

POPULAR ELECTRICITY

AND THE
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A DAY WITH EDISON

BY W.H. MEADOWCROFT.

The suggestion having been made that I contribute an article, descriptive of the daily life of the great inventor, it occurred to me that possibly a real appreciation of his extraordinary activities will best be obtained by the presentation of a

single day in his life, as he lives it at the present writing. With this object in view it will not be my purpose to choose some especially strenuous day in which he might work 20 hours or more, but merely to travel with him through a usual

day; one that will be fairly representative of his labors during all the working days of the week, year in and year out.

At first blush it would not appear to be a difficult task for one who is on the spot, to obtain a record of an average day's work, but it was not such an easy matter as it would seem to be. At the laboratory and around the works some 40 to 50 distinct lines of experiment are always in progress. The main idea and purpose of each is originated by Edison, and he constantly keeps in close touch with all of these developments day and night. Consequently, he is in the habit of popping in at various parts of the establishments, and, in order to follow up some experiments or to save time, will often have the work continued until the "wee sma' hours," or possibly overnight. In order to get data for a really representative day, I made elaborate plans to keep track of his movements without his knowledge, but for three days he unconsciously foiled me by working until the early hours of the morning. The fourth attempt, however, was more successful, and it is to record activities of this one day (not long previous to the time it will appear) that this article is chiefly concerned.

The question is frequently asked me whether Edison, now 66 years of age, ever goes down to his laboratory, the inquirer evidently being under the impression that he has retired on his laurels and is living a life of ease. For one who is in a position to know that the inventor's working hours every day are from 5:30 or 6 o'clock in the morning until midnight, with but moderate intermission for meals, it is impossible to

repress the smile which such an inquiry provokes, especially on recalling to mind many occasions when the subject of the conversation has said to me, with sparkling eyes and in an animated tone,

"I feel bully to-day, I slept only four (or five) hours last night."

There is no affectation about this, for, after a protracted spell of work, Edison seems, if anything,

to be more keenly active, mentally and physically, than

after his usual seventeen to eighteen hour days.

His wonderful recuperative powers

give him the happy faculty of coming

to the day's work with a mind

thoroughly refreshed and

ready for anything, great or

small. So far from

being unstrung from long working hours he actually

seems to be brighter and inclined to more than

his accustomed cheerfulness.

Only a short time ago, following a night session which had

lasted until two o'clock that morning, he was busy with an

important experiment on which he had been intensely concentrated

for several hours. It happened that I had a message of pleasant import to communicate

to him and, upon a favorable opportunity offering itself, delivered it. He had just arisen

from being seated and seizing a

high backed chair began caper-

ing around it like a boy and even tried to throw his leg over the chair, but it was too

high. In two or three minutes he was the inventor again and as deeply immersed

as before in his experiment, utterly oblivious to everything else.



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In a Thoughtful Mood



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Mr. Edison Often Good Naturedly Submits to Being Photographed with Delegations of Visitors, in this Instance a Group of Youngsters from the Orange High School Who Have Been Shown Some of the Educational Motion Pictures

With these preliminary remarks to clear the air, so to speak, let us spend an actual day with Edison and follow him around to its close. On the day of which I write he arose between 5:30 and 6 o'clock, having gone to bed about four hours previous to that time. After completing his toilet in less than half an hour, he went into the den and employed himself in reading with lightning like rapidity a large installment of miscellaneous weeklies, monthlies and quarterlies which are sent up to the house in batches about twice a week. In addition to the daily newspapers, his regular current reading embraces about 116 journals and magazines, covering a wide variety of subjects, including chemistry, electricity, gas, cement, architecture, physics, mechanics, steam, automobiles, motor boats, insurance, medicine, music, dramatics—in fact, almost every live subject appearing in publications of all kinds, from law reports to the *New York Clipper*. It will be quite natural to wonder whether he remembers what he reads. You, gentle reader, would be quite convinced that he does if he said to you, as he does say not infrequently, "There was an article about so-and-so in such-and-such a publication about so many months ago. Find it for me."

READS "FOR KEEPS"

Sometimes he will add that the article was illustrated by such-and-such pictures, describing them. The article is invariably found, as Edison reads "for keeps" and not merely to pass the time away.

After spending about an hour on these periodicals, he looked over the daily newspapers, then out came the little memorandum book in which he writes some of the things to be done during the day. With this he was busily engaged for half an hour or so, jotting down various kinds of trouble for the staff at the laboratory. It may be noted parenthetically that some of these short memoranda are full of meat and the man who receives a copy of one sometimes finds himself provided with work for weeks to come.

But now it is 7:45 o'clock and Edison is summoned for breakfast, to which all of the members of the family usually sit down together. It is no solemn function, for there is generally more or less good-natured "jollyng" of each other, in which pastime the inventor contributes his share. Eating but little, he finishes his meal long before the others. Frequently, after sitting in deep thought for a few minutes, he will enthusiastically



Mr. Edison with a Group of Visiting Automobile Engineers

explain some of his ideas or plans to Mrs. Edison, who is a sympathetic and willing listener.

Breakfast over, a cigar was lighted and the inventor rose to leave for the laboratory. As he passed out into the hall the family dog jumped up with a joyous bark, seeking recognition. Assuming a deep bass voice, Edison said, "Ah, there's the worst doggie in the whole United States!" Meanwhile, the aforesaid "worst doggie," with his tail working overtime, jumped up and down, giving vent to a succession of delighted yelps as he accompanied his master and mistress to the door. Here Edison called out "all aboard," and kissing his wife an affectionate farewell, jumped into the automobile which had rolled up and was whisked off to the laboratory.

Arriving there about five minutes later (8:20), he went into the library, pitched his hat on a table and was off like a flash to the experimental rooms up on the third floor, where he had an interview with the head of the educational

picture department, in which some new problems were discussed. Following this he listened to some voice trial phonograph records that had been made at the New York recording rooms, noting his criticisms carefully in his "singers' book." Then came a consultation with one of the experimenters about results of a new electro-plating process that was under trial. This interview was closed by giving directions for some further changes and by sending a memorandum to another worker to make corresponding changes.

One of the talking motion picture staff then appeared on the scene to ask questions about a new recorder. In passing, it may be remarked that Edison has lately been giving a great deal of thought to the Kinetophone (the technical name for talking motion pictures), in the effort to make further improvements in the quality of reproduction of the voice. For more than a year past those who have seen these pictures have been enthusiastic over the perfection of the

illusion, but Edison is hard to please, and he has been keeping his staff busy on further refinements.

OLD FRIEND OF SALAD DAYS

But to resume our story of the day's work: An old friend who had known Edison in his salad days, when he was a telegraph operator, dropped in for a few moments' chat and friendly greeting. After his visitor's departure the inventor went down to the chemical room to observe the progress of an experiment, and on his return I had a conversation with him on some business matters. A foreman from the works then consulted him about some technicalities of a difficult metallurgical process being carried on in one of the departments; after which the head of another department and his foreman engaged his attention on some engineering problems.

Twenty-five minutes was then spent in listening to some experimental phonograph records, when he was interrupted to go down to the library to have an interview with a representative of the Swedish Government.

After spending about fifteen minutes with this gentlemen he returned to resume his hearing of records. This job being finished, he went down through the yard to the chemical room, where he stayed for

half an hour, watching and directing some experiments, after which he returned to the third floor and spent 25 minutes working on his notebook, in which he personally writes elaborate criticisms and analyses of phonograph records. He then wrote a memorandum of directions to the head of the record-making department, sent it off, and went to the storage battery testing room to look over the test sheets and hear reports of progress, returning in 20 minutes to resume work on his books, on which he continued until noon.

The blowing of the twelve o'clock whistle now causes a donning of coats and hats and a general exodus of the experimenters and workmen for lunch. Following his usual custom, Edison went down to the library to spend the hour between twelve and one o'clock in examining and disposing of his personal mail, which his private secretary had left in an overflowing basket on his desk.

And such a mail! It is doubtful whether Uncle Sam delivers to any other single person such a variegated assortment. Besides reports from various companies and departments and a large number of really important communications relating to his extensive



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On the Way to Make an Experiment with One of the Big Cells



Inspecting a New Auto Truck





Mr. Edison is Just Looking over His Mail. He Was Not Aware That this Picture Was Being Taken. The Photographer Was Waiting to Take a Special Picture and, Seeing His Opportunity, Made the Best of It

business interests, Edison is flooded with a variety of letters which to answer adequately would make demands on the wisdom of a Solomon, the contents of an encyclopedia and the pocketbook of a Cæsus.

WHAT'S IN THE MAIL?

Of course, the autograph collector is always in evidence and if all of his or her desires were satisfied, Edison would become a mere clerk. Parents write to ask what is best to do with sons who show some leaning toward electricity and other arts and sciences. Applicants for positions contribute no small quota. Owners of mines (and their name is legion) send samples of ore, asking for analyses and offer to share their property with the inventor for a consideration. Boys who are interested in electricity seek illumination on various problems which confront them in their experiments. Deaf people write to ask if he has not made some invention to alleviate their affliction. Doctors, lawyers, scientists, and thinkers send him complimentary copies of books, pamphlets and papers they have written. These cover an infinite variety of subjects and some expression of opinion is

expected. Faddists and exponents of various "isms" and cults write mysteriously and intricately to get his views concerning hair-splitting theories with which they are wrestling.

Experimenters in almost every conceivable branch of the arts and sciences write to ask his views on some particular line of work in which they happen to be engaged. Quite frequently the latter class of epistles contain lengthy descriptions, covering many pages of more or less intelligible matter, more or less illegibly written;

and not seldom there is propounded, quite artlessly, some questions that would require the writing of a small volume to answer. A good example of such questions in one case was, "How do they make the most efficient dynamos?" Invitations to banquets; exposition meetings of societies and other functions are constantly in evidence in the inventor's mail.



Conversing with Mr. T. C. Martin (in the Light Suit) and the Author

Requests for interviews and articles for publication, or by those who have "a very important idea" that can only be explained in person are of frequent occurrence. The "important idea" correspondents are usually called on for a bill of particulars before an audience is considered.

Several large record books, and note books galore, crammed with endless ideas of his own for further inventions offer eloquent testimony to the truth of what Edison has often said in this connection: "I am long on ideas but short on time. I only expect to live to be about 100."

It is not to be expected that so prominent a mark would not be aimed at by those who send out letters asking for financial aid. These are plenty, as also are numerous opportunities to finance business propositions. Occasionally comes one seeking to establish a relationship, more or less distant, usually so far distant as to be unrecognizable. Letters from friends of boyhood or old telegraph days are far from uncommon and usually meet with a courteous response. And, once in a while, from various parts of our own country and from all parts of the world comes a gleam of sunshine in the shape of a letter expressing gratitude to the inventor of the phonograph for the happy hours he has afforded them.

All in a class by themselves are the real and near inventors who want Edison to market or complete their inventions for them. It is a poor mail that does not bring three of them. Some days there are as many as seven or eight. If a name were desired to designate this class we might borrow from the florist's catalogue and call them "hardy perennials." Year in, and year out, they come in an endless stream. If Edison could multiply himself by one hundred he might be able to take care of them, but as it is he is so overwhelmed by his own multitudinous affairs that he uniformly excuses himself from giving them consideration, unless the invention relates



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He Has Just Told a Funny Story to Mr. Durand and Mr. E. C. Barnes of Chicago

to his own line of work, in which case it is simply sent to the legal department for investigation and report. But this does not happen once in a hundred times.

PESTERED WITH FREAK SCHEMES

While many apparently meritorious inventions are submitted, the greatest number covers all sorts of freak ideas, from an improved mouse trap to perpetual motion machines. Some notion of the variety of these suggestions may be gathered from the one day's mail which included ideas for a noiseless typewriter, a cement gas range, a nursery cabinet and a blind man's watch, containing a miniature phonograph to call out the time. All the inventors usually ask is that Edison shall complete the invention, put it on the market with his name behind it and divide profits with them, and there you are! The easiest kind of a trick for a man who has nothing to do but work from sixteen to eighteen hours a day, solving his own complex problems.

It would be no difficult task to fill many pages with a mention of the various



Mr. Edison and a Group of His Salesmen Who Are at the Home Office on an "Instruction Visit"

freak schemes that are submitted, but one or two instances must suffice as a fair characterization of all. The idea of one particular inventor (?) was, to furnish rarefied air to hospitals by means of a permanent captive balloon raised to a height of 5,000 feet or more, said balloon to carry an intake pipe, down which the rarefied air was to flow into the hospital! Simplicity itself! Another inventor, writing from the Antipodes, only a few weeks ago, had discovered after years of research, a mosquito banisher (the sample smelled strongly of citronella), and was sure that if Edison contributed \$25,000 to put it on the market, it would be a great success; and if he would cable money for expenses the inventor would immediately come to America to close the deal.

Another humorous side to this portion of the mail basket is provided by those ingenious persons who reinvent more or less ancient inventions. One of these, which was received within the last few weeks, caused Edison to exclaim, "I guess it would take about \$25,000,000 to inform all the people in the United States of one particular thing." As this case is a good example of most of this class, the story may be interesting. A letter came from a professional man in a Western State, in which the writer said he had an idea for an invention which

would provide a sure and continuous income of millions of dollars. He would be glad to send particulars and Edison could put it into practice and allow the writer some of the profits. The usual courteous reply was sent, stating that Edison was too busy to consider other matters than his own and asking to be excused. By return mail came another letter from the same correspondent, acknowledging the reply but insisting that his idea was valuable and enclosing a statement of the idea, sworn to before a notary public. What was it? Merely fifteen or 20 lines proposing to hitch together the phonograph and motion pictures so as to show persons in motion and hear their voices simultaneously. Not a word of suggestion or plan for accomplishing the results but just the crude notion, in return for which he was willing to share the millions.



Talking over a New Sliding Holder for Truck Batteries

A letter was quickly despatched to the professional gentleman (a lawyer, by the way), informing him that he was only a quarter of a century behind the times with his idea; that Edison had conceived it in 1887, at which time the newspapers were full of it; that in the intervening years he had spent a fortune in developing it; that a year or two ago he had given an exhibition of the result (talking motion pictures) to the press, accounts of which were printed in newspapers from Maine to California, and that talking motion pictures were actually being shown to the public in the theaters!

It is to be hoped that the professional gentleman had not yet commenced to spend his part of the millions.

The above affords the reader merely a passing glance at the great inventor's mail by way of illustrating its scope. To attempt a more detailed description of its infinite variety would require more space than is available. For the remainder, the reader is invited to use his or her imagination without placing any limitations thereon.

But, as the French say, *revenons à nos moutons*. We had seated Edison at his desk on the day in question, to spend the noon hour in disposing of the day's mail in his usual way. He takes up a letter, reads it, and with a lead pencil makes comments upon it as to how it shall be answered or attended to. It is then laid aside and the next one disposed of in a similar manner, until all are passed upon. There is not a moment's hesitation as to a reply. He masters the subject with the first reading, and his disposal of the letter follows instantly. In this particular day's mail his correspondence covered as many as 38 subjects, each of an entirely different nature. At the bottom of the basket are placed checks for signature.

He had only just seated himself at his desk on the day in question when there arrived a party of engineers from out of town. He had previously promised them an interview in regard to some auto-

mobile problems. He jumped up to greet them and then went into the yard with them to look at some machincs and special appliances and discussed the engineering question involved. In about half an hour he returned to the library to resume the examination and disposition of his mail.

He was busily engaged on this work when "Freddie" (whose other name is Ott and who has been in the inventor's employ 38 years) came in at one o'clock to signify his readiness to take him home to lunch. Looking up for a second, Edison gave a nod and resumed his work, which was finished a few minutes later. After returning the bunch of papers to the basket he put on his hat, slipped out like a flash and jumped into the automobile, leaving the correspondence to be taken care of by his private secretary.

THIRTY MINUTES FOR LUNCH

Returning from lunch in 30 minutes, he was waylaid at the door by several experimenters and heads of departments, each with their own special trouble or reports. Taking them one by one and patiently going into details, he went into the merits of each case and started them off again to work. Pausing in the library long enough to throw his hat on a table, he went upstairs to resume his labors on the record books, at which he worked uninterruptedly for three quarters of an hour.

The sales manager of phonographs brought in a dozen or so of his traveling salesmen, who were at Orange on an "instruction visit," and Edison dropped his other work to spend a little over an hour with them. At the end of this time the visiting engineers, who saw him at noon, wanted a group photograph taken in the yard, and sent a delegation asking him to make it complete by his presence. He good naturedly complied, and in a few minutes returned to hear a soprano singer who had come over from New York to make a test record for him.



He is Waylaid to Give Information on Some Knotty Problem

Three visitors then came and talked with him on various subjects for about fifteen minutes. These were followed by two of the experimenters who brought pieces of apparatus and talked with him about special electro-plating processes which have engaged much of his attention of late. Then came the head of the storage battery works with a lot of drawings of new machinery and appliances, over which there was much discussion. Next came the manager of the advertising department and an assistant to talk over matters pertaining to their particular realm. I had a few minutes' talk with him on various details, after which the head of the phonograph disk department and an experimenter had some problems relating to voice reproduction to lay before him. These were settled after some warm discussion pro and con.

A lot of models of phonograph cabinets were now brought in, followed by the superintendent of the works and the modeler. Quite some time was spent with them by Edison who finally decided upon the particular specimen to be standardized. He was then consulted by one of the mechanical engineers, who had met with difficulties in his special work. After smoothing these out, Edison went into one of the other experimental rooms but returned shortly and worked again on his record books for

nearly an hour, when he was interrupted by one of the mechanical experimenters who had come to report progress of his work and to get some further instructions. Resuming work on the record book, he continued for half an hour. He then received a call from the superintendent of the iron working establishment who had come at Edison's request to talk over some important questions of business. This interview lasted until half past six.

A few minutes afterward he went down to the library, looked over some reports that had accumulated during the afternoon, made notes on them, put on his hat and jumped into the automobile which was waiting to take him home to dinner.

THE MIDNIGHT OIL

Contrary to his usual custom, he did not return to the laboratory that evening. He had laid out a big job to be done at home and about half past seven he got out a lot of books on chemistry and electro-chemistry and started in to study out various lines of experiment, making copious notes and sketches. In addition, he wrote numerous memoranda for various experimenters, giving directions for work he had laid out for them. Some one said to me the next morning that the "old man," as he is affectionately called, must have stayed up all night writing notes, for it seemed as if everybody around the place received one. Be that as it may, he continued steadily at work all through the evening and did not finish until after midnight, when he went to sleep the sleep of the honest worker with the sweet consciousness of "nothin' to do 'til to-morrow."

I hope the reader will pardon me if I emphasize the fact that the foregoing does not represent an unusual day in Edison's life, but is merely a fair example of his days as he has lived them during the last 44 years. Had I wanted to choose a strenuous day for illustration, it would have been a simple matter, for in the two weeks just preceding the time

mentioned he had worked all night on three occasions and on all the other days had not left the laboratory until two or three o'clock in the morning, returning in about six hours afterward.

He had not been having all-night sessions for some little while until the last few weeks, and on the first occasion of this strenuous period I said to him, "You are at your old tricks; you are incorrigible." He laughed and winked at me but made no reply. Returning to the attack, I remarked, "You'll get yourself in trouble at home." To which he answered quickly and eagerly, "No! No! She sent me some lunch down at half past four this morning."

The married reader will understand the reference to "she." If, however, the said married reader has been as fortunate in his choice as Mr. Edison has he is to be congratulated, for Mrs. Edison is a helpmeet in the true sense of the word. While she still despairs of breaking up her husband's tendency to lead the ultra-strenuous life, she does not add to his cares by throwing obstacles in the way, but, on the contrary, exercises a watchful care of him under all circumstances. Ever since their marriage she has constantly helped him in his work at home, acting as amanuensis, adviser, sympathizer and companion in many of his labors. As an instance I may mention that on the night previous to the day

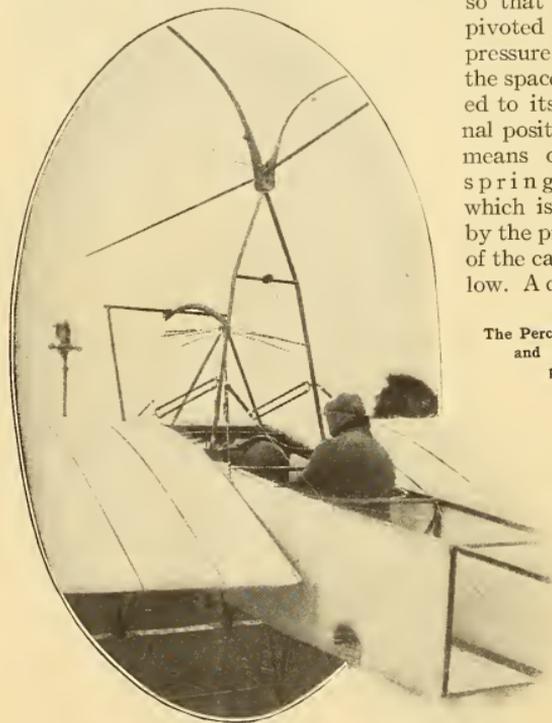
which has been itemized above, she spent the evening with him at the laboratory until one-thirty o'clock in the morning. During the last two hours of this period they listened to and criticised about 120 voice-trial, phonograph records which had been specially made for him in foreign countries.

The reader will naturally wonder how a man of Edison's years can stand such a continuous strain, year after year, working as he does, seventeen to eighteen hours a day, regularly, and yet with sufficient reserve force to continue through periods of several weeks of all-night work as he has done while this article was in course of preparation. Let me quote his own words in a conversation we had on the subject very recently. He said: "I am interested in everything I do and am happy in my work. It does not worry me. If the work in hand begins to be drudgery, I leave it and go to something else. I eat but little and therefore I don't clog my arteries; have no bad habits and leave whiskey alone. The human body is a collection of cells which act in correspondence with their environment. Take a man with a flabby arm and put him at blacksmithing. In a year his arm will be muscular. It is just the same with the cells of the brain. Give them plenty of work and they will grow stronger by thinking. It does not harm any man to think and work."



PERCHING HYDROAEROPLANES

The recent aviation competitions which have been held in various parts of the world have drawn attention to the difficulty which often besets the aviator in starting from or returning to the ship from which a hydroaeroplane is manœuvring. When the sea is calm the start and return are made without trouble, but in

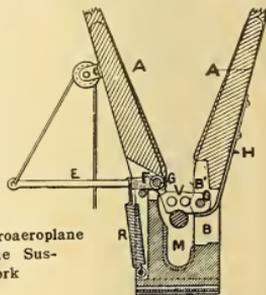


stormy weather the waves often wash over the whole apparatus, adding a weight which makes locomotion difficult or impossible. The arrangement of a platform on the ship solves the problem; but it has to be admitted that this platform, being necessarily of considerable size, is a great incumbrance on any vessel, and especially so on a man-of-war.

Bleriot has been making experiments at Buc, in France, with an apparatus

which enables the aviator to suspend his machine upon a cable which can be strung in any suitable place on board ship. It consists of a fork projecting above the aeroplane, having a spread of about three feet from point to point. Referring to the diagram (AA), are steel plates connecting the horns of the fork with the mechanism of attachment. When returning the aviator guides the machine so that the cable reaches the bolt (V), pivoted at (O), which yields under the pressure and allows the cable to occupy the space (M). The bolt is then returned to its original position by means of the spring (H), which is aided by the pressure of the cable below. A connect-

The Perching Hydroaeroplane and its Unique Suspension Fork



tion with the motor cuts out the ignition circuit at the moment the cable comes beneath the bolt. This insures the immediate stoppage of the motor, and the brake effect caused by the friction of the cable on the bolt is sufficient to bring the machine to rest, even when going at high speeds, in a space of from 75 to 100 feet. To release himself in starting, the aviator raises the lever (E) by pulling the cord, thus allowing the bolt to rise and freeing the cable.

In 1912, according to latest advices from the United States Geological Survey, 1.3 tons of platinum was recovered in this country from domestic and foreign ores. The value of this metal was \$1,732,221, or considerably more than a million dollars per ton.

MUKDEN MERCHANTS' ARCHERY CLUB

Attempts have been made by some of the more enlightened Manchus of Mukden to start a revolver or rifle range, but the Japanese authorities, whose heavy hand orders south Manchurian affairs pretty much after their own ideas, have forbidden this enterprise. The Japanese advisers of the viceroy of Manchuria

prefer to have the frequent brushes between imperialists and republicans conducted with sticks and stones, fireworks and bow and arrow.

So on fine afternoons the merchants of Mukden troop out to the numerous club archery grounds on the outskirts of the city and keenly compete among them-



Archer Merchants of Mukden

selves for the honors of marksmanship with their curiously curved bows that have not altered in shape since the archer sharpshooters of the Tartar hordes swept across the bleak and dreary plateaus of Mongolia and the boundless steppes of Siberia, to fling themselves on the Muscovite bulwarks of mediæval Europe.



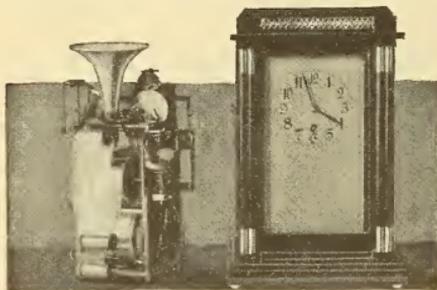
PHOTO BY UNDERWOOD & UNDERWOOD

RACING WITH SIDE CARS

Side cars for attachment to motorcycles are a comparatively recent innovation and we think of them as machines for pleasurable recreation or package delivery service. But now the side car has appeared in the racing game and in a manner calculated to give a new variety of thrill. The accompanying picture shows two side car motorcycles in speed trials on Maderia Drive, Brighton, England, during the Strantham and District Cycle Club's open International Motorcycle Speed Trials.

A TALKING CLOCK

Made literally to "tell the time," this clock, if you owned it, you would often feel inclined to break. It announces the

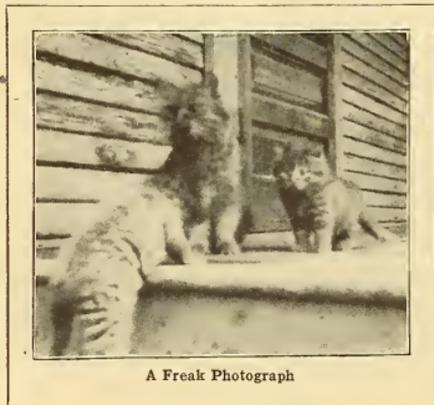


Clock which "Tells" the Time

hours, half and quarter hours in a loud voice by means of a phonograph arrangement with megaphone attachment. It was invented by a German watchmaker.

THE WHAT IS IT

This strange looking animal is apparently a six legged feline with an elongated body like a dachshund. In reality it is cat, just plain cat, but there are two of



A Freak Photograph

them. On close examination of the odd photograph it will be found that the head of the feline, coming up the step, is concealed behind the body of the one looking at the camera, so that the two bodies make the mysterious six legged what-is-it.

KRUPP STEEL FOILS CRACKSMEN

The Krupps, it is stated, have succeeded in producing a material for safes that is not easily fused or penetrated by the oxy-hydrogen and oxy-acetylene burners now in use by scientific cracksmen. It is a variety of cast steel able to resist the best boring tools. It is estimated that to burn a hole 3.2 inches in a plate of the material 1.6 inches thick would take from six to fourteen hours, and necessitate the use of 3000 gallons of acetylene and 3000 gallons of oxygen.

SOME FACTS ABOUT LIGHT

The light that we receive from stars of the first magnitude, like Vega, is equal approximately to a forty-thousand-millionth part of that of the sun. It is calculated that the total light received from the lesser stars is equal to that of 3000 stars of the first magnitude, or a sixth part of that which is sent to us from the moon.

Light exercises a mechanical pressure which can be measured in the laboratory. It has been shown by experiments with artificial light that in its production enormous quantities of energy are dissipated. In an ordinary wax candle the total energy which is transformed into light is really but two per cent. Gas and kerosene lamps are not more economical. On the other hand, the glowworm transforms into light (by means yet unknown) 90 per cent of the total energy expended.

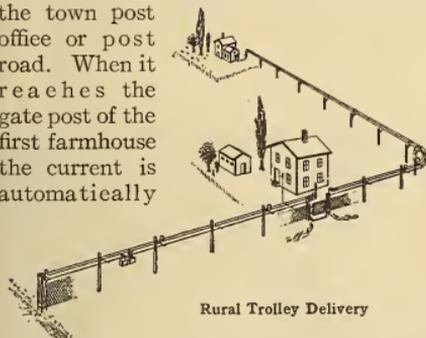
It is known that light influences very largely the aroma of flowers. A garden is more fragrant when it is shaded than when the sun is allowed to shine in full blaze upon it. This, at any rate, is the conclusion of a Frenchman who has made a vast number of experiments. That which affects the fragrance of flowers is not the oxygen of the atmosphere, as has been commonly supposed, but the light. According to the same authority, the intensity of the perfume exhaled by a flower depends upon the pressure of water in the cells of the plant, which tends to throw

out the essential oils that produce the odor, and the action of the solar light diminishes the pressure of the water in these cells. The irrigation of the plant augments the pressure, and likewise, of course, the production of perfume. During the night the air is charged with aroma merely because the solar light does not exercise an inhibiting influence on the emanations.

RURAL DELIVERY BY FENCE TROLLEY

It is the dream of Paul Hempel, Parkston, S. D., to at least shorten the rural delivery man's travel if not to do away with it altogether by means of a patented trolley driven carrier installed upon the roadside fence.

