

-CURRENT- IDEAS

SCIENCE-MECHANICS-RADIO

January

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CENTS

Vol. 1, No. 1

1927





Do This To An Old Tire and Make \$150 Every Week!

Simply Drive Nails into an Old Tire in Front of Big, Interested Crowds and Make from Ten to Twenty Sales an Hour! This is Absolutely the Most Startling, Spectacular, and Thrilling Demonstration You Ever Saw! Just Think—No Matter How Many Nails You Drive into an Old Tire It Won't Puncture—It Won't Leak a Bit of Air—You Can Pull the Nails Out and Drive Right Away!

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Each age, from earliest days of historical significance, has brought into the world ideas of its own, and improvements over the ideas of preceding ages.

It's a long jump from the ox-cart to the aeroplane, from the kettle of boiling water to the steam engine, from the candle to the quartz lamp, from the Daguerrotype to the modern cinema.

CURRENT IDEAS contributed by each generation have brought us to the present era of better living, more leisure, and a happier existence.

In the year 1746 when Benjamin Franklin discovered that he could draw electricity from the clouds with a kite string and a door key, little did he dream that by the simple pressure of a button, or by the turning of a switch, a whole city of hundreds of square miles would be lighted up; little did he dream that the transportation system of a world would be propelled by the same power.

When Watt began his experiment after seeing steam lift up the cover of a tea kettle, little did he dream of railroad engines carrying their precious carloads of passengers and express, at the rate of eighty miles per hour and more. When Daguerre, the Frenchman, made his tintypes he certainly had no thought of seeing every movement of the human body, even to the flicker of an eyelid, portrayed in actual motion on a screen.

And so it is that ideas of even crude beginnings have been combined with other ideas for the furtherance of the human good.

All ideas are worthy of expression. Thought is the propeller of the modern world. No matter how humble in the beginning an idea may in the end redound to the benefit of all mankind.

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CHARLES FRANK SMISOR, Editor

VOL. 1

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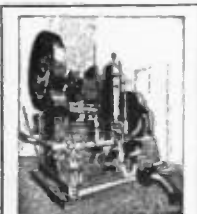
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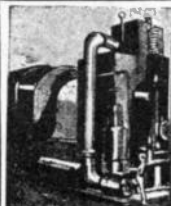
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the only electrical training I ever had. Herman Wittenberg, 1930 Grand Concourse, Bronx, New York.

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CURRENT IDEAS

SCIENCE—MECHANICS—RADIO

CHARLES FRANK SMISOR, Editor

VOL. 1

JANUARY, 1927

NO. 1

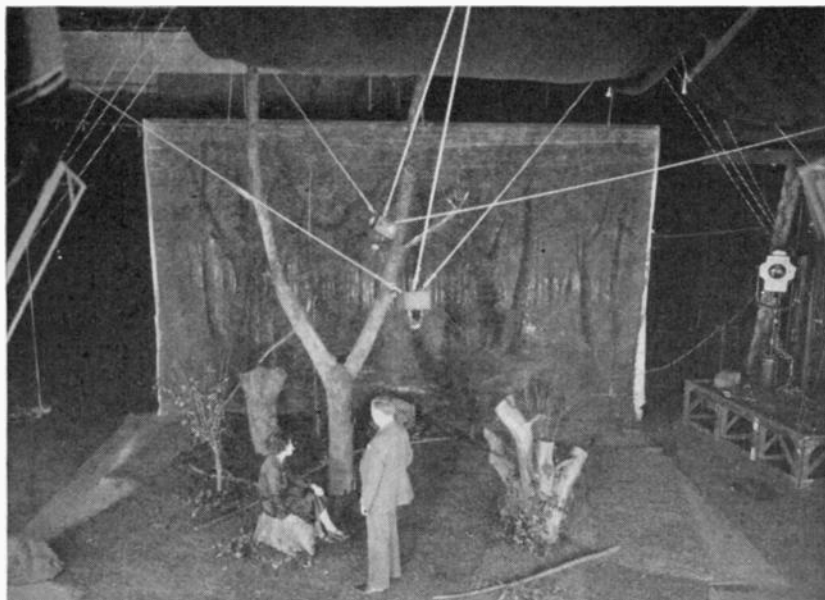
HEAR THE MOVIES

ACTION AND SOUND SYNCHRONIZED

IN the development of the motion picture industry the first films made demanded action. The kind of action was not essential, just so that there was something moving in the picture. Then movements were given more attention and our western plays gradually turned into drama. In the picture of today more than action is necessary for the perfection of a pic-

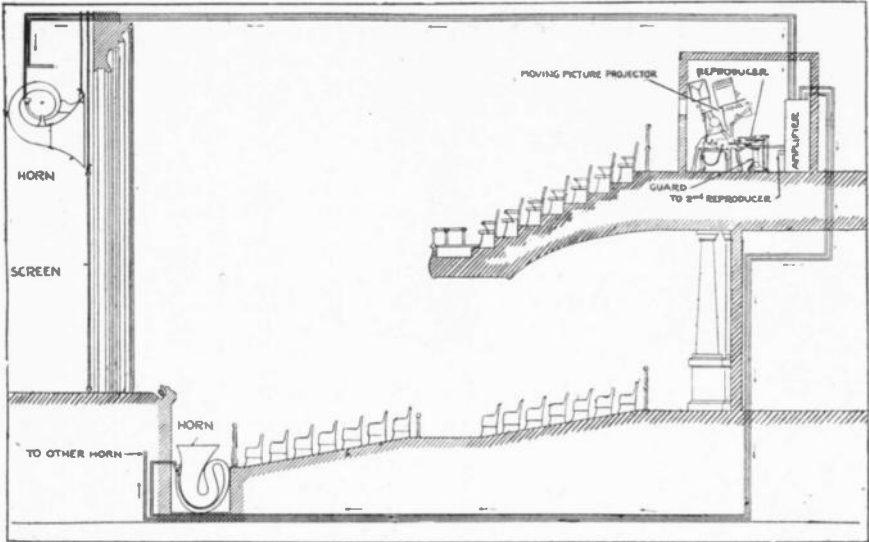
ture. Expression is one of the chief factors. Motion picture actors must have expression that will readily record on a film. This is one of the first essentials in picture making.

There was always something lacking in the projection of the picture which was partially substituted, but not entirely satisfactory and that was the typed explanation between the



© Western Electric

High quality microphones of an improved type are used to pick up music or other sound to be recorded in synchronization with motion pictures. Recording may be carried on at a considerable distance from the source of sound so that the actors or musicians may be grouped naturally and need not be crowded before a microphone. Development of this system of synchronization is a result of years of research.



© Western Electric
 Cross section of a typical motion picture theatre showing schematically the apparatus necessary for Vitaphone presentations, the system for perfectly synchronizing motion picture film and sound—speech or music. In reality the picture as it is shown on the screen speaks out and presents a similar scene to that of the stage with its live subjects.

scenes to take the place of the unspoken words of the play.

To bring the motion picture play up to the spoken stage play; many inventors have worked overtime to make this an actual accomplishment.

Various means were employed and one of them was the strip on the film at the edge of the picture which produced the voice through a selenium cell. This did not prove very satisfactory for many reasons. Pictures and speech were recorded together using the ordinary phonograph or gramophone for the spoken words, but this all did not prove very satisfactory until a method was worked out by organized research at the Bell Telephone Laboratories, the Western Electric Company, the Vitaphone Company and Warner Brothers, Inc.

Possibilities of Development

It requires little imagination to realize the possibilities of this development which can bring to music-hungry audiences even in small towns, great vocal and instrumental artists, not in person actually, but in a form which most nearly approximates a personal appearance. In addition, the original musical settings of feature films which hitherto have been possible only in

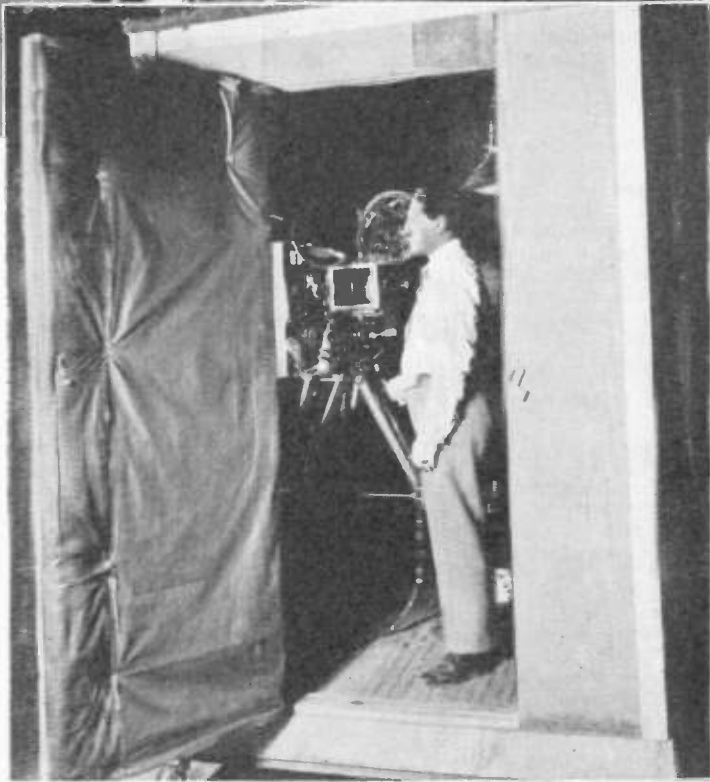
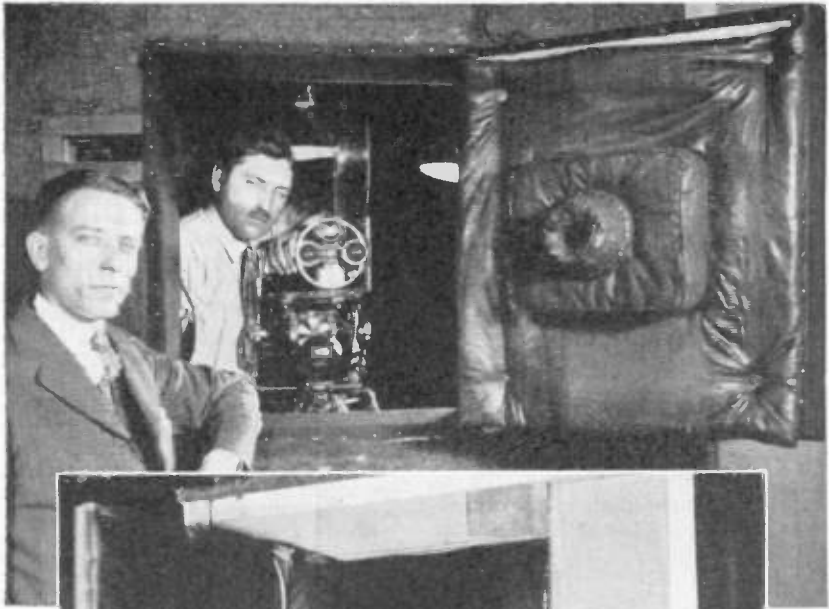
large cities where adequate orchestras can be organized will be retained for presentation through the medium of the Vitaphone.

The achievement of successful talking moving pictures exemplified in the brilliant performance of the Vitaphone marks the attainment of a goal which men long have sought for.

As the several arts of the telephone, the phonograph and the motion picture have advanced and developed, many men who have followed Bell and Edison in the field of speech transmission have striven to realize this ideal form of entertainment and historical recording. Thousands of others witnessing the remarkable achievements of the individual arts in their separate fields have speculated as to why the successful talking motion picture should be so long delayed of realization.

Synchronizing Action and Sound

To most investigators the big problem of successfully synchronizing sound with motion pictures appeared to be in the elements of coordination. As a matter of fact, that proved to present the least of all the difficulties. The really big job was one of adequate sound registration and reproduction.



© Western Electric

Camera man inside the new sound proof camera booth which is a part of the equipment used in making synchronizations of film and sound. Through its use the vocal entertainment will be made available in any motion picture theatre. Motion pictures are synchronized with reproduced sound having a naturalness never before attained.

When, however, the advance of pure and applied science put at the disposal of the telephone scientist and engineer a more adequate understanding of the mechanism of speech and hearing and better means for detecting, translating, transmitting, recording, reproducing and amplifying faithfully the intricate sound waves of speech and music, the door to the successful talking motion picture began to open. What the telephone scientist learned in his search for the solution of specific problems involved in telephony, found a by-product application in the motion picture field quite foreign to the main region of his interest. With the things at his disposal for faithful detection, registration and reproduction of intricate sounds at any desired level of loudness, application of his technical knowledge made the problem of the adequate talking motion picture a relatively direct though not a simple matter for solution.

Sound Registrations

Fortunately, when the telephone engineer was ready with the keystone of the arch the buttress of technique in the perfection of permanent sound registrations and in the high attainment of motion pictures were at hand.

All that the telephone scientist learned in developing each of these steps, has made it possible to open the door to successful synchronized motion pictures. Then came the co-operation of mechanical with artistic technique—and the Vitaphone stands revealed as the result.

Putting speech or music into motion pictures naturally divides itself into two jobs, to register the sounds and secondly, to synchronize them with the picture itself so the sounds are in step with the action.

The sounds are registered electrically. This operation employs high quality microphone of an improved type, electrical amplifying apparatus and a registration mechanism. Registering may be carried on at a considerable distance from the source of the sound. This permits the artists to be grouped naturally and not crowded before a microphone. Right here several problems arise if freedom of action on the part of the artist is to be permitted and faithfulness of the sounds produced secured to a degree that they may not be distinguishable from the music as actually rendered by the orchestra.

It has been customary in the phonograph art, which produces only audible entertainment, to increase solo parts to a level of loudness somewhat greater than the accompaniment which would of course not be the case in a stage performance. Similarly, in motion picture work, it has been customary to hold the attention of the audience on the important features of the picture by keeping such features in the foreground and enlarging them to greater than life size.

Sound and Relative Location

The first audible motion pictures combined these two practices. The result was disappointing. The eye and ear of the observer obtained separate impressions as to the relative locations of the various artists. These locations differed sufficiently to make the attention waver and forbade focusing. In addition, the enlargement of the artists made the music seem disproportionately low in intensity.

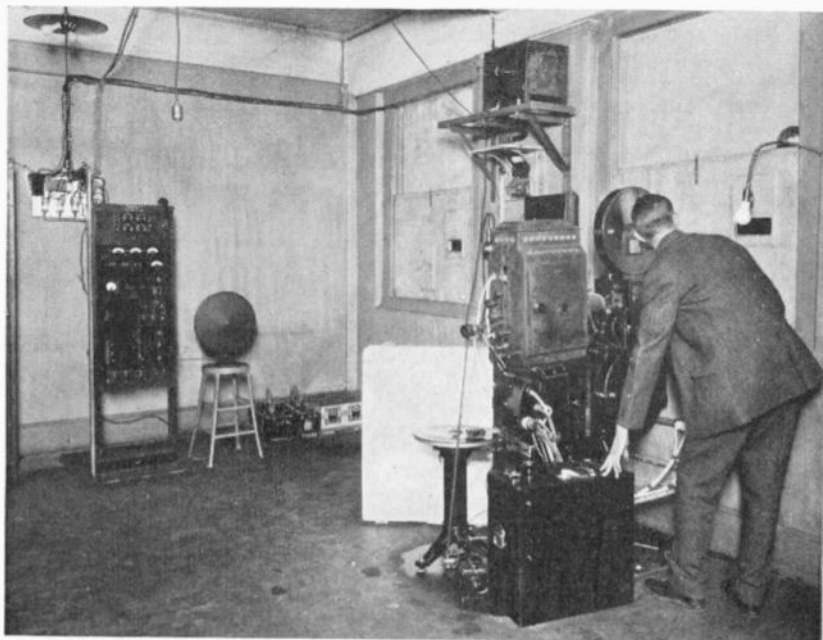
Later pictures, in which the sound was picked up as it would be by the ear of a listener to an original performance and the artists were shown in their natural sizes, removed these difficulties and gave an impression of absolute naturalness.

Experiment has shown, that the shape of the room and the position in which the curtains and other absorbing materials are hung play a part in the excellence of the music. By a proper control of the acoustic properties of the studio or auditorium, it has been possible to record the so-called "atmosphere" surrounding the music. When this result has been accomplished, the listener seems to "feel" the presence of the artists to whose registration he is listening.

Sound Reverberates

If a studio is too highly damped or as a musician would say, "too dead," all of the instruments lack the vibrant ringing tone which lends life and spirit to the music and to which we are all accustomed. In case of large orchestras and similar types of music, the reverberations in the theatre constitutes part of the musical and artistic effect.

With the use of electrical apparatus including amplifiers, the control of loudness is obtained by a simpler manipulation of the amplifier system. The only problem for the studio director in this case is to obtain the



© Western Electric

This projection machine gives the motion picture audience both visual and audible entertainment. It is part of a new system announced as perfect and by means of which complete musical programs played by the world's greatest musical organizations will be available in any moving picture house. Absolute synchronism of films with reproduced sound having a naturalness never before attained is accomplished by the new system. The projector is no more complicated from the standpoint of operation than an ordinary moving picture projector. No special skill is required of the operator. If the film breaks, there is no interference with the accuracy of synchronization.

proper balance among the various musical instruments and artists.

With this method proven to be the most suitable it was found possible to pick up sounds by means of microphones suspended overhead or wherever necessary. The sounds are transferred electrically to the registering mechanism located nearby or at a distance, whichever is most convenient.

Electrical Registering

The registering is done by an electrical reproducer which converts the electrical vibrations into mechanical vibrations. These in turn actuate the stylus which makes the indentations on the disk used to register the musical performance.

Following out the course of the sound vibrations from the time they are produced until they appear as an irregular groove on the master disk from which are made the disks used

later with the films when they are distributed, the sound is first picked from the air by means of a special telephone transmitter (microphone).

As the electrical vibrations representing sounds are brought to the register, they are re-transformed into mechanical vibrations which move back and forth a chisel-like stylus bearing constantly on the wax disk. This stylus rests on the disk just as a phonograph needle rests on its record but of course it is cutting the groove and therefore the wax is dug up by its chisel edge.

The disk upon which the sound is registered is the original or master from which other similar disks are made. This disk is considerably larger than the usual master disks used in recording for phonograph because it must carry sufficient registered impressions of sound to enable it to run at least fifteen minutes and

thus avoid any necessity of changing disks during the running of a film.

At this point with the film and registration made each in step with the other, comes the reproduction of the performance as it appears to an audience.

Machines on Motor Shaft

In reproduction there is no necessity for having the sound reproducer and the picture projector physically separate. Therefore, simplicity can be practiced and its desirability is obvious so the system can be easily operated with no necessity for unusual skill on the part of the operator.

To meet these requirements both the film and the sound device (register) are set in their respective machines with given marker indicating the starting point in the proper place and the two machines are then speeded up from rest together by having them coupled to opposite ends of the same motor. The speed of this motor is held constant by means of a special regulator, adaptable with slight manipulation to either alternating current or direct current.

Connected to Regular Projector

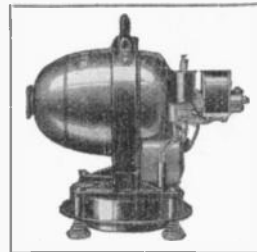
The driving mechanism is so arranged as to be capable of coupling to a standard motion picture projector without in any way modifying its internal arrangement. To bring the registered sounds to the audience, an electrical reproducer converts the movements of the stylus in the groove on the disk into electrical vibrations, which are connected to a loud-speaker of special design.

Regulation of the loudness makes possible the use of a volume of sound and the attainment of a degree of naturalness that gives the desired illusion as to the source of the sound.

