POPULAR ELECTRICITY
AND THE
WORLD'S ADVANCE

VOL. VI JANUARY, 1914 No. 9

ELECTRIC PORTRAIT SIGNS

On Saturday, October 11th, Honorable William Jennings Bryan, Secretary of State, visited the National Conservation Exposition at Knoxville. A feature of the decorations at the exposition during the day was an electrical portrait of Mr. Bryan, which was placed on the Van-Wright Inn and attracted considerable attention and comment. This method of portraiture is known as the Greenwood shadow picture.

Portrait of the Honorable William Jennings Bryan Produced with the "Shadow Picture" System

In the shadow pictures the high lights and shadows are ingeniously blended, the colors are as natural as in real life and the treatment of lamps is such as to make them almost invisible. The effect is produced by the use of reversed construction, and the high lights and shadows are brought out by the ingenious placing of lamps so as to cast reflections and counter reflections.

The half-tone herewith in no way does the display justice. The collar and shirt bosom are pure white—the black necktie is brought out by a deep shadow—the face is of true flesh color, and by a treatment and grouping of lamps, the fine line clear around the back of the head, which is hardly discernible in the picture, is brought out very nicely, giving a vague idea or fine high light line entirely around the head. The flesh colors in the face are toned and shaded as above stated and the lamps are rendered practically invisible at a distance of from 25 to 30 feet by the use of an opal lacquer, covering just enough of the lamp to produce the proper effect.

With the entrance of these shadow pictures of various kinds into the electrical sign industry comes another step forward in the artistic development of electrical displays, not to speak of the great advertising value they will have for the electrical industry in general, by exciting popular interest in the constantly increasing uses of current.

The Mysterious Levitation Act Explained

BY T. J. NEWLIN

To sit in an audience and gaze spellbound at a real, living woman who, to all appearances, is actually suspended and floating in mid-air, naturally calls forth ejaculations of wonder and amazement. The first thought of the uninitiated in stagecraft or optical-electrical illusions is that the living body is suspenden in space by invisible wires. But such is not the case, for even while the thought is running rampant in your mind, that this is the solution of the mystery, the magician is seen passing a wooden hoop around the entire body of the woman just to prove to you that your deductions were incorrect.

This act of levitation was successfully produced for years by the late famous magicians, Messrs. Kellar and Hermann, all over the civilized world and whenever shown never failed to create a deep quizzical impression upon the minds of the spectators.

Like all great magical or optical-electrical illusions, the mode of procedure is very simple. To begin with, the stage has four floor plates set in such a position that the four legs of the couch upon which the woman reclines, coincide and engage precisely with them in order that the iron flange (F) in the diagram shall be placed in the exact position for the rod (mention later) to engage properly as it passes upward from below the stage.

The iron cross (C) is upholstered to match the couch upon which the body of the woman is placed and is set to the position of perfect balance with her shoulders and feet resting upon the cross arms as shown. Continuous with this iron cross (C) is an elongated and exceptionally heavily forged U-shaped band thrown at right angles, on the end of which is formed a collar or flange (F) as shown. During the act the magician stands in such a position at one end of the U-shaped band of iron as to conceal from the audience with his leg the iron rod, which slowly raises the cross and woman, as it passes upward from below stage and into the flange (F). A motor below stage having on its shaft a pinion that engages a worm gearing which in revolving acts in combination with the serrated upright rod is the lifting apparatus used.

Everything being in readiness, the magician steps forth to the apron of the stage and introduces a beautiful, smiling and vivacious woman to the audience. Then with a few passes and movements with his hands he places her in an apparently hypnotic state whereupon he leads her to the couch and places her upon it in a position of perfect poise and balance.

Taking a position behind the couch he secretly gives the signal to the electrician below that everything is ready. The motor is started and as the rod gradually rises through the stage floor, it passes upward behind the magician's leg and engages in the collar or flange (F). Meantime the magician is continually making his mysterious hypnotic passes and to all appearances apparently lifts the woman by some weird influence.

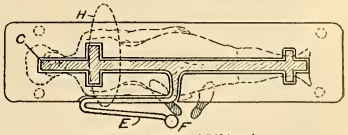
When the subject is about on a level with his hips, the magician signals his assistants who appear and remove the couch from under the woman now floating in mid-air. Then to further mystify you, he takes a wooden hoop (H) and passes it over the feet of the sleeping beauty and toward her head then bearing same toward the left until it strikes the end of the loop (E) which allows him to swing it towards himself and clear away

How the Levitation Act is Performed—it is Simple Enough when Seen from the Rear of the Stage

from the sleeping subjeet. Now reversing the operation until the hoop is elear from the woman's body, he deftly rolls same out into the gaping audienee for inspection for triek springs, openings, ete.

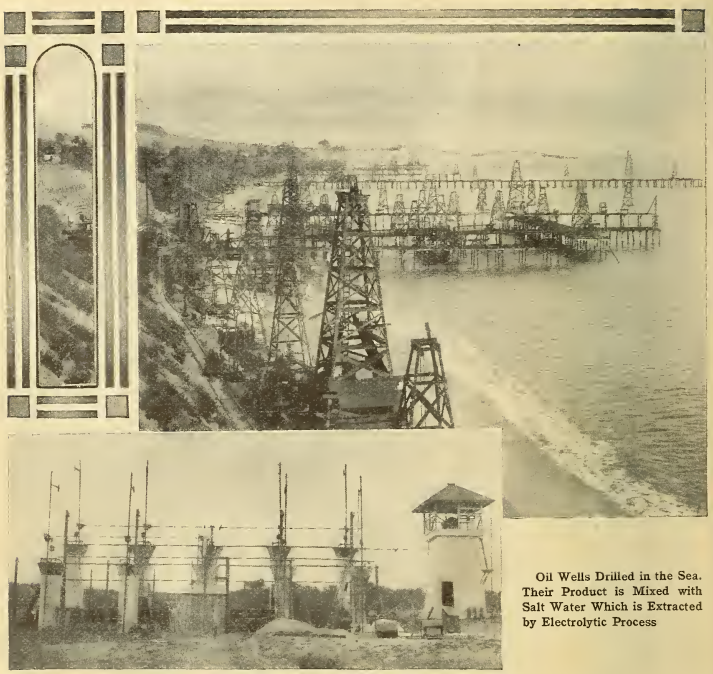
After a few laeonie remarks to the audienee, the assistants replaee the eoueh in its former position and the order of things then being reversed, the body of the woman is allowed to slowly settle into its proper position wherein the cross (C) lies buried and hidden in its former resting plaee among the upholstering.

The magician eonstantly keeps up his hypnotic movements with his hands until he knows the lifting rod has disappeared below the stage floor. Then being at perfeet freedom from discovery of the



Plan of the Cross and Lifting Arm

triek, he steps from his position and proeeeds to lift the woman from the eoueh, and, after dehypnotizing her right before your eyes, both the magician and his subjeet bow to your applause.



Oil Wells Drilled in the Sea. Their Product is Mixed with Salt Water Which is Extracted by Electrolytic Process

ELECTRICAL SEPARATION OF OIL AND WATER

The old saw about oil and water not mixing did not have its origin in the petroleum fields of California, and especially those of the Summerland district, which are unique in that most of them are drilled in the sea. Not only in these wells, but in many drilled far inland as well, a certain amount of salt water is pumped with the oil, enough in some cases to make the well almost worthless. Until very recently an awkward, slow, expensive and unsatisfactory system of settling and re-settling was employed to separate the oil and water, but the invention of the electrical separator shown in the illustration, which works on the electrolytic principle, performs the operation efficiently and expeditiously, and is making possible the pumping of wells in which the presence of salt water would otherwise render unprofitable.

WHEN THE BANANA SHIP COMES IN

When a shipload of bananas arrives at the wharf on Galveston's waterfront lively and curious events ensue. Ranged along the fruit wharf are a number of odd looking, slant sided houses, each with a sort of an elephant trunk protruding. These are the electrically operated fruit conveyors. As soon as the ship is laid alongside, the trunks swing out and downward through the hatches into the hold. Then the wheels begin to turn and the

Odd, Electrically Operated Fruit Hoists

canvas pockets travel in an endless succession from the hold to the wharf. Down in the hold men lay the bunches of bananas onto the conveyor, keeping it at full capacity. As the bunches are discharged at the wharf end they are seized by men of almost every race and nationality, who hustle them off to the various railroad cars on near-by tracks. The wharf appears then to be swarming with moving bunches of bananas set on two legs. An expert fruit classifier sees each bunch as it is carried away.

"Number nine!" calls the expert, and the man under the bunch moves to the open door of a car from which a flag displaying the figure "9" is hung. This grade is the highest in bananas and only the best bunches of firmest, most mature fruit are so classified; yet most of the bunches brought into this port are of that quality. There are also "eights" and "sevens," these being smaller and riper fruit.

As the classifier calls "yellow flag," the toter carries his bunch to a car where riper bananas are loaded, mounting improvised steps and passing his bunch up to the men inside, where it is neatly stacked on the bottom of the car, to be shipped inland but a short distance.

KING ARRESTED FOR SPEEDING

According to a cablegram from Madrid King Alfonso was recently arrested by two policemen as he was driving his high power automobile at great speed from an outlying town into the city. Although the officers on discovering the indentity of

King Alphonso in His Racing Car PHOTO BY UNDERWOOD & UNDERWOOD

the joy rider apologized, the king insisted upon having them take him to the station. Here the king ordered that the men who had stopped him be raised in rank and presented each with a box of cigars.

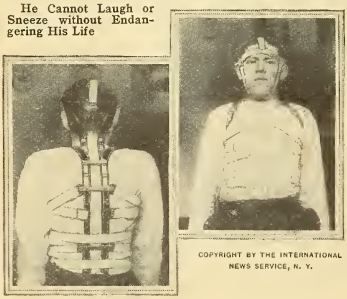
The accompanying picture shows the king at the wheel of his racing machine.

LIVING WITH A BROKEN NECK

A man who cannot laugh or sneeze without endangering his life, because his neck is broken, has been awarded a verdict of $25,000 by a Supreme Court jury in New York.

The winner of the verdict is Fred C. Neun. He fell from the tenth floor of

He Cannot Laugh or Sneeze without Endangering His Life



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the Hudson Terminal Building during its erection, and since that time a steel rod and a steel head brace have supported his broken neck. The 140 foot plunge down an elevator shaft fractured the second cervical vertebra, but left the spinal cord intact.

A sudden jar at any time may snap the spinal cord and cause death. Neun lives with his wife and three children, but he is helpless. He has to be bathed, dressed and shaved by a physician, so delicate must be the care with which he is handled. He testified in court that his clothes are changed not more than once a month, and then by his doctor. This process necessitates being pulled up off the floor by a special harness.

AURORAL EARTH CURRENTS

To the Editor of Popular Electricity and the World's Advance:

I have read with much interest the article on the Aurora Borealis, by Mr. Warren H. Miller, in your issue for October. It carried me back in memory many years to an interesting experience I had in the later 60's or the early 70's at Lynchburg, Va., which I am tempted to offer you for publication.

We were, one cold but calm winter night, treated by Dame Nature to an unusually brilliant display of the Northern Lights, with the usual accompaniment of earth currents that almost paralyzed the telegraph service for several hours. As it was about the first opportunity ever presented to me to investigate the effects of the auroral manifestation, I devoted almost the entire evening to it.

My first observation led me to infer that the earth currents were propagated in slowly moving waves from a potentiality of zero to a maximum of intensity that at times overcame the polarity of our main battery currents, and then would be followed by an augmentation of the strength of the currents far in excess of that from our batteries alone, thus alternately seeming to open the telegraph circuits for a few moments and then close them with a gradually increasing force until a maximum was reached, when the process would be repeated, though not in regular order as to time and intensity.

At my suggestion the "Night Chief" of the Washington office grounded one of our local wires at the same time that I detached the main battery and grounded the Lynchburg end of the same wire. We then found we could converse by using the auroral current alone, and we did thus carry on a conversation for the better part of an hour. But we discovered that the earth currents traversed the telegraph wire in waves as we had previously noted, but the waves seemed to be far more regular, ebbing and flowing from minima to maxima with the regu-

larity of clockwork. At zero there would be no perceptible current on the wire at all and the circuit would be apparently "dead open" for a few seconds. Then it would come on in gradually increasing strength until the maximum would be reached, when in a few moments the current would decline again gradually to zero.

This was before the advent of the dynamo, and before the strong current systems of lighting and power had come in vogue, and galvanometers, ammeters and volt meters and other electrical measuring apparatus were unknown. I was not even in possession of a mariner's compass, which would doubtless have proved that the alternate rise and fall of potentiality of the auroral current was not due, as I supposed, to a simple rise, fall and cessation of movement, but to a regular reversal of polarity from zero to the maximum of one polarity, and then down to zero and beyond to the maximum of the opposite polarity, similar to and yet vastly different from the undulations of the telephonic and aerial telegraph systems of communication.

This experience, coupled with an early telephonic experience with far less powerful earth currents, paved the way for my theory that instead of the generally received theory that the earth was a vast reservoir of electricity, it was merely an illimitable "conductor," and led to the invention of the "common return," at one time so largely utilized by the telephone companies.

Does not the close relationship existing between the mysterious "sun spots" and the exhibition of the Northern Lights, and the singular behavior of the mariner's compass and the dipping needle during the periods of apparent solar activity, lend probability to the theory advanced many years ago that the sun is an immense dynamo propagating electrical influences throughout our solar system through the medium of the all-pervading ether, analogous to the conducting wires of our electric light and power plants; our globe an immense terrestrial field magnet and armature combined, set whirling through space by the solar power currents, and our atmosphere performing the rôle of electric light carbons and filaments in the production of light and heat from the non-luminous and non-heating sun currents? It seems to me that the facts reported by aeronauts who have ascended miles above the surface of the earth in its atmospheric envelope, that the higher they ascend the more rarefied becomes the atmosphere, the deeper the blue of the celestial vault, and the lower the temperature, lends probability to the theory that could we reach the outer limits of the atmosphere we would find that throughout all interplanetary space there was a region of impenetrable darkness and an entire absence of heat. The blackness of darkness and the cold of absolute zero would exist and the sun and all other heavenly bodies would be blotted out of sight. And all because of the absence of nature's media, the earthly atmosphere, for the conversion of the electrical vibrations of our central luminary into the forms of force, light and heat, absolutely essential for our continued existence.

I know there are many unexplained facts that militate against this theory, just as there are many circumstances included in the generally accepted theory regarding the sun being an immense blazing orb radiating light and heat, just as a red hot cannon ball radiates those modes of motion, that cannot be satisfactorily explained either. On which side lie the strongest arguments?

Sun and dynamo, cold and opaque. Ether and wire, neither, under ordinary conditions, exhibit either light or heat. The atmosphere and carbon are necessary to render apparent the naturally latent light and heat of the electrical manifestations! The problem will be worked out some time.

C. E. McCLUER.

Rochambeau Apartments,
Norfolk, Va.
Oct. 16, 1913

SAN FRANCISCO'S PORTOLÁ CELEBRATION

Two Hundred Foot Bell of Electric Lights

Dewey Monument Converted Into an Electric Fountain

Ornamented and Illuminated Trolley Pole

Admiral Drake's Ship of Exploration

One of the Floats was an Old Time Side Wheel Gunboat

The Gunboat Float, the Oregon, Equipped with Guns for Shooting Confetti

One of the greatest festivals of merriment the West has ever seen was held in San Francisco, October 22 to 25. It was known as the Portolá Celebration, and was held in commemoration of the discovery of San Francisco Bay by Don Gaspar de Portolá and the 400th anniversary of the discovery of the Pacific Ocean by Vasco Nunez de Balboa.

During the reign of joy, a mammoth parade, held on the third day, had the unique distinction of being dispatched by telephone. There were fourteen great divisions to this spectacle, extending several miles and lasting four hours. Each division was started by telephonic orders from headquarters which was also continuously in touch with the movements of the prodigious procession along its entire route. Order was thus excellently maintained and delays and breaks entirely avoided.

Tall office buildings were garbed extensively in bright flags, emblems and streamers. Trolley poles extending along Market Street for two miles were beauti-

fully ornamented and illumined with large baskets of artificial flowers twined with electric lights. Nearly 100 lamps were used to each basket and the flowers displayed were large yellow chrysanthemums, red poinsettias, grasses, mosses and palm leaves. Each pole was topped with gay flags and a bright arc light. Similar baskets were suspended over numerous street crossings, the richness and profusion of the entire display giving an aspect of luxuriance and natural wealth. Another striking feature of the electrical display was a mammoth bell of light suspended over the junction of Market and Kearney Streets formed of streamers of glowing electric lights extending 200 feet in the air and revolving over the thoroughfare.

More than 25 electrically illumined floats were in the night parade depicting the evolution of the dreadnaught from the ancient war canoe to the modern Oregon. The countless thousands of spectators along the line of march and perched upon every available ledge of the skyscrapers hurled vast quantities of confetti and paper serpentines down upon the different craft as they passed with smoke rolling from their funnels, with paddlewheels of old-time gunboats revolving, with searchlights on their decks playing upon the crowds or climbing the walls of the peopled buildings, and with crews, costumed in the dress of the age typified, shooting bombs of confetti from guns built especially for the purpose and pausing now and then to bombard forts stationed at various intervals along the way.

UNDER THE SPELL OF THE SNOW

The very appearance of this odd looking group of buildings conveys an impression of aloofness—of something hardly earthly. And as a matter of fact, the function of the intricate mechanisms and the handful of men situated therein has absolutely nothing to do with this earth but with other planets many millions of miles away. This is the Lick Observatory located on the summit of Mount Hamilton, near San Jose, Calif. The view is of incidental interest as it shows Mt. Hamilton during the worst snow storm which has ever occurred in that vicinity. Even a slight fall of snow is exceedingly rare in this section of the country.

ELECTRICALLY COOKED FOOD FOR EXPOSITION CROWDS

With a grill having a capacity of close to 200 steaks an hour, an oven capable of baking 160 loaves in the same period, and a range that had no difficulty at all in cooking the side dishes which made up a most elaborate dinner, the kitchen at the recent Electrical Exposition in New York answered, for all time, the question of the availability of electrical cooking apparatus.

An Electric Grill with a Capacity of 200 Steaks an Hour and an Oven Capable of Baking 160 Loaves of Bread in the Same Period

Probably no feature of the exposition attracted so much attention from housekeepers as the restaurant, for all that was done there was done in the open. As far as service was concerned the exposition dining room was a typical place, but beyond the rail, or behind the scenes, there were wonderful activities that are seldom given the diner to see.

First in importance there was the range, known in the books as the hotel type. On this were prepared all the meats served during the entire ten days. Broiled chicken and grilled steaks or chops were served in the main and these were all grilled under radiant coils, which could be so adjusted that the meats would be well done or rare. In addition to the grills the range was equipped with eight hot plates on which were cooked all the side dishes, while French fried potatoes sizzled in a special electric kettle. Close by the range stood the big bake oven, which baked all the exposition bread as well as the cakes and pies.

And after these electric cookers, came the electric utensils that add so much to the efficiency of any culinary department. There was a warmer to keep the plates hot, a potato peeler that in half an hour pared all the tubers that could be consumed in a day, a dish washer and drier and a special drier of kitchen towels, beside the motor driven tools for sharpening knives and slicing bread. And the most remarkable feature of all was the entire absence of odors. Whatever appetizing effect the grill room had was due entirely to the sight of choice viands

in the hands of a capable chef, for the usual delectable odors were caught up in a motor driven blower and carried out of the room through a window.

This electric kitchen was no mere advertising display. It was a hard and fast business proposition, operated for two purposes — to meet the needs of a hungry host and to show a profit in dollars and cents. It did both. On the very first day, within an hour after the current had been turned into the kitchen from the mains, 100 men were served at dinner. It was not a buffet luncheon or an afternoon tea, but a dinner to satisfy hearty appetites.

MALAYS — THEIR STREET CARS AND SLAMETANS

BY F. G. LUDERUS

In Weltevreden, Java, there exist, side by side, two transportation systems so absolutely different from each other as to call for comment. One of these is a comparatively modern electric railway system, which had its beginning thirteen or fourteen years ago and is now rapidly expanding, and the other is a curious collection of hot water engines and little trailer cars, the like of which has never been seen on our own side of the world. The latter came into existence some 30 years ago and is still doing business on the most desirable rights-of-way in the city, although steps are now being taken to electrify the system.

Natives in a Third Class Car

Electric Railway of Weltevreden

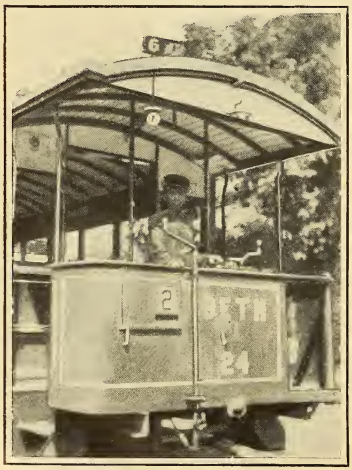
Dutch capital and Dutch brains are behind the two local enterprises above mentioned; the systems are very largely operated by natives and they carry for passengers a nondescript collection of Malays, Chinese, Arabs, Europeans, etc., divided for the most part into classes, for there are first, second and third class cars, with fares corresponding. The natives, for instance, usually ride in the third class cars, while the Europeans patronize those of the first class. A native, however, may ride first class provided he pays the fare, and provided also that he dresses and conducts himself as a civilized person.

One of the pictures shows the interior of a third class electric car. The natives all look with curiosity upon anyone wishing to make a "gambar" (picture) of them. The one in the foreground wears a large white ring on one of the fingers of his left hand. These rings are made from a kind of shell and they are said to possess the mysterious power of detecting poisons which might be mixed in the food of the wearer with the intention to kill him. The natives believe in this power very

strongly and consequently they pay high sums for such rings—as high as $100 and more.

The electric street railway occupies unfavorable parts of the city when compared with the track of its competitor, the superheated water railway system. A great deal of the track of the former runs through what is called the "kampongs," that is, the part where the natives dwell. Here the roads are often so narrow that notices are posted in the interior of the cars bearing this legend in the Dutch and Malay languages: "Take care of the trees along the track," so warning the passengers not to put their heads too far out of the windows.

Curious Hot Water Engine Used on Some of the Street Railway Lines in Weltevreden



A Native Motorman

But more curious than anything else are the little superheated water engines. Briefly, each of these consists of a boiler, heat insulated by means of an air space and felt jackets so as to keep the heat in as much as possible. The boiler contains a little water and a steam dome is provided above the water level. Superheated steam is introduced through a pipe into the water in the boiler. This raises the temperature of the latter far above the boiling point, it being confined under the necessary pressure to permit of this under the laws of thermo-dynamics. Therefore steam will collect in the dome and keep collecting as long as the necessary pressure and temperature holds up in the boiler. The steam is piped from the dome and led to the cylinders of an ordinary steam engine below the car.

The maximum power developed by the engine is 70 horsepower and can be maintained sufficiently long to permit the car to cover a distance of four or five miles. The initial meal of superheated steam must be fed to these little engines at regularly established boiler plants. From there they must then hurry out, perform their work and be back again before the meal has been entirely digested. Otherwise it may happen—particulary on cool or rainy days—that somewhere out on the track they give up the ghost and are left gasping, to the despair of the passengers. It is no wonder, therefore, that steps are now being taken to electrify this antiquated form of locomotion.

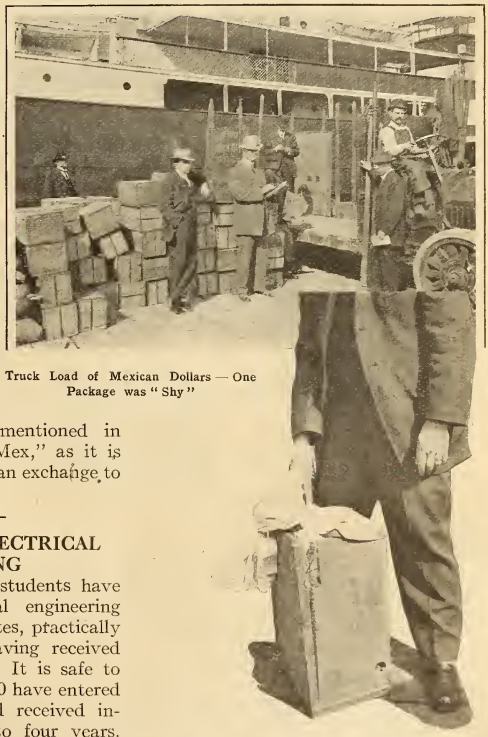
Whenever a new section of track is completed it is inaugurated by giving a feast, called a "slametan," to the natives. This is also given when a new building or any work of moment is completed. If a slametan is not given there must perforce, according to the native understanding, rest a spell of bad luck over the

whole undertaking. According to the Malay, this bad luck manifests itself in several mishaps. When not long ago a new track had been laid for the superheated water, street railway and a slametan was not given for the natives of the company, it happened a few times that the locomotive was derailed. It may be that this was due to malevolence on the side of the natives but such was not proved. At any rate, invitations were immediately sent out for a general slametan, and after it had been celebrated no further trouble was experienced.

A TRUCK LOAD OF MEXICAN DOLLARS

Many thousands of dollars in Mexican currency were received by American banks during the Mexican Revolution. The accompanying illustrations, made on a pier in San Francisco, show how roughly the money was boxed and, in the smaller photograph, broken into and stolen while aboard ship.

When the shipment was checked up, it was loaded aboard the motor truck and carted to a safety deposit vault for safe keeping. It might be mentioned in passing that a "Dollar Mex," as it is termed, is equal in American exchange to approximately 50 cents.



Truck Load of Mexican Dollars — One Package was "Shy"

GRADUATES IN ELECTRICAL ENGINEERING

Almost exactly 20,000 students have graduated from electrical engineering courses in the United States, practically one half this number having received their degrees since 1906. It is safe to assume that at least 40,000 have entered the freshman classes and received instruction for from one to four years. Students who do not continue their courses until graduation profit by their training and many become active factors in the industrial progress of the country. It is fair to estimate that on the basis of years of training given by the electrical engineering schools the equivalent of trained men is 30,000 rather than 20,000.

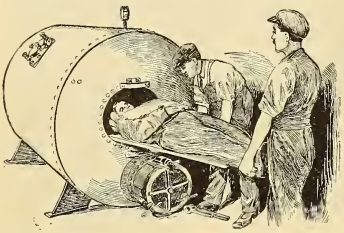
COMPARISON OF STATISTICS FOR SEVEN YEARS

Year	1907	1908	1909	1910	1911	1912	1913
Number of students..	8929	9651	8670	9041	9515	8921	9143
Number of graduates	1358	1501	1473	1545	1614	1442	1366

Not all of these men continue in engineering work. In fact, a large number of them enter other lines, but few indeed are those who do not find their technical training useful in their life work.—*Electrical World.*

DECOMPRESSION CHAMBER FOR DIVERS

The distance to which a deep sea diver can to-day descend below the surface is about 200 feet and at this depth the pressure upon the body, though min-



Taking a Diver from the Decompression Chamber

imized by apparatus, must be carefully considered.

When the diver comes to the surface, the change in pressure, particularly about the head, might cause a rush of blood to the head, and to guard against this he is quickly placed in what is called a "decompression chamber." Here the air pressure is placed at that to which the diver was subjected under the water and then gradually reduced until natural conditions are reached.

RELICS OF THE PORTUGUESE IN EAST AFRICA

Hither and thither along the Eastern coast of Africa are to be found numerous evidences of the Portuguese invasion of Africa under the famous Vasco da Gama and his lieutenants. At Mogadischu in Italian Somaliland, which was the first Portuguese settlement; at Lamu Island; at Kismayu; at Witu; and at Mombasa are permanent monuments of these intrepid explorers.

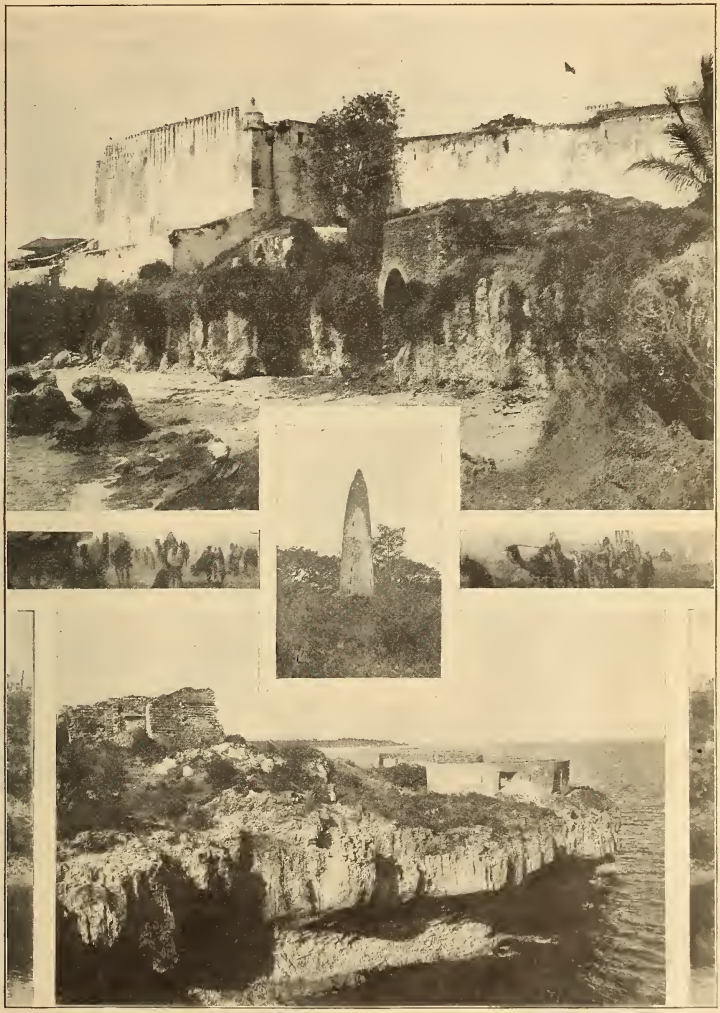
The relics at Mombasa are still in most instances in a marvelous state of preservation, particularly is this the case in regard to Jesus Fort which was built by Thomas de Souza Continho in 1595. The old fort is to-day used as the principal prison of East Africa.

Mombasa formerly was not so much the field where important issues were decided as a seaport tavern into which every passing pirate entered to take part in a drunken brawl and smash the furniture. For this reason it is not surprising that Jesus Fort has had a varied and exciting career. It has been sacked and sacked and sacked again times without number. Built by the Portuguese, it was captured by the Turks, recaptured by the Portuguese, captured again by the Arabs, and finally retaken by the Portuguese, only eventually to fall into British hands, in whose possession it still remains.

A stone pillar erected by Vasco da Gama in 1499, still stands at the entrance to Kilindini harbor. It is surmounted by a crude cross and serves as a landmark.

At the point of the island looking out towards the Indian Ocean stands the ruins of Ras Serani and St. Joseph Fort, marking the scenes of many severe naval and military engagements. They are, however, ruined and covered with thick creepers and what is even worse infested with poisonous snakes.

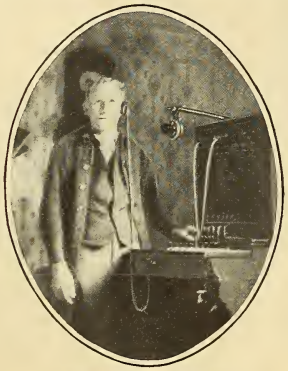
The external and interior solidity of Jesus Fort speak well for the building qualities of the early Portuguese. Of course in these latter days, modern armaments would make short work of the masonry, but in those days they were impervious to the assault of the old-fashioned muzzle loaders. Some of the ancient cannon, dating back to 1795, are still to be seen lying about the harbor and forts. All of them testify to the valiant days of hardy explorers and if they could only speak, what a wonderfully romantic tale they could unfold for lovers of the adventurous.



The Small View Shows an Old Stone Pillar Erected by Vasco da Gama in 1499; the Other Views are the Interesting Ruins of Jesus Fort (Upper) and of St. Joseph's Fort (Lower)

BLIND TELEPHONE OPERATOR

Phillips is a blind telephone operator at Harmony, Ind. He was a coal miner until 27 years ago, when in blasting for a shaft a mistimed shot exploded killing



The Blind Telephone Operator

a companion and making Mr. Phillips blind for life. He is now 63 years old and for some years has been a telephone operator, the patrons at Harmony vouching for his skill in giving quick service.

WHY GOLD PLATED STEEL PENS DON'T LAST

A close observing and very practically inclined professor in a certain Eastern university once made two odd discoveries. One was the fact that gold plated steel pens wear out quicker than the same steel pens not plated. The other discovery was—"the reason why."

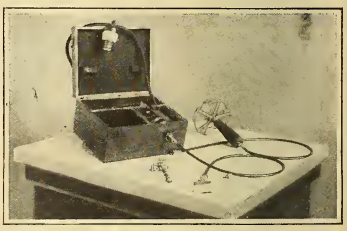
At first thought it would seem almost a certainty that pens plated with gold would withstand the attack of the corrosive action of the ink better than ordinary steel pens. But the observing professor soon noticed that they did not.

Then came an investigation. The thin covering of gold on the pen point is soon worn off, then when the pen is immersed in the ink we have gold on copper on steel in the acid ink—a tiny battery or galvanic cell producing an electric current.

On further experimenting it was found that when a steel pen was connected with a plated pen and both immersed, a difference of potential measuring .020 volt was maintained. In the entire experiment standard pens were used and standard inks.

ELECTRIC VIBRATING RAZOR

One of the newest applications of electricity is the electric vibrating razor. The picture shows the motor, connected by means of a flexible cord to the safety razor. The blade is actuated from the motor so that it acts by impact or blows, cutting the hair not alone by the sharpness of the blade, but by rapid hitting against the individual hair. On this account it is not necessary to have the blades as sharp as in hand shaving; then, too, one can shave in little time it is claimed, two or three minutes being sufficient. The appli-



Electric Vibrating Razor with an Electric Fan as an Accessory

cation of soap is not essential, wetting the skin being all that is necessary. The rapid blows of the blade close to the skin cause a very agreeable after effect, similar to that of a mild massage. The motor attaches by plug to any lamp socket and takes about 24 watts. The picture shows a combination set, the fan being intended for the lady of the house for drying her hair. The whole is made up in a neat polished box, ready for use.

Lieut. George Barrett, R. N., an Englishman, is one of the ten remaining expert swordsmen in the Senior Service. He is here shown cutting a piece of lead weighing many pounds, and with the ends resting on two clay pipes in the mouths of the sailors, with a single blow, and without breaking the pipes. He has also taught his wife to become an expert swordswoman and she is shown preparing to cut in half a potato resting on the back of the Lieutenant's neck.

