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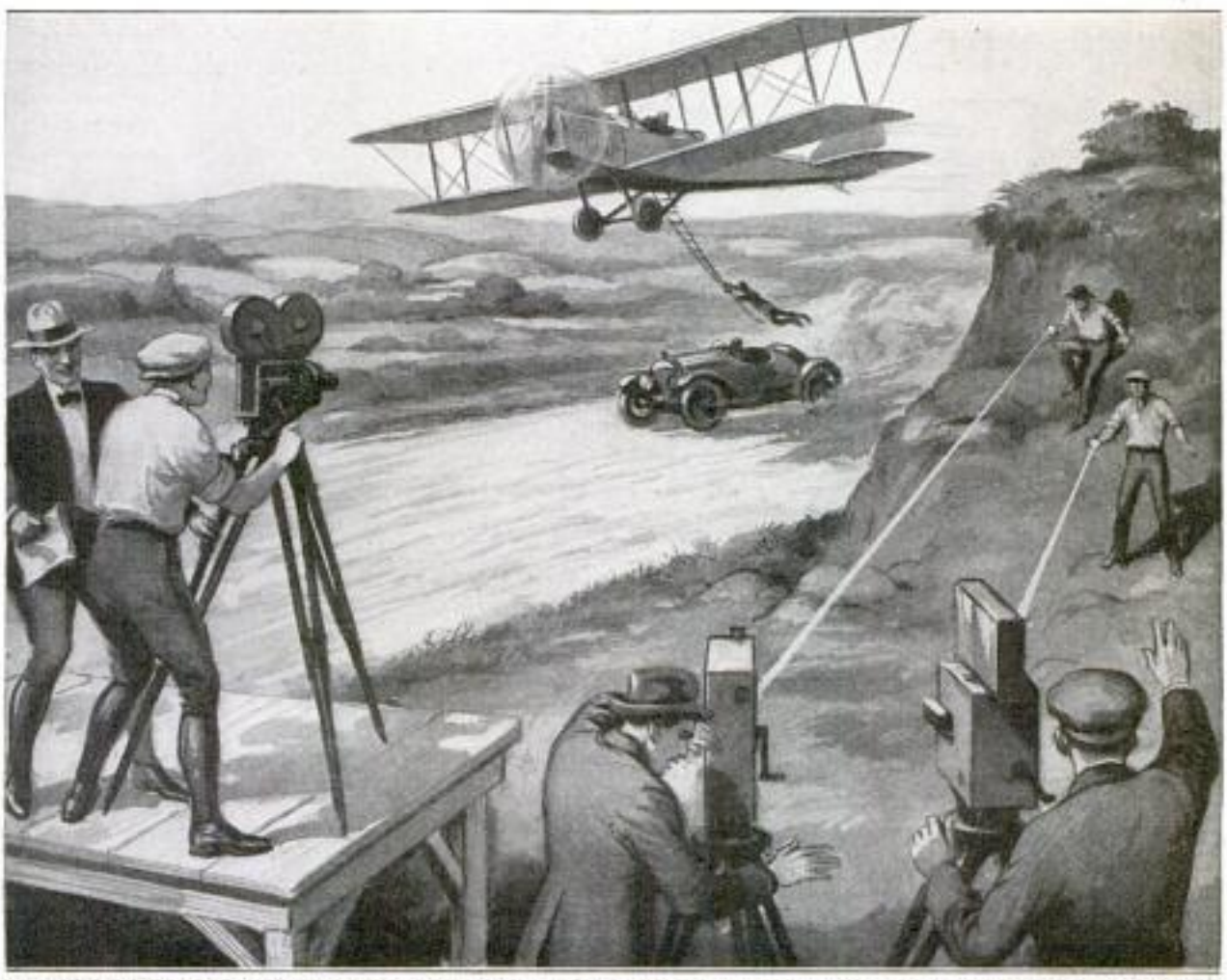
Vol. 36 AUGUST, 1921 No. 2

Fighting Pirate Movie Men with Mirrors

BY JOHN EDWIN HOGG

DURING the staging of motion-picture thrillers the various established film producers have been greatly annoyed by motion-picture news men. Often after some company has spent thousands of dollars in the preparation of such scenes the news pictorial men would appear on the job to make a piratical news picture incursion upon the work which the legitimate producer has taken weeks of painstaking and expensive effort to prepare. An example of this occurred recently when a well-known film company spent something like $25,000 in the preparation of a scene to be part of a motion-picture production which called for an airplane flight from the roof of a down-town office building. About the time the scene was ready for "shooting," no less than half a dozen news pictorial camera men appeared on the roofs of near-by buildings, and filmed, without one cent of expense to themselves or their companies, the work which the legitimate producer had spent weeks and a small fortune to prepare. In this particular instance, however, the producer of the airplane-flight scene secured an injunction from the courts to restrain the news camera men from releasing the films they had taken.



The Two Men on the Bluff are Flashing Sunbeams into the Lenses of the Two Cameras Below. A Motion-Picture Producer Took This Means Recently of Ridding Himself of a Couple of Camera Fiends Who were in the Habit of Stealing His Material. All the Two Pirates Got Was Several Feet of Badly Overexposed Film

In other instances such motion-picture thrillers have been purloined by the news camera men, and released nationally many weeks before the completion of the picture of which that particular scene was to be a part. Obviously, such theft of a film producer's efforts seriously impairs the value of his production.

After being exasperated almost beyond endurance by such activities, a noted film producer recently developed the reflection-mirror method of eliminating the annoyance. It is far more effective than violence, police assistance, or court injunctions. This producer recently spent several weeks, and thousands of dollars, preparing a particular scene, and when he went to film it he found no less than six pirate news cameras on the job just as he had anticipated. This time he was prepared for them. As many of his assistants as there were pirate cameras were on the scene with small hand mirrors. The pirate camera men were not requested to leave, and no attention whatever was paid to them. When the scene was ready for "shooting," however, the men with the mirrors were ready. As the director called "Action! Camera," the men with the mirrors directed beams of reflected sunlight directly into the lenses of the pirate cameras. The reflected light in their lenses precluded the possibility of their filming the picture. Several of the pirate camera men went on cranking before they discovered the beam of reflected light in their lenses. All they got was a piece of badly overexposed film streaked with frightful light halations. Those who observed the mirrors and beams of reflected light simply picked up their cameras and tripods and marched away knowing that they were outwitted and that they might as well admit it.

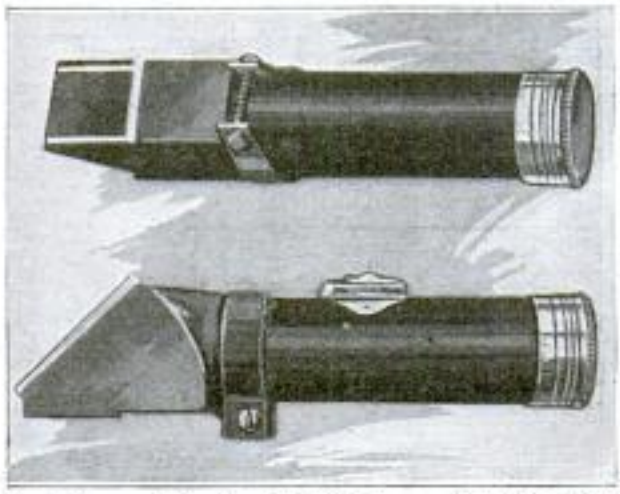
SINGERS' FACES ILLUMINATED BY BOUQUET SPOTLIGHT

A "hand spotlight," designed to be concealed in a bouquet carried by a singer, and to illuminate the face from a concealed source during the progress of a vaudeville song, has been introduced in the West. The idea of illuminating the face in some such manner has been tried before with an electric flashlight, but has been unsuccessful because the sharp angle of light throws deep and unnatural shadows into the face.

Reading from Left to Right: The Singer in the Stage Spotlight Which She Intensifies on Her Face by Use of the Spotlight Concealed in Her Bouquet; a View from behind the Singer Showing the Device in Her Bouquet; a View of the Singer on a Darkened Stage, Illuminating Her Face with the Hand Spotlight

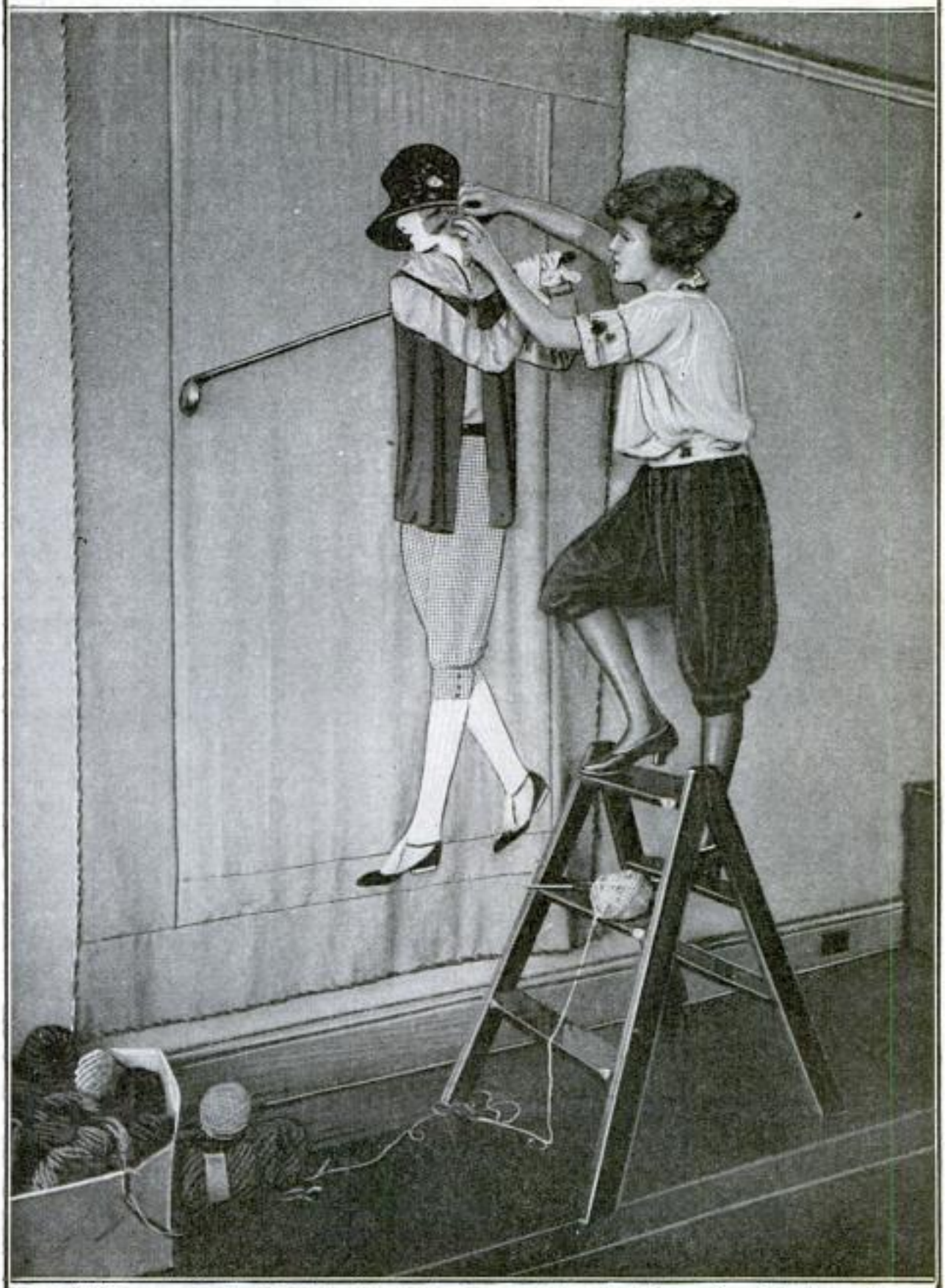
The hand spotlight employs an ordinary electric flashlight for its source of illumination, but undertakes to so throw the light, by a system of reflection, as to do away with these unnatural shadows. The lamp of the flashlight is inclosed in a metal compartment, at the outer end of which (inside) is a polished metal reflector, set at an angle that catches the light projected forward by the flashlight and deflects it, at the same time spreading and softening it evenly. A recess into which colored slides can be slipped is provided above this, so that any desired color of light can be given.

With the little spotlight thus hidden in a bunch of flowers, the flowers can be held in a natural position, while the reflecting system catches the light and throws it back into the face from well in front, instead of below, as in the case of the flashlight alone. The bouquet can be held at different angles so that various parts of the face and figure are illuminated.



Two Views of the Spotlight Device: Light from the Lamp Inside is Reflected from the Sloping End

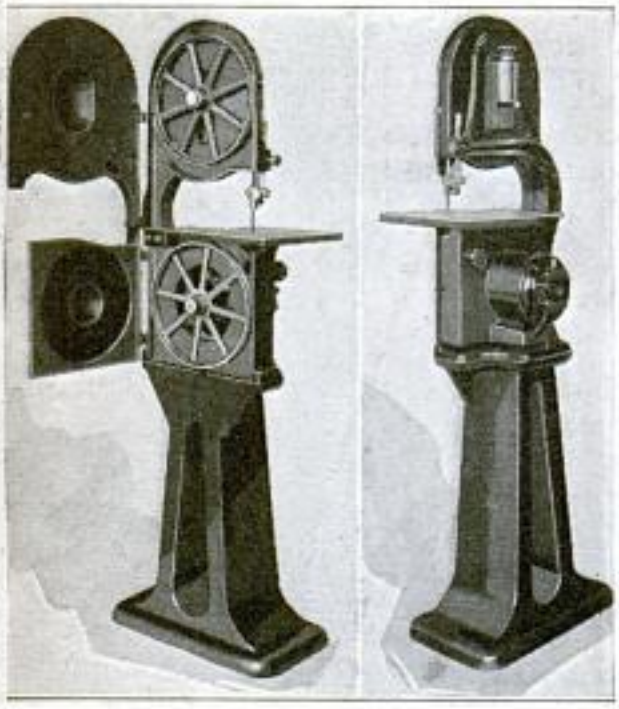
LIFELIKE POSTERS MADE OF PATCHES



PATCH posters, made of odd bits of cloth pinned over a design sketched on a draped background, are the new art advertisements originated by a New York artist. Everything from the rag bag is utilized, and the effect is said to be so realistic that when a figure is finished it can scarcely be distinguished from an original. These novel patchwork manikins are greatly in demand by Fifth Avenue's exclusive shops.

COMPACT BANDSAW BUILT MECHANICALLY PERFECT

Although accommodating only a 12-in. diameter wheel for the carriage of its blade, the late baby bandsaw is mechanically perfect. The base, saw housing and all, when measured from floor to top, comprise a total distance of only 5 ft. Guarded throughout by iron doors, all safety conditions have been considered. A rack and pinion gear with a spring control makes it possible to adjust the saw guide with one hand, leaving the other hand free. The clearance between the guide and the work table is 3¼ in. Power for driving is obtained from a ¼-hp. motor which is fitted with suitable connections for the use of the ordinary light circuit.



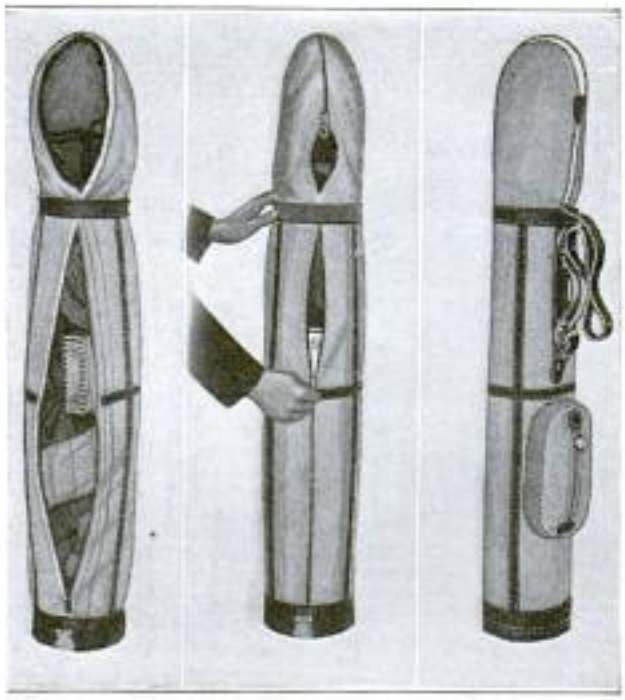
Left: The Machine Open, Showing the Two 12-Inch Pulleys That Run the Bandsaw. Right: The Machine Closed and Showing the Motor That Drives It

NEBRASKA REPEALS TRUCK FREIGHT RATES

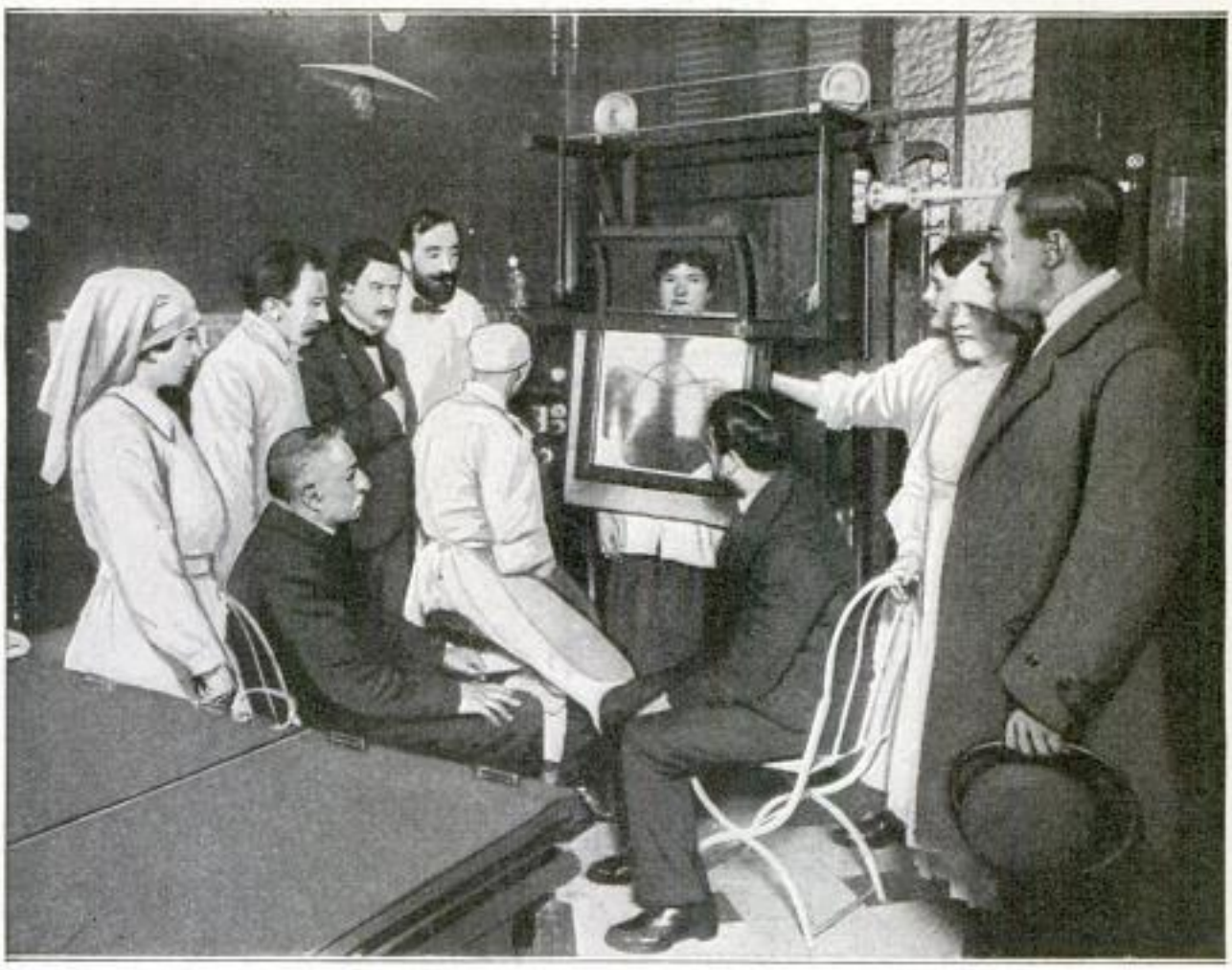
Orders establishing rates for common carriers by trucks on the highways in eastern Nebraska, which were entered May 21, 1919, July 5, 1919, and Nov. 22, 1919, were recently repealed by the State Railway Commission. This action has been taken because the commission is convinced that trucking for hire in more than local service will succeed only when proper attention is paid to the costs of operating trucks and to the promotion of short haul, quick traffic, with return loads properly developed. They claim that when hard-surfaced roads have been constructed and trucking transportation can be had a definite number of days in a year, costs of the business may be ascertained accurately enough upon which to project a rate basis. In the length of time that the authorities have attempted to stabilize the business, not only in the interests of those who risk their capital but in the development of an important arm of transportation service, there has been such a lack of coöperation on the part of concerns as to warrant giving no further consideration to the matter of regulation for protection of the financially interested.

GOLF BAG AND VALISE IN ONE HOLDS CLUBS AND CLOTHING

There is now available a combination golf and traveling bag which, besides carrying a full set of clubs, can be packed with a very complete outfit of clothing such as is needed on the links, in just as good shape as in a valise, instead of having to shove such things down the mouth of the bag, as is so often done with the ordinary golf bag. It should be very useful in interclub trips, or on long golfing tours. There is also a ball pocket large enough to carry two dozen balls. The bag is waterproof, and when packed and closed, can be locked as securely as any traveling bag, and there is one bag to carry instead of two.



Reading from the Left: The Golf Bag Packed with Clubs and Clothing Unclosed; the Bag Partly Closed; Another View of Closed Bag Showing Ball Pocket



A Patient, under Examination of the Phrenoscope, the New French X-Ray Instrument That Gives a View of the Human Diaphragm: The Originator of the Instrument, Seated Beside It, is Explaining How the Movements of the Diaphragm may be Studied for Determining Mental as Well as Physical Tendencies

RADIOSCOPIC EXAMINATION OF MIND AS WELL AS BODY

Its name, "phrenoscope," exactly describes a new French X-ray instrument to those who have a knowledge of the dead languages, for the term is composed of two Greek words meaning a view or survey of the mind or diaphragm, and this is precisely the purpose of the instrument. It makes possible a radioscopic view of any opaque object, and in the case of the human body, enables one to see distinctly the diaphragm—the membrane that separates the chest from the abdomen, dividing thus the body into two compartments. This membrane, although very slender, is muscular, and it vibrates constantly under the action of respiration. It is claimed that these movements of the diaphragm act in unison with the mind, or brain, and therefore a study of the diaphragm in this manner makes possible an analysis that is mental as well as physical. Indeed the French originator of the instrument asserts that he can read the character of any human being, when placed behind the screen of his instrument so that the diaphragm is fully exposed to view. That there is some basis for this assertion has been definitely proved by a number of actual tests that were very successful.

TAIL-SPIN FALL KILLS GIRL FLIER

Military observers who witnessed Miss Laura Bromwell, holder of the loop-the-loop record for women, fall to her death at Mineola Park, L. I., on June 5, declared that the girl's airplane motor stopped abruptly in an upward turn of flight. The machine fell back suddenly in a tail spin, and dropped to a road just outside the park. The girl's lifeless body was disengaged from the wreck. A statement was issued that Miss Bromwell's own machine being out of order, she had borrowed a Canadian plane of a type unsuited to her for exhibition work because of her small stature. Miss Bromwell established the woman's record on May 15, 1921, when she looped the loop 199 times in one hour and twenty minutes.

A CREWLESS BATTLESHIP OPERATED BY RADIO

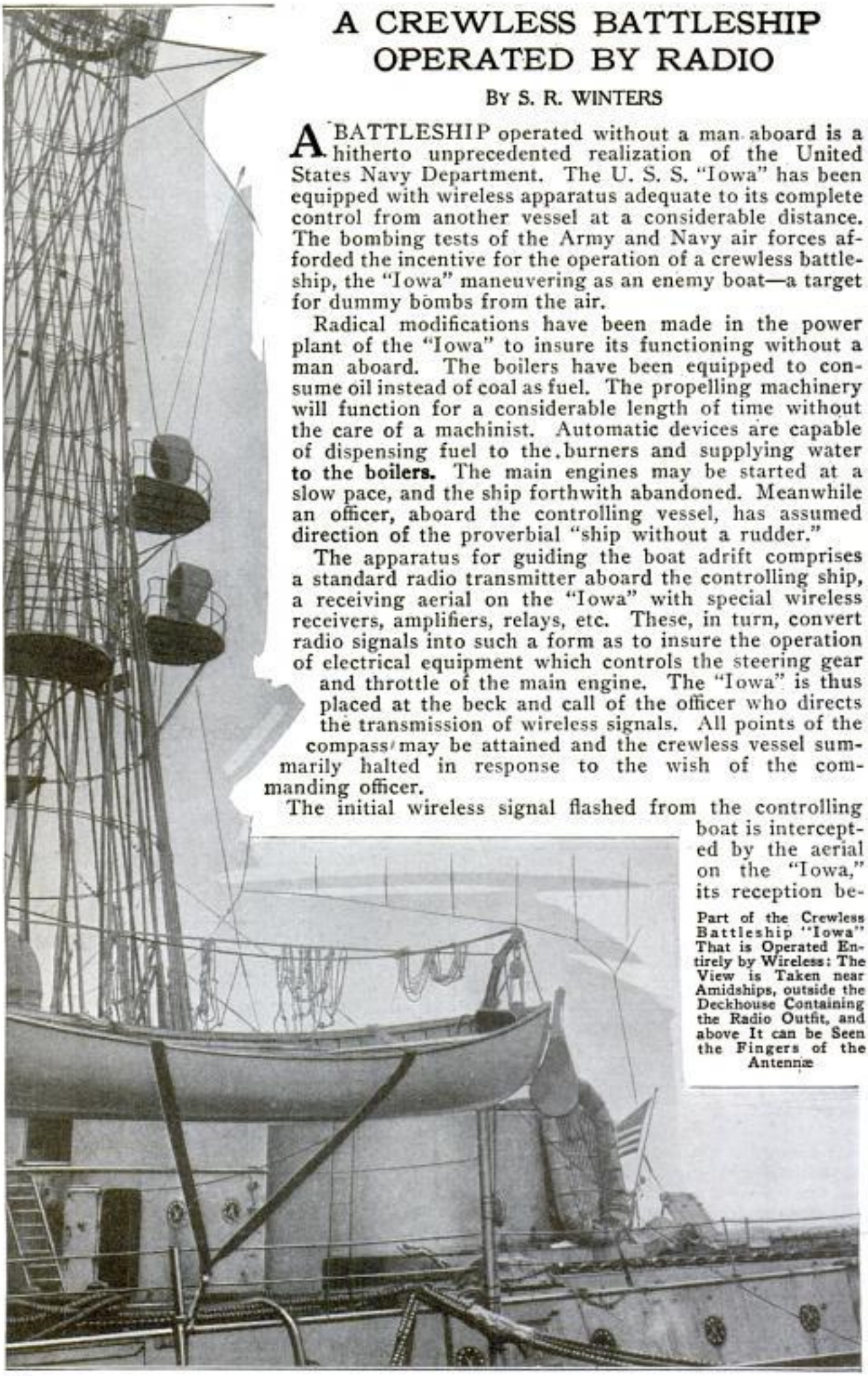
By S. R. WINTERS

A BATTLESHIP operated without a man aboard is a hitherto unprecedented realization of the United States Navy Department. The U. S. S. "Iowa" has been equipped with wireless apparatus adequate to its complete control from another vessel at a considerable distance. The bombing tests of the Army and Navy air forces afforded the incentive for the operation of a crewless battleship, the "Iowa" maneuvering as an enemy boat—a target for dummy bombs from the air.

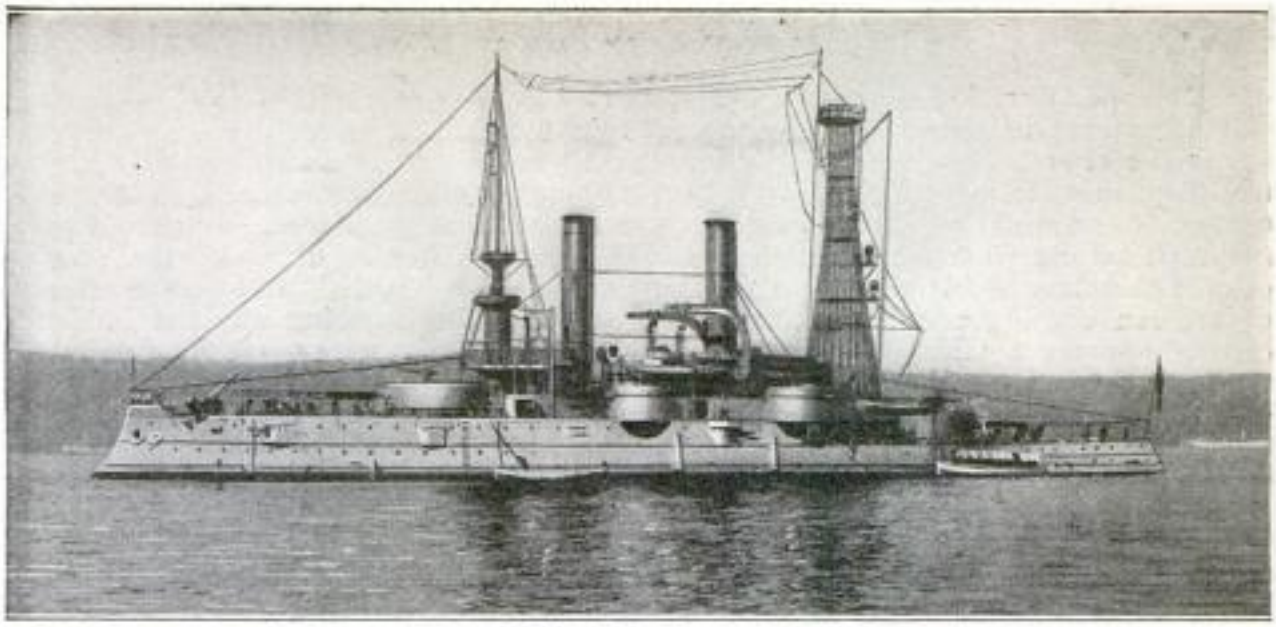
Radical modifications have been made in the power plant of the "Iowa" to insure its functioning without a man aboard. The boilers have been equipped to consume oil instead of coal as fuel. The propelling machinery will function for a considerable length of time without the care of a machinist. Automatic devices are capable of dispensing fuel to the burners and supplying water to the boilers. The main engines may be started at a slow pace, and the ship forthwith abandoned. Meanwhile an officer, aboard the controlling vessel, has assumed direction of the proverbial "ship without a rudder."

The apparatus for guiding the boat adrift comprises a standard radio transmitter aboard the controlling ship, a receiving aerial on the "Iowa" with special wireless receivers, amplifiers, relays, etc. These, in turn, convert radio signals into such a form as to insure the operation of electrical equipment which controls the steering gear and throttle of the main engine. The "Iowa" is thus placed at the beck and call of the officer who directs the transmission of wireless signals. All points of the compass may be attained and the crewless vessel summarily halted in response to the wish of the commanding officer.

The initial wireless signal flashed from the controlling boat is intercepted by the aerial on the "Iowa," its reception be-



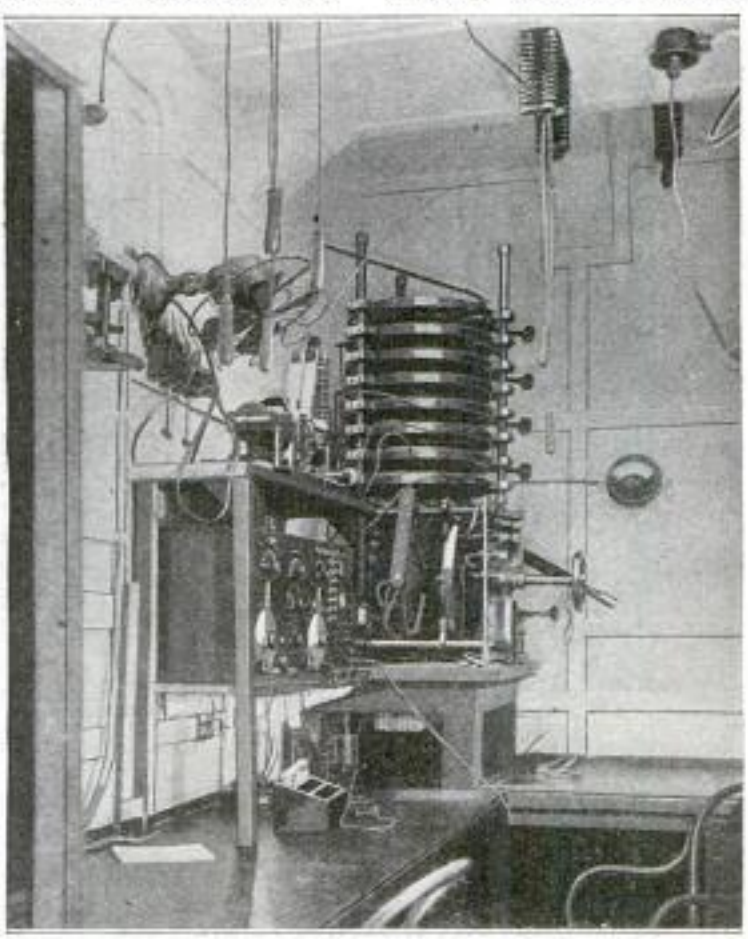
Part of the Crewless Battleship "Iowa" That is Operated Entirely by Wireless: The View is Taken near Amidships, outside the Deckhouse Containing the Radio Outfit, and above It can be Seen the Fingers of the Antennæ



The Crewless Battleship "Iowa" That was Fitted to be Steered, and Controlled in Every Way, by Wireless Apparatus Operated from Another Ship: The Main Purpose of Equipping the "Iowa" in This Manner Was to Use It as a Target Ship for Experimenting with Air Bombs, Which would have been Dangerous with Men Aboard

ing acknowledged by the radio receiver situated well below the deck. The signal is amplified by vacuum-tube amplifiers which operate an extremely sensitive relay or switch which in turn gives impetus to a larger relay. The latter closes an electrical circuit which operates an electrically controlled pneumatic valve. When this valve opens, compressed air is admitted to the throttle control of the main engines. The subsequent opening of this throttle speeds the ship to its maximum capacity.

The large relay referred to in the preceding paragraph likewise gives momentum to a device described as a commutator—the steering mechanism. The guiding gear embraces a standard steam-engine-driven rudder, the throttle valve of this engine being geared to an electric motor. The operation of this unit is thus capably effected, the electric motor in turn being responsible for the steam engine driving the rudder to either starboard or port as needs may dictate. A gyro-compass, electrically connected to the control panel of the electric motor on the steering gear, provides a means of automatic steering.



View inside the Deckhouse Where is Installed the Radio Equipment by Means of Which the Battleship "Iowa," When Entirely without Any Crew Aboard, is Steered and Controlled from Another Ship Some Distance Away

The commutator has been called the "mechanical brains" of the manless battleship. The scope of its activities is quite as varied as are the responsibilities imposed. Radio signals are received, interpreted, and conveyed directly to the electric motor controlling the steering engine by the commutator. The latter duty is hedged by the proviso that the order be either starboard or port; otherwise, the gyro-compass is given control. The "Iowa" may be halted by the transmission of a signal

of ten seconds' duration. Such a prolonged warning serves to operate a relay which opens the circuit on an electrically controlled pneumatic valve. Forthwith, fuel oil and water are taboo, the power plant suspends action, with the resultant effect of a motionless ship. Anticipating the unforeseen contingency of the radio-receiving apparatus failing to function at the critical moment, a safety device has been provided. This takes the form of a time clock which automatically suspends activities.

The first absolutely radio-guided battleship in its adaptation as a moving target for bombs, to all practical purposes, will maneuver as an enemy ship just as though a crew were aboard. War conditions will be simulated. Starting from a point say 100 miles at sea off the Virginia capes, the "Iowa" will move toward shore, while bombing airplanes, starting at the same hour, will go on a searching errand. Having determined the location of the battleship, dummy bombs will be dropped mercilessly thereon in the hope of fortifying the contention that future wars will be waged from the air.

SHOWER BATH IN A TRUNK BOON TO TRAVELERS

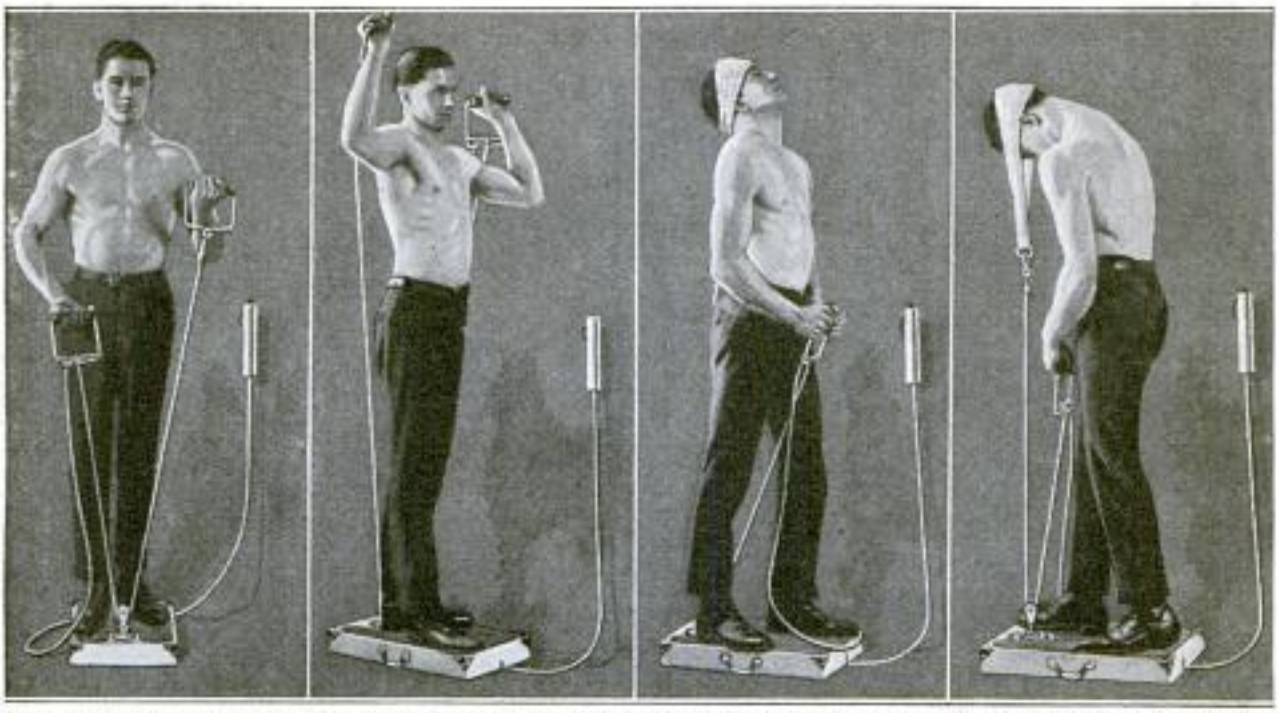
The traveling man, motor tourist, camper, and others who are, for any reason, away from home, may enjoy the luxury of an invigorating shower every day in the week, if they so desire, thanks to the invention of a shower-bath apparatus which folds compactly and packs into a trunk. One pail of water is sufficient for a bath, as it is circulated through the sprinkler head several times by either an electric or a foot-power pump, with which the outfit is supplied. The water is thoroughly cleansed by passing through a charcoal filter during each circuit. A tub of generous size, forming the base of the apparatus, has a 5-in. cavity underneath it, which contains either a kerosene burner or an electric heating element. An enveloping curtain prevents the water from splashing beyond the confines of the device.

The Portable Shower-Bath Cabinet in Service: It Is So Collapsible That It Packs into a Trunk Easily

A U. S. Geological Survey Press Bulletin states that the total production of electric power by public-utility companies is 39 billion kilowatt-hours, of which 62 per cent is produced by fuels—coal, oil, or gas—the remainder, or only 38 per cent, by hydroelectric installations.

U. S. REMODELS WAR AIRPLANES FOR COMMERCIAL PURPOSES

As a step toward the encouragement of commercial aviation, the government has caused a number of the navy coast-patrol flying boats to be converted into six-passenger craft, in both open and inclosed models, and is offering them to the public at about one-third of their cost. These are the machines that made such an excellent war record patrolling the entire Atlantic seaboard on the lookout for enemy battleships and submarines. They have a wing spread of 72 ft. and attain a speed of 75 miles per hour, driven by 400-hp. Liberty engines. The first of a series of the remodeled machines was launched last spring under the auspices of Secretary of the Navy Denby, Capt. Wm. A. Moffet, and members of the senate and house naval-affairs committee. To give an added impetus to the movement and emphasize his faith in the safety and reliability of the newly launched craft, Secretary Denby took a flight over Washington and down the river to Mt. Vernon. This establishes a precedent, as it is the first time a cabinet member has ever so intrusted himself.



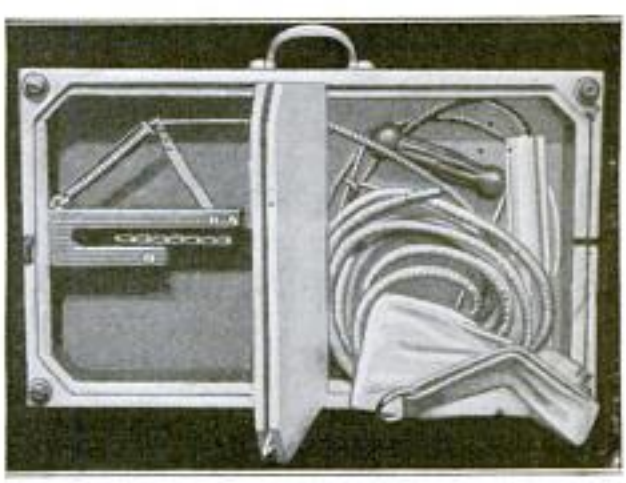
The First View on the Left Demonstrates a New Exercising Apparatus Working the Biceps Muscles of One Arm against Those of the Other, by Means of a Rope Passing Around a Pulley; Second Picture, Shoulder Exercises with the Same Apparatus. In the Third and Fourth Views a Band has been Substituted for One of the Handles in Developing the Neck and Back Muscles. The Device on the Wall is a Strength Meter Operated by the Force Exerted on the Pulley

STRUCTURAL USES OF GYPSUM AFFORD MANY ADVANTAGES

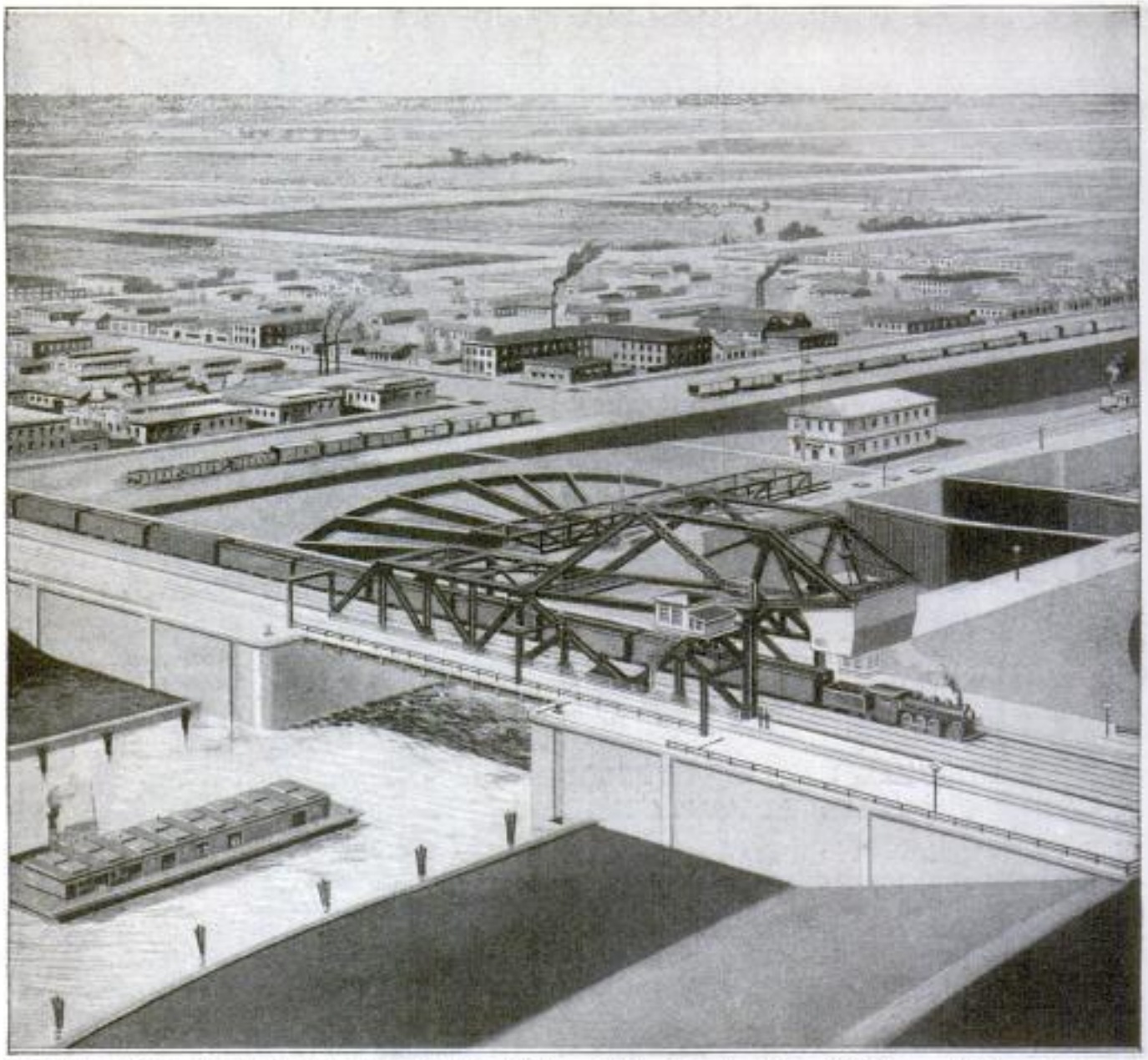
Gypsum is used in the raw state for the manufacture of Portland cement, and as a fertilizer, but when it is converted into calcined gypsum, or plaster of Paris, as it is popularly known, it has a great variety of structural uses, besides its well-known uses in pottery and statuary. Its quick-setting, and its fireproof properties, combined with its strength, make it an ideal material for casting into all kinds of building tiles, similar in form and use to those of terra cotta, over which it has many advantages. It may be used in the forms of tiles or boards in partitions and floors, or it may be cast in place in a manner similar to that used in pouring concrete. There will be a variation in the mixture of its ingredients according to the special use for which it is required, and while it always retains its fireproofing qualities, it may be made either specially light, or specially strong, and it can be reinforced with steel.

SELF-RESISTING DEVICE FOR EXERCISING

A new exercising apparatus makes one set of muscles of the body act against another set, eliminating the necessity for weights, springs, elastics, and other accessories for retractile power. To the ends of a cable passing about a pulley are fastened handles or bands, depending on what part of the body is being exercised, one end of the cable operating against the other. The pulley, against which a pull is being exerted, is fastened to a strength-registering device. A chain attached to the pulley is fastened to the short end of a lever fulcruming about a point and resisted at the long end by a tension spring. To this long end of the lever is tied the cord operating the strength indicator of the meter through a long flexible tube. In this manner the device is applicable to persons of all ages, regardless of strength. The outfit weighs but a few pounds and is readily transportable.



This View Shows the Exerciser Platform Bottom Side Up and the Various Units Contained Within. The Double Door Shown in the Middle Slides Shut so That the Whole Apparatus may be Carried About Like a Suitcase



The Corner of the Inner Harbor and Navigation Canal Where It Runs Into the Mississippi River, and Where the Lock Is Surpassed in Size by No Other Locks on This Continent Excepting Those of the Panama Canal. It is Built of

ENORMOUS LOCK LINKS LAKE AND RIVER AT NEW ORLEANS

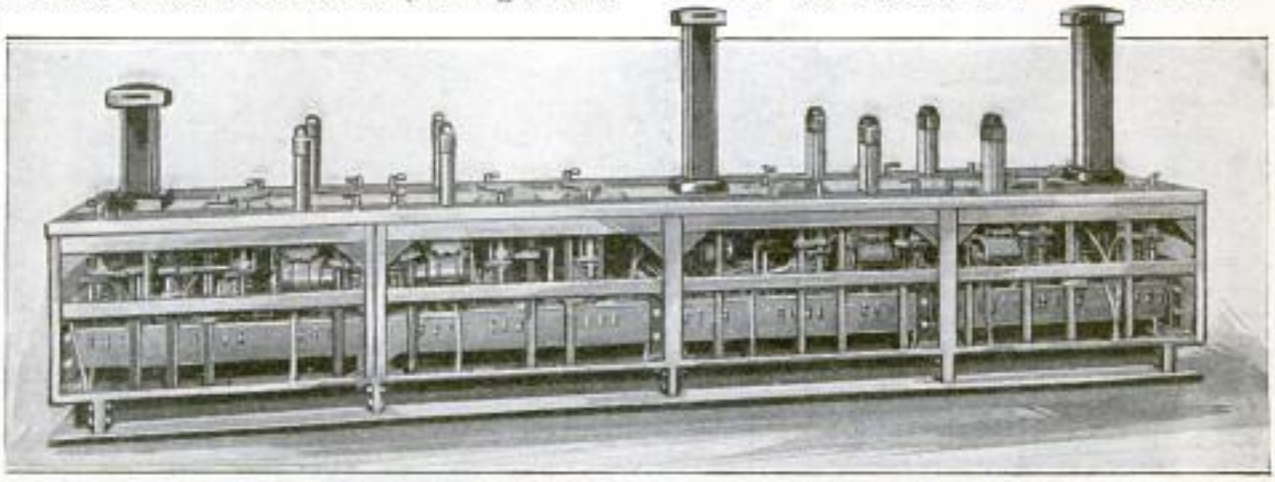
By ROBERT MORGAN

PUTTING to work at least a part of the great torrent of water the Mississippi pours past New Orleans every day, giving some of those waters a new outlet into the Gulf of Mexico, and providing the Louisiana port with nearly 12 miles of new landlocked harbor frontage, the Inner Harbor and Navigation Canal, constructed and owned by the state of Louisiana and the city of New Orleans, was dedicated May 2, during the annual convention of the Mississippi Valley Association. Delegates from 27 foreign countries and approximately 30 states of the Union attended this dedication, their attention attracted most largely by the tremendous concrete and steel lock, which, sunk solidly in a bed of soft delta soil and quicksand, controls the waters of the Mississippi in their entry into the canal.

The completion and successful operation of this lock accomplishes a piece of engineering which many experts declared impossible. The comparatively newly made land of the Mississippi delta, the numerous "potholes" of quicksand which have brought disaster to other heavy building attempts alongside the Father of Waters, and the great pressure of 22 feet of water in the river above the level of the canal, at high-water periods, combined to give the engineers of the Board of Commissioners of the Port of New Orleans a task second to none in the New

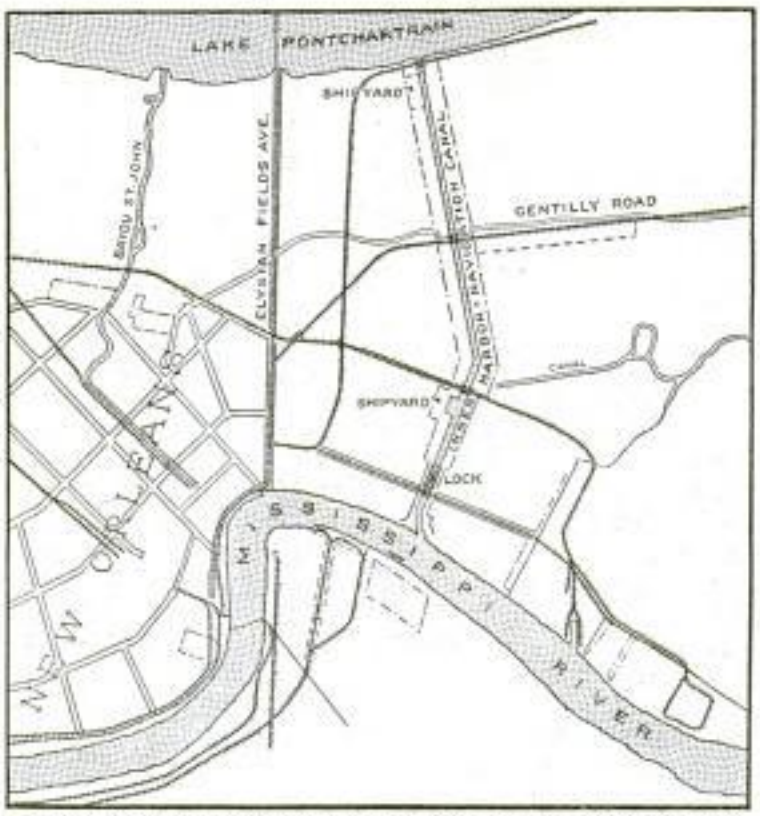
Located That Controls the River Waters That Are 22 Feet Higher Than the Water Level of the Canal: This Lock Is Concrete and Steel, and Its Outside Measurements Are: 1,020 Feet Long, 160 Feet Wide, and 68 Feet High

World, save only in the locks of the Panama Canal. The river will not be turned into the canal until this fall, owing to the summer high stage of water in the river, but the canal itself, with the exception of the lock is now in use.



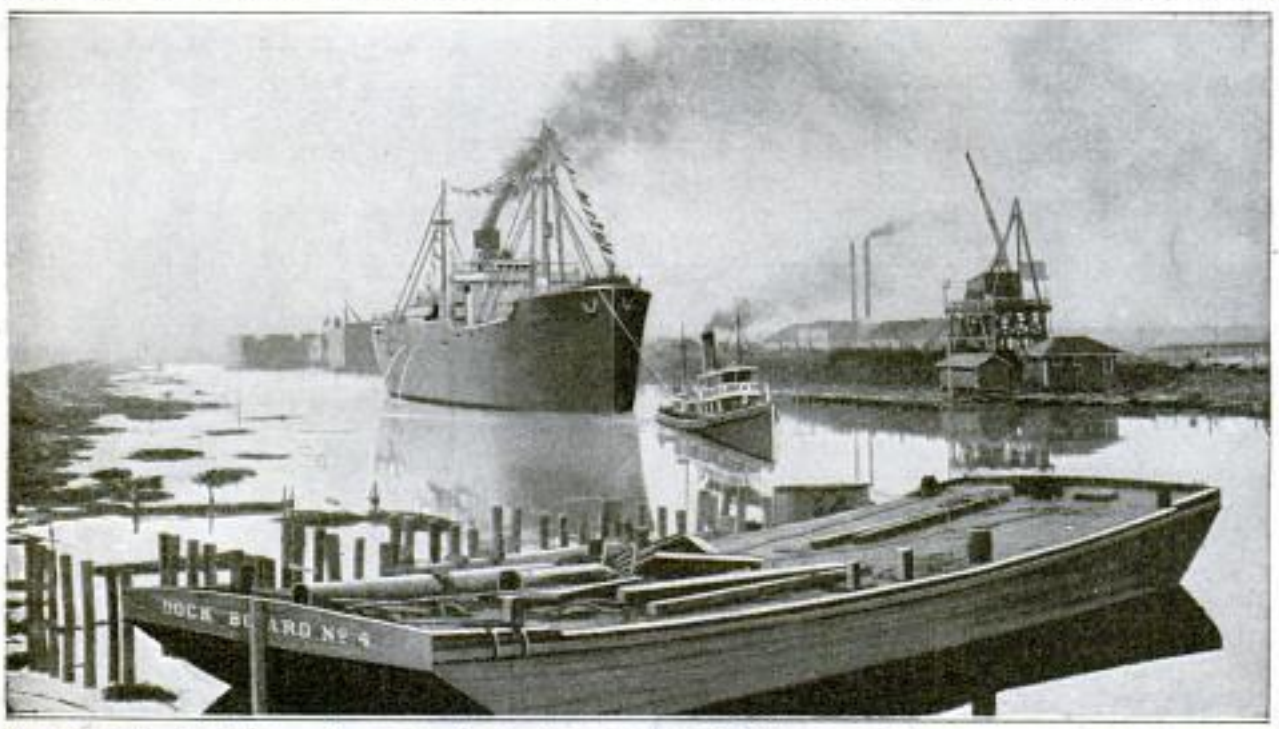
The Lock-Control Board as Used for the New Orleans Industrial Canal: The Tallest Towers Indicate the Water Levels in the Locks. The Smaller Ones Show the Position of the Water Valves. The Small Handles are Used for the Control of the Main Lock Machinery, Gate Motors, Valve Motors, etc. The Small Motors Seen Underneath the Towers Are the Receivers of the Indicating System

The Inner Harbor and Navigation Canal, which is costing $10 for every man, woman, and child in Louisiana, or approximately $25,000,000, connects the Mississippi River with Lake Pontchartrain, running five and one-half miles across the lower business section of the city of New Orleans. The canal is 300 ft. wide at the top, 150 ft. wide at the bottom, and 30 ft. deep at low tide in the Gulf of Mexico, with which it is connected through Lakes Pontchartrain and Borgne. The entrance to Lake Pontchartrain is at tide level in the Gulf of Mexico, but, as these two lakes have an average depth of only eight or nine feet, large shipping must come in and also go out of the canal through the lock, which, therefore, becomes the key to the entire canal, federal government engineers having reported unfavorably on a project to dredge a 35-ft. channel across Lakes Pontchartrain and Borgne and Mississippi Sound, to deep water in Ship Island Pass, on the Gulf of Mexico.

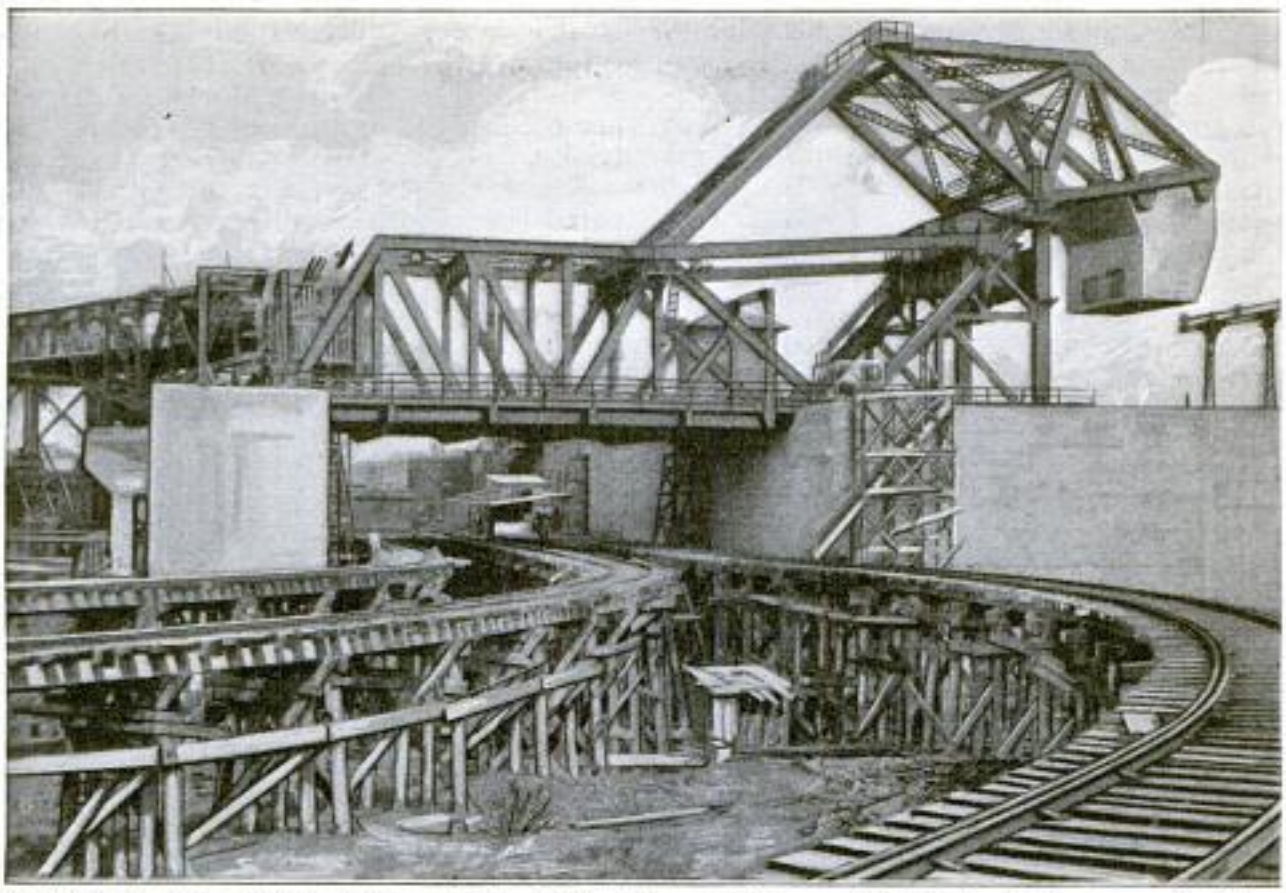


Map Showing How the Inner Harbor Navigation Canal Connects the Mississippi River with Lake Pontchartrain, a Distance of 12 Miles: The Canal Is 300 Feet Wide at the Top and 150 Feet at the Bottom, and 30 Feet Deep at Low Tide in the Gulf of Mexico, with Which It is Connected through the Lakes

This massive lock stands 2,000 ft. inside the levee which protects New Orleans from the rise of the waters of the Mississippi. Access to the lock is given through a channel, cut through this levee, at a downstream angle, 2,000 ft. long, 300 ft. wide at the top, 150 ft. wide at the bottom, and



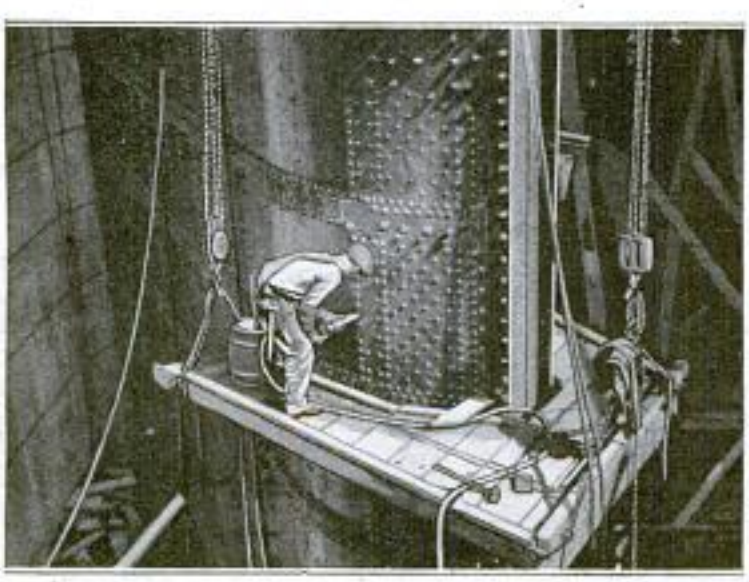
Five 9,200-Ton Steel Steamships, Built for the United States Shipping Board, Floating on the Inner Harbor and Navigation Canal, Following Their Launching from a Shipbuilding Plant on the Banks of the Canal: These Hulls were Dragged across Some 60 Miles of 9-Foot Depth of Water in Lake Pontchartrain, Lake Borgne, and Mississippi Sound, to Deep Salt Water in the Gulf of Mexico, and Thence Sent 110 Miles up the Mississippi



Steel Bascule Bridge Which will Carry Railroad, Street-Car, Vehicular, and Pedestrian Traffic across the River End of the Lock in the Inner Harbor and Navigation Canal at New Orleans

30 ft. deep at low water in the Mississippi River. Two steel gates, each weighing 400 tons, and operated, as is all the lock machinery, by electricity, hold out the thousands of tons of water constantly pressing against them during the several months of high water in the Mississippi, or admit these waters to drop ships into the canal more than a score of feet below.

Approximately 100,000 cu. yd. of concrete went into this lock, which cost $7,500,000 of the $25,000,000 which went into the entire canal. The form work for this concrete casting alone called for two and one-half million feet of lumber, and 6,000 tons of steel were used in reinforcing the great concrete box. The lock is 1,020 ft. long, 160 ft. wide, and 68 ft. high, outside measurements. This height puts the top of the lock 6 ft. above the highest stage of the Mississippi River ever recorded at New Orleans. The inside measurements are 600 ft. long, 75 ft. wide, and a depth of water over the sill of 30 ft. at mean low water in the Gulf of Mexico.



Putting the Last Rivets into the 400-Ton Steel Gates of the Lock on the $25,000,000 Inner Harbor and Navigation Canal at New Orleans: The Gates, like All the Machinery Connected with the Lock, are Operated Electrically

The floor of this lock is laid 45 ft. below the surface of the surrounding ground, on 14,000 piles from 50 to 60 ft. in length, or, approximately 140 miles of piling. Total dirt excavation for the canal and the lock site was 10,000,000 cu. yd., a mass of earth which would require a train 40 miles long to handle it—a total of 100,000 flat cars. Counting the four bridges, the lock,

the gates, and the operating machinery, 14,500 tons of steel were used on the canal. The entire lock, empty, weighs 225,000 tons, but, when filled with water, that weight leaps to 350,000 tons. The land of lower Louisiana, probably the most recently formed of all the lands of this continent, is also the weakest. In addition to this, the sands found below the surface proved even more yielding than usual; gas pressure developed which threatened to blow out the entire work, but a ring of steel cofferdams were sunk, and wells were drilled to relieve the gas pressure. Then 15 tons of water were pumped into the lock excavation to counterbalance the gas pressure, and the floor of the lock—a massive raft of concrete and steel—was laid on top of the 14,000 piles. All this pile-driving and floor-laying was done under water, and, as the floor was laid, the water was pumped off. The floor and the piling held, and the soft earth, sand, gas, and seeping water were boxed out.

Completed, as it stands today, the lock will handle ships up to 20,000 tons, larger than any which come into the gulf ports, or are likely to seek entry there for many years. The machinery of the lock is operated entirely by electricity, the operator sitting in front of a switchboard which is a miniature replica of the lock, with indicators showing him at all times the position of the gates, the height of the water, and the progress of ships through the lock. Though this switchboard is located in a building several hundred feet from the lock, the operator could not have a better view of the entire workings even if he were hovering in an airplane above the big concrete box he controls. This switchboard is patterned after those in use on the locks on the Panama Canal, and is the only similar switchboard in the world.

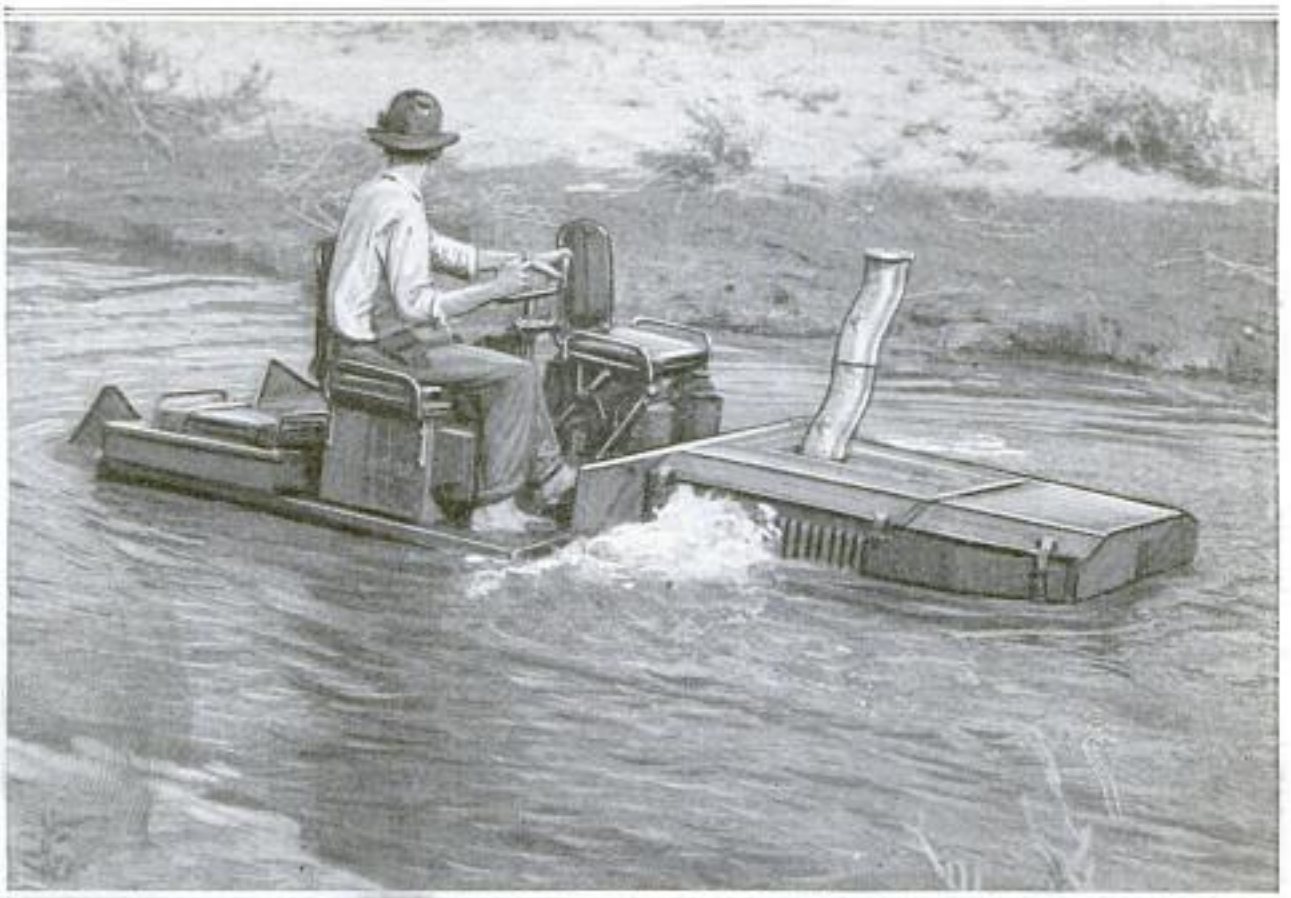
Between the lock and the Mississippi River, a railway steel bascule bridge crosses the entrance channel to the canal. This bridge, also operated by electricity from the same switchboard, carries the Public Belt Railroad, the municipally operated line which connects all the wharves of New Orleans harbor with the stations of all the eleven trunk lines of railroad which enter the city. This "Public Belt" parallels the canal on both sides, and thus connects all industries along it with all other shipping facilities on the New Orleans side of the Mississippi River. In addition to this railroad, this bridge also carries two wide thoroughfares for street-car and vehicular traffic, and two raised sidewalks for pedestrians. Three other bridges, two of them railroad and one general traffic, also cross the canal. These are lift bridges, and are operated by electricity.

A short distance from the lock is located a large turning basin on the west side of the canal. Here ships of 20,000 tons—the largest the lock will accommodate—can be turned end for end quickly, so that they may literally "sail right in, turn right around, and sail right out again." Another interesting feature is the huge siphon which carries the city's drainage across the canal. It is a canal beneath a canal, being dropped under the channel of the Inner Harbor and Navigation Canal. It is 378 ft. long, built of concrete and divided into four compartments, so that if any one of these tubes within a tube should be broken, the main part of the city's drainage will continue flowing as usual. Approximately 2,000 cu. ft. of water flows through this siphon every second, and 18 months were required to build this siphon alone. It rests on piling, the tops of which are 46 ft. below the surface, or 16 ft. below the bottom of the canal. Pumps had to be operated continuously throughout the construction period in order to keep out the quicksand, water, and gas encountered, and the problems overcome were virtually the same as those which many believed would prevent the construction of the 225,000-ton lock.

SPARK-PLUG ATTACHMENT INTENSIFIES THE SPARK

Testing a spark plug with a screwdriver is an old trick that has been practiced by everyone who has had much to do with a gasoline engine. An attachment is now available that makes this practice unnecessary. It is connected to the plug, and forms a permanent gap between the spark-plug wire and a small bar that corresponds to the point of the screwdriver when used for this purpose. The spark in this gap indicates the adjustment of the gap that will give the best results at the plug's sparking point.

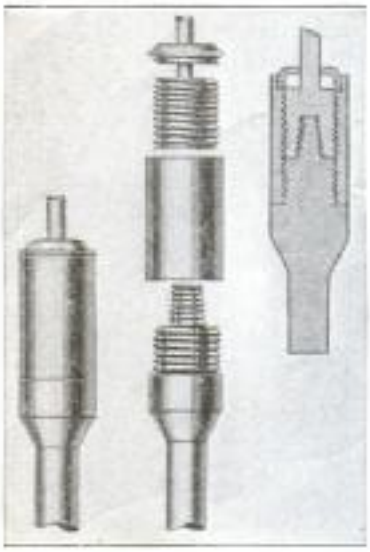
SUBMARINE TRACTOR HAULS GUNS OVER WATER



IN line with similar military experiments in France and England, a submersible tractor has been developed in this country which is capable of traveling through water to a depth of 10 or 12 ft. By the simple expedient of equipping the carburetor with a periscope, air is insured for the gasoline mixture. The seat of the driver is high enough so that ordinarily there is no particular danger of his taking an involuntary bath. Provision is made for the mounting of a small fieldpiece on top.

LOCK-JOINT DEVICE KEEPS TOOL FROM COMING OFF

In drilling oil or artesian wells, much difficulty due to drilling tools unscrewing from the end of the driving rod is experienced. With the use of a new joint-locking device, this trouble will be eliminated. The new fitting comprises a threaded connecting collar which joins the end of the drive rod and drilling tool. These latter fittings are threaded with right and left-hand threads in the proper combination to make the jarring impacts of the driving strokes tighten the tool to the driving rod.



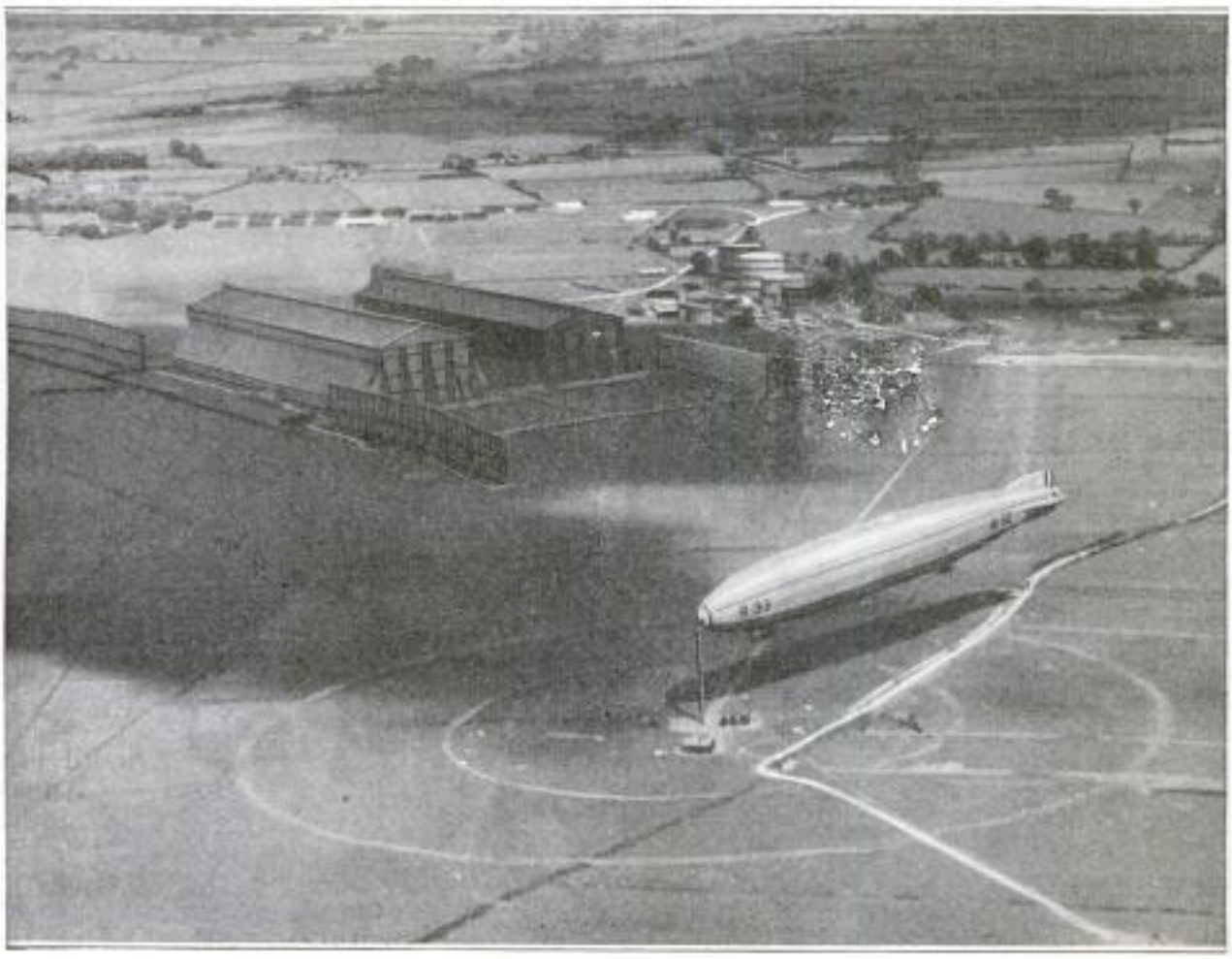
WRECK OF GIANT AIRPLANE IS WORST AVIATION ACCIDENT

The wreck of the giant army airplane ambulance, near Indian Head, Md., was of greater tragical proportions than any airplane accident that has yet occurred in this country. All of the seven passengers —five army men, all of distinguished war service, and two civilians, one a former congressman—perished. The airplane was returning to Washington from a trip to Langley Field, near Newport News, Va., when it ran into a storm, and getting out of control, plunged, nose first, to the ground with such force that its 400-hp. Liberty motor was thrown back into the cockpit on top of the passengers. The airship was of a design similar to the large passenger-carrying planes in Europe, and had been adapted for use as an ambulance, having the cockpit arranged for the accommodation of stretchers. The storm itself, though severe, should not have been enough to put it out of control, and the actual cause of the accident was presumably some defect in the design. Some officers in the air service attribute it to insufficient power, the 400-hp. motor being too small in proportion to the weight of the plane and seven passengers.

AUTO JUMPS EIGHTY FEET IN MOVIE THRILLER

What is believed to be a record jump for automobiles was made at Los Angeles recently in the production of a motion-picture thriller. Boards were nailed together in the shape of wedge platforms, and after a preliminary run of half a mile to gain momentum, the roaring car leaped the take-off at a 68-mile an hour clip, landing on the front wheels a distance of 81 ft. 6 in. away. Although ballasted with a 400-lb. weight in the rear, the machine showed a marked tendency to do a nose-dive, the rear wheels being still elevated 8 ft. when the front ones had landed, and scooting along a distance of 100 ft. in this manner before finally coming to the ground.

Showing the Nose-Dive Landing Made by a Western Movie-Thriller Auto after Its Perilous Leap of 81 Feet: The Machine Gained a Momentum of 68 Miles per Hour Striking the Wedge Platform

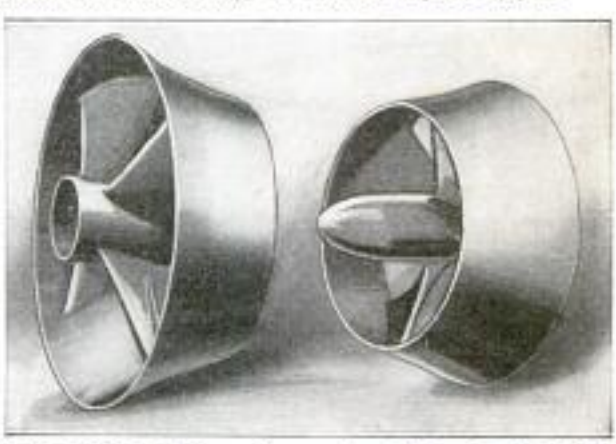


A MASTERPIECE OF AIRPLANE PHOTOGRAPHIC ART

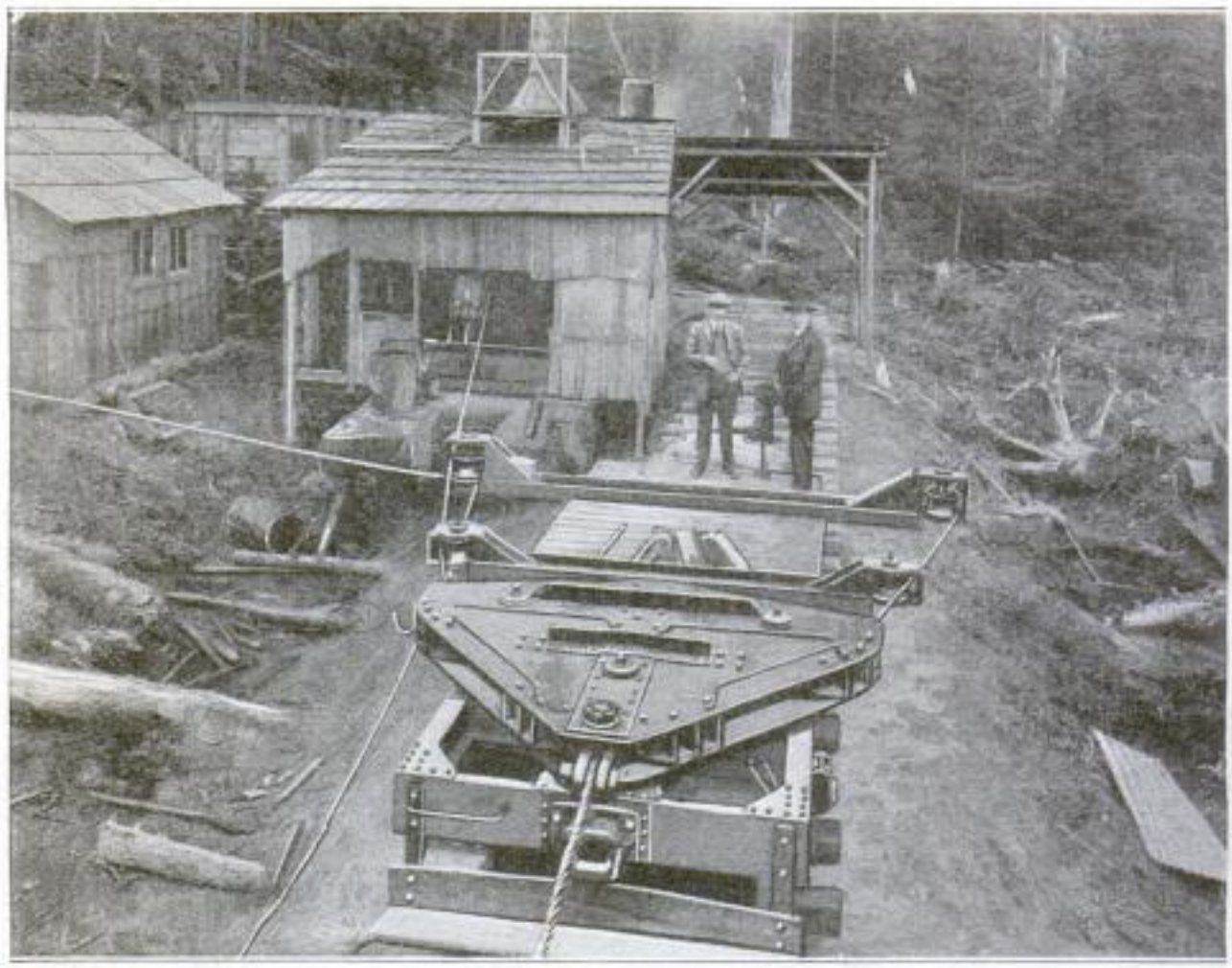
A WONDERFUL bird's-eye view of the great dirigible "R-33," and its surrounding landscape, is so clear and bright that it looks more like a scene in sunny Italy than in a foggy region of England, where it was taken. It is a photographic view taken from an airplane, and shows the "R-33" tied to its mooring mast, as well as the hangars, the gasworks, and neighboring buildings, with the hedges and trees of the English countryside at the Howden airdrome in Yorkshire. A full-page view of the "R-33" tied to a similar mooring mast in another part of England, was shown and described in the July number of Popular Mechanics.

SHROUDED SCREW PROPELLERS SHOW EFFICIENCY IN TESTS

When an ordinary screw propeller revolves it forms in the water a vortex, which is a whirling or circular motion of the water having a kind of cavity in its center. It has been found of advantage to control the action of this vortex by inclosing the blades of the propeller in a shroud, and the resulting device has been called a vortex propeller. The shroud forms a nozzle which is shaped so as to control the flow of the water most efficiently, and to prevent any disturbance of the vortex. The results were plainly demonstrated by the difference in the appearance between the tailraces of an open propeller and a shrouded one. In the former case there is the usual turbulent wake, indicating the dissipation of power required to cause so much water disturbance, and in the latter case there is hardly any wake at all, and the water remains practically undisturbed. After many experiments to find the most efficient proportions and shape of the shroud inclosing the propeller, tests were made in a heavy 15-ft. boat with a four-bladed vortex propeller, which demonstrated the gain in efficiency over the open type.



The Left-Hand View Shows the Driving-Shaft End of the Shrouded Screw Propeller; the Other View the Rear End, or Outlet of the Vortex



Close-Up of Snubbing Device Showing Specially Constructed Block Containing Three Sheaves, the Whole Mounted upon a Railroad Truck by a Ball-and-Socket Joint Which Allows the Block to Adjust Itself to Meet Changes in the Grade

EFFICIENT LOG-TRAIN SNUBBER HAS NOVEL FEATURE

By LAWRENCE WILLIAM PEDROSE

FOR use in braking log trains down steep mountainsides in the Pacific Northwest, a very efficient mechanical snubber has been developed. The first of these devices has been in use for several months near Arlington, Wash., and others are being installed at various points along the coast.

The main feature of the device is a huge block of three sheaves, mounted upon a railroad truck by a ball-and-socket joint which adjusts itself to the varying degrees of horizontal tension due to the changing grade of the road. A 1¼-in. steel cable operates from a donkey engine through the block and is anchored beside the road, thus giving an ordinary block purchase upon the train to which the snubbing truck is attached.

This snubber operates upon an incline one mile long. The grade is of varying degrees up to 25 per cent. As no traction power is applied to the wheels of the train, the ties and track do not creep (creepage is a serious engineering problem in mountain railroading). Three to six carloads of logs are handled each trip, which is equivalent to 20,000 to 30,000 board feet of timber. A round trip is made in 20 minutes.

To serve the same purpose, an ordinary railroad, by utilizing switchbacks, would have to be eight miles long, engineers declare. Under the most favorable conditions it would require three locomotives to do the work the snubber accomplishes, and the wear and tear on machinery and equipment would be terrific; besides there would be unavoidable delays.

A compound donkey engine, equipped with special drum and brake bands, handles the snubbing device. Nearly 11,000 ft. of cable are used. The brakes are steel bands lined with wood blocks, over which a small stream of water plays to keep them cool. On the steeper parts of the grade, steam is thrown into the cylinders to assist the hand brakes.

On this particular road it is estimated $70,000 was saved in construction costs over the ordinary switchback method. In operation, one donkey engine, with a min-

In Operation—Braking Three Carloads of Logs down a Steep Grade: The Double Line of Wires to the Left of the Road is the Electric-Signal System. When the Bottom of the Mountain, a Mile Distant, is Reached, the Loaded Cars are Unhooked and Empty Cars Picked Up and Taken Back to the Place Where the Logs are Yarded. The Two Men in Shirtsleeves on the Snubber Truck Are All That are Required to Operate the Train

imum of fuel and upkeep, serves where three or more locomotives would be required. The accident hazard is practically eliminated. The total saving is computed to be more than 75 per cent.