In this way by combining three developments originating in the telephone art and employed in different applications of electrical transmission of speech synchronized music and films have become a fact. These three developments are: an electrical system of registration, electrical reproducer, link between the reproducer and the audience, and an adaptation of the well-known public address system, and taken together they make possible the day's new marvel.

SMALL HOME ELECTRIC PLANT

An electric machine with self-contained engine that is so small that it can be carried in the hand and will



Self contained electric plant.

light forty electric lights or run machinery up to one-half horse power seems incredible, but the illustration shows just such a small machine. These

self-contained plants are particularly adapted for use in summer homes, on the farm, in boats and camps. A plant can be carried to a place where it is to be used and set agoing for lighting and power.

The plant can be used as a single unit with or without a battery. Where a battery is used in connection with the plant it is so constructed that a push button will start it. The plant requires no foundation.

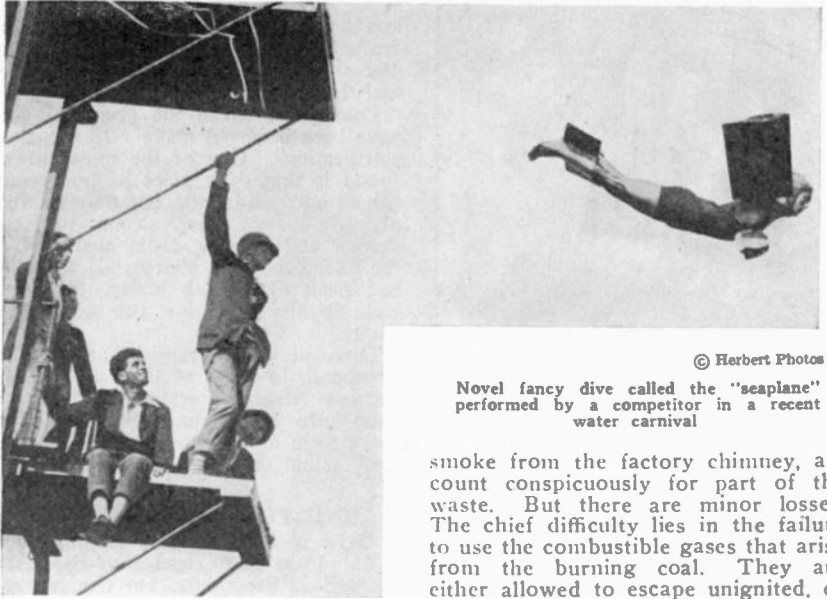
LARGE TURBINE GENERATOR

There was recently ordered from the General Electric Company, a 208,000 kilowatt turbine-generator, consisting of one high and two low-pressure units, for the State Line Generating Company of Chicago.

This turbine will be nearly three times the size of any now operating in this country, and approximately 40 per cent greater in capacity than any now being manufactured. In operation this machine will produce an amount of energy equivalent to over sixty per cent of the total amount of energy generated by the Niagara Falls Power Company at the famous cataract. In other words, it will supply an amount of electricity sufficient to haul 160 fully-loaded Twentieth Century express trains, or take care of the electrical needs of a city of 1,700,000 population.

The set when complete will weigh four million pounds, while the largest single piece will weigh 275,000 pounds. It will require about 400,000 gallons of water and 350,000 cubic feet of air each minute for cooling purposes, while more than two tons of low-grade Illinois coal will be consumed every minute that it operates.

WINGS FOR GRACEFUL DIVING



© Herbert Photos

Novel fancy dive called the "seaplane" performed by a competitor in a recent water carnival

At the playgrounds of our borders we find many a pleasure device used when swimming and bathing is in vogue at all seasons of the year. One of the latest diving attachments for the diver is shown in the photograph. This illustrates how a fancy dive can be made with the use of wings attached to the arms and feet that can be used the same as wings on an airplane in flight to carry the diver the same as a glider until he strikes the water.

With a great deal of experimentation the diver learned many fancy dives and made quite an exhibition at a water carnival. Cardboard wings and rudder was used and the diver who conceived the idea called his attachment the "seaplane."

SMOKE CAUSES GREAT LOSS

About 6 per cent of the coal that fills the fire boxes of the locomotive actually drives it across the country. The rest is wasted. Not more than 10 per cent of the fuel value of their coal is consumed in the furnaces of manufacturing plants.

The rain of cinders from the stack of the locomotive, the pillar of black

smoke from the factory chimney, account conspicuously for part of the waste. But there are minor losses. The chief difficulty lies in the failure to use the combustible gases that arise from the burning coal. They are either allowed to escape unignited, or are discharged without having done any service beneath the boilers, to expend their heat on the air.

The Geological Survey has estimated that the "smoke nuisance" costs the country, through waste of fuel, injury to merchandise, and unnecessary labor caused by clouds of soot, more than \$600,000,000 a year. There is, moreover, an undeniable menace to the public health through the polluted air of great manufacturing towns.

Much of this tremendous waste is at present unavoidable, because we have not learned how to utilize the energy of coal directly. Steam, and often electricity as well, must be generated before the power can be applied.

CENTER LINE ON PAVEMENTS

Center lines on paved roads has become a necessity. Its object at first was to keep the right and left sides of the pavement separate and to show the drivers where to keep their cars out of the center. However, this marking has served a double purpose. The driver naturally keeps close to the mark and away from the edge. This prevents the breakage and chipping of the pavement at the edges and saves considerable repair work.



© Herbert Photos

To quiet a wagging tongue this headgear is locked in position as shown to cover the mouth.

BACK TO MEDIAEVAL TIMES

Punishment may have taken steps farther than the old time stocks but we still have with us some forms of mediaeval days in the headgear as shown in the illustration. This headgear is one of the interesting exhibits shown at the exposition given by the police in Berlin, Germany. This is a punishment mask for the gossiper. The wagging tongue is effectively stilled with this iron muzzle which the offender is compelled to wear at various times, depending on the degree of transgression. Rather a crude affair but what can you expect if you fall into the hands of the law?

CURIOUS PETRIFICATIONS

Petrified objects are found in a great many sections of the world, and most of them in sections where limestone is prevalent.

Petrified wood is quite common. Bits of wood, pieces of bark, and small twigs are the more common, but in some places whole logs are found, and these are so well petrified as to show the bark as perfect as when the tree was growing. Different kinds of wood petrify. It depends more on the amount of lime than on the quality of timber.

In Arizona whole trees are petrified, and, in fact, whole forests have been turned into stone and some wonderful specimens are to be found there. The

petrified trees are sometimes cut up and converted into various articles of value.

Petrified moss is found in many places. It is very beautiful. Petrified grasses, leaves of trees, and petrified nuts and fruits have been discovered in some places. Petrified reptiles and small animals have also been found.

Cobs from which the grains of corn have been removed make rather curious petrifications. One of the most curious found is that of a piece of honeycomb turned into solid stone, but showing very plainly every honey cell, perfectly shaped and equally distributed just as the honey bees had built it. If the comb had been filled with honey, the water had dissolved it, for the cells were empty.

Petrified human remains are not uncommon. In some of the cemeteries in sections where limestone prevails in abundance bodies have been lifted to move them to other cemeteries, and they were found to be turned to stone.

UNICYCLE RIDERS PLAY

Here is a sport that requires real skill. Polo ponies get into the game as well as the riders, but the unicycle must be propelled by the rider while

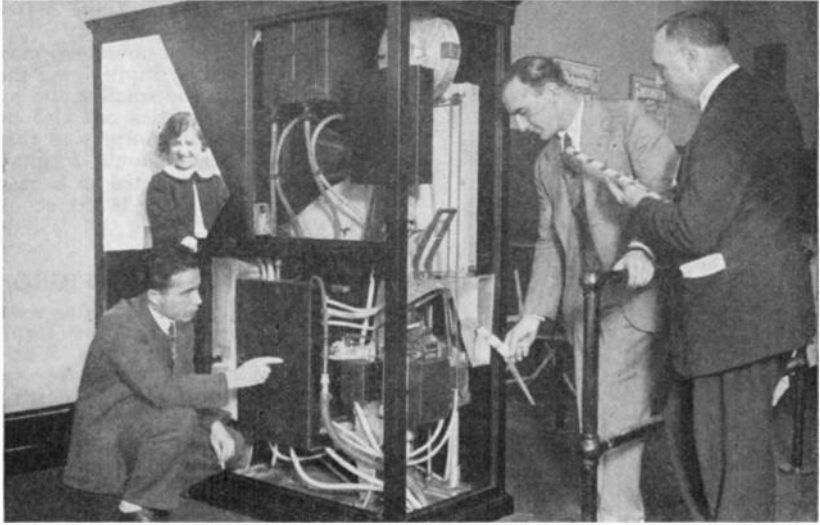


© Herbert Photos

Practicing the game of polo where the riders use unicycles instead of Ponies.

he plays the game. Few people can stick on a unicycle, not to mention playing the game while riding one, however, the game is being played. George Dormonde, of Los Angeles, is the sponsor of the new sport. He plays the game himself and is organizing several teams to play exhibition games.

SLOT MACHINE FOR PHOTOS



© Herbert Photos

The inventor of the machine, Mr. Anatol M. Josepha, of Siberia, is kneeling and explaining the operation of the machine as it takes the picture of the young lady in the booth.

THE photomaton is the name of the new invention that is designed to enable people to take their own pictures in strips, photographing directly on sensitized paper without use of either film or plate. The machine is about the size of a telephone booth. There is no operator, and the subject sits in the booth and drops a coin in the slot, assuming any pose he may desire.

The filming occupies twenty seconds, after which the machine completes the operations of developing and printing and delivers the finished photographs in exactly eight minutes. There are eight pictures on each finished strip. The tone is sepia and they are so clear that they can be enlarged to thirty times without loss of clearness.

RADIO DOES SWITCHING

Signal lights in railroad yards are doomed if tests hold true to their first performance in the yards of a belt line railroad. In the yards where this method has been tried out freight cars come from all directions and then they are made up in trains and sent out in many directions.

There is a hill in the yard called the "hump" and the incoming train is shoved up to the top of this hill and a car or group of cars is cut from the train to coast down the other side of the hill into the track for its destination.

The usual method of directing the switching is with colored lights set from a switchboard at the hump, but this system had many drawbacks. If there is a mist it obliterates the signals.

It was suggested that a radio system would give the same results between the hump and the locomotive. To make this test a small transmitter and receiver were built, the transmitter being installed at the hump and a receiver in the engine.

A code was then arranged for answers by the locomotive whistle. The radio performed its part well but the trouble came when the engine reached a mile and a half away and the whistle could not be heard.

After making these few tests the system was turned over to the yardmaster for practical operation. All that was needed to do was to push the button on the microphone and talk.



© Herbert Photos

A freak of nature where a pepper tree finds root in the side of a palm date

PEPPER TREE AND DATE PALM

A real freak of nature was discovered in Los Angeles recently with the finding of a full grown pepper tree with its roots embedded in the trunk of a date palm. Botanists who have examined the freak assert that the pepper tree derives all its nourishment from the juices of the date palm and has taken a firm root in the somewhat porous structure of the date.

SCALES COUNT IN NUMBERS

If one were entrusted with the task of counting 10,000 screws of approximately the size of a carpet tack he would probably consume the better part of a day, and if he were called upon to attempt the work every day he would really accomplish but little, relatively speaking, during the course of a year.

It was not long ago that a manufacturer of automobile horns and sirens devised a system of counting small parts going to make up such pieces, by weight and a certain sort of scales.

There are four "scoops," upon the scales. The upper, or smallest, scoop is known as the unit and any one part deposited in it is balanced by 25, 50 or 100 times its weight in the lower

scoops in consecutive order. Thus if it is desired to count 1,000 screws, ten are placed in the unit scoop and the lower scoop is filled until the scales balance.

Any other required number may likewise be attained by multiplying the number of units in the small scoop by 25, 50 or 100. The scales can also be operated in a manner contrary to that described, if desired, should a small number of parts be wanted in a case when the contents of the larger scoop are known.

PLANE BEATS CARRIER PIGEON

In a recent test, carrier pigeons were beaten by a plane flying from Hammondsport to Auburn, New York. The course of the plane was several miles farther than the pigeon's destiny but the plane won by three minutes. The time covering the fifty miles was fifty-one minutes.

START OF A CIRCUS OWNER

In the illustration is shown the youngest private circus owner in the country, a boy at the age of eleven years jumping a tea table on one of his horses. He rides and trains dogs, horses and ponies. He performs many



© Herbert Photos

Walter Handsaker making a vault over a tea table with his trained pony

skillful riding feats and gives many shows for charity. This is the beginning of a regular circus and shows what any boy with a turn of mind to own a show can do in the beginning.

Steinmetz the Mathematician

MR. CHARLES P. STEINMETZ'S early life was spent in Germany. While editing a socialistic paper he was imprisoned and the paper confiscated. There was not much evidence to be found against Steinmetz but he realized his career was threatened by the attitude of the government and he made haste to leave the country.

Dr. Steinmetz arrived in New York in 1889 penniless but soon found employment as a draftsman in a company making electric motors and generators. At this time his company was making a few motors and generators. Later on they worked on the problems of the electric street car. All designs for experiments passed through the hands of Dr. Steinmetz. Quarters for a laboratory were obtained and he began to specialize on magnet testing. His writings on electrical subjects began to attract attention and his discussion of the law of hysteresis created much interest on the part of the electrical engineers.

In the changing of ownership of several manufacturing companies, Dr.



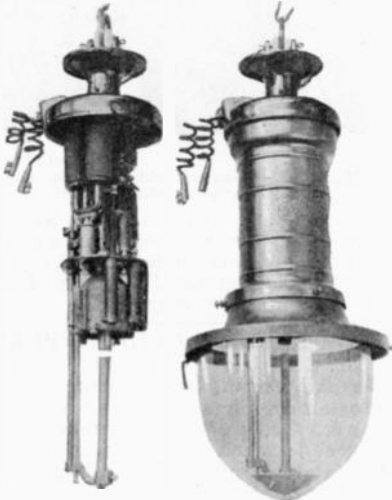
The two great inventors in front of the lighting generator, one of the inventions of Dr. Steinmetz.

Steinmetz was transferred to the General Electric Company.

He was president of the American Institute of Electrical Engineers for the years 1901 and 1902, of the Illuminating Engineering Society for the years 1915 and 1916.

He has written and published many books on electrical subjects. He was one of the foremost authorities on electrical engineering and one of the greatest mathematicians the country has had, his special achievements in the former being magnetics, symbolic method of alternating current calculations and transient phenomena.

Being a mathematician his most brilliant work as an electrical engineer, consisting of formulae and methods of calculation, are intangible and cannot be represented by pictures. He developed first a method, or law, of determining the hysteresis loss in electric motors; second a mathematical method of calculating the characteristics of the alternating current; and third a method of studying and understanding the so-



Magnetic arc lamp containing magnetite electrode and the lamp mechanism.

called "transient" currents, which include lightning. This current is worked with the lightning generator, which, of course, is a tangible piece of apparatus. His magnetic arc lamp also was a brilliant contribution to electrical developments.

ELECTRICITY AT PLAY

So powerful has electricity become in the great achievements of the day that its equally wonderful successes along minor lines are in danger of being eclipsed. In the lighter matters of life, however, electricity is a valuable servant and its results are often as fascinating as they are wonderful.

The dish of ordinary jelly hidden beneath a silver cover and still further shaded by a skilful arrangement of flowers, cannot fail to be a brilliant object when the cover is suddenly removed and the transparent jelly is disclosed to view, bright, glowing, ablaze at its very center, where an electric light is ingeniously placed so that its rays shine through the jelly in every direction.

More wonderful still was a table ornament once displayed by Edison. It was an aquarium containing goldfish, every one of which was a living light. The tiny fishes were all ablaze within and their delicate bodies showed clearly the details of their anatomy. Each had been induced to swallow a tiny electric lamp connected with a battery by two hair-like wires passing out of its mouth.

Jewels and flowers for personal adornment can be lighted by means of very small secondary batteries and walking sticks can be made startlingly brilliant. That great American institution, the rocking-chair, has also come under the spell of electricity. An American inventor has patented one that calls for no exertion on the part of the ease-seeking occupant. It moves by electricity and affords him the additional advantage, if he so desires, of gentle currents of electricity when he grasps the metal handles or places his bare feet on metal pedals.

The attraction that light exercises over fishes led the late Prince of Monaco, who, in his deep-sea soundings in the Mediterranean, observed that the movement of an incandescent light in the water never failed to draw the fish to itself, to design a fish trap lined with incandescent lights. This, also brought light, so to speak, many of the finny tribes new to science.

The ball of light beneath the water is the deadliest lure ever employed by fish-

ing men. When the handle of the battery is pressed, the light fills the water with a glow that makes distinct every object near it.

From far and near the fish can be seen trooping up to this curious thing which has appeared among them, and their movements while under the spell of the light afford a most interesting study. The only danger is that the lure may prove too effective. Its general adoption might have the same result, with respect to certain species of fish that the repeating rifle has had with the once countless buffaloes of the prairies.

YOUNGEST CUP WINNER

Beauty and health are two things all of us want, but health comes first, however this little girl of five years appears to have more than her share



© Herbert Photos
Myrtle Eisenhamer holding seven cups
out of forty-one she has won.

of beauty and health for she has forty-one cups to her credit of winning, only seven being shown in the picture. This is an exceptional winning of cups for a person of her age.

NEW TYPE OF GLIDING PLANE

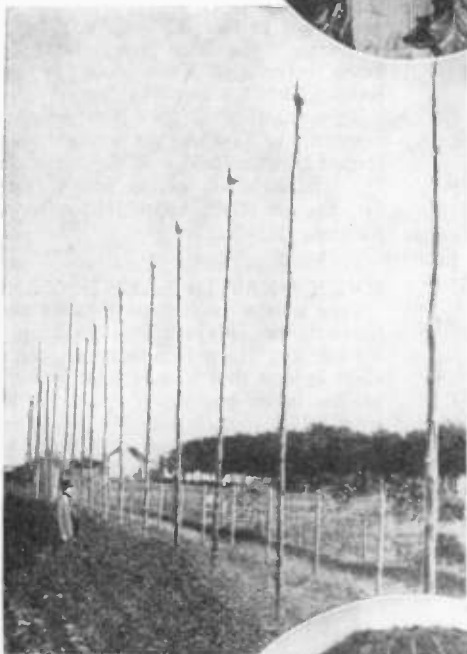
In the development of airplanes, Germany seems to be centering her efforts on gliders or machines without power. They now have a new type of glider designed to imitate the structure and soaring action of large birds. Its wings are pointed, and it is much larger than their previous types of gliders.

Electric Grown Vegetables

In a small test field abroad almost miraculous results were obtained with the use of electricity to accelerate plant growth. As shown below the field was divided in half by a row of masts, each about 150 feet high, and mounted on top is a magnostat that emits rays which are picked up by a fine copper wire that runs the length of the mast.



Plant growth has been increased to a considerable degree with the use of electricity conducted through a system of wiring underground and to a circuit with a magnostat at the top of the high poles. The illustration at the left shows a beet of ordinary growth on the right arm of the girl and one of forced growth on the left arm.



At a state institution for the old soldiers there is an unique globe made of flowers. The continents and oceans are plainly shown in colors of flowers. One of the inmates takes special pride in keeping the boundaries in perfect line. The flower globe is shown at the right.

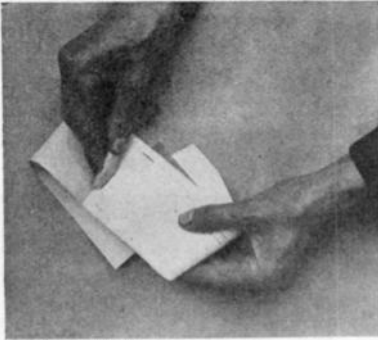


© Herbert Photos

Land owners have differing ideas for the beautifying of their grounds, but this one is unique and stands as a gate post on a New York estate. The clock is wound every week and it keeps perfect time. This clock in post is shown in the picture above.

