph Records Provide a Cheap and Satisfactory Insulating Material for the Amateur Electrician

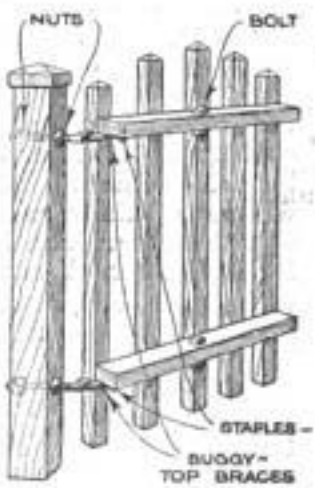
that is readily formed into almost any shape by the application of heat. Disks are cut by pressing a tin can, or piece of tubing, that has been heated almost red-hot, against the record, as shown in Fig. 1. If a tin can is used, a hole is cut in the bottom so that the disk can be pushed out before it has a chance to "freeze" to the inside of the can. As shown in Fig. 2, a tube, or bushing, can be made by heating a strip of the record and forming it around a rod, or tube, of the desired diameter. If the strip is too long, the surplus is cut off with scissors, while warm; it cuts clean and sharp. Bring the edges close together and pass a hot nail, or other piece of heated metal, over the joint to weld the seam. Figure 3 shows a flanged bushing, the joint being welded as described. A little practice is required to make these joints, but the work is easily done. A very neat head can be made for a screw by melting some pieces of old record in the cover of a can. Do not try to heat it too much; when the material is soft enough to gather on the head of the screw, it is sufficiently warm. Roll the screw around until a lump of sufficient size has been collected, as in Fig. 4, and form it with the fingers, pressing it tightly around the screw head, to make a good connection. While still soft, the head may be pressed into a mold, which may be simply a smoothly bored hole in a piece of wood, or the material may be allowed to cool and afterward finished with sandpaper.—Howard Greene, New York, N. Y.

Cleaning Out Stovepipes

One of the quickest and most effective methods of cleaning the interior of stovepipes after they have been taken down for the summer, or when the stove refuses to draw, consists in drawing a small bush or bough through the separate sections. The bush, or branch of a tree, whichever is used, should have as many small twigs as possible. After it has been inserted into one end of the pipe the improvised brush is pulled through from the opposite end.—George G. McVicker, North Bend, Neb.

Hinges from Buggy-Top Braces

Just as the packers utilize everything but the grunt of the pig, the mechanically inclined farmer finds some practical application for every usable bit of metal, as witness the substantial pair of gate hinges made from the braces of an old buggy top. The braces are cut to the length desired and attached to the underside of the gate stringers. The ends of the braces, which fit into holes drilled through the gatepost, should be heated, rounded off, and provided with threads for a nut on each side of the post.—C. A. Black, Jr., Hightstown, N. J.

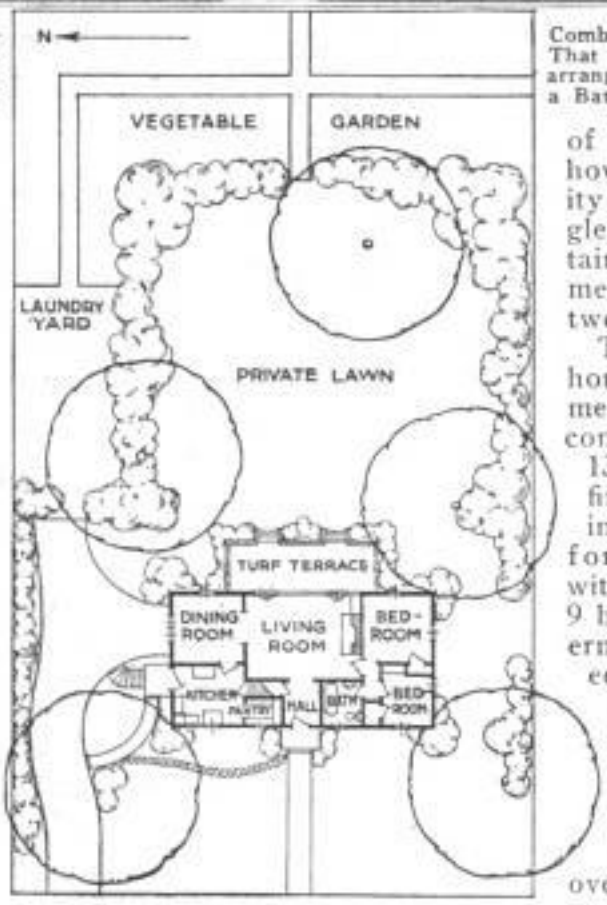


Sprayer for House Plants

As house plants are likely to be injured by pouring a solid stream of water over them, it is best to use some form of sprinkler and apply the water in a fine spray. A suitable sprinkler is made by cutting a series of V-shaped notches around a cork and inserting it into a bottle that has been filled with water. The bottle can also be used for sprinkling clothes in preparation for ironing.