The snubbing device works with no perceptible wear upon the cable. Outriggers upon the truck drop the "dead" line on the left upon poles, and on the right upon rollers fastened on posts and spaced 100 ft. apart. Thus the line does not touch the ground, and there is no friction.

When it is desired to switch a car onto a sidetrack, the outrigger deftly places the line on roller posts on the turns, while on the outside of the turn a post, with a pin which trips, catches the dead line and holds it off the track.

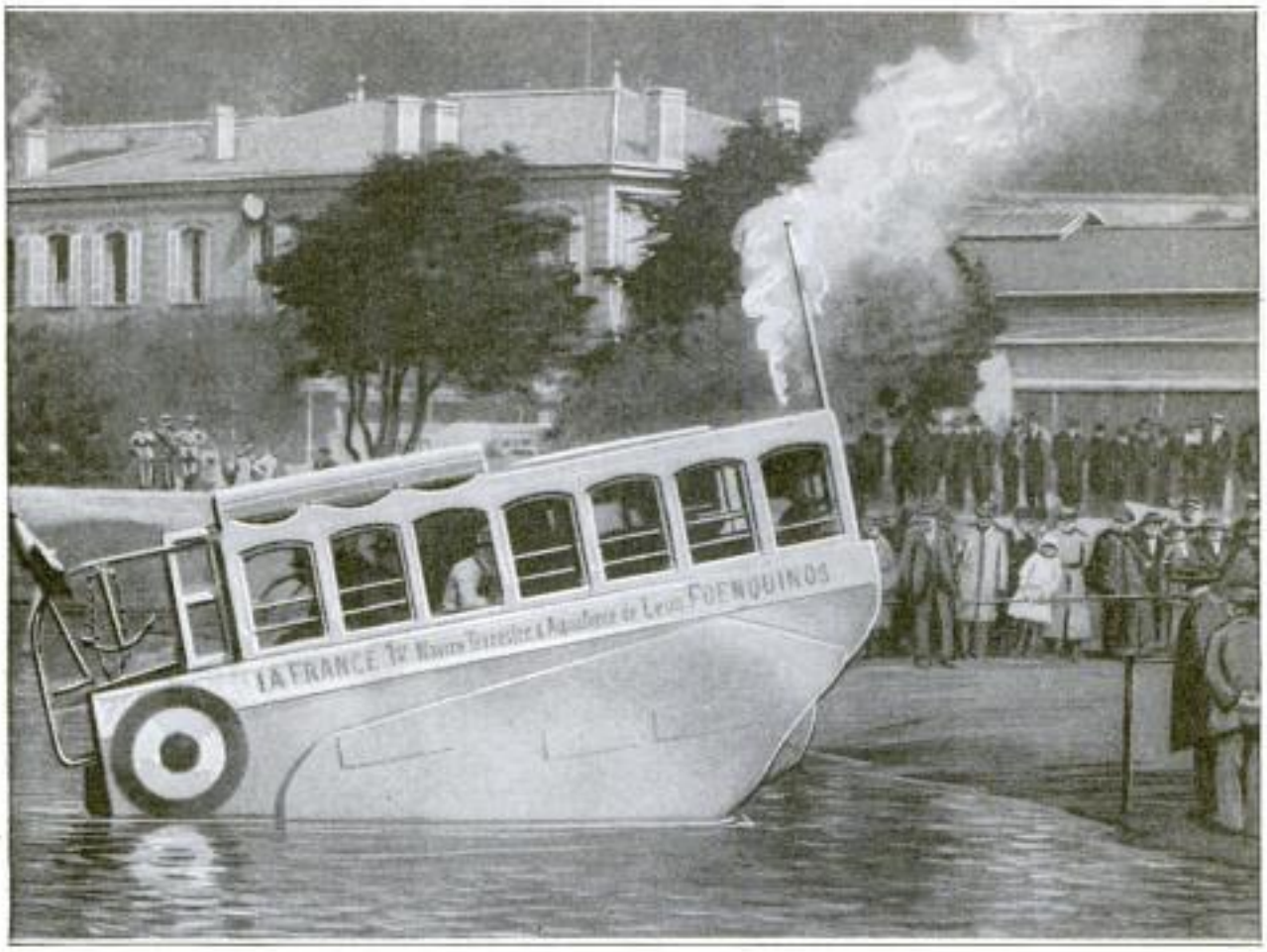
SMALL WASHING MACHINE CAN BE USED IN LIMITED SPACE

A compact little washing machine that is notable for its ease of portability for use in the kitchen or bathroom, was designed to be especially convenient in small flats or apartments, supplementing the larger basement machines. It has but two moving parts, a small tub and a stand, to which the former is attached when in use, and is driven by an electric motor. The upright of the stand is rotated directly from the motor shaft by means of worm gearing, and as the top of the stand is inclined, an oscillating motion is imparted to the tub, sending the hot suds through the wash in all directions. The machine has a capacity of anywhere from one handkerchief or collar up to five large bed sheets.

In the Upper Left-Hand Picture is Shown the New Portable Washing Machine Assembled. The Upper Right Insert Shows the Rotating Stand Driven by an Electric Motor. The Lower View Shows the Machine Disassembled

PURIFYING WATER OF TOWNS ON TIDAL RIVERS

The treatment of the drinking water at the model hospital village at Perryville, Md., for purification by the U. S. Public Health Service includes certain particulars that are of importance to all communities, and especially to towns situated along the shores of tidal rivers. At Perryville the condition of the water is modified not only by the daily conflict of tide and river, but also by the geological formation of the country, and by the strong winds which sweep across the lowlands. The water, which is pumped from the Susquehanna River through 20-in. mains into settling tanks, is therefore subject to rapid changes in turbidity, ranging from 10 to 100 parts per million, and the amount of aluminum sulphate which is added to precipitate the dirt must be varied to suit. Samples of the water are taken every two hours, and the amount of coagulant necessary is calculated by means of a chart based on the state of turbidity; for instance, .6 gr. of the sulphate being added in the case of a 10-parts-per-million turbidity. The proportionate amount, however, is further governed by the relative alkalinity of the water. When it drops below 14 parts per million, soda ash is added.



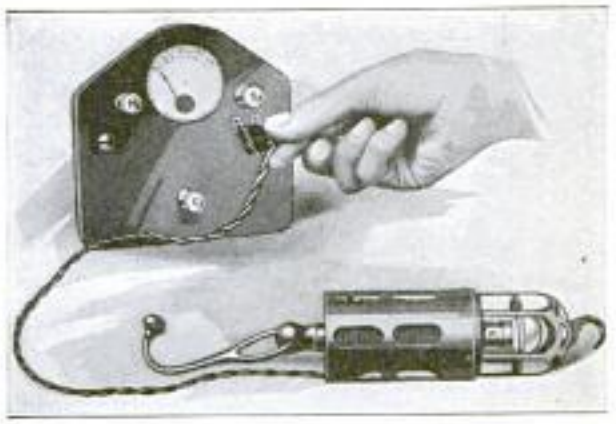
The French Amphibious Tank, or Land-and-Water Ship, is Seen Leaving the Water on Which It Sails in the Manner of a Power Launch, and Coming Ashore Travels over Land by Means of Endless-Tread Wheels Which are Now Concealed by the Water. It Travels Equally Well Ashore or Afloat

FRENCH LAND-AND-WATER SHIP DOES WHAT ITS NAME IMPLIES

The hippopotamus is now rivaled by an amphibious tank that travels equally well by land and water. It is a tank only in the sense that it originated in the fighting tanks of the war, for it is, as a matter of fact, a passenger vehicle. When ashore, it travels on endless-tread wheels, and looks like a motor bus; when afloat, it is propelled and acts like a launch. It is the invention of a Frenchman, and was recently tested, carrying six passengers, in Marseilles, the great Mediterranean port. The French got around the difficulty of giving it an appropriate appellation by calling it a land-and-water ship.

INSPECTION LAMP EQUIPPED WITH CABLE REEL

A new electric lamp designed especially for garage and shop-inspection work is particularly convenient in use, since in addition to the ordinary guard for bulb protection, it is equipped with a reel in the body of the lamp accommodating 16 ft. of electric-light cord. When it is desired to wind up the reel after using, a hooked handle at the end of the reel is used as a crank, and in this way all liability of the cord becoming entangled with the contents of the tool box or other objects is eliminated. A switch plug which makes connection with

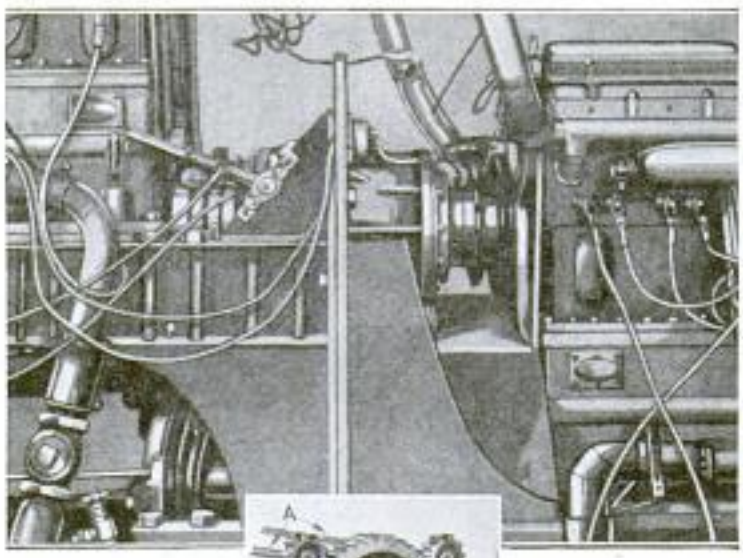


Inspection Lamp Equipped with Reel to Prevent Tangling of Cord When Not in Use: The Switch Plug Fits the End of the Handle

the wall circuit terminals is adapted to fit in the end of the winding stem when not in use. The outfit may be adapted for use with both the shop and automobile lighting circuits, but is ordinarily connected to an alternating 110-volt system.

MULTIPLE-UNIT POWER PLANT FOR FRENCH AIRPLANE

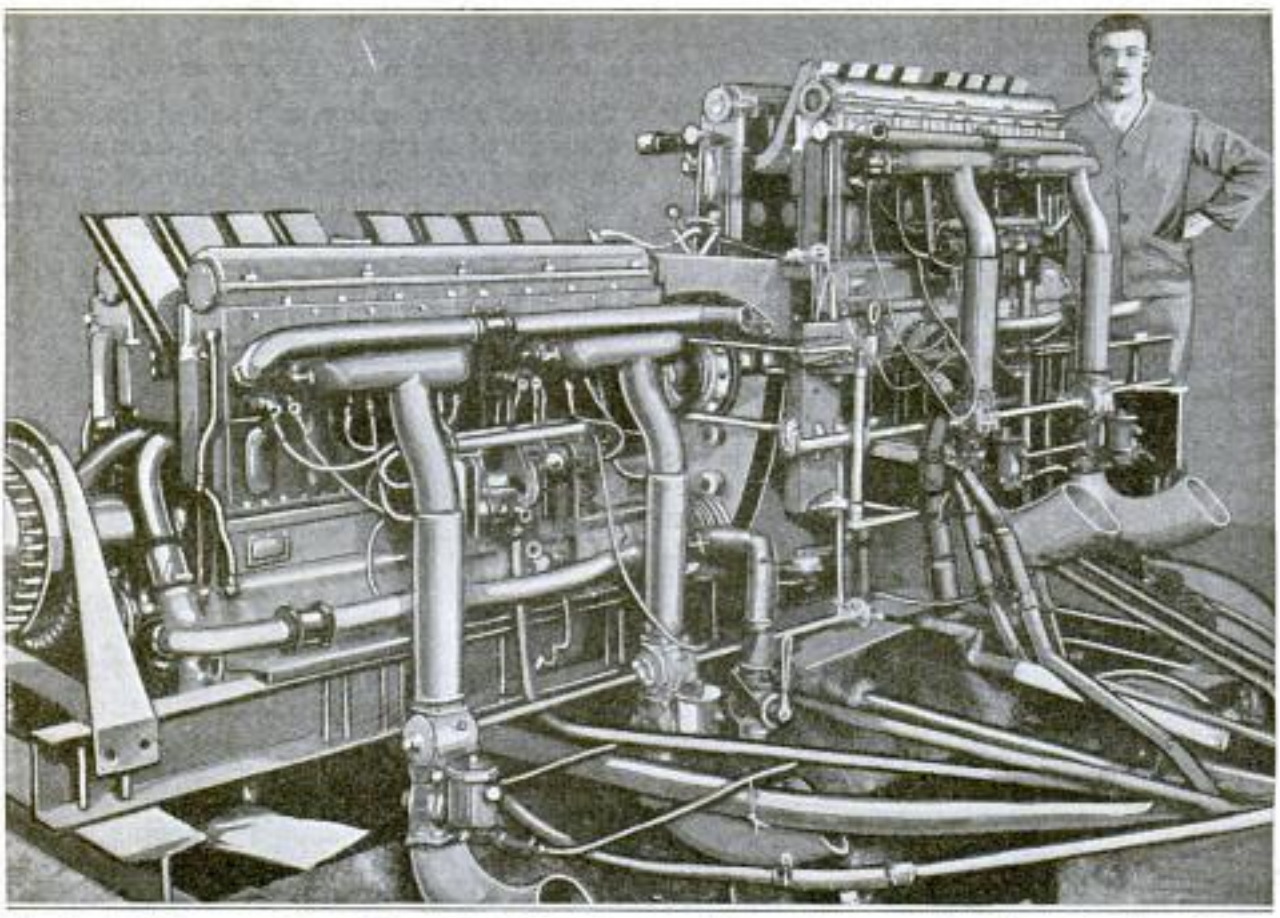
The design and placement of the engine of a new airplane, wholly of metal and designed by a French concern, differ in many major respects from previous American and foreign practice. The motor, which is in reality a unit of four motors geared to a single propeller shaft, develops 950 hp., and is inclosed in the fuselage as against the ordinary method of supporting individual units of lesser power in separate outboard structures. The advantages cited are decreased head resistance, and the elimination of complicated outboard engine supports.



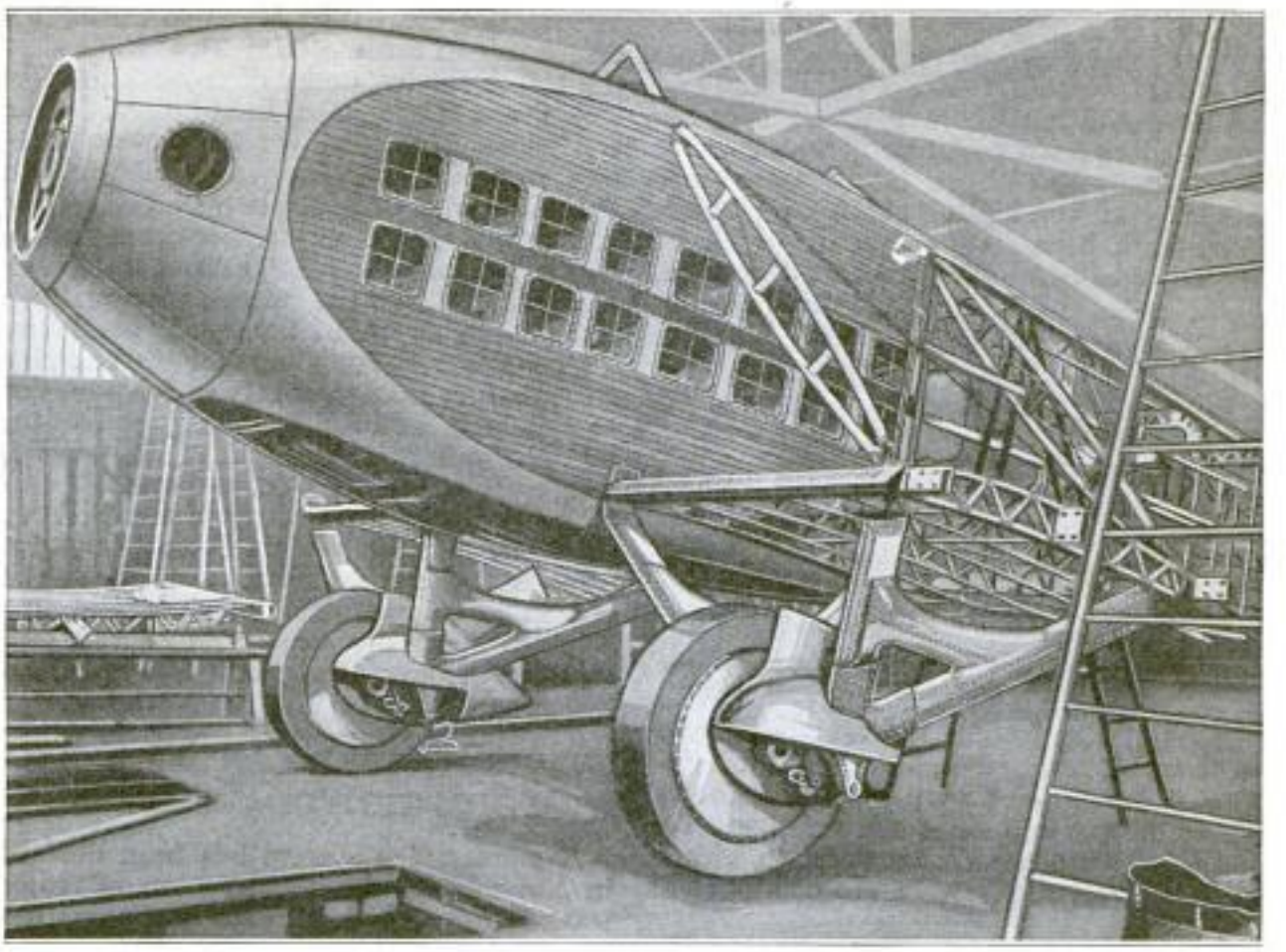
By Mounting the Motors End for End, but Out of Vertical Alinement, as Shown Above, It has been Made Possible to Drive the Propeller Shaft by Means of the Gear at the Right

The Four Small Gears, Which are Slidably Fitted to the Crankshafts A of the Two Engine Units, Drive the Propeller Shaft C through the Large Gear B, That is Keyed to It

The plant is a development of the Bugatti engine. A Bugatti motor consists of two parallel rows of eight vertical cylinders each, each row having a separate crankshaft geared together at the ends. In the advanced design two Bugatti motors are turned end for end and geared at the middle to a large gear, which is keyed to the propeller shaft.



Showing the Enormous Power Plant of the New "Leviathan"-Type Airplane: The Plant Consists of Two Bugatti Motors, Each Having Two Parallel Rows of Eight Vertical Cylinders and Two Crankshafts, Turned End for End and Geared at the Middle to a Single Large Gear, Keyed to the Propeller Shaft



By Placing a Single Plant of Great Power in the Central Fuselage Instead of Several Lesser-Powered Engines on Separate Outboard Supports, Greatly Reduced Head Resistance is Claimed for This New French All-Metal Airplane

As there are four crankshaft pinions meshing with the large central gear, one motor is set lower than the other and provided with a third set of bearings through which runs the propeller shaft. Instead of the pinions at the end of each crankshaft being solidly fixed in one position, they are given a slight longitudinal travel. They are held in engagement with the driven gear on the propeller shaft by a spring which is aided in its action by the spiral of the gears themselves. If anything happens to any one of the four lines of cylinders so that it ceases to drive, the thrust of the gears reverses, the central driven gear becoming the driver, and the pinion slides back along the crankshaft, declutching it and throttling that particular unit. To insure that the gears are kept in their proper angular relationship, a system of synchronization is used to govern the speeds of the four lines of cylinders.

¶ What is said to be the highest one-piece structure yet built has recently been completed at Tokyo, Japan. It is a government wireless tower, 660 ft. high, constructed entirely of reinforced concrete.

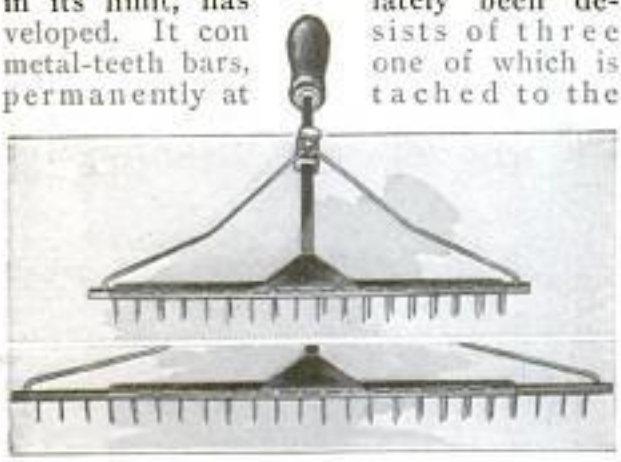
LAWN GROWN IN THREE WEEKS BY BROADCASTING ROOTS

Slitting sod into ribbons and scattering the roots broadcast over the ground is the new way worked out by the Department of Agriculture for obtaining lawns quickly. A full lawn in three weeks' time has been grown by this method. Good healthy sod is stripped to a depth of about 1½ in., leaving as many roots and as little dirt as possible. This is run through a feed cutter so arranged as to slit the sod into ribbons. The ribbons are then shredded by hand and the roots sowed over the earth, which has been previously plowed and harrowed. This is particularly valuable in the renewal of golf courses where the grass is subjected to hard usage.

For preparation of ordinary lawns it has been found sufficient to broadcast the roots and harrow or disk them, but with golf links better results are obtained by a further 1-in. rolled-dirt covering. The green of the public golf course at Potomac Park, Washington, D. C., one of the finest in the country, was obtained in this manner.

SECTIONAL GARDEN RAKE MAY BE WIDENED

A sectional garden rake which may be expanded or narrowed to any width within its limit, has lately been developed. It consists of three metal-teeth bars, one of which is permanently attached to the rake handle and holds the remaining two in place. The latter are pushed out sidewise or drawn back by means of connecting rods operated by a sliding clamp on the rake handle, and are held in either position by a setscrew in the clamp.



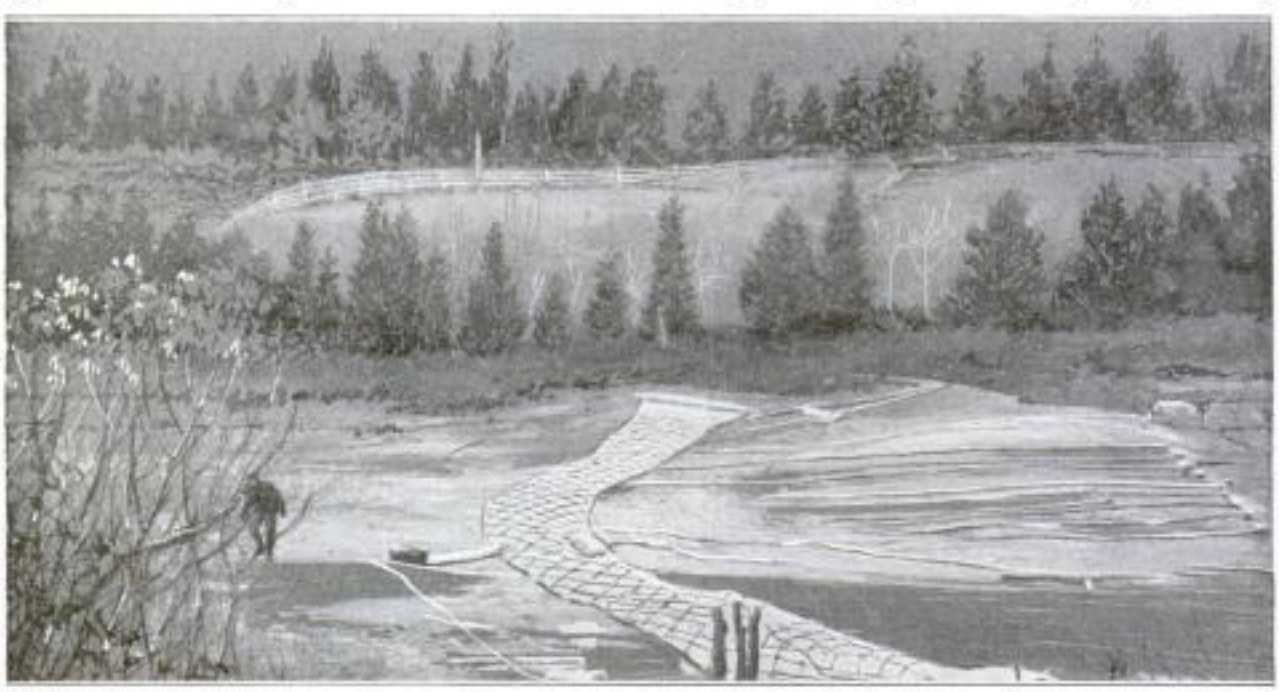
Telescoping Slides Allow This Rake to Contract and Expand as Shown in the Upper and Lower Views

LOW-TEMPERATURE STATION OPENED BY BUREAU OF MINES

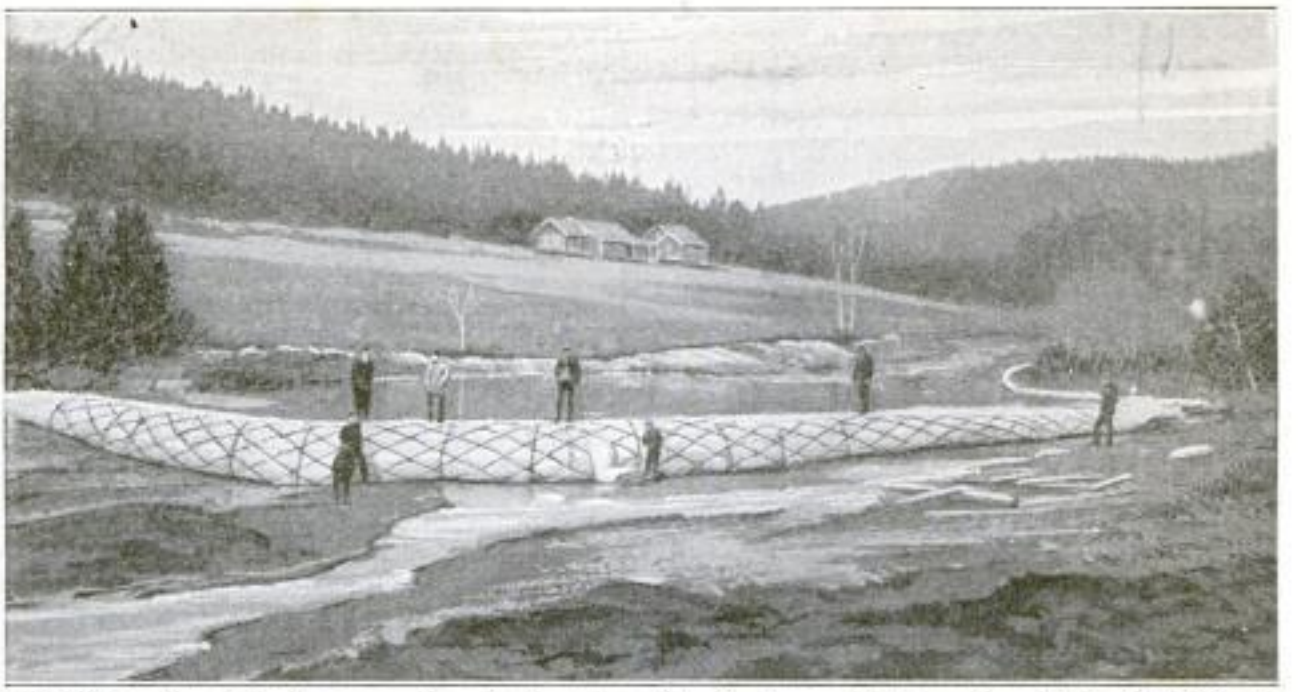
Special low-temperature investigations, particularly for obtaining scientific data useful in the operation of the government helium plants, will be greatly facilitated by a new laboratory of the U. S. Bureau of Mines, dedicated by Madame Curie, the discoverer of radium, May 21. "Kruos" is the Greek for ice, and so the institution is called the Cryogenic Laboratory. The equipment installed in the new Department of the Interior building, at Washington, consists of two four-stage air compressors, of 75-cu.-ft. free-air capacity, which compress to 3,500 lb. per square inch, furnishing the means for making from 15 to 20 qt. of liquid air per hour. There are also two smaller three-stage compressors that compress to 3,000 lb. per square inch, one for liquefying hydrogen, and the other for a liquid-helium cycle. There are two 300-cu.-ft., and one 200-cu.-ft. gas holders for hydrogen and helium, and four smaller holders for storing gas samples. Connected with the laboratory is a well-equipped machine shop, and also a low-temperature expansion engine, and all other necessary physical and chemical apparatus.

WATER-FILLED CANVAS PIPES FORM TEMPORARY DAMS

A canvas-pipe system has been devised in Norway for the construction of either temporary or permanent dams across shallow rivers. The hose is laid lengthwise across the stream in a collapsed state, the closed end being anchored to the opposite shore. It is then filled with water either by turning the open end upstream, allowing the water to pour in by the force of the current and completing the operation by means of pumps, or by



This Is the First Step in the Formation of a Temporary Dam across a Shallow Stream According to a System Devised in Norway. An Empty Canvas Hose is Laid across the Stream as Shown in the Center of the Picture



This Picture Shows the Temporary Dam in Operation After the Canvas Tube has been Filled with Water by Turning the Open End Upstream and Allowing It to Fill, the Other End being Anchored to the Opposite Shore. The Height of the Dam is Illustrated by the Men Standing Alongside and on Top

using pumps from the outset. This forms a wall across the river which accommodates itself to the irregularities of the bottom, causing a complete stoppage of water for a height equal the diameter of the canvas bag. The system has already been tested out with success in Norway. In instances cited, canvas tubing 6 ft. in diameter, protected by tarred ropes, was used. Dams and foundations of a permanent nature may be erected by using liquid mortar as a filler instead of water, it is claimed, eliminating the necessity for cofferdams and other superstructures. In the creation of artificial tidal waves to effect the freeing of stranded boats or logs from the beds or banks of sluggish streams, the temporary dam becomes of value; also in the formation of temporary fords by the construction of one or more dams above the contemplated line of crossing; in the raising of water levels in irrigation ditches, and as a means of increasing the height of dikes and levees in times of threatened flood. The process is patented.

Showing the Completed Dam and the Water Backed Up behind It After the Water-Filled Canvas Hose has Been in Position for Some Days: The Tube is Protected by Rope Netting

SAFETY-RAZOR IMPROVEMENTS GIVE A SMOOTHER SHAVE

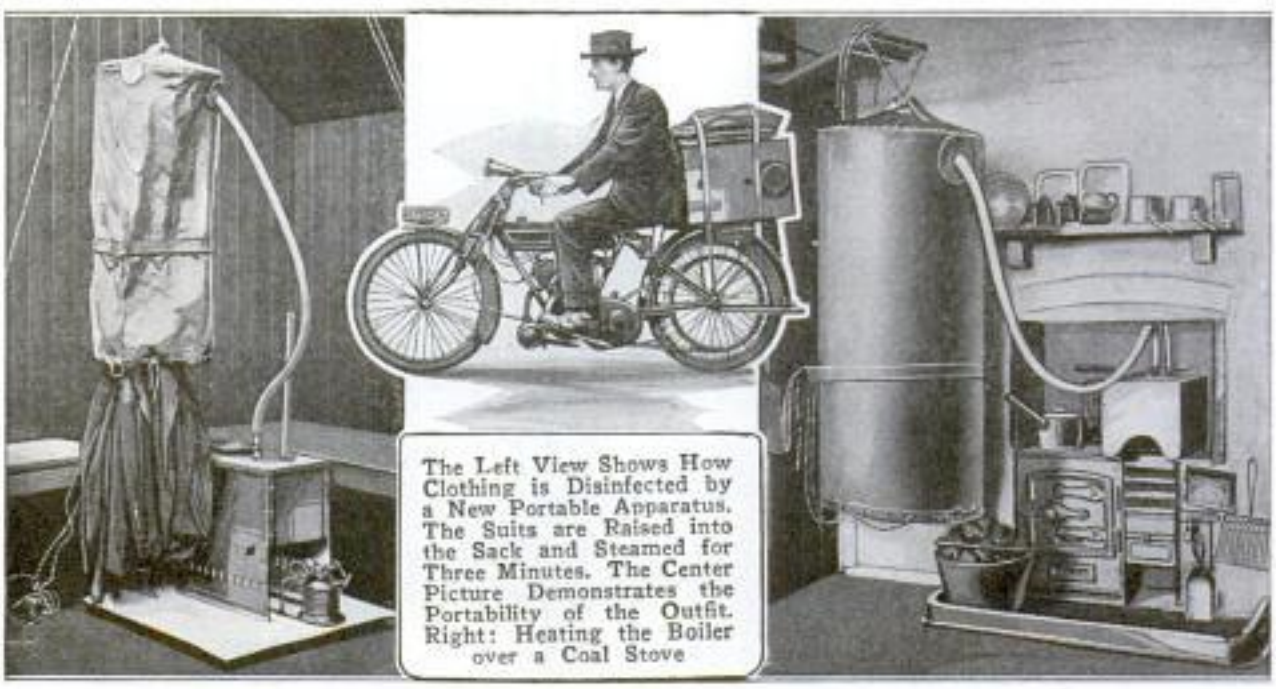
Improvements have recently been made in a well-known make of safety razor that, it is claimed, add greatly to the comfort of shaving, and also prolong the life of the blade. The changes from the old design consist of an improved fulcrum for the blade which holds it more rigidly throughout the entire length of its shaving edge. Under this cutting edge of the blade is a channeled guard, so designed, in combination with an improved contour of its teeth, as to permit the skin to be held more smoothly in front of the cutting edge, giving the blade a better opportunity for doing its work, and preventing any clogging of the cutting edge with hair and soap lather.

CACTUS MADE INTO FODDER BY USE OF BLOWTORCHES

In the semiarid regions of Arizona, where the normal rainfall is only 2.81 in. for the first five months of the year, this year the rainfall has been reduced to as little as .46 in. for that period. Consequently the only vegetation that has survived has been the cactus in its various forms, plants that it is impossible for cattle and sheep to feed upon, because of their prickliness of both stem and leaf. The smaller ranchers, and the Indians, who were unable to send their cattle and sheep to better watered districts have had to make the prickly cactus edible, and they have done this by burning off the thorns and spines with gasoline blowtorches. The work is somewhat slow and tedious.

DISINFECTOR FOR WHOLESALE CLEANING OF CLOTHES

In line with public disinfection methods developed during the war, a portable apparatus has been devised for the wholesale disinfection of clothing, especially that of the heavier sort. It consists essentially of a steam boiler and a coal or oil-burning heater, together with a special sack for containing the raiment. The suits are suspended from hooks fastened to a disk which forms the top of a waterproof but steam-permeable wrapper. The unit is drawn up into an outer enveloping sack and steamed for three minutes. On being lowered from the container, the garments are said to be so slightly damp and so intensely hot that they dry in two minutes. One sack enables 10 suits to be steamed and dried, ready to be worn again, within 10 minutes. The hot vapor is conducted from the boiler to the wrapper by means of a flexible rubber hose. The whole outfit may be packed up in a few moments and transported on the back of a motorcycle.



The Left View Shows How Clothing is Disinfected by a New Portable Apparatus. The Suits are Raised into the Sack and Steamed for Three Minutes. The Center Picture Demonstrates the Portability of the Outfit. Right: Heating the Boiler over a Coal Stove

Right: View of the Diminutive Triplane, Just About a Couple of Feet Taller Than the Man Standing in Front of It, and with a Total Wing Spread of Only 18 Feet 8 Inches. The Comparatively Large Size of the Hood Inclosing the Motor Gives Some Indication of the Proportionately High Power Needed to Obtain Buoyancy with Such a Small Wing Area. Below, the Tiny Airplane is Seen in Flight before a Crowd of Interested Spectators

Left: Rear View of the Airplane Showing Its Extremely Small Fuselage with a Cockpit Just Large Enough for One Man. Two of the Machines are Shown Side by Side, and the Men Standing between Them Give an Effective Indication of the Small Dimensions of the Machines. These Machines are Now Flying in Southern California, Where They have been Nicknamed "Aerial Flivvers"

DIMINUTIVE TRIPLANE FLIES NIMBLY WITH EASY CONTROL

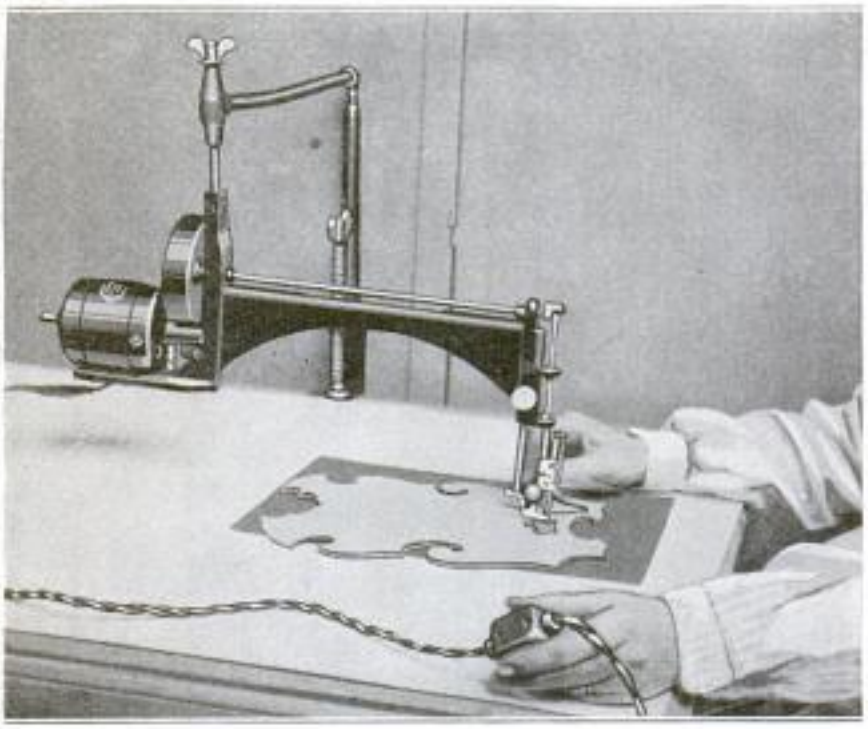
A tiny triplane, smaller even than the famous French Spad, the diminutive biplane that did such wonderful work during the war, is being flown in southern California. Its actual dimensions are a wing spread of 18 ft. 8 in., and a total height from the top of the plane to the ground of only 7 ft. 10 in. Like all small airplanes, it depends upon high speed for its buoyancy, and its ordinary rate of travel is 98 miles an hour, and even in landing its speed is never reduced to less than about 50 miles an hour. Its high speed in proportion to size and weight endows it with exceptional ease of control, and it turns corners with very little banking, and climbs or dives more like a seagull than an ordinary airplane. Its small wing area also permits it to land or take off in very small spaces, and it is possible to do this in country roads when unobstructed by many telegraph wires. Its builders say that it was designed as a pleasure craft, being a comparatively cheap machine, easily cared for, that can be used in the air in the same way as an auto is used on the ground.

FEATHERED SHOES FOR LADIES LATEST PARIS STYLE

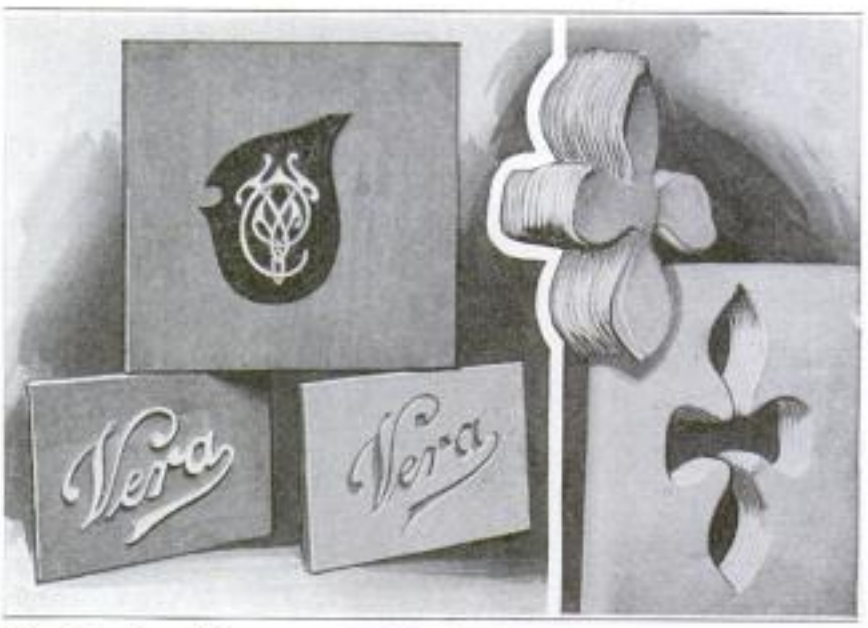
Feathered shoes are to be in fashion for ladies' evening wear this fall, according to an announcement from Paris. The toe of the boot will be sheathed in feathers. Nodding bird-of-paradise plumes will decorate the buckle. A fringe of feathers will encircle the foot insert and heel.

MACHINE CUTS MULTIPLE PATTERNS OF ANY DESIGN

Both art and industry have countless occasions for the use of a means of fashioning in materials of various kinds patterns in the forms of scroll, script, and elaborately fretted work. Up to the present it has been necessary to do this kind of work by hand, excepting in cases where duplications were needed in such numbers that it would pay to make dies, which even in their simplest forms are always costly. The work was then done by stamping. Now there is a machine that will do the same thing without dies, and though not quite so rapidly as by the stamping process, will do it just as accurately. In a general way the machine has considerable resemblance to a sewing machine, and the tool that cuts the patterns corresponds in its location and method of operation to the needle of that machine. At the end of an armlike bracket is a vertical rod, on the lower end of which is a narrow and very thin chisellike cutter, to which is imparted a reciprocating or stabbing motion by means of a small crank, connected to the upper end of the rod, that is rotated at a speed of 2,000 r.p.m. by a horizontal spindle, mounted above the arm and driven from it by a small universal electric motor. This operating combination of the arm, the working cutter, and the driving motor is a unit which is swiveled on another light supporting bracket, also swiveled on its support, so that the combination permits the point where the cutter operates to be moved in any direction as freely as if it were held only by the hand of the operator. The result is that the operator can trace any pattern whatever with the tool just as if he were drawing it with a pencil, and in doing so the cutting tool, stabbing 2,000 times a minute, cuts a clear sharp line through the material being dealt with. The thickness of this line of separation is, of course, no more than the thickness of the cutting tool, and as this is only about .015 in., it will be readily



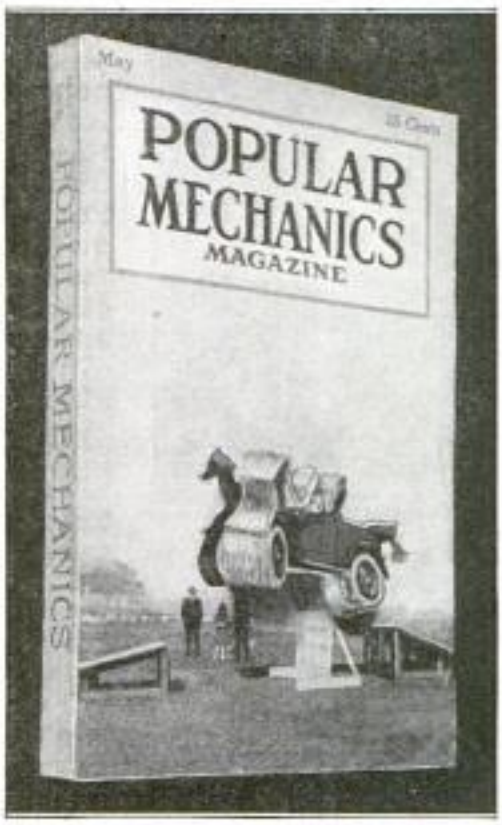
With His Right Hand the Operator Guides the Cutting Tool along the Outline of the Pattern as if He were Drawing It with a Pencil, While with His Left Hand He Controls the Motor Switch



Left: Samples of Marquetry, the Inlaying of Designs in Woods of Different Colors. "Vera" has been Cut in the Two Boards Simultaneously, and the Resulting Parts are Interchanged. To the Right Is a Pattern Cut from 64 Thicknesses of Cotton for Making Artificial Flowers. The Machine may Also be Used in Cutting Appliqué Designs for Dresses

Patterns Cut in Rubber: In One of the Pieces Above, the Pattern is Raised above the Surface. The Four Pieces Below are All Cut at the Same Time

Above: Popular Mechanics Cut at the Same Time in Two Pieces of Different-Colored Stencil Board and Interchanged. Below: The Cutter has Almost Penetrated the Magazine



realized that in certain soft materials it is so slight that daylight will not show through it. The machine has already cut very elaborate designs in many materials, such as soft woods, celluloid, rubber, leather, paper, cloth, cork, and even in copper and very thin sheet brass, where its special utility would be in the manufacture of stencils. It has cut patterns in paper up to half an inch thick, and this makes it evident that where numbers of any design in this material are required, many can be cut in one operation. The machine has made possible the revival of the lost art of inlaying leather. Two or three thicknesses of leather of different colors and grain have patterns cut out of all of them at the same time so that they can be interchanged, giving the result of a perfectly fitted inlaid design. The machine is still in its youth, and later, no doubt, it will be made on a larger scale for manufacturing work, and smaller for use in the home.

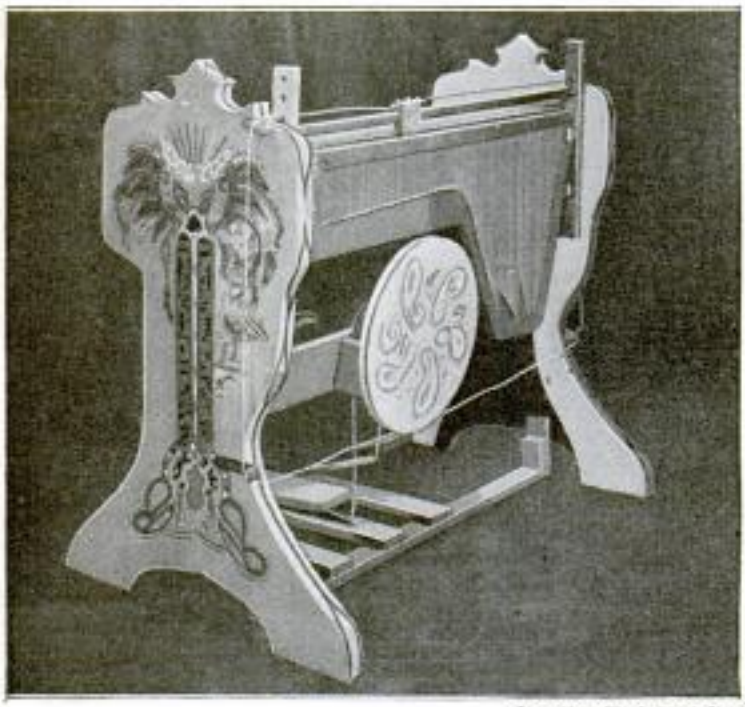
SUPPORT HOLDS FISHING ROD WITHOUT AID OF FISHERMAN

A fishing rod that will fish without a fisherman, if need be, is equipped with a detachable swiveled support that takes the place of the fisherman's hand on the rod. The support can be screwed into the seat, or gunwale, of a boat, and it is readily attachable to or detachable from the fishing rod by means of fingers on the device, which grip the rod much in the same manner as the fingers of a man's hand. The fingers form part of a bracket pivoted in an upright support, the end of which is made with a threaded spindle for screwing into any wooden object, or with a clamp in place of the threaded spindle. The rod can be supported at any angle from the vertical to the horizontal, and when once set, leaves the fisherman's hands free for any other work, or with more than one support he can attend at the same time to more than one fishing rod.

The Fishing-Rod Support Shown Holding the Rod: The Thumbscrew Just below the Rod Is for Adjusting It to Any Desired Angle. At the Bottom of This Support Is a Threaded Stud

LIGHT-PLAYING MACHINE ACCOMPANIES MUSIC

A machine designed to accompany music with harmonious lighting effects has been invented by an eastern artist. The instrument is in the form of a rheostat consisting of continuous parallel loops of resistance wire of different lengths, each having a contact point over which passes a metal block, completing the circuit. The movement of the block is controlled by a cable running over pulleys operated by means of pedals. As the sliding block is moved back or forth over the wires, the degree of light intensity is varied to suit the music, accentuating the musical phrasings of the soloist or orchestra. It may be played either with or without a special written score sheet.



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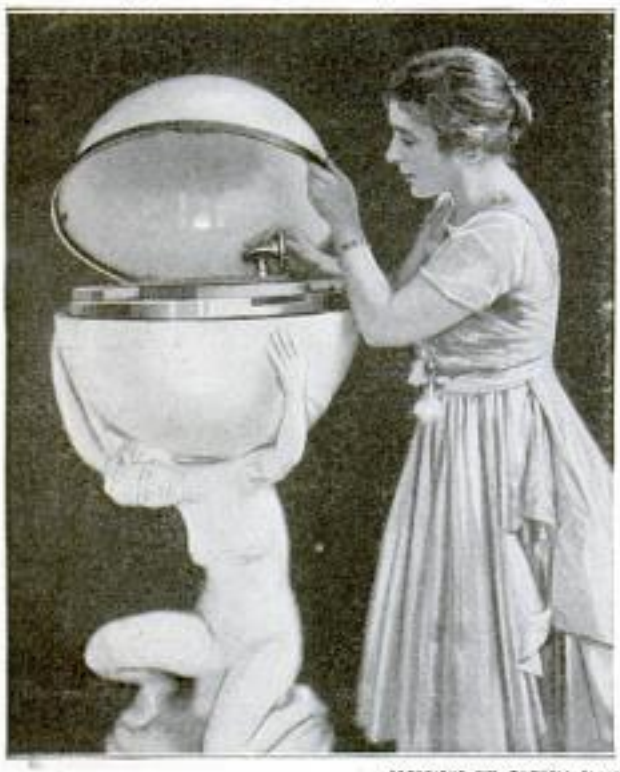
Showing the Rheostat of a Remarkable New Light-Playing Instrument: Resistance Wires are Arranged in Loops of Different Lengths, Contact being Made by a Sliding Block

A further adaptation of the principle of artistic lighting expression through resistance coils is the illuminated phonograph. In this case a rheostat of modified form is used and the light intensities controlled by means of a cam, moving in synchronism with the record. A translucent globe incases the record, motor, rheostat, and accompanying lights.



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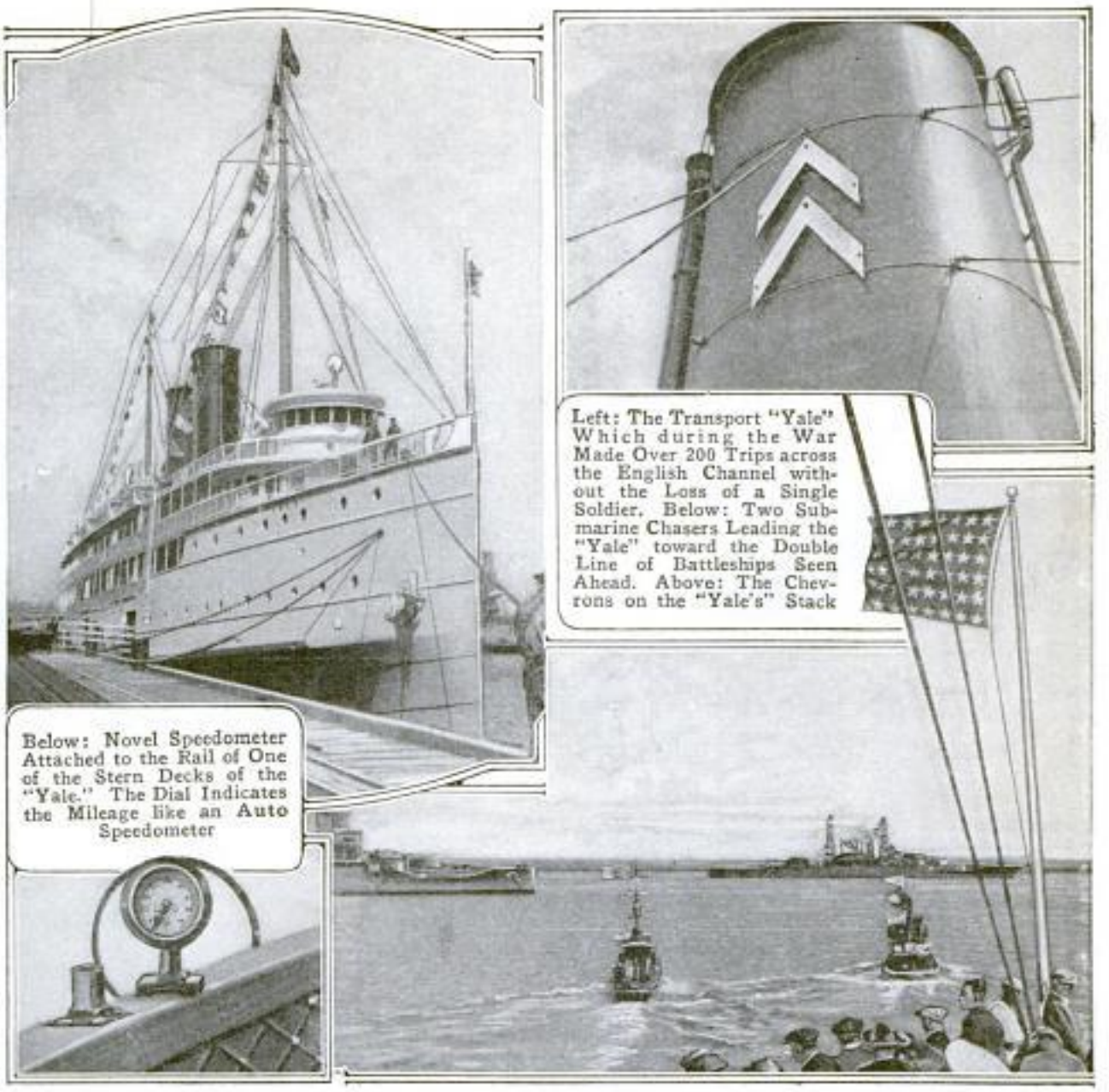
An Adaptation of the Principle of Harmonious Light Control to a Phonograph: The Artist-Inventor is Starting a Record Synchronized with the Control of the Rheostat Incased in the Translucent Globe

WASTE FURNACE HEAT UTILIZED IN BOILERS

The waste heat from ten 75-ton open-hearth furnaces has been converted into power by the installation of a boiler plant, consisting of vertical two-pass boilers with induced-draft fans. On account of the limitations of the space available, the boilers had to be disadvantageously located, about 50 ft. distant from the furnaces, but in spite of this each boiler averaged about 250 hp. during operating hours. At first there were occasional gas explosions in the boilers, but it is thought these can be prevented by more skillful manipulation of the furnace valves. Each of the open-hearth furnaces delivers to the boilers about 65,000 lb. of waste gas per hour at a temperature of about 1,100° F., and it is estimated that with eight of these waste-heat boilers in operation, the coal consumption of the power plant can be reduced from 1¾ to 1½ lb. of coal per kw.-hr., or a saving of about 15 per cent.

¶The use of the alloy duralumin, which was employed so largely during the war in the construction of airships, has been applied, in Germany, to the manufacture of motorboats. It was demonstrated that a duralumin launch, 33 ft. long and with a beam of 7 ft. 6 in., could be propelled at a speed of over 12½ miles an hour by a 4-cyl. 14-hp. engine, because of the lightness of the material.



Left: The Transport "Yale" Which during the War Made Over 200 Trips across the English Channel without the Loss of a Single Soldier. Below: Two Submarine Chasers Leading the "Yale" toward the Double Line of Battleships Seen Ahead. Above: The Chevrons on the "Yale's" Stack

Below: Novel Speedometer Attached to the Rail of One of the Stern Decks of the "Yale." The Dial Indicates the Mileage like an Auto Speedometer

UNUSUAL HONORS ACCORDED SHIP

By FRANK B. HOWE

DURING the late war, the transport "Yale" made over 200 trips across the English Channel, carrying every man safely, despite two submarine brushes. After the war, it was sold to a private concern and put into drydock to be completely refitted for passenger service between Los Angeles and San Francisco.

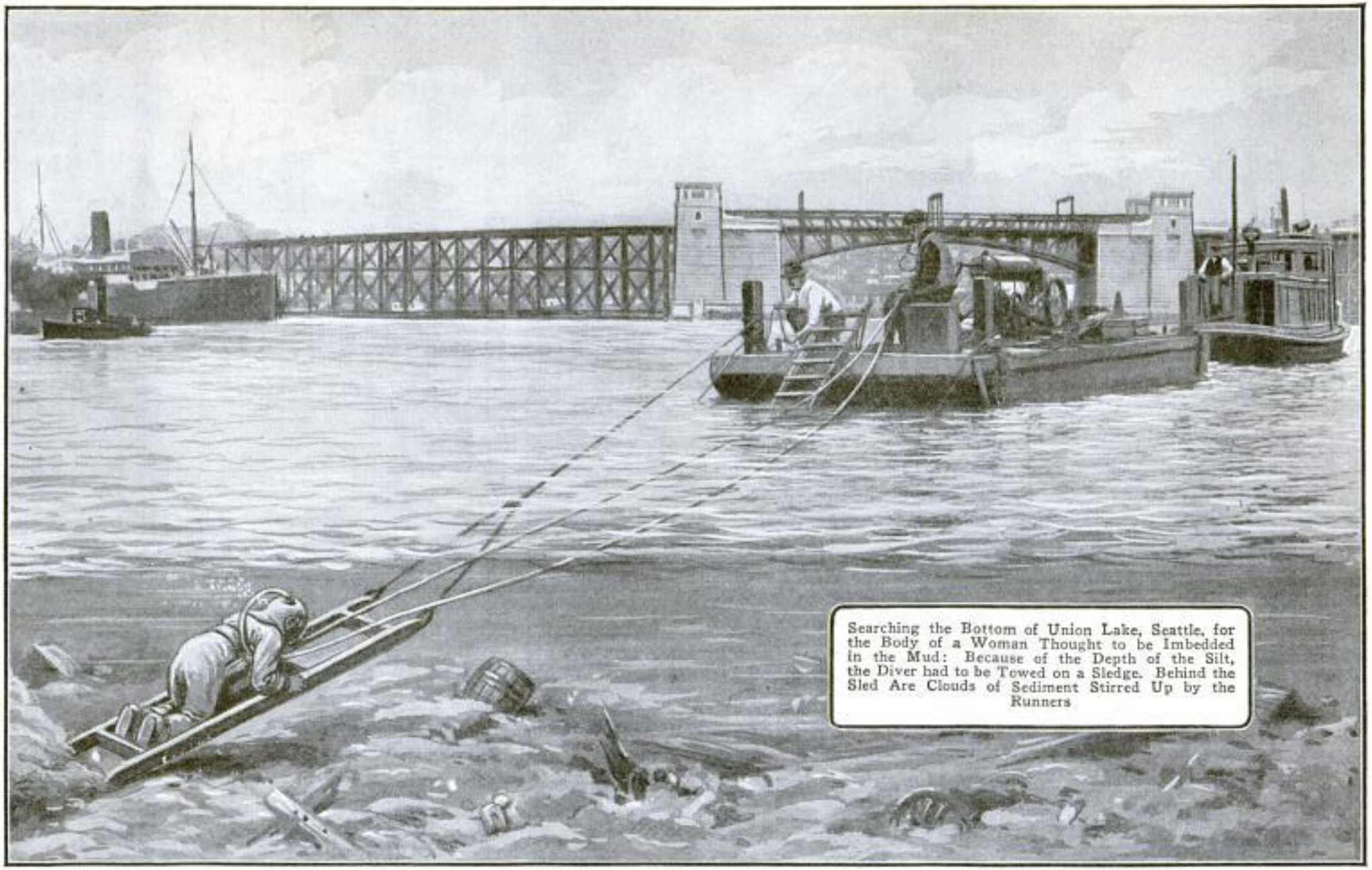
While the citizens of the two cities knew, in a casual way, that the boat was to make its maiden voyage after the refitting process on a certain day, they were scarcely prepared for the send-off the Pacific division of the U. S. Navy had quietly prepared for their former associate.

Fifteen minutes before the ship was to leave, two submarine chasers appeared on the scene. These, with flags flying, took positions on either side of the prow of the huge "Yale" and escorted it down the channel of the Los Angeles harbor to the breakwater, where seven battleships were lined up in a double line. A band was on the deck of each ship and as the "Yale" passed between the two lines of ships, each dipped its colors to her.

Arriving at the end of the line, a destroyer took up the lead and escorted the ship well out to sea. Similar festivities accompanied the ship's arrival in San Francisco the following morning.

From now on, each time the ship arrives in port, "general quarter" will be sounded on each battleship as it passes; the sailors will be lined up on the deck, and the colors will be dipped as the former transport goes by.

The "Yale" is a big ship and accommodates about 500 passengers, although 3,000 can be easily carried. Two gold chevrons are mounted on its stack, as a badge of its former military service.



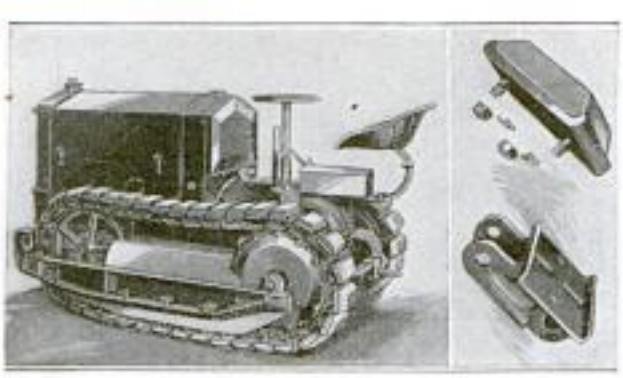
Searching the Bottom of Union Lake, Seattle, for the Body of a Woman Thought to be Imbedded in the Mud: Because of the Depth of the Silt, the Diver had to be Towed on a Sledge. Behind the Sled Are Clouds of Sediment Stirred Up by the Runners

DIVER DRAGGED OVER LAKE BOTTOM ON SLEDGE

In endeavoring to locate the body of a woman supposedly imbedded in the mud of Union Lake, Seattle, a new method had to be devised for exploring the bottom. Because of the extreme depth of the mud it was found practically impossible for a man equipped with a diving suit to move about. A sledge towed behind a boat at a speed just sufficient to keep it from sinking too deeply in the silt was finally decided upon as a means of locomotion. Consisting of two side beams and spacing crosspieces, the sled was suspended, from the front end of the rails to the police-patrol boat, by means of a long hawser. On the rear of the sledge rode the diver in a standard diving suit, gliding over the surface of the mud in a crouching position, the rear ends of the runners stirring up clouds of sediment. On the boat were several attendants, the air pump, and gasoline engine. At times when a stop would be made for investigation of an object on the lake bed, the diver would be forced to wallow in mud up to his neck. During the several weeks of search, thousands of miles were covered in this manner.

RUBBER BLOCKS FORM TREAD OF ENDLESS TRACTOR

A well-known make of endless-track type of tractor is equipped with rubber blocks for industrial-haulage purposes. The hard-rubber block is vulcanized to a channel section of steel which is bolted to a specially constructed track shoe. In this manner sections of the tread may be renewed without replacing the entire track. It is claimed that steel lugs are injurious to the floors of factories and warehouses, especially when of wood, and for this reason a rubber tread is of practical advantage.



This Tractor is Equipped with Rubber-Shod Pads Bolted to the Links, as Shown on the Right

ELECTRIC HEATER FOR LIGHT MELTING OPERATIONS

An electric heating instrument has been devised by an eastern inventor intended for use in soldering, branding, sealing-

The Wax-Sealing Device, Manipulated by the Girl Seated at the Bench, is Electrically Heated

wax melting, and other operations of a similar nature. The heating element is in the form of a rectangular bar of copper which has an end protruding between two electric-resistance coils which are both incased in metal sheaths insulated by mica strips. When it is desired to hold the apparatus in a stationary position, especially for bench operations, it may be clamped to a suitable standard or bracket by means of a handle protruding from the sheaths. It is turned on and off by means of an ordinary switch.

HOT STONES PILED IN BOILER SAVE COAL IN COLD CANADA

At a school in Canada advantage was recently taken of the heat-retaining property of stone. The large space at the back of a boiler, connected with the steam-heating system, was filled with stones, and it was found that when the stones were once thoroughly heated the fire could be allowed to go out, and the stones would keep up steam for a considerable time. Tests were made with two boilers, one a new one and the other old, and it was found that the new boiler kept up steam for 20 hours after the other boiler had ceased to give out heat.

¶A new inside-tire blow-out patch is provided with a feathered edge of pure gum. It is said this prevents chafing, possible with the ordinary patch, the insertion of which causes an extra thickness near the bead.

STAMP-CANCELING MACHINE SAVES STAMPING LETTERS

To eliminate the manifold and time-consuming operations of affixing and canceling stamps on mail matter, a new machine has been brought out. In most respects it is similar to earlier stamping mechanisms but differs in the point of actual results. Instead of simply attaching the stamp or canceling it, the machine prints an authorized government cancellation mark. Each mark is numbered, and the user of the machine pays the government for a certain number of cancellations. The printing die is mounted in a removable cylinder which the user carries to the post office, where the dies within the cylinder are adjusted to show the number of prints paid for. After these run out, a blank appears.

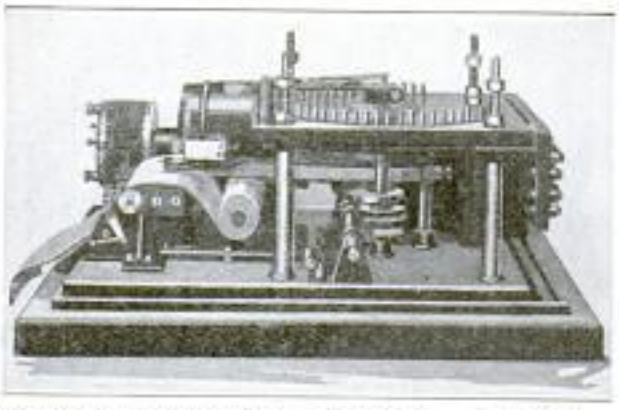
Demonstrating a New Electrically Operated Canceling Machine: A Canceling Mark is Printed on the Envelope by Means of the Cylindrical Die Shown in the Insert

NEW FLEXIBLE MATERIAL FOR WALL PARTITIONS

An inexpensive substitute for lathing in the construction of houses is a new Danish product which consists of thin strips of spruce or pine interlaced with galvanized iron wire. It forms a good base for plaster, and because of its flexible nature has the advantage of being easily applied to irregular surfaces. A smaller amount of plaster is said to be required, and it is well adapted for cheap construction.

INSTRUMENT RECORDS WORKING OF MACHINES IN FACTORY

An automatic instrument for recording graphically the running performance of a number of machines in a factory has been recently introduced in England. As many as 50 machines may be connected up at one time to the recording instrument. It operates electrically, and these connections are to 50 contact studs that are disposed in a circle on a plate that forms the top of the instrument. From the center of this circle a switch, horizontally connected to a vertical spindle, is rotated by a small motor to which the spindle is geared, and passes over the 50 contact studs successively, completing the circuit once every six seconds. Below the plate that carries the studs is a long paper chart that is moved continuously over small cylinders or rollers. Over this paper chart an arm carrying a small inked roller is swung by means of a cam on the vertical spindle that carries the rotating switch, so that it crosses the chart once for each revolution of the switch, returning to its starting point at the beginning of each revolution. As long as all the machines connected to the instrument keep running the inked roller does not touch the paper, but the stoppage of a machine immediately makes a circuit that energizes an electromagnet on the arm that pulls the inked roller into momentary contact with the paper and makes a mark. With the use of a suitably graduated scale it is possible to determine by the printed marks on the chart which machine has stopped running, and to measure the duration of the stoppage.



The Instrument That Automatically Records the Number of Machine Stoppages in a Factory: Each of the 50 Studs of the Instrument is Connected to a Machine

These Two Views Demonstrate a New Wireless Receiving Set Designed More Especially for Physicians. The Picture on the Left Shows the Convenient Disposal of the Small and Compact Instruments inside the Rear of the Tonneau. The Placement of the Antennæ around the Top Edge of the Car Body is Shown on the Right

DOCTOR'S CAR HAS EMERGENCY WIRELESS RECEIVING SET

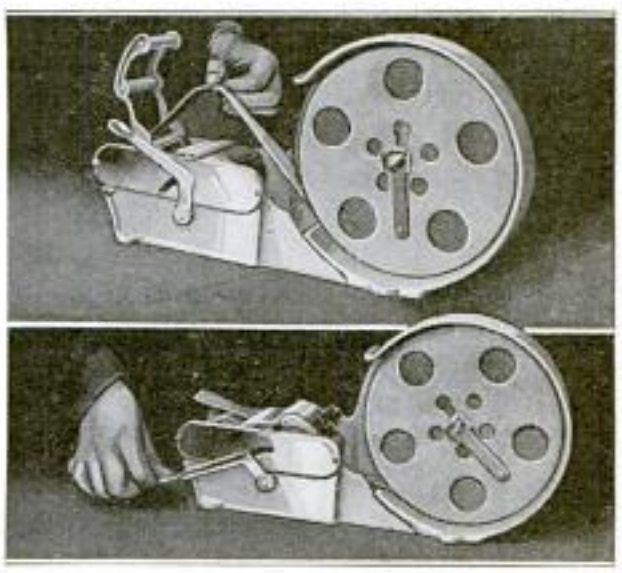
Physicians and others who find it essential to keep in close contact with their homes when out on short motor-car trips, will be interested in the latest development of wireless telegraphy. In its application to the motor car, the tall antennæ are dispensed with and taking their place is a series of four wires which run entirely around the top of the car, resembling a small wire banister. The receiving apparatus is located on top of the back-rest cushion of the rear seat. The outfit has a range of five miles and makes a very useful and modern accessory to the motor car.

METHODS OF UTILIZING WASTE IN GRAPE-JUICE FACTORIES

Methods are being sought for utilizing the waste from grapes in the manufacture of grape juice. It has been found that the waste stems can be made into cream of tartar, the skins into jelly, and the seeds into oil, meal, and tannin extract. As there is rarely enough of this waste material in any one factory to pay for the immediate manufacture of these by-products, the most profitable method of procedure would be to first dry the pomace, then to separate the seeds and skins, and store them until after the busy season in the manufacture of grape juice, when the work of making the by-products could be completed. Experiments in this connection are being made by the Department of Agriculture, and it is stated that there are far-reaching possibilities to the advantage of both consumer and manufacturer.

NEW TAPE MOISTENER HAS PRIMARY WET ROLL

A tape moistener, designed to eliminate twine in the wrapping of store packages, has the particular feature of a lever-operated water-trough roller which is dampened before the tape reaches it. Pressing down on the lever causes the roller to revolve in the water, insuring the gum being wet for the entire length of the strip. The operation takes one second. The tape is mounted in a roll on an axle, where it is held by a removable dial, and after passing over the moistening cylinder, is cut to length by a sawtooth knife. The machine accommodates tape of any width from ½ to 2 in., and up to 800 ft. in length.



Above: Starting the Gummed Tape over the Rollers in Loading. Below: Showing the Lever-Operated Mechanism Which Revolves the Roller in the Water Trough

Transporting Freight across the Sahara Desert by Means of Motor Trucks: The Photograph Shows a Stop Made at a Desert Well during a Successful Trip Undertaken by the French Government from Algiers On the Mediterranean to Tamanrasset, 1,864 Miles from the Coast, in July, 1920

CROSSING THE SAHARA BY MOTOR LORRIES

By E. H. LEMONON

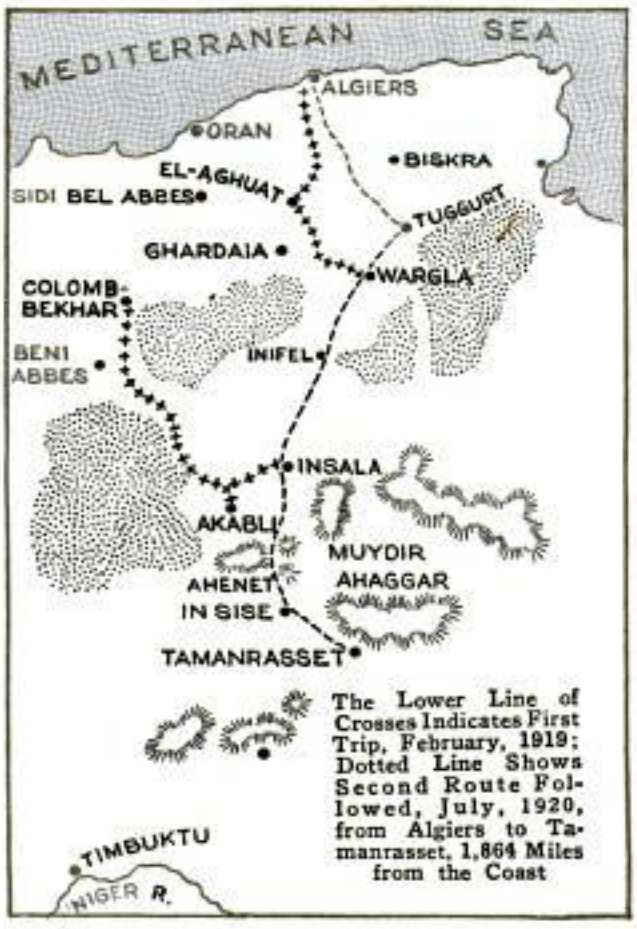
SOME pioneer transport work recently carried out by the French government provided further evidence of the capabilities of the modern business motor vehicle to traverse country that before the war would have been declared impassable to motor cars.

In the instance under review the country twice traversed was the Sahara Desert. In February, 1919, starting from Colomb-Bekhar, the first journey into the desert was a successful trip, and Akabli was reached, this oasis being halfway between Algiers, on the Mediterranean Sea, and Timbuktu, on the Niger. The seven lorries of this convoy were of the type used by the allies during the war, and were fitted with open bodies, the only deviation from the standard practice being the special fitting of the wheels in order to overcome the tendency of the vehicles to bed in the sand and also to provide better cushioning over the rocky portions of the route.

At the best, the road was only a camel track, but frequently this disappeared entirely, and the first motor caravan successfully to invade the Sahara had to travel over trackless sands alternating with rocky surfaces.

The moral result of this first successful undertaking was to overcome the skepticism prevailing in official circles as to the ability of mechanically propelled vehicles to accomplish such a journey.

The second convoy, starting from the suburbs of Algiers in July, 1920, reached Tamanrasset, in the depth of the Sahara Desert. It consisted of 23 vehicles, and its purpose was the establishment of gasoline and supply stations for an experimental air route of nearly 2,000 miles that the French government had decided to open. Also in this case, the only change of importance made in the motor lorries was that their front wheels had been equipped with double pneumatic tires, to give better traction in the sand and better suspension over the rocky portions of the itinerary. The outward journey of 1,864 miles, during which aircraft-supply sta-



The Lower Line of Crosses Indicates First Trip, February, 1919; Dotted Line Shows Second Route Followed, July, 1920, from Algiers to Tamanrasset, 1,864 Miles from the Coast

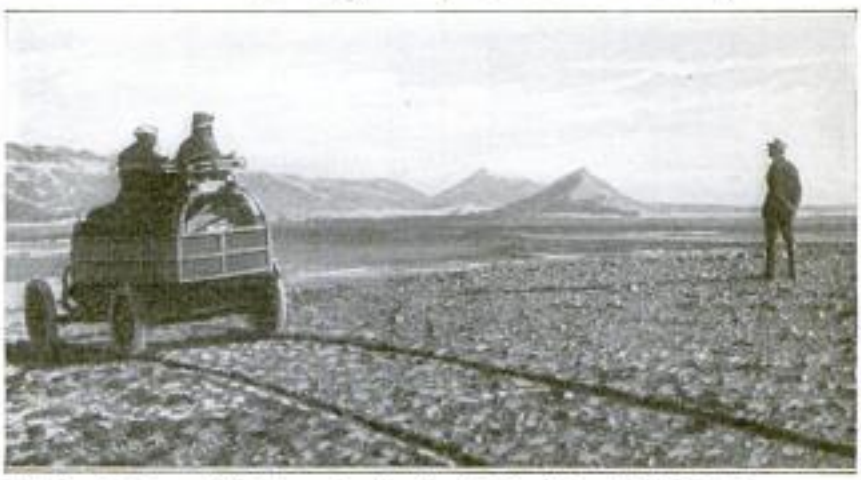
Starting from Insala on the Second Lap of a Motor-Lorry Journey from Algiers to Tamanrasset, a Distance of 1,864 Miles across the Sahara Desert: Except for the Wheels, Which were Equipped with Twin Pneumatic Tires, the 23 Trucks Were Standard, and of the Type Used by the Allies during the War

tions were established at Inifel, Insala, and Tamanrasset, was completed without incident, and the latter point was reached one month after the start. The return trip of this second motor caravan was made under similar conditions but with the vehicles carrying a reduced load.

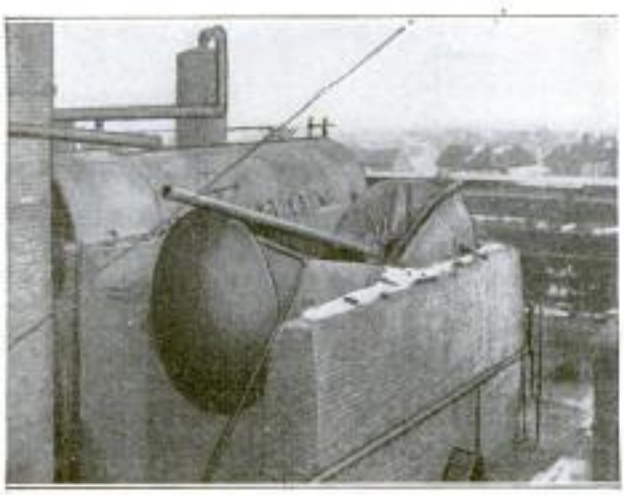
The two performances, while primarily to the credit of the vehicles undertaking it, show the important rôle which motor lorries may play in opening up aerial routes across trackless countries.

Nowhere in the world can be found transportation difficulties of the kind encountered in the Sahara Desert, and so innumerable and varied are the obstacles met with, that it has been thought entirely impracticable for wheeled transport.

That this was an epoch-making achievement cannot be doubted, and it is not beyond the range of possibility that it marks the beginning of a new transportation system over trade routes that have hitherto been traveled exclusively by camel caravans.



This Is the Type of Airplane Trailer Truck Used by the French Government in Making the Pioneer Freight-Carrying Journey, February, 1919, from Colomb-Bekhar to Akabli in the Sahara Desert



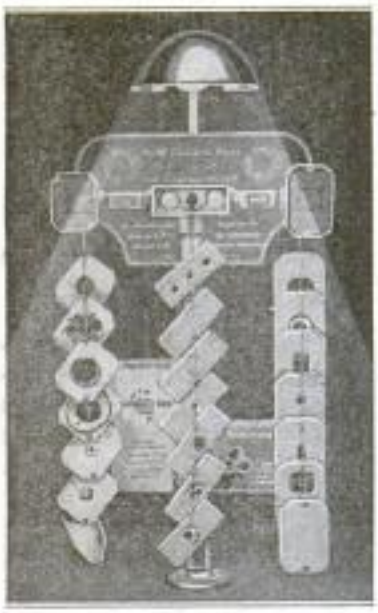
Demonstrating the Power of Atmospheric Air Pressure After Steam had Condensed, Creating a Partial Vacuum in a Boiler at Okmulgee, Oklahoma

VACUUM PLAYS HAVOC WITH STEAM BOILER

The usually imperceptible force of atmospheric pressure often reveals itself by some unexpected and peculiar tricks. One of the latest of its pranks was to crumple the shell of a heavy steel boiler in use near Okmulgee, Okla. The steam within the boiler had been allowed to cool, and in cooling condensed. All of the boiler fittings were so tight that no air could get into the boiler to take the place of the steam, which was now very much reduced in volume, and a vacuum was thus created in the shell. The result was that the pressure of the outside air crushed the boiler shell.

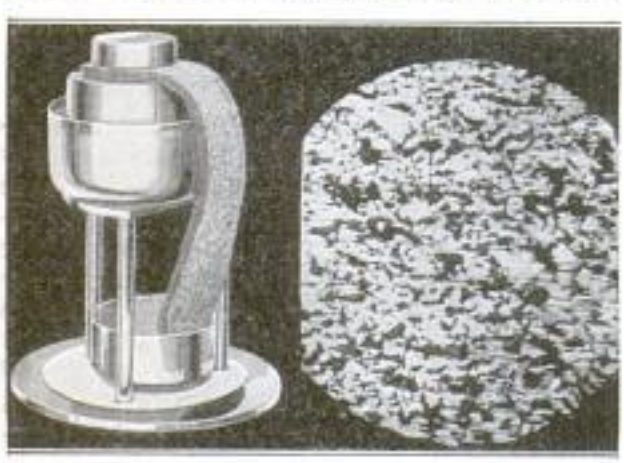
NEW ILLUMINATED ADVERTISER REPLACES WALLBOARD DISPLAY

A new electric-lighted advertising exhibit combines two factors, the drawing power of illumination and the psychology of human desire to become acquainted with an object through direct handling, to create buying appeal for the articles shown. It is in the form of a stand designed to be placed on the counter. Beneath the downwardly reflected light are suspended the articles on sale. Where they are of the same general class, it allows the customer to compare them. Another advantage cited is the additional illumination afforded at the counter.



NEW SELF-LUBRICATING ALLOY FOR HIGH-SPEED BEARINGS

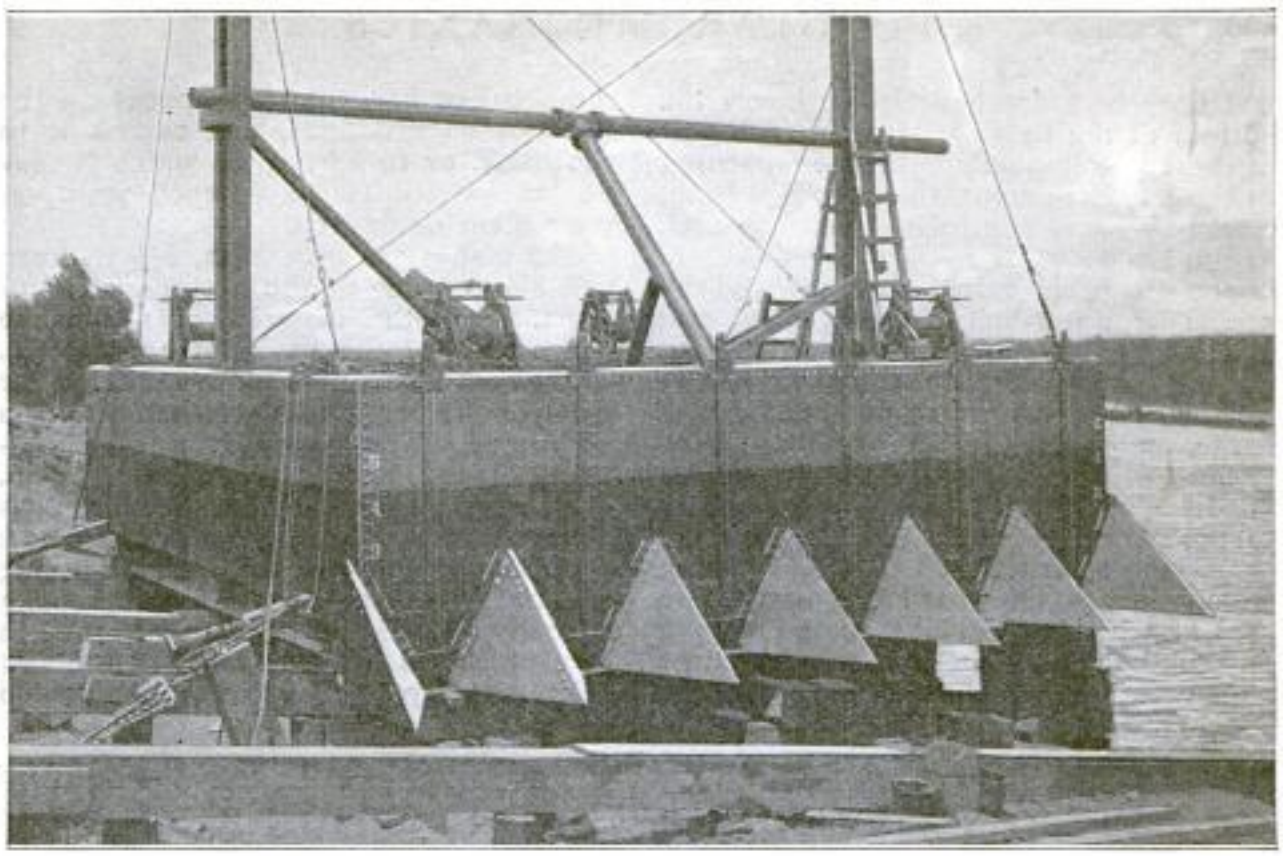
Self-lubricating alloys for bearings have been the aim of many metallurgists for a long time, and several have been produced, more or less successfully. In all cases graphite is depended upon for the lubricant, and this is also the case in a new self-lubricating alloy that has recently been developed, which is distinguished by a specially large amount of graphite in proportion to the metals present—as much as 40 per cent, by volume, of the whole mass. The metals in the alloy are tin, lead, and copper, forming a high-grade bronze. The mixture, in powdered form, is pressed in dies to the shape required, which ordinarily is in the form of bushings for bearings. After being baked, these bushings are finished by grinding, and are then ready for use. The alloy is so porous that it can absorb as much oil as 2½ per cent of its own weight. This extreme porousness is proved by placing a mass of the alloy in a beaker of oil and by means of a woolen wick placed upon the face of the alloy, which is well above the surface, the oil is siphoned down to a lower level. This is a valuable characteristic in high-speed bearings, and makes it possible to lubricate them by applying the oil only to the outside surface of the bushing. The material has the general appearance of bronze, but not its usual characteristics.



To the Left is Shown the Manner of Testing the Porousness of the Self-Lubricating Alloy by Siphoning through It Oil Out of a Beaker. To the Right Is a Section of the Alloy Showing the Even Distribution of the Graphite

HEADSTONES TO MARK GRAVES OF U. S. WARRIORS IN EUROPE

Permanent markers for the graves of American martyrs of the war in France and England have been designed by the War Memorials Council, whose duties are to study and make recommendations for the beautification of American cemeteries in Europe. The headstone as adopted will be of white marble, 40 in. high, 2½ in. thick, and 10½ in. wide at the bottom, tapering to 10 in. at the top. On the face of the stone near the top will be a circle, 2¼ in. in diameter, in which will be engraved a Maltese cross for the Christians, and a Star of David for Hebrews. Below this will be the inscription which will show the grave number, the name, rank, and branch of service of the soldier; that is to say, either U. S. Army, U. S. Marine Corps, or U. S. Navy. The same type of headstone is to be used in the national cemeteries of the United States. Headstones furnished for graves in this country will be inscribed as desired.



The New "Underwater Plow" for Clearing a Channel in a Waterway: It Has Seven Triangular Cutting Blades, Corresponding to Plowshares, in Front of a Large Float, inside of Which is Installed a Regular Suction-Dredge Plant. The Bargelike Float Is Only About Half the Width of the Channel, Allowing Traffic to Continue

"UNDERWATER PLOW" OPENS SHIPPING CHANNELS

By P. F. SPITZFADEN

THE old Bayou St. John in New Orleans, which has been a waterway navigable to shipping drawing not more than four feet of water since the days of Bienville, 200 years ago, but which, some five or six years ago, became choked by a sand and mud bar about 500 feet wide at its mouth, has been reopened by a specially designed machine, just built at the Louisiana port. The canal runs from Lake Pontchartrain into the heart of the downtown business section of New Orleans, and for about half of its length of six miles is a natural waterway, the remainder being artificially constructed and dug approximately half a century ago. Heavy traffic passed over it until the formation of the bar at the mouth, and discontinuance of the use of this canal owing to the closing of the mouth, put a very heavy burden on the New Basin Canal, which also runs into the city from Lake Pontchartrain.