PHOTOS BY PAUL THOMPSON, N. Y.

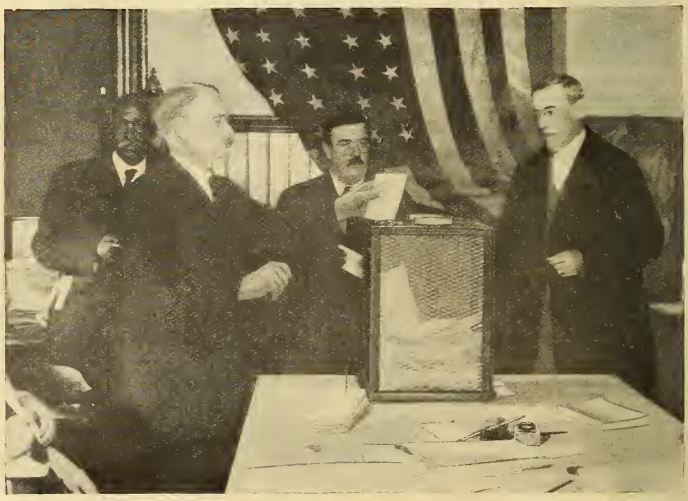
A "Shaving Motor" is one of the latest applications of electric power. It has a number of blades and operates something after the manner of a lawn mower.

PHOTO FROM THE BOSTON PHOTO NEWS CO.

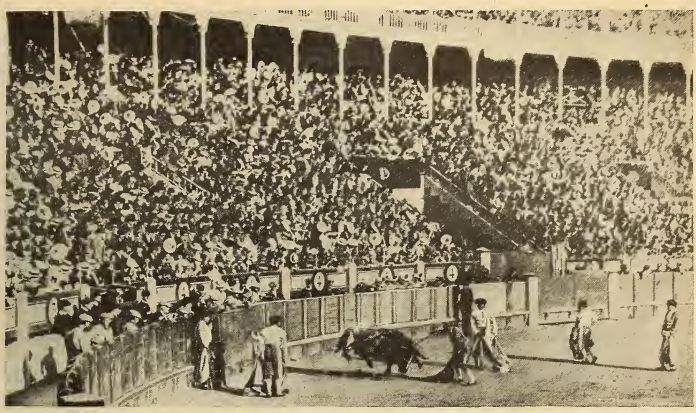
One of the inmates of a cat hospital enjoys a shampoo and more still, the warm blast of air from the "cat drier."

The Leipsig Monument recently unveiled, in honor of the battle of the Nations when Napoleon met his first defeat at the hands of the Allied Nations.

Christopher William Stokes, the son of a Hastings luggage porter, has been judged the best schoolboy in England. In the supplementary tables of results for the Cambridge Local Examinations, he is given the special award of £8 ($38.88) for the boy who did best in the junior examinations.



President Wilson as he cast his vote at the fall election in Princeton, N. J.



Bull fighting in Spain is still popular, judging from the throngs attending the last appearance in the ring [of Bombita, a matador famous at the game for 35 years. He is shown here killing his last bull with a deft thrust of the sword.

The above photograph shows the three sons of Yuan Shia-Kai, the new president of the Chinese Republic, who are being educated at Cheltenham College in England preparatory to entering Oxford. Their education is being carefully guided, also, by three Chinese diplomats commissioned by Yuan.

PHOTO BY GEORGE G. MCLEAN, CARPINTERIA, CALIF.

On the smaller California ranches lima beans have been threshed by driving teams, attached to disk harrows, over them.

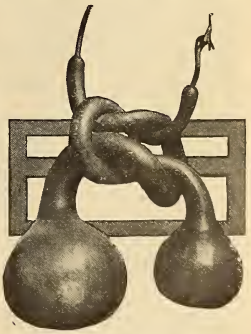
Frank Calderon, the famous animal painter, has a school in Kensington, England, in which pupils are trained in the difficult art of painting animals from life. There is a great collection of models and anatomical subjects as here shown, together with a considerable "zoo" of live animals.

PHOTO BY ORRIN E. CROCKER, HOOPESTON, ILL.

No fancy furniture graces this "tonsorial parlor" which caters especially to hobo trade. It is located in central Illinois and the proprietor claims to have the most sanitary shop in the state.

PHOTO BY PAUL THOMPSON, N. Y.

Packy Mahoney training at Hamstead gymnasium for his contest with Bombadier Wells—hitting the dummy with his favorite body punch.



COPYRIGHT BY G. V. BUCK, N. Y.

Two gourds peculiarly entwined which were presented to the U. S. National Museum at Washington by Dr. Kin, the internationally known Chinese woman physician.

PHOTO BY KATHERINE LOUISE SMITH, MINNEAPOLIS, MINN.

One of the old Hudson Bay Company forts, at Edmonton, which has sheltered hundreds of thousands of dollars worth of furs in its time.

PHOTOS BY LEWIS R. FREEMAN, PASADENA, CAL.

Copra, the dried kernel of the coconut is the leading and almost the only article of commerce of the South Sea Islander. The upper picture shows a group of Solomon Islanders husking coconuts and the lower view shows how the latter are dried for copra.

Perspective drawing of the Panama-Pacific International Exposition showing main exhibit section. The grounds face upon San Francisco harbor for two and one-third miles. In the north before the site is seen Alcatraz Island, a naval prison.

PHOTO BY W. W. SWADLEY

The greenhouses on the Presidio reservation where are grown the hundreds of rare plants and shrubs which will adorn the courts and gardens of the exposition.

PHOTO BY PAUL THOMPSON, N. Y.

Machine which prints bank notes on silk—waterproofs the fabric, without rubber, dyes and prints at one operation.

PHOTO BY L. M. EDHOLM, LOS ANGELES, CAL.

A group of seal pups on the Coronado Islands where they are rarely disturbed. They huddle together among the rocks and boulders, of which they seem a part.

PHOTO BY PAUL THOMPSON N. Y.

Skull of a woman unearthed at Piltdown, Sussex, England. Regarded as the "Missing Link" and believed to be 450,000 years old.

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Tree worshippers of India. The Spirit that created the tree is supposed to be under the stone.

PHOTO BY PAUL THOMPSON, N. Y.

Hungarian horsewoman clearing a dinner table, fully set, and the diner seated at the table.

PHOTOS BY FRANZ OTTO KOCH

Extraordinary bamboo pipe of a Malay stone cutter in Valacca. Only old people are allowed to smoke with such big pipes. The other picture shows a primitive device for cutting tobacco in Indo-China.

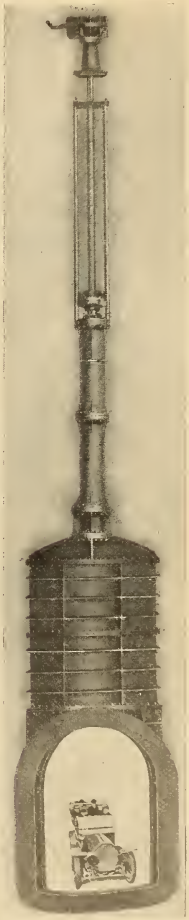

PHOTO BY MACHINEN & ARMATURENFABRIK, HOCHST A. MAIN

The largest hydraulically operated valve in the world. An automobile could drive through its immense gate.

PHOTO FROM BOSTON PHOTO NEWS CO.

These elephants are undergoing a bath to remove the paint with which they had been decorated for a holiday parade. They will now go back to a humdrum existence.

PHOTO FROM BOSTON PHOTO NEWS CO.

This woman has succeeded in making a lynx docile, although, ordinarily, it is the most untamable of all the members of the cat tribe.

PHOTO FROM BOSTON PHOTO NEWS CO.

Prof. Heck, of Berlin, feeding a baby elephant with a bottle.

PHOTO BY PAUL THOMPSON, N. Y.

Incidents in the assembling of an army for manœuvres are plentiful, and many are interesting as showing what goes on in the advance and wake of a large body of soldiers moving about the countryside. This picture shows an aeroplane camp during recent British manœuvres.

PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

When a Hindu Pariah dies, the funeral services and the funeral rites correspond to his station in life. The Hindu of the photograph, being a shoemaker, the cremation ceremony is very simple. The corpse after being washed and dressed in a new cloth is placed on a bier of leaves and bamboo sticks and set on a pile of fuel. The son or grandson then starts and walks around the bier thrice carrying an earthen pot of boiled rice. The rice so scattered must not be touched by man or beast and is buried.

War with Mexico will involve our soldiers with the types of Mexican fighters shown in these three pictures. They are all Constitutionalists. In the upper picture are Villa's mountaineers who had a hand in the capture of Juarez from the Federals, and they are guarding the international bridge between Mexico and the United States; second picture, sharp-shooters at work; bottom picture, execution by Constitutionalists of a Federal officer who was trying to escape, disguised as a common soldier.

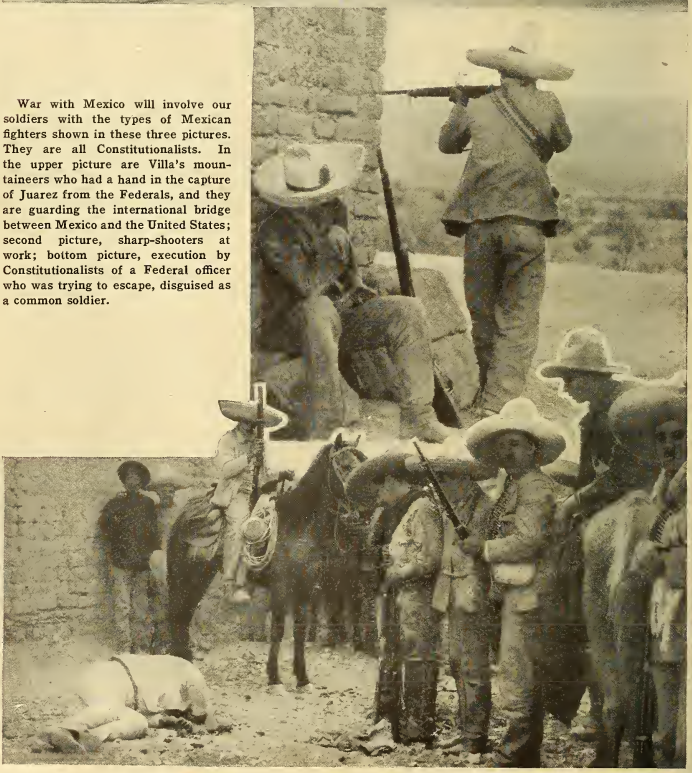

PHOTO BY THE AMERICAN PRESS ASSOCIATION, N. Y.

Scene in Tuxcan where the Mexican Federals defeated the Rebels in an engagement. The small picture shows the Japanese cruiser Ozumi ordered to Mexico.

PHOTO BY THE AMERICAN PRESS ASSOCIATION, N. Y.

The modern game of war as played in Mexico. This picture was taken during a skirmish at Torreon and shows Federal guards with machine gun and rifles returning the fire of Rebels.

PHOTO BY PAUL THOMPSON, N. Y.

A motor "lorry," as used by the British Army Transport, is a huge truck capable of carrying several tons of camp requisites.

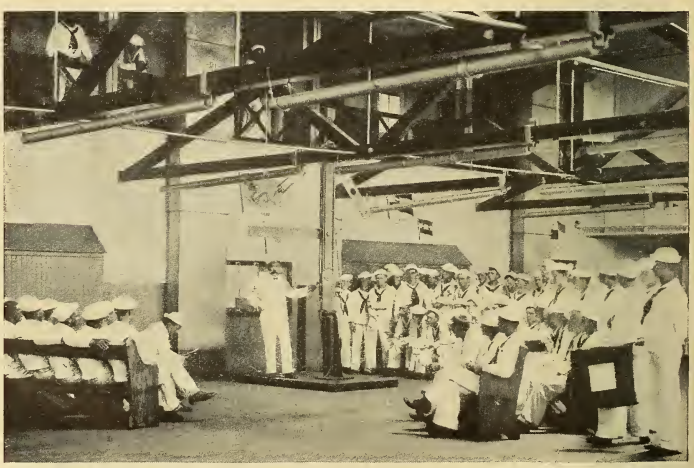

PHOTO BY WALDON FAWCETT, WASHINGTON, D. C.

Scene at the United States Naval Training Station at Newport. New recruits are being instructed in signaling.

PHOTO BY PAUL THOMPSON, N. Y.

In the Suffrage parade held in Brooklyn on Nov. 1, Miss A. Potter was the Grand Marshal.

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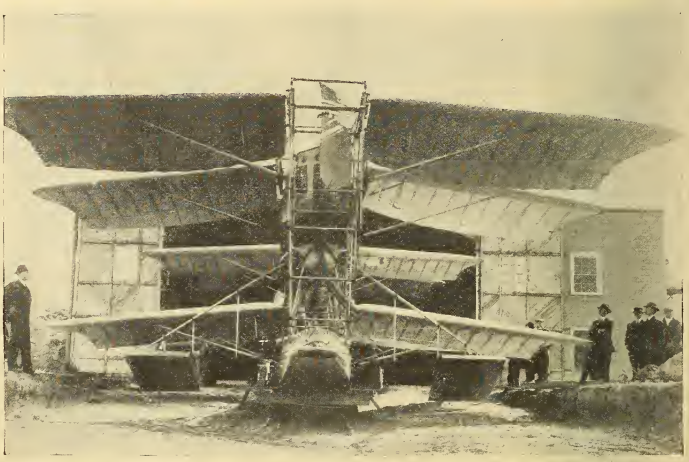
Miss Madeline Y. Doty, prison investigator and Miss Elizabeth Watson for four days lived the life of convicts in Auburn Prison, New York. They are making an investigation of the New York state prison system. They went unknown to any save the superintendent of prisons and the New York State Commission on Prisons, whom they represented. The picture shows them in convict garb.

PHOTO BY C. L. EDHOLM, LOS ANGELES, CALIF.

The Esquimaux now use the parcel post for shipping furs to Seattle and San Francisco. The Esquimaux north of Bering Straits are making better profits than were obtained from dealing with northern traders. Our picture shows the arrival of a dog train of furs at the post.



In last month's issue we described the Batson hydroaeroplane designed to carry passengers across the Atlantic. Here we see an actual photograph of the big machine in front of its hangar, on Dutch Island near Savannah, Ga.

PHOTO BY THE INTERNATIONAL NEWS SERVICE, CHICAGO

An exciting moment during the Chicago-Minnesota football game, Nov. 15. Shaughnessy of Minnesota with the ball.

Inquiring Rufus

BY CHARLES K. THEOBALD

The little negro, with a dinner basket on his arm, gingerly crossed the floor of the power plant, casting scary glances at the humming machinery and swishing belts, much as though he expected something to reach out and grab him at any minute.

"You is Mr. Price, ain't you?" He inquired of the busy man at the switchboard. "An' I 'spec' dis is your grub."

The old engineer looked the boy over critically.

"What's become of the other fellow?" he asked.

The little negro removed his admiring gaze from the glittering array of shining switches and instruments on the polished black marble panels and set his basket on a convenient box.

"Miz Price, she done fired dat lazy nigger. He say he can't tote dinner on a empty stummick, and den he complains 'bout never findin' no leavin's in your basket. So Miz Price gimme de job—I's Rufus Washington Sanders," and the whites of the little darky's eyes rolled again toward the marble panels. Plainly, Rufus Washington Sanders was interested in that switchboard.

"Mr. Price," he asked at length, his gaze roaming over the busy plant and finally resting covetously on the mince pie that the engineer had placed to one side—"Mr. Price, what is dis here 'lectricity anyhow?"

Price smiled as he pulled a chair to the box and sat himself before his dinner. "Thomas Edison says it is a mysterious something about which we know next to nothing, and I guess he's right about it."

Rufus nodded his kinky head sagely and inspected the switchboard again.

"I jess knowed 't was sumpin' like dat," he declared, "'cuz I took one er dem dry batt'ries once and bus' it wide open, an' I ain't never seen no 'lectricity come outen it yit. But tell me dis here, Mr. Price: I seen one er dem 'lectricianers er workin' on de trolley wire one day—and de kyars runnin' all de time! How he done that 'thout gittin' kilt?"

"Set this pot of coffee there, where it will keep warm"—the engineer pointed to the steaming cylinder of a nearby engine—"and I'll tell you."

Furtively eyeing the engine, Rufus took the coffee pot and tiptoed forward much like a wary hunter might creep upon a bear. He slid the pot upon the hissing cylinder and returned three steps at a time.

"The lineman was in no danger while handling the live trolley wire as long as his body was clear of the earth," Price explained. "To receive a shock his body would have had to make a connection between the trolley wire and the car track, the rail carrying as much current as the trol—"

"An' me, jess like a fool nigger, been

steppin' on dem tracks all de time!" And the whites of Rufus' eyes rolled ominously. "Here's one little nigger what don't do no more fool stunts like dat!" This he avowed as he watched the engineer cut into the pie. Then he ventured: "I ain't never et no pie like dat."

A taste of the pie was not forthcoming, and Rufus went on:

"'Member de night of de gas house fire, Mr. Price? How come dem firemans didn't git hurt when dey was a-shootin' water on de trolley wire, an' hit plumb fuller 'lectricity, too?"

"Because water being a better conductor than the human body, the current took the easiest path to the earth, the water in the hose leading direct to the pipe in the ground."

"Sho 'nuff!" And Rufus edged a little nearer the dinner. "I 'spec' I wouldn't know how dat kinder pie tastes."

This hint brought results and, with a slice of pie rapidly passing between hand and mouth, Rufus stood for some little time watching the power circuit ammeter needle fluctuate; then, pointing to the instrument, he inquired:

"What makes dat one handed clock keep on er backin' up and den goin' ahead agin?"

"That instrument shows how much current the cars are using," Price explained. "When the pointer drops back, some of the cars are coasting down grade or have come to a stop, and when it is at 800, where you see it now, all the cars are running, and —"

Bang! There came a flash and report from the top of the switchboard that sent Rufus Washington Sanders' mouthful of pie down one side of his throat while his heart jumped up the other. The engineer hastily left his dinner on the box, stepped to the switchboard and quickly adjusted something thereon.

Rufus stood awed into silence, too frightened to move. Finally, seeing that the engineer took the occurrence as a matter of no consequence, he ventured the question:

"Dat powder circus yammetter done 'sploded, ain't it?"

"Only the circuit breaker on the Clay Street car line—kicked out from an overload. Sit down and finish the dinner."

Which invitation Rufus lost no time in accepting.

"A circuit breaker," the engineer explained, "is an automatic safety device which opens the circuit when, from various causes, the line is taking too much current. It is well compared to the safety valve of a steam boiler—it lets off the

excess current. Each car line is provided with one of these instruments. They protect the dynamos, car motors and wires from burn-outs when excessive current flows."

"Uh-huh," said Rufus, getting full of dinner and electrical information. "But I clean like to forgot to ask you sumpin' what Granny Sanders tole me once—'bout a man's hair turnin' gray from gittin' shocked from 'lectricity. 'D you ever git a shock like dat, Mr. Price?"

"I received a shock one time that laid me up for six months, but it didn't turn *my* hair gray." With which the old engineer laughingly removed his cap and exposed to view a head as devoid of hair as a billiard ball.

With mouth agape at the unexpected sight, Rufus paused in his task of gathering up the empty dishes. He made no reply, but as he went toward the door he declared to himself: "Granny Sanders sho' done been misinformed 'bout

"I Ain't Never Et No Pie Like Dat"

'lectricity turnin' folks hair gray—but hit p'intly do make 'em bal'-headed!"

As he passed into the boiler room he paused to call back a parting question:

"Mus' I tell Miz Price to send us—send you some mo' pie ter-morrer? I done lost de picce you gimme when de circus breaker 'sploded, and—"

And just then a safety valve popped off overhead and Rufus Washington Sanders vanished in a cloud of steam.

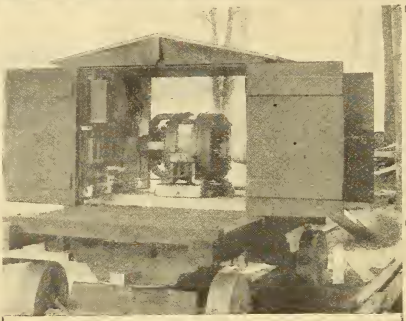
THE ORGAN OF THE HUMAN VOICE

Musical authorities have pronounced the mammoth organ in the Mormon Tabernacle at Salt Lake City to be without an equal and likely to remain so. It would be difficult to say just what peculiar construction and conditions give the organ its wonderful tone. Any gradation or shade of expression and intensity are available through the manipulation of more than 100 stops. Perhaps the most striking value is obtained in a set of pipes which produce a pure, tremulous note so closely resembling the human voice in its highest perfection that one can hardly believe it to be mechanical.

According to Mormon records the organ was conceived upon "Divine Inspiration" by one Joseph Ridges more than 40 years ago. It was first actuated by hand compressed air, later by the power derived from diverting a small stream under the building against a diminutive water wheel, while just recently the mechanical working was brought to a state of modernized perfection by installing a comprehensive pneumatic system and an electric blower operated by a compact ten horsepower motor supplying 5,000 cubic feet per minute.

The acoustic conditions of the Tabernacle are perfect. The building has no sharp corners—the whole scheme is a series of gentle, sweeping curves. A pin dropped 200 feet away can be heard plainer than at five feet. The seating capacity is more than 10,000. An idea can be gained from that figure of its vast size.

The speed of an automobile truck itself reduces traffic congestion. The quicker movement of the self propelled vehicles means an actual lessening of time elapsed in passing through a given street area, thus increasing, by many times, the amount of traffic which can be carried on in that street.

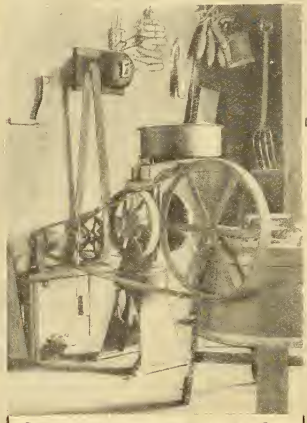


Fifteen Horsepower Motor on a Truck, with Housing Arrangement

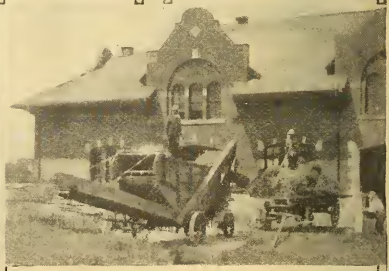
Vertical, Fifteen Horsepower Motor Driving a Six Inch Pump to Irrigate 40 Acres of Alfalfa

Portable Motor Driven Pumping Outfit for Irrigation and Drainage

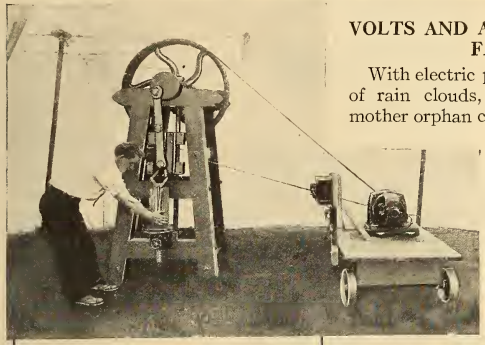
General Utility Motor Here Shown Doing Irrigation Work



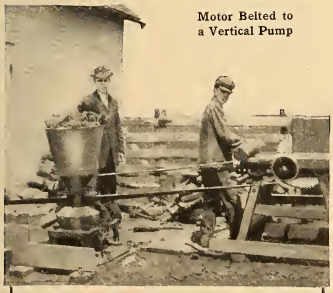
Cream Separator and Washing Machine Operated by One Fourth Horsepower Motor



Electrically Operated Threshing Machine on the University of Illinois Experimental Farm



One of the Latest Motor Applications—A Wood Splitting Machine



Motor Belted to a Vertical Pump

Feed Grinder and Wood Saw Driven by Five Horsepower Motor

VOLTS AND AMPERES FOR THE FARMER

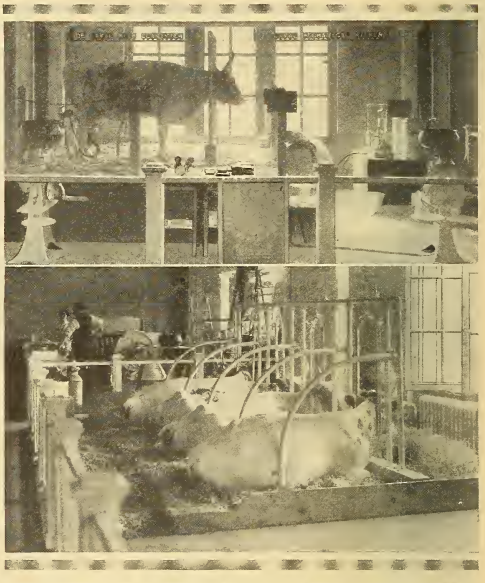
With electric pumps to take the place of rain clouds, incandescent hens to mother orphan chicks and a rubber tube with a nickel plated piece of mechanism to dairy-maid the cows, Twentieth Century farming seems more and more destined to be the field of the electrician. Or if you would rather have it the other way, the Twentieth Century farmer is becoming quite as familiar with his volts and amperes as with his sowing and his harvest.

"Electricity, the Modern Farmer," might well be the title of the horticultural exhibit at the recent Electrical Exposition in New York. By means of a model, the methods of irrigating arid lands were shown, an electric pump forcing water to a reservoir on a hillside, from which, by means of gravity, and conveyed by ditches and canals, it flowed over the lands under cultivation.

On this and the opposite page are shown a few of the great number of electrically operated labor-saving devices now at the disposal of the farmer. Not all of these were on exhibition at the exposition, but on the following pages are two pictures of the dairy which formed a prominent exhibit.

Electric incubators, whose temperatures were regulated by means of an electrical thermostat, were shown as part of the farm exhibit, while the never-ending arrival of little chicks lent an unusual degree of interest. And as fast as the little balls of down gained enough strength, they were placed in an electric brooder, where, without the guidance of a fussy hen mother, they soon learned to scratch for themselves. More than a thousand chicks pecked their way into the world before the gaze of the exposition throngs.

As for the dairy — it was only the swishing of tails and an occasional long drawn mooo-o-o-o-o that remained of the methods of years ago. Four prize winning Ayreshire cows were sent down from the Ryanogue farm, and three times a day they were milked — electrically. Two of the cows had never been milked except by hand, yet if they were surprised at the tubes and pipes and rubber attachments they gave no sign, standing quite unconcerned on their elevated platform until their udders had been emptied. If there was any element of interest lacking, the defect was remedied on the third day of the exposition by the arrival of a sturdy youngster, bearing the same red and white markings of Gateside Blossom XII, the proud mother. In honor of the occasion the heifer was named "Electra."



Four Ayreshire Cows in Their Model Stalls at the Electrical Show. Above is Shown the Electrical Milking Machine Being Demonstrated

After the milking pail, a clarifier, operating on the principle of a Centrifuge, removed all foreign particles from the milk and a separator, operating on the same principle separated the cream. And once a day the cows were cleaned by means of a vacuum cleaner, now a part of the modern dairy barn equipment, and the exhaust pump of which is electrically operated.

Most of the warm milk was sold over the counter, but some was churned in a motor driven churn and made up into butter prints. Needless to say there was a great demand for this on the part of the spectators who had watched the milking process and had drunk the fresh buttermilk while the butter was cooling.

NOVEL SWIMMING POOL LIGHTING

Down in the bottom of the largest ship in the world — the Hamburg-American Line steamer "Imperator" — is a swimming pool, lighted in a novel manner. The general overhead lighting is furnished by Mazda lamps over a false glass ceiling, supplemented by all frosted Mazda lamps located around the sides. The beauty is further increased by lighting the pool by placing Mazda lamps at one end of the pool beneath the surface of the water.

The light is projected into the water through heavy glass windows. This causes the water to appear very clear; in fact so much so, that a small object such as a ring can easily be discerned on the white tile bottom.

THE ART OF SAILING NOT LOST

The "Star of Lapland" is one of a large fleet of sailing vessels of the Alaska Steamship Co., which visits and plys the waters of Alaska for fish and whale. For work of this character it is quite safe to say that the steamship, at least for a great many years, will not supersede the sailing vessel. And, quite contrary to general belief, these sailing vessels are not at all antiquated just because they carry sails. The "Star of Lapland" and her numerous sister ships are steel hulled, have luxurious quarters, and under a steady wind easily average seven or eight knots. "The man before the mast" has not altogether disappearcd.

The " Star of Lapland "—Evidence that Great Sailing Vessels Have Not Altogether Disappeared

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A CURIOUS EXPERIMENT

One of the most interesting features of any electric lamp is the little "glower" (the part that gives out the intense light) of the Nernst lamp. This is a small rod made of the oxides of very rare chemical elements, hardly as thick as the lead in a pencil and an inch in length, more or less. When heated by electric current to its normal temperature of nearly 4,000° F., it gives out the brilliant light with which many are familiar.

In this relation a curious phenomenon occurs when a small particle of one of certain metals is placed on such a glower, which, in this case, must be run on direct current and at a temperature below the melting point of the metal. Examination through a magnifying glass, or low power microscope, discloses to one the amazing fact that, instead of lying quietly on the surface, the particle is actually evincing a decided tendency to move about. As the current is increased, causing an increase in temperature, the particle *does* begin to move with an irregular rolling motion toward one end of the glower.

It presents a most striking appearance as it turns slowly end over end. It may suggest a miniature trunk rolled on its corners by invisible hands. It may suggest a paving stone being turned over and over by a workman. The most irregular pieces will roll with ease.

If the glower be held vertically, the particle will roll up and down, as well as when horizontal, and the effect is unchanged when the glower is turned over. But while the particle is thus apparently defying the laws of gravitation, there is one physical law which it always obeys; i.e., to change instantly the direction of its motion when the direction of the electric current is reversed. It can thus be made to go up and down or back and forth at will.

Nor does the above constitute the strangest part of the experiment. As the glower is rendered hotter by increase of current, the motion of the particle is

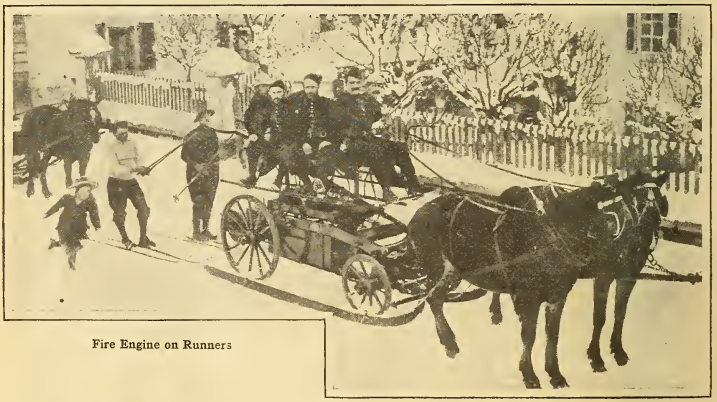
accelerated, and this continues until the melting point of the metal is reached. Then, suddenly, and with what seems like a puff of smoke, it disappears, leaving no trace save a roughened discoloration.

If, at this time, after the temperature has again been lowered, another particle of the same metal is rolled up to the spot, it hesitates and finally stops altogether, refusing to cross. But if the glower be very strongly heated after such a particle has been melted into it, the imprisoned metal is given off. Very curious looking white spots are then sometimes seen to proceed from the spot as the temperature increases. These are oxides of the metal, "metallic ghosts," as it were. They dance and quiver in the intense heat and finally disappear, leaving a surface over which, when somewhat cooled, another particle will now roll freely.

For some reason or other, cobalt is by far the best metal with which to experiment in this relation, although copper will also show the effect well. The particles should be about the size of a small grain of salt. Through a glass of fair power, covered with a piece of red glass for the higher temperatures, the effects mentioned, as well as many others, may be observed.

THE FIRE BRIGADE OF CHAMONIX

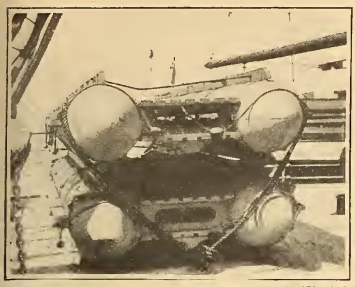
This picture shows a novel method adopted in Chamonix, France, by the town fire brigade for transporting its hand engine. In the warm season the engine runs on wheels, but when the ground is covered with snow it often becomes quite a task to bring the engine to the spot, so they hit upon the original idea of mounting the whole affair, wheels and all, upon a pair of runners so that the horses draw it as a sleigh. Some of the men can follow behind upon skis.



Fire Engine on Runners

UP-TO-DATE LIFE RAFTS

The latest great marine disaster has served to emphasize the fact that the life raft has a distinct place in the equipment for safety at sea and is likely to prove the sole reliance of imperiled voyagers when conditions prevent the launching of lifeboats. Marked improvements have been made in recent years in life rafts and they now have a staunchness and seaworthiness heretofore unknown. One advantage of the life raft is that aboard ship it may be stored in places that would not accommodate a lifeboat. The oblong metal tanks which support the up-to-date



Modern Life Raft

life raft are divided into water tight compartments, each with air pump connection. The newer types of life rafts are built with carrying capacities ranging up to 36 persons.

PARACHUTE DROPS FROM EIFFEL TOWER

A great deal of experimental work must still be done in the matter of designing parachutes which may safely be launched from aeroplanes. Among the investigators in this direction is one Hervieu of Paris and in testing out these devices he drops them from the apex of the Eiffel Tower, with a dummy attached, as shown in the picture.

Aeroplane Parachute Dropped from the Eiffel Tower

PSYCHO-ELECTRICAL PHENOMENA

It has been known since about 1888 that mental labor as well as emotion produce electrical variations in the human body. Two French scientists, Philipson and Menzerath, have recently given the matter very careful study, and have applied the most precise methods of measuring and registering differences of electrical potential in the body by means of an Einthoven galvanometer.

The subject, insulated in a dark chamber, holds in each hand one of the electrodes of the galvanometer, which is observed in an adjoining room. A light flashed in the eyes of the subject causes, two seconds later, the deviation of the register line of the galvanometer, indicating that the right hand has become positive in relation to the left; the difference of potential being about one and a half millivolts. Another excitation, produced by sound, caused another difference of potential greater than the last. When a very simple problem in arithmetic was proposed, no appreciable reaction occurred; but a more difficult problem brought about a considerable difference of potential between the hands.

An intense electrical variation was produced by recalling an injustice of which the subject had been a victim. In every experiment it was the right hand which was positively electrified, even when the subject was left handed, and in every case the time elapsing between excitation and registration was two seconds.