TWO ARMY HUTS MAKE ONE ATTRACTIVE HOME

A Pleasing Bungalow Made by Combining Two of the Rude
20 by 20-Foot Officers' Huts That are Often Sold at Gov-
ernment Cantonments: The Re arranged Interior Contains Five
Comfortable Rooms. a Bath, and a Hall

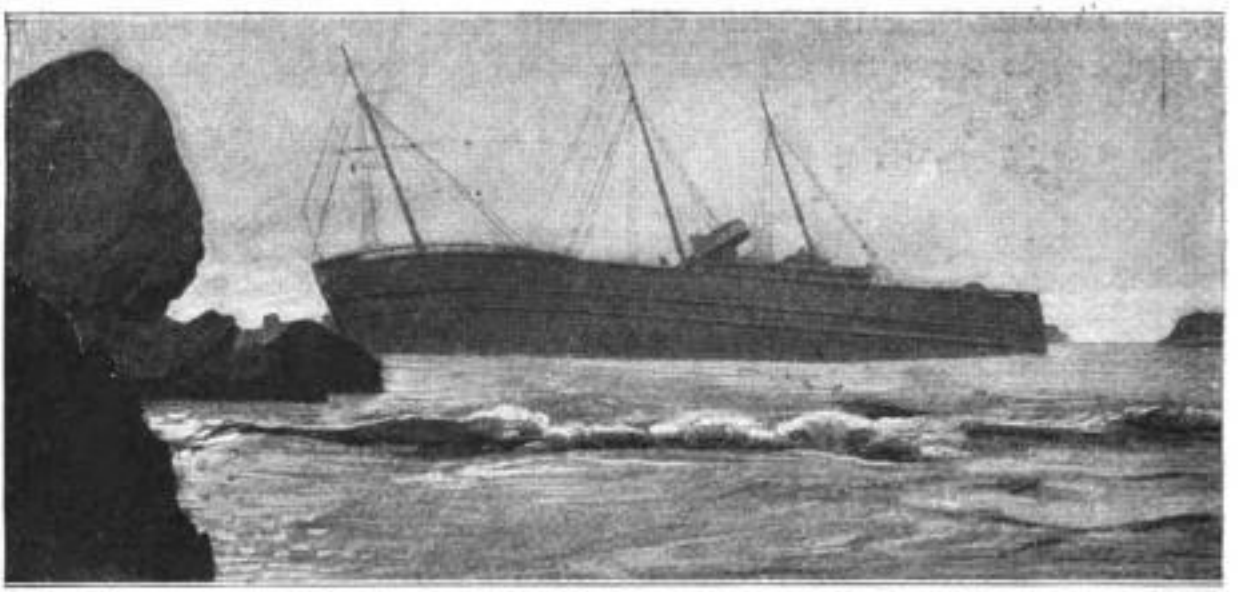


The Floor Plan of the Improvised Bungalow, and a Suggestion for Landscaping the Yard

IN times like the present, when there are more families to be housed than there are homes for rent, the fortunate possessor of a degree of inventive ability sometimes is able to solve the problem in a way that is not only economical, but decidedly pleasing. How interesting a result may be achieved with little to work on, has been strikingly demonstrated in a western state, where one of the government's cantonments was located.

This camp has a number of 20 by 20-ft. officers' huts—rough, unpainted cabins sheathed with perpendicular battens outside, wainscoted up 4 ft. and wallboarded above inside, and having seven single-sash windows and one door. These little houses, with their 7,000 to 8,000 ft. of lumber, have sold in some instances as low as $65 or $75. But while one of them might serve as a shelter, they wholly lack the attractiveness necessary in a real home, however humble. It is the purpose of this article to show how the esthetic quality lacking in a single hut has been attained in complete measure by combining two of them.

The substantial house thus obtained, measuring 20 by 40 ft., contains a living room, 13 by 18 ft., with a fireplace, a good dining room, two comfortable bedrooms with closets, a kitchen, 9 by 10¼ ft., of modern arrangement and equipment, a bath, and a hall. The outside is finished with 8-in. siding and a coat of white paint. There is a little portico over the front door, green shutters at the windows, and an inviting turf terrace reached from the living room through French doors. In the basement, there is plenty of room for a laundry, a storeroom, a furnace room, and even a stall for a small car, entered by an inclined drive. The entire cost of this effective remodeling was about $1,500—certainly a reasonable price for a desirable bungalow.



