

POPULAR ELECTRICITY

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AND THE WORLD'S ADVANCE

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No. 5



LIGHTING A SUMMER CAMP BY WATER POWER

Rather than undergo the inconvenience of candlelight in their summer camp in the mountains, near Pomona, Calif., two ingenious amateur electricians of San Dimas, Calif., rigged up a miniature hydro-electric plant near their camp. The small dynamo furnishes sufficient power for several electric globes in the tent and kitchen of the camp.

The dynamo is set above the splashing

water of the little stream which furnishes the power. A homemade undershot waterwheel sets in the stream and is belted to a jackshaft and flywheel; and from a pulley on this shaft another belt runs to the small dynamo. The armature of the dynamo makes about 50 revolutions to one of the waterwheel. Practically no expense is incurred by this lighting system.



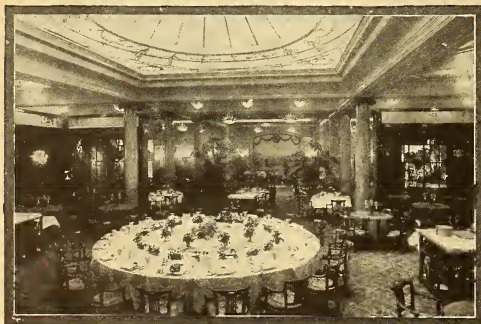
Electricity on the Imperator

Yesterday: dusty, dirty companionways; swinging, smoking oil lamps; hot, smelly galleys; creaking hand windlasses and winches; groaning hand pumps. To-day: electrical elevators; electric lights; electrical ovens and cooking apparatus in clean sanitary kitchens; electrical winches and anchor hoists; electrical pumps. The comparison is made between ocean travel to-day as typified by the "Imperator," the largest ocean liner ever constructed, and ocean travel of three or four decades ago when dingy

steam packets crawled across the Atlantic. And for the most part electricity is responsible for the difference.

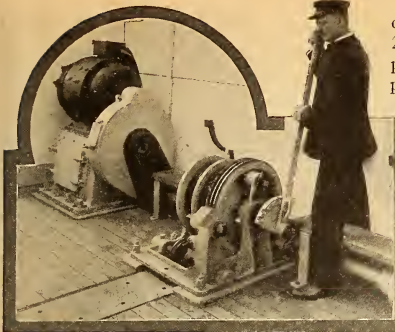
The electrical equipment of the "Imperator" is the most elaborate ever installed on board any craft. Indeed electricity plays such an important part on the hugh new liner of the Hamburg-American Line that without it the floating palace would be untenantable. Electricity does everything on shipboard but turn the four powerful screws.

Five hugh turbo-dynamos located in the outer engine room on the port side of the steamship supply the electrical energy consumed by the myriads of lights and the hundreds of electrically operated tools, hoists, etc. And besides these five there is a sixth dynamo of great capacity which has been installed as an auxilliary. This last is independent of the mechanism of the rest of the ship and is operated by a benzine engine. In case of an accident which might result in crippling



PHOTOS BY BROWN & DAWSON

Lighting Arrangements in Main Dining-room of the Imperator



The life boat davits are all of the very newest type as shown at the right. They are operated with winches driven by electric motors as shown in the picture above and each winch is readily controlled by one man.

dynamos each generates current of 2,000 amperes at 110 volts; motive power aggregating about 850 horse power, besides current for 10,000 lights.

Electricity is used on the "Imperator" for illuminating, ventilating, passenger, provision and luggage lifts, winches, cranes, various machines in galleys and pantrys, bell in-



The winches shown at the left, and operated by electric motors, are used as baggage and mail hoists, also for lifeboats.



PHOTOS BY
BROWN & DAWSON

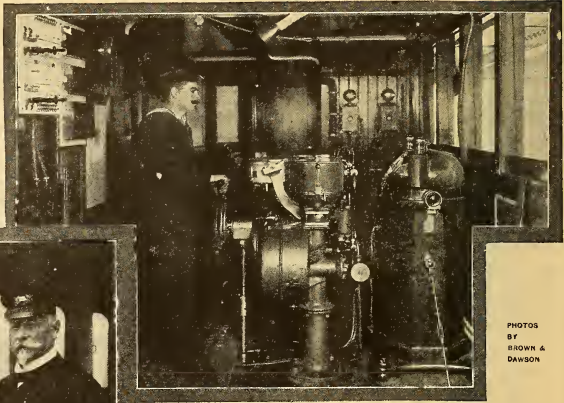
stallations in saloons, first and second class staterooms, officers' rooms and kitchens; alarm bells through the ship, fire alarm installations, electric clock system, wireless telegraphy, internal telegraph and telephone system, signal lighting, and even for heating in many of the first class state rooms and for cooking in the kitchen.

To take care of this electrical equipment a corps of 25 electrical engineers and electricians is included in the ship's crew, besides any number of helpers and assistants.

Naturally one of the most interesting objects on board the vessel is the wireless station located on the boat deck. There

the five regularly used generators this sixth could be started instantly so that light could be supplied to the alley-ways between the staterooms, to the boat deck and numerous other important places on shipboard. This emergency dynamo is placed on the boat deck above the water-line of the vessel. The five turbo-

By means of this small, easily handled wheel electrical contacts are made, controlling motors which handle the nine ton rudder with ease.



PHOTOS
BY
BROWN &
DAWSON



Vice
Admiral
Hans
Ruser
Sta-
tioned
at one
of the
Alarm
and
Signal
Stations

two motor-generators fitted with starting switches, revolution recorders and switch-board. Four secondary or daughter compasses are included in the outfit serving as azimuth and steering compasses. Of these last, two are located on the Commander's Bridge. There are also four magnetic compasses for emergency use; one an azimuth compass and three steering compasses, of which one is located on the steering house on the poop.

The steering of the leviathan is all done by electricity. Motors control and operate the huge nine ton rudder which is turned by means of a rudder shaft two and one half feet thick.

Unlike all other steamships, the "Imperator's" superstructure is not disfigured by hundreds of ungainly and unsightly ventilating funnels. All of the ship's ventilation results from an electrically operated ventilating system. Artificial ventilation is provided for all social and living rooms by means of 80 Sirocco blasts of from 1,500 to 3,000 cubic feet individual capacity each minute. The blasts are directly connected to motors and their total capacity is about 200,000 cubic feet of fresh air every 60 seconds.

The lifeboat davits are all electrically operated. On the boat deck are a score

are two reserve antennæ and two receivers for long and for short waves. It is estimated that the carrying power of the apparatus is about 1,500 nautical miles. Three operators are employed on the ship.

Another important feature of the equipment of the "Imperator" in which electricity plays a minor part is the compass installation in a room on the third deck and in other sections of the ship. It is estimated that the installation could not be duplicated for less than \$9,000. An Anschutz gyroscope compass installation including a mother compass is located in the main room with

or more of motors placed close against the cabin walls. These are connected with the davits and by means of electricity the crew of the "Imperator" can have all of the lifeboats into the water at boat drill in less than five minutes. This, of course, does not mean the 80 or more collapsible lifeboats piled on the boat deck which are lowered by electrical boat cranes one at a time.

Besides boat cranes there are ten electrically operated cargo winches, of three ton lifting capacity each, three warping winches and two electrical cranes forward and aft for handling luggage, mail and provisions.

The illuminating system on board the huge liner is one of the most gorgeous ever planned for a vessel. All sorts of direct and indirect lighting arrangements have been installed in the different saloons with the result that at night the vessel is literally a blaze of glory.

KITE THAT CARRIES A MAN

Captain Saconney of the French military corps has now succeeded in making a man carrying kite which is expected to be very valuable for scouting purposes



New French Military Kite

and taking photographs of the enemy's position. It consists of a first kite which is sent up in the air and then held by its cable in a fixed position. Upon the cable runs the second kite and also the basket with the man, and the wind propels this kite up the cable so as to draw the basket along with it, thus allowing the man to rise to the top or stop at any point that he desires. Each of the kites is made up of quite a number of separate parts so that the whole combination gives a large surface to be acted on by the wind.

LIGHTS FOR THE VILLAGE WITHOUT TELEPHONES

Kettlewell is a little village in Yorkshire, England. It has neither railway nor telephone service and the only link with the outside world is a single telegraph wire. Those who are in the habit of asking, "What would we do to-day without the telephone?" should go to Kettlewell for the answer.

But the village is not altogether out of date, for an electric light plant has just been established there, with the village postmaster as secretary of the company, and the village schoolmaster and the village joiner as directors. A small waterpower has been developed to drive a ten horsepower hydraulic turbine, which in turn drives a small dynamo. The whole plant cost only about \$3,700.

LIGHTNING CURES PARALYSIS

During a thunder shower, which visited Springfield, Mo., at noon on the 21st of June, a heavy bolt of lightning struck the residence of Chris Abegglen, an aged German who had been unable to walk for two years because of a stroke of paralysis.

The chimney was torn from the roof, and the high potential current followed down the flue through two floors and the basement into the ground.

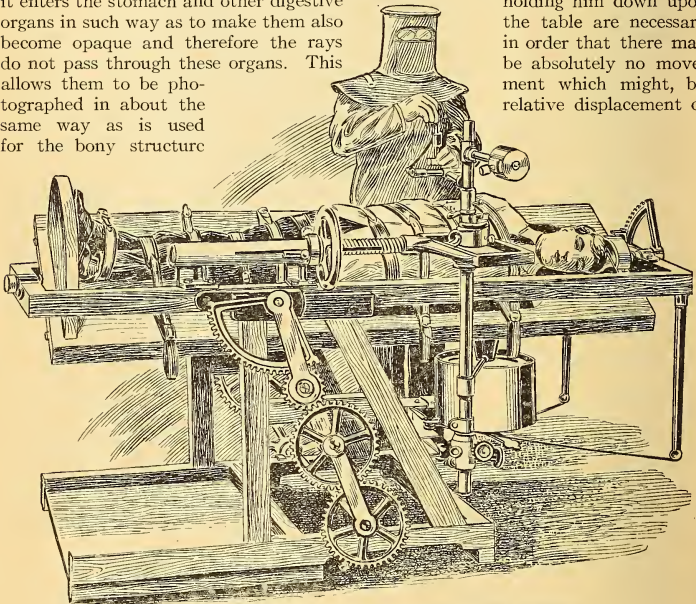
Mr. Abegglen was severely shocked and upon regaining consciousness, was surprised to learn that he had regained the use of his legs.

LATEST ACHIEVEMENTS IN X-RAY WORK

One of the leading X-ray establishments of Germany, the Sanitas Company of Berlin, has brought out a new preparation known as "Diaphanite" which is opaque to the rays and when swallowed, it enters the stomach and other digestive organs in such way as to make them also become opaque and therefore the rays do not pass through these organs. This allows them to be photographed in about the same way as is used for the bony structure

tus in order to allow of making photographs in the apparatus placed at the back or the side of the head.

In another instrument, one would think that the patient was a victim of some terrible torture of a refined scientific kind, but in fact he feels nothing whatever, as may be imagined. The straps holding him down upon the table are necessary in order that there may be absolutely no movement which might, by relative displacement of



Latest X-Ray Apparatus Which Looks Like Some Terrible Torture Instrument

of the human body and the results are of the greatest value in medical or surgical examination of the body, as may be expected since we are now able to see at a glance just where all these organs are situated and whether any of them are out of their usual position or have any unusual size or shape.

A special apparatus is now designed for working upon the head, for instance in the region of the ear, and the rays are here sent through the mouth from the appara-

the parts being slowly photographed, spoil the negative.

REVIVAL OF THE SHIP'S FIGURE-HEAD

The picturesque ship's figure-head, which long ago disappeared from the seas, has been revived on the SS. "Imperator." The designing of these figure-heads grew to be a fine art a century or more ago and the designs were often



Figure-head of the Imperator

very elaborate. To many old seamen, the modern ships, despite their graceful lines, have always appeared unfinished as long as they sailed without some figure at the prow. Since the "Imperator" is the largest ship in the world its figure-head is natur-

ally an impressive feature. The services of Prof. Bruno Kruse, of Berlin, were engaged to design the bronze.

The eagle measures nearly 20 feet from its beak to the end of the wings. The whole is cast in solid bronze. Although the Hamburg-American liner measures 919 feet in length and 98 feet in beam, its figure-head is large enough to dominate the great prow.

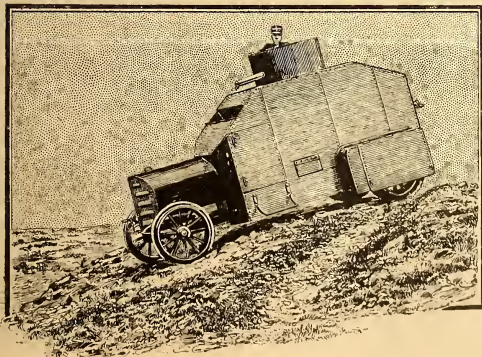
THE SMALLEST DYNAMO

The French press reports the exhibition before the Academy of Sciences of what is held to be the smallest electric dynamo in the world. So small is this dynamo, it appears, that its base would not occupy all the space on an American penny. The instrument is a perfect miniature of a large machine and is a practical model in every respect. It operates with a hum greatly resembling the buzz of a mosquito. It weighs but one-fifth of an ounce and is six-tenths of an inch in thickness. The little dynamo can be used not only as a generator, but as a motor, consuming, in the latter case, two amperes of electric current at a pressure of two and one-half volts. A small pocket battery will operate it.

AUTOMOBILE

"IRON-CLAD"

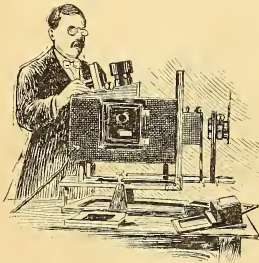
What probably is the most novel as well as modern use of the automobile is the armored car of defense used by the Italian army in operations at Tripoli. It is the most perfect war machine made and it is the belief that in the very near future, the armies of every modern nation will be equipped with these "iron-clads" on wheels, which is here seen surmounting a hill, ready for the offensive or defensive.



"Iron-Clad" Automobile Used by the Italian Army in Tripoli

GERMAN PROJECTOR FOR STAGE EFFECTS

An important achievement in the development of stage effects is the possibility of passing quickly and easily from one effect to another, as for instance, the heightening of the effect by the addition of colors, etc. This operation is performed by means of a new German apparatus called the "Universal stage projection apparatus," described by the



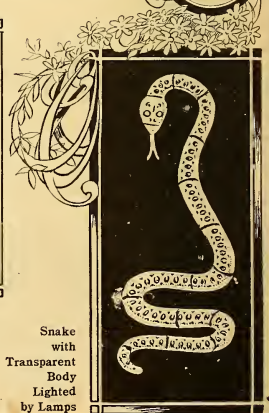
Universal Projecting Apparatus



Used as a Vertical Spot-light



Stage Effect Produced by a Projecting Lantern



Snake with Transparent Body Lighted by Lamps

Berlin Elektricitäts-Werke which lends itself admirably to the production of all kinds of stage lighting effects. Not only simple projections, but also all elementary appearances and moods can be pro-

duced by this apparatus, and it can also, with a few turns of the hand, be transformed into a spot-light for the lighting of individuals, groups or surfaces.

As far as possible by the ordinary methods of reproduction, an idea is here given of how, for example, it is possible with the help of such an apparatus and some specially prepared transparent stuff, to produce an effect as of the ocean. One apparatus projects the clouds floating slowly across the heavens, while still another shows the gathering of a storm.

For the representation of the ocean waves another apparatus is used, and still another device if it is wished to pass from a quiet sea to storm driven waves, to the reflection of the moon in the water, or to any other changes of the kind. The boat is given a moving effect by means of mechanism which causes the image to move up and down, or through the

water, as may be required by the play in progress. By this arrangement, a stereoscopic production of a picture is obtained, which resembles the natural movement of the boat in the nearest possible way.

If, in the representation of the scenes, the players or the stage setting need to be intensively lighted slantwise, or from above downwards, as for example, with sunlight or moonlight streaming in, the apparatus, arranged as a vertical spot-light, is again brought into play.

A stage effect of a different order, brought about principally through indirect lighting, is shown by one of the pictures. The body of the serpent is transparent, and is lighted up by electric lamps in two different colors arranged in series by switches. The colors are changed by an automatic current-breaker, and are so switched as to represent the movement of a snake.

SPECTACLES FOR THE HORSE

The strange sight of a horse wearing spectacles may be seen daily in Los Angeles, Calif., where the animal is employed in a manufacturing plant. Here the refuse from a gas works is compressed into fuel, and the sulphurous fumes are so strong as to injure the eyes of both horse and driver without protection. The horse's goggles are about four inches in diameter, being panes of mica set in a heavy leather band.

in a trough of mercury, on which it is floated, instead of being carried on rollers.

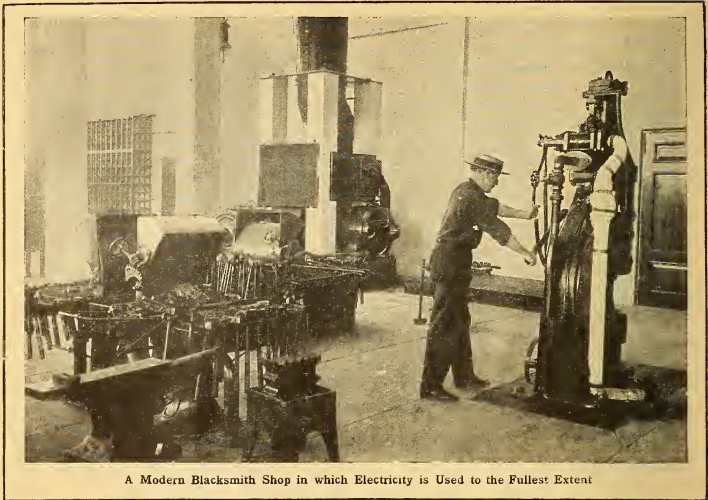
THE ST. CATHERINE LIGHT

An instance of the tremendous increase in the power of modern marine lights is furnished by the equipment of the St. Catherine Lighthouse on the south coast of the Isle of Wight. It has a power of 15,000,000 candles, as against the 3,000,000 candlepower of the light it was made to replace.

The later lens throws three distinct beams of light, which follow one another across the water. The apparatus revolves



A Spectacled Horse



A Modern Blacksmith Shop in which Electricity is Used to the Fullest Extent

ELECTRICITY IN THE UP-TO-DATE BLACKSMITH SHOP

When electricity commenced to supplant all other forms of power in shops and factories, certain pessimists predicted that, whatever conquests motor drive might make in other sections of the industrial domain, it was certain that the new form of energy could not be used satisfactorily in blacksmith shops. Yet, to-day we find that the electric current has been chosen in preference to steam power in a number of the new up-to-date blacksmith shops and its adoption is being daily extended.

For the operation of the larger tools in the modern blacksmith shop, such as the heavy power hammers electricity is proving ideal. And the electric forge is rapidly gaining in favor not only on the old time, coal burning forge but likewise on the more modern oil burning forge. However, it is admitted that some care must be exercised in the operation of the electric forge lest the operative be burned.

It will be observed that in addition to the other applications of electric power shown in the accompanying illustration this model blacksmith shop is lighted by arc lamps.

FINDING A PLACE FOR CANTON'S ELECTRIC RAILWAY

Canton, generally conceded to be the wealthiest and most progressive of all the great cities of China, presents a difficult problem in electric railway construction. In spite of the fact that 25 per cent of its million and a half inhabitants live in boats on the river and canals, the space within the ancient walls of the city is so densely populated that in most of the so-called streets, it is impossible for two sedan chairs to pass each other. There is not room for rickshaws, to say nothing of even a single track electric line.

So the plan has been advanced, and will undoubtedly be followed, of razing the 40 foot wide wall that has encircled the city for a thousand years and using

the material to fill up several of the least useful of the network of intra-mural canals. On the site of the wall a two track belt line will be built completely encircling the city, while the filled-in canals will furnish rights-of-ways for an adequate system of single track feeders. A double track will be laid down the great river boulevard and lines will radiate from the "belt," through the populous country districts, to numerous near-by cities.

shows that there is always a smaller speck of some foreign body at their centers, and most generally this speck is found to be the mineral zircon, which contains a proportion of radium. Radium is the key. These little haloes are caused by the atoms which have been shot out from the enclosed radium in the course of the ages; they represent the limit of its field of force. This idea is susceptible of the most delicate proof. It need



Portion of the Canton City Wall which it is Proposed to Remove to Make Way for an Electric Railway

Inner Gateway of the Ancient Wall



RADIUM IN QUEER PLACES

The "haloes," which are examined by Professor Joly, the distinguished physicist of the University of Cambridge, are associated neither with organic life nor disembodied spirits; they are haloes in the rocks. In certain very old minerals, a brown variety of mica, for example, the microscope reveals minute circular marks which occur quite irregularly, but are themselves singularly regular. They look like circular disks in the slice of rock when it is exposed under the lens, but these dots are really sections of quite regular spheres which have diameters between the twentieth and the thirtieth of a millimeter. They are, therefore, not visible to the naked eye, and they have always been a puzzle. Close examination

hardly be mentioned in this day that radium when it is decaying shoots out atoms that are usually regarded as atoms of helium; and that, in fact, every radioactive substance when it is undergoing change does the same thing. Now the progress of these atoms, the length of their journey and the speed at which it is accomplished, have all been very carefully investigated and computed since the beginning of this century. We know the approximate length of the path of the atom shot out by any radioactive element, from the uranium to the disintegrating forms of radium, thorium and actinium; and we know how soon collisions with other atoms of other substances which it encounters will reduce its velocity to zero.

A remarkable fact discovered by Pro-

fessor Bragg was that the only thing which counted in stopping the discharged atom was the weight of the atom which was in the way. Thus it has been possible to calculate exactly how far a discharged atom should penetrate in any known substance. The discovery of fascinating interest in Professor Joly's haloes is that their radii correspond exactly with the distances which atoms from the varying radioactive minerals ought to travel; and thus no fewer than fifteen kinds of atom produced haloes have been classified. A less mathematical but equally interesting demonstration afforded by the haloes is that of the age of the rocks in which they are distributed. Their age is a little appalling. A halo of less than a million years has never been seen; and hundreds of millions of years must have gone to the formation of some of them.

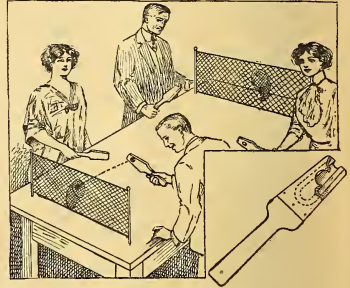
A PORTABLE ELEVATOR

Where heavy sacks or bales of materials are to be handled in storage warehouses and piled in lofty tiers, an electrically operated transportable carrier and elevator, as shown in the drawings, is of immense advantage. It is a very flexible device, operating on the horizontal or at a steep angle. The hand

trucks are simply pushed up against the lower end of the traveling belt or carrier and the load flopped over onto it.

MAGNETIC BASKET BALL

A parlor game of basket ball played upon a table with two upright screens, a ball and bats is the subject of a patent

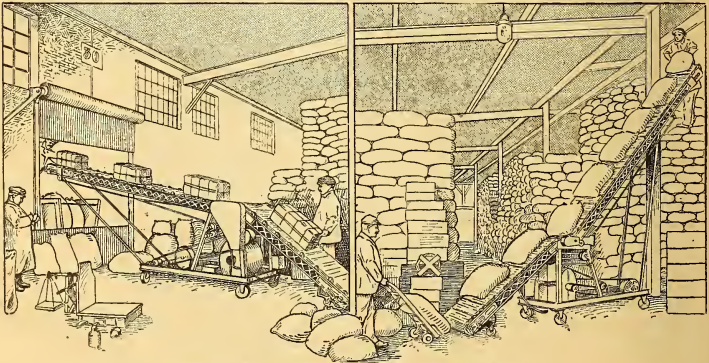


Magnetic Basket Ball

issued to Lenora H. Jones, Sedgwick, Kansas.

The ball is constructed of magnetizable material while the bat, called a tong, contains a permanent magnet, as shown, with a handle.

The object of the game is to pick up the

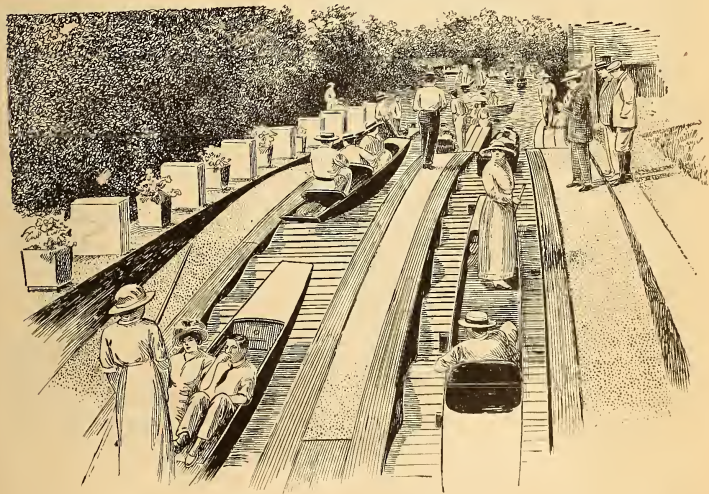


Portable Electric Elevator for Handling Sacks and Bales

playing ball with the tong through the magnetic action and deliver it with a quick jerking motion into the basket, as shown, at the left of the party in play. This is done only by the player standing next to the basket; the other player or players on the same side simply pass the ball along the table with a light tap of the tong. The opponent attempts to prevent a player from scoring by guarding the basket and by knocking the ball from his opponent's tong by lightly striking the latter on the top with his own. Each playing ball delivered in the basket may count two points and the first side scoring ten points shall be the winner in the game and the side first winning five games shall be the final winner.

WATER POWER UNDER MORE THAN A MILE HEAD

The highest head waterpower plant in the world will soon be completed at Martigny, Switzerland. The fall utilized is 5,400 feet and the remarkable feature of construction is the plan of the pipes conveying the water from the head of the fall to the power house, a distance of three miles. The pressure gradually increases with the fall until the lowest point is reached where the pipe had to be made of special ingot-pressed steel in order to withstand the pressure of 2,500 pounds per square inch. The turbines have a total rating of 15,000 horsepower.



MOVING STAIRCASE PRINCIPLE APPLIED TO A LOCK

Boulter's Lock on the Thames always presents an animated scene, especially on Ascot Sunday when hundreds of punts and other sorts of small pleasure craft pass through. There used to be a great deal of congestion at this point until recently, when a new electrically operated conveyer was installed. This is operated by endless chains driven by motors and the craft are carried from one level to the other in remarkably short time. As many as 1,600 boats have been carried through in one day.

STUDYING STARS IN AN ARTIFICIAL SKY

Within a huge globe at the Chicago Academy of Sciences one may see in a few minutes a representation of 692 of the principle stars visible in Chicago during the year. To do this by a study of the heavens would require hours of careful watching for a whole year.

The great globe is revolving slowly. The moon rises and sets and then the sun, both being represented by the ingenious use of electric lights.

The sphere, which is fifteen feet in diameter, is constructed of thin galvanized sheet iron and weighs 500 pounds.

The stars are tiny perforations in the sphere through which shine outside daylight or electric illumination. Each glimmering point is accurately placed according to the star it represents in the real heavens.

Around the globe on the outside and on the line of the

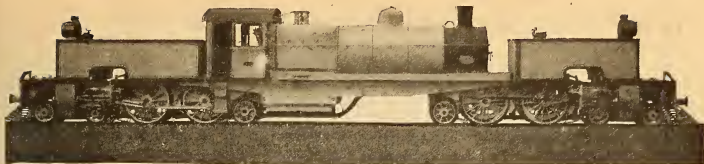


Huge Sphere Containing an Artificial Sky in which to Study Stars

Passing through a door and up a few steps the observer finds himself on a wooden platform, inside the globe, capable of holding fifteen persons. The door closes and everything is dark. Gradually the eyes become accustomed to the darkness and one by one stars are seen in the man made sky. An attendant snaps a switch and the stars begin to

equator is a metal ring to which the globe is secured and this ring runs in grooved wheels as the sphere is turned by an electric motor under the platform.

The globe, designed by Prof. Wallace W. Atwood of the Academy, cost \$10,000 and was presented to the institution by La Verne W. Noyes.



Garratt Locomotive for the Tasmanian Railways

A LOCOMOTIVE FOR TASMANIA

The above illustration shows a British locomotive of the Garratt type built for the Tasmanian government railways — the largest, so far, in that country. The boiler and firebox are in the center. The cylinders are mounted on separate carriages — front and rear — which also carry the coal and water.

TRAWLERS AND THE CABLES IN JAPANESE WATERS

It is reported from Japan that some difficulty is being experienced by the telegraph service there owing to the damage caused to the submarine cables off the coasts by fishing trawlers. By reason of the profitable nature of these fisheries, there has recently been a large increase in the number of trawlers, with the result that an interruption of the cable service is frequently caused. The authorities of the Government Telegraphs and Agriculture Departments are considering measures to overcome this difficulty.

VOLTA'S ELECTRICAL APPARATUS

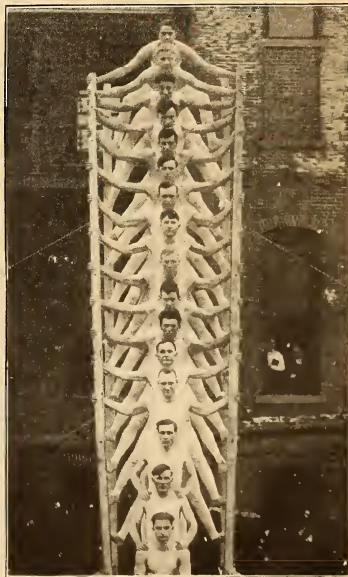
During a visit to a curiosity shop, in an Italian town, not so long ago, Sir Henry Norman, a member of the British Parliament, came upon a collection of electrical apparatus constructed by Volta.

It appears that the uncle of the grandfather of the present owner of the collection was Volta's cook and body-servant for 30 years. On the death of the scientist, the experimental apparatus passed to his body-servant, from whom it passed down from generation to generation. The

collection comprises a cupboard full of old apparatus, a number of books, portraits, papers, letters, etc.

A NOVEL GYMNASTIC FEAT

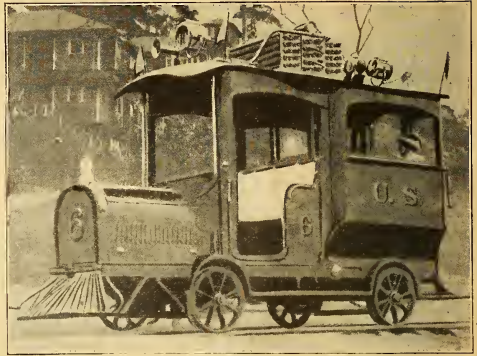
"The photograph shows a novel "stunt" that attracted much attention in the annual gymnastic exhibit given by the Y. M. C. A. of Bloomington, Illinois. It was called "the ladder pyramid," and although not particularly difficult to execute, made a very pleasing appearance.



Gymnastic Feat which Gives a Pretty Effect

ODD CAR IN THE CANAL ZONE

The car in the illustration, somewhat between the common gasoline motor car and a steam locomotive in design, was built for the special purpose of use by the superintending engineers of the Panama Canal. For this purpose it served, but in the same manner that steam and gasoline are being rapidly superseded by electricity for many uses everywhere this peculiar little motor car, with others of its kind, was recently sent to the discard.



Odd Car Used by Panama Canal Superintendents

AMERICA'S MOST EXPERT BOW AND ARROW MAKER

A little city in interior Oregon is famous among archers not only in America but throughout the world as the source of some of the best bows and arrows that have ever been produced. And this but goes to prove what success can attend a one man industry, for F. S. Barnes, of Forest Grove, Oregon, worked single handed to win the reputation which

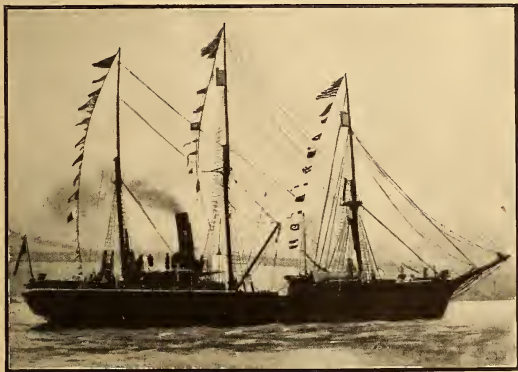
finally came to him as America's most expert bow and arrow maker. It is conceded, however, that much of the magic which seems to lie in the bows made on the Pacific Coast must be attributed to the constructive material, namely, the Oregon mountain yew. This wood is selected with rare care and as no pieces are used save those obtained at an altitude of several thousand feet, merely the prospecting for wood in the mountains is an arduous task.