Researches into the cause of these electrical effects have disclosed the fact that mental and emotional activity

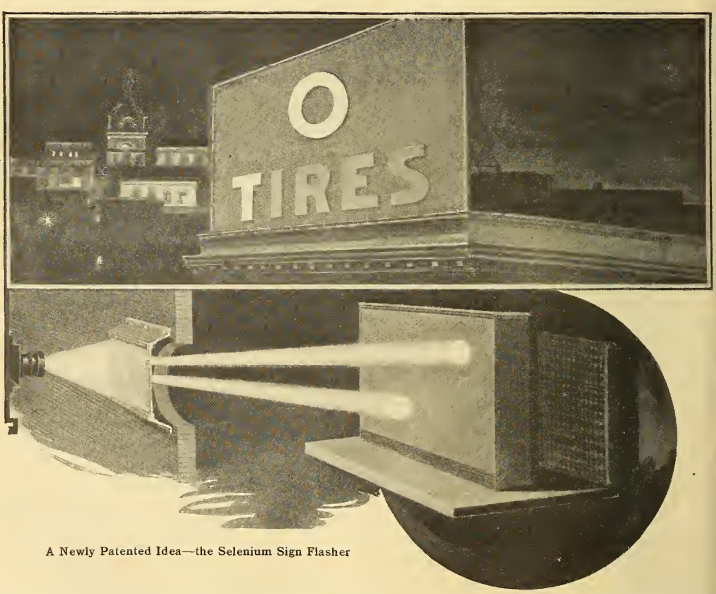
produce a slight contraction of the muscles of the right hand, which it is believed results in the phenomena observed. If this is true it is certainly of great interest from the point of view of the physiology of the brain and nervous system.— *Cosmos.*

SELENIUM CELL SIGN FLASHER

Shafts of light thrown upon one or more selenium cells, each cell operating an electric switch and each switch controlling the current to certain letters or words of a flashing electric sign, is the rather startling announcement of Sixto Ocampo, a Spaniard of New York City, who has just received a patent upon this invention.

Upon second thought, however, this idea may be perfectly feasible, for the selenium cell, as our readers already know, is a conductor of electricity under the influence of light, while in the dark it is practically a non-conductor. Of course, the current which passes through the cell on its receiving a projected ray of light, being small, would control the sign switch through an electro-magnet.

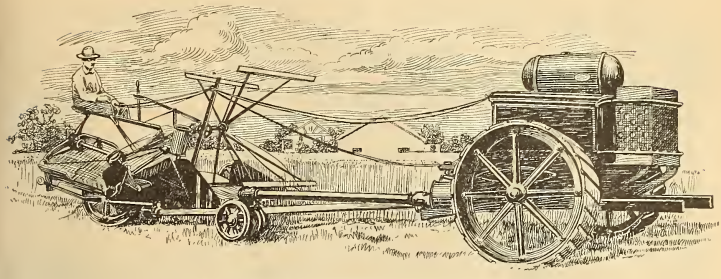
But added to this novel arrangement is the plan for projecting the light rays. It consists of an ordinary projecting machine and moving picture film so made that light may pass through it to certain cells while the dark portions of the film cut off the light to other cells, thus making the moving film the controlling factor.



A Newly Patented Idea—the Selenium Sign Flasher

REINS CONTROL "MECHANICAL HORSE"

A Detroit (Mich.) firm is placing upon the market a four cylinder gasoline and kerosene motor for the use of farmers, a unique feature of which is the control.



Odd " Mechanical Horse " the Engine in Which is Controlled by Reins

The farmer seated upon his wagon, plow or harvester, starts, stops or turns his mechanical steed by means of reins in the same manner as he would drive horses.

AN ELECTRIC HOSPITAL

A model hospital, electrically equipped and complete in all the details, was one of the instructive exhibits at the recent Electrical Exposition in New York. From the diagnostic apparatus to the operating room it showed just how important electricity has become in the treatment of disease. It also marked the development of electro-medical apparatus during the past few years.

The hospital was divided into several departments and each contained the equipment peculiar to that particular department. The physicians' office contained a high frequency machine, a sinusoidal machine, X-ray apparatus, vibrators, a sterilizer and an examining table. In the therapeutic room was a high frequency machine, a light bath cabinet, a therapeutic lamp, electric blankets, an X-ray machine for treatments, a serum incubator and ozonator and a wall-plate. The X-ray department contained a horizontal fluoroscope, a stereoscope for studying plates and an interesting collection of X-ray pictures from certain New York and Philadelphia hospitals.

The striking exhibit in the operating room was the white table under the glare of a pair of focusing shadowless lamps, while close by stood the motor driven intratracheal apparatus for producing anæsthesia. Near by stood the galvanic machine used in the Massey method of treating cancer. There was also an eye magnet, a mercury vapor lamp, an air compressor and a cauterizing outfit.

This exhibit was arranged by Miss Winifred Black, head of the Bureau of Electro Therapeutics of The New York Edison Company. In speaking of the work and the purposes of this bureau Miss Black said: "The Edison Company, realizing the obligation of central stations to instruct in the development of electrical apparatus of all kinds, established this bureau last November for the purpose of showing the medical practitioner just what new appliances were being perfected in his field. To this end the company has secured from various manufacturers not only the special apparatus for administering electrical treatment but the simpler accessories that should be a part of every office equipment. Thus we have a wide variety of appliances from the ordinary facial vibrator to the X-ray installation.

"We realize too the great harm that has been done through advertising electricity as a 'cure-all.' The fact is, there are relatively few ailments that electricity alone will cure—but as an adjunct to the established medical and surgical practices electricity is fast coming into its own."

New York's New Subways

BY NORMAN MAUL

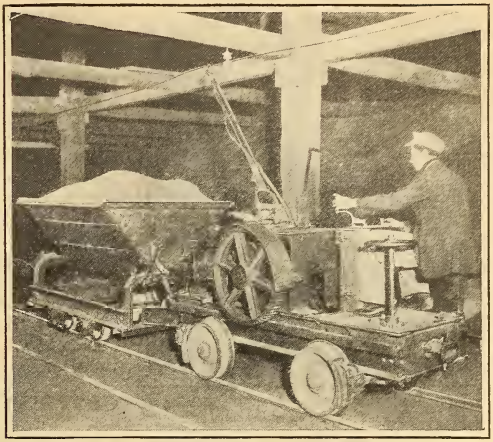
Once more New York is in the throes of an upheaval. Her thoroughfares are paved with planks, massive timbers support elevated structures, landmarks are passing and real estate is booming. All over the city is heard the creak of derrick and whir of motor, the steady rap of drills and the dull blast of dynamite, accompanied by the sound of tumbling stone in concrete mixers and the incessant rattle of the riveters. More subways are being built.

Old Father Knickerbocker, still breathing hard from his effort in getting the construction of the Catskill Aqueduct well under way, has unstrapped his pocket-book again to finance a $337,000,000 job in railroad building, which will when completed give him the most extensive system of city transit in the world. He already boasts a system of close to 300 miles, but when the present work is completed the total will be 618.7 miles of track, while the carrying capacity will be three billion passengers a year as compared with the present capacity of a mere eight hundred million.

Broadway at City Hall Square Showing How the Street Surface and Sidewalks Have Been Replaced by Heavy Timber

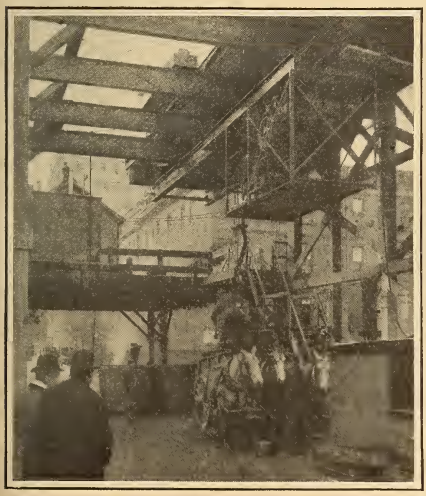
The operation of this railway, which is known as the Dual System of Rapid Transit, will be divided between the Interborough company, which operates the present subway and the New York Municipal Railway Corporation, which operates the present Brooklyn Rapid Transit system in Brooklyn, both of which companies will be under the supervision of the New York Public Service Commission. For a five cent fare it will be possible to ride from White Plains Road in the Bronx, through Manhattan borough,

across Brooklyn and out into Queens Borough, a distance of 26 miles. Another line will extend from Flushing, Long Island, through Queens, over the Blackwells Island Bridge into Manhattan, traversing the entire business district south of Fifty-ninth Street, and on through Brooklyn to Coney Island, a distance of 21 miles. That fare too will be but a nickel, and in neither case will it be necessary to change cars. At present, the longest five cent ride is from Van Cortland Park to the Long Island R.R. station in Brooklyn—a total distance of seventeen and one-half miles.



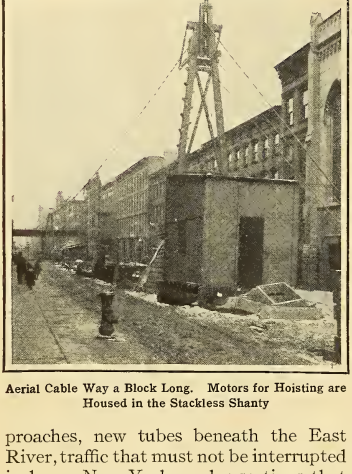
Underground in Lexington Avenue, Showing the Electric Engine Hauling Excavated Material

Beyond the methods of operation there is another interesting comparison between the old subway and the one now building. It affords a striking contrast too, for whereas the builders of the first underground system used steam power almost exclusively, the contractors on this job, with hardly an exception, are using electric motors. The motor installation aggregates close to 15,000 horsepower, and this will be almost doubled when work on the whole system is under way.



At Lexington Avenue and 62d Street, Showing a Traveling Hoist and Method of Dumping Muck Into Carts

Construction shanties may be found all over the city from South Brooklyn to the Bronx, for the work is divided into contracts and each contract awarded separately. By following these shanties the route of the subway may be traced, and all kinds of construction conditions encountered. There are open cuts in Brooklyn, heavy grades on bridge ap-



Aerial Cable Way a Block Long. Motors for Hoisting are Housed in the Stackless Shanty

proaches, new tubes beneath the East River, traffic that must not be interrupted in lower New York, rocky sections that must be blasted away, and the double deck construction for the local and express trains on the Lexington Avenue branch. Each of these is different and each calls for a certain kind of engineering.

However different, though, may be the work of these various contractors their methods, in the main, are the same. They all use electric motors. For instance, at Ninety-sixth Street and the East River there is a central compressor plant that supplies compressed air for all the work between Forty-second Street and One hundred and Eighteenth Street. Here are five 350 horsepower motors, synchronous with the generators at Waterside. Twelve inch pipes extend north and south from the plant and convey the air to the various jobs. Here too should be noted the passing of the steam engine, for engines, with their boilers removed, are operated by compressed air. One of these is a 65 horsepower double drum engine which operates a hoist at the dumping dock, and another is a fourteen horsepower concrete mixer, while a third is a 20 horsepower derrick.

Along the lines of construction motors operate derrick hoists, muck trains, aerial cableways, pumps, and machine tools in various shops. In addition to these there is a clam shell digger operated by an electric motor, the only one yet installed on the job. This is in Union Square, where the route is through sand. Incidentally, arc and incandescent lamps are used for all lighting purposes.

From all these points of construction, the heavy copper feeders lead underground to the big Waterside plant on the East River and day and night the current flows to supply the motors that are making possible Father Knickerbocker's dream of an adequate system of rapid transit.

GIRL DISPATCHES WOOLWORTH ELEVATORS

In the huge, 56 story Woolworth Building, in New York, there are 24 elevators, and a new and very successful system of dispatching the elevators has been devised in which electricity plays a big part. This system has also been the means of creating the most peculiar job held by any young woman in New York.

Under the steady blue eyes of this young woman, Agnes D'Arcy by name, the movement of every one of the 24 elevators is recorded on an oblong board of lights. According to the rules of the building, a car is allowed to stand at the top floor for eight seconds. If it is there nine seconds, the voice of Miss D'Arcy comes through the megaphone into the operator's ear, asking him what is the trouble. If he has a good excuse, well and good. If he has not, look out! The girl has a direct way of speaking that is not to be misunderstood. And in cases of insubordination there is the superintendent behind her, whom she can connect with any elevator's telephone by a mere twist of the hand.

The lines of lights on the board vary in length, according to the distance aloft of the cars. Miss D'Arcy has to watch four banks of cars altogether; that is, four

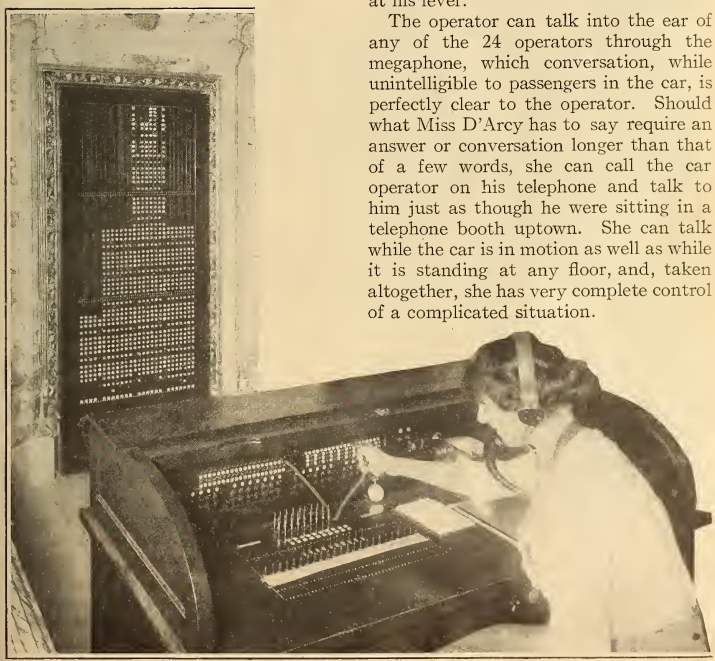
allotments, each running to different heights. First there are the four local cars running express to the fourth and local to the twelfth. Then there are seven cars express to the twelfth and local to the twentieth. Then follow those that run express to the thirteenth and local to the twenty-seventh. Two cars run express to the thirtieth and local to the forty-sixth. And then come the high runs, two of them that do express to the thirty-seventh and local to the topmost, or fifty-sixth floor.

All of these the young operator must keep under her eyes at once — the little hopping lights that come and go on the long paths of the board from 8:30 in the morning to 5:30 o'clock in the afternoon. It's trying work for the eyes, the shift and play of these countless lights that never cease. But Miss D'Arcy says she doesn't mind.

The elevator dispatcher's board is situated on the balcony.

Miss D'Arcy is seated at a combination desk and telephone switchboard. Running from this board are wires which connect with every one of the 24 cars. At any time, in any position in the shafts, she can plug in on a wire and talk to the operator of any car. Situated in each car is a telephone, and beside it is a megaphone, arranged so it is directed into the ear of the operator as he stands at his lever.

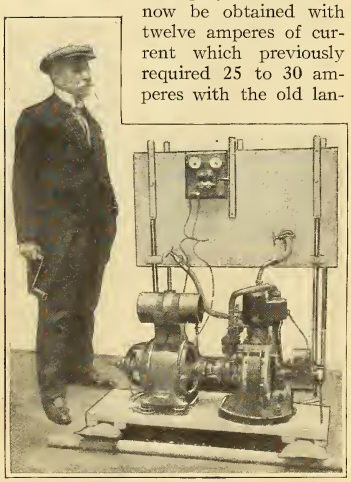
The operator can talk into the ear of any of the 24 operators through the megaphone, which conversation, while unintelligible to passengers in the car, is perfectly clear to the operator. Should what Miss D'Arcy has to say require an answer or conversation longer than that of a few words, she can call the car operator on his telephone and talk to him just as though he were sitting in a telephone booth uptown. She can talk while the car is in motion as well as while it is standing at any floor, and, taken altogether, she has very complete control of a complicated situation.



From This Desklike Switchboard, as She Watches Their Progress on the Lamp Panel Opposite, a Girl Directs the Movement of the 24 Elevators

ELECTRIC POWER PLANT CARRIED BY TWO MEN

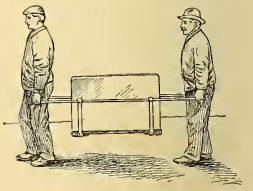
The invention of arc lamps, with short focus reflector and condenser, has done much toward lessening the cost of cinematography, as a projection size can now be obtained with twelve amperes of current which previously required 25 to 30 amperes with the old lanterns and condensers of large diameter. This improvement has been brought about by a better utilization of the light of the arc lamp, which is always the best, and, in fact, the only practical light for public exhibitions. The need for a portable electric generating apparatus for this purpose, as well as for the lighting of country houses, where a current is not otherwise available, has been met by the invention of a Frenchman, Mr. Rene Champly, which is shown in the accompanying illustrations.



Electric Power Plant Which Can be Carried by Two Men

The whole outfit is covered by a sheet metal case measuring 38 by 24 by 13 inches; as the total weight is only 250 pounds, it can be easily carried by two men. The base of the carrying case consists of a piece of hard wood, which serves as the foundation for the small gasoline engine and electric generator. Under this foundation are placed four bags of finely broken cork, which effectually deaden the vibrations of the engine and render any specially prepared foundation unnecessary.

The sheet metal case, on being lifted from its base and inverted, is found to be a water tight tank, capable of holding about 40 gallons. This is set up on four iron pipes, which are a part of the outfit, and connected by stout rubber tubes to the water jacket of the engine cylinder. The lower tube brings the water from the tank and the upper one returns it. A switchboard is fastened on the tank and the dynamo connected with the exhibition hall or with the lighting system, in the case of the apparatus being used for



house illumination. The engine is two horsepower and the dynamo produces a continuous current of twelve amperes at 70 volts and gives sufficient light for cinematography.

AUTOMOBILE SOUNDS ITS OWN FIRE ALARM

When the automobile belonging to Dr. F. C. Schurmeier, of Elgin, Ill., found itself afire, it promptly began to toot its electric horn to rouse the neighbors. Apparently the fire was started by overheating of the machine, and with great courage and fortitude the machine sent out a loud and prolonged appeal which brought the rescuers in a hurry. Heat of the flames evidently burned off the insulation of the wires and caused a connection that sounded the horn.

A Prisoner in the Harem

Adapted from the Blache Feature of the Same Name

In the photoplay the Countess de Marstini, a noted animal trainer, enacts the rôle of "Toru" and Paul Bourgeois, another famous trainer of wild beasts, that of "Akbar."—Editorial Note.

Akbar Spoke Gently to It in a Strange Tongue

A blazing sun shone down upon the tiny thatched hut which the pretty Toru and her miserly father called home, for the hut stood upon an open plain and so was fully exposed to the rays of the Indian sun, which at this hour of the day rode high in the heavens.

Toru's old father was wealthy, as wealth is reckoned in India, and could have built for himself a palace rivaling that of the rajah himself, but his miserly instincts prevented his spending even the smallest part of the wealth he possessed for a suitable domicile for himself and his beautiful daughter.

The daughter's fame as a beauty had

The Tiger Takes Possession of the Harem

spread throughout the length and breadth of the province, coming even to the ears of the rajah. But despite the many suitors Toru might have had, she remained ever faithful to Akbar, the slender, supple, young native into whose keeping she had given her heart many months ago. Akbar was a noted trainer of wild beasts and as he charmed the poisonous reptiles and man eating lords of the jungle, so he won the love of gentle Toru by his soft tones and manly qualities.

Now, though the rajah who ruled over the realm had heard much of Toru's beauty, he had never been fortunate enough to see the girl, so when he rode one day near her humble home, remembrance of the stories he had heard of her beauty came to him and he commanded his retainers to halt near by, while he went to call on Toru and her father.

The pretty maid looked out with awe upon the company gathered before her humble door, until, sighting the rajah, she half guessed his purpose in coming thither and, frightened for her safety, sought refuge within an inner room. The old miser who proudly called Toru "daughter" pretended, however, to be overwhelmed by the honor done him and bowed low before the rajah.

The Indian potentate had seen all the stories verified in the fleeting glimpse he caught of Toru's dusky face and proceeded, therefore, to bargain with the old miser for his daughter. It proved only necessary to jingle a plump purse of coins before the aged miser's eyes to buy his daughter from him. Dispatching his major-domo within the hut, the rajah had Toru dragged forth from her hiding place and placed on the back of one of his steeds, to be carried away to his harem. Though the girl fought and struggled, though she pleaded with tears in her eyes to be released, and soundly berated her unscrupulous father for selling her, the strength of the retainer who held her and the omnipotent power of the rajah proved her undoing, for a sharp command was given and the cavalcade galloped away.

Arrived at the rajah's palace Toru was taken into the women's quarters and there bedecked with gems and ornaments to await the rajah's pleasure. Mightily her little heart rebelled against the indignities heaped upon her and long and earnestly she prayed that Akbar, her lover, might hear of the fate which had befallen her and hasten to her rescue.

As it happened that very night Akbar came to Toru's home to see his sweet-

heart and there learned from her crafty old father what had befallen his beloved. Inwardly raging at the greediness of the old man, who would sell his very daughter for gold, Akbar made haste to leave, and vowed he would yet save the girl from the villainous rajah who had bought her.

Passing through the jungle on his way back to his lonely cabin in the forest, Akbar was attracted by the whining of a huge cat and parting the undergrowth, he beheld at a little distance an enormous tiger rolling on the ground in agony and snapping at its paw. Approaching the beast, Akbar spoke gently to it in a strange tongue and finally dared even to take the injured paw in his hands that he might examine it. Akbar quickly discovered that an enormous thorn had penetrated the paw of the tiger and was causing it intense agony. Gently stroking the paw with one hand, he proceeded with the other to extract the thorn and the tawny beast seemed to find instant relief. The tiger licked first the injured paw and then the hand of Akbar, seeming to try in its dumb fashion to thank the man who had relieved its suffering.

When Akbar at last arose and journeyed on toward his hut in the jungle the tiger followed him, switching his tail from side to side and rubbing its huge head gently against Akbar's body.

After eating his humble meal, Akbar set forth to rescue Toru. He hastened to the walls surrounding the palace of the rajah and the tiger, strange to say, followed him. By skill and stealth, Akbar was able to enter the palace grounds and finally to penetrate even into the huge building itself. He had previously ascertained the part of the building in which the women's quarters were located and thither he made his way.

Just ahead, Akbar perceived two black eunuchs, who served as guardians of the harem, but when these dusky slaves perceived the tiger which accompanied Akbar they fled in terror. The tiger trotted obediently enough at Akbar's heels, but the tremendous size of the jungle cat and the fact that it was free to roam where it willed, proved too much for the harem guards and they deemed it safer to flee, even though they thus incurred the wrath of the rajah.

Penetrating the harem itself, Akbar soon discovered the room in which Toru was confined, for the girl, hearing the cries of the black eunuchs, as they fled in terror before the advance of the tiger, came to the little grill in the doorway of her prison and looked out into the outer room. Great was her joy at seeing her

To Reassure Toru, Akbar Put the Tiger Through Some Simple Tricks

lover come to save her, but almost equally great was her terror when she perceived the tiger which accompanied him.

Akbar was able, however, to calm her fears and briefly related how he had removed the thorn from the tiger's paw and since then the beast had been his faithful attendant. Still Toru was fearful of the huge cat which paced so restlessly backward and forward, and Akbar, to prove how completely it was in his power, arranged some stools in the room and put the tiger through a skillful performance of some simple tricks he had already taught it.

Thus reassured, Toru made preparations to escape from the harem with her

lover's aid and soon the two were on their way from the building. Servants, slaves and soldiers attempted to stop them, but in each instance the appearance of the huge tiger sent those who would hinder them scampering away in terror.

Unfortunately for Akbar and Toru, however, the alarm had been given by the swarthy eunuchs from the harem, who had been the first to encounter Akbar's pet, and ere the two lovers had gone any great distance through the jungle they found themselves surrounded by a vast company of soldiers, slaves and others in the employ of the rajah. A skillful trap had been set for the tiger and once it was captured the soldiers quickly succeeded in catching and binding Akbar and Toru and bringing them prisoners to the palace.

Akbar Threw Himself on the Lifeless Form of the Lion

The girl was thrust back into the harem and Akbar was taken to a huge cage in the rajah's main audience hall where he was confined with his tiger pet. The rajah believed that the tiger, becoming hungry, would attack and kill Akbar, but in this he was mistaken, for the huge jungle cat continued to pace backward and forward, backward and forward, within the confines of the cage, pausing now and then to rub itself playfully against Akbar's hand. Now and then the sweetheart of Toru would stroke the tiger and talk soothingly to it, but for the most part he remained in a kind of stupor, his mind busy with fearful thoughts of what would happen to Toru when the rajah was ready to punish her for her attempted escape.

As the days passed and still the tiger failed to attack Akbar, the rajah raved and swore. Both man and beast were clearly suffering the pangs of hunger, but still their friendship continued and the very fact that they were in a similar plight seemed to create a bond of sympathy between them.

At the end of the fifth day the rajah ordered Nero, one of the largest lions in captivity, to be thrust into the cage with the tiger and Akbar. Surely Nero would put an end to them both, thought the rajah. As the palace slaves brought the captive lion toward the cage, the tiger crouched in a distant corner, switching its tail in fury and growling hoarsely. Nero's eyes lit up and a roar that shook the very walls was emitted from his huge body.

Quickly the slaves thrust the lion within the cage and slammed the grated door. The rajah and his favorites gathered in the huge audience chamber to witness the battle between the beasts. The fountain in the center of the great room splashed merrily, a lordly peacock preened himself as he strutted about and the throng gathered to witness the combat caught its breath with a gasp as the tiger sprang with a roar toward the advancing lion.

The New Rajah Commands That Toru be Burned on the Funeral Pyre of His Predecessor

For more than an hour the battle continued between the lion and Akbar's tiger. Each beast was scratched and scarred, where the cruel claws of the other had torn long gashes in its flanks. The cage was literally splashed with blood and the roars of the contestants horrified the spectators, but, at last, the tiger conquered. Obtaining a death grip on the neck of the lion, the tiger clawed and ripped and tore at the flesh of its adversary until Nero sank to the floor of the cage a bleeding, lifeless carcass, and Akbar threw himself upon the lifeless form.

Aroused to fury, the rajah drew his jeweled sword from its scabbard and himself entered the cage. Wearied as the tiger must be, the rajah believed that he could easily conquer him and then attack Akbar.

Alas for the rajah's hopes! No sooner had he stepped within the cage than the tiger leaped for his throat. The rajah sought to ward off the leap by a thrust of his sword, but the weapon only grazed the tiger's side, while the beast's teeth sank into the soft flesh of the rajah's throat.

The cage door had not been closed when the rajah entered, so Akbar seized the opportunity offered for his escape. With a command to his pet, Akbar plunged through the door and, unharmed, proceeded to make his escape from the palace. The tiger, bleeding and bruised, followed him and not one of the palace guards dared to halt his progress. Weary and sore in body the great beast laid down in the fastness of the jungle to lick his wounds and Akbar laid down beside him, but not for long.

Within an hour following the rajah's death his successor had assumed the

A Moment's Rest in the Fastness of the Jungle

reigns of power and his first command was that Toru, the rajah's latest favorite, should be burned on the funeral pyre of her lord, as was the custom of the country. Poor little jungle girl! There seemed no escape for her this time.

Akbar, however, knowing the custom of the land, had suspected the fate which would be meted out to Toru, and feeling himself helpless to again combat the rajah's staff of guards, servants and slaves, had hastened to the nearest English post to seek aid.

Weary and footsore, Akbar related his story to the British officers before whom he was taken when he arrived at the post, and within an hour a troop of English soldiers were on their way to the rajah's palace. Their approach was noted from a distance and the new rajah decided to oppose them, but the time was so short in which to prepare the defenses of the palace, and the attack of the English was so vigorous, that ere long the battle ended in a triumph for the English.

Akbar, who had accompanied the troops, hastened to the harem where he found Toru safe and unharmed, though badly frightened by the sounds of the battle she knew to be raging without. With the girl clasped in his arms Akbar went before the gruff old colonel, who commanded the attacking forces, and Toru in broken English managed to gasp out her thanks for the rescue. A week later Akbar and Toru took up their residence in the little hut of the former in the jungle clearing. The tiger, which had played such an important part in their life history, was petted and cared for and in time its wounds healed and it grew sound and well. Peace and quiet and happiness settled down upon the home of Akbar and his bride, but it will be many a long day before they can either forget the stirring events through which they passed during the days when Toru was a prisoner of the harem.

SCENES LAID IN MANY COUNTRIES

During the recent trip of a company of Vitagraph players around the world advantage was taken of the opportunities offered to film scenes from various dramas in the different countries visited. For instance, in the picture entitled "On Their Wedding Eve," which tells the story of a young couple who quarrel on the very eve of their wedding, and separate, to forget each other in travel, scenes were taken in Japan, China, Egypt and Italy, and later these were completed by a series of interiors taken upon the return of the company to the home studio

In the Shade of the Sphinx

in Brooklyn, New York. Maurice Costello, the popular Vitagraph leading man, is seen in the accompanying illustration on the back of a camel in the shade of the Sphinx and the Pyramids in Egypt.

What Happens to the Scenario

If you are writing a scenario you want to know where it is going to go, how it is handled, who handles it, how, if acceptable, it is filmed, and other details of a more or less technical nature which will keep you from working in the dark and at a disadvantage. This is the first of a series of articles which will contain much valuable information for the scenario writer.

With bankers, barbers, stenographers and office boys strongly impressed with the belief that it is easy to write motion picture scenarios, not to mention the thousands in between the banker and the office boy classification, it is easy to understand why the script department of the average film company is daily in receipt of several hundreds of photoplays.

Few, however, of the would-be photoplaywrights are familiar with the fortunes or misfortunes of their brain-child, once it reaches the film plant to which it has been mailed. If it is accepted, many and varied are the incidents centering about it, while if it is rejected it can only try, try again. While each motion picture producing company has its own individual method of handling the manuscripts submitted for its approval, in general the scenario is handled in about the same manner by all companies.

Some companies immediately upon receiving a manuscript mail the author a printed form reading about as follows:

"We have received from you to-day the following manuscript:

The Bell-hop's Dream,

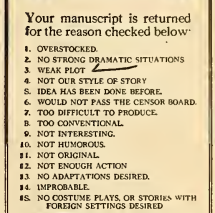
which will be given our careful consideration. Writers should retain carbon copies of any scenarios submitted to us, as we are not responsible for MSS. lost in the mail. Sufficient postage for return of manuscript must accompany all contributions if it is desired that they be returned.

Yours truly,

SCENARIO EDITOR."

Other companies, however, make no acknowledgment of the receipt of scenarios and the writer must wait patiently until he either receives a check for his story or has it returned to him.

The manuscript is carefully read by the scenario editor, who is so experienced that he can tell almost immediately whether the manuscript will be acceptable or not. If found unsatisfactory, the manuscript is returned to the author, accompanied by a rejection slip of about the type reproduced in Fig. 1, with the reason for its rejection checked off with a pen or pencil, as shown in the slip illustrated.


Essanay

Your manuscript is returned for the reason checked below:

1. OVERSTOCKED.
2. NO STRONG DRAMATIC SITUATIONS
3. WEAK PLOT
4. NOT OUR STYLE OF STORY
5. IDEA HAS BEEN DONE BEFORE.
6. WOULD NOT PASS THE CENSOR BOARD.
7. TOO DIFFICULT TO PRODUCE.
8. TOO CONVENTIONAL.
9. NOT INTERESTING.
10. NOT HUMOROUS.
11. NOT ORIGINAL.
12. NOT ENOUGH ACTION
13. NO ADAPTATIONS DESIRED.
14. IMPROBABLE.
15. NO COSTUME PLAYS, OR STORIES WITH FOREIGN SETTINGS DESIRED
16. ILLEGIBLE.
17. ROBBERY, KIDNAPPING, MURDER, SUICIDE, HARROWING DEATH-BED AND ALL SCENES OF AN UNPLEASANT NATURE SHOULD BE ELIMINATED.

Yours very truly,

ESSANAY FILM MFG. CO.

Studio and Laboratories 1333 Argyle St. CHICAGO, ILL.

Fig. 1. Anyhow, You Gained Some Experience

If the reason for the manuscript's rejection comes after the eighth reason listed, an additional slip, reading as follows, is also enclosed when the manuscript is returned:

Arrange your story in scenario form.
A synopsis of about 200 words, followed by short scenes.
All manuscripts must be typewritten.
We are in the market for original dramatic stories with strong heart-interest, for short stories with unusual themes, and for bright, sparkling, high-class comedies.
We are not soliciting western scenarios, costume plays, war stories, or plays with foreign settings.

The rejection slip of the Selig Polyscope Company lists the following reasons for returning manuscripts:

Not available for present use.
We are overstocked with manuscripts.
Would make a better magazine story than a photoplay.
Similar to copyrighted story.
Similar theme used before.
Scenes laid in foreign countries not desirable.
Costume plays not desirable.
Not sufficient action.
Too conventional.
Plot not strong enough—story lacks "punch."
Would not pass "Board of Censors."
Too unpleasant.
Too improbable.
Comedy too much of the slap-stick order.
Impractical for the camera.
Would be too expensive to produce.
Cast too small to make interesting picture.
Lacks moral tone.

and adds the following paragraph:

For your guidance, should you prepare other scripts for our consideration, we suggest that you avoid incidents

and characters, as follows: Thefts, hold-ups, kidnapping, smuggling, burglary, murder, lynching, forgery, suggestive situations, lewd women, drunkards, and other types and actions not consistent with the upbuilding of the photoplay.

Questioned as to why, ninety times out a hundred, the amateur fails to sell his script to the film manufacturer, Miss Louella O. Parsons, scenario editor of the Essanay Film Manufacturing Company and one of the kindest personages who ever sat behind a scenario editor's desk, said:

"The reason so many beginners fail to sell their scripts is that they attempt to write a scenario with absolutely no plot. The amateur will take an incident bare of all dramatic or humorous possibilities and try to weave a photoplay. A scenario must always have a "punch." The climax must be a strong situation, something gripping, the moment when the interest of the audience is keen. Of course, technique and proper construction are of the utmost importance, but we believe that writers are born, not made. Fertile imagination, a logical mind and a keen understanding of human nature are the most essential requirements for a scenario writer. If he has these he can easily learn properly to construct his script. It is true that most of the scenarios received are absolutely hopeless. Occasionally we are able to buy a scenario from a new writer, but most of the scripts submitted by the beginners are worthless. The most frequent cause for rejection next to weak plot is old idea. Hundreds and hundreds of scenarios find their way back to the author simply because he has used a threadbare plot and a stereotyped situation. We are constantly on the alert for something new, something out of the beaten path, and when such a script is submitted to us we are very glad to pay the author a good price for his story."