TEARING RECEIPTS EVENLY

The perforation on a great many of the numerous small receipt and order blank books is not always of the best. The sheets tear out unevenly, leaving



Cutting center of leaves in a receipt book so that the leaves tear out evenly.

a bit of paper sticking in the book. Each one that does this makes it easier for the next one to leave the book ragged, irregular and with a bit of unwanted, unsightly paper hanging down along the perforation line.

The pocket or pen knife may help as you go along, but here is a way to fix it for once and for good. Take a safety razor blade and sink it into the pad along the line of perforation, leaving an uncut margin to each side. These uncut portions will keep the book's shape and form still intact, but when the sheets are hurriedly torn out they will leave the book with a "zip," and be straight and even.—F. W. Bentley, Missouri Valley, Iowa.

ACCURACY OF NAVY SCALES

Among the largest scales are those in the Navy Yard at Washington, which, it is declared, can outweigh the largest railway scales by 50 tons. The railway scales are by no means pygmies, for they can weigh entire freight cars with their loads.

These Navy Yard scales are so accurate that they come within a pound or two of the exact weight. Railway scales are considered good if they come within 50 pounds of the exact weight.

Large ordnance manufactured for the Navy is weighed upon this machine which in appearance resembles ordinary hay scales. The delicate mecha-

nism is invisible, the most intricate portions being in a broad pit below the ground. The platform is forty-eight feet long and twelve feet wide. Beneath the powerful machinery is a cement base laid upon long piles. A solid base being one of the prime requisites of a powerful weighing machine, it was found necessary to use a pile driver to secure a stable foundation. The machine is regarded as the finest of its kind anywhere, and is a splendid achievement of American ingenuity. In order to show the accuracy of the scales to a visitor an officer of the Bureau of Docks and Yards will pick up half a brick and toss it upon the platform. He then consults a long brass lever and finds that the brick weighs about a pound.

The scales will give the weight of a pound of feathers or a pair of sixteen-inch guns and will do it accurately. The capacity of the scales is thus far greater than that of similar apparatus elsewhere.

EVEN HEAT IN LAUNDRY IRON

One of the bothersome tasks about the ironing of clothes is to keep the iron at the right temperature. In the electric iron this feature has been quite predominant but never quite satisfactory. The electric laundry iron shown in the illustration is of a new type which has a thermostat that regulates the heat so that no attention on the



Automatic control through a thermostat keeps the iron at the right temperature.

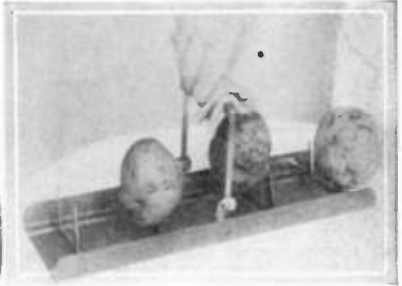
part of the operator is required. Whether you work fast or slow, whether you use the iron constantly or leave it for a while, or even if you forget it, the iron controls itself and keeps an even heat.

HOME TASKS MADE LIGHTER

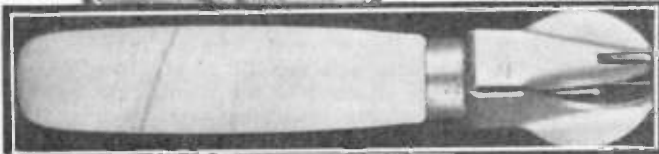
Electrics and Mechanics in the Home



At the left is shown a combination electric waffle and pancake iron.



With the oven tray as shown above, potatoes can be baked and small foods broiled.



Below is shown an ironing board end made of asbestos and with a guard. Iron is kept handy without fear of burns.

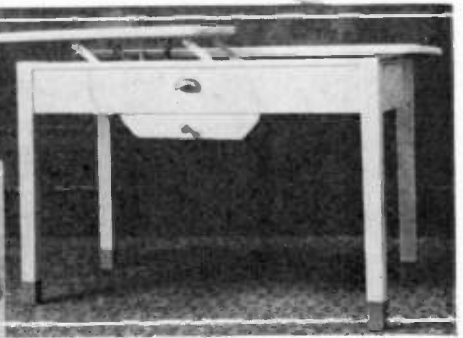
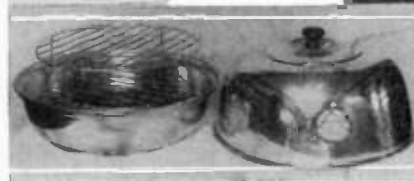


Gravity operates the egg timer shown at the left, it keeps the egg boiling the time for which it is set.

Making meat tender with the tool shown above is easy. At the left is shown a smokless broiler. Grease cannot catch fire.

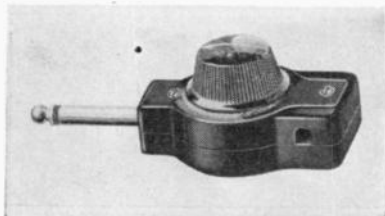


The kitchen table at the right has ironing board attachment and below is shown an economical oven that uses one burner.



RADIO SET TONE SOFTENER

Multi-tube receivers and super-power broadcasting stations have done much to eliminate the old system of several jacks on a receiver. The sudden surge



A plug-in control that softens the tone without destroying the quality.

caused by the opening and closing of a jack circuit is likely to puncture and burn out the fine wiring used in winding these transformer coils.

It has been the desire of set builders to devise a means of softening the tone without destroying the quality. Tone controls have been incorporated in many sets during the past season but the older sets are still requiring something to eliminate the many jacks and to secure tone quality.

The illustration shows a plug-in control that is a simple expedient for the old loud-speaker plug and it effectually softens the tone and gives quality on your old set.

VACUUM TUBE TESTER

The average receiving set owner never knows, and much less cares to know, the technical characteristics of a vacuum tube. It is entirely useless to give the radio layman, who consti-



Tube may be tested quickly by attaching the tester to the tube socket of set.

tutes ninety-nine per cent of radio users a complicated laboratory instrument the reading of which means nothing to him.

The tester shown in the illustration will instantly tell you whether a tube is in condition for satisfactory use and in what capacity the several tubes of a set will operate most efficiently.

Its use is as simple as its operation and all that is required is to insert the plug in a socket in a set, insert the tube in the tester socket and turn on the rheostat controlling the filament circuit to the socket in which the plug is placed till the small lamp in the tester glows. If the small lamp does not burn to full capacity the tube is not good and should the lamp glow before the rheostat is turned on full the comparative quality of the tube may be measured by the distance it is necessary to turn on the rheostat before the glow is visible.

SIDE CAR FOR THE TERRIER

Puppy travels with his mistress in a little side car all of his own, which is attached to the regular car on the running board or foot board and it



© U. & U.

Jock in his side car rides in comfort as other folks do.

has windshield and everything to protect him. Naturally "Jock" does not use the windshield as it appears but desires a clear vision ahead as he leans one side to take a look.

Frozen pipes may be thawed out by packing the frozen part in unslaked lime which is wrapped over with old rags. Pour water over the wrappings and the heat generated will melt the ice in the pipes.

ON THE WINGS OF TIME



Front and Back of the wings as they are attached to the back of the man who is taking the flight. In flying position the body takes a horizontal position.

© World Wide

AERONAUTICS across the seas has a tendency toward small machines. Germany is developing the gliders, England the small airplane and other countries contribute no small part to the form of a small machine either with or without power. Recently an Austrian engineer has made a successful machine in the way of wings, the whole being attached to the back of the person flying. It is propelled by a motorcycle engine weighing 80 pounds.

The model as shown in the illustrations has made many successful flights and is capable of going at a good speed in any direction at the will of the flyer.

A Swiss manufacturer has taken over the rights of the Austrian. It is intended to give the machine rigid tests, make improvements, and develop the flyer to a state of perfection.

COPPER IN OUR PENNIES

A one-cent piece is made from almost chemically pure copper, which is obtained by the modern electric methods. Formerly the refining of copper was an expensive process, but with the utilization of electricity the expense has been materially decreased.

The copper is placed at one end of a tank filled with water. This is called an anode, or positive pole. The action of a powerful electric current releases the copper, carries it through the water, and deposits it on the negative, or cathode, pole. The result is what is known as "electrolytic" or "cathode" copper. This

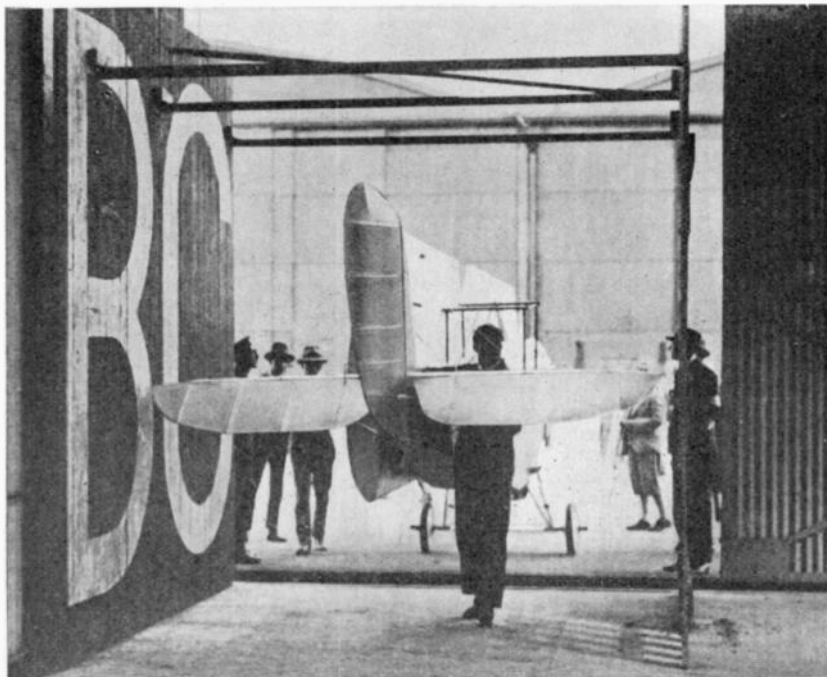
is the material of which pennies are made.

While the "electrolytic" is the purest known copper, the "Lake" copper brings a slightly higher price in the market. This is because there is a small amount of silver in all the copper from the Lake Superior regions. It is, however, of such limited quantity that it cannot be separated at a profit. Silver, moreover, is a better conductor of electricity than copper, and therefore for commercial purposes the "Lake" copper is in such demand that it brings a better price.

COIL SPRINGS OF TUBE STEEL

It was Ernoult, the French engineer, who invented a spring formed of a steel-coiled tube, in which it is claimed are found certain advantages over springs made of solid metal. It is well known that a tube is much stronger and more rigid than a bar of the same material of equal weight, from which it might be assumed that a tube would not form a flexible spring. But Ernoult has, it appears, proved that a tube is more flexible than a bar of the same exterior size. Owing to its smaller mass and consequently smaller inertia the tubular spring responds more quickly, and should, for that reason, be useful for many purposes, especially in aviation.

BUSINESS MAN'S AIRPLANE



© Herbert Photos

Small family airplane passing through a door the same width as that of the backyard home garage. The wings fold up on the side of the plane when it is placed in the garage.

THE light airplane will soon take the place of the family motor car if one is to take heed of the trend of the times. Abroad the light plane is a market staple and manufacturers are now competing with one another in the production of a cheap, safe and easily handled plane for family use. In the illustration there is shown one of these planes which is small enough to pass through the door of the average garage.

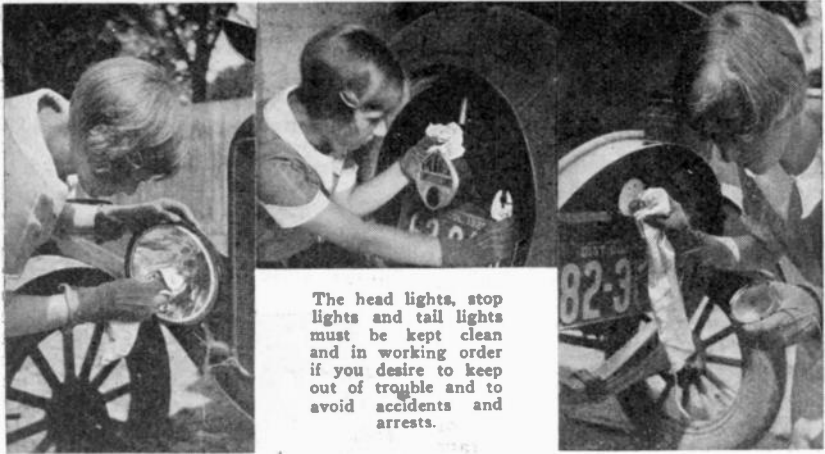
CHOOSING A BUILDING SITE

The average layman, when asked for his opinion as to what furnishes the best natural site for the foundation of a building, will generally declare, without hesitation, that nothing excels bed rock for that purpose. This erroneous belief has been fostered by tradition during the last 2,000 years, the parable of the man who built his house upon a rock being familiar to all of us; but our modern builder does not follow such a course.

In this day the cost of construction is the first item under consideration, and the expense of cutting a cellar in rock is only too well known. If there is much seepage of water near by it cannot penetrate the stratum of rock, but collects above it, and gradually works through the cellar's walls, making the cellar damp and sometimes undermining the foundation. Frequently springs are uncovered while blasting through the rock, and the deflecting of these is necessarily very costly and always difficult.

Made land, sand and silt are obviously unsuitable as building foundations. Clay should also be avoided, for it collects water as does the rock, and its tendency to expand in wet or freezing weather often works havoc with masonry. The frozen clay adheres to the cellar walls and frequently causes dislocation when it expands.

The ideal building site is that upon a bed of gravel and slightly elevated above the surrounding land.



The head lights, stop lights and tail lights must be kept clean and in working order if you desire to keep out of trouble and to avoid accidents and arrests.

CARE OF AUTOMOBILE LIGHTS

By George A. Luers.

One of the most needed attachments to an automobile is the lighting system, therefore it is quite necessary to keep it in good working condition.

The spotlight, while not required by law, enables the driver to read sign boards, to distinguish houses and cross roads, and makes it possible to pass other motorists with safety. The tail light is most necessary for protection against on-coming cars from the rear.

The stop light is not demanded in some states, but it is a safety device to let the car driver back of you to know what you intend to do and it is operated by the brake lever. The small fender light has come into common use for a parking signal.

The care that the average motorist gives to the lighting equipment is very little and as a consequence it is often necessary to remove a headlight rim with a chisel or other tool to get in and replace a bulb.

The reflectors will tarnish and fail to give satisfactory driving light. Lamps flicker and fail in the sockets, wires become detached from the sockets, glass lenses are rattled loose and fall off in traveling.

Care of System

Headlights can be kept in good condition, free from rust, with good connections through periodical inspection and adjustment. The light supports should be made tight. Tighten the bolts, and if cotters are not used, lock washers should be placed under the nuts. A thin film of graphite should be applied on

the inside of the rim holding the glass. Place a drop of oil on the lamp bulb and socket. If the felt strip adjacent to the reflector glass is kept in place the reflector will not tarnish. It is advisable to attach this strip to the lamp with shellac. Place the shellac on one side only so that it will keep its position when changing bulbs. If the reflector becomes tarnished it is possible to clean it with rouge or crocus applied with a bit of cotton then rubbing it in a circular motion.

The wires leading to the lamp socket should be fastened so that they will not swing or be pulled out. A piece of tire tape can be used to advantage in holding these wires.

Tail Lights

Tail lights in addition to their usual duty may stand between the driver and arrest. Avoid this difficulty by keeping these lights working right. The fastening of the light must be secure, using lock washers on the bolts. These tail lights are connected to the license plate and fastenings holding such plate should be well bolted and lock washers used to hold it firmly in place. The tail light will accumulate a lot of rust from the water thrown up by the rear wheels. It is quite necessary to keep the dust wiped off to avoid the collection of dampness which causes rust. Once each year the lamp should be given a light coat of varnish, inside and out.

The weakness of a spot light is that of its being flexible and "rattly". Avoid mounting the spot light too high on the windshield where it is subjected to a greater vibration and more obstruction to the vision. The initial vibration in

spot lights starts at the shield or body post connection. The owner can improve this often by the use of larger bolts and locking washers. The hinging connections of the light are often too loose. These should be as tight as possible and yet allow the light to turn at will. The friction joints in the hinges of spot lights must not be oiled, but if these show rust the surfaces can be protected by a few drops of either linseed oil or beeswax dissolved in turpentine. Glass and ring fastening and oiling the socket is the same as for the other lights. The loose cord that connects the lamp should be attached as close to the lamp as the swing will permit.

Stop Light

The stop light has become a necessity and it must be kept in working order to prevent accidents. Make a test of the stop light each night in the garage by cutting out the other lights and then pressing the brake lever. The red or green light may be plainly seen when it is working right. Some drivers place a small tell-tale light on the instrument board that will show red or green each time the brake and tail light works. Always place the stop light on a secure place and not springy like a fender. Be sure to have all the working parts of the brake and the attachments in working order.

The parking light is the same as a stop light as it will burn erratically if it is attached to a loose fender. The base of the parking light should be given good contact with the fender metal before bolting it in place. Connections of this kind are subject to rust and it is advisable to protect the bolts with varnish.

Time and labor will be saved if you will group all the work on the lights, that is when the work is undertaken on some one unit. Complete the job by inspecting, adjusting and then give attention to all other units of the lighting system.

NEW AIR SERVICE PLANE

Work on the first United States Army Air Service "mystery" plane, the "Cyclops," which is the largest single-engine bombing plane ever built in America, has been recently completed. It is equipped with two 550 horse power engines, is capable of an approximate speed of 135 miles an hour, and carries enough fuel for a 24-hour flight. This huge all-metal plane weighs approximately 17,000 pounds

and is designed to carry a useful load of 9,000 pounds.

The "Cyclops" carries mountings for six machine guns and racks for either one 4,000-pound bomb, two 2,000-pound aerial bombs, or four 1,000-pound bombs thus making it a veritable aerial man-of-war.

DISK BETWEEN CLOSE BELTS

When it is necessary to have two pulleys close together on the same



Separator for two close pulleys to prevent belts coming in contact.

shaft, there is always danger of the belts fouling. Sooner or later one belt gets shifted so that it touches the other and then an uneven joint or a frayed lap gets caught under the other belt where it is pulled around

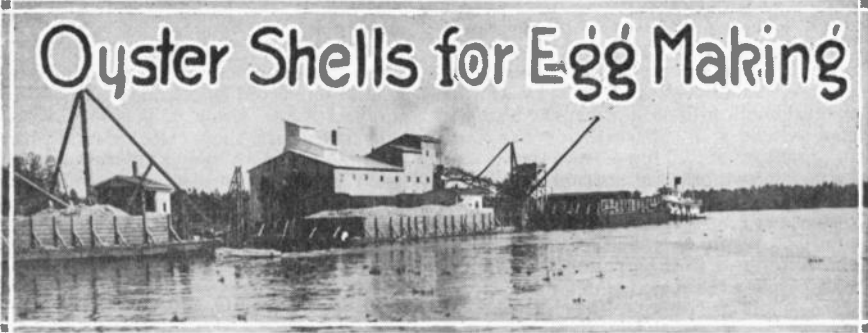
the pulley, breaking at least one of the belts and many times wrecking the overhead machinery. The same thing is sure to occur if a belt breaks or if it is being repaired when the machinery is running, the free end is apt to sway slightly to one side and, if it does, it is sure to tangle up around the shaft.

Such closely set pulleys are common in factories of all kinds because machines driven from line shafts necessitate crowding. Accidents with the belts on these pulleys are equally common.