It is estimated that cargoes worth approximately $10,000,000 a year passed through the Bayou St. John the last year in which it was open, and that this amount will be nearly doubled during the first year after the new machine has cleared away the bar on which it is now working. This means considerable increase in the efficiency of the port, especially for inland-waterway traffic. The newly designed machine, which came as a result of the necessity for a shipbuilding firm to get its boats from its yard on the Bayou St. John out onto Lake Pontchartrain and thence to the Gulf of Mexico, cost approximately $5,600, and has shown such good results in the short time that it has been at work on the bar that boat owners on the bayou have offered to help defray the cost of it.

The members of the Board of Commissioners of the Port of New Orleans sent an expert to study the work of the new form of dredge barge, with a view to using it on other shoals and bars in the waterways of New Orleans, all of which soon are to come under control of that board.

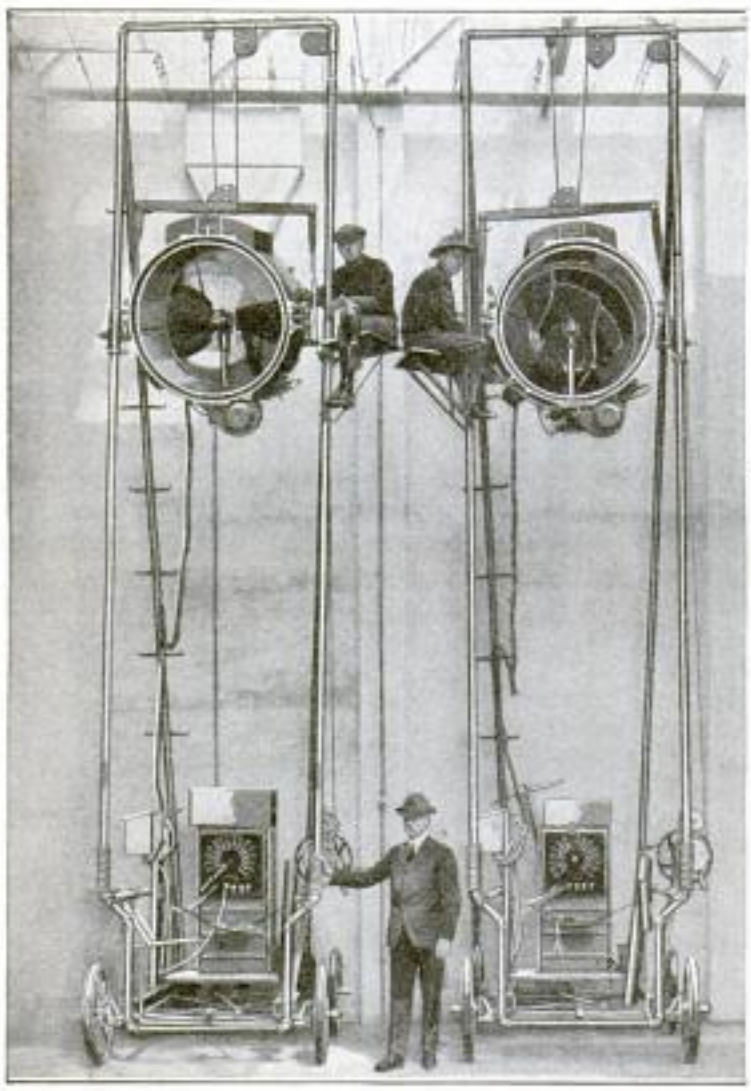
The machine is really a seven-shared plow, inside of which is installed the regular suction-dredge plant, driven by a heavy-duty oil or gasoline engine. The barge, which forms the foundation for the "underwater plow," is 26 ft. 3½ in. in length, 23 ft. 3½ in. in width, and 5 ft. 6 in. deep, drawing, with all machinery installed, 3 ft. The barge body is built to fit about one-half of the channel of the canal, allowing traffic to pass while it is at work. The blades, which are called "power points," are triangular in shape,

and drop to a depth of 18 in. below the bottom of the barge. Between each pair of these power points is the 6-in. opening to the suction pumps, the openings being closed by gates controlled from the deck of the barge.

The barge is raised and lowered by means of water-ballast tanks, filled and emptied by the suction pumps which handle the material from the bottom of the canal. Soundings are made ahead of the barge, and when the bar or shoal in the channel is reached, the ballast tanks are filled sufficiently to sink the power points to the necessary depth against the sand or earth obstruction. Cables, running from winches on board the barge, are then attached to snubbing posts or piling on each bank of the canal, and the barge pulled forward by winding up on the winches. As the power points tear into the shoal or bar, the pump sucks up the material so dislodged, and carries it to the bank, or to barges on which it may be transported to be dumped wherever convenient or desired.

The blades are 3 ft. high, 3½ ft. long, and 3½ ft. wide at the bottom, made of 5/16-in. steel—the material of which the entire hull of the barge is constructed. There are five of these plow points on the front of the barge with one half-point on each side. The pump is a 6-in. centrifugal sand pump, driven by a 12-hp. horizontal gasoline engine, to which it is direct-coupled. This plant will handle approximately 45 cu. yd. of free-running material per hour, and will pump through virtually all varieties of material found in bars or shoals in any waters in the soft delta country of the lower Mississippi River.

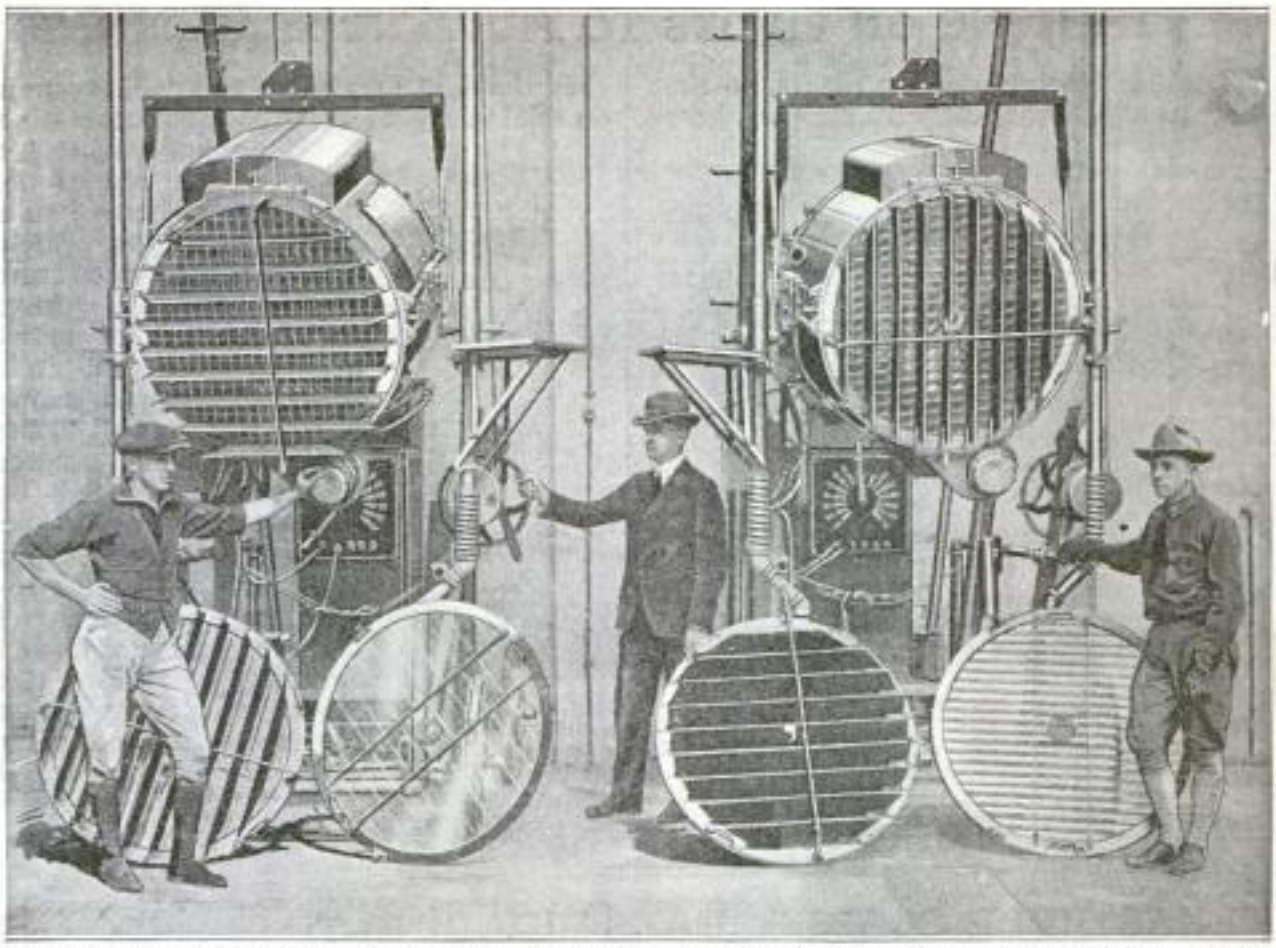
ACTINIC-RAY SEARCHLIGHTS FOR MOTION PICTURES



The Actinic-Ray Searchlights are Sometimes Fitted in High Metal Scaffolds Mounted on Wheels for Portability. The Lights can be Raised or Lowered as Required by the Nature of the Work

Huge naval searchlights, larger than anything used in the navies of the world, and developed to produce a beam of light having five times the actinic value of sunlight upon photographic negatives, recently emerged from the experimental stage, and have been adopted for motion-picture-studio work by one of the largest of the Los Angeles film concerns.

Two of these huge searchlights, producing 1,000,000,000 cp. each of light, primarily ultraviolet, green, blue, and yellow, are now in use. They are the only lights of this type ever built, and have proved so successful in the work for which they are intended that six more are now under construction. One of the huge lights displaces a dozen ordinary studio mercury-arc lamps at about one-fourth of the cost of operation, and with a photographic illumination efficiency approximately 400 per cent greater than a dozen mercury-arc lamps, or sunlight. The development of these lights practically frees the motion-picture industry from the delays and adverse conditions under which the business has been operated during the past years. Weather conditions make no difference, and work may be accomplished with the same efficiency at night as on cloudy and sunny days.



Two Actinic-Ray Searchlights, the First Ever Built, Each of Which Produces a Beam of Light of Approximately One Billion Candlepower, with Five Times the Actinic Value of Sunlight upon a Photographic Negative: The Segmented Glass Fronts Produce the Grade of Light Best Adapted to Photographic Work

Obviously the power of these searchlights is so great that the direct rays cannot be utilized for any sort of photographic work. The light is directed onto the ceiling of the studio to a reflecting screen, which in turn diffuses the light to any particular degree of illumination required, and iris diaphragms in the front of the searchlights control the volume of light, so that it will be directed into a very fine beam or spread out to the width required for any particular purpose.

These actinic-ray searchlights have been developed into several odd forms to meet the peculiar requirements of illumination engineering in the motion-picture industry. They are all mounted upon wheeled carriages for the sake of portability about the studio, and two of the larger types carry high scaffolds on their roller carriages to permit adjustment of the lights up or down. This adjustment for elevation enables the studio director properly to illuminate almost any sort of a scene regardless of its position.

For Close-Up Work the Actinic-Ray Searchlight is Mounted on a Tripod That Runs on Casters, Allowing It to be Introduced into Small Corners

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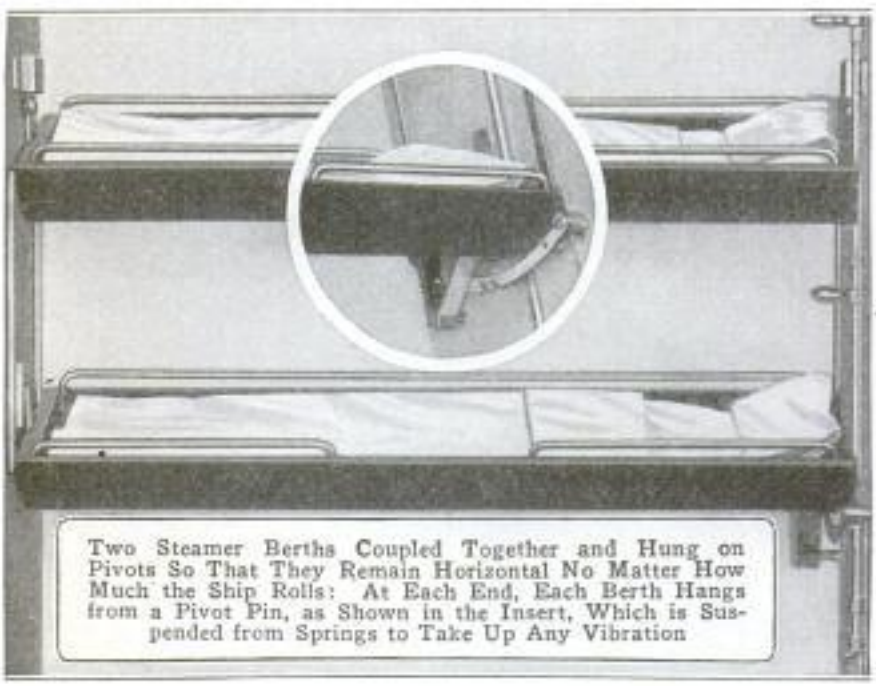
¶Frogs and fish were electrocuted in large numbers recently by a wire that was blown into the Etobicoke River, near Toronto, Can. For nearly a mile along the river practically every frog and fish was killed, and their bodies littered the surface of the stream.

BERTH HUNG ON PIVOTS TO PREVENT SEASICKNESS

Steamer berths hung on pivots, so that they remain practically horizontal however the ship may pitch and roll, are now on trial as a preventive of seasickness on a Pacific-coast passenger vessel. Each end of the new form of berth hangs from a pivot pin, which, in turn, is suspended from a pair of spiral springs that help to take up vibration, shock, and pitch, while the lateral swing neutralizes the roll of the boat. Upper and lower berths are coupled by connecting rods, and swing together. Above each berth a handle projects from a vertical rod mounted on the wall, and turning it locks the berths in a level position for easy entrance, after which they are unlocked again by the same handle.

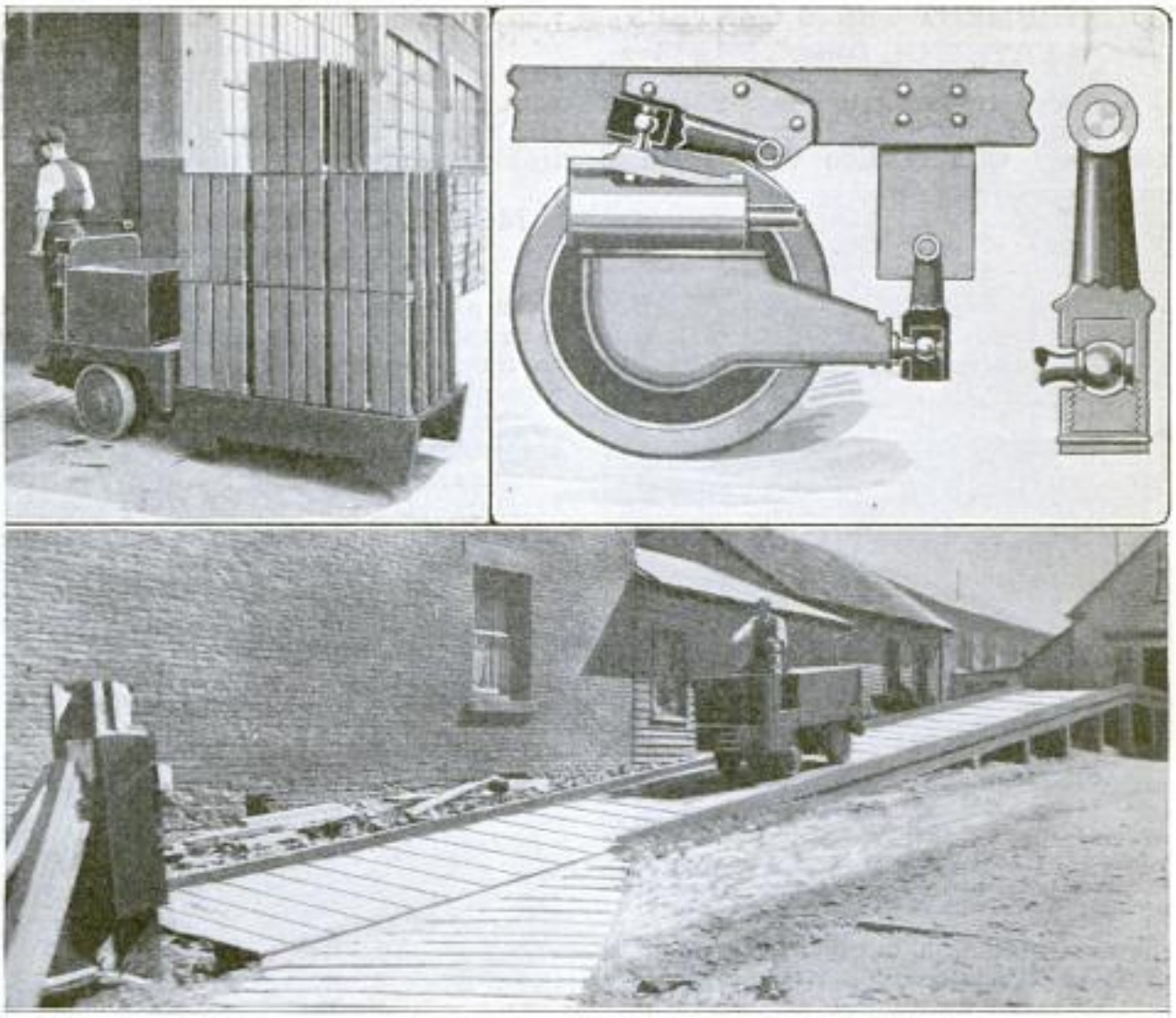


Two Steamer Berths Coupled Together and Hung on Pivots So That They Remain Horizontal No Matter How Much the Ship Rolls: At Each End, Each Berth Hangs from a Pivot Pin, as Shown in the Insert, Which is Suspended from Springs to Take Up Any Vibration

TEXAS BIBLE CLASS BREAKS BUILDING-TIME RECORDS

These Two Photographs Exemplify Coöperative Effort by Means of Which a 24 by 108-Foot Building was Erected in One Day

Members of a Texas Bible class have recently shattered the building-time records of that state by erecting a new meeting house in one day. All of the work was well done, despite the haste. On posts driven in the ground for a foundation, 20,000 ft. of lumber were assembled in a one-story superstructure. Five hundred pounds of nails were also used. The work was started at 6 o'clock in the morning and by 6 o'clock in the evening of the same day, 35 sheets of composition roofing had been applied. The building is 108 ft. long and 24 ft. wide.



The Upper Left-Hand Picture Shows a Freight Carrier Equipped with the Short Ball-and-Socket Torque Rods Shown in the Right-Hand View. This Is for the Purpose of Offsetting the Sudden Strains to Which the Axle is Subjected, Exemplified in the Lower Picture Where the Vehicle is Coming down an Inclined Track

IMPROVED AXLE SUSPENSION FOR INDUSTRIAL TRUCKS

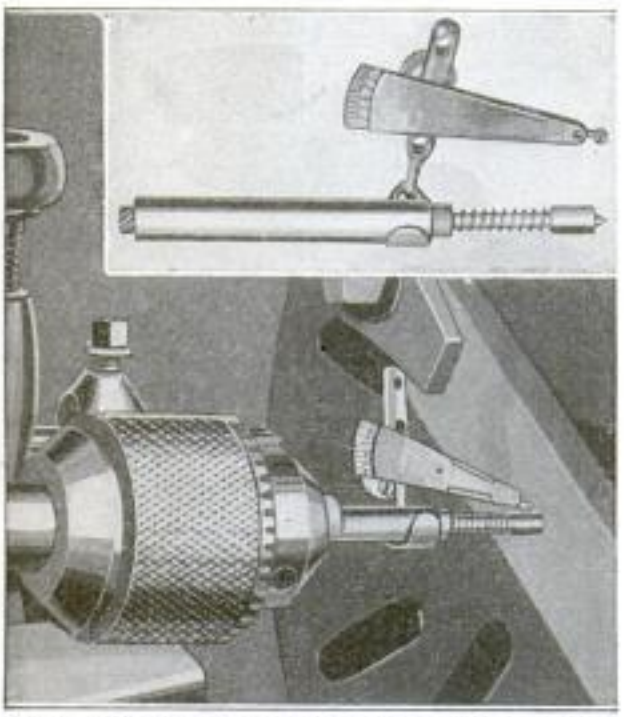
Small industrial-warehouse trucks present many problems of design differing greatly from those used in standard automobile construction. One of these is the method of suspending the driving axles without using long springs, torque tubes, or arms to absorb the twisting effect set up in driving or braking. An eastern manufactory of these powerful little vehicles is using a method of suspension in its product which, it is claimed, meets all the requirements of flexibility and strength. In this design two very short independent torque arms are used, one horizontal and the other vertical. While preventing the axle from twisting, these members transmit a straight-line drive to the frame without strain on the springs, which are of the vertical-compression coil type. The horizontal arm is of the conventional form, but very short, and ends in a ball-and-socket joint. The vertical arm, projecting from the top of the axle housing, also has the same sort of fitting. This arrangement permits the axle to play freely, vertically, but restrains its twisting movement.

ANTIFRICTION ROLLER DEVICE MAKES DRAWERS SLIDE EASY

Spreading the adjustable table and pulling out heavy drawers are two jobs made easy by a lately devised antifriction roller. It is mounted in a circular flange and is made of steel. Two pointed lugs projecting from the flange serve as anchors to hold the unit in a ⅝-in. hole drilled to receive it. When the device is fitted in such places as drawer or extension slides, it forms a revolving bearing for one side of the contact and makes the drawer or extension action easy. The little roller projects 1/16 in. above the circular flange.

INSTRUMENT TESTS CENTERS ON LATHE OR DRILL PRESS

A device to facilitate the locating of prick-punch marks, or centers of holes, accurately with relation to a machine

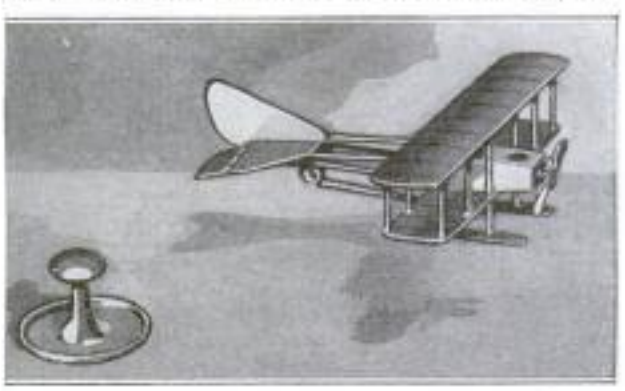


Truing Up a Prick-Punch Mark on a Piece of Work Clamped to the Faceplate of a Lathe. Insert: The Center Tester with an Indicator Attached to It

spindle in lathe, milling-machine, or drill-press work, consists of a tubular holder that fits in the machine spindle, and which has sliding in it a rod with a center point at its working end on which is a collar holding a coiled spring so that the center point is held to the work. A bar carrying a test indicator has a ball-jointed connection to the holder. When either the work, or the spindle, is revolved, the indicator enables the operator to true up the one with the other. The center can be left out, and the indicator used by contact for truing up internal or external surfaces.

MODEL OF HYDROAIRPLANE MAKES A TINY TRINKET

An airplane, complete in every detail, is certainly a large and complicated object to reduce to the size of a trinket, and, moreover, one that is small even for a trinket. With his magnifying glasses and his minute tools, a jeweler has built an airplane of solid gold with wings that measure only 1⅝ in. in length, and that is only 1⅜ in. from head to tail. It has a rotating propeller, hinged rudders on the tail, and pontoons below it to make it a hydroairplane. Attached to it is a safety pin, so that it can be worn like a brooch. It took 14 hours to complete this ingenious specimen of the jeweler's art.

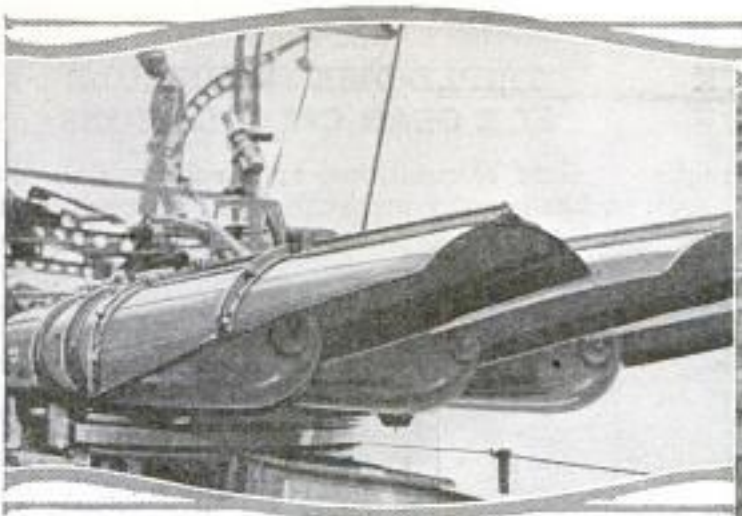


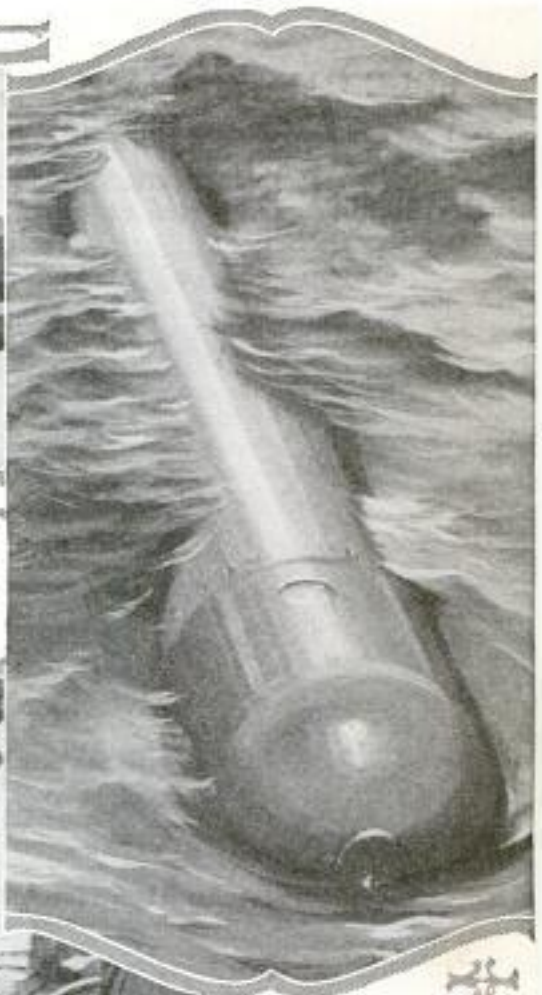
By Comparing This Tiny Golden Model of a Hydroairplane with the Ordinary Collar Stud beside It, It Is Easy to See How Small It Is

DESTROYER TORPEDOES FIRED FROM TRIPLE TUBES

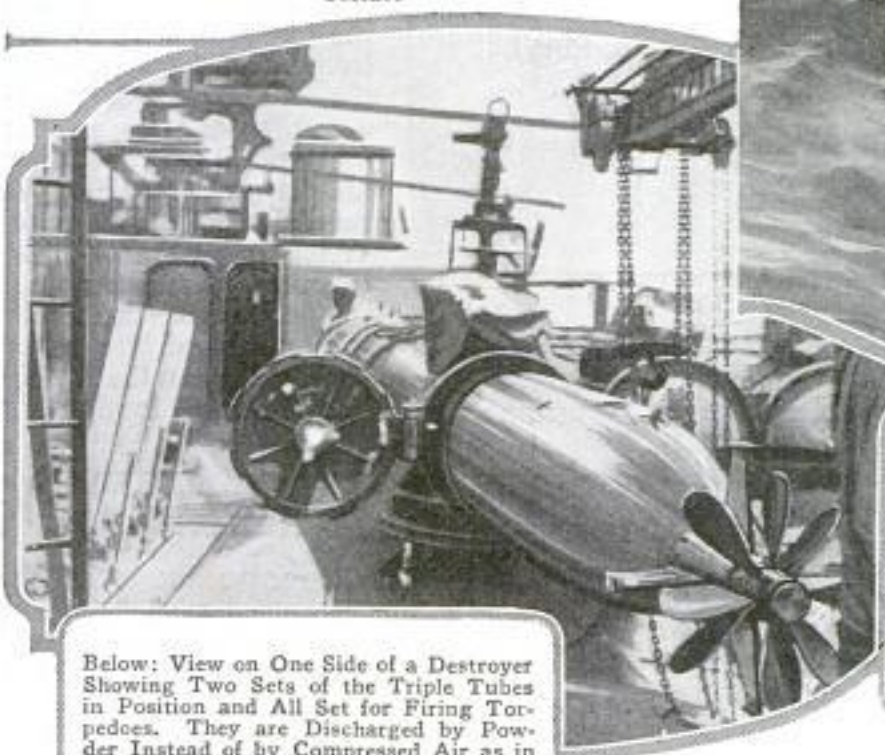
Long before the world war, torpedoes in battleships and submarines had been extensively developed, but it was only late in the war that torpedo seaplanes were successfully employed, and it is here that lies the field of greatest future development. Torpedoes are fired from any form of craft by means of tubes, which in battleships are below the water line, but in destroyers, because of their high speed, from tubes above the water line. The latest destroyers are equipped with triple tubes of this description, making it possible to fire three torpedoes simultaneously, or in very rapid succession. The torpedoes are discharged by powder impulse, instead of by compressed air, as in submarines. Immediately on striking the water they submerge to a predetermined depth, and are propelled toward the target by air-driven turbines inside the shell of the weapon. Their maximum effective range is about 10,000 yds., and in target practice boats are stationed in the vicinity of the target to recover the torpedoes, when they rise to the surface, which happens automatically at the conclusion of their run.

Destroyers are oil-burning, and therefore operate without smoke, but they possess the means of making heavy clouds of black smoke to form a screen for the battleships which they accompany in naval conflicts. This smoke screen is formed by controlling the supply of air to the burners of the destroyer's boilers.



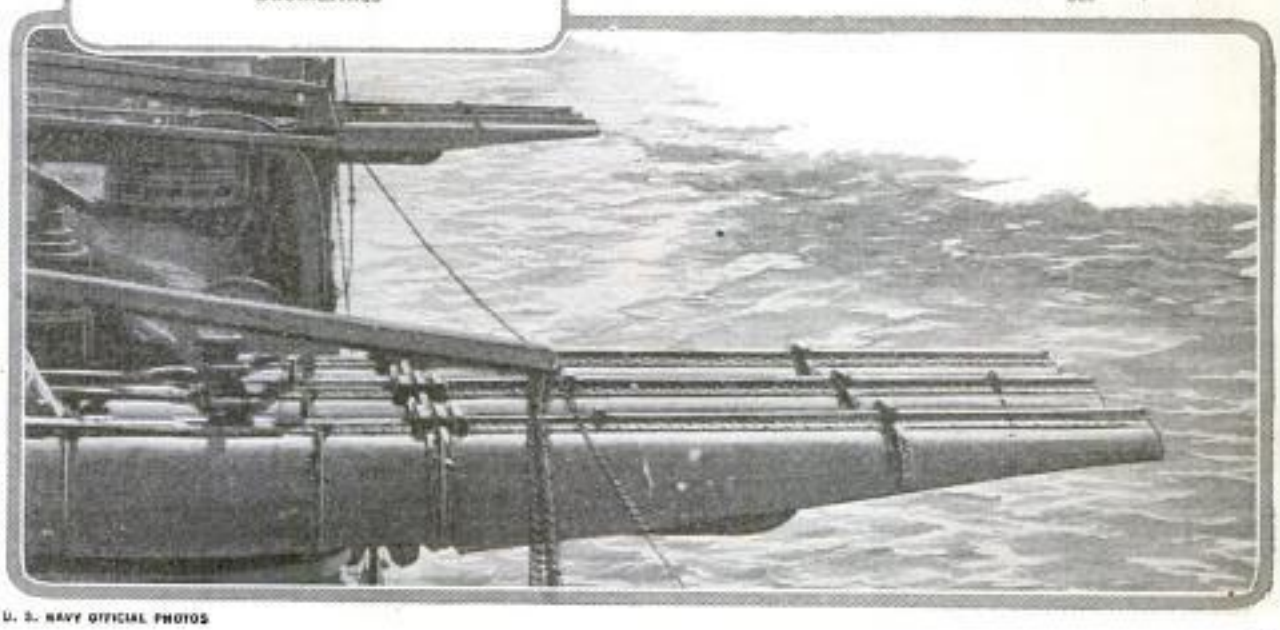


Above: Three of the Tubes Viewed from the Discharge End, Showing a Torpedo in Each Tube Ready to be Fired. Right: A Torpedo at the End of Its Run After It has Risen to the Surface



Left: Inserting a Torpedo into One of the Tubes. View is Taken from the Stern End of the Torpedo, and Shows Its Propeller Which is Driven by a Compressed-Air Turbine, Located inside the Torpedo Shell. The Cover of the Breech of the Tube can be Seen Open. It is Closed and Locked When the Torpedo is Fully Inserted

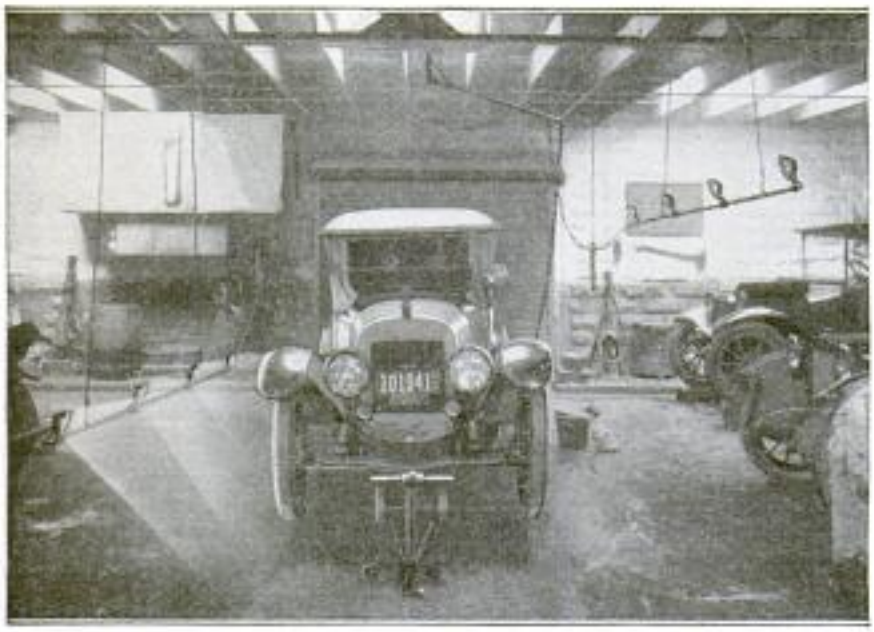
Below: View on One Side of a Destroyer Showing Two Sets of the Triple Tubes in Position and All Set for Firing Torpedoes. They are Discharged by Powder Instead of by Compressed Air as in Submarines



U. S. NAVY OFFICIAL PHOTOS

SIMPLE GARAGE WASH-RACK LIGHTING SYSTEM

A lighting system for garage wash racks which illuminates all the exterior parts of automobiles and thus facilitates the thorough cleaning of them, is simple in the extreme, consisting of two lengths of standard pipe conduit with four incandescent bulb fixtures fitted to each of them at equally spaced intervals. Suspended by cables at each side of the wash rack, the fixtures can be raised or lowered and secured at any height desired. The light bulbs are backed by reflectors which concentrate the beams directly on the work in hand.



A Simple Garage Wash-Rack Lighting System Which Concentrates the Light Exactly Where It is Needed

LOOSE FIRING PIN CAUSES AIRPLANE-BOMB EXPLOSION

Because of a defective safety pin, a 50-lb. TNT bomb exploded with terrific force at the government proving grounds at Aberdeen, Md., recently, killing four men and wounding 11 others. The explosion occurred when the bomb, fastened with several others to a rack suspended from a large DeHaviland plane in flight, somehow became loosened and dropped to the ground. Even then the charge would not have exploded, attendant officials stated, had not the safety pin purposely provided come out in flight, leaving the firing mechanism unprotected.

¶Fourteen new wireless stations are to be erected in Ecuador by a French company. Buildings for the offices and machinery required have been erected.

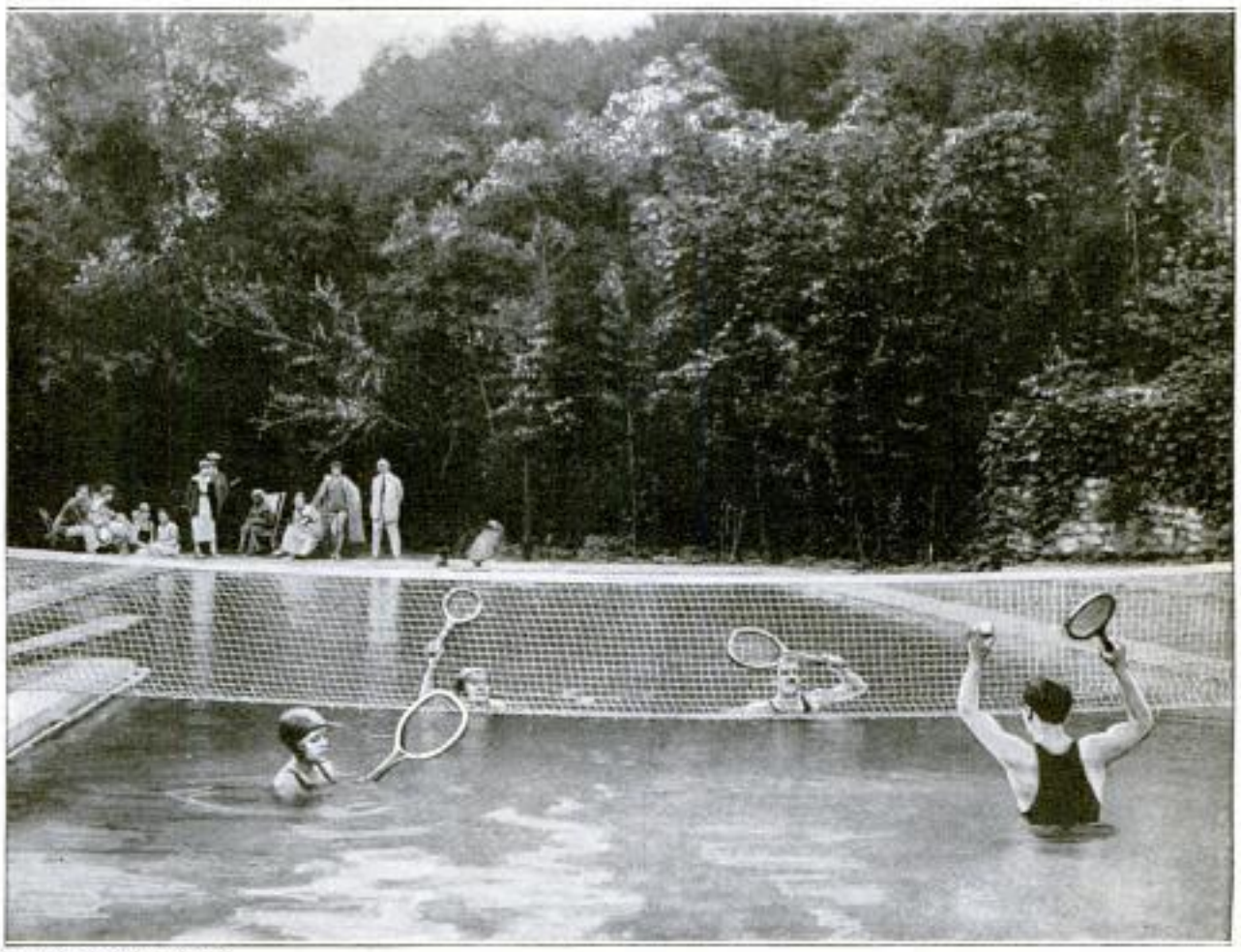
TRIPLE-DISK SLIDERULE FOR GEAR CALCULATIONS

Gear calculations, as a rule, are somewhat lengthy mathematical processes, and therefore a sliderule specially designed for solving gear problems has been brought out by an English instrument maker. It is composed of three different-sized disks of glazed cardboard, which can be rotated independently of each other on a central pin. The intermediate disk has points indicating the material, such as cast iron, steel, bronze, etc.; the outer disk is graduated to represent the tooth pitch, and the inner disk is graduated for the revolutions per minute. When these are brought together a pointer extending from the inner disk indicates on a scale on the outer disk the horsepower that can be safely transmitted per inch-width of tooth.

LARGE WOODEN BLOCKS USED IN LAWN DICE

Wooden blocks, four to six inches in cubic dimensions, are used as elements in a game of lawn dice introduced by a western sportsman. As the blocks are fairly heavy, and are pitched somewhat the same as bowling balls, considerable exercise is afforded. Scoring is the same as in the ordinary game. It is said that the fad is becoming very popular on the west coast.

The Dice Held by the Player in This Picture Are Six Inches Across. They are Pitched Somewhat like Bowling Balls in This New Lawn Game

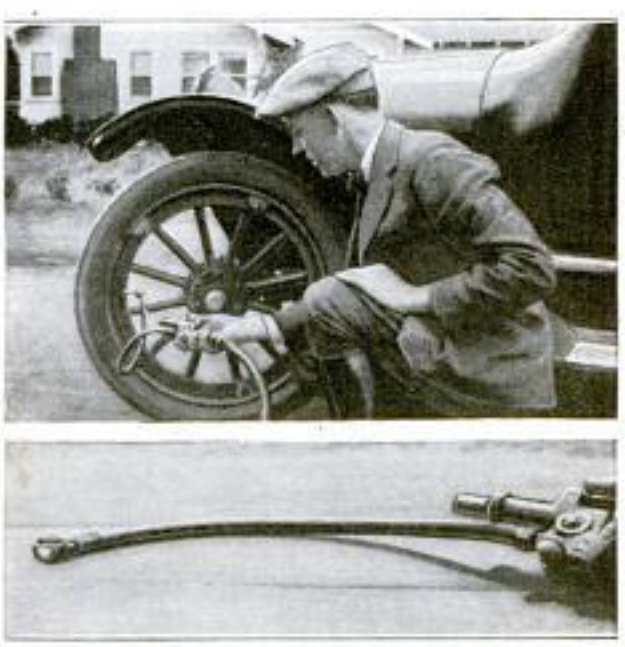


"WATER TENNIS" APPEARS ON WEST COAST

A NEW sport now rapidly gaining favor on the Pacific coast is known as "water tennis." It is really an adaptation of lawn tennis to the swimming pool, and is described as a great hot-weather diversion. When splashing about after the rubber ball in a shallow pond protected from the sun by surrounding foliage, all the exercise and sport of the dry-land game are derived, without the annoying heat and perspiration. An occasional mouthful of water adds to the fun of the players as well as of the spectators.

GAUGE TELLS PRESSURE WHILE INFLATING

A new tire gauge gives a pressure reading without previous disconnection of the air hose from the valve. A small casting, intermediate between the hose and a rubber-tube extension, is provided with a valve, and fits the hand somewhat like a pistol. Pressure on a thumb lever causes the air to rush through the tube into the tire, forcing out a graduated cylinder at the end of the casting a distance relative to the pressure in the air tank. On releasing the lever, the cylinder slides back part way into its casing, indicating by the amount exposed the pressure in the tire. If it is greater than the motorist desires a projecting release in the side of the valve allows the air to escape as long as the finger is held against it. The cap at the end of the extension tube fits all types of valves.



The Upper of the Two Views Shows the Motorist Testing the Tire Pressure with the New Gauge. Below Is a Close-Up of the Pistol-Shaped Valve Casting with the Extension Hose and Cap

THREE-POINT SUSPENSION FOR TRUCK AXLES

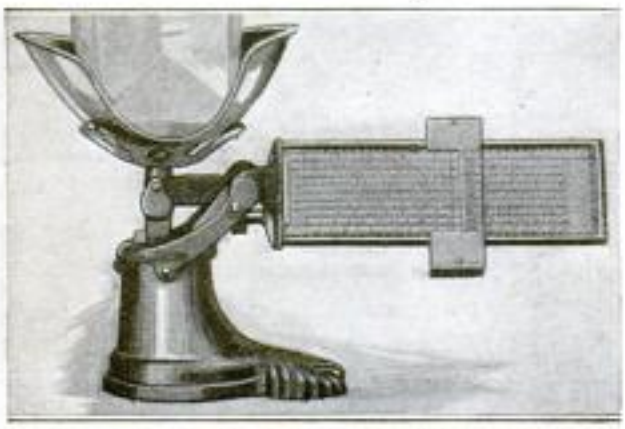
A light truck, built for speed commercial purposes has a front transverse spring that is pivoted at the center, allowing it to rotate through a limited arc. This amounts

The Pivoted Front-Axle Spring Suspension of This Light Speed Truck Allows the Front Axle to Rock Transversely through a Limited Arc, Preventing Frame Distortion

to a three-point-suspended truck frame. Since the engine, transmission, and bearings are rigid with the frame, and the front axle is separately free to pivot about a fixed center, the entire truck will adapt itself to the unevenness of the road without the distortion of any one of its units. The front axle is braced with the usual radius rods.

COMPUTING SCALE FOR CANDY HAS ADJUSTABLE BEAM

A computing scale, specially designed for candy, but which could be used for weighing anything up to 2 lb., has a beam on which can be read directly the cost of

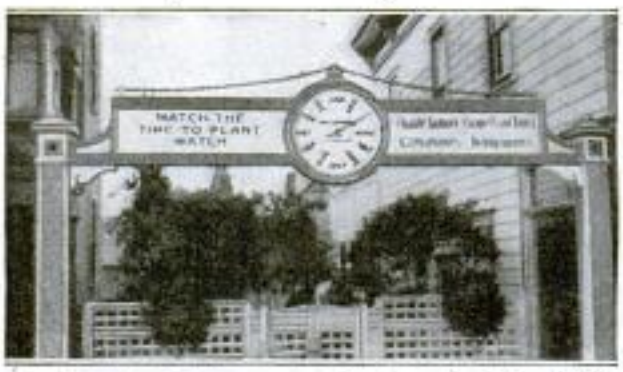


The Computing Scale at Work, the Wire on the Movable Poise Showing on the Graduated Beam the Cost of the Candy at Different Prices per Pound

any quantity in the scale, at prices per pound from 20 cents to $1.00. An indicator poise that slides on the beam has a fine wire that intersects the figures on the beam, in ½-oz. graduations, and along the wire the figures give the cost of the candy in the scale. As in most of such scales, the beam is adjustable around its horizontal axis so that it can be read from any angle. The scale is of substantial metal construction, attractively finished, and the computing face of the beam is white, with easily legible figures.

CLOCK TELLS PROPER TIME TO PLANT GARDEN

At the entrance to the establishment of a California florist and nurseryman is a clock, which instead of telling the time of day, tells the proper time to plant various plants and trees. Instead of the numerals indicating the time of day, the names of the months are used, and but one hand is provided. At the right of the dial is a space provided for hanging light sheet-iron panels bearing the names of



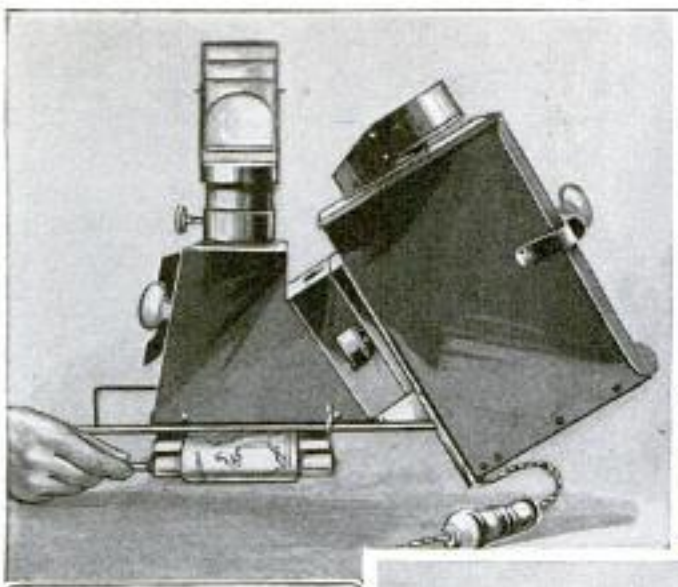
An Attractive Entrance to the Grounds of a Florist and Nurseryman is Provided with a Clock Which Indicates the Proper Season for Planting the Various Plants, the Names of Which are Displayed on Panels at the Right

the particular plants and trees that should be planted at the time indicated by the hand on the dial.

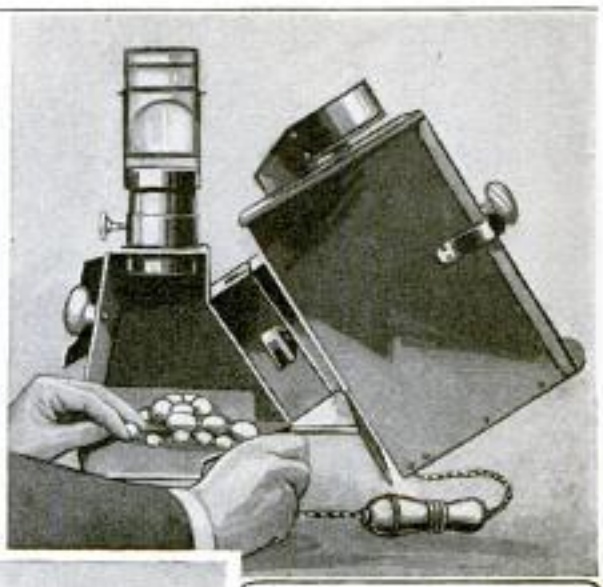
NO SLIDES NECESSARY FOR NEW DAYLIGHT PROJECTOR

A projection lantern which photographs directly from the object itself, dispensing with slides altogether, has been invented by a French physicist. A remarkable feature of the apparatus is that it operates in broad daylight, there being no luminous cone and darkened room necessary, as in the case of the ordinary magic lantern.

Any object of suitable size may be introduced into the lantern—an open book, a stone, a set of beads, or a text, rolled



Showing the Roller Arrangement by Means of Which a Continuous Text may be Passed under the Lens for Direct Delineation on the Screen

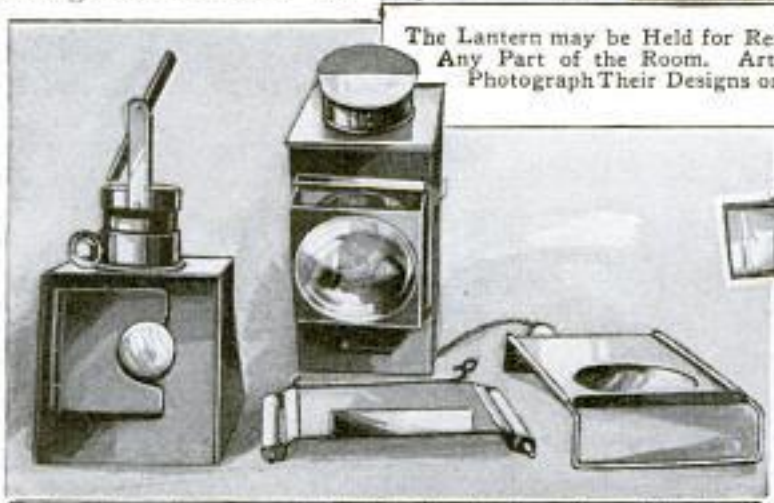


Pearls and Other Precious Stones are Accommodated in This Slideless Lantern. Bank Checks may be Projected with Microscopic Accuracy for Detection of Forgery

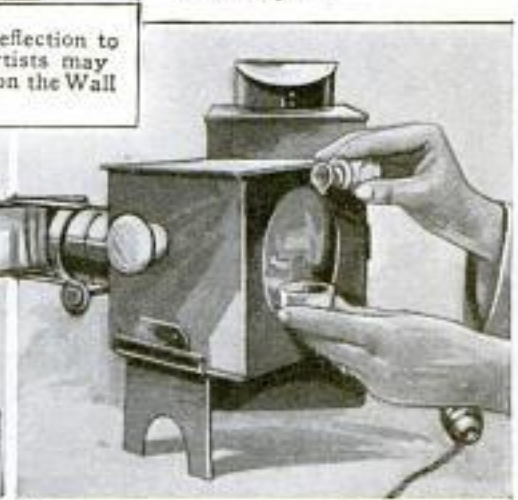
and unrolled on a couple of spools. By means of a set of condensers of one or more lenses, and reflectors at the back of the source of light, the object is photographed upon the screen with microscopic accuracy, it is claimed, the whole force of the light pouring upon the object and reflecting through the lenses to the screen, or any place in the room, from a mirror which swings on an axis. It is said that paintings taken from the Louvre and the salons of Paris and projected in this manner, had all the appearance of the works of art themselves.

Because of its light construction and adaptability to the ordinary 110-volt lighting circuit, the lantern may be used in the home as well as by the platform speaker in illustrating his lecture, without previous preparation of the object.

The Lantern may be Held for Reflection to Any Part of the Room. Artists may Photograph Their Designs on the Wall



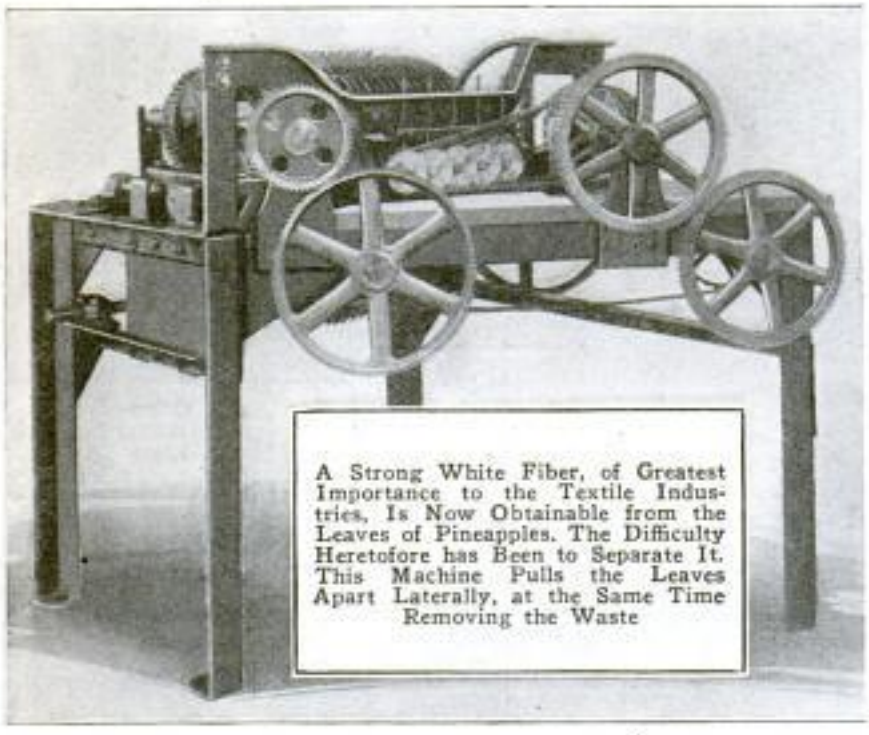
The Four Elements: At the Left, the Box Containing the Lenses with the Swinging Mirror; Next, the Source of Light; Below, the Text Rollers, and on the Right, the Stand for Inserting Books



This Shows the Arrangement When the Object can be Taken in a Vertical Plane Only, Such as Pouring Fluids

UTILIZING PINEAPPLE FIBER IN TEXTILE INDUSTRY

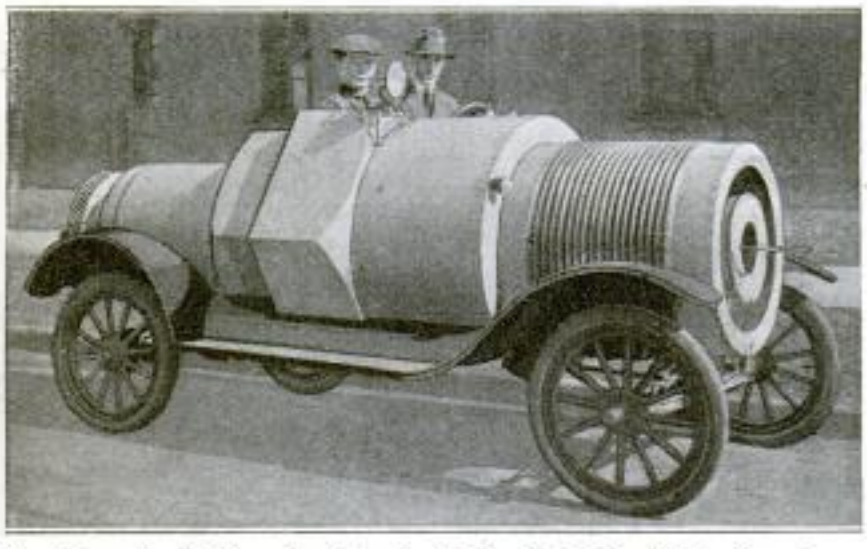
A decorticating machine has been devised for separating a certain fine hard fiber from the leaf of a species of pineapple that grows in great abundance along the Colombia coast of South America. The fiber is stronger than the coarse hemp, jute, or sisal, and is equal to the finest flax as a filler for silk fabrics. In fact it is said to surpass in every desirable quality all other fibers now used in weaving, but the difficulty heretofore has been in decorticating it. Only a few thousand pounds, gathered by tedious hand methods, have been available each year, although the plant itself exists in almost inexhaustible quantities. Instead of combing out the fiber, as has been previously attempted, the new machine grasps the leaves in a series of revolving steel claws and pulls them apart laterally, at the same time combing out the waste. Each machine is capable of producing about 500 lb. of fiber per day. Numbers of these will be shipped to South America for use on the Colombia coast, natives being trained to run them. The final product will be shipped to English and American manufacturers to be utilized in rug weaving, silk manufacturing, and various textile industries.



A Strong White Fiber, of Greatest Importance to the Textile Industries, Is Now Obtainable from the Leaves of Pineapples. The Difficulty Heretofore has Been to Separate It. This Machine Pulls the Leaves Apart Laterally, at the Same Time Removing the Waste

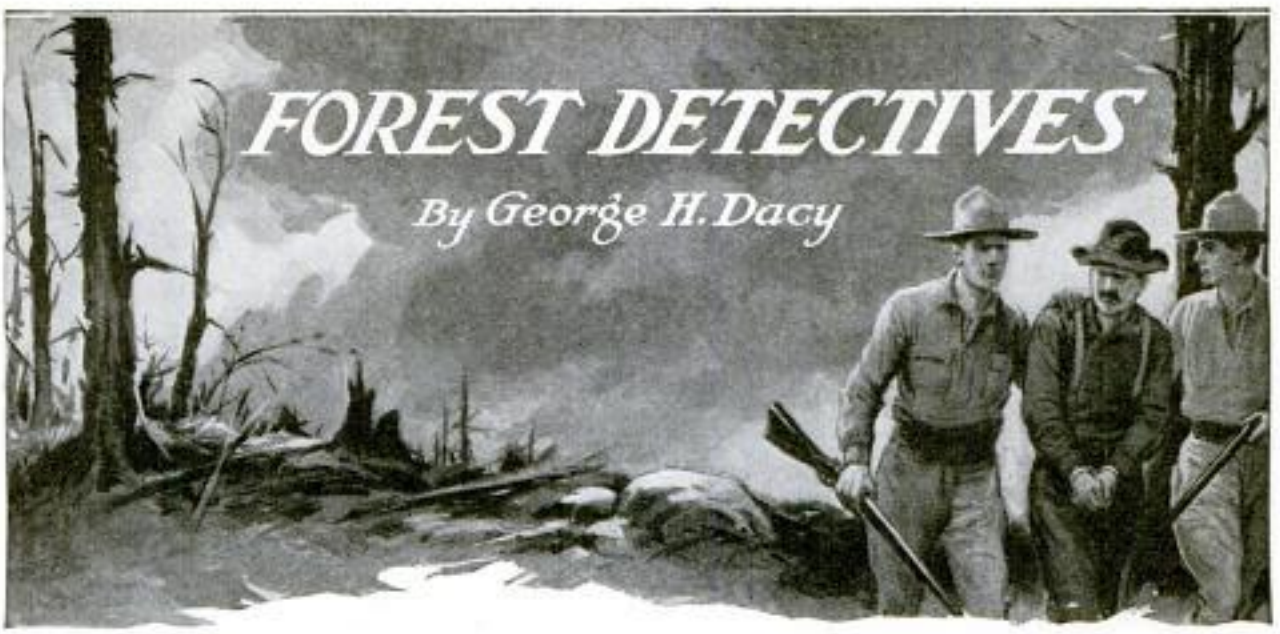
In tests which have been made with ropes of equal size, hemp broke at 2,269 lb., jute at 2,456 lb., and the new fiber at 2,519 lb. In addition, it is said to possess to an unusual degree the desirable qualities of great length, cohesiveness, pliability, luster, elasticity, firmness, and porosity, so that it will absorb dyes.

HUGE REPLICA OF SPARK PLUG FORMS BODY OF AUTO



The Huge Spark Plug Forming the Body of the Novel Speedster Is an Exact Duplicate of the Make It Advertises. Small Lights in the Electrode Points, Flashing Intermittently, Give a Jump-Spark Effect. The Driver of the Car Carries a Demonstrating Outfit, and Does Missionary Work for the Manufacturer

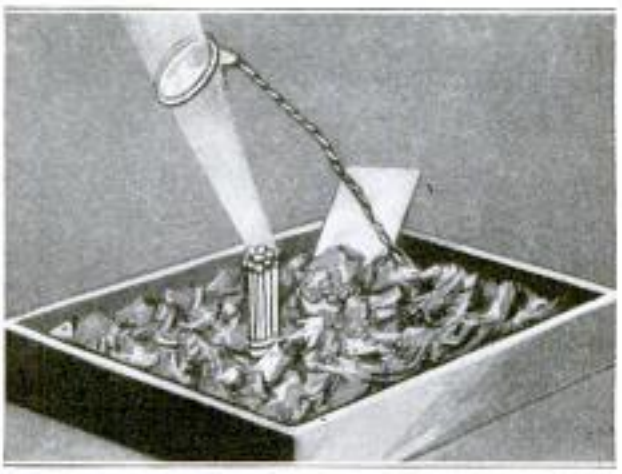
As an advertising stunt a manufacturer of spark plugs has had a number of freak automobile speedster bodies built in the likeness of his product and mounted on the chassis of light cars. At the points of the big electrodes are miniature electric bulbs, which, twinkling rapidly, simulate the flash of the high-tension jump spark that passes between the points of the model plugs. Mounted on the dash of each of the cars is a demonstration outfit, for illustrating the good qualities of the product.



FOREST DETECTIVES

By George H. Dacy

INCENDIARISM—man-started fires—is one of the evils with which the government forest rangers have to contend throughout the many national forests. One does not think of the average forest ranger as a detective, but that these employes of Uncle Sam are clever sleuths is impressively indicated by the remarkable records they have made during the last three years in running to earth and convicting rascals, rogues, and careless hunters, campers, and tourists who have been responsible for man-started fires in the national forests. Fire-warning signposts are placed throughout the government timberlands and the attention of campers, hunters, and fishermen is especially directed to the absolute necessity for extinguishing camp fires before they break camp or move to a new location.



One Means of Starting a Forest Fire: A Box Full of Dried Leaves, a Bunch of Matches Erect in Them, and Supported above This a Burning Glass That at Some Time will be Traversed by the Sun's Rays, Thus Delaying the Starting of the Fire Until the Incendiary has Had Plenty of Time to Get Away a Considerable Distance

The forest rangers and special investigators of the Department of Agriculture have become very adept at locating the manner in which incendiary fires were started, and in tracking the guilty parties to cover. In these detective activities, they make use of water-glass casts as well as impressions made by the use of dental plaster, plaster of Paris, and ordinary cement, in making models of

Left: The Lost Handkerchief with a Distinctive Laundry Mark That Was the Means of Tracking the Starter of a Forest Fire Who Was the Owner of the Handkerchief. Right: Where an Incendiary Fire had been Started There was Found the Small Burning Glass, Seen Now on the Ground, But Which had been Supported above the Dry Leaves by the Wire Stuck in the Ground

the foot tracks of either man or beast. They carefully collect and preserve all articles found around the abandoned camp fire or point where the forest fire started, which subsequently may be examined for finger prints. They search for unburned matches, the charred remains of the man-started fires, lens, and other mediums used for kindling the flames.

It was in 1918 that the pioneer arson squad of Uncle Sam's Forest Service was organized for the prevention of incendiary fires in the forests of California and Nevada. Previous to the inception of the detective service, anywhere from 150 to 300 incendiary fires occurred annually in the national forests of California. Last year—the third year that the "Sherlock Holmeses" of the forest primeval were on the job—the number of incendiary fires was reduced to 28, and there is every evidence that shortly the fires of human origin will be of negligible importance.

The Hobnailed Boots of One Starter of Forest Fires Made a Trail That the Forest Detectives Easily Followed from Where the Fire Started to the Incendiary's Cabin

The mountain custom of always shoeing horses with ready-made shoes has resulted in several malicious fire starters being tracked to their lairs and ultimately tried, convicted, fined, and imprisoned. In each of these instances, the offenders rode horses which had been shod with sharp calks so that it was easy for the forest sleuths to follow their trail. Human footprints—in innumerable cases—have led to discovery and ultimate conviction and punishment. In some instances it was a worn heel, or turned-over toe on the shoe or boot, which led to identification; in other instances, hobnails, peculiar patterns of rubber heels, abnormalities of foot conformation, or other peculiarities of the foot tracks, were responsible for the location and arrest of the vandals. Peculiarities in the foot marks of the horse, mule, or burro ridden by the incendiary have as often aided in the trailing and discovery of the culprit. In one instance a lost handkerchief with a distinctive laundry mark was found near the scene of a fire. Through the laundry number, the owner of the handkerchief and originator of the fire was finally found. The peculiar treads, makes, and tracks of automobile tires have also often facilitated the work.

Where a footmark of either a human being or riding animal is discernible, an impression of it is best made by flowing a wet mixture of cement or plaster over the track and allowing it to harden. Plaster of Paris sets in about five minutes. Then the cast can be removed and subsequently used for identification purposes and as evidence in the court trial when the culprit is found. Where the track occurs in dry sand or dust, the cement or plaster is sifted directly over the track and then a little water is squeezed from a moist handkerchief over the material. Where the footprint appears on a dusty floor or in some similar location, it is sprayed with a mixture of 1 part shellac and 4 parts wood alcohol, using care not to disturb the track. The spraying is continued for 15 minutes, and sometimes

Some of the Plaster of Paris Casts That were Made from Impressions in the Ground Left by Incendiaries: Reading from the Left Is a Cast of the Print of a Hobnailed Boot, of the Track of an Automobile Tire, and of the Print of an Unusual Kind of Hobnail

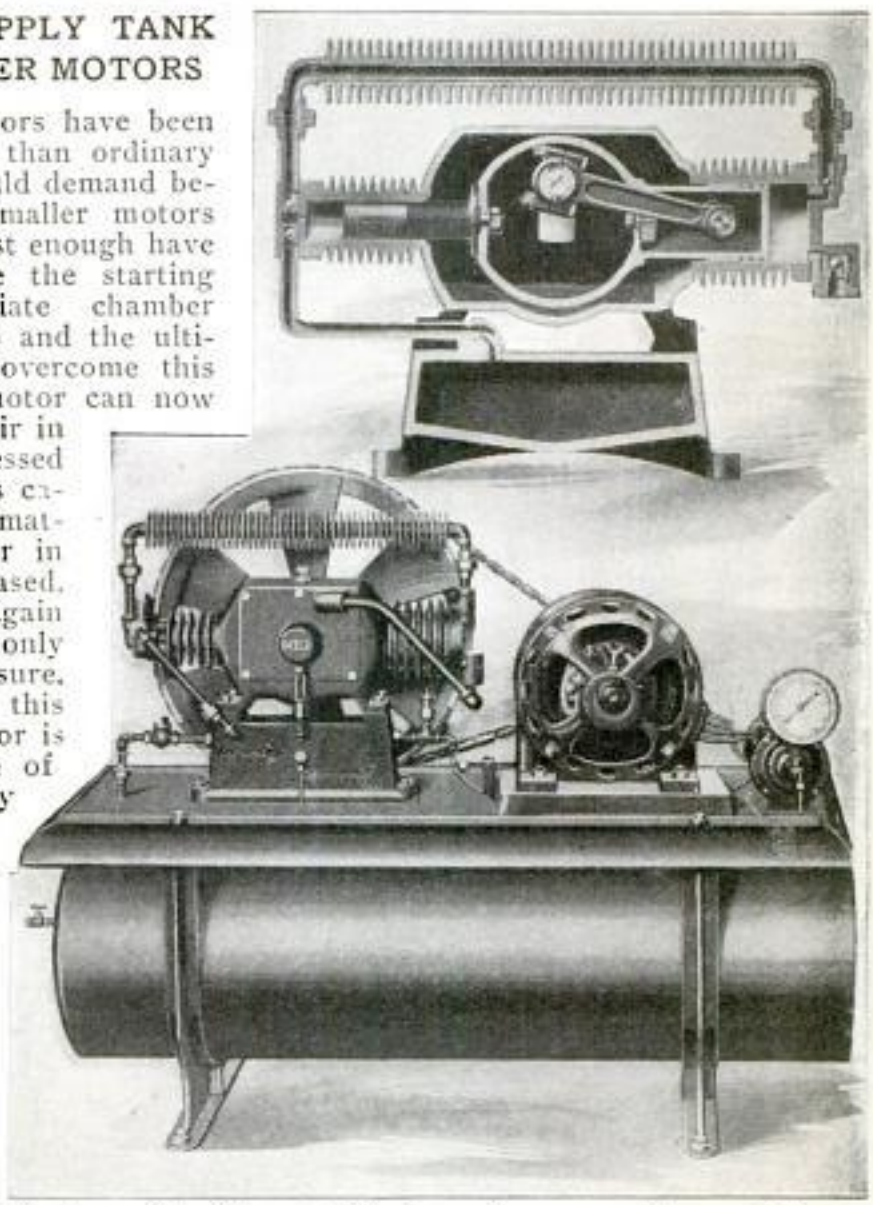
as much as one quart of shellac is used. Then, after drying for 30 minutes, a plaster impression can be made.

The forest rangers engaged in this police work soon become expert in determining the direction an automobile is traveling, from the tire tracks which show in the dust or mud of the road. Note is made of the pattern imprint of nonskid tires, which is steeper and more distinct on the rear side of each indentation, stones which are shoved ahead by the wheels, dust being piled up by the shove on the forward side, a sprinkling of sand or dust which is found on the rear side of stones passed over, direction of the skid on slopes, impact on the forward side of chuck holes, action in ruts—in dropping into a rut, a wheel will run off the high side to a feather edge, while in climbing out it will stay in the rut until side pressure forces it to climb out abruptly—the turn on curves usually is more abrupt on leaving.

Excessive speed will always be disclosed by wind-swirl disturbances of the track, the distance of the side throw of sand, mud, or water, the side lurch on a rough road, and the length of the jump in passing over an obstacle. The size of the car is approximately indicated by the width of the tire tread, although this is affected by the amount of load, as well as by the air pressure on the tires. When the load is heavy, there is a higher piling up of the dust ridges which are left in the center of the wheel track by the suction and thrust of traction on pneumatic tires.

AIR-COMPRESSOR SUPPLY TANK ALLOWS FOR SMALLER MOTORS

Motors on air compressors have been essentially more powerful than ordinary pumping requirements would demand because of the fact that smaller motors which are able to pump fast enough have been unable to overcome the starting pressure. An intermediate chamber located between the pump and the ultimate air tank serves to overcome this difficulty, and a smaller motor can now do the work. When the air in the tank has been compressed to the limit of the pump's capacity, the motor is automatically stopped and the air in the intermediate tank released, so that when the pump is again needed, it has to start only against atmospheric pressure. It has been found that by this arrangement, a ¾-hp. motor is able to supply a pressure of 300 lb. in the large supply tank. The new tank also has arrangement for oil filterage, and keeps the air clean and dry.



The Lower View Shows the Two-Stage Compressor, Motor, and Storage Tank Complete. The Upper View Is a Longitudinal Section of the Compressor, Showing the Hollow Base Which Acts as an Ordinary Unloader When Running, and after Stopping Enables a Machine to Start without Back Pressure

¶A wireless station has been established by a large eastern corporation at one of its plants in Pittsburgh and another in Cleveland for interfactory communication purposes. Other stations are in project for Massachusetts and New Jersey plants.

DEVICE WHICH SPOTS LAYING HENS

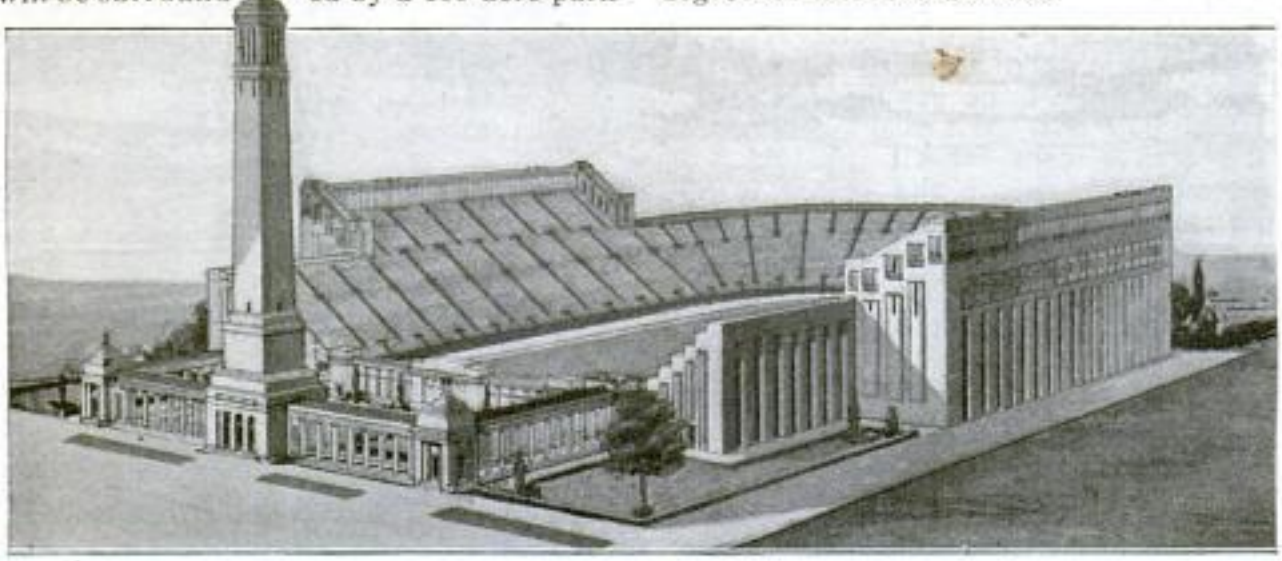
A California inventor has devised an apparatus that actually spots the hen in the act of laying an egg. When the hen sits in the nest box which is fastened to a cradle suspended from a pail of liquid, her weight causes a valve to open, releasing several drops of colored fluid on the hen's back, leaving a mark. If the poultryman happens to own a flock of white leghorns, it is claimed that by this method he can easily distinguish the producers from the non-layers.

ILLINOIS UNIVERSITY TO HAVE BEAUTIFUL NEW STADIUM

A stadium that will be one of the largest in the world, seating 80,000 people, will be erected at the University of Illinois, at Urbana. The structure will be remarkable not only for its size, but also for its special recreation features and the style and beauty of its architecture. It will be surrounded by a 100-acre park of polo fields, baseball diamonds, and grounds for holding tennis, lacrosse, and archery matches. Although seating 80,000 people, the structure will be honeycombed with exits so that it can be emptied in less than seven minutes. It will be built entirely of reinforced concrete, 65 rows high, and the seating arrangement will be such that 40,000 people may sit directly opposite the football field in the center, the remaining 40,000 seats being located in the oval at the end. A notable feature of the exhibit will be the 200-ft. tower and surrounding colonnades at the open end, dedicated to those who lost their lives in the great war.

NEW METHOD OF GRINDING COAL FOR COLLOIDS

A grinding mill has been developed by a German inventor that promises to be invaluable in the preparation of colloids from coal, graphite, and allied substances. The difficulty heretofore has been in grinding various solid substances fine enough to obtain the extremely minute particles necessary to the successful colloidal solution, or physical mixture, which holds in suspension particles of such a finely divided state in a nonprecipitated condition. Use for the mill will be found in the industries associated with the manufacture of glue, soap, and artificial silk, as well as with phosphatic fertilizers, colloidal or liquid coal, colloidal wood, and plastic products. It is a modification of the ordinary so-called "perplex" beater used by druggists, and is made leak-proof by inclosing the shaft in a stuffing box. By running at a very high speed, it is claimed that particles are obtained in any degree of fineness desired.



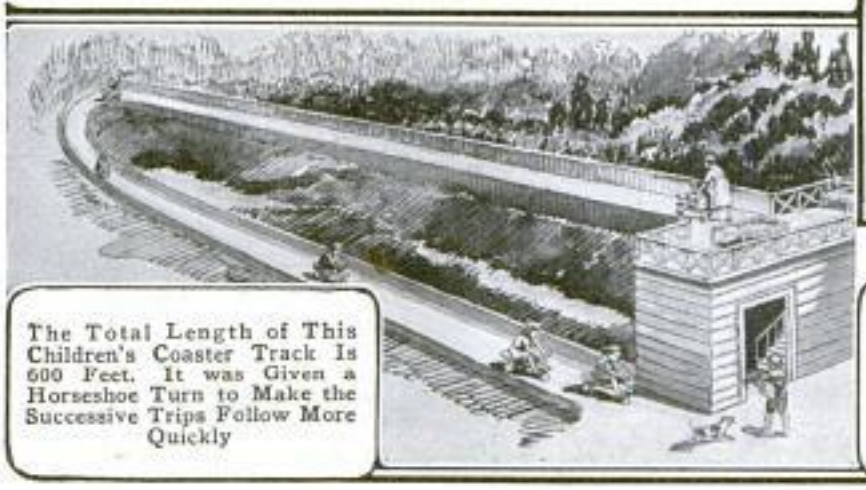
The Huge Stadium to be Built for the University of Illinois at Urbana: It will Accommodate 80,000 People, and will Be One of the Largest Structures of Its Kind in the World

SAN FRANCISCO PARK HAS NEW RIDE FOR KIDDIES

The Grade of This "Kiddie Ride" in a San Francisco Park Is Steep Enough to Insure a Good Start, with a Gradual Reduction to Guard against Accidents

This Shows the Start at the Top of the Concrete-Lined Roadway. On Either Side of the Playground Runway There Is a Continuous Ledge to Prevent the Specially Built Little Cart from Running off the Track. Bordering Fences Keep Out Intruders

Showing the Delightfully Exciting Hairpin Turn: The Grade Is Just Sufficient to Move the Car Along without Foot Propelling. This Bend Is 300 Feet from the Starting Point



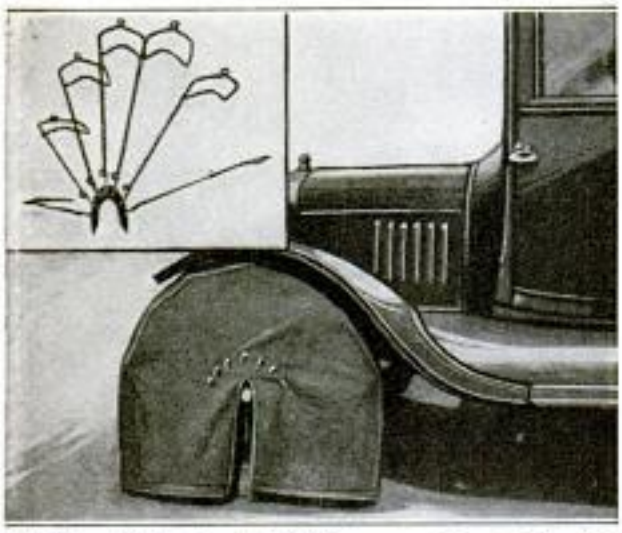
The Total Length of This Children's Coaster Track Is 600 Feet. It was Given a Horseshoe Turn to Make the Successive Trips Follow More Quickly

At the End of the Ride, Which Is Only a Few Feet from the Beginning, the Child Places His Car on a Mechanical Elevator Which Carries It Up to the Starting Incline

A gently sloping coasting hill, measuring a total of 600 ft. in length, has been donated to the Golden Gate Park at San Francisco, Calif., for the use of the kiddies who frequent that park. The incline at the start is steep enough to give the little specially built car a good start, then reduces to insure speed without danger of spills or accidents. The track has a fence and curb on both sides, and is faced throughout with concrete. After the ride on the rubber-tired car, the child carries his conveyance to the starting-platform stairs. Here an elevator, or conveyor, hoists it to the starting platform, saving the rider the trouble. The track adds a new attraction to the wading pools, merry-go-rounds, etc., with which the park is equipped. On the opening day hundreds of children waited their turn for rides.

UMBRELLALIKE PROTECTOR SHADES TIRES FROM SUN

When automobiles are parked in the streets, or elsewhere, their tires suffer considerable deterioration from exposure



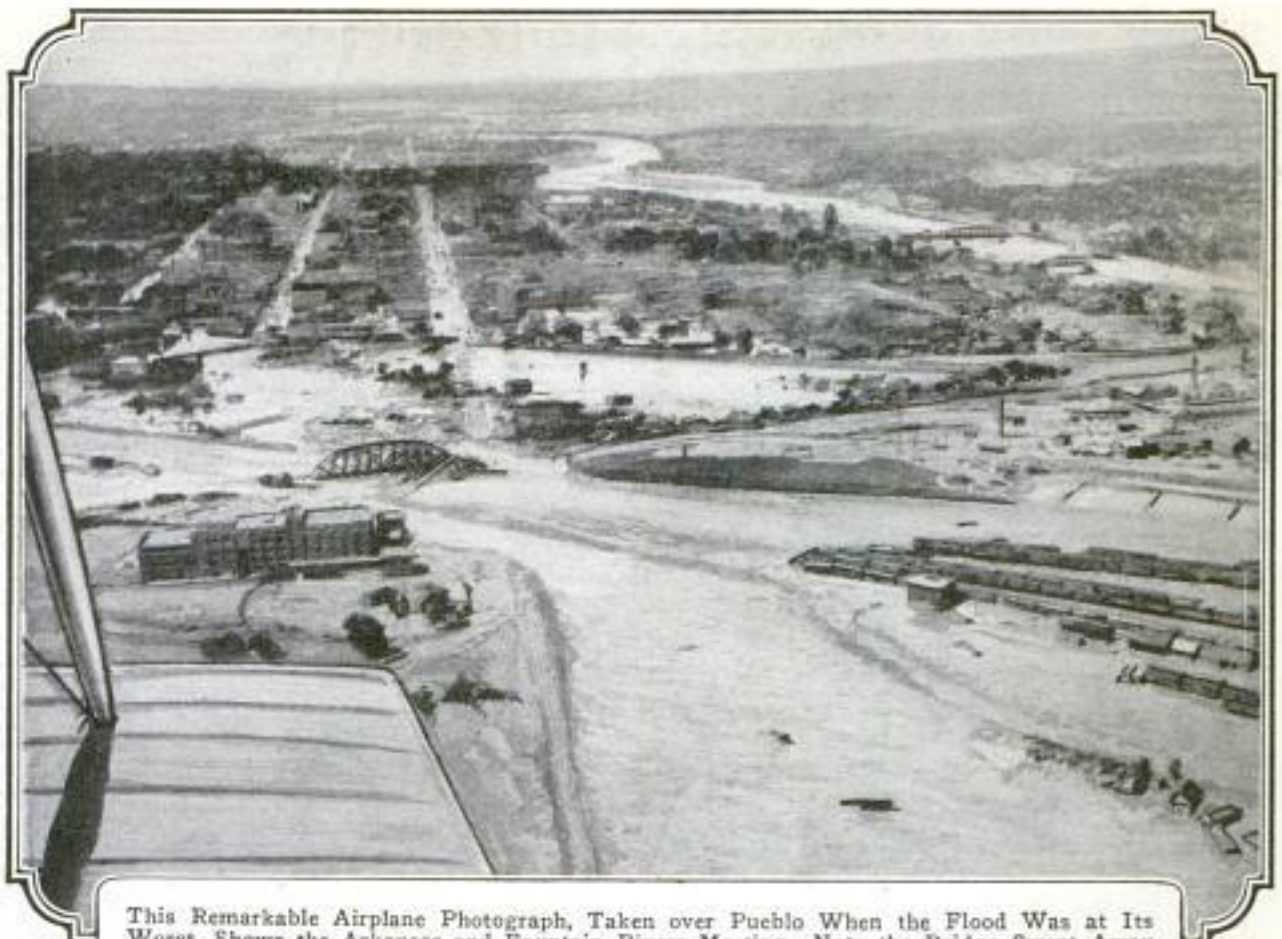
The Tire Protector in Position on a Front Wheel of an Auto, Completely Covering It and Hanging Clear of the Dirt on the Road

to sun and wind. A device has been constructed to protect the tires from such exposure. It is composed of a wire frame, resembling half an umbrella frame, that can be folded up in a similar manner. When opened it fits the upper half of the circumference of the tire from which it is suspended. It is used in connection with a sheet of weather-proof fabric, tailored so that it hangs over the frame, covering the whole of the tire, without touching it, and hanging to within an inch or two of the ground.

FLOOD'S OVERWHELMING FORCE SHOWN IN PUEBLO DISASTER

The overpowering force of water when unloosed in a flood was graphically demonstrated in the recent Pueblo disaster when the Arkansas River and tributary streams, swollen to unusual heights by the torrential rains, swept over the Arkansas valley, bursting dams, tearing away bridges, and carrying along with it accumulated masses of logs, lumber, uprooted trees, box cars, and houses. Hundreds of people were killed and injured, and thousands of others rendered homeless. The water rose to the second-story windows in the business section of Pueblo. In other districts, too, the flood had practically the effect of a tidal wave. At Manitou a wall of water several feet high struck a 1,000-ft. row of one-story buildings and washed them into the creek. It is said that unknown numbers of bodies may be buried without hope of recovery in the layers of mud and débris deposited for miles along the valley. An effort will be made toward preventing a repetition of the catastrophe by erecting immense levees on the banks of the rivers, the work being carried on under the supervision of government engineers.

This Picture Shows the Heart of the Business Section of Pueblo During the Disastrous Flood. The Water Reached a Height of Eighteen Feet Here



This Remarkable Airplane Photograph, Taken over Pueblo When the Flood Was at Its Worst, Shows the Arkansas and Fountain Rivers Meeting. Note the Bridge Swept Away in the Foreground. On the Extreme Right Are Two Houses Surrounded by Floating Box Cars. Other Box Cars are Seen Floating Down the River

Airplane View Graphically Portraying the Havoc Which Resulted When the Flood Swept Over the Union Station Yard at Pueblo, Colorado. The Yard was Filled with Passenger Cars Which were Tossed About Like Sticks of Wood. Many Lives were Lost Here; Passengers were Crushed and Drowned in the Coaches

VERANDA AROUND LARGE HOME BUILT OF STREAM BOWLDERS

Building-material costs or labor troubles had but little effect on one active builder at Milford, Ohio, who secured the material for his porch posts and first-floor banisters from the bed of a small stream adjoining his estate. The porch surrounds three sides of the dwelling, and the only money expended in the construction of the posts was the labor for hauling bowlders and gravel to be used in their construction from the stream bank. The sand for binding material was also procured from the same natural source.