But should the scenario prove available its tale is a happier one. That of "Vengeance," a Majestic subject recently produced, is evidenced.

The story, as the scenario editor received it, was neatly typed on ten sheets of neat, white paper, typewriter size, and, from the general appearance of the copy, was evidently the work of one who had given scenarios and their making much careful thought.

To give briefly the proper arrangement of a scenario the first two or three pages of the manuscript are produced herewith:

CAST

Jack, a young bookkeeper.
May, a stenographer, in love with Jack.
Cozetti, an Italian banker, employer of May and Jack.
May's mother.
Tony, Angelo, Pietro, Beppo and Maria (Italian desperadoes).
Mike, a bricklayer.
Lieutenant and policemen.

SCENES INTERIOR

Scenes 1–7. Outer office. Cozetti & Co.
Scene 8. Cozetti's private office.
Scenes 11, 45, 49. Back room in saloon.
Scenes 14, 18, 22, 25, 27, 30, 43, 46. Cellar.
Scenes 34, 36, 38. Police station.
Scenes 37, 41, 44. Int. chimney.

SCENES EXTERIOR

Scenes 2, 4, 6, 16, 26, 28, 31. Garden in front of May's home.
Scenes 3, 5, 15, 17. Gate in front of home.
Scene 9. Ext. office building.
Scenes 10, 12, 48, 50. Side entrance to saloon.
Scenes 13, 19, 21, 23, 32, 42, 47. Ext. old house.
Scenes 20–29. Along street.
Scenes 24, 33, 35, 39. Ext. half finished building.
Scene 40. Scene near 24.

SYNOPSIS

Pietro Cozetti, a wealthy Italian banker, falls in love with May Summerfield, his stenographer. May, however, prefers John Baldwin, Cozetti's bookkeeper.

Cozetti follows May to her home and proposes to her. She refuses him. The next day John and May resign and Cozetti is told that they will soon be married. Half frantic with rage and jealousy he determines that if he cannot marry May no other man shall, so he enlists the services of several rough characters, and May, by a clever ruse, is decoyed into the cellar of an old house where she is bound and sealed up in the chimney by a bricklayer whose services are secured.

The bricklayer tells the police of his adventure and of the girl's peril. Baldwin, alarmed at May's protracted absence, goes to the police station to notify the police. His story fits in with the bricklayer's and all go to the old house. They break in and the bricklayer recognizes the cellar. Active use of a pick brings the unconscious girl to light and she is carried home. Further pursuit of the trail leads the officers and Baldwin to the room where Cozetti is paying his aides. They are seized by the police after a struggle and carried off.

Baldwin and May, unharmed, are reunited.

SCENARIO

SUB TITLE: COZETTI, THE ITALIAN BANKER, IS ATTENTIVE TO HIS STENOGRAPHER

Scene 1. Main office. Jack at bookkeeping desk. May working at typewriter. Cozetti enters from inner office with papers, gives Jack some instructions, then comes to May's desk, dictates letter to her and is very attentive.

SUB-TITLE: THAT EVENING. MAY REFUSES TO MARRY COZETTI

Scene 2. Garden in front of May's home. May and mother discovered. Cozetti enters from street and greets May and mother. May shows surprise, but introduces Cozetti to mother. Jack enters from street and joins them.

Cozetti greets him patronizingly. Mother talks to Jack, and they stroll down toward gate, Jack looking back occasionally at May and Cozetti.

Scene 3. At gate. Mother shows Jack flowers, etc.

Scene 4. Same as 2. Cozetti makes violent love to May, seizes her hand and kisses it. May repulses him. He asks her to marry him. She shows aversion. Cozetti seizes her in his arms. May cries out.

Scene 5. Same as 3. Jack and mother hear cry and run back to house, Jack much in advance of mother.

Scene 6. Same as 2. Cozetti and May struggling. Jack rushes in, seizes Cozetti. They struggle and Jack hurls Cozetti to the ground. Cozetti slinks off. Jack takes May in his arms and comforts her.

SUB-TITLE: THE NEXT DAY

Scene 7. Same as 1. Clerks at work, with the exception of May and Jack. Cozetti enters from inner office and shows anger at their absence. Jack enters from hallway, looks at Cozetti scornfully and hands him letter.

Insert letter, reading:

"Mr. Pietro Cozetti. Sir: After your conduct last night it would be impossible for me to remain longer in your employ. My fiance, Mr. Baldwin, also severs his connection with you.

Yours truly,
MAY SUMMERFIELD."

Back to scene:—

Cozetti reads note, shows dismay, tells Jack in ingratiating manner that he will treat them well if they will stay. Jack says scornfully that they don't care to work for him and exits. Cozetti exits into inner office.

Scene 8. Cozetti's private office. Cozetti enters and sinks into chair. Shows anger at attitude of Jack and May, pounds desk vindictively and exclaims,

SUB-TITLE: "IF I CANNOT HAVE HER, NO OTHER MAN SHALL"

He considers, smile of triumph comes over his face. He takes hat and exits,

and so on through the 50 scenes which it takes to tell this exciting story.

The scenario read, the editor writes his approval of it on a blank for that purpose, using a carbon sheet. This endorsement of the story is given to the producer or director who is to stage the story in the studio, who puts his "O. K." on it, returns the original endorsement to the scenario editor, and keeps the duplicate one himself. The endorsement slip is like the one reproduced in Fig. 2.

The next step is to inform the author that his scenario is approved and accepted, and the following notice of acceptance is mailed to the author:

Mr. John Doe,
New York City.

Dear Sir:—We take pleasure in enclosing you herewith our check for fifty dollars ($50) in payment of your scenario, "Vengeance."

Kindly sign the enclosed assignment of copyright blank and return to this office.

We have added twenty-five cents to check for notary fee. Please have contract signed by notary, and properly witnessed, and return.

We will be pleased to have further contributions from you.

Very truly yours,

The copyright blank reads:

In consideration of the sum of ..... paid by the BEST FILM COMPANY of Somewhere, U. S. A., to ..... (hereinafter referred to as "the Author"), the said Author hereby sells, assigns, and transfers to the said BEST FILM COMPANY, its assigns and successors, the manuscript of a certain dramatic composition entitled ....., together with all the right, title and interest in and to the said dramatic composition, including the right to copy, dramatize, produce and reproduce it in any manner whatsoever, and to obtain copyright thereof in the United States.

The said Author warrants that he (she) has full right to convey the interest herein assigned, that he (she) has not executed and will not execute any agreement in conflict therewith, that the said dramatic composition is original with him (her) and that no incident therein described is, to the best of the Author's knowledge and belief, the same as or a colorable imitation of any incident in any other copyrighted book or play. .....

Dated .....
Witnesses.....
.....

With the signing and mailing of this copyright blank the author's responsibil-

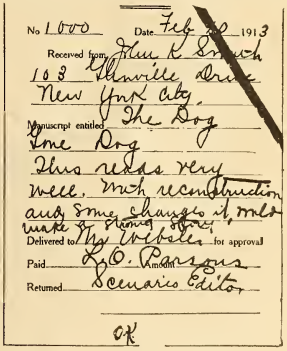


Fig. 2. The Endorsement Slip

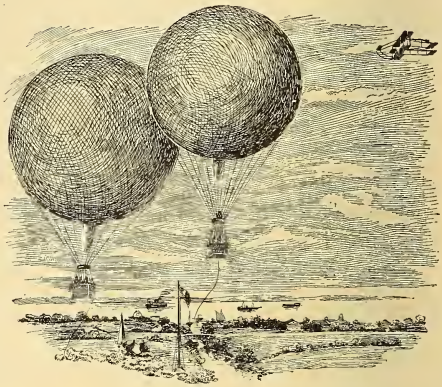
ity for the film story ends and that of the film manufacturer in reality just begins, for the story, as it is submitted to the scenario editor, and as it is shown on the screen for the entertainment of the public, are often strikingly dissimilar. The original scenario may furnish the main idea, and from it the producer, into

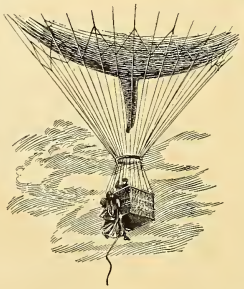
whose hands it is delivered, may weave an almost entirely new story. Often stories of 20 or less scenes are changed to have 40 or more, and just as frequently it works the other way. A story which, when submitted, featured a male character may be changed in the studio to meet the needs of a strong female lead and rewritten so that the part to be enacted by the high salaried and extremely talented leading woman of the film company is made the center of the story.

(In the next issue will be learned some interesting things in connection with the production of the scenario.)

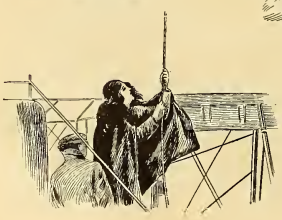
MAKING A PICTURE PLAY IN THE CLOUDS

The British and Colonial Film Company has just concluded taking the final scenes in a subject, which for sensationalism would be hard to surpass. The pictures were taken from a balloon, and the players in the principal scenes were in aeroplanes or other balloons. The climax of the film comes in a chase of a balloon full of criminals by a man and a girl in an aeroplane. While at a height of 3,000 feet, the girl in the aeroplane (Miss Marie Pickering) jumps from the machine into the balloon. She misses, but catches the guide rope and climbs up this and into the basket. During the taking of the pictures the services of three aviators—Messrs. Turner, Ewan, and Verrier—were required.





Various Steps in the Great Cloud Play Pictures

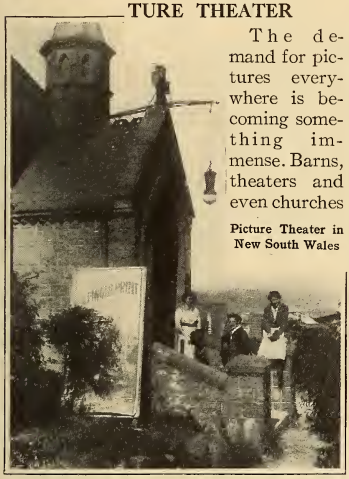


FIREPROOF FILMS IN FRANCE

It is reported that since December 1 none of the ordinary celluloid films have been shown within the boundaries of France, for on that date a law went into effect which makes it compulsory for every exhibitor to use nothing but the new non-inflammable films recently patented by the Pathe Company. The new film withstands fire in a striking manner, as careful and repeated tests have proven it practically non-inflammable. Its exact composition is a trade secret carefully guarded by Messrs. Pathe, but it is known to consist of cellulose impregnated with paraffin and alum. The Prefect of Police, M. Hennion, has taken stringent measures to ensure the enforcement of the new law and every French theater

displays prominently a sign bearing the legend "Only uninflammable films shown here."

CHURCH CONVERTED INTO PICTURE THEATER



Picture Theater in New South Wales

The demand for pictures everywhere is becoming something immense. Barns, theaters and even churches are being used to house the patrons of the silent drama. Our picture shows the transformation of a church in New South Wales into a picture palace.

INDIANS AND MEXICANS AIM TO KILL

Indians and Mexicans undertook to settle some of their grievances against some cowboys by ramming metal and lead down the muzzles of their guns and firing them during a recent sham battle that took place in the making of a spectacular Western photoplay for the "101 Bison" Company at their ranch, near Los Angeles, California.

The pieces of lead and the metal and empty cartridges shown in the accompanying picture are a few of the samples found lodged in the saddles of some of the cowboys. That none of the men were injured is considered miraculous. As is generally known, blank cartridges are used during the taking or making of these scenes, but the confusion is so great and there are so many persons firing at the same time that it would be impossible to single out a man who wished to put a real bullet or slug of some kind in his gun. Realizing this, some of the Indians and Mexicans sought to take advantage of the situation.

Souvenirs from the Playful Mexicans and Indians

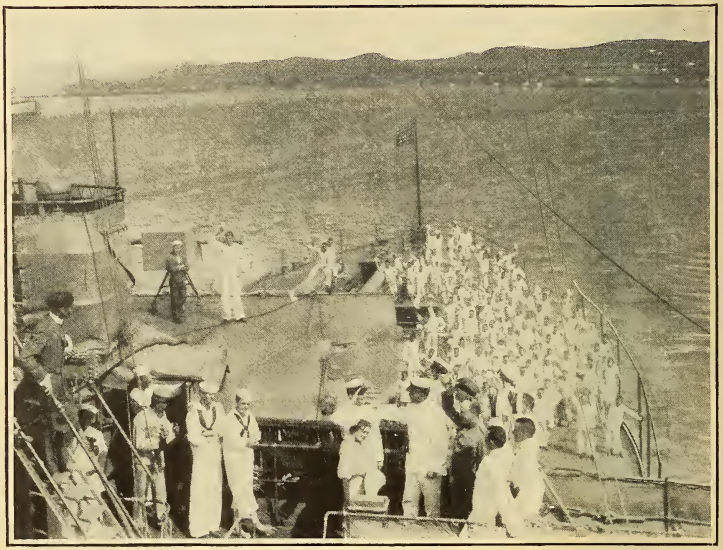
Previous trouble had existed between the whites and reds at the ranch and Manager Bernstein had taken extra precautions in preventing bullets of any description entering the camp. However, old fashioned guns which have a large bore were used in this production and permitted almost any kind of slug being rammed into them, on top of the blank cartridge, and forming a missile, which at close range would be dangerous.

CORRECTION

In the November, 1913, issue, page 780, the statement is made that the "What Happened to Mary" series of films was produced in conjunction with the *Woman's World*. Credit should have been given instead to the *Ladies' World*.

Uncle Sam's Motion Picture Shows

BY H. K. TWOMBLEY



Victory for the Fleet and the Hero Who Has Won His Wife

For years one of the greatest problems faced by government officials has been how to tell the people throughout the country what their government is doing for them. Practically every recognized method of advertising was tried and rejected. Newspapers were entreated to print "feature stories" of the work of the departments at Washington, magazines were supplied with articles dealing with the new inventions and discoveries for the betterment of farmers and others; the government even went so far as to purchase advertising space in magazines and on billboards to show the joys of life in the navy and army in order to secure recruits.

For some reason, however, the general public did not appear to be as interested as it should in the work being done by its own government. It remained for the Department of Agriculture, the one branch of the government which needed advertising more than all the others, to solve the problem.

Previous to his acceptance of the portfolio of Secretary of Agriculture, David Franklin Houston was professor of agriculture at the University of Missouri. While there he had several times advocated the use of motion pictures as an aid to farmers in telling them of advances in the art of tilling the soil and reaping maximum profits. Upon taking up his duties at Washington, Secretary Houston accordingly decided to carry this idea into general effect.

He directed that a number of trial

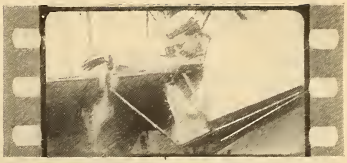
films dealing with the eradication of cotton bolls, the treatment of cattle ticks, the best methods of bee culture and the like be prepared under the direction of government experts and exhibited throughout the country. Some mention has already been made of the work which the department has carried on in this direction.

Reports of the department show that these films have been received with even more enthusiasm than had been anticipated. Farmers came for miles to see the pictures and left with the firm resolve to try some of the new methods advocated by the department, children were interested almost in spite of themselves, and thus the government was able to reach the class which it had been impossible to touch through the medium of bulletins, lectures and the like—the younger generation of farmers upon whom depends the future prosperity of the country.

Department of Agriculture experts, therefore, are enthusiastic over the results produced by the motion pictures already in circulation and orders have been placed for the production of a number of other films which will be shown in all sections of the country during the next year. It is safe to say that there will not be a town of any size which will not have a view of the government-made motion pictures during 1914. It is the plan of the Department to send these films to every section of the United States and to "play return engagements" as often as there is popular demand for them. The object of the pictures is education and the government is prepared to see that everyone is given an opportunity of witnessing the films.

But the Department of Agriculture is not the only branch of the government which has taken up motion pictures as the best possible medium of advertising.

Realizing that the recruiting strength of the army and navy has been falling off at an alarming rate during the past decade, the War and Navy departments



Dropping Bombs from an Aeroplane Upon the Attacking Fleet

some time ago decided to institute a well-defined "campaign of advertising." Practically every known medium of publicity was made use of, but with only partial success. The number of men who signified their intention of entering the military service continued to be less than the number needed for the proper manipulation of the ships or the filling out of the complement of the regiments.

As soon as the success of the Department of Agriculture's campaign with moving pictures became known, however, Secretary Daniels of the Navy and Secretary of War Garrison decided to make use of them to help their departments.

The naval picture was the first one to be finished. It is a five reel film entitled "Victory," which is now being shown, and which, according to Navy Department reports, is already having an appreciable effect upon the recruiting offices.

The film was made with the aid and by the direction of the Navy Department and includes such scenes as Secretary Daniels signing the order sending the Atlantic Fleet to Cuban waters, Rear

Rear Admiral Badger Directing the Battle from the Bridge of the U. S. S. Utah

In Which the Hero is Introduced to the Villain. Just Enough of the "Love Story" is Introduced in the Naval and Military Pictures to Add Spice to the Scenes of War

Admiral Badger directing the battle from the bridge of his flagship, the destruction of the land forts by the fire from the American ships and the final rout of the attacking fleet by means of bombs dropped by the hero from an aeroplane guided by Lieut. J. H. Towers, U. S. N., one of the foremost of the navy aviators.

This picture is not one of the ordinary type referred to as "educational subjects" which are often dry and uninteresting, for a pleasing and highly probable little story runs through and binds the whole together, linking the educational element with that which is purely entertaining. It is a sort of sugar coated pill which educates us while it entertains and amuses, and for this reason will be shown in motion picture theaters of the ordinary class as a full evening's entertainment.

The film was made as an experiment but it has already proved itself to be a success. Its circulation has been necessarily limited but it is planned to show the picture all over the country within the next year and the Navy Department is already busy on plans for another picture along similar lines. It is thought that the exhibition of these films will have the effect of fanning the flame of patriotism and thus gaining recruits in large numbers for the Navy.

The Army picture, now nearly completed, will show an attack upon Manila by a foreign force and their repulse by the American army.

War Department officials claim that this will be the most costly and magnificent picture of its kind ever taken, practically every member of the regular army now in the Philippines being in the film. As in the navy picture the aeroplanes will play an important rôle and there will be just enough of a "love story" moving through the film to bind the scenes together into a coherent whole.

The Departments of Commerce and Labor are also planning to issue "advertising films" during the present year. Pictures illustrative of the work of the Bureau of Standards at Washington—including the clock which sets the time for

the Western Hemisphere and the machine which tests steel rails by bending them like so much rubber—will be the first to be issued by the Department of Commerce.

The plans of the Department of Labor, however, call for pictures with a more general appeal and a more striking moral. For example, the first film to be made by this branch of the government will show a number of the swindles which are practiced upon immigrants by unscrupulous criminals who make a practice of robbing those whose knowledge of English is very poor. The government has been unable to obtain convictions in the great majority of cases owing to the ignorance of the immigrants, but the Department of Labor intends to exhibit films showing these swindles and giving information how to avoid them. These pictures will be exhibited in foreign quarters of large cities and in other places where immigrants congregate and the explanatory text will be translated into various languages.

THE FISH WITH A STORAGE BATTERY IN ITS BRAIN

Much interest was recently aroused over the Patheplay release with the above title, for this film clearly illustrated many points of interest in connection with the electric ray, a fish with the peculiar faculty of delivering an electric shock at will. The fish inhabits the Atlantic and Indian oceans and the Mediterranean sea, lying safely hidden in the sand at the bottom, awaiting the approach of its prey. Once its victim gets within its reach the electric ray sends forth a shock that quickly overcomes the helpless prey. The apparatus by which this wonderful fish is enabled to deliver the electric shock is clearly shown on the screen as are various experiments calculated to show the high current carried by this peculiar inhabitant of the seas. The illustration shows one experiment in which it is said that the ray was enabled to light an incandescent lamp by its storage batteries.

Connecting a Lamp with the Batteries of an Electric Ray

LEAPS 30 FEET DOWN A CLIFF

A jump of 30 feet, down the face of a 228-foot cliff, on a projecting rock about seventeen feet square, was the difficult and dangerous feat undertaken by Lindsay J. Hall, to assure realism in a certain scene in "Over the Cliff," a thrilling Western Eclair drama. This narrow space of seventeen feet was all that stood between Hall and eternity, and, it is, perhaps, one of the most daring risks that has yet been essayed by a photoplay artist. The camera operator confessed afterwards that he was unable to watch the man jump, fearing that he would be dashed to pieces. When the scene was finished the company was so unnerved that operations ceased for the day.

In this same picture Miss Barbara Tennant was seriously bruised by a large rock, dropped down from the top of a cliff by a gang of ruffians.

MARGUERITE LOVERIDGE

Marguerite Loveridge is the girl whom the critic discovered, and who leaped almost overnight from practical obscurity to the position of leading woman in one of the foremost motion picture concerns of this country. The pretty Marguerite was playing an obscure role in a Thanhouser drama when a New York critic commented on her beauty and asked who she was. The query resulted in C. J. Hite, the head of the film company, sending instructions to his director to seek out the girl and give her larger opportunities. Miss Loveridge "made good" in a surprising way and today her position is assured. She now plays leads in "Apollo" comedies opposite Fred Mace.

MARC McDERMOTT

Marc McDermott is an Englishman by birth and during his long stage career has played in England, Ireland, Scotland, Australia and the United States. Seven years of his life were devoted to the interpretation of Shakespearean roles, and the next few seasons were spent in the company which Mrs. Patrick Campbell brought to this country. He spent a year with Richard Mansfield, and another with Joseph Brooks, under Klaw and Erlanger's management. Small wonder is it that McDermott, on entering the picture field, at once established himself as one of the foremost actors of the silent drama. He is at present heading an Edison Company in England.

Music Transmission Room. Note transmitters in Hands of Members of the Quartette and Instrumental Transmitter on Violin

The Loud Voice

In his book "Looking Backward" Edward Bellamy predicted that in the year 2000 we may sit in our homes and hear the music of an orchestra miles away, listen to a prima donna as she sings at the theater, or on Sunday morning by "turning a screw" hear a sermon which if not to our liking may be replaced by another or another until we are satisfied.

But Bellamy was 87 years behind the times. The Utopia which he pictured is in some details already here. The Musolaphone, "the loud voice," at the "turning of a switch" fulfills his prophecy in part.

From a central station, over telephone wires to the home, office or factory, music, weather reports, etc., may be delivered at the order of the subscriber. The Musolaphone apparatus, in conjunction with the Automatic telephone system which is now serving Chicago, consists of a transmitter (the sending device), one for the voice and one for sending instrumental or recorded music; the reproducer (the delivery end of the system) where the sound is reproduced in its original volume, amplified to a larger volume, or cut down in volume as conditions require, and the amplifier, a device which is used when a large number of reproducers are served from one transmitter or on long distance transmission.

Advance weekly programs received by the subscriber place him in touch with whatever service is being given, making it possible for him to select any of the daily musical programs for the week, which are of diversified character, ranging from the popular to the distinctly artistic renditions by grand opera stars or renowned instrumentalists.

As an illustration, a program is made up as follows: From eight to twelve in the morning, announcement of special

(1) Bulletin Transmission Room. (2) Guests Listening to a Musolaphone Concert. (3) Cigar Store. Baseball Bulletins Being Received by Musolaphone. (4) Transmission Room. J. J. Coma, Inventor, at the Switching Table

bargain sales at the leading stores is made, and the principal news items are read from the morning papers including the United States weather report, stock market quotations, announcements of special events happening during the day, etc. At twelve o'clock the announcement of standard Western Union time is made. From twelve to one-thirty is given up to a musical program, especially adapted to cafés, restaurants, dining rooms, etc., and following this is a running description of ball games of the home team and results and scores by innings of other teams in both leagues during the baseball season. In winter lectures by prominent people will be obtainable besides language lessons in French, German, Italian, etc., and a period will be set aside for the reading of children's stories. A half hour's music for dancing will be offered each evening.

When the furnace was first invented some one remarked that it would be a sad evening when the family abandoned the fireplace to sit around a hole in the floor. Will future generations leave the piano to listen toward a funnel at an upper corner of the room, where the reproducer is usually installed?

Fireplaces are still a part of a well designed home and the piano will doubtless not lose its charm.

Chas. A. Comiskey of the Chicago White Sox says: "The day of the megaphone man has passed at our park." Nearly 200 reproducers are distributed about the bleachers to keep spectators informed of the details of the game.

At the Naval Pageant, Chicago, last summer, the grandstand was more than two-fifths of a mile long. On the first day Bishop Fallows made an opening prayer to 30,000 people, many of whom

would not have known what was taking place, yet with the grandstand equipped with the Musolaphone system the great throng remained silent and with bowed heads, every word being distinctly carried to the remotest seat.

Next summer the S. S. Theodore Roosevelt will be equipped with the system, making it possible for the captain to talk to the crew and also to every passenger at the same time if necessary.

The uses to which the system may be put are beyond mention. Probably the most unique use is the installation of 28 reproducers in a large factory having many employees and seven acres of floor space. At the noon hour music is dispensed to the workers, the girls frequently dancing to the music.

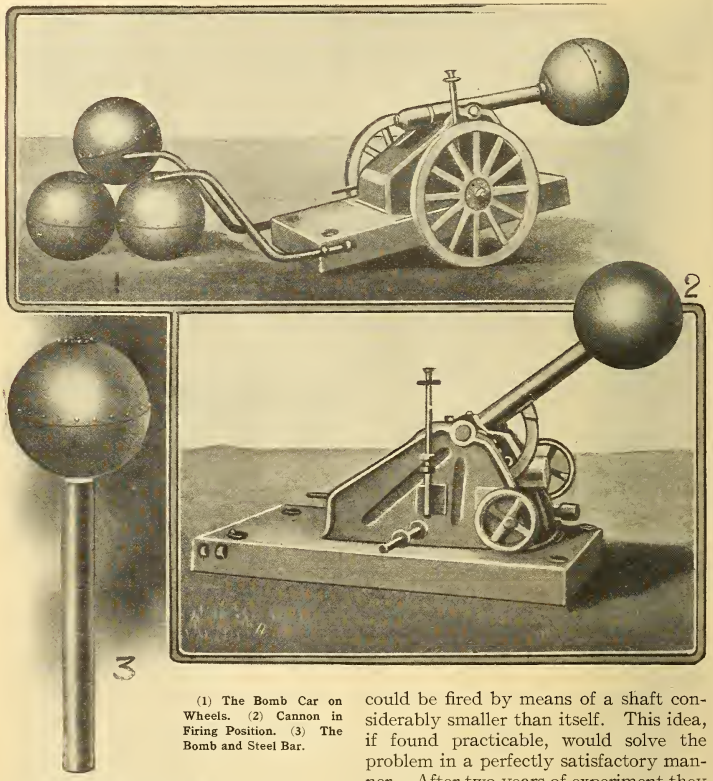
A HYDRO-AEROPLANE WEDDING

Aviator Harry Christofferson and Miss Bertha Mack were recently joined in wedlock in front of Christofferson's hydro-aeroplane, in Seattle, Wash. The groom is considered one of the nerviest aviators now flying on the Pacific Coast. His initial flight was from Vancouver, Wash., to a landing on top of the Multnomah Hotel, Portland, Ore. Very recently he flew from Everett, Wash., to Seattle, about 50 miles, to participate in the Annual Potlatch festivities.

GOVERNMENT BUILDINGS HAVE NEW LIGHTING FEATURES

A novel fixture has been installed in the rotunda of one of the Ohio state government buildings, and is one of the largest chandeliers ever built. The fixture body is over sixteen feet high and is suspended by a chain 72 feet long, consisting of twelve foot links containing special tubular Mazda lamps to give the effect of lamps in decorative design. The fixture itself is finished in composition silver leaf. In some of the reading rooms of the same building indirect lighting has been used with the bottoms of the basins made of pink Georgia marble, thus producing very beautiful effects. The general illumination of these rooms is low, and so each table is provided with reading lights designed by actually placing an individual at the table with a book and adjusting the lamp for his comfort.

Wedding in a Hydro-Aeroplane



(1) The Bomb Car on Wheels. (2) Cannon in Firing Position. (3) The Bomb and Steel Bar.

THE NEW KRUPP BOMB CANNON

Military engineers have long considered the possibility of increasing the size of the shell or bomb fired by a small siege gun, but the difficulty of enlarging the projectile without at the same time increasing the weight of the gun to such an extent as to render it unwieldy, has until lately made such attempts fruitless. About two years ago a young engineer in the employ of the Krupps at Essen, conceived the idea of a projectile which could be fired by means of a shaft considerably smaller than itself. This idea, if found practicable, would solve the problem in a perfectly satisfactory manner. After two years of experiment they have devised a field gun which throws a bomb of enormous size to which is attached a steel shaft fitting tightly into the bore of the gun, which, after having imparted its momentum to the projectile, falls to the earth, leaving the bomb to continue its course unhindered.

The Peace Conferences which have been held in recent years at The Hague and at Geneva have forbidden the use of bombs spreading asphyxiating or deleterious gases, which are as liable to kill or injure non-combatants as those actually

engaged. In the same way the "Dum-dum" or soft nosed, expansive bullets have been forbidden, on the ground of unnecessary cruelty. But it is not generally known that the Germans, at the Conference of 1899, succeeded in introducing an article which prohibits the use of "projectiles having for their *sole* purpose the spreading of asphyxiating or deleterious gases." As the new gun fires a projectile which on exploding scatters an enormous mass of metal *as well as* liberating the deadly gases, they apparently consider themselves within the letter of the international law.— *La Nature.*

STATUE OF A MONGOLIAN HORSEMAN

The imposing dimensions, as well as the artistic character, of the ornamental statues which will adorn the great exhibit palaces of the Panama-Pacific International Exposition at San Francisco in 1915, may be appreciated by an inspection of the figure of a Mongolian horseman, which is now completed, save for a few finishing touches.

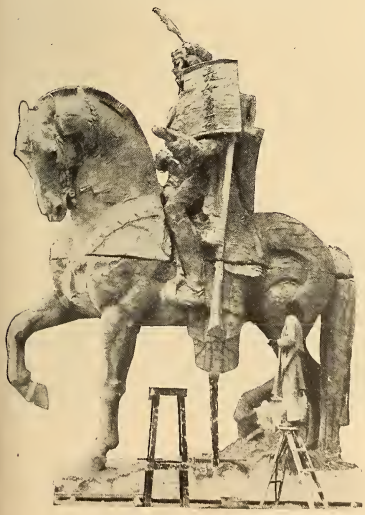


PHOTO BY W. W. SWADLEY

The Mongolian Horseman, by Lentelli

This figure, by Lentelli, is one of the allegoric group entitled "Nations of the East," which will be placed over the eastern portal or "Arch of the Rising Sun" of the Court of the Sun and Stars. It stands about 23 feet high and is a striking example of the Mongol or Tartar type in physiognomy, attitude, raiment and equipment.

GAVEL RESEMBLES PLUM-PUDDING

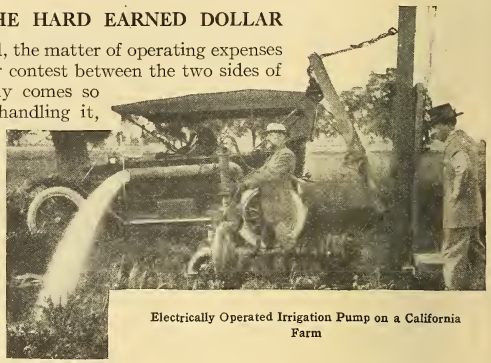
At the opening session of the Illuminating Engineering Society in Pittsburg, on Sept. 22, Prof. George A. Hoadley of Swarthmore College presented to the society, on behalf of the Philadelphia Section, a gavel which forms a miniature exhibit of the development of artificial illumination in America. In the construction of this unusual gavel the candle is represented by a tin handle from a candle making apparatus; the oil lamp by two pieces of iron obtained from a bracket, the design and making of which were supervised by Benjamin Franklin; the gas mantle by a vial containing the original Welsbach lighting fluid, made in the Welsbach laboratories in 1888; the arc lamp by an electrode used in the first magnetite arc lamp in 1903; arc lighting by a piece of single conductor cable installed by the municipality in Philadelphia for arc lighting about 1890; the incandescent lamp by a die which Thomas A. Edison used in his early experiments in making paper filaments in 1879; the vacuum tube lamp by a piece of electrode of one of the Moorelight vacuum tubes, exhibited at the first New York electrical show in 1896; lighting service by a piece of the first Edison three wire cable installed in Philadelphia; while the gas industry is represented by a piece of a gas holder of 85,000 cubic feet capacity, designed in England and built in Baltimore by the first gas company in America.

IRRIGATION AND THE HARD EARNED DOLLAR

When a farm is irrigated, the matter of operating expenses resolves itself into a bitter contest between the two sides of the ledger. Water usually comes so dearly that the task of handling it, unless it is delivered by the gravity system, calls for the simplest and cheapest of means, or else the crops will cost more than they will be worth.

With the present extensive production of cheap electric current by the water power plants high up in the Sierra Nevadas, California farmers are supplied with electricity so reasonably that they can and do employ it in their irrigating projects and reap profitable returns.

The electric pumping unit shown has an hourly capacity of 24,000 gallons. It may be observed, incidentally, that the hard headed California farmer, who represents the utmost in time and dollar saving farming schemes, considers the automobile not a liability and a luxury but an everyday necessity.

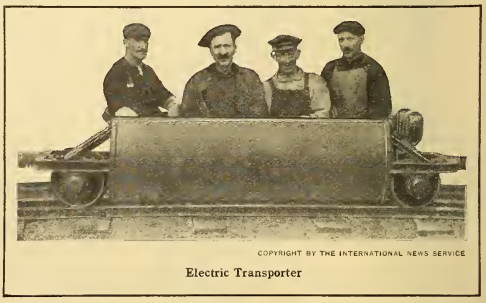


Electrically Operated Irrigation Pump on a California Farm

ELECTRIC TRANSPORTER

A system of electric transportation embodying small motor cars traveling upon a narrow gauge track and controlled from a single central point is the product of a New Jersey company. At a recent test before representatives of the British government one of the 54 inch steel cars, weighing 1,200 pounds was loaded with 1,000 pounds of sand and made to climb a 20 per cent gradient at 30 miles per hour. It also took sharp curves while traveling at the rate of 40 miles per hour.