The Old Bow and Arrow Maker

IMMENSE WATER TURBINES

The possibilities in building immense turbines for the development of electrical energy are emphasized in the construction for the Pirahy plant of the Rio Janeiro Light and Power Company in Brazil of a 20,000 horsepower set. Of even greater bulk, although carrying a lower head, are the turbines of the White River plant of the Pacific Coast Power Company of Seattle which can develop 20,800 horsepower. The Rio Janeiro company's turbines will operate at a speed of 300 revolutions per minute under a head of 900 feet. The Seattle turbine runs at 360 revolutions under a 440 foot head. The addition to the Rio Janeiro plant makes its capacity 94,000 horsepower.



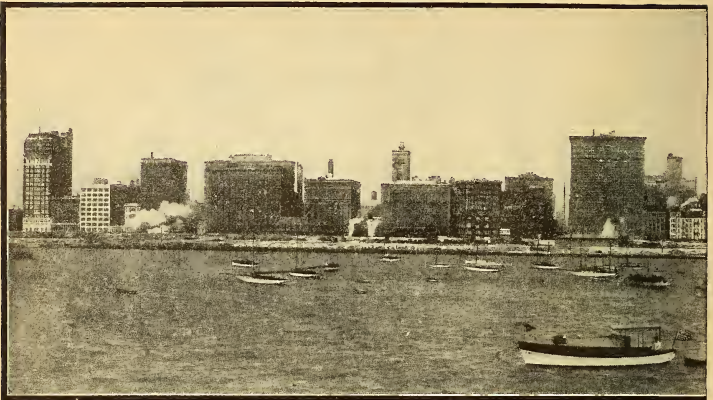
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In the far north Capt. Peary sighted a vast island or continent which he named Croker land. An expedition has just sailed, headed by Donald D. Mc Millan, to explore this land. The whaler Diana which carries the party is here shown as she was about to sail.

These are some of the principal members of the McMillan expedition. Top row, left to right, President H. Fairfield Osborne, of the Museum of Natural History, New York; Dr. Hovey, Dr. D. McMillan. Seated, left to right, H. J. Hunt, physician of the expedition; Maurice Tammery, geologist; W. Elmer Ekvlow, geologist and botanist; Ensign Fitzhugh Greene, U.S.N.; Jerome Allen, wireless operator.



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Chicago's famous water front is among the world's greatest city spectacles, either by day or by night. It is perhaps best described by Arnold Bennett in "Your United States." He says: "And then, in the night and in the rain, you swerve round some corner into the straight, by Grant Park, in full light of one of the most dazzling spectacles that Chicago or any other city can offer — Michigan Avenue on a wet evening. Each of the thousands of electric standards in Michi-



PHOTO BY FRANZ OTTO KOCI,

These wonderful decorations were built up especially for the funeral of Prince Churlo, brother of the Siamese king. Elaborate though all these decorations were, they were burned after ceremonies lasting several days, and the body itself was cremated.



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gan Avenue is a cluster of six huge globes (and yet they will tell you in Paris that the Rue de la Paix is the best-lit street in the world), and here and there is a red globe of waraing. The two lines of light pour down their flame into the pool which is the roadway and you travel continually toward an incandescent floor without ever quite reaching it, beneath mysterious words of fire hanging in the invisible sky!"



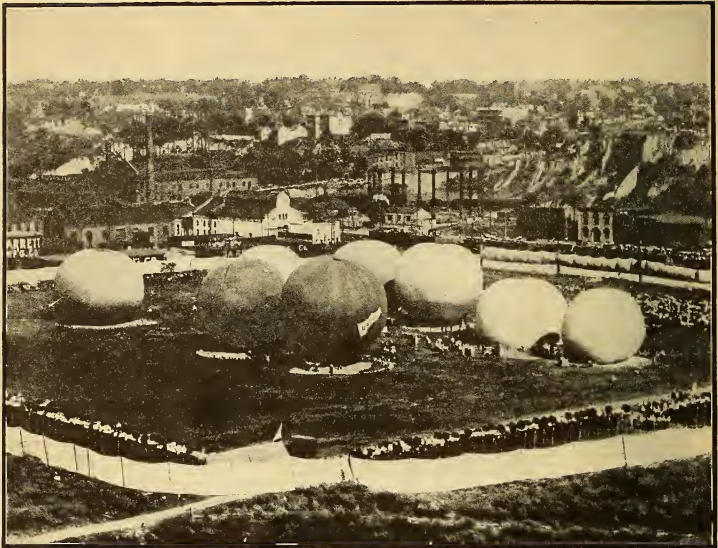
PHOTO BY FRANZ OTTO KOCH

A group of Typical Chinese Workmen at their noonday meal. Apparently they are a happy and contented lot.

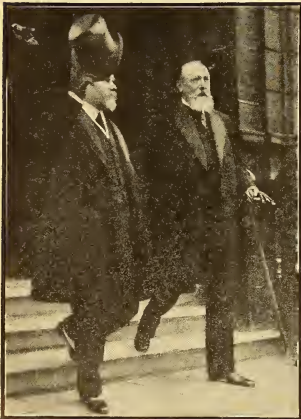


PHOTO BY GEORGE GRANTHAM BAIN

Lady C. Stewart Richardson, the talented English noblewoman, who has presented in this country a new type of interpretive dancing.



Showing the general view of the field before the start of the National Balloon Race at Kansas City. COPYRIGHT BY THE INTERNATIONAL NEWS SERVICE, N. Y.



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President Poincaré of France (at the left) just leaving the French Hospital in London during his recent visit to England.

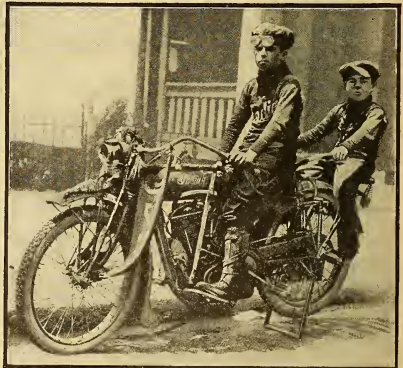


PHOTO BY GEORGE GRANTHAM BAIN, N. Y.

These are the internationally famous "Abernathy Kids" on their way by motorcycle from Oklahoma to New York. Arriving at New York, they expect to go abroad with their machine. They are the sons of Capt. Jack Abernathy.



PHOTO BY THE NEW YORK EDISON CO.

In line with New York City's sane Fourth this year, special illuminations were substituted for the usual fireworks. This shows the illuminations of the City Hall. Electric current was given to the city free for this purpose by the New York Edison Company.



PHOTO BY EMILE RUEGG

After mounting one of these serene mountain peaks in the Alps there is generally a dread of going down. By far the most secure way of descending is that shown. All sit on a rug or overcoat and guide with their ice axes. This mode of descending is only safe when there are no crevasses and especially when there is new snow.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

There are many curious ways of diving, among the most spectacular being diving with the aid of wings.

Mrs. John Boldt, prominent suffragette and first aide of "General" Rosalie Jones, shown here in type of trousers which she would have women adopt in the place of skirts. "What we need to break the shackles and free women as slaves of fashion is a leader," said Mrs. Boldt. She declares that, in her belief, women are many years behind the times in dress. In her opinion the women of the East are far more progressive in their manner of dress than are the women of Occidental countries. "Trousers of the style I wear," said Mrs. Boldt, "with draperies for evening of soft materials, giving an artistic Grecian line, are far more modest than the slit skirts you see on Broadway, with the limbs exposed to the knees or transparent underclothing."



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PHOTO BY WALDON FARWELL, WASHINGTON, D. C.

This picture attests the portability of the United States Army's lately adopted "knock down" oven which, despite its light weight and the short time required to set it up or dismantle it, is of a capacity sufficient for a force of 60 men.



During the recent visit of the King of Spain to Paris more than 80 French war aeroplanes were assembled. After the review they all took to the air — the greatest number ever seen in flight at once.

Fred C. Thomson of Los Angeles, Cal., having just completed a three year course in the Princeton Theological Seminary where he graduated in the 1913 class, has taken the pastorate in a Los Angeles church. Thomson is regarded by many athletic critics as a world marvel in his athletic ability, as his mark in many cases is nearly equal to that of Thorpe, the great Indian, and in some instances he excels that of Thorpe. Below are his records compared with those of Thorpe.

	Thomson	Thorpe
100 yd.	11 sec.	10½ sec.
1 mi. run	5 min. 25½ sec.	5 min. 26 sec.
120 yd. hurdles	16 sec.	16½ sec.
½ mile walk	3 min. 33 sec.	3 min. 48 sec.
Shot put	43' 2½"	44' ¾"
H. jump	5' 11½"	6' 1½"
Hammer	128' 6"	122' 10"
Pole Vault	10'	9' 6"
56 lb. wt.	27'	28' 2"
B. jump	21' 4½"	23' 3"



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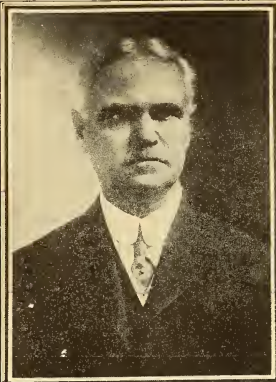
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Vincent MacLean, son of E. B. MacLean, Washington, D. C., and called the richest boy in America, is an enthusiastic farmer. He takes a keen interest in working in the corn field and has a choice collection of sheep, chickens and goats. He also has a little negro boy for a playmate, who will grow up with him and be his valet.

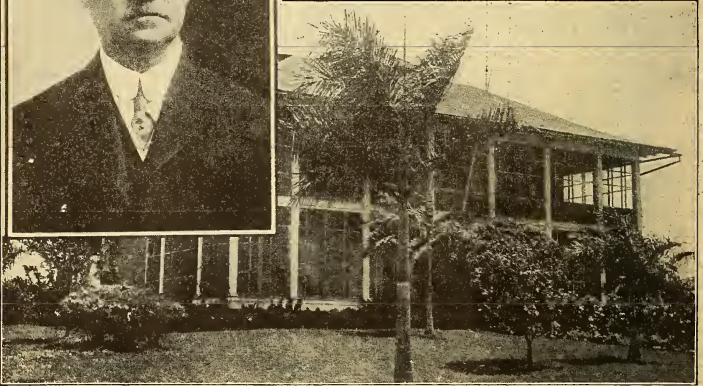


PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

Julia Marlowe loves the water — only she likes it in the ocean or in a placid bay, and not in the way of constant downpouring from the heavens. During the past two years the actress has leased a country house in England. Last summer, during nine weeks, there were but three days of sunshine. That settled the matter; no more England. So, Miss Marlowe and her husband, E. H. Sothern, have purchased a lovely, spacious home at West Hampton Beach, Long Island, where they are now spending their vacation.



The most recent photograph of Col. Goethals, whose indefatigable labor has been responsible for the rapidity with which the Panama Canal is nearing completion, and his residence at Culebra. The wide verandas surrounding the house allow the free circulation of air, and the screens completely shut out the mosquitos. All government buildings in the canal zone have those two features, and because of the continued warfare against the mosquito, yellow fever has been entirely wiped out in the Isthmus.



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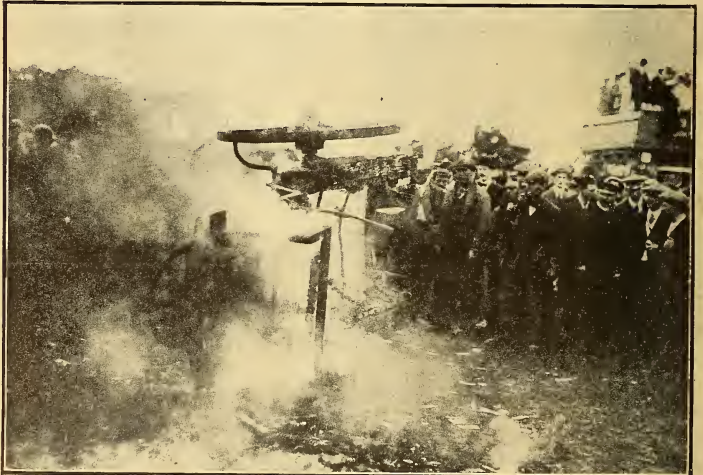


PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

The man who takes one's wager at the races in England and then "welshes" on his payments is not very leniently dealt with when the angry bettors manage to lay hands on him, as is demonstrated by the burning of the "welsher's" wagon after the recent Derby run at Epsom Downs.



PHOTO BY FRANZ OTTO KOCH

Picturesque Egg and Banana Sellers of Siam.



PHOTO BY BURKE AND ATWELL, CHICAGO

This is a picture of Wah-Hah-Gun-Ta (chief firemaker), a Blackfoot Indian who is 132 years old. He was born in Glacier National Park in 1781 according to reliable authority. His wrinkled countenance bears this out.

He was the first red man in that territory to visit the great white father, and his journey to the national capital when President Jefferson was in the White House was a memorable event in his life.



This view represents a dogs' barber shop in Paris. Here, in the little courtyard on the bank of the Seine, are to be found professional dog shearers.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

Women in England are keen for outdoor sports and many of them become expert shots with the rifle. This is a general view of the firing line during the Ladies' Meeting at Hisley, England.

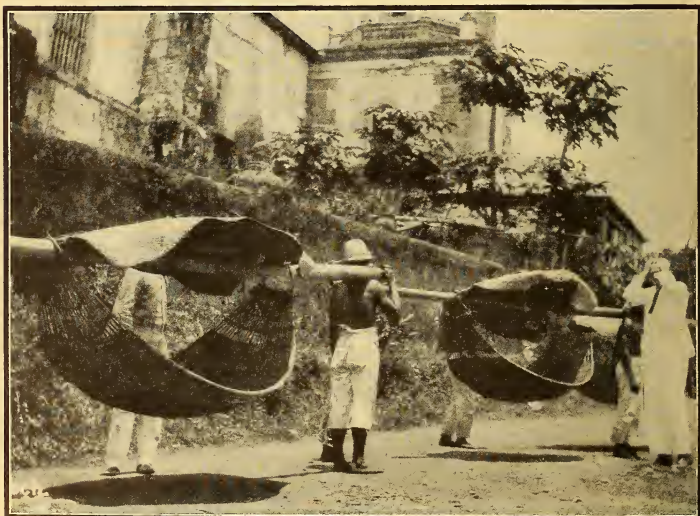


PHOTO BY FRANZ OTTO KOCH

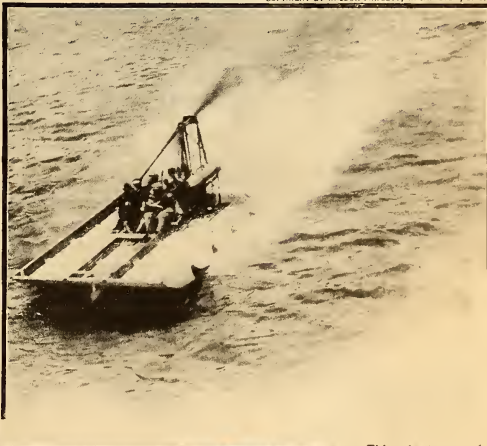
The Taxis of the Philippines. People are carried from place to place in these baskets.



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It is frequently stated, as indicative of Dutch industry, that even the dogs work in Holland and it is literally true. They are the beasts of burden for the butcher, the baker and the candlestick maker; they work long hours but are ever willing and they cover great distances on the level roads.

Gliding over the surface of the Seine on a gliding or skimming boat driven by an air propeller is the latest French sport. The one shown in action belongs to Count de Lambert



This photograph, made in an isolated section of the Blue Ridge Mountains at an altitude of 3,500 feet and eighteen miles from the nearest railroad, shows the primitive method of cutting shingles by hand yet in vogue. Lately a demand for these hand made and consequently expensive shingles has developed on the part of builders of elaborate frame houses in fashionable suburbs of our cities.

PHOTO BY WALDON FAWCETT, WASHINGTON, D. C.



PHOTO BY EMILE RUEGG

The pyramids of Ritten in the Swiss Jura are practically all inaccessible. Many a hardy climber has endeavored to force his way to the top of some of these "tables" on top of the pyramids, yet all in vain. Many have killed themselves in the attempt, but no one has ever succeeded in mounting to the top.



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Miss Jessie Wilson, the President's youngest daughter, and Francis B. Sayre, to whom Miss Wilson's engagement has been announced.



PHOTO BY GEORGE GRANTHAM BAIN

Judge Quentin D. Corley of Texas is probably the only man in America who, having no hands, is still an expert motor driver. He has rigged up his wheel so that with the aid of a hook on the stump of his arm he is able to guide perfectly and he is also able to shift gears without trouble.



PHOTO BY SUCK, FROM UNDERWOOD & UNDERWOOD, N. Y.



These are the "Cheese Twirlers" of Edam, Holland. A view in the market place showing how Dutch Cheeses are handled.

Tramping on the last leg of his 25,000 mile trip around the globe, Captain Alfred J. Brown left Washington in June journeying south. He has walked through the leading Asiatic and European countries, followed Colonel Roosevelt into Africa and has been forced to take part in the Mexican Revolution. His trip ends in Winnipeg, Can., where he goes to claim a bet of about \$4,000 and 50 acres of Canadian timber land he wins by walking around the globe. He plans to complete the trip within four years of the time of starting.



Lord Selborne presenting William Kerswell (14 years old), of St. Johns School, Ealing, with the first aeronautical engineering scholarship in England.



Old-time sleigh used by Madame Du Barry, now in the Versailles Museum. It was pushed along by a servaut.

A veteran army, united in sentiment and united in fact, held its great encampment on the field of Gettysburg the first week in July. Over the field where 50 years ago 150,000 men in blue and gray fought one of the decisive battles of the world, now trooped the soldiers of peace from North and South, from East and West, and for four days lived in the tented city. Over 40,000 old soldiers were assembled, the greatest army ever assembled on Gettysburg field after Lee and Meade left it to history. To use a common expression, the veterans had the time of their lives. They told stories, sang songs, and with trembling fingers pointed out, traced and retraced the strategic moves made in the greatest battle of the Civil War.



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Had John Bullington, color bearer for Pickett, he of the famous charge, and W. H. Calvert of the 77th Pennsylvania met on the battlefield of Gettysburg 50 years ago, the meeting would have been far different than the one shown above. Men who half a century ago would have faced each other behind the barrels of rifles are to-day clasping hands all over the field of the great battle, just as Bullington and Calvert in this picture.

Recalling incidents of the engagement at the Peach Orchard on Gettysburg Battleground. Left to right: Dr. J. R. Edwards, 9th Alabama; D. B. Gentry, 9th Virginia, and Captain H. N. Blake, 11th Massachusetts.



Gettysburg meeting of the Blue and Gray at Bloody Angle after 50 years.

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General Daniel E. Sickles, only surviving leader of the Union forces at the battle of Gettysburg.

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General view of the encampment at Gettysburg where were gathered 50,000 veterans of the Union and Confederate armies. The tents housing the veterans were situated in what 50 years ago would have been directly between the outposts of the hostile armies and directly within the range of fire.

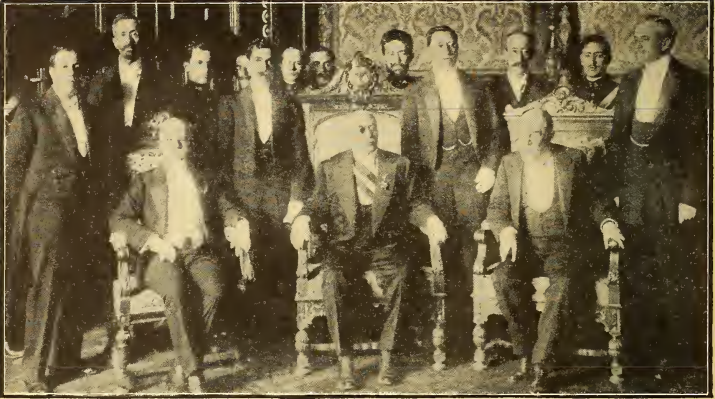


PHOTO BY UNDERWOOD & UNDERWOOD N. Y.

First Photograph of President Huerta of Mexico and his Advisers. Reading from left to right: Rayes (Justice), Esquinal Ofregun (Finance), de la Barra (Foreign Affairs), de Mondragon (War), President Huerta, Kra Stanol (Public Works), Garcia Gernados (State), Roblagil (Interior)



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The "Modern Dutch School of Painting." Photograph made at Volendam, a quaint Dutch fishing village (one of the "dead cities of the Zuyder Zee") where the old costumes and customs yet survive.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

Perry's old flagship the "Niagara" rebuilt after having been raised from the bottom of Lake Erie where she had rested for almost a century. She was brought through the storm which buffeted and threatened to send her to the bottom, victoriously, and with the old watchword of Perry, "Don't Give Up the Ship" flying from her main spar, arrived at Fairport, Ohio. Thousands inspected the old vessel.

THE SOURCE OF THE NILE



The Source of the Nile

A short distance from the pier at Jinja, a Uganda port on the Napoleon Gulf of the Victoria Nyanza, is the principal source of that vast river which for countless ages has fed the prosperity of Egypt and upon which it depends now even more than of yore—the mighty Nile. As compared to the Niagara Falls and the Victoria Falls, the Ripon Falls at Jinja are not so spectacular, perhaps, but they are remarkable for the immense quantity of water which flows over them. It is estimated by experts that fully eleven million gallons per minute flow over the falls, which are not more than 850 feet wide. The drop is small as compared to that of the other two great falls of the world, but the volume of water, even in that short drop, is a sight never to be forgotten.

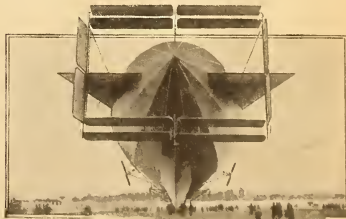
In order to get the accompanying photograph it was necessary to be lowered to a water sprayed rock half way to the base of the fall by means of a strong rope.

LIVING TREES AS TELEGRAPH POLES

In Eastern Africa there is a telegraph line in the construction of which living trees, instead of cut poles, have been used over long distances, in order to escape the ravages of white ants, which attack the poles, but not the trees. The latter are planted along the lines with their branches cut off. They readily take root and need only to have their branches trimmed from time to time. The wires are affixed by means of tarred cords of hemp, which serve in place of insulators. It is the intention eventually to replace the trees with iron poles.

THE NEW FRENCH DIRIGIBLE "SPIESS"

The new French military dirigible, "Spiess" as it is called, is built up of fourteen light and strong hollow wood beams running along the length so as to make up the frame upon which to stretch the covering. The balloon framing is held together by a bracing of steel rods inside, and contains a set of fourteen separate balloons or gas bags, so that an accident to one or even several of them will not disable the whole airship. Such



French Dirigible "Spiess"

balloons are made of rubber covered tissue, and the whole framework of the airship is covered with light and stout canvas. Below the body is a keel formed of framing covered with canvas and the crew can pass along its whole length. Two 175 horsepower motors operate the four propellers.

The Wayagamug Play

BY H. BEDFORD-JONES

(Photos by Grace Chandler Horn)

At Wayagamug, Mich., is presented the only genuine Indian pageant given in the country to-day — the play of Hiawatha. Its keynote is authenticity. The play is presented by a band of pure-blooded Ojibways and Mohawks, in their own language, every detail of costume and "props" is worked out by them and manufactured by them. The Wayagamug bids fair to become to this country what Oberammergau has become to the Tyrol.

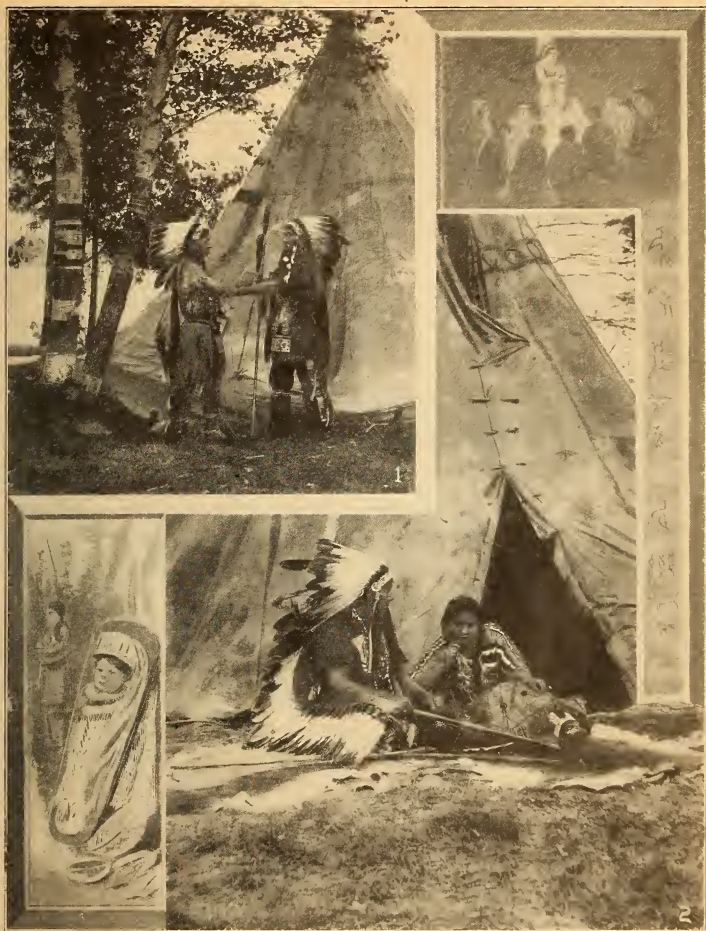
This play of Hiawatha is in reality a national thing for these Indians. The Longfellow legend is adhered to more or less, but the text of the play is the correct Indian legend, and the finely educated members of the band, some of them graduates of several universities, take keen interest in securing absolute accura-

cy in the least detail. The play is given for a month each summer at Wayagamug, and none save pure-blooded Indians are allowed to take part.

The band lives in ancient Indian fashion on the spot, in bark and skin wigwams, and the only concession made to the visiting tourist is that an interpreter delivers the text of the play in English as it proceeds, which rather spoils the effect in places, for as actors these Indians are unexcelled. Here at Wayagamug they form a little colony, getting "back to the primitive" and taking a truly savage delight in doing so. This is perhaps the only spot in the country where Indian-manufactured goods are sold, which opens up an interesting question, as the so-called Indian goods are usually factory



The "Rock" from which Pau-puk-kee-wis makes his Final Leap to Death



(1) Hiawatha and Pau-puk-kee-wis (2) Hiawatha and Minnehaha

made. Here they are made on the spot, from materials of the best, in genuine Indian fashion; a great deal of time and care has been expended on attaining the

means and methods of the older Indians, and these are followed exclusively. As may be seen in the illustrations, the canoes are of birch-bark — and they are

no mere stage properties either — while the costumes used in the play and worn at all times are highly valuable, being composed in part of magnificent bead and feather work.

The "stage" of the play consists of a portion of the Indian village itself, which is placed on a tree strewn tongue of land projecting into the large lake, and from the neighboring shore the spectators are allowed to witness the play. In one of the pictures is shown the only "fake" part of the whole place — the high "rock." From this Pau-puk-kee-wis makes his final leap to death, and it is a very thrilling leap indeed, more especially

as he is forced to dive into a bit of shallow water and come up under the "rock," out of sight of the spectators.

A word about the illustrations may prove of interest, as Mrs. Horn is the only person who has succeeded in obtaining any photographs of the play, through gaining the firm friendship of the players. Cameras are strictly barred from the grounds, as a number of the Indians have a firm belief that a photograph brings bad luck; this feeling was heightened a few years ago when one family was persuaded to pose for a picture and a little later three members of it died. Of course the photographer was blamed.

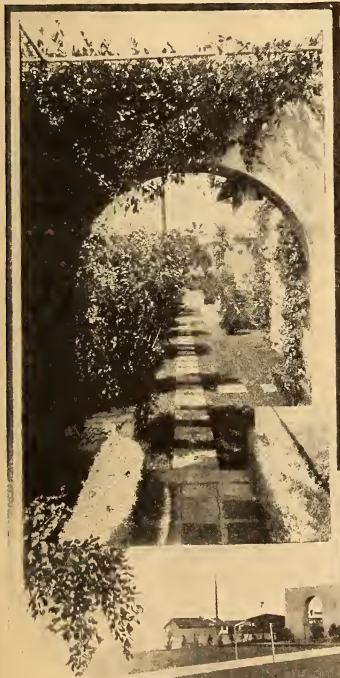


LICORICE ROOT AND WHERE IT COMES FROM

A very considerable part of the licorice root used in America comes from the marshy plains of Turkey and Russia. The root is not cultivated but grows wild in large quantities, generally in great stretches of open ground where the soil is more or less damp. It is regarded as a serious pest and greatly interferes with cultivation. The licorice of commerce is obtained by evaporating an infusion of the sliced roots. This solidified substance is used for flavoring confectionery and beer, as well as entering into the make-up of most of the brands of smoking and chewing tobacco. The collecting stations of Syria are at Antioch, Aleppo, Bagdad and Damascus and the accompanying drawing is from a photograph of one of these stations.

NOVEL AND EFFECTIVE ARCHITECTURE

Irving J. Gill of Los Angeles is becoming famous for his unique and beautiful designs for cottages, office buildings, arbors, gateways, etc. His designs are along a line that is absolutely novel in architecture, as will be admitted upon study of the examples illustrated in the accompanying pictures. This type of architecture is adapted to a warm climate.



THINGS THAT ARE NOT WHAT THEY SEEM

Custom and usage have rendered the misapplication of certain words and names so familiar that they have quite lost their original meaning and to this day carry a significance in many cases directly opposite. Here are a few examples:

Irish stew. This is no more an Irish dish than it is American or English; and the term "Irish stew" would not be understood in the Emerald Isle. But the name sticks.

No more does "Prussian blue" depend for its supply on the output of the Kingdom of Prussia. Its name is derived, quite otherwise, from prussiate of potash. Nor is there anything characteristically German about "German silver." The alloy can be made, like Irish stew, anywhere one wills. India ink is not a product of India, but of China; and the turkey is a native of the New World.

Rice paper is not made from rice; and catgut is not derived from the cat, but from the sheep. Galvanized iron is zinc-coated, but no longer by the process of Galvani. The copper cents of our currency are not made from copper, but from an alloy more properly called bronze.

Among the articles of dress and of personal use we find many false names. Dogskin gloves rob few dogs, and kid



A New Style of Architecture Well Fitted to Warm Climates

gloves fewer kids. As with catgut, the sheep again supplies the material; the other animals do nothing except furnish the name.

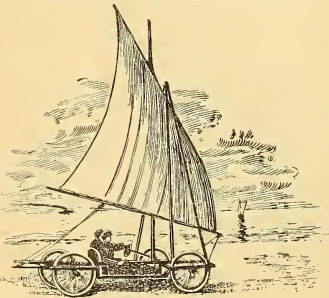
Sealing-wax contains no wax, and Dutch clocks, so called, are of German manufacture.

In the animal world we may observe that a titmouse is a bird, and that a shrewmouse is no mouse at all. Blind worms have eyes, and so, naturally enough, can see.

A curious instance of the misapplication of a word is afforded in the case of "slave." Now the Slavi, tribes dwelling on the banks of the Dnieper, derived their appellation from "Slav," meaning noble, illustrious. In the days of the later Roman Empire vast numbers of these Slavs were taken over by the Romans in the condition of captive servants; and in this way the name of the tribes came in time to carry with it the idea of a low state of servitude, the exact antithesis of its original meaning, and one that endures to this day.

SEA BEACH SAILING—A THRILLING SPORT

Sea beach sailing with the new sand runner car or "aeroplage," as it is called in France, is a sport from which no little excitement is to be had, especially when racing with the car at such high speeds as 60 miles an hour. The celebrated

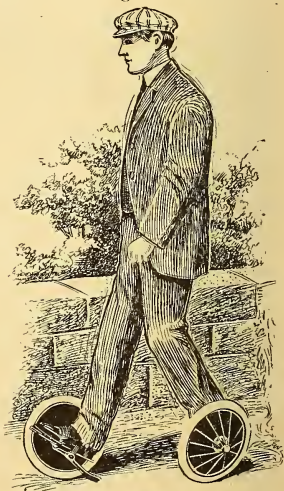


Sea Beach Sailing

aeroplane pilot Blériot is an enthusiast of the sport, and was one of the first to build racers of this kind of a substantial shape. We illustrate one of the most recent cars which he built, and it is of all-metal construction and runs upon four wheels, spaced quite wide apart so as to keep the car from overturning under the strong push of the wind.

WHEEL WALKING

A Swiss inventor amused the people of the city in which he resided by going about on "walking wheels." The move-



Wheel Walking

ments of the wheel walker are similar to those of the skater except that the former in bringing the foot forward does not lift the wheel from the ground. Brakes are provided to prevent undue speed on inclines and there is also an arrangement to permit standing still.

No spokes connect the hub with the tire, but a solid steel sheet instead. The wheels are made of great strength, but of light weight and without perceptible

friction. Walking can be easily learned, like the art of skating, and proficiency in the latter is helpful.

HANDS FREE WHILE TELEPHONING

A new form of telephone instrument as shown in the drawing permits listening and talking without employing either hand in holding the instrument. By means of an automatic catch the talking connection is maintained should it be desired to leave the telephone to speak to other people in the room or look up information.