The carrier divided into compartments for each person's mail is started out from the town post office or post road. When it reaches the gate post of the first farmhouse the current is automatically

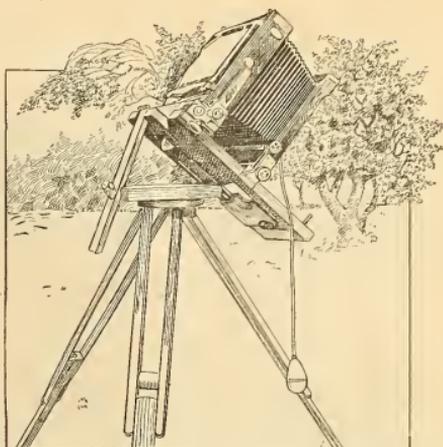


Rural Trolley Delivery

cut off and a bell signals its arrival. After such mail has been removed as belongs here the carrier is placed on the track across the gateway to continue its journey in a similar manner from house to house. The return trip is made in the same manner, the carrier being started back at the last house and mail for the post office being placed in it on the return journey.

TILTING BASE FOR CAMERA

For taking pictures of plants and other small objects on the ground, a tilting base for the camera is essential. The one shown in the illustration was made by a California photographer from three



Tilting Camera Base

pieces of inch board. One piece is attached to the tripod in the same way that the camera is ordinarily. To this is hinged another piece on which the camera is fastened by a thumb screw. The upper piece is tilted by use of the third board which is cut to two inches wide. It is hinged to the top piece and regulated by thumb screws attached to the bed piece.

HOMES WILL SHORTLY HAVE COMFORTS YET UNKNOWN

Dr. Berliner, in writing of "Electrifying America," makes the following prophecies:

"When a wire brings into the house all the energy required not only for lighting and cooking, but also for heating purposes, the inmates will enjoy a degree of comfort unknown to them hitherto. The heating arrangements will be so distributed through the rooms as to furnish a moderate amount of pleasantly warmed air instead of a small quantity of overheated air. The kitchen will be one of the coolest rooms in the house in summertime, the range being replaced by an ordinary table on which a few simple pieces of apparatus will suffice for all culinary operations. The heat will be

turned on with a switch when it is wanted and there will be no ashes to be carried out and no dirt.

"Before very long all big cities will be similarly electrified, the use of coal being almost entirely abandoned. Thus will arrive the beginning of our emancipation from the thralldom of coal, upon which we are so absolutely dependent industrially and for ordinary comfort. Illuminating gas will be driven out altogether by electricity, the employment of which for lighting is increasing at a rapid pace. It furnishes an artificial daylight that is indispensable in many places where real daylight is not obtainable during any hour of the 24."

ROENTGEN RAYS IN TREATMENT OF CANCER

Roentgen rays filtered through silver, copper or tin plate are said to have been used by Dr. Roberts, senior surgeon of the General Hospital at Hobart, Tasmania, in the treatment of cancer. The sur-

geon states that he has successfully treated 40 persons suffering from the disease.

VENTILATION

Robert A. Lyster, formerly assistant lecturer in hygiene at the University of Birmingham, England, is the author of one of the best modern books on the subject of hygiene. In the chapter on ventilation the author makes this point: "Fans are usually relied upon in all systems of artificial ventilation of schools. The open blade types are preferable as they are easily kept in order and are economical. An electric fan ten feet in diameter, running at 90 revolutions per minute and delivering 2,115,000 cubic feet of air per hour is used in the Bradford schools and costs the astonishingly small sum of 1.3 pence per hour. Fans may be driven by electric motors, by steam or by a gas engine. Electricity should always be used where possible, as it possesses the combined advantages of being cheap, noiseless and inodorous."



SHOVELING ROCK SALT

No more liberal education can be obtained along the line of modern machinery equipment than to go down into one of the rock salt mines at Tetsof, N. Y., and watch the modern electric shovel at work handling rock salt at the rate of 250 to 300 tons per day. The illustration shows one of these machines at work, and it is said to be the last word in electric shoveling machinery.

The inventor and manufacturer of the machine is authority for the statement that as a general rule the new electric shoveler will accomplish a saving in the cost of loading material of 50 per cent over the hand method used.

The machine consists of a main frame upon which the motor and rear conveyor are situated; a jib frame is pivoted on the main frame and this carries the front conveyor and shovel. The jib can be swung laterally reaching any material within ten feet of the center of the track.



The World's
Picture Gallery



COPYRIGHT BY UNDERWOOD & UNDERWOOD, N. Y.

House building in India—native carpenters and bricklayers.



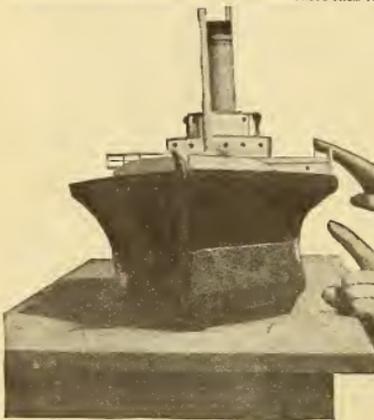
Only lady pavement artist in London. With lightning like strokes she draws and colors portraits, landscapes and still life scenes in colors on the paving stones.

PHOTO FROM THE BOSTON PHOTO NEWS CO.



Wedding presents for King Manuel of Portugal were numerous and beautiful. This picture shows the presents of Duchess of Connaught, Queen Alexandra, the Duke and the Princess Royal with a silver bowl sent by Lord Rosebery in the center.

PHOTO FROM THE BOSTON PHOTO NEWS CO.



Captain Caines, of Ysgol Street, Swansea, has invented a ship which, after the most severe trials in model form, has proved unsinkable.



PHOTO FROM THE BOSTON PHOTO NEWS CO.



A successful trial flight with a new type of passenger carrying biplane was undertaken recently in England. The machine has a span of 75 feet. Four passengers were piloted by Mr. Grahame-White over several circuits at an altitude of about 300 feet.



Peculiar way of building a water tower in Kuala Lumpur, Federated Malay States. A huge scaffold made of bamboo was first erected.

PHOTO BY FRANE OTTO KOCH



PHOTO FROM THE BOSTON PHOTO NEWS CO.

Fall grouse shooting on the moors is looked forward to by the English sporting gentry. Above is a shooting blind or "butt" with the birds flying over. Two well known guns are shown, Lord Rocksavage (seated) and Lord Elsmere, the old gentleman above.



Fishermen of the Channel ports of Normandy frequently convert their fishing boats into houses by adding a roof as shown in the picture.



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The Steamer Voltorno, which was burned at sea on Oct. 9th, with a loss of 135 lives, 521 being rescued by steamships brought to the scene through aid of wireless messages. This remarkable photograph was taken by a passenger on the Steamer Grosser Kurfuerst, showing the ill-fated Voltorno burning, with the life boats in which most of the passengers of the latter vessel were rescued, alongside. The picture was taken on the morning of Oct. 10th, after the high seas had abated.



The upper picture shows a group of the surviving members of the crew of the Voltorno. The lower picture shows heroic members of the Grosser Kurfuerst, who saved 105 lives. They volunteered to man life boats, which despite the storm, were lowered away to go to the rescue of the passengers of the Voltorno.



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One of the most dramatic moments in the deep sea tragedy of the Voltorno, showing the life boats coming alongside the Grosser Kurfuerst. After facing what seemed a certain and horrible death, some of the unfortunate victims of the disaster are now about to step to safety.



Polo Grounds in New York City where the first game of the 1913 world's series between the New York Giants and the Philadelphia Athletics was played.



PHOTOS BY GEO. GRANTHAM BAIN, N. Y.

Connie Mack, manager of the Athletics, who has brought his team to victory in three world's series—the only manager with such a record.



Remarkable photograph showing Coombs, one of Philadelphia's famous twirlers, who was ill during the series, in his bed in the hospital receiving bulletins of the game by telephone.

PHOTO BY THE INTERNATIONAL NEWS SERVICE, N. Y.



PHOTO BY GEO. GRANTHAM BAIN, N. Y.

In the press section of the grand-stand at the Polo Grounds. This is part of the battery of 100 telegraphers who took the news, hot from the field, and sent it broadcast to eager fans all over the country.



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Mathewson, after scoring the first run in the second game, is here seen rooting for his teammate, Herzog, who is just coming to the plate.



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Mathewson of New York, considered the greatest pitcher of all time, who saved the honor of the Giants, at least in the eyes of New York fans. It was Matty's single early in the 10th inning of the second game that won for the Giants.



COPYRIGHT BY THE INTERNATIONAL NEWS SERVICE, N. Y.

Chief Bender, the great hurler for the Athletics, who won two games in the world's series. It was also his great work which helped largely to win the series of 1911 for the Athletics.



PHOTO BY GEO. GRANTHAM BAIN, N. Y.

Jos. Bush is the young recruit of the Athletics, unknown two years ago, who was put in to pitch in the third big game and held the Giants to five hits. He is only 20 years old and fans predict that he will develop to be the equal of Walter Johnson on account of his great speed.

"Home-run" Baker, of the Athletics, shown above at batting practice, is considered the greatest third baseman in the game.



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The first water from Gatun Lake was allowed to flow into Culebra Cut through four 26-inch pipes in the Gamboa Dyke. The four valves are here shown fully open allowing free entry of the water, which acted as a safety cushion against the force of the explosion which blew up the dyke.



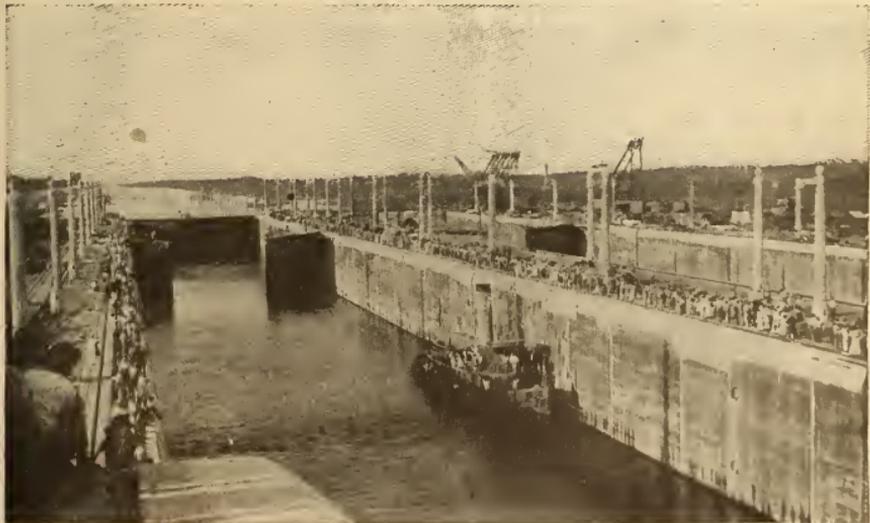
PHOTO BY GEO. GRANTHAM BAIN, N. Y.

Scores of charges of dynamite are inserted in the pipes shown and wired so as to be discharged at the same instant by electricity — destruction of Gamboa Dyke.



PHOTO BY GEO. GRANTHAM BAIN, N. Y.

This photograph shows the blowing up of the Gamboa Dyke, the last obstruction in the Panama Canal, on October 10. President Wilson, in Washington, touched the button which set off eight tons of dynamite, throwing dirt and huge rocks high into the air. Following the explosion the waters of Gatun Lake, which had been flowing slowly into Culebra Cut for some days, rushed into the great cut and the Panama Canal was completed except for the finishing touches and the dredging and widening of the channel. Thousands of sightseers witnessed the spectacle.



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Tugboat "Gatun," first to pass through the locks. It is here shown in the lower lock, with the water up to the center of the lock level and the north gates closed.



PHOTO BY THE AMERICAN PRESS ASSOCIATION

Colonel Roosevelt and members of his party starting on their South American trip, at the rail of the Van Dyck as she pulled away from the pier, October 4.



PHOTO BY THE AMERICAN PRESS ASSOCIATION

G. E. Parker, new register of the treasury of the United States. Parker is a Chocktaw Indian, born in Oklahoma 36 years ago. He is the first man of Indian blood to hold such an important government position.

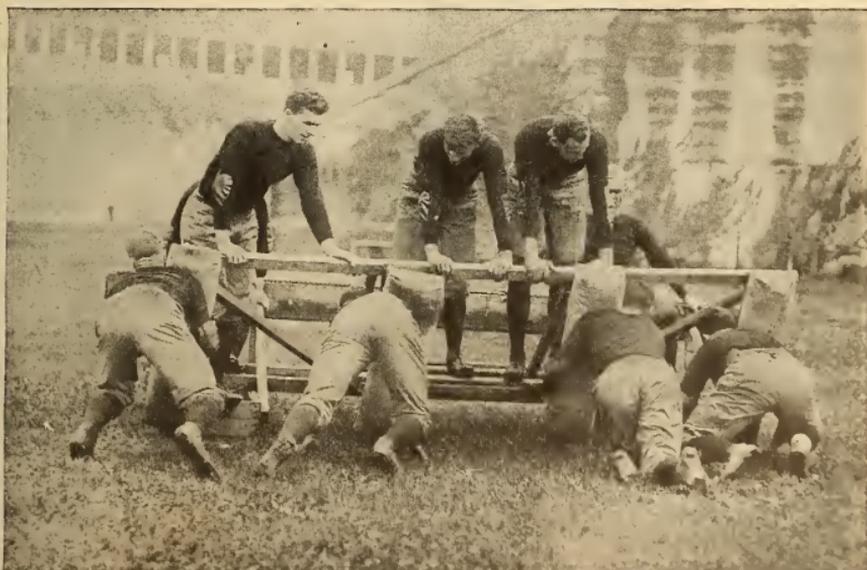


PHOTO BY THE AMERICAN PRESS ASSOCIATION

William Thaw, aviator, in a Curtiss hydroaeroplane with a passenger, Dr. S. McGordon, on Oct. 6 flew from New Haven, Conn., to Oakwood Heights, Staten Island, a distance slightly less than 50 miles, in 32 minutes. Before landing they sailed under the four big bridges and then circled the Statue of Liberty six times. They were just landing when the picture was taken.



This is a pontoon bridge thrown across the Thames during the recent army manœuvres in England. Shortly after this picture was taken, the bridge broke, throwing horses and men into the water. Four horses were drowned, the men narrowly escaping with their lives.



One of the features of football training at Harvard University is the line bucking machine, so-called, devised by Head Coach Percy Haughton to train the men in line bucking and breaking through. It is a simple contrivance of lumber, like a sawhorse, on which a number of heavy men stand while other heavy men, candidates for guards, push against it and endeavor to move it.



Serge Marcouff, the famous sculptor, Moscow, beside his recently completed statue of Tolstoi.



PHOTO BY GEORGE GRANTHAM BAIN, N. Y.



PHOTO BY PAUL THOMPSON, N. Y.

"Stop," the wonderful Swiss police dog clearing a wall at the international police dog competition held in Berne, Switzerland.



Francis Ouimet, but 20 years old, who defeated the world's greatest golf players, Edward Ray and Harry Vardon of England, at Brookline, Mass., Sept. 20th.



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Whaler Wedderburn and the harpoon shooting gun used by the Prince of Monaco on board his yacht Herondelle.



PHOTO BY UNDERWOOD & UNDERWOOD, N. Y.

Demonstrating the value of the aeroplane as a life saving device, when people are cast into the sea, during an aeronautic meet at a famous beach resort near Paris.



PHOTO BY BURKE & ATWELL, CHICAGO

Since he was twelve years old, which he says was just about a century ago, Thomas Sullivan of Williams Bay, Wis., has taken a morning plunge in the bay. During the winter days, he is seen chopping the ice preparatory to his plunge. He is hale, hearty and active.



PHOTO FROM BOSTON PHOTO NEWS CO.

Miss Lowther, daughter of Speaker Lowther of the British House of Commons, takes an active interest in the Boy Scout movement. A squad under her guidance is shown at ambulance class.



PHOTO FROM THE BOSTON PHOTO NEWS CO.

Sir Thomas Van Sittart Bowater, recently elected Lord Mayor of London, assumed his office on November 9. Like every other Lord Mayor he had first to serve as Alderman and Sheriff. He was born in Manchester in 1862 and is head of a large firm of paper makers.



PHOTO BY KATHERINE LOUISE SMITH, MINNEAPOLIS, MINN.

In Yellowstone Park there is a place where a fish may be caught and then cooked in a hot spring without removing it from the line.



PHOTO FROM THE BOSTON PHOTO NEWS CO.

The Royal Highland Society's meeting at Braemar. The various clans, including the Duff Highlanders, the Invercauld Highlanders and the Balmoral Highlanders, headed by Colin Cameron with the pipes, marched three times round the enclosure. The meeting which was graced by the King and Queen included Pibroch playing, dancing and all the games usual to the gathering.



PHOTO FROM THE BOSTON PHOTO NEWS CO.

Dr. Mallandra, Professor of the Royal Observatory at Vesuvius, entering the crater on a recent scientific investigation.

Dr. Carrel's Living Machine

BY WILLIAM BRADY, M. D.

Some time ago Dr. Alexis Carrel, of Rockefeller Institute, succeeded in keeping alive a small fragment of heart tissue extirpated from the animal body, so that the fragment of heart tissue continued pulsating for a hundred days.

This experiment led him to attempt similar work on a larger scale. He thought it would be important for the study of many problems to keep entire organs alive outside the animal body. So he proceeded to perfect a technic whereby a complete system of organs could actually be made to live and functionate *in vitro*.

A philanthropic tabby having been selected, ether was administered and, under sterile conditions, as for an operation on a human being, the esophagus or gullet was tied off in the neck, the wind-pipe cut across and a glass tube inserted in it, through which a rubber tube passed as far as the point where the bronchial tubes branch off from the wind-pipe. The other end of this rubber tube was connected with a bellows.

Now everybody please stand back and give the poor kitty air!

Next the abdomen was opened, the great aorta and vein of the trunk tied and severed low down. The intestinal canal and kidney drainage tubes were also tied and severed low down, and a number of smaller arteries and veins also. Nerves were merely cut across wherever encountered. Cats are not nervous creatures. The ligaments supporting the organs were all dissected free and the entire mass of feline contents lifted alive from the cat proper.

From this point onward we must not confuse the original cat with her projected self. Dr. Carrel's artificial cat will presently enter the spotlight—and she will be quite a cat in her way.

As the liver and stomach and other stuff were lifted out of the cat proper the

entire palpitating mass was wrapped in a Japanese silk towel. We now have about half the makings of a cat in our hands. There remains the task of separating the organs from the cat's chest.

First the chest wall was severed longitudinally, just as a doctor might dissect you in an autopsy, and the diaphragm muscle completely dissected from its attachments to the ribs. By this time, of course, the cat proper began to experience some difficulty in breathing, so artificial respiration had to be carried on throughout the remainder of the seance.

For a time the pulmотор, such as it was, worked beautifully. It looked as if two cats might shortly be mewling where only one mewed before. But as luck had it, right here Tabby gave up the ghost—that is to say, she gave up ghost No. 1. There are nine lives in every cat, you know. Dr. Carrel knew this too; hence he worked right on in perfect confidence. It is wonderful to observe the cool, collected manner of the skilled surgeon at work. Although Tabby the First was as dead as a doornail, the doctor was not in the least alarmed.

But to continue our story; all the big blood vessels in the chest were tied and cut through, the nerves severed from their connections with the brain and everything inside loosened up from the chest walls. All this time the artificial respiration had been kept going, notwithstanding that Tabby was quite dead, and it was now seen to establish renewed pulsations of the heart, although very feeble.

The entire system of unattached organs was now removed from the cadaver and placed in a tray containing salt solution at a trifle over body temperature. Thus encouraged the heart beats became visibly stronger, the blood pressure in the vessels rose and there was practically a

normal circulation of blood throughout the living machine!

But Tabby the Second became disconsolate and threatened to die again. Of course there would have been seven lives still left to work on, but Dr. Carrel didn't care to take any unnecessary chances, so he administered a transfusion of blood—not from the cat proper, but from another cat that kindly volunteered to donate the necessary blood, anxious to promote the advance of science. On receipt of this fresh blood, Tabby perked up in good shape, and positively began to take nourishment. At least her alimentary canal contracted in normal peristaltic waves, her heart beat at the usual rate for laboratory cats and in fact everything but the purr—which had been cut off—was re-enacted as cozily as could be if her original undemoted self were comfortably encoined on the rug before the laboratory oven. If any one doubts the strict accuracy of these statements I would refer the doubter to Dr. Carrel's own report of the experiment in the *Journal of the American Medical Association*, Vol. LX.

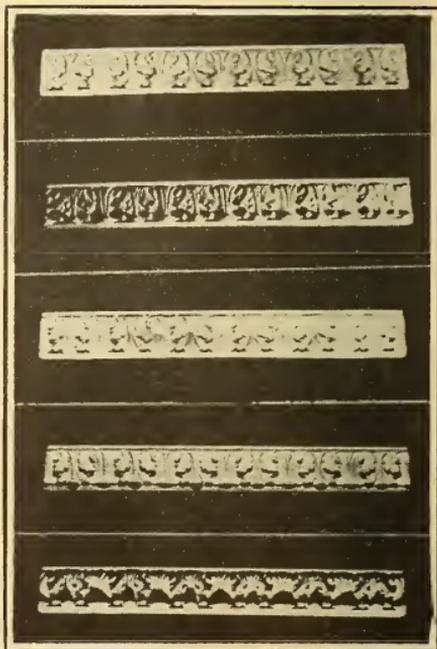
The living machine was kept in a tin box like an incubator, with glass cover and openings for the wind-pipe tube and the feeding tube and so forth. None of these openings were large enough to admit a mouse, but if a mouse had strayed in Tabby would undoubtedly have pounced upon him instantly. As it was, the tin box kept her from foraging for her own food. Therefore, water and food were administered at regular intervals through the esophagus tube, and if we may judge by the thoroughness with which all offerings were digested Tabby enjoyed her meals immensely. Indeed she thrived in her luxurious quarters. Sometimes she seemed to be trying to hump her back and rub against the lid of the box, so complete was her satisfaction with the doctor's care.

Now, had it not been for that fatal number 13, the outcome of this experiment would have settled for all time the

vexed question of the number of lives a cat really has. But alas, precisely on the thirteenth hour of Tabby's reincarnation she gave a sudden shudder, crumpled down in a discouraged little heap and died. This time the effort was final. Tabby the Second had followed her former self over the border of feline finity. That was several months ago. Whether she has ever revived since or whether she has resumed some other form for her third reincarnation does not appear in the record. She lived thirteen hours apart from herself and then expired.

LIGHT, THE SCULPTOR

The illustration shows that light indeed moulds architectural designs. The same moulding is lighted in various manners by



The Same Piece of Moulding Lighted in Different Ways

simply varying the position of the lighting units. The effect is striking for the light has really moulded various designs.



The Harvester is Drawn by a Gasoline Tractor Which Also Carries a Dynamo. The Latter Furnishes Electricity to a Motor on the Harvester for Operating its Complicated Mechanism

GIANT HARVESTER RUN BY ELECTRICITY

Horses are now dispensed with in many of the large California grain fields and gasoline and electricity are being used in their stead. The great harvester-threshers used in California for harvesting the grain and threshing it at the same operation have become famous, but up to recently these mammoth machines have been drawn by about 40 teams of horses or mules. Traction engines are now being used in some places, but the most recent development is the combined use of gasoline and electric power. The machine shown in the accompanying picture is pulled by the tractor hitched in front of it. On this gasoline tractor is an electric generator which produces electricity to operate a motor on the harvester.

The big advantage of this arrangement is that in heavy grain the tractor may be stopped and the thresher kept in operation until the grain is threshed out. It often happens that the machine will become clogged in heavy grain. With horse power, the only way to remedy such a condition was to stop and clean out the grain. With the separate power the thresher can be kept going until it cleans itself.

This outfit, which is made in California, has been used on Ryer Island in the Sacramento River in Solano County.

Canada's water power is estimated at 16,600,000 horsepower, equal to an annual production of 36,700,000 tons of coal; only 1,016,521 horsepower has been developed.



Below are Shown the Trays of the Electric Incubators Which Hatched the Chickens

"Flats" where the Chickens Were Nurtured



In These "Flats" the Chickens Were Under the Influence of High Frequency Current



Preparing Lettuce for the Chicks



General View of the Immense Chicken Nursery

FORCING THE GROWTH OF A CHICKEN

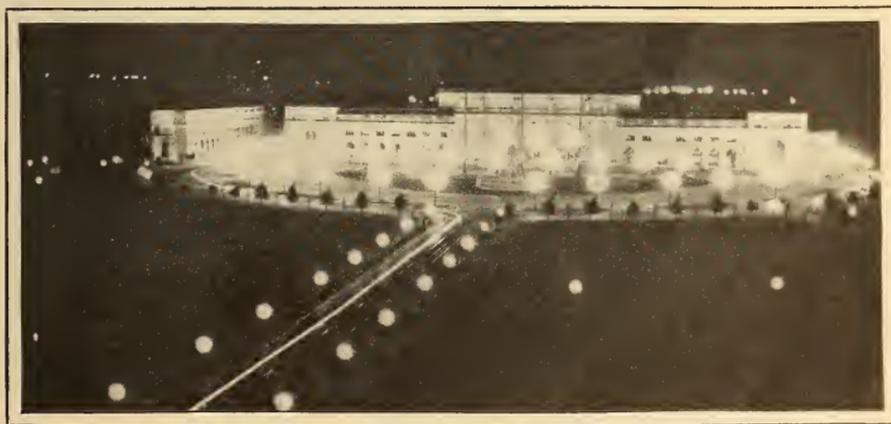
A long succession of ingenious experiments have been privately made in the effect of electricity upon growth both of plants and animals. It is now possible to say with some approach to confidence that startling results have been reached in one direction.

Beyond all question young poultry respond to electric stimulus, applied in a particular way, with rapidity. They surpass the best on record in rate of growth at the time of year, they keep their health in crowded conditions and become almost independent of the season.

In the south of England, on a large poultry farm, an experiment of this nature has just been completed. Eight hundred chickens, in two equal groups of 400, were nurtured on the intensive system; that is, in flats, almost trays, one above the other. One group of 400 was

treated by the electric system, and so charged were the chickens with high frequency electricity that a shock could be distinctly felt when the finger was put to the beak of a chicken. The chickens in this 400 grew to a marketable size—that is, as "*petite poussins*"—in five weeks, and of the 400 only six, and those were weaklings in the beginning, died—it being late in the year for healthy growth—and the the other 400 took three months to reach the marketable size.

This experiment followed other experiments in which similar though not so striking results were obtained. Trials on a yet larger scale are being prepared for, and there is at any rate a reasonable hope that a method of real value in the intensive production of food has been found.



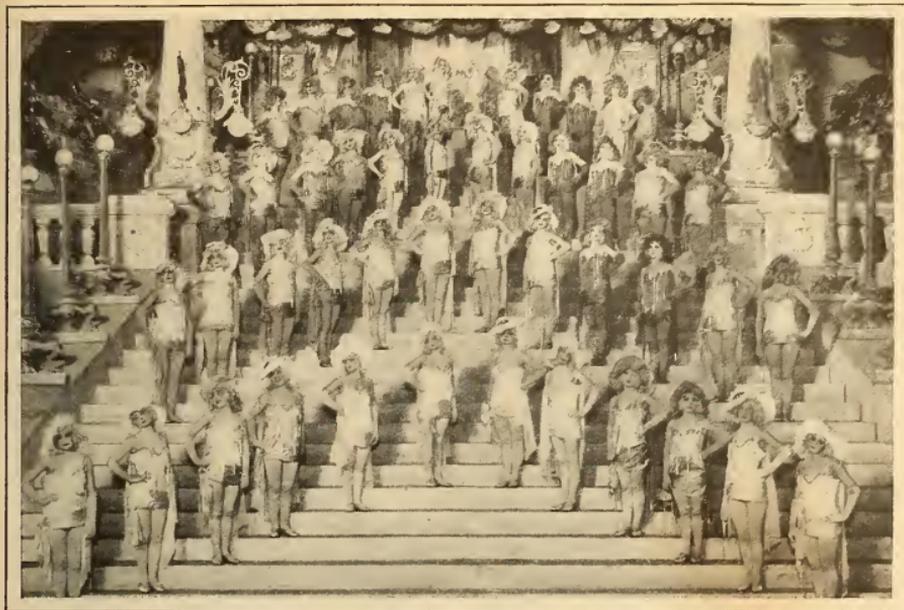
WASHINGTON'S UNION STATION AT NIGHT

This view of the New Union Station in Washington, D. C., was taken from the roof of the Senate Office Building, an exposure of ten minutes being given. The enclosed arc type of light is used, about 50 in number, immediately surrounding the station, which makes the night practically as bright as day. The building immediately adjoining the station on the left is the new City Post Office Building, now in course of construction. The dark foreground is to be included in the extension of the Capitol grounds.



CLIMBING THE JUNGFRAU BY TROLLEY

It is safe to say that in none of the countries of Europe has the mountain climbing electric road proved such a success as in Switzerland and in this wonderful country all the new electric methods for taking passengers up to high points are employed. Within a late period it is possible to reach the heights of the Jungfrau by electric cars, so that tourists are enabled to visit the famous peaks and enjoy the magnificent panoramas from the snow covered summits without the fatigue of a mountain climb, thanks to electricity. The photograph here reproduced shows a recent view of this electric road and the Oerlikon locomotives, taken at the Eiger glacier station lying at the foot of the two principal peaks of Eiger and Rotstock.



Flight of Steps upon Which the Chorus Enters from the Fly Galleries

FLIGHT OF STEPS WHICH GIVES THRILLS

Who would think that a flight of steps could be thrilling? In every day life they are commonplace enough but when staged, as they never have been before, at the Winter Garden, New York, this season, they are a sensation.

In this production instead of utilizing a flat surface upon which to display the beauty chorus and the dancing girls, they have built a flight of steps that reaches from the footlights to the back wall as high as the fly galleries and as wide as the proscenium opening. On this precipitous incline the girls perform evolutions that are kindred to the daily pranks of the fly. To date not a spangle has been lost nor a shin skinned, but at each performance the orchestra sits breathless, waiting for the first human toboggan. One false step and bang! bang! bang! The manager has each girl protected by insuring her.