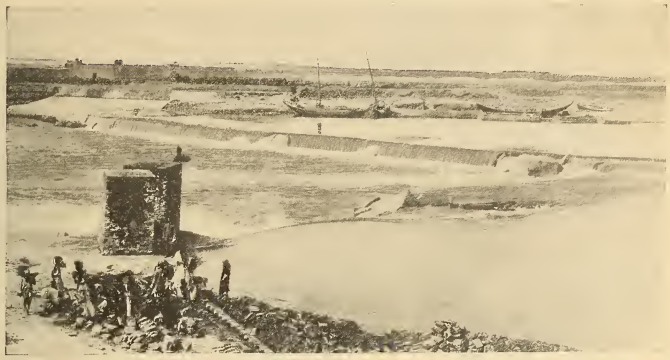
The applications of the system are for haulage about industrial plants and also for mail delivery purposes in large cities between railway stations and the postoffice and postoffice substations.



Electric Transporter

ELECTRIC BELT FRAUD AGAIN

Dr. W. A. Evans, former commissioner, of health for Chicago, in reply to an inquirer who wanted to know whether the use of an electric belt would raise the blood pressure in the case of rheumatism or paralysis, said: "No; neither will it lower it. The only effect will be on the pocketbook."



Constructed Portion of the Great Dam on the Euphrates River to Produce Electric Power for the Garden of Eden

ELECTRICITY IN THE GARDEN OF EDEN

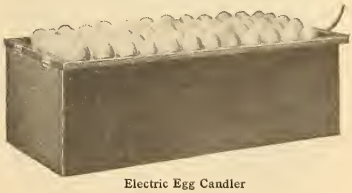
"Trolley cars and electric lights in the Garden of Eden" has a somewhat startling sound, but the latter, and probably the former, will become an accomplished fact upon the completion of the great dam across the Euphrates in 1916. That part of Mesopotamia which lies about the junction of the Tigris and Euphrates has been looked upon as the site of the Garden of Eden from the time of Abraham down to the present. It was the seat of the ancient empire of the Babylonians and the Chaldeans, and, in later times, of the Arab Kaliphate which had its head at Bagdad. The dam alluded to, which is being built by a British firm of contractors for the Turkish government at a cost of about $5,000,000, is designed to throw the Euphrates back into its old channel and put a million or so acres of very fertile land under canal.

Incidental to the building of the dam a good many thousand horsepower of electricity may be developed, for there will be a fall of 30 or 40 feet and a practically unlimited flow of water. The German scientists at Babylon have already applied for power to operate pumps to clear their lower excavations of water, and it will also be used in pumping water to land which lies above the canals. A trolley line from Kerbela to Bagdad is also among the possibilities, as the travel between those two cities is very heavy.

FOR DETECTING BAD EGGS

A bad egg will find it difficult to "get by" the Dixey egg tester in which electric lights are employed to determine their condition.

The tester is a box 18 by 16 by 26 inches, having a lid with openings, each of which



Electric Egg Candler

is just large enough to receive and hold an egg upon end. Light from incandescent lamps within illuminates the egg and discloses its condition.

Doing and Daring for the Public's Pleasure

BY ELECTRICE

I chose "Electrice, the Girl Who Defies Electricity" for my stage name, believing that people would be drawn toward one of the fair sex who dares to handle with apparent fearlessness an energy which in one form can tear down church spires or melt bars of metal in an instant. And, while the word "defies" conveys, to the public's mind, a challenge to this mighty power, to me, as in every instance in the household or factory, it means that electricity is perfectly safe and harmless when properly handled—a thing that people are slowly learning.

You have grasped the handles of a toy magneto while some one slowly turned the crank and every turn made the muscles of your hands, wrists and arms convulsively contract. The current produced was alternating, and to Nikola Tesla we are indebted for its practical application and for many spectacular experiments with it. "I have produced electrical oscillations," says he, "which were of such intensity that when circulating through my arms and chest they have melted wires which have joined my hands, and still I have felt no inconvenience. I have energized with such oscillations a loop of heavy copper wire so powerfully that masses of metal placed within the loop were heated to a high temperature and melted often with the violence of an explosion. And yet into this space in which this terrible destructive turmoil was going on I have repeatedly thrust my head without feeling anything or experiencing injurious effects." Tesla talks of currents of 80,000,000 vibrations a second in doing his hair raising body experiments, and remarks, "I don't do it any more; it is too dangerous."

It is with high frequency alternating current that I entertain the public, and I can assure you that electricity is a thing people still consider with a feeling of awe.

As the curtain rises showing the three-quarters of a ton of apparatus for the production of my act, the electric chair is the first object the eye of the spectator picks out and it creates the proper psychological effect, for I have frequently caught the word "Sing Sing" from across the footlights.

Those red spots are from "drawing" five to eight inch sparks from the transformer upon my bare hand with one terminal in the other hand.

Lighting candles or a cigar in the hands of my assistant with sparks from the finger tips is not painful until the finger ends get pitted by burns so that one is inconvenienced in changing costumes. When this happens I wear a copper thimble for a few performances. Swinging a glowing Geissler tube upon a darkened stage gives a startling effect, as does the "electric kiss" in which my assistant and myself hold the opposite ends of a 30 inch Geissler tube in our mouths. My invitation of "Next" is never accepted.

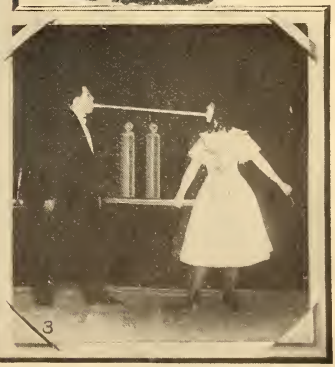
Other acts which seem not to become less thrilling to the audience are welding iron under water, lighting cotton by sparks from the knees and soles of the shoes, holding an arc lamp carbon between the teeth while from its outer end is drawn a steady, glowing arc (the act being designated as the "human arc").

I conclude the performance by being strapped in the electric chair to receive the full voltage of the transformer, the current jumping from a point above down to the helmet. This part of the performance usually causes my assistant to be looked upon somewhat as the villain is in the melodrama. "That man ought to be strung up; he's a brute"—this in a Montana town. "He ought to be settin'

there insted o' her," snapped an old lady in my hearing. My appearance, however, contradicts any theory that the work is injurious. On a recent trip West I gained fifteen pounds and it was in hot weather, too. Perhaps this may have something to do with

(1) Lighting a Candle from the Finger Tips

(2) Daring High Voltage in the Electric Chair



(3) The Electric Kiss

it, for I assure you I received the full benefit of hand and forehead contacts while at work, because I was frequently perspiring. Many times have I "gone on" with a headache and have returned to my dressing room entirely refreshed.

One is asked a great many questions, as, "How many *empires* do you take?" "Why don't your clothes catch fire?" and, too, I am frequently accused of having secret wires and plates on the floor, so now I carry a light board platform upon which I stand while working. The audience is asked to figure the voltage of the sparks from the fact that 20,000 volts is the pressure required to force a spark across a one inch air space and between needle points. But they are in the main interested, I think, because a woman dares.

SAN FRANCISCO'S WELL-LEARNED LESSON

There is probably no city in the world to-day better equipped for fire protection than the "Sunset City." It is a revelation to anyone accustomed to the congested, fire trap conditions of our eastern cities. Buildings, individually, are noticeably well protected, the city fire department contains machines of very latest devise, while the harbor situation is in the efficient hands of a fleet of the most up-to-date high pressure fire tugs.

One of San Francisco's New Fire Tugs Delivering a Broadside of Eight High Power Jets

LIGHTS FLOAT ON MERCURY

An increasing demand for quicksilver has been reported in manufactures of electric appliances. An interesting and increasing use in Scotland is the floating of the lights of lighthouses upon a body of quicksilver. The metal is not consumed, of course, and the loss in use is insignificant. Concerning this, Consul Fleming writes as follows:

"The commissioners of northern lighthouses, Edinburgh, have in their charge 90 lighthouses on the coast of Scotland. Up to the year 1900 the revolving lights were borne on rollers. The 'float' system has been gradually introduced, however, and is now in operation at 30 coast stations and will be used at all others. The lighting machinery rests on a pontoon which runs on quicksilver in a groove. The quantity of mercury required for this purpose in a lighthouse is from seven to eight flasks of 75 pounds each."

Steel Reinforcement in the Base of a Chimney

REINFORCEMENT FOR A CHIMNEY BASE

This is not a new fangled cage for wild animals, as one might suppose, but the concrete reinforcement for the base of the great chimney of San Francisco's pumping plant.

ELECTRIC LOCOMOTIVES FOR CANADIAN PACIFIC

Sir Thos. Shaughnessy, President of the Canadian Pacific Railway Company, has announced that the company's experiments in the Rocky Mountains with electrification are only preliminary to an enormous development electrically of the whole system. In the Canadian West there will soon be entire divisions operated exclusively by electric locomotives for handling freight as well as passenger traffic.

"If the experimental work proves a success," said Sir Thomas, "the entire system will be electrified as rapidly as power plants can be installed." He declared that the operation of terminals with electricity, as is done in New York, was the least important possibility in electrical railroad operation. Cheaper train service, the use of fewer men and a saving of fuel were only a few of the economic changes to be effected under the new power.

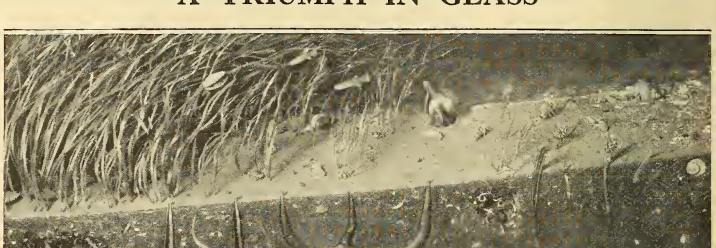
WHALE'S BONES AS HOUSE DECORATIONS

The accompanying picture shows two huge bones, removed from the lower jaw of a bow faced whale, which are now serving to decorate the front of the home of J. M. Robinson of Sebastopol,

Doorway Arch from the Jaw Bones of a Whale

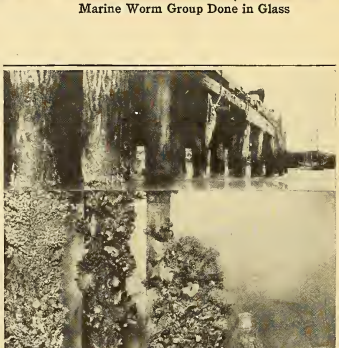
Calif. These mammoth bones weigh over 400 pounds each. They are placed in about the same position they were when in the whale, so some idea of the size of the beast's mouth may be obtained.

A TRIUMPH IN GLASS



Marine Worm Group Done in Glass

The American Musuem of Natural History in New York has lately had added to its priceless collection the work of Mr. Roy Miner and two or three assistants, consisting of specimens of sea life reproduced in glass in a way that rivals the wonderful glass flowers seen in one of the natural history museums in Cambridge, Massachusetts. Mr. Miner has reproduced not only the curious growth on wharf piles but also fishes and worms in a way that seems but little short of marvelous. He has reproduced jelly-fish, spongelike growths, shells and sea weed in the most lifelike manner. The most threadlike tentacles have been blown in glass. There are hundreds of tentacles for the sea anemone, and the extreme delicacy of some of the work has back of it infinite care and patience. Mr. Miner and his assistants were two years collecting and reproducing the specimens on exhibition in the museum. In no place in the world will one find finer specimens of the skill of the worker in glass. Mr. Miner calls one of his groups "Seaworms" and another "Animals of the wharf piles." Worms and mussels are reproduced with the most absolute fidelity to Nature and they seem as fascinating as rare jewels to the crowds that daily gather around them.



Wharf Pile Group

ELECTRICAL MANUFACTURE OF FERTILIZERS

There has just been finished near Johannesburg in Sweden a large plant for the manufacture of calcium carbide and nitrate of calcium by an improved electrical process due to the Swedish

engineer Carlsson. This process is characterized by the addition of a small amount of feldspar to the carbide, which is found to improve the quality of the product. There are four monophase electric furnaces of 400 kilowatts for the manufacture of the carbide, and six three phase furnaces of 2666 kilowatts for the production of the nitrates.

ACTIVITY IN WIRELESS TELEPHONY

In the past five or six years there have been all sorts of ridiculous and outrageous claims and statements made as to what has been accomplished in wireless telephony—mostly for stock jobbing purposes, particularly in this country. There have even been fake exhibits of wireless telephone apparatus at various electrical expositions within the last six years, and greedy promoters selling shares in all manner of fraudulent companies have flocked to the scene, being aided in their schemes by the world wide publicity given to wireless telegraphy at the time of the sinking of the S. S. Baltic.

At this time, however, there seems to be some indication of tangible results over short distances as a result of continuous and long tried experiments. A brief mention of some results that may be considered worthy of attention will doubtless greatly interest the public. It will also remind them to give no heed to offers of shares or of stock in this or that wireless telephone project. For as yet there is not very much to go on.

To take experiments in Germany: It is reported by the German wireless telephone syndicate from Berlin that most interesting experiments have been conducted at the wireless station at Nauen with a wireless telephone invented by Count Arco. The experimenters, it is said, have at last succeeded in transmitting the human voice some distance and conversations have been maintained between Nauen and Cologne, Metz, Strasburg, Wilhelshaven, Vienna and with a German cruiser in the North Sea. It is claimed that in one instance a distance of 500 miles was covered.

Now take the English company known as the Grindell-Mathews Wireless Syndicate, Ltd. It also claims wireless telephone service of approximately 500 miles, but only over the sea. Mr. Ditcham, chief engineer, as a result of experiments declares that the future of wireless telephony divides itself naturally into two distinct fields.

On the one hand, there is communication over distances so great as to render transmission of speech by cable physically impossible. In this class come messages across the ocean, and the great Continental or American areas. On the other hand, there is telephone communication from ship to land and from ship to ship at sea.

With regard to the first of these, many experiments have been and are being made, but so far without any noteworthy result. But in the case of land to ship and ship to ship at sea, speech is reported to have been transmitted intelligibly over as much as 500 miles. Various methods have been employed. Mr. Ditcham states that some variation of the high frequency alternator method has been usually employed in the long distance experiments and that any notable extension of the distances so far attempted would involve considerable development of the apparatus used.

In the case of the Marconi Company it will be best to quote the remarks the managing director, Mr. Godfrey C. Isaacs, made recently at the sixteenth ordinary general meeting of that company held in London. Mr. Isaacs declared that in the last few months Commendatore G. Marconi, generally and more simply known as "Marconi," had taken out many valuable patents in the last six months and said: "I am going to venture to prophesy on this occasion that the date is not far distant when with our breakfast in the morning we may hear the ring of the telephone bell and taking the receiver

from its hook we may talk with those whom we left behind when we went on board; we may tell those on shore what sort of a night we passed, and learn what sort of a night they had. The Marconi Company has not made it a habit to boast at any time of the work it is doing or contemplates doing. I suppose you have all read in the papers paragraphs telling of the wonderful things that were being done by those whose names perhaps most of you did not know, in connection with wireless telephony. Well, I want to tell you that whatever you have read in the papers as having been done by wireless telephony, the Marconi Company has done more. But until the Marconi Company is prepared to say exactly what definite results in a practical way can be obtained from wireless telephony it will remain silent. We shall perhaps at an early date be able to turn wireless telephony to practical commercial account and it will then be time enough to speak." The United States Navy Department also announces continued experiments in wireless telephony and fair success as between ships at sea and from land to ships and ships to land.

HYDRO-ELECTRIC DEVELOPMENT IN MEXICO

That the electrical industry is progressive and advancing is proven by the fact that the construction of one of the greatest hydro-electric developments on the American continent has been successfully carried on and the project completed while war and brigandage prevailed throughout the country in which it is located.

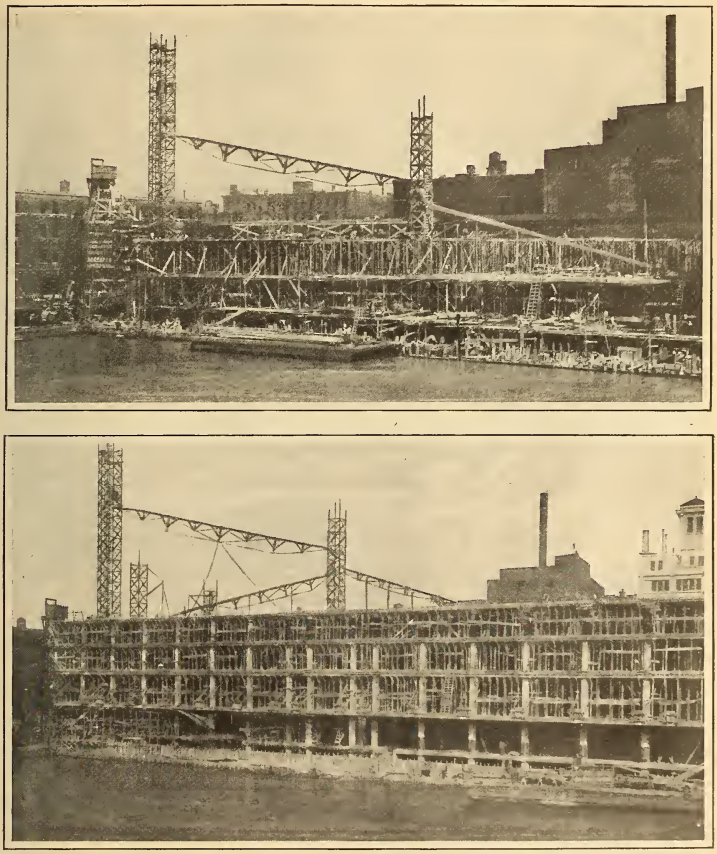
The Mexican Light and Power Company has recently completed at Necaxa, which is about 110 miles from Mexico City, two hydro-electric plants having an aggregate capacity of 127,500 horse power, at a cost of, approximately, $80,000,000 (gold). An extensive system of transmission lines from the Necaxa plants connect with the auxiliary hydro-electric plants located at Texcapa, Laguna, Irrigador and San Ildefonso, all of which are embraced in the general Necaxa power system. The aggregate capacity of the auxiliary plants is 21,400 horse power, making a total of 148,900 horse power that the company has available at the present time.

From an engineering standpoint, the development at Necaxa is considered one of the most remarkable of its kind in the world. In order to provide an ample supply of water with which to operate the plants during the dry seasons, it was necessary to build a series of great storage reservoirs in the high mountains, that the water falling during the rainy seasons might be stored for future use. These reservoirs are connected by means of long tunnels through the intervening ridges of rock. The last of the series of reservoirs has just been completed, and affords a capacity of 6,000,000 cubic feet of water, and the total storage capacity of the reservoirs is estimated to be sufficient to keep the large hydro-electric plants in continuous operation for a period of six months without any rainfall.

POURING A CONCRETE BUILDING

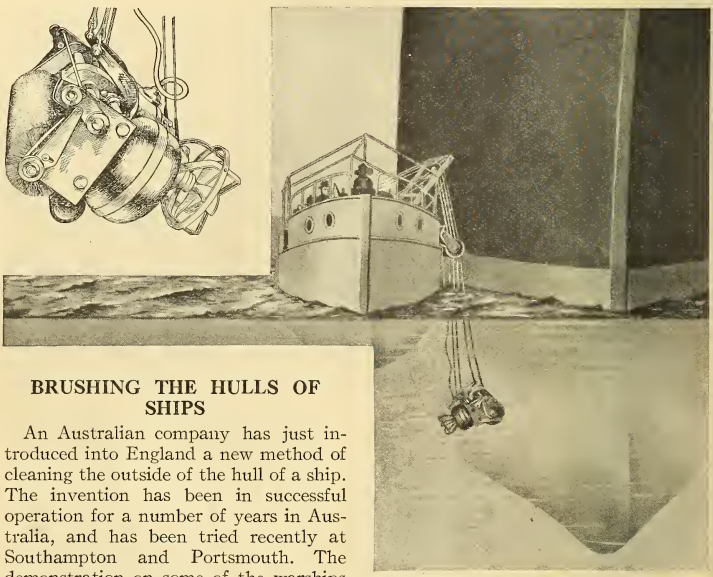
The ease and rapidity with which a concrete building is erected or "poured" to-day can scarcely be appreciated save by personal observation, although the two pictures on Chicago's river front of the same building, here shown, taken 27 days apart, convey to the reader some impression of how fast the rock, sand, and cement can be mixed and formed into pillars and walls.

In this instance crushed rock and sand are brought by barges to a point at one end of the building and dumped into separate bins. Chain buckets then elevate it to separate large bins shown at the left of the higher staging. From these bins through openings at the bottom, the proper quantity of each material is dropped into a huge motor driven mixer with the right amount of cement and



Two Views Showing How a Modern Concrete Building is Constructed. The Photograph Shown by the Lower Cut Was Taken 27 Days After the Upper One

water. As the mass comes from the mixer it falls into a metal bucket designed for the purpose and electric power hoists the bucket with lightning speed up through the staging to a trough into which it is poured. This trough is lined with smooth sheet metal and inclined so that gravity carries the wet mass on down to a movable section, the end of which is placed here to fill a wooden wall form, or there to pour concrete into the upper end of a cylinder of metal to form a pillar. The volume of concrete handled here each day if made into the shape of a cube would measure 23 feet on an edge.



An Electric Motor Drives the Brush and Also a Propeller, which Forces the Brush against the Hull

BRUSHING THE HULLS OF SHIPS

An Australian company has just introduced into England a new method of cleaning the outside of the hull of a ship. The invention has been in successful operation for a number of years in Australia, and has been tried recently at Southampton and Portsmouth. The demonstration on some of the warships was so satisfactory that the British Admiralty has entered into negotiations with the inventor.

The apparatus is mounted upon a suitable frame, which can be suspended from the side of a boat. It consists of a cylindrical brush about five or six feet in length, held in a framework which also supports an electric motor and a propeller. The purpose of the propeller is to keep the brush pressed against the side of the ship. The boat carrying the apparatus contains also a four cylinder petroleum motor directly coupled to a dynamo. The current produced serves to raise and lower the carrying frame, as well as to drive the propeller and brush. As the appliance operates under water, the motor and gearing are enclosed in a water tight box. The machine is capable of removing the thickest deposits and can thoroughly clean the hull of an 8,000 ton ship in from six to seven hours.

TO TUNNEL THE CANADIAN GIBRALTAR

Engineers under the direction of the Canadian Government are preparing to drive a large railway tunnel through the enormous mass of precipitous rock on which stands the city of Quebec. Railway entrance to Quebec has always been a serious problem, the narrow strip of water front lying between the upper town and the River St. Lawrence being already badly congested with transportation lines. By this method a station can be constructed right in the heart of the picturesque old fortress. The tunnel will be large enough to accommodate all the trains of the new National Transcontinental Railway crossing from the Atlantic to the Pacific, and will be electrically operated along lines which in some important respects will be radically new.

The Mountain Meadow is Now Under Water. Reservoir Near Dam No. 1

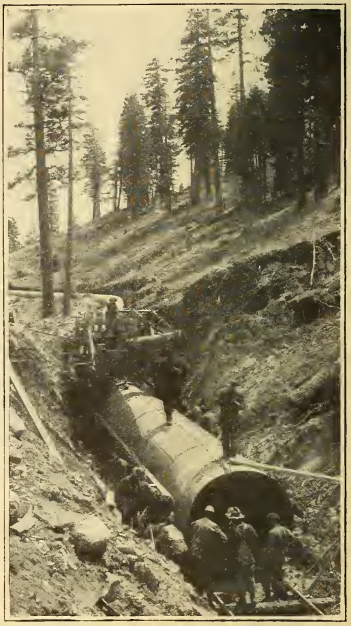
Ninety Thousand Horsepower in a Mountain Meadow

Up in the Sierra Nevada Mountains, about 70 miles east of Fresno, Calif., there is a natural mountain meadow. It lies about 6,800 feet above sea level. All around tower great mountains 9,000 to 11,000 feet high. Mountain meadows are common enough, and most of them are as serene and peaceful to-day as they were untold centuries ago when the little hollows first began eagerly to accept the rich deposits of mountain erosion. But this particular one has suddenly lost its identity as a meadow and become the bottom of a lake, and there is great human activity all around it. Big capital and shrewd men have found it out.

There must be a reason why this meadow came into prominence; and the reason is not difficult to understand when it is considered that the meadow represents the focal point of a watershed comprising some 88 square miles, while immediately below it is a drop of 1,900 feet which can be utilized in developing power from the impounded waters of the meadow reservoir. This, and the fact that Los Angeles, 245 miles away, is clamoring for more electric power, brought the capital and brains to the meadow and resulted in the Big Creek hydro-electric power development—one of the greatest of the great "White Coal" propositions in California.

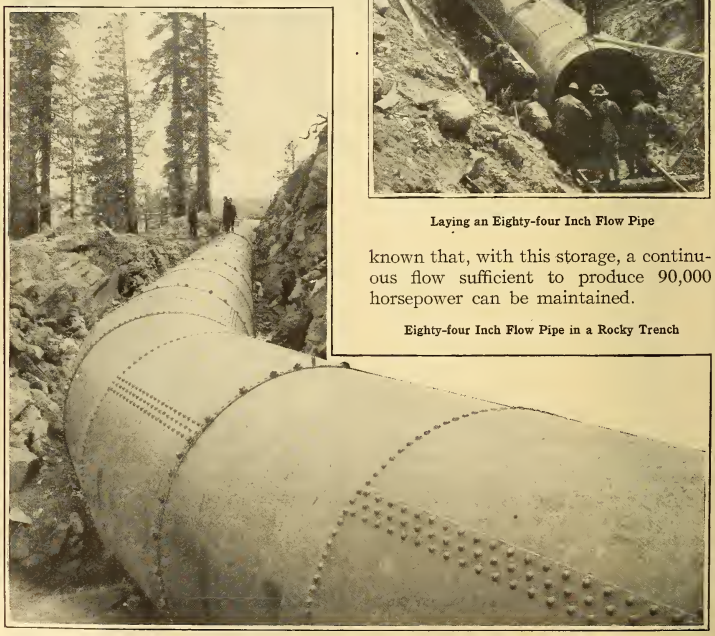
There are three natural outlets to the depression which now constitutes the reservoir, one through which Big Creek flows on its way down the mountain and two others through which there are no watercourses. All three have been closed up with great gravity dams, forming a lake four and one half miles long and half a mile wide, with a water storage of over 4,520,000 cubic feet. From run-off records kept over a period of several years it is

Steel "Y" at West Postal Tunnel



Laying an Eighty-four Inch Flow Pipe

known that, with this storage, a continuous flow sufficient to produce 90,000 horsepower can be maintained.



Eighty-four Inch Flow Pipe in a Rocky Trench

The main dam, known as Dam No. 1, closes the outlet through which Big Creek leaves the basin. It is 132 feet high to the spillway, built in a curve with the convex side upstream and contains 59,000 cubic yards of solid masonry.

In order to generate the power of the impounded water a conduit and tunnel system is being built to carry the water to the power house below, which is now nearly completed. Water enters the tunnel through an intake tower fitted with screens and electrically operated rakes to prevent *debris* from entering. Here also is a great nine foot gate valve controlling admission of water to the tunnel.

After passing through the gate the water enters a twelve foot tunnel, 3,880 feet long, and is carried to the brow of a steep descent at the foot of which is the power house. The tunnel was excavated through the solid granite of the mountain side.

From this point on the water descends through massive steel pipes, riveted and bolted into long, continuous penstocks. There are two of them at present and two more to be built later. They are 84 inches in diameter at the top and the bore grows gradually smaller and the sides thicker toward the bottom of the steep slope, in order to withstand the tremendous pressure of the water at the lower end. At the brow of the hill is another set of gate valves, motor operated and designed to be controlled from the power house. Eight hundred feet from the latter a "Y" is inserted and each pipe divided into two parts, each one of which leads to a water wheel in the power house.

Just outside the power house we find that the diameter of the pipes has decreased to 24 inches, and here also are the hydraulic gate valves, designed for a working pressure of 1,000 pounds to the square inch, which represent the last means of controlling the water before its impact with the cup like blades of the water wheels. And such an impact!

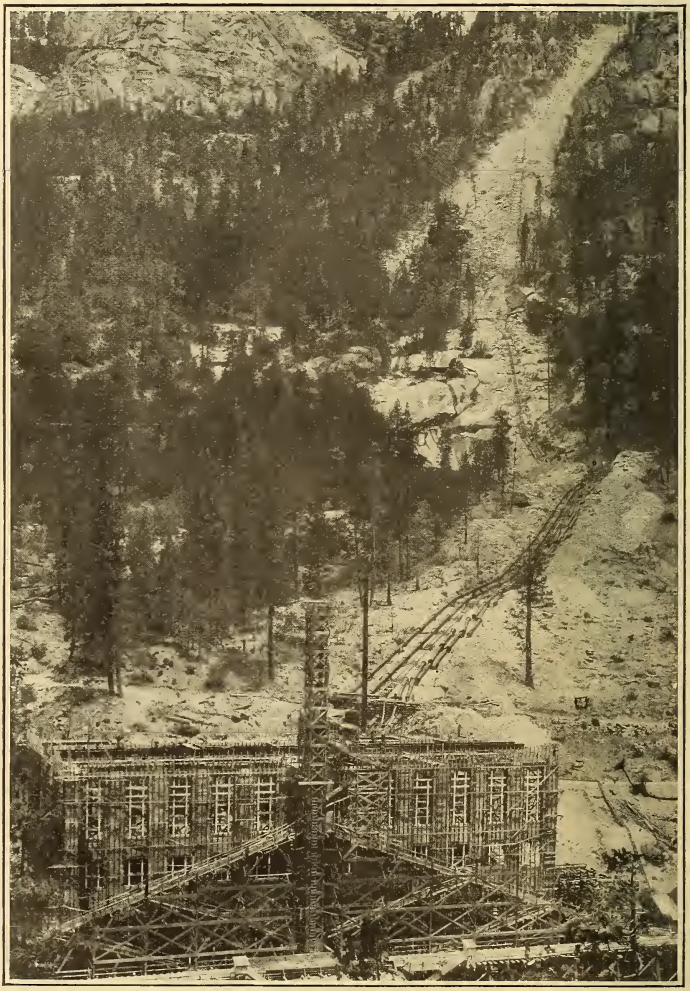
A jet of water issues from each nozzle which forms the lower extremity of the pipe. The water must fall 2,146 feet before it is released to do work at the nozzle. In other words, this is the gross head. Subtracting friction and other losses we find that there is an effective head of 1,900 feet, which causes the water to issue from the nozzle in a jet 5½ inches in diameter at a velocity of 300 feet per second.

One can not comprehend the force of such a jet. Apparently it is as solid as a bar of polished steel. Stories are told of strong men attempting to cut such a jet with an ax and having their arms broken in the attempt; such stories are not exaggerations. While we can not comprehend the force behind the stream we do know, however, that it is capable of developing over 10,000 horsepower at the water wheel upon which it impinges.

The initial equipment of Power House No. 1 consists of two 20,000 horsepower units and two others will be installed later. These water wheels drive electric generators which furnish the current which will finally reach the consumers in Los Angeles.

Less than a quarter of a mile up from the power house just mentioned another stream with a somewhat smaller watershed joins Big Creek. Here another dam has been built and the water of the reservoir thus formed will be utilized in another power house now under construction, the two power houses and four dams being included under the name of the Big Creek Development. This big project is owned by the Pacific Light and Power Corporation of Los Angeles, Calif., and was constructed for owners by the Stone & Webster Construction Company of Boston, Mass.

The electrolytic iron is said to be magnetized and demagnetized much more rapidly than ordinary soft iron, which, it is believed, will give it a wide field of usefulness in the construction of electromagnets.



Power House No. 1 and Penstock Incline, 4500 Feet in Length, of the Big Creek Power Development

CELLON—SUBSTANCE TO REPLACE CELLULOID

Dr. Eichengrün, a German chemist, has been at work for several years upon a non-inflammable substance to take the place of celluloid, and has taken out a number of patents here and abroad, ten in England alone. His earlier product was known as "Cellit," but the final development, Cellon, is much superior. Its tremendous industrial importance is evident from the fact that it can be made as transparent as plate glass, is extremely tough and flexible, is impervious to oils, benzine, fats, water, salt water, weak acids and alkalies, even hydrogen gas, and is an excellent electric insulator—and with it all is non-inflammable.

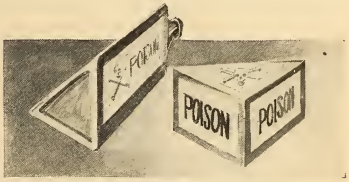
Celluloid is a mixture of camphor and a nitrocellulose formed by the action of nitric acid on cellulose. Cellon is similar, in that camphor and cellulose are used in its manufacture, but cellulose acetate takes the place of the highly inflammable nitrocellulose. Cellulose in the form of cotton wool is treated with acetic anhydride, glacial acetic acid and concentrated sulphuric acid until a thick syrup results. This is then mixed with a large quantity of water which precipitates a flaky mass. The acetylhydrocellulose thus formed is dissolved in camphor and a mixture of alcohol and ethyl acetate to form a plastic product. The above is a general outline of the older "Cellit" patents, but the Cellon process includes a number of improvements.

Cellon is sold in sheets 52 inches by 23½ and is easily cut with scissors. It may be had paper-thin or in much thicker sheets. As wind shields in aeroplanes and windows in autos and airships Cellon is meeting with marked success. A Cellon lacquer or varnish is used by such aviators as Farman and Grahame-White to coat the wings of aeroplanes. The gigantic Zeppelins use it and, indeed, the finest grades make a balloon cloth impervious to hydrogen gas. The British War Office is using this varnish in large quantities. For electrical insulation it is extremely valuable. Very fine wire may be dipped, rubbed and dipped repeatedly to secure an excellent insulation better than silk.

An immediate demand for Cellon films is found in the cinematograph industry. It is well known that ordinary motion picture films of celluloid burst into flame in three seconds when the machine stops unless the light is turned off. A Cellon film exposed, motionless, to the concentrated light of an arc lamp is said to remain unchanged—entirely safe.

TRIANGULAR BOTTLES FOR POISONOUS DRUGS

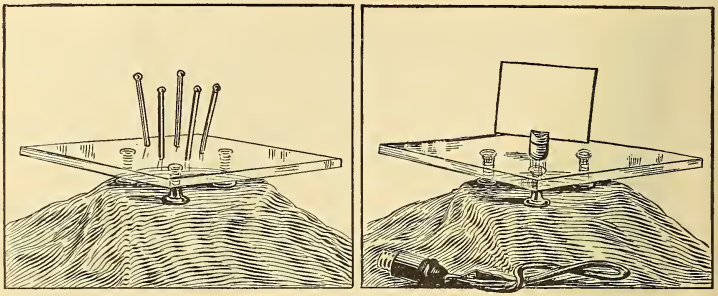
Hereafter in San Francisco when you buy a poisonous drug or disinfectant you will get it in a three cornered bottle.