The illustration shows a protector that is simple to make and is very efficient. It makes close pulleys safe by raising a barrier that positively keeps the belts apart while they are on the pulleys and it is of sufficient size to keep swaying, flapping ends away from the point of contact when the belt is separated for any reason.

The protector is a wooden disk about 6 in. larger all around than the larger pulley of the pair. It is cut out on the band saw or may be turned in the lathe, if one large enough is available. The edges are well rounded over so that they will not be "catchy" and will not chafe belts. The disk is made in two parts and attached to the rim of one pulley with screws, then the two pulleys are clamped on the shaft so that there is no space between them.

Oyster Shells for Egg Making



By Robert Page Lincoln

AN estimate has been made that only about 25 percent of the farmers of this country are using oyster shells as a part of the regular diet for their poultry, which is astonishing when one considers how necessary and how economical is the product and how very certain is its value. In the light of present day investigation a hen limits her egg production to the amount of shell making material to be had. This is natural, no doubt, and beyond her control, but it is a fact.

If eggs are to be had, shell making material must be present. The belief that a hen in the course of a day can pick up enough shell-making material to yield a maximum percentage of eggs day in and day out has been abandoned. Oyster shells, possessing a 98 percent carbonite of lime content, is the perfect shell-building element and the use of it means healthier fowls and sturdier chicks to replace the parent stock. There is a great deal of misinformation or no information at all about oyster shells as a poultry standby.

Farmers are all too apt to look upon this product as a non-essential. They may suspect that it has some mysterious value, imparting some benefit to the hens, but do not know where it is beneficial. They may consider it as a luxury and as such may give it scant consideration, but when the chickens start to lay soft shelled eggs they will have crushed oyster shells recommended to them as a means of correcting this fault. It is then that they will comprehend the worthwhile nature of the oyster shell as a shell builder in turn.

To the hen, oyster shells in the crushed form, are as necessary as grit, for one produces the shell making ma-

terial while the other serves to grind the food. One is just as essential as the other and one cannot take the place of the other. Each has its particular duty to fulfil. Coarse oyster shell crushed, dried bone and limestone grit are three elements that are now considered necessary by the successful poultryman. The farmer who does not specialize in raising chickens, save as a side line, can follow the lead of the poultry expert and acquire healthier, sturdier chickens and never know such a thing as the spasmodic laying hen.

Crushed oyster shell of the better grade sells for approximately \$1.75



Shells coming from the revolving screens where they are washed and run into a barge.

per hundred which is about \$35 per ton. Cheaper grades of oyster shell, which often contain about 5 percent dust are less in price but contain, of course, much waste. Much of the oyster shell sold is not crushed to the size where it is possible for the fowl to swallow it. This comes from improper screening and sorting as to size.

A hen will consume about two pounds of crushed oyster shell annually. While this will not cost much, the difference in the production of eggs will pay for it several times over. Compare shell fed hens with those that are denied this mineral element and it can be seen that the extra expenditure makes a good investment.

In an experiment station white leghorn hens were given a well balanced ration with ready access to all the crushed oyster shell they desired. The twelve hens laid 499 eggs in a space of time covering two months. The shell making material was then withdrawn but the well regulated and balanced food ration was kept up. During the first thirty days only eight eggs were laid and in the following thirty days 194 eggs were laid. This plainly showed the falling off due to the withdrawing of the shell making material and proved that it controlled the egg yield. It also banished the belief that the regular food contains a sufficiency of lime. It does not. A one-year-old hen is known to possess a body content that is over one third lime. There is, therefore, a proportionate demand for a lime supply and this can only be supplied by an introduction of the crushed oyster shell.

TEST FOR FLATNESS

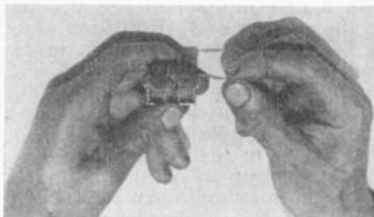
Surfaces of discs so flat that any deviation from perfect too small to be measured have been produced by the U. S. Bureau of Standards. These discs, or optical flats, will not be used for direct comparisons, but as masters for checking the accuracy of optical discs used in the Bureau's work. In addition to serving as a test for flatness of surfaces and straightness of edges, these standards are used in the production of standard angles and for calibrating or checking instruments that measure curvature. These master flats are made from clear fused quartz, or silica glass. Clear fused quartz is much harder and expands much less upon being heated than glass. The surface of glass formerly used for optical flats changes considerably in shape when

touched by the hand, so sensitive is it to heat.

Measurement on the surfaces of these master discs, about eleven inches in diameter and one and a half inches thick, fail to show any spots where they are more than two ten-millionths of an inch from being absolutely flat. Such accuracy means that magnified until the discs extended from Washington to Chicago, no point except along the margin would be out of absolute flatness by more than 1 inch.

LOOSENING STAMP BAND

A great many of us are soon going to turn the old year over for the new—on the dating stamp. Twelve months of 1926 have stuck the rubber tightly to the metal of the stamp frame. Do not take the blade of even a small knife and dig away to loosen the band. If the stamp is about to the end of a series you stand a good chance of breaking the hardened fibre, or cutting it. Remember the last time? Draw an ordinary pin out with a small hammer or with anything



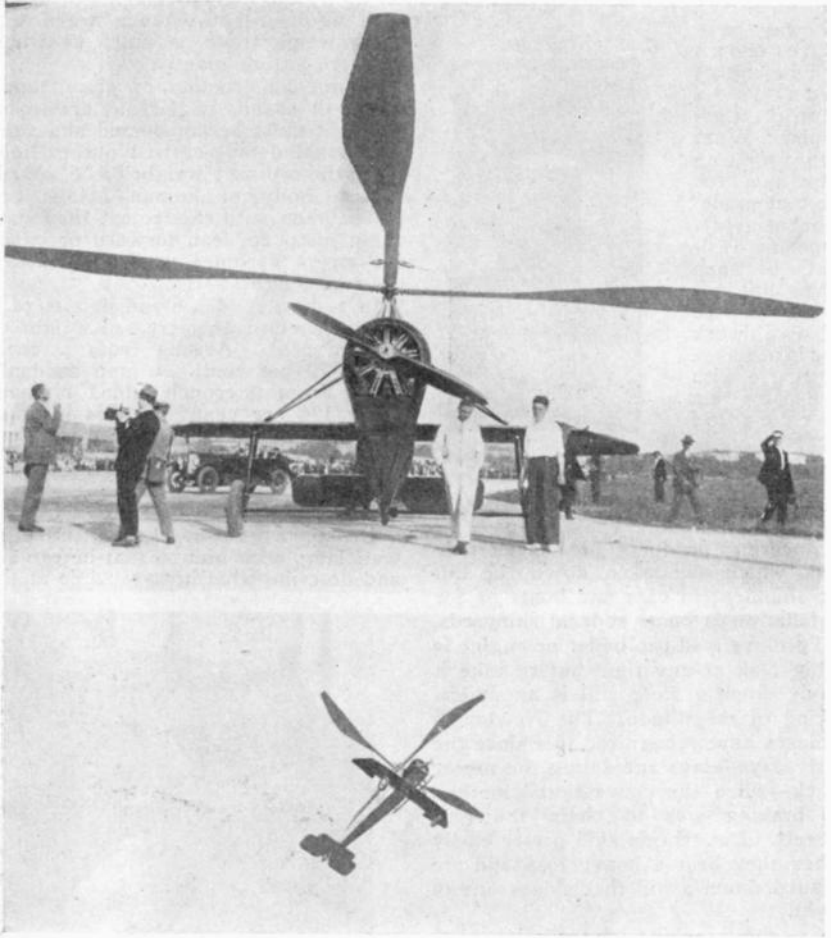
Flat instrument inserted under stamp band loosens it for turning to new date.

else handy that will strike light but flat blows. The brass in a pin is then thin but very tough and springy. You can readily work it under the band on the sides and face. No danger of stretching or cutting the rubber. Slide it around.

DIAMOND COLOR UNCHANGED

It is thought that diamonds can be treated so that yellow tinted stones will turn to a blue white. Many treatments and tests have been made but none have proven of value. Radium is used in some instances but in practically every test the diamonds took on a greenish tint instead of the blue-white and none was productive of any discovery of commercial significance. Even though it were found possible—and such possibility is decidedly remote—to change the color of a diamond, it is extremely doubtful that this would be permanent to any degree.

AUTO-GYROSCOPIC AIRPLANE



© Herbert Photos

The upper view shows the general construction of the plane using the revolving wings for a lift and control. The lower view shows the plane in flight which has proven a success above all the helicopter types of heavier than the air machines.

FOR many years inventors have been working on different models of airplanes with a gyroscopic or helicopter lift. Very few of these planes have accomplished anything at all in their efforts for a flight. Less than a half dozen have ever reached a height of even a few feet. Recently there has been constructed a combination of an airplane and helicopter which, upon trial, has produced results.

The plane is of the usual type, however, the revolving horizontal wings take the place of the regular wings of the plane. The flight of the plane is controlled by the revolving horizontal wings.

The lights in automobile curtains made of celluloid may be readily cleaned with vinegar applied with a piece of muslin or cheese cloth.

HILL SNUBBER FOR TRUCKS

Newburgh, N. Y., is one of those cities built on the steep banks of the Hudson River, where all the streets one way have a perilous grade that ends in a jumping-off place. What engineers know as a "ten per cent grade" is but a gentle slope to residents of such towns but not so to those whose work includes a struggle with the unseen forces of nature.

A number of machine shops are located on the brow of the hill. These shops build engineering products of considerable bulk which are taken down the hill for shipment in cars and boats or for installation in boats at local shipyards.

To move a 10-ton boiler or engine is a big task at any time but to take it safely down a steep hill is an undertaking of magnitude. The Newburgh builders have recognized this since the early days—days antedating the motor truck—when the conventional method of braking was to chain the rear wheels. But wheels skid pretty easily when they bear a heavy load and are headed down a hill that slopes one in eight.

So the machine shops adopted a standard type of snubbing post and divided the expense of installing them on the several hilly streets adjacent to their plants. One of them is shown herewith. They are 10-ft. lengths of iron pipe, set two-thirds in the ground. The inside is filled with concrete, which is given a noticeable crown on top to shed water. By means of these posts, the heaviest machinery is let down the hills in safety. Some idea of the force of gravity, however, is obtained by the deep grooves which are worn in the metal casing by the loads at the far end of the ropes.



Snubbing post to lower heavy loads.

DOUBLING YOUR WEIGHT

In engineering circles it has been found and demonstrated that stresses set up by the live movements of loads, such as men and women when excited, weigh twice as much as when they are sitting quietly.

In the construction of grandstands where thousands of persons are to be seated it must be considered and constructional details carried out to hold twice the ordinary weight to be seated.

If a body of human beings are seated, then with excitement they suddenly jump up, lean forward or sway, the stress becomes more than twice the real weight.

In tests a sudden stand or rise of a person showed an increased weight of 67 per cent. Arising from a chair added 79 per cent. A man suddenly rising from a crouch added momentarily 174 per cent. In this instance his weight was increased more than two and one-half times.

LIGHTING UP SEA BOTTOM

Dr. F. D. Elise takes a thousand watt lamp with him so that he can see and describe what he saw while at the



Dr. F. D. Elise starting for the bottom of the sea with his one thousand watt lamp.

bottom of the sea near Atlantic City. Below seventy-five feet a person is in absolute darkness but with the electric light he was able to see and to read a message to the mayor of the nearby city. Naturally he had means of transmitting speech which was boardcasted at a nearby station.

WAVE IN MILADY'S HAIR



THERE is nothing more glorious to the crowning glory of womanhood than a beautiful wave. While a wave may be made in various ways, one of the simplest and best that will give perfect satisfaction is to use the waver as shown in the illustration.

It consists of two combs and a center pin attached at one end to a cross bar and so arranged that they can be adjusted over the hair and fastened at the opposite end to form a perfect ridge. The hair is dampened and combed out straight, then the wavers are adjusted and allowed to remain until the hair dries. When the wavers are removed do not comb the hair until the next day. A perfect wave will be the result.

WHEN A "BLOW-OUT" HAPPENS

Tire troubles are the bane of the motorist, and of these a "blow-out" is the most expensive, as well as the most annoying. Some blow-outs seem to be of an almost mysterious origin, for a tire that has been thoroughly examined and found to have a perfect surface will sometimes give way suddenly while traveling over a smooth road which could seem to furnish no reason whatsoever for an accident of this kind.

As a matter of fact, the trouble probably occurred on a previous trip when a stone or depression in the road caused such a severe shock on the tire, as to rupture the fabric. The fabric is the foundation or base of the tire, and as this is covered with rubber, the rupture beneath the surface would not be apparent from the exterior. The rubber alone, however, cannot long withstand the load on the tire that is supposed to be borne by the fabric, and in consequence the blow-out will occur sooner or later merely from the continued pressure of the air in the



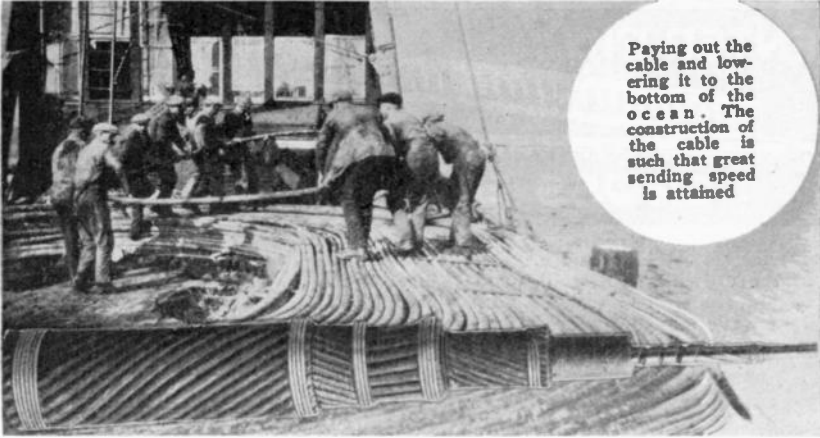
Dampened hair placed in the waver soon sets to the wave and remains in that position for many days

tire. Under these conditions a blow-out could occur while the car was standing serenely in the garage, and the tire will probably be blamed for what in reality was the fault of a stone or other obstacle that was encountered days or weeks before.

POWERFUL TRANSMITTER

A vacuum tube transmitter eighty times as powerful as the ordinary transmitter in a broadcasting station has been installed in the naval radio station at San Diego, Calif. This sending vacuum tube, radiates 80,000 watts of electrical energy and is claimed to be the most powerful tube transmitter in the world. This broadcasting device was not designed for telephone use, but will be employed for radiotelegraph communication.

FASTEST CABLE COMPLETED



Paying out the cable and lowering it to the bottom of the ocean. The construction of the cable is such that great sending speed is attained.

SEVENTY years ago the first message was sent across the Atlantic over the first successful cable laid on the bottom of the ocean. It took several years previous in experimenting and losing cables to even reach a point where a cable could be laid that would stand the elements at the bottom of the sea. The one the first message was sent over failed to work and it became useless a few months after it was lowered in the ocean. The idea was correct but it took a lot of experimenting to get coverings to keep the line in active order for years.

Recently the last of a series of cables has been laid between New York and London and it is the fastest line laid at the bottom of the ocean. This line makes the nineteenth trans-Atlantic cable. Its speed is 2,500 letters a minute, or eight times faster than any other cable. This speed is made possible by the fact that the copper conductor is sheathed in a wrapping of permalloy, an alloy of nickel and iron.

The innermost section of this slender line of communication which links the two continents is the copper conductor, less than one-fifth of an inch thick, which carries the electric current. Around this wire is wrapped six flexible copper tapes to carry the current around the gap in case the cable breaks. Another wrapping of permalloy is placed around the conductor and next to the permalloy is the insulation, consisting of three layers of gutta percha.

Over the gutta insulation is a layer

of jute yarn to act as a cushion for the armor which protects the cable from breaks that might be caused by the wreckage of sunken ships. This armor consists of 18 galvanized steel wires. These wires are wrapped in a fabric to prevent oxidation under water. Finally, the cable is wrapped with two servings of jute yarn saturated in coal tar, wound on spirally and forming the outer coverings.

GREATEST SHAFT H. P.

The electrically-propelled airplane carrier, the U. S. S. Saratoga, giant ship of the United States Navy, represents the greatest horsepower per shaft that has ever been projected in any marine installation, irrespective of the type of motive power. Electric motors, rated at 180,000 horsepower and attached to the four high propeller shafts, drive this 33,000 ton vessel through the water at a speed of nearly forty miles per hour.

The electrical energy is produced by four 35,200 K. W. steam turbo-generators, and is sufficient to meet the power and light demands of a city of 700,000, the size of the city of Boston. If all the inhabitants of New York City were able-bodied men, they would in an eight-hour day be doing the same amount of work as would be done by the power plant on the U. S. S. Saratoga.

The U. S. S. Lexington, sister ship of the Saratoga, is built after the same pattern and is the same size as the latter.

Steam Beaten By Electricity

WHILE steam or water power may be the base from which electrical energy is derived, yet when it is applied in mechanics the electric motor has proven to be the best for power transmission. It is steady and powerful which is needed in hauling heavy loads. Perhaps you have seen a team of horses drawing a large load. The team that makes the steady pull draws the heavier load. The jerky team that seesaws never moves tonnage and even the light load is moved with much fatigue to the horses.

Recently trials have been made for a test to see if a steady power applied would be more beneficial than the jerky kind as delivered by the reciprocating movement of the steam engine cylinders. Even in the so called balance type of a locomotive the uneven pull retards the power applied. Two locomotives were pitted against an electric engine. In the test it was shown that the electric engine could draw the engines against all the power applied to them by the steam. The steady pull made it possible for the electric power to outdo the steam at the time when there was no pressure applied on certain cycles of the engine wheels.

While the initial cost of construction is great yet in time the upkeep cost of electric application will soon

pay for any outlay for rolling stock and third rails. In the maintenance of electrical railways the cost is greatly reduced. In many places electrical energy may be obtained from water



Two steam locomotives placed against an electric engine of the same rated horsepower failed to hold it. The steady pull of the electric power gained advantage over the reciprocating action of the steam engine.

power and where this cannot be supplied the cheapest grade of coal may be burned at power plants.

Owing to the steady power on electric engines they will run much longer than the steam locomotive without repairs. Statistics on repairs show a decrease of 50 percent over that of the steam locomotive and the depreciation covers a longer period of time.

RADIO BATTERY CABLE

There is a time when a great tangle of wires made quite an impression on the uninitiated in radio. Today a radio set is accompanied by neatness in the wiring, both in and out of the set. All lead wires from the batteries are enclosed in a cable form and add much to the appearance and attractiveness

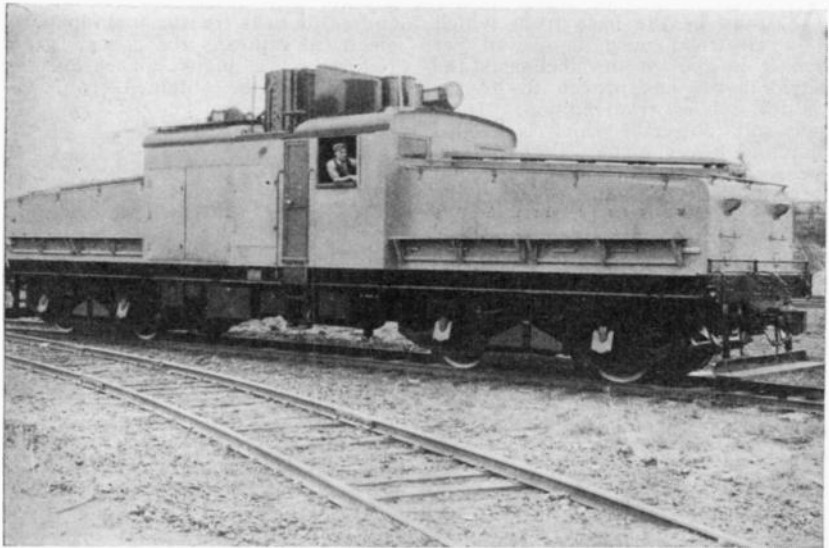


Enclosing all the battery wires in a rubber tube to keep them from a tangle.

of a set, both from an artistic and housekeeping standpoint. A good cable can be made at home which will enclose the wires and have just as good appearance as the commercial kind.