It's the first time in stage history that actors have made their entrance from the fly galleries. This is so high above the level of the orchestra that persons sitting in the balconies and even the rear orchestra seats wonder why the others are applauding, for they cannot see the top flights of steps and consequently miss the opportunity of extending a hand when a favorite appears.

To be exact there are 32 steps in all. They are constructed in multiples of four, this arrangement being necessary on account of the music. The top step is 28 feet high, which means a height of 35 feet above the heads of those sitting in the first row of the orchestra. The depth is 40 feet and the width 32 feet. In order to enter the scene the company climb to the topmost floor and land upon the fly galleries, there being one gallery on either side of the stage. Reaching from each gallery is a wooden and steel cantilever bridge 20 feet in length and three feet wide and able to support five

tons. Blithely the little girls emerge from these dizzy heights to go through on the steps, marches, and dances, which are done with such precision and abandon as to rob them of much of their intricacies and real danger.

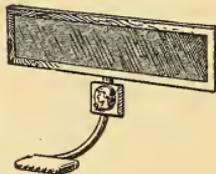
In all, 20 men must hustle to set up this scene in the required time of nine minutes. And while the stage hands are moving noiselessly about, over 22 electricians are preparing the light effects which are brought into play back of the steps at the finale. When the act is on these electricians work under the stairs among never ending strands of cables and plugging boxes. These boxes, 50 in number, are square black affairs about the size of a cigar box. Each receives a main cable and sends out six other circuits which go to the circuits of strip lights back of each "riser" in the flight. At the signal from the head electrician these circuits flash blue, green and red, lighting up the steps from top to bottom. As the risers are built of gauze the effect is marvelous.

MIRROR HELD IN THE MOUTH

A new idea, and one which will be appreciated by ladies, has originated in Paris. It embodies a small mirror which can be held in the mouth so as to leave both hands free in order to arrange the hair, or adjust a veil. In many cases the usual elaborate mirrors may not be at hand and the present one will be very



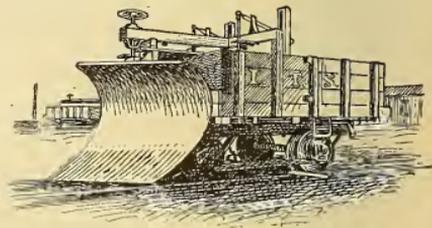
Application of the Mouth Held Mirror



convenient for making a few retouches. The supporting rod is made quite long so that the back of the head can be easily seen and the rod ends in a piece of rubber designed to be held by the teeth. If need be, this piece can be covered with paper or metal foil, sheets of which are included in the outfit, especially where it is to be used by different persons.

EFFECTIVE INTERURBAN SNOW-PLOW

The reliability of electric traction service has been proven time and again during severe winter weather and in the



Interurban Snowplow

accompanying illustration is shown a peculiar looking though common type of snowplow in service upon an interurban system in the Middle West.

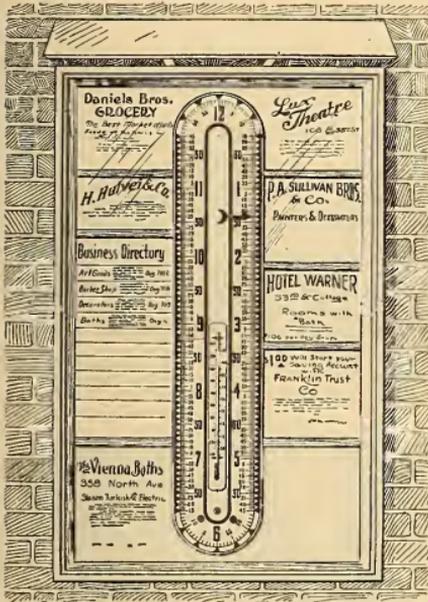
The plow is placed in front of the regular electric locomotive and does its work effectively.

MOTOR OPERATED UNDER WATER

A remarkable performance of an electric motor is reported. The motor was doing service in a mine, geared to a pump, and because of the high temperature prevailing at the spot the motor was not enclosed, as they often are. During last winter the mine was flooded, submerging the pump and the motor several feet. As it was necessary to keep the operation of the pump going, the motor was shut down, and for two hours there was no interruption, though completely submerged until it had actually pumped itself clear of water.

VERTICAL DIAL CLOCK

Because you never saw a clock with a vertical dial and only one hand, don't think it is not possible—or practical. This illustration shows such a clock the manufacturers of which call it a "one



Clock with a Vertical Dial and Only One Hand

hand wonder" and make it a medium for display advertising.

An ordinary clock face with two hands is too familiar an object to attract any attention, but a single hand on an oblong dial face calls for notice.

This device is placed outdoors on the side of a building high enough from the ground so that the bottom of it clears a man's shoulder, yet low enough so that all the information and advertising is easily read by people who come within view of it.

The advertising is contained in a steel cabinet 3 by 5 feet which is weather and dust proof. There is also a standard thermometer and a weather report provided for. At the top of the

cabinet is a reflector containing two 40 watt tungsten lamps which the clock turns on and off as desired.

EDISON AND THE NEW OFFICE BOY

According to a recent press report, when Thomas A. Edison, who has just recovered from an illness, started to enter his laboratory he was intercepted by a boy who had recently become attached to the laboratory office force.

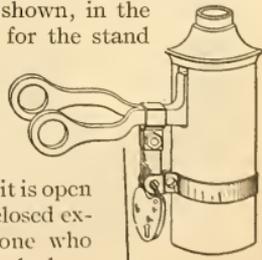
"No strangers allowed in here," said the boy. "It is a rule that no one except employes can enter the building unless he has an appointment with Mr. Edison and you can't see him because he's home sick."

The inventor asked to whom he should go if he wished to make an appointment with Mr. Edison. The new boy summoned W. H. Meadowcroft, Mr. Edison's secretary, who was greatly astonished when he saw the "stranger."

"I've come to take up the work left off by Mr. Edison. I want to know if you are not desirous of employing a man who is willing to work now and then," said the inventor, as he shook hands. He added: "Meadowcroft, that boy you have here is all right. I hope he will continue to see that the rules of this laboratory are faithfully carried out."

LOCKING DEVICE FOR TELEPHONE

A simple and inexpensive means of preventing unauthorized persons from using a telephone is shown, in the form of a collar for the stand and a padlock and a link to hold the receiver hook down. In this position the talking circuit is open and cannot be closed except by some one who has a key to the lock.



**FIRST PHOTOGRAPHS OF THE
SCHROEDER-STRANZ
EXPEDITION**

Lieutenant Schroeder-Stranz and several other members of a German expedition set out in the summer of 1912 to explore Spitzbergen. None of the members of the expedition had had any previ-

ous experience in Arctic exploration and it is now believed that all have perished with the exception of one, Mr. Rave, marine painter and artist and photographer of the expedition. A rescue party has brought him back to civilization and the accompanying illustrations are from among his photographs.

The party left for the frigid regions in



Relief Ship Herzog Ernst on the Coast of Northeast Land



First Walrus Captured on the Expedition



At Sorge Bay —
Dr. Rudiger and
Painter Rave



Marine Painter Rave only Survivor of the Expedition



With the Relief Expedition over Unknown Lands

the ship Herzog Ernst, going to North-east Land. A house was built at Sorge Bay which the party used as a base, and it was here that the artist was found by the relief expedition sent out under the direction of Captain Strayrud.

A FAMOUS LANDMARK

The accompanying picture, which resembles a huge oil derrick, shows to advantage one of the most prominent landmarks in California. It is the old historic electric light tower of San José, the former capital of California. The tower is built entirely of steel. The main structure is 207 feet high and is capped with a small flag pole. The base is 80 feet square. The entire frame is outlined with nearly 2,000 sixteen candlepower electric lights.

There were formerly a dozen arc lamps suspended from the top of the tower, but

demolished large buildings of all descriptions, the old tower stood like a sentinel.

TELEPHONE AS A FIRE ALARM SYSTEM

A unique fire alarm system has recently come into use among the small towns of Pennsylvania, in which the "personal element" and the telephone must play partners. The system provides for numbering the fire hydrants (or "plugs") in each town and printing these numbers with the locations on cards which are generally distributed. Citizens are supposed to keep this card and also be familiar with the number of the hydrant nearest their residence. In case of a fire the engine house is called up by telephone and this number given, which number is also used in ringing the alarm to inform the volunteers where the fire is located.

LIGHT MEANS HOSPITALITY AT NIGHT

Those people who entertain to even the slightest degree, or whose neighbors entertain to even a moderate degree, appreciate the porch light. When there is nobody looking for company and prepared for anything but company it is one of the annoyances of life to have to answer the door bell to inform a lost and apologetic individual that your neighbor's house is next door.

Those people who do not desire an especially bright light for the porch and still do not wish their neighbor's friends wandering aimlessly about on an otherwise systematically ordered street, perhaps in rain or sleet, have taken the ten watt Mazda lamp for their means of identification.

The surest way of making a house number stand out at night is to have it painted upon the light globe. A ten-watt Mazda lamp burns just about all night for one or one and a half cents. Thus the latch string is out the entire year for about three dollars.



The Old Tower of San José

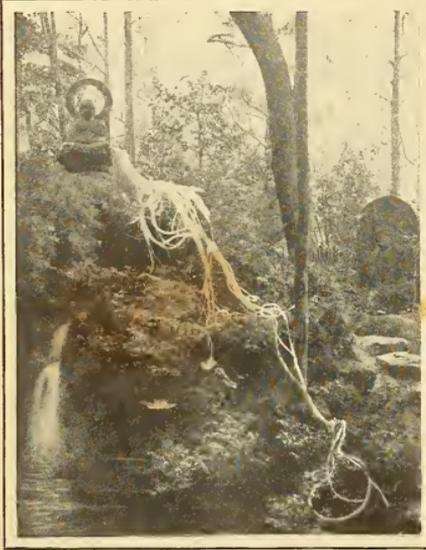
recently the arc lamps have been removed entirely, and in their stead a great crown outlined with incandescent lamps, has been erected.

For many years this giant was the guide for many a lost farmer. The tower is located on the famous El Camino Real, built by the Jesuit Fathers over 100 years ago, and spans the intersection of Santa Clara and Market streets.

In 1906, when the heavy earthquake

EIGHTEEN FEET OF TAIL

In Shinewara, on the Island of Shikoku, Japan, long before the theory of evolution had been heard of, the natives undertook to breed roosters with one aim—the lengthening of the tail feathers of the ordinary barnyard cock. Patient



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Rooster, Bred in Japan, with a Tail Eighteen Feet Long

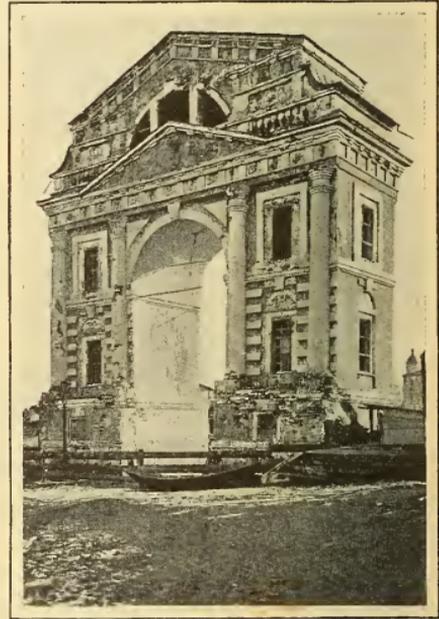
selection of a breed of fowls, the hens of which sometimes have tail feathers eight inches long, continued through a hundred years, has resulted in the rooster which is pictured here, with tail feathers which measure eighteen feet in length.

Naturally, in breeding roosters with such long tails, it is necessary to confine them in very close quarters, so that it will be impossible for the feathers to wear out. The fowl is therefore placed in a narrow cage, so narrow that he cannot turn around in it. Once every day or two, he is taken out and allowed to stretch his legs, under the careful surveillance of an attendant. To keep his plumage in good shape, from time to time, he is given a bath and carefully dried after it. Through this careful and well

planned routine, the cock lives out its allotted span of life, which authorities say is from eight to nine years.

THE ARCH OF DESPAIR

At the west entrance to the city of Irkutsk, Central Siberia, stands an arch through which have passed for a century or more all the exiles and convicts en route to penal settlements in Eastern Siberia and the Island of Saghalin. The road which passes through it is the old postal route between Moscow and the Pacific. In times gone, the prisoners tramped all the way across the dreary steppes from Europe, a journey of many



The Arch of Despair Through Which Thousands of Siberian Exiles Have Passed

months. Now conducted in trains, they arrive at Irkutsk in a few days and are allotted their places of residence or imprisonment.

Despite the efforts of the municipal public safety bureau, the old Arch of

Despair is gradually falling to bits. Last year, the passage through was closed to traffic and those who tread the Moscow pike must make a detour. Exiles still pass it. A few hundred yards beyond, the road forks to the north, leading finally to the Yakutsk Government which fringes the Arctic Ocean. Sixty versts (40 miles) beyond Irkutsk on this road is the Alexandrofski Prison where are confined several thousand men and women exiles serving short terms for criminal or political offenses. A fortnight's tramp from the Alexandrofski brings the prisoners to the first of the Lena River penal settlements where live the long term and life sentence men and women. Russia is still exiling political prisoners at the rate of about 4,000 a year. Siberia, holding the bulk of them, counts some 50,000 exiles and criminals within its vast domains.

WORLD'S RECORD IN MORTAR FIRE

During Secretary of War Garrison's recent visit to the forts commanding the entrance to Puget Sound, the question of landing a force at Port Discovery and thus taking the forts in the rear, was discussed. In order to settle the question once for all, the big twelve inch mortars at Fort Worden were discharged at moving targets stationed in Port Discovery Bay, nine miles distant. Although a range of hills intervene, three of the seven shots fired struck within fifteen yards of the target, establishing a world's record for mortar firing.

ELECTROCUTION IN ARKANSAS

The Arkansas legislature has enacted a law substituting electrocution for hanging in the execution of criminals con-

victed of capital offenses. All persons receiving the death penalty for crimes committed after June 13, 1913, will be electrocuted in a specially prepared death chamber in the state penitentiary at Little Rock.

The substitution of the electric chair for the gallows in Arkansas meets with almost general approval by all the citizens, and the 75 sheriffs of the state are especially pleased, as they indorsed the proposed act during the last session of the legislature.

The chair to be used is a "home-made" product, and was built under the direction of Prof. W. N. Gladson, of the University of Arkansas, at a total cost of \$702.05. The cabinet work was done in the shops at the state university and the electrical work by a Chicago firm. It is wired for alternating current of 2,200 volts, which will be supplied by the state



Mortar Firing at a Target Nine Miles Away

COPYRIGHT BY TOROKA BROS.

plant, located in the same building. The current reaches the vital parts of the body through electrodes at the scalp, wrist and the left ankle.

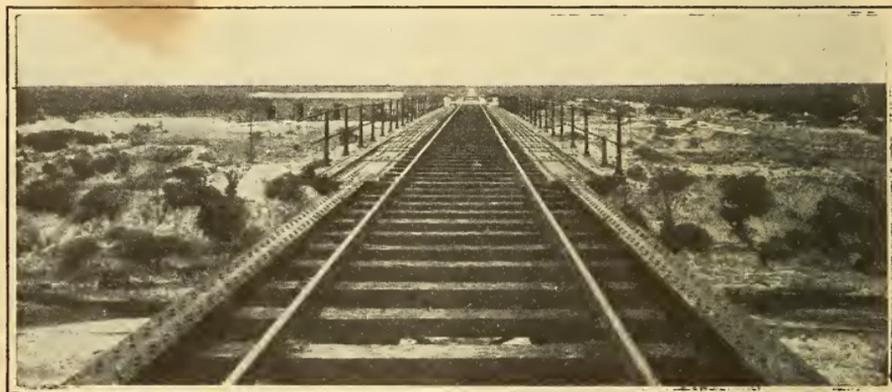
After the death chair was installed, it was successfully tested by electrocuting a heavy steer. One electrode was attached to the animal's head, another to a hind leg, and the current passed through its body, varying from 2,200 volts to 200 volts in 30 seconds, after which the steer was pronounced dead.

UNIFYING THE NATIONS WITH ELECTRICITY

A remarkable comment on the value of electrical discoveries and applications in the matter of overcoming international animosities was made recently by the famous Dan Crawford, who buried himself in the heart of Africa 23 years ago and emerged for the first time only during the past twelve months. His book "Thinking Black" has had an enormous sale all over the world.

"After getting back to civilization I could not help feeling very topsy-turvy, and somehow, when I looked around, I almost fancied I had struck the planet Mars, so changed was the world from the civilization I knew. The one great fact that impressed me was the leveling of class distinctions, which was everywhere

apparent. Twenty-five years ago I could tell the difference in almost every grade of society, but now all is different, and the sharp distinctions are gone. The tremendous progress towards the unification of the world at large also struck me very forcibly. In Britain, on the Continent, in the United States and Canada; all is being merged into one, and a dominating factor in the change seems to me to be electricity. The electric telegraph has placed the uttermost ends of the earth on speaking terms with each other and this, I believe, is the first stage in that process of mutual absorption which is gradually spreading over the civilized world. The means of locomotion are also becoming so easy everywhere that the great gulf which formerly yawned between nations is being gradually filled up."



LONGEST STRETCH OF STRAIGHT RAILWAY TRACK

The statement is still often made that the longest piece of straight railway track in the world is a stretch of upwards of a hundred miles in New South Wales, Australia. This is not true, nor has it been true for fifteen years. This distinction belongs to Argentina, and was gained by the construction on the line of the Buenos Aires al Pacifico of a stretch of track which crosses 175 miles of Pampas without a curve. But for a slight "S" curve near Villa Mercedes this "tangent" would be 205 miles in length, for an uncurving stretch of 30 miles follows this break. The Pampas of Argentina comprise incomparably the largest area of level land in the world, and it is by no means improbable that this remarkable record for straight track may be broken by future construction.

WORSHIPING THE CAMERA

During a sojourn in a Japanese country hotel I took a number of photographs of the proprietor and his family. They had never seen a camera in operation before and were much excited and mystified



Old Japanese Woman Worships the Camera

over the process. The camera awakened curiosity in the young and a feeling which appeared to be akin to reverence in the old. The former manifested itself in such investigations as opening plate holders and unrolling films in my absence in order to get a quicker look at the newly taken picture, while the latter could not be better illustrated than by the accompanying photograph. I had set my camera up to copy some Japanese prints, and during a few moments absence the old mother of the proprietor of the hotel brought out her pillow and beads and fell down before it in an attitude of worship. I snapped her with my small hand camera without her knowing it, adding still further to her mystification and reverence by exhibiting the print the following day.—LEWIS R. FREEMAN.

WHEN THE BEES FAILED TO DO THEIR WORK

In some parts of the South of England, bee keepers have lost countless swarms of bees through the ravages of a strange disease. Following this, there came a shortage of fruit. After some investigation, this shortage was traced to an interesting cause—the lack of bees to carry the pollen dust.

The fruit growers, however, were not long in sizing up the situation and at once set to work to do the bee's work by hand. The illustration shows how the pollen is carefully transferred from blossom to blossom with the aid of a bit of cotton wool.

LONDON'S UNDERGROUND RAILWAYS

The last links in the great double chain of London's underground traffic are fast being completed. There are two great underground railway combinations in London—the Metropolitan Railway Company and the "Underground." Both are electrical as far as the underground lines are concerned, but the "Underground" owns six railways as well as most of the motor bus service, and two regular trolley car systems. The two combinations work fairly well in harmony, but an absolute completion of all the links in the two systems will mean either one gigantic system or a traffic war of serious dimensions.



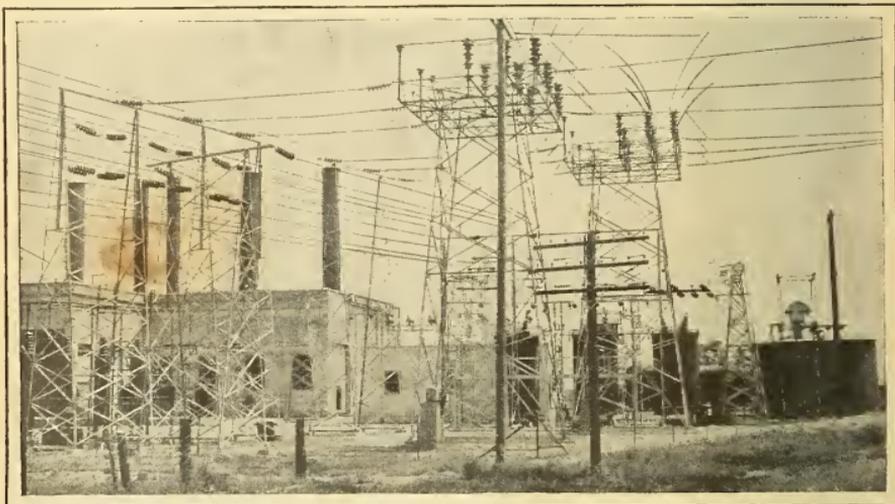
Doing the Bee's Work by Hand

AN OUTDOOR SUB-STATION

Attention is called to this picture for the purpose of giving the non-technical reader an idea of the most recently approved method of shackling and controlling extremely high voltage current when it reaches a point of distribution after passing over a long transmission line. This is what is known as an outdoor sub-station, it having been demonstrated in

cuits. These circuit-breakers are nothing more than huge knife-blade switches of copper, hinged at one end and held by a latch at the other. One is inserted in each line, and in case there is an excessive load the latch opens automatically and the knife-blade drops and swings down from the hinged end.

As the blade falls a great arc follows, since the current tends to flow across the gap through the vaporized copper formed



An Outdoor Sub-station in California Where 150,000 Volt Current is Controlled

the last few years that expensive buildings are not necessary to house the transformers; switching apparatus and circuit-breakers. This point marks the end of a 240 mile transmission line and is located at San Bernardino, Calif. Here the wires bring in the current from distant hydro-electric plants under the tremendous pressure of 150,000 volts. In the rear are to be seen the three transformers, standing exposed to the weather, which will take this current and reduce its voltage to a safe value for distribution.

The two steel towers in the foreground carry, between the two right-hand rows of insulators, the circuit-breakers which will open automatically and protect the lines in case of overloads or short cir-

by the intense heat; but this arc is almost instantly extinguished by the diverging horns above the circuit-breaker, for, strangely enough, the arc will travel right up the horns and literally blow itself out at the extremities.

These circuit-breakers also take the place of switches, as they may be tripped and opened at any time by the station attendant.

Wireless telephony has been successfully tried in a South Yorkshire colliery in England. Conversations have been carried out between the pit house and various points in the mine as far as 3,000 feet away.



The Junior Partner

BY STANLEY HALL

The big house on the hill was aflutter with excitement. The entire social life of Creston centered that day in the palatial Barnes mansion and for more than an hour a steady stream of holiday gowned villagers had been ascending the broad steps which led up to the entrance.

J. D. Barnes was the merchant prince of the thriving little town of Creston and this was the day on which his daughter, Flo, was to become the Countess La Badie.

Though Barnes had plenty of this world's goods, owned the finest home in the village, was a director in the Security National Bank, proprietor of the largest store on Main Street and president of the Commercial Club, still he was one of Creston's most democratic citizens. He cared nothing for style or show, and dressed no better than some of the clerks in his employ, a fact which caused his wife and daughter no little concern, for, frankly, Mrs. Barnes had social aspirations of the highest order.

For years she had dreamed of becoming mother-in-law to a nobleman, and today, after years of waiting, her fondest dream was to be realized, for at high

noon her pretty daughter was to become the bride of Count La Badie, a French nobleman with a high sounding title and an amazing array of creditors. Though his wife found much to feel proud of in the fact that her only child was to become a countess, Barnes felt anything but satisfied

with the step she was taking and would much have preferred seeing her the wife of Ben Lawrence, his junior partner. Ben, who in reality was in love with Flo, was a man of exceptional qualities and Barnes had come to rely upon his sound judgment in business affairs and to look upon him as his successor when the day should finally come for him to seek



"What's Worrying You, J. D.?" THANKHOUSE!

retirement from active part in the business.

Precisely at high noon the wedding occurred and the Crestonites were given a close and intimate view of "a real count," and went away declaring pretty Flo Barnes "the most beautiful bride of the season." The ceremony over and the wedding dinner served, Count La Badie and his bride hastened to catch the afternoon train for New York, where they were to spend a day or two before proceeding to their castle in France.

Ben Lawrence was dining at the Barnes home, one evening, nearly a year following the departure of Flo and the count. He noticed that his host was anything but himself during the meal and seemed brooding over something. In fact, Ben had never seen Barnes so haggard and careworn. When the two men went out onto the veranda to enjoy their after dinner cigars, Lawrence slipped one arm across the shoulder of the older man and inquired: "What's worrying you, J. D.? You aren't a bit like yourself this evening."

"So you noticed it, eh?" inquired Barnes. "I didn't suppose it had begun to show in my face, though I know it has aged me terribly during the past six months."

"What is it—something about Flo?" gently prompted Lawrence.

"Yes."

"Isn't she happy, J. D.? Isn't the count treating her right?"

"That's just it—I don't know," replied the elder man. "The only letters we get are requests for money. Nothing at all about whether she's happy or not. I have the feeling that all is not right, and if I weren't so old I'd be tempted to undertake a trip abroad just to satisfy myself that all is as it should be."

"There, there, J. D., don't let it worry you. If you'd care to have me, I'll take the trip. I haven't had a vacation in years, as you know, and perhaps the ocean voyage will do me good. I'll run in on Flo, stay a few days, look around a bit and then come straight back and report. That will put your heart at rest, I'm sure."

"Ben, could you really do that for me?" There was a world of anxiety and care in Barnes' tones, which gave way to relief and positive joy when Lawrence answered: "Surely I will. I'll start next week, if you'll let me."

As the "*Imperator*" plowed her way through the waves Lawrence found himself impatiently pacing her decks and begrudging every hour that kept him

from Flo's side. The love which he had bravely attempted to stifle when he learned Flo was to be the bride of another now burst forth anew, and every turn of the propellers which brought him nearer to his divinity kindled it afresh.

He had promised Barnes carefully to study her surroundings with a view to learning the sort of life she led and how she was being treated, but he suddenly found himself wishing that an excuse might offer itself for boldly taking her from this foreigner, nobleman though he might be.

On arriving in the vicinity of the count's castle, he learned many things from the idle gossipings of the simple natives—learned things which convinced him that he should pursue his mission cautiously, instead of boldly entering the castle and announcing himself. Accordingly, he obtained a false beard and mustache from the shop of a little wig maker, which he chanced upon, and in disguise spent many hours prowling about the castle grounds.

In this way, he by chance overheard one night a conversation between the count and a rascal of a physician, which convinced him that Count La Badie was plotting to send his American bride to an asylum as a lunatic. As he stood concealed in the shrubbery and listened to this villainous plot, Lawrence felt his blood racing through his veins and longed to spring out upon the men and interrupt their dialogue, but prudence cautioned him to remain where he was, until he had overheard all the details of their plan.

The rascally doctor explained to the count that it would be necessary for a second physician to certify to the facts in the case, before commitment papers could be obtained, and as the two wandered farther down the shaded pathway and out of Lawrence's hearing, they were discussing who this second doctor should be.

The American made his way in a roundabout fashion to the shrubbery which lined the driveway and there con-



THANHOUSER

He Covered the Doctor with His Revolver, Carefully Keeping it Out of the Count's Vision

cealed himself, to await the coming of the physician.

Soon the steps of the doctor were heard approaching and at the moment when he arrived exactly opposite the shrubbery, the American sprang at him. Startled, the man fell backward, but Lawrence quickly followed up his advantage and with a revolver held carelessly at his side covered the physician, while he explained what he wanted. Briefly he told of overhearing the plot of the count and demanded that he be taken back as the second physician, who was to certify to Flo's insanity.

Naturally the doctor demurred at first, but the revolver proved an overwhelming argument. The two returned to the castle and Lawrence was introduced as "Dr. Black," that being the name he had chosen to assume. The American kept one hand on the pistol in his coat pocket and was ready for any treachery on the part of the man who had

brought him there, though he believed the rascally doctor had been cowed during their interview on the driveway. He depended, also, on the dark false beard which he had assumed, to prevent the count's recognizing him.

Flo was summoned, worried and careworn and now frightened almost into hysterics, and arrangements completed for making the test of her sanity.

"I'd prefer to examine the countess in private," began "Dr. Black," playing the part of an alienist to perfection, "so if you have a room handy, to which we can retire for a few minutes, I will soon be prepared to report on her case."

For a single instant Lawrence feared his boldness would prove his undoing, for the doctor who had introduced him to the count prepared to utter a remonstrance. Instantly he slipped the revolver out of his pocket, covering the doctor with it, but carefully keeping it out of range of the count's vision. The bluff worked, for

the count, after a moment's hesitation, murmured: "Certainly, you and the countess may step into the library yonder, though I trust you will not be long."



Lawrence Managed to Stand Them Off

Lawrence knew that the moment he made his exit from the room the physician would tell the count everything, so haste was necessary. He took Flo gently by the arm and led her calmly toward the library, but the instant they stepped across the portals and were concealed from the view of the count, Lawrence whipped off his false beard and mustache and exclaimed, "Flo, I've come to save you, but minutes are precious, so we must be on our way instantly!"

"Ben!" gasped the countess, overwhelmed by her surprise.

"Yes, but I've no time for explanations now. Haven't even time for you to get a hat and a wrap of some kind. The important thing just now is to get out of here, and to do that quickly. I believe the count has a big car in his garage and if you'll lead me there, by the shortest route, we'll just borrow it for a time."

"You mean you're going to take me away—that you hope to get me out of this dreadful place entirely and will take me home?"

"Just that, Flo, but please let's not talk it all over now. We must get started, and talk things over later."