The Rocks and Gravel Used in the Construction of the Veranda and Columns of This Home in Milford, Ohio, were Secured by the Owner from a Near-By Stream, Thus Effecting a Partial Solution to the Problem of Building-Material Costs

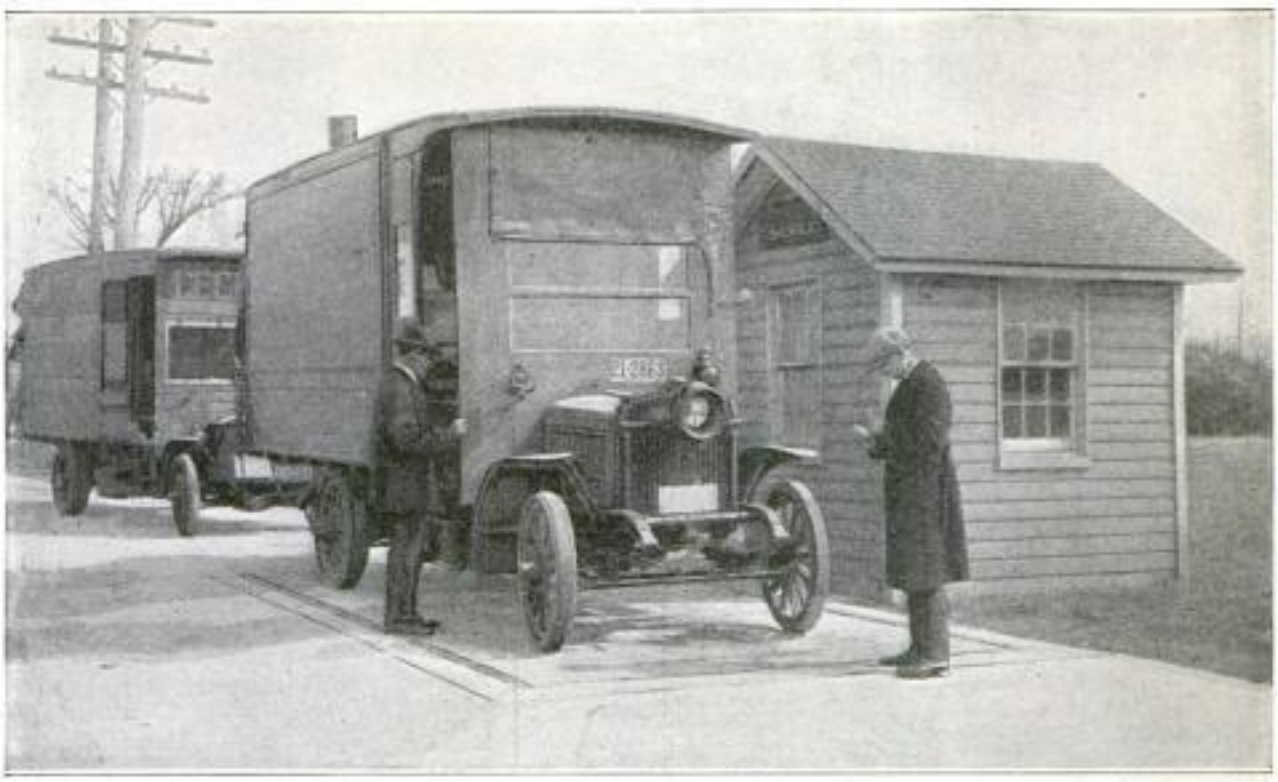
NOVEL METHOD OF QUARRYING WITH COMPRESSED AIR

Compressed air is being used, near Atlanta, Ga., in quarrying granite, and it has been found to have advantages over the more usual method when the granite rock is devoid of "joints." Two 3-in. holes are drilled, a short distance apart and perpendicularly to the rock, to a depth of 8 ft. After removing the drills, a spoonful of black blasting powder is dropped to the bottom of each hole, tamped with clay, and the holes wired so that they can be electrically fired. The effect of the explosion is to start cracks in the rock at right angles to the holes. This operation is repeated a number of times, until it is certain that the cracks radiate from the bottom of the holes to a distance of about 75 ft. Into each hole, to slightly over half its depth, there is then inserted a 1-in. pipe, and the space surrounding the pipes in the holes is filled with sand, tamped so as to seal it against air pressure. Connections are then made between the upper ends of the pipes and the quarry air compressor, which continues to pump air, at 100-lb. pressure, into the holes until the block of rock above the cleavage already formed is torn from the surrounding rock.

NEW ROAD LAWS FORCED UPON EASTERN STATES

New road laws aimed especially at truckmen driving excess loads, have been passed by several of the eastern states. The increasing traffic, the heavily overloaded trucks pounding continuously day and night over the new state highways, have destroyed, in a comparatively short time, surfacings that under normal conditions would have lasted for years. Connecticut has posted large signs, announcing the allowable weights and vehicle conditions, on some of the main traveled roads leading into the state. They are 15 ft. high and 50 ft. long, and are electrically illuminated at night. At each of the signs is stationed an inspector from the state-highway commission, whose duty it is to scrutinize all incoming trucks. If there appears to be a violation of the law, the car is stopped and the driver required to correct the condition or else is forced to turn back. So far nine of these signs have been erected in Connecticut and more are planned as traffic grows heavier. On all other routes there are smaller notices stating the more important regulations that govern incoming freight in particular.

In Maryland the roads are patrolled by inspection crews having police powers, accompanied by armed officers in uniform. They enforce the following regulations: that the maximum weight of any vehicle, including the load, shall not exceed 20,000 lb.; that the load per inch width of tires

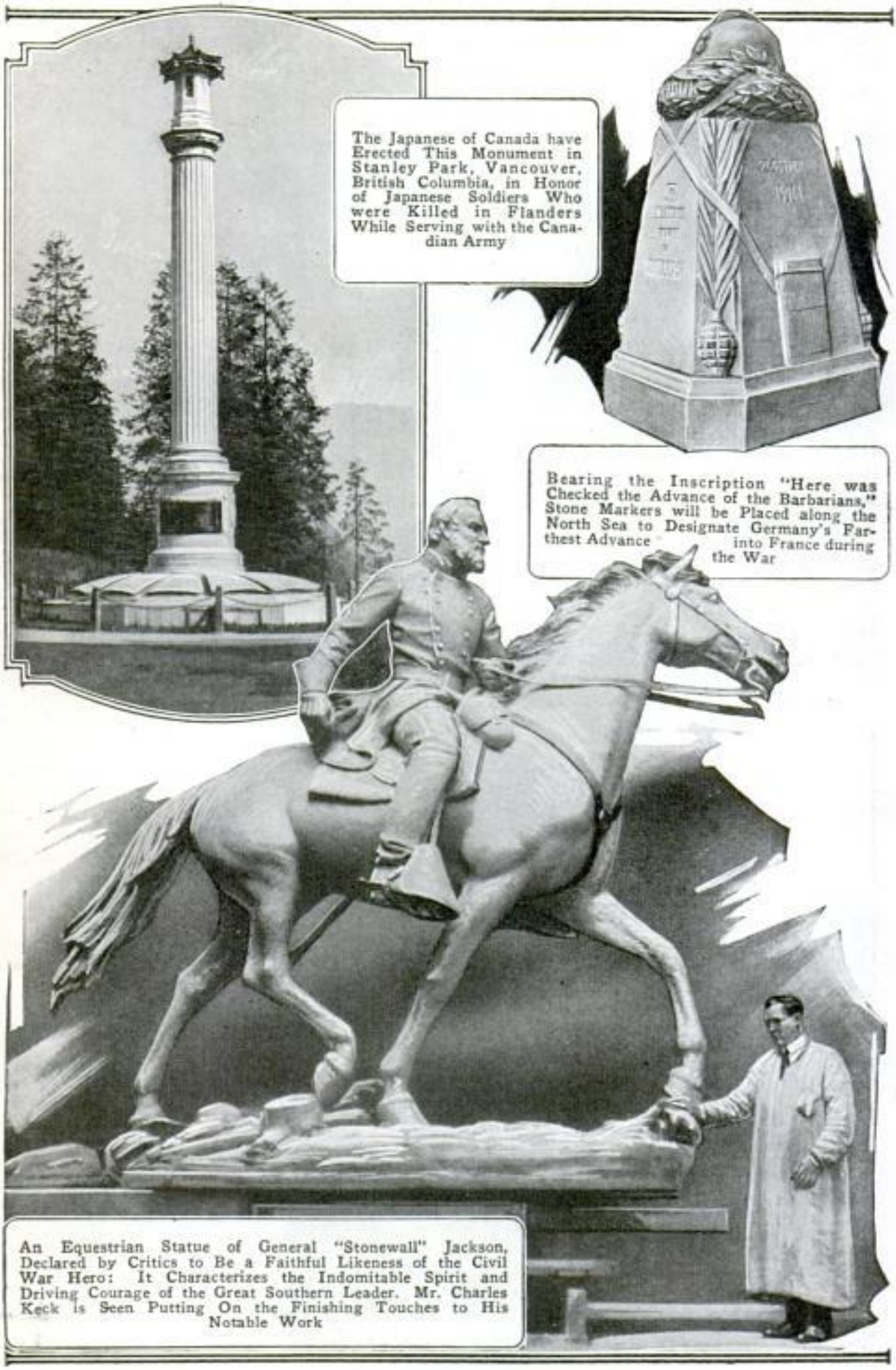


Alert Inspectors are Stationed along the Highways of Maryland and Connecticut to See That the New Traffic Laws are Complied With. In the Case of Overloaded Trucks, Road Scales Determine the Excess Weight

shall not be more than 650 lb.; that the maximum width of the truck shall be 90 in., and that the allowable speed limit for gross loads exceeding six tons shall be 12 miles per hour. The road crews are equipped with portable loadmeters, or jacks, and travel in light cars. When the system was first put into operation, violators were fined various small sums, but this did little toward checking the flood of heavier traffic. Thereon a different policy was pursued. Drivers with loads exceeding the limit were forced to dump the excess portion on the ground, returning for it in a second trip. So much time was lost in this manner that the loads were quickly trimmed to the legal requirements.

Road Crews Patrol the State of Maryland, Equipped with Portable Loadmeters or Jacks. Trucks That are Overloaded are Forced to Reduce Their Freight to the Legal Requirements on the Spot

HEROES AND HISTORIC EVENTS IMMORTALIZED



The Japanese of Canada have Erected This Monument in Stanley Park, Vancouver, British Columbia, in Honor of Japanese Soldiers Who were Killed in Flanders While Serving with the Canadian Army

Bearing the Inscription "Here was Checked the Advance of the Barbarians," Stone Markers will be Placed along the North Sea to Designate Germany's Farthest Advance into France during the War

An Equestrian Statue of General "Stonewall" Jackson, Declared by Critics to Be a Faithful Likeness of the Civil War Hero: It Characterizes the Indomitable Spirit and Driving Courage of the Great Southern Leader. Mr. Charles Keck is Seen Putting On the Finishing Touches to His Notable Work

IN SCULPTURED STONE AND BRONZE MEMORIALS

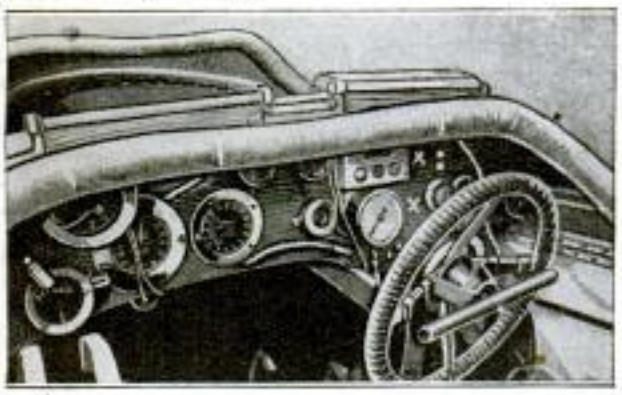
Unveiling the Bronze Statue of Simon Bolivar, South American Patriot and War Leader, Recently, in The Mall, Central Park, New York: A Crowd of Several Thousand People Was in Attendance. Speeches were Made, Salutes were Fired, and the Venezuelan Band Played

This Statue was Designed to Recall the Memory of Two of America's Most Famous Explorers, Lewis and Clark, Who Opened Up New Territories to the United States in Their Famous Western Exploration Trip in 1803-6. The Forward Figure Is That of Clark and in the Rear Stands Lewis. They are Guided by Sacagawea, the Indian Girl. The Statue was Recently Presented to the University of Virginia

To Rectify an Error Made 31 Years Ago, the Inscribed Date of Marshall's Discovery of Gold was Changed from January 19, 1848, to January 24, 1848, on a Monument Marking the Spot in El Dorado County, California

AUTOMATIC MEANS OF CONTROL FOR COMMERCIAL AIRPLANES

Apparently the day is at hand when the navigation of an airplane will require no more skill and self-reliance than does the driving of an automobile. A flight has recently been made from London to Paris and back, during which, for two consecutive hours, the pilot was enabled to depend entirely upon an automatic mechanical control for everything but the actual direction by means of the steering wheel.

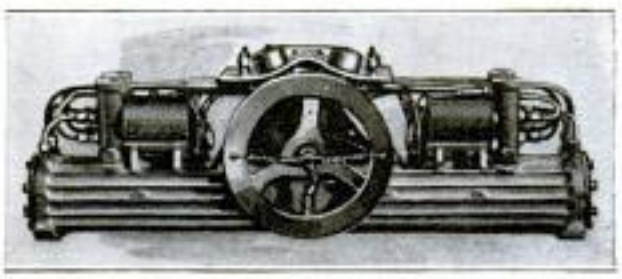


The Cockpit of an Airplane Fitted with the Automatic Control: On the Dashboard, behind the Steering Wheel, Is the Air-Pressure Gauge, and above It the Indicator with the Lights for Controlling the Equilibrium

In the past there have been many attempts made to devise an automatic mechanical control of the equilibrium of the airplane, thus reducing the work of the pilot to no more than that of an automobile driver; that is to say, attention to the steering, and control of the motor. These past attempts embraced the utilization of the principle of the pendulum, which never held out much promise of success, and also of the gyroscope, which although successful as a stabilizer, was too complicated and cumbersome for commercial airplanes.

More recently a French inventor has produced a mechanical pilot by means of which all control except the actual steering is done either automatically or by readily made adjustments. The device has attracted a great deal of attention in England, where elaborate tests are now being made at both government and private aerodromes. This machine is so arranged that the pilot can retain personal control of the ailerons and elevator, as well as of the engine plant and rudder, as long as he likes, and also has the means, whenever he desires, to turn over to the automatic system the control of the ailerons and elevator simultaneously, or of the ailerons alone—but not the elevator alone—and in addition he can cut out both automatic controls, and use indicators that are installed on the dashboard of the airplane cockpit as an index as regards horizontality. It is more than a means of relieving the pilot from fatigue, for, when flying through clouds or fog he need no longer fear that he is "banking" unintentionally, while for landing, the control can be set so that the machine will descend at a predetermined angle, thus removing one of the dangers of night flying.

An essential element of the device is a compressed-air system consisting of two small compressors mounted beneath the fuselage, and actuated by a windmill, driven by the motion through the air during flight. The receiver for the compressed air is located in the cockpit, and is connected to a gauge under direct observation of the pilot, so that he easily maintains the required pressure of about 60 lb. per square inch. The compressed air is for the purpose of operating, in a horizontal cylinder, two pistons at the ends of a common connecting rod, which by moving to the right or left actuate the control of the ailerons and elevator, there being one such cylinder in each case. The action of these pistons is controlled by valves that are electrically opened or closed by the operation of a circular tube half filled with mercury, and so arranged that its inclination one way or the other makes or breaks an electrical contact on one side or the other, and thus opens one or the other of the valves. Above the pressure gauge, in full view of the pilot, is an electrical switchboard fitted with a small lamp on either side of it. Any inclination of the plane lights automatically one of the lamps, showing the pilot instantly which way the machine is inclining, enabling him, in the densest of atmospheric conditions, to maintain a correct equilibrium. By means of a lever within his reach the pilot can throw the automatic control out of gear, whenever he desires to take personal control. When the pilot takes control the lights on the switchboard are his equilibrium guide.



Front View of the Horizontal Cylinder Which, by Means of Pistons at the Ends of a Common Connecting Rod, Actuates the Control of the Airplane's Ailerons

In the Far-Off Spitzbergen Islands in the Arctic Ocean This Steam Shovel of American Make Mines the Coal the Year Round. From October to February the Aurora Borealis and the Moon Furnish the Light

STEAM SHOVEL WORKS IN FAR NORTHERN SPITZBERGEN

In the Spitzbergen Islands far into the Arctic Ocean—in fact, much farther north than Iceland—may now be seen at work a steam shovel of American make. With harbors frozen so tightly in winter that shipping is impossible and the only connection with the outside world is a wireless station, the industrious shovel works right along at the Kings Bay coal deposits. Between the months of October and February, the work goes on under the light of the moon or the almost continuous aurora borealis. The shovel runs on a narrow-gauge railway, by which the coal is transported and stored near the harbor.

GIANT BLACKBERRY DISCOVERED IN SOUTH AMERICA

Huge blackberries, growing to a length of 2½ in. and a breadth of 1½ in., have been discovered in South America. Plants bearing clusters of these berries have been found by American scientific explorers at an altitude of 10,000 ft. in Colombia. The plant is vinelike, half climbing, half self-erect, and in some cases grows to a height of 10 ft. Although only four degrees north of the equator, the altitude, and the clouds drifting up the Magdalena Valley and depositing their moisture, make the climate cool and moist throughout the year; and for this reason it is thought the plants may be transplanted to the United States. The berry is not quite black in color, but verges on a dark red. The taste is said to be surprisingly agreeable and pleasant. What value the fruit may attain by means of further development by American horticultural experts is hard to estimate.

BY COURTESY OF THE JOURNAL OF HEREDITY

These Huge Blackberries the Size of Lemons were Discovered in the Remote Forest Regions of South America. Horticultural Experts are Carrying On Experiments with a View to Transplant Them to This Country

¶Investigation has disclosed that the wavy motion of centipedes is due to the legs moving in groups, each wave including a definite number of legs.

CAPE COLONY SUMMER HOUSE TYPICALLY SOUTH AFRICAN

Three brothers, in their spare time in far-away Cape Colony, constructed this summer house, which is so characteristic of South Africa, resembling, as it does, the houses that the Kaffirs, or native South Africans, have built for themselves since long before they ever saw a white man. It is built, and thatched, entirely from pine trees which are so plentiful there. The little terrace on the left is for flowers, but the picture was taken when the house was so new that there had not been time to do any planting.

This Rustic House was Built by Three Brothers in Far-off Cape Colony, South Africa. It was Constructed to Resemble the Thatched Abodes of the Kaffir Natives Who have Built Such Houses for Centuries

FUEL FOR 9,000-MILE VOYAGE COSTS LESS THAN NOTHING

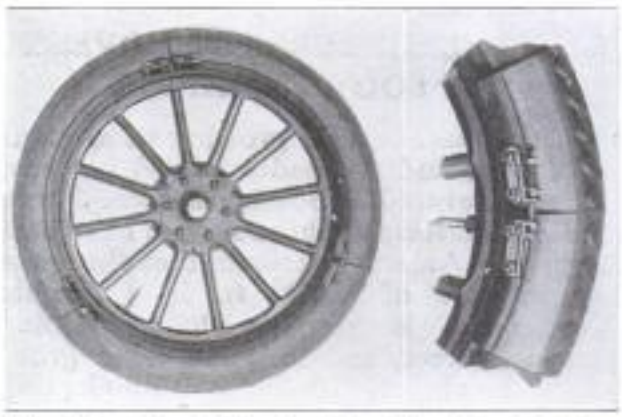
The object of economy in fuel consumption is, of course, reduction of cost, and where this reduction is a little more than 100 per cent, it is safe to say that the economy has reached its limit. This has actually been done, due to the difference in oil values, in a motor ship trading between San Francisco and Stockholm, Sweden. The ship has a bunker capacity of 1,500 tons of fuel oil, which is enough to make the round trip, and also to sell 800 tons of the oil at Stockholm. The total cost of the oil at San Francisco was about $36,000, and as the 800 tons of oil in Stockholm was worth about $38,000, the ship's fuel for the whole voyage from San Francisco to Stockholm and return, cost something less than nothing. In truth, the cost of the oil was a bonus of $2,000.

FLYING BOATS SURVEYING VENEZUELAN OIL FIELDS

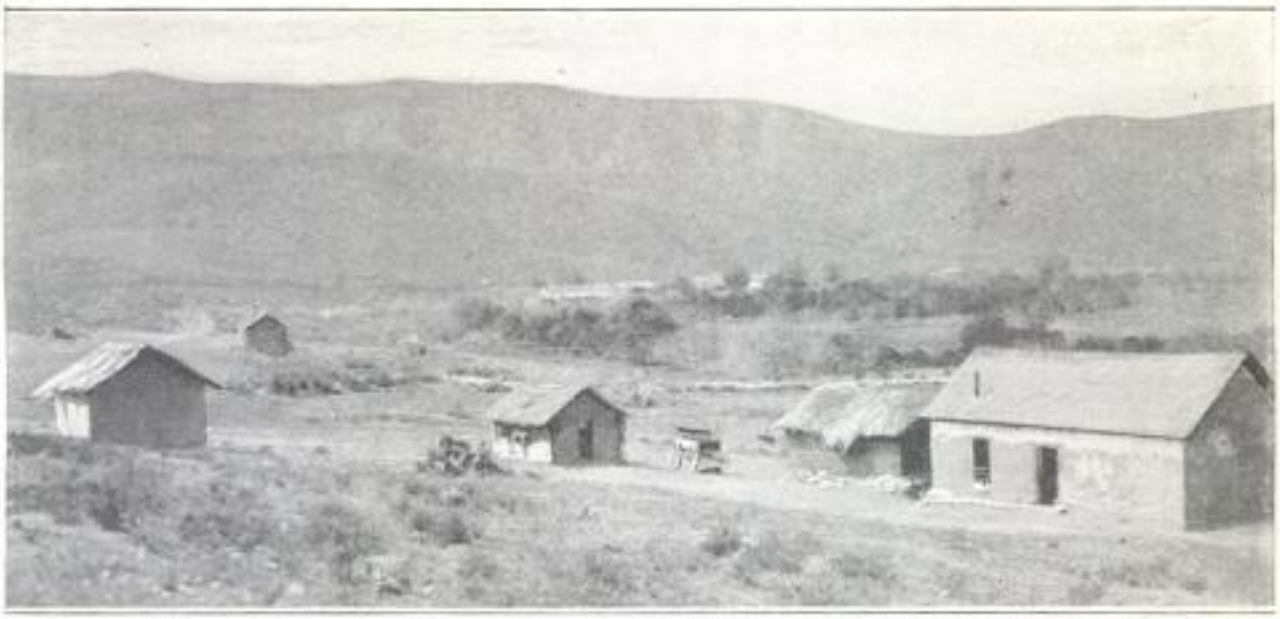
Oil fields in Venezuela that are practically inaccessible by land or water are being explored, via the air, by means of flying boats. A British oil company has sent two specially equipped flying boats to make a photographic survey of the delta of the Orinoco River, where the oil lands will be very easily shown photographically on account of the fact that the oil has a destructive effect on vegetation. Each plane is equipped with a regular boat, and in the bottom of the hull an opening is provided for the operation of the camera. This opening resembles a porthole, and is fitted with a watertight cover that can be closed whenever it is desired to use the boat afloat.

SECTIONAL CASINGS SAVE PNEUMATIC TIRES

A sectional tire, designed to fit over the ordinary pneumatic for the purpose of saving wear and increasing resiliency, is now on the market. The sections are furnished complete, or the joining clips alone are sold. These clips consist of a spring-tension bolt passing through lugs on either side, which are bolted to the section. It is claimed that any dirt and sand that may get in between the tire and the sectional casing is automatically removed when the wheel revolves.



This New Tire Casing is Bolted in Three Sections, and was Designed to Protect the Inner Casing from Wear



A View in Lower California, Hundreds of Miles from Civilization, Where the Lost Mines are being Sought: Near This Bleak, Inhospitable Landscape the First Mine was Discovered, and the Adobe Huts are for the Accommodation of the Miners

HUNTING THE LOST MINES OF LOWER CALIFORNIA

By FRANK B. HOWE

WITH the establishment of comparative tranquillity throughout Mexican territory, the search for the "lost mines" of Lower California has been undertaken in real earnest.

These mines, originally located centuries ago by the conquistadores from Spain who ventured to the newly discovered land, have long been celebrated in fiction and poetry. The mines of romance have, however, their counterpart in reality, for there can be no reasonable doubt that immense deposits of gold were located at several points by the early travelers, who left many records of their discoveries. The knowledge that such deposits do exist, coupled with the fact that the Spanish conquistadores did not work them to any appreciable extent, offers great enticement to American prospectors at the present time, for this is the first time in several decades that it has been reasonably safe to undertake the work of relocating the rich ore underground.

One of the Trenches Dug by the Discoverers of the First Mine: It Runs Laterally to the Fissure That Contains the Ore, and is Braced with the Limbs of Trees

One of the old mines, at least, has been located, and the interesting methods employed in working it are entirely different from those commonly used by prospectors in this country. Its location, hundreds of miles from civilization, makes necessary methods that are different from those employed where modern facilities are at hand. Yet the crude ways of the prospectors pioneering in Lower California are surprisingly complete so far as results go.

After constructing rough houses and shelters of adobe and straw for the accommodation of themselves and their animals, the fortunate finders of the first of these many lost mines began to improvise means of handling their work. Trenches, braced with limbs of trees to prevent crumbling, were built, running laterally to the fissure containing the gold ore. The ore then could be taken from the fissure at various points, the original trenches filled in, and new ones built farther along as the work progressed. In this way all the upper strata of the mine could be worked without sinking shafts and doing expensive construction work. There is

enough to the mine to keep this method in operation several years; by that time it is hoped to have facilities at hand for the sinking of shafts and reaching the ore that lies farther below the surface.

The Miner is Pouring Mercury into the Concrete Basin That is Constructed for Extracting the Gold from the Ore. This Is the Last Operation Necessary before Evaporating the Water

A Portrait of the Finder Taken on the Spot of the Only One of the Lost Mines That has been Discovered as Yet

The ore is then shot down the side of the mountain, on slides built of logs, to the valley below, where the most interesting work begins.

A large basin is built of concrete, 8 or 10 ft. in diameter and perhaps a foot deep. In the center of this, a large concrete block firmly supports an upright iron rod. There is also in the basin a movable block of concrete which has two similar iron rods in the top, each with a hooked end.

When sufficient ore has been accumulated beside this basin, it is filled with water, and some of the ore-bearing rock placed inside. A long pole is slipped over the central iron rod, which serves as an axis, and under the hooks of the movable rock. A burro is harnessed to the outer end of the pole and driven round the outside of the basin, the heavy rock being dragged around the basin as he does so. The result, of course, is the complete pulverizing of the ore.

Next, a quantity of quicksilver is poured into the basin. This absorbs the gold particles that have been loosened by the pulverizing process. The water is then evaporated, and the quicksilver, with its gold, remains in the bottom of the basin. The quicksilver is then scraped up, the dirt washed out by panning, and the quicksilver is placed in a buckskin bag and pressed. The quicksilver passes out of the pores of the skin, but the gold remains inside. Such of the quicksilver as remains—a very small amount—is burned out and the process is then over.

Crude, indeed, is this method of gold mining, yet it does not compare unfavorably with modern methods when one comes to consider the relative facilities that are at hand in this forsaken waste of land. At least it serves to form a nucleus to which more and more civilization will

A "Pan," the Same as in Placer Mining, is Used for Washing the Dirt Out of the Mercury and Gold Before Placing It in a Buckskin Bag

attach itself until, with the discovery of others of the lost mines, there will undoubtedly grow up communities with better facilities for extracting and handling the precious metal. The real achievement of finding the deposits seems to have been completed; it is merely a question of time until the growth is effected. And, at the present rate of influx of miners, that time is not very far away.

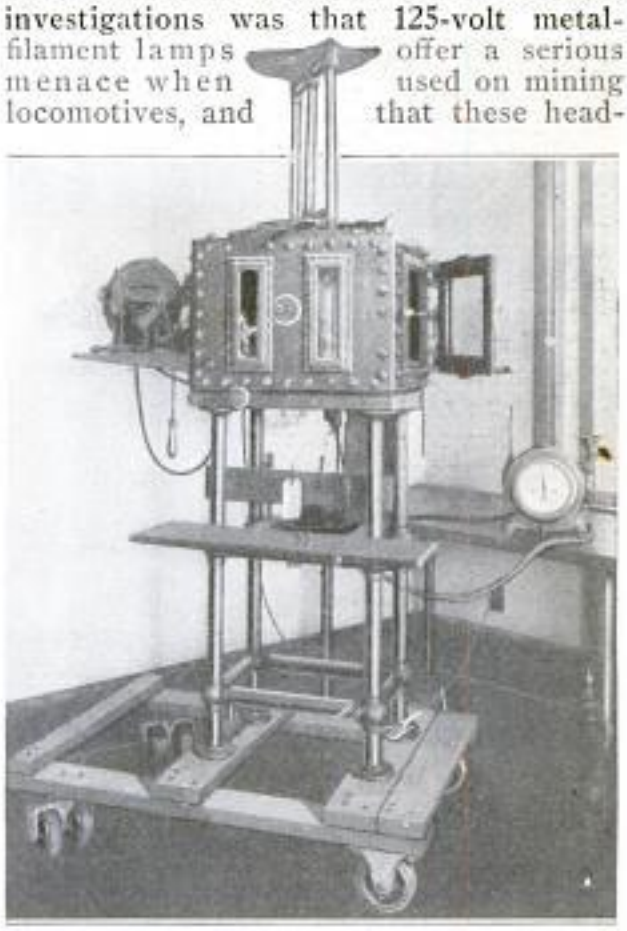
On the Cloth Are Pieces of the Ore Showing the Size to Which It is Broken in Preparation for Putting It through the Crushing Process That Takes Place in the Concrete Basin

BAGS FOR CEMENT AND LIME MADE OF SPECIAL PAPER

Cement and lime are now being shipped in paper bags. The paper, of course, is specially made for the purpose, and has to have qualities very superior to ordinary paper. These characteristics are determined by laboratory tests which include, besides the tests ordinarily performed on paper, a number of special service tests, such as filling a standard bag with 94 lb. of sand and dropping it a distance of 3 ft., and also subjecting such a bagful of sand to a jolting test on an ordinary foundry jolter. For the paper to be acceptable, the results must show that the bag has a good bursting strength, a high tensile strength in both directions, a fiber composition of not less than 50 per cent strong manila and jute, with the remainder as chemical wood ash not over 3 per cent, and with resin of at least 3.5 per cent. On conclusion of the tests these characteristics are embodied in the form of a specification.

BROKEN COAL-MINE HEADLIGHT LAMPS ARE MENACE

A series of experiments with the headlight lamps of coal-mine locomotives to test the danger of gas explosions as a result of the breakage of the bulbs of these lamps, was recently conducted by the United States Bureau of Mines. These tests took place in a gas-tight steel box, having a steel-framed glass door, and observation windows. At the top of the box a safety valve was provided to take care of any violent explosion. The box was filled with an explosive mixture of Pittsburgh natural gas and air. It was measured by a sensitive meter, and admitted into the box through a mixing fan. Bulbs placed in this box were broken by means of a steel rod sliding into the device, and of 56 such tests, 22 resulted in the ignition of the gas contained in the box. The conclusion drawn from these investigations was that 125-volt metal-filament lamps offer a serious menace when used on mining locomotives, and that these headlights should have some means of protection, such, for instance, as a device for interrupting the circuit before the bulb is shattered.



An Apparatus for Testing the Danger of Gas Explosions from Broken Lamp Bulbs: These are Placed Inside the Steel Box and Broken After Being Filled with an Explosive Mixture of Gas and Air

COMPACT VACUUM CLEANER FOR CRAMPED QUARTERS

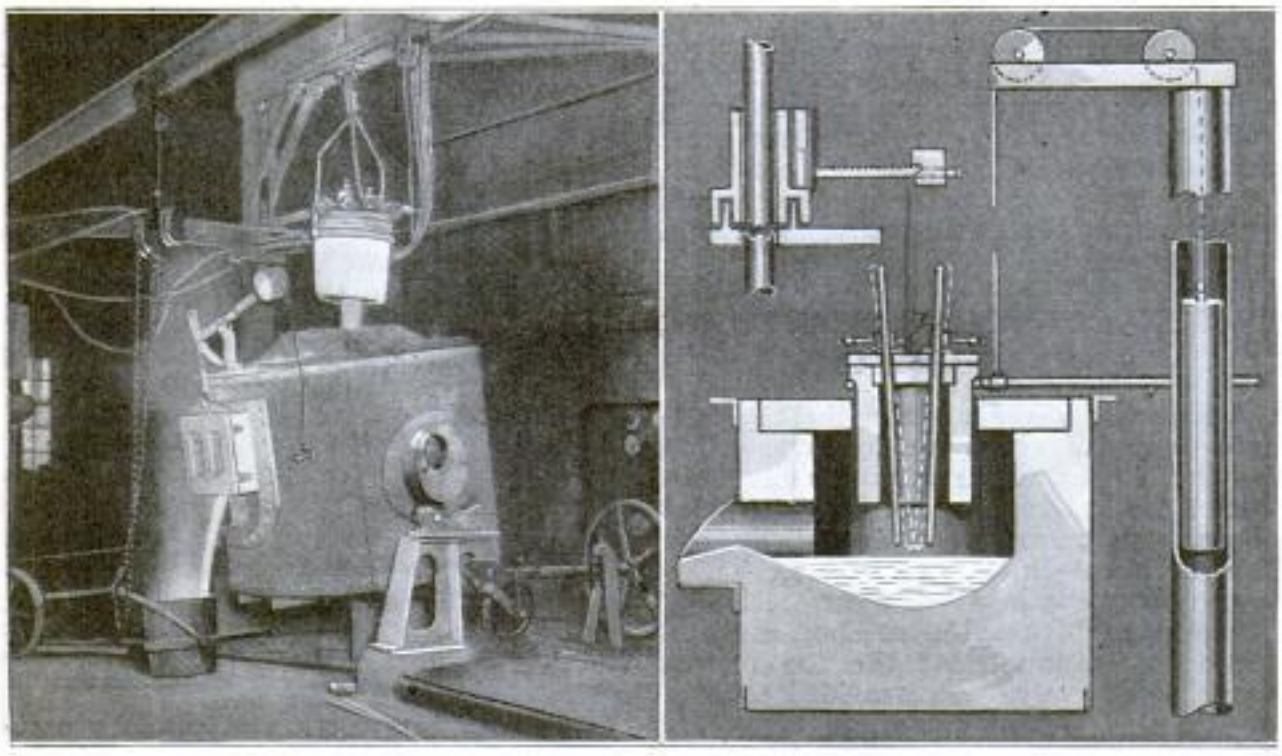
For working in close quarters, such as the interior of automobiles, carriages, clothes closets, and the like, a newly introduced vacuum cleaner has something of an advantage over machines of the conventional type, as it is so designed that the motor can be carried in one hand while the nozzle, which is made with a short handle, is manipulated with the other. Aside from its compactness and resultant ease of handling in restricted spaces, the new apparatus is practically identical with other widely used makes of cleaners.

A Compact, Light-Weight Vacuum Cleaner Designed Especially for Cleaning the Upholstery of Automobiles and Carriages, but Which will Do the Work on Larger Surfaces Satisfactorily

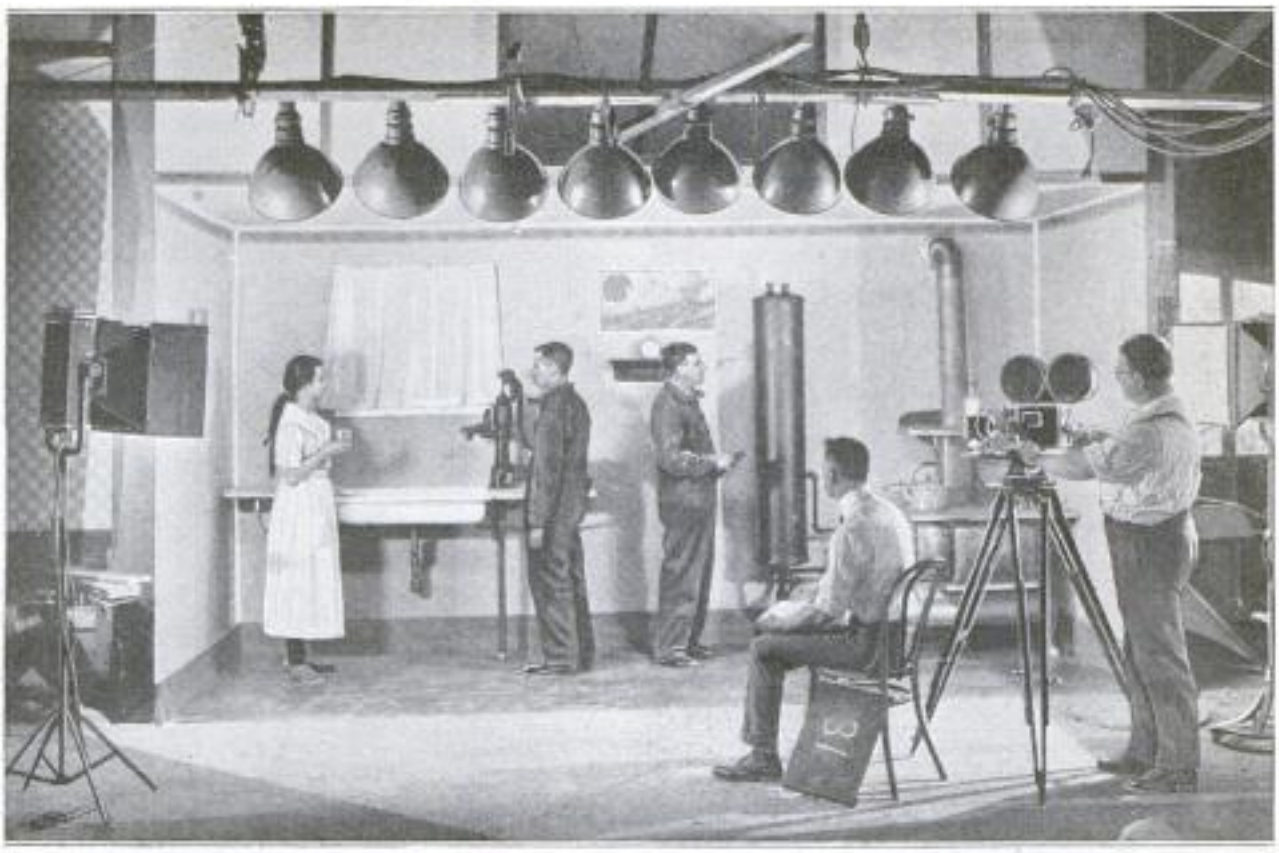
AN ELECTRIC TORCH FOR INDUSTRIAL USES

An industrial electric furnace of new design has recently appeared for use as a melting or refining medium for metals. It is really an electric torch. The electric current is so applied to the electrodes that they repel each other, forming an arc which has the appearance and effect of a torch. Hence, the new furnace is known as the repelling-arc furnace.

Another novel feature of the new furnace is that the electrodes can be raised and lowered as a unit, or in a cluster, rather than individually. This makes it possible to use gas-tight electrode joints, thus preventing the rapid wear of the electrodes, and doing away with water-cooled holders in the roof of the furnace. This construction also permits the suspension of a cluster or torch alternately in either one of several furnaces, so that one furnace can be charged with metal while the other is operating.



The Carbons of This New Electric Furnace, Shown in the Diagram, are Arranged in a Cluster and Are Adjustable Individually or as a Unit. The Metal to be Melted is Contained in an Enclosing Wall of Fire Brick Encased in Sheet Steel. The Photograph Shows a Furnace Pouring, with the Cluster in a Raised Position



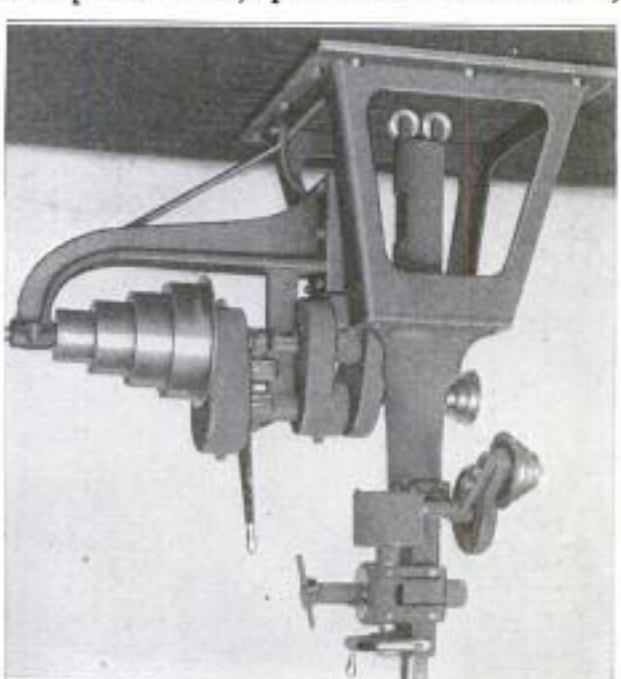
The Gentlemen in Overalls in This Picture Are Members of the Engineering Staff of the New York State Agricultural College. The Young Lady Is a Co-ed. They are Demonstrating the Proper Way of Installing Household Plumbing Fixtures for a Moving-Picture Film Which is to be Widely Circulated in New York State

NEW YORK STATE TO SEE FILM OF PLUMBING INSTALLATIONS

Educational efforts on the part of organizations interested in the welfare of New York State citizenry will soon be aided by the broadcasting of a new film demonstrating the importance of correct plumbing installations as an aid to health. It is intended primarily as a help to rural folk in the better way of installing kitchen and bathroom plumbing fixtures. It depicts in detail the modern methods of installation that not only add comfort to the country home, but make its water supply more healthful as well. Though the truck demonstrations which preceded it were invaluable, it is thought the film will be of greater benefit because of the larger audiences it will reach through wide circulation. The scenes were staged in the engineering laboratories of the State Agricultural College, enacted by members of the professorial staff.

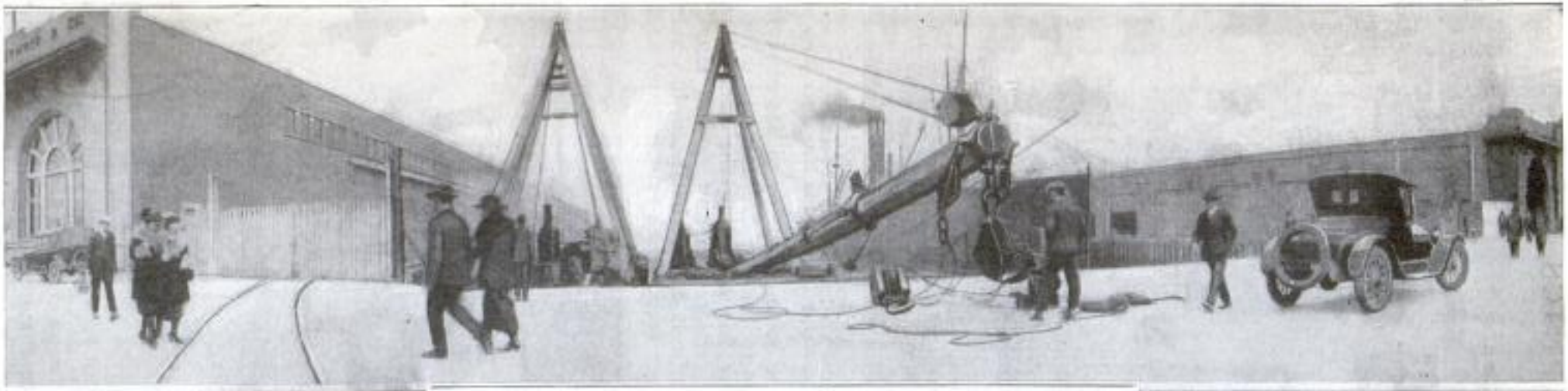
DRILLING MACHINE IS BOLTED TO THE CEILING

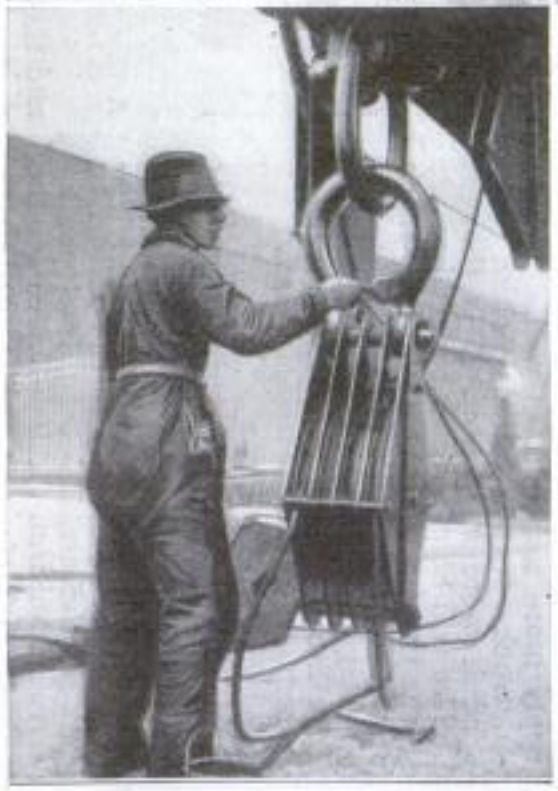
A suspension-type drilling machine, which is bolted directly to the ceiling, or overhead timbers, has been developed by an American firm. It is intended for the drilling of boiler plates, switchboard slates, and other large, unwieldy pieces of work. Holes up to 2 in. in diameter are drilled. The lever for operating the back gears can be furnished in any desired length. The spindle is counterbalanced, has hand and power feed, quick-return movement,



A New Drill Press Is Unusual in That It is Bolted to the Ceiling Instead of the Floor for the Purpose of Drilling Large-Size Work

and three changes of feed. The machine weighs about 1,800 pounds.





REPAINTING A SEAGOING SALVAGE BARGE

LIKE all other industrial units which are exposed to wind and storm, even the sturdy seagoing barges whose work it is to reclaim and repair wrecks in the deep sea, must occasionally be painted for protection. One barge used for such salvage work out of San Francisco harbor was recently given a coat of paint. Its 100-ft. wooden boom was first lowered as shown in the top picture, to bring the otherwise inaccessible steel tackle within reach. These fittings consisted of steel blocks and cables of immense proportions, as may be perceived by comparing them with the painter who is working on them. Red lead and linseed oil was used on the pulleys throughout, as this combination is a very good preservative for metal exposed to the weather. Tar pitch was rubbed on and into the cables to preserve them, and lubricate them during action.

On the right are seen all the pulley blocks connected to the end of the boom. The one the man is painting is used for raising or lowering the load only, the one above the boom is for raising and lowering it, and the side ones are for swinging it.

BLOWING UP THE "CAMPANIA" WRECKED DURING WAR

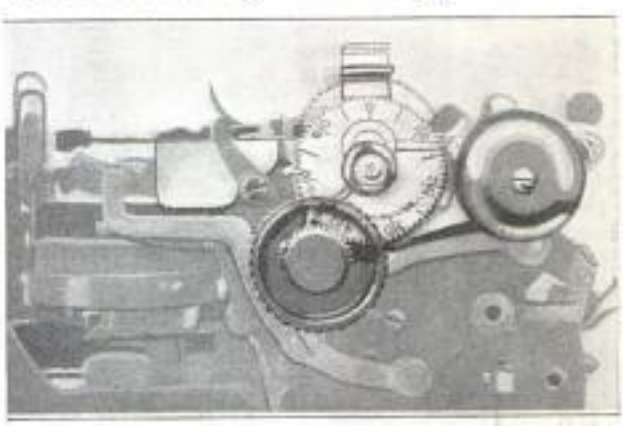
One of the largest Cunard ships, and at one time one of the fastest, the "Campania," was wrecked in the river Clyde while engaged in war service, about 4½ years ago. There it has been a derelict ever since, and to some extent an obstruction to traffic. A salvage company was commissioned by the admiralty, a considerable time ago, to blow up the vessel, but the work of preparing for the destruction of a wreck of such proportions is a very elaborate process, and it is only recently that the task was completed. The final act was the connection of the firing cable to the top of the mainmast, which protruded for some distance above the surface of the water. The pressure of one switch-key did the rest.

Above: The Visible Result of the Blowing Up of the Wreck of the "Campania," Sunk During the War in the River Clyde, Scotland, and Until Its Destruction, a Considerable Obstruction to Traffic

In Preparing the Wreck for Destruction, the Final Act Was to Connect the Firing Cable to the Top of the Mainmast Which Was Above Water, as Shown in the Illustration, Where the Men are Preparing to Leave the Finished Job

PAGE AS WELL AS LINE ENDS SIGNALED ON TYPEWRITER

Every typewriter has a bell to signal the end of the line, and by means of a new attachment the bell can now be made to signal the end of the page as well as the end of the line. It thus ensures perfect bottom page margins, without requiring any attention from the operator except to listen for the bell. It is built as an attachment to existing typewriters, and its main feature is a dial divided, like the face of a watch, into spaces representing lines instead of minutes. In commercial work the usual number of spaces is 40 to 45, beginning from zero, which represents the date line. To the dial is connected a tripping finger, which is set at the number of the lines the page is to contain, and which, when that point reaches a gear that revolves the dial, actuates a spring that rings the bell, and returns the dial and the finger to the zero point. The attachment fits any make of typewriter.



The Page-End Signaler Attached to a Typewriter. The Last Line of the Page is Signaled by Setting the Hand on the Dial at the Corresponding Number on its Face

The Mayor of Portland, Oregon, is Handling the Winch That Hoisted the Flag at the Dedication of One of the Highest Wireless Telegraph Towers on the Pacific Coast. He is Watching for the Flag

To the Left Is a Full-Length View of One of the Highest Wireless-Telegraph Towers on the Pacific Coast That was Recently Completed at Portland, Oregon. Above: the Men are Preparing the Flag to be Hoisted by the Mayor to the Top of the Tower During the Dedication Ceremonies

WIRELESS-TELEGRAPH TOWERS HIGHEST ON PACIFIC COAST

The two tallest wireless-telegraph towers on the Pacific coast are each 626 ft. high. One, at San Francisco, is nearing completion, and the other, near Portland, Ore., is already completed, and was recently dedicated by the mayor of that city. The towers are of steel construction, built like a huge derrick boom, braced with 20 guy wires, and are anchored to a base of 600 cu. yd. of concrete. Each tower has four outgoing circuits with a combined capacity of 700 words a minute, and an operating radius of 5,000 miles.

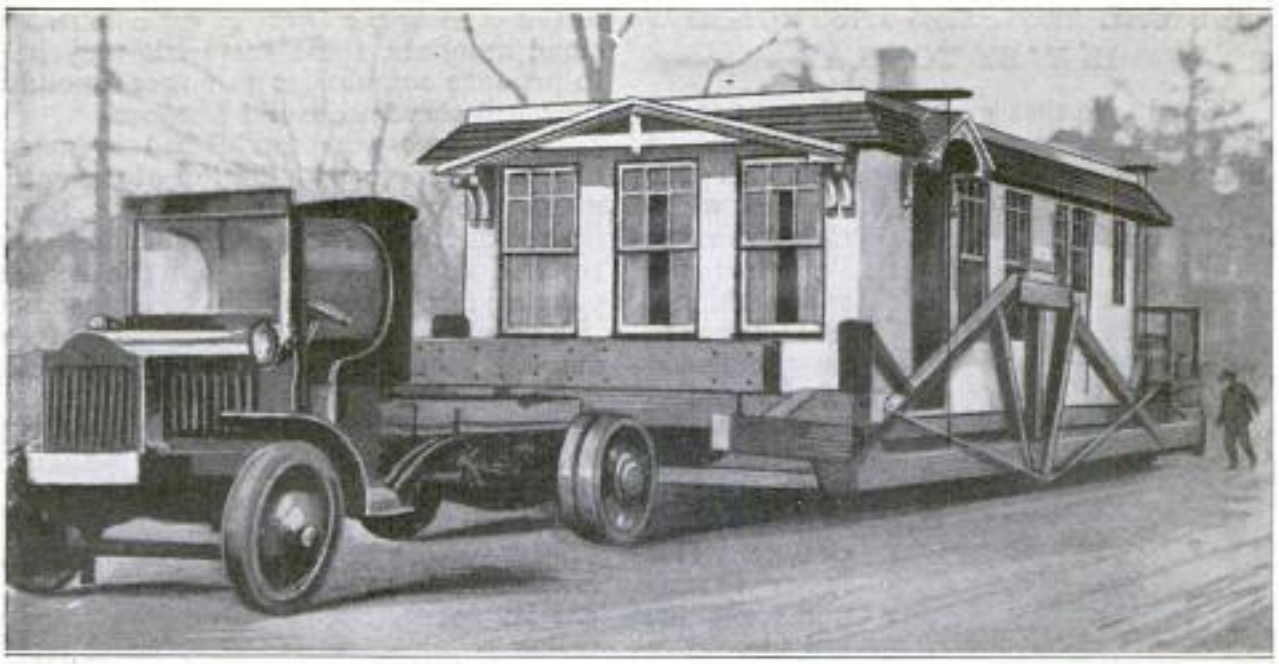
CAST CUTTING TOOL CONTAINS NO IRON

More information has become available regarding a new cutting tool which has a nickel base, contains no iron, and is cast and ground to size, requiring no previous forging or heat treatment. Besides nickel, the component elements are tungsten, aluminum, molybdenum, silicon, and a 15-per-cent-high proportion of zirconium. In competitive tests which have been conducted, a tool of this composition ¾ in. square, cut to a depth of 3/16 in. at a traverse rate of 1/16 in. per revolution, with a cutting speed of 123 ft. per minute, removing 4.85 lb. per minute. After 2¾ minutes a tool of similar proportions of the best high-speed steel was reported worn to a dull edge, while the tool of the new composition was still cutting efficiently after 14½ minutes. The new cutter is said to have a fine silky fracture, to be free from shrinkage and blowholes; and it is stated that it can be used for the large majority of production operations, excepting where specially thin tools are required.

CONCRETE BUNGALOW MADE IN TWO AND A HALF HOURS

A reinforced-concrete house that is ready to be shipped within a few hours after pouring, is the product of an eastern concern. The dwelling is cast in one piece in a few moments' time, two sets of forms completing four houses per day. A patented process claims to dry the concrete thoroughly in 2½ hours. A considerable saving in time and money is thus effected over the old method where several days are required.

The smallest structure produced is of



Placing Home Construction on a Production, Manufacturing, and Shipping Basis Is the Scheduled Purpose of an Eastern Concern. Building Costs are Greatly Reduced in This Manner, It is Stated, and a Finished House Is Ready to be Shipped a Few Hours after Receipt of the Order

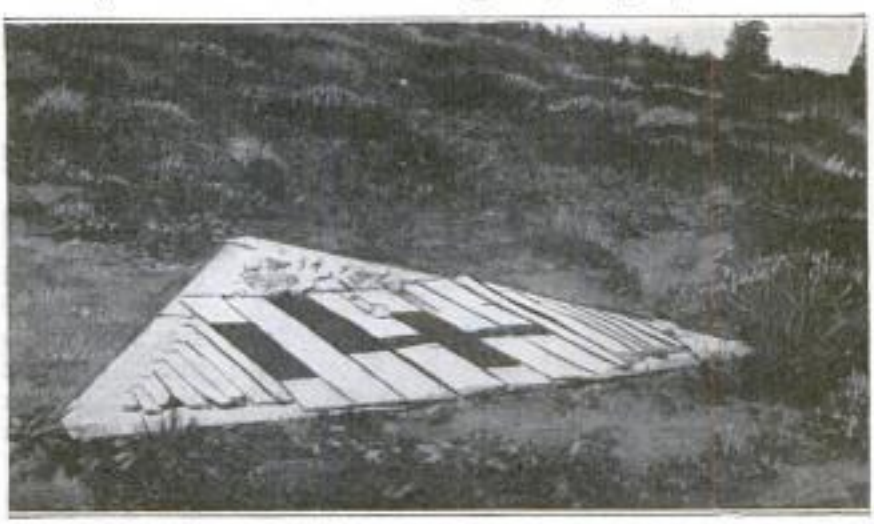
the unit bungalow type, 28 ft. long, 12 ft. wide, and contains five rooms, including parlor, living room, bedroom, bath, and kitchen. A unique space-saving feature of the bedroom is an elevator bed which may be swung out of the way by means of pulleys. Larger houses can be built by casting additional units.

CONTINUAL COAST EROSION FORCES NEW PROTECTION

Concrete walls sloping back at an angle of 28° and extending for three-quarters of a mile are to be built along the Essex coast between Walton-on-the-Naze and Frinton, England. Every 50 ft., the walls are to be reinforced by concrete piles driven 10 ft. into the clay subsoil. The wearing action of the sea, combined with that of rain and frost, is continuous and rapid, amounting to 11 ft. a year on the Holderness coast of Yorkshire alone. The cliffs are of an easily eroded material—bowlder clay, surmounted by strata of sand and gravel 6 to 10 ft. in thickness. A further part of the plan is to include a driveway and a sewer on the top of the cliffs connecting Frinton and Walton, and a jetty for landing fish at half tide.

FIELD MARKERS FOR AIRPLANES USED IN WESTERN FORESTS

Boards formed into large triangles and painted white are used to mark off landing fields in the government patrol of western forests. It was discovered after airplanes had come into use for forest-fire inspection that difficulty was encountered by airmen in distinguishing landing clearances from the woodlands surrounding them. Constant patrols are maintained by the government in the forests of Washington, Oregon, and California in combating conflagrations. It is claimed that between 700 and 800 blazes in the last year alone were discovered by this method.



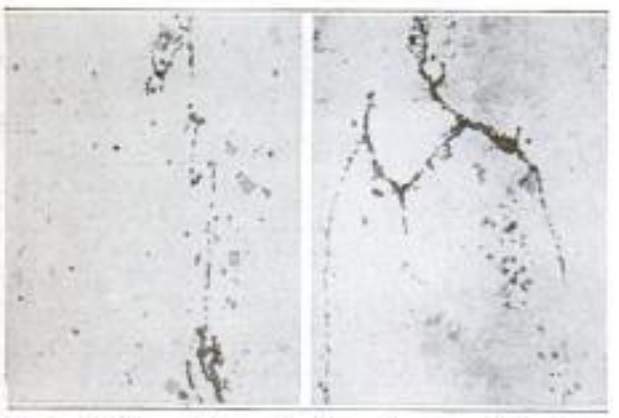
In the West, Where the Government Maintains Air Patrols for Forest-Fire Service, Triangular-Shaped Markers are Placed on the Ground to Aid the Airmen to Distinguish Landing Places from Surrounding Woods

MUSICAL WHISTLE INSTRUMENT IS EASY TO PLAY

"So simple that even a child can use it" is a phrase commonly seen and heard these days, and which is applied with ease to a new whistle instrument. By pulling and pushing a lever attached on the inside of its barrel to a small piston, the tones of the whistle are caused to change. This lever terminates on the outside in a triangular-shaped finger-piece running through a slotted plate. Markings representative of musical tones appear on the plate, and as the triangular lever moves into place before the markings, a correspondingly pitched musical tone issues from the whistle.

NEW DISCOVERY ON ACTION OF ALLOYING METALS

Important facts have just been established at the Bureau of Standards relating to alloy and special steels. It appears that zirconium, titanium, and aluminum are not true alloying elements with steel, but that their value arises from the fact that they act as scavengers. When they are not eliminated in the slag they remain in the steel in the form of inclusions. In small amounts, these materials may help to produce soundness; in larger amounts, they will serve no useful purpose.



Left: A Microphotograph of an Ingot as Cast, Containing 0.11 Per Cent Zirconium. The Crystals of This Material can be Seen Scattered Throughout the Specimen. Right: A Piece of Steel Containing Both the Yellow Crystals of Zirconium and the Orange-Pink Crystals of Titanium. The Black Line of Dots is a Series of Aluminum Inclusions

These facts were established by means of a microscopic examination of the specimens of steel prepared for the study. Some idea of how the conclusions were reached can be gained from the accompanying microphotographs. For instance, if zirconium is present in excess of the amount required to purify the iron, the extra amount is present throughout the iron in the form of small bright-yellow crystals, cubical in form, which require a magnification of 500 diameters or more to be seen readily. These crystals may be of zirconium oxide, carbide, or possibly cyanide. The presence of titanium is disclosed by orange-pink crystals.

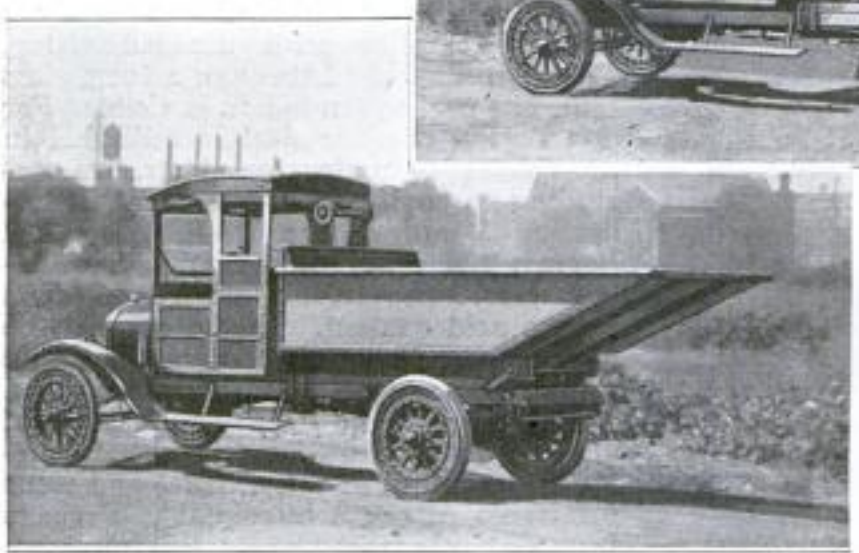
One Conspicuous Cluster of Crystals, the Larger and Brighter Ones of Which Are Bright Yellow and Composed of Zirconium, and the Smaller Darker Ones Are the Orange-Pink Titanium. The Black Streaks That Appear as a Sort of Blemish Across the Field are Very Probably Composed of Little Particles of Aluminum

WEATHER BULLETIN FOR AIRMEN FLASHED FROM ARLINGTON

A new air bulletin service, designed especially to meet the needs of airmen, was inaugurated June 1, 1921, by officials of the U. S. Weather Bureau. The forecasts, warnings, and summaries of weather conditions are an aid also to marine interests, and the work is carried on in cooperation with the Naval Department. Each morning at 10:30 o'clock the signals are sent broadcast from Arlington station, Virginia. The bulletin is divided into two parts, and invariably begins with the letters USWB (U. S. Weather Bureau). The first half gives surface weather conditions based upon observations taken at 8:00 a. m., 75th meridian time, and the upper-air observations begun at 7:00 a. m. of the same day. The second part of the bulletin warns of storms and hurricanes, gives wind and weather forecasts for ocean zones, and a summary of general air-pressure conditions for twenty-four hours.

SPECIAL TRUCKS TO HAUL DETROIT GARBAGE

A very practical and capacious auto truck is used by the city of Detroit, Mich., for hauling garbage and refuse. The distance from the top of the truck body to the ground is less than 5 ft., and this, of course, makes it easy for the workmen to empty cans and other garbage receptacles without climbing aboard. The back of the body is tapered to provide a slanting dump surface when the truck arrives at the unloading point. A dumping mechanism, in the form of a hand-operated winch, is also provided which permits discharge of the load, without shoveling, in 30 to 40 seconds.



Left: The Truck Is in Position for Loading. The Receptacle for the Garbage Is Low Enough to Allow a Man Standing Beside It to Easily Reach Over It. Above: The Garbage Receptacle has been Raised by the Winch to the Dumping Position with Its End Sloping to the Ground

OLD FIRE ENGINE USED AS ROAD BUILDER'S PUMP

That putting out fires represents only one phase of a fire engine's usefulness was demonstrated recently in New Jersey, while a system of concrete highways was under construction. A considerable supply of water was needed for mixing the concrete and curing the pavement after laying, and it was amply available in a near-by stream, but the contractor faced something of a problem in raising it economically to the point of application. An old fire engine, retired from its original occupation but still in good pumping order, was put to work, and proved satisfactory.

Above: The Old Fire Engine, Quite a Relic of the Past as Compared with Modern Fire-Fighting Machines, Is at Work Proving That It Still Has Vitality Enough to Pump All the Water Needed for Road-Building Purposes. Right: Hanging Over the Bridge with Its Nozzle in the Water Is the Hose through Which the Veteran Fire Engine is Pumping the Water

NEW SLAUGHTERING GUN KILLS HUMANELY

Death to the sheep, cow, or hog may now be administered in a very humane

Killing a Sheep by Placing the Nozzle of the Slaughtering Gun Against Its Head and Then Pulling the Trigger. Inset: A Detailed View of the Pistol

manner by the use of a new slaughtering pistol. Unlike the lead projectiles formerly used for the purpose, the gun emits no bullet. Instead, the cartridge within its chamber creates a terrific air pressure which is used to project a blunt bolt. This bolt, when applied at the right point of the animal's head, will result in death.

BISMUTH WIRE MANUFACTURED IN THE UNITED STATES

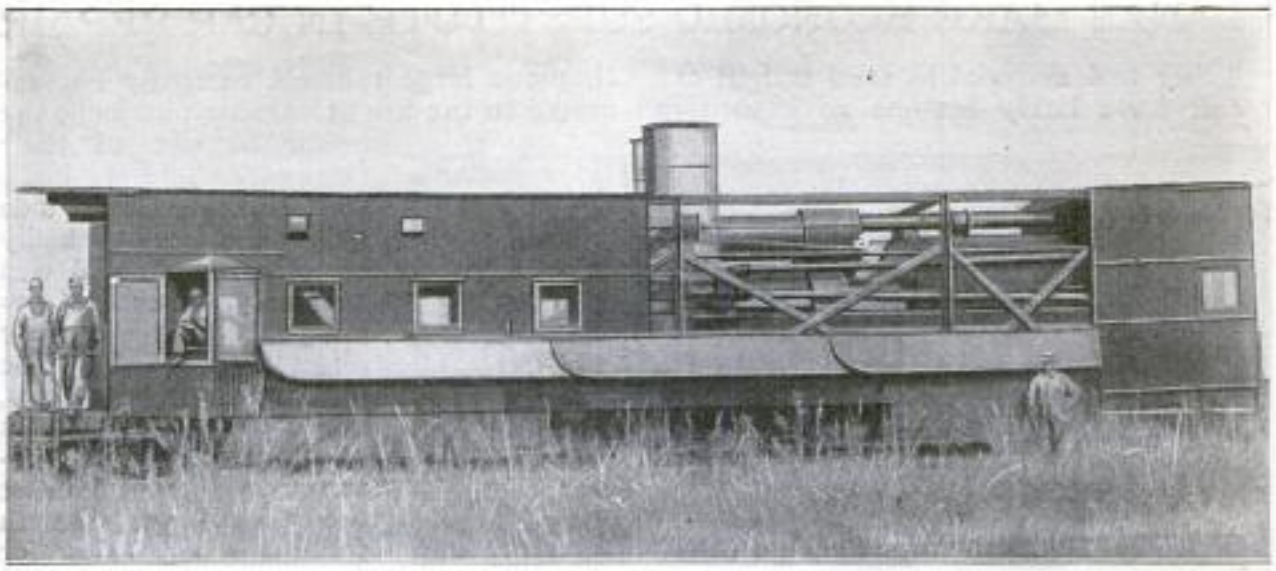
Bismuth wire which is so useful in plotting the intensity of magnetic fields, in making resistance tests, and for use in measuring small intensities of heat and light, is now being made in the United States. Its manufacture has heretofore been left to other nations who have sold it to this country at the handsome figure of $1 a yard, but by the use of a recently developed American "extruder," the investment of $4 in the crude metal will return $10,000 worth of the product. The extruder is a cast-iron cylinder with a tight-fitting plunger, into which the molten metal is poured. When at the proper temperature, the metal is forced by the plunger at the rate of 35,000 lb. per square inch through a die that forms the other end of the cylinder. This die is bored with a hole to correspond in diameter with the wire-size specification. Although bismuth is naturally very brittle and crumbling, the metal is ejected into a strand of very substantial wire.

UNDERGROUND STREAMS TRACED BY UNUSUALLY STRONG DYE

The coloring power of fluorescein, a coal-tar product, is so great that one part mixed with forty million parts of water is easily discernible with unaided vision, and when examined through a long glass tube, one part in ten billion is visible. For this reason the chemical is utilizable in the tracing of underground streams, according to engineers of the Land Classification Board of the U. S. Geological Survey. In waters containing free mineral acids, however, it is rendered colorless by the acid content. In the case of the disappearing river of comparatively pure water, the method pursued is to place a small charge of the dye near the point of disappearance and then watch all surrounding bodies of water, lakes and wells for traces of the colored fluid. Seepage from canals is traced by small borings adjacent to the charged canal.

PLYWOOD AUTO BUMPERS TO SUPPLANT STEEL

Automobile bumpers, made of laminated oak, or yellow birch, in the natural finishes, have made their appearance on the market, and may take the place of the steel types on both front and rear of cars, as they are said to be practically as strong as steel and weigh only about one-half as much. Attached by means of flat spring-steel stock, they are quite elastic and should absorb minor shocks as well as the older metal bumpers.



This Is a Special Oil-Burning Weed Burner Used on a Texas Railroad to Clear the Track of the Thickly Growing Overrunning Vegetation: Blasts of Air Heated to 1,500° F. are Forced, by High-Pressure Fans, to a Distance Seven or Eight Feet Either Side of the Track, Clearing the Roadbed of Impeding Growths

RAILROAD RIGHT OF WAY SINGED CLEAR OF WEEDS

After trying several methods, including hand and mechanical labor, to clear its right of way of impeding weeds, the Texas and Pacific Railroad Company has successfully used a weed-burning outfit which will clear 5 miles of track per hour. Upon a 60-ft. specially built car is a unit of two heating retorts, one of which is a 180-cu.-ft.-capacity furnace wherein combustion between air and gas is completed at a temperature of between 2,500 and 3,000 degrees. A second mixing chamber which is the same in style, but considerably larger and in which the temperature is reduced to about 1,400 or 1,500 degrees, works subsequently and in conjunction with the first. The heat is forced from here to a 38-ft. hood which straddles the rails under the car and spreads to a distance of 10 ft. outward from the center of the railway.

Steam turbines are used to drive the blowing fans which furnish the combustion chambers with air. Safety dampers are also provided by which the torrid discharge may be checked in passing over bridges, walks, etc. Three men, an oil and water supply, and an oil-burning engine are required for operation of the unit. The fuel consumption is 60 gal. per mile.

PAPER FROM HARDWOOD PULP AS WELL AS SOFT WOODS

In the present shortage of wood pulp, it will be a great gain if some means can be devised for making paper from hardwood, as well as from soft-wood pulp. In an effort to solve the problem, one of the largest paper-making companies in the state of Maine, where hardwood forests abound, has turned over to its chemists 10,000 cords of birch, beech, maple, and other hard woods, and it is thought that their work will prove that, though there must necessarily be a difference in the chemicals used, no great change will be required in the machinery used in making pulp and paper from soft woods. Similar attempts have been made in the past, but the processes evolved have been too costly to make them commercially practicable.

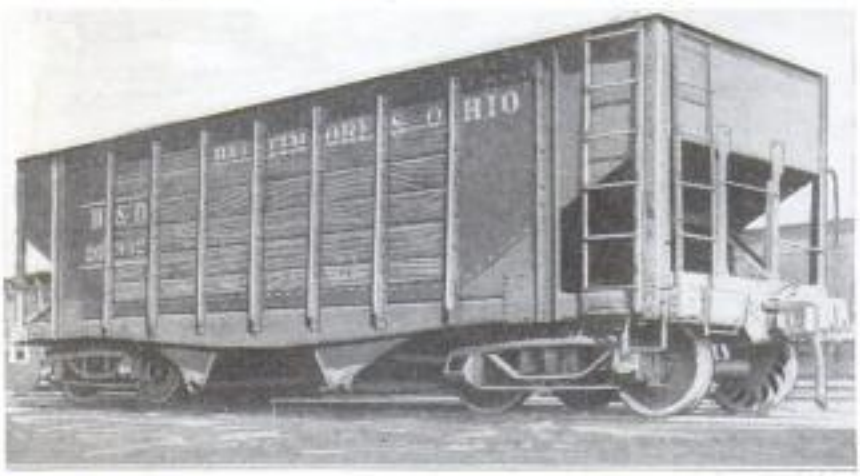
CONCRETE BUILDING COLUMNS TERMINATE IN ROOF ROOM

An interesting application of concrete construction was made recently when eight of a building's concrete columns were extended for several feet above the roof. The columns terminated in a ceiling which gave the combination the appearance of a room. The effect added greatly to the appearance of the building.

Unusual Roof-Garden Effect Formed by Extending the Concrete Columns One Story Above the Front of the House: Cross Trellises Heighten the Garden Effect

PLANKS MAKE ECONOMIC SUBSTITUTE IN CAR REPAIR

Labor and material in steel freight-car repair have lately become so expensive that one large railroad company has resorted to the use of wooden planks in the repair of one of their steel cars. The six large steel sheets on each side of the car were so badly rusted that removal was necessary. Instead of riveting steel plates in their place, as is generally the practice in such cases, six 2 by 12-in. planks were inserted. It is estimated by authorities that the cars will operate with these wooden sides for from five to eight years, and that the repair cost, at present prices, is only one-third as much as if steel plates were used. Before they are worn out steel may be cheaper.



A Steel Freight Car Repaired with Wood Instead of Steel on Account of the Present High Cost of Structural Steel. Six Plates on Either Side of the Car were Badly Rusted, and These were Replaced by Two-Inch Wood Planks, 12 Inches Wide

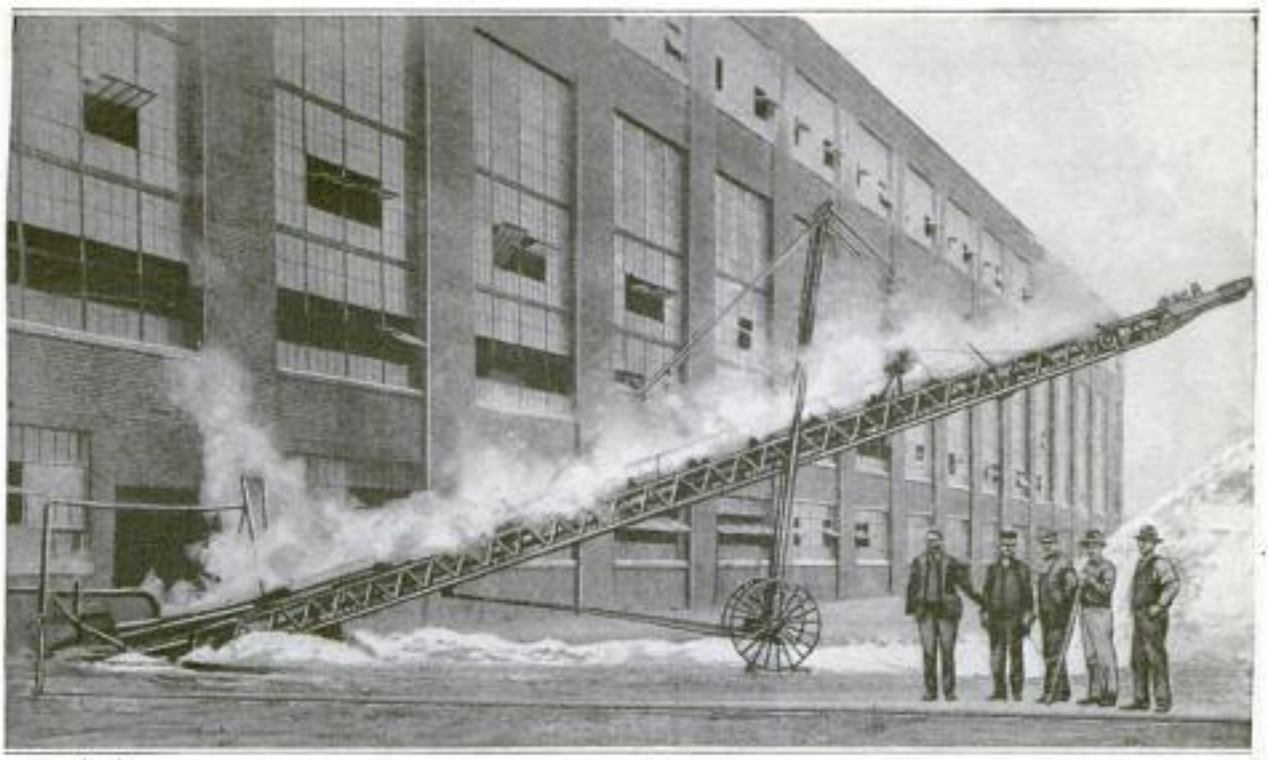
PORTABLE X-RAY SET SERVES PATIENTS AT HOME

A surgical X-ray outfit that is carried in an ambulance, and may be taken to the bedside of a patient too ill for removal to a hospital, recently passed a successful trial in England, thus adapting an emergency war-time arrangement to civilian use. A generator in the ambulance operates the tube, which has a special mounting that enables it to be placed over the patient's cot, and adjusted for height and position by handwheels. The control apparatus is mounted on a separate stand, and connected to the ambulance outside by a cable wound on a reel. Provision is made for developing the exposed plates at once, so that a diagnosis can be made in a few minutes.

The Ambulance is Standing in Front of the Patient's Residence with the Wire Arranged to Transmit the Power from the Ambulance to the X-Ray Apparatus in the Sick Room

¶A Canadian manufacturer has produced an imitation of a leather brogue in the form of a rubber overshoe, which at much less cost, looks exactly like a real brogue.

Members of the British Red Cross Society are Operating the Surgical X-Ray Outfit in a Sick Room in a Private Residence, the Patient Being Too Ill to be Taken to a Hospital



The Old Method of Transporting Molten Glass When Draining for Cleaning Purposes Was to Have it Wheeled from the Discharge Point in the Wall to the Scrap Pile by Gang Laborers. A Portable, Endless-Belt Conveyor Now Displaces Human Labor. It is Protected from the Red-Hot Glass by a Stream of Water

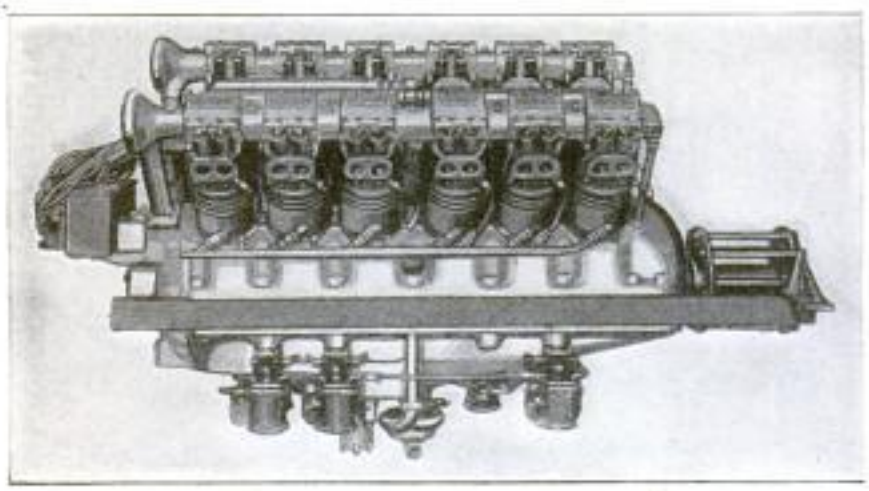
RUBBER CANVAS BELT USED TO CONVEY RED-HOT GLASS

In order to repair glass furnaces, it is necessary to drain them. Their remaining content of molten glass is allowed to flow through a 1-in. discharge hole onto a steel-pan conveyor, by which it is transported to an opening in the building wall. Under former methods, the glass was wheeled from this point to a pile in the yard by a gang of laborers. A rubberized-canvas belt, which is constantly watered to keep the red-hot glass from burning it, now displaces the wheelbarrow gang and carries the hot glass to the dump pile. Because of the water bath to the belt, its load of hot glass is suddenly chilled so that it breaks up in small pieces. This also eliminates much inconvenience, as it was formerly necessary to break the glass by manual labor. The belt is part of a portable conveyor, and the unit may be moved from place to place.

AN ORNAMENTAL GARDEN WALK OF CONCRETE SLABS IN TURF

An old Dutch method of making ornamental garden walks was to form tessellated patterns by the use of concrete slabs in combination with the grass sod. The owner of extensive grounds at Colorado Springs has used this method for the construction of what he calls a "watch your step" walk. The slabs are placed in the turf so that they correspond to the footsteps of a person walking along the garden path, and it is possible to traverse the whole length of it without stepping on the grass.

The Idea of "Watch Your Step" has been Used Literally by a Western Gardener in Laying Out His Walk. Stone Slabs have been Placed in the Middle of the Turf



This New 700-Horsepower Airplane Motor Is a Single-Unit Power Plant Developed by Engineers of the United States Air Service. It Is of the "W" Type, Having 18 Cylinders Arranged in Rows of Six Cylinders Each

POWERFUL AIRPLANE MOTOR BUILT BY GOVERNMENT

A 700-hp. engine, the most powerful single-unit air-craft motor yet built in the United States, has recently been completed by staff engineers of the United States Air Service. It is of the "W" design type, having eighteen cylinders arranged in rows of six each. It was tested at McCook flying field, Dayton, Ohio.

TEXAN FINDS FOSSIL OF AMERICAN ELEPHANT

About 500,000 years ago, as nearly as can be estimated, a huge progenitor of the present-day elephant crashed to earth, never to rise again, near what is now Houston, Tex. During the centuries its remains lay buried in the sand and gravel until a short time ago. R. L. Roy, of Houston, kicked at what appeared to be a loose rock, but which he discovered to be one of the enormous teeth of the prehistoric beast. Careful excavation unearthed more teeth, a number of vertebræ, some leg bones, and best of all, the skull and tusks. These last measured 11 ft. in length. Experts in biology believe that the remains are those of neither a mastodon nor a mammoth, but of a later species known as the "imperial" elephant, which attained a height of 14 ft., greater than that of either of its forerunners. These elephants were spread over the entire United States during the Pliocene period which is believed to have ended between 50,000 and 100,000 years ago, and which lasted from 400,000 to 1,000,000 years. Only one larger

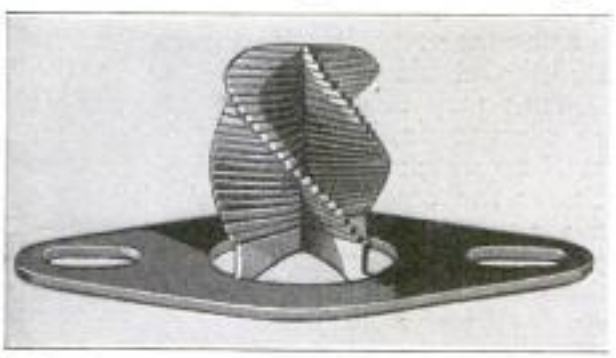
These 11-Foot Tusks were Carried About by an Elephant Standing 14 Feet High, That Roamed Over North America 500,000 Years Ago

Hundreds of Thousands of Years Passed before the Skull and Tusks Marking the Grave of an "Imperial" Elephant were Discovered in the State of Texas by a Man Who Stumbled over What First Appeared to Be Loose Rocks

known specimen is extant. It forms part of the exhibit in the former Royal Museum of Petrograd, Russia.

AUTO INTAKE-PIPE FITMENT SAVES MUCH GASOLINE

An extremely simple little contrivance, designed to be fitted between the carburetor and intake manifold of automobile engines, is claimed to effect an economy in gasoline consumption of from 33⅓ to 50 per cent, greatly reduce carbon formation, increase power, and prevent the fouling of spark plugs from an overrich mixture. There are no moving parts in the device, as it consists of a flange base of antimonial lead, which needs no packing gasket, and a four-sided spiral-shaped part with serrated surfaces and edges. It is installed with the spiral upward in the intake-manifold vertical column. In theory, the serrations break up the partially mixed gasoline and air into submicroscopic particles, which then combine very thoroughly to produce a homogeneous dry-gas mixture. The spiral form imparts a cyclonic motion to the rushing gas, which keeps it agitated and well mixed until it enters the cylinders.



A One-Piece Spiral Device Designed to be Installed between the Carburetor and the Intake Manifold of the Automobile Engine is Claimed to Effect a Saving of 33⅓ to 50 per Cent in Fuel Consumption

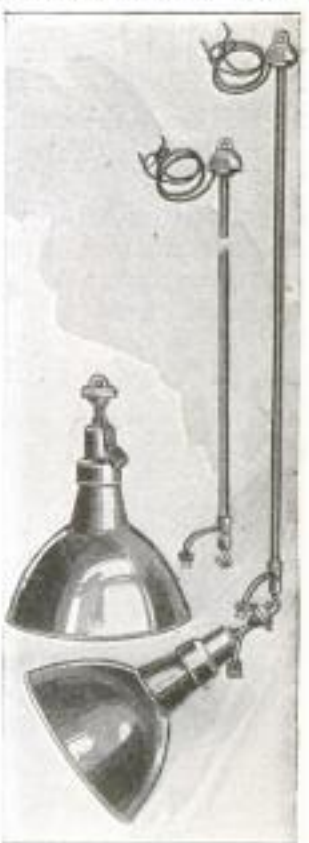
FOUNTAIN OIL CAN IS SAFE OIL DISPENSER

A fountain oil can designed to serve the purpose of filling oil-burner reservoirs and other like receptacles, without waste or danger, is on the market. The can has an inclined bottom, at the foot of which is a dispensing opening and the usual delivery hose. The oil is delivered through this hose by an intensified gravital pressure which is induced by pumping air into the space above the fluid level. A pumping device is included in the unit for this purpose. At the end of the dispensing hose is a trigger valve with a suitable nozzle for insertion into supply openings in the receptacles to be filled. When this trigger is pressed, the oil flows from the valve in a fast, even stream.

This Fountain Oil Can was Designed with a View to Safety in the Transfer of Oil from the Receptacle to the Reservoir of Some Other Device. Pressing the Trigger Releases the Oil in a Quick Stream

DETACHABLE LAMPS HANDY FOR LOFTY FIXTURES

Lamps suspended from cranes and building trusses are very difficult to reach, and because of their dangerous location, are often left uncleaned. A late introduction in the form of a detachable lamp is expected to overcome most of the difficulties and provide for safe cleaning whenever it is necessary. It is built with the reflector-bulb combination separable from the drop conduit. The latter fitting terminates in a hook on which the lamp part hangs. Current connection is made through an attachment plug. Thus, when cleaning is imperative, the attachment plug is pulled out and the lamp unhooked from the conduit. The unit may then be cleaned in the shop.



¶An air-service line is under consideration for use at the diamond mines of the Kongo region, South Africa. The present river transport requires two weeks to cover a 500-mile route.