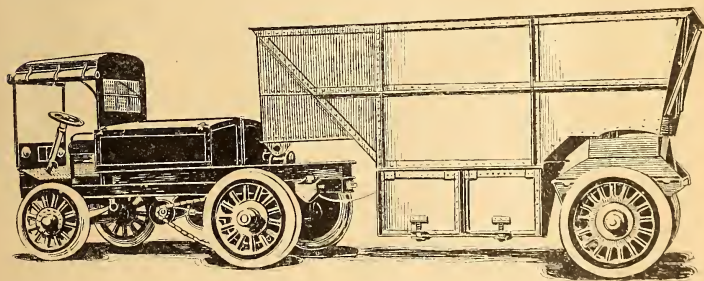


Telephone Receiver that Need not be Held in the Hand

A CURIOUS THEORY

More than one American observer has called attention to a curious property of an electric current in that, when passing round a sharp corner, it apparently projects a discharge along its original line of motion. In Germany, the same phenomenon has been observed, and there the theory is advanced that this is evidence of the existence of a true

electric momentum, resembling that of water flowing in a pipe. Faraday had divined the possibility of such a thing, but his experiments led him to conclude against its existence. Clerk Maxwell afterward raised the question again, and also decided in the negative. But it has of late been pointed out that the phenomenon is in accord with the most recent theory of the ionic nature of electricity.



A COAL TRAILER AND BATTERY TRUCK

The accompanying illustration shows an immense electric tractor and trailer, designed at Detroit, Mich., for the purpose of transporting fuel from coal yards to an electric power plant. It may be stated that this trailer is capable of carrying twelve tons of coal and is loaded in the coal yards from a hopper so that the time for loading and unloading is about eight minutes. One round trip is made hourly and two or three carloads can be handled per day. The labor for transferring this coal is reduced to a minimum as but one man is necessary for all the work involved.

CUTTING A CANAL ACROSS CANADA

Without any fanfare of trumpets, or indeed any public announcement, the Government of Canada is now considering a canal digging task that will in many respects rival the vast undertakings at Panama. With the favorable reports gathered by survey parties, and the question of cost reduced to very minor

foot canal could be built without the country feeling any serious financial burden.

From Winnipeg westward the Government engineers continued their survey up the Saskatchewan River to Edmonton. The cost of this longer and more difficult reach has been placed at \$7,000,000 to



Route of the Proposed Canadian Canal

importance, a waterway is being planned from practically the edge of the Rocky Mountains across the Dominion to Lake Superior. Stupendous as the thing appears, few suspected that Nature had gone so far in solving it until Federal engineers examined the proposed route and gave it their hearty approval.

It was found that to link Winnipeg city with the Great Lakes advantage must be taken of the Lake of the Woods and a series of navigable streams flowing south and east. The latter comprised 311 miles which, by a proper arrangement of stop-log dams and the construction of locks, could be fully utilized for purposes of transportation. The total cost of opening up a six foot waterway has been estimated at \$1,500,000 by the engineers who made the survey. The estimate referred to a six foot waterway and is so reasonable that a more serviceable twelve

\$8,000,000, so that for \$10,000,000 steamers might ply freely from the prairies to any of the Lake ports, and eventually, no doubt, to the Atlantic. The upshot of these reports is that the Government of Canada is about to appoint a commission of able business men to investigate the whole question and pave the way for a practicable scheme.

LUMINOUS ELECTRIC MIRROR

A lady of far off Tibet was asked by a tourist if he might take her picture. "I will permit you to do so two days from now," she replied, "for that will give me time to arrange my hair."

Womankind are much the same the world over, hence it is safe to say that a luminous electric mirror will be welcomed as a necessity. The mirror is fitted with a low voltage battery lamp. In the

handle is a small battery and upon the outside is a small push button. By pressing the button the lamp lights not only the mirror but also the face of the user. It is very serviceable, therefore, at

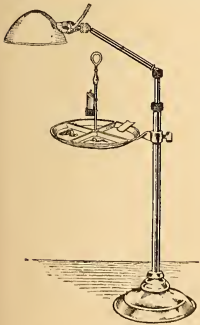


Luminous Electric Mirror

night when other sources of illumination are turned off as at the theater or opera house.

A patent upon this interesting novelty has been issued to Hugo Gernback of New York City.

ASH TRAY ON PORTABLE LAMP



Ash Tray Fastened to Lamp
Standard

A portable lamp stand maker provides a novel addition to his goods in the way of a tray for the use of the man who smokes. The tray is equipped with compartments and a match box holder.

MANUFACTURE OF BOLTING CLOTH

* It is said that bolting cloth is for the most part manufactured in Switzerland. Italy furnishes a smaller amount. It is generally made of Italian silk of the purest kind, and there is no other silken textile calling for more perfect material.

At one time it was thought that the fiber of a species of nettle would produce an equally beautiful thread, as it was so fine that 60 miles of it would weigh but $2\frac{1}{2}$ pounds, but the experiment proved unsuccessful.

It is difficult to realize how so delicate and beautiful a fabric can be woven in such quantities in such dark and dingy places. The Swiss peasants who follow this trade spend the most of their lives in damp cellars and underground rooms, and their only vacation consists of a furlough of a few weeks in summer, when the air becomes somewhat dry in these gloomy rooms.

It is necessary to weave this cloth in damp places because of the electricity in the silk, which, if not counteracted, would produce an uneven fabric. The dampness, however, does away entirely with the static charge on the threads, which would otherwise collect.

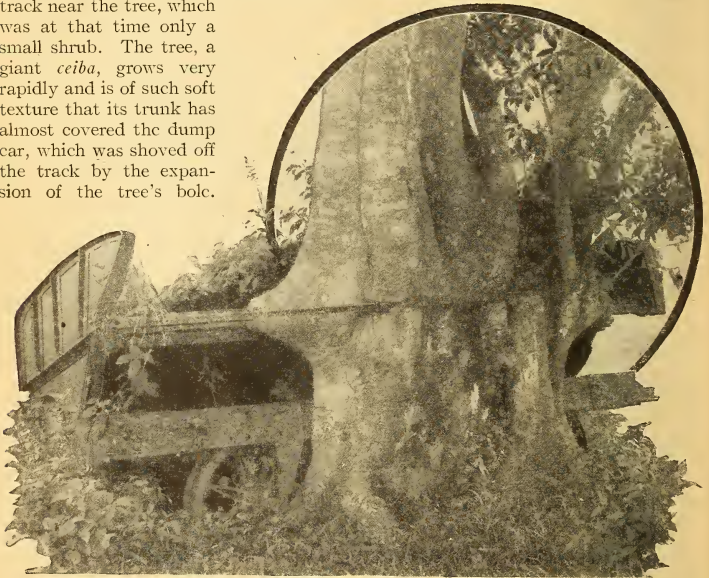
There are many grades of bolting cloth, differing in texture from sieve like fabrics to those so fine that the threads can be counted only by the aid of a microscope.

Some notion of the skill of the weavers and of the beauty of the cloth may be gained from the statement that any part of the fabric when placed under a microscope must be found to contain a certain precise number of threads to the square inch. In order to obtain this proficiency, the worker must spend his time weaving but one particular grade of cloth. The art is gained by the skillfully acquired touch of the sley or reed, for each thread is pressed into place only by the guiding hand of the operator. The woven cloths are sized to give them weight and a more perfect finish.

ONE OF NATURE'S PRANKS

This curious prank of Nature was found in the Canal Zone. The car, a remnant of the French times, was left on the track near the tree, which was at that time only a small shrub. The tree, a giant *ceiba*, grows very rapidly and is of such soft texture that its trunk has almost covered the dump car, which was shoved off the track by the expansion of the tree's bole.

in ordinary storage lost from 30 to 35 per cent of its calorific powers, the same kind of coal kept under sea water, at a depth of 30 feet, remained intact for five years.



Absorbed by Nature—A Relic of the French in the Canal Zone

The tree is large and healthy and does not seem to be the least bit stunted by the intrusion of the car.

COAL UNDER WATER

When coal is left exposed to the air for a long time it deteriorates and chemical changes ensue that diminish its heating power when burned. Experiments conducted by the British Admiralty have shown that coal stored under water, and particularly under sea water, escapes most of the deterioration that it undergoes in the open atmosphere. At Hong-kong, where it had been found that coal

A CURIOUS APPARATUS

The Zeiss optical works at Jena have put out a rather curious form of apparatus. A so called iron arc; that is, an electric arc with its carbons impregnated with salts of iron, giving out a light rich in ultra-violet rays. Then screens are used, so as to cut off all the heating and luminous rays, leaving none but ultra-violet invisible radiations. In these pure ultra-violet radiations nearly all substances fluoresce; and the light they give out is greatly affected by the degree of their purity, thus providing means of examining the chemical purity of substances.

Making Farmer Boys Into Naval Electricians

By LOUIS E. BROWNE

All machinery and mechanism on a modern dreadnaught, except the engines for propulsion, is operated by electricity. In the heart of the ship there is a great dynamo room furnishing sufficient power to amply supply a city of 30,000 inhabitants. There is a complicated lighting system, electric boat cranes, powerful searchlights, electric anchor winches, fans and ventilators, electric firing devices for the huge guns, and on the very newest of the terrors of the sea, the old fashioned coal burning galley has given way to a superb electric range.

There must be men to operate and keep in repair all of the thousand bits of electrical apparatus on board ship. Most of the men who enlist in the Navy are from the Middle West and have had practically no mechanical training whatever. If one enlists for service as an electrician, he must first become one of Uncle Sam's students in the electrical schools of the Navy at New York or San Francisco.

Here for more than 20 weeks the recruits in the electrical branch of the service study over the theory and practice of electricity. First, from simple text books and under the supervision of expert electrical engineers in the service, the man learns the nomenclature of the craft. Next he goes into the shops where he learns the manufacture of ordinary dynamos and motors from the time when the casting for the base is poured until the time its armature has been wound and its frame painted dark brown with yellow stripes and declared completed.

The student studies insulation as practiced on the warships of this nation, the method of wiring a ship, the manipu-

lation of the electric system of fire control, and finally he is sent to one of the huge ships of the Atlantic Fleet to complete his electrical education with severe practical work.

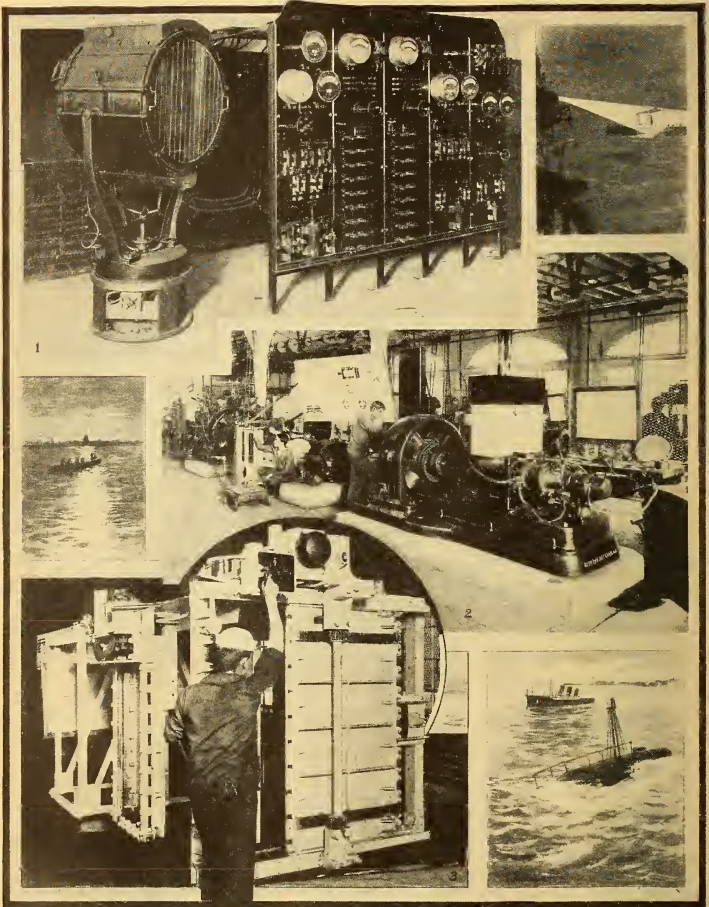
If it is learned that some recruit has picked up the Morse code somewhere, he is sent to one of the wireless schools for three months' instruction. As in the case of the ordinary electrical student, Uncle Sam requires that the prospective wireless operator shall start from the foundation and reach the top only through the laborious laboratory and classroom route.

There are two objects in this instruction for enlisted men of the navy. Uncle Sam can not use farmers on his battle-ships but he can use electricians. He instructs the farmer in electricity and obtains competent men to operate his ships. Josephus Daniels, Secretary of the Navy, believes that the other object is fully as important. In his own phraseology, Mr. Daniels says:

"There is no reason why the United States Navy should not be a great vocational school. A four year enlistment in the navy should be equal to a four year course in the best vocational school in the United States. I sincerely hope that conditions can be made so that this ideal will be perfected."

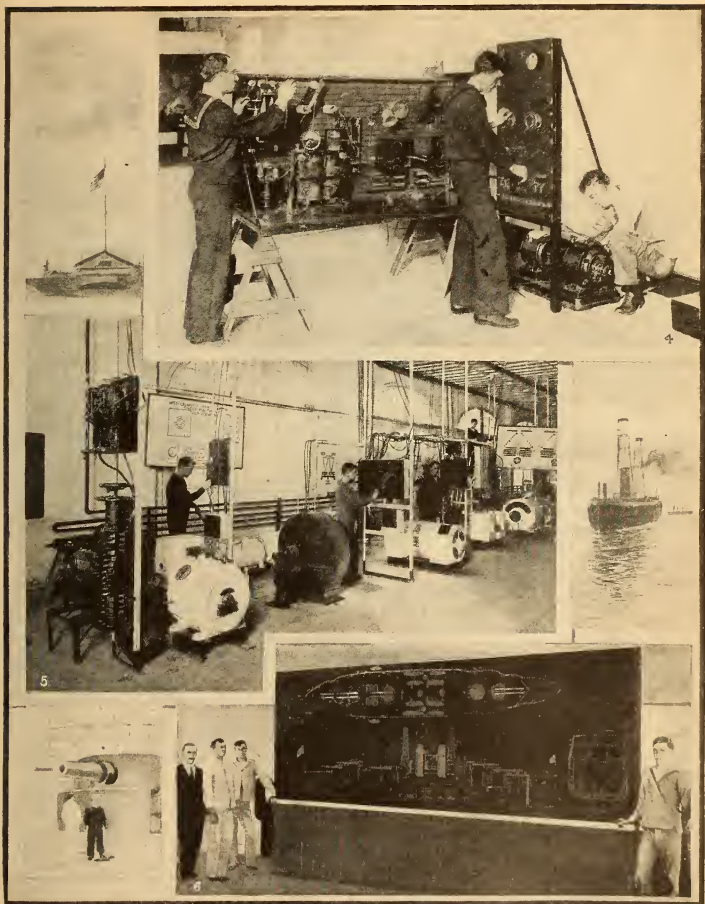
As a matter of fact any man who has been in the electrical branch of the service can enter the service of any of the huge trans-Atlantic or trans-Pacific steamships either as junior wireless operator or ship's electrician. Many men in the service learn wiring so thoroughly that when they return to private life, they take up the vocation of an electrician.





MAKING FARMER BOYS INTO NAVAL ELECTRICIANS

(1) Searchlight and Dynamo Room Switchboard. Expert Operators Can Pick up a Torpedo Boat on the Horizon Eighteen Miles Away. (2) Dynamo Room of the New York Naval School. (3) Studying the Watertight Door System. Experts Trained in the Electrical Apparatus which Operates it After Leaving the Service, often Find Positions on the Great Ocean Liners.



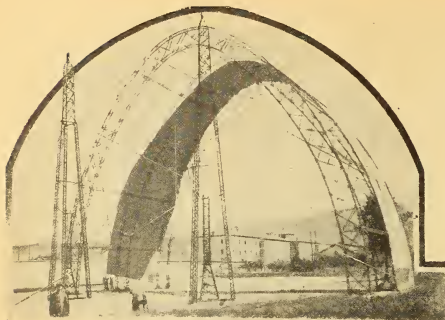
MAKING FARMER BOYS INTO NAVAL ELECTRICIANS

(4) Learning the Principles of Wireless. (5) Studying the Electrical Control Systems of the Great Turrets of the Dreadnaughts. (6) The Construction of a Ship is Studied in the Minutest Detail, Even to the Making of Diagrams of the Complicated Systems of Electrical Apparatus.

HANGAR FOR DIRIGIBLE BALLOONS

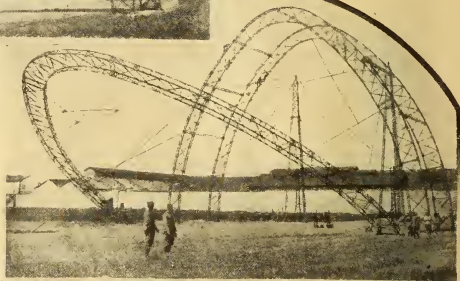
The transportable hangar for dirigible balloons adopted by the Italian army is made up of a number of arched sections, varying in number according to the length of the structure. The framework is

Method of Erecting a Transportable Hangar



all of steel and iron, with a fabric covering to keep out wind and storm.

The sections of the framework are fastened together by joints, which are later rigidly held together by bolts. The structure is first assembled on the ground and then raised, as shown.



UNIQUE HOME OF A UNIQUE ORGANIZATION

The photograph shows the hall which is the home of the Arctic Brotherhood in Skagway, Alaska. The entire front of the



PHOTO BY DRAPER & CO., SKAGWAY, ALASKA

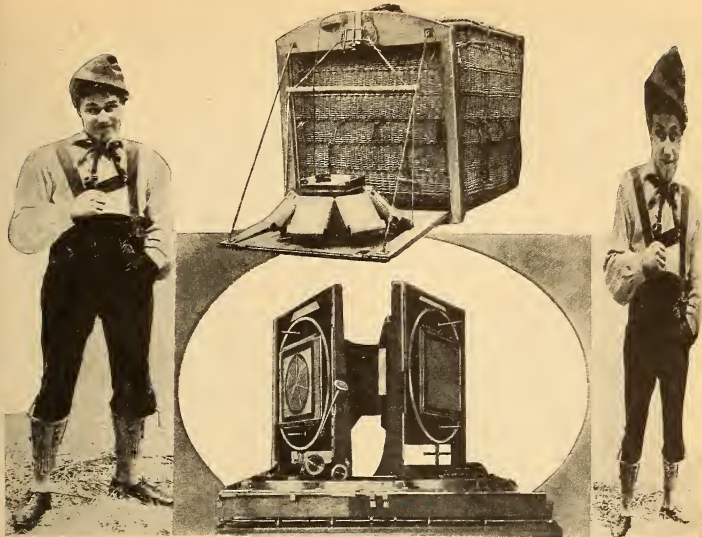
Unique Home of the Arctic Brotherhood

building is made from sticks, logs and other driftwood picked up on the beach at Skagway. There are shovel handles, parts of Indian war boats, pieces of totem poles, backs of richly carved chairs and many other curiosities used in constructing the front. The whole is so artistically done that the attention of every tourist who visits the town is attracted.

The photograph also shows the snow in the deep gulches on the mountain in the background plainly marking the letters A B, the initials of the fraternal order that has its home in the building.

THE "PERSPECTOGRAPH" CAMERA

By the new process known as "aerophotography" with the new apparatus due to the Austrian engineer Scheimpflug, some wonderful results in this



Above is the Arrangement of Cameras for Taking a Number of Photographs from a Balloon, and Below is the Perspectograph for Combining These into a Single Undistorted View. At the Left is a Straightened View Made from the Distorted Picture at the Right

field are now to be had and the new method is attracting attention in different countries of Europe on account of its great practical value. It has long been desired to use the camera to take bird's-eye views of the ground when sailing at some height in a balloon, but up to the present this has not been of much practical use in making photographic maps, especially for very exact work.

It might seem easy to photograph the ground from a balloon or airship, but in order to cover a wide reach of country the lens would need to have a very wide angle; but as is well known in photography, such lenses have a small opening and thus do not admit the light which is needed for this work. The problem is solved in a most ingenious way by the inventor, who uses a number of separate cameras pointing all around the ground so as to give, for instance, eight separate

views. But as the photographs are all on the usual square plates it is impossible to match them for the map, and besides, all but one of the views are taken obliquely to the ground — only the central view is a straight down view and the rest are unsuitable for a map.

However, by the use of another instrument, known as "perspectograph," he takes the usual plate and makes from it a corrected plate, such as would be given by a straight down view, and this enables all the plates to be matched into a single large map.

Mr. Kammerer, an Austrian engineer, to whom we are indebted for the present details, is now engaged in perfecting the method. Some photographs are also here reproduced, giving an idea of how well the perspectograph changes an oblique and distorted view into a straight and natural appearing one.

MINIATURE WARSHIPS HANDLED BY ELECTRICITY

The most expensive mechanical toy in the world was recently placed on view in Northampton, England. It is a miniature fleet of super-Dreadnaughts, battle cruisers and destroyers, with a royal yacht, all fitted with guns and searchlights. The whole is a replica, exact in every detail, of the vessels in the British Navy, whose names they bear and was designed for the Imperial Services Exhibition at Earles Court.

Every vessel is fully armed with guns that will fire. Each one is equipped too, with the correct number of secondary guns and carries electric navigation lights and searchlights, while the torpedo boats are operated automatically.

The bigger boats carry two persons, and the destroyers hold one. They are propelled by electric motors, and all the boats can travel at speeds varying



Preparing the Miniature Ships for Action

from $2\frac{1}{4}$ knots to $3\frac{1}{2}$ knots for two hours without stopping. In each boat there is half a ton of electric storage batteries.



GUNNING FOR AEROPLANES

At the famous Krupp works a new type of gun has been developed for use in attacking aerial craft from the deck of a submarine. The gun has a bore of 7.5 centimeters or about three inches. It is made to appear and disappear on the deck of the submarine through a hatch, as shown in the accompanying pictures, and it is so mounted as to be readily turned at any angle with the horizon.

When an attack from the aeroplane upon the submarine boat is expected, by dropping bombs, the gun on the deck may be lowered, the hatchway closed and the submarine boat sunk at will beneath the surface.



The New Krupp Gun to Repel Aircraft from Submarines



Motion Pictures

In the Midst of the Jungle

BY STANLEY HALL



She had almost Met Death when Attacked by Crocodiles

As the sun rose above the hilltops it revealed a long caravan wending its way slowly out of Fort Congo, South Africa, and setting out along the route to Mombasa. At the head of the procession, which consisted of an elephant, six horses, four pack mules, four camels, a four-ox team and a retinue of servants, rode Colonel Jackson, famous hunter of big game, accompanied by his two daughters, Aliee and Ethel, and his stalwart son, Jaek.

It had been less than a week before that Colonel Jackson had received the

message from his old friend Jorgson, which read:—

ZANZIBAR, Nov. 26, 1910.

DEAR COLONEL:—

I promised to notify you regarding the hunting in the interior. Advise you to go to Mombasa at once and equip, as game is plentiful.

Yours old friend,
JORGSON.

Since the receipt of this message all had been bustle and excitement in the Colonel's home, for the two girls and the son had been eager to accompany their

NOTE: From the great animal picture released by the Selig Polyscope Company of Chicago, in which Miss Kathryn Williams is featured as "Alice."



Three Huge Lions Leaped Frantically at the Fragile Barrier

father, while he had been busy preparing his weapons, camp equipment and hunting paraphernalia. At last, however, all was ready and they were really off on the expedition.

On the third day out from Fort Congo the party came upon a Kaffir village and learned that game was plentiful in the vicinity. They obtained a guide and, after going some miles farther into the jungle, made camp.

The Colonel was up at dawn the following morning and before noon the trackers discovered a huge lion which was trailed to its lair and shot by the hunters. As they parted the bushes to obtain their game, Alice discovered two lion cubs playing about the body of their dead mother. Though the sympathy of each of the girls was roused by the sight of the motherless cubs, it was outweighed by their delight at the capture of the cunning little animals, which they carried back to camp with them.

During the following night the roars of other lions and jungle beasts were plainly

heard, and in the morning it was reported that one of the camels was missing from camp. Armed with a huge net and other hunting equipment the Colonel set off at daybreak to capture the lion which had attacked the camel and, probably, dragged it off to its lair. Less than two miles from camp they came upon the carcass of the camel and there they spread their net.

Soon after the Colonel's departure, Alice and Ethel ordered their own horses brought round and set out to follow the hunting party, in the hope of seeing the lion captured. In some manner they missed the party, however, and Colonel Jackson was much worried when he discovered his daughters had gone alone into the jungle. He promptly set out to find them, accompanied by several native guides.

The girls, meanwhile, had found the place where the net had been spread for the lion and came up just as a huge beast by a terrific effort, tore himself loose from the meshes of the net and bounded

away. His roars frightened the horses and Alice's mount swerved so quickly that, although an expert equestrian, she was hurled from her saddle. Ethel's horse also took fright and, accompanied by the riderless animal, dashed back towards camp. Alice, left alone in the jungle, found the fall from her horse had injured her so she could barely crawl into a crevice in some neighboring rocks and there seek such meager refuge as the boulders afforded from the jungle beasts.

Ethel's return to camp upset the whole party, and other guides set out in hope of discovering her. Though Colonel Jackson and his aids scoured the jungles for hours afterwards no trace of the missing girl was discovered, and one guide stoutly asserted that the broken lion net conclusively proved that the girl had been devoured by the beast which had escaped from the net. This Colonel

Jackson at first refused to believe, but when two days of tireless hunting failed to show even a trace of his daughter, the Colonel resigned himself to her fate and sorrowfully gave orders to break up camp. It was a sad and disconsolate party that returned several days later to Fort Congo.

Alice, meanwhile, continued to live in the narrow crevice in which she had sought refuge, and at night had to fight off lions, panthers, a hyena and other beasts of the jungle. After several days of hopeless effort she managed at last to stagger down to a nearby waterhole and there found the tracks made the by

parties which had been seeking her. She staggered along the trail which led back to camp and, after hours of painful effort, reached there, only to discover that the tents had been taken down and the party had left the jungle. Then she fainted away.

One night, two years later, Colonel Jackson, a man worn almost to a shadow of his former self by constant grief over the loss of his daughter, sat in his home

brooding over the past, when a strange vision came to him. In fancy he saw Alice, alive and well, living in a thatched hut in the jungles, with leopards and lions for her companions and playfellows. The vision seemed so real that Colonel Jackson rose to his feet with a cry that brought Ethel and Jack to his side. After explaining to them his vision, the Colonel declared that he must immediately return to the jungles, in one final effort to see if Alice might not yet be

found. Though doubting that such a thing was possible, at this late day, the faithful son and daughter assisted him to prepare for the trip and the following day they again set forth for Mombasa.

Alice was, in truth, alive and well. She made her home in a little hut that closely resembled the one seen by her father in his vision and several tame leopards were, in fact, her companions. Vividly she recalled a day not long past when these same leopards had saved her life, when she had been attacked by a huge lion. Releasing her pets she urged



Leopards and Lions for Her Playfellows

them on to fight the lion and they had eventually succeeded in killing the king of the forests. On another occasion, she had almost met death when attacked by a host of crocodiles, while she had been to a neighboring pool for water.

The Colonel and his party scoured the vicinity of their former camp for days, in a futile effort to obtain some trace of the missing Alice, and then, one day, wandering farther from their camp than usual, they sighted a hut which closely corresponded to the one the Colonel had seen in his vision. Before the doorway crouched three huge lions, that now and then leaped frantically at the fragile barrier that prevented them from obtaining some prey within. The approach of Colonel Jackson and his party frightened the beasts, and they sought refuge in the dense jungle that fringed the hut.

A moment later the party were astonished to see the door of the tiny habitation open, and upon its threshold appeared a strange figure, clad in a leopard skin, with limbs bare almost to the knees and long hair framing a face of singular beauty. At the side of the figure stood two leopards, who looked inquiringly up at the face of the woman who seemed to be their mistress.

As one of the native guides raised his weapon and took aim at one of the beasts the figure in the doorway stepped in front of the leopard and with arms extended begged that it's life be spared. At the sound of the voice Colonel Jackson's heart missed a beat or two. Surely that voice could never be forgotten. With a glad cry of "Alice! Alice!" he leaped forward and clasped the strange figure to his breast. A moment later the rest of the party gathered about them and assured themselves that the weird jungle woman was indeed Alice.

The reunion can better be imagined than described, so we shall leave the happy members of the Jackson family, reunited at last, as they are preparing once more to return to their home in Fort Congo.

INCONGRUITY SPOILED PICTURE

The director of the American Film Manufacturing Company's players at Santa Barbara, Calif., recently received some new fire making material and used it in a production for which it had been ordered. The old Gonzales mansion was purchased and used for the film story. The equipment was made ready and soon a cloud of flame and smoke was pouring through the doors and windows of the old structure. An excited woman resident, who didn't perceive that they were "only taking pictures" turned in a fire alarm, and the result was a hurry-up visit by the fire department. The director was delighted with the sudden turn of events, and some hundred feet of film was made to include a view of the bustling firemen.

After the excitement was all over, the director had begun to congratulate himself on the bully picture secured, and the players to prepare for the next scene of the drama being produced, someone remarked, "Say, that was a motor truck fire engine. How could an old adobe house, in a supposed Mexican wilderness, be saved by a brand new, 1913 model fire engine?"

TOP NOTCH IN ADMISSION PRICE

The top notch in the way of admission prices to a picture theater seems to have been reached at last. A man over in Michigan, last week received a letter from his brother, who is manager of a picture show in a mining camp in Alaska, located some 300 miles from the nearest railroad. The Alaskan writes that he is doing a thriving business, and gets changes of film every time a dog team reaches the camp. The enthusiasm of the miners over pictures must be great, for it is necessary to show the same films over and over again, even though the price of admission is one dollar.

A Tide in the Affairs of Men

BY EDNA FRANCES

"Mother, dear, this soup is so delicious I'm going to take a little of it upstairs to old Mr. Vivinot. I'm sure he hasn't had anything so nice to eat in a long time and he does like to have me remember him." With these words, pretty Jessie

so miserly I don't believe he gets half enough to eat at times. Jessie seems to be the only human being in whom he's the least bit interested and he simply worships her," beamed Mrs. Brown.

"Oh, well, the old chap is getting so



George Fields

Louise Lester

Vivian Rich

"I Am Going to Take a Little Upstairs to Old Mr. Vivinot"

Brown poured out an extra plate of soup, and then went laughingly out of the room to seek her especial friend, the old miser who roomed just above the Browns.

"What's got into the girl?" inquired Jessie's father, as he watched her exit with the soup.

"Bless the child, she must be a regular angel of mercy to the old gentleman above us. The neighbors say he's worth millions—got heaps and heaps of gold and jewels hidden away somewhere, but he's

feeble he's almost helpless and if he's taken a fancy to Jessie I suppose it's all right," answered Brown, as he finished his soup and prepared to attack the big platter of beefsteak before him.

Jessie, meanwhile, had rushed in upon a gray haired, aged, somewhat crabbed looking old gentleman, who occupied the story just above that in which the Browns resided, and had almost startled him by the abruptness of her entrance. "See what I've brought you," she

NOTE: From the film of the above title, released by the American Film Manufacturing Company.

laughed, handing the steaming dish of soup to the lone occupant of the room.

"Well, well," began the miser, "if it isn't my little girl from downstairs, and if she hasn't brought me something more to eat." Taking the plate on his trembling old knee, Vivinot sank contentedly back in his chair, and with twinkling eyes, stared across at his visitor. "You go on and eat your soup," commanded Jessie, "and I'll straighten things up a bit," and she began to tidy up the room, which was in sad disarray.

"Why, uncle John, you haven't got a thing to eat in the house," scolded Jessie, as she returned from an inspection of the pantry shelves which she had chanced to discover were almost bare. "You promised me faithfully, only last week, that you'd be sure and get yourself plenty to eat and now I find you haven't done so. I'll have to attend to it myself," and Jessie

which it contained. Startled a few moments later by some noise without, he hastily stowed the box away and tried to stagger back to his easy chair.

Before he could reach it, however, he was seized by a severe pain in the vicinity of his heart and crashed, face down, upon the floor. Five minutes later, Jessie, returning from her shopping, found him there and ran below to summon her father and mother to help. Mrs. Brown and Jessie quickly returned and aided old Vivinot to his bed, while Mr. Brown ran for a physician who lived in the next block. Vivinot was conscious when the doctor arrived, but breathing with difficulty. He gasped out a request for a lawyer and stated that he wished to make a will, as he feared his end was near. Though the attorney was quickly summoned, the old miser lived barely long enough to affix a trembling signature to a will, leaving all he possessed to Jessie, before the angel of death called him.

A week or more following the funeral of the old gentleman, the lawyer who was handling his estate was ready to turn over Jessie's fortune to her. Much to the surprise of all this "fortune" consisted of less than 50 dollars, and the greater portion of this sum had been raised from the sale of Vivinot's effects. It seemed clearly evident that the stories of Vivinot's supposed wealth and unlimited store of jewels and precious stones were myths, or wild imaginings of some of his more fortunate neighbors, for, though a most thorough search was made of his apartments, no such treasure was discovered. Jessie, however, was well content and declared the sum she received was far more than she had ever deserved for her kindness to old Vivinot.