Purchase a large diameter, black or dark colored rubber tubing, long enough for your purpose. Assemble enough strands of flexible wire that is rubber covered to lead from the A, B, and C batteries and bundle them together, tying at several points with fine thread. Push these through the tubing and wind each end of the tube and the wires with electric tape to keep out moisture and to prevent them from slipping. Each wire then can be tabbed at each end with a cloth sticker and properly labeled. The picture shows tabs made of heavy cloth stickers used in binding book leaves together. These are doubled around the wire and labeled in ink.

Largest Battery Locomotive



Largest type storage battery engine built for yard service in switching freight cars. It has been found that such an engine will do the work much easier and quicker than any other type of an engine.

ONE of the largest storage battery locomotives has been put into service in the yards of the Chicago and Northwestern Railroad at Chicago. It is capable of hauling a 1500 ton train, equivalent to 70 empty, or thirty loaded freight cars, at a speed of from 8 to 10 miles per hour. It is entirely smokeless, noiseless and gasless and can accelerate speed quicker and can move a train faster than any other type of switching engine. The huge battery in the locomotive weighs more than 39 tons, is equivalent to 1579 radio batteries and contains enough power to crank 1600 automobiles.

BROKEN RAILS ON RAILROADS

Among all the causes of railroad accidents in the United States none is mentioned with greater frequency than the broken rail.

Many causes are assigned, and, doubtless, many are contributory. An excess of phosphorus, not easily eliminated by the Bessemer process, by which most American rails are made, has been most commonly blamed; but some of the best mechanical engineers now regard this cause as unimportant. Improper shape

and a lack of pressure in rolling modern rails of the heavy sort proportionate to that which was available for the lighter rails of the past are more important faults. An excess of carbon is another.

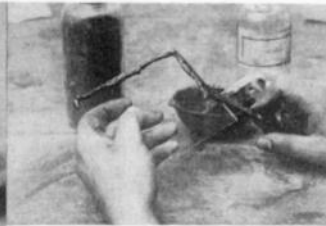
Faults of shape usually consist in undue thinness of the web or shank of the rail and thinness of the base. The disproportion between these parts and the head of the rail tends to a lack of uniformity in texture after cooling.

Most important of all causes of broken rails is the strain imposed by the great weight and high speed of modern trains. Mechanical engineers believe that with the present style of rail the limit of safety is reached at an axle load of 45,000 pounds; yet many trains considerably exceed that figure.

Some time ago steps were taken by various associations to have adopted specifications for a standard rail heavier in the web and the base than those in use, and these specifications were approved by leading engineers.

The average radio receiver requires about two pounds of copper in all forms. It is used as coil winding, antennas or loops, lead-in wires, switches and other connections.

CEMENTS AND ADHESIVES



Common putty and red lead cement, also a rapid drying cement.

Dr. E. Bade

THE value of a cement or adhesive increases with the force necessary to pull the objects apart that are united. It is quite natural that one cement or adhesive cannot be used for all purposes for a cement which may unite metal to wood may have practically no holding power when two pieces of wood are joined together. For the same reason it would be futile to unite two pieces of porcelain with an adhesive made primarily for the gluing of paper.

In spite of such diverse uses for cements or adhesives, only a few are essential for the repairing of the more common objects found about the home. The prime consideration, before mending can be intelligently accomplished, is to consider the use or abuse to which the object is to be exposed. When the object must resist vibrations a more or less flexible cement is essential and when exposed to water a cement must be used which will not be softened by it. At the same time the mechanical strength of the adhesive must be sufficient to withstand ordinary wear.

One of the most common and at the same time the most neglected of all cements is putty. It consists of a drying oil and precipitated chalk. The oil used is linseed oil and sufficient chalk mixed with it to make a fairly thick mass. Putty should be used as soon as possible after making it, or after opening a can in which it may be purchased, for when it is exposed to the air for any length of time, it soon becomes hard and dried. It cannot be used in this condition and, if it is to be kept for a few weeks, it should be placed under water or wrapped in oiled paper and placed where it is damp.

When putty is made with boiled linseed oil, the mass hardens much more quickly, and when a little white lead is added, extra hard putty results when dry. In replacing a window pane, see that the wood of the rabbet is painted or, at least painted with linseed oil. The putty will not stick to the bare wood. After linseed oil has been spread on the wood apply a thin string of putty, insert the glass hold in place with a few glaziers points, and putty the outside of the window frame.

In removing fragments of putty, an old chisel may be used, and if the putty is so hard that it is impossible to remove in this way, it may be softened by brushing with a mixture consisting of two tablespoonfuls of burned lime, two tablespoonfuls of washing soda and two tablespoonfuls of water. A strong solution of lye may be employed, care being taken not to spatter it around as it is very corrosive.

When red lead is added to putty it may be used as a cement for making pipes air and water tight and at the same time it can also be used as the cement which holds the glass plates of an aquarium in position. In the former case the threads are covered with the red lead mixture, in the latter case the inner edges of the glass are provided with a triangular section of the cement the entire length of the glass.

A very rapid drying and hardening cement for leaking tubs, wooden containers, metal vessels and stone ware that is exposed to water, acid or alkali may be prepared by means of litharge, the yellow lead oxide and glycerine. To about a tablespoonful of the yellow oxide of lead use about five or six drops of glycerine and mix intimately, making a comparatively thick mass. As this cement hardens within an hour, only a small quantity

should be prepared at one time. This mass becomes so strong that it is almost impossible to remove it after once set.

After the glycerin cement has been prepared, brush the parts to be united or cemented together with a little glycerin and then apply the cement. Let it set for a few hours. Keep all water or moisture away from the mixture before it becomes hard. If this is not done the cement will not set.

Cracks and holes in plaster walls are easily repaired by making a cement from plaster of paris. Add just sufficient water to the plaster of paris powder to make a thick paste and stir this until uniform. The plaster must be used within ten minutes of making and therefore only enough of it should be prepared at one time for immediate use. Just plugging up the holes with the plaster is not sufficient. Under such condition the plaster will not hold. The place to be repaired must first be thoroughly moistened until no more water is taken up rapidly. The cement is applied and smoothed into place with a knife.

Entirely different methods must be employed when it becomes necessary to reset knives into their handles. There are two ways in which this may be done. When only one or two knives are to be reset, powder a small portion of rosin and add half this quantity of precipitated chalk. Mix thoroughly and force as much of this powder as possible into the handle after the knife has been removed. Then hold the knife with a pair of pliers. Heat the shank to such a temperature that the shank, when placed in contact

with a small piece of rosin will melt and soften that part of the rosin with which it comes in contact. When the shank has attained this temperature quickly insert it into the handle and force it down into the powdered mass. The mass will be melted and when it is allowed to cool it will hold the knife firmly in place.

When larger knives are to be reset, it is best to melt the rosin in a porcelain or iron dish, and, when the rosin is melted, add a half part of precipitated chalk. After mixing, the heated mass is poured into the handle and the knife inserted.

AN ASTRONOMICAL MIRROR

One of the most remarkable scientific instruments yet devised is that constructed by Professor R. W. Wood to aid the work of astronomers. This is an astronomical mirror, the reflecting surface of which is revolving mercury elaborately protected against vibrations; and it magnifies in proportion to the speed of its revolutions. A metal dish containing mercury and turning on bearings carries on its edge a series of magnets. Encircling, but not touching them, is an iron ring. By motor power this ring is made to revolve upon bearings separate from those of the mercury-container, but its magnets, attracting those on the container's edge, cause the latter also to revolve. Centrifugal force compels the mercury to form a concave surface, perfect so long as free from jars. This apparatus is sunk in a well 14 feet deep and set upon a solid foundation to eliminate all ordinary shocks.



Cement to fill cracks in walls is easily made and a way to hold knives tightly in handles.



How to Make Mottled Effect on Surfaces of Brass

Most of us admire the pretty effect of mottling on manufactured brass instruments, something like the markings in marble. A smooth finished brass surface readily shows scratches, and is difficult to lacquer perfectly, evenly and free from brush marks. On the mottled surface lack of skill is not noticeable.

The mottling is really a series of fine circles running into one another scratched on the surface of the brass.

Take a small round piece of wood Fig. 1 (a piece of penholder or a pencil will do), put it in a drill chuck or self centering chuck, leaving about 1 in. projecting and start the lathe or drill. With a fine file make the end slightly convex.

Cut a piece of fine emery cloth in a circle, Fig. 2, about 1 in. in diameter. Fasten this to the convex end of the wood or pencil with a string, Fig. 3.

Hold the piece of brass in the right hand and while running the machine at a good speed press the brass lightly against the emery covered wood, moving it slightly forward at right angles. A sort of shaded vein will be seen where the rotating emery has cut lightly in the brass. Any pattern may be followed at first, but the operator will soon be able



Fig. 1



Fig. 3

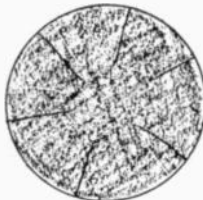


Fig. 2

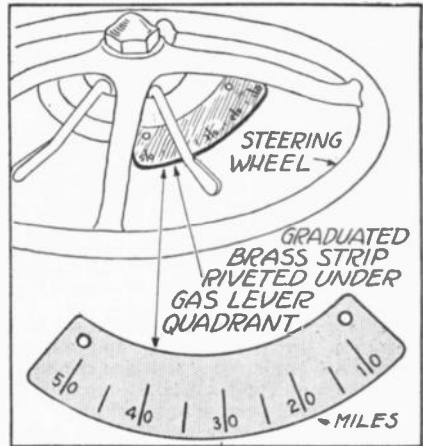
Homemade abrasive tool for use in making mottled effect on brass surfaces.

to form some very nice patterns as he proceeds with the work.

If two or three diameters of wood are used, the veining may be of different widths.

Speed Marks on Automobile Steering Wheel Quadrant

Many cars are not equipped with a speedometer and owners of others so equipped neglect to keep the speed-



Quadrant on steering wheel post for setting the gas lever for speed in miles.

ometer in working condition. The speed of the car is not known, the driver does not have any means of checking his mileage against standard road maps or compliance with speed regulations.

A simple method which one driver of a car without speedometer has adopted without expense but to good advantage is the use of a reference marking on the quadrant of the gas lever.

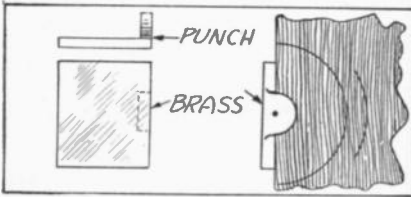
This is shown in the illustration and it consists of a strip of brass with numerals below the lever, indicative of the speed at these positions of the lever. This strip was made and the marking determined by comparison with a speedometer equipped car. All marks correspond to full advanced position of the spark lever. Obviously these marks are for level roads, however, the ascent and descent of hills will be averaged at about the same

speed as the level stretches, which about balances up the speed.

The means while simple and permitting of variations, will give the driver a fair idea of the distances. As an example, the destination is ten miles. With the lever set at the twenty mile position a half hour's driving will bring the car to its destination due allowance being made if stops or delays are encountered.—G A. Luers, Washington, D. C.

How to Draw Half Circles on Wood for Pattern Work

In pattern work there is much need of drawing half circles on surfaces of wood for sawing on the band saw. In draw-



Brass clip sets on edge of board where it is held for the leg of a compass.

ing these semi-circles there is no support for the compass leg and various means are employed which are not satisfactory in making a perfect circle.

The illustration shows a small and convenient device made of brass which will place the leg of the compass exactly on the edge of the wood. The brass can be filed into shape from a piece of $\frac{1}{8}$ -in. metal. The edge is turned over or a piece set in and soldered. A small hole is drilled at the intersection of the wood and brass. It is much better to use a prick punch to make this hole as it furnishes a place for the compass leg to set it in and not bind.

Illuminating Gas Instead of Acetylene Gas Cuts Steel

There has been developed recently a method whereby steel may be cut with illuminating gas instead of acetylene.

The function of any metal-cutting blow torch is two-fold: first, the steel is heated at the point where the cut is to be started, and then a jet of pure oxygen is released, severing the piece of steel. The gas is the source of heat for bringing the temperature of the plate up to the burning point and keeping it there. This must be done quickly, there-

fore a special coil arrangement was built into the torch so that heat could be applied to the gas and oxygen before combustion, thus raising the flame temperature at the torch tip and facilitating the starting operation so that a piece of steel six inches thick can be cut as easily as a loaf of bread is cut with a knife.

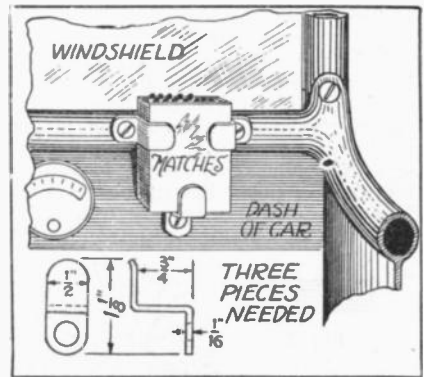
The effect of the heat applied to the cutting oxygen also aids in starting a cut, increases speed of cutting, and decreases oxygen consumption in some cases as much as 40 per cent.

Match Box Holder Attachment for the Automobile

The illustration shows a match box holder which one motorist has found advantageous for the equipment of his car. This is a simple fixture made from three similar parts of thin brass bent and drilled for small screws, which places it in a conspicuous and convenient position on the instrument board.

Placing the box so conveniently is suggestive of use of these safety matches, which must be lighted on the box.

The foremost consideration, which the car owner had in making this ad-

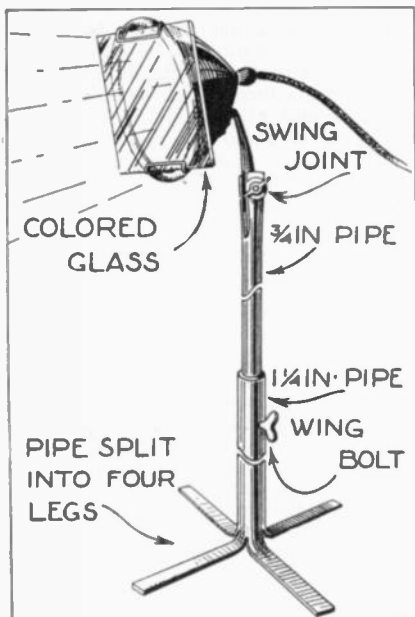


Match box holder for the enclosed automobile to keep scratches from the finishing material.

dition was that of avoiding the occupants from scratching the matches on the paint or upholstery. Apart from the convenience, the avoidance of the ugly match scratches, is a detail making this simple holder a desirable addition, especially where the car is well kept.—George A. Luers, Washington, D. C.

Colored Light Effects for Posed Models

Modern illustrators and artists use mechanical means to help them in their



Homemade lamp to cast colored light on subjects to get moonlight and other colored effects.

work, among them the throwing of colored lights upon their models to give the effect of firelight, moonlight and similar effects. This gives the actual color values. One illustrator of considerable fame utilizes a homemade color projector based on the light as illustrated herewith.

The short length of 1 1/4-in. pipe was used for the base. The bottom end was cut so that it made four feet. The cutting was done with a hacksaw. The four pieces made by the cuts were flattened out and turned out at right angles with a hammer. A hole was drilled about half way up its length and tapped for a wing bolt.

A similar length of 3/4-in. pipe was split down one end for about 6 in. and drilled near the top for a bolt. This pipe was then slipped down in the larger one and clamped at the height desired with the wing bolt.

The supporting rod on a Ford headlight was heated, flattened drilled and fitted in the slotted pipe with a wing bolt and washers so that it could be swung

up and down and clamped where it was wanted. Two slides of stiff wire were constructed and soldered to the rim of the headlight, top and bottom, as shown. The wires to the light were then connected to the house lighting circuit and a toy transformer used to reduce the current to 6 volts. Colored glass slides slipped in front of the lens gives the proper shaded beam on the models.

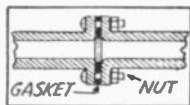
Locating Breaks in Insulated Electric Wires

A break in an insulated wire circuit may be easily located with the use of a test line made of a length of flexible wire and two pins. The pins are connected together by means of the wire. Holding the pins the length of the wire apart, the points are pushed through the insulation of the broken circuit wire. This is repeated along the circuit until the pins and connecting wire form a contact by straddling the break.

While this would be satisfactory and suitable for low voltage circuits it will be extremely dangerous for use on lines carrying any high potential.

Lead Pipe Connection Without Using a Wipe Joint

Suppose you live in the country and have a house with modern plumbing, such as many farmers have today and you desire to make some changes on the lead pipe connections? There are very few of us who could even start to make a wipe joint of lead which is necessary to join the ends of lead pipe. In the illustration is shown a way how one country dweller made a connection without a wipe joint and it is just as good and will hold even better when pressure is applied.

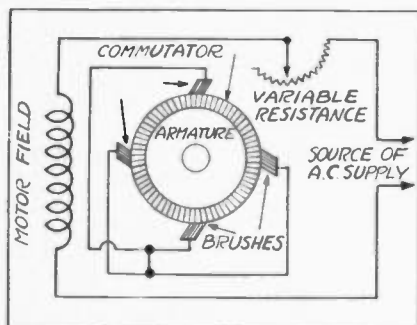


Pipe ends with gasket makes tight joint.

The ends of the pipe were turned out to make a flange, the extension being at least 3/4 in. The faces of these flanges were made as flat as possible. A way to do this quickly is to bore a hole the size of the pipe with an expansion bit in a block of wood so that it will slip over the pipe. The flange can be hammered down on the wood flatly. Four or six holes are drilled into the flanges for stove bolts. A rubber gasket is used between the flanges.

Using Alternating Current on Direct Current Motor

The illustration shows a method which will be found very useful in running a



Circuit in which a direct current motor may be run in an emergency on an alternating current.

direct current motor from an alternating current line in an emergency.

Disconnect the field windings from the motor armature and connect the brushes of the machine together. Arrange the field of the motor in series with a variable resistance and the source of the alternating current. The value of resistance should be low for starting, but may be increased when the machine is running at its rated speed.

Lifting Baled Hay With the Power of a Truck

It is said that a motorist in California has discovered a new use for the automobile, be it a passenger car or a business machine. Upon delivering a load of hay to a barn, this driver found that there was no way of lifting it to the second floor, so he decided to put his truck to work. To do this the machine was backed to within a short distance of the building, after which the brakes were applied and one of the rear wheels was jacked up. The lifting rope was run around three bales of hay and passed through a block and tackle, the opposite end of the rope being wrapped a couple of times around the hub of the wheel that was elevated, and an employee being stationed where he could take up the slack of the rope.

The engine of the truck was then started, this resulting in the turning of the raised rear wheel and hub. As the hub turned, the rope was drawn in and the bales of hay were raised to the height of the second floor.