The countess led the way across the

library, through a door which led into a long corridor and then, at the end of that passage, stepped into the art gallery. Hurrying through this portion of the castle the two came at last to the servants' dining room and an open window looking out upon the garage. Lawrence helped Flo through the window and had just time to deposit her in a big touring car, crank it up and throw on the power, when the count and the doctor appeared in a huge doorway that opened from the side of the castle.

Both men cried out something, but their words were drowned in the roar of the exhaust and a moment later the car rounded a bend in the driveway on two wheels, and swung out into the open roadway. Lawrence throttled the engine down to a speed which he believed he could steadily maintain over the rough roads, and then looked back over his shoulder to see if they were pursued. A group of horsemen were just driving out



They Emerged at Last from the Secret Passage

from the castle and the American knew a race was on.

For several miles the leader held his own, but the car was behaving badly and kept getting worse. A mile farther on it stopped entirely, and Lawrence decided it best to seek a refuge, rather than to risk capture by pausing to tinker with the car. Just at the brow of a nearby knoll stood a weather beaten little hut.

It offered scant protection but was better than the auto, and perhaps would bother their pursuers for a few minutes, anyway.

When the count and his retainers arrived, a rush was made upon the hut, but Lawrence was a splendid revolver shot and managed to stand them off. They retired to a short distance and began a discussion of how best to go about taking the citadel. The count at last issued orders to have the place burned, and his minions hastened to bring up brush and leaves, which they heaped about the walls of the little hut. Lawrence kept up his target practice, whenever one of the besiegers exposed himself, but the smoke soon began to roll in on him and Flo's eyes were growing red and misty. In fact, the young people were nearly suffocated when Flo chanced upon a trap door, in one corner of the hut, which led into some queer sort of a passage below.

Lawrence jumped to the conclusion that it must be a secret passage constructed by smugglers, and his guess was later proven to be correct. It was dark and damp in that queer underground chamber, but Flo was so relieved to escape the smoke and the flames that she leaped gayly into it, and, with her heart pounding wildly, followed Lawrence as he disappeared down the passage, one hand extended back toward her for guidance.

With what relief the two emerged at last into the clear light of day can better be imagined than described. They found themselves more than a quarter of a mile from the burning hut and well concealed from the count and his men who were still under the impression that the fugitives were within.

By skillful dodging, Lawrence and Flo managed to creep up on the horses of the count, which were picketed near the roadway, and a few minutes later they galloped off, secure in the knowledge that they had at last eluded their pursuers entirely and left them without a means of following.

The next steamer westward bound carried a couple strangely happy at being again in each other's company, and upon arriving in New York they were met at the pier by a jubilant father and an anxious mother, for Lawrence had cabled the Barneses immediately passage was engaged.

Before Flo had completed her plans for the securing of an annulment of her marriage, news of Count La Badie's death reached America, so the case was never called in the courts. Less than a year thereafter another wedding occurred at the big house on the hill, only this time stern old J. D. Barnes had nothing to regret in the match, for he warmly welcomed his junior partner as his son-in-law.

AUTO WINDSHIELD SPOILED FILM

Motion picture directors have learned to beware of shadows and mirrors in their work. Director J. F. MacDonald of the Powers Company and his camera man had a curious experience recently. Mr. MacDonald and his operator were following an automobile containing a runaway couple, who were being chased by an irate father. The camera man took several hundred feet of film and then went back to the studio to develop it. When the negative strip of film was inserted in its proper place in the rest of the roll and the whole reel flashed off on the testing room screen, it was found that every move of both Director MacDonald and his operator had been mirrored in the windshield of the automobile they had been taking. The entire scene had, of course, to be retaken and 300 or more feet of bad negative thrown away.

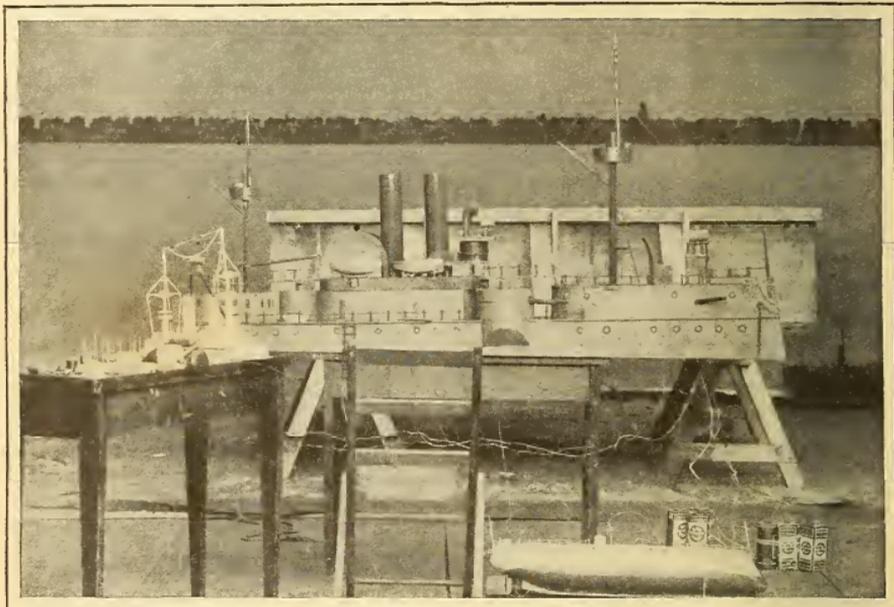
To study the life of the habitues of the underworld of Paris, King Baggot, the Imp star, dressed in the velveteen peg-top trousers of the Apaches, and went into their haunts in the Montmartre district.

A TRIUMPH OF DOUBLE EXPOSURE

Though the scenario (from which the motion picture was to be produced) called for a representation of the sinking of the "Maine" in Havana harbor, the Edison director, in charge of the produc-

tion, "The Family's Honor," never blinked an eye, for such little incidents as the sinking of a battleship have grown too common to longer surprise him.

The property man, the scene painter



The Maine in Miniature and Other Properties Used in the Havana Harbor Scene



The Maine as it Sank Behind the Table. In Combining the Two Negatives the Table Top Marked the Water Line



and the staff of electricians were called into consultation and a few days later the big scene was staged with wonderful realism. When you see the finished film you'll be convinced that you are actually beholding the catastrophe which became the basis for the Spanish-American war but the majority of you will wonder how it was done, hence this brief explanation.

The upper illustration shows the group of miniature battleships, all of which are seen at anchor in the harbor of Havana in the opening scenes of the film. Note the elaborate detail with which the models of the warships have been worked out and the intricate electrical equipment by which they are operated. Above the models you will note the shoreline of the Cuban harbor.

In the lower picture the "Maine" is seen as it appeared following the explosion and it will be noted the battleship has "sunk" beneath the canvas-covered table on which it rests. First the camera photographed the wreck of the "Maine," the canvas-covered table forming the waterline in this picture. Later, another exposure was made, in some bay or harbor and then the two negatives were so matched that the waterline of the real out-of-doors picture exactly fell along the line A-B of the table-top. When the positive prints were completed, real water is seen where the table appears in the first picture, and the "Maine" seems to be the battered hull which it really was following the explosion.

Picture of an Actual Raid Headed by Col. D. A. Kanipe, Shown at the Right



Infinite care had to be taken, of course, in matching up the two negatives in order to make the illusion perfect, but the completed picture is another triumph of double exposure and seems to be convincing proof that nothing is impossible for the modern motion picture to reproduce.

FILMING A RAID ON MOONSHINERS

Every once in a while Uncle Sam's revenue officers run down and destroy an illicit still, but it is seldom indeed that the revenue men are photographed as they are in the act of surprising the moonshiners and confiscating their property. Yet a few weeks ago C. E. Ray, a photographer of Asheville, N. C., and a representative of one of the big motion picture "weeklies," was invited to accompany a party of revenue officers, headed by Col. D. A. Kanipe, when they went into Burke county after some makers of "white lightning."

Mr. Ray planted his picture machine in such a way as to secure an excellent view of the surprise, fight, capture and

destruction of the mountain distillery, and the films when developed presented a remarkable record of an uncommon occurrence. Particular interest attached to this raid, due to the fact that it was led by Col. Kanipe, who is the only survivor of the Custer massacre, he having been dispatched by General Custer with the last message ever sent out by the hero of the battle of the Little Big Horn less than half an hour preceding the final attack of Sitting Bull and his braves upon the little band of soldiers.

their baseball playing no less than by their appearances before the camera. Darwin Carr, of the Solax forces, was one of the best men on the team from that studio, while Irving Cummings, he of the handsome features and winning smile, achieved a record of which "Ping" Bodie might well have been proud. As a home run hitter Cummings saved the day for the Reliance team on more than one occasion. Several of the Pathe players are said to have batting averages well above the .300 mark, and the Lubin nine,



The Lubin Nine from Philadelphia Invaded New York with a Team that Connie Mack Will Do Well to Keep His Eyes Upon

STUDIO BASEBALL TEAMS

Employees of the various film companies, in their hours outside the studio, manage to have just as much fun as any other normal young men, if not more. During the past summer nearly all of the eastern studios have had baseball teams to represent them and a regular series of games has been played between the various companies. Several of the leading men have distinguished themselves by

from Philadelphia, invaded New York with a team that Connie Mack will do well to keep his eyes on. The accompanying cut shows the Lubin boys lined up to have their photographs taken.

A melodrama, complete in every detail, acted by children, with miniature machinery and "props," even down to the horses and carriages, is a recent film production and the first of its kind.



Scene in the
Temple of Isis



Entrance of the
Gladiators

Nydia and Ione in the
Home of Glaucus



Nydia Prepares to Escape



"LAST DAYS OF POMPEII"

The picture going public will shortly be offered in the larger theaters of the country the six reel film production "The Last Days of Pompeii" which was filmed in Italy by the Ambrosio Company and which George Kleine, owner of the great "Quo Vadis?" pictures, has purchased outright for presentation in America. In the opinion of many who have seen the film



projected it ranks in every way as the equal of "Quo Vadis?" the arena scenes and the destruction of the city of Pompeii by the eruption of Mt. Vesuvius being in every respect as spectacular as were the scenes showing the slaughter of the Christians and the burning of Rome. Some idea of the scenic beauty and elaborate costuming of the Bulwer-Lytton novel in picture form can be obtained from the accompanying pictures which are exact reproductions of strong scenes in the film. Signora Fernanda Negri-Pouget as "Nydia," the blind flower girl, has a rôle that calls for acting of the finest sort and her clever interpretation of it seems certain to make her name famous throughout the civilized world.

ground of a real old fashioned English village. The other view shows another scene from the same drama and was taken along the rocky beach of the Cornwall coast, since the story concerned smuggling operations and the landing of contraband goods on the English coast. The reader will note that the photography is clear cut and sharp, a fact which caused much comment among the British film manufacturers, for the Americans were able to prove to the satisfaction of everyone that motion photography was possible in all portions of Great Britain, despite the general belief that the English fogs would greatly hamper the taking of clear pictures.

SOME INTERESTING ENGLISH PICTURES

It has become quite the custom for several of the American film concerns to send companies abroad each season, thus enacting the scenes of the picture dramas at the very place in which the story is laid. Marc McDermott and Miriam Nesbitt this past summer headed an Edison Company which was stationed in England, and there they filmed many quaint stories of life in the British Isles. One of the pictures shown gives a view of Mr. McDermott and Miss Nesbitt in a love scene from a one reel drama entitled "The Coast Guard's Sister," and they are posed against the back-



Marc McDermott and Miriam Nesbitt in the "Coast Guard's Sister"; A Quaint Story of Life in the British Isles. Below is a View in the Same Drama, Taken on the Cornwall Coast



A Temporary Studio Under a Tent—Four "Sets" Arranged at Once

TAKING PICTURES UNDER CANVAS

Occasionally motion picture dramas are filmed under unique conditions. The Reliance Company, only recently, abandoned its New York studio, having purchased the Clara Morris Estate, which comprises about four acres of high ground overlooking the Hudson River at Two Hundred and Sixty-second street, New York City. The new studio, which is in course of erection there, not being quite complete on the date when the Reliance players, directors, scene shifters, carpenters and electricians moved up from lower New York, it became necessary to stage the dramas then in course of production in a big tent which was hastily erected.

The accompanying illustration will give some idea of the busy scenes that were daily enacted in this canvas roofed studio while the company was awaiting the completion of the new home. Four big "sets" could be arranged at the same time on the spacious stages and reference to the illustration will show that three were in use at the time the picture was taken. The one at the right, and then being photographed, shows a hallway

and staircase; just to the rear of this is seen a bedroom, while the stage adjoining this is set for a parlor scene.

As it happens the line dividing Yonkers from Manhattan passes through the grounds of the Morris estate and will cut the stage of the new studio, so that it will be possible for a Reliance actor in New York to play a scene with an actor in Yonkers without any trouble.

NOTABLES VIEWED "GETTYSBURG" PICTURES

Quite recently a special exhibition showing the five reel film "The Battle of Gettysburg" occurred in London, England. Among the specially invited guests were the following notables: The American Ambassador and his staff, the American consul, Colonel the Right Hon. J. B. Sceley, Lord Kitchener, Earl Roberts, Sir Hubert and Lady von Herkomer, Sir Charles King, Col. R. S. S. and Mrs. Baden-Powell, Mr. and Mrs. Selfridge, and some 60 war veterans headed by Secretary J. Davis, one of the veterans being 104 years of age, all of whom greatly enjoyed the fine series of war pictures.

NOT ALL FUN FOR THE CAMERAMAN

One hears all sorts of interesting stories about the players who enact the leading rôles in the films; the publicity department tells the public constantly about the hairbreadth escapes and close shaves

mind, for he has been in similar ticklish situations so frequently in the past that he is hardened to it.

In the other picture Wray Physioc, manager of productions of the Herald Film Company, a new concern, is seen directing a scene from a row boat, while

Dave Gobbett, the cameraman, is working while in the water up to his hips. It was necessary to plant the camera in this strange location in order to get it level with one of the players, enacting the part of a fisherman, who was in another boat, not shown in the illustration. It was a matter of duty for Gobbett, but you can be very sure he took a warm shower the minute the scene was finished. However, ticklish situations such as these are all in the day's work.



All in the Day's Work

which the favorites of screenland are constantly having, but rarely, if ever, is anything said about the humble cameraman, yet time and again he undergoes peril of a far greater sort than that which the players experience.

The accompanying cut shows Forsyth, the Edison cameraman, filming a scene in the comedy release "Starved Out."

The players of the Edison Company are seen comfortably seated aboard a houseboat, with plenty of room to move about in, while carrying out the action called for by the scenario; but the cameraman is hanging onto the big rock, on which he has mounted his camera, by the skin of his teeth. He hasn't room to stir in any direction, lest he slip off—but he doesn't



Working the Camera Under Disadvantages

PLAYERS ENJOY LIFE

The popular players who compose the picture companies are, as a rule, the jolliest, most genial sort of people in real life and make actual play of their work. In the moments between scenes they laugh and joke with one another, and are exceedingly democratic, directors



A Group of Reliance Players Aboard the Canal Boat

and leading people chumming with the minor members of the company, and no snobbishness exists. Here's a group of the Reliance players who were snapped by the camera just after they had finished their lunch aboard a canal boat, on which they had been enacting scenes for the film entitled "Peg of the Polly P." Vivian Prescott, leading woman, is seen seated in the bottom row near the middle, while about her are grouped several of the character actors, and in the background the director will be noted.

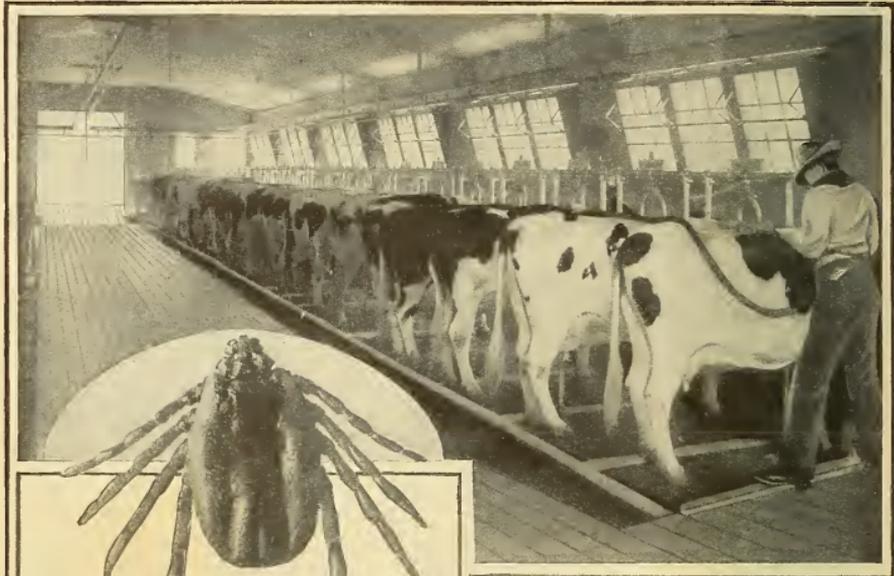
CAMERA WENT TO SMASH

While Tom Mix, Selig star, was attempting to bulldog a steer, as an incident in a thrilling two reel feature being filmed by the Diamond S Company, a thousand dollar camera went to smash. The operator had placed his camera in one corner of the corral and Mix ran into the picture, lassoed the steer and then grabbed him by the horns in an attempt

to bulldog the beast. The steer started straight for the camera, with Mix clinging about its neck, head down. The operator made a frenzied attempt to save himself and his camera, but things were happening too fast for him to evade them all. When the dust had cleared away, Mix, the operator and the steer disentangled themselves, and the camera was found to be totally wrecked.

Just to show that he still had some nerve left, Mix again chased the steer into a corner and, after a little, was able to bulldog the resisting animal, while the hushed onlookers held their breath. A new camera had been rushed to the corral, and the picture was completed upon its arrival, though for several days following Mix was rubbing sore spots on various portions of his anatomy.

Soon the first educational pictures made for the Universal by L. S. Andrews, late of the U. S. Dept. of Agriculture, will appear.



Interior of Low Barns, Showing Sanitary Conditions
—Uncle Sam's Most Modern Dairy
at U. S. Soldiers' Home

UNCLE SAM AS A MOTION PICTURE MAN

At last Uncle Sam has become a motion picture man! He held out a long time against the growing desire for this means of depicting Nature, conditions and events as they actually happen; but when the guardian of the nation realized that his children and wards would not be content to listen to a lecture illustrated with stereoptican slides, he stepped into the path of progress and followed the crowd to the moving picture show.

It has all come rather suddenly, too, and now there is a grand rush in the various departments to exhibit workings and teachings by means of the animated camera, which has become

A Young Female Texas Tick and Method of Dipping Used to Eradicate It — as Shown by Uncle Sam in Motion Pictures

the common educator—aye, even the daily newspaper—of the masses.

Already a number of films are being made and circulated for the welfare of the public, the preservation of scientific specimens, and the educational advancement of the farmer, cattlemen, officials, and urban communities. The Office of Public Roads possesses a series of films on road building, which has been exhibited freely in rural districts. This has been one of the causes for the present impetus for better roads. The views of how to make durable highways, how to repair worn roads and the wretched condition of some of our public thoroughfares has borne fruit with farmers and state authorities, as well as congressional officials at Washington.

The Bureau of Animal Industry is doing a great work in the motion picture field. It has secured animated views of high scientific value, showing animal pests. A very interesting film is one telling the story of the government supervision of the exportation and importation of livestock, showing the inspection of cattle at the stock yards and on the steamer and the solicitous transportation of these four footed passengers. This very forcibly impresses upon the spectator how Uncle Sam guards his thoroughbreds, and keeps out of this country many diseases prevalent among cattle in other countries.

Perhaps the most interesting and important film at the present time is that of the Texas tick—that stubborn cattle pest which has been fought with indifferent success for a long time. The Department of Agriculture has made a special study of the disastrous contagion spread by the ticks, with its causes, prevention and eradication and the life and habits of the tick itself. All this may be viewed on the screen now to the edification and benefit of agriculturists, cattlemen and scientists.

The films being made by the Bureau of Animal Industry will throw interesting

side-lights on animal husbandry. Among those now under consideration are the story of meat, from the cattle to the table, and the development of the dairy industry, showing processes of butter and cheese making.

As an indirect teacher of hygiene and sanitation, the government has already begun a campaign in motion pictures which is bearing fruit. The national Congress of Hygiene proclaimed certain films of the government as among the most important exhibited. Many fields are offered where Uncle Sam, alone, may tread with dignity, to lead the way to health and cleanliness.

It is reported that the Department of Labor is contemplating studying conditions under its supervision by use of the animated camera. Some very valuable and interesting data may thus be caught that a worded report would fail to reveal clearly.

The Department of Commerce, it is rumored, proposes making exhaustive investigations of marine navigation as well as land transportation with motion pictures. Such views will point out very forcibly causes for improvement and legislation.

Looking into the future, with Uncle Sam as a motion picture man, we see the much abused bulletins of the government being replaced by interesting films, and official reports being accompanied by a tin box, guarded against flammability. Then, Congress will be entertained with a screen view of the bill proposed, which will eliminate the unnecessary quibbling of words as to what a senator or representative meant. The Library of Congress will need some revision to receive the boxes of reels. Librarian Putnam is quite in favor of filing educational, historical and official films in the library and he would be among the first to provide for them, under his supervision. Certainly the motion picture is the thing of the hour and Uncle Sam has done well to enter the field.



PEARL WHITE

Pearl White is the pretty leading woman of the Crystal Film Company and has only recently returned from a month's vacation spent in Europe, where she visited the studios of a number of the film manufacturers. Miss White's father was a theatrical manager and his daughter quite naturally took to the stage at an early age. She developed her talents under various stage directors, possessing a natural tendency toward fun making that makes her an apt comedienne. Working first with the Pathe Company, the merit of her pictures proved her abilities as a picture star and she was soon made leading woman of the Crystal Company.



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CARLYLE BLACKWELL

Carlyle Blackwell, to qualify as a leading man of the Kalem Company, had first to possess a "striking personality" and good looks. Being athletic, versatile, of superior intelligence and thoroughly schooled in dramatic and motion picture work, he qualified. For more than a year and a half Mr. Blackwell has been a Kalemite and frequently played opposite popular Alice Joyce. When out of the studio he takes great delight in dashing madly about in a high powered racing car and is rapidly earning for himself the title of "The Speed King." Of late, character work has been his especial study.



REMOTE CONTROL FOR TRAVELING CRANES

The traveling electric cranes used at some English docks have had the dangerous defect that the operator in control could not personally see what was going on in the hold of the ship. An extra man

follows the work where he pleases. An emergency stop checks the crane in any position and levers move it in all directions. The connections between the controller and the crane motor in the cab are through a flexible, steel armored cable passing through the center post of the crane and into the center.



The Man with the Crane Controller is Able to Watch Proceedings

was required to stand at the entrance to the hold and signal. As a result serious and costly accidents have frequently occurred injuring ship, cargo and men.

The Holme crane controller is a new improvement on the usual device and has proved so successful that already over 100 have been installed in England. Instead of standing in the crane cab the operator carries the small and compact eight pound controller on his chest and

A CURIOUS ARTIFICIAL EYE

To increase the resolving power of the microscope, Professor Kohler, of Jena, has employed for illuminating the object to be examined the ultraviolet rays of the spectrum, which, though highly effective in photography, are totally invisible to the human eye. For focusing and adjusting the image a kind of artificial eye is employed, which consists of an eye lens

of crystal glass and a retina of fluorescent glass. The image formed on this retina by the ultraviolet rays can be examined visually through an ordinary lens. The fluorescent light, however, is injurious to the eye and this method of examination is sparingly used.

VINES ON LAMP POSTS



A Pleasing Effect

This is the manner in which the city of Washington, D. C., disguises and beautifies its lamp posts. This picture is of a lamp post on Potomac Park Driveway, fronting the Potomac River. The post is of the common iron variety on concrete base; the lamp is an enclosed tungsten of high power; the vine is planted back of and close to the post and certainly improves its appearance greatly.

UNIVERSITY OF MICHIGAN TESTING TANK

In the July, 1913, issue of this magazine appeared an illustrated description of the model testing basin of the United States Navy Department in which model battleships are put through their paces. The statement was made that the testing tank was without counterpart on this side of the Atlantic. It has since been pointed out, however, that in the Marine Engineering Laboratory of the University of Michigan a similar installation has been in operation at least since 1905. This tank is 300 feet long, 22 feet wide with a depth of water of ten feet.

The models used in the tank for testing purposes are from ten to twelve feet long, and are made of paraffin wax. A clay mould is first made approximately to the

shape desired, and a core inserted. The paraffin is then poured into the mould and after cooling the rough model is taken to the model cutting machine. This machine consists essentially of two moving tables or platforms upon one of which is placed the model and upon the other the drawing which it is desired to reproduce. The model moves under a pair of rotating cutters, which are made to follow the lines on the drawing. After cutting, it is brought to its final shape by hand, then carefully weighed, and sufficient ballast added to bring it to any desired draft and displacement.

A CLOSE CALL

But few people know, and those few only on the inside, how close there came to being a serious break in the receiving of the body of the late Mayor Gaynor when it was brought back to this country in state on the giant Cunard liner "Lusitania" which arrived at Quarantine early on the morning of Friday, September 19th. Had it not been for the heroic efforts of one man, an electrician, the big Cunarder, as she came creeping up the harbor out of the gray mists of early morning, would have been unmet by the boat which was scheduled to receive the remains and bear them to land.

The plans were well laid and it seemed impossible in the minds of the officials that a slip could occur. It was arranged that the steamboat "Correction" of the Department of Charities, which was moored at the foot of 35th Street and the North River, would meet the "Lusitania" at quarantine and receive the remains, proceeding to Pier A., North River, where an automobile would complete the journey to the Mayor's home in Brooklyn.

Between one and two o'clock in the morning everything was in readiness to start instantly at the word of command, the "Lusitania" being then on her way up the bay. Suddenly every light on board the "Correction" went out, leaving the

boat in total darkness except for her starboard and port lights.

A hurried consultation was held and Commissioner Drummond was communicated with. The job evidently required the services of a skilled electrician and at that outlandish hour none was available. It looked pretty bad. Finally Commissioner Drummond decided as a last hope to call up the emergency department of the electric light company.

"Can you come right over to 35th Street and the North River?" asked the Commissioner, explaining the situation.

"Of course we can," replied Charles Kahn, who has charge of the night emergency work. "Be there in a jiffy," he added, slamming up the receiver. He jumped into the emergency auto and a record run was made to the pier.

Kahn procured a lantern and dashed into the hold of the "Correction."

"It is a pretty bad mess," he remarked as he threw off his coat and got to work. "The commutator is short circuited and thrown things out of kilter generally," said Kahn, "but I'll do my best."

When he ordered the tools he needed brought from the machine he glanced at his watch. It was after two. The "Lusitania" must even then be nearly in quarantine. Kahn is a man used to all kinds of difficulties and accustomed to facing all sorts of problems, but here was something to tax even his nerve and skill.

The minutes flew—fifteen of them—thirty—forty—fifty—and still Kahn bent over his work with flying fingers. Oh those precious minutes; why did they go so fast? At last Kahn stood erect and wiped the perspiration from his brow.

"All right," he cried, "now we'll try her and see if she will work."

Slowly but surely the generator started to revolve. Again the lights on board shone out of the darkness and a great sigh of relief escaped from those who were waiting. Someone started to applaud and the others took it up.

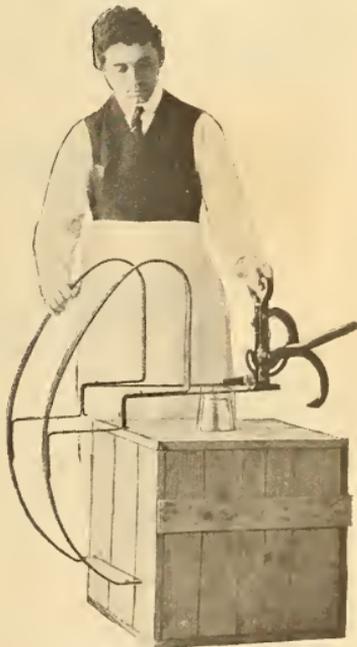
"It's all right," said Kahn. "That is only temporary stuff I have put on there

but it will last for to-night. Now go ahead and good luck!"

It lacked but a few minutes of three o'clock as Kahn stepped ashore and before those three minutes had elapsed the "Correction" was sliding out into the channel on her way down the bay.

CARBOY INCLINATOR

Anyone who has ever handled carboys of acid in battery rooms and similar places knows what backaching work it is, and



Easy Way of Handling a Carboy

how, despite the utmost care, acid will get splattered on the clothing and shoes, ruining them. Therefore, the inclinater here shown, designed easily to draw acids from carboys will be appreciated.

It is adjustable and can be used on any carboy and if the handle should slip from the grasp of the operator at any time, the carboy, through an ingenious curving of the rockers, will immediately assume an upright position.

WHEN A CITY PLAYS

Some one has said that the reason Duluth, Minn., has such a good time at play is that she is new and the zeal of co-operation has not worn off as in the case of older and larger cities.

Whatever may be the cause, the effect is present and agreeably noticeable. There are well attended ski matches, curling matches and a yacht club whose

membership, as compared to the entire population is probably higher than any similar organization in existence—surely an index to the democracy of the community.

Water is so convenient to Duluth that water sports naturally predominate: sail boating, canoeing and races of all sorts. In the winter, thick, safe ice and unbroken, cold spells provide convenient means for cold weather sports.