Ten years later found Jessie the wife of sturdy, handsome Tom Bradford, settled in a cosy home of their own, and this home brightened by a pretty boy of three, who was his father's pride and his mother's constant joy. The world had been extremely good to Jessie, for almost immediately following the death of her



George Periolat Vivian Rich
"Ah, but She's a Good Girl," Muttered Vivinot

picked up a market basket and announced that she was going after some meat and groceries.

"Ah, but she's a good girl, a good girl," muttered Vivinot, as Jessie departed and he, having finished his soup, tottered across the room with the empty dish. After puttering about the room for a few minutes in an absent minded sort of way, he produced a huge tin document box from a secure hiding place and, opening it, began to run through his fingers the many coins, jewels and precious stones



Vivian Rich Warren Kerrigan Jack Richardson
Caught Her, Fainting, with the Tin Box in Her Hand

parents, some years before, she had become Bradford's wife and begun life in a home of her own that far exceeded her rosier dreams in splendor.

Fortune now seemed suddenly to turn, however, for Tom, when he came home from work brought news of the disastrous floods which were sweeping over the Ohio regions in which they lived, and the evening papers were filled with warnings to all to prepare for flight, as it was feared the waters would rise still farther. Morning found the worst predictions fulfilled, for the river had overflowed its banks and was pouring past their very door in a torrent, and bearing on its surface debris of all kinds.

Tom assisted his little wife to pack such belongings as they could crowd into a trunk, and then, she taking their baby boy in her arms, they set forth in a rowboat to seek what shelter they could find from the flood.

Twelve hours later found them sheltered beneath a tent, which had been erected

for the refugees, and cooking their meager meal over a campfire. In looking over such belongings as they had rescued from their home, Jessie came across the tattered and worn will made out by old Vivinot, and which she had treasured all these years. Briefly telling the story of her supposed "fortune" Jessie showed her stalwart husband the age worn document.

"Why, girlie, that very house in which you and old Vivinot lived is being torn down this week, or the work of wrecking it was beginning before this flood came upon us," commented Tom, as he handed back the paper. "Oh, Tom, do you suppose Mr. Vivinot may really have had some treasure that has never been found?" queried Jessie, as she put the will carefully away again.

"Hardly possible," answered Bradley, as he donned his hat and coat and prepared to go out and investigate the present stage of the flood.

Jessie, left alone, kept thinking more and more of what her husband had said

about the demolition of her old home, and discovering that she was in the vicinity where it stood, she made up her mind to at least stroll past and see how it looked.

Arrived at the door of the old place she found the flood had swept through it but had since receded. Led on by curiosity, she peered within and, finally, ventured to cross the threshold. A ghoul, prowling about the deserted building in search of such loot as might fall within his reach, was frightened by her entrance and fled just as her husband

arrived and caught her, fainting, in his arms.

On reviving, Jessie's glance turned toward the black and shiny box she had snatched from the ghoul as her husband had driven him away. Judge, then, of their surprise when they discovered it to be a tin document box! A little pressure had loosened the cover and Jessie was gazing down upon a huge bundle of bank notes and a whole handful of precious stones and glittering gems. Her "fortune" had come to her at last!

WHAT PUTS THE COLOR IN KINEMACOLOR ?

You've probably often asked yourself the above question while watching the natural color pictures on the screen, or at least you must have heard those about you speculating over the matter and probably offering various explanations, no two of which agreed.

"They're hand painted films," says one lady to your right; "No, there are three films shown on the screen at the same moment, one is green in color, one blue and the other red, and when shown together they give all the colors of Nature itself," guesses a fat man to your left; "It's very simple," languidly explains a confident chap behind you to his lady friend, "you see the picture is projected in the ordinary manner, but they pass the rays of light through a rainbow colored glass instead of through a white one, and, naturally, color results."

As it happens, however, all the guesses you probably overheard were wrong, though the fat man came the nearest to being right. The secret lies in two things: one is the peculiar treatment of the raw film stock on which the negative is taken, which permits it to retain all the varied shades and tones of natural light, and the other is the delicate color filters through which the rays of light are passed on their way from the projector to the picture

screen as the film is wound past the shutter.

The first is a secret most jealously guarded by the Kinemacolor Company, but the latter is a device that will be carefully explained and possibly even shown you, should you care to discuss the matter with the operator, after the evening's entertainment or when he has a moment to spare.

First of all, the film used in making Kinemacolor pictures is made panchromatic, that is, sensitized for all the rays of the spectrum. This peculiarly sensitive film is then exposed in the camera, behind a revolving shutter in which are fitted two filters (or screens) colored red and green. Thirty-two pictures a second are taken, alternately, through the red and green filters.

This is the vital part to be remembered. Ordinary white light — sunlight — contains all the colors of the spectrum blended together. The primary colors are red and green, and red and green light properly blended will give any shade or tint. In exposing the film a red and a green glass (filter screen) are brought in front of the lens alternately. The red filter allows only green light to pass through it and one picture on the film is thus made with green rays only. Next

the green filter comes up into position and this lets only red rays pass through, so the next picture on the film is made with red rays only. This is kept up as long as the shutter moves, the individual pictures on the film being taken alternately with the green rays and the red rays reflected from the object photographed.

After the positive print of the film has been completed we discover it to be apparently nothing but black and white, the same, as an ordinary strip of film, but in reality all the tints, tones and shades of Nature are stored up within its depths.

This film is run off in the Kinemacolor projecting machine at the rate of 32 pictures per second. Here again the white light from the arc lamp is passed through similar red and green filters, which allow, respectively, only green and red rays to pass through. Consequently the pictures thrown upon the screen are alternately red and green — at the rate of 32 per second. In other words sixteen pictures per second are red and sixteen are green.

So quickly do these pictures follow one another, however, that the eye cannot pick out the individual red and green ones and is fooled into believing that both red and green are being viewed at the same instant. Since, as above stated, red and green light properly blended will give any shade or tint between black and pure white, all the tints of the scene which lay before the camera's eye when the film was exposed are in turn revealed to ours as we view the screen.

Naturally, also, owing to the need for projecting Kinemacolor film at the rate of 32 pictures a second instead of at the rate of sixteen pictures a second, as in the showing of ordinary black and white pictures, the film has to be about twice the length of the black and white subject. That is, if 1,000 feet of film is necessary to tell a certain story in ordinary motion pictures, Kinemacolor will require two full reels of 1,000 feet each to tell the same story.

FLIP FLAPS 175 FEET ABOVE BROADWAY

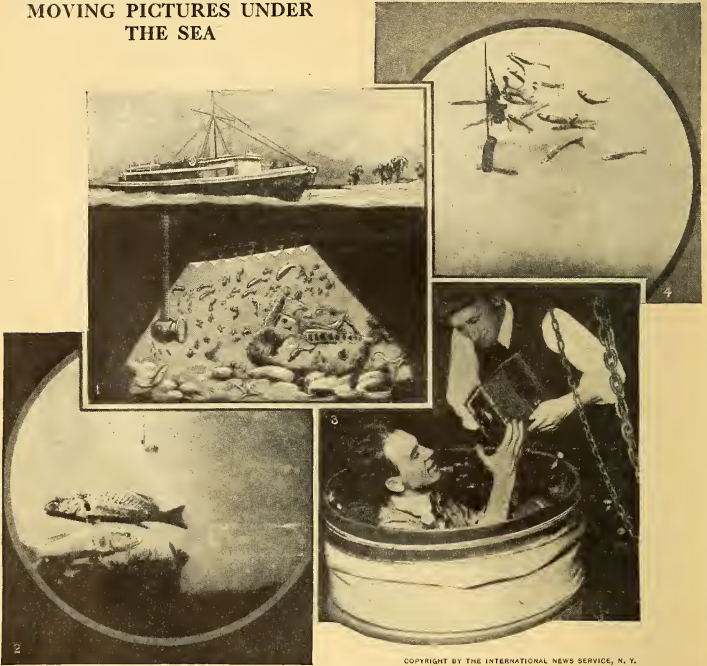
The photograph reproduced herewith shows one of the Samarian troupe of Russian dancers doing flip flaps on the three foot parapet of the Mecca Building, in New York City, 175 feet above Broadway. Shanley's cabaret show was taken up to the roof of the Mecca Building to be



Frantz turning a Back-somersault on Top of the Mecca Building — 175 Feet above Street Level.

photographed in Kinemacolor and the entire troupe of Russian dancers posed with the spires of the distant Cathedral and the blue sky as a background. After the dancers had been taken in such steps and poses as seemed suitable for their precarious footing Frantz, the acrobat of the troupe, proceeded to "do some stunts," until his manager, Victor Hyde, shouted in alarm, "Stop, Frantz, if you fall off that parapet you'll break your contract."

Little Marie Eline of the Thanhauser Company, better known to the public as "The Thanhauser Kid," was recently a headliner at a New York vaudeville theater.

MOVING PICTURES UNDER
THE SEA

(1) How Submarine Pictures will be taken. (2) "Creakers" at the Bottom of Hampton Roads. (3) Williamson Descending into the Tube. (4) Nibbling at the Bait

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Moving pictures under water are now an assured fact. It remained for Ernest L. Williamson to prove that the denizens of the deep, can be portrayed on a film just as they live under sea. Williamson is a son of Capt. J. H. Williamson, inventor of the Williamson submarine tube. This tube is flexible and can be lowered to any depth from one foot to 500 and is the last word in simplicity.

It is provided with a chamber, in which three men can work and live for hours. They do not have to be supplied with air by artificial means, but they breathe the same air under the same conditions as if

they were on the surface. The chamber is windowed.

Ernest Williamson went down the tube in Hampton Roads. He took pictures at a depth of 15, 20 and 35 feet. He got a picture of big and little fish nibbling at bait dangling from a hook 20 feet under water. He took pictures at night with the aid of four electric lights. The fish attracted by the light, came around the window chamber in large numbers.

There were two men in the chamber with young Williamson. One of the party agreed to jump overboard and dive past the windowed chamber at a depth of

15 feet. As he shot past, Williamson snapped his picture.

Williamson is planning to make a cruise to the West Indies to take pictures under water. He says it is possible to get views of the sunken cities of Yucatan and other wonders of the deep.

FILMS FOR CONVICTS

To relieve the monotony of prison life and as a reward for good behavior, convicts at the Deer Lodge Penitentiary, Mont., regularly attend a motion picture exhibition at the prison each Sunday. This form of entertainment was inaugurated a few months ago and has proven tremendously successful. Many of the convicts who attended the first show saw motion pictures for the first time in their lives, as they had been behind the bars during the years in which cinematography has been developed. The pictures were found to do much more than furnish mere amusement for the convicts, for they have promoted discipline in a manner that has already been easily noted, as each man, in order to secure the privilege of attending the picture show, must have a certain number of merit marks to his credit, and almost every convict strives hard to attain a goodly number.

WIND IN THE PICTURES

It will be observed that in the pictures there is nearly always a strong wind blowing, disporting itself in the trees or with the skirts of the women players.

One explanation held forth for this is that were the reels taken when the air was perfectly still the result would be that the players, when they chanced to be in repose, would look as "dead" as the "dead" portions of the scene pictured. Accordingly, the ingenious gentlemen charged with the duty of photographing the "scenario" select a time when the wind is generally active. A reel is much more effective when things are moving generally—trees swaying, skirts flutter-

ing and hair flying. In a moving picture there must be "something doing" all the time. Moreover, the ever watchful producer must see that the same effect is carried out in all the scenes for a given reel.

Another reason is that atmospheric conditions are much more favorable to photography when the air is in motion, and clearer, more snappy pictures can be made; therefore the camera men are sent out, as far as circumstances will permit, on windy days.

WATCHING MACHINERY HALL GROW

After Machinery Hall of the Panama-Pacific Exposition has been completed an opportunity will be given of seeing, from the film, this great building rise as if by magic. Motion pictures are being taken automatically, every five minutes, of the



Sections of Film Showing the Growth of Machinery Hall

details in the construction. The camera is mounted upon the roof of the service building, one of the completed edifices, and covers an inclusive view of the new structure.

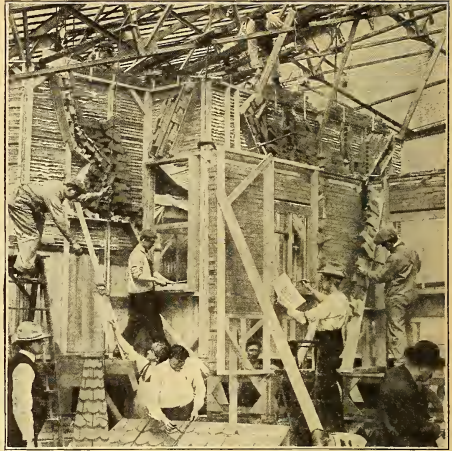
Under the magic influence of moving pictures a full grown building will be conjured up, beginning with the bare ground and finishing in 80 minutes with a structure completed to the topmost pinnacle. Like Solomon's Temple, it will be built without the sound of a hammer.

The records will show 96 pictures for each working day, or a total of 6,912 for the three months required for completing the building. When the pictures are reproduced the reel will be run at the rate of 864 pictures per minute, or more than a week's progress in that time.

PRODUCING AN EARTHQUAKE SCENE

Some idea of the endless patience and labor required to produce some of the spectacular effects seen in motion pictures can be obtained from the two photographs reproduced on this page, showing the construction of a scene for a coming Lubin feature in which the San Francisco earthquake will be reproduced in pictures.

Nearly a score of stage carpenters, scene painters, property men, electricians and stage directors have been at work for weeks getting ready for the big production. The construction of one of the big scenes, alone, took the men employed in arranging it over ten days to perfect, and yet, in making the picture, the whole structure was destroyed in less than two seconds. Note the careful arrangement



Construction of a Scene in the Lubin Studio for the San Francisco Earthquake Picture. This Scene Alone Has Taken 20 Men a Month to Build and Will Be Destroyed in Two Seconds When the Camera is Turned on

of the bricks, lath and plaster in the upper scene and the utter havoc wrought in the picture below.



The Aftermath of the Earthquake — All Down in Two Seconds

JULIAN ELTINGE HAS A RIVAL

As most every patron of the theater knows, Julian Eltinge has, for years, had the reputation of being the greatest feminine impersonator on the legitimate or vaudeville stage. But, now, a player in the Thanhouser Film Company, of New Rochelle, New York, has created



Harry Benham

some feminine rôles in motion picture dramas and comedies which rival anything that Eltinge has done. Harry Benham, one of the Thanhouser leading men, is the player in question, and his work on the screen has been arousing no little comment among theatrical folk generally, as, naturally, they at once compare it to the impersonations given by the famous Eltinge.

Neither Benham nor Eltinge is in any sense a "sissy" when out of the feminine make-up, but quite the contrary, for

both players are unusually athletic, muscular and interested in masculine pastimes and diversions in the hours they spend off from the stage. In the accompanying cut, Mr. Benham is seen in the make-up he wore while appearing in "The Eye of Krishna," a Thanhouser release.

LOS ANGELES, NOW FILM CAPITAL OF U. S.

Not so very long ago, most of the motion picture studios were located either in New York or across the river in the Highlands of New Jersey. Within the last two years, however, Los Angeles, Calif., has awakened to the fact that she is the motion picture producing capital of the United States. When one recollects the whimsical weather of the East, it is not hard to guess why one company after another has packed up and moved out to California. At present, within a radius of ten miles from Los Angeles are the Powers, Nestor, Broncho, Bison, Essanay, Rex, Frontier, Imp, Champion, Biograph, Majestic, Thanhouser, Keystone, and Kay Bee studios.

Most of the above companies employ from fifteen to 25 "regulars," besides innumerable "extras," hundreds of Indians, cowboys, etc., such as you see in Bison, Kay Bee, Broncho, and other films. Very few patrons who walk in and out of theaters realize what a gigantic industry the manufacture of motion pictures has become. It is said that over 300 persons in and about Los Angeles, alone, depend upon the studios for a livelihood.

ARE YOU PRONOUNCING THEM CORRECTLY

Owing to the frequent mispronunciation of the names of certain popular brands of motion picture film, the phonetic spelling of a few of these brands are given herewith. Cines, the film made at Rome, Italy, should be pronounced as though it were spelled "Se-nays," although an Italian would probably call it

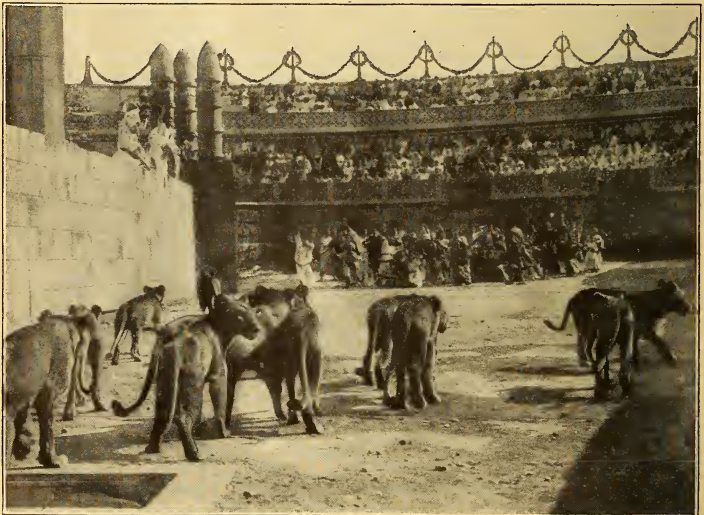
"Chi-nays." Gaumont, the French film, is in English called "Go-mont" though the foreigner will say "Go-mong." Pathe, or Pathe-Freres, which means of course "Pathe brothers," by most theater managers is called "Pathey," though the correct pronunciation may be indicated by spelling it "Patty-Frairs." Than-houser films are nearly always called "Tannhouser," the first "h," seemingly, being entirely overlooked. The first syllable is "Than" not "Tann." Kinemacolor causes some confusion. "Kinney-ma-color" seems to nearest indicate the correct method of saying it. Eclair should be called "E'-clair."

"QUO VADIS?"—A WONDERFUL FILM

Within the past few months there has been shown in all parts of the United States what is generally conceded to be the greatest motion picture yet produced

—"Quo Vadis?" (Whither goest thou?)—in eight reels. This picture version of the famous novel of Henry Sienkiewicz is not alone remarkable on account of the fact that more people were probably employed in making it, more money was spent in producing it and more real thrills were combined within it, than in any other picture ever thrown on the picture screen, but also on account of the fact that it goes far beyond any former pictured pantomime in real quality, in the vast depths given to the big scenes in which great hoards of supernumeraries are used, and in the startling realism of the scenes undertaken and depicted. The great scenes representing the burning of Rome, and, later, the reproduction of the great amphitheater, in which the Christian martyrs were tortured and devoured by wild beasts, are marvels of stage direction.

Though it is almost impossible to convey even a small portion of the thrill



The Christian Martyrs at the Mercy of the Wild Beasts in the Arena — "Quo Vadis?"

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The Tottering Walls of Rome as they Were Presented to the Gaze of the Crazy Nero — "Quo Vadis?"

GEORGE KLEINE

and realism of the stupendous film production by means of inanimate photographs, the two reproduced herewith will, perhaps, give some vague idea of the elaborate detail with which "Quo Vadis?" has been staged. The one cut illustrates a portion of one of the scenes showing the burning of Rome, gives just a glimpse of the tottering walls, the fallen pillars, the smoking ruins and the distracted populace hurrying hither and thither in their efforts to escape from the conflagration, while the other shows the Christian martyrs assembled in the arena, before the gaze of haughty Nero, most cruel of the Roman emperors, at the moment when the wild beasts were turned loose to devour them. The film was made in Rome—the scene of the story.

The motion picture machine will shortly take the place of the recruiting sergeant if the recommendations of Major R. C. Cruixton, U. S. Infantry, are complied with in future campaigns for army recruits.

ANOTHER SCENE SPOILED

Many are the scenes that too thoughtful spectators have spoiled by their willingness to run to the aid of an afflicted actress. Mary Fuller of the Edison Company is the latest victim and her experience was distressing to say the least. She and Richard Tucker were sent out from Larchmont in a large motor boat, which was supposed to catch fire. A stage hand, concealed in the cabin, lit his smoke pot and Tucker, seizing the only life preserver, strapped it on and plunged overboard leaving Miss Fuller, enveloped in dense smoke, imploring him to save her. Then in desperation, Miss Fuller leaped over. So far all had gone well, but now Walter Edwin saw all his plans go to smash as a small boat put out from one of the big yachts anchored near, and despite his efforts to stop it, proceeded right into the picture. The protesting actress was hauled aboard by her solicitous rescuers, spoiling the film.



PILOT

LOUISE VALE

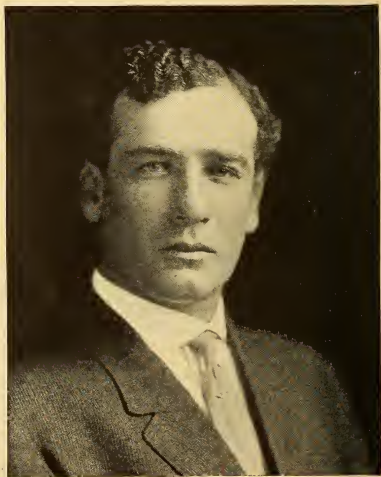
Louise Vale, leading woman of the Pilot Film Company, used to head the Vale Stock Company at the Plaza Hall, New York City, the Gaiety, Hoboken and the Orpheum, Jersey City. For three seasons she starred in "The Girl on the Emerald Isle" on the road, and also played in stock in Portland, Me., Syracuse, N. Y., Chicago, New Orleans and Denver. Her first picture work was done with the Rex Company, where she succeeded Marion Leonard as leading woman. She has been with Pilot several months and is being strongly featured.

32

THOMAS SANTSCI

Born in Luzern, Switzerland, Thomas Santsci came at an early age to St. Louis, where he continued his trade as a watchmaker. His passion for music led him to frequent the theaters and soon he left the bench to become an actor. One day he became interested in pictures and soon signed a Selig contract. His dressing room diary shows that he has enacted over 1100 different parts during his five years as a film player. The Selig company and Tom are now inseparable and neither is anxious to lose the other.

32



COPYRIGHT, 1912 BY THE SELIG POLYSCOPE CO.

PORTABLE COAL LOADER

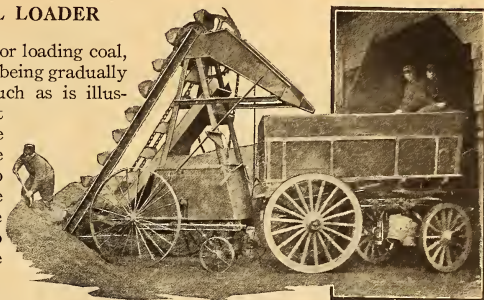
The use of hand labor for loading coal, sand and gravel wagons is being gradually replaced by apparatus such as is illustrated. It is claimed that a two ton wagon may be filled in less than five minutes with one man to direct the operation of the buckets in the coal pile and the wagon driver to spread the coal on the wagon.

The cable leading over the top of the apparatus is the current connector for the motor located in the box on the body of the loader. The motor is also used for the transportation of the outfit about the yard by gears connected to the rear wheels.

RESTAURANT HAS CHANGED ITS NATURE

The *Standard*, a London newspaper, comments upon the establishment of a new restaurant in that city.

"A new force has arisen in London that will compel a revision of the methods of catering to London's millions, and may ultimately cause a change in public catering generally. This new force is the electric restaurant.



Coal Loader

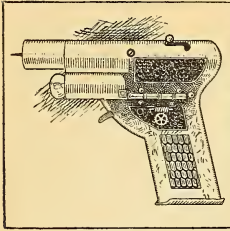
"Now one of the features of the new electric restaurants is the standing invitation that exists for customers to see the cooking in operation. The reason for this lies probably in the fact that an electric kitchen is as different from the kitchen of old as the boiler room of an oil fuel steamship from the boiler room of a steamship burning coal in the old fashioned way. One resembles a cool, well ordered center of pleasurable activity and the other a working model of the nether world. There are no fires in an electric kitchen, and consequently no smoke and no dust. The heat that is used for cooking, cooks and nothing more."

CALIFORNIA'S OLDEST GRAPE VINE

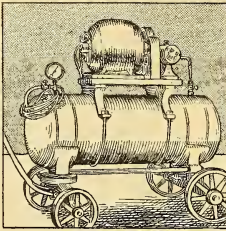
The grape vine shown in this photograph was planted by the early Mission Fathers in 1771, from seeds or cuttings said to have been brought from Spain by way of Mexico. After almost 150 years this giant grape vine is still producing the luscious fruit which the *padres* cultivated so carefully in the early days.



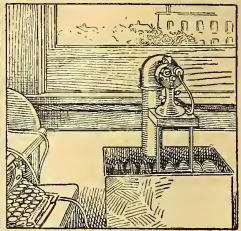
Grape Vine Planted in 1771



Electric Pistol



Portable Tire Pump



Office Ventilator

NEW WAYS OF USING ELECTRICITY

PORTABLE MOTOR DRIVEN AUTOMOBILE TIRE PUMP

The portable, motor driven, tire pump is brought to the car needing service so that its use eliminates the expensive, leaking, air lines necessary with stationary installations. It eliminates too the back straining labor of hand pumping.

In the outfit illustrated, the small, motor driven, air compressor is mounted upon the storage tank, the entire outfit being on wheels. The compressor is driven by a small $\frac{1}{4}$ horsepower Westinghouse motor operated from an electric light socket. With the equipment is a pressure gauge, twelve feet of high pressure air hose and an automatic tire connection.

ELECTRIC PISTOL

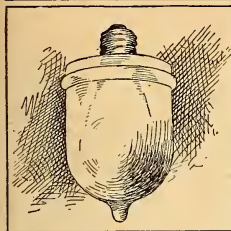
A very clever device in the shape of an electric pistol is a recent Paris production and it not only has the appearance of a "Browning" but it gives a flash as well as a loud report. Being almost an exact imitation of a real pistol but at the same time inoffensive, it is very useful in frightening thieves in case of night attacks. In some countries of Europe it is unlawful to carry fire arms, so the imitation pistol may there be quite useful. A small electric lamp is mounted at the end of the lower barrel, and by pressing the trigger so as to produce a momentary

light, a flash appears to come from the pistol. A small storage battery is lodged in the lower part, and it can be reached by a hinged cover. In the top barrel is placed the device for giving the report, this being done by drawing back a spring which works a striker for a fulminate cap. The ball is represented by a cork that is put in the end of the muzzle. To fire the pistol, press upon the flashlight trigger with the thumb and at the same time set off the spring by the forefinger. This explodes the fulminate cap and drives out the cork with a loud report quite imitating the noise of a pistol, while the lamp gives a bright flash, thus completing the illusion.

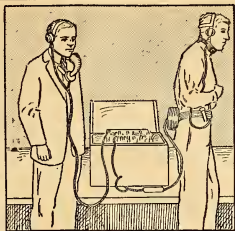
OFFICE VENTILATION AT SMALL EXPENSE

In summer the ventilation problem is an easy one. In winter raised window ventilation means coat collars turned up, fur collars put on and cold feet. With the electric fan used as in the illustration, fresh air may be drawn from the outside and delivered against a steam radiator. The air is warmed and delivered in a gentle current which will not cause any one to be uncomfortable and yet the room will be warm and the air fresh.

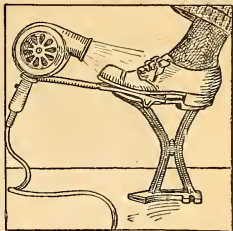
The air is prevented from blowing along the floor by a galvanized iron box which surrounds the radiator on all four sides, extending from the floor to the



Colored Lamp Hood



Mine Rescue Telephone



Electric Shoe Dryer

top of the radiator but open at the top. Thus the cold air is delivered at the top of the radiator in a downward current, and before it can find its way out of the box again, it must rise around the radiator and become warmed. The blower shown is capable of supplying 175 cubic feet of air per minute, or 10,500 cubic feet per hour, a sufficient supply for three persons.

COLORED LAMP HOOD

There is on the market a colored lamp hood which slips over an incandescent lamp bulb, is securely held in place and is weatherproof. The hoods are made in sizes to fit both Mazda and carbon lamps, and are especially adapted to spectacular electric signs, exit lights, elevator signals, etc. Although covering the body of the bulb, means is provided for the circulation of air between it and the hood.

MINE RESCUE TELEPHONE EQUIPMENT

Mine accidents have led to many safety regulations and appliances to protect human life, the most important of these devices being the telephone.

The fact that in many instances lives could have been saved if a quick means of summoning aid had been at hand has led to the installation of telephones underground in mines. The next step in advance is a telephone equipment for the use of rescue parties.

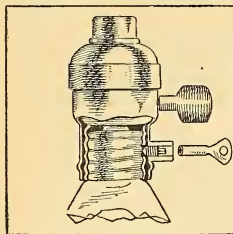
A man wearing an oxygen helmet which covers his mouth cannot use the ordinary type of telephone transmitter so a special type known as the "throat" transmitter has been developed for this use. The transmitter is light and is made with a soft rubber cup to fit the curve of the throat and with it speech is readily transmitted by the man in the mine to the one outside who wears a chest type transmitter and head band receiver. The rescue party wears a head phone and also a belt carrying a leather case containing 500 feet of wire in the form of a coil which pays out as he goes into the mine. The total weight carried by the oxygen helmet man is five pounds.

In case it may be in some instances necessary to carry a talking circuit down a shaft, a large box containing a reel holding 1,300 feet of special flexible twisted pair cable is provided. Connections with the apparatus box and added cable are made by means of aluminum incased jacks and plugs.

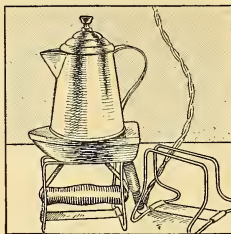
DRYER FOR SHOE SHINING PARLOR

In the up-to-date shoe shining parlor will be found an electric dryer such as is here illustrated. Following the cleaning of the leather the electric dryer fans away the moisture assuring a perfect shine without streaks or uneven polish marks.

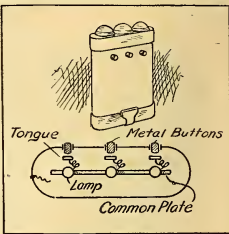
The Cyclone shoe dryer has a polished



Lamp Locking Device



Holder for Electric Iron



Three Color Signal Lamp

aluminum casing enclosing a small motor which drives a fan throwing a blast of air through the directing nozzle upon the shoe. Close up to the motor and at the handle is a metal support made to fit any stand so that one shoe can be dried while the other is being polished, thus saving time. The dryer weighs two pounds and is stopped and started from a push button in the handle.

MULTIPLIES USES OF ELECTRIC IRON

The tendency of the age is to make one device serve as many purposes as possible. The user of an electric iron will accordingly appreciate the Utility holder, a handy little stand by means of which an electric iron may be converted into an electric stove or heater.

Tip an electric iron upside down so that it rests in the holder and it may serve for heating water for shaving, for steaming feathers, face steaming, heating the baby's milk, keeping a meal warm, etc.

THREE COLOR SIGNAL LAMP

A flash signal lamp to give three different colors is made up in the compact shape shown and it can be carried as easily as the usual pocket lamp. It has three small electric lamps, for example, red, blue and white, and by pressing a button in front of each lamp, they can be put, on separately so as to make up

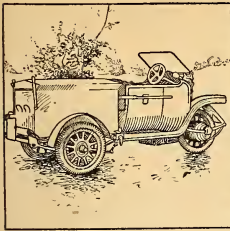
any kind of signal combination that may be desired. A metal plate runs along under the lamp sockets so that putting in a lamp makes automatic connection with the plate by the lamp base. Opposite each of the three buttons lies a spring tongue which is insulated from the metal cover of the box. The buttons are all connected to the box so that on pressing a button it joins the box to the lamp through its tongue. The battery is coupled on one side to the metal box and on the other to the common plate lying under the lamps. It will be seen that pressing a button closes the circuit for that lamp and lights it up. Signals can be sent at night by the use of the three colors, or on the Morse system where one color represents a dot and another a dash.

PREVENTS THEFT OF LAMPS

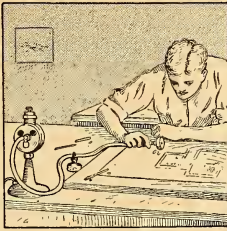
The theft of lamps is something it has been hard to guard against, especially since many office buildings, factories, stores, etc., have installed lamps of the high efficiency type of higher cost.

The device illustrated is one of recent design placed on the market, to prevent the removal of a lamp from the socket even though a hairpin, toothpick, match or a piece of wire be used by the would-be thief.

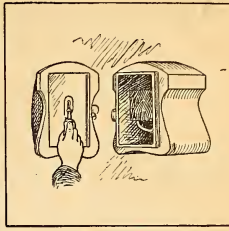
The Shurlok locking attachment makes it impossible to remove the lamp without the use of a special key, and is also arranged to hold a private seal.