Poison Bottles Used in San Francisco

Be it dangerous powder or tablet, such as the common bichloride of mercury, it will come in a three cornered box. This is the purport of a measure brought forward by an eminent San Francisco doctor, and immediately adopted by the San Francisco board of supervisors.

Formal dedication of the Chattanooga and Tennessee River Power Company's hydro-electric development at Hales Bar on the Tennessee River, near Chattanooga, took place on November 13. This is one of the largest plants of its kind in the country, ranking with the Niagara Falls and Keokuk plants. Seven years were required in which to build it and the cost was $9,000,000. Sixty-five thousand horsepower will be generated.



Animated Matches and Cards Make Very Effective Window Displays

ANIMATED MATCHES

A piece of heavy glass rests upon three porcelain knobs which in turn, as the observer sees, are supported by a flat topped object covered with a cloth of black velvet. When the plug is attached to a lamp socket and the current turned on the matches become very much alive—standing on end for a few seconds, then falling upon the glass.

The mystery is explained by the fact that a cylindrical electro-magnet is under the velvet and a current interrupting device is a part of the plug. Each match has a piece of soft iron wire concealed in the end, and as the magnet is energized and de-energized by the current interrupting device the bit of wire is caused to stand up vertical to the magnet face and then drop back.

A piece of wood with a spherical base of soft iron is also made to cause a card to perform as do the matches.

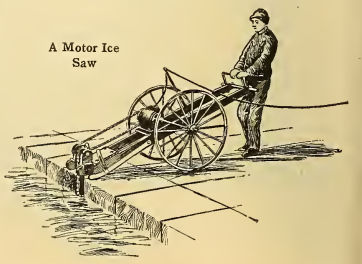
The device is patented by E. M. Stockton, Chicago.

ICE CUTTING MACHINE

Electricity will cheapen the gathering of ice materially with the employment of a motor driven machine for sawing the blocks into a convenient size for handling. Letters patent have been issued to Samuel J. Ferriss, New Milford, Conn., upon such a saw. A motor is mounted on a framework supported on two wheels. The saw which is of the endless, jointed, ice cutting type is placed at end of the framework farthest from the operator and power is transmitted to it by a sprocket chain. The illustration shows the manner of handling the machine and the heavy cable supplying the motor with current.

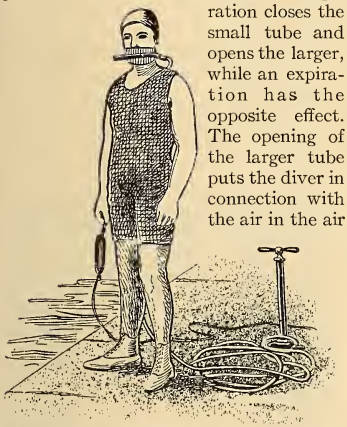
A NEW DIVING APPARATUS

Everyone knows the cumbersome and costly equipment which is necessary to enable a diver to remain for any length of time under the water. Such an equipment will cost from eight hundred to a thousand dollars, and can only be used by an experienced diver, accompanied by competent assistants. Mr. Maurice Ferney, a Frenchman, has recently



A Motor Ice Saw

invented a very simple diving apparatus, which weighs, complete, only 25 pounds, and is sold for forty dollars. It consists of a rubber band fastening over the mouth and around the neck. Inside this band is a hole surrounded by a rubber disk, which is placed between the lips and the gums. The opening in front of the mouth communicates with a rubber bag placed on the back of the diver and which is inflated by an assistant in a boat or on shore. In the interior of the tube connecting the mouth with the bag is a smaller tube terminating at the point at which the larger tube joins the bag. At this point is a valve so arranged that an inspiration closes the small tube and opens the larger, while an expiration has the opposite effect. The opening of the larger tube puts the diver in connection with the air in the air



Newly Invented Breathing Device, Light and Convenient for Divers

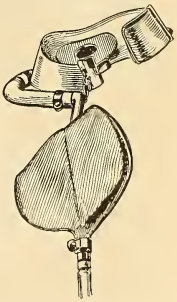
chamber; the smaller or expiration tube discharges into the water, or into the surrounding air in case the appliance is used by firemen, for instance, or in any situation where a man must get into an enclosure filled with smoke or noxious gases.

In order to test the apparatus, in August of last year the inventor, in the presence of a number of government officials, remained for 58 minutes at the bottom of the Seine, coming back into the boat at the end of that time covered with black mud from head to foot. To keep the diver at the bottom a weight of about fifteen pounds is necessary for a man of average size.

BIG CALIFORNIA WATER POWER PROJECT

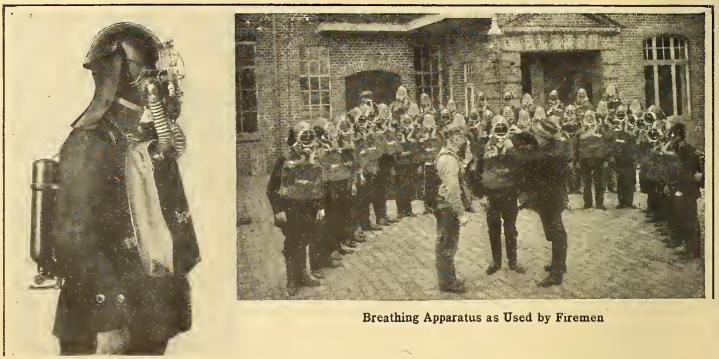
A water power permit has just been granted by the secretary of agriculture to the Truckee River General Electric Company, a California corporation, under which this company will develop power on the Eldorado national forest, to serve various California towns and cities.

In developing power the company states that it expects to construct seven reservoirs, five for water storage and two for equalizing the flow. Two of the storage reservoirs are on the upper Rubicon River. By the use of a tunnel, approximately a mile and a half long, the flow of the upper Rubicon River and the water stored in these two reservoirs will be brought into the Gerle Creek drainage, where the waters will be further stored. From this storage the water will be conveyed by ditches and natural streambeds to Pilot Creek, upon which the two power plants mentioned in the permit are to be located. The water will finally be discharged into the Rubicon River.



Rubber Mouthpiece and Head Band which is Connected by a Tube with the Air Bag

At each of the two plants there will be a head of approximately 1,300 feet. The company expects to make an initial installation which will develop about 16,000 horsepower, which will probably be doubled as the market for the product increases.



Breathing Apparatus as Used by Firemen

BREATHING APPARATUS FOR FIREMEN

The latest adaptation of the Draeger breathing apparatus is for the use of firemen and mine rescue parties. A new ear protection is one feature in the present design, and it leaves the ear uncovered so as not to prevent the fireman from hearing, which is important. All tubes and the like are leather covered as much as possible, and the wearer can change ammunition after an hour's work within a moment's notice, and should he be not too much fatigued can continue for another hour. By ammunition is meant the supply of chemicals used to absorb carbonic acid gas and to produce oxygen.

Briefly, the principle of operation consists in renewing the air as it is breathed, by absorbing the carbonic acid gas and then adding just the right amount of oxygen at each breath. In this way the air never becomes foul, as the lung products are constantly absorbed by chemicals contained in the front case, while steel bottles of compressed oxygen on the wearer's back afford enough of the life giving oxygen for a long time. Of course the wearer is out of all connection with the surrounding air, and just as in the diver's helmet or mining device of this nature, he breathes pure air even when plunged in smoke or deadly gas.

WOMAN'S PROFILE IN A GLACIER

On the steep sides of Mt. Baker, in Washington, during the months of July, August and September, when the winter's snow has melted, the face of a woman appears. The photograph herewith

Nature as an Artist—The Glacier Profile

reproduced shows very distinctly this wonderful phenomenon of Nature. The view, which is a profile, is directly in the center of the picture, facing to the left, and is brought out in the white coloring. The dome of the mountain serves as a picture hat for the strange and uncanny personage who yearly, for a period of three months, looks off across the wild, unforbidding snow wastes.

THE LAST OF THE BLACK WALNUT

More and more in our country we are hearing of the "last" of things—first it was the last of the wild pigeons, then the last of the buffalo. We are threatened with the last of the lobster, the last of the salmon, the moose, the elk—and we have come now to the last of the black walnut. The celebrated Makemson timber tract of 400 acres, five miles east of Danville, Ill., is now under the ax.

This has long been the only black walnut grove of any size in the world. It was purchased over 80 years ago at less than $2.00 an acre and until this past summer not a tree had ever been cut from it. It sold at public auction for a small fortune.

Grove of Black Walnut About to Fall Under the Axe

Our picture shows three of the great trees of this grove which await their doom.

HE IS KIND TO HIS HORSE

A California horse owner who has far more consideration for his animal than the average driver has equipped his rig

An Odd SunShade

with a huge sunshade which protects not only the horse's head but his entire body.

IS A TELEPHONE WEDDING LEGAL?

Lawyers and laymen are gossiping over the telephone marriage the other day at Dayton, Ohio, of Louis Motzel and Florence Igou, who were made man and wife by a magistrate who was miles away in a lumber camp. The couple had hunted in vain for a clergyman, according to report, and were finally advised that a certain "squire" was good natured and always willing to oblige. They ran him down finally by telephone, but were informed he would not be in Dayton for a day or two. He cheerfully suggested that they be wed by telephone. Witnesses were "cut in" and the ceremony was performed.

Was it legal? Some lawyers contend it was. Others say "It won't go."—*Telephone Engineer.*

ELECTRIC CLIMBED RIGHT UP

Where gasoline cars have failed often, the electric takes the stiff grade up Twin Peaks without seeming effort, let alone difficulty. Twin Peaks provides but one of the many severe grades about San Francisco and the modern electric vehicle is rising to the occasion in every instance. Absolute necessity backed by expert specialization has placed the electric car in its present position. In the last two or three years it has picked up wonderfully in the matter of speed as well as in its ability to negotiate grades.

Electric Climbs Twin Peaks

ELECTRICALLY OPERATED GEAR SHIFT

An electrical gear shift, which may be attached to any sliding gear car and make it possible to shift the gears by merely pressing a button located on the steering wheel, is something to arouse quite as much interest on the part of motorists as did the electric starter when it first came out. Such a system is now in the practical stage and embodies a button for each speed and one for neutral. Its use dispenses with the old fashioned hand lever and makes it unnecessary to remove the hand from the wheel while driving. The desired speed change may be anticipated before the clutch pedal is thrown out. An important point is the fact that the clutch is always fully disengaged and the gears return mechanically to the neutral before the electric gear shift takes place, merely by the act of pushing the pedal, so that it is impossible to strip a gear. This is especially convenient for women drivers.

The operation is extremely simple; all that is necessary is to push the button for the desired speed, push out the clutch pedal, when the gear shift will take place instantaneously, the gears meshing under an instantaneous pressure of 150 pounds. The operator can wait as long as desired after pushing the button before operating the pedal to cause the shift of gears and can change his mind and push as many other buttons as desired, and nothing happens until the clutch pedal is thrown on, and then the last button pushed will be the speed obtained. There is a mechanical interlock on the buttons, so that two cannot be depressed at once; in other words, depressing another button releases any one already depressed, and this last button remains depressed, showing which is the speed that will take place, and it also remains depressed until some other one is pushed down, or until the speed change is effected.

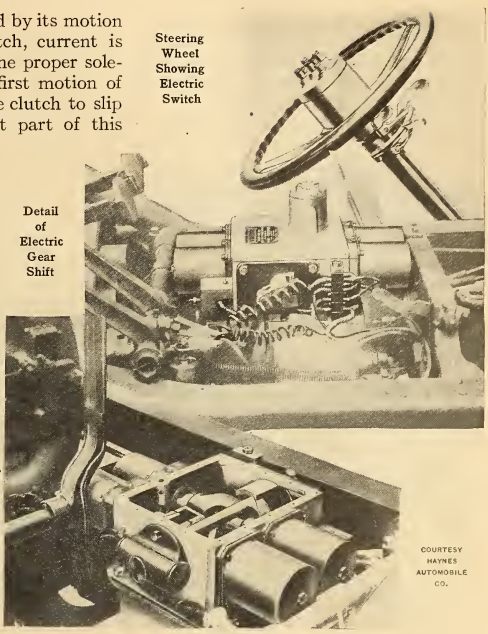
The mechanism consists simply of a set of solenoids, one for each speed. These take the place of the ordinary hand lever. Depressing the buttons simply makes a connection, so that when the clutch is

disengaged to its limit, and by its motion connects up a knife switch, current is allowed to pass through the proper solenoid momentarily. The first motion of the clutch pedal allows the clutch to slip as in any car. The next part of this motion mechanically puts the gears in neutral. When it is pushed to the extreme it closes the knife switch and allows the solenoid to mesh the gears.

An ordinary six volt battery is sufficient for operation, the current consumption being for each shift about one three-hundredths of that consumed in starting the motor electrically.

As the clutch pedal can be moved for slipping the clutch and only engages the knife switch when pushed to the extreme, it is possible to select the desired speed beforehand, slip the clutch as much as desired, or coast in the usual manner, and then make the gear shift at any time by simply pushing the pedal to the limit.

The device is said to be as foolproof and as free from trouble as any other part of a modern automobile.



Neutralizing Cam of Electric Gear Shift

INCOME FROM SALE OF CHARGING CURRENT

It is very evident that the one field of future profit and increase in the business of central stations engaged in the distribution of current for power and light, is the charging garage for electric vehicles.

It is practically the most "resultant," if one may so use the expression, source of income of any tapped by generating stations. Electric vehicles are charged in the "wee sma' hours" of the morning, from one to six or so when there is no peak load and the load in service would otherwise be at its lowest.

The wide-awake central station management is very much alive to this fact and is doing all possible to increase the use of electric trucks and wagons, not to mention pleasure vehicles of all kinds. One central station had $200,000 of income from this charging service alone last year.

It is the general impression that before very long electrics will have entirely taken the place of the gasoline and horse wagons for delivery purposes in all towns and cities. They are both silent and clean and make good time with scarcely any wear and tear from frequent stopping.

SLEEP IN YOUR CAR

A sleeping place that is quite as comfortable as the accommodations found in the average hotel has been designed by an inventor in Oakland, Calif., and installed in his motor car. It is made up like a Pullman berth with the cushions of the automobile for the mattress and a frame of his own design to bring the parts to the proper level. Only five minutes work is required to adjust the frame and cushions, and then with a pair of blankets and linen the motor tourist can be made comfortable for the night.

An Easy Couch Constructed from the Cushions

ELECTRIC RUNABOUT FOR "CONVENIENCE SAKE"

The woman who knows that she has been the last person on the street of whom her neighbors would be the least bit envious can't help but feel a sort of subtle gratification when she suddenly discovers that they are looking at her out of the corners of their eyes as she glides past.

She would probably be just a little bit piqued if she knew that they knew that it was her former "disadvantage" which now gives her the advantage.

It may have been just a little bit mean of her husband to confide to his next door neighbor (but being men they can't be accused of talking too much or of "exchanging" confidences) that he had made his wife a present of that electric runabout because she was just a little too stout to enjoy the city car service.

But what she does not know that the neighbors do know won't lessen her enjoyment of her parlor on wheels, and what they know that they know does not lessen their admiration of their neighbors' new "calling machine."

PROPOSED ELECTRIC VEHICLE EQUIPMENT SYNDICATE

One of the most interesting suggestions made at the fourth annual convention of the Electric Vehicle Association of America, held in Chicago, in October, was that of Mr. Arthur Williams, the then president of the association. It was to the

effect that probably the best way to bring about an immediate and great increase in the sales of electric trucks and delivery wagons would be by forming an electric vehicle equipment syndicate. One of the difficulties in the way of very extensive purchases by merchants and other power wagon users in the past has been lack of money to change their equipment from the ordinary horse vehicle to electric. An equipment trust or syndicate sponsored, say, by the Electric Vehicle Association of America, and based on the flotation or sale of equipment bonds or notes would enable purchasers to buy their electric wagons by installment payments, the equipment notes being mortgages on the vehicles and the firms or corporations owning the wagons being also guarantors of the securities. It is an idea well worth noting.

ENGLISH WOMAN ESTABLISHES A GARAGE

Miss Alice Hilda Neville, a Worthing, near Brighton, England, young lady, has set the seal to a new opening for enterprising business women by establishing a successfully conducted garage. More than that, she is so enterprising that she gets into the midst of things herself and washes cars, tinkers with differentials, and changes tires now and then.

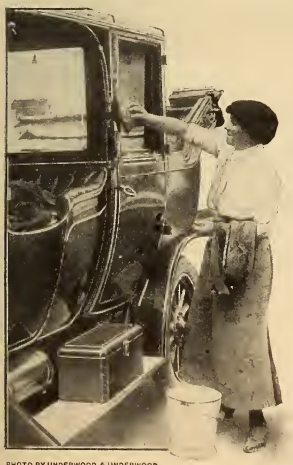


PHOTO BY UNDERWOOD & UNDERWOOD

She Gets into the Midst of Things

GARAGE FOR MILLIONAIRES' ELECTRICS

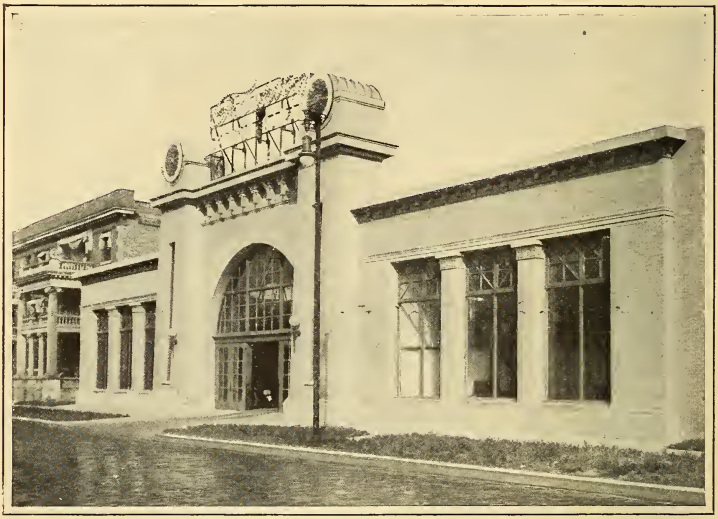
The most elaborately equipped and probably largest garage in the world devoted exclusively to the care of electric vehicles is located at Cottage Grove Avenue and Fifty-first Street, Chicago.

It is not usually termed a "garage" but "Fashion Automobile Station" and the first word of its name indicates the character of its clientele. Wealthy business men and half a score of millionaires keep their machines on call here and their wives and daughters in several instances have electrics for their own special use in calling and shopping. In fact, so thoroughly has the electric demonstrated itself as a lady's vehicle that the station has one lady attendant.

"Many automobile men tell us we are spending too much money for the ground for our station in this high class neighborhood," said H. Salvat, president of the concern, "but we can give better and more prompt service by being located near our patrons."

An important though hidden adjunct of the station is a direct line of cable between the station and a power house of the Commonwealth Edison Company. This line brings into the station direct current, eliminating the use of rectifiers and motor generators. Rheostats for handling the charging current are so arranged that a battery may be charged at as low a rate as one ampere.

To all appearances save for outlets and a central switchboard, the interior stands out as a structure of concrete and steel, every bit of the wiring being enclosed in pipe, most of which is concealed in concrete.



Entrance to the "Fashion Automobile Station" Devoted Exclusively to Electrics

Interior of the "Fashion Automobile Station"

The station is equipped with departments to handle any service required by the electric car owner. A distiller provides water for flushing the batteries, there is a battery repair department, an upholstering and wood shop section, a paint shop and a machine shop equipped with a planer, lathe and drill press.

The massive entrance and the completeness of the equipment led one patron to call the station "a palace for electrics."

TESTING A FOUR-WHEEL DRIVE TRUCK

A Duplex, four-wheel drive motor truck is here seen performing an almost impossible feat, going up the steps of the court house at Charlotte, Mich. The car went up with perfect ease and stopped and was then backed down as easily as a person would lower a basket. This was a most severe test and one which was thought impossible.

A Severe Test

The Duplex is the invention of Maurice Bollstrom of Battle Creek and is unlike any other truck on the market. It is a heavy five ton truck and has a vertical, 30 horsepower, Hazard engine, placed under the seat where it is easily accessible, and also a sliding gear transmission. All four wheels are driven simultaneously by the single engine.

THE AUTOMOBILE SHOWS

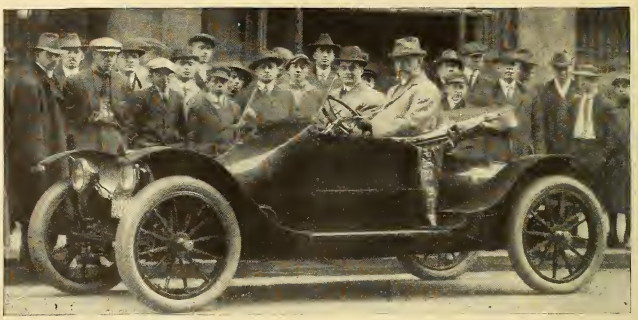
When at midnight on January 10th the New York exhibition of the Fourteenth Annual National Automobile Show closes, a swarm of workmen will invade the Grand Central Palace and feverishly begin the stupendous task of moving a large part of the exhibit to Chicago. Exactly fourteen days later the Chicago exhibition will open. During those fourteen days the exhibits of manufacturers taking part in both shows will be moved in a body from the Grand Central Palace in New York to the Coliseum and the First Regiment Armory in Chicago. It should be pointed out, however, that the two shows are quite distinct, for many of the Chicago exhibitors will not be represented at New York and *vice versa*.

But there are scores of manufacturers who will be at both places and when it is considered that every manufacturer will show several models, not to mention the numerous companies which manufacture "little brothers of the automobile" and automobile accessory companies that will have displays, it is easily seen that the United States Express Company, which does the moving, will have an enormous rush order.

All indications tend to show that both exhibits this year will be record breakers. A few years ago the New York exhibit was housed in the Madison Square Garden, but this year that historical building could not house one half of it. Four entire floors of the Grand Central Palace will be pressed into use and 50,000 more square feet of exhibition flooring will be used than was the case last year; 18,700 square feet of space will be devoted to accessories.

No commercial machines will be exhibited this year in New York but an unusually large number of electrics with the latest model closed bodies will be shown.

It is expected that the Chicago show will be more representative than the New York show though possibly not so extensive as to the number of cars exhibited. The decorations of the Coliseum are to be of the most sumptuous and lavish description with fountains and hangings and some set road pieces and much good music. Samuel Miles will be in entire charge at Chicago and in part charge in New York. At the time of going to press full details concerning either of the shows were not to be had. But it may be stated that all the new models will be to the front and not an electrical device will be missing.



Col. Bailey at the Wheel, at the end of the Chicago-Boston Run in an Electric Car

BOSTON TO CHICAGO IN AN ELECTRIC ROADSTER

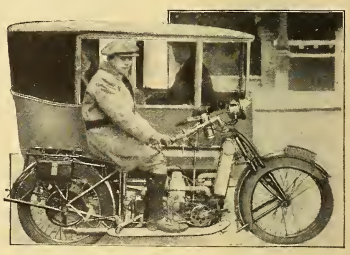
This run, from Boston to Chicago via New York, was made by Colonel Bailey, General Manager of S. R. Bailey & Co., Amesbury, Mass., to prove the availability of the electric automobile equipped with an Edison battery to do hard service in actual touring. The car used was a Model F roadster, from stock, new and untried. It was equipped with a G. E. motor and a 60-cell, A-6 Edison Battery. Colonel Bailey was accompanied by Mr. H. J. Foote of the company as a travelling companion. They started from Boston on October 14.

The trip was completed with no accident to the car nor failure of any part. While some of the day's runs were short and the speed low, they were as far and as fast as other cars. The car was mired some four times during the trip, but came out under its own power in every case but one. Many gasoline cars were passed on the road, very few indeed passed the electric. Colonel Bailey reports that had the weather conditions been fair, the ride would have been a pleasure and the run could easily have been made at an average of about 150 miles per day at good motoring road speeds.

The total distance covered on the route was 1302.5 miles. The average running speed for the entire distance was 17.8 miles per hour. The average speed absorbing all road stops was 15.7 miles per hour. These stops included not only those for inquiring the way, railroad gates, etc., but for getting arrested and going to court, stopping for luncheon, changing tire chains, etc.

LIMOUSINE SIDE CAR

The accompanying picture illustrates another step in the manufacture of motor propelled vehicles. The latest novelty in this line is the product of the Williamson people of Coventry, England. It

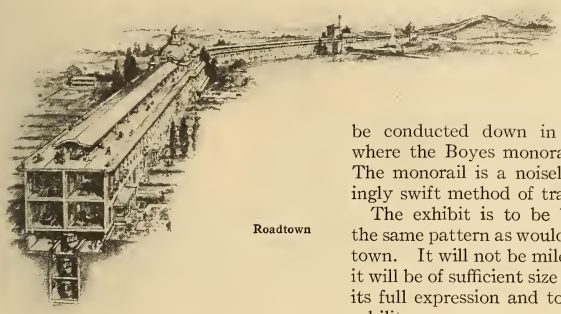


Side Car with Limousine Top

is a three wheeled motor cycle with side carriage capable of holding two passengers comfortably. The top of the side car is collapsible, but when in place, as shown in the picture forms a quite satisfactory limousine top.

ROADTOWN—A NEW KIND OF CITY

A modern skyscraper, laid on its side, with the pipes and wires and elevators running horizontally instead of vertically and with the inhabitants of the building having free access to the open country that surrounds it—that is the idea of Roadtown, which will be one of the most remarkable exhibits at the Panama-Pacific International Exposition at San Francisco in 1915.



Roadtown

Roadtown is the invention of Edgar Chambless, who for seventeen years has studied the problems of housing and transportation. The result of his study is to conceive the idea of a town that is built outwards instead of upwards. He took the idea of the skyscraper and used it in "another direction." Instead of traveling upwards 40 stories, the inhabitant of Roadtown will travel along the level terra firma as many as a hundred or even a thousand stories. Roadtown is a single line of houses, superimposed upon three lines of railway, one on top of the other, two stories of living and working rooms above ground, a continuous promenade along the roofs, and gardens and country front and back, all the way.

The arrangement of this prolonged municipality provides for the piping of water, gas, steam for heating, disinfectants and vacuum for vacuum cleaners. There will be wires for lighting, telegraph, phonographic opera and the daily oral newspaper.

Roadtown is to be built of "poured" concrete—Edison's system—and it will be earthquake proof, fireproof, sound proof and germ proof. All the transportation will be conducted down in the basement, where the Boyes monorail will be used. The monorail is a noiseless and exceedingly swift method of transportation.

The exhibit is to be built in exactly the same pattern as would be a real Roadtown. It will not be miles in length; but it will be of sufficient size to give the idea its full expression and to test its practicability.

THE ANSERFONE

An instrument, which will answer a telephone and record messages in the absence of the subscriber has recently been invented by Harry Legar, of Chicago, upon which he has applied for a patent.

If the subscriber has left his office, and his telephone should ring, this invention, called the Anserfone, would, with the use of a phonograph, announce—

"This is the Anserfone. Mr. Blank is not in at present, but if you speak distinctly your message will be recorded."

Another phonograph apparatus is then automatically put into action and the caller's message is recorded.

A number of messages, depending on the length, can be recorded on this one record.

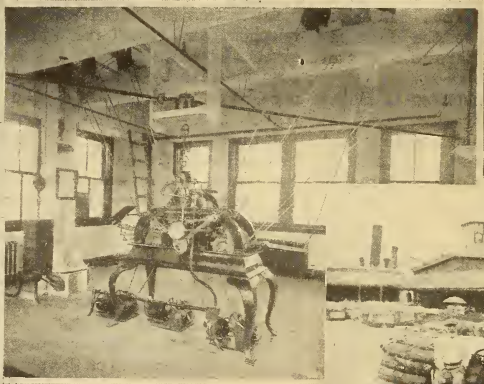
Upon the return of the subscriber he sets the phonograph in operation and listens to the messages which have come in during his absence.

It is estimated that the cost of such an equipment would be so low as to permit of its use on any subscriber's telephone.

THE PASSING

Sawing out Stock for Base Ball Bats in a Sporting Goods Factory

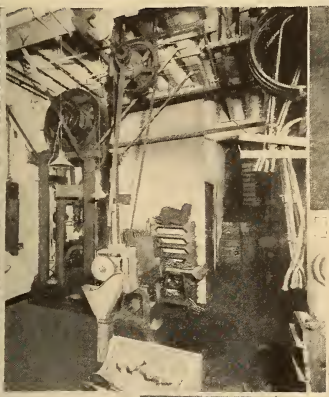
Cows Being Milked by Electricity at the Canadian Pacific Railroad Model Dairy



A Cotton Motor Truck Heavily Loaded

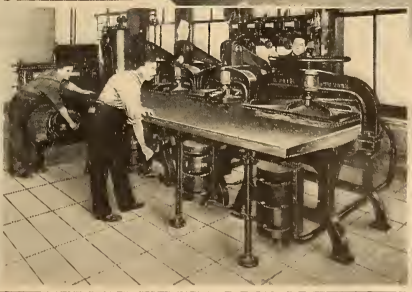
This Clock Has an Electric Chime Regulator, also a Regulator for Illuminating the Dials at Night According to the Time of Year

ELECTRICAL SHOW.



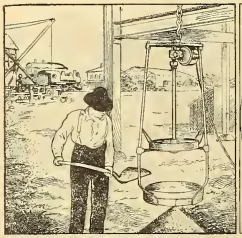
A Motor Driven Surfacer

Large Motor in a Plumbing Supplies Factory, with Selective Group Drive

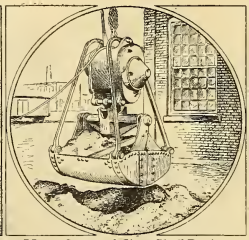


A Modern Book Bindery Electrically Operated

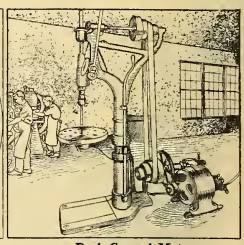
Matrix Drying Table in a Newspaper Plant



Gyratory Sand Riddle



Motor Operated Clam Shell Bucket



Back Geared Motor

NEW WAYS OF USING ELECTRICITY

GYRATORY SAND RIDDLE

To the foundryman, well riddled sand is not the only thing he considers, but he takes into account the time required to get this sand ready.

The gyratory riddle uses an electric motor in place of hand power and with one man shoveling will prepare about ten times more sand than one man can make ready by hand. The riddle is portable, weighing less than 100 pounds, and is arranged — motor and all—in a frame which can be suspended from a cross beam or crane hook and if desired, right over the flask being filled.

The motor is installed at the upper part of the frame and is geared to a vertical shaft, at the lower end of which, and at some distance above the sieve, is a sector shaped weight which it whirls inside a circular band. This action imparts a gyratory motion to the sieve at the bottom through which the sand is screened. Current may be taken from the ordinary lamp socket.

CLAM SHELL BUCKETS

A dirt, coal or rubbish bucket, the jaws of which are opened and closed by an enclosed motor and foolproof mechanism on the framework of the bucket, is shown in the illustration. Through a waterproof cable, current is conveyed to the motor and the operation of the bucket is controlled. The smallest bucket made picks up three-quarters of a cubic yard. Others are made in larger sizes.

The operation of the bucket is simple. Throwing the controller handle on the end of the cable one way closes the bucket, the motor stopping automatically when the operation is completed. Reversing the lever opens the bucket. An automatic take-up reel cares for the cable, taking out of the way any slack due to the movements of the bucket.

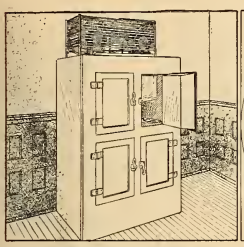
BACK GEARED MOTORS

There are two ways of obtaining slow speed from motors: either by using a larger and more expensive frame wound for slow speed and proportionately smaller power, or by employing a motor of standard speed and securing the reduction by means of a back gear.

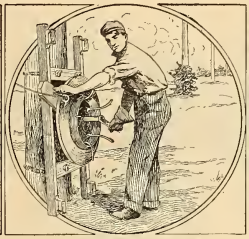
The illustration shows a motor equipped with a back gear operating a four-conc pulley of a drill press, this being only one of many applications of this idea.

These motors are well adapted for direct connection to apparatus which requires slow speeds. They may be connected directly to the countershaft or by gears or belts.

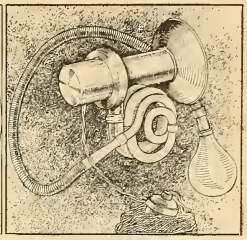
When cone pulleys are used on the countershafts of these motors they will operate machine tools at variable speeds without the use of any additional countershaft.



Domestic Electric Refrigerator



Take-up and Pay-out Wire Reel



Double Signal Horn

"DOMELRE"

The word "Domelre" is a contraction of "domestic," "electric" and "refrigerator," and is applied to a household refrigerator recently placed upon the market, in which electricity is used to produce cold. The electric motor and cooling machine are placed on the top of the refrigerator. The interior of the refrigerator is divided into compartments where the temperature varies from that necessary to make ice, to a temperature in which milk, cream, cheese and other foods may be kept without danger of freezing.

In average weather the machine must run only a couple of hours in the morning and a couple of hours more in the evening. The maid turns the current on the first time she has occasion to open the refrigerator and turns it off again when it gets cold enough. In the evening the machine is switched on when the refrigerator is used at dinner time and turned off again later in the evening. It is possible to make the same temperature produced by ice, at much less than ice costs, proper temperature for cold storage at about half the cost of ice, or real cold at about the normal cost of ice.

TELEGRAPH AND TELEPHONE WIRE REEL

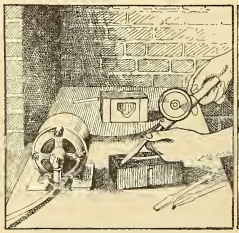
The Eichoff reel for handling wire on the line requires only one man to do the work which ordinarily takes the labor of from three to five men.

The reel is made to take up or pay out wire. It is mounted upon a framework with convenient handles for carrying it from place to place. The disk itself is of galvanized sheet steel. The arms of the reel are adjustable, so that a coil of wire may be readily taken off or put on the reel. In the illustration the reel is shown set up at a pole, the operator taking up wire with it. A brake upon the hub adjusts the tension on the wire leaving the reel, while a stop pin enables the operator to hold the reel at any point. A number of reels can be fastened to the sides of an ordinary truck, which leaves the platform of the truck for linemen's supplies and tools.