A Good Ski Meet Draws Thousands of Spectators Despite the Intense Cold, Often 35 and 40 Degrees Below Zero

The Dare-devil Feats of the Scandinavian Ski Runners of Duluth Have Become Famous. It May Be Observed that the One in the Picture has Slight Belief in the Superstition Connected with the Number 13



Steady, Off-lake Breezes Provide Plenty of Incentive to the Amateur Sailorman. Minnesota Point Shelters the Sailing Course from Rough Seas



This is About the Latest and Most Thrilling of Water Sports. A Long, Slender Plank is Attached by a Long Rope to the Stern of a Motor Boat. The Object of the Game, of Course, is to Stick to the Plank While it Plunges Through the Water at a Rate of 30 Miles an Hour

At no Place Outside of Girls' Schools do the Young Ladies Enter into the Spirit of Water Sport to Such an Extent as Here. The Picture Shows One of the Contesting Boats at the Start of an Exciting Race Between "War Canoes"



Lake Superior's Waters are Uniformly Cold the Year Around Except in the Latter Part of August When the Water Warms up to some Extent and Yearly at that Time Swimming Matches are Held

ELECTRIC LIGHTED TRAIN IN THE HIMALAYAS

The title of "the crookedest railway in the world" has a number of claimants, but among lines which depend on adhesion and not on cogs for traction the Darjeeling-Himalayan Railway is probably without a rival. This remarkable little line, which is of two foot gauge, climbs 6000 feet in 50 miles in ascending from Siliguri, at the foot of the Himalayas, to the Darjeeling, the hill station and summer capital of Bengal. The road crosses itself many times in its dizzy climb, spirals, "horse-shoes," "switch-backs" and "cork-screws" succeeding each other all the way. The diminutive train carries first, second and third class passengers, the fares being approximately



The Crookedest Railway in the World

the equivalent of twelve, six and two cents a mile, respectively. The express trains are electrically lighted and provided with fans, the motor for generating the current being carried on a separate van of its own.

A picturesque feature of this line is the presence on the cow-catcher of a man with a basket of stones to throw at elephants, bullocks, goats, etc., which are constantly straying upon the unfenced right-of-way.

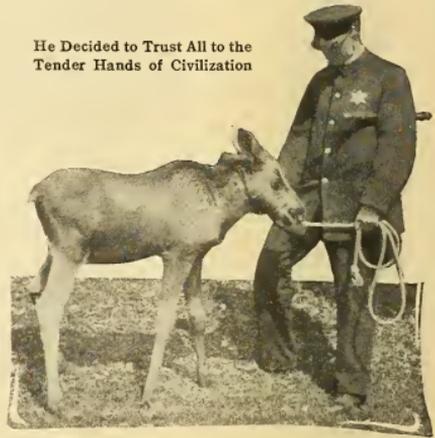
Up to date the motor vehicles that have been registered by the London county council number more than 57,000.

BABY MOOSE STROLLS INTO CITY

A three month's old moose shyly strolled from the rugged fastnesses of the Minnesota foothills down a main street of Duluth recently, and meekly submitted to the halter at the hands of a watchful policeman.

Possibly the baby moose weighed the matter carefully in its mind after being

He Decided to Trust All to the Tender Hands of Civilization



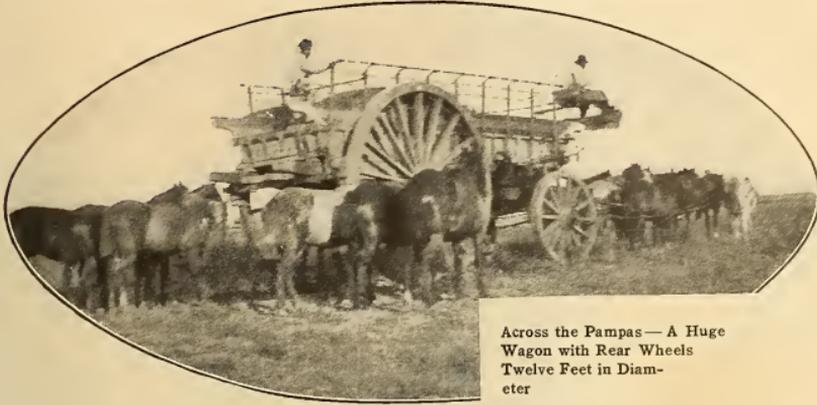
deprived of its mother by some heartless hunter, and decided to trust all to the tender hands of civilization rather than the merciless treatment of the denizens of the wilderness. Or, again, perhaps it was merely attempting to execute the principles of the party it symbolizes and expected to carry the town by storm. At all events, little "Bull Moose" is now fattening in the sunlit enclosure of a Virginia zoo.

GREAT WAGONS OF THE PAMPAS

The roads of the Pampas or plains of Argentina have deeper dust in summer and deeper mud in winter than those in any other part of the world, a condition which is responsible for the existence of wagons in those parts which have larger wheels than those in use anywhere else. The front wheels, which are of comparatively small size in order to pass under the high hung

body to allow short turning, are six feet in diameter, while the back wheels may be anywhere from twelve to fifteen feet across. The idea of the big wheel is that

plainly seen to the right at the extreme end of the tail which is curled up. The sting from a scorpion of this variety produces almost instant death. It should



Across the Pampas—A Huge Wagon with Rear Wheels Twelve Feet in Diameter

it has farther to sink before the hub is submerged in dust or mud holes, while the greater diameter gives an added leverage in pulling out. An average sized wagon requires eight or ten horses to pull it empty, while with a full load of grain—it will hold almost as much as a flat car—anywhere from 20 to 40 may be used.

POISONOUS SCORPION IN BANANA SHIPMENT

This scorpion, which is more than three inches in length, is of the deadly poison variety from South Africa, and



Deadly Scorpion of Peculiar Variety Found in a Bunch of Bananas

was recently received in a Duluth, Minn., commission house in a consignment of bananas.

The stinger and poison bag can be

not be confused with the tarantula—a giant spider whose bite is equally deadly.

STREET CARS IN DELIVERY SERVICE

The electric railway company operating in the city of Dresden, Germany, provides a very convenient and effective method of forwarding baggage, parcels and general merchandise between distributing points along the line. Much



Delivering Goods by Trolley in Germany

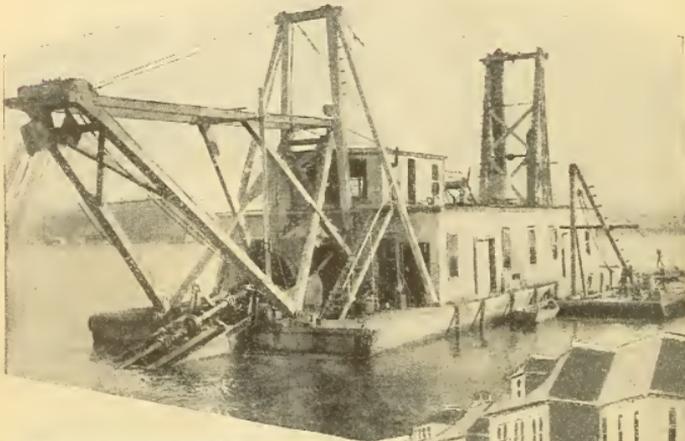
of this sort of delivery work is done by the company through the agency of a special baggage car attached as a trailer.

ELEVATING A TOWN BY HYDRAULIC POWER

Cities have been known to tear down their hills and level them off by means of hydraulic power after the fashion of hydraulic gold mining, Seattle, Wash.,

raised, as well as the plank walks and roadways. Vacant lots were cleared of trees and undergrowth (a regular jungle) at an average cost of 80 dollars an acre and the cuttings were burned on the ground.

The Tacoma Dredging Company holds the contract. The six large cutter knives of its 24 inch electric dredge are able to excavate 10,000 cubic yards of dirt in twelve hours. Two 500 horsepower motors pump this dirt with 80 per



Dredge with Pumping Equipment on the Chehalis River

and Portland, Ore., being notable instances. But the city of Aberdeen, Wash., is exactly reversing this process and is elevating its level by the hydraulic process. All one side of the

town, 250 acres, is being filled by the pumping of sand and water from the bed of the Chehalis River, the intention being to raise the whole level of the town above all possible danger of overflow during the high tides.

For this fill 1,750,000 cubic yards of dirt will be required and the preparatory work has been of no mean proportions. Over 900 buildings and houses have been raised from one to ten feet, old sawdust fillings removed, all sewers and manholes



A Stream, 20 per cent Dirt and 80 per cent Water, Gushes out and Engulfs the Land in a Black Devastation

cent of water through the large pipes and discharge it in a great river of mud that seems about to engulf the country in a black destruction; but the water soon flows away, leaving behind a level and solid fill, for the sediment left by the water compacts even more closely than ordinary earth.

The enormous power of this great electric dredge has brought up much besides silt—stones, branches of trees, live fish, and, it is even whispered, human bones.

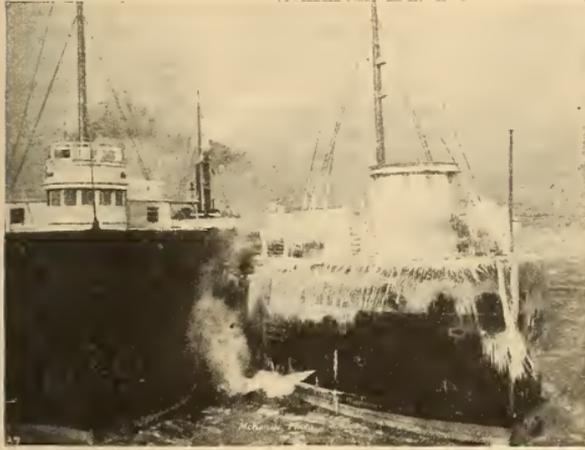
ATTACKED BY "THE LITTLE ICE DEVILS"

One cold winter morning a freighter steamed into one of the harbors of the Great Lakes with a strange story. Aboard of her, besides her own complement, was the entire crew of a boat which had sunk and in the sinking of the boat

water that the waves were lapping the deck.

Sailormen cite this incident as an attack by the "Little Ice Devils," while, in technical parlance it would be termed frozen spindrift or spoondrift. But the name given by the seafarers seems much more appropriate. Every winter ships crawl into harbor under staggering loads of frozen spray and numbers of them do not reach port at all. It is a slow, insidious death—a parasite which cannot be shaken off.

Up in Lake Superior where the temperature often drops to 45 to 50 degrees below zero, ice forms with startling rapidity. If the wind is blowing across the bow, ice forms only on that



Sailormen Call this an Attack of "The Little Ice Devils".

and rescuing of the men lay the strangeness of the story.

The ship which sunk had sailed out of Duluth with a cargo of packet freight for Buffalo and had encountered rough seas and a strong head wind. Each time a wave would break over her bows the wind would carry it up and over her until layer after layer of ice froze and soon formed a solid, cumbersome mass. The freighter sank lower and lower into the water and finally the situation became so dangerous that distress signals were sent out.

A passing vessel in response to the frantic tooting put on all steam to reach the waiting boat—now so low in the

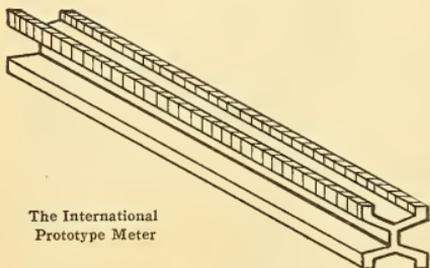


side sometimes to such an extent that the boat will nearly capsize. After a long run it is no uncommon procedure to chop the wheelsman out of the pilot house.

A new insulator for use in electrical work is made by condensing phenol and formaldehyde. It is said to resemble Japanese lacquer.

THE METER

In recent years the metric system has made rapid advances in the United States. Our fundamental unit of length, the yard, is legally defined as 3600/3937 of the international meter; in events like the Olympic games the 100 meter dash has displaced the 100 yard dash; owners of



The International
Prototype Meter

wireless outfits measure wave lengths in meters; scientists invariably employ the meter with its divisions and multiples; Porto Ricans and Filipinos use the meter where we employ the yard; and so on indefinitely. As a consequence the meter, for which the system is named, is of increasing interest to us.

The meter illustrates man's most earnest and most nearly successful attempt to establish an invariable standard. It originated at the time of the French Revolution. At an international convention held in 1790, working plans for the establishment of an accurate standard of length were formulated. Previous standards based on natural objects had always proved variable; but it was believed that the distance from the equator to the pole is absolutely constant, and that some fraction of this distance would serve for the length of the proposed meter.

An arc of ten degrees along the meridian passing through Paris was actually measured with the utmost precision. In 1799 another international convention decided that the meter should be $1/10,000,000$ of the distance from the equator to the pole on this meridian. A standard meter made

of platinum was prepared and formally adopted. But later measurements showed that mistakes had been made, and that the standard meter was too short. (According to the best modern measurements, the distance is 10,000,880 meters.) It was then decreed that the meter should be the distance, at the melting point of ice, between the ends of the bar. Touching the ends was prohibited by law; yet in some way they became dented, making the standard length somewhat uncertain.

Modern needs demand more accurate standards, so in 1872 another international convention, attended by representatives of 30 nations, met in Paris. It was decided that the new standards should be made of an alloy containing 90 per cent platinum and ten per cent iridium. This alloy is difficult to prepare, but it has a fine grain and resists the corroding action of air to a high degree.

After ten years the alloy was ready; and, in 1889, 31 meters made from it were formally approved. One of these, the general shape of which is shown in the diagram, is called the International Prototype Meter. The meter is the distance, at the temperature of the melting point of ice, between two microscopic lines engraved near the ends. This one is kept at Sevres, a suburb of Paris, in a triply locked vault which cannot be opened oftener than once a year.

Each country that signed the agreement to establish and maintain a permanent International Bureau of Weights and Measures was given two of the other 30 meters prepared. Those numbered 21 and 27 were allotted to the United States. Though these are of the same form and careful construction as the international standard, they have small errors. As determined by 784 comparisons, number 21 is about $1/10,000$ of an inch too long and number 27 about $1/16,000$ of an inch too short.

President Harrison received the two meters January 2, 1901. They were at once deposited in the Office of Standard Weights and Measures, but later were

turned over to the United States Bureau of Standards, which was established in 1901. In 1893 our yard, for lack of a worthy and reliable standard, was defined by an executive order as 3600/3937 of the international meter.

METEOROLOGICAL PLANTS

Naturalists have observed in the behavior of plants and animals many signs which enable them to foretell the weather. The appearance of some of the common wild plants on the approach of rain is shown in the illustrations taken from *La Nature*. It will be noticed that although most of them tend to close up both leaves



(1) Cowslip; (2) Clover; (3) Oxalis; (4) Convolvulus; (5) Lettuce. (P) Indicates Plants During Rain; S, During Fine Weather)

and flowers when rain or storm is near, the flowers of the lettuce, on the contrary, open at that time.

WARNING FOR THE POISON BOTTLE

Ordinarily a red label is used for bottles containing poisonous substances, but even here a mistake may be made, especially in an obscure place or in the night. It will be quite impossible to make a mistake by taking the following simple precaution which consists of attaching a very small sleigh bell of the common kind either to the cork or hanging it about the neck of the bottle.



Poison Bottles Fitted with Simple Alarm

PROJECTILE BECOMES A SEARCH-LIGHT

Coast artillery officers of the United States army propose to experiment with a recent German invention of illuminating projectiles that are intended to replace electric searchlights on war vessels. The projectile filled with calcium carbide and provided with a special mechanism is thrown on the water by a cannon. As the projectile is lighter than the water, it is submerged after striking the water only for a short time and it is filled with water through a tube. Acetylene gas is produced, which is ignited automatically. The illumination of one of these projectiles is 3,000 candlepower, and the combustion lasts several hours.

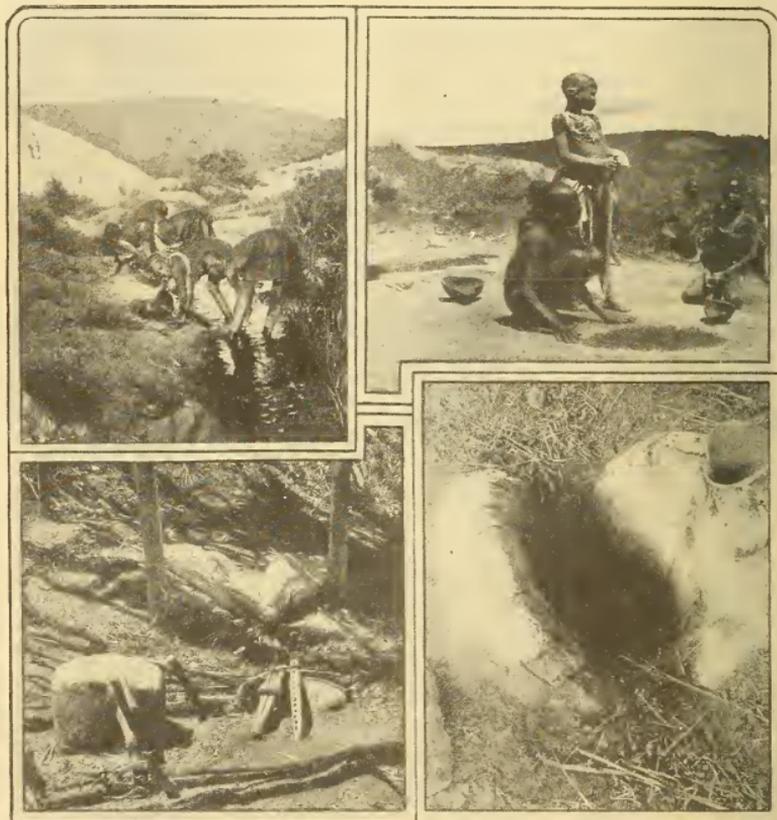
It is believed that such a projectile is worthy of experiment in our coast defense and if it can be thrown to the vicinity of a target at long range, it bids fair to yield illumination for night firing of battleships at ranges beyond 6,000 yards superior to that from electric projectors located on shore, whose effective light diminishes rapidly at long range.

Iron Making Among the Savages

By W. ROBERT FORAN

You may see iron being smelted in Central Africa to-day in a manner so very simple that you are forced to the belief that it is the method of prehistoric mankind, before the days of the dawn of history. Long before the advent of the

collection and iron smelting, as zealously as a most carefully guarded state secret, yet occasionally they have permitted a few white men to observe their industry. It is, however, a very difficult matter to make them even consider the lifting of



Washing the Iron Bearing Sand at the Side of a Stream
Interior of a Native Blacksmith's Shop where Ore Smelting and Sword Making are Performed

Natives Drying a Pile of Washed Sand on Top of a Smooth Faced Rock

A Native Furnace for Smelting Ore; View from Above

white man in Africa, the black races could make better iron than the white man could bring them.

They guard their secret, both of iron

the veil of secrecy. I consider myself extraordinarily fortunate to have had the opportunity of seeing for myself their methods and actually watching them.

The winning of the iron is done by the women and children from the iron bearing sand of certain rivers. They will select a spot by the side of a stream where the ground is hard, or some place in the course of a channel in a stream, and make a shallow pan. Its shape is somewhat like that of a scallop shell. Its dimensions are three by two feet. At the point where the hinge of the shell would be, and for two feet on either side, they build a wall a few inches high of sticks and grass, leaving an opening about nine inches wide in the middle. This opening is then temporarily closed with a separate wisp of grass.

Making a pile of about ten quarts of iron bearing sand at the end of the pan farthest from them, and standing with one foot outside of the grass gate and the other in the stream, they will take half a gourd in their hand and begin work. Holding the gourd by its neck, they will scoop up the water and dash it against the face of the pile with a rapidity and accuracy that is obviously the outcome of constant practice. The water flows away in a steady stream, turbid with the lighter materials in suspension. The larger pieces are lightly flaked out of the pan with the finger tips as the workers pause from time to time in their labors. They continue this process until most of the pile has disappeared. The sand now covers the floor of the pan, and has assumed a much darker color, owing to the proportion of ore mixed with it. Again it is piled up at the same spot in the pan, and the process is repeated. From time to time they lift the wisp of grass that closes the opening in the little fence and scrape up with their hands the rich deposit accumulated in front and beneath it, as also that which covers the floor of the pan.

This process of alternately piling and washing is repeated some half-dozen times. When the iron grains spread over the floor of the pan fairly mask by their black color any sand mixed with them, they scrape up and put into the half-

gourd what they have obtained, and moving knee-deep into the stream, proceed to give it the final washing.

Repeatedly they stir the contents of the gourd with their hands, adding more water and pouring it away until it comes off perfectly clear. The result is a wet mass of black sand which is, to describe it accurately, a magnetic ore. It is a mixture of quartz grains and magnetite. This wet sand is at once spread out on a flat rock to dry, and is then poured into a gourd bottle ready to be carried home. To gain a pint of well cleaned ore would take a woman about an hour.

The iron smelters are blacksmiths, some half-dozen in number, who live in the neighborhood of the "iron quarry." The furnace or hearth is made by a hole in the ground lined with clay, similar to that of which pots and bellows' nozzles are made. Its shape is that which a round bowl assumes when laterally compressed and reduced in diameter by one half; the edge becomes depressed at the extremities of the long axis, forming, as it were, two spouts, whilst the sides rise up considerably above the level. The fire-clay lining is brought well over the edge, forming a convex, wide border all round. The interior of the furnace has the form of a blunted cone, laterally flat. The substance of the clay forming the lip is about two inches thick. Over the whole is thrown a well built permanent roof—a circular hut without sides and about fifteen feet in diameter.

The bellows consist of a cone, or fool's cap, of sewn goat skins, four feet long and six inches in diameter at the larger end. Into the apex is whipped a carved wooden pipe six inches in length. This pipe, when the bellows are in use, is securely pegged down to the ground, and over its extremity is loosely fitted the expanded end of another pipe made of pottery. This is three feet long and the size of a man's wrist. It rests on the lip of the hearth, with its nose directed somewhat downwards. Its end is buried half beneath the mass of charcoal that covers the top

of the hearth, but the nose alone is in great heat. This gives a very intense heat when worked.

They also use the usual hammer and tongs of a blacksmith. The blast of heat in the furnace is kept up all day, and at night, or rather at sundown, the melted ore is left in the hearth to cool off. Next day all loose charcoal is removed. A little water is sprinkled on it; a rope of green banana leaf midribs is slipped beneath the mass, and depressed to capsize it. More water is then sprinkled on it, and the smith and his crew, with round, water worn boulders in their hands, proceed to knock it into pieces. The slag is distributed through the mass as it has flowed in the smelting, whilst the pure iron has similarly run together into small lumps. The resulting product is a very pure form of steel.

PORTABLE THRESHING OUTFIT

A Skowhegan, Me., man has combined a threshing machine with a gasoline engine so that the outfit moves about by its own power, the separator being built on a jigger of the four wheeled delivery cart style. In moving the machine from place to place the rate of travel is about four miles per hour and in operation it threshes grain faster than with the old fashioned horse power threshing machine.

DRINKING FOUNTAINS 450 FEET UNDERGROUND

We do not ordinarily associate the two ideas of deep mines and highly developed sanitation together, but here is a mine



PHOTO BY THE OLIVER MINING CO.

Four-Hundred-Fifty Feet under Ground

in the rough "Iron Country" of the Lake Superior district that really is an exponent of modern thought.

For the convenience and health of the miners — and they are a husky lot — the Oliver Mine has installed sanitary drinking fountains of the most approved



Threshing Outfit of Small Capacity but Portable and Extremely Easy to Handle

type. Incidentally, the picture shows an extension tunnel reinforcement of concrete and steel in preference to the customary timbering. The "Oliver" is the only iron mine so protected.

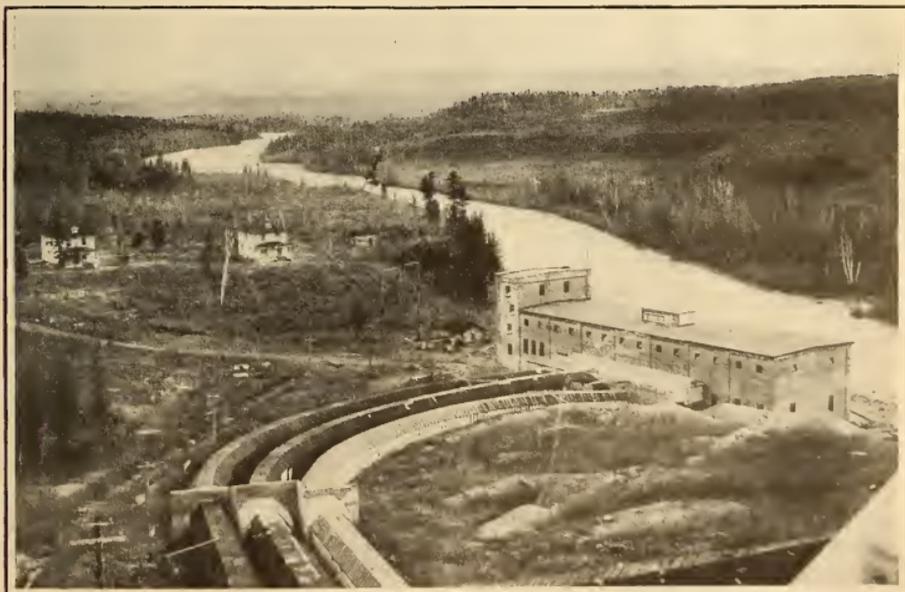
ARE WE DESECRATING THE RED MAN'S RIVERS?

Years ago the Chippewa Indian paddled his canoe, fished for trout, shot deer and moose and erected his wigwam along the same Kaministiquia River that has recently been partly diverted through concrete flumes to a squat, concrete structure on the lower bank. Here, now, incessantly humming, tremendous engines transmuted the energy of the sparkling, foaming water into electricity and project it many miles through copper wires to the cities on Thunder Bay—for the sordid cause of dollars.

There is something discordant in the thought which bears analysis, and undoubtedly many will say: "That is desecrating Nature."

Whether or not the statement is true depends upon the point of view. Modern tendencies are more or less along industrial lines. But in these activities, in a busy scene along the quay or in railroad yards, or in a ponderous dredge grubbing in Panama, there is much to excite the artistic mind—great artists have seen in these things great pictures. There is something romantic in the setting of a great machine of any kind in the wilderness; a logging engine among disordered timber, a locomotive in a deep ravine, or, to bring the matter to the present, a hydro-electric plant on the banks of a fast stream far away in the wilderness to send its pulsating energy back to the abodes of man.

The Chippewas with their barbarous picturesqueness are passing. Their wonderful country is changing into another no less picturesque, but of a more peaceful variety: golden fields of grain and thriving, industrious cities. It is none the less fitting that grim, business-like concrete structures should spring up



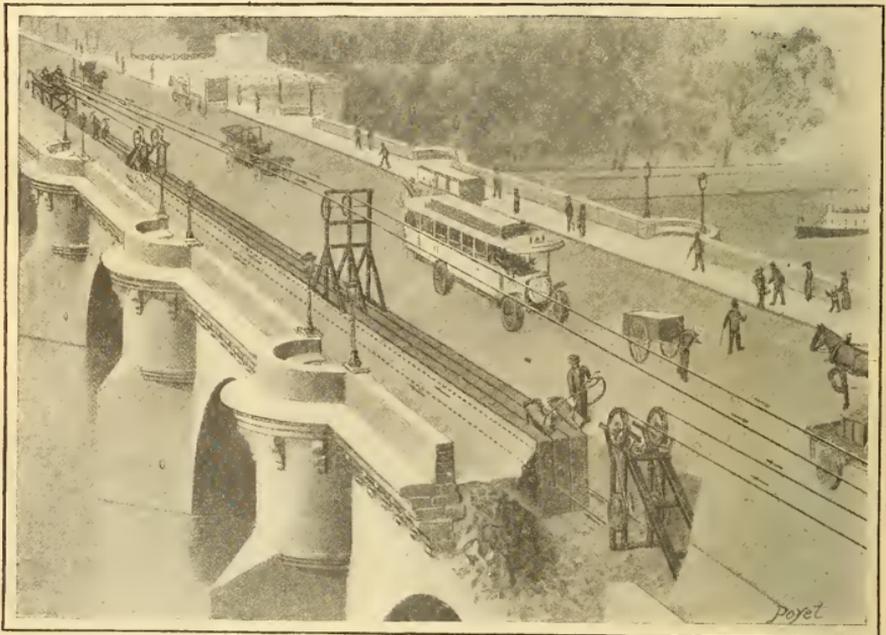
Electric Power Plant in the Wilds of the Kaministiquia Valley which Sends Current many Miles to the Cities on Thunder Bay

along the streams, and, by the mysterious, magic force concealed within, produce from the silvery water an invisible, resistless power to drive the wheels of industry.

SAWING THE PONT NEUF IN PARIS

Recently it became necessary to cut into the Pont Neuf at Paris for the purpose of laying electric cables from a power plant situated on one bank of the river

means. The use of explosives was not practical on account of the danger of destroying the whole bridge; consequently the contractors had recourse to the use of the helicoidal saw, which is a device consisting of an endless cord composed of three steel wires twisted together, the cord being fed with sand and water and drawn along the stone to be cut. The illustration, reproduced by courtesy of *La Nature*, gives a better idea of the



Helicoidal Saw Used in Cutting Through the Pont Neuf in Paris

and supplying street car lines on the other. This bridge, although built in 1605, is still called the New Bridge, and is constructed very substantially of stone cemented together with concrete. For a part of the distance, that is to say as far as the statue of Henry IV, the work presented no difficulty, as the necessary trenches could be made by ordinary means of excavation; beyond that point, as far as the right bank, a distance of nearly 400 feet, it was necessary to adopt other

method of operation than would any description.