Refuse Vehicle



Electric Eraser



Battery Lighter

ELECTRIC FOR STREET REFUSE REMOVAL

The most progressive cities of Europe have adopted the electric vehicle for removing refuse from the streets.

The cars for this purpose are three-wheeled with the motor built solidly in the front wheel. The refuse box on the rear can be emptied from the driver's seat by operating a lever which tips the container and dumps the contents. The car will run 50 miles on one charge at a speed of from twelve to fifteen miles per hour. The car can also be used to scatter sand on the streets, the sanding device being run by battery current. The refuse box may be removed and the car made suitable for carrying passengers by adding an extra seat.

BATTERY LIGHTER TO REPLACE MATCH BOX

A very convenient lighter to take the place of matches is made up in the shape of a small box to be hung on the wall and containing one of the usual small batteries such as is used for incandescent lamps, also a spark or extra-current coil made up simply of a rather stout insulated wire wound about an iron core. One end of the wire goes to the metal cover of the box and the second, including the battery, is connected to a small pin lying at the center of an opening in the cover but without touching it.

A convenient lighter is made of a small metal lamp with an asbestos wick, as shown. This is held in the hand for striking upon the box. The lighter is ready to work at a moment's notice. The instant the metal wick holder touches the edge of the opening and the pin point at its center a spark results which ignites the gasoline on the asbestos wick.

MOTOR DRIVEN ERASER

Recently there was an error on a run of 200,000 souvenir post cards which meant that all would have to be thrown away unless the error could be remedied. A sheet brass mask was made and an eraser operated by a flexible shaft from a small motor like that shown in the illustration easily erased the error and paid for itself a good many times over.

The Coates drafting room eraser outfit consists of three feet of flexible shaft, a small motor and a circular eraser. This little power eraser removes small detail lines and heavy ones with equal quickness and neatness. The lamp socket of the fixture in the drafting room is the only source of current needed.

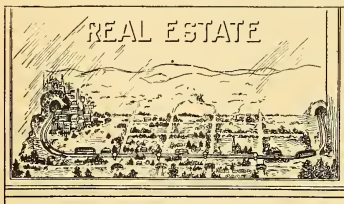
Heating by electricity is more expensive than by gas or coal, when mere energy is measured. But the heat can be applied at any given degree wherever and whenever it is wanted. And then the expense can be instantly stopped. The control of electricity is left to the button.

Electricity—the Silent Salesman

Examples of Electrical Displays that Have Been Used to Good Effect

SUBURB IN MINIATURE IN WINDOW

A Chicago real estate man who deals in lots in an outlying suburb makes use of a show window at the city end of the

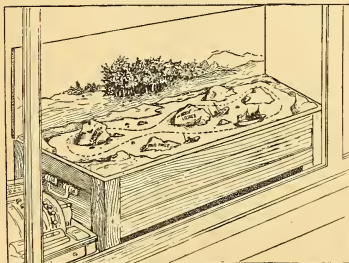


Suburb in Miniature

car line running to the suburb in which he is interested.

A suburb in miniature occupies the window, streets, houses, churches, bridges, etc., being shown. A toy electric railway is kept in operation and to draw attention at night several small battery lamps are set along the car line and are kept burning in the evening. The background is a painting so illuminated that the effect of distance is conveyed to the observer.

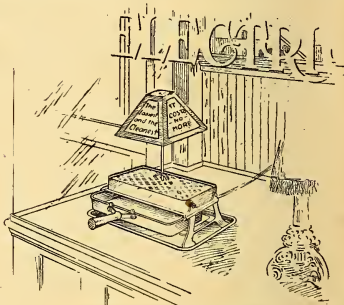
MYSTERIOUS MOVING MINIATURE SHIP



The Mysterious Ship

A window display of the National Cash Register Company, in Chicago, offers an interesting application of electricity.

A tank, as shown, is filled with water and imitation rocks. Each rock is labeled with a phrase setting forth business dangers, while near these rocks are wrecked craft. A single boat, named "Good System," moves about in a regular course among the rocks without striking them. The secret of the boat's safe guidance is a curved track under the



Displaying a Grill to Advantage

bottom of the water receptacle upon which runs a truck carrying a double pole electro-magnet. The track supplies the current to energize the magnet while an electric motor operates a chain and sprocket to run the truck. The boat possesses a soft iron keel which the moving magnet pulls along.

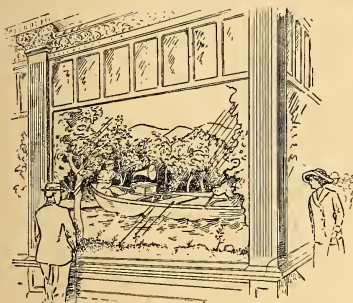
ELECTRIC GRILL WINDOW DISPLAY

The manufacturer of an electric grill employs the heat from it to turn a prettily colored shade pivoted on a vertical rod above it, the arrangement being used as a show window display. In the upper part of the shade is a set of paper vanes,

like those of a windmill wheel, by which the heat from the grill revolves the shade. Upon the four faces of the shade advertising matter is printed.

VACATION SCENE IN SHOW WINDOW

Thoughts of fishing and summer vacation camps are usually uppermost in the mind during "dog days." This state-

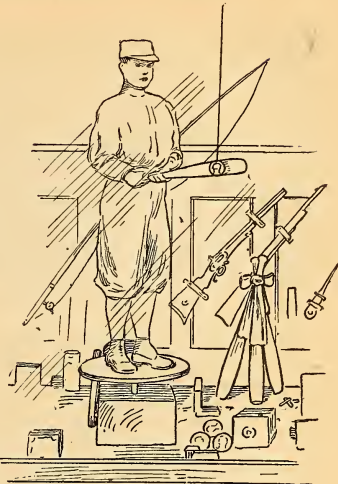


For Vacation Days

ment is substantiated by the number of people attracted to a clever show window used by a phonograph dealer and here illustrated. A hidden motor imparts a gentle rocking motion to the boat by framework underneath, while a green cloth is moved in semblance of waves on the surface of water.

ATTRACTING THE BASEBALL FAN

A most effective show window attraction used by a Chicago sporting goods house is illustrated. A life size figure clad in a baseball uniform is placed on a circular platform revolved by a small electric motor. In the hands of the player is a regulation baseball bat. Suspended by a string from the ceiling is a league ball at such a height that as the player is turned around his bat

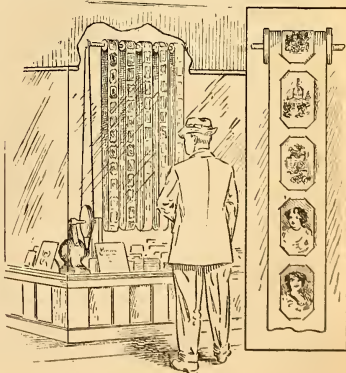


Display Appealing to the Baseball Fan

strikes the ball if it is not swinging about from a previous blow.

MOVING POST CARD DISPLAY

The window display of a Detroit, Mich., post card dealer which secured for him a



Display which Increased the Sale of Post Cards

decided increase in trade is here illustrated.

A wooden shaft in the upper part of the window was fitted with spools a little wider than the ordinary post card. An endless paper strip was placed upon each spool after being filled with cards, as shown in the right of the illustration. From a small electric motor the shaft was turned by a stout fish cord belt and the observer saw twice as many cards by means of the moving paper belts as a stationary display would have afforded.

DISSECTING LABORATORY OF THE SORBONNE

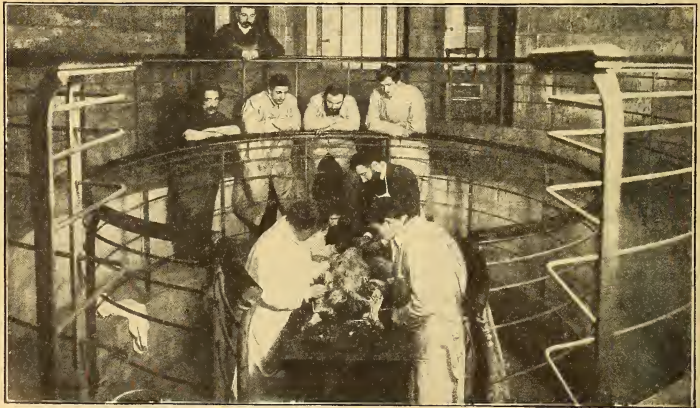
Unquestionably the great advances made in medical and surgical science have been made possible in a large degree by experiments upon animals. While there has been much objection to this from many quarters, on account of the assumption that the dumb victims are subjected to great pain, the work is nevertheless necessary and moreover is largely carried on upon anæsthetized animals. The picture herewith shows one of the small dissecting amphitheaters in the laborato-

ries of the famous Sorbonne, the central institution of the Paris University. In these great laboratories are made discoveries which often have a far reaching effect and enlarge our ideas in the fascinating field of the study of the functions of man and the lower animals.

A SKY BUNGALOW

William Ernest Walker, a Chicago architect, is building for himself a unique home. Up in the air 110 feet above the street level and on the roof of an eight-story apartment building, Mr. Walker will soon have completed a ten room bungalow, overlooking Lake Shore Drive and Lake Michigan.

It is of white cement, with a green slate roof, green shutters and with red brick chimneys and facings at the corners. Its doors and French windows will open on two sides onto a terrace whose outer dimensions will be 120 by 65 feet. A handsome balustrade, about three and a half feet high, will rim the terrace. The latter is to be turned into a hanging garden of Babylon by bay trees, box trees, vines and flowering shrubs. But the



Dissecting a Dog in the Laboratory of the Sorbonne



Bungalow Built on the Roof of an Eight-Story Apartment Building

most curious and attractive feature of all will be that no window screens are to be provided, for none will be needed. This sky bungalow is above the fly belt, above the mosquito line and even above the realm of that occasional summer pest, the sand fly or sisco fly — the big winged insect that is sometimes blown in in clouds by an east wind and settles on the street lamps.

PETER—THE ORIGINAL “BEAR-CAT”

His official name is “*Binturong*, Genus *Arctictis*,” but to his friends he is just plain “Peter.” A distinguished personage is Peter, for he is the sole representative of his genus. Although closely allied to the palm-civet tribe, yet he is so different from the members of that group in certain respects as to call for special notice in all zoölogical works.

Caught when a mere infant in the dense jungle forests of Sumatra, Peter has been brought under the white man’s influence until he has lost all his instinctive desire for savagery. Peter is now as tame and docile as the tamest of domestic cats.

Peter’s tribe has rather a wide distribution over the Oriental regions ranging from Assam through Arakan, Tenasserim, Siam, the Malay Peninsula, Sumatra and Java. They live for the most part on small mammals, birds, fish, earthworms, insects and fruit. Owing to its purely

nocturnal and retiring habits, the bear-cat is rarely seen and seldom captured.

The *Binturong* is chiefly distinguished from all other members of the civet family by the long tufts of hair surmounting the ears, and by the prehensile nature of its long and bushy tail, which aids it in climbing trees.

The length of the head and body varies from 28 to 33 inches—in Peter’s case the latter figure—while the tail is from 26 to 27 inches long.

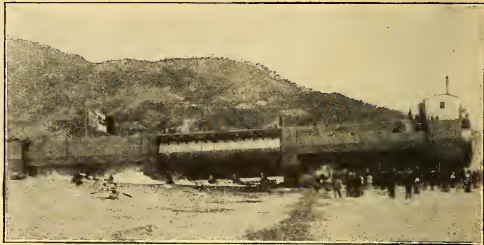


The Original Bear-Cat

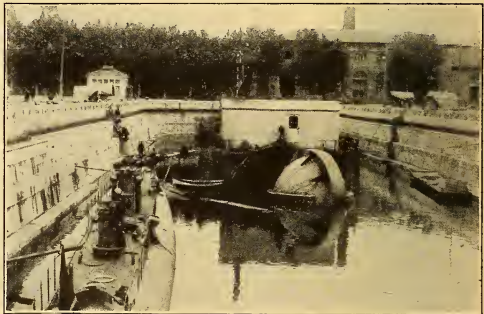
MAKING SURE OF THE SUBMARINE'S STRENGTH

Records of submarine disasters are replete with instances where lives could have been saved or, perhaps, never jeopardized if the boats had been strong enough to resist the crushing pressure of the enveloping sea. The constructors thought the under water craft secure against just such casualties, but they did not learn that they erred in their calculations until some of their fellows had emphasized the fact by going to harrowing deaths. The Government is going to construct a special dock for the testing of submarines under conditions which will simulate all of the circumstances of a deep submergence without really putting the under water boat entirely beneath the surface. This probably sounds paradoxical, but it is a fact.

To-day, when the submarines built for the navy are tested they are carried to some point off the coast where the water is deep enough, and then sunk to a depth of 200 feet without anybody being inside of them. Various pressure gauges are placed within them by which it is possible, after the boat is raised again, to tell how much the hull was deformed or squeezed by the grip of the burdening sea. This is really only part of the information that should be had to make certain that the little vessel is reasonably safe in case she should sink that deep with all hands aboard. The exhaust pumps and other mechanisms should be worked during



Launching the Novel Testing Dock for Submarines—Italian Design



Opening the Testing Dock to Admit Submarine on the Left

that test to show that they would function as required in case of need. But by the present method of examination, this is out of the question. The testing dock that the Navy Department will build is after an Italian design and similar to others that have been built abroad.

The structure is really a long steel cylinder, or, it might be said, a huge bottle, which can be effectually sealed by putting a stopper in one end. This sturdy metallic bottle is big enough to receive a submarine, and strong enough to withstand a bursting pressure far in excess of

that of the sea at the maximum depth to which the submarines are designed to sink. The method of operating is quite simple. The submarine is floated into the testing dock, moored right at the wharf of the building yard where most convenient, and then the open end of the structure is plugged by a globular gate, caisson, or stopper, as you may choose to call it. The boat is held in place by suitable means and the steel bottle then filled with water so that the craft to be tested is thus completely enveloped by the fluid. Everything being in readiness, the pressure pumps are started, and gradually the compressive force of the confined water is increased to the required degree.

Observers, not as in the usual sea test, are inside of the submarine, and they can watch for developing leaks and make progressive tests of all operative mechanisms essential to the craft's security or safety when otherwise submerged. The observers inside of the boat are in telephonic communication with the engineers at the pressure pumps, and upon the appearance of serious yielding of the hull or dangerous leaks, the pumps are stopped and the external pressure about the craft in this manner immediately relieved.

the bottom of Vasco da Gama Street in Mombasa, where is to be seen a delightful Arab well. As Mombasa is a coral reef island, there are no rivers, and all the fresh water is obtained by means of deep wells. The water carriers, both men and women, go to the wells and pull up the water by means of kerosene cans. A pulley and rope are used, being suspended by means of a cross bar from the roof of the well.

RUBIES AND VIOLET RAYS

Abroad, the violet rays of the spectrum are considered of great practical value in the jewelry trade, since, by their aid, the qualities of various gems may be readily distinguished. In the case of rubies, it is claimed, they are very effective. The rubies of Burma have a higher value than those of Siam, but experts are sometimes deceived in distinguishing them by the ordinary methods. With the aid of the violet rays, however, the Burmese gems can always be differentiated, so the French experiments show, from the less precious varieties.

The fluorescence that the rays impart to diamonds offers an equally trustworthy diagnosis of the excellence of the stones.

OLD ARAB WELL IN MOMBASA

Dotted all along the east coast of Africa are to be found remarkable evidences of the architectural proficiency of the Arabs. In Mombasa, the coast town of British East Africa, and in Zanzibar there are a profusion of real gems of Eastern art in building.

Perhaps one of the best examples of what an Arab builder can do in the way of artistic work is to be found at



Quaint Well of Mombasa—An Example of the Architectural Proficiency of the Arabs

CLEANING WOOL

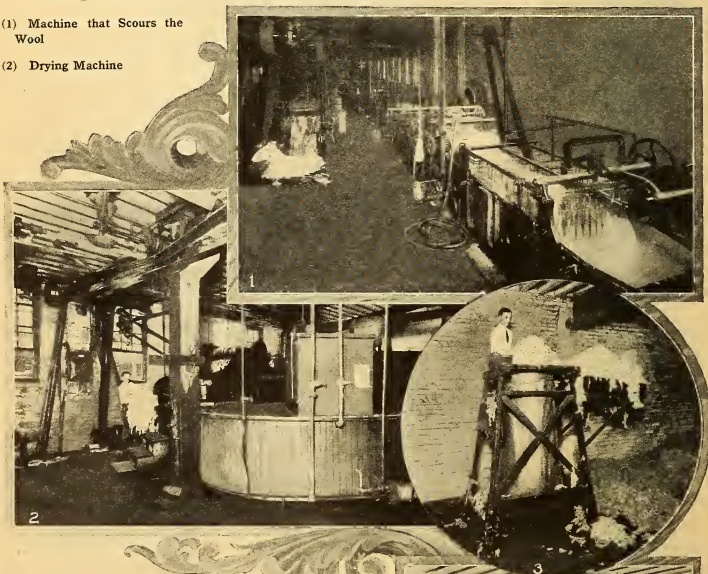
In the modern wool handling establishment electricity is used in preparing the wool for manufacture into yarn, cloth, etc. The product as received from the grower is first put through the scouring machine shown in picture No. 1. Here moving fingers pass it first through water then through alkaline solutions

fan blowers to the sacking room, picture No. 3, where it is packed into bags of large size ready for storage or shipment to the yarn manufacturer.

However, some of it may still contain burrs, and this "burry wool" is fed into the burr machine, picture No. 4. The burrs drop out at the bottom and the clear wool is blown through pipes back to the packing room.

(1) Machine that Scours the Wool

(2) Drying Machine



(3) Here the Wool is Packed in Large Sacks

(4) Taking Out the Burrs by Motor Power

until finally it emerges thoroughly cleansed.

The wool is next placed in the dryer, picture No. 2, where, under cover, fans arranged beneath steam coils throw a current of warm air through the mass until it is quite dry, when it assumes a light airy appearance. It is now conveyed by means of

SHE HAS WALKED 12,000 MILES

One of the "Walking Woolfs"

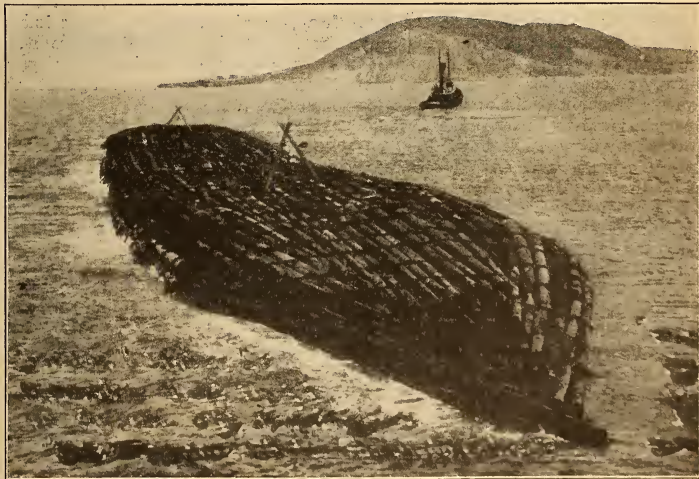
"The Walking Woolfs" is the name by which a Kansas couple go, a young, athletic pair who have been walking for three years, and are now near San Francisco, Calif. Mr. and Mrs. Woolf started from Kansas City three years ago and walked to New York. Then they rambled down the Atlantic Coast, strolled through the southern states and turning westward again walked to the Pacific

Coast. They reached Los Angeles in January, 1913, and started north to San Francisco.

The dog goes along for company and warning against night prowlers, while the pony and cart take care of their camp outfit. The cart is literally covered with visiting and business cards, which were tacked on by acquaintances made on this 12,000 mile foot tour.

A MONSTER LOG RAFT

A raft of enormous proportions took a journey down the Pacific Coast from Oregon to San Diego, Cal. It contained 5,088,000 board feet, which represented 100 acres of timber. It was 800 feet long and 52 feet wide. It stood out of the water thirteen feet and was submerged 25 feet, so that only a part of the raft was visible. It was towed from Wallace Slough, Columbian River, Oregon, to San Diego in fifteen days, a distance of about 1200 miles.



Eight hundred feet long and 52 feet wide, this monster raft stands thirteen feet out of water and 25 feet beneath, and contains over 5,000,000 feet of lumber.



PHOTO BY ROY C. ANDREWS, AMERICAN MUSEUM OF NATURAL HISTORY

Koreans Preparing a Feast of Whale Meat

REDISCOVERING THE GRAY WHALE

At the American Museum of Natural History in New York there is being mounted at the present time the first and only skeletons of the California Gray whale in the world.

Only recently this whale, which naturalists throughout the world have for years believed to be extinct, was rediscovered by Roy C. Andrews, the well-known explorer and Assistant Curator of Mammals at the museum.

The California Gray whale is particularly interesting to the naturalist, because it represents a stage between the two great families of whales—the right or Greenland whale and the fin whale. The California Gray has characteristics of both families.

The interesting history of the California Gray whale, according to Mr. Andrews, goes back to 1850, when it was first seen and named on the coast of California. Its winter home was in the Arctic, but the whale made regular migrations to the South for the summer.

Long before the California Gray was known to the white man, the Indians on

the islands off the coast of Canada hunted it for food. Among them, Mr. Andrews has determined, the whale was known for its ferocity, and there are numerous stories concerning their great hunters who went forth against the monsters.

Then the American hunters began to learn the habits of the California Gray, and in the summer time hunted the whale in the lagoons of California. There the whale gained the reputation as a hard fighter and the work of hunting him was dangerous in the extreme.

About 1879, the California Gray, on account of persistent hunting, had disappeared from the sea and nothing more was heard of it till Mr. Andrew made a trip to Japan in 1908, to study the methods of the Japanese whalers in the new industry established on the coast of the island.

Here quite by chance one day while conversing with one of the whalers he heard of the Kukekua Kugira (Devil Whale), so called by the Japs because of its fighting qualities and the dangers



PHOTO BY RAY C. ANDREWS, AMERICAN MUSEUM OF N. H.

Whale Steamer Bringing in a Gray Whale

that attended the hunting of it. The whaler told the American naturalist that the Devil Whale came every year to the coast of Korea for the females to breed.

Mr. Andrews was most interested and was convinced that he was on the track of an important discovery. He decided to make a trip to Korea and study the Devil Whale. This he did during the past few months and succeeded in his quest.

Investigation has convinced Mr. Andrews that there were originally two great herds of the California Gray. One of

these herds, estimated by naturalists to have numbered about 50,000 whales, came down the American Pacific coast to its southern quarters in lower California.

X-RAY AND TOBACCO

A new use has been found for the X-ray. Every smoker has at times been disgusted to find that an invisible parasite has eaten holes in his finest cigars. The tobacco worm is all too common a nuisance. But science has got the better of this little pest. An X-ray is turned upon a large box of tobacco before it is made into cigars, with the result that the parasite is destroyed most effectually.

DELIVERING A TRUNK BY AERIAL EXPRESS

The novel idea of carrying a trunk 30 miles and more and delivering it to a customer in Pasadena, Cal. was carried out by a Los Angeles trunk agent, E. C. Learock. It was carried in a monoplane driven by W. L. Bonney, and was delivered in 20 minutes, breaking all records.



An Aeroplane in the Express Business



The Richer the Chief the Better the Band He will Have

AFRICAN KING'S PRIVATE BAND

In wandering through Central Africa one will be astonished to find how fond the natives are of drilling like soldiers, and how anxious every king and petty chief is to possess his own band. Generally these bands consist of nothing more than a side-drum and a couple of bugles; but the richer a chief is, the better band he will have. They are quite prepared to give a good sized elephant tusk, valued at about \$120, for a side-drum worth no more than \$5, and the traders have been quick to discover this.

The accompanying illustration shows the drum and bugle band of Chief Kiripa of Uganda, who is one of the richest and most powerful chiefs of the Gondokoro province. The players either have been in the British army service as bandmen, in the Belgian service, or else have been taught the calls and marches by those who have. They play with an astonishing accuracy and it is remarkable how splendidly they render the tuneful bugle marches.

Every large village will be found to have not only its little army, but also its "cadet" corps of little boys. You may see a tiny lad, naked as the day he was born, putting a dozen or more of his playmates through all the details of squad drill as laid down by the British drill book, using the English words of command with surprising accuracy of pronunciation. Armed with sticks for rifles, and headed by a battered old side-drum, a still more battered infantry bugle and an equally decayed pair of cymbals, a band of some 50 of these naked youngsters will march swaggeringly and in perfect time through the village until they reach an open space outside, where their naked "captain" proceeds to put them through the English army company drill.

W. ROBERT FORAN.

The economy of electricity is of decided importance. Electricity can be turned on and turned off, and waste avoided instantly. Electric energy in the form of light, heat or power can be more definitely utilized than any other form.

STAR BALL PLAYER

NEWARK		TORONTO	
1	0	0	0
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3	3	3	3
4	3	4	4
5	2	5	5
6	2	6	6
7	1	7	7
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97	0	97	0
98	0	98	0
99	0	99	0
100	0	100	0

2 OUT
0 RUNS

STRIKES 2
BALLS 3

THE LATEST BASE-BALL SCORE BOARD

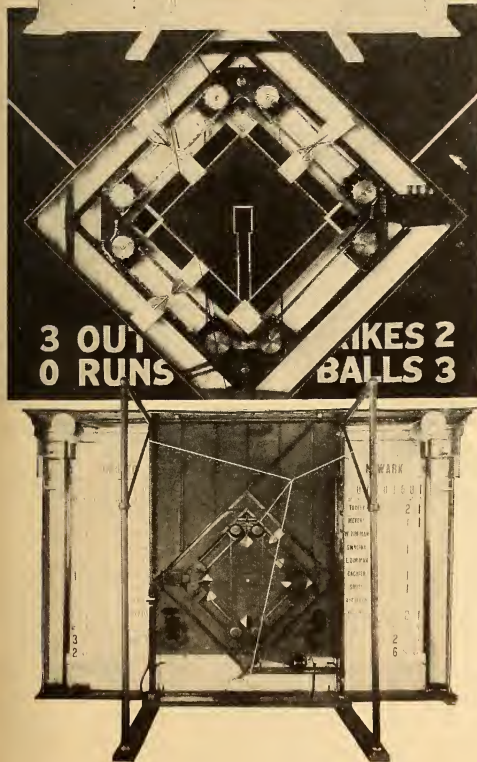
A new kind of score board, which is the very next thing to the actual game itself, has got the New York fans going. It is ten feet high, with a bright green field and red pitcher's box and red base lines. Suspended on invisible wires is a gleaming white ball, a real ball, in fact, which by a cunning mechanical arrangement of wires to deep center or wherever the batter happens to send it. This ball, showing every action, is the distinctive feature of the new board.

To make the game seem all the more realistic, the man behind the board can make the ball curve for an out and then for an in-shoot. If a runner is on first base he can be made to flit back and forth off the base, while the ball moves hesitatingly to and fro in the pitcher's box, as the pitcher considers trying to catch the would-be base stealer off first base.

Zip!

The white ball flashes to first. Safe! And on the next ball the man goes down to second. It's a long throw from home to second, but they get him. Get him within a few inches, which makes the play so real that a crowd can't help but yell.

Up on the small platform behind the board stand four men. One operates the ball; one, with a



Electrical Score Board and its Mechanism

telephone receiver to his ear, gets reports from the telegraph room in the newspaper office; a third tends to the inning scoreboard and the batting order list, while a fourth reads off the game and checks up from his "flimsy" sheet the telephone reports of the game ball by ball, strike by strike and play by play, as the game is clicked off from the box at the Polo Grounds, only 20 to 30 seconds before it is flashed in action on the board.

The ball is operated by a wand which, when moved in any direction behind the board, causes the ball to execute a similar movement for the spectator. When a man steps up to bat a paddle with his name on is moved out about three inches toward the infield to denote that he is at bat. The ball goes from pitcher to catcher; if a strike or ball, the proper slide shows it; if a hit the ball stops at the batter's position and then moves to whatever point in the infield or outfield it is batted to.

If a hit, the white paddle at home base starts toward first. If he is out at first, the ball gets there ahead of him and the white paddle disappears. By means of a hand crank, a runner can be caught edging back and forth off a base and by means of the pointer operating the ball he can be caught out, to the great delight of the crowd.

When there are three men on bases and a long hit is made to the outfield which brings in the runners, as each crosses the home plate, the slide marked "runs" is moved to indicate the runs. Runs, hits and errors are posted opposite each player's name.

The ball may even be shown to "wind up" in the pitcher's hand by describing a small circle with the wand. A foul along the foul line may be illustrated by moving the ball from the batter along the foul line and at the same time starting the runner. When the runner, as indicated by the white square is half way to first base, he can be stopped and made to return to home base. A foul back of the

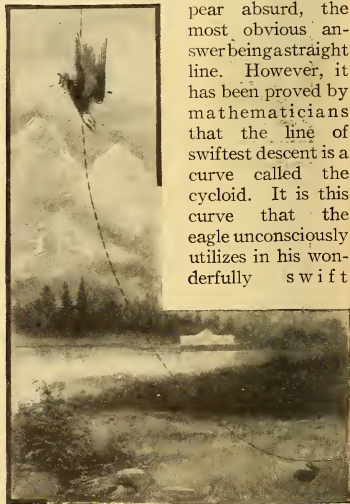
catcher is illustrated by moving the white ball to the batter and then at an angle back of him. If the foul has been caught the placard bearing the batter's name is taken away, showing he is out.

An electric motor moves the base men. Four push buttons give the operator a chance to make his runners accentuate their speed or slow up at will.

It is the actual sight of the white ball mechanically whanging across the plate or sailing far afield, and then the white disk that represents the batter flying from base to base as the ball is relayed toward home, that catches the fancy of the crowd and makes them shout as loud as at a real game.

THE LINE OF SWIFTEST DESCENT

What is the line of swiftest descent? To anyone not acquainted with the laws of higher mathematics, a proposition such as this would appear absurd, the most obvious answer being a straight line. However, it has been proved by mathematicians that the line of swiftest descent is a curve called the cycloid. It is this curve that the eagle unconsciously utilizes in his wonderfully swift



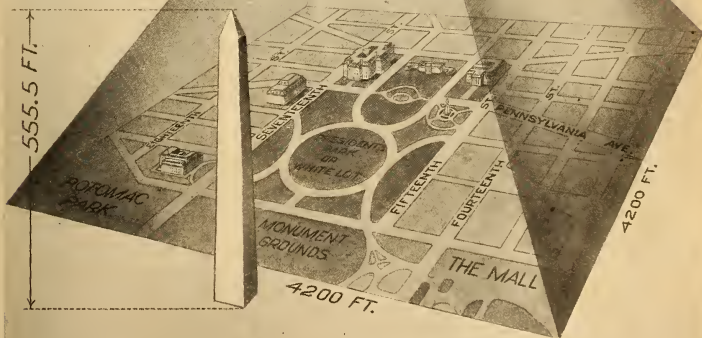
The Eagle Swoops in a Cycloid Curve

swoop to his prey. The analysis of the curve is simply a straight line motion combined with a circular motion. The best illustration showing this is a cart-wheel as it rolls along the ground. Any point on the rim of the wheel is describing a cycloid, and no point is at any time describing a circle or going in a straight line.

A peculiar thing is deduced from this knowledge, and that is that no point on the rim of a wheel rolling on a surface goes round the center of the wheel, for the center is describing a straight line and all the points on the rim are describing cycloids; thus, as no circular motion exists, the statement holds.



A Railway tunnel, 14 Ft. in diam. dug straight through the center of the earth of the equator, could be completely filled with the rock and earth taken out of the Panama Canal.



The 242,000,000 cubic yards of excavation taken out of the "Big Ditch" would build a pyramid whose base would be 4200 Feet square and whose altitude would be twice that of the Washington Monument.

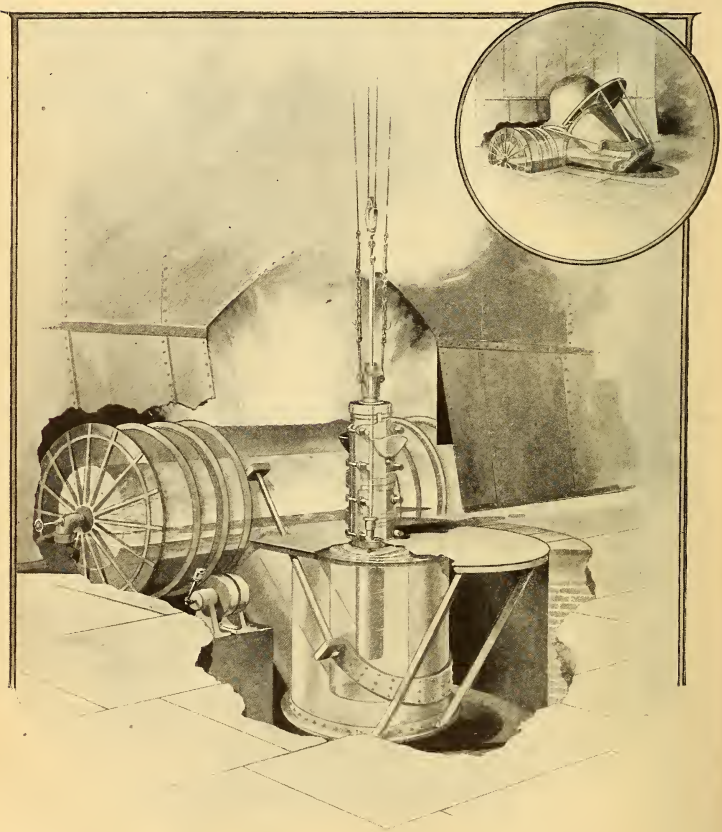
THE PANAMA EXCAVATIONS

A great amount of information has been published concerning the details of digging the Panama Canal, and yet few of us realize the immensity of the undertaking. One of the best illustrations to fix in mind the great amount of excavation necessary appeared in the *Bulletin of the Pan American Union*. It gives one an idea of what two hundred and forty-two million cubic yards of earth and rock really mean.