MANIFOLD THAT REVERSES FLOW FOR OIL PUMPS

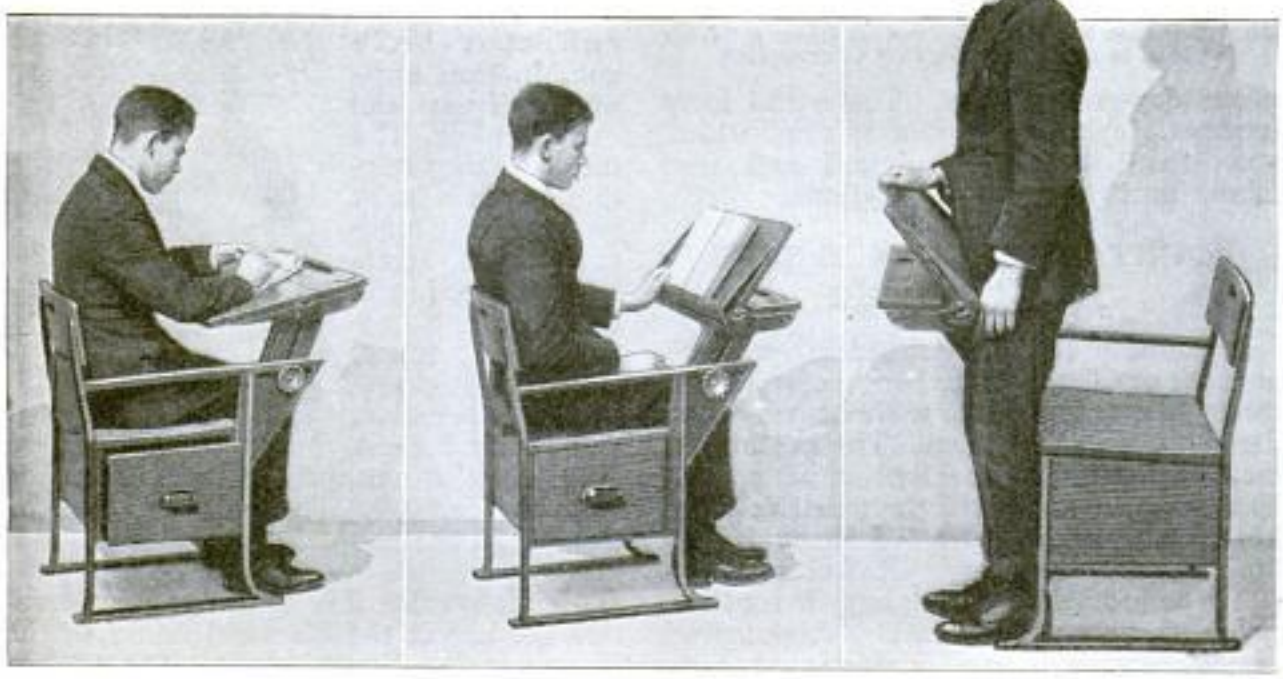
A new reversing device has been put on the market which, it is claimed, may be directly applied to either reciprocating or rotary pumps for oil-pumping installations. It is in the nature of a two-valve, four-way manifold with but two movable parts, doing away with numerous ells and tees of the multijoint, by-pass system. It has a full 2-in. flow at all valve positions. Because of the shorter pipe flow and consequent reduction of fluid friction, much less power is said to be required in operation.

NEW METHOD DEVELOPED FOR DRYING CHINA CLAY

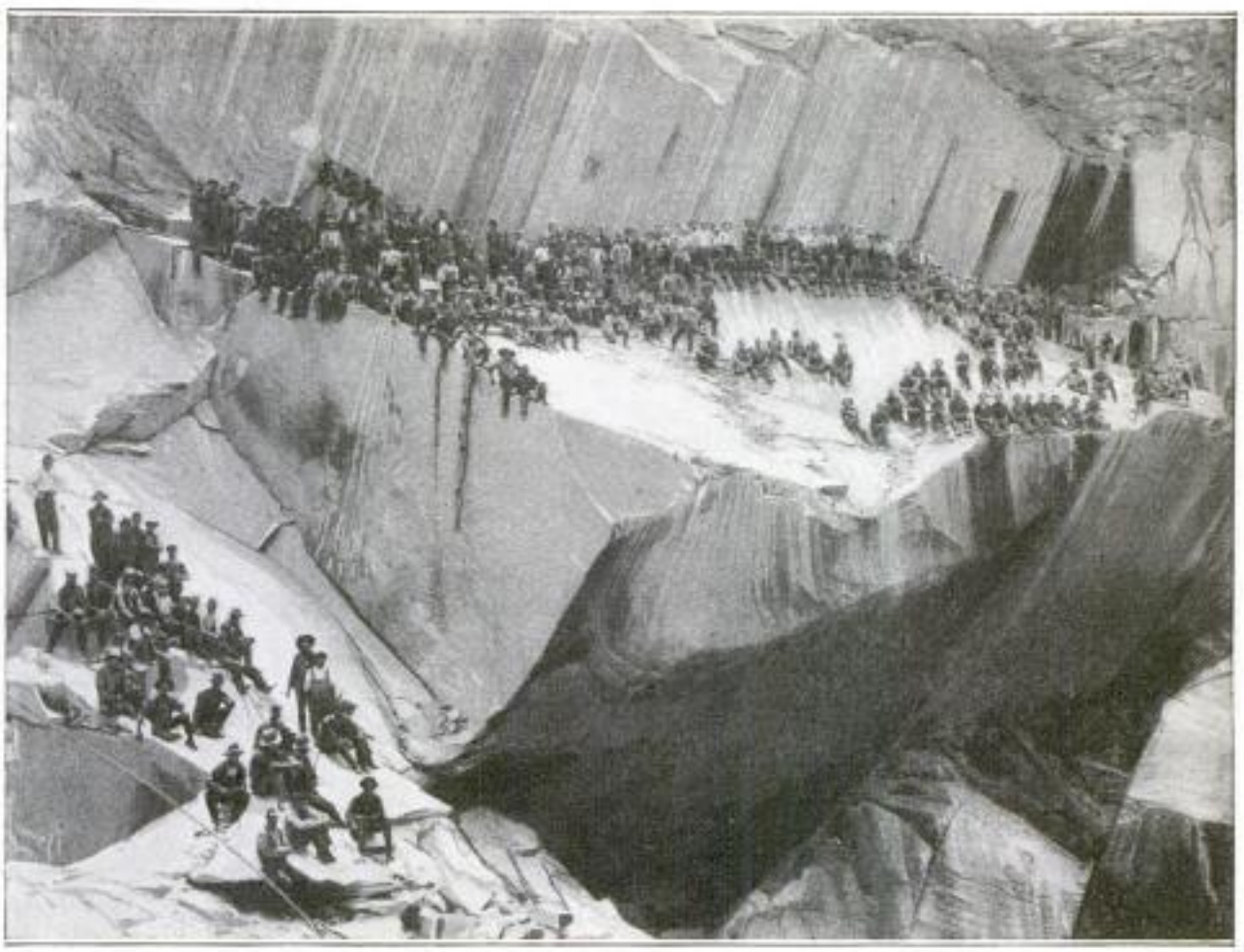
By automatically feeding China clay into a container inclosing a steam-heated drum, a great saving in time and money has been effected over the old method of drying. Previously, a shed, anywhere from 200 to 300 ft. long, was built with a fire box at one end and a chimney at the other, the fire passing through fire-brick flues heating the drying pans. Before the clay was dried it had to pass through settling pits for drainage, involving an extra transportation charge. In the new process the steam which heats the inner drying drum is used in continuous rotation between the boiler and the drum at a very moderate heating cost; in addition the clay can be fed automatically into the outer chamber, eliminating the extra expense for cartage. A plant of this description, to handle 24,000 tons of clay per year, costs about $70,000, as against an expenditure of $120,000 for an old-process plant drying 12,000 tons a year.

NEW STUDY DESK IS COMPACT AND CONVENIENT

Convenience and space saving are two achievements in the construction of a newly designed school desk. The desk is in reality a seat and desk combined, the latter fitting being connected to the seat by a metal extension arm. The desk part is hinged slightly above the middle so that the student may merely swing it over into a right-angle position. It then becomes an easel on which he rests his book for study. Under the seat is a drawer which holds the necessary collection of books and papers. In rising, the pupil turns the desk up as in the position of study, thereby giving him room without stepping into the aisle.



A New Combination Seat and Folding Desk has been Designed to Save Space in the School Room. The Desk Swivels in the Center for Convenience When Standing. Underneath the Seat Is a Drawer for Books and Papers



The Largest Block of Granite Ever Quarried in One Piece—Large Enough to Accommodate on Its Upper Surface the Crowd of More Than 300 Workmen Shown in the Picture. Subsequently, the Huge Block was Worked into Smaller Blocks Suitable for Monuments

RECORD BLOCK OF GRANITE QUARRIED

Modern methods that would have made the quarry worker of 20 years ago gasp with astonishment made it possible to establish a record for quarrying in the granite hills near Montpelier, Vt. There the greatest block of granite ever quarried was loosed from its resting place, then worked up into smaller blocks so that it could be conveniently handled for transportation. The top of this great block was large enough for a game of tennis to be played upon it.

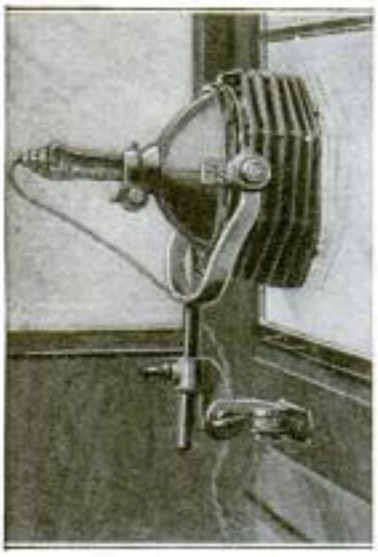
In this great granite center nine quarries are being operated within a circumference of a mile. One plant has 40 drills and channelers. In blasting, holes are drilled about two-thirds of the depth to which it is desired to split the granite. A sharp groove is then cut in the holes in the direction the split is wanted. After the black powder and detonator are placed, the hole is filled about halfway down with a paper wad. This leaves a chamber for gas pressure. The holes are connected in series and shot by electricity. As all rock quarried here is for monumental use, great care is taken not to injure the granite in blasting. After the block is moved by blasting, it is quarried to the approximate dimensions with plug drills. Derricks with 100-ft. masts and 90-ft. booms are used to remove the granite from the quarries, which are 200 ft. deep in some places. Smaller derricks down in the quarries feed the larger ones.

All granite is carefully inspected. The rejected granite, called grout, is piled near the quarries. Some of these piles are nearly 200 ft. high, representing the accumulations of many years. Some of this grout is now being used to make a filling for a railroad.

¶Tests of the electrically welded joints of a ship built in Gothenburg, Sweden, showed a tensile strength of 29 tons per square inch, compared with 28 to 32 tons for the plates themselves. Tests for alternating stresses gave equally satisfactory results, and it was demonstrated that the welded were as strong as riveted joints.

BELLOWS-FRONT SPOTLIGHT USED FROM INSIDE AUTO

Ever since the advent of the first spotlight there has been a demand for one which could be mounted inside the car. This has been impracticable for the reason that the glass of the windshield reflects the blinding rays backward and blinds the driver. What the manufacturers believe will overcome this objection consists of a bellowslike device, similar to a camera bellows, which attached to the front of the spotlight body, fills up the distance between it and the windshield pane, and pressing against the latter, prevents the rays from being deflected sidewise or reflected backward.



The flexibility of the bellows permits it to conform to wide differences in angle between the spotlight lens and the windshield.

COPPER-COVERED SHIPS' HULLS NOT IMPERVIOUS TO WORMS

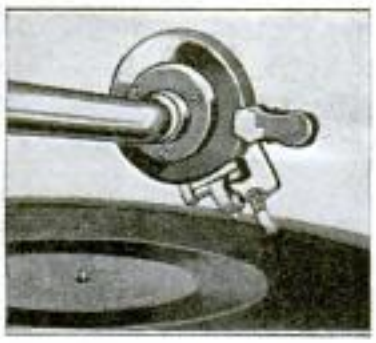
The copper sheathing which covers the hulls of wooden ships below the water line, and which is essential to any ship in order to secure Lloyd's rating of "A-1," does not render the ship immune from damage by some species of worms. When the sheathing was stripped from the hull of a schooner recently docked at Rockland, Me., the four-inch spruce planks of which it was constructed were found to be honeycombed with worm holes. A fragment of one of these planks might have been easily mistaken for a piece of sponge.

PAPER SUBSTITUTED FOR GLASS IN PHOTOGRAPHY

Foreign news tells of a new paper substitute for glass negatives used in photography. It is described as a "negative paper, orthochromatic and highly sensitive, suitable for landscape and instantaneous work." Supports for the negative are provided in the form of metal frames, enameled black, and fitting in the ordinary dark slide. Exposure and development are the same as with glass negatives. Owing to the lesser light-conducting qualities of the paper, the degree of development is at first difficult to determine, but this is readily overcome, it is explained, by information gathered in experimental try-outs.

PHONOGRAPH-RECORD CLEANING BRUSH FOLLOWS NEEDLE

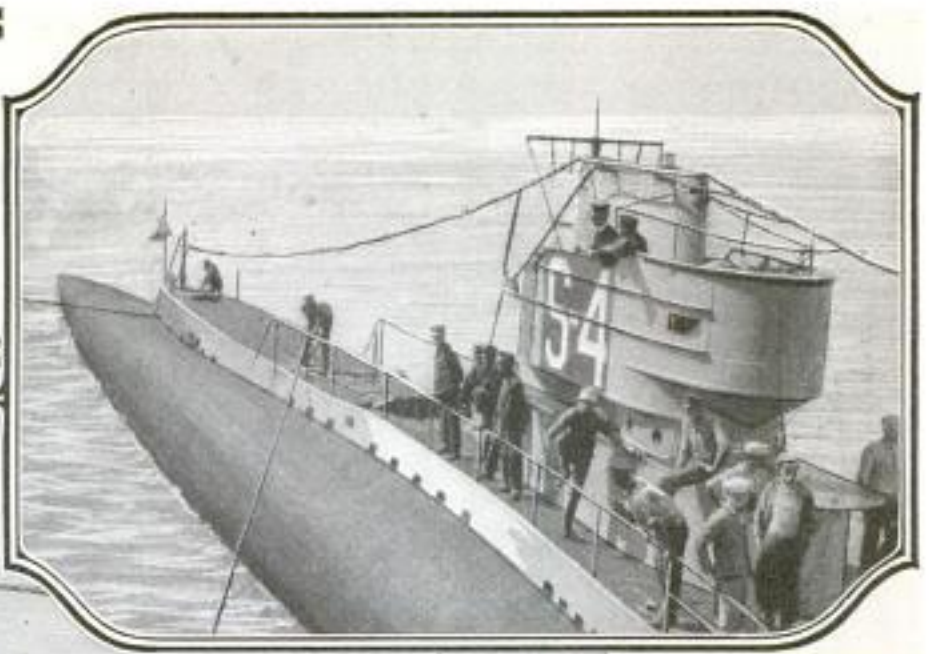
As a rule, phonograph records do not receive the care they should, with the result that they quickly become scratched by gritty dust particles which lodge in the grooves. A clever little fitment recently offered on the market will remedy this, as it automatically cleans the records as they are played. It is a diminutive bristle brush attached by a short length of wire to a pinch clip made like a spring-center clothespin.

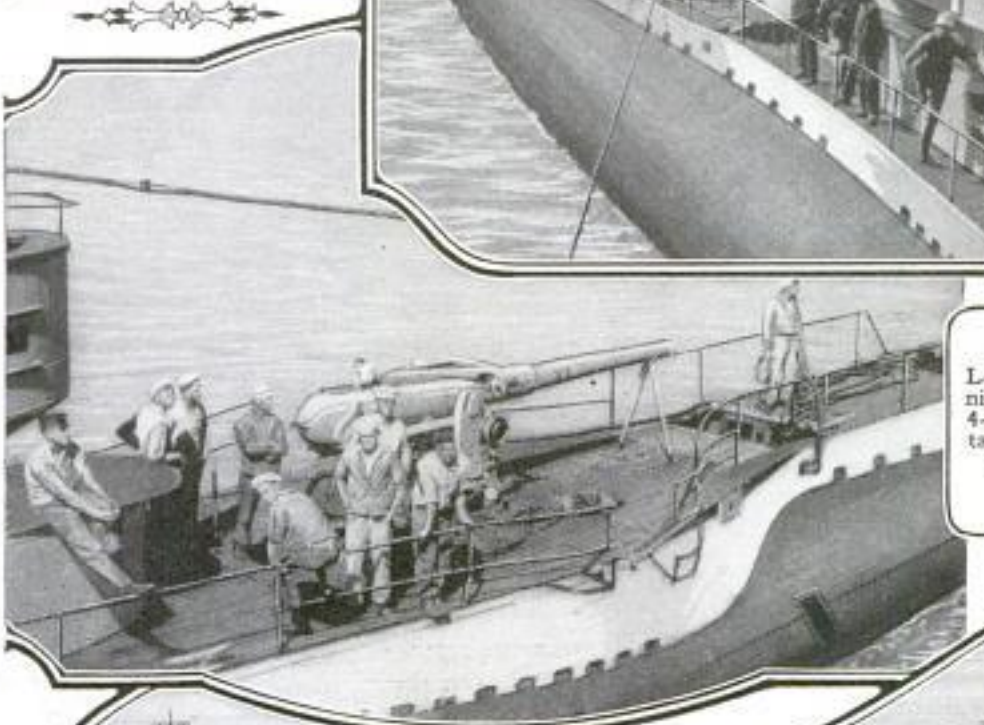


NEW S-TYPE SUBMARINES EMBODY WAR EXPERIENCE

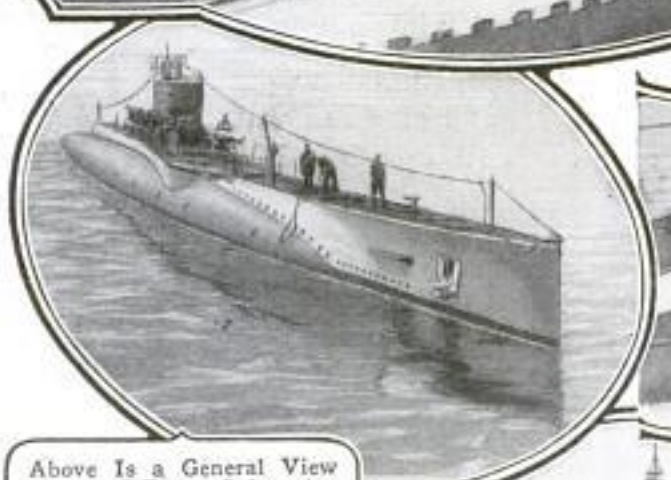
The new S-type submarines are very much larger than the H and L types, and have many novel features that are the result of experience in the recent war. On the upper deck forward of the conning tower they carry a 4-in. gun, which maintains its position when the vessel submerges, as was the practice of the German U-boats during the war. The forward anchor and the bow planes are housed in the hull instead of lying outside of it in the usual manner. The conning tower is very roomy, and the radio apparatus connected with it is of exceptionally heavy construction. A squadron of these submarines has gone to Honolulu, where it is expected to be on duty for three years.

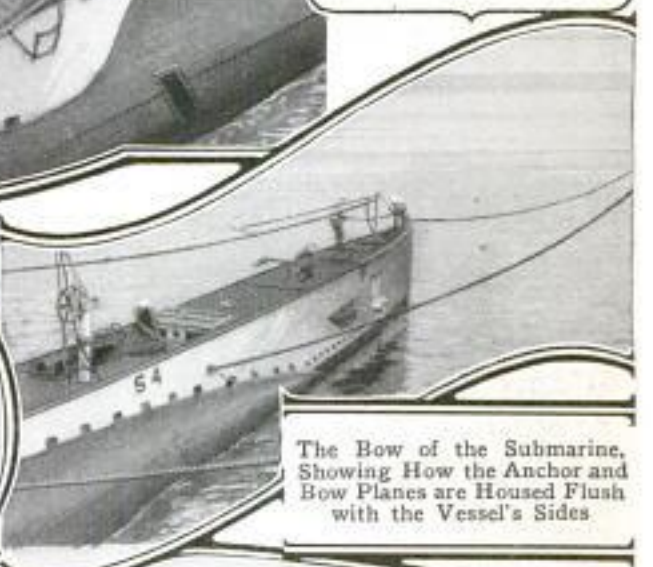
The View to the Right Shows the Conning Tower, Which is Exceptionally Large and Roomy. Just behind It can be Seen the Radio Apparatus Which Is of Very Sturdy Construction. The View is Taken from a Position Near the Bow of the Submarine





Left: Forward of the Conning Tower, Showing the 4-Inch Gun, Which Maintains This Position When the Vessel Submerges





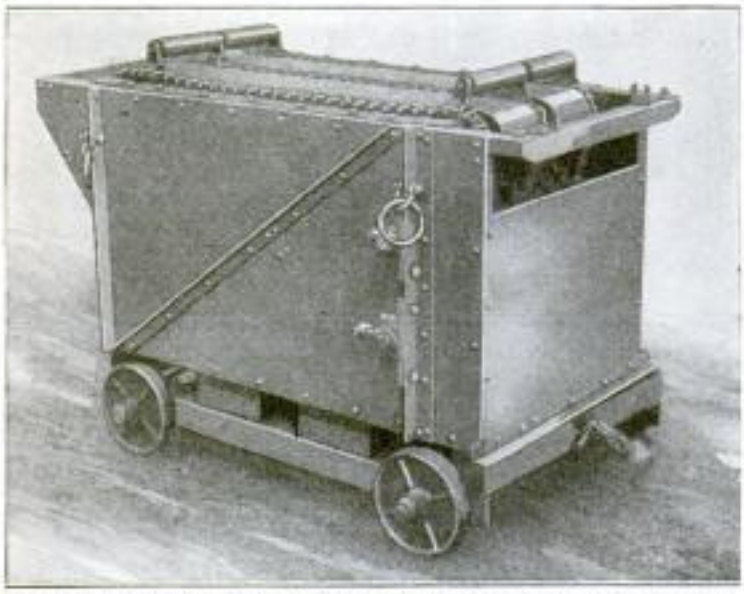
The Bow of the Submarine, Showing How the Anchor and Bow Planes are Housed Flush with the Vessel's Sides

Above Is a General View of an S-Type Submarine Afloat on the Surface. The Photo was Taken from Near the Bow, and Consequently the Camera has Distorted the Proportions. Compared with the Bow the Conning Tower and the Stern Appear Smaller Than They Are

Right: The Tender-Ship That Accompanies the Submarines on Their Cruises: It Is a Converted Merchant Ship. A Submarine is Seen Lying beside the Tender-Ship

SHIFTER PUSHES BOXES ALONG DOCK FLOORS

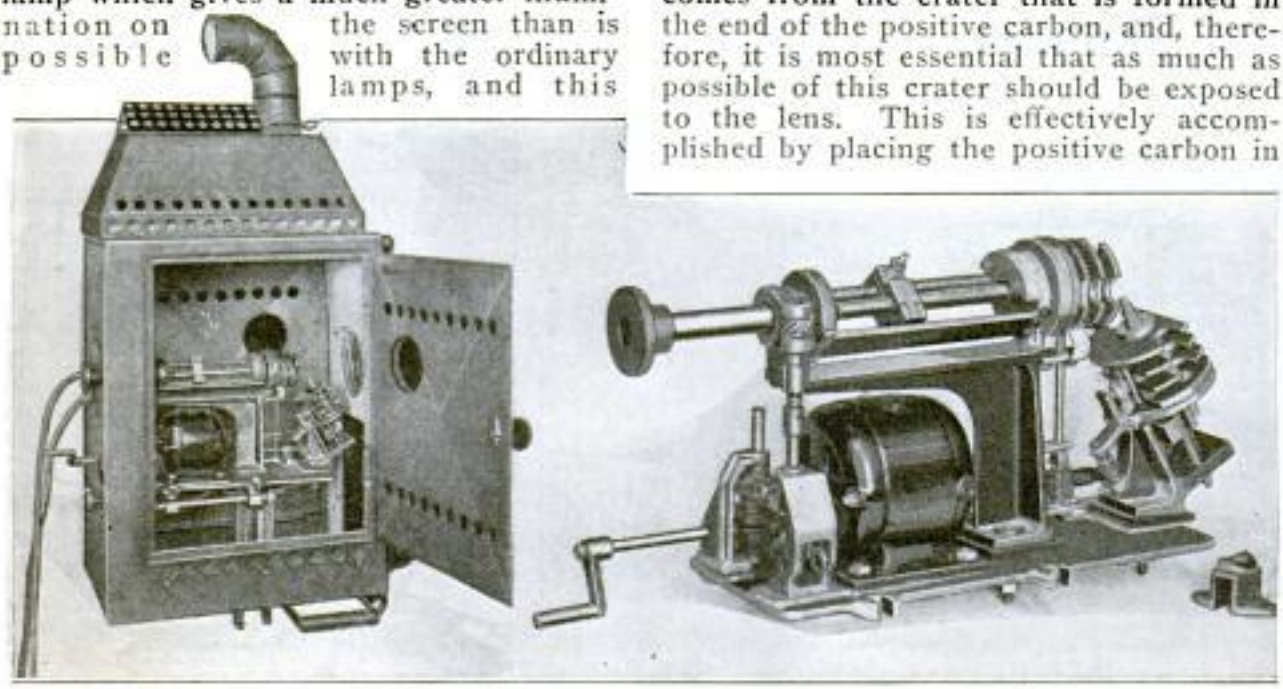
To facilitate loading of boxes on ships and piling them on warehouse and dock floors, a new electrically operated conveying device receives the boxes and pushes them one against the other to a point where they are picked up. Inclosed within the plate-steel case of the device is a series of belts running over four drums which are located in the upper portion of the case. At the ends of each drum are sprockets carrying the drive chains of the belts, and as the chains engage the sprockets, the belt is drawn around the four drums in endless-chain fashion. At properly spaced intervals, crossbars are located that are set in the drive chains and protrude upward to press against the bottom corner of a box. The cases to be shifted are placed between these crossbars, and as the belts travel over the drums, a case is pushed by the bar until it leaves the conveyor. Another case is then placed on the belt, and as it is pushed off the conveyor, moves the first one along, the process being repeated until a long string of boxes is sliding across the dock floor to the desired point. The machine has pushed a line of 200 boxes at a time, and many also be used to slide them up an incline.



The Mechanical Conveyor Which, by Means of Crossbars in Connection with an Endless-Belt Drive, Pushes Boxes One after the Other Along Warehouse and Dock Floors

PROJECTING MOTION PICTURES WITH HIGH-INTENSITY LAMPS

Recent experiments in the field of motion-picture projection have resulted in the development of a new high-intensity lamp which gives a much greater illumination on the screen than is possible with the ordinary lamps, and this without any increase in current consumption. The aim has been to approximate daylight, and thus make the pictures clearer, and give full value to the colors in colored pictures. In any arc light about 90 per cent of its illumination comes from the crater that is formed in the end of the positive carbon, and, therefore, it is most essential that as much as possible of this crater should be exposed to the lens. This is effectively accomplished by placing the positive carbon in



To the Left Is the Complete Projecting Machine with Its Door Open, Exhibiting the Lamp, Which is Shown to the Right on a Larger Scale. The Horizontal Positive Carbon Above is Seen Geared to the Motor Below, Providing Its Feeding and Rotating Means

a horizontal position, with its crater end pointing straight at the lens. The negative carbon is placed at an angle of 120° with the positive, and thus its tip is never between the crater and the lens. A small motor inside the lamp house rotates the positive carbon and its carriage by means of a train of gears, and also operates a feed screw that moves the carbon forward. The negative carbon is not rotated, but is fed by means of a clamp on the feed screw. The arc length is regulated automatically by connecting the motor across the arc, and thus the speed of the motor is unaffected by any fluctuations in the power supply. This lamp, with its high-intensity light having daylight color values, is specially designed for use in the large theaters which have become so numerous of late in the motion-picture industry.

MONSTER LEMON IS LATE BOTANICAL ACHIEVEMENT

The task of rolling and squeezing lemons is soon to be greatly minimized, as a monster lemon, the product of late botanical experiments, becomes more widely used. The new fruit measures 16 in. in circumference over the long axis and 14 in. over the short axis, standing 5¼ in. high. It yields a full cup of juice at a squeezing.

A New Lemon has been Developed by Botanical Experts That Has All the Size of a Grapefruit and the Flavor and Texture of an Ordinary Lemon

The peculiar cross was produced by fertilizing the pistil of a grapefruit with the pollen of the lemon. The fruit has the size of the grapefruit and the lemon's texture and flavor.

STEAM EXCAVATOR FORDS RIVER ON ITS OWN ENDLESS TREADS

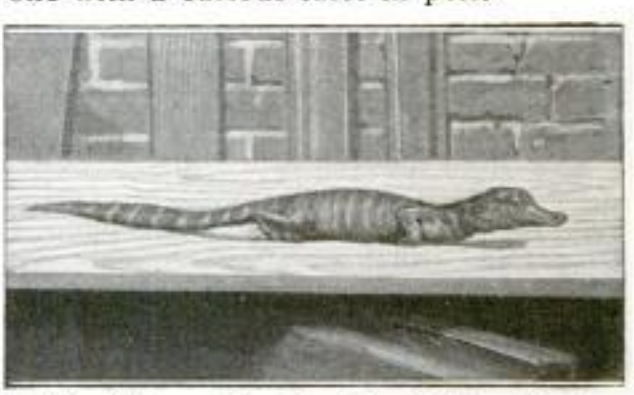
Unable to cross the Mississippi River by the bridge at Grand Rapids, Minn., on account of its great weight, a steam excavator made the crossing through the water on its own endless-tread wheels. As it lumbered over the river bed, at a point where the water was very shallow, it used its own digging shovel for removing bowlders and other obstacles. The

The Steam Excavator is Fording the Mississippi River on Its Tractor-Tread Wheels Just as it Travels on a Dry Road. With its Excavating Bucket It Clears the Way Ahead of It

water was kept shallow by closing a dam, located about a hundred yards above the point of crossing.

BABY ALLIGATOR CAPTURED IN INDIANA LAKE

Lake Manitou, in northern Indiana, is far from tropical in its aspect, and has the usual northern habit of freezing over in winter. Therefore, when some men hunting frogs not long ago captured a real live alligator, about 14 in. long and two or three years old, considerable excitement was aroused in the near-by town of Rochester. The little reptile appeared to be in the best of health and spirits, and its captors are still wondering if it actually made the long trip up the Mississippi and the Tippecanoe, or escaped from some one with a curious taste in pets.



A Baby Alligator, Found in Lake Manitou, Northern Indiana, Which, Unless It had Escaped from Confinement as a Pet, must have Made a Very Long Journey to Get There

Modern Courtesy Signs are Replacing the Old-Fashioned Kind Which Threatened Dire Penalties for Infractions of County and Village Laws in the Days of the Horse-Drawn Buggy. They Remind the Driver Both to Extend the Ordinary Good-Fellowship of the Road, and Give Road Directions for the Tourist

SEMI-INDIRECT LIGHT TOTALLY INCLOSED

A semi-indirect, totally inclosed light fixture, which is built with convenient bulb-removal fittings, has been recently put on the market. In place of the usual upper open space, the light bowl has a transparent glass. Dust collections that tend to dim the lights settle on this upper surface, from where they may be readily removed with a moist cloth. The lower part of the bowl is enameled and emits a dense, highly diffused light to the room. In the center of the bowl bottom is a brass cap which is easily removed, giving access to the electric bulb. The new light is made in sizes suitable for rooms with ceilings of varying heights.

COURTESIES OF THE ROAD FOSTERED BY NEW SIGNS

The days of the old-fashioned road signs threatening dire penalties for infractions of village, county, and state laws, are passing, and these relics of horse-drawn vehicles and mud roads are being replaced with others, based on the rules of reason and courtesy. More and more is the magic of the word "please" being invoked with marked effect on the users of the highways. One long-needed sign requests that tire and other minor repairs be made in farmers' driveways or on the dirt border along the narrow strip of hard surface. Another impresses the fact that common courtesy in driving will do much to make the roads safe for all users. Many villages are marked with entering signs, requesting considerate driving within their limits, and others, on the way out, express appreciation with a kindly "Thank You, Call Again."

TELEPHONE INDEX IS HINGED TO FACILITATE REFERENCE

A hinged directory that hangs from the mouthpiece of the telephone, and which is very helpful for quick reference, is now being marketed. It consists of a series of cards whose upper ends are pasted in spaced intervals on a piece of cloth serving as a hinge, and at the bottom of which is an alphabetical index. By grasping any card bearing the first letter of the desired name and pulling downward, a reverse action is applied to the cards lying on top of it, and they are drawn upward out of the way. The index is suspended from the mouthpiece by a cord loop which is attached to the top card. Its weight is negligible.

MAINE SAWMILL IS FIRST ELECTRICALLY DRIVEN

It would seem that the last stronghold of the steam engine should be in the wilds of the lumber country where good fuel is a plentiful by-product of the industry. However, there comes a report from Maine to the effect that the field of lumbering has been invaded by the all-conquering giant of electricity. What is claimed to be the first electrically driven sawmill is in operation in the depths of the forests, turning out 15,000 ft. of pine or 10,000 ft. of hard lumber daily. The power is taken from an 11,000-volt transmission line and stepped down, by transformers, to the 440-volt pressure suitable for the motors. It is said that the cost of current amounts to less than the customary wage of a fireman, a considerable saving in a year.

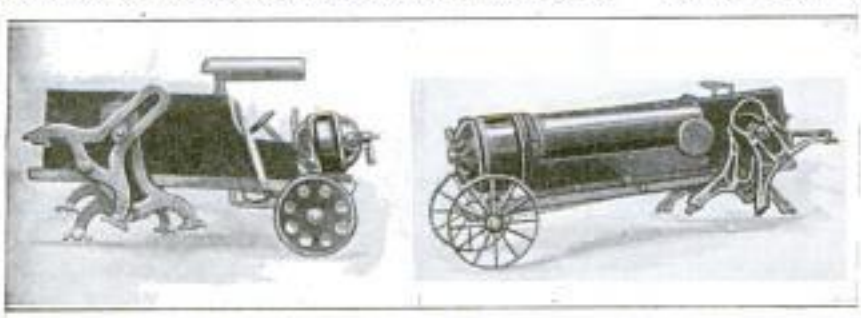
In the Depths of a Forest, Where Wood Fuel Abounds, This Sawmill is Electrically Driven. It is Said to Be the First of Its Kind to Change from Steam to Electricity

WHEELS MADE SELF-ADJUSTABLE TO DIFFERENT RAIL GAUGES

In the railway systems of Australia exist a condition that causes much trouble in handling traffic—a difference in their rail gauges. Presumably there are local conditions that make impossible the obvious remedy—the adoption of a uniform gauge—for, instead, many plans have been tried to make the same cars adaptable to the different gauges. The governments of New South Wales and Queensland are now experimenting with a car in which the wheels are loose upon their axles, and are slidable from one automatically locked position to another, so that they will adjust themselves to any gauge. Where the break in the gauge occurs for a distance of about 100 ft., the rails are inclined from one gauge to the other. Along this link between the gauges the rails are double, so as to form a slot in which the wheel flanges run, and thus they force the wheels along their axles to fit the change in gauge.

"WALKING" MOTOR CAR TRAVELS SLIPPERY ROADS

A true nonskidding motor car has been evolved by a Czecho-Slovakian inventor in which the driving members are feet and legs instead of wheels, and which propels itself by a heel-and-toe walking action. The four legs of the odd contrivance are attached to the throws of a crankshaft in such a way that as it revolves they are first lifted, then carried forward and lowered, and again carried backward. Another part causes them to rock backward at the top as they descend, which brings the heel of the foot in contact with the ground first. As the shaft continues to turn, the heel gives a backward shoving impulse and rises. The toe then comes into contact and imparts a shove. The throws of the crankshaft are so spaced that the eight heels and toes follow each other with their impulses in rapid succession and at exactly equal intervals.

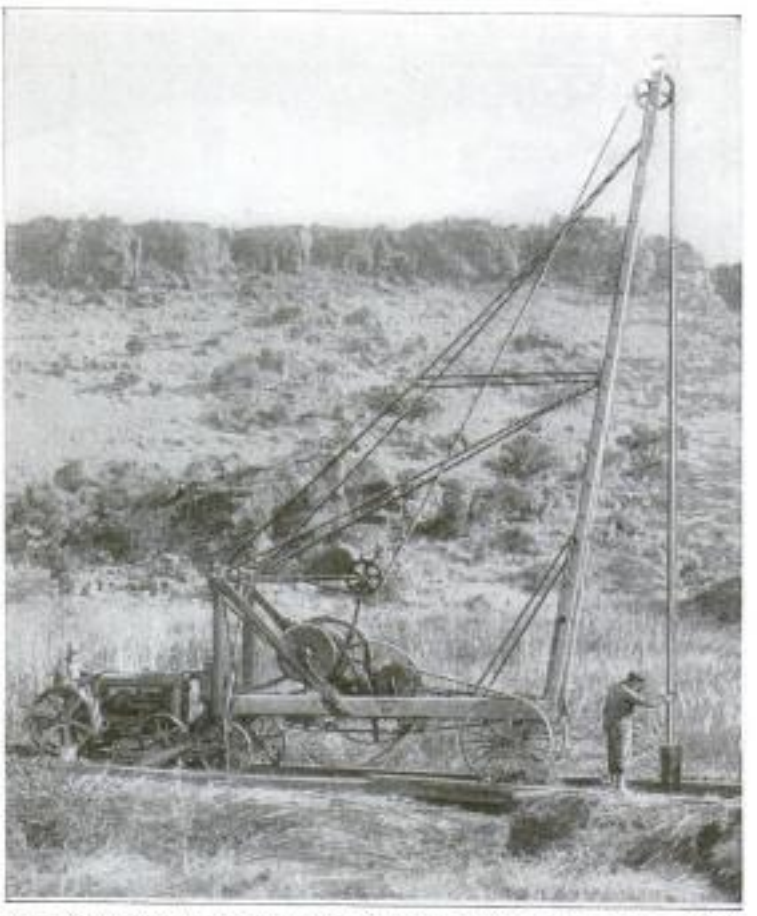


Two Small Models Which were Built to Demonstrate the Operation of the Walking Legs That Took the Place of Driving Wheels

DRILLING WELLS TO DRAIN LAND

By W. F. WILCOX

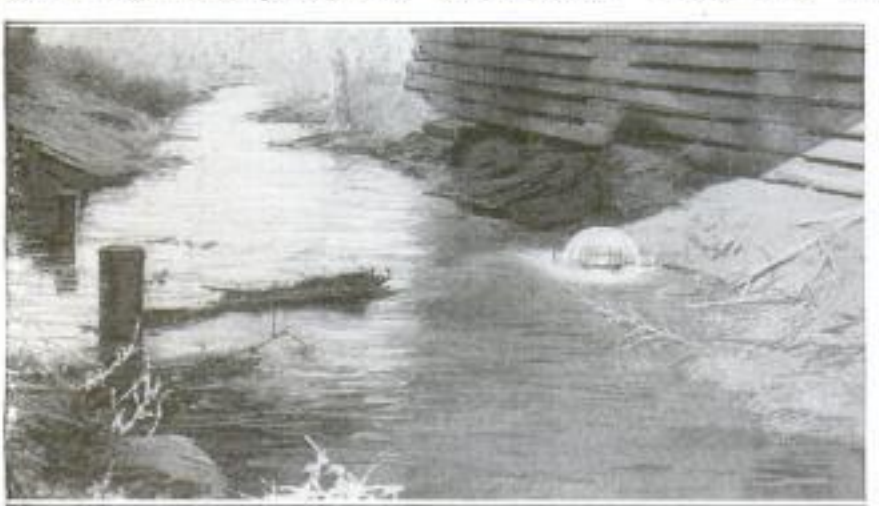
IN the Shavano Valley, Montrose County, Colorado, the land has been farmed for 30 years under irrigation with no evidence of seep. Five years ago a canal was cut across the upper end of the valley through the sandstone. Soon after, evidence of seep began to show in the lower end, until recently several hundred acres were waterlogged, and became a swamp that neither man nor beast could cross, and, of course, the land was rendered worthless for farming.



The Drill at Work Boring One of the Half-Dozen Drainage Wells That Were the Means of Converting This Worthless Swamp into Valuable Farm Land

A geologist investigated the matter and came to the conclusion that he had found its cause. The valley has about 30 ft. of alluvial soil, a sedimentary deposit. Then comes the sandstone. This is in layers. It appears that a big earthquake crack exists in the lower end, and the whole has been shoved out of place. There is sandstone around the edges of the valley. The scientist believes that when the canal was cut along the upper end, it allowed water to seep down underneath this sandstone, and it flowed along a second layer to the lower end of the valley. Here it encountered a dam formed by the upheaval and the throwing of the rock against the side walls so tightly that the water could not get out. Finally this basin filled with water and began to press upward and downward and in every direction. It found a crack upward and overflowed, saturating the soil above until it became waterlogged.

This explanation has been borne out by subsequent activities. A number of farmers put up a sum to drill a test well. This was done, and after the drill had penetrated the 25 ft. of top soil and about 25 ft. of rock, the water bubbled up like an artesian well.



The Open Ditch That Carries Away the Water That Bubbles Up from the Half-Dozen Wells That were Bored to Drain the Water Reservoir Below

The flow was so great that half a dozen other wells were bored, as the cost is nominal. They have a flow of 10 to 12 bbl. each per minute. The water is carried off in surface ditches, and already the land shows evidences of drying up.

It is a peculiar situation. The seeping takes place three miles below the ditch, which is said to be its cause. The water has drained down between the layers of sandstone to the basin, whence it could find no outlet, filled it, and by consequent feeding created sufficient pressure to force itself up

through the earthquake crack, or fault, and saturate the land. It is believed the wells will relieve the basin of water so that it will no longer flood the land. It is a cheap way of drainage, and promises to reclaim several hundred acres that had become worthless through being waterlogged.

RACING MOTORCYCLES STARTED BY TOWING

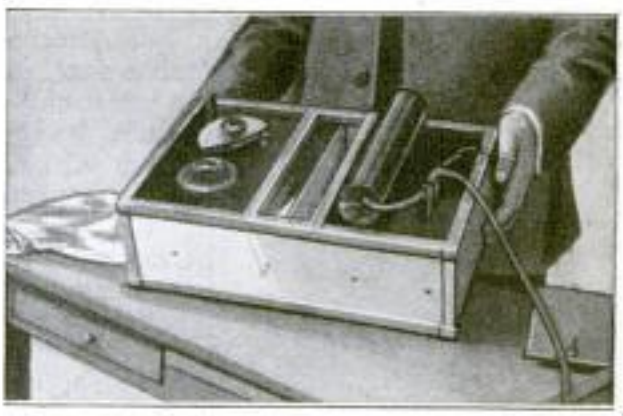
Spectators at a recent motorcycle-race meet learned a new way of starting racing machines. The usual method is for the rider to push the machine and, when the engine starts, make a desperate leap for the saddle. It is not uncommon that this procedure results in a bad spill and ruins a rider's otherwise splendid chances of winning. By the new method, a stock machine with a "kick" starter is used to tow the racing cycles until their engines

The Stock Motorcycle Tows the Racing Machine Until Its Engine Starts. The Racer Then Casts Off the Line and the Race Is On

begin to fire, when the riders cast off the towline and, passing the tow machine, get away to a flying start.

PRIVATE MONEY-PRINTING PLANT PROVES A SWINDLE

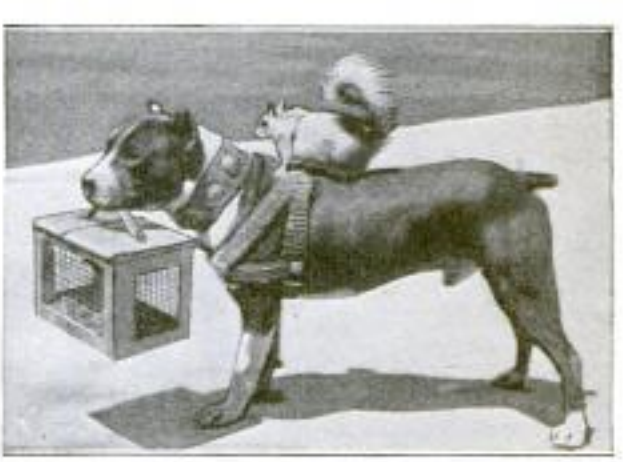
A clever variation of the old-time "green-goods" swindle recently made its appearance in a western city. By a skillful appeal to his greed, the victim was induced to pay $650 for a businesslike contraption which, so the operator claimed, changed sheets of blank paper into paper currency in a few moments. He proved it by inserting the sheets in a small drawer, turning some mysterious switches, and removing crisp new bills from the same receptacle. While the prospect's attention was distracted by the manipulation of the exterior parts, the swindler shifted the drawer in such a way that the blank paper was hidden, and the previously secretly "planted" paper currency disclosed to the prospect.



The Money-Printing Plant Showing the Trick Drawer, Which, being Secretly Shifted, Discloses the New Paper Money Supposedly Made from Blank Paper Inserted by the Victim

BULLDOG, BIRD, AND SQUIRREL IN STRANGE AFFINITY

A trio comprising a canary bird, a bulldog, and a gray squirrel, has for some unknown reason, entered into a strange mutual relation. The bulldog is guardian of the combination and keeps an ever watchful eye over his smaller friends. The dog's back is the appointed place for the squirrel, and he takes his rides in a quiet and peaceful manner until some one attempts to stroke him. He then sets up a furious chatter. The canary bird is housed in a small cage which the dog carries in his mouth, and from all appearances it is well satisfied with its surroundings. Quite often the dog is seen strutting down the street carrying his coterie



Cats have been Known to Mother Puppies, but This Is a New One. The Bulldog, Squirrel and Canary Are Fast Friends

of peculiar friends, in a very self-conscious and proud manner. The combination is the property of an itinerant entertainer.

SEAT AND HORSE COMBINED IN NEW BARBER CHAIR

The forward portion of a hobbyhorse in connection with an adjustable seat, is the latest children's hair-cutting chair. The horse part of the combination is pivotally applied, and when the child desires, he may obtain a rocking motion from it by pulling on a pair of reins. Adjustment of the seat is effected by the use of an oil cylinder as in the ordinary barber chair. Restive and nervous children are quieted when seated in the chair, as their attention is detracted from the undesirable feeling of clipper and scissor by the presence of the movable hobby before them.

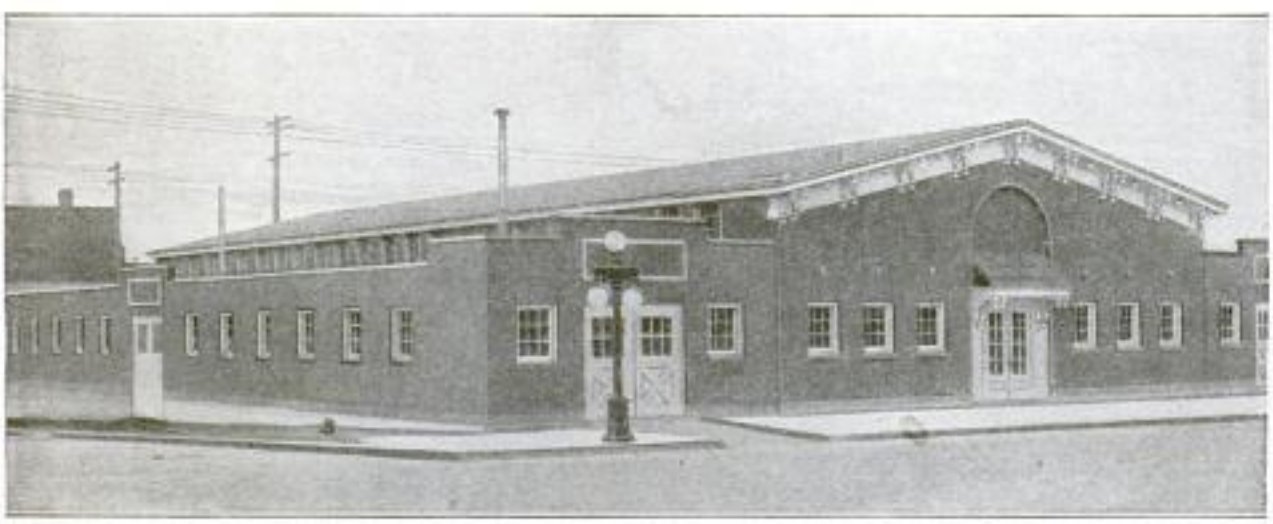
¶By means of a dipping solution now on the market, photo prints may be given a thin, flexible, waterproof coating that enables them not only to resist dirt and moisture, but to be washed clean.

PAVILION FOR STOCKMEN PROVES PROFITABLE

The stockmen near Leavenworth, Kan., were for a long time at a great loss to find a suitable building whenever they wanted to hold a stock sale or a community meeting. They felt that the best interests of their industry were being neglected through the lack of such a building. Then it was that the Leavenworth Chamber of Commerce, with the coöperation of the farm bureau, organized the Leavenworth County Auditorium and Sales Pavilion Association to finance the enterprise. About one-fourth of the stock was taken by the farmers and stock breeders, and the rest by local business men. The building is a one-story structure, 96 by 125 ft. The floor is of concrete, and the walls of hollow tile, plastered on the outside with cement, and stuccoed. There are four large double doors for the convenient entrance and accommodation of motor trucks.

The building has a large auditorium and well-equipped offices and restrooms. It has been used for a wide variety of purposes. A three-day motor-car show, a big community dance, concerts, a chautauqua series, a poultry show, a county fair, a corn exhibit, several cattle shows and sales—these are but a few of the uses to which it has been put. Nearly 200 cattle can be exhibited here at a time.

Seven directors manage the association. Three of them are farmers and live-stock men, and four are business men and bankers. This building is proving highly useful in developing the stock-raising interests of the community, and is deemed a profitable investment in many ways.



This Building, 125 Feet Long and 96 Feet Wide, is Used at Leavenworth, Kansas, for a Large Variety of Purposes, Such as Automobile Shows, Community Dances, Concerts, Chautauquas, Poultry Shows, County Fairs, and Cattle Exhibits. It Has a Large Auditorium and Well-Equipped Offices and Restrooms

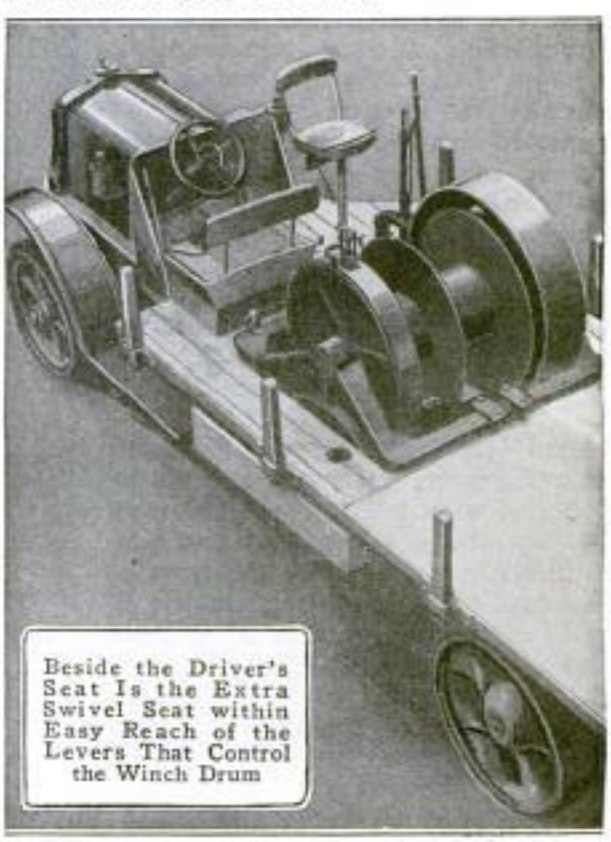
The Surplus Logs are Seen Piled Up to a Great Height above the Logs in the Pond, and the Men are Drawing Out the Lower Logs So as to Form an Incline down Which the Higher Logs Roll Till They Reach the Water Level, and are Then Floated to the Mill Door

SMALL POND STORES MANY LOGS BY NEW SYSTEM

A large sawmill high in the Sierra Nevada Mountains, forced by an unusual cut of timber last season to store more logs than its artificial pond would accommodate, adopted the plan of high-decking the surplus supply in the pond itself, piling them upon those already in the water. Drawing a log from the deck just above the water line causes those above to roll down, and those below to rise, so that all may be floated to the mill door without further handling. The mill's winter supply of saw logs is thus made available with a minimum of labor. The pond held 3,000,000 ft. of logs, and the high-decking took care of some 4,000,000 ft. more.

OIL-WELL PULLER TRUCK WITH NOVEL SEAT

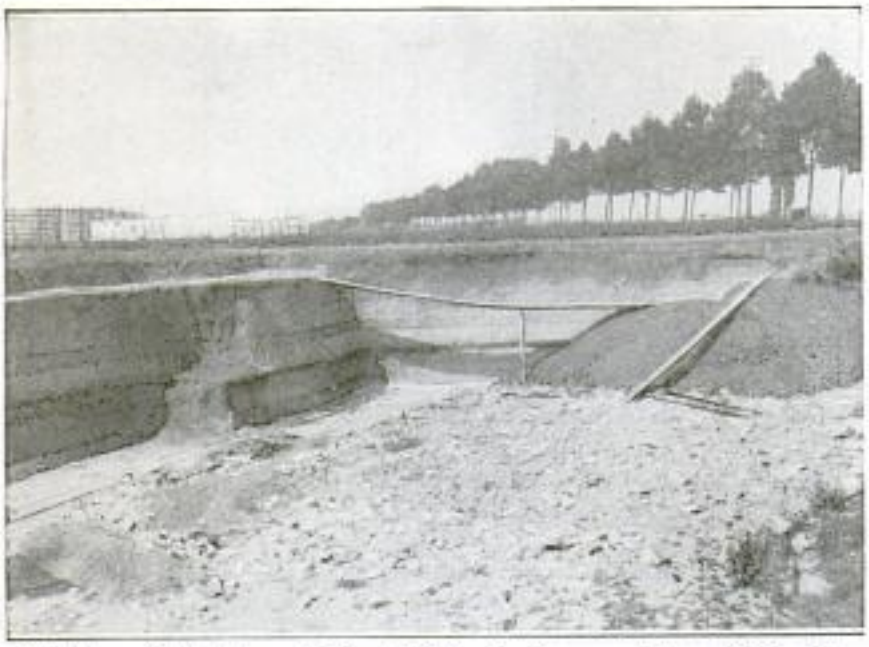
To enable the driver of a motor truck to operate with facility a winch which is installed on the truck deck to be used as an oil-well puller, a special seat has been devised to be located at the side of the regular driving seat. It is a swivel seat, mounted in a pipe standard which is bolted to the floor. From this seat the winch drum can be controlled by means of either the transmission gearing of the truck or the throttle at the motor.



Beside the Driver's Seat Is the Extra Swivel Seat within Easy Reach of the Levers That Control the Winch Drum

REMOVE GRAVEL SUBSTRATUM WITHOUT DAMAGING CROPS

When valuable gravel and good farm soil occupy the same field in Europe, modern engineering practice decrees that neither shall be sacrificed for the sake of the other. In some parts of the Rhine valley, a 3-ft. surface layer of rich black loam is underlaid by 10 or 12 ft. of small gravel of uniform size, very useful for making building blocks. The contractor buys the gravel of the land owner at so much per cubic measure, and agrees to leave the soil as productive and as cultivable as he found it. A narrow strip is then opened, the loam piled at one side, and the gravel excavated. As soon as possible the loam is replaced, the same as before but several feet lower, and an adjoining strip opened. In this way the whole field is worked while under cultivation, only a small portion being out of use at any one short period of time.



Working a Substratum of Gravel Out of a European Farm Field without Injuring the Crops: The Pile at the Right is Replaced Loam

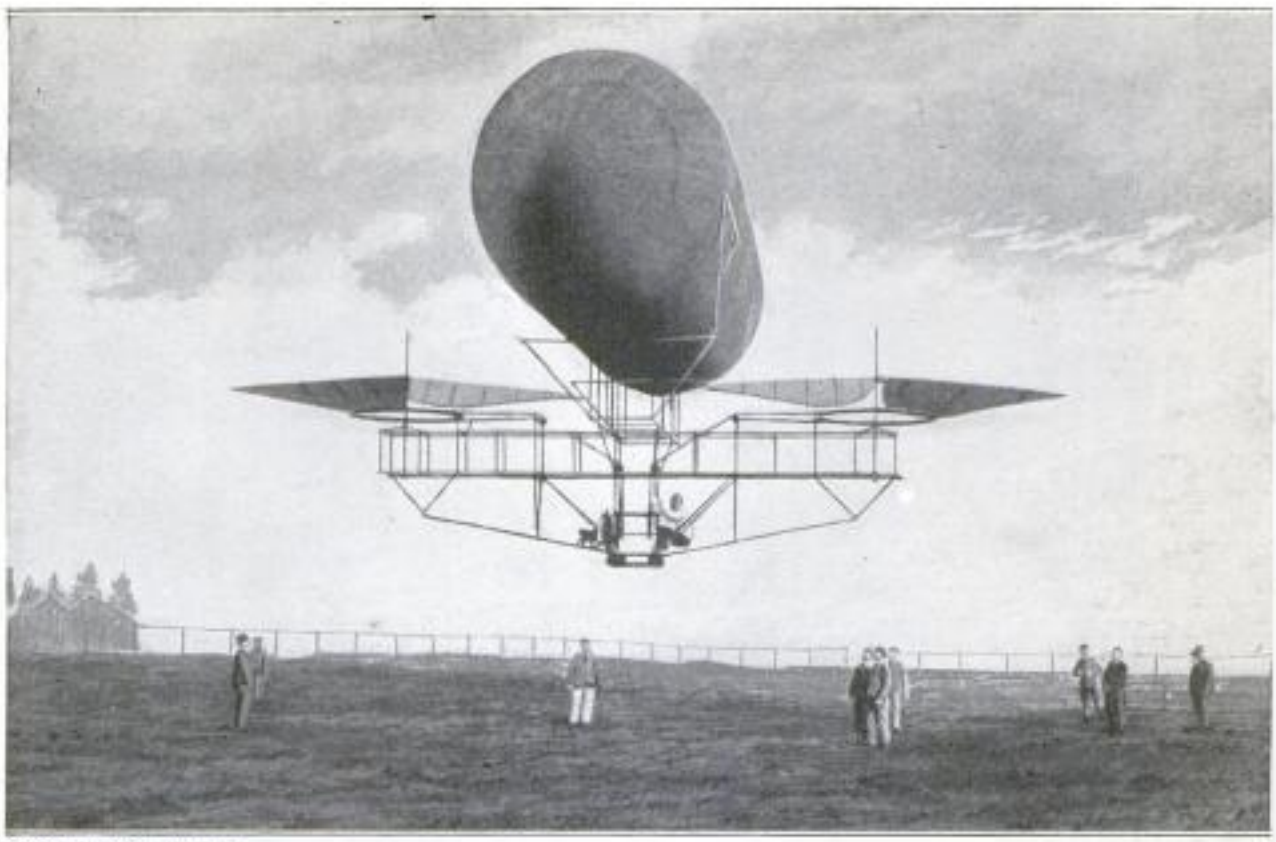
OXYACETYLENE BLOWPIPE LIT UNDER WATER

Oxyacetylene blowpipes when used for underwater cutting often go out, which necessitates ascension to the surface by the diver for a fresh light, involving much inconvenience and a considerable loss of time. To overcome the difficulty, a French inventor has produced an underwater lighter that is pivotally attached to the air-jacket bell surrounding the external nozzle of the blowpipe, and throws a flame across the gas outlet of the blowpipe when applied for use. Metallic potassium and other chemicals of like nature, which will ignite in contact with water, are held in a suitably arranged cap. In the event of flame extinction, the valves of the blowpipe are manipulated as usual in above-water cutting, and the gas is allowed to flow from the nozzle. The cap of the lighting device is then withdrawn. The chemicals thus exposed are brought into contact with the surrounding water and the flowing oxyacetylene gas takes a light from the flame afforded. The lighter is then sprung back to a place alongside the air-jacket bell, and out of the way of the operating area of the blowpipe. This method of submarine cutting is applied mostly to ships damaged below the water line, as explained in an article in the May magazine, and the lighter is considered a valuable aid to the process, having proved successful in test trials.

An Oxyacetylene Blowpipe That can be Ignited by a Diver under Water

NORTHWEST LUMBER REACHES ENORMOUS FIGURE

Since the lumber center of the country moved to the great Northwest, the vast forests of that heavily timbered region have yielded an ever-increasing output. The lumber shipped out of the Columbia River in 1920 reached the enormous figure of 553,000,000 board feet. The significance of this impressive total may better be realized by the statement that it is equivalent to a single board 1 ft. wide and 1 in. thick, with the incredible length of 104,735 miles, or to a boardwalk 4 ft. wide and 26,184 miles long, enough to circle the world and lap over more than 1,000 miles.



The Lifting Propellers of This New French Helicopter are Said to Be 20 per Cent More Efficient Than Any Others So Far Designed. The Balloon is Used Principally as a Stablizer, Raising Only 140 Pounds of the Entire 675-Pound Weight

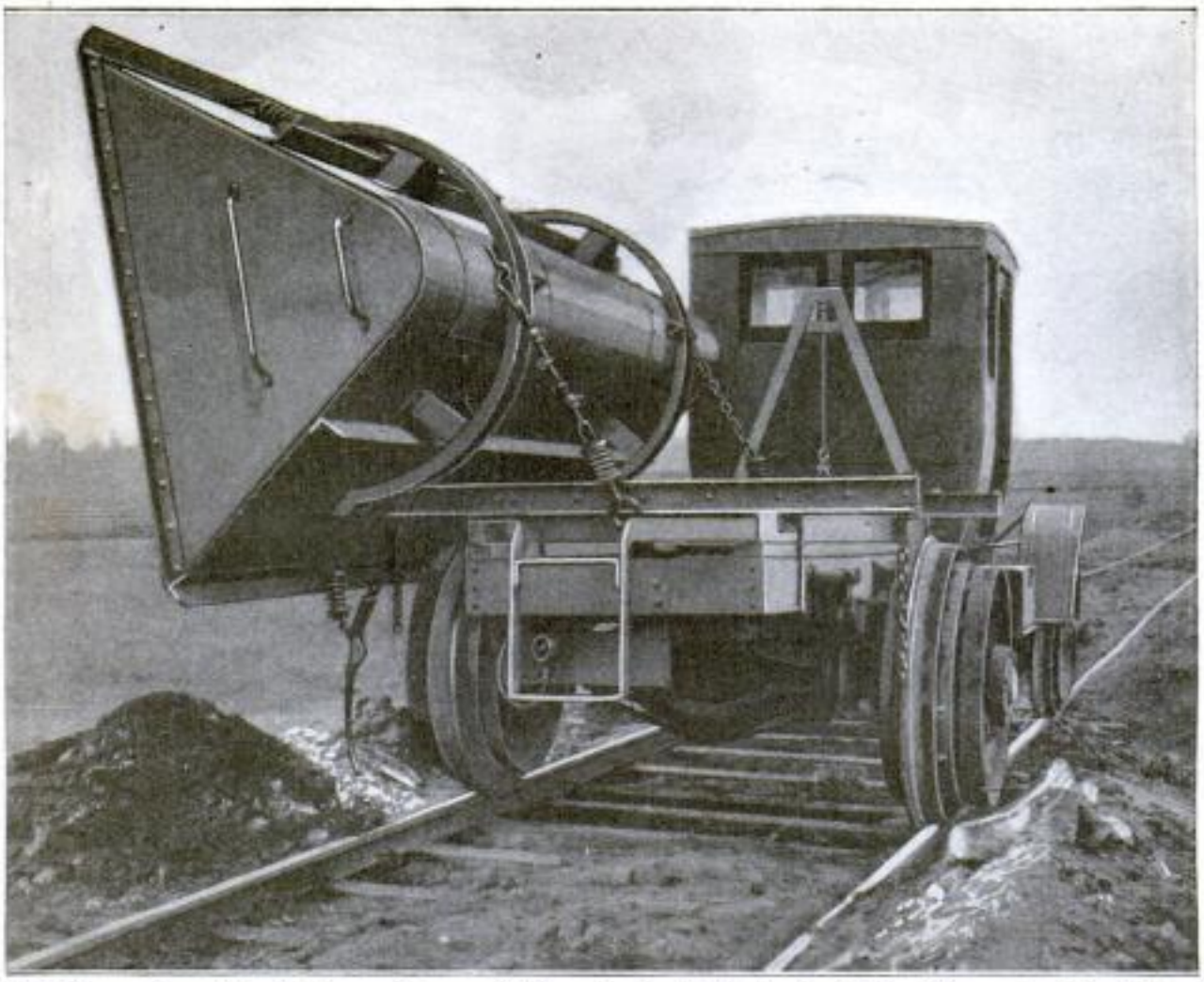
AIR CRAFT COMBINES HELICOPTER AND BALLOON

WM. H. HUNT

THE helicopter principle of mechanical flight seems to be commanding, increasingly, the attention of air-craft designers the world over. Hardly a week passes without the announcement of some startling, or at least new, development along this line. One of the latest of these comes from Valentigney, France, and has to do with a combination dirigible balloon and helicopter, which, so runs the report, has made over 70 successful ascents. The balloon is used to prevent dangerous rocking and swaying only, and not to lift, as its lifting power is negligible—only about 140 lb. In fact the machine has risen without the balloon, and the inventor expects to eventually equip it with an automatic stabilizer and eliminate the balloon entirely.

The propellers exhibit a radical departure from conventional types, being designed according to a recovery-of-energy theory held by the inventor, who claims that it accounts for the marvelous endurance shown by migrating birds on their thousand-mile flights. Whether or not the theory is correct, it is said to be a fact that the propellers are about 20 per cent more efficient than those of recognized types, and that they easily raise machine and operator, a gross weight of about 675 lb., to a height of 3 to 6 ft. Doubtless greater heights could have been attained, but these were free, not captive, ascents, and purely experimental.

The Inventor did Not Risk an Altitude of More than Six Feet in the Preliminary Trials. Since the Propellers were Built for Lifting Only, and Not for Driving Horizontally, the Machine would Drift with the Wind



An Ordinary Motor Truck Converted Into a Railway Car by Replacing the Rubber Tires with Flanged Steel Wheel Rims, Adjusted to Fit the Rail Gauge: The Truck is Fitted with a Large Receptacle for Slag That is Hinged on One Side and Operates as a Dumper

FOUNTAIN BRUSH HAS SAFETY FUSE

A feature of a fountain brush having a reservoir containing inflammable liquids, such as gasoline, benzine, and turpentine, for cleaning purposes, is the fusible cap which melts in case of fire, and said to prevent explosion and spread of flaming fluid. A valve plunger pressed down by the forefinger admits the liquid to the bristles. The reservoir serves also as a handle. The brush is for the purpose of cleaning a variety of objects—type forms, halftones, and utensils found in the rubber-tire and electrotyping industries.

MOTOR-TRUCK DUMPER RUNS ON RAILS

The work of dumping slag at a big Michigan iron plant that formerly used up a team of horses every two months, is now being done horseless fashion. The slag wore out the horses' hoofs in that short time, but it does not hurt the hard steel flanges that are pressed upon the standard wheels of a motor truck, nor the narrow-gauge steel rails that these wheels run upon. On this straight narrow-gauge track the motor truck can run back and forth to the dumping pile for many times two months, without being any the worse for wear and tear.

¶All mail-by-air routes, excepting the transcontinental line between New York and San Francisco, will be abandoned, according to a recent announcement of the Post Office Department. The reasons given were the undue expense and the difficulties of operation.

IRRIGATION DITCHES CAUSE STUPENDOUS LOSS

By LAWRENCE W. PEDROSE

FIFTY million fish annually—enough to supply a city of 400,000 inhabitants with food—has been the toll taken by the Yakima Valley, Wash., irrigation ditches, according to experts, and to stop this stupendous economic loss, the Bureau of Fisheries is exerting every effort to provide a vast network of irrigation-ditch screens as a means of protecting the future of an industry worth tens of millions of dollars a year.

Young Blueback and Chinook salmon, the most valuable of all food fish, are the principal victims of the Yakima Valley ditches, as the Yakima River and its tributaries are the natural spawning ground for these fish. But in recent years the irrigating ditches have taken from 90 to 97 per cent of the water in the river during the months of July and August, which are also the spawning months of the salmon; thus the same percentage of fish is lost. Recently a check upon the losses was made by a district director of the fisheries department. Two hundred acres fed by one ditch were gone over carefully after a single watering, and 20 fish to the acre were found. Of these 4,000 fish, 90 per cent were spawning salmon. In the Yakima Valley there are approximately 250,000 acres of land under irrigation, according to the Bureau of Fisheries, and thus one watering of the parched valley fields resulted in the loss of about 5,000,000 fish, 4,500,000 being salmon in their first and second years.

A Number of Young Salmon Found Frozen in the Snow at the Bottom of What had Been a Small Pool of Water Where the Fish had Taken Refuge Before It Dried Out

For the season, these figures would be multiplied many times. Huge quantities of migrating fish that are not washed out through ditch laterals to perish on the fields, are lost in the main irrigation ditches in the fall, when the pools into which they have concentrated freeze over or become dry.

One of the Main Ditches Which the Bureau of Fisheries Desires to Have Screened So as to Keep the Spawning Fish Out of the Lateral Ditches. During the Months of July and August the Main Ditches Are Literally Alive with Salmon

In the last decade there has been an alarming decrease in the production of salmon on the Pacific coast, excluding Alaska, which is as yet not damaged to any great extent. The reason for the decrease may

Left: Thousands of Fish Which have Perished in One Corner of an Irrigated Tract of 250,000 Acres in the Yakima Valley, Washington, Where Altogether 50,000,000 Fish have been Lost Annually. Right: Fish are Trapped in a Ditch When the Stoppage of the Flow of Water in the Main Ditch Allowed the Surface Water to Freeze

be found by studying the Yakima River and Columbia River basins, state experts, who point out that in the latter locality several thousand miles of spawning territory for the best varieties of salmon are now receiving little or no seeding. It is estimated that in many of the rivers and streams only five salmon go up to spawn now where a hundred went up ten years ago.

PHONOGRAPH PLAYS A MULTIPLE OF RECORDS

The embarrassment of a last-minute search through the phonograph-record files for what to play next will soon be eliminated with the use of a phonograph

In the Upper Part of the Phonograph can be Seen the Three Disks That Carry the Records and Guide Them in Succession to the Turntable. They can be Adjusted for Any-Size Record

which will hold and play, successively, from 15 to 100 records. Selected beforehand, the records are held on a central post by three spiral-edged disks. As the playing groove of the record on the turntable below ends, the tonearm shifts to one side and the disks revolve, dropping another record. With each new record, the turntable also lowers. Records of different diameters may be played with but little extra adjustment. All the various operations are regulated by button switches. Turntable rotation is accomplished by a spring motor, while an electric motor controls the dropping of the records, and other changes.

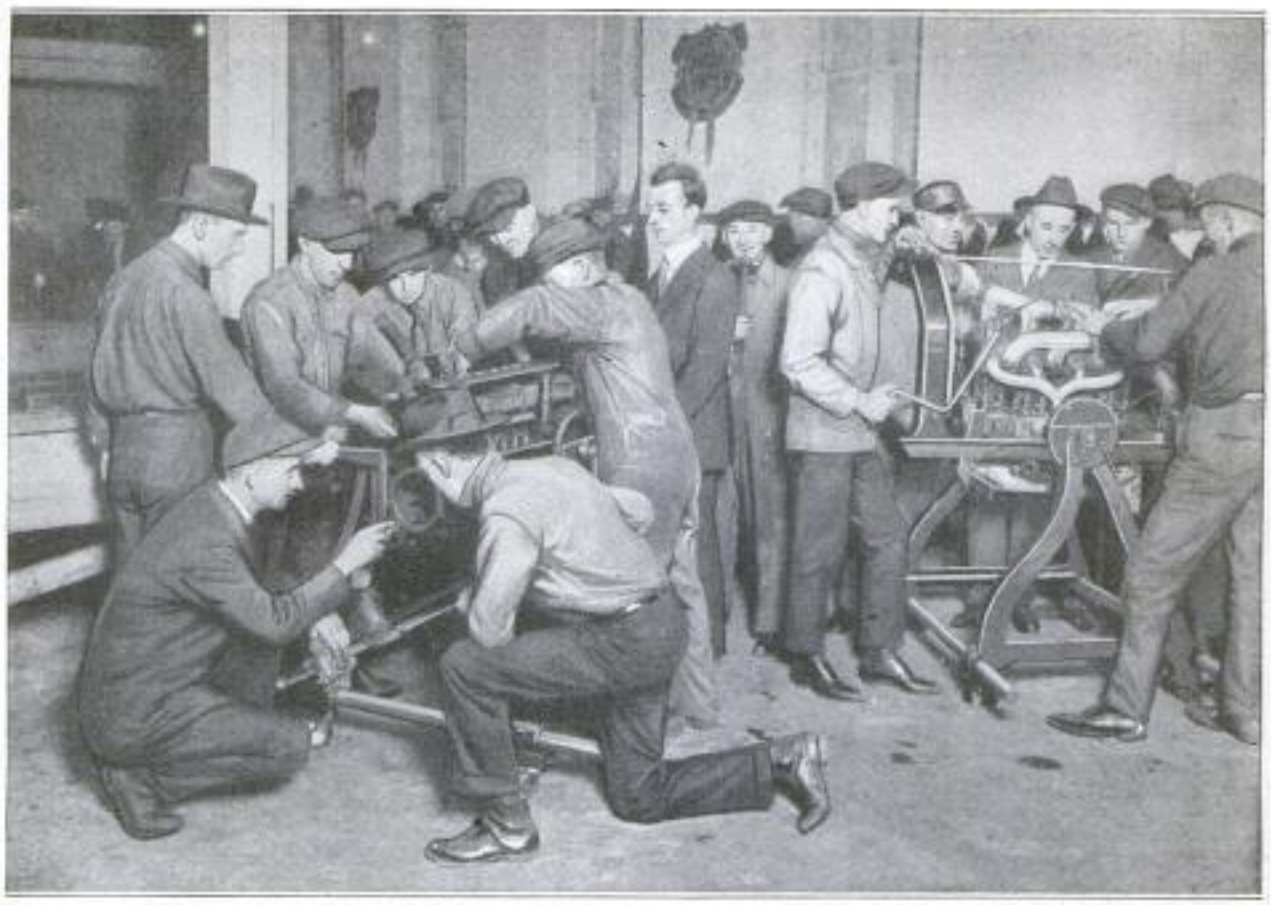
NEW TYPE OF CEMENT KILN WITH AUTOMATIC FEED

A new form of kiln that is a combination of the old type and the rotary, has been proved to have advantages over either type separately. It is vertical, and the charge is pressed into blocks and automatically fed to the kiln. In the bottom is a revolving crusher head that makes only a few revolutions an hour, and that has a means of supplying air to the center of the kiln, making the combustion so perfect that there is great economy of fuel. As the operation of the kiln is automatic, the control is so simple that two men can run a battery of two kilns with an output of 50 tons per day each.

AUTOMOBILE SCHOOL TRAINS EX-SERVICE MEN

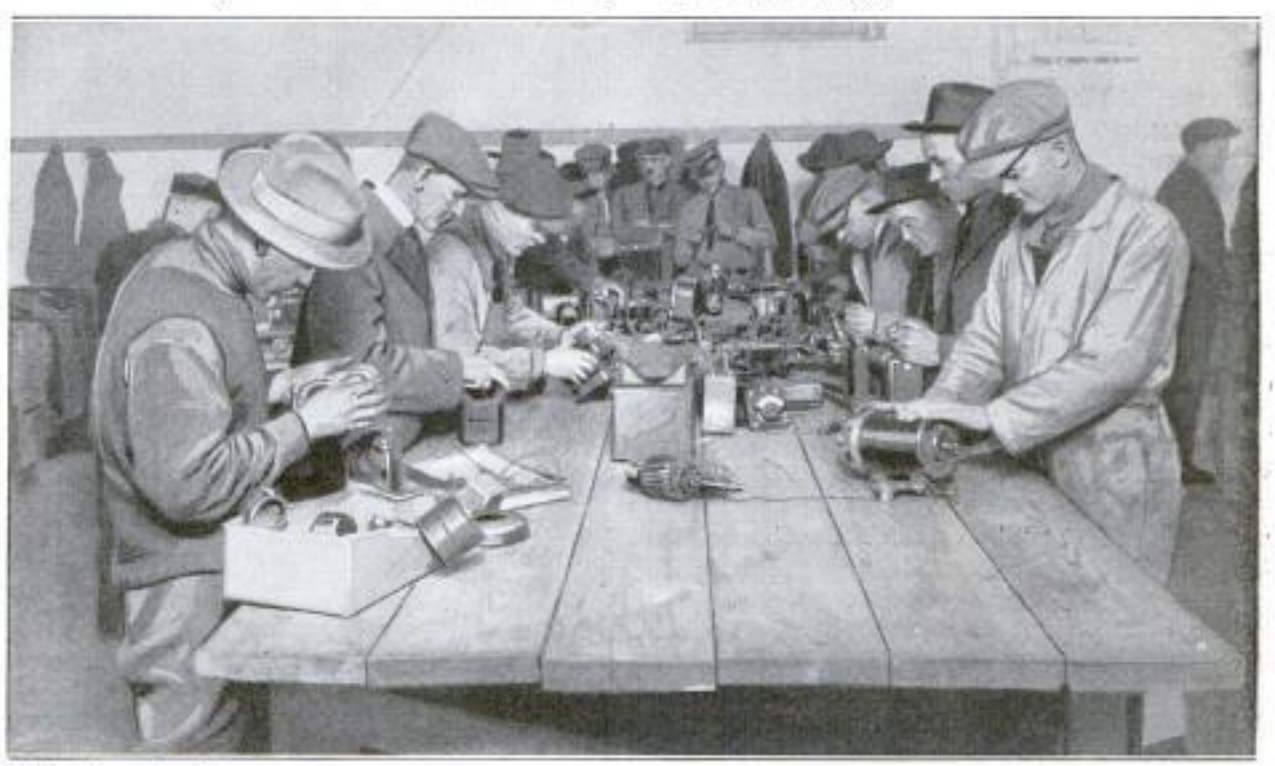
Throughout the country automobile schools for the benefit of ex-service men are now conducted. Many of these institutions exhibit great originality in the selection and arrangement of equipment and in the methods of instruction. One of the most noteworthy in these respects is that located at Omaha. Here the subject is divided into 15 distinct heads and taught by demonstration of the working parts of cars. Each group of parts of various types, occupies a separate table, 5 by 15 ft. in size, sturdily built for hard service. The student advances from one station (table) to the next as he acquires a grasp of the subjects. The order of the stations is: 1, general lectures; 2, engines; 3, transmissions, and so on, finally ending with stations 13, 14, and 15, where general chassis features, tires, and the electrical equipment are taken up. Every student is given three evenings' instruction at each table, with practical work given the preference over theory, two evenings being devoted to the former.

In the selection of instructors, the auto-service field has been drawn upon with the result that the personnel is made up of men engaged in practical, everyday service work. An attendance of three evenings per week for 15 weeks is required to complete the primary course, after which the student is privileged to take a



These Ex-Service Men are Studying the Design and Construction of Gasoline Motors in Preparation to Become Expert Automobile Mechanics. Several Schools are Now being Conducted Throughout the Country, Primarily for the Benefit of Ex-Soldiers. The Motor is Pivoted on a Rotating Stand for Closer Inspection

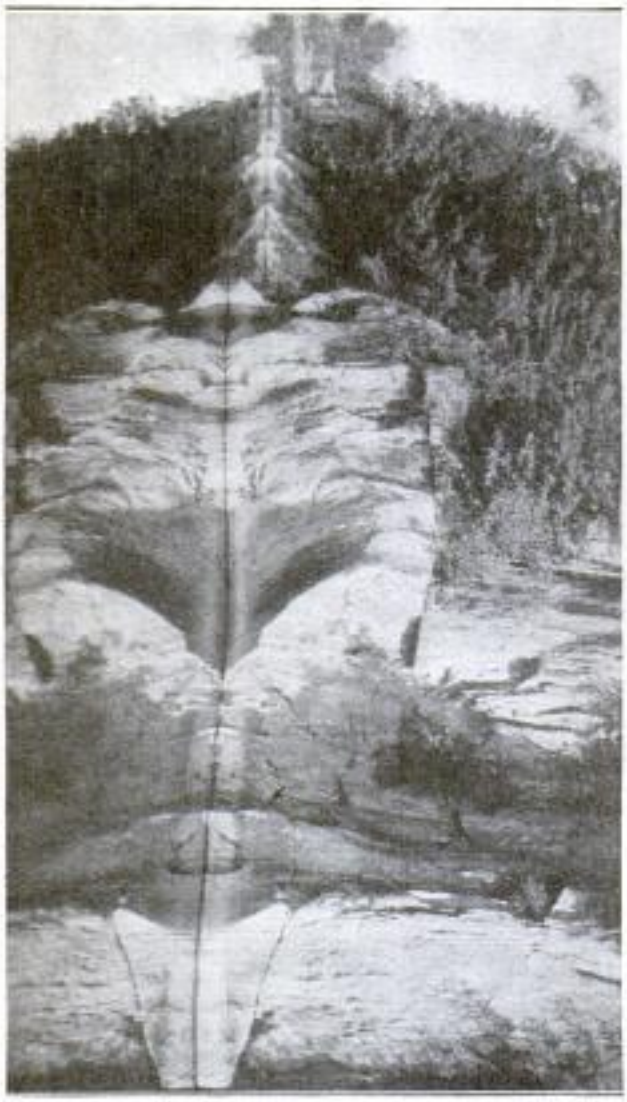
postgraduate course specializing in automotive electrical work. The cost of the installation was $30,000, which is considered well spent for the reason that, though the graduate may not be classed as an expert, he is capable of making himself immediately useful and of commanding a fair wage.



Delving into the Mysteries of Armature Winding, Ignition and Lighting Systems: The Study of the Parts of an Automobile is Arranged on a Progressive Plan, the Student Passing from One Table to Another as He Acquires Knowledge of the Subject

A PHOTOGRAPH THAT DEPENDS UPON THE POINT OF VIEW

Things are not always what they seem, particularly if one looks at them from the wrong point of view. A good example



Looked At from This Point of View This Picture does Not Mean Anything, but Turned to the Left, It Proves to Be a Beautiful View of Rocks Mirrored in Water

of this is a photograph that was taken in southern Vermont, which, held vertically, has a very puzzling appearance, but when turned to the left, and viewed horizontally, reveals a picture of wonderfully perfect landscape reflection on a surface of water so smooth that it makes it the kind of mirror the ladies of fashion sought so eagerly in the days before the invention of glass or polished steel.

In Japan the metric system became legal in 1913, and now, after 8 years to give the people time to adapt themselves to the new units, the system has been made compulsory. The same plan has been followed in China and Siam, where it is still in the preparatory stage.

PORTABLE WEST-COAST RADIO CATCHES ATLANTIC SIGNALS

Small enough to be packed in a suitcase, except for a six-volt storage battery, a wireless-receiving set was recently driven along the streets of San Francisco receiving signals from the Atlantic coast. Nothing but the frame of the automobile was used for the "ground," the copper-wire antenna being strung about 10 ft. above the road from the tops of bamboo poles at the front and rear of the car. Only one bulb was used, the signals being clearly audible without amplification. The apparatus was not specially manufactured for the purpose, but was of standard make. Messages were caught from New Brunswick, N. J., Annapolis, Md., and Pearl Harbor, Hawaii.

BROAD-FACED CHIPPING CHISEL GRINDS MORTAR FROM BRICKS

Another of the many applications of the pneumatic hammer is its adaptation to removing hardened mortar from the surface of old bricks. The chisel for the hammer is wedge-shaped, and when in operation, the quick strokes smash the mortar from the bricks without injury to the latter. One contractor prepared a table on which 100 bricks could be laid at a time.

An Ordinary Pneumatic Hammer with a Broad-Faced Chisel Connection for Cleaning Mortar from Bricks

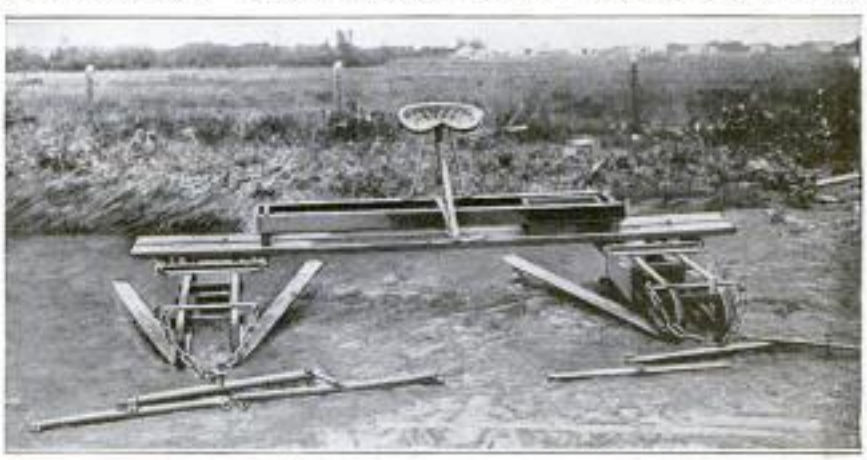
The bricks reclaimed by this process represented a considerable value in money saved.

FLOATING MARINE STORES FOR GREAT-LAKES AND OCEAN HARBORS

A FLEET of small houselike boats which will carry supplies of all sorts, and which will be at the service of the maritime trade, will soon commence operations on the great lakes and in the New York, Boston, and Philadelphia harbors. The front of the houseboat is built after the pattern of an ordinary retail store, and has a landing ledge to which rowboats may be tied while their owners make their purchases. Complete lines of merchandise of the character generally needed aboard ship will be carried by the craft. Such floating markets are expected to be a great convenience to the seafaring trade, as it will save many trips ashore and consequent loss of time.

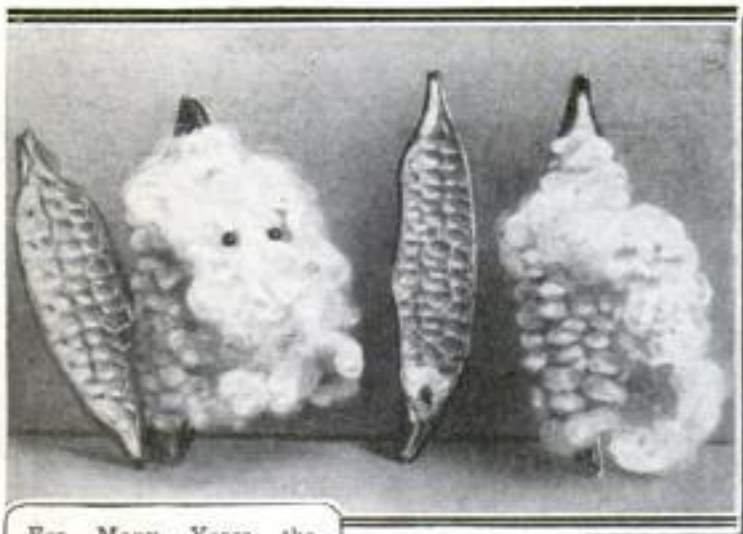
LATE-MODEL CULTIVATOR CAN WORK TWO ROWS

A knife cultivator for weeding corn, sugar cane, and other crops planted in wide-row formation, and one that will clean two rows at one time, is now coming into use. Two runners of boxlike construction are fitted at the front with plowlike knives, and as the horses, which are harnessed in teams on each runner, pull the cultivator along, the knives dig into the dirt of two rows far enough to clip off undesirable plant growths. The driver is seated on a saddle bolted to planking which connects the runners and which is movably affixed to them to allow for variation in the width of the rows. Thus as the horses move ahead, the driver rides over a row while the two cultivating runners work the rows adjacent on both sides. This device has been used by western farmers after the harrow.