STEAMER WRECKED OFF OREGON COAST IS IMPRISONED IN ROCKS

IT is a strange fortuity that can carry the storm-driven wreck of a big steamer through rocky passes that no helmsman would attempt, and finally maroon it upon a sandy beach, within a practically impregnable circle of pinnacled rocks. During a terrific storm that recently swept the Oregon coast, the ship "Joan of Arc," driven 15 miles off its course, crashed upon a reef near Port Orford, and then, helpless, was washed into a rock-bound basin where even the rescue tugs could not reach it. Finally a little passenger boat, the "City of Topeka," felt its way gingerly among the menacing points of rock, was perilously brought within 25 yd. of the derelict, and successfully took off the 28 members of the crew and two women, the wives of the captain and first engineer.

OPPORTUNE ANNOUNCEMENTS

Whenever prize competitions mentioned on this page are conducted by a public institution, the name and address will appear with the announcement. Industrial addresses will not be published, but may be obtained from our Bureau of Information by request, mentioning the title of the article and date of publication.—Editor.

PRACTICAL IDEAS OF INVENTORS WELCOMED BY WAR DEPARTMENT

Inventors who can produce improvements of real military value have an unusual opportunity in the present policy of the War Department, which not only welcomes the submission of such ideas, but assures their protection during the period of investigation. While no preliminary agreements are made as to the acquisition of rights, and the department assumes no obligation for submitted inventions, all information is regarded as confidential, and close attention is given to all claims. Exhaustive investigation and tests are made of such ideas as appear meritorious, and rejected descriptions and models are returned to their senders. Acceptance of an invention is followed by an equitable award of recompense to the inventor.

ITALIAN PRIZES FOR SCIENTISTS COVER EIGHT-YEAR PERIOD

Whatever two scientific accomplishments, completed during the two four-year periods of 1914 to 1918 and 1918 to 1922, are regarded by the Accademia delle Scienze, of Turin, Italy, as most important or useful, are to be rewarded with prizes of the nominal value of $1,737 each. The Bressa prize is normally a quadrennial event, and has been awarded 20 times, without regard to national factors. Physical or experimental science, natural history, applied mathematics, chemistry, geology, history, geography, statistics, and physiology or pathology are included in the broad list of eligible subjects, and the prizes are awarded whether the achievement has been offered in competition or not.

GASOLINE FROM WRECKED TRAINS IS MENACE TO SALVAGERS

Not the least remarkable feature of the story told in this magazine last November, concerning a train wreck that provided many Oregon motorists with free fuel, was the fact that no explosion or fire resulted from the unauthorized salvage. In a similar recent accident, where three gasoline tank cars were derailed and two of them broken open, a lighted lantern, held by an amateur salvager near the dome of a tank, caused an explosion that cost the lives of three men and destroyed over $7,000 worth of property. It is an interesting fact that sporadic fires on the site of the wreck, ignited by lanterns and passing locomotives, continued for three days. The official Bureau of Explosives, ever alert to safeguard the transportation of dangerous commodities, points out that the regulations drawn to cover such cases, providing for barring unauthorized persons from the vicinity and for covering exposed gasoline with earth, obviously were not obeyed in either of these instances.

INDUSTRIAL-ART DISPLAY IS MADE PERMANENT BRITISH FEATURE

Beauty of design as a commercial asset is featured in a permanent display recently established in London by the British Institute of Industrial Art. Trades and crafts originating productions of artistic merit will be able now to place them on exhibition in a collection that will grow in value from year to year. The institute will take part in the British Industries Fair to be held beginning February 19, this year, displaying selected specimens of ceramics, textiles, metal work, jewelry, and other art products of interest to foreign buyers. It is the purpose of the organization to emphasize the interrelation of art, industry, and education, and ultimately to extend its operations to include exhibitions in various cities of Great Britain and its colonies.

¶The Club Nautico Belgrano, of Buenos Aires, Argentina, has decided to buy in North America a number of 22-ft. shallow-draft sailboats for regatta purposes. Naval constructors and architects in a position to furnish designs, plans, models, and prices of craft of this type, as well as manufacturers and dealers in marine fittings, hardware, and sails, for motorboats and yachts, are invited to communicate with the organization through its secretary. Communications should be addressed as follows: Secretario, Club Nautico Belgrano, Rawson 229, Buenos Aires, R. A.