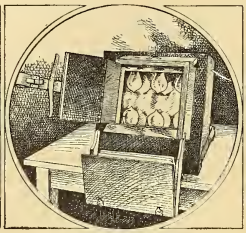
COMBINATION BULB AND ELECTRIC HORN

Something new in automobile and motor boat horns is a combination of the electric and bulb models. The wind portion of the horn, to which the bulb tube is attached, is placed directly below the funnel, the electric device being located at the rear end of the horn. This horn thus enables the use of either signal and but little additional space occupied by the device. The electrical part operates on six volts, the normal voltage of three cells of storage battery or on six cells of dry battery.

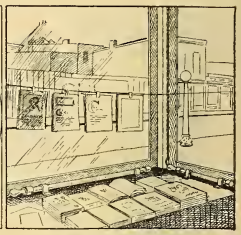
The horn is finished in Japan — baked on — with nickel throat or special brass finish as desired. One of the most attractive features of the horn besides it double signal is the clear, deep and pleasing note which it emits.



Die Sinker's Hammer



Photograph Printing Frame



Window Heater

DIE SINKING WITH ELECTRIC HAMMER

Energized with power from a one-eighth horsepower motor, the die sinker's hammer illustrated strikes 2,000 blows a minute. The power is carried from the motor to the hammer through a flexible shaft no larger than that used by the dentist.

The hammer can be used on stone work also and is adjustable so that a heavy or light blow can be obtained at will. For stone work, the motor is equipped with a carrier which goes over the shoulder and around the waist of the operator.

The value of this outfit in the tool room is appreciated by the man who is sinking the dies. Much of the time required to work out a die with a hand tool can be saved with this outfit. Sinking dies is an expensive proposition at best. It is not the cost of the high grade steel alone used in making dies that represents their value, but the time required to sink them.

BETTER PICTURES IN LESS TIME

The photographer need no longer rely upon outside light for making prints, if his studio is equipped with electricity.

The Ingento rapid printer uses six incandescent lamps within the cabinet, which, when in a semi-vertical position, automatically places each exposed print in a detachable receiver. This does away with one handling of the print and saves time.

The cabinet is mirror lined, the distribution of light being such that dodging, vignetting, etc., can be done with little trouble. Negatives 8 by 10 or smaller are handled by the apparatus.

PREVENTS "STEAMED" WINDOWS

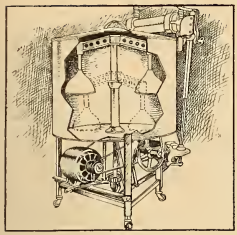
While the electric fan is doing good service in keeping show windows clear of condensed moisture during cold weather, by sending a current of warm air against the glass, inventors are seeking something still better.

A device of English make is here illustrated. The heater is made up in the shape of a heating tube which can be installed in a few minutes along the bottom of each pane and a flexible cord and plug serve to connect up to an ordinary lamp socket. These tubes are made in any length up to eight feet, and the heater consumes very little current. Another point is, that the tube heater takes up hardly any room and does not interfere with the goods in the window. It is also cheap, so that it is likely to be applied extensively when once its advantages become known. The inventor of this device is Harry Moss, 116 Horton Grange Road, Bradford, England.

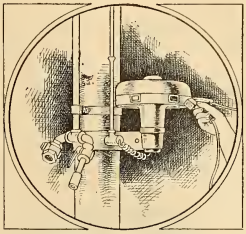
THE "EASY" MOTOR WASHER

"Air and suds" without friction are the cleansing elements which electric power applies in the modern Easy motor washer.

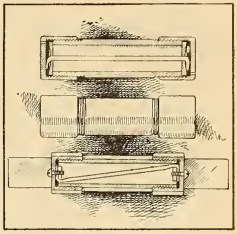
The copper suction basins shown here, within the tub, are automatically adjust-



"Easy" Motor Washer



Revolving Head Receptacle



Refillable Fuse Shell

ed to the size of the washing. These basins work up and down, forcing the water through the clothes and sucking it back again, turning automatically at the top of each revolution for a new position on the downward movement. The tub is 24 inches in diameter and 18½ inches high and of 20 ounce cold rolled copper.

The water discharge is threaded for connecting to the sewer system or is equally convenient to discharge into a pail or open drain.

The weight of the machine complete with the motor is about 130 pounds. It is mounted on roller-bearing, rust-proof casters of the right size for convenient wheeling about the floor, empty or loaded.

The finish on the steel and iron parts is black enamel, a smooth black surface, thoroughly protecting the parts against rust — easy to clean and keep clean.

REVOLVING HEAD RECEPTACLE

An innovation in receptacle construction is here shown in the "revolving head receptacle" which is equipped with fuses and receptacles and particularly designed for service in shops where electrical tools are employed.

A set of conductor rings makes connection within the metal casing to the receptacles and the head is pivoted so that it revolves freely.

As ordinarily installed the head is supported on a cast iron base, mounted upon a three inch pipe, the location being such as to reach the greatest number of electrical tools and appliances. The illustration, however, shows the head fastened to an upright post by a malleable iron bracket. A distinctive advantage which the head has, is the removal of all temporary wires out of the way as soon as the tools with their connecting cables are put away after use in a crowded shop.

REFILLABLE FUSE SHELLS

Enclosed fuses in both plug and cartridge types are more largely used than the open link fuse in light and power service. The fact that the enclosing cartridge casing is destroyed on the ordinary cartridge fuse has led to much experimenting to produce a refillable cartridge shell.

The illustration shows a Daum refillable cartridge fuse. The shells are vulcanized fiber tubes fitted at the ends with removable caps screwed on. To refill the fuse, the caps are removed and the proper size of fuse wire fastened under the washers inside the cap or T shaped screw head and the contact is tightened by screws passing through the ends of the cap.

Lifting a wire nail from the floor and driving it to the head into a board in the ceiling eight feet above is one of the freak stunts of a bolt of lightning, reported from the Davis log hotel at Brighton, near Salt Lake City.

Electrical Men of the Times

H. D. CRITCHFIELD

Harry Dixon Critchfield is a lawyer by profession, and a telephone man from choice. Admitted to the bar in 1889, he barely had time to swing his shingle before enthusiastic clients came thumping up the stairs to his office for counsel, the object being to establish an independent telephone system for Mt. Vernon, Ohio. The law has had compensations for Mr. Critchfield ever since, but before he had finished with his independent telephone clients he joined with them.

In that early beginning, Mr. Critchfield saw opportunities that could not be matched by a legal career. The idea of competitive telephone service was sensible. It was a brand new idea and required a discriminating mind to grasp its importance. Mr. Critchfield pinned his faith to the idea.

In 1896 he was elected secretary of the Ohio Independent Telephone Association. The following year he was chosen chairman of the constitutional committee at the organization of the Independent Telephone Association of the United States. The name of this organization has been changed frequently, but the constitution stands. Mr. Critchfield has been a member of the advisory board, or a member of the executive committee of the association ever since it was founded. He was general counsel of the association for five years after its organization.

This isn't a review of the struggles and hardships of independent telephony. Men who were seriously engaged in the early problems of the industry are still finding others. Men who were on the firing line with Mr. Critchfield in the earlier days know how valuable were his services, how long were his hours and how short was his pay. But unmindful of this, they were paving the way for a still larger performance for him. This came with his association in the preparation of the famous Berliner patent cause, the result of which made possible the use of the modern telephone transmitter. The great development of competitive telephony practically dates from the favorable decision of the Berliner case.

In 1898 Mr. Critchfield removed from Mt. Vernon to Cleveland, where he became general counsel for the Everett-Moore syndicate. He was thus active in the development of telephone properties in Cleveland, Columbus and Dayton, including the United States Long Distance Company and its far-reaching system, besides many smaller properties.

He came to Chicago, December, 1901, as general counsel for the Automatic Electric Company, then in process of organization. In the following years, while he was associated with it, the company installed its equipment at Columbus and Dayton, Ohio; Grand Rapids, Mich.; Los Angeles, Cal.; Lincoln, Neb.; Sioux City, Iowa; Wilmington, Del.; and many other places.

H. D. Critchfield is a big man, as big men are measured. He stands more than six feet, and weighs more than 200 pounds. He looks you straight in the eye. His eyes are his peaceful levelers. If he has any hobby, it is the automatic system of telephony; but should the subject of "dogs" be mentioned, particularly the Gordon setter, Mr. Critchfield can readily prove that though "dogs is dogs," the Gordon setter is more. One cannot talk long with him without finding that he has a longing for the frontier, which perhaps has something to do with his rugged, alert, right-from-the-shoulder, direct way of doing things for the land of his dreams, "the rock-ribbed West where men are ruled by conscience and not controlled by convictions; where success is not so much in a situation as it is in you." You would guess he never had need of a physician, but severe sickness put him out of the running in 1903. In December, 1908, he was elected general counsel and assistant to the president of the International Independent Telephone Association, a position he retained until June 15, 1909. The International Association offered Mr. Critchfield, during his short incumbency, the best opportunity he had ever had. His time was wholly given over to defeat the efforts of the Chicago Telephone Company to purchase the telephone rights of the Illinois Tunnel Company. He did that. To his untiring energy in this crisis, Chicago became competitive territory for telephony.

From the moment Mr. Critchfield engaged himself with telephone men, he has been active in shaping the policies of competitive interests. His particular attention has been devoted to organization and legislative matters, but he takes greatest pride in his work before the Chicago council telephone committee, which ultimately reached a conclusion that the telephone afforded desirable qualities as a competitive agent.

H. D. Critchfield was born on a farm in Knox County, Ohio, near Mt. Vernon, February 15, 1862.

Electrical Interests of Women

EDITED BY GRACE T. HADLEY

THE NEW YEAR'S SPREAD

Ethel's box has come at last! The long delayed holiday box was delivered on New Year's Eve and the good word flew about as a winged message among the girls who had been compelled, for various reasons, to spend their holiday time at school. Such shrieks of joy as Ethel unpacked the box and drew forth the mysterious packages one by one! Was there ever such a wonderful box of gifts or such welcome presents!

"An electric chafing dish, a coffee percolator and an electric grill," cried the assembled girls. "What fun we will have and what feasts!"

"A party on New Year's night, everybody invited," cried Ethel as she waved a long handled spoon. "Beth, get the

Mirth Reigned the Next Night in Ethel's Room

supplies; Mame, help pick up this paper and let us all tidy up the room and gather here to-morrow night."

Mirth reigned the next night in Ethel's room. The hostess stirred up a rarebit in the new chafing dish. Beth made the coffee, while Mame toasted crackers. When they had enjoyed the spread, Ethel remarked:

"Considering what an improvement this new electric set is over the old chafing dish, I shall now offer a prize to the girl who can tabulate the good points of these beautiful electric utensils."

"No heat wasted," suggested Nell who had intently followed all of the operations.

"Heat can be obtained at a moment's notice," said Beth.

"The cooking apparatus is portable and can be brought into my room," suggested Mame, "to-morrow night."

"No dirt to accumulate on the cooking utensils and therefore no awful times washing up," remarked practical Peg.

"But best of all," said Ethel, "is the safety feature. I had an awful accident with my old chafing dish at home and mother said I should not bring it with me when I came to school. In fact, it was thrown on the ash heap after the spirit lamp upset and I burned my hand trying to put out the blaze. Mother said, 'Maybe Santa Claus will remember you with a new chafing dish in which safety is the first big advantage.'"

WHERE HOMES ARE ELECTRICALLY HEATED

The Minidoka project in Idaho is one of the largest works of the United States Reclamation Service. It involves the reclamation of 132,000 acres, the establishment of four new towns, three of which are government towns and 2,000 farms.

The little towns of Rupert, Heyburn and Burley now adorn a landscape that was merely a desolate desert five short years ago. A sage brush desert has been transformed into a habitable region presenting the appearance of a prosperous community.

Best of all, the homes are well lighted and heated with electric current, power being furnished from the Minidoka dam, at the remarkably low rate of one-third cent per kilowatt hour.

The farms are from 40 to 80 acres in area and the products are wheat, oats, sugar beets, potatoes, apples and small fruits. A railroad through the project connects the farms with the markets of the world. An encouraging feature is the growth of co-operative spirit among the farmers. They are organized for the special purpose of marketing their products and for social benefit. A special advantage is the cheap power which the government develops at the great Minidoka dam.

Cozy Bungalow Lighted and Heated by Electricity

Rupert is located in the center of an irrigated tract on two lines of railroads, and gives promise of becoming a town of considerable size and importance. It is built around a central park and its wide streets are already shaded with attractive trees. Many of the business houses and residences are lighted and heated by electric current, and in many of the homes the cooking is done by electricity, from the government power plant. Rupert already boasts a $25,000 high school.

"Fate cannot harm me—I have dined today."

My Electric Party

BY MRS. HENRY GOLDWATER

Last Christmas my supposedly adoring relatives were gently advised that I would be pleased only with the various and sundry cooking devices, toaster, percolator, chafing dish and other things of that nature. The result was a regular electrical shower, or should I more properly say electrical *storm?*

Naturally I was most anxious to display all my treasures at the first opportunity and decided to give an electrical party to a select company of intimates. As Franklin is always associated in our minds with electricity, what more appropriate than to entertain on his birthday, January seventeenth?

The house that evening was enlivened with red and white kites, interspersed with the odd shaped and elaborate Japanese kites and strings of electric lights, also red and white.

Shortly after the assembling of the guests I put my electric fan on a pedestal at one end of the room and set it going, then I gave each person a handful of strips of lightest tissue paper. These were to be set floating before the fan, the participants following one another in rapid order. After each had floated out his bit, a ticket was given to the one whose slip went farthest. Then each one tried again. The game proved a jolly one, but, as soon as the players seemed to tire, the tickets were counted and a copy of "Poor Richard's Almanac" given to the holder of the greatest number of tickets.

Next all were put to shuffling around on the rugs to develop static electricity, and to test it by touching fingers to other people's cheeks. Two of us were secretly supplied with pins and gave a tiny prick now and then to those we met, eliciting a little scream and an "I felt one then!"

Picking coins out of a bowl of water in which the poles of an induction coil had been placed drew forth shrieks of laughter.

At supper time all were lined up in front of the dining room doors. The lights were switched off and the doors were opened showing only blackness. Suddenly, just opposite, the word "Franklin," blazed out and a zigzag streak of lightning flashed above it; again all was darkness, and once again the word and the flash appeared. The spectators were delighted and clamorous for an explantion after the lights were turned on in the room. The matter was simple enough. A very large shallow box of pasteboard had been covered with black paper, the word "Franklin" and a zigzag lightning streak cut out of the front. The box was then fastened to the wall and a powerful bunch of electric lights placed in the box, so arranged that they could be flashed on and off by a switch.

My dining table was open to its greatest capacity and set with doilies and my new electric cooking appliances. For decoration I used only red toy balloons, one for each guest, tied down to large, old fashioned keys. The effect was very unusual and attractive, and later we had balloon fights and other joyous sports.

The name cards were small kites of white cardboard with red edges, red paper strips to simulate braces, and red crêpe paper tails. Each kite bore a quotation from "Poor Richard's Almanac."

While we were being seated, supplies were brought on and some of the guests put to work cooking the supper. Welsh rarebit in the chafing dish, coffee in the percolator, panned oysters in the sauté pan and crackers on the toaster were soon sending out stimulating odors. Meanwhile all were supplied with pencils and paper and requested to write limericks on something electrical or containing a pun on an electrical term or terms.

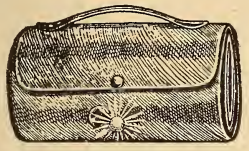
The prize, a little electric appliance to heat the water in which it is immersed,

was voted to the writer of the following verse:

There once was a gay young "spark,"
Who loved joy rides in the dark.
When he blew out his plug
That stopped his chug-chug,
And put an end to his lark.

LADIES WILL NOW CARRY LANTERNS

The accompanying cut illustrates one of the most recent adaptations of miniature Mazda lamps. A woman's leather handbag is equipped with a concealed interior pocket holding a slender cylindrical battery which operates a flashlight



Handbag Flash Lamp

lamp. The lamp is set flush with the surface of the leather and when not in use is concealed by a circular metallic cover. The cover is pivoted and automatically lights the lamp when opened and extinguishes it when closed.

This novelty is meeting with favor among theater-goers for reading programs between the acts. Many other uses suggest themselves, such as finding lost articles in the dark, finding keyholes, etc.

"WHAT IS HOME"

A few years ago a London magazine sent out one thousand inquiries on the question: "What is home?" Eight hundred replies were received out of which the following gems were carefully selected:

"Home—a world of strife shut out, a world of love shut in."

"Home—the place where the small are great, and the great are small."

"Home—the father's kingdom, the mother's world and the children's paradise."

"Home—the place where we grumble the most and are loved the best."

"Home—the center of affection round which our hearts, best wishes twine."

"Home—the place where our stomachs get three meals a day and our hearts get a thousand."

"Home—the place on earth where the faults and failings of humanity are hidden under the sweet mantle of charity."

"Never worry your food; let it cook out its own salvation."

"The cunning manipulation of three or four common articles of the domestic cupboard will often give surprising results."

"Women are never out of place in connection with the good things of the table."

DISHES OF THE ORIENT

The favorite dishes of the Orient are rapidly becoming favorite dishes of the Occident. This is especially true of Chinese dishes. The glamour thrown about them by the mystery of their origin and the still greater mystery of the combinations used in their preparation, adds a zest of which even the most skeptical is conscious. While this mystery causes a natural hesitation on the part of the person who tastes for the first time, still when he has once tasted he is sure to taste again, and soon he, too, falls under the spell. He acknowledges that these Chinese dishes possess an intangible something that no other cooking can approach. Then he wonders how they are made, and whether it is possible to prepare them in the home.

A dinner served in Chinese style would begin, for instance, with a dish of preserved Cun Quats, a dish of tiny Chinese rice cakes and salted Chinese almonds and unlimited Chinese tea. The diners relax, converse and leisurely enjoy the sweets, the nuts, the quantities of tea—thus preparing for the heavier dishes which follow.— *Chinese Cookery.*

THE TWIN GLOWER

"Yes, we live in the home electrical and we like it too. Every night before we go to bed we toast our toes and warm our hands by the little twin glower. Once when we were making a snow man out in the yard, old Jack Frost bit us on the nose and we cried. Then our mamma said, 'Little folks shouldn't stay out so long. They should run in every now and then and warm themselves by the little twin glower.'

"Mothers are very nice and they know such a lot! Once our mamma said, 'Electric radiators are worth many times

"Yes, We Live in the Home Electrical"

their cost as a convenience. They will dry damp clothes and remove the chill from a bedroom and they are a great boon in the nursery.' We're not sure we understand everything mother says about electricity, but maybe you do!"

SOME WOMEN WALK 234 MILES TO IRON

The average housekeeper would dread it if she knew she had to walk during the next twelve months; from Boston to New York, a distance by rail of 234 miles, yet people who have a mania for statistics claim that this is the distance every housekeeper who does her own ironing must trudge in a beaten path between the stove and the ironing board.

Whether these exact figures are true or not, every woman knows that she has to walk a great deal, even in the course of doing her week's ironing.

All this is eliminated when the heat can be put right into the iron and kept right under the control of one's hand by the twitch of the switch. To-day this is only genuinely practicable with the electric iron.

EDUCATION OF THE MODERN WOMAN

"Woman in the home has ever been the conserver of health, the promoter of comfort, the divider of the loaf and the missionary of beauty. She must perform these offices for the state as the home. To prepare her for these enlarged duties, courses of study should follow these four main lines.

"To conserve the public health, a thorough knowledge of biology, bacteriology, sanitation, chemistry and physical culture are necessary.

"To promote the public comfort and welfare requires an acquaintance with sociology, political economy and civics.

"To divide the loaf requires an accurate acquaintance with foodstuffs and their proper preparation, together with all the variety of knowledge embraced in modern domestic economy. The problem of the high cost of living might be solved if women had a more accurate knowledge of the cost and quality of foodstuffs.

"The missionary of beauty must have a broad grounding in painting, music, architecture, sculpture and the drama.

"Along with the intellectual training

must go the developing and deepening of the spiritual nature which is the highest function of a woman's college."— Dr. Luella Clay Carson, president of Mills College, California.

PROPER SIZED LAMP REDUCES CURRENT BILLS

Careful selection of incandescent lamps with a view of adapting their candlepower to the particular service required of them is one way to limit the cost of electric lighting. More than half of the complaints of excessive bills—especially in the case of residences—are traceable to the use of lamps of unnecessarily high candlepower for the volume of light needed.

That the cost for lighting keeps step with the increase of candlepower is readily shown. A ten watt Mazda lamp will burn 100 hours for a total cost of but ten cents where the rate is ten cents a unit. A 45 watt lamp on the same circuit will burn 20 hours for ten cents, and a 40 watt lamp 25 hours for ten cents. It is evident, then, that by exercising a little judgment in the choice of lamps a considerable saving can be made.

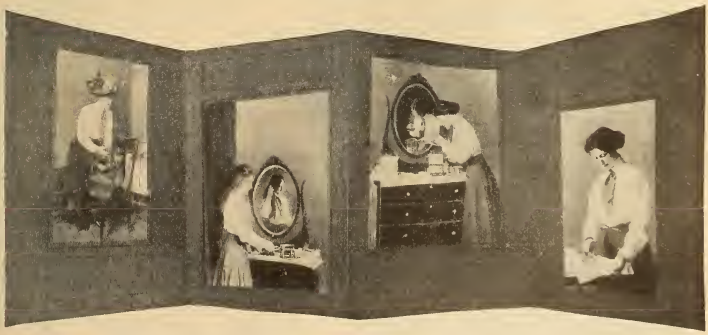
PLAIN OMELET

4 eggs
4 tablespoonfuls of milk
1 teaspoonful of butter.

Break the eggs in a bowl and whip them thoroughly. Put the butter in the blazer of the electric chafing dish, turn the current on at full heat, and when the dish is very hot put in the eggs, allowing them to cook until thick. Use a thin knife to loosen them from the bottom, but do not stir. When done carefully roll the edges of the omelet over until it is all rolled up; serve on a hot plate. The cost of current is 1¾ cents for preparing this omelet.

WHEN I GO JOURNEYING

When on a journey I must go,
There's one thing I shall not forget:
That most convenient outfit,
My electric utility set.



So easily I curl my hair,
Electric heat is always there.

I warm the water with utmost ease,
This small set is sure to please.

To press my waist is no great task,
Electric heat is all I ask.

COLLEGE STUDENTS DO THE WASHING

One of the live agents of an electric washing machine company in a college town is using a novel method of acquainting housewives with the merits of the machine. He advertises that he will do a family washing right in the home at so much per hour. He is in touch with a number of students working their way through college who are glad to earn a little extra money. When he gets a call, he sends to the house a student with a Thor machine. The student runs the washer and wringer, finishing in one third the time it takes by hand and takes the machine away.

This novel advertising stunt effects several good results—the student makes some extra money, the housewife sees the advantages of the washer and usually orders one herself and the dealer's sales increase.

THE ELECTRIC GIRL

With her gauzy costume adorned by scores of tiny incandescent bulbs, lighted by dry cells concealed about her person, a dainty little dancer made her appearance at a banquet in Los Angeles recently. Being a Southern California event, the orange was featured, and the surprise of the evening was a huge basket of golden fruit and glossy foliage, which was carried in by several men and set upon the banquet table. Then, suddenly, the oranges all glowed with light; they were cleverly designed bulbs of translucent glass, and the charming little dancer emerged from the clusters of fruit which had concealed her, the electric lights of her costume glittering and flashing as she sprang from among the golden spheres. It was a wonderful demonstration of the artistic possibilities of the electric light.

A Charming Little Dancer Emerged from the Clusters of Fruit

THE IMPROVED POWER TABLE

The kitchen is the work room of the home and the improved power table is a wonder worker which will perform practically all the operations necessary in the preparation of food formerly done by hand. Every modern home has many small household appliances which are or could be easily driven by an electric motor. Sewing machines, washing machines, ice cream freezers and many other conveniences which once exhausted the strength of the home worker are now operated by electricity.

The electric power table does all of these things and it does them better; best of all it is absolutely sanitary. The heavily plated utensils are always clean and shining. There are no nooks or crevices to gather dust or dirt and it is easier to clean than the ordinary kitchen equipment. It is not only clean itself but it handles the food in a more cleanly way than human hands could ever do.

It will mix cakes, beat eggs, knead bread, grate horseradish, sharpen and scour knives, seed raisins, pit cherries or grind coffee, all in a fraction of the time required by the old hand process and make a better job of it. From freezing ice cream to chopping mince meat it saves

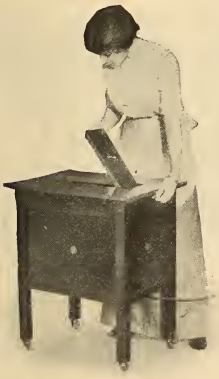
time and doubles the capacity of the cook in the kitchen.

First the table is seen as an ordinary table with mechanism dropped and sliding cover closed; to start, the end of cover is pressed down, then the slide is pulled out and the cover is lowered vertically; the next operation is to pull up the power head and push in the slide to lock it and the head is ready for using the different attachments. When through using the table it should be washed thoroughly and put away. This is done by reversing the operations.

The various attachments are the bread mixer, cake mixer, coffee grinder, food chopper, ice cream freezer, egg beater, vegetable slicer, food grater, knife sharpener and knife polisher.

Electricity is supplied through a ten-foot connecting cord securely fastened to the table and fitted with detachable plug for connection with the nearest lamp socket.

End of Cover is Pressed Down



Cover is Lowered Vertically

The Power Head is Pulled up

Head is Ready for Different Attachments

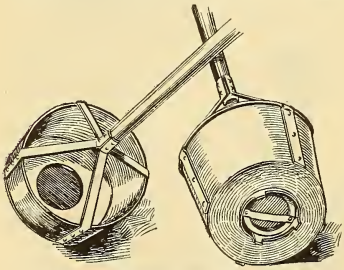
LOBSTER A LA NEWBURG

Take one and one-half pounds of lobster and steam for about eighteen minutes. Then take out the meat and cut into small pieces about three-eighths of an inch thick. Fry in a copper frying pan and with butter and a little salt and paprika, until it is a golden brown color. Put one small glass of sherry wine into the lobster with one coffee cup of cream and boil these together. Whip four raw eggs in one-half cup of cold cream, then put the eggs into the lobster, shaking it quickly so that it does not boil any more. Upon thickening, cut off current, but keep shaking all the time. Add a lump of butter the size of an English walnut. Serve in chafing dish.

For Practical Electrical Workers

POLE HOLE WATER BUCKET

The illustration shows an apparatus for bailing water out of telephone pole holes designed and used by S. J. Axford and described in the *Telephone Review*. A metal bucket ten inches deep, ten inches in diameter at the top and eight inches across at the bottom is fitted with a valve over a hole in the bottom of the bucket. When



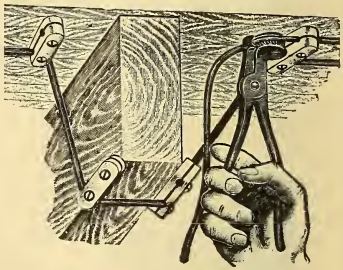
Exterior and Interior of Pole Hole Bucket

the bucket is lowered by the pole into the water the valve opens and is closed again by the water admitted through the valve as soon as the bucket is raised.

WIRE PULLING TOOL

The Johnson wire puller is a new and simple device just on the market, which may be employed to pull wires taut in obstructed places. To operate, set the insulator, tighten the screw or nail partly, pull up the slack with the hand in the usual way, then apply the puller either right or left and give it a turn. The wire is then rolled upon the cam-shaped pulling block until the required tension is obtained. Then tighten the screw or nail and release the puller. The cleat will not be pulled back by the wire when puller is released, the slack in the cleat having been pushed back to its limit by the puller in operation. This sagging back of insulator especially in short pulls makes the lines appear loose and is one of the difficulties the wire man cannot overcome in the ordinary way of doing cleat work.

This device will pull when an insulator is set within a few inches of an obstruction and still



Taking up Slack Wires

pull the line as taut and easy as when room is ample. There is no marring of finished ceilings or walls and no injury to the insulator as in old methods of wiring.

APPROVED SOLDERLESS CONNECTOR

The Usem wire connector here illustrated is a radical departure from past wiring practice but its use is approved by the underwriters.

No solder, compound or tape is used. The skinned and twisted wires are inserted as far as they will go and the conical point of the screw kinks them into the corresponding recess of the shell. After the screw has been set up the insulated cap is screwed on with the fingers and the job is done. The reverse operation takes the joint apart and the connector can be used over and over again. It is approved for splicing wires of No. 12 B. & S. gauge or smaller.

Solderless Connector

Elementary Electricity for Practical Workers

By W. T. RYAN

Chapter X. — Measuring Instruments.

"We owe all the great advance in knowledge to those who endeavor to find out how much there is of anything."— Maxwell.

In order to find out how much there is of anything electrical we must have electrical measuring instruments. It is practically only since about 1882 that this particular branch of the industry has developed. In everyday engineering work the four measurements most commonly met with are current, voltage, power and energy. In addition it is often desired to have instruments to measure power factor, frequency, detect grounds, measure insulation resistance, synchronize, etc.

Instruments for measuring current are called ammeters; for measuring voltage, voltmeters; for measuring energy or quantity of electricty, watt-hour meters and for measuring power, wattmeters.

Ammeters may be classified as follows:

Ammeter { Moving magnet; Moving coil, permanent magnet; Moving coil, fixed coil; Induction; Hot wire }

Voltmeters are classified the same as ammeters except that the electrostatic type should be added.

Wattmeters and watt-hour meters are classified as follows:

Wattmeters and watt-hour meters { Moving coil, fixed coil, induction }

In any electrical measuring instrument there are in general two forces acting. One we call the *actuating force* (basis of classification) and the other the *controlling force*. The moving part of the instrument which usually carries a pointer which plays over a divided scale comes to rest when these two forces are in equilibrium. The usual controlling forces are: (1) Attraction of gravity, (2) Pull of a helical spring, (3) Twist of a spiral hair spring, (4) Attraction of permanent magnets, (5) Attraction of electro-magnets, (6) Eddy current damping, (7) The attraction of induced and inducing currents, (8) The mechanical friction of a rotating fan.

The details of the actuating and controlling forces outlined above will be brought out in the discussion of the instruments utilizing these forces.

Ammeters and voltmeters: The early ammeters and voltmeters were mostly of the plunger type with either gravity or spring control. Fig. 58 shows the working principle of the Kelvin ampere and volt gauges.

(E E) is a thin soft iron wire plunger about eight inches long which is drawn into coil (C) by a force which is proportional to the strength of the current, I. (P) is a pointer which plays over a divided scale, as indicated. A dashpot (D) containing oil is placed below the plunger and weight (W) and a light disk hung from (W) moves up and down in the oil, giving an irregular or a periodic motion to the moving system. This instrument is suitable for either direct or alternating currents.

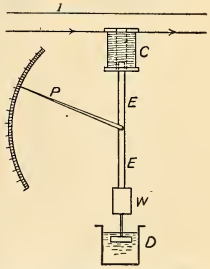


Fig. 58. Illustrating Principle of Kelvin Ammeter

The Kelvin voltmeter also works on the solenoid and moving plunger principle with a damped gravity control, as just described. The only difference in construction is that the coil (C) is wound with a large number of turns of fine wire in place of a few turns of heavy wire. The coil (C) is then connected across the line instead of in series with the line.

A very interesting and satisfactory type of instrument is the one shown in Fig. 59. This also works on the moving, soft iron needle and solenoid principle.

(E) is the working solenoid, which is wound with heavy wire if the instrument is to be used as an ammeter and with fine wire if it is to be a voltmeter. In the opening in the solenoid is a small, thin, soft iron strip (C D) bent and shaped as indicated. If it were bent out straight it would be a triangle with its apex at

(D). Pivoted concentrically with (E) in jeweled centers is a light steel spindle to which is fixed the pointer (P) and a thin soft iron plate or vane (N). When (P) is at zero the movable vane (N) and the plate (C) are very close together and nearly parallel. When current is sent through the solenoid they develop like polarity at the same ends and therefore repel each other. (N) is driven toward the apex (D) of the fixed triangular plate, where the repelling force is not so great. Its motion is controlled by a non-magnetic spiral spring (not shown in Fig 59).

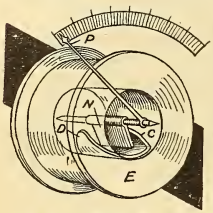


Fig. 59. Operates on Solenoid Principle

The most familiar plunger type is the Thompson inclined coil built by the General Electric Company and illustrated in Fig. 60. It is used to a large extent for alternating current switchboards.

A coil (C) is mounted with its axis inclined to the horizontal shaft, to which is attached the pointer (p). A small iron vane (v) is mounted on the shaft (v′) at an angle. When a current flows through the coil, lines of force will thread through it as shown. The vane (v) will tend to turn into such a position that it will lie parallel to the lines of force. The controlling force consists of two spiral springs attached to the shafts at the points (a) and (a′).

The Castle ammeters and voltmeters belong to the moving magnet type and have the very uncommon feature of magnetic control.

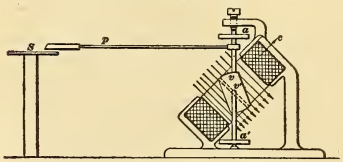


Fig. 60. Thompson Inclined Coil Ammeter

Fig. 61 illustrates the working principle of the instrument.

(M) is a permanent magnet. (R S) and (N R) are two soft iron rods in alignment horizontally. Their ends form the poles (N) and (S) of a strong magnetic field. Between these is pivoted a diamond shaped piece of soft iron (N′ S′). The soft iron piece (N′ S′) is held in the horizontal position by the strong field due to (M).

The deflecting field is due to the coils (C C) which are energized by the current or voltage which it is desired to measure. With no current passing through (C C) the soft iron (N′ S′) is magnetized inductively by the permanent magnet and is held in the position shown in the figure, the pointer (P) then being at zero on the scale. When current passes through the coils (C C), (N′ S′) tends to swing around into such a position that the lines of force passing between the coils (C C) will pass through it from (N′) to (S′), hence it tends to swing into the vertical position, whereas (M) tends to hold it in the horizontal position. Hence the diamond shaped piece of iron (N′S′) will turn through a certain angle, depending on the magnetic strength of (C C) and the pointer (P) takes up a corresponding position on the scale.

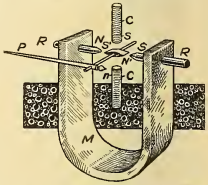


Fig. 61. Principle of the Castle Magnetic Control

The most familiar moving coil permanent magnet instruments are the Weston ammeters and voltmeters of this type. Fig. 62 shows the principle of operation of these instruments.