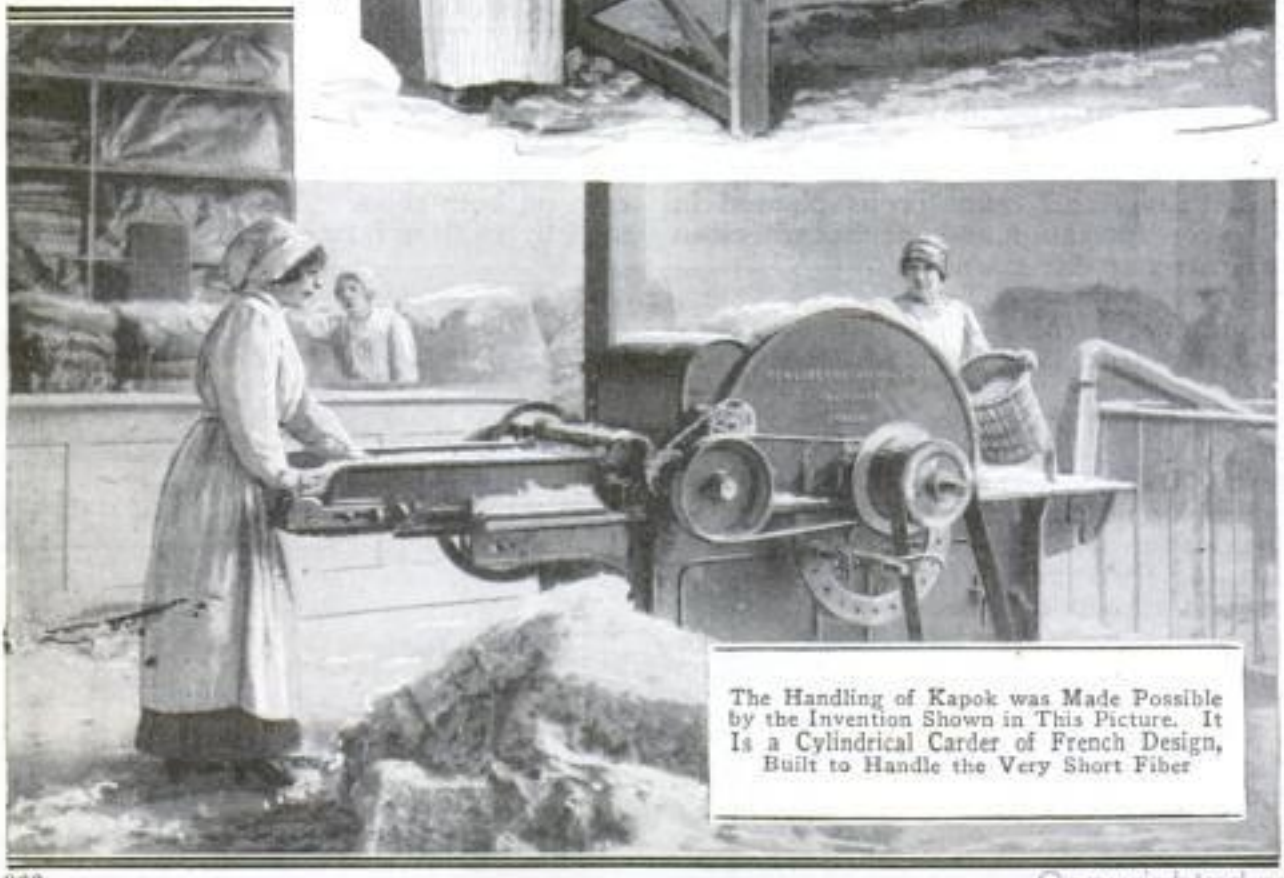
This Double Cultivator Weeds Two Rows at a Time. It is Used in Cultivating Corn, Sugar Cane, and Other Soil Products. The Driver Rides over One Row While the Two Sets of Plow Knives Clip Off Undesirable Growths on Either Side

ABUNDANT KAPOK FORMERLY WASTED



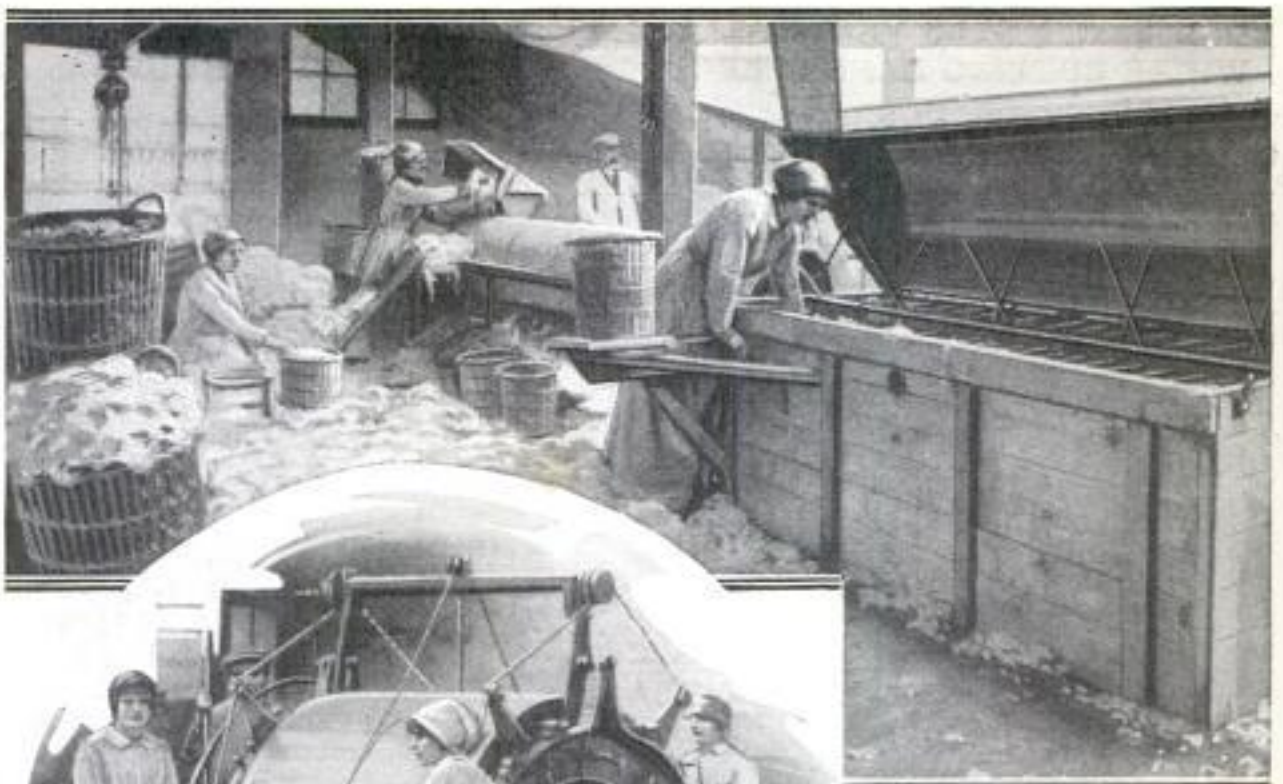
For Many Years the Valuable Fiber of the Silk-Cotton Tree Pod Known as "Kapok," was Left to be Blown Away by the Wind. Later On, a Use for It as Stuffing in Cushions, and the Like, Inspired Its Harvest, and This was Done by Knocking the Pods from the Trees with Long Poles. Finally, Machinery Which could Spin It into Useful Fabric was Invented, and the Fiber Conserved as a Commercial Commodity. The Trees Are Numerous in the Tropics

A Mat Made of the New Thread: The Thread, as It Appears before Working into Cloth, Is Shown Draped over the Mat



The Handling of Kapok was Made Possible by the Invention Shown in This Picture. It Is a Cylindrical Carder of French Design, Built to Handle the Very Short Fiber

IS NOW SPUN INTO ATTRACTIVE FABRICS



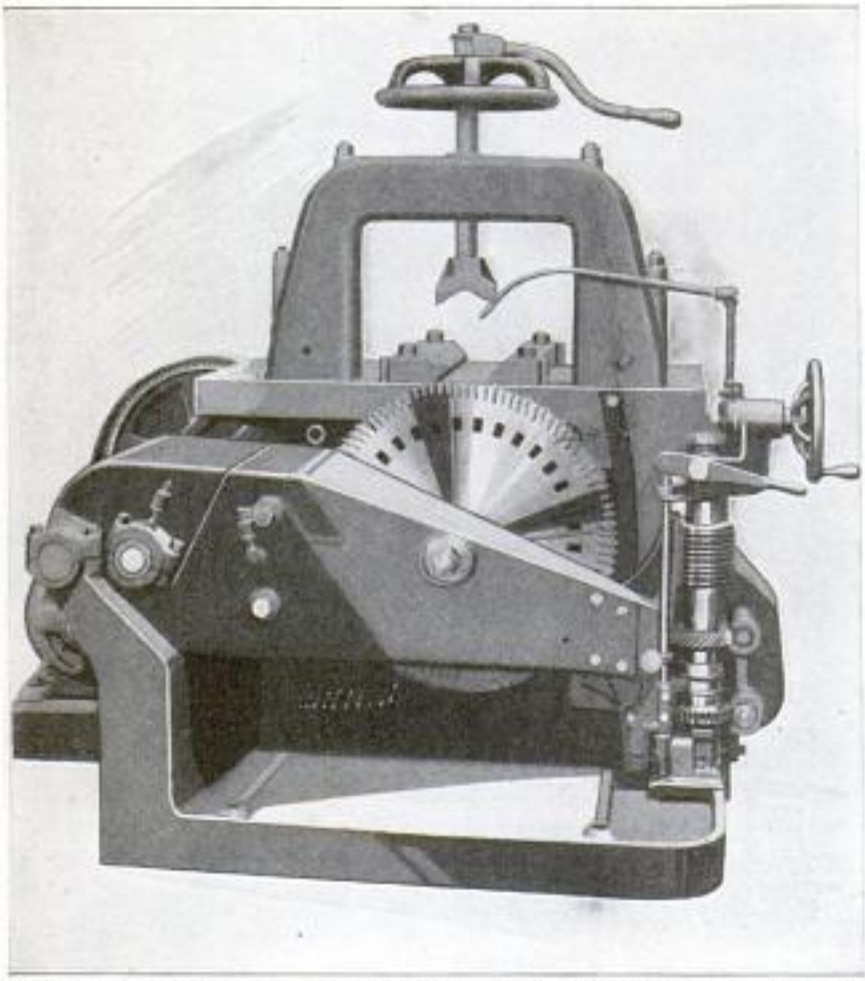
Seeds in the Silk-Cotton Boll are to be Reckoned With, the Same as in Ordinary Cotton. Gins are Built That Perform the Extraction and Which Differ from the Cotton Gin Only in That They Handle Shorter Fiber

The Film of the Kapok Fiber is Here Shown Running Out onto Supporting Strips. During This Process, the Threads are Straightened Out between the Teeth of the Carder by Brushes. These Brushes Keep the Fibers Parallel but do Not Break Them

The Coat and Quilt were Spun from the Kapok Fiber. After the Carding and Cleaning Operations, the Thread is Woven into Fabric. Because of Its Fluffiness, the Thread Is Very Desirable for Quilting, and the Like. It will Float 35 Times Its Weight. Cork will Float Only Five Times Its Weight, Hence Kapok Is Also in Demand for Life Preservers

COLD SAW MOVES VERTICALLY WHILE CUTTING HARD STEEL

Almost universally a circular saw has the material that it is sawing fed to it horizontally, and in cases where the saw moves, instead of the material, it moves horizontally also. There has been recently developed a new form of cold saw for cutting hard steel or bronze alloys, that is fed vertically into the material, which is clamped to a supporting table above. The saw is carried centrally in a substantial arm that is pivoted at one end, and raised or lowered by a worm gearing at the other end, which has interchangeable hand or power drive, upward and downward. The controlling levers are all at one point, and make the machine very easy to operate.



A Cold Saw That is Fed Vertically into the Steel While Sawing It: The Arm Carrying the Saw is Pivoted at One End and Raised at the Other by Means of the Worm-Gearing Seen on the Right

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¶The seaworthiness of U. S. navy flying boats is attested to by the fact that two of the air craft recently outrode a 40-mile-an-hour gale for two days while anchored at Hanamaula Bay, Hawaii. An accompanying "eagle" boat, however, was unable to maintain a safe anchorage.

FRENCHMAN CLAIMS TO MAKE STEEL IN FIVE HOURS

A French inventor claims to have discovered a process of converting iron directly into steel, eliminating the expensive pig-iron process. This has long been the dream of experts. A reduction of iron oxide is effected by using an exactly predetermined amount of carbon. This takes place in a chamber having a high temperature into which is blown powdered carbon, and air previously raised to a temperature between 700 and 1,000° F. The carbon is introduced in amounts sufficient to produce only oxide of carbon in burning in the heated air, but the heat thus emitted is nevertheless extreme, and assures the rapid and almost complete reduction of the mineral with the production of steel direct. By this system there is realized in five hours' operation what takes six times as long in a blast furnace where there are mixed alternate layers of oxide, iron, and coke. An important bearing on French military strength is seen, as the process utilizes a low grade of coal, of which France has an abundance, eliminating coke altogether, and the necessity for the importation of the same.

ROAD-BUILDING IN MOROCCO AFFORDS A DOUBLE BENEFIT

The French Protectorate in Morocco, from 1913 to 1919, built more than 1,200 miles of highways, serving two purposes: improving transportation, and also furnishing employment to the native population, who were suffering from the economic bad times of those years. On account of lack of fuel due to the war, steam rollers were replaced by smaller rollers, drawn mostly by camels. This helped both the government and the natives, for it gave employment to more men, and it cost less to do the same amount of work, since a camel and driver cost about $1.25 a day.

Examining School Children of the Industrial Districts of the West, and Prescribing for Tuberculosis: Although the Clinic is Intended Primarily for the Industrial Sections, Others may be Served if Their Cases Merit. Each Clinic is in the Charge of a Specialist and Attendant Nurses, the Running Expenses being Defrayed by the County, Under the Supervisional Aid of the Tuberculosis Association

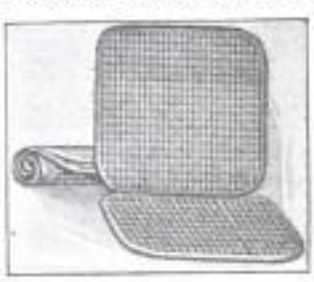
Notable as Another Step in the Advancement of Public Health Work Is the New West-Coast Extension Medical Service. The Motor-Truck Tuberculosis Clinic Is a Public Institution. When Sufferers cannot Come to the Hospital, the Hospital Comes to Them. It Cost $15,000 and was Paid for by the Sale of Red Cross Christmas Seals

TRAVELING WHITE-PLAGUE CLINIC GOES TO CASES

A motor-truck tuberculosis clinic, fitted up by the California Tuberculosis Association, goes to those in need of its assistance when the sufferers cannot come to it. The clinic serves the school children of the industrial districts primarily, but others may have the service if their cases merit. Each county furnishes nurses, and other necessary help, to the doctor in charge of the truck. Special batteries are installed in the chassis to furnish electrical power necessary for medical use, and the rear of the truck has a platform for the distribution of literature, etc. The truck is screened to allow proper ventilation, and bears signs telling of its mission. The cost of the outfit, $15,000, was paid for by the sale of Red Cross Christmas seals.

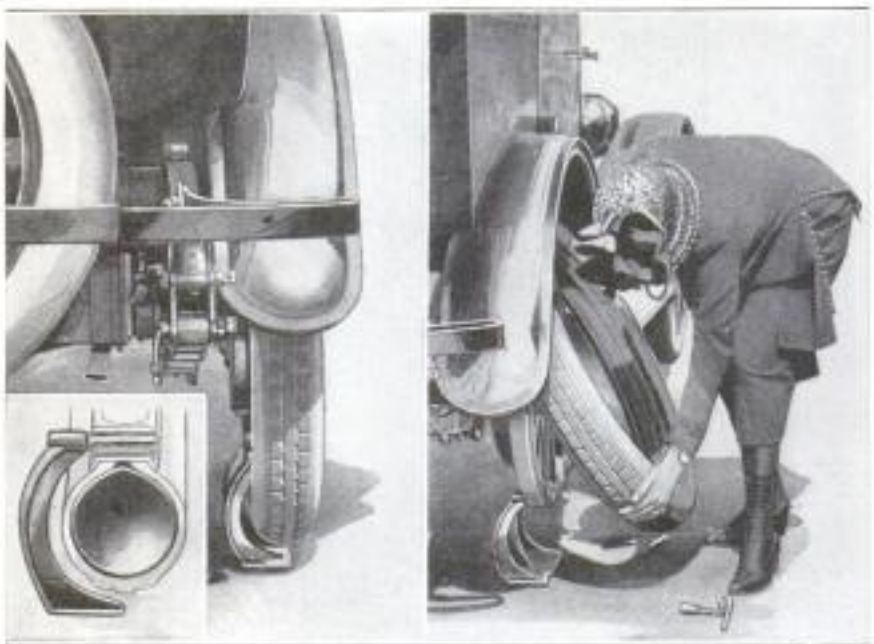
CLEANABLE AUTO-SEAT PADS ADD TO MOTORING COMFORT

Automobile seat pads, made of rice straw, which can be easily cleaned with soap and water, are said to add greatly to the joys of motoring, as they protect slip covers and clothing from wear and soiling, and being good heat conductors, keep the user cool. They are especially conducive to comfort when used on smooth bare cushions, as they have a tendency to cling to the upholstery and thus prevent the disagreeable sliding about that is a common annoyance to the passenger.



SIMPLE ONE-PIECE CASTING DOES WORK OF AUTO JACK

For tire-changing purposes present forms of automobile jacks may be discarded in favor of a simple, one-piece cast-steel device recently placed on the market. Shaped in the form of a segment of a circle, but with a broad flat base on the outside, the contrivance is fitted with two sidewise-projecting steel studs, spaced about 8 in. apart. To use, the studs are inserted in brass-bushed holes in the wheel felloes with the body of the casting partly encircling the tire. The car is then driven ahead until the device goes under the wheel, raising the tire clear of the ground. Besides this primary purpose, the jack is said to serve excellently as a locking mechanism for spare tires and as an emergency mudhook with which to pull out of difficult situations.



Insert: Enlarged Sectional View of the Auto-Jack Substitute, Showing How It is Secured in the Wheel Felloe, and Encircles the Tire. The Other Views Illustrate the Ease with Which a Tire is Removed

TREES PRODUCING LACQUER SAP INTRODUCED INTO FRANCE

The trees producing the sap from which lacquer, a special varnish, is made, were introduced into France from the Orient during the war, supplementing to some extent the markets of India, China, and Japan. Lacquer has been found to be of extreme value in airplane manufacture, combining, as it does, durability and toughness with the characteristic of bending without cracking. It takes a high polish, and is used especially for coating propeller blades.

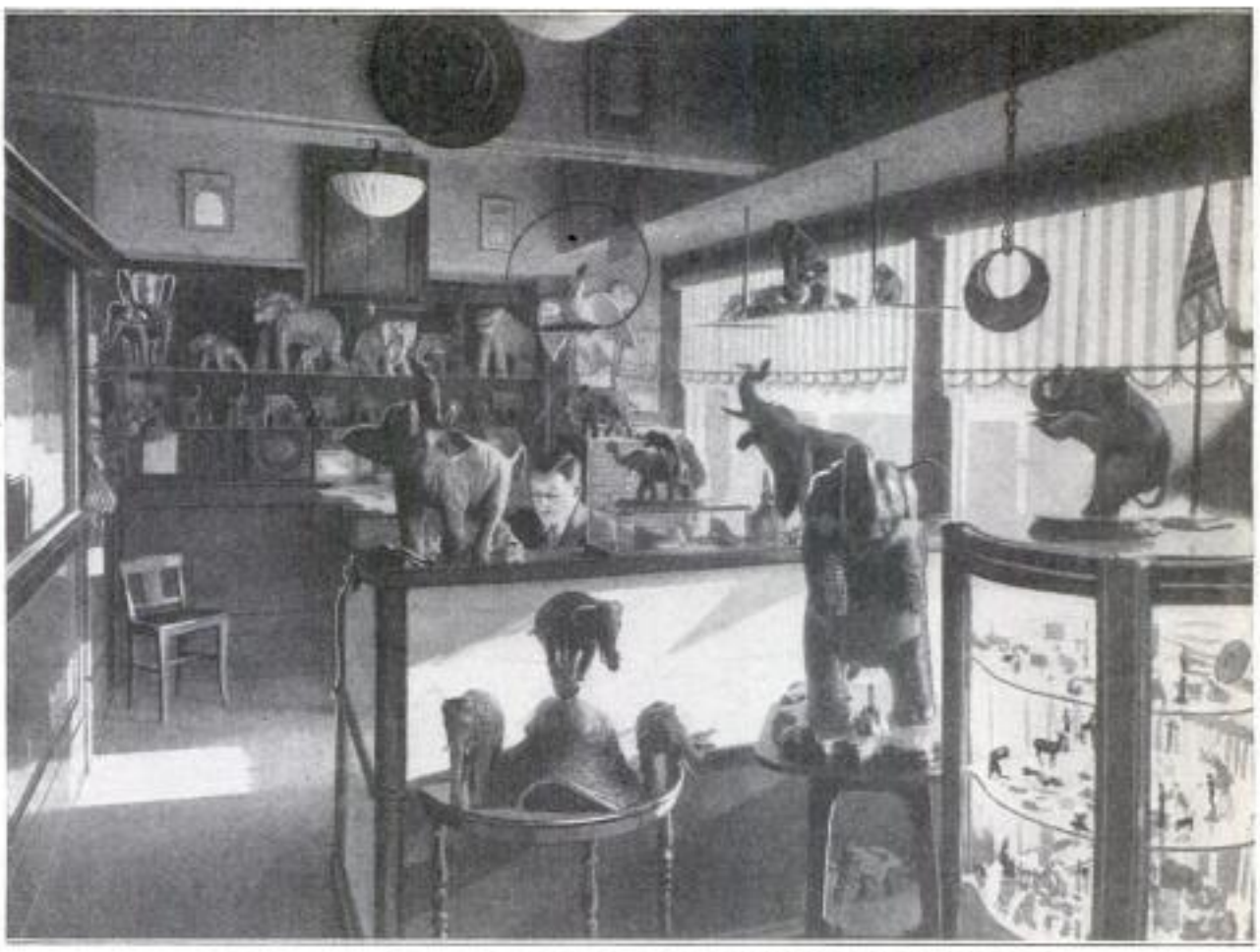
MARKING MT. McKINLEY MEANS CROSSING HUGE GLACIERS

Due to the rugged topography and the fact that the work of marking the 250-mile boundary of Mt. McKinley National Park involves the scaling of immense glaciers, it would be impractical to try to monument the entire line, nor is it necessary according to the park service. The 11,500-ft. summit of the mountain forms the southwest corner of the park. The work of marking on the ground will be started, as soon as weather conditions permit, by the United States General Land Office. In creating the park it was the intention of Congress not only to maintain this territory of magnificent scenery for the people, but also to preserve the game supply of this part of Alaska. For necessary development, it is permitted that prospectors and miners actually engaged in their work may kill for food, but indiscriminate hunting is prohibited.

ONE-STRINGED VIOLIN WITH HORN

The horn for this one-stringed instrument, intended for use in orchestras as well as for solo playing—presumably of a jazz nature—acts as a substitute for the ordinary sounding box or resonator. A banjo string is used, played with a cello bow, the horn resting between the knees of the player, and the neck against his shoulder. It is said that a well-versed player can imitate even a wind instrument with this device, and that it may eventually rival the ukulele in popularity.

No Modern Jazz Orchestra Is Complete without at Least One or Two Queer Looking Instruments of Out-of-the-Ordinary Nature. This One is Played Like a Cello, and It is Said to Have a Tone All Its Own



STATUETTES OF ELEPHANTS ARE BUSINESS MAN'S HOBBY

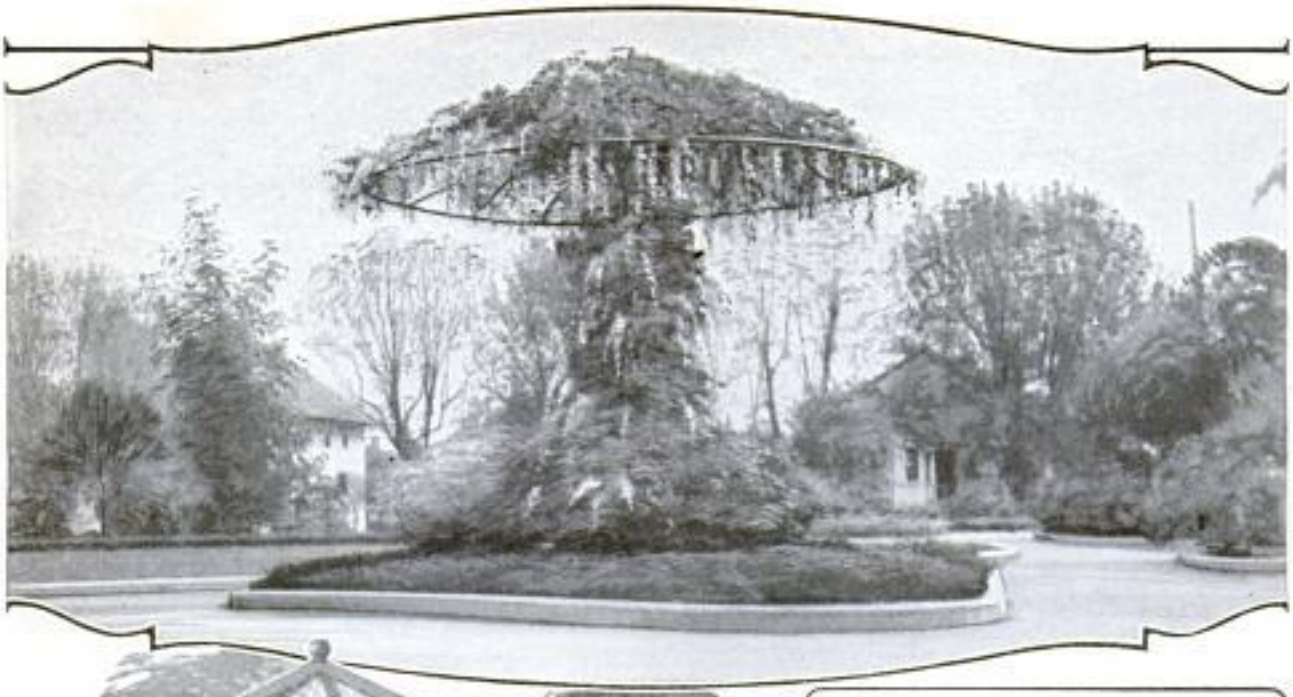
COLLECTING things, that queer human instinct that brings so much happiness to the collector and so much astonishment to his friends, takes a most unusual direction with a certain Oregon business man. His particular hobby is elephants; not live ones, of course, but little statuettes of them, reproducing the huge beasts in all manner of postures. There are big and medium-sized ones of bronze, little ones of ivory, and others, large and small, of teakwood, stone, and bone. Some few reveal a cubist or impressionistic touch, but most of the large collection are in the best style of the Chinese and Japanese artists, who have a knack of changing the ungainly animals into objects of real beauty. Many of the specimens are old, rare pieces of art, and of great value.

COMBINED INTERCHANGEABLE SCALE AND TRUCK

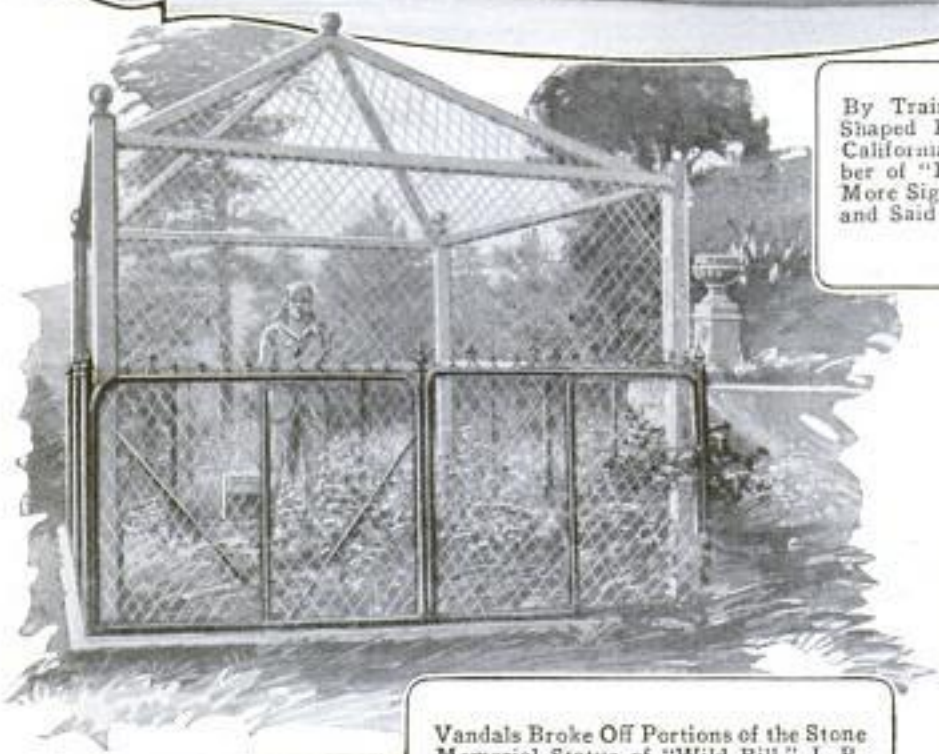
A combination that is a scale or a truck interchangeably, and that when used as a scale weighs correctly, whether level or sloping, is now on the market in Chicago. The truck is of rugged construction, built for severe usage, and the scale, which is on a vertical support at the front end of the truck, is rigidly built, with no small, weak parts to get out of order. The scale has somewhat the character of an ordinary platform scale, in which the platform is convertible by the movement of a lever, so that it becomes the deck of the truck. This happens automatically when the truck is moved forward after being used as a scale, by an automatic tripping device, which immediately lowers the platform onto the truck frame. The beam of the scale is made to weigh correctly at any slope of the truck by means of an adjustable counterbalancing device.

The Truck in Scale Position with Platform Raised from Truck Frame: When Moved, the Tripping Device between the Front Wheels Replaces It Upon the Frame

CIVIC FEATURES THAT PROMOTE THE COMFORT



By Training Vines over Umbrella-Shaped Pipe Framework, Santa Ana, California, Parks have Grown a Number of "Living Umbrellas." They Are More Sightly than Artificial Structures, and Said to Be Equally Satisfactory as Shelters

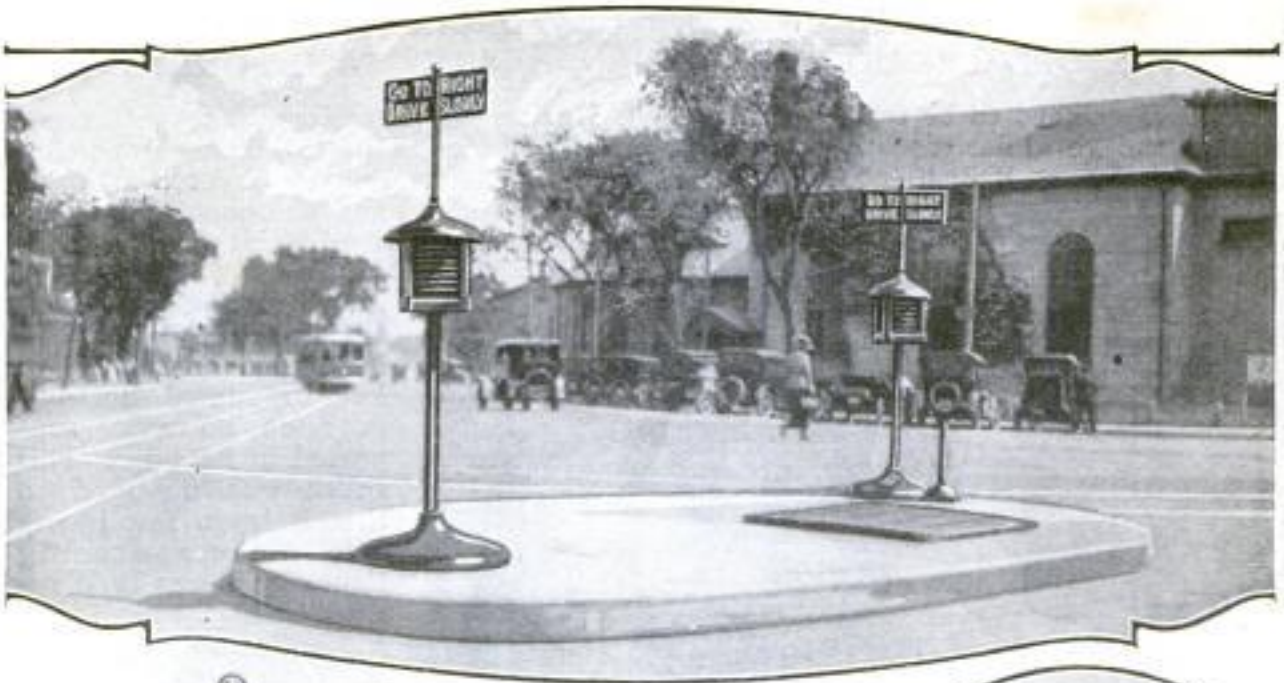


Vandals Broke Off Portions of the Stone Memorial Statue of "Wild Bill," J. B. Hickock of Pioneer Fame, at Mt. Moriah Cemetery, Deadwood, S. D. Hence This Wire Cage for Protection. The Grave of "Calamity Jane" Is Near-by

Self-Increasing Force Hydrant, San Diego, Calif.: The Fire Connection Pipe Is Cone-Shaped, Said to Increase the Force of the Water Because of the Greater Volume at the Rear

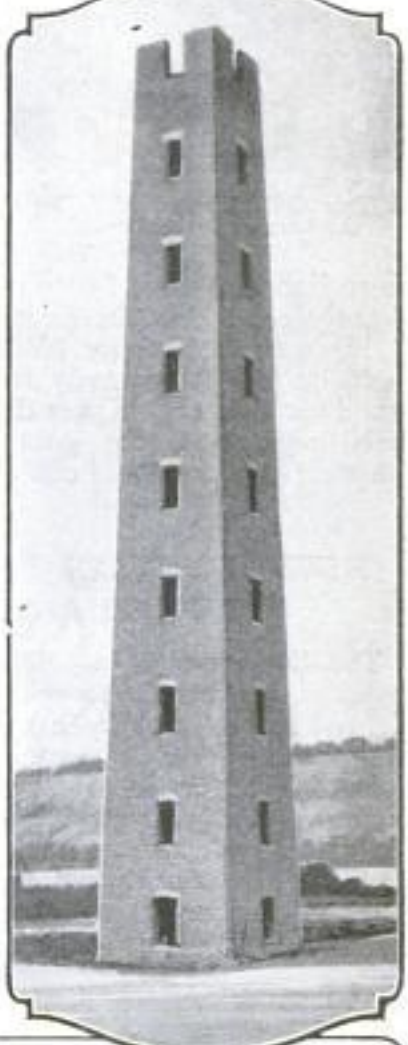
The Grated Mirror of This Cincinnati Street-Corner Signal Reflects the Beams of the Headlight Back into the Driver's Eyes, Warning Him to Slow Down

AND ENJOYMENT OF VISITORS AND RESIDENTS



"Silent Policemen" of Quincy, Mass.: These Traffic Signs are Supplemented by Glaring Red and White Danger Signals Posted at Vital Street-Corner Crossings throughout the City. "Forty per Cent Less Accidents Than in 1919," has been the Report, Since the New Traffic Control Went into Effect

Heavily Armed Signal Stations have Been Established on All the Roads in the Vicinity of Paterson, N. J., Leading from New York City, as a Means of Capturing Criminals Escaping in High-Powered Automobiles. These Outposts Are in Direct Connection with Police Headquarters

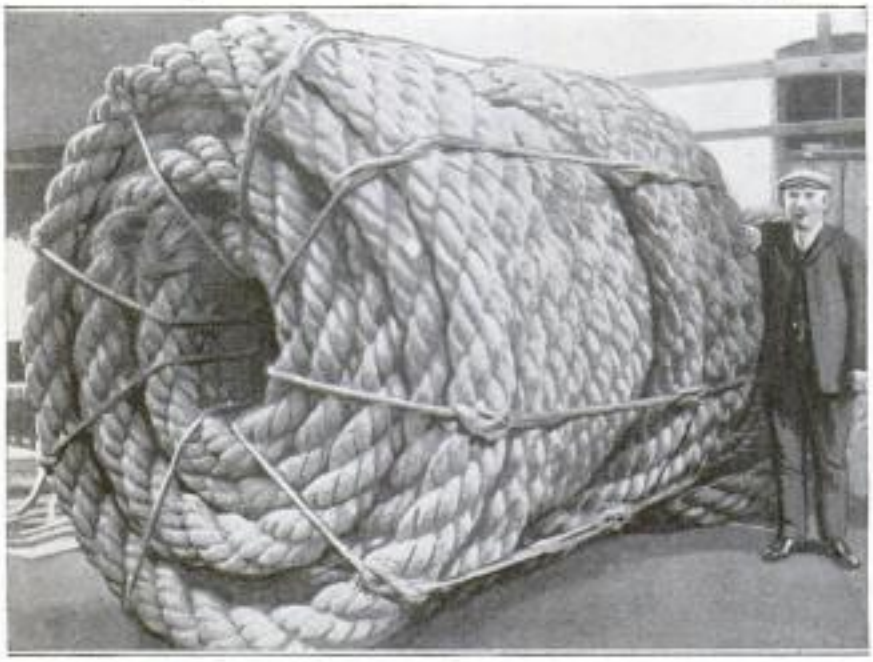


This Is the Combination Horse Fountain and Danger Signal Used in Quincy, Mass. The Sides Are Venetian Blinds, Doing Away with the Usual Breakage of Glass. It is Painted a Glaring Red and White. Two High-Powered Red Bulbs Illuminate It at Night

In the Allison-Henderson Memorial Park at Dubuque, Iowa, will be Preserved This Famous Old Shot Tower Which has Stood on the Banks of the Mississippi for 70 Years. Shot was Formed by Letting Slender Streams of Molten Lead Fall from the Top, Congealing into Little Balls in Flight and Hardened in Vats of Water Below

ENGLISH ROPE CABLE IS SIZE RECORD BREAKER

What is claimed to be the largest rope cable in the world has recently been manufactured by a British concern. The huge line measures 240 yd. in length and slightly over 7 in. in diameter, or about 22 in. in circumference. When coiled and piled on the floor ready for shipment, it stood considerably higher than an average-sized man. Such ropes were used as ship moorings before chain cable was invented.



If This Coil of Rope, Made by a British Concern, Is Not, as Claimed, the Largest in the World, It will be Seen by Comparing It with the Man Beside It That It cannot Be Far from It

FORCING EVAPORATION AT POTASH PONDS

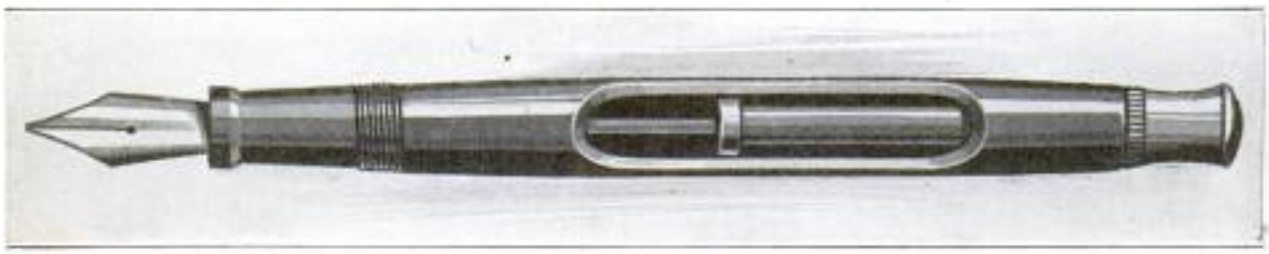
During the past winter evaporation has been retarded, as usual, over the potash-refining ponds west of Great Salt Lake, and one company, which found this delay expensive and irksome, installed a device consisting of a cylinder, 2 ft. in diameter and 12 ft. long, mounted horizontally on an axle, supported in bearings. This roller was mounted so that it lay a few inches into the evaporating liquor, and was then rotated at high speed, with a gasoline engine.

A spray of water was thrown into the air several yards high and was carried away a considerable distance by the winds. This pool, containing several hundred acres of heavy liquor a few inches deep, was thus forced to evaporate at practically twice the natural rate produced without the roller spray, it has been reported. The apparatus is undergoing further experimentation and improvement, and will probably be utilized day and night the year round, if results and needs continue to warrant.

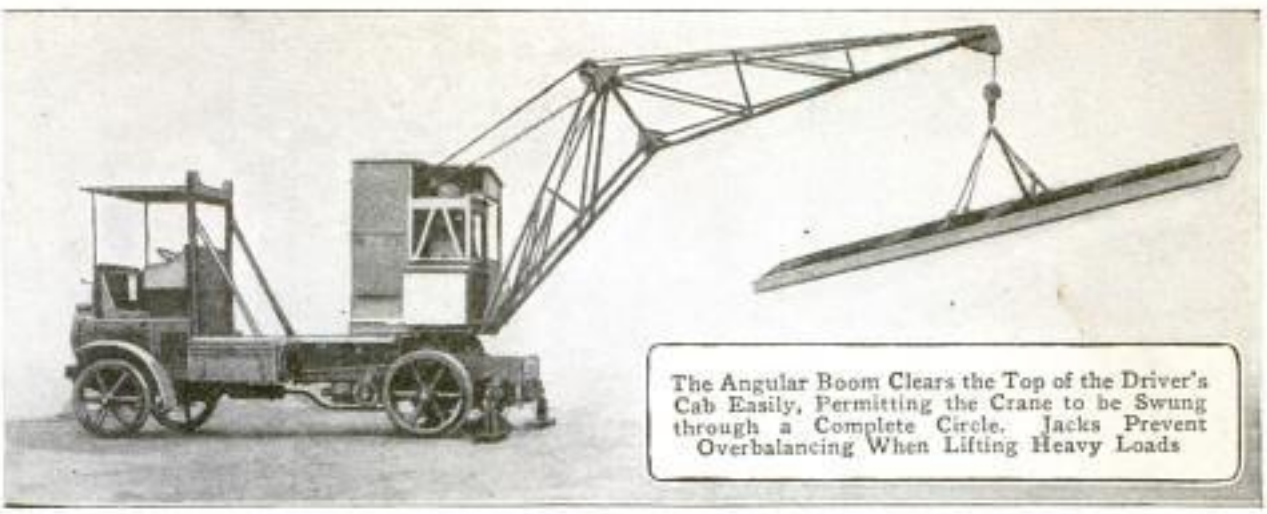
NEW FOUNTAIN PEN FILLS BY PUMP ACTION

The last word in writing utensils is a fountain pen which is worked like a pump. On the inside of the pen barrel is a small hollow tube which communicates with the point. Telescoping upon this tube is a second and slightly larger tube terminating outside of the barrel in a knurled cap. In filling the pen, the user grasps this cap and pumps it up and down, which action draws the ink through the hollow tube into the pen barrel. No space within the barrel is wasted, as rubber sacks and springs are eliminated.

¶Over one hundred models of famous statuary were destroyed by fire in Brooklyn recently. Included were the original models of the equestrian statue of Simon Bolivar, South American patriot, and the Frederick Remington statuettes of "The Outlaw" and "The Mountain Lion."



This Fountain Pen Works Like a Pump in Filling. The User Grasps the Knurled Cap at the End and Pumps It Back and Forth, Drawing the Ink Up into the Pen Barrel



The Angular Boom Clears the Top of the Driver's Cab Easily, Permitting the Crane to be Swung through a Complete Circle. Jacks Prevent Overbalancing When Lifting Heavy Loads

BOOM OF AUTO-TRUCK CRANE HAS FULL-CIRCLE SWEEP

The cantilever-design boom of a portable crane, mounted on a motor-truck chassis, permits the use of the apparatus over the sweep of a full circle instead of a limited radius at the rear and sides. Being of a peculiar angular, instead of a straight shape, it clears the top of the driver's cab when it is desired to use it in lifting loads directly in front of the truck. The power plant is an independent unit housed in an operating cab pivoted on the rear end of the chassis.

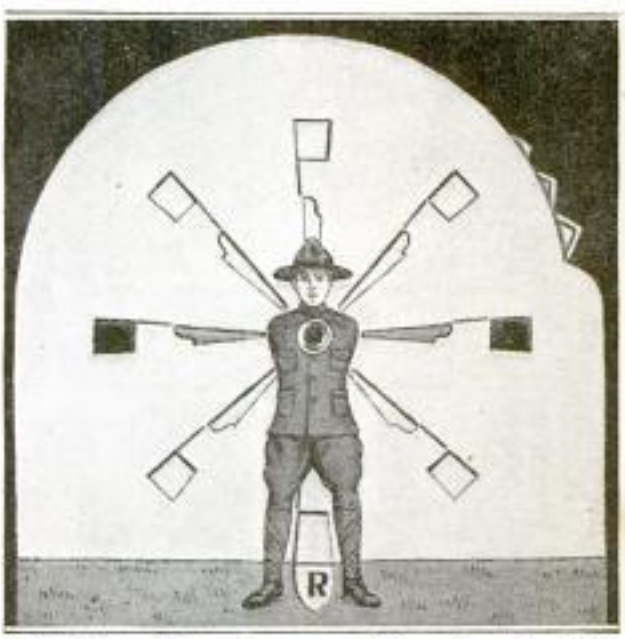
NEW TOOL INSERTS STORAGE-BATTERY PLATE SEPARATORS

The insertion of the somewhat frail, 1/8-in. thick wooden separators between the plates of automobile storage batteries, without excessive waste through breakage, is the object of a new service-station tool recently offered to the trade. Arranged crosswise at the heel of a blade, somewhat like a long putty knife, is a deeply grooved crosspiece.

In using the tool, the separator edge is placed in the groove, and the blade, acting as a wedge, forces the plates apart sufficiently to permit easy insertion of the separator. The grooved crosspiece is said to prevent splitting, as it applies the pressure equally over the whole edge of the fragile part.

ARMY SEMAPHORE CODE TAUGHT BY CARDBOARD "INSTRUCTOR"

The difficulties of learning the army and navy semaphore code, appreciated by the several million young Americans who in 1917 and 1918 attempted to master it al-



The Disk of the "Instructor" has been Revolved Until the Letter "R" is Seen. Simultaneously the Red Flags Indicate the Same Letter in Army Code

most overnight, are lessened considerably if the pupil provides himself with a small cardboard "instructor" now offered for sale to the general public. The face of the apparatus bears the picture of a soldier, with eight slots radiating from his shoulders to correspond to the eight possible positions of arms and flags. On the rear is pivoted a cardboard disk on which is printed the letters and numerals, and various strips of red. As the disk is revolved by the thumb, the characters are displayed between the soldier's feet while the strips of red show through the slots in the proper combinations.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

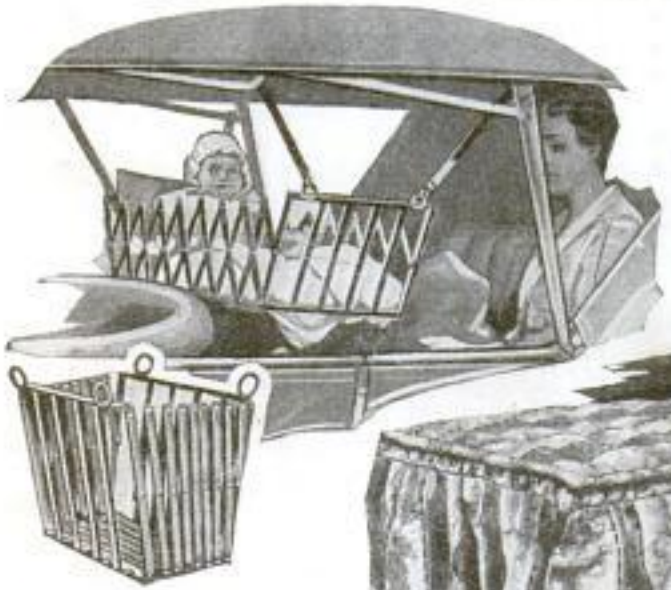
This Plant Stand can be Adjusted to the Angle of Light for Plant Growth and Display

Refuse Receiver Provided with Casters for Rolling It along the Floor

A Sewing Machine Which Looks like a Writing Desk, the Machine being Folded Out of the Way When Not in Use, Is Now on the Market. The Motor, Controlled by a Knee Switch, Is Integral with the Machine, and Does Away with a Foot Treadle Altogether

This Saw-Tooth, Spoon-Shaped Implement Is for the Purpose of Scraping the Meat Out of Cocoanuts

A New Design of Glove for Women Has a Slit in the Middle for Access to the Wrist Watch



This Baby Crib Collapses on the Lazy-Tong Principle. When Used for Touring It may be Suspended by Means of a Strap from the Auto Top

A New Sanitary Steel Couch may be Elevated at the Head. This Makes for Ease in Reading after Retiring, and may Also Be of Appeal to an Invalid

Anyone wishing further information on devices described in the editorial pages can

INTENDED FOR THE HOME AND ITS MEMBERS

Combination Electric Lamp and Ventilating Fan for Cool Reading in the Summertime

A Newly Designed Electric Candlestick is Made of Metal Finished in Gold or Silver

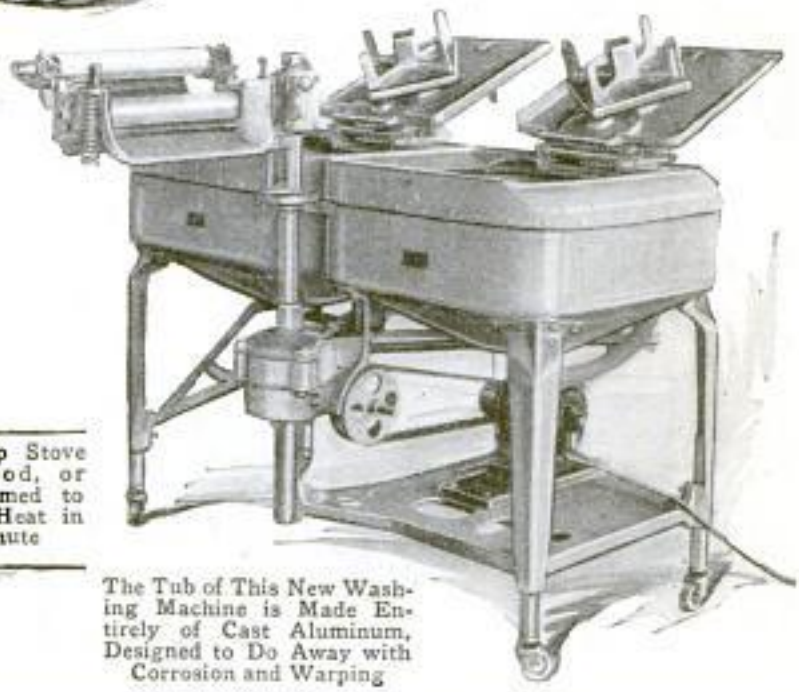
A New Rubber Nursing Bottle may be Turned Inside Out for Cleaning

New Electric Waffle Iron: Pull Down the Handle and the Iron Is Ready for Use. Pour in the Batter, Raise the Handle Until the Top Closes Down; and in a Few Minutes' Time the Waffles are Done

Coffee Is Ready to be Served in This Urn When Boiling Water is Poured over the Grounds Held in the Wire Filter

New "Rosebud" Bag: The Flower at the Top of the Silk Pouch Is of Shell Carved to Imitate a Rose

This Folding Camp Stove Burns Hay, Wood, or Straw. It is Claimed to Reach a Cooking Heat in Less than a Minute

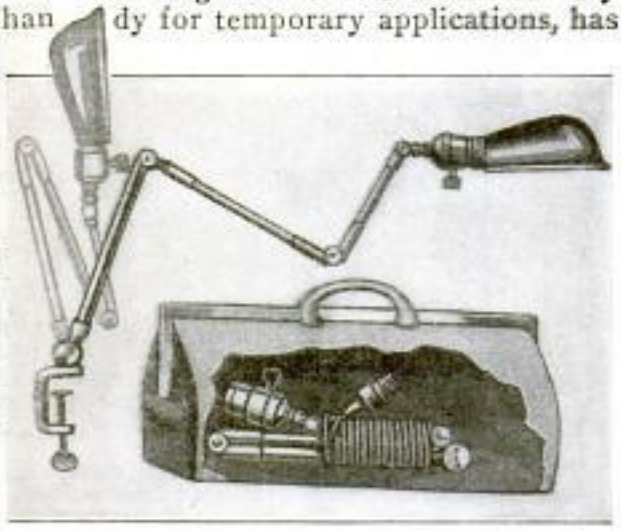


The Tub of This New Washing Machine is Made Entirely of Cast Aluminum, Designed to Do Away with Corrosion and Warping

obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago

ADJUSTABLE LAMP BRACKET IS HANDY LIGHT FIXTURE

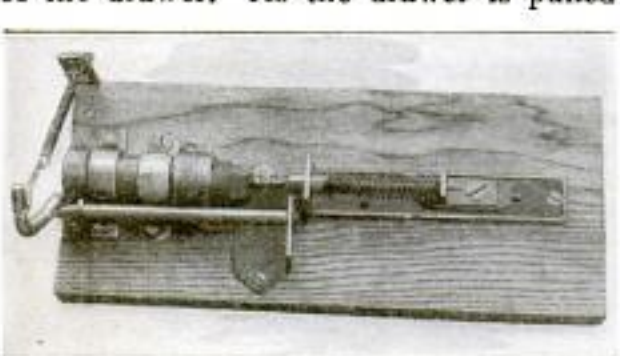
A sectional lamp bracket that is equipped with a clamp at the end remote from the light bulb and which is very handy for temporary applications, has recently been developed. The sections unite in a flexible joint which permits folding up the bracket into a compact bundle.



The Clamp on the End of This Light Bracket Permits It to be Attached to Drawing Tables, and the Like. The Fixture Folds Compactly in a Small Satchel

TRICK BUCKSHOT GUN SHOOTS CASH-DRAWER ROBBER

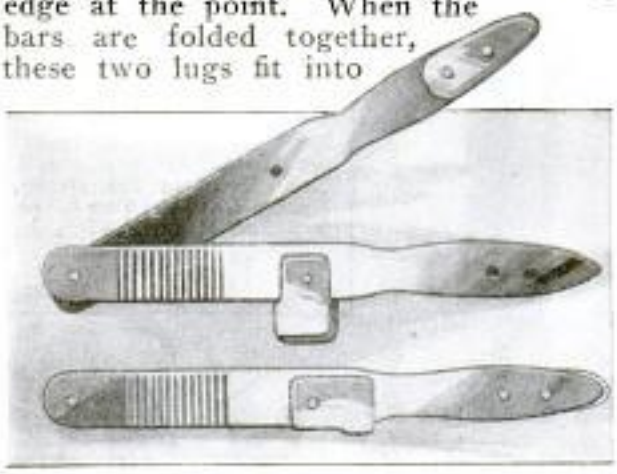
The latest thing in cash-drawer safety devices is a small buckshot gun which is designed to fire at the person who attempts to rob the drawer. The gun consists of a ½-in. diameter barrel and a firing pin, the latter being controlled by a strong spring. The trigger which restrains the spring and pin is designed to stand in a cocked position on the top edge of the drawer. As the drawer is pulled forward, the trigger drops, releasing a rod which in turn removes a restraining lug from the firing pin. This action permits the pin to strike a percussion cap at the back end of the barrel which discharges the load of buckshot. The gun is so small that it is not easily seen.



This Gun Shoots at the Person Who Attempts to Rob the Cash Drawer. It Fires When the Drawer is Opened

READILY STERILIZED SCALPEL WITH RENEWABLE BLADE

A surgeon's scalpel, recently patented, is readily taken apart, making it easy to sterilize, and affording the advantage of being able to replace a worn-out blade without discarding any other part of the instrument. The scalpel is composed of two flat, thin, resilient bars, with part of the surface on one side corrugated to furnish a grip for the thumb. At one end of these bars is a single, easily removed pin, which forms a pivot on which the bars separate like the blades of a pair of shears. At the other end of one of the bars are two small round lugs, upon which is adjusted a blade, with a rounded cutting edge at the point. When the bars are folded together, these two lugs fit into two holes in the other bar, and the two bars then form a guard for the blade, which projects only slightly beyond them, thus preventing too deep an incision.



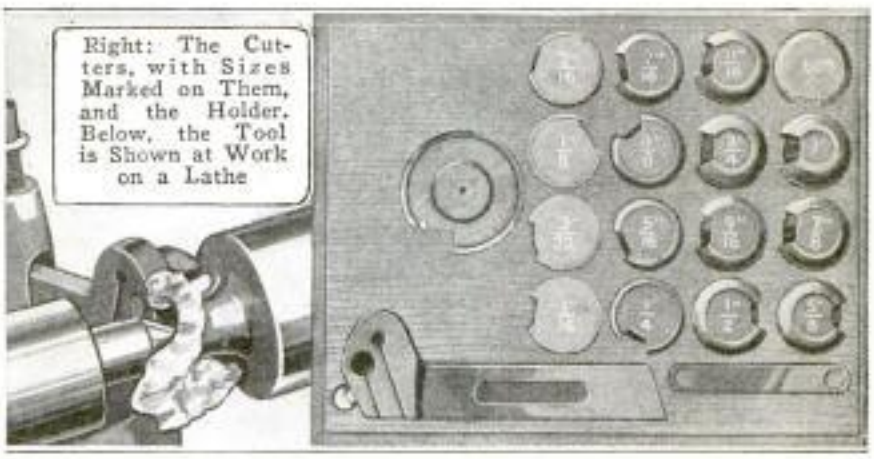
Above: The Two Bars Connected at the Pivoted End with the Cutting Blade in Place. Below: The Bars Clamped Together, Ready for Use as a Scalpel

LETTERS TO CIRCLE GLOBE IN TIME TRAVEL TEST

Two letters westward and two eastward, the former by a route south of the equator and the latter by a route north of it, will circle the globe in a test trip. The time consumed in the travel of these letters will be closely tabulated and held for comparison with the time consumed in an around-the-world aeroplane trip soon to be attempted. The letters over the northern route will be relayed at England, Ceylon, and Japan, while those over the southern will be forwarded at England and New Zealand.

MANY-BLADED LATHE TOOL CUTS RADII ACCURATELY

A new tool designed for use in lathes, shapers, and planers, has 26 cutters, all of which are interchangeable in one holder. Fifteen of these cut accurate radii of convex circles ranging from 1/16 to 1 in. in diameter and nine make concave radii of the same dimensions. Besides these the set includes one each thread-cutting and cut-off tool. The cutters are circular in shape and have a short boss projecting from one side, by which they are clamped in the jaws of the holder. They are sharpened by grinding straight across the rim on a line exactly parallel with the axis of the boss, or hub, the whole rim constituting a blade which may be reground many times.



Right: The Cutters, with Sizes Marked on Them, and the Holder. Below, the Tool is Shown at Work on a Lathe

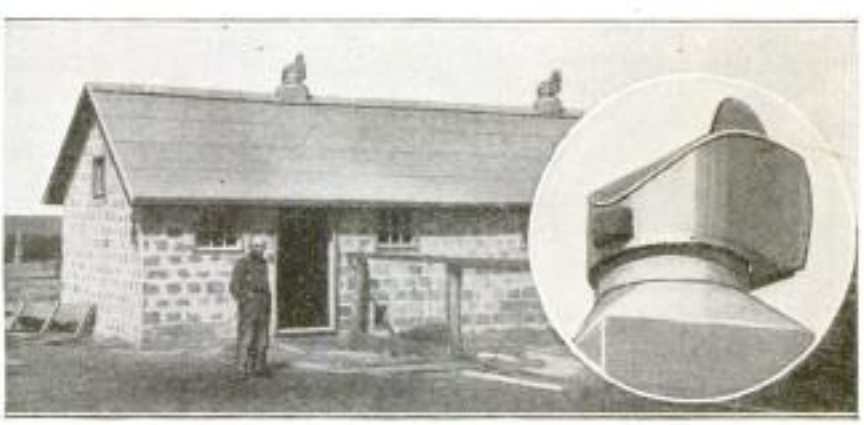
A REAMER ADJUSTABLE TO DIFFERENT SIZES

The usual practice is to have a separate reamer to fit exactly each hole to be reamed. Recently a reamer has been introduced that is adjustable, so that one can be made equivalent to two or three of the old kind. It has an adjustment with micrometer graduations, and it is set just as closely, and in the same manner, as a micrometer. The cutting blades are strongly supported in slots in the body of the reamer, which is of ample size and strength. A helical spring at the lower end of the tool forces the blades to correct adjustment. Chip clearance is provided. The reamers are adjustable to variations in diameter up to 1/16 of an inch.

The Adjustable Reamer: From the Left End Is First the Spring, Then the Blade Collar, and Third the Blades, Supported in Their Slots. Beyond Them Is the Micrometer Adjustment

DRAFTLESS VENTILATION FOR HENHOUSES

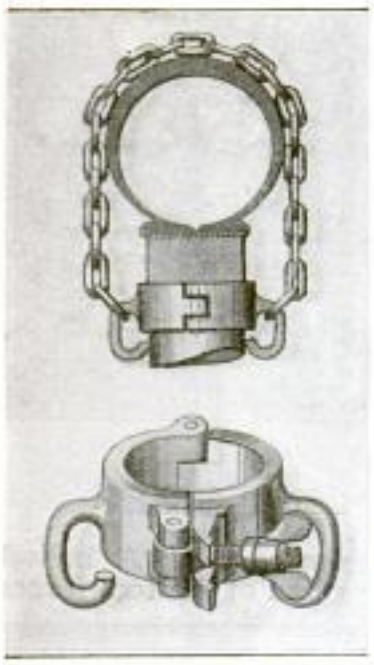
Chickens, like human beings catch cold when subjected to draft, and to furnish them with sufficient air without endangering their health, a suction ventilator has been devised. It is made in two main sections, namely, a sheet-metal under box and an upper rotating member. The rotating part is counterweighted and fitted with a vane to keep its screened open end away from the wind. In the neck of the lower section is a fan which is turned by the draft furnished by suction reactions at the open end of the upper member. This arrangement furnishes air in sufficient quantity without danger of draft. Two ventilators are generally used on the lower buildings for better air distribution.



Insert: A Fan in the Neck of the Ventilator is Turned by Suction, Furnishing the Chicken House with Draftless Ventilation. The Picture Shows the Ventilator Placed upon the Chicken-House Roof

NONSKID CROSS-CHAIN LINKS CLAMP TO WHEEL SPOKES

In a new antiskid device for automobiles, the usual long side chains and their end hooks are eliminated, the cross chains being attached to the wheel spokes by means of clamps. These are so designed that they encircle the spokes. They are hinged at one side and provided with a wingnut at the other, with which they are securely locked in position. Each one is made with two hooks with their openings turned toward the spokes. This has the result of so effectively closing the openings that the end links of the cross chains, hooked into them, are prevented from working out. On the other hand, after removing the clamps from the spokes, the cross links can be unhooked easily.



CHECKERBOARD HAS ATTACHED PLAYING COUNTERS

An accidental nudge of the elbow against the checkerboard has often cost the followers of that game the pleasure of finishing a hotly contested match. Such muss-ups need not be feared when a new checkerboard, to which the playing counters are riveted, is used. In place of the usual round counters, a series of circles divided into six parts are printed on the board. Two of these parts are blanks, two are red and black crowns, and two are red and black playing colors, respectively. Covering these printed circles are disks, each having a 60° segment cut out. Thus, as the plays are made, they are represented in the printed under colors appearing in the space cut out of the upper disk. Jumped players and empty spaces are represented by the blank divisions.

BELL SIGNAL ANNOUNCES BASKETBALL SCORES

Standing back of a crowd of rooters and listening to their jubilations over the accomplishments of their basketball teams is little sport to the fan who finds himself so situated. Dim lights also make it hard for the ardent booster to ascertain whether or not the toss of his team went home. A bell signal, which announces the baskets with a loud clang, now is used and is an effective means of notifying those less fortunate observers. The steel basket rim is fitted with a strip of metal projecting downward, which serves as a base for a bell and its striking mallet. The latter is centrally pivoted and one end projects into the basket so that the ball will hit it when passing downward through the basket. When this happens the mallet end forcibly strikes the bell, and the resultant clang may be heard throughout the gymnasium.

LATE-DESIGN WINDOW LOCK IS MODEL OF SIMPLICITY

There are numerous window locks and latches on the market, and among them a new model which embodies a curved lever that wedges into locked position is marked by its simplicity. The end of the lever is fitted with a rubber cushion to prevent abrasions on finished wood sash, and makes contact with the upright sash of the mate window. A base to which the lever is pivotally attached is screwed to the upper sash of the lower window. In releasing,

the free end of the lever is pressed, which draws the wedged end out of contact with the upper sash.

ENVELOPE HAS SAFETY FLAP TO PREVENT TAMPERING

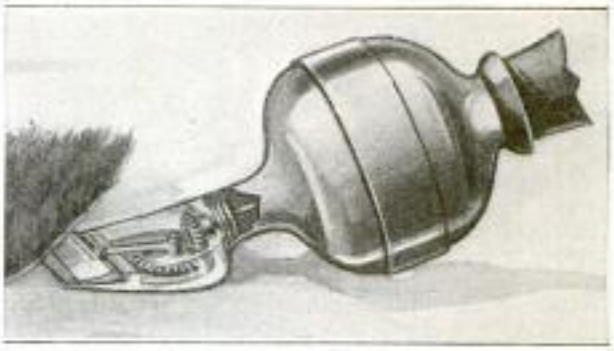
An envelope with a perforated-line flap has been designed for the purpose of providing a means of detection should the envelope be surreptitiously opened and resealed during transit. The scored lines afford weakened spaces on the gummed flap that are easily separated from the main portion. It is claimed to be practically impossible to disengage the gummed flap from the lower part without detaching one of the sections. Should a knife or steam be used, one or more of the parts would become dislocated, making detection certain. An additional advantage is a marked space provided for the return address.

HANDY MITER CLAMP HOLDS PIECES FOR JOINING

To hold mitered pieces securely while they are being nailed or glued, a new clamping tool is very handy. The device consists of a slotted base having two upwardly projecting ends. One of these ends terminates in a 90° angle and its projection serves as an abutment for the pieces to be joined. A hand-operated screw is carried in the projection in the opposite end and moves another 90° angle plate that fits in the base slot. When the mitered pieces are laid against the abutting end, and the sliding plate is tightened against them by means of the screw, they are securely held until the joining operation is complete.

AUTOMATIC SKINNING DEVICE QUICKLY REMOVES HIDES

The uncertain and often wasteful strokes of the butcher's knife as he peels the hide from the animal are soon to be supplemented by a mechanism designed for the same purpose which is speedy and economical in operation. It comprises a motor-driven reciprocating knife which protrudes from a mouthlike aperture at the tip of a chisel-shaped housing. This housing is inserted between the hide and the flesh. With the motor running, the knife alternately protrudes and withdraws from the housing in rapid reciprocations,



This Motor-Driven Skinning Knife Separates the Hide from the Animal by Driving a Reciprocating Blade between the Hide and the Flesh

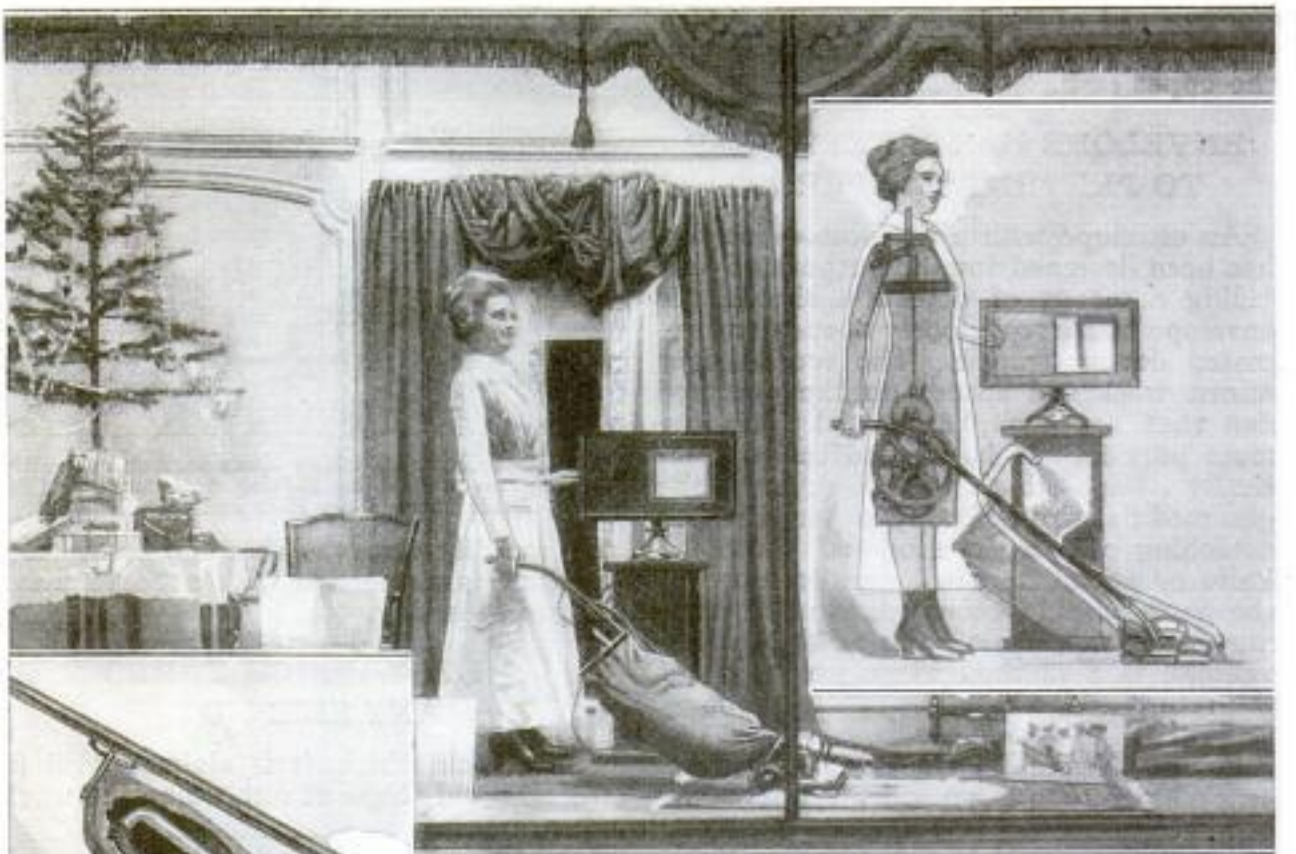
and speedily parts the skin and flesh. The machine is also made with a perpendicularly disposed motor.

NEW WRENCH TAKES ANY SIZE NUT

A wrench which, it is claimed, will fit any size and shape of nut, doing the work of a socket wrench, S-wrench, and tire tool, is now on the market. It is a drop forging, casehardened, 10 in. long and weighs 1½ lb. The adjustment is by means of a thumbnut operating on a pivoted lever.

RADIATING FLANGES ON AUTO CRANKCASE KEEP OIL COOL

Theoretically, if automobile engine oil could be kept very cool, its lubricating properties would be better preserved, and it would serve longer before becoming unfit. With this thought in mind, an eastern manufacturer is offering a bottom plate for engine crankcases which is deeply flanged for its entire length, thus presenting a large radiating surface to the cooling effect of the rushing air. It is claimed that the device will keep the oil so cool that an economy of over 50 per cent is effected. Other advantages claimed are that engines run cooler and develop more power; that burned-out bearings are prevented, and that carbon deposits are decreased.

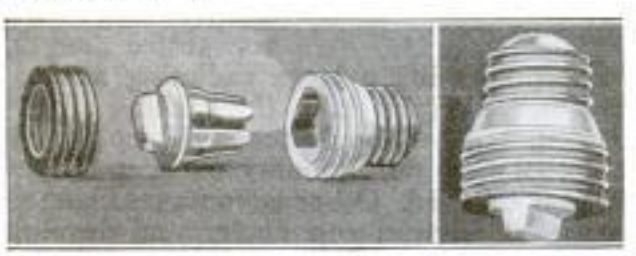


The Mechanical Woman Shown at the Left Moves the Vacuum Cleaner Back and Forth and Also Changes Ad Cards. Right: Phantom View of Dirt Course and Figure Mechanics

How the Dust is Carried to the Dirt Sack of the Ingenious Vacuum Cleaner: It cannot Fall Back through the Suction Aperture

MULTIPLE FUSE PLUG SAVES CHANGING

The aggravating task of changing fuse plugs every time one blows, will become less frequent with the greater use of a multiple plug of late design. It comprises a base, a cap, and a finger-operated multiple fuse. The latter fitting contains six fuses and when one blows, a second may be placed in contact with the circuit terminal by simply turning a projection on its top. When all of the six fuses are blown, the plug is disassembled and the fuse replaced.



The Multiple Fuse Plug. Left: The Parts Disassembled for Changing. Right: Unit Assembled for Fitting in Socket

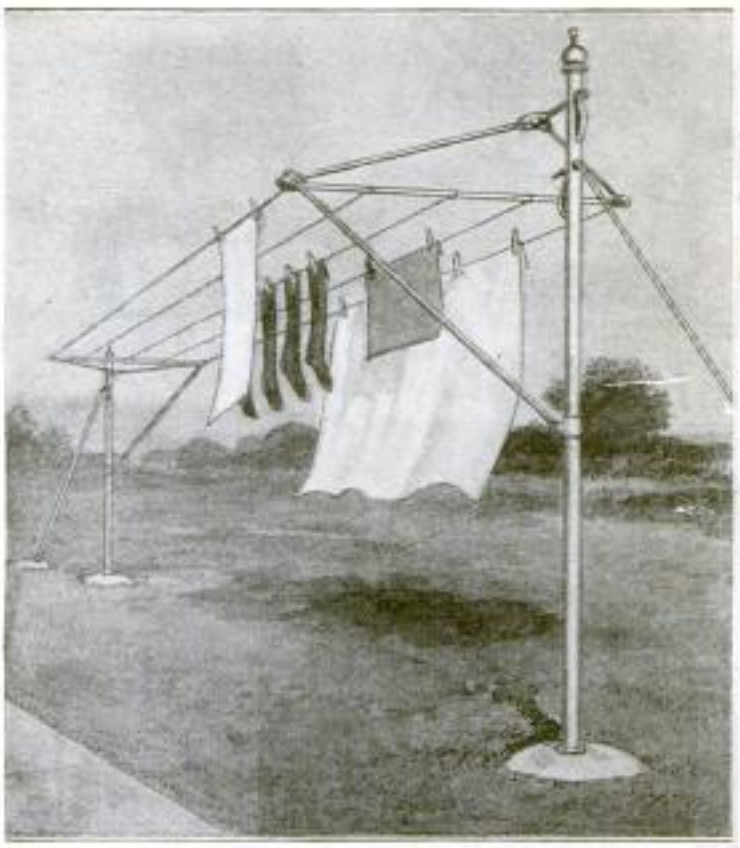
MECHANICAL WOMAN OPERATES VACUUM CLEANER IN WINDOW

A very interesting window display was exhibited recently in a store window of Portland, Ore. It consisted of a mechanical woman operating a vacuum cleaner on the rug of a room. The figure is fitted with rods and gearing which causes the head to turn, makes one hand change advertising cards in a frame, and the other move the cleaner back and forth. The vacuum cleaner is furnished with a constant supply of dirt from a box beneath the card frame, and this is made possible by a new development in the vacuum-cleaner design. The inside of the dust bag is equipped with a pipe which scatters the dirt about in a manner similar to the distribution of straw by a threshing machine. For the display, this pipe was lengthened and connected with the box under the card frame which is an inclosed hopper. From this hopper the dirt is automatically dumped to the rug in front of the sweeper.

¶The new 32,000-ton U. S. battleship "Tennessee" stopped and reversed in the record time of 3 min. during tests off the coast of Maine, recently.

CLOTHESLINE SUPPORT USED FOR MULTIPLE LINES

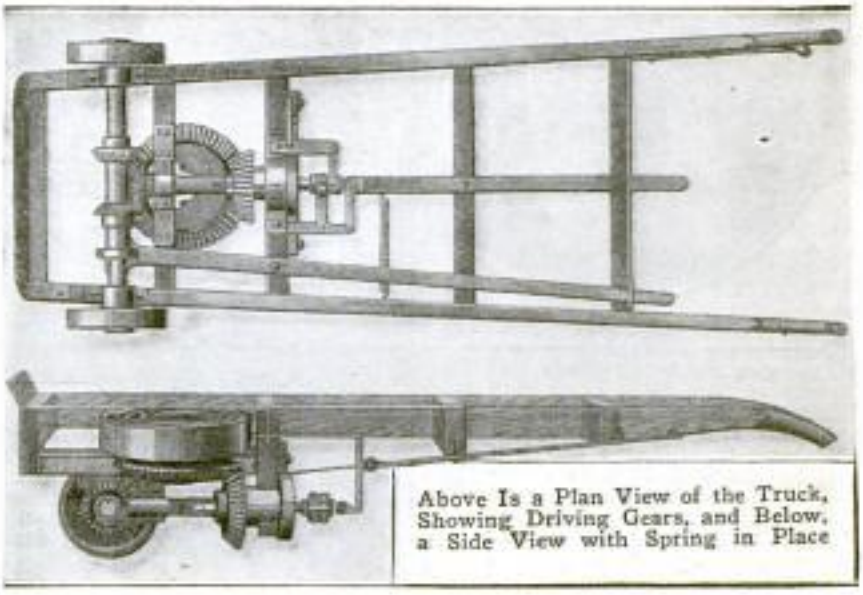
Nearly every washday morning in the days gone by, back yards could be seen to resemble a giant spider web with their network of clotheslines strung from many posts. An improvement over these old-time clothes-drying methods is a post with a triangularly arranged group of rods extended at right angles to it and held in position by a pair of guy rods attached to the lower part of the post. The rod forming the base of the triangle holds the clotheslines, and there is room to tie many of them to it. The ropes are made taut by turning a handle, which serves as a pull nut, and is attached to the bolt that holds the triangle to the post. The entire post is guyed to the ground by a hook set in a piece of concrete having an eye at its opposite end, into which a rod is fitted that passes through the clothesline post below the rope rack. The guy rod is pulled into place by a handle attached to the threaded end of the rod protruding on the opposite side of the post.



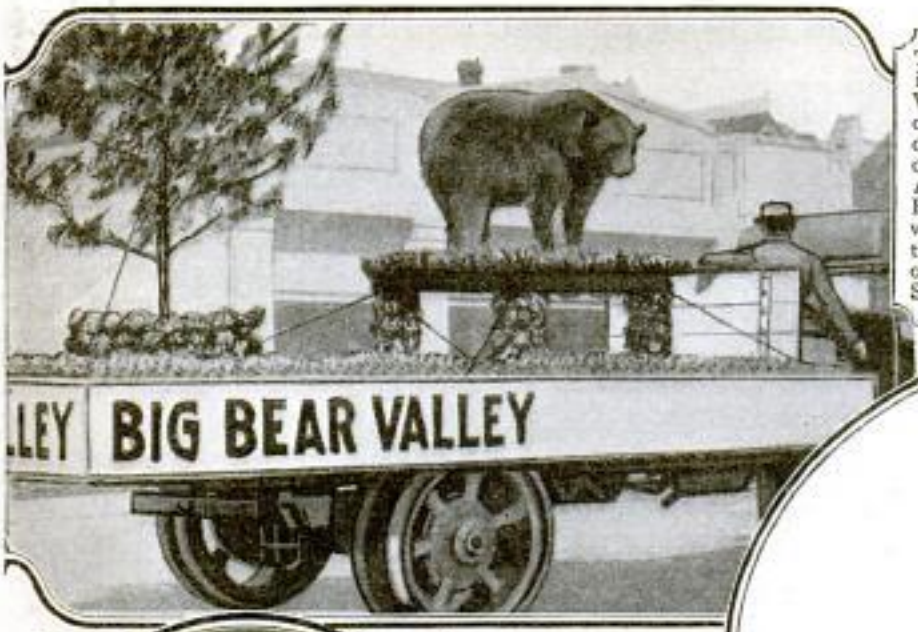
The Multiple Clothesline Support Has a Triangular Upper Frame, One Side of Which Serves as an Anchor for Many Lines. The Lines are Drawn Tight by Turning a Handle on the Upright Support

SPRING-DRIVEN HAND TRUCKS LESSEN STEVEDORE LABOR

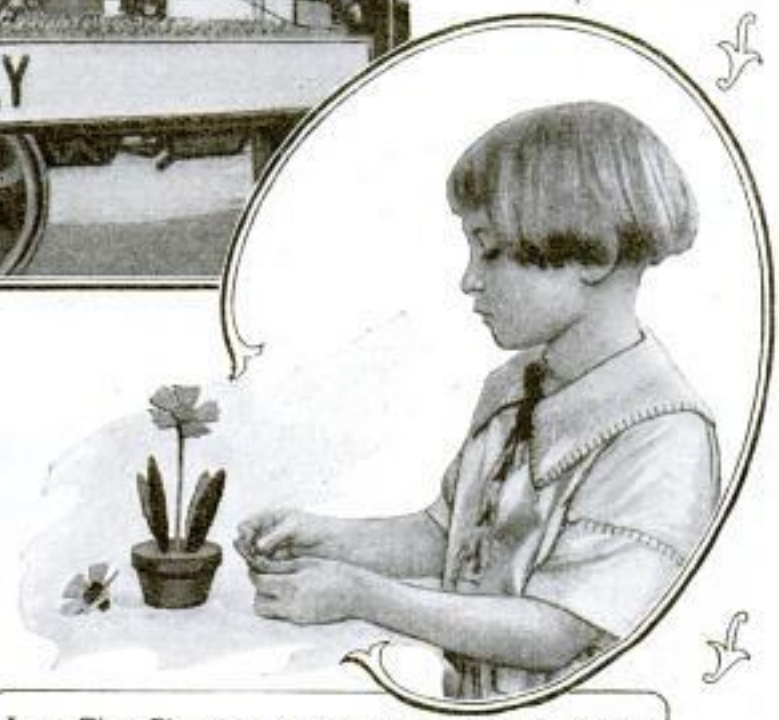
A warehouse truck of the two-wheeled variety, equipped with a powerful spring motor, to be used when ascending inclines, has been brought out by a Minnesota inventor. The driving mechanism consists of a flat coil spring, five bevel gears, two of which are attached to a sleeve keyed to the truck axle, and a short shaft placed lengthwise of the truck. A movement of 100 ft. in either direction winds the spring, which then automatically disengages from the gearing, thus preventing breakage from winding too tight. For movement over level floors, the spring is not used, but is engaged only when it becomes necessary to climb inclines, such as those presented by the steel plates used to bridge the gap between freight cars and warehouse platforms and by ship gangplanks. Engagement of the driving parts with the truck axle and also an ingenious reversing arrangement are controlled by two levers placed within easy reach. There is also a lever for throwing the spring out of action at the top of an incline.



Above Is a Plan View of the Truck, Showing Driving Gears, and Below, a Side View with Spring in Place



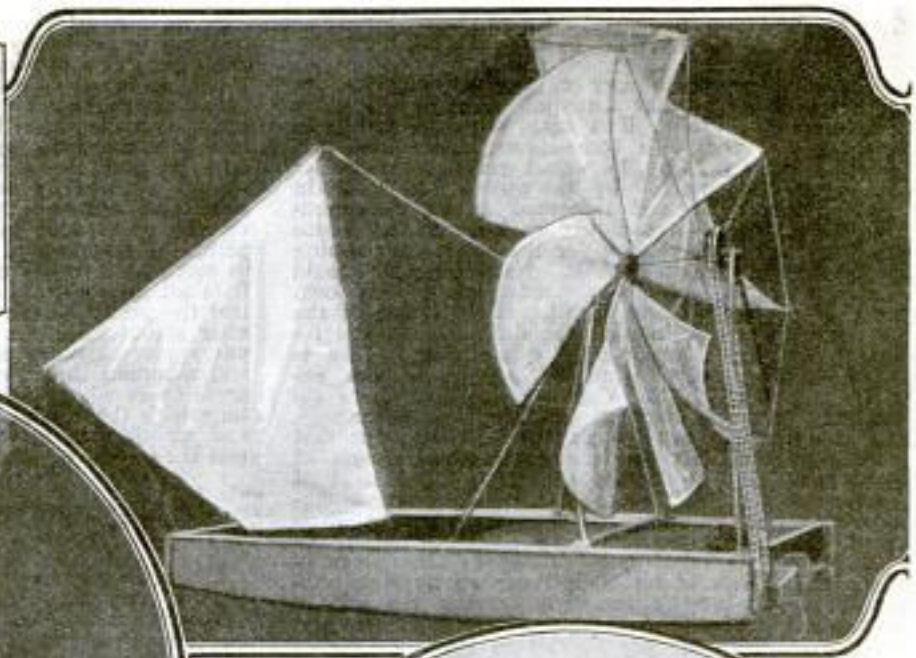
To Carry through the Streets, in a Parade, a Big Brown Bear, Weighing 400 Pounds, Loose on a Small Platform, on Top of a Truck, as was Done Recently in Los Angeles, would Appear to Be a Somewhat Risky Performance. But the Bear was Prevented from Leaving the Platform Because of a Row of Pine-Tree Cones, with the Sharp Ends Nailed Uppermost



In a Tiny Flowerpot Any Kind of Plant or Flower can be Built by Putting Together in Proper Form Sets of Differently Shaped and Colored Wooden Petals, Leaves, and Flower Centers. It is an Interesting Way to Study Botany and Color Harmony

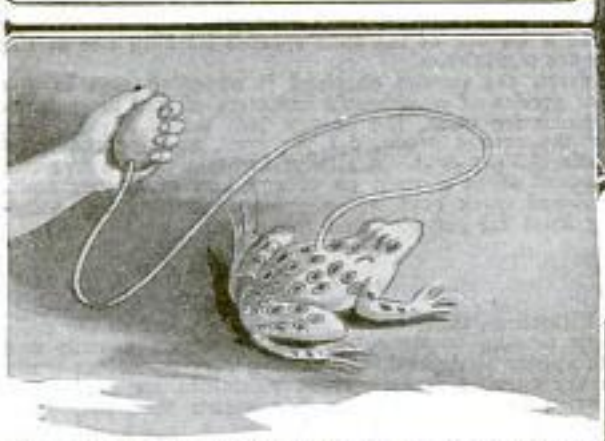
Dolls for the Kids are Now Very Appropriately being Made Entirely of Kid, by a Lady in a Western State. Any Kind of Leather Has the Advantage of Making Dolls Light and Unbreakable, and Kid, in Addition, Is Very Beautiful. Their Beauty Is Also Lasting, for They Retain Their Shape under Considerable Rough Usage, Which Any Doll may Receive from an Over-Fond "Mother"

A Sheep is Generally Assumed to Be a Stupid Animal, or Anyway Not Nearly as Intelligent as a Dog, and Yet a Colorado Rancher Has a Sheep That will Do Almost Any of the Stunts of a Trick Dog, Including Standing on Its Hind Legs to "Beg" for a Piece of Bread



An Ingenious Toy Boat, the Work of a French Inventor, Utilizes Wind Power by Means of an Ordinary Windmill, for Propulsion. The Power is Transmitted by a Chain and Sprockets to a Screw Propeller. The Boat Itself is Composed of Two Floats with Cross Braces. It is Steered by a Sail in Front

A Miniature Golf Course in an Open Box, Not Much Larger than the Two Hands of a Boy, Has Six Holes, and the Game is Played without Any Kind of Club. The Ball is Teed and Shot to the Hole with a Jerk or Toss of the Box, and the Jerks are Scored in the Same Way as the Strokes in Golf



There Is No Frog Living That Can Jump Better than This Artificial Frog. It Jumps When the Bulb is Pressed, and the Harder the Pressure the Higher the Jump

In Both Buffalo and New York City, in Sections Inhabited by a Class of People Who Have Few Bathing Facilities, There has been Arranged What is Called a "Shower Street," to Take the Place of Bathing Beaches in Hot Weather, during Set Periods of the Day When This Portion of the Street is Closed to Traffic. There Are Three Showers in the Length of a Block, Each Throwing a Spray Large Enough to Sprinkle from 200 to 300 Children at a Time

LATEST DEVELOPMENTS IN SCIENTIFIC RESEARCH

By C. A. BRIGGS

MOTION CHANGES SIZE OF THINGS

According to the theory of relativity, which recently came to popular attention through the work of Professor Einstein, if a man passes a house in a street car, and with some arrangement measures its width as he goes by, he would get a result smaller than would be obtained by the owner who stood in front of his home and measured it on the premises. Also, the man standing in front of his house would get a shorter length for the street car passing by than would the man in it. Each observer would declare that the other's measurement of his own house or vehicle was too small. If the speed of the moving body were doubled the difference in the results would be approximately quadrupled. This is for illustration only. Actually, the differences existing according to the theory of relativity are remarkably small under all ordinary circumstances. The importance is not the size of the effect, but that it may exist at all; and the fundamental nature of the theory, and its influence upon the processes of thought and the advance of knowledge and understanding, justifies everyone knowing just a little about it.