PUTTING A COPPER JACKET ON STEEL WIRE

The illustration above shows the first step in the manufacture of copper clad steel wire, now largely used in electrical work where great tensile strength and high electrical conductivity are required.

When a blacksmith "welds" two pieces of iron or steel together, he heats them until their surfaces are plastic or semi-molten and then applies pressure by means of his hammer. The two soft, like-metal surfaces will unite integrally or "weld," the plastic metal flowing under the pressure of the hammer.



Illustrating the First Step in Making Copper-Clad Wire

The molecular constitution of the two pieces of metal being similar, since iron and steel are like in nature, metallic union is obtained between the two pieces of plastic metal, *provided* the two surfaces are free from films of other matter.

To obtain a weld, the metallic surfaces to be united must be clean and must be like in nature. Copper molecules are arranged so differently from steel molecules that it is hopeless to try to directly weld steel and copper thus. But if you have an iron-copper alloy, it partakes of both the nature of iron and the nature of copper; it may be welded to either.

That is the fact which is utilized in making Duplex wire. Instead of trying to weld pure iron and pure copper directly together, pure copper is welded to steel through an intervening layer of iron-copper alloy.

Steel billets of a composition suitable for making mill wire are received at the mill and passed to a machine where one end is drilled and tapped.

After pickling and washing, the billet is brought up to a given temperature and is then drawn up into a mould (also previously heated) by means of a rod, screwed into the billet.

The mould and billet are now carried to a furnace of special design, which contains molten copper at a very high temperature. The billet is lowered out of the mould and into this copper (see illustration), and kept there for a time sufficient to form an alloy on the surface of the steel. The billet is then drawn up into the mould and the whole carried to a second furnace containing the purest of commercial copper.

This copper is poured in through two openings in the top of the mould (the bottom of which is closed by a flange) and unites with the alloyed area and fills the mould.

When the copper has set the holding rod is unscrewed and the copper clad billet taken out of the mould, and after the necessary preliminary heating it is rolled to any desired size and shape.

AN AMPHIBIOUS AUTOMOBILE

This French submarine automobile is for use in the rough country of the French colonies, where bridges are scarce. The machine possesses the remarkable property of being, for practical purposes, amphibious, its motor being designed for



Taking to the River

working under water. It may be stated that all joints and bearings were made watertight and the sparking plugs were fitted with small hoods. The carburetor and magneto were inserted in hermetically closed casings.

On traversing a river it will be seen that the motor takes air and exhausts by means of two vertical tubes which can be fixed in position within five minutes whenever the motor has to ford a stream.

Electricity cannot be adulterated. The meter measures the energy exactly. Should you fail to get good light, full voltage, the meter will not charge you for this lack of light.

AN OSSIFIED MAN

An offer of \$1,000 to any surgeon who will break his back has been made by Frank Worden, an Iowa man, who has become ossified. Eighteen years ago Worden woke up one morning with a stiff



Man Who is One Huge Piece of Bone

neck. As there was no pain he paid little attention to it at first, but it commenced to get worse until he was afraid that his jaws would become rigid and prevent him from opening his mouth. He placed small wedges of wood between his teeth and in that position the lower part of the face ossified. In time the wood was removed and the teeth are left about half an inch apart, and liquid food is given him through this small opening.

Gradually his whole body became affected, until now he is a huge piece of bone with the exception of the arms below the elbow and his tongue and eyes, which he can still move.

THE MAN WITH A SILVER DOLLAR SKULL

An instance of the amazing surgical skill away out where people think it is "all backwoods" is discovered in an operation which Dr. W. A. Butt of Omaha, Ark., local surgeon of the White River Railroad, has successfully performed on John Creekman.

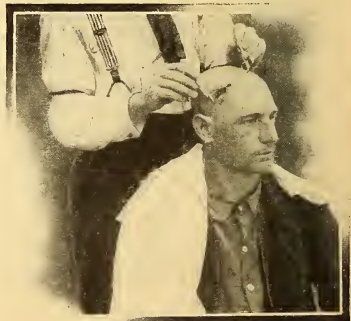
Creekman had his skull crushed in by a rock and a jagged, frightful wound existed which would doubtless have been considered by the average physician as inevitably fatal.

Dr. Butt, however, had a silver dollar hammered out to extreme thinness, so as to get all its space possible. He inserted this into Creekman's skull. (The length of the silver plate is designated in the photo by the two instruments being held on the head.) It protects a space of $1\frac{3}{4}$ by $3\frac{1}{2}$ inches.

The operation was performed on February 24th, and the photograph, taken April 18th, shows wonderful progress of healing for so short a time.

LIGHTING PLANT AT 80 DEGREES N. LAT.

In July the Crocker Land Expedition under the auspices of the American Museum of Natural History, the American Geographical Society, the University of Illinois and other institutions, sailed from New York City to explore the North Polar regions. One of the interesting features of this expedition's equipment will be a complete electric lighting plant which will be installed in a portable house at about 80° North Latitude. This lighting plant will be equipped with an "Ironclad Exide" battery, so that electric lights will be available at all times and it will only be necessary to charge the battery.



A Good Piece of "Backwoods" Surgery

QUAINT FASHIONS IN NILE HEADDRESSES



Nile Headdresses

There are many quaint styles of hair dressing among the various tribes of Africa, but the palm of uniqueness must be given to the superb giants of the Shilouk tribe on the Upper Nile. They inhabit a territory contiguous to the Nile from, roughly, Kaka to about Lake No, and are also to be found on the White Nile near the Sobat River. The men are immensely tall,

many of them reaching a height of seven feet or more. Broad shouldered and with powerful limbs, they are yet astonishingly thin. Their walk is most striking, being lithe and active.

They wear the most remarkable headdresses imaginable. The formation of their skulls is not of the African type, and is peculiarly adapted to the modes in which they delight in dressing their heads. They use gum, cow-dung and clay to make a paste, which, when applied to their hair and allowed to dry, gives it the appearance of felt. By shaving the head here and there and cutting the felt at the desired places almost any form of headdress can be obtained. Some are fanlike, others resemble a cock's comb, while others, again, prefer long excrescences which have the general appearance of horns or asses' ears. The effect is extraordinary, fantastic and even at times terrifying to the traveler.

W. ROBERT FORAN.

AN ODD STREET SWEEPER

Parisians were somewhat amused to see a curious little tricycle device circulating through the streets and picking up waste material as it goes along. Jacquelin, its



Bicycle Street Sweeper

inventor, is a well known cycle champion, and he had the idea of rigging up a machine so as to serve not only for sport but also for real work.

HUMAN PROFILE MARKING ON A CALF

A striking resemblance to a human profile is the odd marking borne by a calf in Pennsylvania. It is thought to resemble the profile of Mark Twain.



Calf with an Odd Marking



View Half-way Through the Yangste Gorge

China's First Hydro-Electric Plant . . .

By LEWIS R. FREEMAN

The author presents some facts concerning hydro-electric possibilities ascertained while visiting there as a member of the commission representing the Associated Chambers of Commerce of the Pacific Coast.

—Editorial Note

The great empire of China — destined, perhaps, to be the world's leading manufacturing country within the next quarter century — is unfortunate in that none of its eight or ten largest cities are within economic transmitting distance of a point where hydro-electric energy could be generated in large amount. Canton, Nanking, Soochow, Tientsin, Hankow and Shanghai are all situated in the midst of flat river valleys or deltas, with no mountains of sufficient height near at hand to give birth to swift flowing streams such as might be utilized for electrical development. Peking is within 20 miles of a fairly high range of mountains, but the precipitation in that part of China is insufficient to keep large streams running the year round.

Foochow, on the other hand, with a half million or more people, lies in a mountainous and well watered country, and though there is no data available on the subject, it is very probable that practicable sites of great value exist on the River Min, or some of its swift tributaries, within easy transmitting distance of this important manufacturing center.

Nearly all of China's great rivers take

their rise in the snows of the Tibetan plateaus, at elevations of over 20,000 feet, and the largest part of their four mile drop to sea level is made in the course of their journeys through the rich interior provinces of that extensive empire. This is notably true of the mighty Yang-tse-Kiang, one of the five largest rivers of the world, which descends something like 15,000 feet in traversing the province of Szechuan alone. It is in this province, rich, populous, but almost wholly undeveloped, that the greatest field for hydro-electric development will be found.

The gorges of the Yangtse itself, in which the great river cuts through the mountain ranges dividing upper and lower China, descending a thousand feet in a series of rapids rivaling any in the world for swiftness, volume and grandeur, have been the subject of conjecture from the standpoint of power development for many years. The mean flow of water at Ichang, near the lower end of the gorges, is reckoned at 750,000 feet a second, and though the average fall through the hundred miles or more of chasms is not great, there are places where the drop for short distances is very considerable.

Yunnan, which with the great province of Szechuan I have mentioned, forms the eastern portion of China, is to have the honor of the first hydro-electric plant to be erected in the Celestial Empire. The conditions here for power development are hardly as favorable as in Szechuan, nor is it by any means so rich and populous as its sister province, but the completion of the French railroad, from Haiphong on the coast of Tongking, to its capital, Yunnan-fu, furnished adequate transportation facilities for the requisite machinery, and the enterprising viceroy lost no time in taking advantage of the opportunity offered to put his city one

viceroys heard, from a missionary, of the electric chair as used at Sing Sing. The German engineer was summoned post haste. "If you harness the river dragon, can you build me a killing throne such as the American mandarin uses?" "Can do," replied the German, and promptly wired the news of his success to Shanghai and Berlin.

The following day, in company with the German consul, he called on the viceroy to obtain the latter's signature to the papers granting the concession. The official took up his brush to affix the necessary ideographs, and then, a new thought striking him, he arose and led



The Mandarin Wanted not only Electric Lights but Electrically Operated Apparatus of this Type, to make Offenders Very Unhappy.

step ahead of the other provincial capitals.

The story of how the concession for this Yunnan-fu power installation was won and lost from the predecessor of the present viceroy is both amusing and instructive. When first approached by the representative of the German company which is now building the plant, the mandarin in question — a typical Chinese official of the old regime — refused to discuss the project of all, saying that, as oil had proved good enough for Confucius it was also good enough for a humble disciple of Confucius. At the end of six months it chanced that the

his guests to a window overlooking the court of the viceregal "yamen." "But supposing we should not desire to kill, but only to treat like these" — and he pointed to a half dozen wretches suspended by the necks in bamboo cages — "or like those" — and he indicated some petty offenders groveling in the ponderous wooden collars called "cangues." "Has the American mandarin any thrones which will not kill but only make very unhappy?"

And because the Germans would not agree to the installation of an electric torture chamber, the negotiations ended then and there, not to be reopened until a

more humane and progressive mandarin sat in the viceregal yamen of Yunnan-fu. I have often wondered how a Yankee agent would have met the emergency which flooded the German. He would have secured the signature and the concession — there can be no doubt about that — and probably satisfied the mandarin later by rigging up some innocuous contraption along the desired lines.

The following is a translation of part of a letter which Messrs. Carlowitz, the German firm having the work in hand, have written me regarding the Yunnan-fu project:

“The electrical plant now in course of construction at Yunnan-fu is a municipal undertaking, and it is to be erected for the purpose of lighting the numerous yamen or public buildings, besides the schools, police stations and the main streets. It is the first project of its kind in China, but, we hope, only the forerunner of many more which will doubtless be built when the people of this province learn the facility and cheapness with which power may be developed from their rivers and waterfalls.”

HAULING FISH NETS BY THE AID OF ENGINES

Interesting new evidence of progress in an ancient industry is found in the recent recourse of American fishermen to stationary engines to aid them in hauling their nets. Both gasoline engines and steam engines of the “donkey” type are being employed for this innovation, but it seems probably that ultimately the gasoline engine will have the preference.

In the case of the nets now handled by the aid of engines it has not been found practicable to dispense entirely with human brawn. But the force

of men needed for hauling the nets has been greatly reduced, inasmuch as the main force for dragging ashore the heavy, fish laden nets is supplied by the engine, and the limited number of men that supplement the machine are needed only to guide the net as it is hauled in and so to hold it that none of the fish will escape from the meshes.

AN ELECTRIC TANNING PROCESS

For some time experiments have been made in England with an electrical process of tanning leather. Now, it is reported, such a degree of success has been obtained that the adoption of the process on a commercial basis is thought to be justified.

Specially constructed vats are filled with the hides, along with metal conductors to effect the electrolytic action, and after this preparation has been completed, the remainder of the process is almost automatic, since mechanical provisions are made to prevent any damage by reason of excess of current. The current passing through the hides



Hauling in the Nets With an Engine

hastens the tanning process to the extent that six weeks suffice to do the work which ordinarily requires several months.

The automatic feature of the tanning process makes it an economical one, and two men are thus enabled to take care of all the vats of a large tannery.

MANILA CARNIVAL SCENES

The Manila Electric Railroad and Light Company, operating in Manila,



Over 22,000 Filipinos and Others
Listened to the Electric Light
Company Band



Electrically Lighted and Operated
Float which won First Prize

P. I., is an important factor in the affairs of the community. At the Manila Carnival held in May of this year, it furnished the people with entertainment in the way of band concerts. The band is made up of employees of the company and comprises 80 members. One of the pictures herewith shows a portion of the 22,500 Filipinos and others who listened to it in a single evening during the carnival.

The company also went into the carnival parade with a float representing an armored aeroplane. This was built upon an electric truck and took first prize.

FARM HOUSE LIGHTING FROM AUTOMOBILE OUTFIT

Mr. H. J. Murch, who lives near Northboro, Mass., has found a very novel and practical use for the storage battery

which he uses in his Cadillac car for starting his engine and for his automobile lights.

His house when built was wired for electric lights and an extension was carried from the house to his garage, but electricity has never been available in his district for lighting his home.

He conceived the idea of connecting the wires from his house to the battery in his car and using the energy from the battery for lighting his home.

During the day, while he is driving his car, the engine runs a dynamo which charges the battery and which furnishes current for

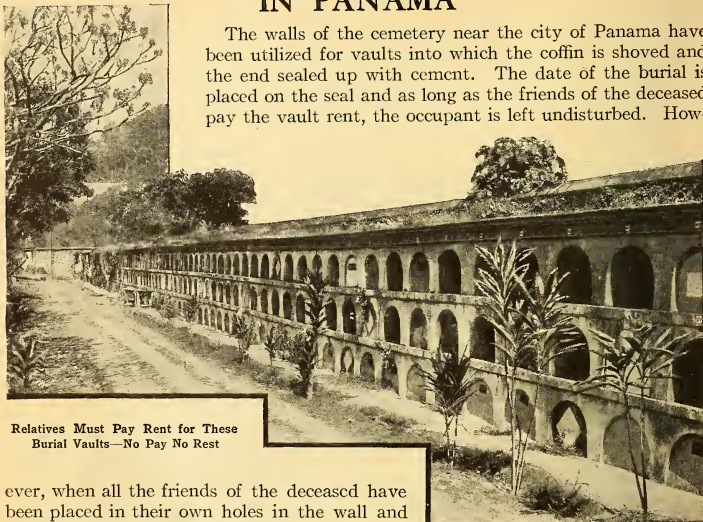
starting, lighting and ignition. At night he connects the wires from his house to the battery and the energy which has been stored in the battery during the day is then used for lighting his home, this energy being sufficient for lighting four sixteen candlepower carbon filament lamps.

In his house he uses lamps of the same size as are used in the head lights of his car; one on the piazza, one in the kitchen, one in the living room and one in the bedroom.

The battery has furnished all the current needed for the house lighting without interfering in any way with the electric self-starter. The battery is a standard "Exide."

BURIAL VAULTS ON A RENTAL BASIS IN PANAMA

The walls of the cemetery near the city of Panama have been utilized for vaults into which the coffin is shoved and the end sealed up with cement. The date of the burial is placed on the seal and as long as the friends of the deceased pay the vault rent, the occupant is left undisturbed. How-



Relatives Must Pay Rent for These
Burial Vaults—No Pay No Rest

ever, when all the friends of the deceased have been placed in their own holes in the wall and the rent is unpaid, the decayed coffin and musty bones are taken from the vault and thrown on the common heap in the potter's field. Then the vault is ready to let again.

COAL MINING BY STEAM SHOVEL



Steam Shovel at Work in a Surface Mine

“The land of the steam shovel mines” is the term lately in use by the citizens of southeastern Kansas to describe the Pittsburg coal district. Here huge steam shovels, 25 in number, now strip the earth, to a depth of 30 feet, from the coal vein and the miners, working in the open light of day, shovel up the coal without

danger of explosions, fires and black damp.

Steam shovel mining has been in progress but three years, yet it has become an established industry in two Kansas counties. The machines, two of which are the largest in the world, plow great furrows across the prairie, just by creeping along slowly, a few feet a day. Ridges like small mountains are piled on high.

THE AEROPHORE FOG SIGNALER

What is an aerophore? Popularly, it is a device for eliminating the dangers of fog at sea. Technically, it is the latest

invention of Dr. Lee De Forest, to enable ships in a fog to talk with each other, and determine each others location.

The aerophore looks like a small electric searchlight mounted on a swivel. Behind this searchlight is a huge copper reflector, about six feet long, highly polished, bent into a semi-circle two feet wide, and revolving with the light. Thrust out from the top of the mast to



Lee De Forest's Latest Idea, the Aerophore, by Which to Send Wireless Signals along a Beam of Light

which the reflector and light are attached is a horizontal arm or bowsprit, holding a web of copper wires strung down in front of the light, and gathered together at the foot of the mast. Also behind the light is a powerful dynamo which charges the light rays with Hertzian vibrations, and sends them forth through

the fog. As the Hertzian wave rays are too rapid for the eye to follow, they are sent out in the direction of the slower light waves which have been concentrated and bound together through the medium of the reflector.

Thus, when the light of the acrophore is turned toward any point of the compass, the Hertzian waves follow the beams of visible light, and continue far beyond them in the same direction. Their action is comparable to that of a bullet, taking its course from the groove of a rifle barrel, and keeping that course 10,000 yards beyond. The shaft of the acrophore's searchlight might represent the gun barrel, and the Hertzian waves, bearing the message, the bullet. Every five or ten minutes during a fog, the entire arm or bowsprit, swings with the light first in one direction, then in another; and, every time the acrophore ceases its revolutions, a message is sent to that point of the horizon toward which the searchlight is aimed.

In utilizing this concentrated light to send out warnings, the acrophore relies upon the phonograph. This is a certain kind of phonograph, having a record roll of bronze steel, and is run by the same motor as the acrophore's searchlight with the horn attached close to the transmitter of the wireless telephone. When the searchlight points to starboard, the phonograph whispers into the transmitter the name of the vessel and the word "starboard." Simultaneously, a set of four bells, tuned to the four quarters of the octave, ring within the phonograph's interior. After the message has been sent, and the bells have rung, the mechanism of the acrophore shifts the switch that renders the wireless telephone capable of receiving messages, in case there should be an answer.

After a wait of five or ten minutes, according to the gear of the apparatus, the searchlight is swung another point, and the call "starboard quarter" goes out with the ringing of the bells. The acrophore revolves step by step, and

notifies ships in every quarter of the compass from just what part of the ship the message is sent. In each the quartet of bells ring.

The reason for the bells is to make the message absolutely accurate. The distance at which a bell of a given tone may be heard, can be exactly determined under given atmospheric conditions; and the acrophore is designed to have a standard code so that the bells of the highest note can be heard at 6,000 yards, the next highest at 4,500 yards, the third bell at 3,000 yards, and the lowest-toned bell at 1,500 yards. Thus if the operator on a certain ship received an acrophore warning, and heard only one bell, he would know that the ship sending the signal was 6,000 yards away; if he heard two bells, he would realize that she was 4,500 yards off, and if all four of the bells followed the warning, he would understand that the vessel was close.

BOY AEROPLANE MAKER

Perhaps the most famous boy maker of toy aeroplanes is Percy W. Pierce. The picture shows him in his workshop — the attic of his mother's home in the Bronx, New York. He has made toy aeroplanes which have flown a quarter of a mile and examples of his work have been on exhibition at Madison Square Garden and at Morris Park. He is fourteen years of age.



Percy W. Pierce in His Workshop

PROJECTING LANTERN CARRIED BY A KITE

An apparatus for projecting a changing series of illuminated displays upon a



Projecting Lantern



Kite Carrying Electric Projecting Apparatus

screen suspended from a kite or balloon, at night, is a recent addition to what is known as spectacular advertising. The projector is sent up in focus with the screen and requires no attention whatever after the desired height is reached, the action of the mechanism being entirely automatic. A contrivance of this description compels attention where a continuous advertisement without variation, would get only a cursory glance.

The pictures, or displays, are mounted in such a manner in the projector as to form an endless belt, which is kept in motion by a small electric motor, through suitable gearing. A variable number of advertisements may be shown and in the machine illustrated eight of the pictures are used.

A powerful, electric, incandescent lamp is placed behind the endless belt at the proper point and is supplied with current, as is also the motor, through two wires from the ground, one of which may serve as the kite line, or to hold the

balloon captive where a balloon is used. The projector is about sixteen inches long and ten inches square and is built entirely of aluminum, weighing approximately fifteen pounds.

THE FLY TRAP MAN



The Fly Trap Man

The city of Redlands, Cal., has an official fly catcher, or more correctly, fly killer. His duty is to care for the fly traps which are scattered plentifully along the sidewalks. He destroys the flies, empties the traps and puts in fresh bait. Hundreds of thousands of the little pests are destroyed annually by this unusual but effective method.

In efficiency, in adaptability, there is no comparison of electricity with other forms of illumination. It will meet any situation, anywhere, at any time.

GERMAN ELECTRO-PORCELAIN

In Germany, the electro-plating process whereby glassware is decorated with a network of silver designs has been extended to the plating of porcelain dishes, such as platters, bowls, tureens and tea

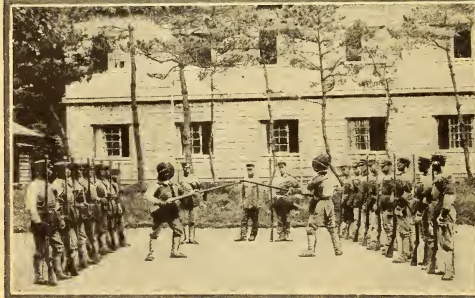
and cooking pots are usually left uncovered within, because porcelain can more easily be kept clean than a surface of metal.

EXERCISES FOR JAPANESE SOLDIERS

The diminutive soldiers of Japan are among the hardest and best trained athletes of any army and a variety of exercises form part of the military life. Swimming lessons are given in the broad, shallow estuaries or inlets of the sea, but as the Japanese are a race of fishermen and divers, most of the recruits know how to swim before entering the army. Lessons on the horizontal bar are given to teach perfect control of the body, while hurdle races over stone walls are supposed to be of service in charging over entrenchments.

Bayonet fencing is a popular sport among the brown soldier laddies, the guns being "dummies" provided with a pad at the end, while the fencers are protected with huge helmets and the same sort of a quilted bodyguard that the baseball catcher uses.

An interesting outdoor practice for hilly country is the climb up a steep slope in a chain; that is, the foremost man carries his gun by the butt and the one behind grasps the weapon by the barrel to steady himself. He carries his gun in the same way, giving aid to number three, and in this way a body of men can ascend much more easily than if each man were for himself, while the guns, instead of being a burden in the ascent, become a help.



Bayonet Fencing and Work in the Hilly Country by Japanese Soldiers

and coffee sets. Vessels thus treated are said to wear better than either simple porcelain or solid silver, being less fragile than porcelain and less subject to indentation and deformation than silver. The product is called electro-porcelain and is cheaper than plated silverware. The plating is usually of silver, but sometimes of nickel.

In some cases, however instead of covering the entire vessel, the plating is confined to the handles, knob, and edges;

NEW TELEPHONE FOR LONG DISTANCE

On April 14th last the French Academy of Sciences received a communication relating to a new telephonic apparatus, due to the ingenuity of Dr. Jules Glover. In his position as Doctor of the Conservatory of Music and Oratory, Dr. Glover had occasion to study particularly certain phenomena which have been overlooked by the inventors of the

upper surface of the two mirrors, where, in fact, it finally disappears altogether.

Now the deduction which was drawn from the experiments was that the nasal, or M and N, sounds are lost to the ordinary telephone, and therefore Dr. Glover proceeded to construct an apparatus which would be sensitive to both kinds of sounds, by adding to the usual instru-

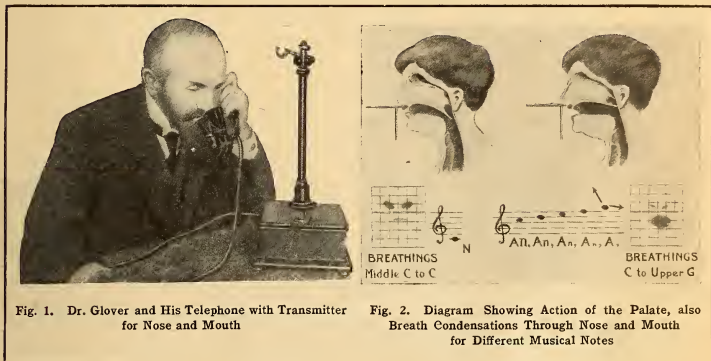


Fig. 1. Dr. Glover and His Telephone with Transmitter for Nose and Mouth

Fig. 2. Diagram Showing Action of the Palate, also Breath Condensations Through Nose and Mouth for Different Musical Notes

telephone. By means of an apparatus, which was ingeniously constructed of two mirrors placed at right angles, one surface of which is placed before the mouth and the other under the nose, he succeeded, as the result of the condensation formed upon the two surfaces when sounds are emitted, in distinguishing between sounds made by the mouth and those made by the nose.

His experiments have established the fact that all sounds containing the letter M or N are nasal, and that all sounds not containing these letters are mouth sounds.

Figure 2 illustrates a further discovery, which, although of no apparent significance at present, is nevertheless interesting. It was found that a low sound containing an M or N was more nasal than the same sound on a higher key, as shown by the smaller amount of moisture on the

ment an attachment which receives also the sounds proceeding from the nose. The reason that such an arrangement was expected to give valuable results, especially in long distance transmission, is that the receiving magnet is affected rather by the variations than by the strength of the current produced. The results indicate that this reasoning is correct, and in consequence there is, with the new apparatus, an increase in the volume of the sound and a clearness of the voice which is indispensable in long distance, and especially transoceanic, communications.

The apparatus, as shown in Figure 1, consists of two horns, one for the mouth and the other for the nose, each with its own microphone of different sensibilities, as well as the receiver.

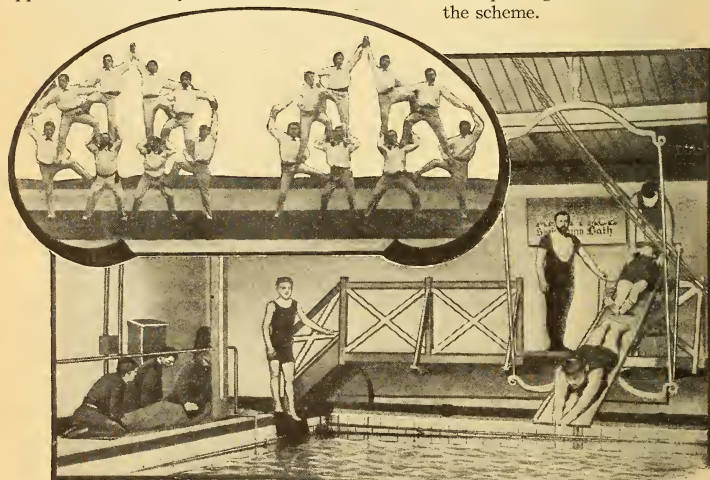
The inventor believes that with this

improvement, together with others which are now being worked upon, we shall in the near future be able to communicate by telephone between Paris and New York.—*Translated from La Nature by J. H. Blakey.*

A SCHEME TO TAP THE MAGNETIC POLE

That the wild imaginations of company promoters and inventors have not been confined to this generation is proved by a recently published biography dealing in part with the discovery by Sir John Ross of the North Magnetic Pole in 1831. It appears that some years after the dis-

covery a Captain Kennedy, employed by Lady Franklin to search for the lost Sir John Franklin in the Arctic regions, made a serious proposition that a company should be formed with himself at the head to tap the pole for electric power and conduct it by cables to the city of Winnipeg, Canada, which lies 20 degrees to the south. The captain's scheme was in some way to sink a shaft until the line of energy was encountered, and he sincerely believed that half the American continent could be supplied in perpetuity with practically no expense. The cautious Scotch settlers of those days decided to give the suggestion a "six months hoist" before putting their "siller" into the scheme.



BLIND STUDENTS ENJOY ATHLETIC SPORTS

Blind students at the Royal Normal College in London have the same facilities for gymnasium work, swimming and athletic sports generally as do the students of other institutions.

The physical director has made himself acquainted with all the different systems of physical training and his successful teaching has given that freedom of movement, activity, self reliance and courage which are so essential to the blind in securing employment. The gymnasium is fitted with 55 different pieces of apparatus, embracing the best points of the English, Swedish, German and American systems.

A CENTURY PLANT IN BLOOM

It Blooms Once in 20 Years

To see a century plant in bloom is quite an unusual sight, even in sunny California, but in the accompanying illustration one may be seen at its best. It is stated that in the Golden State these plants bloom once every 20 years instead of once in 100 years as popularly supposed. The plant in the photograph is unusual in several ways. It was found blooming beside a hot, dusty road and it is doubtful if during its entire life it had been given a moment's care or attention. Another remarkable feature about it is that al-

though neglected it has attained the maximum height of any plants of that kind known to that section—the southern portion of the state. It is 30 feet in height and at the base measures eight inches in diameter.

SIMPLE MAGNETIC LOCATOR FOR HOUSE WIRING

An easy method of locating the right spot at which to bore a hole down through a floor and the ceiling underneath is employed by John E. Taylor, one of the readers of this magazine. He has a large file which he has magnetized by stroking over the pole piece of a dynamo—also a little pocket compass. He fastens the file to a springy piece of bamboo fishing rod and, having found the proper point

in the ceiling, springs the pole in place so that the file is held vertically under that point. Going to the floor above, he can locate the place approximately by guess, then taking the compass he moves it about over the floor. When it is directly over the file magnet the needle is agitated violently. Close location can be made in this way, or, better still, by bringing the compass up slowly from several directions, marking the points of greatest agitation, connecting them and boring at the center of the region.

If the ceiling is not plastered and it is simply a matter of boring through

Using the Compass as a Locator



boards or joists the sharp end of the file may be driven into the point ascertained below as indicated in the figure.

DAY SPORTS BY NIGHT

If Emerson were to write his famous essay on "Compensation" at the present time he would more than likely cite the multiplication of opportunities for recreation by night that have been made possible by modern lighting as an offset to the extension of the available hours of labor that has been afforded by the same cause. If artificial light has made the "night shift" possible in industry, it has also made the night shift in recreation equally possible.—*Lighting Journal*.

DAY AND NIGHT CROQUET COURTS

Lincoln Park, Chicago, offers those fond of the game of croquet an opportunity to play in courts maintained by the park.

The novel feature about these courts is that while they are much used during the day they are most heavily patronized during evening, this being made possible by the installation of incandescent lamps enclosed within massive, white glass globes upon two ornamental iron pillars installed between each two adjoining courts.

The courts are covered with fine, well packed sand and bordered by a curb of concrete. The arches and balls are made to conform to the rules governing the game of roque, which requires more accuracy than croquet. Any pleasant summer evening will find the benches occupied by spectators watching the skill displayed on the four electrically illuminated courts.

KASSINO AND THE GIANT PHONE

Circus people on the road—as becomes happy-go-lucky folk engaged in a most healthful occupation—have no end of



Day and Night Croquet Ground in Lincoln Park

fun among themselves. This season the employees of the largest American circus have been particularly regaled by the antics, "behind the scenes," of a dwarf clown, who has adopted as the vehicle of his merrymaking a giant toy telephone instrument—one of a number of such instruments which are carried by the show for use in the latest trained elephant act. The clown who has been tickling the risibility of his associates, and particularly the circus electricians, is Andrew Kassino, a diminutive comedian known by sight to almost every American circus goer and who has lost none of his agility, although he is no longer young.