Keep the Aerial Clean if You Want Good Reception

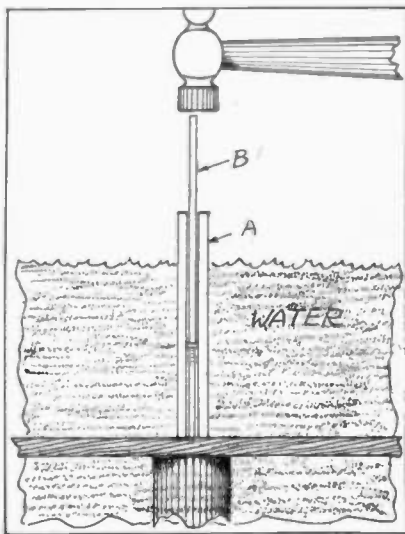
During the summer the outside aerial has been exposed to the elements for many days and has collected a coating of soot, coal, grime and oils, both on the bare copper wire and insulators. It is likely this coating is the direct cause of much resistance which cuts down the volume and range of the set. If you want good radio reception during the winter take a cloth saturated in alcohol and clean off both wire and insulators, or erect a new aerial.

Homemade Tool for Driving Spikes Under Water

To drive a spike several feet under water use the method as shown in the illustration.

Place a piece of small pipe, A, long enough to extend above the water to a convenient height and just large enough to drop the spike in readily and still keep it upright in the water. Drop the spike or nail in the pipe and with a steel rod, B, drive the spike. The pipe may be held at any angle.

The steel rod should be long enough to drive the spike down and leave a

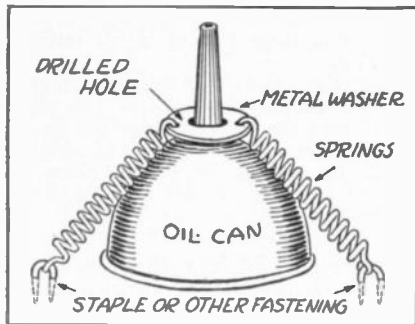


The spike is held in the pipe and placed on the object to be nailed then driven with a hammer.

handhold above the pipe of sufficient length to drive with a hammer.

Oil Can Holder Attachment for An Automobile

A simple holder for the oil can which can be attached to a car is shown in the illustration. The holder



Tension holder for an oil can to be used on an automobile.

consists of two small springs and a washer. The washer should be large enough to slide freely over the spout of the oil can. The springs are hooked into holes made in the washer. The lower ends of the springs are secured with staples or screws to the surface where the oil can is to be placed. Enough tension is given to the springs to hold the oil can in an upright position and keep it from rattling.

Furniture Finisher Gives Best Recipe for a Polish

One of the latest recipes for making a fine furniture polish comes from a veteran furniture finisher which is as follows: Mix 4 oz. vinegar, a dessert-spoon of sulphuric acid, 2 oz. of butter of antimony, 2 oz. of white mineral oil and one teaspoon of French chalk in one pint of water.

Add the ingredients to the water in the order given, apply with a rag and dry the surfaces with a soft cloth. Always remember that the sulphuric acid is dangerous to handle and should be given care. It will attack any cloth or metal save lead. In measuring use a glass measure as sulphuric acid will eat into the metal of a spoon.

How to Make Artificial Marble Used in Statuary

A process for making imitations of statuary marble, onyx and other multi-colored stones, has been devised in France. About 1,000 parts of alum, from 10 to 100 parts of heavy spar (barium sulphate) and 100 parts of water are

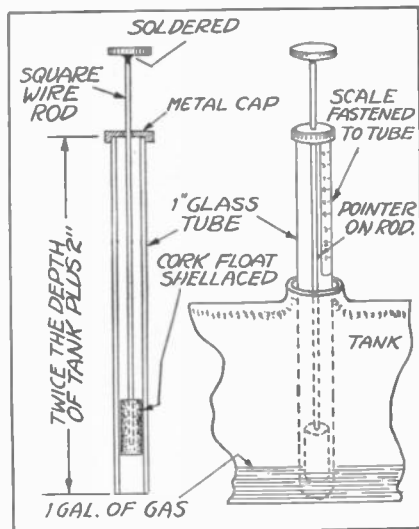
mixed with the requisite pigments, and the liquid mass is boiled down and cast in a mold. The amount of heavy spar used varies with the degree of translucence desired. After being molded and dried, the artificial stone thus produced can be polished and finished as desired.

Self-Reading Gasoline Tank Measuring Stick

The gasoline "stick" shown in the illustration was made to measure just how much oil is in the tank at any time.

Procure a piece of glass tube 1-in. inside diameter and 1 in. longer than double the depth of the tank from the filler opening edge to the bottom. Make a metal cap for the top, which will fit snugly down over it.

Shape a cork about $1\frac{1}{2}$ in. long and cylindrical in shape that will fit loose enough inside the tube to slide up and down easily. Bore a hole down through the center and force in a length of square bus wire, or similar wire to form a vertical, square rod. Dip the cork in shellac two or three times to prevent it "waterlogging." Cut a square hole in the exact center of the cap through



Measuring stick for the gasoline tank of an automobile. Tells instantly how much gas is needed.

which the rod will slide easily and then cut off the rod just above the cap when the cork float is at the bottom of the

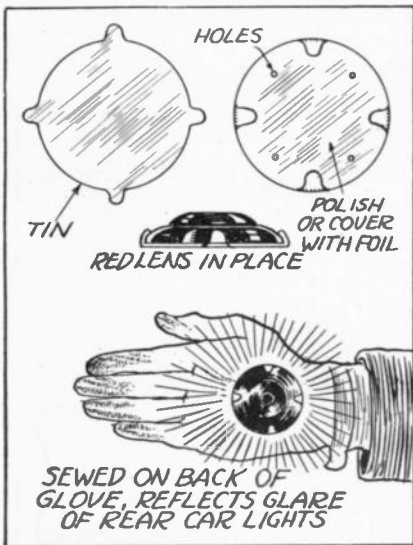
tube. A paper scale should then be glued to the tube so it is clear of the tank when the tube is inserted for reading.

Empty the tank and insert the tube. With the cork resting on the bottom make a mark on the rod to come opposite the bottom of the scale. Then pour in a gallon of gasoline and mark on the scale where the pointer comes and so on until the tank is full. Number the marks on the scale from the top down representing the number of gallons the tank holds. Solder a small pointer to the rod on the mark previously made and which can be easily seen.

Insert the stick in the tank and read the pointer at 6. You will immediately know that the tank can take 6 gallons of gas. The stick can be kept in a mailing tube without danger of injury and it will be found a handy thing on long tours.

Red Reflecting Hand Signal for Night Driving

Anyone doing much night driving will appreciate having a hand signal that can



Red light signal placed in the back of a glove to warn drivers in the rear

be seen by the driver of a car in the rear. Such a signal can be easily seen by anyone and it does not require batteries to operate it successfully.

Procure a small ruby lens from an old parking light at the second hand car dealers. One can be picked up cheap-

ly. Cut a circle of bright tin the same size as the lens, but with four extensions as shown. Make three or four holes in the tin and sew it to the back of one of your driving gloves. Place the flat of the lens over the tin and bend the extensions over it to hold it in place like a stone is held in the setting of a ring.

When the hand is held out at night the lights of the cars back of you will reflect from the tin and shine out as a red light through the lens. If bright enough tin cannot be found, place a circle of clean tinfoil between the lens and the disk which will do as well.

Kerosene Makes the Best Lubricant for Aluminum

Aluminum castings, plate and bar stock are much in use and demand today and when it comes to working the pieces it is quite a problem. If a tool is kept quite sharp fair results may be obtained in turning the metal. However, in drilling and tapping the metal becomes more of a problem because the blunt cutting faces of the tools drag and tear the metal. The chips will stick to the stock and when a tool is backed out the threads will be torn away.

The best lubricant for tools used in this metal is kerosene. To give a clean machined surface allow a fine stream of kerosene to run over the tool. In drilling and tapping use a plentiful supply of kerosene. This will keep the hole or thread smooth and of the proper size.

Coils and Tubes in Making a Receiving Set

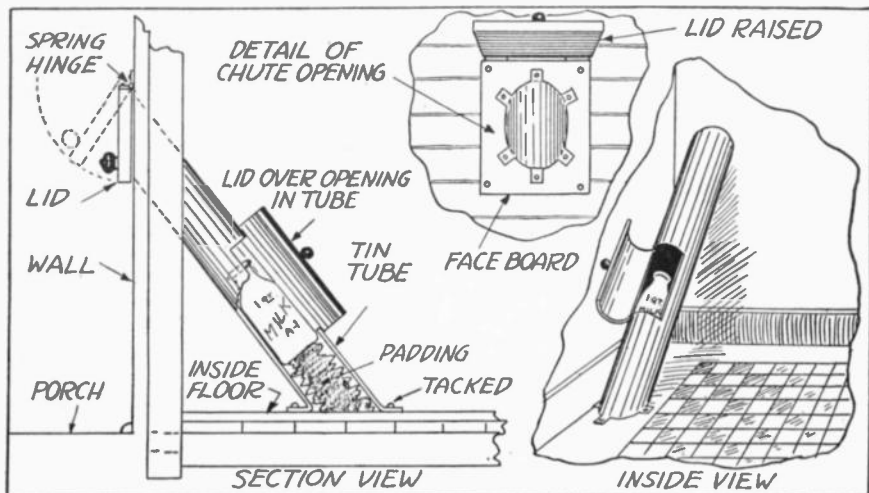
The radio set builder is always somewhat confused in regard to coils and their windings, size of tubes and the like. For tuning coil tubes they may be from 3 to 5 in. in diameter and the wire of any size from No. 26 to 20, covered by any suitable type of insulation. The primary coils should have from 8 to 10 turns, the secondary suitable to match the condenser to be used with it and the tickler coil about 20 turns. A 23 plate condenser will require 45 turns on the secondary, a 13 to 17 plate condenser about 55 turns and for an 11 plate condenser from 60 to 65 turns.

In the wiring of a set make sure that the plate leads do not run parallel with the grid leads. Also keep these leads away from the B battery leads and not parallel with them. The plate and grid leads should be as short as possible.

Porch Chute and Holder for a Milk Bottle

A suburban dweller was much annoyed by having the milk stolen from his porch at times and he decided to put a stop to it in the following way: He built a chute leading into the house

tube was then pushed down the hole from the outside and the lugs tacked down. Care was taken to have the hinged door on the upper side. A hinged lid of wood was then attached to the side of the house over the opening to keep it weather tight.



Chute inside of house receives milk bottle and keeps it from the petty thief

through which the milkman would drop the filled bottle. While it was a simple way it served two purposes, it prevented thieving and kept the bottle from the sun.

A piece of tubing was made at the tinsmith of tinned iron and slightly larger than the diameter of the quart milk bottle. It was made sufficiently long to reach from a convenient height in the outside wall of the house down to a sharp angle to the floor inside. Each end was cut at a miter to meet the floor and wall and make a good joint. About 1 ft. from where it met the floor a hinged door was provided to an opening through which the milk bottle could be removed. This is clearly shown in the illustration. Each end of the tube was provided with several short lugs for tacking the metal to the woodwork.

The top end was laid against the outside of the house at the proper point and the shape marked out with a pencil. This was then cut through the wall with a keyhole saw and made just large enough so that the tube would fit inside. A piece of thin board with a similar hole was made to fit over the clapboards as a faceboard and nailed in place. The

The inside lower end of the tube was then tacked to the floor by the lugs and the inside of the tube filled with cotton paddings cut from an old quilt to a height level with the bottom of the door. The whole arrangement, in this particular case, was set in the corner of a back hallway where it was inconspicuous and out of the way of any one passing it.

The milkman drops the bottle with the cap end up into the chute where it lands at the bottom on the padding. The bottle is then taken out by the owner at his convenience.

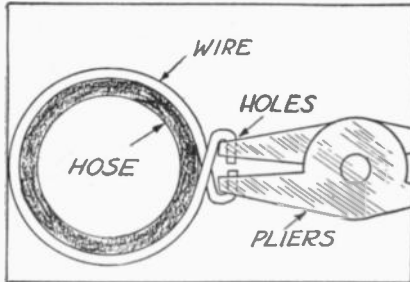
Quick Setting Cement to Fasten Tools in Handles

One of the best cements that can be found for fastening tools in handles, or uniting small parts of metal or other material is common orange shellac dissolved in sufficient alcohol to form a paste. Place the required amount in a small stamped tin cover and set fire to it. When the flame dies out use immediately before it has any chance of getting cold.

Tools to be fastened in handles should have the tang heated over a flame previous to inserting in the handle. This cement is strong and waterproof.

Pliers Make a Tool for Twisting Wire on Hose Connections

Almost every home is supplied with a pair of pliers and the condition in which they are kept depends on the own-



The ends of the wire are held tightly while the twist is made.

er, however old ones are just the kind to make the wire twister shown and they become a tool without parallel for making hose connections. A hole is drilled through near the end of each jaw. If the jaws are hardened the temper may be removed with heat. The wire to be used is given one or more turns around the hose in the usual manner, then the ends are drawn up and placed in the holes of the pliers as shown. The jaws are spread to tighten the wire then turned to make the twist.

What to do When Your Watch Stops

Watches stop for several reasons. The most obvious reason is the fact that you may have forgotten to wind it. Sometimes watches stop when they are wound too tightly. When you wind your watch do so gently, smoothly, and at about the same time each day, preferably on arising in the morning, thus providing for the violent jarring of the watch during the day when the springs are under tension, rather than when the springs have about run down, as they will be during the following night.

If you wish to reset your watch, never turn the hands backward; move them forward to the point desired. Moving the hands backward is hard on the delicate bearings, and if often repeated will certainly cause it to stop. During cold weather, when the watch may be left in a pocket of a vest hanging in a room where the temperature falls below freezing, the cold will sometimes stop a watch because of the contraction and distortion of the case or bearings, or by hardening

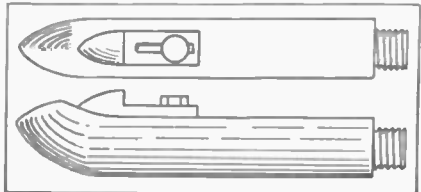
the lubricating oil. Friction in the bearings and jewels, and particularly in the axles which turn the hands, will cause a watch to stop eventually if all such parts are not oiled occasionally. About twice a year, remove the front crystal and the rear cover of the watch case, and with the aid of a common wooden toothpick dipped from time to time in good lubricating oil, apply a small quantity of the oil to the axes of the hands, the winding apparatus, and also to the bearings and crystals in the back of the case. Then use a chamois-skin to polish the face and the crystal, and to remove the excess oil.

An inexpensive watch in a nickel-plated case will be found quite as satisfactory a timekeeper as an expensive gold watch. This should be borne in mind by all whose watches are subject to neglect and to occasional hard usage. If the same good care is taken of an inexpensive watch as is expected of a costly one, it will be found to keep time faithfully for a good many years. When it finally wears out a new one can be purchased for the amount which would ordinarily be required to pay for repairing an expensive watch. Besides, the inexpensive watch, representing only a small investment, may be carried without fear on an outing, or on a fishing or a hunting trip, when a person would hesitate to carry a costly watch.

How to Make a Tool for Pulling Pipe Out of Ground

For pulling sections of pipe out of the ground the tool illustrated proves satisfactory. The tool must be made for the size of the pipe to be pulled. It must fit slightly loose on the inside diameter.

The tool is fastened into a pipe of the proper length and it is then pushed down

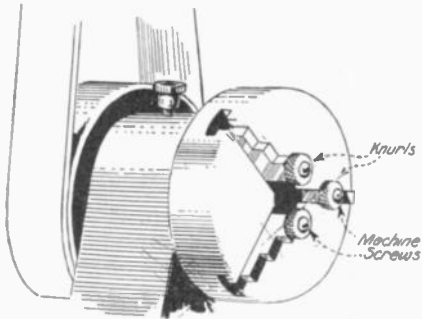


Homemade tool that slips into the pipe end and grips it for pulling.

inside the hole until the end enters the hole in the pipe to be pulled. When the pull is made the small sliding part slips down, wedging in the pipe, and grips it for the pull.

Jaws of a Lathe Chuck Makes Mounting for Knurls

Knurls are best used when a counter pressure is placed on the piece in which the indentations are being made. Three knurls of a like design can be used to



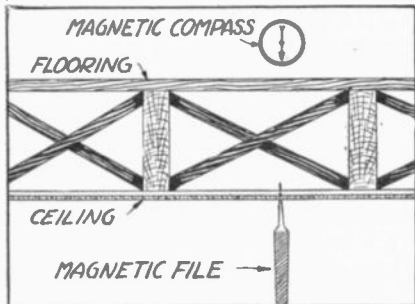
Knurls are mounted on the jaws of a chuck and revolved in the lathe.

advantage in both fast work and even pressure by mounting them on the three jaws of a universal chuck. Of course the centers of these knurls must be in line, that is, on a line with a certain radius from the center. Holes are drilled and tapped for machine screws that will snugly fit the holes in the knurls. The knurls may be attached quickly for any work.

It is quite obvious that pieces cannot be knurled that are any longer than the hole through the spindle of the lathe.

Locating Holes for Wiring Finished Buildings

When wiring up a finished building it is sometimes quite difficult to locate points on which to drill holes through



Locating a point on the floor directly above a place on the ceiling of the lower room.

the flooring and the ceiling in the room below.

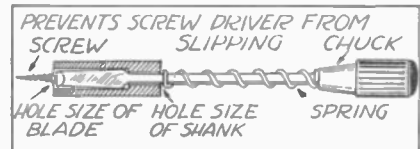
The simple method given here makes

use of an ordinary magnetic compass and a large magnetized file, or similar article. A file will be found most convenient to use because of its pointed tang.

The file, which should be strongly magnetized, is driven into the ceiling at the point where it is desired to have the hole. By moving the magnetic needle over the flooring above, it is possible to locate the desired position because of the strong agitation of the compass needle when it is passed directly over the position occupied by the file.—Peter J. M. Clute, Schenectady, N. Y.

How to Make a Guard for a Ratchet Screw Driver

There are very few who have used a ratchet screw-driver for any length of time who have not let it slip and scratched a panel or dug into the woodwork of an expensive cabinet. In fact even if it is a considerable time-saver many people are loath to use it on this account. A simple little device can easily be made which will almost entirely prevent the screw-driver from slipping off the head of the screw. The device also make it much easier to center the screw. This will be



Guard to keep the screw-driver from slipping off the screw head while turning it in place.

particularly handy where a large number of screws of the same size are to be driven.