All motion is relative, according to the theory of relativity. There is no such thing as absolute motion or rest. Any observer measuring the lengths of objects which are moving with reference to him will find that things are shorter in the direction of motion than will be found by one who moves with the object. Other curious things occur, but this odd effect upon length is perhaps the simplest and most important that can be given at the present time.

The magnitude of this shortening is so small that no one need be concerned with its influence upon our practical application of geometry and mechanics in everyday affairs. This can be appreciated by considering the equator of the earth. This is approximately 24,000 miles, and due to the earth's rotation, any point on it moves with a velocity of 1,000 miles an hour. Multiply the velocity of an airplane by ten, and we get a conception of the speed with which that point on the equator moves by virtue of the turning of the earth. Now, what is the shortening effect of this motion according to the theory of relativity, produced in this belt 24,000 miles long moving with a velocity of 1,000 miles an hour? The figure is interesting on account of its surprising smallness. The shortening according to the theory of relativity is .002 in.—an amount so small that if it were represented by a gap in a steel belt about the earth it would not be large enough to admit a knife blade.

It is only when velocities become enormous, or a long interval of time is involved, that the effects represented by the theory of relativity are large enough to be readily pictured by the imagination.

* * *

SMALL BITS OF QUARTZ ESTABLISH RADIO WAVE-LENGTH STANDARDS

The standards of wave length for radio telegraphy can be prepared and kept in the form of small bits of crystals; and a small chip of quartz can determine whether an operator has his apparatus adjusted within the law or not. This fact was brought out at a recent meeting of the American Physical Society, in Washington. Several wave-length standards were exhibited in the form of crystals, and they were surprisingly small. They were bits of quartz, square in cross section, .04 in. on the side. The one for representing the 200-meter wave length was so short that the crystal was reduced to a tiny cube about the size of a pinhead, and the volume was approximately one fifteen-thousandth cubic inch. To correspond to a wave length of 200 meters this small crystal will vibrate 1,500,000 times a second. Electricity travels through the air at the speed of 300,000 kilometers per second, so that when the number of waves per second is known, the value of the wave length can be readily obtained.

The accurate measurement of the length of electrical waves is of great practical importance in radio telegraphy and telephony. For instance, amateurs are not ordinarily supposed to exceed 200 meters, signals of ships in distress at sea are sent out in 600 meters, and so on, for numerous classes of radio work.

The method of using crystals of quartz makes it possible to employ them to calibrate wave meters with great precision. When a piece of quartz is squeezed, a charge of electricity is developed at the surface where the pressure is applied, and conversely when an electrical potential is imposed upon a crystal a corresponding change in dimensions is produced. This action is made use of by introducing the quartz crystal into the electrical system of an oscillating audion bulb, in such a manner as to have a small condenser action. It can be made to control the frequency of oscillating systems by merely placing it on certain binding posts used in the circuit. When the natural period of vibration of the electrical circuit is adjusted to correspond to the mechanical vibration of the crystal, it is set in vibration, and it then can be made to control the period of the electrical circuit. For instance, after resonance is set up, the electrical circuit can be put appreciably out of tune, but the crystal will hold and maintain the vibrations at a fixed frequency. In some cases where the electrical system is not in exact tune with the crystal, the bit of quartz can be tapped and set to vibrating, and it will then dominate or control the period of the electrical system.

* * *

WHY WATCH SPRINGS BREAK IN THUNDERSTORMS

Did you ever have the mainspring of a watch break? If you did, the chances are that this occurred in thunderstorm weather. It has been the experience of many jewelers that in thunderstorm seasons the number of broken watch mainsprings increases greatly. This has been erroneously ascribed, though somewhat vaguely, to the effects of electricity, magnetism, and of the noise from the thunder, but an analysis of the explanations attempted fails to develop any reasonable relation in accord with these ideas. This matter has recently been made the subject of a scientific study.

An examination of the records of jewelers' repairs showed that there was a very distinct increase in the number of broken mainsprings during the thunderstorm season. This was finally found to arise from the fact that at this time of the year the air was both warm and moist, and that both of these conditions facilitated rusting. A small spot of rust often starts on the spring or in a crack, and the spring soon weakens and lets go. The trouble is therefore not due to any mysterious effects of magnetism or electricity. It can be largely prevented by a layer of oil on the surface of the spring.

* * *

THE QUALITIES OF HAMMERS

Recently a laboratory investigation was made to determine the relative energy losses of different types and kinds of hammers in ordinary use. The effect of the loss of energy is to cushion the blow of a hammer. Tests were made with an apparatus which forms a part of the equipment of most physical laboratories. In this device ordinarily steel spheres, cylinders, or blocks are suspended by cords in such a manner that one object can be caused to fall through a given arc to strike another, and the energy losses through imperfect elasticity are determined from the rebound, and from the angle through which the object struck will swing. For the tests, the hammers were substituted in turn for one of the steel spheres forming one of the impact pendulums.

From the results obtained it appeared that in the best grades of machinist's hammers offered for sale in a hardware store, the energy loss was 2.3 per cent; for the second grade, 5.3 per cent, and for the third grade, 9.3 per cent. A similar hammer from a five and ten-cent store showed an energy loss of 20 per cent. Railroad track hammers showed an energy loss varying from 2.3 per cent to 5 per cent.

* * *

VITAMINES

Vitamines, those important but rare, and to the ordinary person, vague substances on which growth and life appear to depend, will receive very persistent study in the coming years. These vitamines are present in certain foods in such small amounts that they have not as yet been isolated. However, a method of measuring the quantity present has been devised recently by one scientist. This consists in determining the weight of yeast produced in the solution containing the vitamines, as compared with that produced in a similar solution in which the vitamines are not present. The difference in weight of the two yields of yeast is said to be proportional to the vitamines present.

Extension for Rear Deck of Coupé

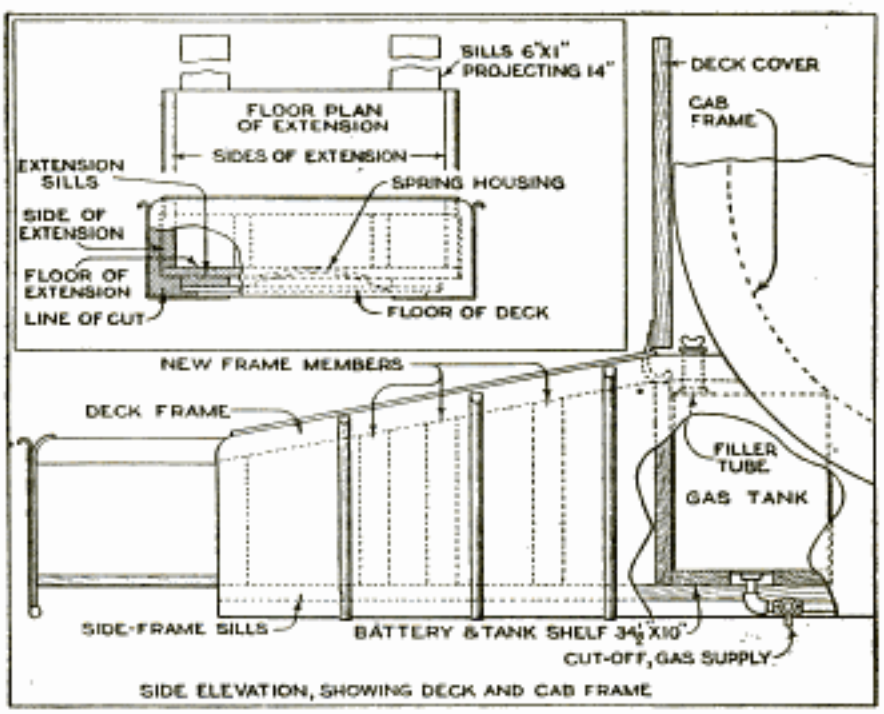
BY T. W. INGERSOLL

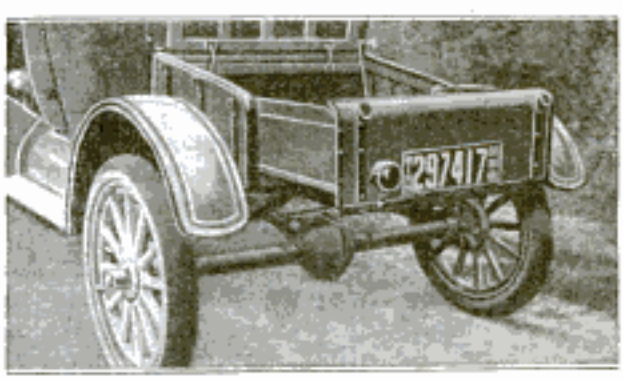
A COUPÉ model of a popular make of light automobile has many individual good points, but lacks room for baggage or occasional commercial use. The gas tank occupies much valuable space, and the storage battery that is hung under the floor is inconveniently located. The needs of a ruralite often demand additional load space, and I have reconstructed my own car in the manner shown, so that it is now possible to carry loads of considerable bulk and weight without detracting from the appearance of the car when it is used for personal purposes.

The battery and gas tank are rearranged, the latter being replaced by a tank built to fit into the space not occupied by the storage battery. These two parts are supported on a 10-in. board that extends across the car and is attached to the side-frame sills. This will give a clearance of about 1 in. above the floor, and allows the extension-frame sills to slide underneath the shelf. The storage battery is clamped to the left side of the shelf, and the gasoline-tank filler tube is arranged to project through the deck between the hinged cover and the back of the cab.

It will be necessary to remove the two iron strips on the back end of the deck and expose the joints of the metal body. A hacksaw will readily cut through the metal frame, and by removing a few screws, the back panel can be easily removed.

A sliding drawer is built with an open inner end and using the original metal panel above referred to for the rear end. This extension fits easily inside the deck frame, and when closed should just reach the board protecting the gas tank. The drawer should have two 6-in. hardwood boards for sills; these should be 1 ft. longer than the extension and slide underneath the gas-tank shelf when closed. Also, these sills will raise the floor of the deck 1 in., so as to allow it to slide over the spring housing which comes through





The Illustration Above Shows the Rearrangement of the Gas Tank and Storage Battery, and the Method of Constructing the Sliding Members. The Rear Panel of the Car is Used as the Back of the Sliding "Drawer"

Right: The Coupé Model of a Light Car Altered to Enable It to Carry Heavy Loads without Detracting from Its Appearance When Not So Used

the floor of the car. Three iron angle braces are bolted to each side of the deck and two to the rear. These have open hook tops so that the rope used for lashing the load can be passed around them.

When the extra space is not required, the extension is pushed in flush with the back and fastened in place by any convenient method; the hinged deck cover is closed, and the car shows no apparent change.

"Direct to Consumer" Idea for Selling Vegetables

The increase of automobile traffic into rural and suburban districts, and the uni-

A Self-Service Stand for Fruit and Similar Products of the Soil, with a Top and Awning That can be Folded Up to Form a Substantial Cover and Protection

versal desire to lessen the high cost of vegetables and similar products of the land, have opened an opportunity for growers in the vicinity of cities to do a considerable business selling their products "direct to the consumer." The chief problem arising from these "direct-selling methods" is the amount of time required in tending the stand.

By adapting the idea illustrated, it is possible to dispense with any attention whatsoever, permitting the customer to select, wrap, and pay for his purchase at the price indicated on properly displayed cards.

A locked cash box, having a slot in the top for the insertion of coins, is secured to the front of the stand and a supply of paper bags or other wrapping material is provided for the convenience of the buyers in wrapping their purchase. The stand can be provided with a hinged cover and awning, and arranged so that the cover may be dropped over the stand, and the whole outfit securely locked and protected from theft and weather.

Finishing Oak Floors

After the floor has been thoroughly swept, it should be scraped to insure a good surface for polishing. Always scrape lengthwise of the grain, not across it. After scraping, rub down with No. 1½ sandpaper, then sweep and remove the dust with a soft cloth.

"Clear" oak flooring should be treated with a natural-oak filler. For "select" and "sap-clear" grades, use a light golden-oak filler, and after filling, go over the floor with a little burnt umber mixed in turpentine, to darken any light streaks. This will make the color of these grades approach that of the "clear" flooring, although slightly darker. In filling "No. 1 common," use a dark golden-oak filler, darkening the light streaks as described. To thin the filler, use turpentine, benzine, wood alcohol, or gasoline; use a paste filler, never a liquid one. When the gloss has left the filler, rub across the grain with excelsior or cloth; this forms a smooth, level surface that keeps out dirt and forms a good foundation for a successful finish. Allow the filler 12 hours to dry, then apply two coats of white shellac, if a wax finish is desired. If the floor is to be varnished, apply one coat of filler and two coats of varnish.

The best method of applying wax is to fold cheesecloth, doubled, into a bag, insert a handful of the wax, then go over the floor thoroughly. This gives an even coating, prevents large wax spots, and also avoids waste. When the wax has been on for about 20 minutes, polish with a weighted brush or soft cloth, rubbing first across the grain and then with it. A piece of woolen felt or carpet, placed under the brush, may be used to give a finishing gloss. Allow about an hour to elapse, then apply a second coat, and finish as before.

A varnished finish, while usually more expensive than wax, gives a very hard surface, though an elastic one. Any standard hardwood-flooring varnish will give good results. A cheap finish is obtained by using light flooring oil made especially for this purpose. It may be bought from the paint or varnish-supply houses, and serves as both filler and finish. The oil keeps down the dust and preserves the floor.

¶Never check the size of a new broach, or a reground one, by measuring the broach itself. Broach one hole, then measure this; it will show accurately whether or not the size is correct.

Making Milk Cans Look Old

A dairyman shipping milk into a large city was not long in discovering that his bright new cans never came back to the farm, while instead battered and blackened veterans of many a trip were returned.

In order to prevent this loss, or at least minimize it so far as possible, the new cans were made to have the appearance of age by staining the outside with an acid or caustic solution.

Either solution should be painted on, but allowed to remain only long enough to stain the surface. The can must be thoroughly rinsed to make sure that every trace of the chemical has been removed. The acid solution is composed of equal parts of hydrochloric acid and water; the caustic solution is made by dissolving 1 part caustic soda, or lye, in 20 parts of water. Better results are assured if the solution is applied hot.

Tinning Cast Iron

Castings weighing up to 1,000 lb. can be tinplated by the electroplating method if a strong support is constructed over the plating tank, from which the article can be suspended. A suggested electrolyte is made up as follows: water, 5 gal.; caustic soda, 5 lb.; sodium hyposulphite, 2½ lb.; tin chloride, 20 oz.; sodium cyanide, 10 oz., and glue, 1 oz. Commercially pure tin anodes should be used.

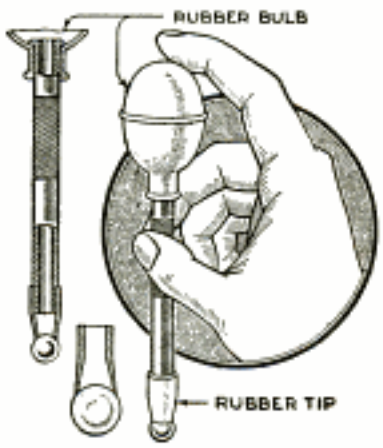
Wrench for Service Cocks

For the use of employes of gas and water companies whose duties require them frequently to open and close service cocks, the drawing shows how their wrenches, particularly those of the iron-handled variety, can be altered to turn the cocks without adjusting the wrench each time. The idea is very simple and consists in cutting a slot in the end of the wrench handle large enough to fit over the standard cock. Such a wrench can quite often be used, when for lack of space, the jaws cannot be applied.

¶To catch the sparks and emery dust when grinding in the lathe, place a small pan of water under the wheel.

Handling Small Balls

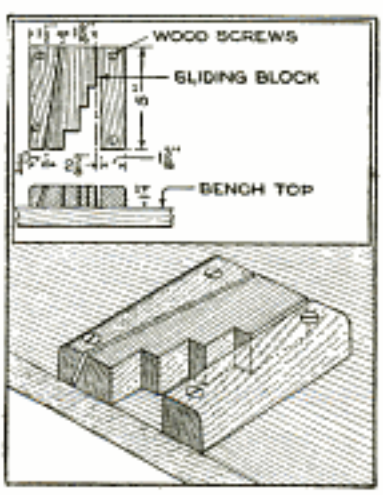
The tool shown in the drawing makes the handling of small balls an easy matter, and can easily be made from a short length of brass or steel tubing. The outside of the tube may be knurled or not, as desirable. A small shoulder is turned on one end of the device, to prevent the rubber bulb from slipping off. Various kinds of rubber tips can be made to meet special requirements, two styles being shown in the drawing, one for small balls and the other for larger ones.



To pick up a ball, the bulb is compressed and the tip is placed over the ball. On releasing the bulb, the suction causes the ball to adhere; to drop the ball into position, the bulb is compressed. —Norman Hazen, Montreal, Que.

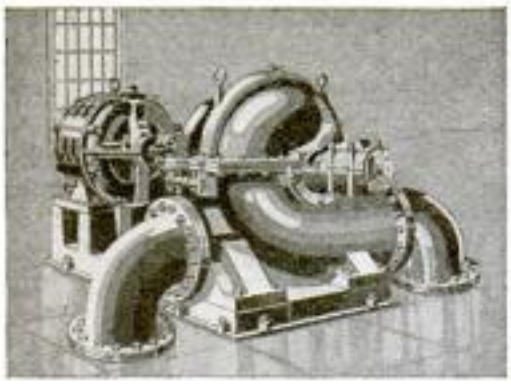
A Self-Adjusting Bench Stop

The drawing shows a bench stop that is particularly adapted for use in woodworking shops and which can be easily made from a piece of hardwood about 1 in. thick.



The inner, sliding block is provided with a series of steps to accommodate stock of the various sizes likely to be used in it. This and the blocks against which it bears are cut from a single piece, one cut being made at an angle, as indicated in the drawing. The two outside blocks are permanently attached to the bench with screws.

In use, the stock is placed against one of the steps and a push forward causes the sliding wedge to jam it against the side, where it is held until the work is completed.—R. R. Lange, Portage, Wis.



PUMP TROUBLES

By A. P. Blackstead and G. R. Hargis

[This is the fourth of a series of five articles, the first of which was published in May. In this installment, various priming troubles, and the remedies applied, are dealt with.—Editor.]

PRIMING, or the initial filling with water of the pump chambers and suction pipe of pumping units, whether of centrifugal or plunger type, is of vital importance to the successful starting of such machines. The impeller of a centrifugal pump rotating in air will not produce sufficient vacuum to render the pump self-priming. Obviously, where pumps are employed for booster service, with water flowing to the suction under pressure, or when, as often happens in vertical-shaft installations, the water will flood the pump casing, provision being made for the expulsion of air from the pump by this pressure, priming becomes unimportant, but where suction lift is present—and this is usual in the majority of cases—it is found necessary to provide for effective priming through the employment of mechanical devices.

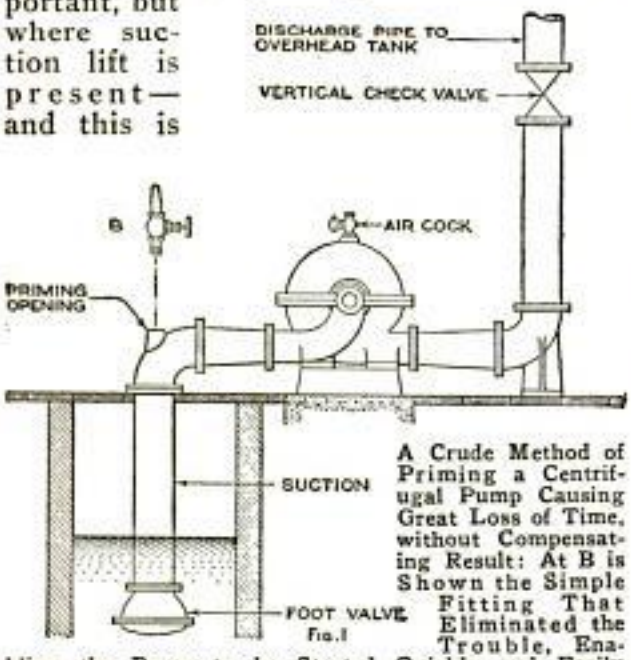


Fig. 1

A Crude Method of Priming a Centrifugal Pump Causing Great Loss of Time, without Compensating Result: At B is Shown the Simple Fitting That Eliminated the Trouble, Enabling the Pump to be Started Quickly and Easily

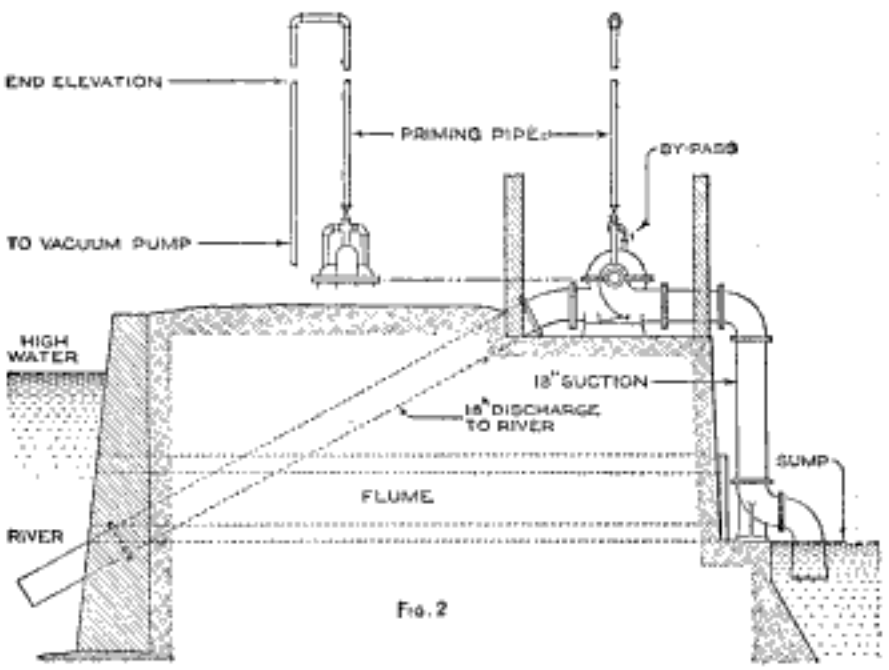
When pumping hot water, as in boiler feeding, or in handling any liquid heated to such a point that vapor will arise, there positively must be no suction lift if satisfactory operation is to be expected. The pump must be so located with reference to the source of supply that the water enters the pump-suction connection freely and with a positive head. Assuming boiler-feed water at a temperature of 180° F., nearly all pump manufacturers will specify at least a 10-ft. positive head on the suction side, at sea level, and for normal pump capacity, to prevent vaporization within the casing. Also suitable vent openings, fitted with shut-off cocks, are usually provided at the high points on the casing for the relief of vapor, should the pump become inoperative through vapor binding.

In cold-water pumping, assuming that a gate or check valve is placed in the discharge line near the pump and a foot valve at the end of the suction line, it is often found necessary to prime only at infrequent intervals, for if there are no leaks in the pipe joints and packing boxes, the water column in the suction pipe will be sustained indefinitely after the pump is shut down. The most simple priming attachment for such a case is a plain by-pass pipe having a small valve, or cock, connected to the discharge main ahead of, and passed around, the discharge valve, and behind the valve to a point on the pipe or pump casing, which should have an air vent at the top for use when the by-pass valve is opened. A similar connection to an outside source of supply will serve the same purpose.

Such a contrivance is of little use if there is no foot valve. Then it becomes necessary to employ some method of creating sufficient vacuum to raise the water and fill the pump. Various types of ejectors are used for this purpose as well as power-driven vacuum pumps. The former may be obtained for use with steam, air, or water under pressure, but the first-mentioned of these is preferred, as it is easy to determine when the suction water has reached the ejector, both by sound and by feeling the delivery pipe, which is first heated by the steam and then suddenly cooled upon the arrival of

the water. The air ejector is given second choice, for with it the coming of the water can be distinguished by the same method, although not so readily as with the steam siphon. This leaves last place to the water-operated device, and with it much greater difficulty is experienced in distinguishing, either by sound or feeling, when the pressure water and the priming water mix.

Power-driven reciprocating vacuum pumps, either steam or electric-motor operated, are used extensively on the larger units or in stations where a number of units are housed. The rotary type is preferred by the writers, inasmuch as a small quantity of water passing into the vacuum-pump casing causes no injury, and because the first cost is generally lower for the same displacement. In addition, many reciprocating-piston pumps are of such design that a shot of water drawn into them may smash the cylinder head. In order to guard against this, the priming pipe is often carried vertically upward to a height of about 34 ft. above the maximum high water in the suction basin, in the form of an inverted "U," as shown in Fig. 2. This prevents the priming pump from drawing water over the top of the loop. Another precautionary measure resorted to at times, is the insertion in the priming line of a special "floating" valve, which will remain open as long as air is drawn through, and is designed to close the instant the water reaches it.



Another Case Where Faulty Design Not Only in the Priming Connections but Also in the Layout of the Discharge Pipe, Caused Considerable Trouble: Had the Discharge Pipe been Extended Farther into the River, the Loss of the Plant might have been Prevented

Notwithstanding such attachments, trouble often will occur. In the case with the inverted-U pipe, it must be shut off by a valve from the main pump, and if this pipe is connected to a pressure point on the pump casing, as is usual, the operator must close the priming-pipe valve before starting the centrifugal pump, or the head pressure generated by the main pump will force water into the line, thus jeopardizing the vacuum pump. Or, when using a floating valve, it may stick, and not "float" the instant the water strikes it, likewise endangering the primer. While such possibilities may seem remote, yet they actually have happened on numerous occasions, sometimes with disastrous results. Sight-gauge glasses, or glass water-column gauges, attached to the priming line and located in plain view of the operator, are of great assistance, but are generally classed as a refinement and therefore seldom used.

In order to illustrate one troublesome case, Fig. 1 is presented; this shows the arrangement of a 6-in. pump of 1,000-gal.-per-minute capacity, in service at an eastern steel plant. As a new outfit, it was installed to deliver river water into an overhead tank, situated about 30 ft. above the pump-house floor, and directly over the pump. This tank was also supplied by a steam-driven plunger pump, and priming water was taken from it for the initial starting of the centrifugal unit. A 1-in. tapped connection was left on the suction quarter-turn bend, as shown, with a pipe plug in it. The operator would remove the plug, stick a rubber hose, which fitted fairly snugly, in the hole, open the air cock on top of the pump case, and allow the tank pressure to force in as much water as possible, then quickly pull out the hose and endeavor hastily to screw the plug in place while the water was gushing in a large stream out of the opening in the elbow. This was a crude method, indeed, yet it was tried repeatedly but without success, before a pump man was called in. From the illustration, it will be observed that an air leg will be present in the discharge pipe below the

vertical check valve, and unless water under sufficient pressure to force open the check is introduced, the air in this pocket is trapped and becomes compressed. The priming water was under the same pressure as the water acting on the top of the check valve from the tank above, hence the air could not be forced through the valve, which was practically in balance and remained unopen. When the rubber hose was pulled from the opening in the elbow, the compressed air quickly expanded and before the plug could be screwed into place, blew sufficient water out of the hole to destroy the priming effect.

The use of a valve with two nipples, as shown at B, Fig. 1, one of which was ground to a taper over which the hose could be forced, ended the trouble. Nearly all the water put into the pump in this manner could be retained by simply closing the valve, thus holding up the column to a sufficient height to seal the pump. On the first trial under these conditions, the pump picked up the water as it should and emptied the system of the entrapped air. After the first perfect start, it never was necessary to prime again unless the pipe lines were disconnected or the valves became leaky.

Another interesting case is a low-head drainage pump, arranged as shown in Fig. 2, where the entire pumping system, when in operation, worked under a pressure of less than one atmosphere, or in other words, some degree of vacuum was present at all times. Conditions were such that only when the water in the river was high were the pumps to be used. Displacement vacuum pumps with electric-motor drive were provided for priming, and the vacuum-pump connection was taken from the top of the suction elbows, as shown, at the direction of the engineer in charge. This method of connecting the primers with the centrifugal pumps proved to be faulty, and much time was wasted in trying to get the pumps primed and started, but starting was an impossibility under these conditions.

It was a hard matter to convince the engineer that the top of the pump case remained air-bound even with the priming pumps running. His idea in arranging the priming pipe as shown was to eliminate the possibility of the pressure from the main pumps ever flooding the primers. Eventually, however, he yielded to the idea of inserting a ½-in. by-pass pipe with valve in the priming line, and on the first trial after priming with this arrangement, the pump picked up the water and functioned properly. Even then, the consulting engineer would not consent to placing the by-pass on the second unit, until several hours more were wasted in trying to start without it.

Apart from the priming features, there are other interesting characteristics observable in this installation. It will be noted that the static lift, that is, the vertical distance from the water in the suction bay to the level of the river, is very small, and also that the discharge outlet is submerged. This arrangement lends itself to siphonic action once the pumps are in service. As the pipe lines are all quite short, the resultant loss of head is very small and constitutes but little of the total head. For these reasons, the entire system, when in operation, is under vacuum, as the total head never reaches a pressure equivalent to that of the atmosphere, and should a connection be made on the discharge pipe and opened to the air, suction effort would readily be observed.

Incidentally, the entire life of this plant was very short, extending over a period not exceeding two years. This may be attributed to a combination of the following causes: The pump house was not built upon piling, and was located on a narrow strip of land, between the river, about 20 ft. distant, on one side, and the low area which was to be drained, on the other. In fact, the pump house was almost over the suction pump and was undertunneled by the flumes used to allow the drainage water to run off at low water in the river. Also, it should be particularly noted that the discharge pipe, installed as planned by the consulting engineer, terminates close to the river bank, instead of being carried out farther into the river, and also that it points downward at an angle of approximately 30 degrees.

Overnight, and without warning, the wall along the river gave way, the bank caved in, water from the river rushed through the opening, and the pump house with all machinery actually sunk. The writer witnessed the sight shortly after the catastrophe occurred, and could see no remains of the pumping equipment except the upstanding ends of the suction and discharge pipes, which were snapped off; the entire pumping station, with all apparatus, had disappeared.

The action of quicksand was blamed for this calamity, which may be the proper diagnosis, but without a doubt, the exit velocity of the water from the discharge outlet was largely instrumental in "digging the grave" by washing out a huge

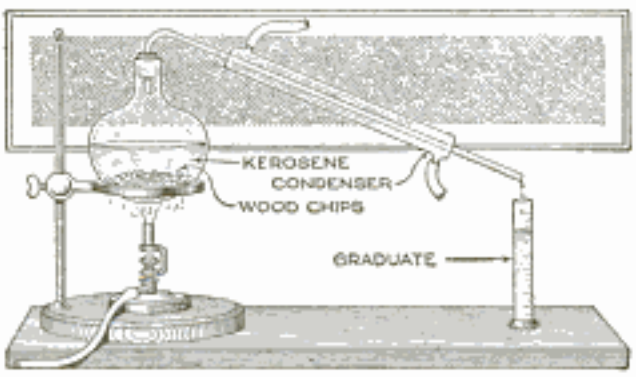
cavity under the river wall. Had the discharge pipe been extended horizontally into the river, say, three pipe lengths, or about 35 ft., this disaster might have been averted.

Determining Moisture Content of Wood

A method used by the Forest Products Laboratory for determining the amount of moisture in chips and sample borings from large pieces of wood, requires little equipment and only a few minutes' time. The moisture content of pulp-wood chips can be found by this method in from 7 to 10 minutes.

A specified weight of wood chips, usually 100 grams, is immersed in kerosene in a flask or retort, and the mixture is heated. The water in the chips changes to steam at 212° F. and passes out through a glass tube in the cork of the flask, is condensed by a water jacket surrounding the tube, and caught in a graduate. The boiling point of kerosene being higher than that of water, all the moisture will be driven off the chips before the oil vaporizes to any great extent. The oil that does go off in the form of vapor is condensed and caught in the same graduate with the water. When the evaporation of the moisture is complete, the oil and water are allowed to remain a few minutes until the water has settled to the bottom of the graduate. The amount of moisture in the wood chips is then found by direct reading.

This method has been checked for accuracy with the method of weighing samples before and after oven-drying, and the variation found to be less than one per cent.

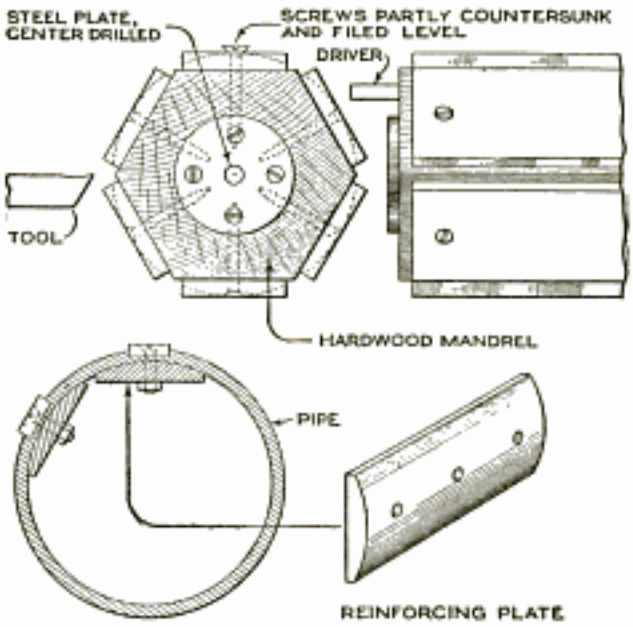


A Simple Method, Demanding but Little Equipment, for Determining the Moisture Content of Wood: The Result is Read Directly from the Graduate

¶Points of dividers, scribers, or similar marking tools are easily hardened by heating them cherry-red and plunging into a soft piece of soap.

Turning Segmental Plates

A number of soft-steel plates of segmental cross section, about 2 in. wide by 1 ft. long, were required, and as they did not have to be turned out with any great degree of accuracy, being intended to fit inside a 5-in. iron pipe, the work was done on the lathe by means of a hexagonal wooden mandrel, to which the flat stock was fastened.

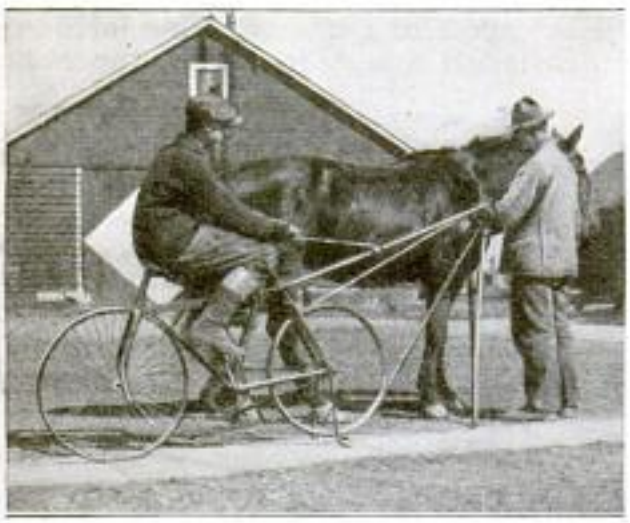


A Convenient Method of Turning Segmental Sections of Flat-Iron Stock in the Lathe Makes Use of a Hexagonal Wooden Mandrel to Which the Bars are Attached

Hard maple was used for the mandrel, and circular steel plates, center-drilled, were countersunk into its ends to serve as lathe centers. The mandrel was driven by a slotted faceplate, engaging a steel rod driven into the end of the mandrel. Six soft-steel bars were attached to the mandrel by first drilling the holes that were later to serve as bolt holes, three in each plate, and countersinking them enough to hold the screw heads, the screws being turned down tightly and the heads filed flush. Then the mandrel, with plates attached, was placed between the lathe centers, and by taking a series of light cuts, the plates were rounded off to the desired cross section. The plates were removed by drilling into the ends of the filed-off screw heads and prying, the bodies of the screws being removed with a small pipe wrench. In turning the next set, the plates were set a little farther along on the mandrel so as to set the screws into solid wood. The illustration also shows the method of using the plates to reinforce keys, bolted into shallow keyways on the surface of the pipe.

Bicycle Drives Horse Clipper

Owning a number of head of cattle and horses that required clipping each spring, a farmer and stock raiser devised a plan

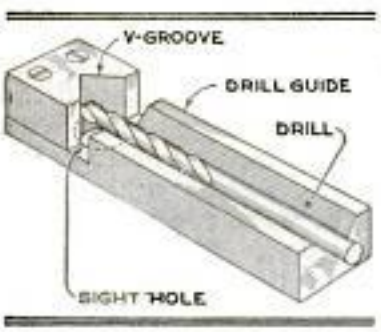


By Connecting a Set of Power Clippers to an Old Bicycle a Farmer and Stock Raiser Is Able to Clip Many Animals Each Spring with a Minimum of Labor

for using a bicycle to transmit power to the clipper. The rear wheel of the bicycle is supported above ground by a home-made stand, the seat is placed in the handlebar socket, and the handlebar in that of the seat; a boy mounts the machine and "pumps" the pedals in the ordinary manner. A belt, running over the rear rim, operates the clipper, and the work is done rapidly and easily.—John Y. Beaty, Chicago, Ill.

A Handy Drill Gauge

The drawing shows a form of drill gauge that has the advantage of indicating at once whether the drill has been ground central and to the correct angle or not.



The gauge is made in two pieces, the drill guide being made from ½ by 1-in. stock, with a V-groove cut the entire length. One end of this guide is milled down to about the depth of the V-groove, as a seat for the V-block into which the point of the drill fits. The sides of the V-block are cut to the same angle as a correctly pointed drill—118°, included angle. A hole is drilled just underneath the slot in the end block, the latter being fastened to the guide by two screws. By placing the drill in the position indicated, any irregularity in grinding will be readily discerned by holding the gauge to the light and observing whether or not light can be seen between the drill and the edge of the groove in the block.—Harry Moore, Montreal, Que.

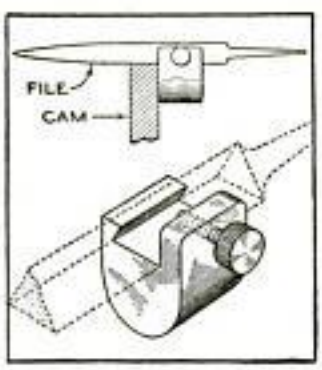
Signaling Device for Oil Wells

In one of the Pennsylvania oil fields, where the pumping is done by gas engines, with a single pumper responsible for the operation of a number of widely scattered wells, a signaling device is attached to the top of each derrick so that the pumper can tell whether or not the engine is still operating.

The device consists of a brightly painted semaphore, mounted on top of the derrick and connected by a small rope or wire to the walking beam or the pump jack, in such a manner that at each up and down-stroke the semaphore wags its assurance that all is well.—Wm. H. Steele, Wilkinsburg, Pa.

A Scraper for Cams

An excellent scraper for the edges of cams up to ½ or ⅝ in. thick can be made from a worn-out three-cornered file that is held in a suitable guide in the manner indicated in the drawing.



The file should be ground parallel along its three sides, as far as possible, and the guide is clamped to it by tightening the setscrew with which the latter is provided. The guide is provided with a dovetail slot, and all faces should be accurately machined, so that a true right angle will be formed between guide and scraper when the latter is in place.

After the cam is roughed out, it is filed down to the line and kept as square as possible, the scraper then being used to finish and correct any errors in filing. With the scraper fastened in the guide, the device is applied to the edge of the cam and pressed snugly against the side. This position should be maintained during the operation, the result being a very smooth finish and a dead-square edge. It is obvious that the device can be used for

similar work that requires a smooth and accurately squared surface, and also that as one part of the scraper becomes dull, it can be moved along until each of the three sides is dulled before regrinding is necessary.

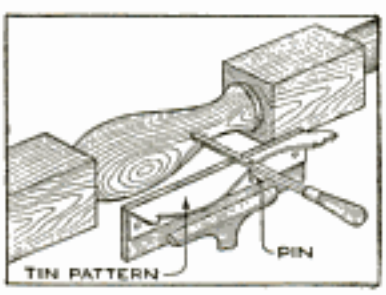
Reducing Noise and Friction in Shaft Log of Motorboat

If the shaft of a motorboat is not exactly in line it is often quite difficult to keep the water out without causing too much friction on the shaft at the stuffing box and losing a lot of valuable power. A simple method of overcoming this friction consists in drilling a hole in the shaft log, into which a piece of ⅜ or ½-in. brass pipe is screwed. The hole in the log is usually bored anywhere from ⅛ to ¼ in. larger than the diameter of the shaft, and as this leaves a space all round the shaft, medium-hard cup grease is used to keep it filled so that a much lighter pressure can be carried on the stuffing box.

A large grease cup screwed into the upper end of the brass pipe referred to is used to keep the space surrounding the shaft filled with grease. As a remedy against noise alone, this method will repay the time spent in installing it.

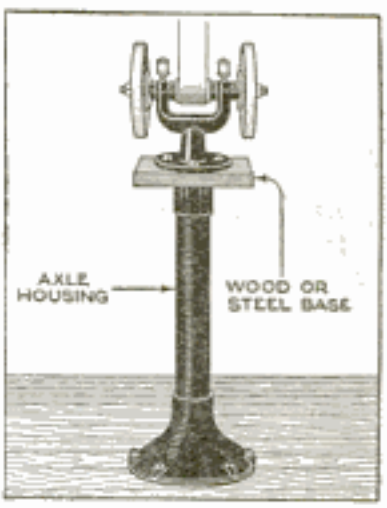
Duplicating Irregular Wooden Forms in the Lathe

When repairing an old porch I found that a number of new balusters were needed, and as these were not to be obtained from stock without a considerable loss of time, it was decided to make them. There was a lathe handy but no expert turner. However, by the method described and illustrated, 27 balusters were turned out in a few hours. A template, reproducing the contour of the baluster, was cut on one edge of a piece of heavy tin. The tin strip was bent at right angles and fastened to the tool rest. A very narrow turning chisel was used, and this was provided with a small pin at right angles to the blade, to serve as a gauge and to follow the outline of the template. With very little practice I was able to duplicate the needed balusters.—B. T. Seymour, Hot Springs, Ark.



Axle Housing Used for Grinder Column

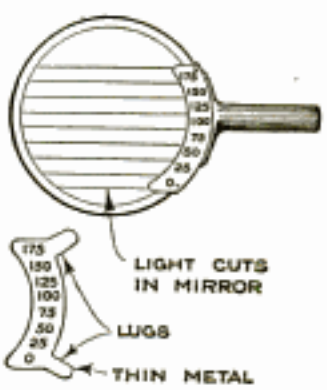
The drawing shows an axle housing from a light automobile used as a pedestal or column for a small power-driven grinder. The housing is well adapted to the purpose, as it is stronger than the ordinary cast-iron column, and is neat in appearance. The grinder base is either bolted directly to the flange after cutting off the projecting sleeve, or a steel plate or wooden block may be interposed. The housing is bolted to the shop floor with bolts or lag screws through the regular holes.—H. H. Parker, Oakland, Calif.



Gauging Distances in Rear of Auto

In a few minutes the autoist can graduate his rear-view mirror so that he can accurately and instantly judge the distance of a car following.

The car is run about 175 ft. ahead of a stationary automobile, and the mirror is tilted so that the reflected wheels of the rear car appear in the mirror about three-fourths of the way up; a mark is made on the mirror at this point. The car is backed 25 ft., and the location of the reflected wheels marked again, this procedure being repeated until the zero line is located. The different points on the mirror are indicated by light parallel lines made with a glass cutter. A metal scale is soldered or screwed to the frame of the mirror so that the figures coincide with the marks on the glass.—L. B. Robbins, Harwich, Mass.

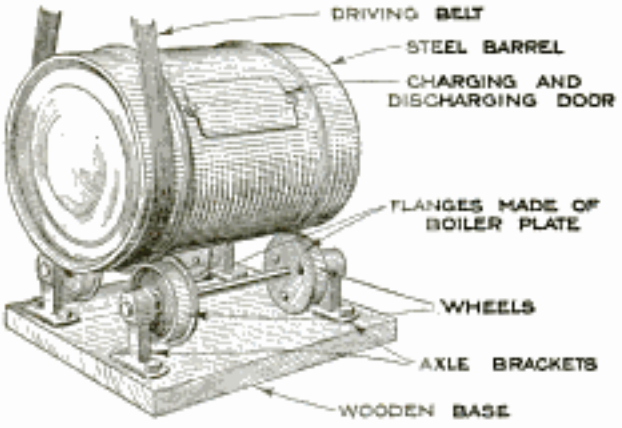


¶Four ounces of gold bronze require a half pint of thinner, while 4 oz. of aluminum bronze will need one pint.

Tumbler Made from Steel Barrel

The drawing shows a tumbling barrel that was made with entirely satisfactory results from a steel oil drum and miscellaneous material salvaged from the scrap pile.

Four old wheels from shop trucks were provided with boiler-plate flanges, and these were suitably elevated on brackets, the barrel being mounted on its bearings

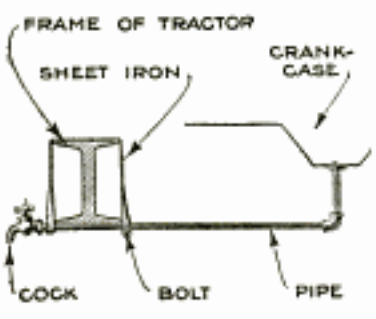


A Tumbling Barrel for Polishing and Finishing Work, Which Gives Good Results at Insignificant Cost, is Made from a Steel Oil Drum and a Few Miscellaneous Parts

in such a manner that the expanded rings, with which such containers are provided at each end, rode with their inner surfaces against the wheel flanges. A door for charging and discharging was cut in the side of the barrel and a cast-iron or boiler-plate door provided. This was fastened with bolts. The barrel is driven by a belt around one end in the manner shown.—M. E. Duggan, Kenosha, Wis.

A Convenient Tractor Attachment

In order to avoid the trouble of having to get under my tractor for the purpose of drawing the oil from the crankcase, which has to be done quite frequently on this class of machinery, I attached the simple arrangement shown in the drawing.

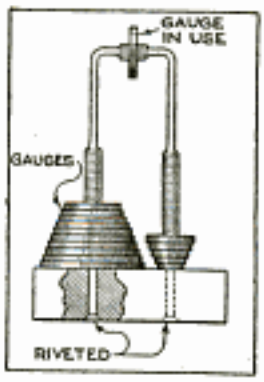


The plug in the bottom of the crankcase was removed and then, by means of bushings, the hole was reduced to ¾ in. in diameter. A 12-in. length of ¾-in. pipe was threaded on each end and fitted into the bushing. Another and longer piece of pipe of the same diameter was joined to the shorter one by an elbow, and an oil cock was fitted to the outer end of the long pipe. The pipe is cut so that it will be just in line with the tractor frame, to which it is fastened with sheet-iron straps, to prevent it from jarring loose.

This arrangement saves the operator much time and trouble, and prevents the loss of considerable oil caused by the wind when drawing the lubricant directly from the crankcase.—S. E. Weaver, New York, N. Y.

A Radius-Gauge Holder

A handy set of radius gauges and a convenient holder for them are shown in the drawing, the latter being designed to suit a set of gauges of radii from .160 in., increasing by .025 to .535 in. At first the disks were strung on a chain, but as one gauge would be used for a considerable time for inspection purposes, the others were in the way, and as it was not desired to separate them, as a safeguard against loss, the holder shown was worked out. This holder keeps all the gauge disks together, and the one in use is in a handy position when inspecting the work.



The gauges are made from 1/16-in. stock and tapped at the center; a piece of 3/32-in. wire is flattened out for a short distance near each end and at the center, and a die, the same size as the tap used for the gauges, is run over the flattened portions. The wire is then bent as indicated, with the gauges threaded on one side, starting with the smallest and up to the largest, forming a cone. A base is made from a piece of flat steel, and drilled with holes to take the ends of the wire, which are then riveted in place.

It will readily be seen that to use a certain gauge those above it are twirled off one side of the threaded wire and over the central portion to the threaded portion on the opposite side. The gauge wanted is left on the central threaded part, where it can be used without interference.

¶Asbestos paper that has been used for protecting welded parts is an excellent packing material for annealing steel dies. It crumbles readily, cleans off easily, and may be used repeatedly.

Imitating Embossed Printing

Excellent imitations of die-embossed work can be produced in practically any print shop with a few cheap materials and a little extra work.

The only special apparatus required is a small gas burner, or other source of heat, and a piece of drain tile, or iron pipe, about 5 or 6 in. in diameter and 8 in. long. A small quantity of finely powdered white resin is the only extra material needed.

The printed work is done on the press in the ordinary way, using a good, heavy black ink and taking a light impression. While the ink is still damp a small amount of the pulverized resin is sprinkled over the work, and the surplus dusted off without touching the printing.

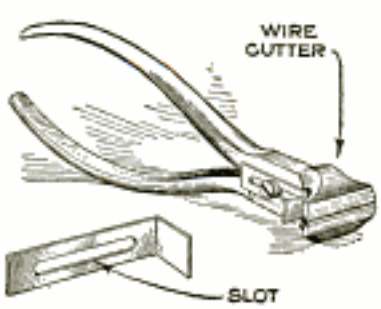
The piece of tile or pipe is placed on end, surrounding the flame, to form a sort of flue through which the heat is conducted upward, and if the pipe totally confines the flame inside it, the latter may be turned quite low, as only a little heat is necessary.

The resin-coated impression is passed over the top of the pipe and the heat fuses the resin, causing it to blend with the ink and produce printing in low relief. Care should be taken to prevent the heat from scorching the paper; a few experiments will show just how the best results can be obtained.

This process gives to printed work the effect of engraved or die-stamped work, but is much cheaper than either, as it is produced with ordinary type without recourse to plates or dies.

Gauge for End-Cutting Pliers

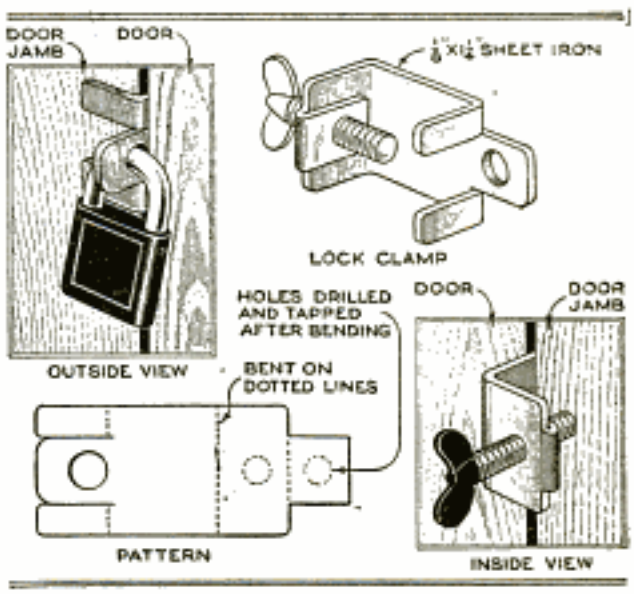
When cutting off rivets or wire pins with pliers, particularly with the end-cutting type, the pieces will not be uniform in length unless a gauge is provided. The gauge also prevents the cut-off pieces from flying and causes them to fall straight down. The gauge is simply made, and consists of nothing more than a strip of stiff sheet metal, bent at right angles and provided with a slot, so that it can be attached to the pliers with a screw, in the manner indicated.



A Screwless Padlock Hasp

When working away from the shop and wishing to lock his tools in any locker or cupboard that might be handy, a mechanic made and used the screwless hasp shown in the drawing.

A piece of sheet iron is cut and formed according to the pattern and provided with a suitable thumbscrew and hole for the padlock. The ears are bent at right angles to the main body and fit over the edge of the door frame, where the device is securely clamped by tightening the thumbscrew. After the hasp has been put in place, the lock is inserted and snapped. Anyone trying to open the door will be prevented from doing so by the lock which hangs over the edge of the door and frame.



A Screwless Padlock Hasp That can be Applied to Any Door: It is Clamped to the Door Frame, and When Locked, Prevents the Opening of the Door

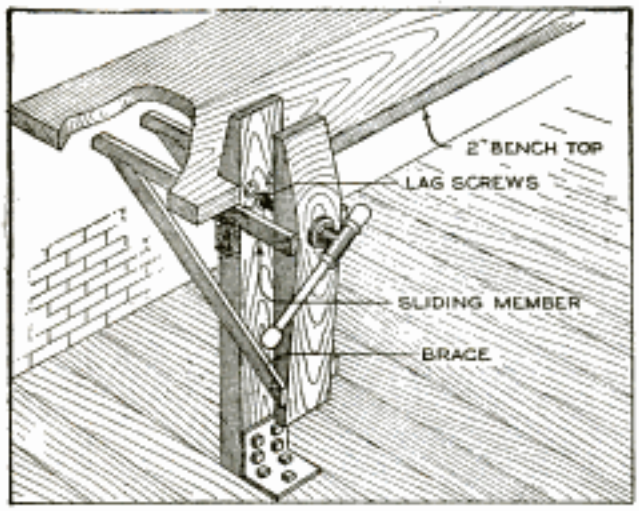
Protecting the Hydrometer

The use of a hydrometer is necessary in various manufacturing processes for testing the specific gravity of solutions. These instruments, being made of glass, are easily broken, and while the individual cost in most cases is not large, the total loss, where a large number of hydrometers is used, easily becomes considerable.

To protect these instruments, one plant uses a piece of 3-in. pipe, cut about 4 in. longer than the hydrometer. One end of this pipe is plugged, and the pipe is attached to a post at a convenient location. The pipe is about four-fifths filled with water, and the hydrometer inserted. Thus the instruments are safe from damage when not in use.

Parallel-Jaw Attachment for Woodworker's Vise

The illustration shows a vise that has one great advantage over the usual type

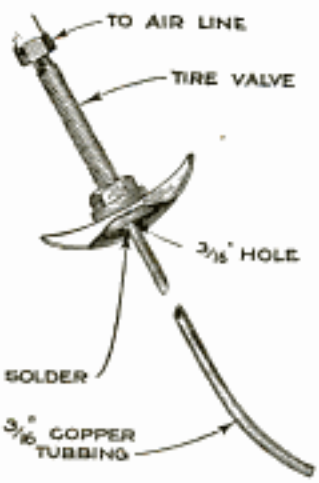


A Common Type of Woodworker's Vise Arranged So That the Jaws Are at All Times Parallel

used by carpenters, in that the jaw faces are parallel at all times, regardless of the thickness of the work. Two sliding members are attached to the movable jaw. These members run on blocks fastened to the stationary jaw, and are braced as indicated. Any slight friction that occurs between the sliding members, the blocks, and the underside of the bench, may be eliminated by applying a little hard grease, or graphite, between the bearing surfaces.

Device Aids in Cleaning Auto

For blowing carbon and dust from the automobile engine, and other parts of the mechanism not easily reached, as well as for cleaning the accumulated dust and dirt from the tufted upholstery, the device shown in the drawing will give excellent results when attached to the garage air line.



An old tire valve and a length of copper tubing are the only materials required, the latter being soldered into a hole drilled in the bottom of the valve to receive it. As the valve inside serves no useful purpose, it may be removed to permit an unobstructed flow of air.—John C. Burton, Monticello, Ky.

Finding Correction Factor for Inaccurate Water Meters

It is a very simple matter to test a water meter suspected of being inaccurate, and, this being the case, where much water is used, the correction factor should be found for each meter. Obtain two tanks of at least 25-gal. capacity, and larger if possible. An accurate platform scale is also necessary. If a test on a very large meter is to be made, there should be a scale for each tank so that there will be no need of lifting. The tanks themselves, in this case, should be of large capacity and have valves at the bottom of sufficient size to permit rapid emptying.

The tanks should first be "wetted," that is, they should be filled with water and then drained. Much water will adhere to the sides and bottom, and make a noticeable addition in the weight. Then weigh each tank very carefully, and designate them by marks, A and B.

Examine the piping system of the building, making certain that no water will be used except that for the test. If possible, the system should be shut off to insure accurate results. By means of a hose, arrange so that the flow of water can be turned from one tank to another quickly.

The meter should now be carefully read and this reading recorded. Turn the water into tank A, and as soon as it is full, switch the hose so that the water flows into B. At the moment this transfer is made, the meter should be read, recording the reading as before.

While B is filling, weigh the filled tank A, record the weight, and empty it preparatory to refilling. As soon as B is full, switch the supply back again to A. The meter should again be read at the moment of transfer, and the tankful of water weighed. Alternately fill A and B until at least 10 readings have been taken. The data are now ready for working up.

A cubic foot of water weighs 62½ lb., while a gallon of water weighs 8⅓ lb. The weight of the water would of course be the total weight of the tankful, minus the weight of the "wetted" tank found before the test. Therefore, obtain the net weight of the water for each reading, and then find the average weight used during the entire run. Subtract the second meter reading from the first, record the difference, and subtract the third reading from the second; record this difference also, then subtract the fourth reading from the third, proceeding in this manner, recording the difference each time, until the tenth reading has been sub-

tracted from the ninth. These differences represent the amount of water recorded by the meter for each tankful. Add the differences, and divide by the number of times the tanks were filled; this gives the average meter reading.

The weight of water in each tankful is known; find the average weight and express it in terms of cubic feet, if the meter reads in cubic feet, or in gallons, if the meter reads in gallons. This is easily done by dividing the average weight by 62½, for cubic feet, or by 8⅓, if the answer is desired in gallons.

The correction factor must now be found. It is equal to the computed value found by weighing, divided by the value as read on the meter. For instance: suppose the average tankful was 400 lb. of water net. Then it would contain 6.4 cu. ft. of water. The average meter reading during the run was, say, 6.58. Then the calibration factor is .97. This means that the meter is running faster than it should, and the reading should be multiplied by this factor to find the actual amount of water used.

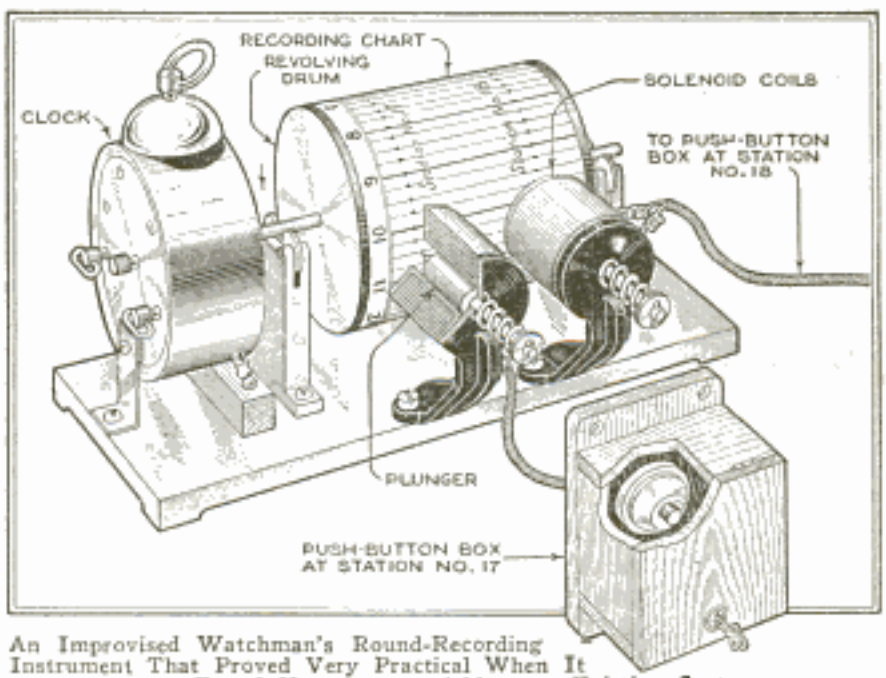
In case platform scales are not available, the volume of the tanks may be computed from actual measurements, but in this case the results will not be so accurate.—Kenneth Coggeshall, Webster Groves, Mo.

Addition to a Watchman's Clock System

By W. BURR BENNETT

A FACTORY, in which a watchman's clock system was installed, erected a small building remote from the main plant, and it became necessary to provide a watchman's supervision because of the hazards present. As the existing system was a 16-station one, it was at first thought impossible to do this without purchasing a new clock, but "necessity is the mother of invention," and the system herein described was finally worked out to serve two more stations, at a fraction of the cost of a new clock.

The illustration shows the recording device, which was placed in the office under lock and key, and one of the push-button boxes in the building. A recording drum of soft wood is connected to the hour-hand spindle of an ordinary alarm clock. The drum spindle revolves upon bearing wheels, to avoid friction as much as possible. Upon the circumference of the drum is mounted the recording chart, suitably divided into hours and quarters. Opposite the station numbers on the chart, two brackets, each bearing a solenoid with a pointed core, are mounted. The cores are provided with springs which normally hold the cores within the coil, but permit them to be drawn forward when the solenoid circuit is closed.

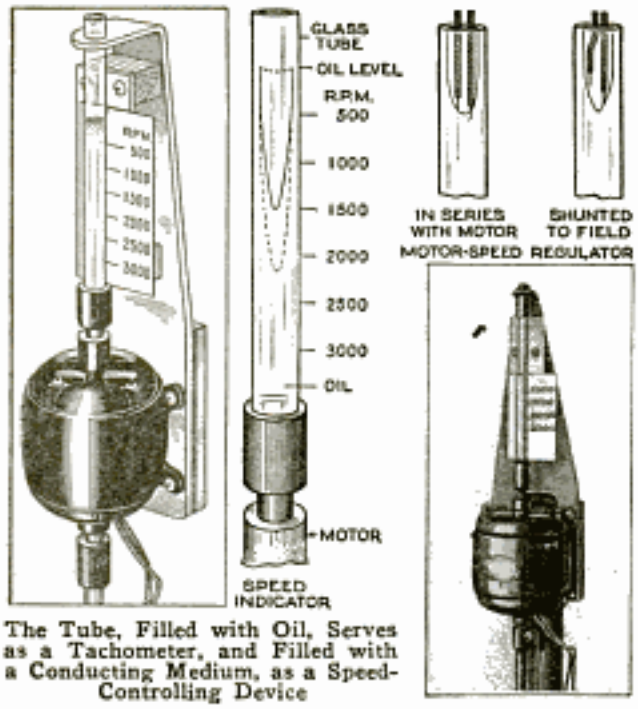


An Improvised Watchman's Round-Recording Instrument That Proved Very Practical When It was Found Necessary to Add to an Existing System

The push buttons are mounted in locked boxes, the watchman being provided with keys. In operation, the watchman at the proper time unlocks the box and presses the button; this energizes the solenoids, which are wired in series with a six-volt battery, drawing in the core, the point of which perforates the chart. Upon releasing the button, the spring withdraws the core, and the watchman locks the box and proceeds to the next station. Each morning the factory manager renews the chart, noting the time at which the watchman made his rounds during the previous night. The watching time is from 6:00 p. m. to 6:00 a. m., and corresponds to one revolution of the hour hand.

A Novel Tachometer

The device shown in the photograph is used on a small electric motor as a speed indicator and motor regulator, and has been found to be an efficient, as well as



The Tube, Filled with Oil, Serves as a Tachometer, and Filled with a Conducting Medium, as a Speed-Controlling Device

an ingenious, application of the well-known physical law of centrifugal force.

A small glass tube, mounted vertically on the end of the motor shaft, is filled with oil to a height indicated by a mark on the scale back of the tube; this is the proper oil level when the motor is at rest. When the motor is in operation the oil will be thrown up on the sides of the tube and depressed in the center in the form of a hyperbolic curve. As the speed increases the curve increases from a very shallow depression to a deep one. The scale back of the tube has been graduated for various speeds, and all that is necessary to make a reading is to compare the depth of curve with the scale of revolutions per minute. This arrangement is quite sensitive, and using a tube about ½ in. in diameter and 7 in. long, it has been operated at speeds ranging from 500 to 3,000 r.p.m. Although water may be used in the tube, oil is more suitable for high speeds.

The same device was adapted to control the speed of the driving motor. This motor drove some apparatus which was required to be run at a constant speed, and owing to the fluctuation of the current available, this had previously been thought almost impossible.

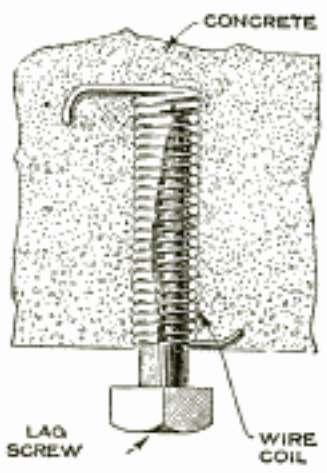
The motor was set vertically and it was desired that it should operate at 1,500 r.p.m. A socket was fixed on one end of the motor shaft and filled with plaster of Paris, in which a short piece of boiler-gauge glass, about 5 in. long, was set and trued with the shaft.

About 1 in. of a diluted solution of salt and water was put into the tube to act as a conductor for the current; mercury was first tried, but was found to be too heavy at high speeds, although excellent for low speeds; in the event that it is used, it should be covered with a layer of some light oil.

The operation of this speed regulator is simple, the curve assumed by the liquid becomes deeper as the speed increases, and as this draws out, the resistance between the connections increases and the motor is slowed down, this action adjusting itself to the variations of the current. In the arrangement shown, the wires may be either arranged in series or may be placed in shunt with all or part of the motor. The arrangement will require a little adjustment at first, but after the proper setting has once been found, further attention is unnecessary.—A. Swenson, Okmulgee, Okla.

Lag Screws for Concrete Floors

Various means have been devised for fastening machinery and shaft hangers to concrete floors and ceilings, but many objections have been raised to the most common of these. If bolts are set into the concrete before it dries, they are in the way until used, and if they are put in later and fastened with lead or sulphur, they are rather hard to move. Besides, the material is rather expensive. The device shown in the drawnig consists of a coil of wire into which the lag screw may be inserted at will, and as easily removed from it. This device is particularly advantageous when hanging line shafting to concrete beams, as the coils can be set into the bottom of the forms when pouring the concrete. The coils are easily made, particularly if a lathe is available, and at very low cost. A wooden peg should be loosely inserted into the coil while the cement is drying, so that the inside will not be filled up with dirt or cement.—S. E. Gibbs, Des Moines, Ia.



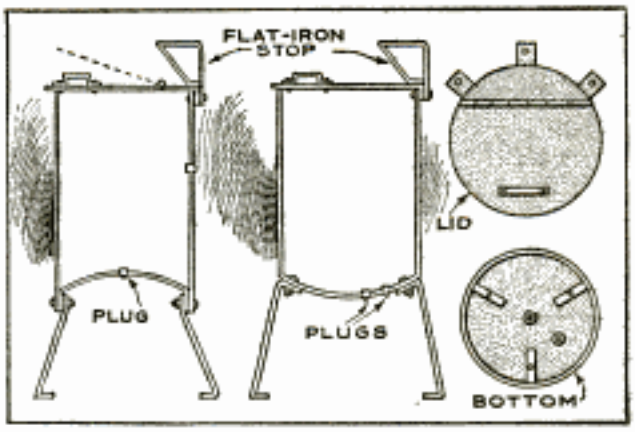
Ventilation for the Automobile

Four ordinary screen-door hooks, attached to the body and doors of an automobile, afford a method for holding the doors slightly open for ventilation. The screweyes are driven into the upper edge of the doors, the hooks being attached inside the door frame or body.

Durable and Fireproof Steel Cans for Greasy Waste

The uses to which discarded range boilers are applied are legion—the junk man won't take them as a gift, and consequently they are very easy to obtain. The usual method of converting the boilers into useful articles involves the use of a hammer and cold chisel, and much hard work, but the quickest and neatest way is to use an oxyacetylene flame, and considering the amount of work required, it will in most cases be found economy to pay a competent welder to do this.

The drawing shows containers made from range boilers made and installed in a factory for receiving greasy and oily waste and rags, which, if allowed to lie around exposed, might easily cause a fire as the result of spontaneous combustion. The two types shown are provided with



Waste Cans, Made from Discarded Kitchen Range Boilers, Prevent Fires Due to Spontaneous Combustion in Accumulations of Oily Waste

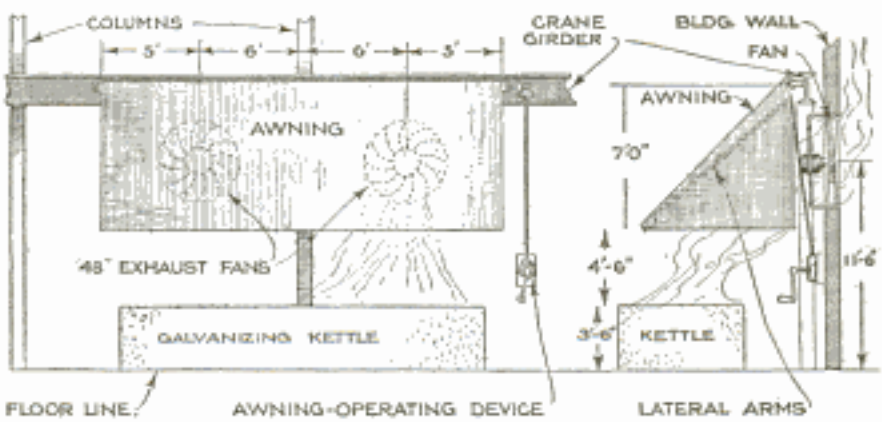
a tight-fitting cover and suitable legs, both cover and legs being held in place with rivets, although they could just as readily be welded. The lids are made self-closing by using a stop that makes it impossible to raise them into a vertical position. The covers may be made from galvanized iron and provided with three or more projecting ears at the back for attachment to the body.—Jas. E. Noble, Portsmouth, Ontario.

Exhausting Fumes from Galvanizing Kettles

Much trouble was experienced in a galvanizing factory, in getting rid of the fumes arising from the several galvanizing kettles. Roof and open-window ventilation were both used, but neither would clear the building of the heavy gases. On damp days but very little of the gas escaped, so that living and working conditions became almost unbearable.

It is common knowledge that a large hood over such kettles, with a positive exhaust system of sufficient capacity, will easily take care of such fumes and gases, but, since it was necessary to remove the dross on the surface of the liquid in the kettles in question several times a day, by means of a large dipper or skimmer carried by a traveling crane, it is apparent that no form of permanent hood could be used.

However, after all other means had been tried out, the idea illustrated was resorted to with entirely satisfactory results. An ordinary canvas awning was arranged to cover the kettles, the awning

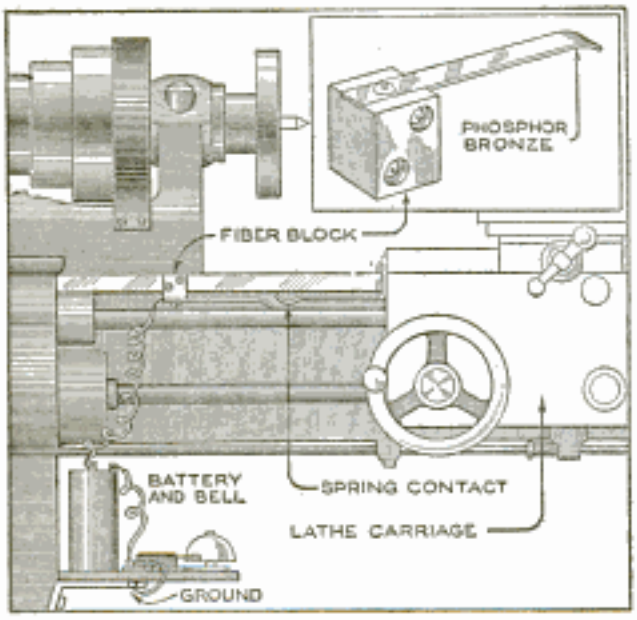


An Ordinary Canvas Awning over Galvanizing Kettles So Arranged That It can be Rolled Out of the Way: As the Skimming is Done by an Overhead Crane No Form of Permanent Exhaust Hood Was Possible

roller being attached to the web of the crane girder in such a manner that it would not interfere with the passage of the crane. The area underneath the awning is exhausted by two 48-in. direct-connected electric fans. When the kettles are to be skimmed for the removal of accumulated dross, it is only necessary to roll the awning out of the way.

Lathe-Carriage Safety Signal

A shop was having a lot of trouble, due to the fact that inexperienced men ran the carriages of lathes into the headstocks, with consequent damage to the driving gears and feed-screw mechanism. As none of the lathes was built with a safety clutch operated by the carriage, the signal system shown in the drawing was attached to the lathes, and no further trouble from this source occurred.



An Electric Safety Signal That Rings a Bell and Warns the Lathe Operator That the Carriage Is in Danger of Running into the Headstock

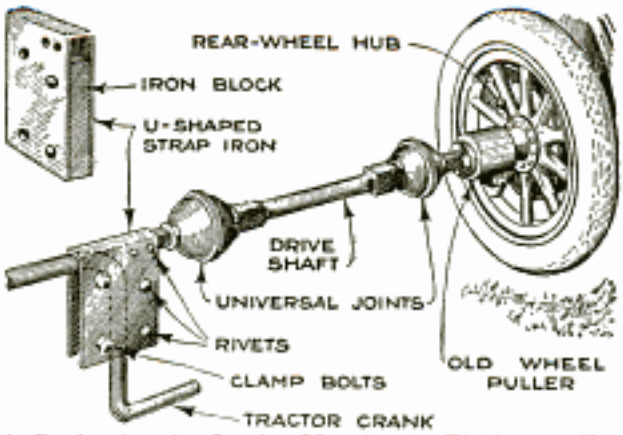
Two phosphor-bronze or spring-brass fingers, one on the carriage and the other on the bed, were arranged so that when the carriage came within a few inches of the headstock, an electrical contact would be established, and the bell would ring. The finger mounted on the bed of the machine was insulated by a fiber block. The battery and bell were supported on a shelf attached to the leg of the lathe; one of the battery wires was attached to the insulated finger, and one to the bell; the other terminal that leads from the bell was grounded to the bed of the machine.—W. B. Bennett, Honesdale, Pa.

Power Starter for Tractors

As most farm tractors are not equipped with starters, it is usually a back-breaking job to start one just after the engine has been overhauled and the bearings set up. This is especially so when the work is done on the farm, away from the shop, and where there is no power appliance for turning over a stiff motor. However, the service man generally has at hand a source of power in the form of the shop car. This being so, the problem is to apply the power to turning the crankshaft of the engine.

By using two universal joints, an old drive shaft, a wheel puller of the type that screws onto the hub in place of the cap, and a piece of strap iron, the problem can be very easily solved. The universal joints should be of the type that has a socket on one end and a tongue on the other.

Square the ends of the drive shaft, slip one universal joint onto each end, and pin it there. Remove the center setscrew from the wheel puller, and square the hole to fit the tongue of the universal joints. Bend the strap iron into a "U," and pin the tongue of one of the universals to the bottom of it in such a manner that it will not extend into the U-shaped piece to more than half the depth of the latter. An iron block, the same thickness as the tongue of the universal should be riveted inside the "U" on the same side as the joint. Slip the U-clamp over the tractor crank, with the tongue of the joint in a direct line with the shaft of the crank; mark the places in the clamp for bolts, as indicated in the drawing; these should be placed as close to the crank as possible. Then remove the clamp and drill the holes.



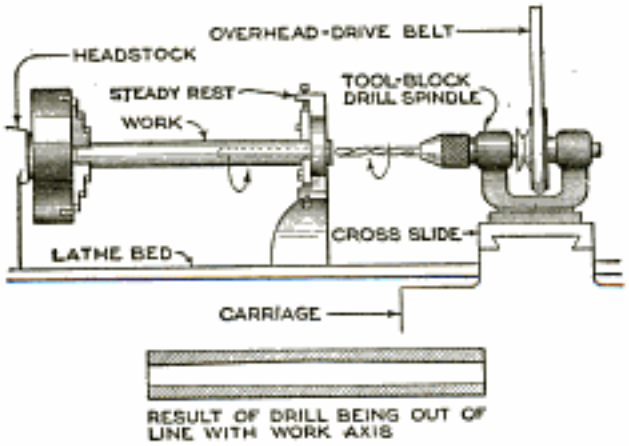
A Device for the Service Man in the Field That Enables Him to Start an Overhauled Tractor Engine by Means of His Service Car

To use, line up the rear wheel of the car with the crank of the tractor. Block the other wheels of the car and jack up the left rear. Remove the hub cap and screw the wheel puller on in its place, and be sure to tighten the clamp screw securely. Clamp the strap-iron "U" to the crank of the tractor to be started, and push the tractor ahead enough to enter the tongue of the universal in the wheel puller and to engage the dog of the tractor crank with the ratchet. Start the engine of the car, and throw the gear into low speed; as soon as the tractor engine starts, the crank will be kicked out of engagement.—Vernon Orr, Pomona, Calif.

Long Holes Drilled Axially Parallel

The drilling of a long hole is a difficult process, due to the great tendency of the drill to run off center. If the parallelism of the axis of the hole with the axis of the work is the more important requirement, rather than the diameter of the hole itself, the drilling may be accomplished by revolving the work as well as the drill in opposite directions. This can be arranged for as indicated in the drawing, assuming that a long bar is to be drilled. The bar is centered in the chuck, and the end to be drilled is supported in a steady rest, taking care that the axis of the work is set exactly parallel with the lathe center line. The drill is rotated in a toolpost drilling spindle, driven from an overhead drum or by a separate electric motor. The drill spindle must be as nearly as possible at the center line of the lathe and in line with it. As both the work and drill revolve, the former in the usual direction and the drill in the opposite, the drill speed may have to be reduced slightly. The work is rotated at about the same speed that would be used if the hole was being made with a boring tool; in fact, the drill serves as a boring tool as well as a drill.

To start the hole, it is center-drilled, drilled out with a smaller drill for a short distance, and a small boring tool used to true up the hole, bringing it to such a diameter as to just take the final drill. The toolpost drill spindle, with the drill held in its chuck, is then brought up,



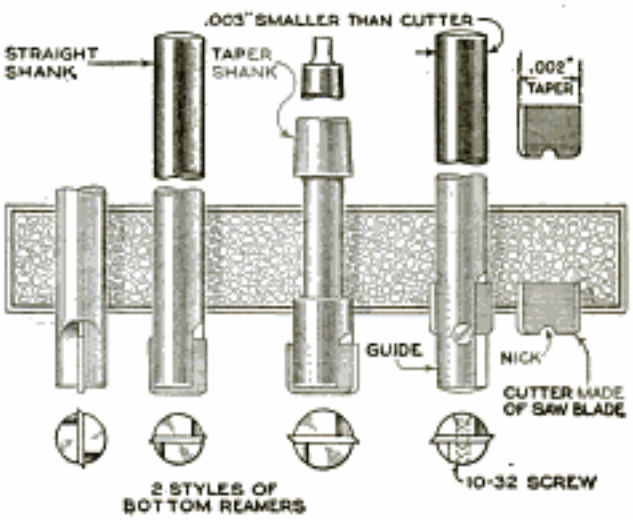
A Method of Drilling Long Holes Axially, in Which the Work and Drill are Rotated in Opposite Directions, Produces Satisfactory Results for Work of Certain Classes

and the drill as well as the work is set in rotation, the former being fed in by means of the carriage feed. When halfway through, the work is reversed and the operation repeated, both holes meeting at the middle.

While this method, if carefully carried out, will produce holes axially parallel with the work center line, the holes themselves may not be parallel; that is, they may be tapered, either in or out, depending upon the amount and direction by which the drill spindle is out of line with the lathe axis. If exactly coincident, the resulting holes should be straight and parallel, but unless the lathe is of the precision pattern, this condition is seldom attained.

Reaming Small Oversize Holes

On production work the oversize reaming of many small holes presents some-



A Reamer for Production Work That Materially Reduces Reamer Cost and Gives Satisfactory Results, Uses Cutter Blades Made from Pieces of High-Speed Hacksaw Blades

thing of a problem, as the reamers wear rapidly. This wear, on expansion reamers, soon puts them out of commission, due to their limited expansion.

One solution of such a problem is to be found in the solid inserted-blade reamer, which uses a single blade made from high-speed power-hacksaw blades. The blade is ground accurately to size, and is replaced in a few minutes when it has worn beyond the minimum tolerance. Old blades that are worn too small are not thrown away, but are kept and ground to the next smaller size needed. The bars may have either straight or taper shanks.

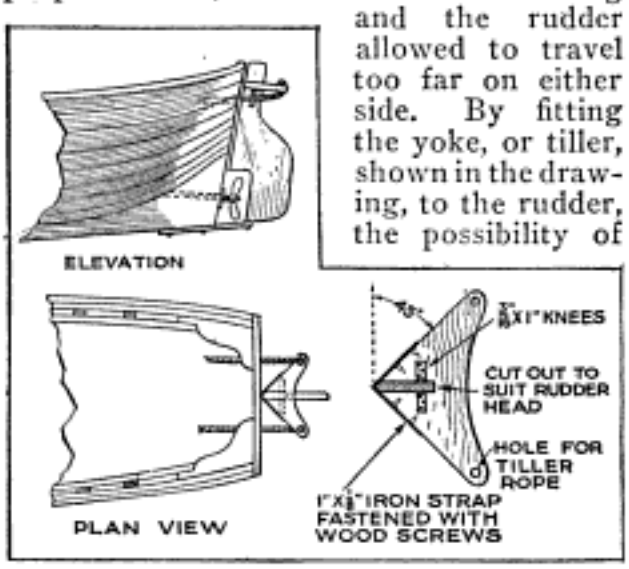
The bars are made from low-carbon tool steel, and casehardened, to prevent wear, after all machining operations have been completed. The set of a new saw blade is ground off, and this saw is used to slot the bars for the cutter blades; the bars are also milled away as indicated in the drawing, to allow room for the chips ahead of the blade.

The cutter blades are two-edged, and

are ground to size at the bottom or lower end, with a taper of about .002 in.; this prevents binding or choking. These blades are held in place by making them a driving fit in the bar slot, or if a bar can be used with an extension below the cutter, a screw may be used, which should hold the bar firm at its lower end, and by grinding a nick in the blade and passing half the screw through, the blade can be prevented from shifting or pulling out when the reamer is withdrawn from the work. All bars should be slightly smaller in diameter than the minimum diameter of the hole in which they are to be used. —J. V. Romig, Allentown, Pa.

Tiller for Square-Stemmed Boats

The rudder of a yawl or other square-stemmed boat is often twisted off, or the propeller bent, when the boat is backing and the rudder allowed to travel too far on either side. By fitting the yoke, or tiller, shown in the drawing, to the rudder, the possibility of



A Yoke, or Tiller, That Prevents Damage to the Propeller and Rudder of Square-Stemmed Boats by Limiting the Travel of the Latter

such an accident is eliminated. The tiller is made of wood in the form of a right-angled triangle the hypotenuse being shaped as shown. This allows the tiller to be moved through an angle of 45° on each side, which is as far as is necessary to get the full efficiency of the rudder in the "hard-over" position. Consequently it will be impossible for the rudder to travel too far to either side, as its movement is limited by the tiller striking the stern.

Handy Tool for Patternmakers

A piece of a hatpin or a large needle, about 2½ in. long, inserted into a wooden handle, makes a very convenient tool for holding small parts of patterns until the glue sets, after which the parts can be fastened securely with nails or screws. By sticking the point of the tool in at the edge, as in toenailing, it will hold a piece more securely for nailing when the glue is still soft, and the piece is not likely to slip from the exact location mark. It is also handy to hold down the ends of fillets when gluing them in.

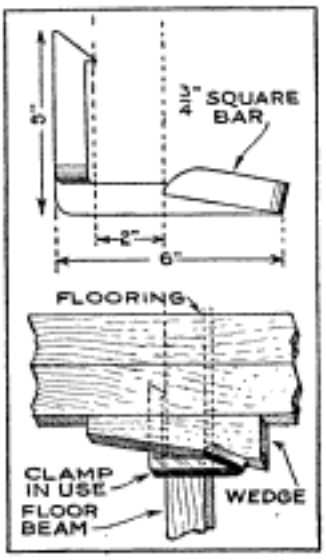
Lettering with Two Triangles

When it is necessary for a tracer or draftsman to do considerable lettering on a drawing, the method of using two triangles is of great assistance, when inking, in completing the work.

Often a line of a letter will be overlooked, and in using but one triangle, to move it back will usually cause a smear or blot on work already inked; to wait until the ink dries wastes time, but by using one triangle over the other, the omitted lines can be drawn in as soon as noticed. In this manner the work will naturally proceed more rapidly, because the thought of the uninked lines will be eliminated from the draftsman's mind, and this, though a small matter in itself, tends toward neater and more rapid work. —Truman R. Hart, Ashtabula, Ohio.

A Carpenter's Flooring Clamp

For laying flooring over the joists where a subfloor is not used, or when laying the subfloor, the substantial metal clamp shown in the drawing has more than sufficient merit to warrant the slight trouble and expense of having it made, the cost being not more than 50 cents. The material is ¾-in. square wrought iron, 15 in. long. The ends are beveled, and the piece is bent in the manner indicated. The clamp is set onto a joist or floor beam by driving the pointed rear end into the wood, and a wedge-shaped piece of flooring is used to jam the flooring in place. A clamp of this nature will be found very useful when laying a floor, of which the joints must be tight, or where the flooring is warped.



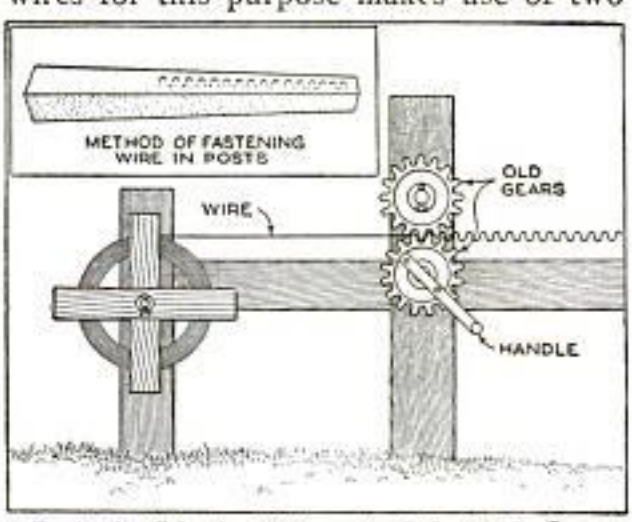
A Stone Mulch for Fruit Trees

Stones in the garden or orchard are commonly regarded by the owner as an unmitigated nuisance. There are situations, however, in which they are not, as practical fruit-growing experience has demonstrated. For example, some of the best peach orchards are on stony soil. In a severe drought, the stones can be raked under the trees, so that they completely cover the ground. Here they form as effective a moisture mulch as the more commonly used material—cut grass. Rain percolates into the soil, but its evaporation is markedly retarded by the stones above. The stone mulch also checks the growth of weeds. While stones are heavy things to rake up and spread, a situation may easily arise when it is profitable to do it.—Oscar C. Place, Boulder, Colo.

Attaching Wires to Cement Posts

When casting cement fence posts some means must be provided for attaching the line wires or woven-wire strands, and a very practical method of doing this is to crimp a wire so that one-half of each crimp will protrude beyond the post and the other half will be imbedded securely in the cement, producing the effect of staples, to which the wires can be easily secured with short wire ties.