Kassino varies his burlesque somewhat, posing one day as a lineman and again assuming the rôle of an operator, although he is so short in stature that it is only with effort that he can get within hailing distance of the transmitter.



Kassino Posing at the Giant Phone

A telephone system, American throughout in equipment and providing a service equal to that of any city in the United States, has recently been installed in Bahia, Brazil, and is giving complete satisfaction to subscribers.

BRITISH LINEMAN OF EARLY DAYS

The telephone lineman of early days in England carried no tool case discernible to the casual observer, but it nevertheless was present — a part of his weird costume. The interior of his top hat was the receptacle for the tools of his trade. The picture herewith presented is reproduced from a portrait of a Birmingham lineman made during the first years of telephony in England.

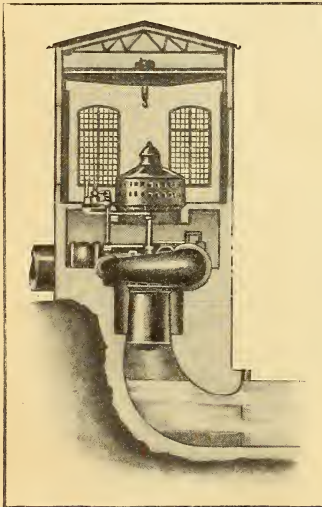
THE MODERN HYDRO-ELECTRIC PLANT

We are all familiar with the manner in which the old mill wheel of song and story takes from the water the energy to operate the mill, but modern electric plants such as Niagara, Keokuk, or the Cedar Rapids



COURTESY OF THE TELEPHONE ENGINEER

Tools were also Carried in the Stove-pipe Hat



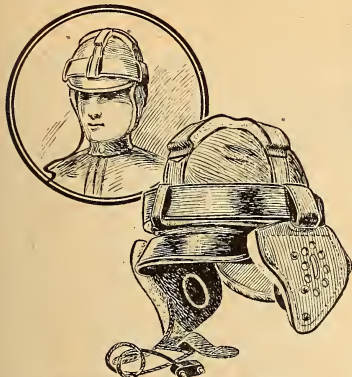
Scheme of the Modern Hydro-Electric Plant

manufacturing and Power Company where the largest units in the world are now being installed, are great works of hydro-electric engineering that cause us to ask how the water surrenders such enormous power.

The accompanying illustration offers some idea of the operation of a common type modern hydro-electric plant. Through strong steel pipes the water is led into the power house under the floor. Here is located a spiral metal casing, containing a water wheel upon a vertical shaft. The water traverses the spiral until its energy is spent in turning the wheel and then drops into the passage below and enters the tailrace.

Upon the same vertical shaft as the water wheel but above the floor is the armature of the huge generator which is enclosed in a heavy metal casing containing numerous openings for ventilation. Because of the great weight of the parts of these machines a traveling crane is usually installed overhead.

AVIATOR'S CAP FOR WIRELESS SIDE CARS FOR MOTORCYCLES

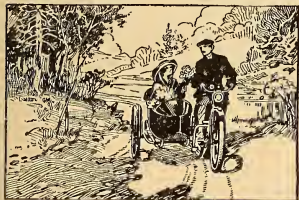


Aviator's Cap Containing Wireless Receiver

Wireless telegraph receiving instruments embody a telephone through which the clicks of the incoming messages represent the dots and dashes of the code. There has been much experimenting done in connection with the use of wireless instruments on aeroplanes and on account of the roar of the engine

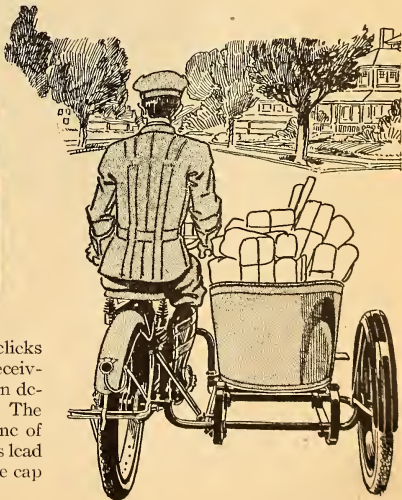
Since the motorcycle has become developed to the point of reliability, with a compact and powerful engine, it is natural that it should be put to more serious work than mere speeding. The result is the side car, a combined package and passenger carrier, which can be attached to any motorcycle. The unit thus secured is in fact a substantial three wheeled automobile, suitable for pleasure riding or for package delivery service.

The Rogers side car is 55 inches long and will carry as much in the way of packages as five market baskets filled to the brim; in weight it will carry 400 pounds. A delivery boy will walk only ten miles a day, a horse and wagon will make 20, but a motorcycle, with its side car full of packages, will make 65 miles a day. Consequently, the advantage of this mode of delivery to the small business concern is evident.



The Motorcycle Side Car is Adapted to Both Pleasure and Commercial Delivery Purposes

it is almost impossible to hear the clicks in the telephone receiver. A receiving cap or helmet has therefore been devised as shown in the drawing. The telephone receiver is embedded in one of the ear flaps and suitable connections lead out from it to the instruments. The cap is heavily padded.



Electrical Men of the Times

REAR ADMIRAL ROBERT S. GRIFFIN



PHOTO BY WALDON FAWCETT, WASH., D. C.

Rear Admiral Robert S. Griffin, the newly appointed Chief Engineer of the United States Navy, is clearly entitled to a prominent place in the gallery of electrical men of the times. Indeed, by virtue of his position as head of the Bureau of Steam Engineering of the Navy Department he will henceforth exert an influence in the electrical industry that will rival that of almost any of the practical electricians who have attained to positions of prominence in the commercial field.

The new engineer-in-chief is by no means unknown to electrical men of large interests. On the contrary, more than a dozen years of continuous service in the Engineering Bureau — most of that time as second in command — has brought him in touch with most of the electrical leaders of the period and he has also had intimate acquaintance with all phases of that electrical conquest which has revolutionized conditions in the American navy during the past decade.

And because the conquest by electricity

is not complete but is even now approaching its climax it may be said that Rear Admiral Griffin comes into his new position at a most significant juncture. In full sympathy with the idea of utilizing the magic current for every possible service aboard ship and in the big shops attached to United States Navy Yards, he will probably have more opportunity than any of his predecessors to demonstrate his faith in the Twentieth Century power. For one thing, the fact that Uncle Sam has taken to building some of his battleships in navy yards involves demands undreamed of a few years ago, for electrically driven machinery and for electric cranes, derricks, hoists, etc., for handling material.

Secondly, emphasizing the importance of the present in this relation, is the circumstance that Uncle Sam is just now completing the first large, electrically propelled, sea going vessel for naval use. If this innovation should prove successful it will be epoch marking. And Rear Admiral Griffin has every confidence in the outcome. Speaking of the project, recently, for POPULAR ELECTRICITY AND THE WORLD'S ADVANCE, the engineer-in-chief said: "Just now, we of the Navy are awaiting with the keenest interest the outcome of this practical trial of electrical propulsion. Whereas the undertaking is to some extent an experiment, we have strong faith in the outcome. Indeed, if we had not had such confidence we would not have sanctioned the plans of the electrical engineer whose ideas are embodied."

Rear Admiral Griffin has had a long and very active career in the engineering branch of the United States Navy. Appointed from Michigan, he entered the Naval Academy as a cadet engineer in 1874 and graduated four years later.

The new chief of the Bureau of Steam Engineering was during his sea service successively the chief engineer of such well known naval vessels as the "Bancroft," "Vicksburg," "Mayflower," "Dolphin," "Illinois," "Chicago," "Iowa" and

"Kearsarge." Throughout the Spanish War he served on the "Mayflower." During the time he was stationed on the flagship "Kearsarge" he acted as chief engineer of the North Atlantic Fleet. Since coming ashore in 1899 he has been identified in a prominent manner with the activities of the Bureau of Steam Engineering. During the last six years of the incumbency of Rear Admiral Melville and during the entire term of Rear Admiral Conoc, who recently retired as Chief of the Bureau, the position of assistant chief was held by the officer who now succeeds to the post of dictator of the Navy's policy as to machinery.

Among men in commercial life no less than on the part of naval officers the selection of Rear Admiral Griffin for his new position is recognized as a fitting reward of merit. Indeed, it is recounted that so well known is the ability of this officer that President Wilson made the appointment without having received so much as a single verbal endorsement or written plea in support of Rear Admiral Griffin's qualifications for the position — an almost unheard of condition in Washington, where political and social "pull" manifests itself on every hand.

Electrical interests could have no better friend at court than the newly chosen engineer-in-chief. Thoroughly progressive in his ideas, Rear Admiral Griffin not only recognizes that electricity is to supplant to a great extent every other form of power in use on shipboard, but he welcomes the invasion. Discussing the trend of the times in the Navy he remarked: "We are using electricity aboard ship very much more extensively than ever before and the use of electric power is being further extended every day. Both on the ships and in our shops on shore, motor driven machines are rapidly supplanting the belt driven, and the electric drive is particularly advantageous on shipboard, reducing, as it does, to a minimum the manifest problems presented when belts are employed." — WALDON FAWCETT.



Electrical Interests of Women



EDITED BY GRACE T. HADLEY

A Social Engineer

"I am under so many social obligations, I must give an affair soon," remarked Mrs. Fitzgerald, musingly.

"You're quite at liberty to do so," said her husband. "I believe your affairs are always successful."

"Yes, but really, you've no idea how difficult it is to do so at present."

"What is the particular difficulty? You just send out your cards, don't you and all of your delectable friends immediately respond and say how delighted they will be to come."

"Oh, yes, but several of my delectable friends are not on speaking terms just now and I can't very well invite one without inviting all, otherwise they will not be on speaking terms with me."

"I perceive the delicacy of the situation, but by dint of diplomacy, I daresay, you will get by it."

Mrs. Fitzgerald smiled and slept over the situation and in the morning, at the breakfast table, her beaming face betokened the fact that she had solved the problem.

"Did you dream a way out of the difficulty?" enquired Mr. Fitzgerald, as he finished the iced cantaloupe.

"Yes, I have solved the problem in this way," Mrs. Fitzgerald paused a moment while she poured the coffee from her new electric percolator. "I have decided to give a large card party. I will have auction bridge in the drawing room, bridge proper in the library and "five hundred" in the large living room upstairs. Mrs. Gellis who is an auction enthusiast, will play in the drawing

room; Mrs. Bent who sticks to stereotyped bridge will play in the library; while Mrs. Cale who has not yet advanced beyond five hundred will go upstairs."

"A neat arrangement and admirably planned," commented Mr. Fitzgerald, as he helped himself to a slice of nice crisp toast, hot from the electric toaster.

"Yes, but it grieves me that three of my friends should not be on good terms. I wish —"

"You wish something would happen to break up the discord and resolve it into harmony," completed Mr. Fitzgerald.

"That is it exactly," and his wife nodded brightly as he kissed her good-bye for the day.

Preparations for the party went on apace. Great bunches of graceful golden-rod brightened every nook. Palms and ferns adorned each corner. An atmosphere of festivity pervaded the house.

On the eventful day, the hostess, beautifully gowned, received her guests in the spacious reception room. Among the early arrivals was Mrs. Gellis.

"How do you do, Mrs. Gellis. I'm so glad to see you. Lay off your wrap in the adjoining room. Auction will be played in the drawing room."

Mrs. Gellis tall and majestic passed on after returning the cordial greeting and Mrs. Fitzgerald was very busy with the new arrivals.

"Ah, my dear Mrs. Bent, so glad to see you here. Bridge players will gather in the library. That's right, just give your wrap to the maid."

The next automobile brought Mrs.



The Beautiful Room Was Flooded With a Soft, Radiant Light

Cale and a party of three friends. Mrs. Cale was slight and dark but quick and active.

"So glad to see you, dear," murmured the hostess.

"Oh," bubbled Mrs. Cale, "I wouldn't miss one of your parties for anything. I always have such a good time."

When all the social butterflies had arrived, they fluttered into their places about the many small tables and there was a hum and a buzz of conversation, social greetings, felicitations and agreeable comments upon the arrangements. When the signal for the game was given, gloves were pushed back, bracelets and jewels adjusted to the best advantage and the card party was on in good earnest.

"You are quite devoted to the game, I understand," said a lady to Mrs. Gellis.

"I would rather play than eat," said Mrs. Gellis, as she gathered up her cards. "Auction offers a far greater scope for

individual enterprise than its older rival, bridge."

"You have the reckless optimism essential to auction bridge," laughed the lady. From the various tables the progressive calls began to be heard. From their own table came the compulsory call of the dealer; "One spade!" This merely said to the partner opposite: "I cannot make it no trumps and have no especially strong suit. My strength, if any is scattered." The second hand passed. The third hand called, "One heart!" while the fourth hand, Mrs. Gellis announced, "One no trump," with moderate strength in three or more suits; being well assisted by her partner, she scored two tricks.

"Well, that is a good beginning for us," chirped the partner, who was immensely pleased to play with Mrs. Gellis. "Two at no trumps and 30 for aces."

"But the heavy scoring in auction," remarked Mrs. Gellis with great wisdom, "is done above the line by defeating one's adversaries."

"Yes," put in the dealer briskly, "50 points for every trick under the contract, so that's why I ventured no risky declaration."

From a nearby table came the call: "I'll go a 'Lil.' "

"Oh, they're playing Royal Spades," cried the little lady opposite Mrs. Gellis, "shan't we?"

"By all means. I did not hear that we were to play Royal Spades. The Lily trick counts nine."

Mrs. Gellis' score gathered strength with each game and mounted bravely upwards until when refreshments were announced, it was somewhere up in 2,000; and she was correspondingly complacent.

The salad, sandwiches and coffee were served on the card tables which the maids had deftly covered with embroidered linen cloths and the erstwhile eager players relaxed now and enjoyed the good things set before them. Presently some one besought Mrs. Fitzgerald for a peep at her new dining room.

"Very well," laughed the hostess, "I may let you all look in, if you wish to."

"I understand," continued the lady, "that you had it newly decorated this fall and fitted up with everything electrical."

"Judge for yourselves," and Mrs. Fitzgerald threw back the curtains that concealed the doorway leading into the dining room.

Those nearest the doorway sprang up and entered the room with many admiring "Ahs!" and "Ohs!" and gurgles of delight. The card tables were soon deserted and the game forgotten. Mrs. Fitzgerald pressed a button and the beautiful room was flooded with a soft, radiant light from a semi-indirect luminous unit overhead. The dining room

dome had been eliminated. Wall brackets with frosted bulbs diffused the light principally in the horizontal plane. The sideboard contained an electric coffee percolator, electric chafing dish and electric samovar; on a small side table was an electric toaster stove; an electric fan adorned a post of the mantel while near it was an electric toaster.

The guests crowded about their hostess in their eagerness to hear what she had to say about the comfort and convenience of electric utensils. Other guests came in from the library and from the living room upstairs. They pushed up closer and closer; all the auction, bridge proper and five hundred players were hopelessly and indiscriminately mixed. Mrs. Bent found herself next to Mrs. Gellis while Mrs. Cale fluttered nearby; they fairly jostled elbows, but everyone was in a mellow mood and then the unexpected happened!

When Mr. Fitzgerald got home to a delayed dinner that evening, Mrs. Fitzgerald was quite eloquent about the matter.

"They forgot they were not on good terms and they spoke! They were so interested and perhaps I took quick advantage of their interest just then to bring them together, when I saw them all three directly in front of me. They admired the things electrical and I made haste to say: 'It is wonderful how electricity is bringing people closer and closer and binding them with the invisible band of good fellowship and common interests. The fundamental advantages of electricity are safety, adaptability, control and economy, but the binding of the various human units by that invisible current that lights our homes, heats our food and makes possible the good things that warm our hearts —'"

"My dear," interrupted Mr. Fitzgerald, mischievously, "you are undoubtedly a class A, social engineer!"



A HOME TELEPHONE SYSTEM

A home telephone system is a mighty useful thing for the modern housewife. Inter-phones are not toys. They are carefully made talking telephones for use in the home; an inter-phone system means sending your voice instead of yourself on your errands. Climbing the stairs again and again is an acknowledged hardship and there are many things that often need attention at the same time. Inter-phones are the solution of the stair climbing problem.

One, a hand set, by the bedside; another, a wall set in the kitchen, and no one has to walk a step. One by one the tradesmen appear at the back door and the cook must find out what is wanted. The tradesmen may even step to the wall phone in the kitchen and get their orders at first hand from the mistress of the house upstairs.

The inter-phone also provides a means of letting the cook know what is wanted for breakfast and there is no delay in getting it ready. An inter-phone in the kitchen and one in the children's sleeping room will make the morning call easy for all. When the hands of the clock show the rising hour, the maid in the kitchen presses the button and keeps on ringing until one of the youngsters has answered the call. Then to make sure that they have not slipped back into bed she calls again in a few minutes.



One of the best things about an inter-phone is that it is a great protection at night. Perhaps the father of the household has been detained in town or called out of the city. The wife is at home alone with the children. She sleeps fitfully as if conscious of the unprotected condition of the house. Should anything happen to disturb her, she can call the head gardener by means of the inter-phone, or rouse some of the help. A few sharp rings, a few hasty words and assistance is on the way.

Simplicity is the feature of these little private line telephones; to operate, it is only necessary to press the button, lift off the receiver and talk. When you talk over these practical little telephones, your message is received and answered at once. No time is wasted. No steps are needlessly taken.



THE ART OF BEAUTY CULTURE

How satisfactory it is to be admired at first glance! The keen, quick appreciation of beauty of face and figure appeals to every woman no matter what the race, clime or condition of civilization may be. Health gives lively, determined energy and the gifts of beauty assure favorable impressions at first sight; to make such a favorable impression is more and more the desire of women and they resort to such aids to beauty as will prove helpful.

Health and beauty go hand in hand and if one's personal appearance is not entirely attractive, by making some effort it is possible to improve one's self. Chief among the aids to beauty in the modern *salon de beaute* is electricity. Electric curlers are a great improvement over the old fashioned curling irons; vibrators, hair dryers, electric combs and other pieces of electrical apparatus play an important part in beauty culture.



A Beauty Boudoir in Siam

A complexion is admirable when it pleases like a beauteous flower; but to be charming, it does not have to resemble one flower alone. Race, climate, hair and eyes determine the color fitness. A rose-fair face is the supreme desire of the American woman, but there are tawny and copper toned skins suggesting other flowers that are often handsome according to the race.

The Siamese lady wears a *panung* like the men; this is a graceful garment of shot silk draped to look like loose knickerbockers, and a white tunic much adorned with frills and bows and jeweled brooches, with a sash across the tunic. Nothing covers her short black hair, but she is careful to protect her light complexion with a parasol and she carries a reticule

filled with the most amazing assortment of cosmetics. The Siamese girls are pretty little things in *panungs* and dainty, bcribboned chemisettes with their heads closely cropped except for a carefully tended top-knot. On festive occasions this is adorned with a wreath of flowers, or a chaplet of silver or gold work, for even the poorest households possess some valuable bits of jewelry. At about the age of eleven, this top-knot is cut off and the hair allowed to grow up short and bristly; it is then brushed straight up from the forehead.

A beauty boudoir in Siam includes a mirror made of solid copper with the reflecting surface highly polished. Various gold and silver boxes contain the cosmetics peculiar to the Orient.

BEAUTY BOUDOIR IN THE ASTOR HOME

THIRTY THOUSAND DOLLARS FOR A PRIVATE BEAUTY PARLOR!

Mrs. John Jacob Astor the young widow, who now owns the famous \$2,000,000 Astor home in Fifth Ave., New York, has just spent a small fortune on fitting up this palace of beauty which is a marvel of luxuriant elegance.

For making and installing the electrical apparatus Mrs. Astor paid \$15,000 alone, the rest of the money being expended in making this dainty little boudoir the most elaborate and complete room of its kind in the world.

Everything in the way of electrical beauty apparatus is right at hand in this room and in variety of equipment alone it is said to surpass anything in the possession of a private individual either here or abroad. The beauty room was fitted up under the personal direction of W. Gentry Shelton, who scoured the world to secure the latest devices.

The electrical beauty room is on the second floor of the Astor mansion and connects directly with Mrs. Astor's bedroom. The room is small, being only fifteen by fifteen, but a picture of luxury.

Beautiful white tile constitutes the flooring, this being covered with a magnificent oriental rug, in itself worth a small fortune. An exquisite mural painting by a famous artist looks down from the ceiling. Standing nine feet high around the walls are rich beveled mirrors with glittering gold empaneled borders. The electric lighting is indirect. Not a light can be seen in the room, but, hidden in the moulding numerous globes shine upward a soft pleasing light throughout the room which is further distributed by the reflection of the mirrors.

Every piece of electrical apparatus in the room is gold plated. The smaller toilet articles have mother of pearl handles with gold clasps.

In the center of the room stands a hairdresser's chair that can be set in any position either for sitting or reclining. It is of carved wood and inlaid with gold. Just above the chair, set in a gold-plated bracket, is a hair dryer, such as is used in the large hairdressing estab-

ishments. It is operated entirely by electricity which heats the air and operates the motor. It throws a large volume of hot or cold air and will dry a heavy head of hair in from three to five minutes.

At the other side of the room stands a pedestal electric vibrator for massage. The motor is held by four claws of a dragon. The current is regulated by a switch near the top of the pedestal. With this machine are also a massage cup and a vibro-hand attachment which can be connected with the vibrator and operated by its current.

There is an applicator of intense rapidity for the chest and shoulders, another of lesser degree for the arms and

one of extreme softness for the cheeks. On the last, powder or facial cream may be placed so as to rub a glow into the cheeks in such a way that the sharpest eye cannot tell it from the natural color that nature gives to those who take the air. These pieces are all gold plated, the pedestal vibrator occupying a conspicuous place in the room.

There is an electrical machine for face bleaching, an expensive set of electrical marcel irons and several aseptic sterilizing cabinets in which the articles are kept.

The smaller articles are in dainty boxes with blue silk lining made of the finest leather and clamped with gold. The box for the manicure set cost \$80.



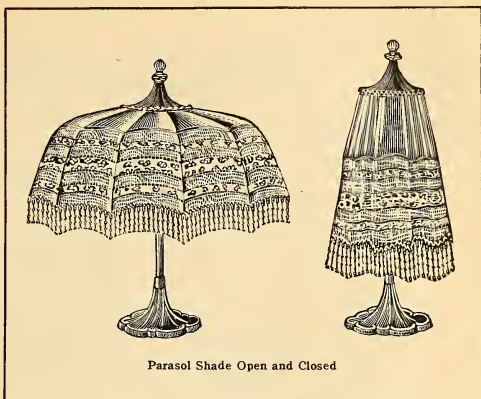
AN ACTRESS AND HER ELECTRIC BROUGHAM

Miss Maybelle Gorham, an actress at San Francisco, enjoys the electric brougham and finds it a delightful recreation after her strenuous professional duties to drive along the perfect roads that pass through sun tinted thickets of manzanita or down the slopes of forest bordered valleys.

Perhaps no vehicle meets with so much approval among women as the electric brougham. It is easy to drive and to control. The absolute simplicity of operation of the electric vehicle is one of its most important advantages.

LAMP WITH A PARASOL SHADE

An electric lamp with adjustable and folding features, opening and closing the same as a parasol, is the newest idea. Many novel features are incorporated in this lamp which make it one of the prettiest and most artistic devices of the season. The opening and closing feature alone makes it convenient to the housewife to place it anywhere and move it about without exertion. When a bright light is wanted the lamp is pushed up to its highest point and is lowered to suit the needs of those desiring a very soft, agreeable illumination.



Parasol Shade Open and Closed

The shade is of beautiful colored silk and cretonne designs in plain, flowered and Japanese fabrics. This shade may be taken off and put on by the housewife whenever she sees fit to change it. The bases are of brass in varied designs, also in mahogany finish, gilt and carved ivory finish. The shade works up and down the same as an umbrella.

ANOTHER USE FOR THE ELECTRIC FAN

Many women prefer to shampoo their hair at home but the process of drying it in a quick and satisfactory way has been a drawback. The electric fan offers a simple solution of the problem as illustrated.

About the best shampoo is composed of eggs, castile soap and a little salts of tartar. One or two eggs may be well beaten and rubbed into the scalp, then rub in a liquid soap, made by dissolving imported white castile soap in boiling water until it is thick as cream; wash off with warm water into which has been put enough salts of tartar to soften the water, about a large teaspoonful to two quarts of water; then rinse thoroughly with clear water.



The Electric Fan for Drying the Hair

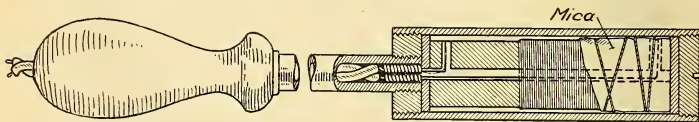


For Practical Electrical Workers

How to Make an Immersion Heater

The case must be watertight, and careful work is necessary to make good joints. Take a piece of brass pipe one inch inside diameter with $\frac{3}{32}$ inch walls and four inches long. Cut a fine brass thread inside each end for a distance of $\frac{3}{8}$ inch and $\frac{1}{4}$ inch respectively. Make a brass plug $\frac{3}{8}$ inch thick to fit in one end and through it drill a $\frac{3}{8}$ inch hole tapped for $\frac{1}{8}$ inch pipe. A piece of $\frac{1}{4}$ inch brass pipe outside, six inches

groove of the threads. Lead it out at the other end and back through the center hole. Splice on next to the element a piece of lamp cord, or better yet, use asbestos insulated heater cord. Make the splice by twisting the wires together and insulate them with a winding of asbestos string. Try 110 volts across these leads. The element should heat up to a dull red. Get some thin sheets of mica and wrap them around the



Homemade Immersion Heater

long, will serve for a handle. Cut a thread on one end, screw it up tight into the plug and the plug into the pipe. File or turn the plug so that it is flush with the pipe and then flow solder into the joints, heating it up well. Take off all the surplus solder and finish with a buff. This should leave a very narrow ring of solder in each joint, making a watertight job. There is no danger of the solder melting if the heater is kept in the liquid while the current is on. Make a brass plug of $\frac{1}{4}$ inch brass for the other end of the case and slot it with a hacksaw so that it can be screwed up tight.

The heating element can be wound on a base of any refractory material but the best plan is to get a thick piece of transite, or cement several thin pieces together, so that a short cylinder $\frac{7}{8}$ inch in diameter can be turned out. Set the lathe for 24 threads per inch and with a deep V tool cut a thread on the transite cylinder. Drill a $\frac{1}{8}$ inch hole through the center and cut off $3\frac{1}{8}$ inches long. Near each end drill a fine hole at right angles to the center one. Get 20 feet of No. 24 nichrome resistance wire. Lead about a foot through one of the holes and wind it in the

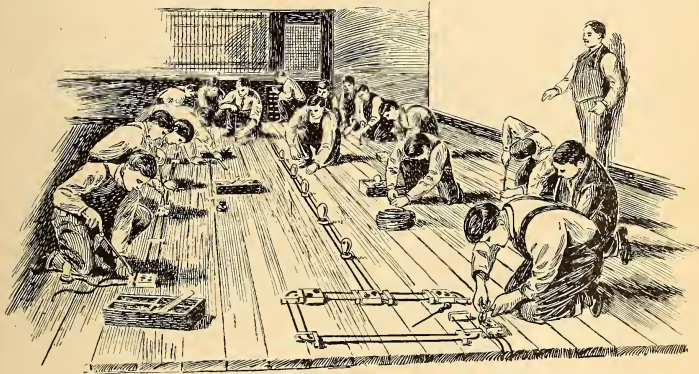
element, covering all the exposed wire. Tie the mica on with some thread. This will hold it until placed in the case, when the thread will burn off leaving the element insulated from the brass by the mica. Make a thick mica washer one inch in diameter with a $\frac{3}{8}$ inch hole at the center. Drop it into the case and then lead the connecting wires through the brass pipe pulling the element into place. If it rattles around, pack with asbestos fiber. Test carefully to see that there are no grounds to the case. Lay a mica disk on the exposed end of the element and screw in the plug. The drawing shows the arrangement of the various parts. Test again for grounds and if clear solder up the joint in this plug, take off the surplus solder and buff the whole thing up. If possible, get the case nickel plated, for this finish can be kept clean very easily. Turn up a short wooden handle of any desired shape, and drill a hole through it. Lead the lamp cord through this hole, and force the handle onto the small pipe. An attachment plug on the cord completes the heater. Be careful in using it that it is always immersed while the current is on.

GETTING PRACTICE ALONG WITH THEORY

The accompanying photograph shows a group of students of a well known school learning the details of open cleat wiring. Instead of placing the wires on the ceiling, the floor serves as well, the details of the installation being just the same and studied with somewhat less physical exertion.

The young man who seeks training in electrical construction to-day will find that almost

changes as soon as it is exposed to the potential difference of the circuit. It will shorten and become wider on the lower end, following the changing of the potential differences instantaneously. This property can be used in transmitting signs according to the Morse code by working the key accordingly. By means of a very thin wire of .004 inches diameter, a distance of about ten miles may be worked over. With such a small wire no bell or lamp would work. The flame on the receiving station will reproduce



Using Floor Instead of Ceiling for Practice Work

any credited institution to which he may apply will put him through a regular course based upon: "Learn to do by doing."

EXPERIMENTS WITH FLAME

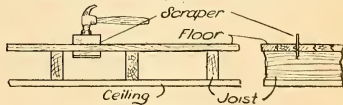
A very convenient and simple method for the determination of the positive and negative pole of a direct current line is the following: The flame of a candle or of some other source is brought between the terminal conductors of the line; the flame will close the circuit and on the negative pole a tree shaped deposit of pure carbon will appear which will grow until a bridge to the positive pole is formed. The voltage must be at least twelve volts but there is no upper limit.

Another interesting phenomenon of flame may be utilized in order to establish a very cheap telegraph line. If we arrange the conductors and the flame stationary, providing a key or a switch for cutting in and out the circuit, we will observe that the slender shape of the flame

exactly the same distortions of the shape so that it is easy to read the signals.

TAKING UP FLOOR BOARDS

The tool advantageously used is an ordinary carpenter's scraper, one edge of which is ground or filed to a cutting edge. The tongues are cut by driving the knife edge of the scraper down in the cracks between adjacent floor boards.



Cutting Tongues off Floor Boards

method has the advantage that it leaves no marks on the surface of the floor. The tongues on both sides of the floor board to be taken up should be cut and the cutting should extend a foot or so past the point at which the floor board is to be cut off.

GEO. V. JEROME.

Elementary Electricity for Practical Workers

By W. T. RYAN

CHAPTER VI.—ELECTRICAL CIRCUITS

There are in general two kinds of electrical circuits, multiple or parallel circuits and series circuits. A multiple circuit is one that is branched so that the current divides into two or more parts. Fig. 14 shows such a circuit.

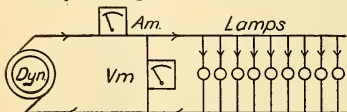


Fig. 14. Multiple Circuit

A series circuit is one consisting of several parts connected "in series" or in a row so that the same current passes through each part one after the other. Fig. 15 illustrates such a circuit.

Fig. 16 illustrates "series multiple" and "multiple series" circuits. The former may be thought of as a series of multiple circuits and the latter as a multiple of series circuits.

Practically all indoor wiring and to a certain extent outdoor wiring is regulated by the rules

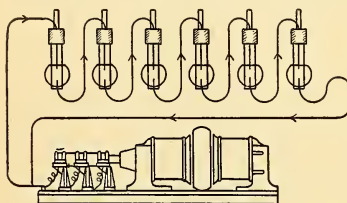


Fig. 15. Series Arc Lamp System

of the National Board of Fire Underwriters, known as the National Electrical Code. This chapter will be limited to a discussion of systems of distributing electric power.

MULTIPLE SYSTEMS OF DISTRIBUTION

The first Edison commercial station to be operated in this country was that at Appleton, Wisconsin, but its only serious claim to notice is that it was the initial one of the system driven by water power. It went into service August 15, 1882, about three weeks before the

New York City plant at 257 Pearl Street. This latter station included four boilers with a total capacity of 1,000 horsepower and six engines driving six dynamos. The district supplied was about a square mile in extent.

On November 3, 1911, the most powerful generating unit in the world (since duplicated several times) was placed in operation at the Waterside station of this same New York Edison Company. The unit consists of a 30,000 horsepower Curtis vertical turbine driving a 20,000 kilowatt General Electric Company, turbo-generator. This unit takes up less floor space than the six engines and dynamos aggregating



Fig. 16. Series Multiple Circuit—Multiple Series Circuit

gating 1,000 horsepower which were originally used.

The first voltage used was fixed at about 110 by the inherent nature of the carbon incandescent lamp filament, which in the early stages of its development could not be made to give sixteen candlepower at much more than 110 volts without very greatly reducing the life of the lamp.

The unusually large quantity of copper required to deliver electricity in any quantity at the distances required led Edison to devise the three wire system of distribution.