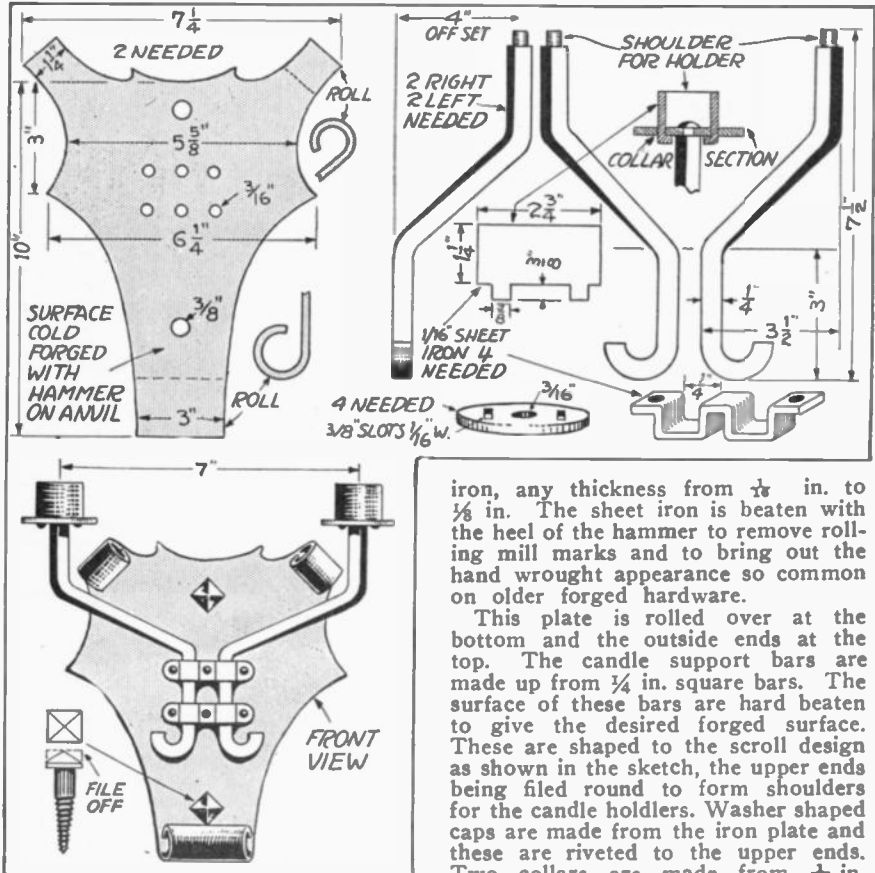
A screw-driver of the proper size is first selected and then a piece of metal is shaped as shown in the sketch. A small hole is first drilled through the entire length of the stock which should be just large enough so that the shank of the screw bit will slip through easily. The outside diameter of the stock should be about 1-16 in. larger than the width of the screw-driver. A hole just large enough to take the width is then drilled from one end so that the screw-driver fits in as shown. A small spring may be slipped on above this piece to hold it down. The edge of the guard should be made smooth so that the edge of the cabinet or panel will not be marred as the screw is driven home.—K. B. Humphrey, Brooklyn, N. Y.

How to Make an Antique Candle Sconce in Metal

Of all the decorations candle sconces are the best indoor pieces of antique work. Those double candle sconces which balance, one on each side the

type of sconce is shown. This sconce can be duplicated from simple materials, sheet iron and an iron bar, without needing difficult machine work.

The back of the holder is a cut pattern, made from flat black sheet



Sheet metal and bar iron make a handsome antique metal sconce to be used single or in pairs on the sides of a mirror or other piece of furniture requiring lights.

hall mirror, are pleasing and decorative additions to the hall.

For the purpose of the home owner, willing to spend a few hours time in the basement workshop, the construction of two of these wall candle holders, in the same design, will not alone afford a method of spending the evening but it will prove an unique decoration.

In the illustration the details of a

iron, any thickness from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. The sheet iron is beaten with the heel of the hammer to remove rolling mill marks and to bring out the hand wrought appearance so common on older forged hardware.

This plate is rolled over at the bottom and the outside ends at the top. The candle support bars are made up from $\frac{3}{4}$ in. square bars. The surface of these bars are hard beaten to give the desired forged surface. These are shaped to the scroll design as shown in the sketch, the upper ends being filed round to form shoulders for the candle holders. Washer shaped caps are made from the iron plate and these are riveted to the upper ends. Two collars are made from $\frac{1}{8}$ -in. sheet metal with tabs to hold these to the disks.

Clips for the support bars, are also made from the $\frac{1}{8}$ -in. sheet metal and the bars are secured to the plate with these clips. Two made-over lag screws on which the heads are ground to a pyramid shape complete the sconce.

The sconce can be made with the simplest of tools including a hammer, vise, drill, shears, chisel and some sort of a heavy block or anvil to form the shape of the bars. It is advisable to outline the pattern on the plate and cut to the outline rather than draw the design on a separate sheet of paper.

The scone can be finished in flat black, enamel, or left in the original condition of the metal, if the iron does not show burnish marks or other evidence of newness to the work.

How to Make a Rawhide Hammer to Drive Chisels

How tempting it is for the layman, and many times the carpenter, to use the hammer for driving a chisel. The chisel handle is ruined by hitting it with the steel face of the hammer. Provide a chisel driving surface on the hammer and the temptation is removed.

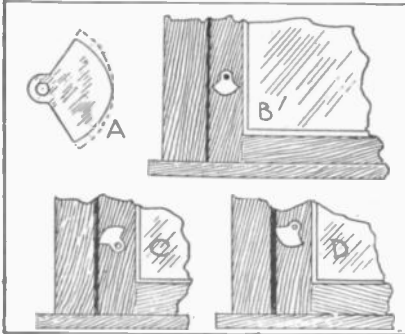
This may be done by removing the hammer head and drilling a hole through one side of the eye and with a file make the hole conical or countersunk from the inside. Cut a piece of rawhide to fit the hole so that a portion of the rawhide will extend out from the surface of the steel. This face can be used when a chisel is to be driven.



Soft driving head to drive chisels.

Window Sash Catch for Height and Locking

Complicated apparatus for any mechanical need usually results in dissatisfaction to the user. The same applies to window fastenings. Very few devices for holding sash in any position prove



Locking device and how it is attached to a window sash to hold it in any position or to lock it.

satisfactory. Usually some homemade affair will give results that cannot be had with fancy metal pins or clasps. The one shown in the illustration comes very

near satisfaction. It consists of a piece of metal, brass preferred, cut in the shape shown at A. The outside edge is not an arc of a circle. It is fastened to the sash stile so that its circular edge will bear against the window casing. In a down position, B, the sash may be raised or lowered freely, in an up position, C, it holds the window locked, and in the position D the sash may be stopped at any position.

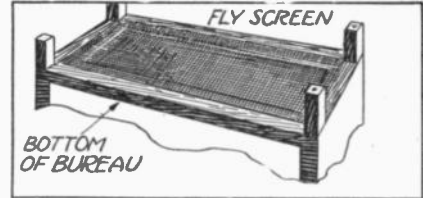
Use for Screw Top Patching Box Containers

The little box with the screw lid top in which rubber tire patching is sold makes a convenient container for many items used by the camper. Spark plug repairs, rubber cement in tubes and many other small things can be carried in them. Save all such boxes and put them to use.

How to Keep Mice and Insects Out of Bureau Drawers

Mice and roaches find a convenient entrance to bureau drawers by using the open space at the back of each drawer.

By tacking metal—copper preferred



Fly screen tacked on the lower part of the framework of bureau to keep out mice and insects.

—fly screen to the frame work on which the lowest drawer rests these pests will be kept out. Fly screen is better than the solid piece of wood or metal as it will hold no dust.—James M. Kane, Doylestown, Pa.

How to Prevent Heat Burning Walls Back of Stoves

Walls back of stoves may be protected by a coating of liquid asbestos. The liquid can be made in the following manner: Three parts gumlac, 4 parts sodium borate, seven parts powdered asbestos, twenty parts of water. Heat the water, add the gumlac and borate and when all have been dissolved stir in the asbestos.

In bulk gold is one and a half times heavier than lead.

SPANISH HOUSE WITH GARAGE



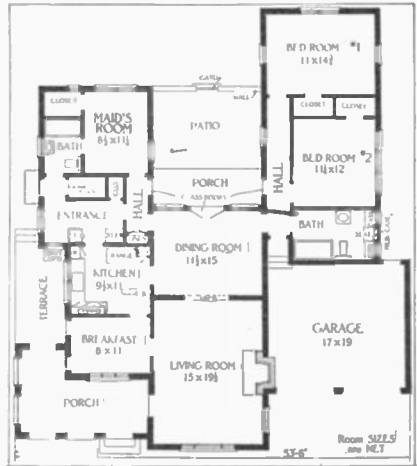
By Charles Alma Byers

THE one-story Spanish house illustrated herewith possesses a number of particularly interesting features. Located on a sixty-foot lot and having a total street breadth of fifty-three feet and a half, it is provided on the front with both an attached two-car garage and a porch. In the rear there is also another porch which faces upon a small wall enclosed patio.

The interior arrangement, which is shown by the accompanying floor plan, is quite exceptionally pleasing. The living room and dining room are connected by a broad open arch, and French doors open from the latter into the rear porch and patio. Glass doors also give access to this porch from two halls, and a pair of such doors likewise connect the little breakfast room with the front porch and terrace. It is further noted that an inside entrance to the garage is provided from the forward end of the bedroom hall.

The closets and built-in features further help in making the interior of this house convenient and attractive. These include a large clothes closet for each of the bedrooms, as well as a maid's room, a broom closet on the rear porch, a linen cabinet in the maid's hall, two shelf and drawer cabinets, a box seat and a medicine cabinet in the family bath room, and in the kitchen a draft cooler closet, a cabinet ironing board and built-in cupboards.

The exterior is finished in light cream cement stucco over metal lath and frame work, and the roof is of burnt clay tile. The slight wood trimming is done in soft brown, and the



There are a living room, dining room, breakfast room, kitchen, Maid's room, two bedrooms and two bath rooms besides the usual kitchen service porch

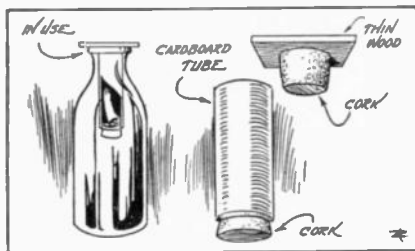
cement paving of the front porch and terrace is in dark red.

The interior wood work consists of pine throughout. In the living room and dining room it is finished in imitation of antique mahogany; in the bedrooms and maid's room it is in very light gray, and in the breakfast room and kitchen it is in a pale green. The ceiling of the living room is vaulted in barrel style, and that of the dining room is coved. The plastered walls of these two rooms are finished in semi-rough and painted in oil, in light parchment shades, and the walls of the bedrooms, maid's room and halls are papered. The bath rooms have tile wainscots and tile floors.

IDEAS FOR AMATEURS

Inside Coin or Ticket Holder for the Milk Bottle

Did you ever place money in a milk bottle and find that the bottle had blown over, or that the coin or bill had fallen to the bottom of the bottle where it could not be extracted without great



Tube slips into bottle top where it holds the coin or bill to pay milkman.

difficulty? This difficulty can be removed by the use of the coin holder as illustrated.

Procure a piece of mailing tube that will fit into the neck of the bottle and cut off a piece 3 in. long. Give it a good coat of shellac, inside and out, then fit a cork to one end and drive it in. Tack a second cork to a piece of thin wood, as shown in the sketch. Coat the wood with shellac.

When it comes to pay the milkman, insert the money in the tube and cork it with the capped stopper. Insert the tube and place the bottle outside the door. All the milkman has to do is uncork the top of the tube and remove the money or ticket. If he cannot get it from the top he can remove the tube from the bottle. The bill may be inserted in the tube and left with the bottle of milk on the porch.

Cardboard Makes Dancing Snake Run by Heat

When you do not know what else to do, make a dancing snake. There is nothing difficult about the work. Procure a piece of thin cardboard or thick

paper—a piece of bristle board is the best to use—and cut it into a spiral, coloring it as you desire so that it will resemble a snake. Fasten a piece of wire upright in a block of wood as a base and file the upper end into a smooth point, and then hang the tail of the snake on the point of the wire. Place the snake near a stovepipe or some other like heat where it is rising and the snake will twist around in a realistic manner. The power that makes the snake turn comes from the hot air currents striking the surface of the paper spiral.

How to Demagnetize a Watch Without Special Apparatus

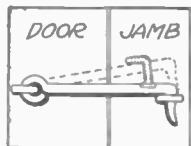
A watch, that has been magnetized by proximity to electrical machinery, can, with very little trouble and no expense, be demagnetized by its owner.

Tie the ring of the watch to a heavy thread or a light string about 2 ft. long. Then holding the string by the end, turn the watch around until the string is twisted 40 or 50 turns. As the string unwinds and revolves the watch, pass it slowly back and forth close to the fields of a small motor or generator while the machine is running. Special precaution must be taken to keep the watch revolving over the motor.

Common Door Hook Made Into an Efficient Lock

Just an ordinary door hook can be made into a lock that will be as effective as the best pin lock on the market.

A nail is partly driven into the door or door jamb over the hook at a distance of 1 in. Sufficient end should be allowed to project so that it can be turned at right

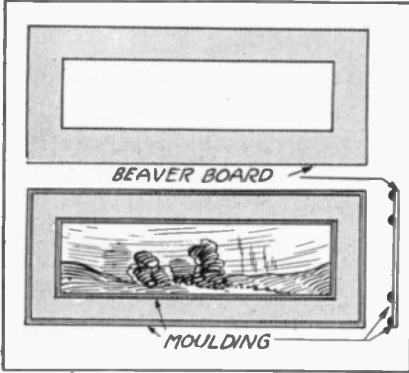


Nail turned down keeps hook in staple.

angles for the head to rest on the body of the hook when turned in the down position. When turned up the hook is free to be raised from the staple.

Inexpensive Picture Mounts Made at Home

More pictures, photographs and prints would be saved and displayed were it not for the cost of the glass and frames. In addition to this, frames



Pictures mounted on wall board make good frames for display on a wall.

are not so easy to make, especially if the moulding is narrow.

By using any of the prepared wall boards very attractive picture mounts can be made at a trifling cost. Take any of these boards and coat them with filler or shellac. Attach the picture—if on paper—with paste or glue and if they are on canvas attach them with varnish. Attach narrow half round moulding with glue, brads or fine nails. Glue with a few brads for additional security is the best way.

The moulding need not be half round but of any preferred shape. The moulding can be bronzed or finished in any way for a wood finish. The space between the picture and moulding can be finished in the same way or decorated in any style to please the individual. By painting this in-between-space with heavy oil color and then covering it with small-painter's sand—a rough effect is procured. When dry it may be given a coat of bronze or aluminum.—James M. Kane, Doylestown, Pa.

Capacity in Aerials Used for a Receiving Set

There are two kinds of aerials, the inductive, such as the loop, and the capacity, such as the ordinary single strand outside aerial. In the loop aerial the induction is between the strands, and in the capacity aerial between the earth and the single strand.

In the capacity aerial the single strand is the most efficient for the average set that does not require an inductive aerial. The radio waves travel around the wire, that is, they pass along it on the outside, and of course, if we have a large area we will have a low resistance.

Using Cheap Parts will Spoil the Receiving Set

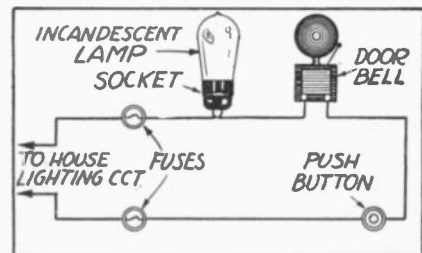
A radio set should be made only of the best parts throughout. Many builders of sets who know this is true, imagine that because the fixed condenser is a little thing it is of little consequence, and so make the mistake of using the cheaply constructed condensers which are made of two layers of tinfoil separated by a waxed paper and then folded to a small size. A saving of a few cents here may spoil an otherwise excellent outfit.

The potential which is on the condenser varies from time to time. The electrical stresses set up by the varying potentials draw the layers of tinfoil closer together and then when the potential decreases allows them to separate. Changing the distance between the layers changes the capacity of the condenser and causes a buzzing sound in the phones or loudspeaker.

Good fixed condensers are made from layers of tinfoil separated by sheets of mica. The condenser parts are firmly pressed together and clamped in position between two pieces of insulation, making an efficient, rigid construction.

Door Bell Attached to House Lighting Circuit

In an emergency the house lighting circuit can be used to connect the door bell circuit, if the method is fol-



Circuit in which a lamp is placed to furnish a low voltage current for a door bell.

lowed as shown in the illustration: Connect the bell circuit wires to the

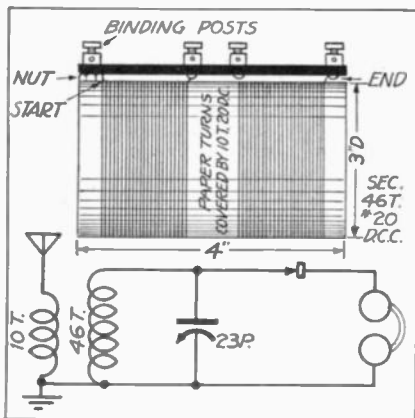
lighting circuit, running one line wire directly to the bell through the push-button contacts and connect the other line through an ordinary incandescent lamp to the other terminal on the bell. The purpose of the lamp is to reduce the current in the circuit to prevent damaging magnet coils.

This method can be used until a new set of dry cell batteries or bell ringing transformer is procured. The lamp may be placed where it will show in another room from that in which the bell is placed, if so desired.—Peter J. M. Clute, Schenectady, N. Y.

How to Make a Simple Crystal Receiving Set

While the crystal set has limited range and volume yet the average person can get some thrill from such a set because it has very few parts.

A condenser, 23 plate, a coil of wire, crystal and head phones make up the set. Procure a 3-in. tube 4 in. long for the coil. The regular bakelite form or an oat meal container will do. Wind on 46 turns of No. 20 double cotton covered wire which will about fill the tube in length. In the center of this coil place



Simple coil for use in making a crystal set of the most common kind.

two layers of glazed paper and on the paper wrap 10 turns of the same size wire.

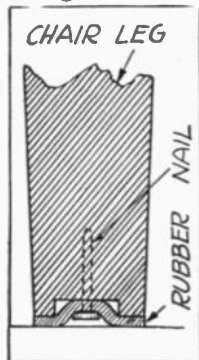
A strip of wood, bakelite or other insulating material can be used for a strip to mount the binding posts, as shown in the illustration. This makes up the coil.

The diagram shows the hook-up to use for this set. There is not much to it and you can pick up signals from stations 25 miles distant.

Chair Post Cushions Made from Rubber Tires

To prevent a chair post from slipping on the floor and scratching the varnish,

cushions may be made and applied to the post ends, as shown in the illustration. A hole is bored in the post end about $\frac{1}{2}$ inch in diameter and $\frac{1}{8}$ inch deep. Disks are cut from discarded bicycle casings or automobile tire tubes to the same size as the chair posts. These are fastened into the holes bored with a nail or screw as shown. This forms a cup of rubber that will hold a chair where it is placed.



Rubber cup on chair post end prevents floor scratches.

This forms a cup of rubber that will hold a chair where it is placed.

Grid Leak Control to Prevent Blocking of Signals

Resistance in a radio set is usually detrimental, but in a certain few instances is really essential. The detector tube needs a high resistance path from the grid to the filament, to prevent blocking of signals and to allow the tube to deliver its test volume.

To understand why this is really necessary the tube operation must be understood. The hot filament emits minute particles of electrical energy called electrons. These have a negative charge and are attracted to the plate which is attached to the positive B battery. When they have the filament and flow across the intervening space to the plate, through the B battery, and back to the filament, there is a complete circuit.

The grid of the tube acts as a valve, or regulator, of this current. If the grid, which is between the other two elements, is negatively charged it will repel the electrons and make them return to the filament, or in other words, break the circuit. If the grid is positive, it will aid the flow of electrons and regulate their passage.

The grid of a detector tube is normally positive, thereby allowing a flow of electrons across all of the time. The

incoming signal will change the voltage of the grid with the strength of the signal changes thereby changing the current flow across from filament to the plate in like proportion.

During this process the grid attracts many negative electrons and thus accumulates a negative charge, shutting down the flow of electrons to the plate and blocking the tube. Between signals much of this charge may leak off through a defective grid condenser, but usually a high resistance path must be made around the condenser to accomplish this action.

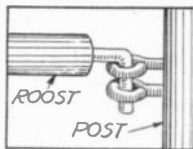
The usual high resistance, or grid leak as it is more often called, is made up of a strip of carbon impregnated paper, having a resistance of from 500,000 to 8,000,000 ohms, depending on the tube it is to be used with. The value of this leak varies with the tubes used, the circuit, and often with the tuning of the receiver. For this reason it is often desired that the leak be made variable so that the correct value can be obtained for any tube and the utmost sufficiency may be had for any circuit.