(M) is a carefully selected well aged powerful permanent steel magnet, shaped somewhat like a horseshoe. To the poles (N) and (S) are fastened the soft iron pieces (W W). These are bored out so as to be truly cylindrical. (K) is a soft iron cylinder concentric with (W W) and fastened to them. A narrow rectangular coil of wire (C) swings in the air gap between (W) and (K). The controlling force is a phosphor-bronze hair spring.

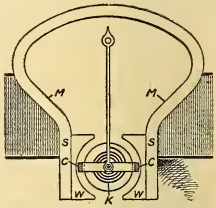


Fig. 62. Weston Ammeter Parts

The action of the instrument is due to the fact that the moving coil when carrying a current endeavors to turn into such a position that the lines of force it produces will coincide in direction

with those due to the permanent magnet.

The instrument measures voltage and is suitable for direct currents only. When used to measure current it is always used in conjunction with a manganin shunt. The instrument itself simply measures the voltage between the terminals of the shunt. This voltage is of course proportional to the current flowing through the shunt, therefore the instrument may be calibrated to read the current flowing through the

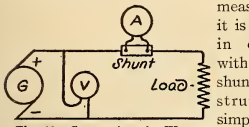


Fig. 63. Connections for Weston Voltmeters and Ammeters

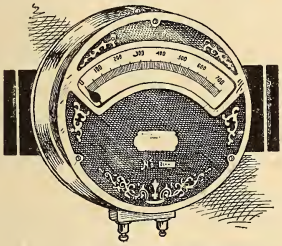


Fig. 64. Weston Power Station Ammeter

shunt. Fig. 63 shows how Weston ammeters and voltmeters should be connected.

Fig. 64 shows a Weston power station ammeter, reading up to 700 amperes.

Fig. 65 shows three Weston power station type shunts.

Fig. 66 shows a Weston portable standard ammeter and Fig. 67 shows four Weston standard portable special alloy shunts.

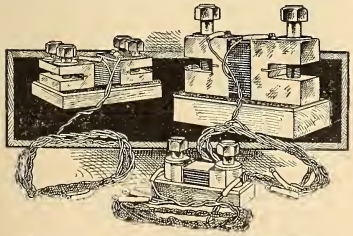


Fig. 65. Three Weston Power Station Type Shunts

The principle of operation of the moving coil, stationary coil type is illustrated by Siemen's electro-dynamometer. It consists of two coils at right angles to each other, one being stationary while the other is free to rotate. The stationary

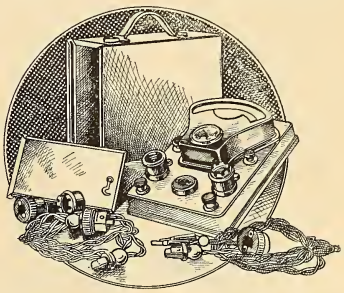


Fig. 66. Portable Voltmeter with Lamp Testing Attachments

coil is inside the moving coil and is in the form of a rectangle hung from a thread inside a spiral spring.

Electrical connection with the movable coil is made through mercury cups into which the ends of the coil dip. When current is passed through the two coils, the movable coil tends to turn to a position where its lines of force will coincide in direction with those due to the stationary coil. Hence it tends to set itself parallel to the stationary coil. The movable

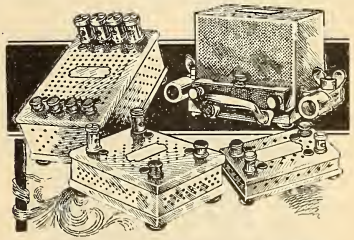


Fig. 67. Weston Portable Special Alloy Shunts

coil is kept at right angles to the stationary coil by rotating the torsion head to which one end of a spring is attached. The amount of twist given the spring by the torsion head in order to bring the coil back to zero is a measure of the current in the coils. If it is desired to use the above instrument as a voltmeter both coils are made with a large number of turns of fine wire so as to be sensitive to small currents. Then

by placing a high resistance in series with the instrument it may be connected across the terminals of the circuit whose voltage is to be

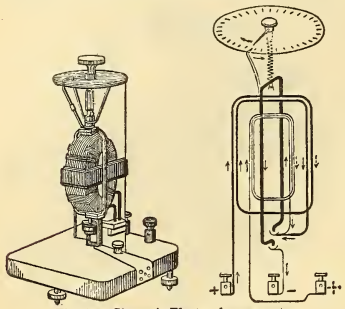


Fig. 68. Siemen's Electro-dynamometer

measured. It really measures the current passing through it, but by Ohm's law this is proportional to the voltage at its terminals and its force is therefore a measure of the voltage.

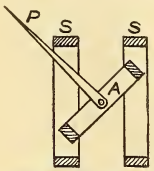


Fig. 69. Operating Principle Weston A. C. and D. C. Voltmeter

The well known Weston standard portable voltmeter for alternating and direct currents is also of the moving coil fixed coil type. Fig. 69 shows its principle of operation.

(S S) are the fixed coils which are connected in series and (A) is the movable coil to which the pointer (P) is attached. The current due to a voltage (E) passes through

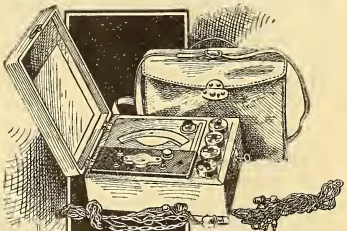


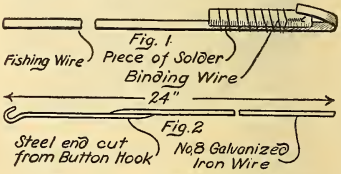
Fig. 70. Portable Voltmeter and Ammeter with Adapters

the two coils in series. The coil (A) which is held in the zero position by a hair spring, tends to turn into such a position that the lines of force it produces will coincide in direction with those due to the stationary coils (S S).

(To be continued)

FISH WIRE SUGGESTIONS

In Fig. 1 is illustrated a method of weighting the end of a steel fishing ribbon that will make fish wiring easier under most conditions. The end of the ordinary fishing ribbon should always have a hook bent in it to prevent its catching on obstructions, but even when this precaution is taken, the end of the wire has an unfortunate tendency of curling up instead of laying down close to the surface along which it is being pushed. It is particularly essential that the wire lay against the surface when one is fishing in the space provided by furring strips, that exists between the inner surface of a ceiling and the joists. With a length of solder wire possibly two inches long bound or soldered to the fishing



Weighted Fishwire and Button Hook End

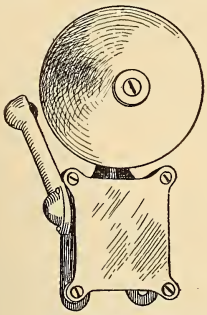
wire end, as in Fig. 1, the wire will usually lay close to the surface along which it is being pushed.

Another method of effecting the same result is illustrated in Fig. 2, wherein the hook portion of a steel button hook is brazed or soldered to the fishing wire. The steel hook has sufficient weight so that it will stay reasonably close to the surface and it is so stiff that it cannot readily be pulled out straight when under tension. A steel button hook soldered or brazed as shown to a length of annealed galvanized iron wire, possibly 24 inches over all in length, comprises a very useful tool for drawing fish lines and wires from outlets out into the open.— Geo. V. Jerome.

A law has been enacted in Prussia to provide a sum of about $2,500,000 for the development of hydro-electric energy by the State from existing reservoirs built by the government, in connection with the Rhine-Hanover Canal, at Hemfort on the River Ader and at Helminghausen on the River Diemel.

ODD LOOKING BELL

The accompanying picture shows a bell with its working parts protected by a waterproof



Waterproof Bell Case

metal case. A peculiar appearance is given to the bell by the hood which shelters the metal tapper and its arm.

ELECTROPLATING ON WOOD

There are two reasons for depositing metals on wood—one is for industrial purposes, the other is because just now it is the fashion to plate cane and umbrella handles and the like.

The harder the wood to be coated, the more readily it may be prepared for the process; but as a matter of fact, no wood is too soft for the electroplater's cunning. One prime requisite is that the wood be made watertight by filling its pores, not by covering its surface. There are many materials known to the cabinet maker and others which will effect this, thoroughly stopping the pores and permitting the excess, on the surface, to be rubbed off by sandpapering; although sandpaper is in most instances to be avoided, and where (as is often the case) the wood is finely carved, its use is not permissible.

The next step is to coat the surface with varnish, preferably a tough and elastic one, and it may be laid on with a brush so carefully that no streaks show. The first coat must dry overnight and be followed by a second, similar one, but this latter coat must not be allowed to dry. While it is still sticky it must be dusted with the finest copper dust obtainable, so thinly that the fine lines of the carving will not be filled, the object being solely to make the surface a good conductor of electricity. If possible, the varnish should be one which dries rapidly, but this quality must not be obtained at the expense of making the coat brittle. After removing all excess of copper dust with a brush, the surface must be examined carefully in order to see that no places remain unoccupied. Should there be such, they must be touched with varnish and dusted.

The next step is to follow the mechanical metal coating with a galvanic one of copper, or still better, of silver, the latter being apt to be more regular in thickness. For the silver bath there is used in German practice 9½ quarts of water, six ounces each of potassium cyanide and silver nitrate. Should the solution not be clear, more cyanide should be added. It is essential that there be very little or no free acid. The articles to be plated are immersed for a few seconds in this bath (without any current) the result being a thin silver deposit.

Although the articles may now be plated in a regular way, it is still desirable to give them a galvanic copper coat in an acid bath; then they may be plated with gold, silver or what not. To effect this preliminary coating there is employed a cold bath of 9½ quarts of water, 56 ounces of copper sulphate (blue vitriol) and eight ounces of sulphuric acid, with a current induced by only one or two volts, as a stronger current is apt to give a rough coating.

It is, of course, necessary to hang to each wooden article sufficient weight to prevent it from floating in the bath. The best way to do this is to drive into some deep hollow a brass screw eye to which a brass or lead weight may be hung by an insulated wire. Iron wire is in no case to be used as it would spoil the bath.

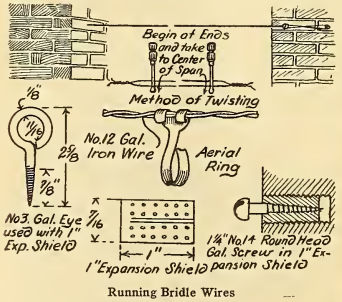
Should a very heavy coating be required, the articles should be removed from time to time from the bath and well scratch brushed; this has for its object keeping the coating smooth.

Burges recommends for the preparatory process dipping the articles in hot paraffin wax, which will quickly fill the pores. Any surface excess of paraffin, as well as that lying in the pores near the surface, may be readily removed by dipping in ligroin; then the wood should be dipped in the copper sulphate solution and well dried. The copper sulphate remaining in the pores should be treated with sulphuretted hydrogen, either in gaseous form or in aqueous solution, which will transform the sulphate into sulphide. This is then reduced to metallic copper by employing the articles as a cathode in a solution of chloride of sodium and surrounding them with a wire spiral having

about two-fifths inch pitch. Quite a strong current should be employed, and in about ten minutes the articles will be ready to be put into the galvanoplastic bath.—Dr. Grimshaw.

SUPPORTING BRIDLE WIRE SPANS

In running bridles it is often necessary or desirable to carry several twisted pairs across an opening between two buildings, past an alley, light well or air shaft or some other gap and to accomplish this result the twisted pairs are usually taped together into a sort of a cable. Some sort of a messenger or span wire is necessary to hold the bridle wire cable and upon which the aerial rings may be fastened. For a long span, a regular messenger wire should be used but for short spans the messenger wire may be made up of two pieces of No. 12 galvanized iron wire as shown and placed in position. This messenger idea for supporting bridle wires or aerial cables across short spans should never be dispensed with as the messenger takes all of the strain off the bridles or cable in the event of ice forming, snow sliding off the roof, or something solid falling upon it from above. Either of these three causes are likely to break the bridle wire or damage the cable sheath. In using the method indicated it is best to first twist the wires together as shown and securely fasten one end to one of the buildings and then crimp on the aerial rings and, for long

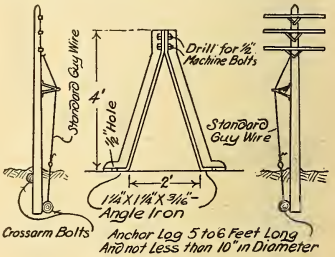


Running Bridle Wires

spans, pull a fairly heavy line through the rings. The span wire is then drawn taut and the other end fastened to the opposite building after which the made up cable of bridle wires is pulled through the rings with the aid of the rope. If the span is short the rope may be dispensed with. This method can also be employed when bringing in bridle wires from a pole to the building.

STRENGTHENING A BENDING POLE

Here illustrated is what is termed a "stay brace and anchor log." This type of anchor looks a good deal as though it worked on the principle of a man trying to lift himself by his bootstraps, but such is not really the case. The iron stay brace is shown in detail and is about all that there is to the arrangement. This method of guying is not to be used on hills but is occasionally employed when the side pull on a pole is causing the pole to bend. This guy is then placed

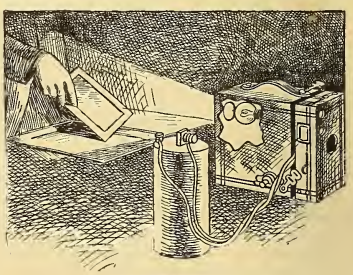


Stay Brace and Anchor Log

on the opposite side of the pole and overcomes the bending strain keeping the pole straight.—G. Madison.

EMERGENCY RUBY LAMP

In developing films and plates it is essential that a ruby lamp be used. Not having one I took my Brownie No. 2 camera, in the back of which is a small ruby lens and removed the film holder. In this space was placed a small



Dark Room Emergency Lamp

tungsten battery lamp. A few feet of flexible wire was attached to the lamp socket terminals and a dry battery furnished the current.

PLACING LEATHER HEADS ON NAILS

The accompanying illustration shows a simple device which I use in placing leather heads on nails for fastening up porcelain knobs. A piece of sheet metal having considerable spring is bent and placed beneath a board in such a

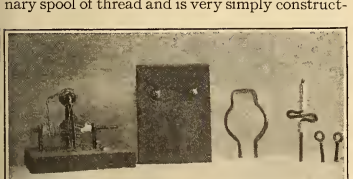
Leather Heading Nails

way that the end comes under a hole just large enough to take a nail used in porcelain knob work.

The leather head can be quickly picked up on the end of the nail, and as the hammer hits the nail, driving it through the hole, the leather head is slipped up to the head of the nail and at the next moment the spring throws the nail back. — T. W. Bisland.

TINY MOTOR

The little motor shown in the illustration has a wooden base no larger than the end of an ordinary spool of thread and is very simply construct-

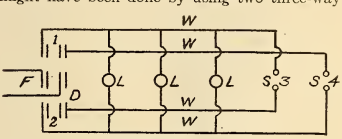


Small Motor

ed. The field magnet is No. 16 soft iron wire bent in the form shown and driven into the small wooden base. The armature shaft is a soft iron wire, No. 18, bent in two curves projecting at right angles to the shaft. The shaft bearings are two wire screw e[illegible] driven into the wooden base. The armature and field are each wound with three feet of No. 28 s.c.c. copper wire, the commutator being the ends of the armature coil (one-half of which is wound on opposite sides of the shaft), brought out on opposite sides of the paper insulated shaft. The two ends of the field wire are the brushes. Short wire pins driven into the two eyes of the curves of the armature shaft hold the two armature coils.

TWO PLACE CONTROL OF LIGHTS

I used the following diagram to wire lights in a barn and between the house and barn for a customer. He wanted to turn the lights off or on at either the house or barn. Although this might have been done by using two three-way



Two Point Light Control

switches, I had only a double pole double throw knife switch and some single pole switches. (F) is the circuit supplying the current, (D) is a double pole double throw switch, (L) marks the lamps, (W) the wires connecting house and barn and (S) the snap switches. When switch (D) is at position (1) S_4 must be on to burn lights. When one of the snap switches is on, always have the other off or no matter how (D) is thrown the lights will burn.— W. Hall Moss.

TELLING LIVE WIRES FROM DEAD ONES

Having occasion to look up some trouble on a telephone line, I came across a high tension line, a limb of a tree, and a barb wire fence all in a pile. I did not know which one to pick up first, so I set to work to find out whether the high tension line was dead or not. This I did in the following manner: I took a bunch of nails out of my pocket and wrapped some bell wire around them. Then I took a telephone receiver and connected the wire ends to this. I then held the coil close to the high tension line. A slight humming noise was heard in the receiver, which indicated that the wire was live, so proceeded accordingly.—Stanley Radcliffe.

UNCLE SAM'S GREAT LIGHTNING RODS

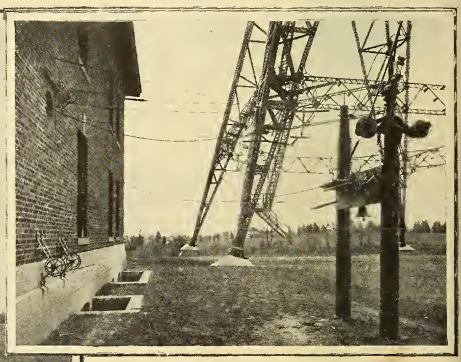
The 600-foot towers of the Navy's great wireless station at Arlington, Va., have proven to be immense lightning rods. Three successive electrical storms have put the station's apparatus out of commission and so great has been the commotion of the disturbances caused by huge balls of lightning flashing over and about the aerials and towers that no one will live within a mile of the station.

During the last summer's storm the motors, transformer system and generators were blown out and so great was the damage that the station remained idle for three weeks.

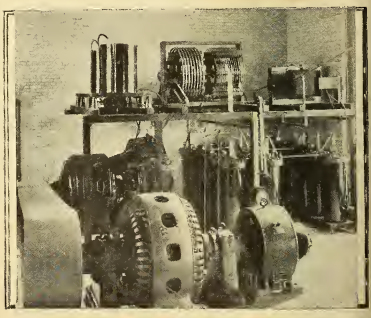
The Navy's wireless experts set about to perfect some safeguard against the ravages of lightning. The aerials were re-hung and properly insulated, a new switching system was installed so that the current could be broken some distance from the station house. The switch operates by a unique system of sprockets and chains.

A more efficient ground was also established. The photograph shows a wire leading from the base of one of the legs of one of the three towers

How Legs of Towers are Grounded



New Switching System



Generating Plant at Station

into the ground. It is attached to a steel plate weighing nearly half a ton which is embedded in damp soil some 30 feet below the surface of the ground.

The generator and motor which were blown out were replaced as shown in the photograph. The power is received from a public utilities corporation and transformed into direct current which operates a motor hitched to the special wireless dynamo by means of an eighteen inch belt.

CONDENSER CONSTRUCTION

All who have made glass plate condensers for a high frequency outfit or wireless set know that it is difficult to avoid "homemade" losses. Shellac, asphaltum, glue, paraffine, vaseline and other substances have been tried as adhesives to keep the foil on but in most cases blisters occur after a time. The following will doubtless be helpful to those who are contemplating the construction of a condenser for use with a transformer of ¼ k. w. capacity or more.

OPEN PLATE TYPE

This type is not as suitable for a small power set as is the oil insulated type, except where good appearance is desired. Dust and other deposits are sure to collect on the plates and even ordinary changes in the temperature and atmosphere will affect them. Much trouble will be avoided if the plates are thoroughly cleaned, dried, rubbed over with a rag saturated in alcohol and then allowed to stand. The alcohol evaporates and in doing so should leave a very clean plate.

The foil used should be heavy, at least No. 35 gauge. Asphaltum varnish or shellac is perhaps as good as any adhesive and the foil should be rolled on the glass plate after it has been smoothed out. Some pressure can be applied in putting the foil on the plates. The corners of the foil should be rounded in order to avoid leakage.

After the adhesive has set thoroughly, the connecting lug or area having been made, the plate is again cleaned with a dry rag and the entire plate painted with shellac (one or two coats). The writer examined some old plates after two years' use and found that the shellac used was still wet on parts of the foil covered plate. This could easily have been avoided by care in making and by drying the plate over a hot air register. Too much adhesive should not be used as it cannot harden sufficiently when protected by the foil covering. Another method is to use a good grade of glue to fasten the foil to the plate, applying the glue to the part of the plate covered by the foil only, after which the insulating coats of shellac can be applied as before mentioned. As the glue is used only as an adhesive on the part covered by the foil coatings and not as an insulator, it will often prove quite satisfactory. For large condensers, thin sheet metal (copper, aluminum, or brass) should be used and can be held on the glass with a good cement. Some weight or pressure should be applied until the cement can set, a heavy book being suitable. The thin sheet metal mentioned can be had from any chemical supply house.

OIL IMMERSED TYPE

This type of condenser is ordinarily the most desirable one. The suggestions already made can be applied to this type. It is not necessary to fasten the foil to the plates in this type and practice shows that no advantage results when this is done. It may even prove a disadvantage when carelessly done as the oil can not penetrate into the condenser to operate properly. When assembled with care so that the foil coatings are in alignment, the foil smooth, its corners rounded and the whole condenser is bound together with tape before it is immersed in a thin insulating oil, the oil type of condenser is as good as any that the experimenter can make. Here again, the use of thin sheet metal is to be recommended.

The condenser is best made in sections, at least two, so that if one is damaged it can be replaced with a substitute unit without taking the whole condenser apart.

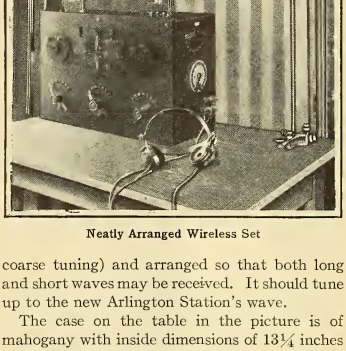
The bubbles, often called blisters, can be avoided. It seems that the blister is caused by the pull of the foil away from the plate at a point where it has not been permanently fastened to the plate, such as occurs when shellac is applied unevenly to the plate in the making. The loose foil gives or spreads out in such a case and forms the little pockets which are generally called blisters.

Small condensers can of course be made on the same plan as the oil immersed type except that they are used without the oil. The entire exposed edge and sides of the condenser in such a case should be filled in with paraffine or asphaltum. This can be done by using the asphaltum or paraffine while it is just hot enough to spread. Apply it to the edges of the glass plates with a common spoon. If paraffine is used too hot the glass is liable to crack.—PHILIP E. EDELMAN.

ARRANGING WIRELESS STATION APPARATUS

The object of this article is to give the wireless amateur some details of a station having the appearance of a commercial station. In amateur stations, one will sometimes find apparatus scattered over the table, one piece here, another there; whereas it can be made compact and by so doing greatly improve appearances.

The operating table may be a flat top desk of the office type, with or without drawers. The tuner requires careful consideration. It may be of the valve type and so constructed that it will have a "tune" and "stand-by" side (sharp and



Neatly Arranged Wireless Set

coarse tuning) and arranged so that both long and short waves may be received. It should tune up to the new Arlington Station's wave.

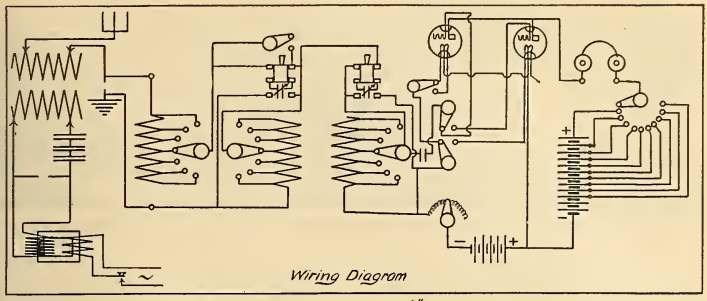
The case on the table in the picture is of mahogany with inside dimensions of 13¼ inches by 20¼ inches and the front or cover is of black fibre. This is much cheaper than hard rubber and gives a fine effect against the wooden case. The front is arranged on a hinge and overlaps the sides and top by ½ inch.

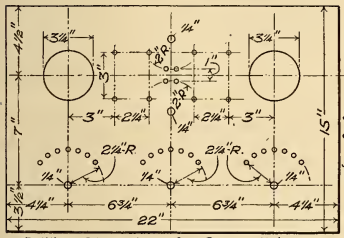
Dimensions are shown in the drawings. The loading and primary coils are both wound with No. 22 s.c.c. copper wire on four inch cardboard tubes to within ½ inch of the ends. The former has six taps of 28 turns each taken off and the primary is wound so that the first three taps will have five turns of wire to each switch point. The remaining four should be arranged to take up the rest of the 156 turns. The secondary is six inches long and is wound with No. 28 s.c.c. wire on a 3½ inch tube, seven taps of 43 turns being taken off. The taps on the primary and loader are made by allowing twelve inches of wire to reach in loop form and be brought from the outside of the coil to make a complete circuit without breaking the wire to each switch point. The loop is then twisted and winding proceeds on to the next tap. The secondary is made in a similar manner, only where each tap is taken, a small hole is pierced through the cardboard tube and the lead is brought through inside to the binding posts on the wooden coil head, given a twist and then wound on to the next. After the coils are wound, they are given several coats of shellac so as to hold the turns firmly in place. The knife switches are of the Marconi type having a piece of hard rubber separating the blades. The switch is made as seen in the drawing. The metal parts may be nickel plated. The switch arms for the primary loader and secondary are also shown in detail. These parts may be purchased from any supply house, as well as the rheostat, switch-points, binding posts, etc. The Blitzen variable condensers used on this tuner may be bought from the Clapp-Eastham Company, the audion detectors from the Wallace Company of New York and the stands for the detectors from the Manhattan Electric Supply Company. Two of each are required. The high tension battery consists of a dozen ordinary flash light cells. For the lighting circuit, dry batteries or a storage cell may be used, the latter being preferred and giving better results. A small shelf should be built inside the case to accommodate both batteries.

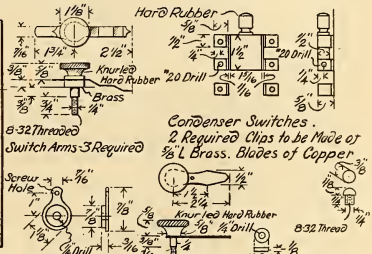
The apparatus should be mounted as follows: On the front: Variable condensers with knife switches, two two-point switches for changing the high and low voltage from one lamp to another, loader, primary and secondary switches, taps and bearings. On the top are the audions with stands and binding posts. At the right side is a switch of eleven points for adding in any amount of the ten flash light cells for the high voltage, rheostat and rod for changing the coupling of the tuner and four binding posts for the aerial, ground and phones. The left side has two two-point switches, one for long and short wave lengths, the other for changing filaments of one lamp.

The set is wired as shown in the diagram and is operated as follows:

By opening the two point switch on the left and throwing the primary variable switch up, the condenser is placed in series with the aerial, thereby adjusting the set for short waves. By reversing these switches, the tuner will work on long wave lengths and if there is not enough inductance in the primary the loader may be thrown in. By having the secondary variable switch up, the variable capacity is used between the primary and secondary, causing a "stand-by







Wiring Diagram and Construction Details

tune." Having this switch down puts the closed circuits on the "tune" side. By adjusting the variables, signals may be brought in to their maximum strength. The voltage for the audions needs little varying after once being set. Either lamp can be used should one not be as sensitive as the other, the same holding true with the filaments.

The transmitter apparatus should be of the cabinet type. As this part of the set varies with amateurs who have transformers and others who have spark coils, the arrangement will be left to their discretion.

On the opcrating table there should if possible be no other apparatus than the tuner, phones and key. The transmitting instruments should be placed on the floor, but within easy reach. This will give the station a neat and compact appearance. In this system the most modern applications are used; namely, multiple tuning, using taps instead of sliders and the "break-in system" which abolishes the troublesome aerial switch.—GEORGE UZMANN.

WIRELESS TELEPHONE ON JAPANESE SHIPS

The Toyo Kisen Kaisha (Oriental Steamship Company) has installed wireless telephone apparatus aboard the Shrinyo Maru in addition to its wireless telegraph instruments. It is proposed to test out the wireless telephone apparatus on the Inland Sea of Japan.

FRENCH MEDAL FOR BOY OPERATOR

"Jack" Scheetz, the boy wireless operator who in August, 1911, saved the steamship Lexington off the South Carolina coast, is to get a medal from the Societe des Hospitaliers Sauveteurs of Brittany, France.

On the way from Savannah to Philadelphia the Lexington went aground and her wireless was put out of order. Scheetz, who was only sixteen, climbed to the top of the mast in a 90 mile gale, repaired the wireless and flashed an S O S message that summoned the United States revenue cutter Yamacraw.—*The Marconigraph.*

On Polyphase Subjects

SIR WILLIAM HENRY PREECE, "FATHER OF WIRELESS"

Sir William Henry Preece who was engineer-in-chief and electrician to the London General Post Office from 1892 to 1899 and who died November 6, 1913, at the age of 79 was generally known as "the father of wireless telegraphy." Before Mr. Marconi was born, in 1875 as a matter of fact, Sir William was carrying out experiments with a form of wireless and in 1876 he succeeded in telegraphing across the Solent when the cable to the Isle of Wight broke down. Mr. Marconi remarked of him when informed of his death, "He was the first person in England to take an interest in my early experiments and to lecture on them."

The achievements of the late Sir William were many. He invented a duplex system of telegraphy, perfected the block signalling system, invented electric bells, originated the automatic telephone system, perfected the working of the postal telegraph and was responsible for the first domestic light system which was installed in the house of Sir Francis Truscott in Park-Crescent, London.

There is a good story told of him. On one occasion, in order to give the late Queen Victoria some idea of the possibilities of the telephone, then a new invention, it was arranged that a band should play in London and that Her Majesty should listen to it at Osborne. The Queen's arrival at Osborne was delayed, and the musicians after playing for some time were dismissed.

Shortly afterwards a message was received from Osborne that the Queen had arrived and was ready to hear the music. On the impulse of the moment Sir William decided to see what he could do to demonstrate the wonder of the 'phone, and he hummed "God Save the Queen" into the receiver. He then inquired whether Her Majesty had recognized the tune.

"Yes," was the reply, "it was the National Anthem and very badly played."

ELECTRIC, THE ONLY PRACTICAL BUS

Some little trouble is being experienced by an electric bus company of New York City in securing a franchise. Opposition to the plan comes from the street railway companies, who contend that additional motor trucks on the streets are going to endanger the lives of pedestrians. The bus company, in a hearing before the Board of Estimates, came back with the argument that the ease of control of electrics would counteract this tendency, and Thomas A. Edison lent weight to the argument by a letter contributed to the discussion in which he made the following statement: "I believe that for traction in cities the electric motor will displace all other motors. Already it has displaced steam on street cars, elevated railways and subways. It drives all of the elevators and most of the machinery in the city. If buses are desirable for intercity traffic, the electric is the only practical one. It is noiseless, has half the destructive effect of a gasoline engine, and can be stopped quicker than the gasoline vehicle, with the added economic value of much cheaper operation."

Willie was greatly interested and much impressed by "Quo Vadis." When the scene where the lions devour the martyrs was thrown on the screen he began to cry.

"What's the matter?" asked mother, thinking the dreadful sight was too much for his young nerves.

"Boo! hoo!" wailed Willie. "I saw a lion that didn't get any Christian."

* * *

We pause to inquire: "Is it because the department store elevator is a shop lifter that it has automatic devices for arresting it?"

* * *

Operator — Number, please.

Subscriber — I vas talking mit my husband und now I don't hear him any more. You must of pushed him off de vire.

* * *

A Hammond, Ind., lawyer approached the Erie depot in a somewhat excited manner, addressing a colored man thusly:

"What time is it, please? I want to get a train south; how long will I have to wait?"

The colored party replied thusly: "If you-all is waitin' for the 'Erie' to pull in, what you want is a calendar, not a watch."

* * *

A lady approached the clerk at the central station office in Jamestown, N. Y., and complained that the company was not charging her on a flat rate. She thought she was entitled to a flat rate, she said, because she lived in a flat.

* * *

An old colored woman was sitting with knees crossed in the shoe department of a large store when a young woman clerk stepped up to wait upon her. "What size of shoe do you wear, Aunty?" she inquired.

"Well, honey, I kin wear eights; I ginerally wear nines; but dese yer I'se got on am twelves, an' de good Lawd knows dey hu'ts me!"

* * *

"Did she come to the door when you serenaded her with your mandolin?"

"No; but another fellow came along and brought her out with an auto-horn."

* * *

The palm for brevity in speech should be awarded to a marine who testified about the explosion of a gun on a war-vessel — an explosion which had sent him to the hospital for months.

"Please give us your version of the explosion," he was asked.

"Well," he said, "I was standing beside the gun; there was an awful racket, and the doctor said, 'Sit up and take this.' "

* * *

Shopman — That's your wife I'm attendin' to, sir?

Mild Individual — Yes.

Shopman (who has in vain tried on the biggest boot in the shop) — Well, sir, let her go home and put on thin stockings, then come back and we'll try on the box.

* * *

"You're rather a young man to be left in charge of a drug store," said the fussy old gentleman. "Have you any diploma?"

"Why, er—no, sir," replied the shopman, "but we have a preparation of our own that's just as good."

* * *

"My dear," said Miss Gushleigh, "this coldslaw is simply delicious. I do not think that I ever tasted cabbage with such a fine flavor. I wish you would give me your recipe."

"I have no recipe," replied Mrs. Newbride. "I make it out of my own head."

* * *

"What sort of a boat is this?" asked the inquisitive man.

"A cruiser," replied the smart lad.

"And where is she going?"

"A cruise, sir."

"What makes it go?"

"Its screw, sir."

"Who are on board?"

"Its crew, sir."

"It looks pretty smart!"

"We have to keep it clean, or rubbish and dust would accrue, sir."

"Oh, you are too smart. Where do you come from?"

"From Crewe, sir."

* * *

"I want to be procrastinated at de nex' corner," said Mr. Erastus Pinkly.

"You want to be what?" demanded the conductor.

"Don' lose your temper. I had to look in de dictionary myse'f befo' I found out dat 'porcrastinate' means 'put off.'"

* * *

Willie — Paw, what is a jury?

Paw — A body of men organized to find out who has the best lawyer, my son.


TINGA LING-TING A LING
The Bell
With abject apologies to Edgar Allan Poe--
Hear the loud alarum bell
Telephone bell!
What a tale of terror now it's resonances tell!
In the startled air of night
How it screams out its affright
As you tumble out of bed
How the blame thing raises Ned
Out of tune!
Then you grope across the room & crack your head against the door
And you utter words no mortal ever dared to say before
Then you stumble down the stair;
Stub your toe against a chair;
And when you get there & grab the receiver off the hook & shout "Hello! some blithering idiot says "Oh excuse me --- I rang your number by mistake ---"
Oh the bell bell bell bell bell bell bell etc.
OW!
QUOTH THE RAVEN NEVER AGAIN-
DEBALL