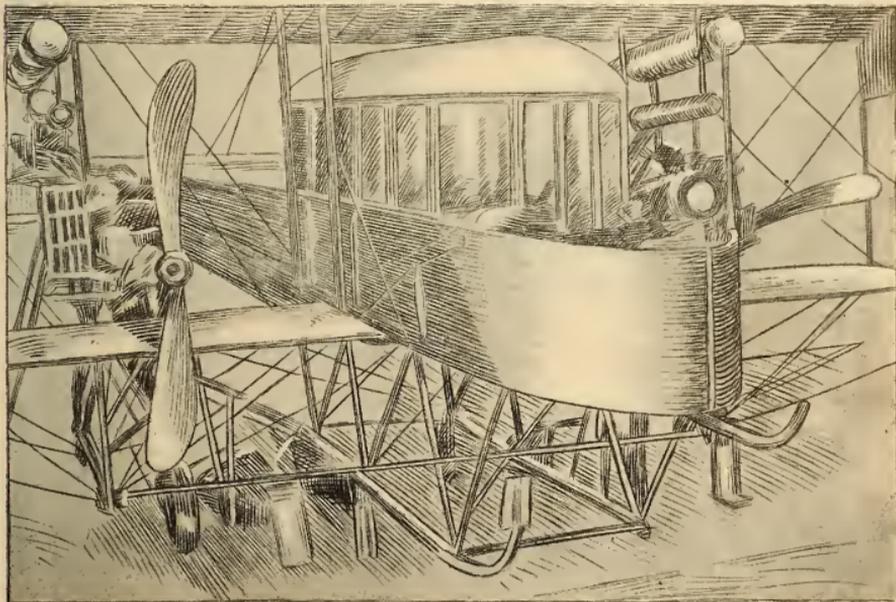
Altogether 3,610 electric vehicles are registered in the State of Ohio. Of this number, Cleveland leads off with 1,838, and other cities have the following: Columbus, 459; Toledo, 367; Cincinnati, 238; Youngstown, 116, and Akron, 99. The electric vehicles make up approximately six per cent of the total number of automobiles in the State.

AERIAL LINER

Sheltered cabins in aeroplanes are bound to come sooner or later, and a Russian inventor is the first to succeed in this field. The Sykorsky "Grand" is the

THE LIGHT OF CRYSTALS

Not all diamonds shine in the dark after exposure to sunlight or electric light, but some do shine to a remarkable degree. A diamond rubbed with a woolen cloth,



The Sykorsky Biplane with a Car for Seven Passengers

name of the new airship which is the invention of M. Sykorsky. It has already made a flight of 64 minutes carrying seven passengers in the cabin.

The machine does not differ greatly from the ordinary biplane except that it is larger. In front of the planes a cabin with a roof and glass sides projects in which the pilot and passengers can sit or move about as they please.

Doubts were at first expressed by the Russian authorities as to the practicability of the machine, but official trials were carried out in the presence of a commission of experts and the machine was acquired for the Russian army. Recently M. Sykorsky was commanded to fly the machine before the Czar.

or against a hard surface, will sometimes shine brilliantly. The emission of light is a property belonging to many, if not all, kinds of crystals.

There is found at Hastings, on the Hudson River, a variety of white marble which gives out a flame colored glow when pounded, and bright flashes when scratched with steel. In northern New York there is a kind of stone, known locally as "hell-fire rock," which exhibits bright, sulphur colored streaks when scratched in the dark. Pieces of rose quartz rubbed together exhibit brilliant flashes, sometimes bright enough to illuminate the hands of the person holding them. Smoked quartz and other varieties sometimes show a similar phenomenon.



FIGHTING FOREST FIRE BY THE GOLDEN GATE

The inhabitants of the large cities located on the shores of San Francisco Bay witnessed an unusual spectacle when the beautiful wooded slopes of Mt.

Tamalpais were swept for five days and nights by a forest fire of unknown origin. The smoke of the conflagration at one time rose directly upward with the cone shaped peak for a background, giving the latter a wonderfully realistic appearance of a living volcano.



COPYRIGHT, 1913, BY THE TREASURE HOUSE

Two Artillerymen from Fort Baker Watching the Flames
Render Futile a 50 Foot Back Fire Trail $\frac{1}{2}$ Miles Long
which They had Aided in Cutting

The fire undoubtedly started from the proverbial cast-away cigarette thrown from a coach of a train of the "crookedest railroad in the world," the mountain scenic railway winding upward to the summit through beautiful wooded canyons thickly studded with commuters' summer home bungalows among the big redwood trees. The flames soon got beyond control and advanced on the towns of Mill Valley, Lockspur, Corte Madera and others with such speed and volume as to bring out over 3,000 fire fighters to combat them by means of back fires and the cutting of wide check paths.

The photographer who took the photographs herewith was trapped by the fire near sundown along with several companies of soldiers when a swift afternoon breeze suddenly made an inferno out of a slumbering line of fire almost conquered. Escape was made only by climbing the



Flames When Photographed Were Consuming about 1,000 Acres per Hour. The Column of Smoke at the Right was from Another Fire Only Two Miles Away from the Government Preserve of Big Redwood Trees

mountain after dark. It was two days and a night before he reached "bread and butter and the pump" again, still packing a burden in the form of a suitcase containing a 50 pound camera outfit which he had been compelled to carry over the up-and-down distance of fifteen miles.

THE PROOF OF THE PUDDING

The best answer to all the arguments pro and con about the use of electricity in power transmission is to be found in the fact that those who once use it stick to it. They not only use electric motors but they use more of them. When a man goes from a general drive to smaller group drives he never goes back again to the general drive, but usually he goes a step further to individual drives. Once a man takes up individual drives he

sticks to the idea and extends it further. In other words, it is seldom that one can find any retrogression in the matter of electric transmission. Right here is the proof of the pudding, in the fact that the users of electric motors keep using them and when they start to dividing them up into small units they keep dividing them and working steadily toward the point of individual units for each machine.



As Dusk Settled upon One Scene at the Fire



COURTESY OF "ICE"

Dr. John Gorrie, Inventor of the Ice Machine

Jack Frost's Modern Competitor

Some Impressions Gathered at the International Refrigeration Exposition

In 1850 a guest at the Mansion House, Apalachicola, Fla., wagered a basket of champagne that he could furnish ice made in the dining room of the hotel for a banquet the following day and he won the bet. The guest was M. Rosen of Paris, who assisted Dr. John Gorrie, the inventor, to perfect the first ice machine, and Dr. Gorrie at that time was known to the New York papers as "a crank down in Apalachicola, Fla., who says he can make ice."

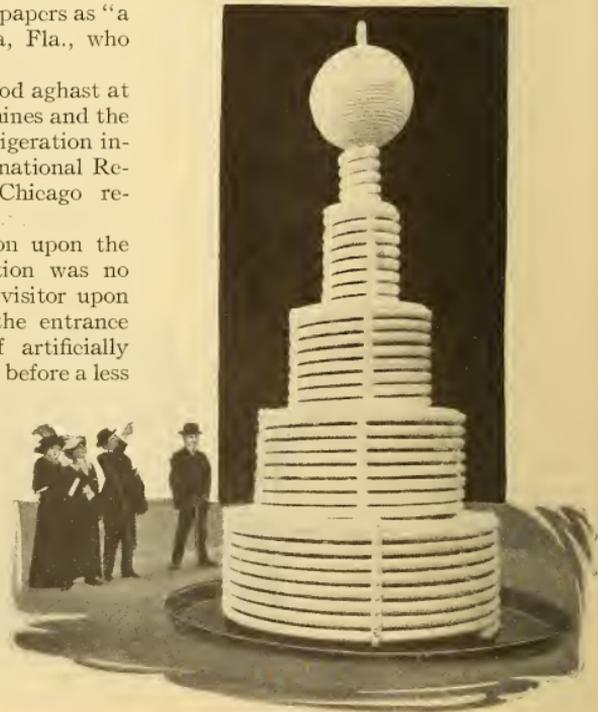
Dr. Gorrie would have stood aghast at the array of ice making machines and the vastness of the ice and refrigeration industry that the recent International Refrigeration Exposition in Chicago revealed.

"Slide in," the admonition upon the advertising for the Exposition was no attempt at slang, for every visitor upon surrendering his ticket at the entrance found a miniature lake of artificially frozen, glary ice to be crossed before a less precarious footing could be reached.

While electricity provided general illumination and scores of ozone machines distributed about the building purified the air, the electric sign was generally absent. Metal pipes

formed into letters set against a black background and carrying freezing fluid seized the moisture from the air and congealed it into a coating of hoarfrost about the pipes and these cold, white signs served also to demonstrate the refrigerating machine to which they were connected. One company used a frosty pipe railing about its booth.

While the subject of refrigeration may seem technical, the layman found plenty of real devices and machines to hold his attention. The slow turning of the ponderous wheel of a big engine called



Freezing Temperature of the Pipes Seizes Moisture from the Air to Form a Frost White Fountain

attention to an ice machine which it operated and with which a solid mass of ice as big as a good sized story and a half cottage could be made from water in 24 hours.

The Meltedice water cooler is a decided innovation and offers a means for using the water of melted ice, of which John C. Sparks, water expert of New York City, says, "A more extensive use of ice as a

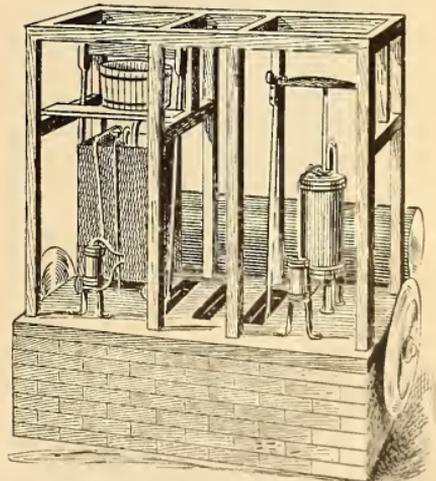


Group Made of Frozen Butter Showing Battle Between an Eskimo and a Life Size Polar Bear

The Department of Agriculture with a car equipped with a gasoline engine and a mile of piping demonstrated a plant for cooling refrigerator ears after loading. It requires about 48 hours for ice to chill a carload of warm fruit down to 40° F. at which it should be held during transit. The demonstration ear showed how quickly cooling can be accomplished by forcing artificially made cold air through the loaded car. The car is then iced and the ice lasts, instead of melting quickly as when placed in a car of warm fruit.

Then there was the device with the long name, the Multithermograph, which marks down upon a record paper the temperature at six different points every three minutes, each in a different color. The instrument is connected by wires to a coil of fine wire (resistance thermometer) at each point and the current through the coil varies according to the temperature about it and this causes the little needle on the paper to make its mark accordingly.

drinking water would aid in the reduction of typhoid fever and make a useful and easily attainable extra supply of safe drinking water within the reach of every



From a Model of the Original Ice Machine Invented by Dr. Gorrie



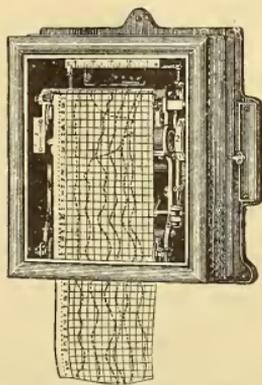
Food under Refrigeration in a Car Having Glass Sides

one." The cooler is a large, glazed stone, double vessel with a hermetically sealed air space on the sides.

But of all exhibits the one that brought the subject of refrigeration home to mother's pantry and eliminates the ice man, is the electric motor driven outfit that can be installed on any refrigerator. A small brine tank, coils, etc., are provided, the whole equipment being simple

ishable products from cheese to old hen turkeys in cold storage. A sample card on a case of mackerel read "Caught off Cape Cod, Oct. 17, 1912. Washed in salt water. Frozen at 0° F. Held at 10° F. in Mass. Shipped to New York under refrigeration. Held in New York at 10° F. until March 3, 1913. Shipped to Chicago March 3, 1913. Held at Chicago to date at 10° F."

Government statistics show that the per cent of the total yearly production of the following are placed in cold storage: beef, 3.1; fresh mutton, 4.1; fresh pork, 88; butter, 9.6; eggs, 15; and that only one half of one per cent of 1911 eggs were held over to 1913.



Multithermograph which Records on Paper, Every Three Minutes, the Temperature at Each of Six Distant Points

and operated from the ordinary lighting circuit.

"In September the Christmas turkeys for the United States soldiers stationed in the Philippine Islands were shipped," said the expert in attendance at the government exhibit which included per-

COST OF SMOKE DAMAGE

Mellon Institute, University of Pittsburgh, has issued its report on the Pittsburgh smoke nuisance, placing at \$9,944,740 the damage done yearly in that city. This represents a per capita charge of about \$20. Innocent suffer with the guilty in paying this tax, for, as estimated by Mr. John O'Conner, economist for the investigation, while the loss to the "smoke-maker" himself, due to imperfect combustion, is but \$1,520,000, the cost to individuals in laundry bills amounts to \$1,500,000 and that for dry-cleaning to \$750,000. Among other items the extra cost to stores, wholesale and retail, is estimated at \$3,675,000 per year.

QUEER CLAMS INHABIT ROCKS

In the rocky ledges of the northwest coast are to be found curious clams, buried at a depth of two to six inches. These are the pholas or boring clams,



Clams Burrowing in Solid Rock

often but erroneously called the "rock oyster." The clam excavates its burrow by means of its sharp shell and gains its subsistence from the animalculæ swarming in sea water. The pholas make delicious soup and are in great demand by epicures.

LITTLE IRON MEN FOR SOLDIERS

A Copenhagen inventor now comes out with the "electric soldier" which is intended to be even more effective than the real soldier, at least in many cases, and a single row of electric soldiers drawn up in line will work great havoc among the enemy. Sunk in the ground is a steel cylinder serving as a base, and from this rises a second and telescoping cylinder somewhat less than a man's height. Electric motor apparatus causes the cylinder to rise out of the ground in a mysterious way, being controlled by wireless waves coming from a post placed several miles away. Inside is an automatic gun which delivers several hundred rounds pointed straight ahead or in different directions,

so that a file of several hundred steel soldiers could defend a position against quite an army, and it is very difficult to approach them in order to destroy them one by one as would have to be done, for gunshot would not harm them.

AN AMUSING FAKE

One of the amusements of expert photographers is the double or triple print, combining several negatives upon one print. The "fake" here shown is made by printing from three separate negatives, one of the group in the airship (a non-flying machine which is part of the studio property), while the landscape and the child are also taken on different plates. The combination of the three is rather startling and the illusion is cleverly carried out by using a negative slightly out of focus for the distant background. It is interesting to note that one of these photographers, Champion by name, has recently joined the ranks of the real aviators, and is now flying a Bleriot monoplane in his home town, Long Beach, Calif.



A Freak Photograph

Batson's Trans-Atlantic Flyer

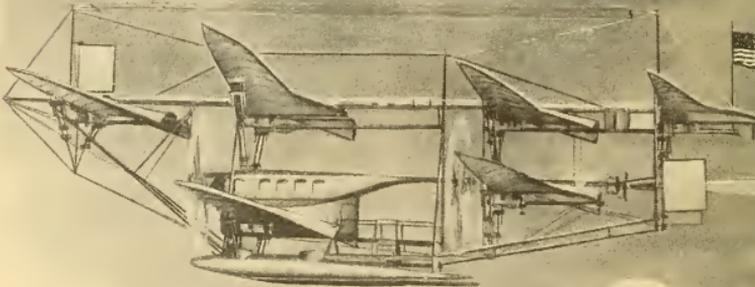
BY JOSEPH A. MASSAL

If the dreams of a retired United States Army officer materialize soon travelers will enjoy the unique distinction of breakfasting in this country and dining the following day in London, Liverpool or Paris. Captain Matthew A. Batson,

The Batson Triple-Motored Aero-Yacht is the name of this new machine, and soon it will be launched from its hangar for its first over the ocean flight, which will be made from Savannah. The birthplace of this great new mechanical



The Batson Aero-Yacht, a Great Machine, with Multiple Wings Designed for Great Stability and Carrying Power Sufficient, it is Hoped, for Trans-Oceanic Flight



PHOTOGRAPHS COPYRIGHTED BY JOS. A. MASSAL

U. S. A., retired, of Savannah, Ga., has invented an airship designed to cross the Atlantic Ocean in 30 hours or less, and carrying several passengers.

bird—for it resembles a bird with many wings—is on a little island in the harbor of Savannah. Practically nothing has been published of this latest heavier-than-

air machine and few persons know of its existence.

One of the principal features of the Batson machine is its flexible wings. It has long been recognized by men who have devoted their lives to the study of heavier-than-air machines that the present type airship, with its rigid planes, will never be able to commercialize the art of flying, as the sudden gusts of wind are liable to carren the machine and dash it and its driver to the earth, wrecking the machine and killing the man.

The Batson machine is designed to overcome this obstacle, and its planes, of which there are a number, are flexible, that is, will yield the same as those of a bird.

The wings of the machine are of a peculiar construction, and so arranged that the air currents will be guided under them inwardly toward the body of the machine, where they will be banked under the base portion of the wings—which is concave underneath—and also carried back along the chassis in such a way as to conduct the currents of air inwardly and along the part nearest the chassis, thus bringing the greatest stress on the part where the weight is carried.

The wings are so joined to the machine and so coupled together that a single pilot can increase or decrease the angle of incidence of all wings together or simultaneously increase it on one side and decrease it on the other side. He can also change the angle of incidence of any pair of wings without disturbing the others, all of which can be done as easily as changing the speed of an automobile.

The mechanism that controls the angle of incidence of the wings is so arranged that should all the engines be stopped, the wings will at once and automatically be set at a safe gliding angle and the machine descend by a series of long glides during which the pilot retains control over the steering wheel and can conduct the descent so as to avoid obstacles in landing.

Motive power will be furnished by three engines and two propellers, each

engine independently operable and alone of sufficient power to drive the machine safely in flight. In starting all three engines may be utilized, after which one may be stopped to be later thrown in again to relieve one of the others. In this way each engine will be given alternate periods of rest, or should it be necessary, enabling it to be stopped for repairs without descending and without affecting the flight of the machine. A streamline car will afford ample room for passengers. A powerful wireless apparatus will permit of constant communication with land and vessels on the sea.

LIGHTING A PAINTING

The illustration shows the importance of the position of the light unit in affecting the appearance of a painting. By merely varying the position of the unit the mood can be altered as shown. This can readily be explained, for the artist



Painting Brought out by Two Methods of Lighting

always suffers from a handicap which pigments can seldom overcome. His whitest pigment is not more than 30 times brighter than his black, yet in nature much greater contrasts are found. A ready solution is found in so placing the light unit that the brighter lights in the painting will receive more light than the shadows. Thus the handicap is largely overcome.

The illustration speaks for this explanation and shows the effect upon the painting of changing the position of the light source.

How the Fire in the Wire is Conquered

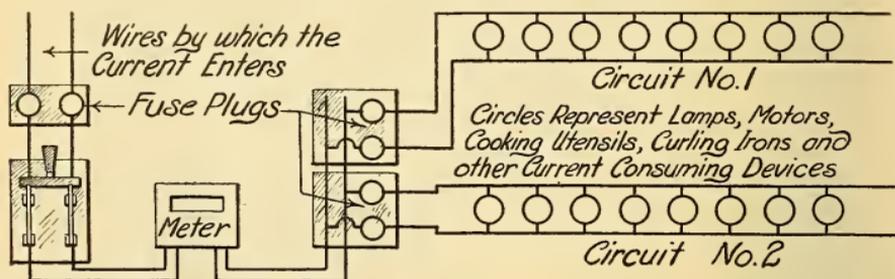
BY CHAS. K. THEOBALD

The biggest fire that now issues from electric light wires is the brilliant blaze which floods your room when you push the little white button on your wall switch—and the tiny spark, enclosed in the iron switch box, when you shove the black button in and extinguish the light, is about as dangerous as the glow of a firefly.

The arc or spark occurring where the present day alternating current circuit

such fuse plugs located above the main switch.

These plugs and also the four others shown on the right of the meter are fire proof receptacles and enclose soft metal wires which are designed to melt or fuse with any amount of current in excess of a certain rated quantity. For example, if the blades of the switch be joined together with a piece of wire or any other metal conductor, an excess of current



Showing in a Simple Way How Fuse Plugs are Inserted in a House Wiring Circuit

is broken—either accidentally or when some switch is snapped off—is insignificant in size and need not be feared as a fire producing agent.

But there is another spark, too, which our perfected system of house wiring has successfully muzzled. That is the arc occasioned by a "short circuit," which much used and sometimes misunderstood term means an excessive flow of electricity, occurring when two current carrying wires of opposite polarity are stripped of their insulation and brought together. But the enclosed type fuse plug takes proper care of that condition.

Referring now to the illustration representing a two-circuit wiring plan, before the current is permitted to enter the house wires, it must pass through two

would flow at that point; when the soft metal wires in the plugs would immediately melt and automatically open the circuit. The fuse plug, then—the *weakest point in the line*—is the safety valve of the wiring system and it never shirks its duty when called upon.

To the right of the meter the two sets of plugs protect their separate circuits. Here it should be said that the National Board of Fire Underwriters has placed a limit on the number of lights, fans, and other appliances that may be used on a circuit protected by one pair of fuse plugs. And the quantity of electricity which that circuit *could* be made to carry in comparative safety is far in excess of what that circuit is *ever permitted* to receive. For example, if 50 amperes of electricity

is known to raise above normal the temperature of a certain size wire, the "safe carrying capacity" of that wire, as ruled by the underwriters, is far below 50 amperes. And switches, lamp sockets and all other fittings are marked along the same safe lines.

To return to the drawing, circuits No. 1 and No. 2 would be protected with nothing less than six-ampere plugs, while the main fuse block would be supplied with plugs of twice that carrying capacity; so that, whereas the main fuse plugs would take care of any "short circuits," or excess current that might occur in the main switch or in the meter, the other and smaller fuses would afford individual protection to their respective circuits. And though the flash occasioned by the "blowing" of these fuses could hardly escape the fireproof casement of the plugs, still, as a matter of extra precaution, the fire underwriters' rules require, in most cases, all fuse plugs and circuit switches to be enclosed in metal or other non-inflammable cabinets.

Briefly, then, in accordance with the present day perfected method all fuse plugs and circuit switches are confined to one safe point and that point usually further protected by a fireproof cabinet, and the electric light consumer should not any longer conjure up visions of fire when

he lies in bed of nights and imagines he hears rats gnawing the wires in the garret.

VENTILATING SUBWAYS

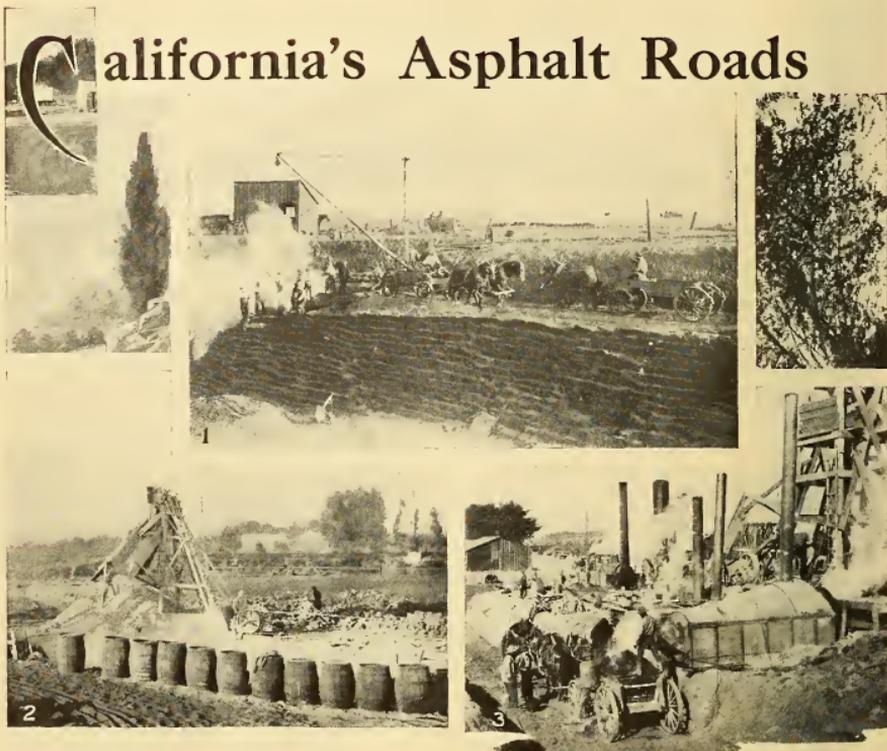
Travel in subways would become unbearable from stagnant air, and for that reason, would not be practical if effective ventilating systems were not constantly bringing into them large quantities of fresh outside air. The most recent and successful system is to place at stated distances apart, in subway passages, large electrically driven fans or blowers to keep air from the outside continually moving through the entire length. Such a blower is shown in the accompanying photograph, which was taken in the Pennsylvania Railroad subway leading to the Washington, D. C., station. The blower consists of a many bladed fan of cylindrical form revolving in a sheet steel housing which directs the air currents and also acts as a protection. The blower is belted to an electric motor which is controlled from a switchboard in the electrical engineer's office.

In the kitchens of the United States Military academy at West Point, N. Y., practically all the work is done by electricity.



Giant Fan for Ventilating the Pennsylvania Subway in Washington

California's Asphalt Roads



(1) An Asphaltum Mine—the Deposit is Removed with Hot Shovels. (2) Rock Crusher at the Mixing Plant. (3) Loading the Asphalt on Wagons at a Temperature of 300 Degrees

California leads all other states in the number of automobiles per capita and this, no doubt, is a factor in her remarkable progress in road building. Also the state is particularly fortunate in having abundant supplies of asphaltic crude oil together with both hard and soft asphaltum. Miles and miles of beautiful, smooth surfaced, asphalt roads are being built through the country, the equal in every way of city pavements. Particularly is this true in the southeast corner of Santa Barbara County where supplies of all the necessary materials are at hand which make the cost somewhat lower. Even here, however, the cost per mile averages \$7000 to \$8000.

The pictures herewith show the pro-

cesses attendant upon this elaborate road building. A deposit of soft asphaltum has been uncovered less than a mile from the nearest point of the roadway which contains oil and mineral ingredients mixed in almost ideal proportions for road building. The stuff is mixed in blocks varying from 150 to 250 pounds in weight. An asphalt grinding and mixing plant has been installed, a rock crusher for producing fine rock for the concrete foundation and a concrete mixing plant. A nearby beach furnishes any quantity of the best kind of sand for the purpose and altogether conditions are perfect for not only rapid, but first class work, as the picture of the finished stretch of road will testify.



(4) Self Dumping Motor Truck of Five Tons Capacity which Operates at an Expense of 8½ Cents a Mile Against 25 Cents for Team Haul. (5) A Bit of Newly Laid Top Coat. (6) A Stretch of Finished Roadway

LOG TRACTOR IN OHIO WOODS

Theodore Kundtz of Cleveland has operating in the woods near Brecksville, Cuyahoga County, southern Ohio, a specially designed auto as a log tractor. This unique engine serves the purpose of a combination of logging locomotive, skidder and donkey engine. It has a six cylinder motor. A power winch, driven from the transmission, is built in the middle of the tractor.



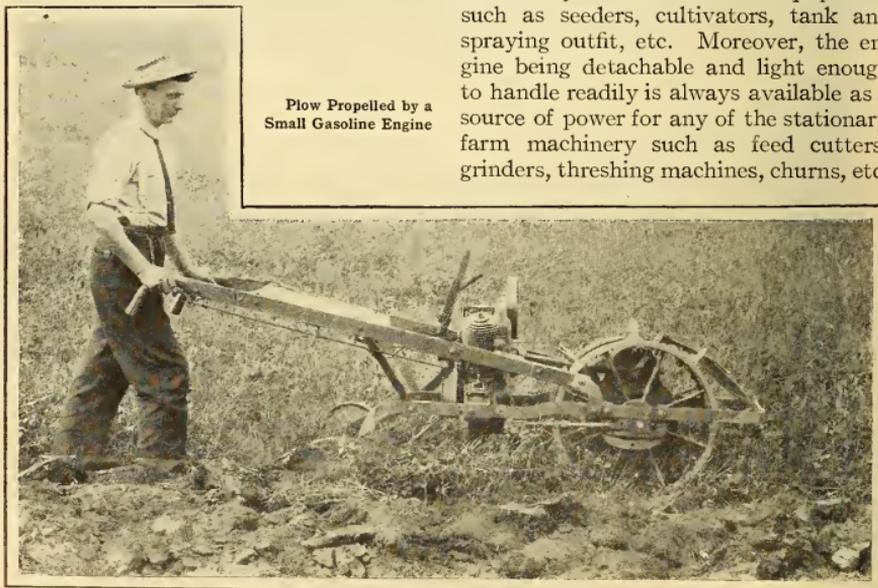
Logging in Ohio Woods

Loads of over six tons have been transported; the loading crews, on test, have put 1,000 feet of lumber on the truck in 20 minutes, and the tractor has frequently demonstrated its efficiency by serving as a donkey engine to haul logs from ravines 500 feet deep. Altogether it has been found to be a more economical equipment and one easier to handle than horses.

NOVEL MOTOR PLOW

A motor plow driven by a nine horse-power gasoline engine is being built by a concern in Bedford City, Va. The engine drives the two large spiked wheels which provide plenty of tractive force to enable the implement to tear through heavy sod. In addition there are various attachments which may be included in the equipment, such as seeders, cultivators, tank and spraying outfit, etc. Moreover, the engine being detachable and light enough to handle readily is always available as a source of power for any of the stationary farm machinery such as feed cutters, grinders, threshing machines, churns, etc.

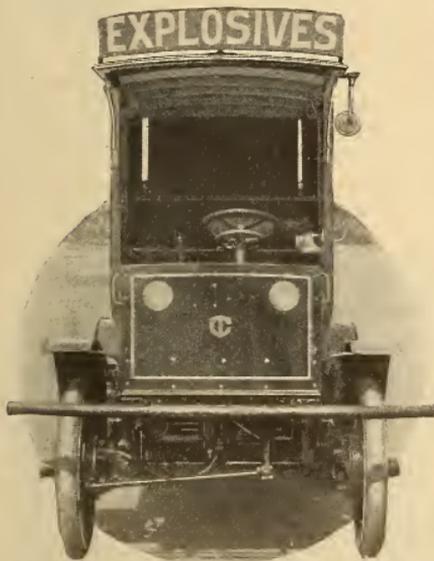
Plow Propelled by a Small Gasoline Engine



ELECTRIC TRUCK FOR EXPLOSIVES

In considering the important problem of how explosives were to be transported from one part of a city to another, after ten years of study, the idea of the electric truck has been settled upon as the most satisfactory solution. To-day it is used in New York by a powder company, and has been passed by the Bureau of Combustibles of the New York Fire Department as the safest means of transporting dynamite.