If any of the common means of sliders or rollers are used to vary the resistance of the leak this means roughens the surface so that the contact is poor. As the leak is used in the grid circuit, poor contact will result in a very noisy receiver. With a variable grid leak it is possible to obtain exacting control of the receiver and to bring the tubes up to the greatest possible point of efficiency without having the set break into oscillation.

Poultry Roost That Can be Removed for Cleaning

Persons interested in poultry raising know how difficult it is to keep the poultry house clean and free from insects harmful to poultry. The roosts are troublesome to get into for removing the dirt. The little device shown in the illustration, a homemade affair, provides a means of removing the roosts so that they can be taken out and cleaned and disinfectant applied.

The holding arrangement consists of a hook driven into the end of the pole and for a place to put the hook, two

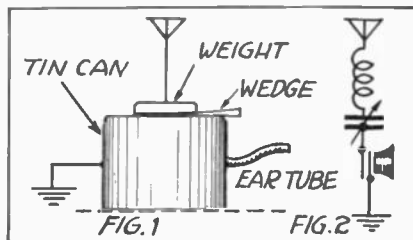


Hook in pole end and screw eyes in post.

eye screws are turned into the wooden post or side of the house at the proper location. The illustration clearly shows details. The hooks and screw eyes may be purchased from any local hardware store.

Radio Reception Without Crystal Tube or Phones

To say that the usual radio broadcast program may be received without employing a crystal, vacuum tube or other



Simple apparatus for receiving signals without crystal or any detector tube.

detector, without using an inductance coil of any sort, and perhaps strangest of all, without a telephone receiver, will doubtless strike many as being unbelievable. And yet, under appropriate conditions, this may all be done. While many will not find themselves so situated as to be enabled to make an experimental demonstration, a brief description of how reception was accomplished in this incredibly simple manner should prove instructive, particularly in reminding those who, amid the complexities of a multi-tube set, are apt to lose sight of the fundamental simplicity of the phenomena of radio.

The writer carried out the experiment rather close to a 100 watt broadcasting station, but doubtless equally satisfactory results would be had at greater distances from relatively stronger stations. The hookup is shown in Fig. 1.

The aerial was connected to a lead weight, resting on the bottom of a tin can, turned upside down. The can used was one in which cigars are marketed, and was enameled, so that, in combination with the flat underside of the weight, it formed a condenser. The capacity was adjusted to the amount required for tuning by tapping on the end of a thin wedge of wood, which was used to control the degree of separation between the weight and the can. The can was grounded, and a hole was made for the insertion of a rubber tube, the end of which was held to the ear.

It is, of course, a basic fact of electrical phenomena that opposite polarities attract, and, as the two plates of a radio condenser are always of opposite polarity, a certain degree of attraction exists between them. It is true that the polarity of each plate is continually reversing in accordance with the frequency of the radio wave, but no matter what it may be at any instant, the other plate is of the opposite polarity.

If the wavelength is 300 meters, there will be one million cycles and two million separate attractions—one for each positive maximum and one for each negative maximum—and in this lies the reason why no rectifier or detector is necessary.

In the case of a telephone receiver, the diaphragm moves toward the magnets only when the current is flowing in the proper direction, in consequence of which the high frequency alterations cancel one another as far as the vibration of the diaphragm is concerned.

In the electrostatic receiver, however, the high frequency waves are integrated, as it were, the resultant effect depending, not on the direction of the current, but only on the amplitude of the waves, which is controlled by the modulation. In other words, the radio current, irrespective of its alternating nature, sets up an attraction between the weight and the can. As this current is strengthened and weakened (that is, modulated) in accordance with the vibrations of the microphone at the transmitter, the attractive force acting on the bottom of the can is varied accordingly, and so it emits the particular sound transmitted.

It will be obvious, of course, that the simple experiment described is susceptible of considerable improvement. A variable condenser would facilitate tuning, and an electrostatic receiver could readily be contrived that would be much superior to the tin can. If the wavelength of the broadcasting station exceeds the natural wavelength of the aerial system, an inductance coil will be necessary. The hook-up would then be as shown in Fig. 2—John D. Adams.

Chinese Carpenter's Substitute for a Chalk Line

Carpenters in this country sometimes use a piece of chalked string for marking off a straight line; but the Chinese carpenter prefers his string greased. He makes a small wooden reel and mounts it on the large end of a cow's horn. He fits wooden plugs into both ends of the horn. Then he runs a cord through



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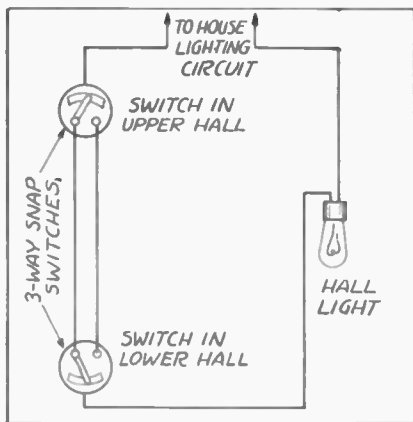
Address

holes in the plugs and winds it on the reel. Finally he pours black grease into the horn through a hole in the top.

When he wants to mark a straight line on a board he pulls the desired length of cord through the grease in the horn, stretches the line taut upon the board, and with thumb and forefinger snaps the cord. The heavy black line of grease that results not only guides him as he saws the board but, perhaps also, makes sawing it easier.

An Electric Light Controlled From Two Points

When it is desired to wire up a circuit so that a light may be controlled from two points or places the method shown



Two switches at different locations for controlling a single electric light.

in the illustration can be used to advantage. This is especially desired where a hall light is to be controlled from either the lower hall or the upper hall on the second floor.

How to Make a Gray Finish on Hardwood

Craftsman's gray may be applied to the surface of open grained woods, such as oak, ash and gum, easily as follows: Apply a coat of linseed oil to the surface of the raw wood and when it becomes dry dust out the pores of the grain thoroughly. Fill the grain with white lead or a commercial paste filler colored a light gray. Force the thick filler into the grain with a putty knife and remove the surplus. When the filler is dry, sandpaper the surface with 00 paper and complete the finishing with wax or varnish.

How to Make a Polarity Test for Line Wires

When installing electric machinery, charging storage batteries, and other electrical work it is often necessary to deter-

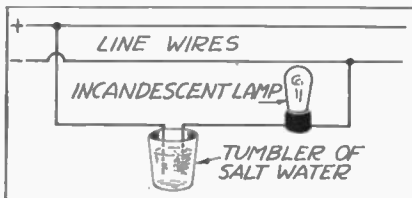


Figure 1 shows a simple test for finding the polarity of line wires.

mine the polarity of a circuit before connections can be made.

A simple test for other than high potential lines is shown in Fig. 1, which represents the end of two wires on each side of the circuit and placed an inch or two apart in a tumbler of salt water. A suitable resistance, such as one or more lamps, is connected in the circuit. Bubbles will arise from each wire. The one from which the least number of bubbles arise is the positive wire.

A compass may be used for determining the direction of the current flow. The compass is placed directly over a part of the wire that can be placed or bent in a north and south direction, as shown in Fig. 2. If the current in the wire flows from south to north, the north pole of the compass will be deflected toward the east and vice versa.

Perhaps the quickest method of all is to use the direct current voltmeter, if it

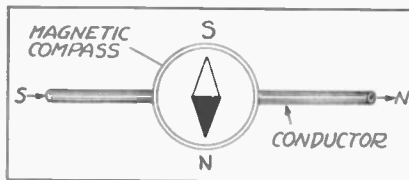


Figure 2 illustrates a way to use a compass on a wire to show the direction of current.

is available. In order to obtain a proper deflection of the needle the positive meter terminal must be connected to the plus side of the circuit and the negative terminal to the "minus" side of the circuit. If the connections are reversed the needle will be deflected in the wrong direction.

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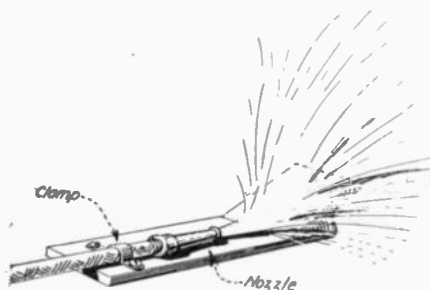
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Spraying Attachment for the End of a Hose

If you do not have a spraying attachment for the hose for sprinkling the lawn one can be made quickly of two

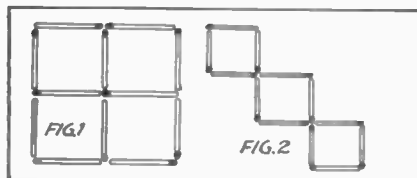


The wood block holds the nozzle and spreads the stream into a spray.

boards cut and joined as shown in the illustration. The shorter piece is attached at an angle and the hose is placed on the surface of the long piece. The water as it comes from the nozzle is forced against the slanting surface into a spray.

Vanishing Square Trick Made of Parlor Matches

Twelve matches are arranged so that four squares are shown in Fig. 1. The trick is to rearrange four matches so that only three squares will be formed all of the



same size as the original four in the first large square. While this, at first thought, seems impossible, yet it is quite easy to do. The solution is easy enough, as shown in Fig. 2, which is self-explanatory.

No pay of any kind is or will be accepted by this magazine for descriptions of new devices and, for this reason, the name of manufacturers or firms selling such articles is omitted in the description. This information is kept on file and furnished on request by our Service Bureau, Current Ideas, 612 North Michigan Avenue, Chicago, Illinois.

How to Make a Test for a Radio Transformer

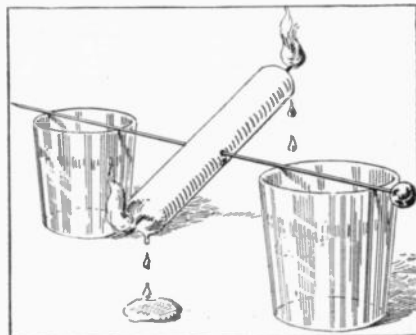
Disconnect the lines to the primary and secondary of the transformer. Connect a 22½-volt battery in series with a voltmeter and to each coil for a test. If the coils are shorted the reading on the voltmeter will be over 20 volts.

An Effective Bait for a Mouse Trap

If you have difficulty in catching that mouse and cannot bait him with the usual piece of cheese to spring the trap try a pumpkin seed. This is a bit of delicacy that a mouse likes and it leaves no bad odor for the next mouse that is apt to try the same trap.

Tipping Candle by Burning the Ends

In the illustration is shown a way to make a reciprocating motion which is set up by the burning of a candle at both



Alternating the melting of the wax quickly makes a reciprocating motion to the candle until it burns up.

ends. Stick a hat pin through the center of a candle and light both ends and lay the hat pin on two tumblers. When the flame strikes the wax it is melted quickly and the weight reduced allows it to arise and then the opposite end takes a turn at heating the wax fast and lowering its weight and rising. This motion will keep up until the candle is burned to its limit.

Take Your Time When Applying a Coat of Varnish

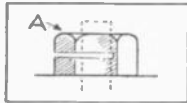
Do not hurry the process of varnishing. If a second coat is applied before the first one is thoroughly hard the varnish is sure to crack. If driers are added to the varnish to hurry its drying qualities, it is likely to cause pinholes and other defects.

How to Apply Gold Leaf on Granite Surfaces

Apply a coat of size and let it dry; then apply several coats of size and very fine bolted whiting mixed together to form a paint. Let each coat dry, then rub each coat with very fine sandpaper. Apply the gold size, evenly and thinly, and after that apply the gold leaf as usual. The same instructions apply to marble.

How to Make a Worn Nut Fit Tightly on the Threads

When you find a loose nut about machinery and one that will not stay put try the following method: Take the nut and saw a slot in one side with a hacksaw, as shown in the illustration, then strike the side or point A with a hammer. This shortens the pitch to some extent and the nut will stay in place.



The slot shortens the thread pitch to make nut hold.

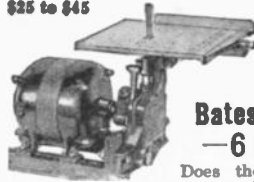
A nut fixed in this manner will serve the purpose of a locknut.

All Traffic Red Lights Flash for Fire Signal

A new type of synchronized traffic signal system, automatically controlled and the first of its kind in the country, was recently inaugurated at Lynn, Mass.

The signals are placed in groups of four units, one on each corner of important street intersections. A red light flashes for traffic to stop; yellow for pedestrians to cross the street, and at a green light, vehicles are allowed to proceed. The system is so connected with fire headquarters, that all red lights will flash when it is desired to stop all traffic to make way for the fire fighting apparatus.

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Some of the large cables have as many as 250 repeaters in each station, in addition to the power equipment and emergency storage batteries. On the New York-Chicago cable route alone there are seventeen of these repeater stations.



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Iron-Concrete for Road Pavements

The increasing weight of trucks in recent years has aroused the ingenuity of road-builders. Among the various suggestions for improving highways, the most practical, perhaps, is one providing the two chief requirements of the modern road—enduring strength and absence of dust.

Nothing but iron is fitted to resist the wear of the electric and other motor vehicles, and iron incorporated with cement is now used on the highways of France. "Ferro-cement" is a mixture of mortar (made of cement and sand) and iron shavings, known in the French market as "iron straw" (paille de fer). The iron so used is in fine, regular, yarn-like threads which, immediately after they are mixed in the liquid mass, contract a molecular alliance with the cement. When mixed the mass is absolutely homogeneous. The iron filings are made by a special machine, because ordinary filings—waste—being irregular in form, could not be used. The straws, or filings, must be regular and free from grease and dust.

This iron-cement (ferro-cement) promises to be the preferred road of the future.

Explosion Caused by Music

One of the most powerful of all explosives is a black powder called iodide of nitrogen. When it is dry, the slightest touch will often cause it to explode with great violence.

There appears to be a certain rate of vibration which this compound cannot resist. In experiments to determine the cause of its extreme explosiveness, some damp iodide of nitrogen was rubbed on the strings of a bass viol. It is known that the strings of such an instrument will vibrate when those of a similar instrument, having an equal tension, are played upon.

In this case, after the explosive had become thoroughly dry upon the strings, another bass viol was brought near, and its strings were sounded. At a certain note the iodide on the prepared instrument exploded.

It was found that the explosion occurred only when a rate of vibration of 60 per second was communicated to the prepared strings. Vibration of the G string caused an explosion, while that of the E string had no effect.

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The finding of this new way of rectification may lead to new devices in radio and battery charging that has heretofore been accomplished by other means.

Permanent Frost Coating for Electric Globes

To frost an electric globe permanently use a good piece of fine emery cloth. Rub the cloth over the entire lamp with a circular motion. Rubbing up and down will not produce good results. About fifteen minutes' work will produce a very good frosting on an ordinary globe.

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Indeed, there has been a dire need for some means of overcoming these obstacles. SUBANTENNA is the answer, for it not only cleans up the reception before it reaches the set, but it actually gives greater distance, bigger volume to weak signals and finer selectivity. Send coupon for particulars and Trial offer.



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Right now — decide to test down your aerial; that unsightly, inefficient combination of sticks and wires that is obsolete. Just send the coupon and we'll mail you full particulars of SUBANTENNA—the first and only really practical system of radio reception. Mail the coupon NOW —for special TRIAL offer. Clip at once!

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- At once—send me full particulars of SUBANTENNA, also tell me about your special introductory TRIAL OFFER.
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The very latest discovery in the scientific world... **THE DANGER OF THE NIGHT, THE MORE BRILLIANT IT BURNS.** Quite simple to use. Anywhere you can see it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the gush button or watch plates, match boxes, and innumerable other articles, making your own luminous watches, clock faces, match boxes, etc. See our advertisement, 50c and 81 postpaid. **JOHNSON SMITH & CO., Dept. 712 RACINE, WIS.**

Serpent's Eggs

Box contains 12 eggs. When laid with a match, each one gradually hatches itself into a snake several feet long, which curls and leaps about in a most fascinating manner. **Price per box, 50c postpaid, 3 for 25c.**

CIGARETTE MAKER



Roll your own and save money. Makes better and quicker besides saves more than half. Use your favorite brand of tobacco. Next useful and handy smoker's accessory, weighs 10 lbs. Made entirely of metal, nickel-plated. **Price \$25.**

MIDGET BIBLE

GREAT COMMUNITY Midget Bible in the World. Size of a postage stamp. 200 Pages. Dead to bring good luck to the owner. A golden book of art. Must be seen to be appreciated. Make good money selling them to friends, or organizations, etc. **PRICE 15c each, 3 for 40c, 12 for \$1.00, 500 for \$17.50.** Also obtainable in leather binding with gold edges. **Price 50c each, 3 for \$1.25, 500 per doz.** Shipping charge for use with Midget Bible, 15c.

STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Price, postpaid: 40 Bills 25c, 120 for 50c, or \$1.50 thousand postpaid.**

Wonderful X-Ray Tube

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, a horse appearing out of the water, human figures, a mystery that no one has been able to solve until recently. **Price, 3 for \$1.15 direct, 75c, Johnson Smith & Co.**

Good Luck Ring

Quiet and Novel Design

A VERY striking and uncommon ring. Silver finish, skull and crossbones design, with two brilliant, flashing gems sparkling out of the water. Said by many to bring Good Luck to the wearer. **None to be had.** Good Luck Ring. Very unique ring that you will take a pride in wearing. **ONLY 25 CENTS.**

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Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends.

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HOT DOG! NATIONAL NEW NOVELTY

It is made of rubber like a small balloon. Contains a curious chemical that acts in a most remarkable way. **Remove the deflated balloon with the hand and it suddenly becomes quite warm and fills itself up with air.** It is SELF-BLOWING! Play all sorts of pranks with it. Lay it on a chair; place it freely underneath any one; undress with anyone's pillow; drop it in someone's pocket; and after a short time, when friction causes the air-bubbles to burst, a large and superbly colored balloon develops. **Each Hot Dog in a small box. Quite harmless, but loads of fun.** **15c, each, 3 for 40c, \$1.25 doz. postpaid.**

Female SEX Male Sex Indicator

Hold the **SEX INDICATOR** over a man's hand—instantly it moves in a straight line toward and forward. Held it over a woman's hand and it descends completely and continues to swing backward as if by magic.

The same action can be obtained over a letter or card or even a woman, etc. It is fascinating; baffling. We have never been able to figure out how it's done, but we've never seen it fail. Many novel and astonishing facts may be performed with the Sex Indicator. For similar, similar results can be obtained with animals, cats, dogs, rabbits, or birds, or chickens, rattlers, etc. Also used in determining the sex of unborn and live, etc. In fact it is sold as a patented sex tester in Europe. **Only 25c, or 3 for 80c, postpaid.**

POPULAR WATCH CHARMS

JUST LIKE ORDINARY CIGARETTES. BUT MUCH REAL STARTLERS! The box contains ten genuine cigarette excellent quality. They appear as real, but when each charm is about smoking, the watch sets off a very great surprise at it goes off with a loud BANG! A great watch provoker yet entirely harmless. **Price 25c per box.**

15c ONLY 3 for 40c; \$1.35 doz.

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Mystic Skeleton

A jostled figure of a skeleton 14 in. in height, with various gyrations and movements while the operator may be some distance from it.

10c & pd.

Novelty Badges

2 **REPLICATOR**

Known Form 10c. Cover: Jasper 10c. Two very novel metal badges, nickel plated, that you can wear, giving you fun out of all proportion to their trifling cost. 10c, each badge, 3 for 25c, or 75c per doz. postpaid.

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Wonderfully Sweet Toned and Musical

The Magic Flute, or Humanator, is a unique and novel musical instrument that is played with nose and mouth combined. There is not a little knack in playing it, which, when once acquired after a little practice, will enable you to produce a very sweet music that somewhat resembles a flute. There is no finger and, and there you have mastered it. You can play all kinds of music with facility and ease. When played on an accompaniment to a piano or any other musical instrument, the effect is so charming as to be surprising.

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