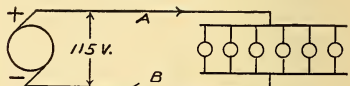


Fig. 17. Single Dynamo and Load

Fig. 17 shows a number of lamps supplied through the mains (A) and (B) by one 115 volt dynamo. Fig. 18 shows the same six lamps supplied by two 115 volt dynamos in series.

Fig. 19 is the same as Fig. 18 except that the main (C) has been added. The arrangement shown in Fig. 19 is known as the three wire system of distribution.

Suppose each one of the lamps shown in Figs. 17, 18, and 19 to take one ampere. In Fig. 17, the current in the mains (A) and (B) is six amperes, whereas in Fig. 18 it is only three amperes. If the voltage at the lamps is to be 110, the voltage drop per main in Fig. 17 would be 2.5 volts, whereas in Fig. 18 if there is to be 220

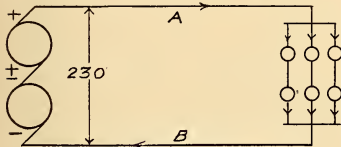


Fig. 18. Two Wire 230 Volt System

volts for each group of two lamps, in series, (110 volts for each), the voltage drop per main would be five volts. With one-half the current and twice the voltage drop, from Ohm's law it follows that the resistance of the mains may be four times as great. Therefore, for a given voltage drop in the mains only one-fourth as much copper is required.

The disadvantage of the arrangement shown in Fig. 18 is that we cannot turn off or on one lamp without turning off or on two lamps at the same time. With the arrangement shown in Fig. 19 we can switch on and off single lamps at will. If we have more current in the main (A) than in (B), or vice versa, the main (C) will carry the difference. If the lamps in the (A)-set and in the (B)-set are judiciously placed, we can allow the customers absolute freedom in turning on and off their individual lights and still have practically the same number in each set at all

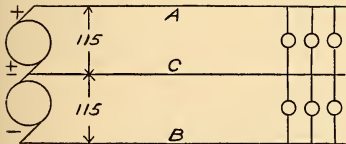


Fig. 19. Three Wire System of Distribution

times. Since the main (C) carries only the unbalanced load it is usually of only one-half the cross-section of (A) or (B). Since (A) and (B) are one-fourth the cross-section as compared to the two wire system and (C) adds another one-fourth of one-fourth, it follows that the three wire system of distribution requires only 31.25 per cent as much copper as the two wire system. This very great saving of copper has

led to its general adoption for low voltage distribution systems.

The adaptability of the direct current motor to variable speed work, as for example, elevators and printing presses, and the possibility of using the storage battery as a reserve in case of emergency have led to a rather extensive use of direct current systems in the congested parts of most large cities.

The excessive amount of copper required to extend low voltage over a large area soon led electrical engineers to turn their attention to the development of alternating current systems, and the use of higher voltages with transformers. The first alternating current central station in the United States was put into operation some time during the year 1886 at Greensburg, Pa. by the Westinghouse Electric Company. This plant was operated at 1,100 volts, 133 cycles, single phase. Single phase motors were not satisfactory, excepting possibly the very small

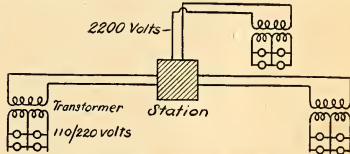


Fig. 20. Single Phase System

sizes. In 1888 Westinghouse began developing Nikola Tesla's polyphase induction motor and his polyphase distribution system. The two and three phase induction motors were self-starting, very rugged in character and less expensive to maintain than direct current motors. It was evident by this time that 1,100 volts was rather low so it was decided to make 2,200 volts the standard for transmission. Both induction motors and arc lamps were found to be much more satisfactory at 60 cycles than at 133 cycles. The two phase system was selected because it was considered easier to balance two phases than three. Therefore, for some years, two phase, 2,200 volts, 60 cycles, was standard. As distances increased the voltages increased next to 4,400, then 6,600, then 9,000, then 13,200, etc., finally reaching 150,000 in 1912.

SINGLE PHASE CIRCUITS

In single phase alternating current systems, Fig. 20, electric power is generated usually at a high voltage and then reduced by transformers to the voltage at which it is desired for use, and then distributed on the three wire plan.

This system is not suited to cities where there is very much power load to be served as single phase motors do not compare favorably with polyphase motors for general power work. It is used to some extent where the greater part

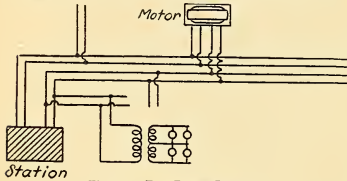


Fig. 21. Two Phase System

of the load is lighting with only a small demand for power.

TWO PHASE CIRCUITS

The generator delivers two separate currents, one of which is 90 degrees out of phase with the other. Four wires are required, Fig. 21, unless the special arrangement known as the two phase three wire system is used. The lighting load is balanced on the two phases, each phase being a complete single phase system in itself.

Where a two phase induction motor is to be supplied, current is supplied one of the two windings on the stator of the motor from one phase and is supplied to the other winding from the second phase. This produces a torque which makes the motor self-starting. Current for power purposes is available only where the four

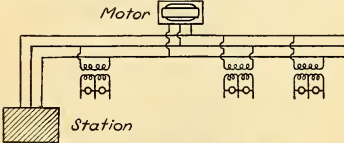


Fig. 22. Three Phase Three Wire System

wires are carried along together; also a two phase motor requires two transformers and four wires, whereas the single phase motor requires only two wires and one transformer. Customers having small motors, say three horsepower or lower, are usually required to provide single phase motors on account of the extra cost of supplying them with two phase current.

The three phase system of distribution Fig. 22, has all the advantages of two phase for power purposes and in addition makes a saving of 25 per cent in the high voltage distribution feeders as compared with single phase or two phase.

The three phase four wire system, first used in Chicago in 1898, is illustrated by Fig. 23.

The voltage between the outside wires is 3,800 and between the neutral and any one of the three outside is $3,800 \div 1.73 = 2,200$ volts. Standard single phase 2,200 volt transformers are used for lighting purpose and are connected between the neutral and outside wires. The power load is taken from the outside wires.

SERIES SYSTEMS OF DISTRIBUTION

The large areas covered by street lighting circuits led to the adoption of the series system for street lighting. The first arc lamps required direct current for their satisfactory operation, therefore special constant current variable voltage direct current generators equipped with automatic regulators were developed. The Brush arc-light generator and the Thomson-

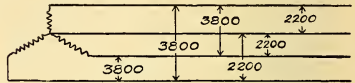


Fig. 23. Three Phase Four Wire System

Houston dynamo were the two principal types.

From about 1895 on, the use of alternating current for series arc lighting was developed to such an extent that many of the special direct current generators were replaced by constant current alternating equipment.

A series arc lighting circuit is usually laid out so as to use as small a length of conductor as possible and yet provide a sufficient number of test points in order to locate breaks more easily. The circuit may be laid out on the open loop plan as shown in Fig. 24(a) or the parallel loop system as shown in Fig. 24(b). The open loop system obviously uses much less wire than the parallel loop system, but in case of a break there is no opportunity to make jumper connections at various points. With the parallel loop system the lamps on any one of

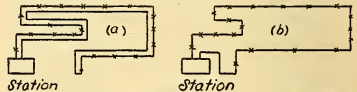


Fig. 24. (a) Parallel Loop System. (b) Open Loop System

various loops can be cut out by simply short circuiting that portion of the loop, whereas in the open loop system a break any place in the line means the disabling of the whole circuit.

(To be continued).

CLEANING METERS WITH TOOTHBRUSHES

When the flood receded at Dayton, Ohio, the Dayton Power and Light Company proceeded to clean up and put into condition something

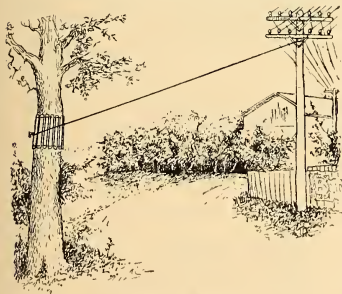


Scrubbing Meter Parts with Toothbrushes

over 4,000 meters. The water had carried into the delicate parts of the meters fine mud and silt. As the meters were brought in, the hose was turned on the parts after the cover was removed, the meters were then dried and a more thorough scrubbing given the parts with toothbrushes and water to remove the rest of the mud.

GUYING TELEPHONE POLES TO TREES

Illustrated is a method of guying telephone poles to trees where possible instead of setting anchors or guy stubs. This method is preferable, under certain conditions, to guy stubs and



Tree for Guy Stub

anchors, as the guy wire is high enough to prevent persons from walking into it in the dark or its

catching the top of a load of hay. This style of construction is used far oftener in the country than in the city but you can readily appreciate the fact that a good, sound, live tree will naturally makes a better and safer anchor than will a piece of dead timber planted in the ground or a piece of a pole planted so as to rot off at the ground line.

LIGHTING THE SHAVING MIRROR

But why ruin your chances for Paradise by shaving by the old mirror and one light.

Take an ordinary mirror and mount on it a number of porcelain receptacles in which are to be inserted miniature incandescent lamps such as are used for Christmas tree or automobile lighting. These lamps can be bought at electrical supply stores and are made for various voltages.

The lamps should be wired in series as shown; that is, the wire from one side of the supply



circuit goes to the first lamp terminal, from the second terminal of that lamp to the first terminal of the next, and so on around, connecting finally to the other side of the supply circuit. The number of lamps required will be the number of volts in the main circuit divided by the rated voltage of one lamp. Suppose, for instance, the circuit voltage is 110 to 112 volts (the usual lighting practice) and your lamps are marked seven volts; the number required would be sixteen. If you use more lamps they will not glow or if you use less they will burn too brightly and perhaps burn out.

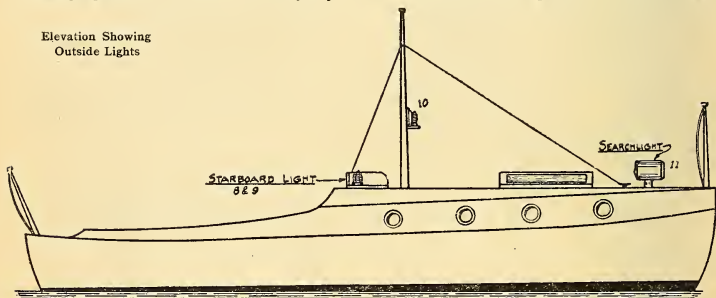
Motor Boat Lighting with Dry Batteries

The lighting of a motor boat depends upon the type of boat in which it is desired to install lights. Large boats used frequently and at night are mostly equipped with a generator and storage battery set, while small, open and cabin boats require only the regulation sailing and necessary lights in the cabin. As the majority of

to do the wiring with No. 16 rubber covered wire. It is advisable to enclose the batteries in a locker or box. It is not well to pour molten wax or tar around batteries as the heat lowers the efficiency of the cells.

The drawings show the arrangement of the interior and exterior lights and the switchboard

Elevation Showing Outside Lights

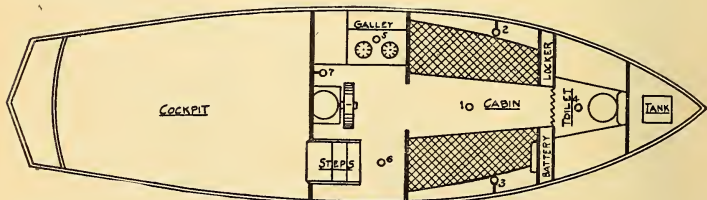


these boats are seldom used after dark, they may be well lighted with dry batteries. This article has to do with the requirements of those who own small boats which are used occasionally and seldom after dark. In this case dry battery lighting would be the most advantageous.

The lighting system is shown installed on a

and wiring diagrams. Of course nearly all boats differ in construction and the drawings used are merely to illustrate a good combination.

The following list of lights used with this set is given below with the approximate candle-power and amperage, the numbers corresponding with those on the drawings:



Plan Locating Inside Lights

common type of cabin boat of Class 2, under 28 feet. Electric lights are not only cleaner, better and more convenient than oil, but they also reduce the fire risk to a minimum.

For boats of this size the length of distributing wire makes no material difference, and six volts pressure is satisfactory. It is best to use four sets of five cells connected in multiple series in connection with tungsten automobile lamps and

Nos. 1, 4, 5, and 6	2 1/4 C. P.	.25 Ampere.
" 2, 3 and 7	5 "	.75 "
" 8, 9 and 10	5 "	.75 "
" 11	24 "	3.50 "

Lights Nos. 2 and 3 are screwed into wall brackets over the seats and are used for reading, etc. Lights Nos. 1, 4, 5 and 6 are screwed into sockets in the ceiling. Light No. 7 is attached to a flexible cord and is used around the engine.

The sailing lights are: mast light, No. 10; port and starboard lights, Nos. 8 and 9; searchlight,

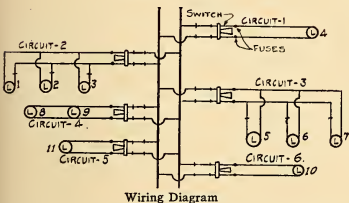


but as it is seldom used and then only for short intervals, the drain on the batteries will not be heavy. The regulation lights Nos. 8, 9 and 10 will be used the most as they must be lighted after sundown.

The diagram shows a method of connecting batteries and the different circuits to the switchboard. The batteries are connected to a double pole, double throw switch and fuses of a capacity equal to the sum of the amperages of all the circuits. Six circuits run from the switchboard and should be equipped with switches and fuses of correct capacity. Circuits Nos. 1, 4, 5 and 6 are all controlled directly from the switchboard. Circuits Nos. 2 and 3 are controlled at the switchboard and at the lights.

The writer does not advise the operation of the engine ignition from the lighting set. There should be a separate set for that in order to secure satisfactory operation.

The lights described are usually furnished with candelabra or Ediswan bases, but the ordinary 110 volt socket can be used in connection with reducing adapters.

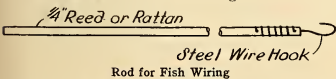


No. 11. The searchlight takes the highest amperage as the candlepower is necessarily large,

RATTAN ROD FOR FISH WIRING

A useful tool for fish wiring can be constructed as suggested in the illustration. A hook of steel wire is made at the end of a length of rattan or

each. In attaching to the binding post of a cell the springs are pressed together so that the hole in each ring easily slips on the post. As soon as pressure is released from the springs they tend to separate and make a firm connection even without the thumb nut.



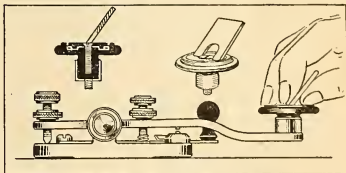
reed such as is used by furniture makers for weaving furniture. The reed may be eight to twelve feet long and because of its tendency always to lay straight can be used in many cases where no other sort of a fishing device is satisfactory.

PRACTICAL BATTERY CELL CONNECTOR

IMPROVED TELEGRAPH KEY KNOB

An improvement in the telegraph key knob is here presented. A finger clip is rigidly attached to a small, round plate screwed into the top of the knob. By loosening a screw in the plate, the finger clip can be set at any angle to suit the

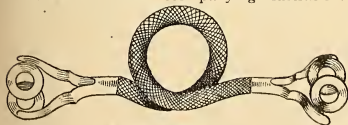
A practical connector for joining cells of batteries is shown in the accompanying illustration.



Telegraph Key with Improved Knob

operator and then held by tightening the screw. The main body of the knob is of rubber.

The claim of the inventor and patentee, H. C. Dauphinas, Fargo, N. D., is that the use of the clip takes away the physical strain due to sending with a key having a flat knob.



Battery Cell Connector

Each end of a six inch flexible cord is tipped by a split spring with a circular copper ring on



WIRELESS TELEGRAPHY IN THE BALKAN WAR

Wireless telegraphy played an important part in the Balkan War. Illustrated here are two portable military stations of one half kilowatt capacity which were supplied by the Telefunken Company to the Bulgarian army. Official tests were made of each equipment. The first test was made between the towns of Mustaphapasha,

and Skobelovo, which are 50 miles apart and in spite of bad weather conditions, which are evident in two of the pictures, the tests were satisfactory. In a second test, a distance of 81 miles was covered, telegrams being sent at the rate of fifteen words per minute, a wave length of 600 meters being employed.



(1) Greek Marine Station at Salonica. (2) Portable Station near Mustaphapasha. (3) Testing Bulgarian Equipment. (4) Manner of Transporting Sets.

POPULARIZING WIRELESS AMONG NEW ENGLAND BOYS

Interest in wireless telegraphy among the boys of New England has been greatly stimulated during the last few months by the formation of the Amateur Wireless Association of New England under the auspices of the Marconi Wireless Telegraph Company of America and William Filene's Sons Company, of Boston, Mass. Probably no other large center of population in this country has so many youthful followers of the art of radio signaling as the Boston district, and the purpose of the new organization to encourage practical work and research in this fascinating field has been so much appreciated that no less than 250 active members are now enrolled, of which 20 per cent hold government licenses as radio operators and 50 per cent have made application for the coveted certificates.

When the Filene building was completed last summer, a five kilowatt Marconi service station with a working radius of about 500 miles was installed upon the roof, the aerial being carried between two steel towers 125 feet high and 250 feet apart. This station was constructed and is operated under governmental supervision and is open 24 hours per day, handling commercial and private messages between incoming and outgoing steamships and the shore, bulletins* of shipping conditions, weather and other information being posted daily in the Filene store for the benefit of customers.

In and around Boston are nearly 600 radio stations which have been built by boys and young men, and at scattered points in New England there are at least 100 more. All these stations are restricted in the matter of sending, but are in close touch with the work of the large governmental and commercial plants on the New England coast and elsewhere. To bring these operators together and encourage the existing widespread interest in the subject of radio communication, it was decided to establish headquarters at the Filene store and the outcome was the formation of the association.

In the latter part of March, the Filene company sent a circular to every accredited amateur wireless operator in New England, announcing that between the hours of 10 A. M. and 12 noon a message would be sent from the radio station on top of the building addressed to all the amateur stations in New England for which government licenses have been received or asked. To every owner of a radio station in New England taking

the message and sending it to the store in written form within ten days a reward was given in the shape of Commander S. S. Robison's Manual of Wireless Telegraphy, for the use of naval electricians. Two hundred and fifty of these books were given away, the message being correctly received at the rate of twelve to fifteen words per minute from points as distant as Great Barrington, Mass., and Bangor, Maine, the signals being deciphered at stations operated by amateurs living more than 250 miles from Boston. The message invited its recipients to submit it complete to the Filene company and to receive the reward above mentioned. The first message was brought in within 30 minutes by H. N. Hammett of Roxbury.

About this time a sub-wireless station was installed on the second floor of the store, with a full complement of apparatus as used on a transatlantic liner, and with telephonic connection with the main station on the roof. This was done to provide the most convenient possible means of illustrating the equipment used in important service.

The headquarters of the Marconi company in Boston are now located at this point, and besides the apparatus displayed, accommodations are provided in the line of technical and popular reading matter including both books and periodicals of wireless interest. A large map of the United States showing by black dots the location of naval stations and by red dots the location of commercial stations is also available.

Soon after the sending out of the Filene message, lectures were given daily for a fortnight on wireless telegraphy, by men versed in the art, at the sub-station on the second floor of the Filene building. These were largely attended and led to a trip to the Boston Navy Yard, where the latest governmental apparatus was inspected, both ashore and afloat. Eighty-five boys from 29 different towns around Boston were present, and all were actively interested experimenters in wireless, each being the possessor of some apparatus and none buying complete equipment, all making their own so far as possible. Within a week the Association was formally organized, a pair of head telephones being offered for the best name, through the Filene company. The winners, each of whom suggested the name adopted, were Messrs. A. S. Boutillier of Roxbury, Mass., and H. Quinlan of Somerville, Mass.

Except in the summer, bi-weekly meetings are held, the general practice being to dismantle aerials during the hot weather on account of

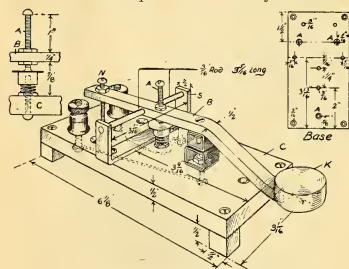
lightning storms. The age of the members ranges from twelve years up. At the meetings lectures and discussions on wireless form the program and interest is so intense that the boys fairly have to be driven out of the store at closing time.

The officers of the Association are, president, Harold J. Power, of Everett, Mass., a Tufts College senior who is serving this summer as chief operator of J. Pierpont Morgan's yacht "Corsair;" and secretary and treasurer, L. E. Webb, Brookline, Mass.

WIRELESS TELEGRAPH KEY

The key described may be used up to $\frac{1}{2}$ kw. or possibly more. It is of large size and may be easily constructed.

First, procure a base $\frac{1}{2}$ by $3\frac{1}{8}$ by $6\frac{1}{8}$ inches of black fiber and polish it with very fine sand-



Wireless Telegraph Key

paper. Then drill $\frac{3}{16}$ inch holes at the corners. These are for the screws to hold the small, fiber, block legs. Altogether thirteen holes should be drilled in the base as shown on the plan. Reference to the sketch of the entire key will make plain what these are for.

Suitable countersunk holes (A) of the size to fit your screws may be drilled in the base for fastening the key to the table. The support (S) is made from a brass bar $\frac{1}{2}$ by $\frac{1}{2}$ by 5 inches. This bar and also the lever may be purchased at a hardware store. Two $\frac{1}{4}$ inch holes are drilled in (S) almost at the extreme ends for the shaft supporting the key. One inch from each end a straight line is drawn across and the bar bent at right angles on these lines.

The key (B) is of brass $\frac{1}{4}$ by $\frac{1}{2}$ by 7 inches. A hole for an $\frac{8}{32}$ inch machine screw is drilled $\frac{3}{4}$ inch from the end. Another one $2\frac{3}{4}$ inches from the end is also drilled for (A). A $\frac{1}{8}$ inch

hole is drilled four inches from the end and countersunk to fit the head of a flat head machine screw snugly. The key shaft passes through a $\frac{1}{4}$ inch hole in the key and is secured to the key by soldering. The bend in the key is made $4\frac{1}{4}$ inches from the end between the binding posts. The contacts are two pieces of copper $\frac{1}{8}$ by $\frac{1}{2}$ by 2 inches. Bend each as indicated until you have a square, the two ends overlapping each other. Now drill a $\frac{3}{16}$ inch hole in the center of the overlapped ends. One of these contacts is mounted by a $\frac{3}{4}$ inch machine screw and nut to the base. The other is fastened to the key by a $\frac{3}{4}$ inch flat head screw.

The fiber knob (K) is secured to the key by a $\frac{3}{4}$ inch threaded rod screwed into the fiber and then turned into a tapped hole in the end of the key. The key spring is coiled and inserted under a $\frac{1}{2}$ inch tube having a circular, brass-sheeting cover which is soldered to the machine screw (A) after it is placed in the key. (N) is the adjustment screw. Binding post connections under the base are shown.—HARRY HONG SLING.

WIRELESS ON ROBINSON CRUSOE'S ISLAND

The government of Chile has erected a powerful wireless station on the island of Juan Fernandez, the scene of the adventures of Robinson Crusoe.

This island, which is situated some 300 miles west of the mainland, is of considerable importance to the government of Chile as a base for naval maneuvers. The Telefunken system is used and the station is in communication with Valparaiso at all times.

STEFANSSON'S WIRELESS PLANS

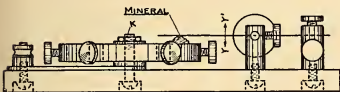
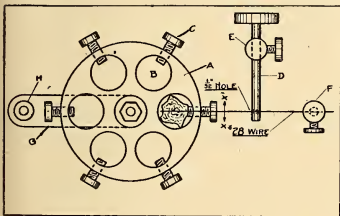
When Vilhjalm Stefansson, the discoverer of the White Eskimos, set forth from Esquimaux in June with the most elaborately equipped Arctic expedition that has yet put north for scientific research, he bade farewell to civilization for four years—except by wireless. It is Commander Stefansson's intention to keep up daily communication with the world for the first two years of his absence by utilizing the Alaskan wireless stations. After the two years are up, he will find himself too far out of range of any station and until he emerges from the silence of the ice fields the world will have no means of telling what success and what tragedies have been encountered. The Canadian government supplies the funds for Stefansson's expedition.

"CAT WHISKER" DETECTOR

For all around service the universal or "cat whisker" gives good satisfaction, owing to the ease of adjustment and good results obtained. As shown in the accompanying drawings, the pieces of minerals are held in the revolving cup (A) which has the six holes (B) drilled in it. The small screws (C) are used to clamp the minerals in (A). The binding post (F) holds one end of the brass wire which in turn passes through the small hole in the end of (D). (D) is the adjusting rod which is held in the post (E) and can be clamped with the small set screw.

By moving (D) the wire can be moved in any direction such as (XX') and (YY') thus reaching any point on the mineral.

The cup (A) is made of brass or copper, $\frac{1}{4}$ inch thick and two inches in diameter. The holes (B) are $\frac{1}{2}$ inch in diameter. The brass screw (K) holds (A) to the base so that it can turn. (G) is a brass strap $\frac{1}{16}$ inch thick and $\frac{3}{8}$ inch



Plan and Elevation of Detector

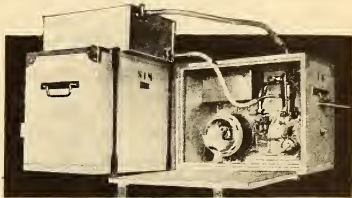
wide, and connects (A) to the binding post (H). This strap is not necessary as the connection can be made with wire under the base. Electrical connections are made with (H) and (F).

Polish all parts or nickel plate and mount upon a suitable base, preferably of hard rubber. Silicon, copper and iron pyrites, and galena are minerals best suited to this detector.

The Naval Radio Station at Newport states that it recently received wireless signals that were being exchanged between two stations in the Argentine Republic. This means a transmission of over 6,000 miles.

MUSICAL NOTE WIRELESS EQUIPMENT

Wireless telegraphy methods in which the incoming waves have the effect of a musical note are now recognized as offering an advantage in clearness of receiving by the telephone. Such apparatus, however, is not easy to construct when it comes to making up a light and portable set, such as is required for military use upon



Portable Musical Note Set

aeroplanes or airships, or for mule back army outfits. The Paris engineer, H. Magunna, and Prof. Mercadier of vibratory multiplex telegraph field fame, now use an ingenious method for musical wireless.

It is well known that a tuning fork can interrupt the current by a contact with its prong so that the current which it produces is of a pulsatory movement like the fork itself. Direct current from a battery is thus transformed to pulsatory or "musical" current, and when this is fed into the induction coil of the wireless apparatus, there are produced waves upon what is known as the musical system. The inventor keeps the tuning fork in vibration, not by an electro-magnet, but by simply using a "bow" formed of a belt stretched between two pulleys and running upon the sharp corner of the tuning fork end, so that the effect is the same as drawing a violin bow across the fork. The belt is run by a small electric motor and against the prong of the fork is an electric contact, so that the current is interrupted very regularly by the fork's vibration. The set is well arranged for portable purposes. One box contains a compact gasoline engine and dynamo set, and a second one holds a large water box for cooling the engine. Another case holds the electric motor driven belt apparatus and tuning fork, induction coil and the like, while the receiving set occupies a fourth box, the folding mast being carried as a separate load. For aeroplanes, the regular motor serves to drive the dynamo.



On Polyphase Subjects

NOW FOR YOUR CANDID OPINION

POPULAR ELECTRICITY AND THE WORLD'S ADVANCE: frankly now, what is your opinion of the new name, the new cover and, above all, the contents of the magazine?

To many of you this is your favorite magazine, the first one no doubt to bring to you "plain English" information concerning that all absorbing topic, Electricity. How about it? Have the additions which we have made in this present issue, and which are outside of the electrical field, impaired the value and interest of the publication in your estimation? Or do you still find within its pages the kind and amount of electrical reading that you want, plus other features of just as much interest?

Other readers are probably occasional buyers of the magazine from the news-stands and still others are reading it this month for the first time. To all of you we wish to say, as we remarked in the August number, the things which help wonderfully in that pleasant form of indoor recreation known as editing, are the opinions, criticisms and suggestions of the reader. For months we have been planning and working over this issue and now it is "up to you" to tell us frankly what you think of it. If your letter contains adverse criticism we shall assimilate it and profit by it, particularly if such criticism be of the constructive order. On the other hand, if you find things to commend, we are not such modest, shrinking violets that we will not thrill at your words.

We propose, primarily, to give you first-hand, up-to-the-minute information concerning the science and applications of electricity. In addition to this the departments for practical workers and the wireless enthusiasts will appeal to those of a constructive turn, who have progressed in the art sufficiently so that a watt means something and who are not afraid of the simplest forms of mathematics — but all elementary.

Besides this, we have let down the bars to the subject of moving pictures, which constitute one of the "big" developments of the world to-day. In presenting a film "story" or two each month we are catering to a very widely developed taste among patrons of the moving picture theaters. In presenting some of the "inside" workings of the craft and some of the personal chat about the actors and their goings and comings, we appeal to a larger class perhaps. Should the stories be continued or should the whole department be devoted to matters of general interest concerning films?

And finally, a word about that great educator — the camera. In this issue and others to follow, we ask you to look at the world through its polished lens. We will present to you a gallery of special pictures every month — 30 to 40 in number — from this and foreign countries. These are altogether apart from the scores of other illustrations in connection with the regular reading pages and we propose in every issue to have them just as diversified and full of interest as can be secured anywhere.

Such, in brief, are the specifications we have laid down for ourselves for the production of the magazine. Do you think we have lived up to the specifications, and if so, do they suit you? We hope so. But if not, specifications were never made that could not be altered if both parties agreed. Let us know — it's your magazine.



Short Circuits

A man in a deep state of mental confusion was shouting and kicking vigorously at an electric lamp post, when the noise attracted a near-by policeman.

"What's the matter?" he asked the energetic one.

"Oh, never mind, mishter. Thash all right," was the reply. "I know she'sh home all right, I shee a light upstairs."

* * *

A small boy handed in the following on an examination paper in United States history:

"General Braddock was killed in the Revolutionary War. He had three horses shot under him and a fourth went through his clothes."

* * *

First Tramp—Did you know, Bill, that I had noble blood in my veins?

Second Tramp—Well, I knew it was either that or the hook worm that ailed you.

* * *

Man in Auto—Will you marry me, Lucille?

Girl at Side—No, Charles; this isn't the make or priced car I could ride in as a wife.

* * *

"Tommy," the schoolma'am asked, "why are you scratching your head?"

"'Cause nobody else knows just where it itches."

* * *

The teacher was hearing the class in arithmetic. One of the pupils, a rather stupid boy, watched the figures on the blackboard with a great deal of interest, much to the teacher's satisfaction. The teacher did several sums on the board especially for this pupil and as he erased the last figure he turned to the boy:

"Well, Andrew, do you understand those examples that I have just been doing?"

"No sir," replied the boy, "but I would like to ask a question about them."

"What is it Andrew?"

"Where do the figures go," asked Andrew, "when they are rubbed out?"

* * *

"Casey," said Pat, "how do yez tell th' age of a tu-u-rkey?"

"Oi can always tell by the teeth," said Casey.

"By the teeth!" exclaimed Pat. "But a tu-u-rkey has no teeth."

"No," admitted Casey, "but Oi have."

In the days when the sight of young America abroad was not as common as it is to-day a beautiful Connecticut young woman made the ascent of Mount Blanc in the company of a party of English and Americans, mostly artists. The others had given expression in awestruck whispers to the impression which the sublime scene made on them, while the young lady stood apart in silence, gazing out over the vast prospect with eyes bright and lips parted.

Finally they turned to her for some expression of her emotions and she suddenly exclaimed: "My! Ain't I high!"

* * *

A snobbish young Englishman visiting Washington's home at Mount Vernon was so patronizing as to arouse the wrath of guards and caretakers; but it remained for "Shep" Wright, an aged gardener and one of the first scouts of the confederate army, to settle the gentleman. Approaching "Shep" the Englishman said:

"Ah—er—my man, the hedge! Yes, I see, George got this hedge from dear old England."

"Reckon he did," replied "Shep." "He got this whole blooming country from dear old England."

* * *

A certain jobber, while at a convention in Chicago, went to the room assigned to him at the hotel. There he found a very "natty" chambermaid just finishing cleaning up. Says the jobbing Adonis, with harmless intent, "Oh, fair one, are you to be let with the room?" Quoth she, "No, you square head, I'm to be let alone."

* * *

A belle was told it was apropos to have a ring with a setting of one's birthstone, and a little later a bell was tolled because it was apropos to have a ring with the setting of one's tombstone. —Swing low, sweet chariot!

* * *

Moike — Pat, phwat is diplomacy?

Pat — Diplomacy is when yez wants to call me a liar, but does it over the telephone.

* * *

"If Tennyson had lived in my suburb," said paterfamilias the other night, as he sat with his cheekbook before him, ruefully contemplating his electric light bill, "he would never have written 'Honor the Light Brigade! Honor the charge they made!'"