This truck is fire proof and collision proof as far as brains can make it. Special patent bumpers are attached to absorb the shock. The body of the truck is of steel with asbestos lining to insure



Electric Truck for Carrying Explosives

against fire. Every wire and even the control is in asbestos lined steel tubing. The capacity of the truck is 2,000 pounds of dynamite and it can carry this amount with safety at twelve miles an hour.

Of course the driver never goes this fast, for there is too much danger in sight. A guard has a seat assigned to him on the

rear of the truck and while in motion he waves a flag with the word "Danger" in big black letters against a red background.

FORD MAGNETO IN TESTING TELEPHONE LINES

Here is a picture showing how a Ford automobile magneto may be used to



Testing a Telephone Line with an Automobile Magneto

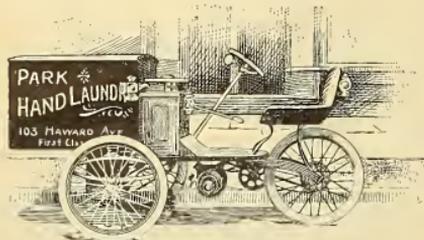
make field tests for telephone and telegraph companies.

Two testers start out in a machine and run up beside a telephone or telegraph pole, as the case may be, and attach one end of a wire to the magneto and the other end to the wire to be tested on the pole. Another wire is run from the magneto to the telephone instrument of the person making the test. Another wire is then run direct from the instrument to the wire on the pole. The engine of the car is kept running and the test is made.

AN ODD LAUNDRY WAGON

The accompanying drawing shows a battery driven, three-wheeler utilized by a laundry in Brooklyn for delivery service. The capacity of the wagon is 200 pounds, and one driver. It has a speed of eight miles per hour on level asphalt street, loaded, and the mileage on one charge is from 25 to 30 miles, according to street conditions.

The wheels of this machine are 26 inches diameter; the battery lead, ten Edison cells; the loading space measures 36 by 31 by 27 inches.



A Small Electric for Laundry Service

PORTABLE PIPE THAWING PLANT

A gasoline-electric motor car and electrical apparatus for thawing out frozen water pipes is utilized by the Columbus water purification works. On this truck is installed an engine of 50 horsepower. This is direct connected to an electric generator by a flexible coupling and a special governor was designed which permits of governed control at all speeds.

A frozen underground service pipe can be freed from ice only by means of heat.

the frozen pipe in an electric circuit which is carrying current of sufficient volume to raise the temperature of the pipe above the melting point of ice.

This motor wagon carries all the equipment necessary.

The cables are carried from the switch-board busses to brushes which bear on slip rings mounted on a drum, which in turn is carried on hangers under the right hand side of the truck body. This drum carries two 210 foot lengths of 300,000 circular mil flexible cable, any length of which may be unreel for making taps, and which is rewound by means of a crank.

There were bronze clamps designed to make proper electrical contact on any size of pipe between $\frac{3}{8}$ inch and $2\frac{1}{2}$ inch by hand nut adjustments and other connections for making contact on hydrants and bib cocks and all these auxiliaries are designed to be used with the hands alone without tools.

The melting capacity of the plant is twelve pounds of ice at 32° F. per minute. This melting effect is, of course, concentrated on the inside wall of the pipe, pro-



A Compact Equipment for Thawing Frozen Waterpipes by Electricity

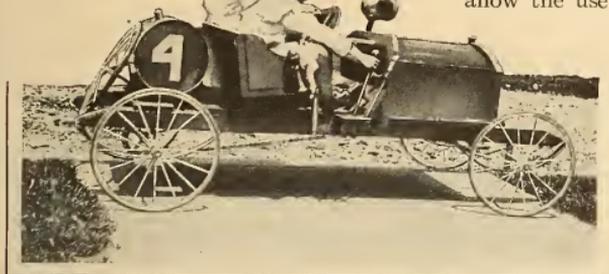
The best method by which heat can be applied to or generated in an underground pipe is to include the length of

ducing a skin of water surrounding a core of ice, which is quickly melted by the flow of the water itself.

JOY RIDES FOR YOUNGSTERS

There is nothing pleases the child quite so much as having something "just like father's." In this instance the small car shown was constructed especially for

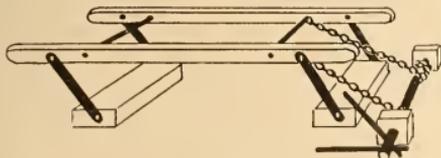
A Miniature Electric Runabout



Master Tom Hoyt, son of the well known consulting engineer of Cleveland. The little car is complete to the last detail, is driven by a small electric motor with clutch and two brakes and has a dummy shift lever. The driver of the car will never be molested for exceeding the speed limit of most cities, as the greatest speed to be obtained is but six miles per hour. It has been considered the most practical and complete little car ever constructed.

AUTO LIFT INSTEAD OF A PIT

A device which will lift an automobile quickly from the ground, high enough to allow a man to work under it conveniently, is shown in the drawing. The lift is built permanently in the garage. It is made of two beams three inches square and long enough to fit under the axles



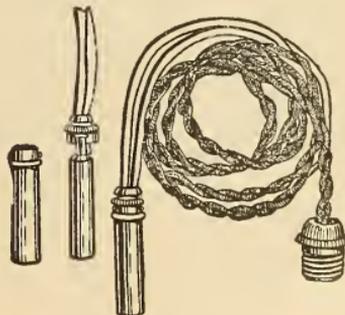
Automobile Lift

with room to spare at each end. Each beam is mounted on two side members, forming with the base a shiftable parallelogram. The two beams are held together by two $\frac{3}{4}$ inch rods. Heavy blocks bolted firmly to the floor serve as the base of the lift. The lift is operated by two chains attached to the front rod and wound onto a two inch roller as shown. Holes in one end of this roller allow the use of levers. When the machine is high enough, one of the levers rests against the floor and prevents the roller from turning.

ELECTRIC HEAT FOR THE RADIATOR

Those who have resorted to all sorts of makeshifts to keep the radiators in their automobiles from freezing during the cold winter nights will be glad to see a small article fashioned especially for this purpose.

This device is an ordinary cartridge-



Electric Heater for the Radiator

shaped electric heater which can be fitted right into the lower part of the radiator. It is made to attach to either the lighting circuit of the machine or to the storage battery circuit.

A 25 watt heater has been found to make heat enough for a three gallon tank provided it is covered with a blanket.

Electricity—the Silent Salesman

Examples of Electrical Displays which Have Been Used to Good Effect

FROM POWER PLANT TO HOME

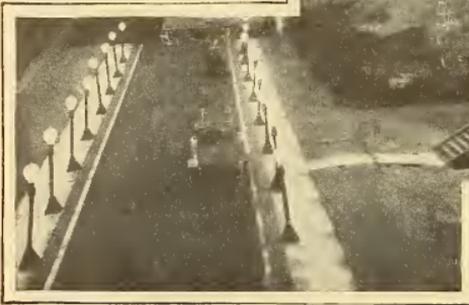
A very good window display made by the Montana Power Company, Butte, Mont., represents one of the company's power stations located on the Big Hole River, 27 miles from Butte.

In this display is a miniature generator set which can be seen through the windows. There is also a dam, with water continually flowing over it, a lake at the head of the dam, a penstock, and in fact everything represented in connection with an up-to-date power station.

From the power sta-

tains an electric piano. In the kitchen is shown an electric range, water heater and vacuum cleaner. In the laundry is shown an electric washing machine and mangle. The entire house is lighted very brilliantly by hidden lights.

In the front of the house is a street lighted by miniature luminous arc lamps, almost an exact reproduction of the luminous arc system installed in Butte.



Window Display Which Represents a Complete Power Plant

tion a high tension line with miniature steel towers leads to a substation; thence secondary lines to a modern electric dwelling on which is a card naming this dwelling "The House Electrical."

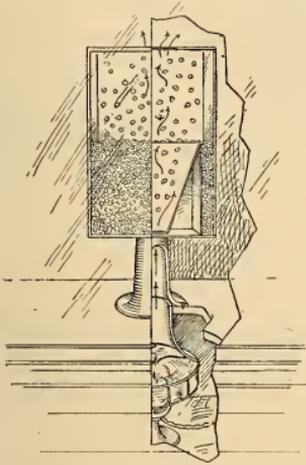
The house is constructed so as to show the entire interior, consisting of a living room, a dining room, kitchen, and a laundry. The furniture is made of paper, and the entire furnishings are perfect representations and in size approximately three inches high. In the center of the living room there is a table on which stands a reading lamp lighted with a miniature lamp. This room also con-

In the yard adjacent to the house is a miniature motor operating a circular wood saw. On the street in front of the house is also a miniature electric limousine and an electric dray.

IMITATION OF POPPING CORN

Geel! See that popcorn pop! This expression was repeated many times in front of the window of a Milwaukee dealer in confectionery who makes a specialty of "fresh buttered popcorn." In the window was the clever device shown in the cut.

A large clear glass cylinder was placed upon a metal pipe pedestal. The cylinder was apparently filled half full of popped corn which in reality only lay on the

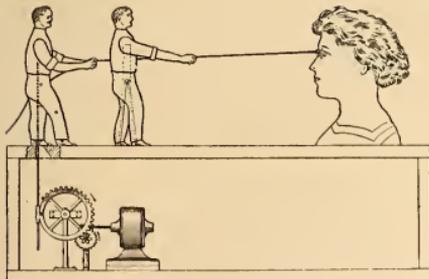


Imitation of Popping Corn

outside of an inner metal cylinder as indicated. Not being able to see over the upper edge of this popcorn layer, the observer was unaware that the vigorous jumping about of a goodly supply of popped corn in the upper part of the glass cylinder was due to the air which an electric fan forced through the cylinder.

WINDOW ADVERTISING DEVICE

The accompanying show window advertising device is almost self-explanatory. Two miniature figures moved by an



Advertising Novelty

electric motor exemplify the strength of the article for sale by apparently exerting a pull upon the cord. In this particular case the efficiency of the nose bridge of eye glasses in staying on is demonstrated. It may be said, however, that the cord is elastic and stretches with each pull of the two figures.

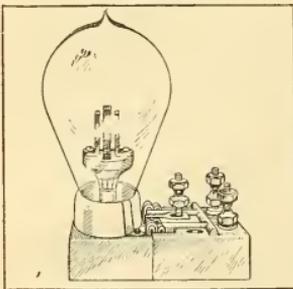
A GOOD ELECTRICAL STORE DISPLAY

This display in an electrical store window in Philadelphia is to be commended. There are no knick-knacks — no frills — but it does give the passerby an idea to take away with him. It explains, even to the layman that there is a simple device by which alternating cur-

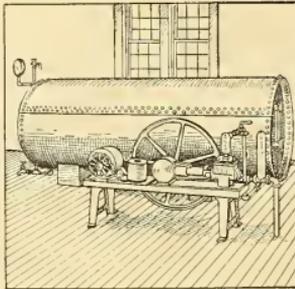


Calling Attention to a Rectifier

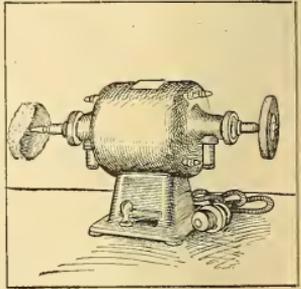
rent can be changed to direct current — and that is a problem that doctors, dentists, experimenters, automobile owners and many others frequently encounter, since the ordinary lighting current is alternating while only direct current will charge a storage battery.



Vacuum Lightning Arrester



Home Pumping Equipment



Dental Lathe

NEW WAYS OF USING ELECTRICITY

VACUUM LIGHTNING ARRESTER

The "V A C—M" (vacuum) arrester is a device designed to protect telephone, signal, fire, police and other signaling circuits from high voltage, static electricity and lightning. The arrester is simple in its construction, consisting of a base upon which is a detachable portion sealed in porcelain—in reality, a glass globe similar to an incandescent lamp, from which the air has been exhausted. Mounted within the globe are carbon blocks, spaced $\frac{1}{8}$ of an inch apart, more or less, in accordance with the voltage they are expected to be a protection against. In case high voltage comes in upon the line, it jumps across the rarified air gap very easily and goes to ground. This gap has not been made small enough so that the ordinary current over the line protected would, under ordinary circumstances, break across it.

WATER SUPPLY FOR COUNTRY HOMES

The motor driven pump affords to the outlying home, country club or farm the advantages of a water supply equal to that of the city.

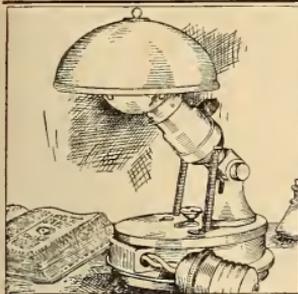
Such a pump as shown in the accompanying illustration can be used to supply either a closed tank in which pressure is maintained, or it may lift the water to an

open tank which distributes by gravity. Such pumps may be controlled either by hand, or by an automatic switch, which starts and stops the motor and pump at the proper time. Usually the automatic switch arrangement is preferred, because it gives a continuous supply of water without any trouble or attention on the part of the user.

In some cases the pump is installed on a cast iron stand secured to the wall of a cistern; and again, it may be placed in a well in a somewhat similar manner. The motor drives the pump by means of a flat, waterproof belt, which may be kept tight by an adjustable idler pulley. Where an open tank is used, what is called a "float switch"—in other words, a float fastened to a metal arm—rises and falls with the water level and opens and closes the motor circuit. When a pressure tank is used, a pressure gauge is installed upon it and the pointer on this gauge is so arranged that it will open or close the circuit when a certain pressure is reached, or when the pressure falls below a certain point. The parts of the pump are so made that a single filling of oil will last for a year and the whole equipment requires practically no attention after being placed in good running order.

LATHE FOR THE DENTIST

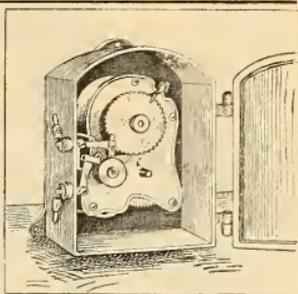
A new electric lathe designed especially for dentists has been placed on the



Little Wizard Lamp



Popcorn Vender



Time Switch

market. It is of Westinghouse manufacture and is made for operation on either direct or alternating current circuits. The alternating current motor has two speeds, and the direct current machine three. The speed is regulated by a switch lever at the base.

On the extended shaft of the motor may be mounted buffing and grinding wheels of various sizes, drills, burrs, etc., and the working parts are enclosed and thus protected from dust and dirt.

The lathe is finished in black Japan, ornamented in gold and all bright metal parts are nickel plated.

POPCORN VENDER USES ELECTRICITY

Even the peanut and popcorn business is made more profitable by the employment of electricity according to the assertions of venders of these foods and manufacturers of machines for preparing them.

The accompanying picture shows a peanut and popcorn machine fitted with a motor and equipped with incandescent lamps. While the heat is furnished by burning gas or gasoline, a turn of a switch starts the rotating part of the corn popper and turns on the lamps for lighting the interior.

The upper case is for popcorn and the lower one for peanuts. In operation the roasted nuts are dumped direct from the cylinder into the lower case without removing the cylinder. The case has a

large drawer for shelled corn, etc. Under the peanut case is a copper warmer heated by a burner, creating steam for keeping the roasted nuts hot, and this is provided with a glass water gauge. The power from the motor is transmitted by sprocket wheel and chain system, except a belt from the motor to the drive wheel. Where electric current is available it can easily be arranged to operate this machine either in the store or on the sidewalk.

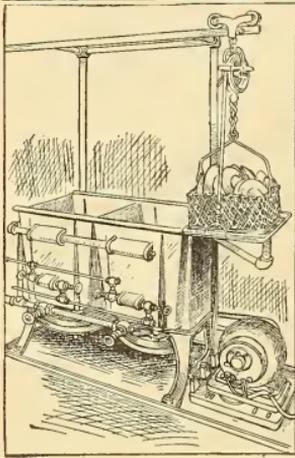
LAMP OF MANY USES

The Little Wizard lamp gets its name from the numerous services to which it may be put. It is mounted upon a base containing a roller upon which the lamp cord may be wound and thus concealed. The base is fitted with a rubber suction cup. By moistening the edge of this cup, then pressing the button on the center of the base and at the same time placing the cup against a smooth, non-porous surface, the lamp will remain in position. Both the lamp and shade are adjustable. In the base also are a hook and a clamp which ordinarily are not visible except when called into service.

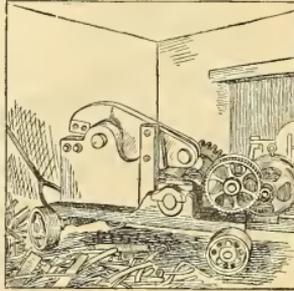
The lamp may be attached to a mirror by means of the suction cup, clamped to the edge of a sewing machine or table or hung on the wall by a hook.

CLOCK OPERATED SWITCH

It is frequently desired to open and close an electric circuit at certain predetermined times. The momentary cir-



Dish
Washer



Junk Chopper



Fixture for Vehicle Washing

cut closer here shown is a clock operated device originally designed to take samples of ore in mining, every fifteen minutes, by turning on an electric motor for a few seconds but is now applied in many other ways.

The clock requires winding once each week, if the circuit is closed four times each day; that is, the clock must be wound after each 28 operations.

The entire device is incased in a cast iron weatherproof box with a locked door. Terminals for connecting to the electric circuit are brought out through the side of the case. The regular type circuit closer is made for a circuit of 20 amperes.

DISHWASHING BY MOTOR

The Vortex dishwasher employs an electric motor for imparting vigorous motion to water about the dishes placed in the galvanized iron tanks. A hoist handles the basket and the capacity of the washer ordinarily is about 4,000 pieces per hour.

PORTABLE METAL JUNK CHOPPER

The portable shears here illustrated are only one of the many applications of electricity to the sorting, baling and cut-

ting of scrap metals. A small five horse-power motor transmits sufficient power to the vicious looking jaws of the shears to enable them to bite their way through bars of steel or iron as thick as a man's wrist. The outfit is mounted on a wheeled truck and is easily moved from place to place.

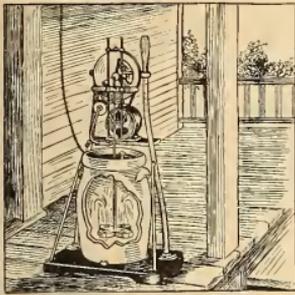
FIXTURE FOR VEHICLE WASHING

A lighting fixture combined with a vehicle washing device is one of the novel but serviceable applications of electricity. At the ceiling of the wash room is a revolving joint supporting a cluster light and hose on one end and counterbalanced at the other. Water is piped in the ceiling over to the center support. The mechanism is designed to make a complete revolution around the conveyance and as the lamps swing with it they aid in detecting dirt or any gritty substances which would mar the polished surfaces of a carriage or automobile.

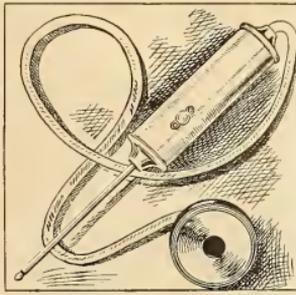
A MECHANICAL STETHOSCOPE

The Detectorphone is an electrical instrument which employs the principle of the microphone for the detection of mechanical trouble. The instrument employed by the physician is called a stethoscope and so this device has also been termed a mechanical stethoscope.

It consists of a sensitive microphone and a six-inch dry cell enclosed in a metal



Electrified Churn



A Mechanical Stethoscope

Stove
Polisher

cylinder, a high resistance telephone head receiver with flexible connecting cord and two metal rods, one of which is straight and the other curved at right angles. The microphone, battery and receiver are connected in series, the circuit being closed by means of a push button on the battery cylinder.

In service, the metal rod is pressed against the part to be tested, the head receiver is held tightly against the ear and the push button is pressed down to close the electric circuit. The vibration of the machine being tested is transmitted to the receiver and there made audible by a slight humming or buzzing sound. The slightest irregularity of operation, which may be inaudible to the unaided ear, can thus be instantly detected by the humming noise produced in the receiver. It is first necessary to make tests of the sounds made by the machinery while in perfect running condition. The irregular sounds then produced by defects in the operation of a machine can, after short practice, be readily noted.

ROTARY STOVE POLISHER

The hand operated, stove brush and mitten make decidedly slow progress in polishing stoves in comparison to the rapidly rotating, motor driven brush which is now generally used in large stove manufacturing plants for this purpose. The brush revolving at the end of a flex-

ible shaft drives the blacking into the pores of the iron, giving it a polish that it was formerly impossible to obtain by hand. It not only does the work better but a great deal quicker.

The stove is first run over with a steel wire scratch brush, removing all rust and foreign matter. The polish is then applied, the head changed and the shining process completed. The polisher can be used either as a stationary or portable outfit. It is only limited for its radial reach by the length of the electric connecting cord.

ELECTRIFIED STICK-AND-DASH CHURN

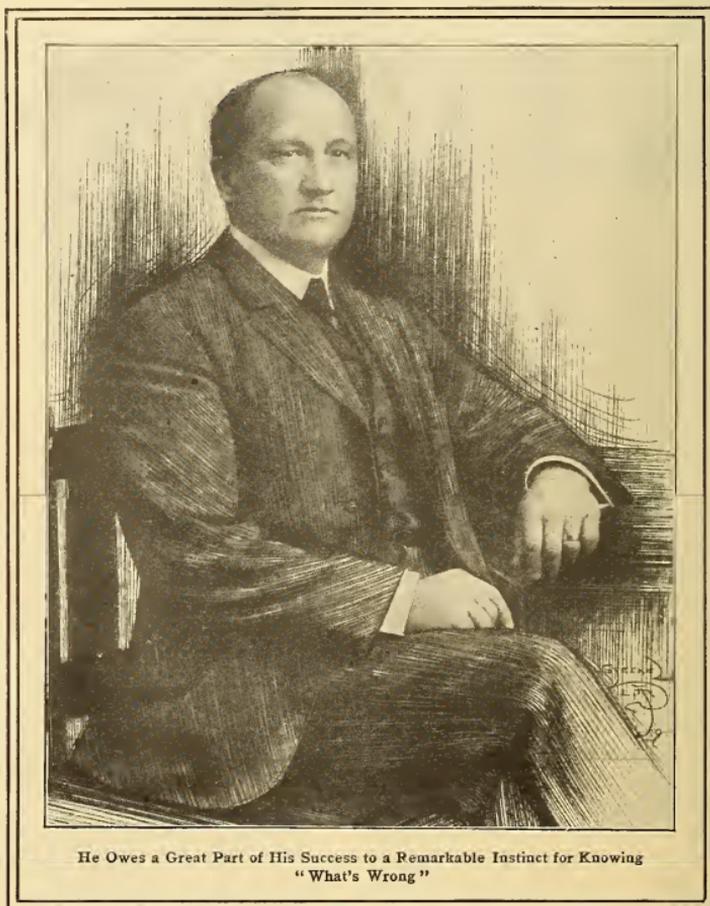
"Yo-hoo, Skinnay! C'mon over. We got a new 'lectric churn" will shortly be the invitation of Skinnay's boy friend whose Saturday morning job at mother's request is to "do the churning" with the old stick-and-dash churn.

The churn is equipped with a 1/30 horsepower motor which will operate the churn at one-fourth a cent an hour with the price of current at ten cents.

The gearing which the motor runs drives the dasher two and one-half strokes to one turn of the large wheel. The churn is made in various sizes to meet varied conditions.

Electrical Men of the Times

H. H. SINCLAIR



H. H. Sinclair is almost as famous as a yachtsman as he is as a captain of electrical industry, and it was just after the finish of one of the earlier trans-Pacific races, which he had won with his "Lur-line," that the manager of a sugar plantation near Honolulu, over which the distinguished visitor was being shown, mentioned that the electrical service had been out of order for several days. The head electrician had been quite unable

to locate the cause of the trouble, he said. Hardly pausing in his walk, Sinclair swept the short transmission line from the power house to the mill with a swift but searching glance, and then pointed to a small dark object which rested on the wires where they passed through the frond of a cocoanut palm.

"I think you will find that the removal of the body of that dead flying-fox will remedy the difficulty," he said quietly.

Henry Sinclair owes a great part of his success to a remarkable instinct for knowing "what's wrong," and pointing the way out of the difficulty. I have cited this comparatively trivial Hawaiian incident as illustrative in a small way of a faculty which has carried him through many times in a large way. Perhaps the best instance of this was also the most important — his building, in the early ninty's, of the 80 mile line from the San Bernardino mountains to Los Angeles, a pioneering achievement of such audacity at the time that its success won for him the title which is still acknowledged rightfully to be his, "The Father of Long Distance Transmission."

At this time the world's longest distance transmission was one of 42 miles near Fresno, Calif., and the highest operating voltage 15,000, although the General Electric Company had operated an experimental line in its works at Schenectady up to 19,000 volts. Beyond this the experts of that company said it was impossible to go. Sinclair had already come prominently to the attention of the electrical world by the construction of the first multi-phase power-transmission station ever built, but even with this extremely creditable achievement to point to, the "Powers-that-Were" adopted only an air of amused skepticism when he broached his new project. George Westinghouse dismissed him with, "Better be satisfied with what you have done for the time being, young man. Your ideas are ten years ahead of the times, and even if they were practicable to-day, the gas engine, as I now have it perfected, would drive you out of business."

Sinclair, with that remarkable faculty I have alluded to for putting his finger on the weakness of a scheme under consideration, believed that he knew the reason why the transmission of electrical energy had so far been limited to 19,000 volts. "The trouble lies in the insulators," he said. "The best of them in use at the present time are so porous that the

current leaks away through them like water from a sponge. If we can have insulators made in the United States that are up to the samples of porcelain we have received from Italy, there should be no more trouble on that score." A Trenton manufacturer, after several attempts, produced the desired insulator.

With the success of this first long distance transmission project, Sinclair became a power in the realm of power, and when his small Redlands concern was absorbed by the Southern California Edison Electric Company in 1897, he went to the latter concern as vice-president and general manager. With the extension of the possibilities of long distance transmission, that company's market was broadened until it included practically all of the country within a 125 mile radius of Los Angeles.

Mr. Sinclair resigned from the Edison company in 1907, and for the next two years confined his activities to hydro-electric consultation. In 1909 he became vice-president and general manager of the Great Western Power Company, and spent the next three years in getting under way that concern's great \$50,000,000 scheme of hydro-electric development which will supply light and power to the cities of the Sacramento Valley and the San Francisco Bay district. The most striking feature of his work in this period was, perhaps, the bringing through its crucial earlier stages a great dam at an elevation of 4000 feet on the Feather River.

For the last two years Mr. Sinclair has devoted the greater part of his time and energy to planning and building the remarkable industrial city of Torrance, near Los Angeles. He is still much sought for consultation on hydro-electric affairs, however, and during the next five years — in which time California plans to develop a total of over 1,000,000 horse power in hydro-electric energy — there is no doubt that his peculiar genius for finding out "what's wrong" will often be called upon.

— LEWIS R. FREEMAN.



Electrical Interests of Women



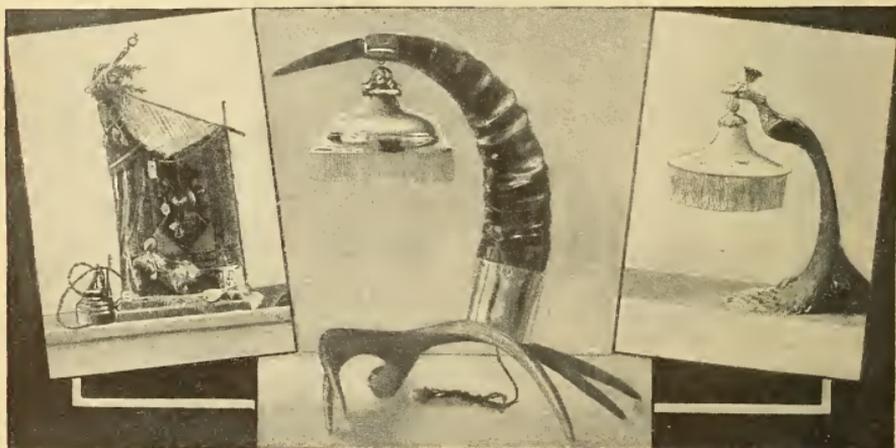
EDITED BY GRACE T. HADLEY

IMPORTED ELECTRIC LAMPS

A recent authority on illumination has pointed out that there is a personality about a "Lamp" in the popular meaning of the term; that is, a portable, self-contained light source that clearly distinguishes it from the cold material effect of

service and to every whim and fancy of its possessor.

Imported electric lamps illustrate the versatility of the modern lamp to a remarkable degree. Among the new and unique models is a lamp made of polished buffalo horn from Africa mounted on a base of antlers. The globe is made of



Some Designs Which Illustrate the Versatility of the Modern Lamp to a Remarkable Degree

BY COURTESY MARSHALL FIELD & CO.

illumination from fixed and distant sources, which makes it a companion.

No matter how scientifically and artistically a room may be lighted artificially, a table lamp is always a permanently welcome guest. Its cheering companionship rests upon the deepest psychological workings of the human mind and is no more to be questioned or explained than the universal admiration of flowers and sunset skies. Like all constant friends, the lamp is versatile in its nature, adapting itself to every condition of practical

exquisite Austrian glass ware with that live iridescent quality characteristic of this ware.