A fast and practical method of crimping wires for this purpose makes use of two

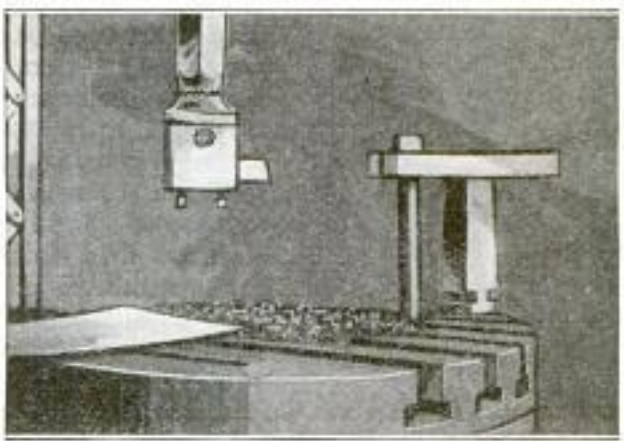


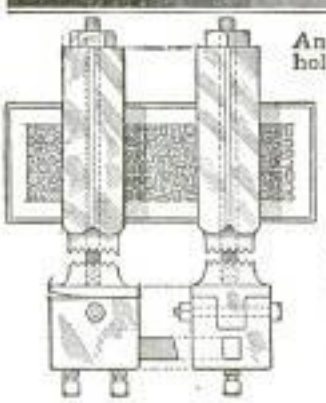
A Device for Crimping Wires to be Imbedded in Cement Fence Posts for Holding the Line Wires or Woven-Wire Strands

old gearwheels. By mounting them on a post so that the teeth will mesh, but making allowance for the thickness of the wire, the wire can be fed through as rapidly as the crank can be turned. To make the loops as large as possible, gears having deeply cut teeth should be used.—Geo. G. McVicker, North Bend, Nebr.

Adjustable Tool Holder for Slotter

The illustration shows a slotter toolholder used by a large railroad machine





An Adjustable Slotting Toolholder That Permits Positive Locking When Set: Old Toolholders may Easily be Changed to This Form by Cutting Fine Teeth across the Surfaces of the Joint

shop. The holder is made in two parts, the joints between the parts being provided with teeth, as shown. The bottom section is held fast to the upper one by a threaded rod, tightened by a nut, and is positively locked when adjusted. An old holder may easily be converted by cutting teeth across the faces of the joint; the finer the pitch of the teeth, the closer the adjustment.

This toolholder is of great advantage where it is absolutely necessary that the adjustment be retained without any fear of slipping.—A. A. Stafford, Reno, Nev.

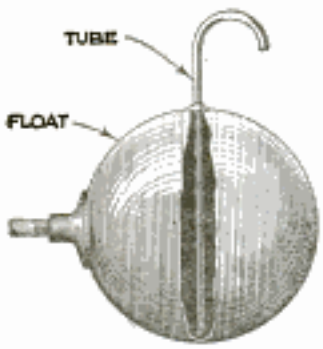
Heating Soldering Iron in Coal Fire

Under ordinary conditions a fire of soft coal is not suitable for heating a soldering iron because the gases and sulphur in the coal will spoil the tinning on the point of the iron. The iron can be heated in a coal fire, however, by placing it inside a short length of pipe having a diameter sufficient to admit the tool easily. One end of the pipe is plugged, or capped, and placed in the fire, the soldering iron being inserted into the open end.—H. F. Grinstead, Columbia, Mo.

¶Open and close knife switches quickly. If they are operated too slowly, an arc is likely to form, fusing the lips of the contact points.

An Improved Tank Float

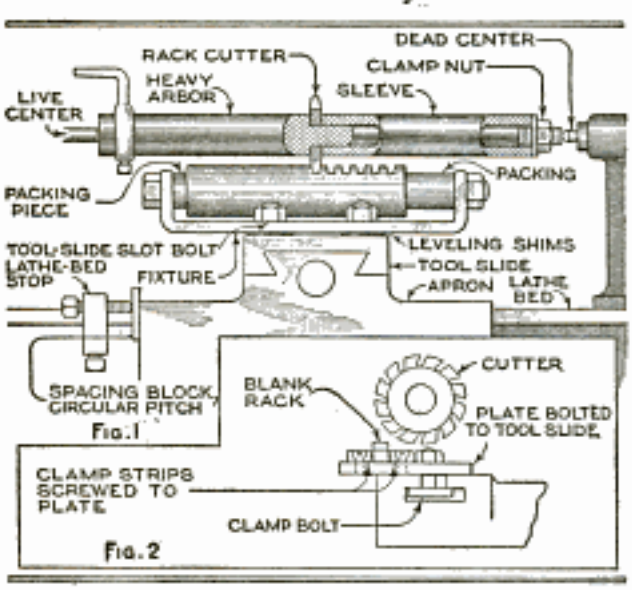
A cock float is more likely to spring a leak when operating in liquids having a variable temperature than in those where the temperature is nearly stable, simply because pressure due to high temperature and expansion will find leaks for contained air that would otherwise be safe. In cooling and contracting, liquids that would not ordinarily leak through are sucked into the ball.



To obviate the trouble, the device shown in the drawing can be attached to the float. Expanded air finds free egress through the tube and prevents it from exerting pressure against the inside of the float. Should leakage occur from any other cause, the accumulated liquid will be automatically expelled from the float with each rise in temperature.—H. E. Brunner, Hayward, Calif.

Lathe Used to Cut Rack Teeth

The drawing shows a simple fixture for cutting rack teeth; in Fig. 1, upon a cylindrical cast-iron drill-press quill, the fixture plate being bolted to the tool slide and fed under the cutter by means of the lathe crossfeed, while the cutter is held on an arbor between centers. The work, of course, must be held the correct distance below the cutter, so that the full depth of the tooth will be milled out in a single cut as the work is fed under the cutter.



The Versatile Lathe is Made to Mill Out the Teeth of Racks. A Milling Cutter and a Simple Work Fixture Makes the Operation Possible

To obtain the proper spacing of the teeth, the circular pitch, found from the diametral pitch of the cutter used, is determined, and a spacing block is carefully ground or lapped to correspond to this thickness. This block, which should preferably be hardened, is to be used in connection with an adjustable screw stop, clamped to the lathe bed. The block is placed between the stop and apron, and the stop screw and stop clamped in place; the carriage is then clamped to the bed and the first tooth cut. Then the spacing block is removed, and without moving the stop, the carriage is released and brought up against the screw stop, clamped again, and the second tooth cut. With the carriage still fast, the stop is released and moved along the lathe bed until the spacing block can be placed between stop and apron, adjusting the stop screw again if necessary, but clamping before removing the block; this is repeated until all the teeth are cut.

Racks of rectangular section may be similarly cut, the only difference being in the manner in which the work is clamped, as indicated in Fig. 2. A heavy cutter arbor should be used to prevent springing, unless the rack to be cut is short. The arbor is of large diameter as far as the cutter position, and here it is reduced to the diameter of the cutter hole, the opposite end being threaded for a clamp nut. To stiffen the reduced portion of the arbor, a steel sleeve of the same outside diameter as the large part of the arbor is slipped on and clamped between the cutter and end nut. If it is desired to move the cutter farther along the arbor, this can be accomplished by using a shorter sleeve, and a spacing collar or sleeve between the cutter and solid part of the arbor, of the proper length to move the cutter the required distance.

Opening Oxygen-Cylinder Valves

An oxygen-cylinder valve should never be opened quickly. It injures the high-pressure gauge to admit a 1,800-lb. pressure to the tube suddenly, perhaps bursting it and ruining the gauge. Also, as the sudden compression of the air or gas in the regulator tube is accompanied by heat, it may be sufficient, under certain conditions, to destroy the regulator seat, allowing the oxygen to flow into the diaphragm chamber and bursting the regulator.—A. MacCullough, Chicago, Ill.

How to Make an Electric Toaster

BY A. H. SCOTT

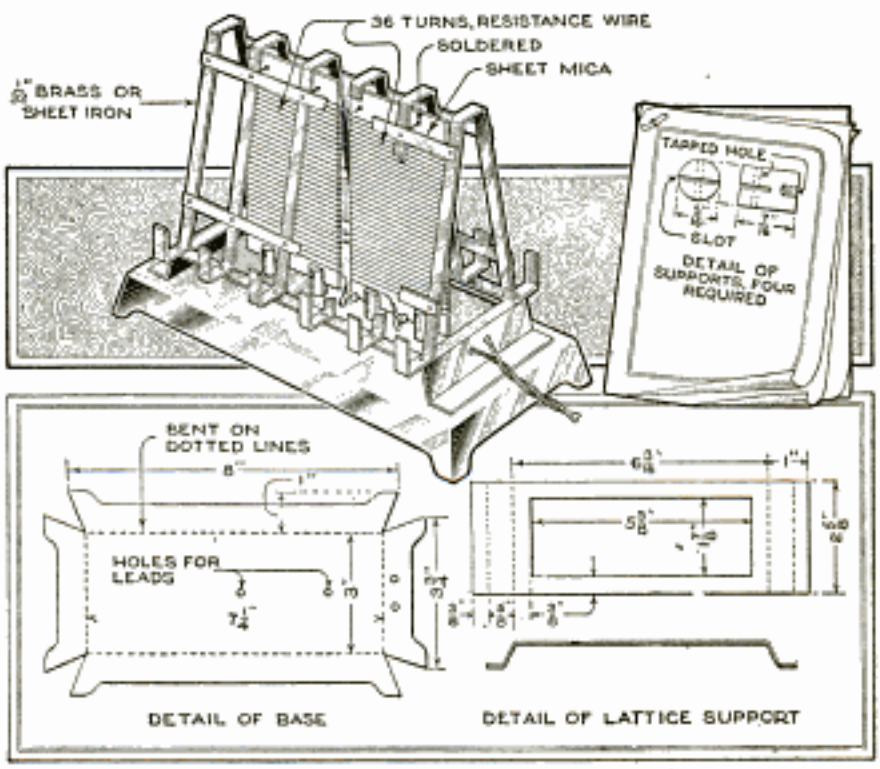
THERE is no toast superior to that made by the even heat of an electric toaster, and as such a toaster is of simple construction, anyone having 110-volt alternating or direct current available should not be without one.

The base is cut from a piece of sheet metal, to the form and dimensions given, and bent down along the dotted lines until the gaps at the corners are closed, the edges then being soldered. Four supports like those indicated, to hold the heating elements, should also be provided. These supports, which may be made of any convenient metal, or, better still, of fiber, are attached to the base with screws. A hacksaw cut in the upper end serves to receive the mica sheets, while a tapped hole at right angles to the slit is provided with a setscrew, or machine screw, to prevent the heating units from shifting their position.

The support on which the latticework bread rack is mounted has an opening cut in the center before it is bent into the form shown, and is either soldered or riveted to the base. The rack that supports the bread and holds the upper ends of the heat units in position, is made of six strips of sheet metal, ¼ by 11 in., bent as shown. These six pieces are equally spaced and held together by horizontal strips at top and bottom, the rivets used being made from pieces of copper, or other soft wire.

The heating units consist of resistance wire wound over mica supports, each unit being wound with 36 turns of .015-in. German-silver resistance wire, wound directly on the mica. Each mica sheet is 2 by 4¼ in. The winding should start at the bottom of the left unit and pass over the top of the right and down to the bottom, the actual winding being done before the units are put into place. The elements are then set into the slotted supports provided on the base, taking care that the supports, if these are of metal, do not short-circuit the units, and the setscrews, if such are used, are tightened until the mica is held rigidly. If machine screws are used, holes of ample clearance should be drilled through the mica to accommodate them. The upper ends are held in position by passing two pieces of copper wire through holes in the mica, above the resistance winding, and twisting the ends around the upper parts of the metal crosspieces. Two knots of fine wire are then wrapped around this wire on each side of and against the mica plate, and a drop of solder is used to hold them.

The terminals of the winding are joined

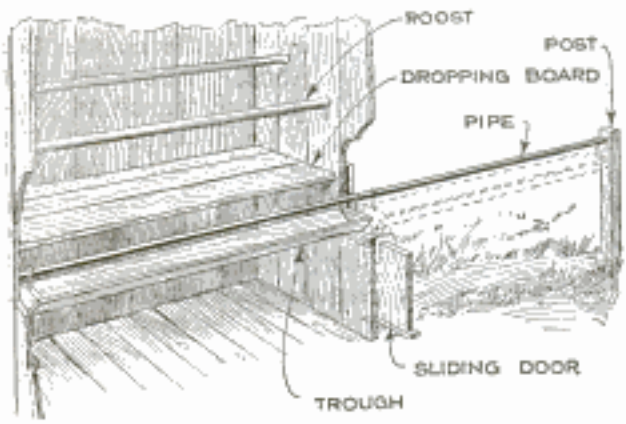


Toast Made on the Breakfast Table by an Electric Toaster Surpasses Any Other Kind. Such a Toaster is Easily Constructed

with solder to pieces of asbestos or rubber-insulated wire of about No. 18 gauge, which is passed through the holes in the base and out at one end, or through holes in the lattice support. It is permissible to solder these connections, as No. 18 wire is so much larger than the resistance wire that the joint does not reach a temperature that would melt the solder, although the remainder of the unit stays at a dull-red heat. The loose ends of the wire passing through the base should be joined to a suitable cord extension and attachment plug for connecting the device to the lamp socket. The metal parts may be nickeled if a neater finish is desired.

Cleaning the Poultry House

In order to maintain the poultry house in a sanitary condition, daily cleaning of



Daily Cleaning of the Poultry-House Dropping Board is Facilitated by a Sliding Trough into Which the Droppings are Scraped

the dropping board must be persisted in, but for a commuter this was an early-morning job that was not anticipated with enthusiasm.

A V-shaped trough was made by nailing two 8-in. boards together and closing the ends. Also, a 9 by 14-in. opening was cut in one end of the house, the center being in line with the front edge of the dropping board. A piece of 1-in. pipe, long enough to extend the entire length of the dropping board and for about a foot more than the length of the trough on the outside, was supported at each end so as to be directly under and parallel with the edge of the dropping board, as shown. The V-shaped trough was suspended from the pipe underneath the dropping board. With this arrangement, it was an easy matter to scrape the droppings into the trough and slide it outside to be emptied.—H. L. Tunison, Wakefield, Mass.

Automobile-Tire Paint

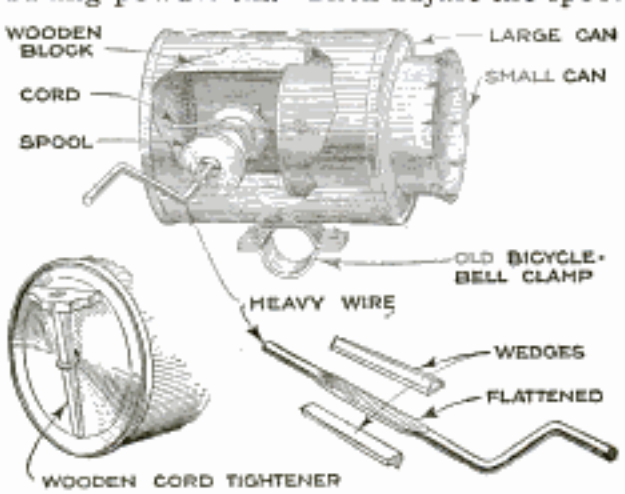
After overhauling the family car, polishing the brass and nickel, and even painting the body, the tires still have a dirty and unattractive appearance. The only remedy for this is to paint them with a paint that will give them the look of new tires, and, incidentally, prolong their life. The same paint will also improve the appearance and prevent rapid deterioration of spare tires.

A tire paint of this character can be made by thoroughy mixing 2 oz. of zinc oxide with 2 oz. of turpentine, add 3 oz. of gasoline, and shake up with ½ pt. of rubber cement. This paint can be tinted with lampblack so as to give a light gray color. It is applied to the tire with a brush and allowed to dry.—G. W. Greene, Madison, Wis.

A Homemade Bicycle Horn

A boy can make a bicycle horn from materials that cost nothing, and one that, when properly adjusted, is capable of producing a variety of tones and sounds, depending upon how fast the handle is turned. The sound is produced by the friction of a spool inside a loop of resin-coated cord, the latter being held tight by an adjusting device on the back of a can in which the spool is mounted so that it may be rotated.

To make the horn, use an ordinary tin can that has a capacity of about a pint. An opening is cut in one end to fit a smaller can, which may conveniently be a baking-powder tin. Then adjust the spool



A Variant of the Tin Can and Resined-String "Rooster" Makes This Bicycle Horn. The Tone may be Varied by Turning the Crank

on the stiff wire handle, as indicated in the drawing, so that there will be no pos-

sibility of its turning on the shaft. A small hole is punched in the bottom of the small can and a strong cord is knotted and inserted as shown, the cord and spool being well rubbed with a piece of common resin. The cord is wound once around the spool and the end is brought through a hole in the end of the larger can so that the proper tension can be obtained by a simple tightening arrangement. This consists of a wedge-shaped stick with a block pinned to the larger end, the cord being tightened by pushing the wedge toward the center of the can.

The small can is held in position by means of the two wooden stops, at top and bottom, as shown, or, by soldering the cans together after the horn has been assembled. If desired, a suitable clamp can be soldered or riveted to the horn for attaching it to the handlebars, or other part, of the bicycle.—F. E. Leitch, Brooklyn, N. Y.

A Comfortable Footstool

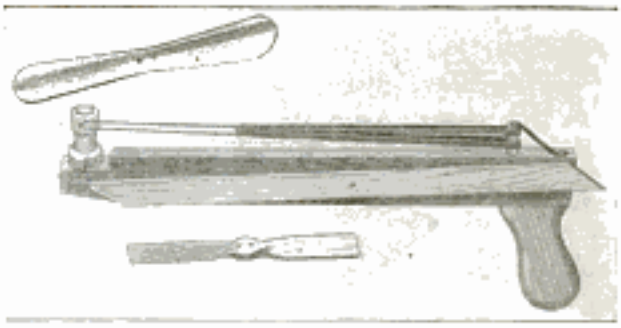
To overcome the tiring effect of keeping the legs bent at a constant angle, which is necessary with the usual footstool, the bottom edges were rounded off after the fashion of a rocking chair. Each support was "ballasted" with a crescent-shaped piece of sheet lead fastened to the inner surface at the bottom. These weights served to hold the stool upright. Such a stool does not confine the user to one position, but conforms to any position of the feet and legs.—F. C. Davis, St. Joseph, Mo.

A Propeller Pistol

A spring pistol that is something of a departure from the usual spool device for shooting small metal or wooden propellers into the air can easily be made.

The photograph shows a pistol made of ¾-in. wood, and about 14 in. long; however, these dimensions can be altered to suit. A freely revolving spool is mounted on the outer end of the stock, a nail or screw being used as an axle. The lower flange of the spool projects beyond the stock, and a deep notch is cut in it to engage with the trigger, which is pivoted to the side. Near the rear end of the stock, a dowel is inserted as an anchor for the rubber bands that are used to revolve the spool, the bands being prevented from slipping off by a strip of tin.

Strong rubber bands are used for driving the propellers into the air. The elastic



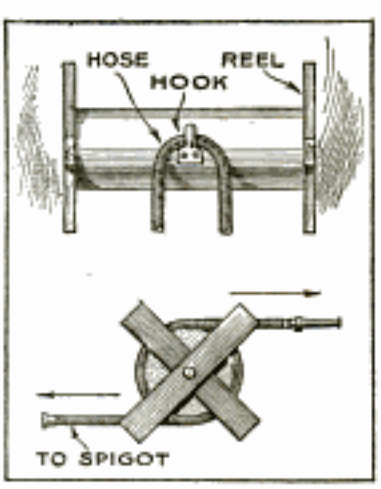
A Pistol That Shoots Small Propellers into the Air will Provide Much Amusement for the Youngsters

bands are slipped over the post, a strong cord is inserted through them, and both ends led forward to the spool, where they are securely fastened. The propellers can be made of either tin or wood, with holes near the center to fit over projecting pins on top of the spool. These pins are spaced about ¾ in. apart and are made of nails, the heads of which have been cut off.

The gun is "cocked" by turning the spool to wind the string around it and stretch the rubber bands, the bands being held in tension by means of the trigger. After the propeller has been put in place, the trigger is released, causing the propeller to be spun up into the air. —R. W. Wagner, Webb, Ia.

Reeling the Garden Hose

Garden hose, if wound on a reel from one end in the usual manner, becomes somewhat unmanageable when it is necessary to move from one place to another, as it persists in twisting and kinking.

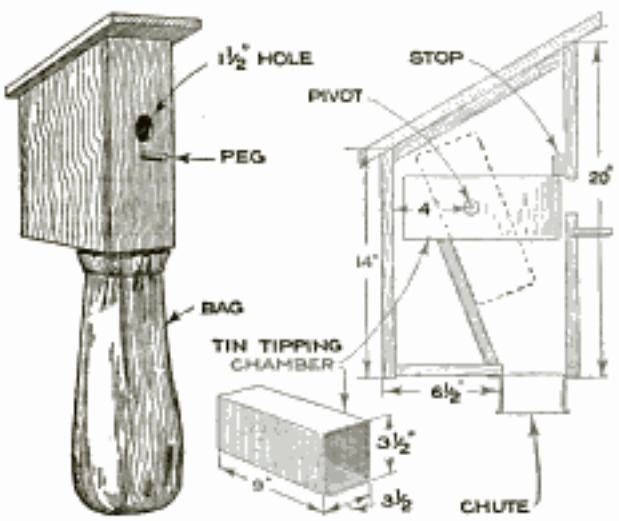


By the method shown in the drawing, the hose may be screwed to the water connection and unwound as needed. A hook, or cleat, is fastened to the center of the reel, and the hose, doubled at the middle, is hooked over it. This permits the hose to be wound or unwound simultaneously without disconnecting it.

Nest-Box Trap for Sparrows

Since the introduction of the English sparrow, or, as it should be more properly called, the house sparrow, the country has been trying to get rid of it.

The drawing shows an efficient nest-box trap for catching the feathered pests as



A Nest-Box Trap That Catches Sparrows as Fast as They Come Along in Search of a Nesting Place: The Bag may Easily be Removed and the Birds Destroyed

they come along in search of nesting quarters. The principal parts of the trap are a box with a tipping chamber inside, a spout underneath, and a bag into which the sparrows are precipitated. The tipping chamber is made of tin, closed at the rear and pivoted near the center, so that it will tip over easily. A few feathers and bits of straw can be fastened to the rear of the trap to attract the curiosity of the birds and to hasten their entrance.

Poison offers another effective means for reducing the sparrow population. For this purpose strychnine is used, as it is easy to prepare and acts quickly. Wheat, or any other grain or seed readily eaten by the sparrows, can be used for bait. The bait is poisoned by putting ⅛ oz. of strychnine into ¾ of a gill of hot water, adding 1½ teaspoonfuls of starch or wheat flour, moistened with a few drops of cold water. The mixture is then heated, stirring constantly until it thickens. The hot starch is poured over 1 qt. of grain and stirred until every kernel bears a coating. Only as much of the poison should be put out as is likely to be eaten in one day, since exposure to moisture reduces its effectiveness. One will naturally be guided in the use of such bait by the existence of laws or ordinances prohibiting such practice, and the likelihood of other birds and fowls being poisoned by it.

Blowtorch Cleans Typewriter

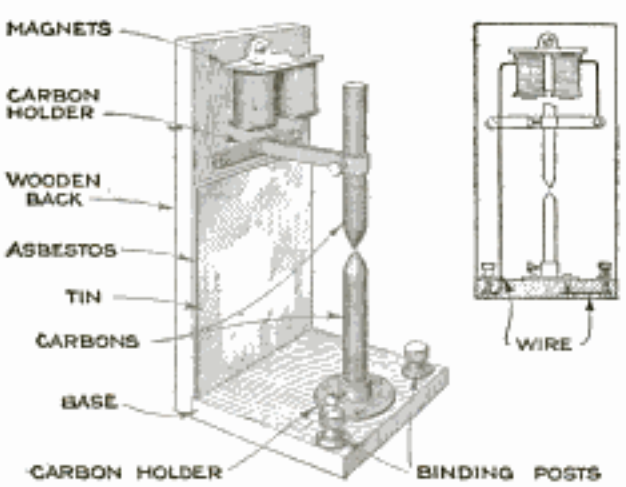
A novel method of cleaning a typewriter and reaching the parts that, on many models, are practically beyond reach by other means, makes use of a fine stream of gasoline under pressure from an ordinary hand blowtorch.

The tank of the torch is one-quarter filled with gasoline, benzine, or denatured alcohol, and the maximum pressure pumped up. After the pressure has been raised to the desired degree, the valve is opened just enough to produce a small but strong stream of the fluid. The force of the stream is sufficient to dislodge particles of grit and gummed oil. The machine may be placed on several thicknesses of newspaper to absorb the fluid that drips through. Care should be taken to perform this work away from all lights and fires, and if possible, in the open air.

A Low-Voltage Arc Lamp

An arc lamp that can be used for experimental and practical purposes can be made by the amateur electrician at slight cost in money and time.

Build a stand of wood after the style illustrated, so that the back will be about 15 in. high and the base 6 in. long, the width of both to be about 6 in. Obtain a pair of good-sized magnets from an old bell, and remove the small-gauge wire with which they are wound, substituting



A Simple Arc Lamp That can be Built in the Experimenter's Workshop to Operate on a 30-Volt Current Furnished by Dry Cells

for it the regular No. 18 gauge bell wire, and making sure that this is wound onto the cores in the same direction as the original winding. After rewinding the magnets, they are attached to the top of the rack by the iron yoke that holds the cores together. Just below the magnets,

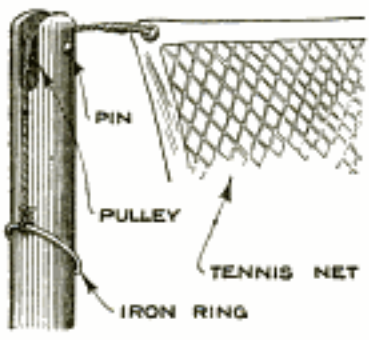
fasten one of the carbon holders to the back, carefully insulating it from the wood. This holder is made from a strip of brass, bent to hold the carbon and provided with a thumbscrew. Directly below this holder a socket is provided for the lower carbon. Make this part from a section of brass tubing set into a fiber washer. A setscrew should also be provided in this for holding the carbon rigid.

The wooden back is insulated with a piece of sheet asbestos, and this is in turn covered with a sheet of tin, which serves as an additional protection for the back and also as a reflector.

Wire one pole of the magnets to the upper carbon holder and the second to a binding post on the base. The bottom carbon holder is connected to a second binding post. Connect this arc lamp to a battery of about 15 dry cells, or other source from which approximately 30 volts can be obtained. Adjust the distance between the carbons until a position is obtained at which the arc will be strongest. As the carbons burn away they must be readjusted manually.—L. B. Robbins, Claremont, Calif.

Adjustable Fastener for Tennis Nets

The drawing shows an adjustable fastener for tennis nets, by means of which the net can be kept stretched taut without the need of tying knots.

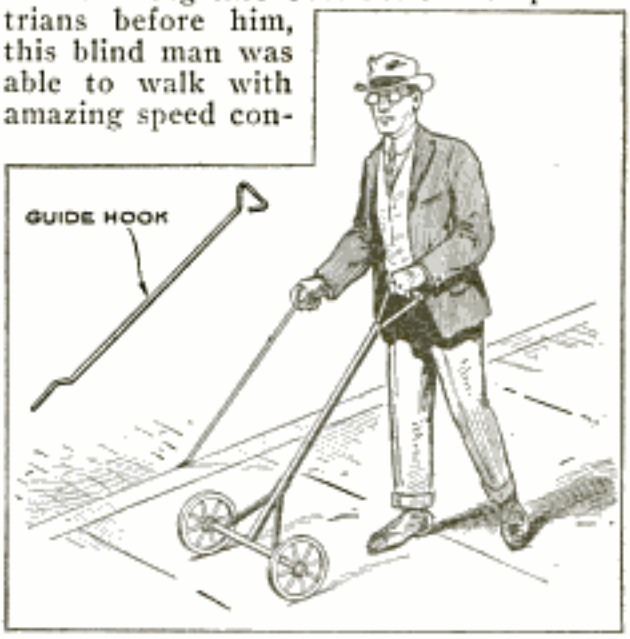


Two iron rings, slightly larger than the post, are obtained and tied to the net ropes, as they are not removed when it is taken down. All that is necessary to tighten the net, is to place the rope over the top of the post and press down on the ring with both hands. If a small pulley is set into the top of the post, as shown, the net can be tightened much easier.—Elmer O. Tetzlaff, Milwaukee, Wis.

Aids for the Blind

An ingenious blind man, finding a cane insufficient to enable him to walk rapidly, had the two aids shown in the illustration made for himself. One consists of two small wheels from a baby carriage which are attached to a handle; the other is a bent iron hook, which may be made as illustrated or cut shorter and set in a long wooden handle or in the end of a cane.

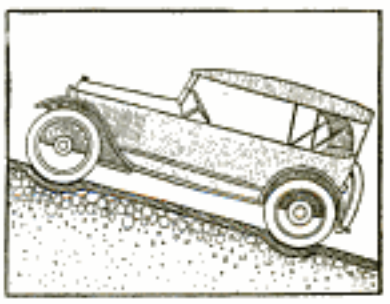
With the hook to guide him along the curb, and the wheel arrangement to prevent running into obstructions or pedestrians before him, this blind man was able to walk with amazing speed considering his affliction. Any blacksmith will make the hook for a few cents, and the cost of the wheel device will be so small as to be negligible.—Frank Harazim, New York, New York.



Two Novel Devices Used by a Blind Man by Means of Which He can Walk Rapidly and at Minimum Risk of Running into Obstructions or Pedestrians before Him

Depressions in Inclined Drive Prevent Auto from Backing

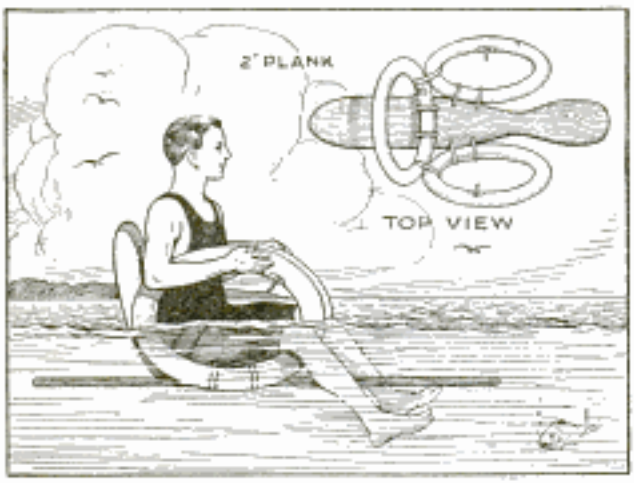
The owner of a residence on a hilly site was compelled to build a driveway to his garage at a decided angle. While the drive was under construction, depressions, slightly wider than the wheel, were made in the concrete at intervals, as indicated in the drawing, so that, should the engine stall or some part refuse to hold, the danger of the car's running backward for any distance would be greatly minimized. —Dale R. Van Horn, Lincoln, Neb.



¶Ordinary asphaltum varnish, obtainable at all paint stores, is one of the best paints for door and window screens, to prevent them from rusting.

A Novel Armchair

Few think it possible to lie back and take it easy in a morris chair in six feet



A Novelty in Armchairs for Use on the Water Permits the Bather to Sit at His Ease without Exerting Himself to Keep Afloat

of water, yet, with a chair of the style shown in the drawing, it can be done with ease and comfort.

A cedar, or soft-pine, board, about 1 ft. wide and 6 ft. long, is formed as indicated, so that the narrow part will be about one-third of the total length from the front. The board is then rubbed down smooth and given one or two coats of paint. Two inner tubes, about 30 by 3 in., are lashed to the sides with straps passed through slots cut in the board, taking care not to draw the straps too tight, but just enough so that the tubes can be inflated to nearly full capacity. A third tube is lashed across the back between those at the sides.

The tubes are pumped up so that they will hold their shape well, and the chair is ready to be launched. By leaning against the back tube and holding those at the sides like the arms of a chair, one can tilt back as comfortably as though in the sitting room at home. Proper balance will soon be attained by shifting the weight of the body back or forth as occasion may demand.

A Chemical Dandelion Eradicator

Dandelions can be eradicated from a lawn by the simple method of spraying or sprinkling with an iron-sulphate solution, instead of digging them out with a knife. Besides, the weeds will not return, as they will in most cases when a part of the root remains in the ground, as it generally does when cut. While the solution referred to is particularly valuable for destroying dandelions, it will also destroy some other types of weeds and, unfortunately, white clover as well, so if there is both white clover and dandelions in the lawn, it is a question of which is the most desirable—to kill both, or to keep both. However, the solution is harmless to grass.

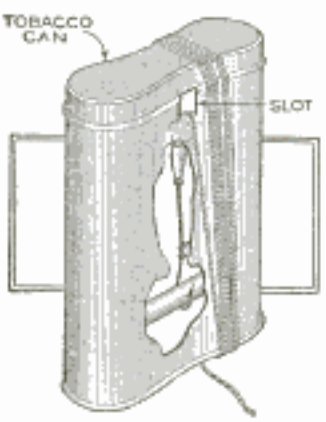
Iron sulphate is inexpensive and can be obtained through most seed dealers. One and a half pounds of the chemical are dissolved in a gallon of water, and the solution is applied with a spray or sprinkling can, preferably the former, as it has been found from experience that the more thoroughly the solution is driven onto the leaves and stems, the better.

The first application should be made in the spring, just before the dandelions have had an opportunity to bloom. This application should be followed by a second, third, or even a fourth, at three or four-week intervals. One or two applications can be given late enough in the fall to prevent growth before the end of the season.

Properly applied, the solution will cover about 375 sq. ft., and should not be allowed to come into contact with stone or concrete work, as it will cause unsightly, rustlike stains. Also, the iron-sulphate solution should not be used in hot, dry weather, as considerable damage may be done to the then comparatively inactive grass.

Tobacco-Tin Tackle Box

To prevent the hook from catching in the clothing and his line from becoming snarled, the young angler will find that an ordinary tobacco tin makes an effective tackle box for his limited equipment. A small slot is cut in the edge of the can, and the resulting tongue is bent over to prevent cutting the line. The hook, sinker, and float, if the latter is not too large, is placed inside the can, and the line is wound around the outside in the manner shown, to prevent it from becoming knotted and tangled. If desired, a small wooden rod may be placed inside the tin, as indicated, to hold the hook, the rod being held firmly by a couple of tacks driven through the tin.—John S. LaFleur, Haverhill, Mass.



CONCRETE GARDEN FURNITURE

By Donald MacKay

Part IV — Glue Molds

WHEN pieces of elaborate design, containing portions more or less undercut, are to be cast in concrete, glue molds are employed.

To the worker who has followed this series thus far, the making of glue molds will present little difficulty. In this, as in the casting of balusters and pedestals, it is necessary that the worker procure a wooden model of the design to be reproduced, unless he has sufficient ability as a modeler to make his own designs in clay. For one who has not, there is a wealth of material available in old carved furniture, or in plaster ornaments, parts of which may be pressed into service; for example, the writer has often used old carved legs of tables as models for the legs of garden tables; pieces of plaster-ceiling ornament as decorations for panels on sundial and other pedestals, and ornamental plaster molding as models for molding to be used in connection with similar garden pieces; many other carved-furniture parts and ornaments may be used with equal facility. The last illustration in this installment shows a garden table made by using models of this character, and the making of the legs is illustrated in the other drawings.

The first step is to shellac and oil the model. Lay it down on the working board, as shown in Fig. 23, and draw a line along each side, in the most convenient position for parting.

Obtain two pieces of thin board, about 6 in. wide, and cut one edge of each piece to fit the model as closely as possible, at the parting line. Nail blocks on these boards, as in Fig. 24, to support them so that their upper face will be exactly at the parting line.

Take a sheet of old newspaper, wet it, and spread it over the upper half of the model, pressing it down into close contact. Then take some modeling clay, flatten it out into a sheet, about ½ in. thick, and apply it over the newspaper, pressing the clay down into every detail on the model surface, and carrying it down until it rests upon the boards at each side of the model. Oil the surface of the clay, then build up upon it a plaster case about 1 in. thick. Fig. 24 shows the clay and plaster coating, in section, upon the model. When the case has hardened, turn the model, with its clay and plaster covering, on its opposite side and remove the boards. This leaves one half of the model exposed, as in Fig. 25, with a straight, clean surface of clay and plaster at the parting line. Spread wet newspaper over the exposed half, apply

Fig. 23

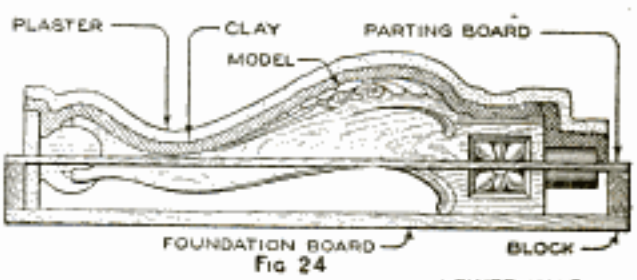


Fig 24

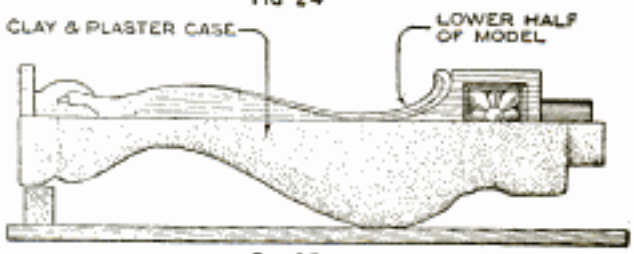
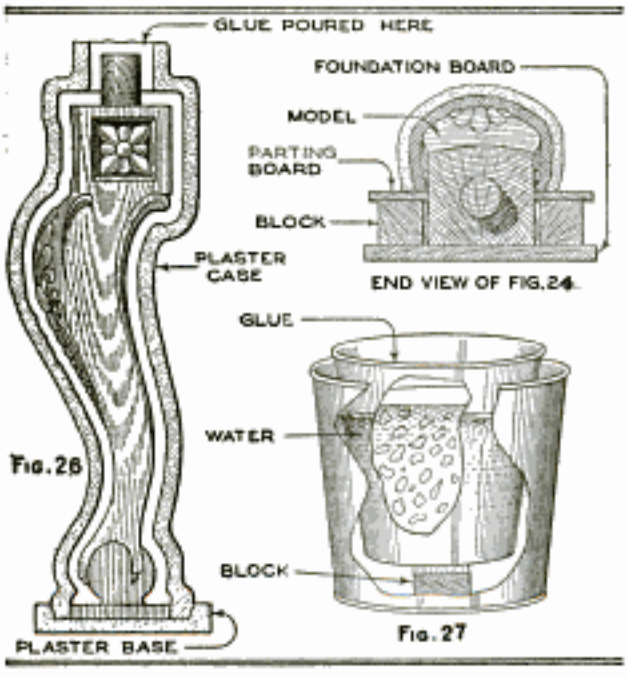


Fig 25

Figs. 23-25—Method of Applying Clay and Plaster to the Model, and of Using Boards to Support the Case

the clay coat, oil, cut joggles in the edge of the plaster case, oil this edge, and pour the remainder of the case. Allow the whole assembly to harden thoroughly, then cast a plaster base on the case, as

shown in Fig. 26, tapering the bottom edges of the case before pouring the base. When hard, remove the base, separate the halves of the case, and carefully clean away the clay and the newspaper, both from the model and the case, shellac and oil all surfaces of the plaster case and base, oil the model, and reassemble. We have now the model inside the plaster case, with a space between, as may be seen by reference to Fig. 26, of the same



Mold in Position, Ready for Filling with Glue: Figure 27 Shows How the Glue should be Melted for Large Pieces

thickness as the clay had been. This space is to be filled with glue.

The glue used for molds is a good grade of white glue, obtainable at any dealer in painters' or 'plasterers' supplies. It must be melted in a regular gluepot, if the piece is small, or, if much glue is required, use two pails, one inside the other, as shown in Fig. 27. Support the inner one upon a block, a few inches high, fill the outer one about one-third full of water, put the glue, which has previously been soaked in water for about 15 minutes, into the inner one, with about a quart of water, then heat gently. When the glue is of the proper consistency, pour it into the space between case and model. The glue will require about 24 hours to harden. When hard, remove the plaster case, and cut the glue carefully along the slight ridge that marks the parting line of the case. This makes a glue mold in two parts. Paint the inside of the glue mold with the very best grade of clear varnish, three or four coats.

When ready to make a cast, place each section of the glue mold back into its own half of the case; this is necessary because the glue is so flexible that it will not support either its own weight or the weight of the concrete. Oil the interior, assemble the case and base, strap the case firmly, and the mold is ready for filling with the mixture of 1 part Portland cement to 2 or 3 parts sand. Do not hesitate, when stripping the glue from either model or finished piece, to pull firmly, though carefully, on the glue mold over undercut portions; it will come away easily if proper care is taken, and will snap back into place when released. Glue molds cannot be used for more than four or five casts, but as the old mold, cut up into small pieces and allowed to dry, may be used again, there is little or no waste. The writer has seen molds made of glue that had been used for several hundred casts, and that, when used with a proportion of new glue, retained all its first flexibility, reproducing the most delicate designs with great fidelity.

The making and using of glue molds is a very interesting process, and is one that will repay the effort spent upon it. The worker should keep his eyes "peeled" for suitable subjects and models; many models may be picked up during the dismantling of old buildings; the passing of the saloon especially has made available many pieces of woodwork eminently suitable for this purpose. When reasonable care is used, pieces that will be a delight to the eye may be made from glue molds, and if simple designs are used, they will harmonize with almost any surroundings. Simple designs should, in any case, be chosen by the beginner, as, with elaborate

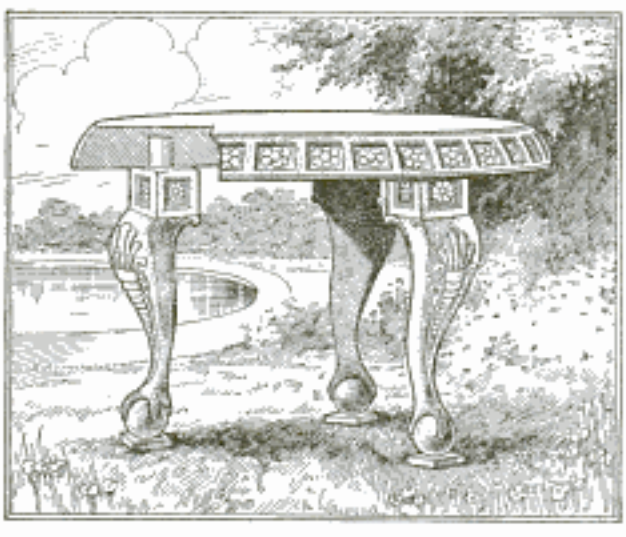


Table Cast in Concrete: The Legs were Cast in a Glue Mold Made by Using a Carved Table Leg as a Model

ones, the first results are apt to be somewhat disappointing.

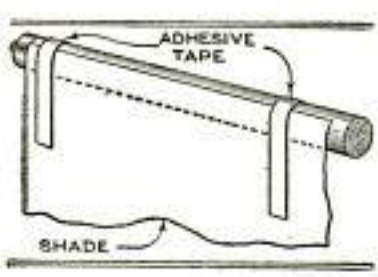
Handles for Safety-Razor Blades

Finding that most of the women of my acquaintance used safety-razor blades for ripping seams, and one purpose or another, and that they experienced some difficulty in holding them, I fitted the blades to old toothbrush handles, making them much easier to use and removing the danger of cut fingers from double-edged blades.

Of course any kind of material can be used for handles; aluminum, hard fiber, and even hardwood, when provided with a suitable slot. However, an old toothbrush furnishes a handle that is ready-made. The bristles are removed and a slot is cut into that end to take the blade, which is held in place by rivets made from soft solder, inserted through holes drilled through the handle. Although the solder rivets would seem soft, they serve to hold the places securely, and are easily removed. When completed, both sides of the handle are finished smooth.—M. L. Lowrey, Livermore, Calif.

Attaching Shades to Rollers

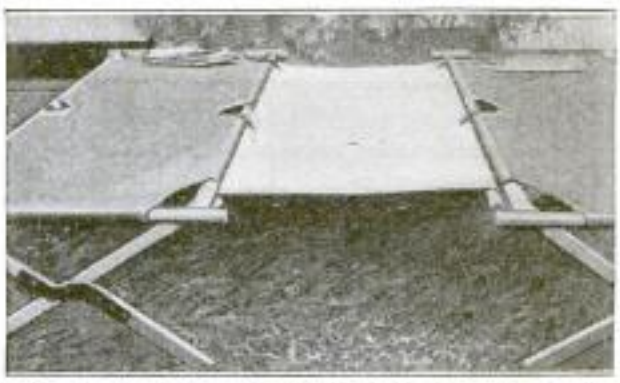
Being called upon to repair a window shade that had pulled loose from its roller, and having none of the small tacks used for the purpose at hand, strips of adhesive plaster were used with satisfactory results. The plaster was cut into 6-in. strips, one-half of this length being wrapped around the roller and the rest attached to the shade.—Thos. W. Benson, Philadelphia, Pa.



Three Cots Made from Two

Two folding army cots are about all the average automobile tourist or camper wants to carry along with him, but if there are three members in the party, some sleeping arrangements must be provided for the "crowd."

The photograph shows how a party of three automobile tourists slept on two cots. Two sticks, the length of the cots when opened, were inserted through hems sewed into the sides of a strip of canvas, to form a bed for the third person. This arrangement was slung between the two cots by means of straps, one end of which was fastened to the sticks, the free ends being passed around the side rails of the cots and buttoned on fasteners such as used for fastening buggy curtains.



Reducing the Bulk and Weight of the Camper's Equipment by Taking Only Two Folding Cots for Three Persons: The Third Sleeps on a Canvas Strip Slung between the Two Cots

Shorter sticks, notched at the ends, were inserted between the side sticks at the head and foot, below the canvas, to keep it stretched tight. The only objection to such a bed is that the person occupying the central part must wait until the other two members of the party have retired. Also, should one of the "outsiders" get up during the night or roll out of bed the man in the center will be dropped down unless both cots are prevented from tipping over by driving a stake at each end and fastening the outside corners down with a short length of rope.—Harry E. Forbes, Van Wert, Ohio.

Cord Adjuster Made from Spool

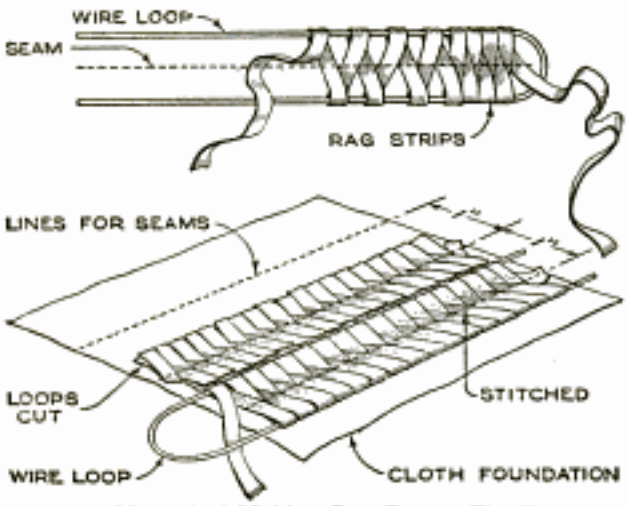
Electric lamps, depending from the ceiling on a flexible cord, can be adjusted for height by using an empty spool instead of tying a series of knots in the cord as is usually done, at the risk of damage to the insulation of the wire, in addition to their being hard to untie.

In use, the wire is looped over each end of the spool in the manner indicated in the photograph, with the excess length forming a loop in the center.

¶Sickle sections of a mowing machine can be easily removed by clamping them in a vise and striking the end of the bar with a hammer to shear off the rivets instead of filing.

New Method for Making Rag Rugs

A beautiful rug, similar in appearance to the old-fashioned drawn rugs, but demanding far less work, can easily be made at home.



A Simple Method of Making Rag Rugs. The Rags are Torn Into Strips, Looped, and Sewed to the Cloth Foundation

The only tools needed are a sewing machine and a long wire loop bent into the shape of a hairpin. The loop can be made from a piece of stiff wire, bent so that the sides will be an inch or so apart, this distance depending upon the appearance desired in the completed rug. A piece of strong denim, burlap, ticking, or similar material, is also needed for the foundation of the rug; if ticking is used, have the stripes run crosswise, and if the foundation has no stripes, it will need to be marked with parallel lines, about 1 in. apart, with a heavy pencil.

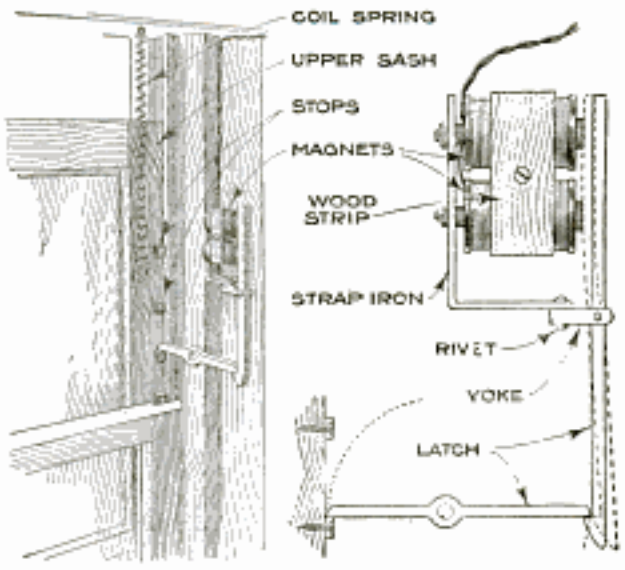
The rags used are torn into strips, as for carpet rags, although somewhat narrower, and they need not be sewed together. Take one of the rag strips and, fastening it to the rounded end of the wire loop with a safety pin, weave the strip around the wire, as shown in the drawing, so that the separate loops will be as close together as possible. Then take the foundation that has already been prepared, place the pin on the middle line, and sew the strip on in the sewing machine, running the seam through the middle, as shown by the dotted line in the drawing. When the strip has been sewed, the loop is drawn out and the result is a double row of cloth loops across the middle of the rug. This operation is repeated, first on one side and then on the other of the center row until the rug is completed. If one pinful of the woven strips does not reach all the way across, stop at the end, withdraw the wire, refill and finish the row.

After the rug has been entirely covered, the rows of loops are cut open with the shears. After a hard shaking the rug will have all the appearance of the tediously hand-drawn article.—Cora Hamilton, Binghamton, N. Y.

An Automatic Window Closer

In the early hours of the morning when the temperature is around zero, it requires courage to climb out of a warm bed and close the bedroom window. However, by installing the electrically operated device shown in the drawing, the window will close itself.

The window is closed by a spring of the screen-door type, and is held open by a simple latch which engages with stops fastened to the upper sash. A groove must be cut in the lower sash to permit the stops to clear it. The latch is released by an electromagnet, connected as shown and operated by one or two dry cells. The device is wired to an ordinary alarm clock, or to the automatic regulator with which many furnaces are equipped, so that at the hour set, the circuit will be closed, releasing the latch, and permitting the window to be drawn up. Three or more



An Electromagnetic Arrangement for Closing the Bedroom Window can be Connected to an Ordinary Alarm Clock or Used in Conjunction with an Automatic Furnace Regulator

stops may be used so that the window may be only partly or fully opened. If the presence of the spring should be undesirable, extra-heavy sash weights can be used.

¶Children's worn stockings can be made into socks by cutting off the tops, forming a 2-in. cuff, and embroidering it.

Mounting Photos on Canvas

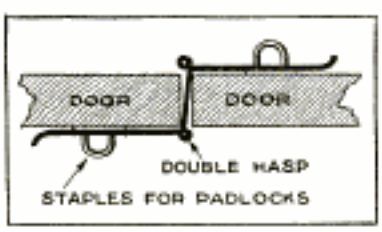
Mounting photographic prints or enlargements on canvas or linen to give the effect of a painting, particularly when the work is to be colored, is often attended with unsatisfactory results. The proper method of procedure is as follows: The print is placed on some smooth surface, face down, and given a coat of any good photo paste, or even common starch paste, which must, however, be free from lumps. The paste is well rubbed in until the print, which preferably should be made on single-weight paper, is quite limp. Then the fabric is lowered upon the paste-covered print and rubbed into close contact. Special attention should be given to the edges so that they adhere properly, and for this purpose it will probably be found necessary to rub with a paper knife or similar article. After the print has been pasted to the cloth backing, it is turned face up and allowed to dry.

Drills Made from Needles

Small drills for a variety of purposes in the amateur's workroom can be easily made from ordinary sewing needles of different sizes. A portion of the eye is ground off and the sides are beveled as indicated in the drawing to form the lips. Such drills will prove very convenient for drilling holes of small diameter in various thin materials that are no thicker than the depth of the slot.—Edwin M. Love, Alhambra, Calif.

Double Hasp for Sliding Door

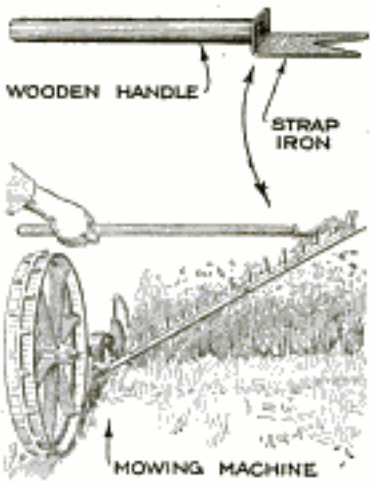
By using a double-jointed hasp, such as shown in the drawing, on double sliding doors, and two padlocks, the door can be unlocked from either inside or outside.



Two ordinary door hasps are used, the butt ends of which are cut off to the proper length and then welded or riveted together as may be most convenient.—E. E. Lakso, Toledo, Ohio.

A Sickle-Guard Cleaner

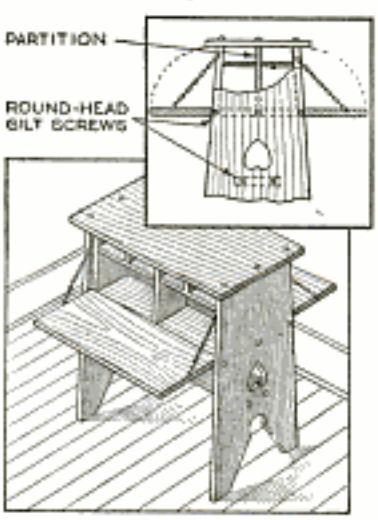
When mowing sweet clover, or other fine-stemmed hay, much trouble is generally experienced from dry trash or clover leaves sticking on the points of the guards and preventing them from entering the swath, thus leaving a strip of unmown grass.



When the sickle guards become thus clogged, it is usually necessary to back up the team, lift the bar and clean out the trash. To save time spent in dismounting from the machine, and also to protect the fingers against dangerous cuts, the simple cleaner shown in the drawing may be made from a piece of sheet metal screwed to the end of an old rake handle. By lifting the cutter bar with the foot, the cleaner can be used from the seat to push the trash from the points of the guards.—Geo. G. McVicker, North Bend, Nebraska.

A Double Desk for the Children

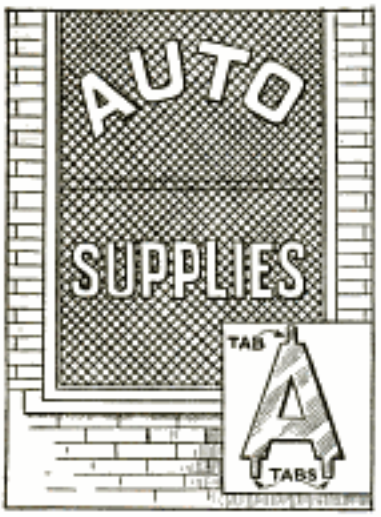
Having two boys attending school, and both wanting a desk in which to keep their work and stationery, the double desk shown in the drawing was designed and built, to avoid the necessity of buying or building two separate desks.



The desk shown is divided in the center by a horizontal partition, and a hinged writing leaf, which also serves as a cover, is provided for each half. Oak lumber was used, and after the work was finished, the desk was stained to harmonize with the rest of the furniture in the room.—A. C. Westby, Porter, Minn.

Metal Letters for Wire Screens

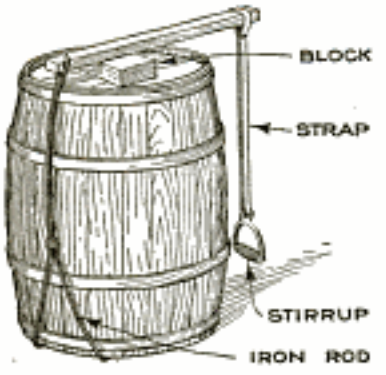
The heavy wire screens commonly placed over windows on shops, garages, etc., as a protection against stones and the entrance of thieves, can be used to advantage for advertising purposes by attaching suitable sheet-metal letters and characters to the mesh.



The letters can be cut from any kind of sheet metal to the size and form desired, the only tools needed being a pair of tin snips, a cold chisel, and a file for finishing off any rough edges. Ears or tabs of suitable length are cut so that they can be slipped over the mesh and bent back to hold the letters in place. Such a sign is clearly legible in the daytime, but is even more conspicuous at night, when the window behind it is illuminated.

A Barrel Header

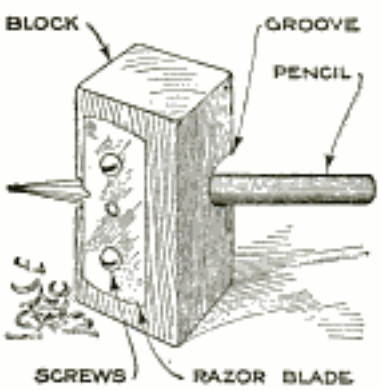
Barrels that contain apples, or other perishable or fragile articles, require that the packing be compressed firmly, so that the packed container may stand rough treatment in shipment with the least possibility of damage to its contents.



A useful contrivance, by means of which one man can press the heads of barrels into place, leaving both hands free for other operations, is shown in the drawing. It consists of a piece of ⅜-in. iron rod, bent into the form shown and provided with hooks at the ends to fit under the lower chine. One end of a short wooden lever is inserted in the eye, and a block is placed on the head of the barrel. The proper downward pressure is obtained by means of a strap slipped over the outer end of the lever, the pressure being applied by inserting the foot into the stirrup at the lower end of the strap, and bearing down, when the head may be nailed.

A Simple Pencil Sharpener

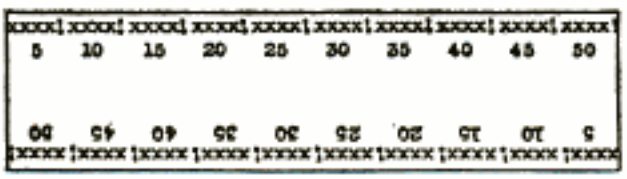
Another of the varied uses to which safety-razor blades may be applied is in the construction of a simple pencil sharpener. A block of wood, about ¾ by 1¼ by 1½ in. and two small screws, together with the blade, are the only materials needed, and a pocket-knife or round file, and a screwdriver, the only tools. A round-bottom groove is cut or filed diagonally across the block; this is cut so that when the blade is mounted, as shown in the illustration, the edge of the blade will project over the edge of the groove about ⅛ in. When the pencil is placed in the groove and drawn across the cutting edge, a small shaving will be cut from the wood, the pencil being revolved between cuts. The slope of the groove will give the proper angle to the pencil point.—Geo. G. McVicker, North Bend, Neb.



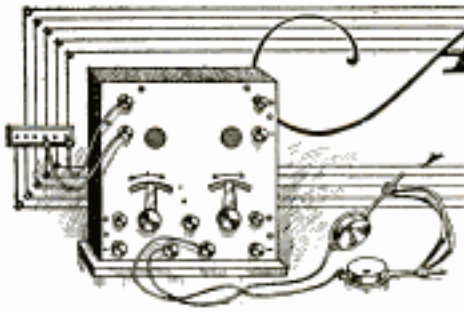
Spacing Rule for the Typewriter

For spacing odd lines of typewritten matter so that they will "balance" and give a neat appearance, the spacing rule shown in the drawing will be found almost indispensable.

The rule is typed on stiff paper, each fifth space being indicated by an exclamation point or some other distinguishing character. For additional convenience, the rule should be printed on both edges and on both sides so that it will be ready for use no matter how it may be picked up.—Harold R. Harvey, Claremont, Calif.



A Spacing Rule for the Typist That Makes It Possible to "Balance" Odd Lines of Poetry and Other Typewritten Matter



A CONCEALED LOOP AERIAL

By F. L. Brittin

NEARLY all designs of loop aerials now in use demand a considerable amount of space, and this is usually at a premium in the average amateur's radio laboratory.

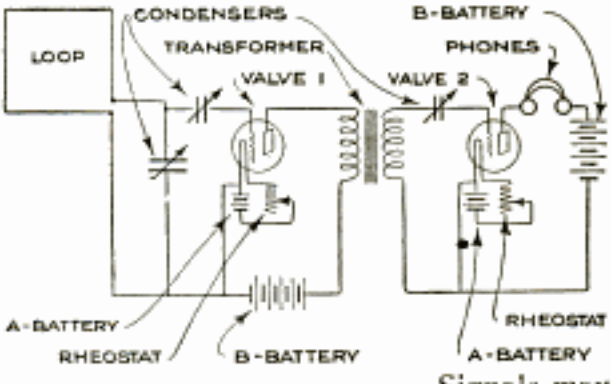
The loop illustrated in the drawing, although slightly directional in its performance, will be appreciated by those who need the extra room and are not "finicky" about directional values. It is of particular value to the jeweler who receives his time by wireless and does not wish to mar the interior of his store with unsightly equipment, or to the amateur living in a small apartment.

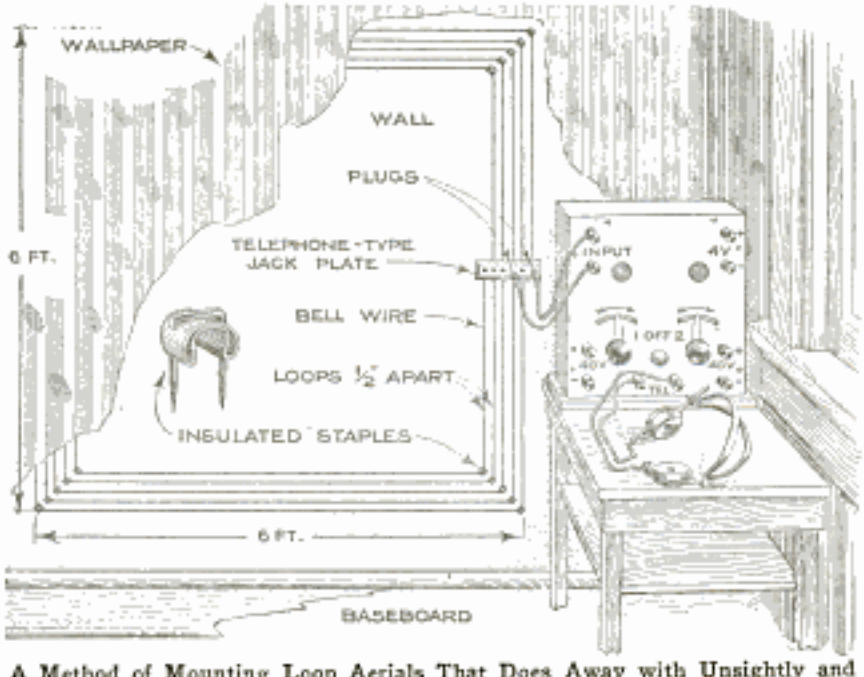
Select a 6-ft. wall space, and wind the loop as in the drawing, using five or more turns of wire, which may be common bell wire, fastening it at the corners with insulated staples, and spacing the loops ½ in. apart.

The brass plate is of the switchboard plug-and-socket type, obtainable from electrical-supply houses, a socket being provided for each loop of the aerial. Push-button (of the flush-plate, wall-type) or snap switches may be placed above or below the plate for the purpose of cutting out dead ends. The wires may be concealed by mounting a wallboard panel over them, about ½ in. from the wall, and covering the panel with wallpaper of the same design as on the wall. At a distance of a few feet, the panel will be practically unnoticeable. If this is done, the plug plate must be mounted on the front of the panel; the wires may, if desired, be mounted on the back, thus making the loop readily portable; this method is, indeed, preferable.

The following table is given as a guide to those who wish to know the number of turns necessary to receive a definite wave length, using a 6-ft. loop:

Wave Length, Meters	Turns
200 to 250	2
400 to 600	4
600 to 800	7
800 to 1,000	10
1,600 to 2,000	20
2,000 to 3,000	30



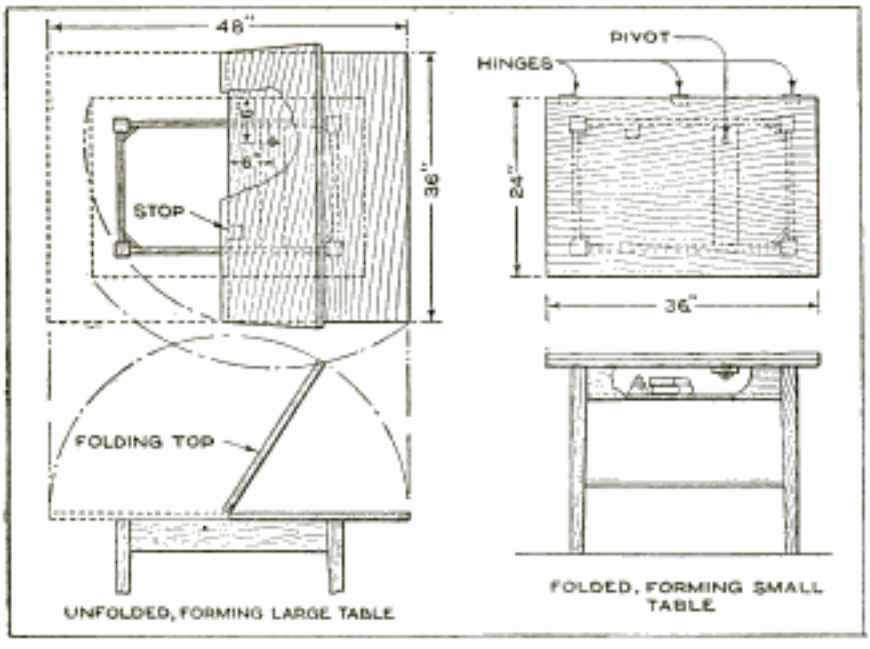


A Method of Mounting Loop Aerials That Does Away with Unsightly and Bulky Frames: The Wires may be Concealed by a Wallboard Panel

Signals may be heard at wave lengths greater than those for which a loop is intended, but never less; this is important to remember when tuning in on short wave lengths, and care should be taken to cut out dead-end effect. Loop aerials work on a great variety of circuits, but the best results are obtained with the high-amplification circuit given in the smaller drawing.

A Convertible-Top Table

In these days, when it is not only desirable but absolutely necessary in some cases to obtain maximum economy as far as the space occupied by furniture is concerned, the convertible table herewith described represents a long-sought improvement.



Increasing the Capacity of an Ordinary Table by Two by Adding an Extra Top and Pivoting the Whole So That It can be Swung in a Semicircle

It has two tops, each 24 by 36 in., made of suitable material and thickness to prevent warping. These are joined together along one of the long edges by three hinges, so that they can be folded. The rest of the table must be well braced because the top is not fastened to the frame. The pivot point is located 6 in. from the center line and from the edge, as shown. A crosspiece of 1 by 3-in. material is fastened to the inside of the table frame, and the location of the pivot point transferred to it. One method of pivoting the table consists of a simple bolt through the lower top and the crosspiece, and countersunk in the top.

A stop block is fastened to the underside of the lower top in such a manner that when the top is swung around, it will be brought to a stop in the proper position. Hooks or latches, not shown in the drawing, may also be used for locking the tops in their respective positions.—Franz Szabo, Kewanee, Ill.

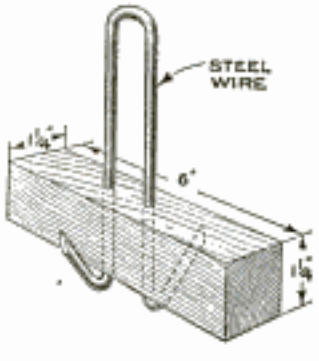
¶A solution of potassium hydroxide applied to a painted surface and permitted to stand for several hours makes it possible to wipe off the old paint with a rag.

A Simple Typewriter Code

A simple secret code that is very easy to write, provided both parties have typewriters of the same make, consists in using the extra characters and figures with which every machine is equipped. Thus, when writing a letter that it is not desired every one should read, the characters and symbols are used instead of the ordinary alphabetical characters. Such a letter will be a jumble of characters and symbols that will be practically undecipherable to anyone not possessing the key. The communication can be made still more mystifying by occationally inserting a word written in the ordinary characters. A sample sentence "will arrive at six fifteen; be sure and be there," as rendered by the typewriter code, might read "28 # @44'3 @5 $8) f8f533:. Be $743 @:% "3 5=343." Obviously any other combination of symbols can be similarly used.—Geo. E. Perkins, S. Bound Brook, N. J.

Hook for Lifting Window Screens

Instead of carrying window and door screens through the house to an upper floor, with consequent peril to bric-a-brac and interior finish, a simple grappling hook permits the screens to be drawn up from the outside.

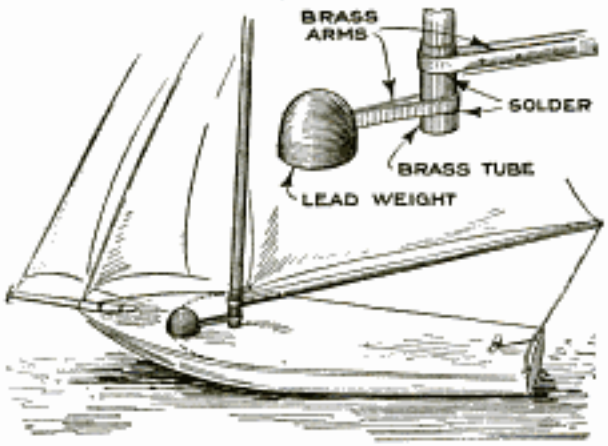


The crossbar should be set low down on the hook to prevent it from turning and perhaps dropping the screen. Set all the screens for the upper floors against the house directly underneath the windows in which they belong, and with the screen side toward the house. Then lower the hook at the end of a cord and it can be easily caught under the center of the top crossbar of the screen frame, which is then drawn up and placed in position.

Live Ballast for the Model Yacht

When the skipper of a racing sailboat goes out for a speed trial he usually carries "live ballast"; that is, two or three of his crew shift their weight to the windward side of the boat, as may be necessary. This permits him to carry a greater spread of canvas than would otherwise be possible.

With a model yacht the same effect can be obtained by using the attachment shown. A 1¼-in. length of brass tubing, large enough to slip over the mast, is obtained, and a strip of sheet brass is bent around the tube and soldered, the end of the boom being lashed between the ends of the strip. A similar brass arm, about half the length of the beam, or width, of the boat, is soldered to the tubing exactly opposite the boom. A ball of lead is soldered to the outer end of the second arm.



A Simple Counterbalance Applied to the Mainsail Boom of a Model Yacht Takes the Place of "Live Ballast"

When completed, the tube is slipped over the mast and several turns of wire are made around the mast just above it, to keep the boom from working up. The proper weight for the lead ballast must be found by testing the boat in water.

The action of the device is simple; when the boom is forced out by the wind, the ball of lead is swung out over the windward side, tending to balance the pressure of the wind on the sail.—Edwin M. Love, Alhambra, Calif.

Frame for Displaying Documents

Old or historic documents and papers are conveniently displayed by placing them between two pieces of glass mounted in an ordinary picture frame; this arrangement permits both sides of the document to be examined and also makes the watermarks visible.—J. Alexander, Lincoln, Neb.

Old Pipe Aids in Building Fence

When stretching some poultry netting to inclose a run, I found considerable

A Piece of Old Pipe Inserted through the Individual Meshes of Poultry Netting to Make the Bottom Tight and Prevent the Fowls from Crawling under It

difficulty in making the wire sufficiently tight at the bottom so that the fowls could not crawl under it.

I had intended to drive stakes into the ground and attach the wire to them, but before doing this, I thought of some old water pipe that had been thrown on the junk heap because it was cracked. One of these pipes was drawn through the individual meshes near the ground, with the result that a much neater and more effective piece of work was obtained than if the stakes had been used.—John Y. Beaty, Chicago, Ill.

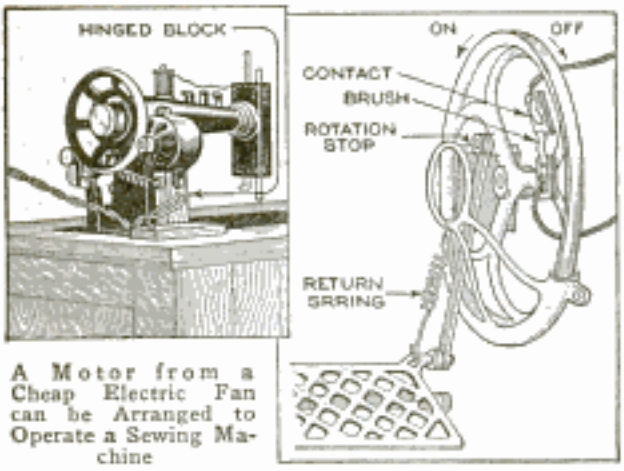
A "Daylight-Saving" Clock

In communities where daylight-saving and standard-time systems overlap, much confusion and some inconvenience is caused by the difference in time indicated by the clocks in stations and other public places, which, despite conspicuous placards, are often misread.

However, by putting two hour hands on such public clocks the confusion can be practically eliminated. A red hand is used to indicate daylight-saving time, while the regular black hand shows the standard time, which is in all cases an hour slower than the former. A sign below the clock explaining the position of the two hands further serves to avoid misunderstanding.—Richard F. Lufkin, Medford, Mass.

Attaching an Electric Motor to a Sewing Machine

The electric motor shown attached to the sewing machine in the drawing was taken from a small electric fan, costing about $5. The cast-iron base was taken



A Motor from a Cheap Electric Fan can be Arranged to Operate a Sewing Machine

from the motor, and a wooden support fitted in its place; this block is long enough to hold the motor at the proper height, and stands on a flat wooden base to which it is attached with a hinge, permitting the motor to swing toward the flywheel of the machine. A spring is used to keep the pulley in close contact with the flywheel. A single bolt, passing through the belt hole, holds the wooden base to the sewing-machine table. A disk of rubber, about ¾ in. in diameter and ⅜ in. thick, was cut and tightly fitted onto the shaft of the motor, and a groove was formed in this disk by running the motor and holding a sharp round file against the edge of the disk, the finished diameter of which was about ⅝ in. As motors of this type are small and do not operate the machine at much more than 400 stitches per minute, only one speed is needed, thus doing away with the need for some device to control the speed. All that is necessary is to fit a contact-making device to the treadle wheel, as shown in the drawing.

A block of wood is screwed to the side of the cabinet and between the spokes of the wheel, to limit its rotation to about 3 in. when the pedal is pressed down. Another block is fitted to the wheel spokes to carry the brass brush. A wire is connected from this brush to a flexible extension; the other wire is connected to a contact piece mounted on a hardwood block attached to the cabinet.

In operation, the treadle is pressed down and the crank rotates the wheel in the "on" direction as far as the wooden stop will allow. At this point, the brush should make contact with the contact piece and start the motor. When the treadle is released, the spring returns the wheel to the position shown, and breaks the circuit.—A. D. Robbins, New York, New York.

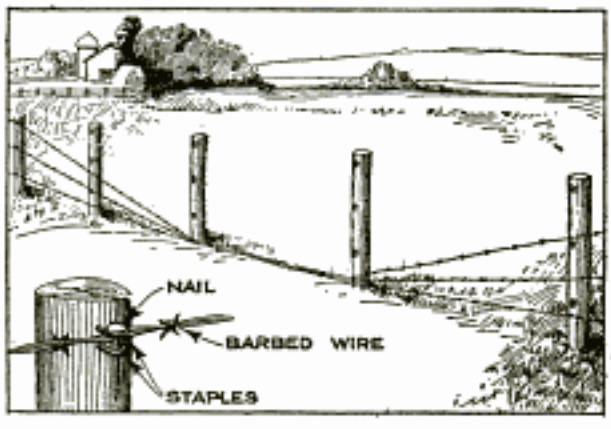
Sunbeam Used as Sight Line

It is sometimes necessary to erect a row of stakes when a line that is long enough to serve as a guide in setting them is not at hand. If the sun is shining and there are no obstructions in the way, a small pocket mirror can be used to run the line. The two end stakes are placed and the mirror is fastened to the top of one of them so that the beam of reflected sunlight is focused on the opposite stake. It will now be seen that there is a straight beam of light between the two stakes, and the other stakes to be placed are moved about until they are directly in this beam. It is necessary to commence placing the stakes from that one which is farthest from the mirror.—Geo. E. Perkins, S. Bound Brook, N. J.

Gate Made in Fence without Cutting Wires

Farmers often loosen the wires of a fence from a few posts and weight them down to make a temporary opening which can easily be made into a permanent gate that the casual observer would hardly notice.

Instead of fastening the wire to the posts in the usual manner, staples are driven horizontally on each side of the wire. The staples are set into the post far enough to leave an eye through which



A Simple Method of Making an Opening in a Wire Fence Where a Gate of the Regulation Type would Seldom be Used

a nail is inserted to hold the wire to the post. The wires are kept down by hooking them over nails driven into the posts near the bottom.—Warner H. Ellis, Mt. Vernon, Ill.

PRIZE OFFERS

SMITHSONIAN INSTITUTION COMMISSION TO PROMOTE NATIONAL GALLERY OF ART

The board of regents of the Smithsonian Institution, at a special meeting held May 27, created the National Gallery of Art Commission, whose primary functions will be to "promote the administration, development, and utilization of the National Gallery of Art at Washington, including the acquisition of material of high quality, representing the fine arts, and the study of the best methods of exhibiting material to the public, and its utilization for instruction." The collections already acquired by the National Gallery of Art have a value of about $7,000,000, and with reasonable encouragement the development of Washington as a great art center is assured. The commission will at once proceed with its work of developing the usefulness of the National Gallery of Art, and immediate attention will be given to the provision of a suitable building to house the valuable art works already in the custody of the nation, and to provide for the future expansion of the collections. The gallery is at present inadequately installed on the first floor of the Natural History Building of the National Museum. The National Gallery of Art is an institution in which every American citizen should take interest and pride. Its proper development will insure America's standing in the field of art.

MEDALS, DIPLOMAS, AND MONEY AWARDS FROM THE FRANKLIN INSTITUTE

The following awards are offered by the Franklin Institute:

The Franklin Medal (gold medal and diploma) to those workers in technology, without regard to country, who have done the most to advance a knowledge of science or its applications.

The Elliot Cresson Medal (gold medal and diploma) for discovery, original research work, invention, unusual skill or perfection in workmanship, or any other work that is of value to humanity, irrespective of commercial value.

The Howard Medal (gold medal and diploma) for important development of previous basic discoveries, inventions, or products of superior excellence, and for papers of importance that have been published in its journal.

The Edward Longstreth Medal of Merit (silver medal and diploma) for inventions of high order and for particularly meritorious improvements in machines and mechanical processes.

The Certificate of Merit, for persons adjudged worthy thereof for meritorious inventions, discoveries of improvements in physical processes or devices, and for papers of particular merit published in its journal.

The Boyden Premium. Uriah A. Boyden, of Boston, Mass., has deposited with the Franklin Institute the sum of $1,000 to be awarded as premiums to any resident of North America who shall determine by experiment whether all rays of light, and other physical rays, are or are not transmitted with equal velocity.

The Secretary of the Franklin Institute will furnish any further information desired.

PRIZES FOR ESSAYS BY ENLISTED MEN ADVOCATING MILITARY TRAINING

The proof of the pudding is in the eating, and no man is better suited to talk on the subject of the benefits of military training than the man who has been trained himself—the enlisted soldier. For this reason the adjutant general has announced a prize-essay contest to be conducted among the enlisted men in each corps area on the subject, "The Benefits to the Nation and to the Individual of One Month's Training in a Citizens' Military Training Camp, Red Course." The essay is to be of not less than 200 words nor more than 500 words; and it may be constructed in any form, such as a letter, a dialogue, an article for a periodical, or copy for an advertisement. Five cash prizes—$50, $25, $15, $5, and $5—for each corps area will be offered. Any enlisted man desiring to enter the contest can secure all information from his commanding officer.

TWENTY-THREE PRIZES FOR PHRASES DESCRIBING EDISON PHONOGRAPHS

Prizes to the value of $10,000 for phrases which most aptly and completely distinguish the new Edison phonograph from all other sound-reproducing devices are offered by Thomas Edison. The contest is open to everybody. The conditions are that the phrase shall not be more than eight words in length—a hyphenated word counting as one. Phrases may be either original or quotations from well-known authors. Ideas will rank higher than literary style. All phrases must be submitted on blanks that may be obtained from any Edison dealer. On the back of these blanks is complete information regarding the amount of the prizes, and all other particulars. The first, second, and third prizes are, respectively, $5,000, $2,000, and $1,000. Twenty prizes of $100 are offered for the fourth choices. Where an Edison dealer is not within reach, information may be obtained by addressing: $10,000 Contest Department, Thomas A. Edison, Inc., Orange, N. J.

ONE MONTH'S OUT-OF-DOOR VACATION WHILE TRAINING AT CAMP GRANT

What better vacation could a young man have than one month out of doors, with all the advantages of the best of good-fellowship, and the most beneficial kind of physical training, with all expenses paid by the government? This is what is offered by the Citizens' Military Training Camps Association at Camp Grant, Ill., July 21 to August 20, 1921. The opportunity is open to men between the ages of 16 and 35, and entails no subsequent military obligation. The aim of this and similar camps is to promote good citizenship and an interest in national defense. The War Department plans to bring together young men of all occupations on a basis of equality under the most favorable conditions of outdoor life. All information may be obtained by addressing Major Allen R. Edwards, 210 Mallers Bldg., Chicago, Ill.

THOUSAND-DOLLAR PRIZE FOR BEST ESSAY ON CONTRIBUTIONS OF JEWS TO HYGIENE

A prize of $1,000 is offered by the Jewish Publication Society of America for an original study in the English language dealing with "Contributions of Jews to Hygiene." The competition is open to the members of the faculties and the students of all universities in the United States, as well as certain Jewish colleges, and also all schools and institutions of research, such as hospital, municipal, and state laboratories. The work should not contain less than 40,000 nor more than 60,000 words, and must be original. The manuscript must be in the office of the society, 1201 North Broad St., Philadelphia, Pa., on or before Nov. 1, 1922.

PRIZES FOR SOLUTIONS OF A MYSTERY OFFERED BY THE COSMOPOLITAN

The Cosmopolitan Magazine offers $5,000 in cash prizes for the cleverest replies—to the length of 500 words or less—to the question, "How might the famous Montalais jewels be recovered?" referring to the mystery of the disappearance of these jewels as related in "Alias the Lone Wolf," a serial by Louis Joseph Vance now appearing in that magazine. The contest is open to anyone, whether a subscriber or not to the Cosmopolitan. The solution must be mailed not later than by midnight of Aug. 12, 1921. There are four prizes of $2,000, $1,000, $500, and $250 respectively, besides 25 prizes of $50 each.

GORDON BENNETT AIRPLANE TROPHY IS REPLACED BY COUPE DEUTSCH

Last year when the Gordon Bennett Trophy, which for so long had been regarded as the blue ribbon of the airplane world, was won outright by the French competitor, it was thought that that would be the last of these great speed races. However, a substitute is

offered, and the race will be over the same course as the old Gordon Bennett, with some modifications of conditions, and the name of the trophy changed to Coupe Deutsch de la Meurthe, to be popularly known as Coupe Deutsch. The trophy is valued at 20,000 francs, and there will be a money prize for the winner each year for three years, of 60,000 francs. The new conditions remove all previous restrictions, and there will be no minimum landing speed, nor any load required over the weight of the pilot and the fuel. The course will be from the airdrome at Villesauvage south of Etampes to La Marmogne, near Gidy, and back, a distance of 186 miles. The race will be on October 1, and entries close August 27. Machines must be at Villesauvage by September 30.

THE CHICAGO TRIBUNE OFFERS A PRIZE OF $5,000 FOR BEST MURAL DESIGN

A prize of $5,000 is offered for the design which shall prove most suitable for the embellishment of the city room in the new plant of the Chicago Tribune. The design must express pictorially significant phases and episodes in the history of journalism. The Chicago Art Institute has consented to be the direct medium of communication between the Tribune and competitors for this prize. The Art Institute, moreover, on its own account, offers ten free scholarships, on a competitive basis, for the painters who take up work on the Tribune designs. These scholarships will be open to painters, not now enrolled, who shall enroll before Oct. 1, 1921, in the Art Institute school for the year of 1921-22. Any such enrolling artist who desires to compete in the scholarship contest must send in with his application: (1) a composition in color, (2) five life drawings, and (3) a life painting, all to be submitted by Sept. 15, 1921, addressed to the Mural Scholarship Competition, Chicago Art Institute. In the contest for the Tribune prize, after the most appropriate design has been selected, the execution of it will provide the successful competitor, and four of his colleagues, remunerative employment for probably about two years, for the room to be decorated is very large, comprising three principal panels, the largest of which is 37 ft. long and 15 ft. high. Contiguous to this is another panel 18 ft. long and 15 ft. high, making a wall space, including the intervening pilaster, of 855 sq. ft. to be decorated. The third panel is 22 ft. long and 15 ft. high. Besides these there are nine smaller panels averaging 21 ft. long and 7 ft. high.

The themes for the decoration of the three large panels are indicated by the Tribune, as follows: (1) The bringing in of the verdict of not guilty in the case of King vs. Zender for libel, a case of great historical importance in colonial annals of the American people; (2) The sitting of the American congress in which the constitutional amendments safeguarding the liberty of the press were adopted, such provisions not having been incorporated in the original instrument; (3) Prewar conference in the old Tribune office in the late 50's between Abraham Lincoln and the early editors of the Tribune, concerning measures which eventuated in the liberation of the slaves and "union one and indivisible." The subjects and inscriptions for the smaller panels have not yet been decided upon.

CONTESTS PREVIOUSLY ANNOUNCED

Students of Railroad Engineering: Scholarships; announced March, 1920; closes Dec. 31; offered by the Southern Pacific.

Essays on the Life of Roosevelt: Scholarship prizes valued at $1,000, $750, and $500; announced Aug., 1920; closes Dec. 31; address, Woman's Roosevelt Memorial Association.

New Methods of Testing Hardness of Metals: Prize $1,000; announced Oct., 1920; closes Jan. 1, 1922; address, Institution of Mechanical Engineers, London, England.

Piano and Strings Quintet by an American Composer: Prize $500; announced July, 1921; closes Nov. 1; address, M. Gobert, 4 W. 130th St., New York City.

Painless Animal Trap: Prize $500; announced May, 1921; closes Oct. 1; address, American Society for the Prevention of Cruelty to Animals, New York City.

Essays on Economics: Prizes, $1,000 and $500; announced June, 1921; closes Dec. 31; address, Dr. Wm. T. Foster, Newton 58, Mass.

AMONG OUR READERS

UNSAFETY OF "SAFETY ISLES"

INSTALLATION of so-called "safety isles" at street intersections and trolley-loading points is now standard practice in many large cities. In most cases these isles are merely concrete platforms a few inches higher than the pavement. That their safety is largely a state of mind is indicated by an incident observed by Harry Seaman at Broad and Market Streets, Newark, N. J., a short time ago, in which the absence of casualties is creditable to good fortune rather than to protection. The driver of a light truck swerved sharply to the left as a small car cut in unexpectedly ahead of him, and the truck rolled up onto the safety isle with scarcely a jar, as illustrated in one of the pictures. The other view indicates the casual and confident manner in which the isles are commonly occupied, their very name engendering a false sense of security. This and similar incidents in all large cities seem to show that the usual form of safety isle has little more protective value than a prohibited area painted on the pavement.

A POPULAR MECHANICS SUBSCRIBER 72 YEARS A CHURCH ORGANIST

As a present on her 83rd birthday, the children of Mrs. H. G. Cole, Marietta, Ga., gave her a year's subscription to Popular Mechanics, of which she has always been an interested reader. Mrs. Cole is distinguished in the community as a veteran church organist, having served in that capacity continuously for 72 years. She began at the age of 11, by playing a small organ in the local Episcopal church, and has been a devoted church organist ever since.