Another lamp of graceful design is the peacock lamp, sparkling with cut stones and most artistic in construction. A lamp especially adapted to a smoker's den represents the desert habitation of an Arab sheik fitted with a wee rug of the orient as a background, while the bit of real matting over the top conceals the electric tungsten lamp. When illuminated the color effect is wonderful.

TELEPHONING FATHER CHRISTMAS

Christmas is the time of year when many children walk in the path of realized dreams. As a child, one looks forward with eager expectant hopes to the blissful day when the dreams of wished-for gifts become delightful realities. Formerly there were more or less illegible missives sent to Santa asking him "to please bring that beautiful doll that opens and shuts its eyes," or earnest, childish prayers were offered up for "balls, tops and wooden soldiers."

Now the Christmas season brings the most wonderful display of mechanical marvels, ships that sail, electric trains that run on real tracks, aeroplanes that fly, so that youthful joy overflows on Christmas morn.

Dot, Dimple, Sue, Bud and Joe Field were five happy children on Christmas day. Santa had been very good to them indeed. After they had rummaged their stockings and glimpsed the treasures of the tree in the nursery, Dot had an idea!

"We ought to thank Father Christmas for all his good gifts," she suggested gravely.

"Yeth," lisped Sue, "leth eall 'im on the 'phone." Sue believed that with a 'phone all things are possible.

Dark haired Dot seized the telephone and held the receiver to her ear while the other children grouped about her in breathless suspense. When Dot heard a voice on the wire she promptly replied:



There Was Some Mysterious Merriment from the Other End that Thrilled the Children

"This is Dot Field—and the other Field children—and we want to speak to Father Christmas—yes, we don't know his number—oh, thank you."

Pretty soon there was a big hearty voice buzzing in her ear, so hearty the other children could hear it quite plainly.

"Good morning, children; I'm delighted to hear from you. Merry Christmas to

you all!" The children were wild with excitement.

"Good morning," cried Dot, "is this Father Christmas?"

"It is!" The children gathered closer.

"Well, this is Dot and we thank you, oh so much, Father Christmas, for our presents. We haven't looked at all of them but they are bee-yoo-tiful. Best love from Dot, Dimple, Sue, Bud and Joe."

There was some mysterious merriment from the other end, a bubble of laughter that thrilled the children with the

UNI-SET OUTFIT

A new combination set of electric utensils includes a percolator, chafing dish of one quart capacity and samovar of three cup capacity. The percolator has a three large cup capacity which makes it desirable for breakfast use.

The nursery outfit consists of a four inch stove with a one quart vessel in which is inserted a steamer vessel, perforated, which may also be used as a cereal cooker. By removing the steamer vessel



A Combination Set of Electrical Utensils

thought that Santa Claus was really the merry patron saint that they had pictured.

"So glad you are pleased. It is my pleasure to make you happy always. Goodbye!" There was a merry chirping sound and a jingle of bells. The children were sure it was Father Christmas. Maybe it was Papa Field on the inter-
phone!

"Without the door let sorrow lye:
And if for cold it hap to die,
We'll bury't in a Christmas-pie,
And evermore be merry."

—GEORGE WITHER

and the small cover, a standard hygienic milk bottle can be inserted.

An egg rack that will hold five eggs can be inserted and the container may be used as an egg boiler. A tea ball can be inserted in the cover and the outfit used as a samovar.

The outfit is also very convenient for making chocolate and warming water; furthermore, the comfort and ease with which a light meal can be prepared at irregular hours is a great boon. Cookery in the dining room is rendered practical by electricity because of the ease with which the apparatus is set up.

ELECTRIC FIRELESS COOKER

The new electric fireless cooker costs no more to operate than an electric iron. See how simple it is to use: just put in the



The Fireless Heat
is Generated
Within the
Cooker
Itself

cold food, set the automatic control and turn on the current and the cooking is completed without further attention on your part.

You are free now to attend the *matinée*, go shopping, or out to an afternoon tea; and when you come home, behold, dinner is ready to serve! That's the surpassing convenience of cooking electrically. This cooker roasts, bakes, boils, fries, steams and stews.

The fireless heat to do this fireless cooking is generated within the cooker itself. The electric heater, which is of an entirely new type, is installed directly in the cooking compartment and just below the cooking pans. It consists of four units of pressed steel; only half the current or half the time is required to bring it to working heat that would be demanded of the usual type of electric oven disk heater.

WASHING FOOTBALL SWEATERS

Washing football sweaters is not supposed to be the easiest task which a washerwoman can have handed to her. Last year a woman in a small college town who had repeatedly been the fortunate recipient of after game sweaters received four with instructions that they were to be thoroughly cleaned and dried before the "nine o'clock train left."

In desperation she decided upon an experiment. She bundled them up and went to the nearest electric shop and asked for a demonstration of an electric washing machine.

The four sweaters were tumbled into the machine and churned around for four minutes. They were taken out, critically surveyed and pronounced perfectly washed.

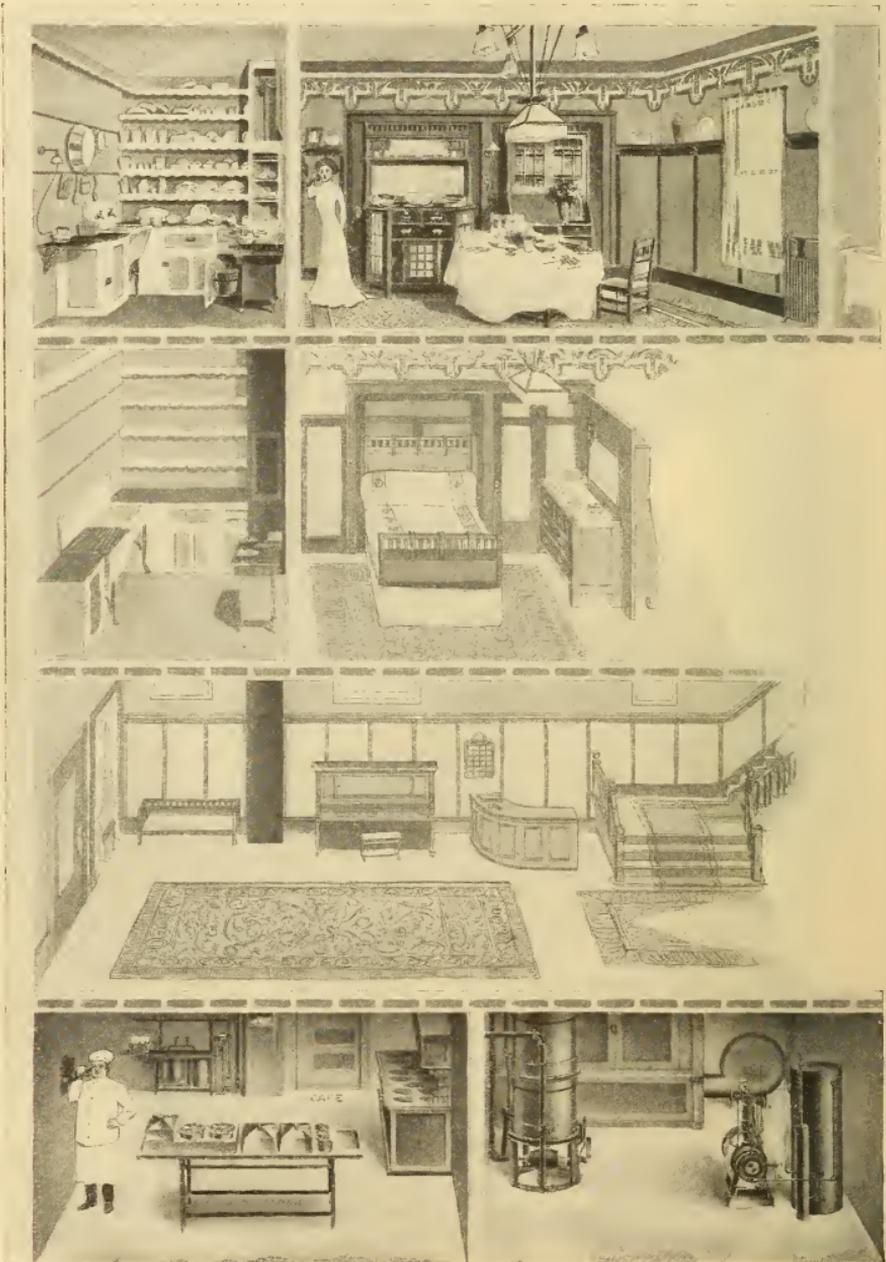
Out of sympathy for the task she had before her, the demonstrator hung the sweaters up

and turned some electric fans on them and the drying was completed before the "nine o'clock train left." This brought the woman to a decision in the matter of buying an electric washing machine, which she proceeded to do.

The same lady is ready this year at the beginning of the football season for anything which comes her way. Her electric washing machine has been paid for between seasons.

TO RENOVATE OSTRICH PLUMES AND RUCHES

To renew the curl and the fluffiness of ostrich plumes and trimmings, an electric hair curler may be used. As the heat is steady and not too intense, curling with the electric tongs does not injure the fibers as much as the usual slow method with a knife.



Magic Flats—A Remarkable Evolution of the City Home

MAGIC FLATS

It was early in 1906. A dreamer sat by the window of a small two room suite in Vancouver. Outside, the black fog was so dense that the passing cars were invisible. As he glanced about the room he wondered why so little attention was given to real comfort. He reflected upon the price asked for rooms and the little comfort received. Then he fell to dreaming how delightful it would be if there were only ideal conditions and conveniences.

"If yonder bed was a handsome piano, the washstand a bookcase, the dresser a comfortable lounge, the old rocker a comfortable armchair, the walls bright and clean, the old rug an oriental. If one could open the door and see a china service to delight the eyes of the most fastidious, conveniences for cooking in the refrigerator, cream, strawberries, fruit and cake, then the center table should unfold its leaves to an ample dining table.

"If the walls of the clothes closet revolved, why not let it remove the piano and bring into the room a handsome bed; the door to the closet when open bring into the room a full size dresser and cheval glass, at the same time removing the bookcase and writing table."

As the dreamer dreamed on, the living room dissolved into a dining room and a table glistening with silver and china and laden with a Christmas dinner came to view—out of this dream the magic flats were evolved. They became a reality in the Vancouver Mansions in 1907.

The accompanying picture illustrates the remarkable evolution in city home making, with the labor saving and space saving economies which are employed. The patent disappearing furniture is arranged on the two sides of a revolving door, so that one side may be turned into a well ventilated closet while the other side is in use. For example, the bed is being aired during the day, yet in the room there is a sideboard where the bed previously stood; or a dresser can be

brought out at night and the bookcase quickly and easily swung out of the way. A large airy sitting room becomes at night a large airy bedroom much to be preferred to the small bedroom often opening on alleys. In addition each apartment has a kitchenette where light meals can be easily prepared at little expense but with much convenience and satisfaction.

It is a hotel of the latest modern type turned into something approaching a real home. In the daytime there is not a suggestion of a bedroom, but at night the disappearing furniture may be easily operated and the bed comes to view. The dresser is upon an oscillating panel and as it swings into place two electric lamps become instantly illuminated. Every apartment has a complete private bathroom off the main part and quite out of sight.

The service in such a system of magic flats includes uniform light, an abundance of steam heat, hot water, vacuum cleaner, a cool blast of fresh air on hot nights, a café where guests may be served, a special shower with dressing rooms in basement if surf bathing is convenient, telephone in each room, maid service and a housekeeper in every building who is trained to anticipate the wants and wishes of the guests.

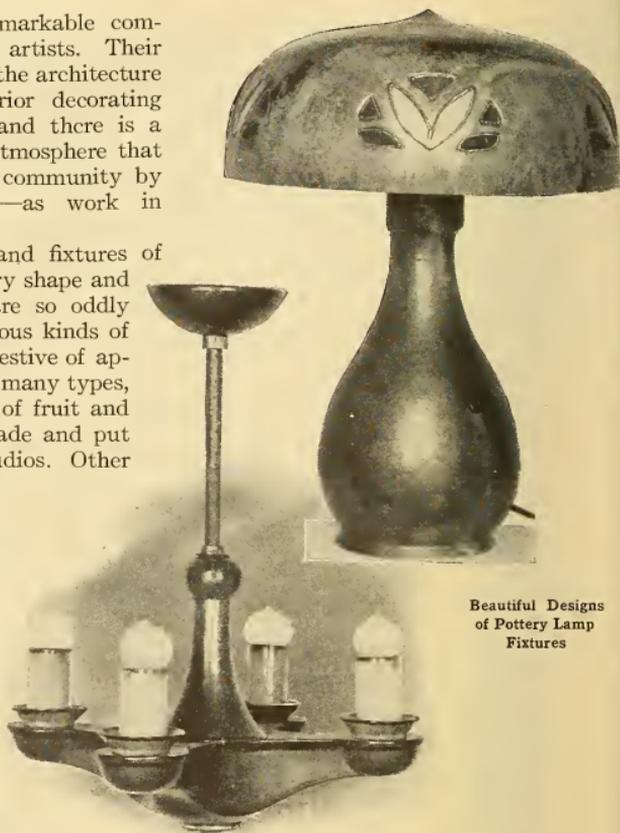
ART POTTERY IN LAMP FIXTURES

A pottery at Flemington, N. J., where undoubtedly most of the artistic pottery of this country comes from as well as a great quantity of just ordinary jugs and casseroles, the oldest pottery in America, has been the first to recognize the electric light and make electric chandeliers, table lamps, and lanterns. These new and wonderfully artistic creations reflect in their different glazes and blending colors the landscape of the quaint little New Jersey city and the personalities of workmen that for two generations have made "Art Pottery," as it is termed by the workers. Since 1805, when the pottery first commenced operations, the city has

been growing into a remarkable community of craftsmen and artists. Their influence is noticeable in the architecture of the homes and interior decorating throughout Flemington and there is a certain strange spell or atmosphere that has been cast upon the community by this work in ceramics—as work in artistic pottery is termed.

These electric lamps and fixtures of pottery are made in every shape and glaze. Many of these are so oddly artistic as to suggest various kinds of vegetation. Lamps suggestive of apples, pears, mushrooms of many types, squashes and other kinds of fruit and flowers are continually made and put on exhibit in New York studios. Other shapes are similar to such articles as ginger jars, smoke stacks, funnels and telephone line pins. Almost every source of inspiration for these unique shapes appears to have been utilized.

The colors and variety of glazes are fully as distinctive as the shapes. The lamps are made up in five types of glazes; the mirrored class giving high reflections as from a highly polished mirror, comparable only with patches of sky in single color; the flambé class giving a mirror effect and suggesting powerfully the gorgeous colors in an autumn sunset; the lustre class has a mirror surface similar to oil on water or soap bubbles; crystal glazes, comparable to flowers that grow in the surrounding country or showing the weird, swirling reflection of moonlight on water, are sometimes realistically suggestive of surface crystals like hoar frost on the window panes or the surface of galvanized iron. Another class apart from the others is the matte class. These are glazes with a texture or tone as revealed in the velvety warmth of nature, realized by a sense of feeling in the touch of the



Beautiful Designs
of Pottery Lamp
Fixtures

brilliant foliage or the petals of flowers.

Strange tales are current in Flemington of the mystic processes used in getting the hundreds of color effects produced, this being due to the fact that no one is allowed in the compounding and experimental parts of the pottery except workmen. Bones, said to be human, strange minerals from foreign lands and packages of rare metals of great value, go into these secret precincts to be combined into the vari-hued pottery. The lamps are all fitted with electric switches that are so inconspicuous that they are hardly noticeable. These switches are fitted into the base of the lamps and the electric light sockets are keyless, a little projecting pin taking the place of a key.

THE HOME ELECTRICAL

The Home Electrical is the coming home. It is coming fast. In fact, it is here. It has been arriving on the installment plan for some years and perfecting itself first in the intelligent use of artificial light, in effects highly satisfactory to the eye and producing a delightful quality of harmony. Then inventive genius turned to the properly designed apparatus for electric heating and cooking. Numerous domestic heating devices make the house electrical a home of wonders. Already there is at hand the magic touch that illumines the modern home, transforms the old time tasks, reduces drudgery and develops light and art in the home.

This picture, so artistically suggestive of the things just mentioned, the brightness and good cheer of the Home Electrical, adorns one of the season's novelties—the Electric Calendar. Why we have waited so long for a really representative and typical electric calendar is hard to say, but it has come out at last and is unique in its æsthetic suggestions for the modern home and in addition to its practical value in the home, it points out in a purely artistic way the fundamental advantages of electricity in the direction of safety, health, purity, flexibility and adaptability.



The Home Electrical

A FAMOUS CHRISTMAS BABY

The Christmas day of 1642 was marked by the birth of one of the world's greatest men, Sir Isaac Newton. During his long and valuable life his researches extended over an illimitable domain of science.

Many stories are related of his absent-mindedness while deeply interested in some of the abstruse problems to which he applied himself so entirely.

One day an intimate friend, Dr. Stukely, called on Newton and found on the table a cover laid for his solitary dinner. After waiting a long time, Dr. Stukely removed the cover and ate the chicken underneath it, replacing and covering up the bones.

At last Newton appeared and after greeting his friend, sat down to dinner, but on lifting the cover he said in surprise: "Dear me, I thought I had not dined, but I see I have."

COFFEE CREAM

Boil a calf's foot in a quart of water till it reduces to a pint of jelly, clear of sediment and fat; make a teacupful of very strong coffee, clear it with a bit of isinglass that it may be perfectly bright; pour it into the jelly and add a pint of very good cream; sweeten to taste, give it one boil up and pour it into a mold.—Dainty Dishes.



For Practical Electrical Workers

ECONOMICAL SHOP LIGHTING

An economical method of securing either general or concentrated light in a small shop is herewith shown. On a shelf edge above the bench are screwed four "T" hinges on which are

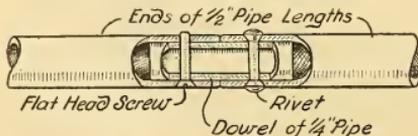


Shop Lighting

fastened metal shields. When concentrated light is needed on the bench the shields are lowered, thus hiding the source of light and giving the desired result. When light is needed for the other parts of the shop the shields are raised.

JOINING PIPE LENGTHS FOR EXTENSION BORING

The arrangement shown for joining together the lengths of an extension boring tool, is frequently preferable to that involving the use of conduit couplings. It comprises a dowel of $\frac{1}{4}$



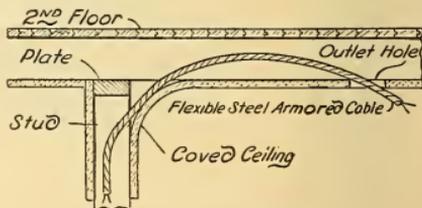
Extension Boring Device

inch pipe which is riveted at one end into a $\frac{1}{2}$ inch pipe or conduit, that forms an extension piece. The other end of the dowel is held in its conduit length with a flat headed machine screw turning into the hole which is tapped through

one wall of the conduit, but which is unthreaded through the other wall. There is no possibility of the conduit lengths being twisted apart, regardless of the direction in which the brace is turned, and the external diameter of the joint is very little greater than that of the conduit.—
GEO. V. JEROME.

FORCING ARMORED CABLE IN COVED CEILING

In fishing conductors around the coved portions of ceilings it will usually be found—particularly when steel armored conduit or steel armored conductors are being installed—that the conductors or conduit can be readily pushed around the curved portion of the ceiling as detailed, without any prior fishing. It is always worth while to try to push the conductors around



Fishing Armored Cable

where construction of the sort described is encountered before fishing through the wire route with a snake.

EFFECT OF OIL ON INSULATION

Because oil has a disintegrating effect not only on rubber but on cotton and fabric as well, care should be taken to see that the wiring for electric lighting and engine starting systems is well protected.

If oil is permitted to remain on the wiring, the insulation will in time be so softened that the slightest chafing will cause the bare copper to be exposed and a short circuit or a leakage of current will follow and it may be an extraordinarily difficult leak for even an expert to discover.

Elementary Electricity for Practical Workers

By W. T. RYAN

CHAPTER IX.—ALTERNATING CURRENT GENERATORS

An alternating current generator is a machine for the conversion of the mechanical power of a steam engine, gas engine, water wheel, or other type of prime mover into electrical power which

angular displacement between the voltages is therefore 90° .

Fig. 45 shows a star connected elementary three phase alternator. There are three coils (or sets of coils) 120 degrees apart. Instead of having two slip ring terminals for each coil (or set of coils) they are usually connected so that only three slip rings are required.

When the three coils are connected together at a common point and the other terminals brought out, the machine is said to be star or Y connected. If as indicated by Fig. 46 they are

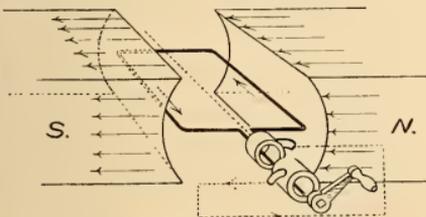


Fig. 43. Elementary Single Phase Alternator.

is delivered as alternating current. Fig. 43 shows an elementary single phase alternator.

If the coil shown in Fig. 43 is rotated clockwise the voltage in the wire at the left will send current towards the handle, while that in the other wire will send current in the opposite direction. After the coil has passed a position midway between the poles begin cutting the lines of

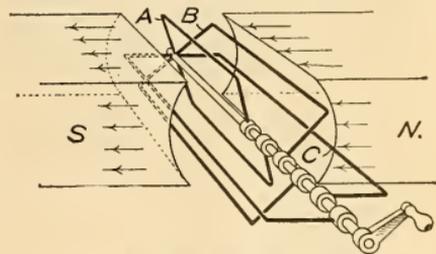


Fig. 45. Elementary Three Phase Alternator

connected in series and the points where the coils are connected together brought out, they are said to be delta (Δ) connected.

On an alternator the commutator of the direct current machine is replaced by slip rings which deliver alternating current to brushes making contact with them when the armature rotates, or receive direct current for exciting the field when

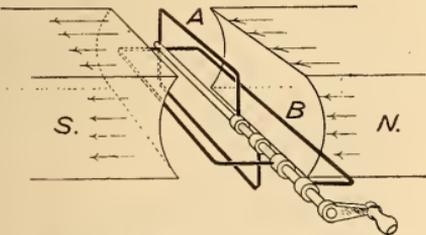


Fig. 44. Elementary Two Phase Alternator

force in the opposite direction and the current is reversed. It is evident, therefore, that the current in the external circuit will be an alternating current.

A two phase alternator has two separate windings which are so arranged that the voltage in one is zero at the instant the voltage in the other is a maximum. Fig. 44 shows the elements of a two phase alternator. When the coil (A) is cutting no lines of force, the coil (B) is cutting them at the maximum rate, therefore produces maximum voltage when (A) produces no voltage. The

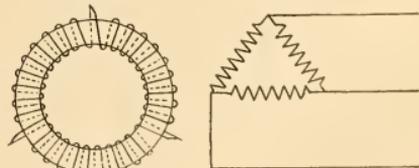


Fig. 46. Delta Connected Armature

the field rotates. Since it is the relative motion of the armature and field which is essential in the generation of voltage, we may have the field rotate instead of the armature. In fact, practically all large alternators are of the revolving field type,

the revolving armature type being limited to very small units and to machines which generate both direct current and alternating current.

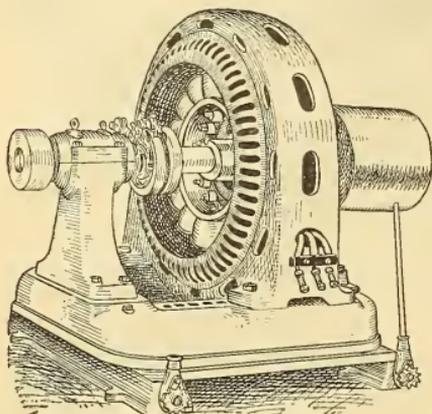


Fig. 47. Revolving Field Alternator

Fig. 47 shows a revolving field alternator. Fig. 48 shows the rotor of a revolving field alternator, and Fig. 49 one of the field coils.

The principal advantage of the revolving field alternator is that it avoids the collection of high voltage currents through brushes rubbing

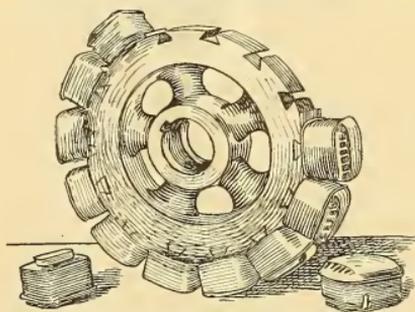


Fig. 48. Rotor of Revolving Field Alternator

on slip rings. The armature connections are fixed and only low voltage direct current need be supplied to the brushes for the field coils. The armature winding can be better insulated, having more space and not being subject to so severe mechanical strains. The revolving field also has a greater flywheel effect which is sometimes desirable. Revolving field alternators are a commercial success for voltages of 25,000 and higher, whereas the revolving armature type is practically limited to 5,000 volts.

There is a third type of alternator known as

the induction type which has both its armature winding and field winding stationary and has an iron rotating member which periodically shifts the path of the magnetic field. It has no brushes, no collector rings and no moving electri-

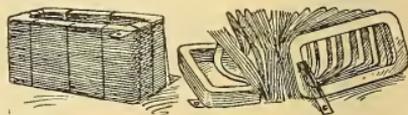


Fig. 49. Edge Wound Strap Field Coil

cal circuits. However, because of its high first cost and lower efficiency it has not proven the success commercially that the revolving field type has.

Alternator windings may be divided into two general classes; namely, closed windings and open windings. The most familiar type of closed winding is found in the rotary and in the revolving armature type of alternator. This is simply an ordinary direct current generator with taps

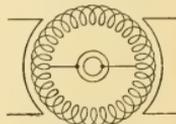


Fig. 50. Single Phase Closed Winding

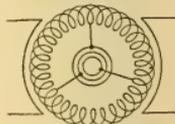


Fig. 51. Three Phase Closed Winding

taken from certain points on the armature winding. If single phase and bipolar, we would tap two diametrically opposite points on the armature winding as indicated in Fig. 50.

If the machine were multipolar the connections to the slip rings would be joined to all the equipotential points on the winding, so that in general each slip ring has as many connections as there are pairs of poles. The effective alternating voltage is equal to .707 times what the direct voltage would be.

The connections to the slip rings of a three phase bipolar rotary or of a revolving field armature are shown in Fig. 51. The alternating voltage is 0.61 times what the direct voltage would be.

Fig. 52 illustrates a single phase open winding with one slot per pole. It is the usual type of winding used on revolving field alternators.

Fig. 53 illustrates a winding where there are two slots per pole and where two thirds of the surface of the armature is occupied by the slots.

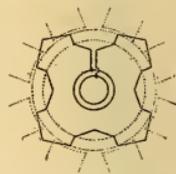


Fig. 52. Single Phase Open Winding—One Slot per Pole

Fig. 54 illustrates a two phase open type winding for an eight pole machine with one slot per pole per phase. Fig. 55 illustrates a three phase open type winding for an eight pole machine with one slot per pole per phase. The three

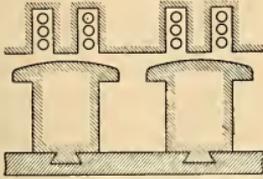


Fig. 53. Winding of Two Slots per Pole

voltages in value are 120 degrees apart. It should be considered as three separate single phase windings and then the three windings may be connected in either star or delta. If they are connected in star the voltage between the slip rings will be 1.73 times the voltage induced in one of the three separate single phase windings. If connected in delta the voltage will be equal to

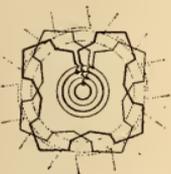


Fig. 54. Two Phase Open Type Winding

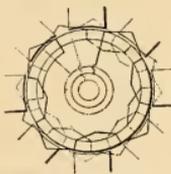


Fig. 55. Three Phase Open Type Winding

that which would be produced by one of the three windings, but the current in each of the three leads coming from the armature will be 1.73 times the current in each one of the windings.

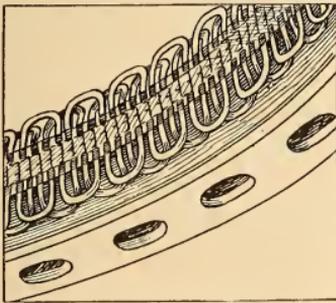


Fig. 56. Three Phase Chain Winding—One Slot per Pole per Phase

The number of slots per pole for two and three phase machines must be divisible by the number of phases, and when the same stampings are used

for both two and three phase machines, must be divisible by six. According to Rushmore (*Trans. A. I. E. E.*, Vol. XXI) most engine type alternators are built with six or twelve slots per pole, twelve slots per pole being used where the kilowatts output per pole is necessarily high, and it is not desirable to increase the length of the armature the amount necessary for six slots. Nearly all engine driven alternators have six slots per pole. Many three phase alternators, however, are designed with nine slots per pole or three slots per pole per phase.

As to method of construction, there are two types of armature coils; namely, chain or non-

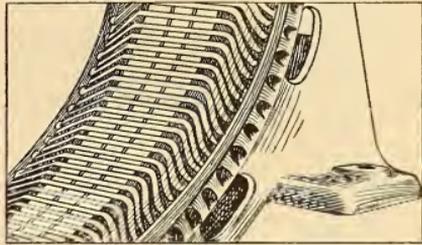


Fig. 57. Interchangeable Armature Coils

interchangeable coils and double layer or interchangeable coils. The interchangeable coils are more generally used because only one mold and one form of coil is required. Figs. 56 and 57 illustrate the two types.

(To be continued)

BLOWN FUSE ADVERTISES THEATER

Over the door of a moving picture theater was an electric lamp letter sign spelling the name "ALBUM THEATER." Each letter was upon a separate circuit. One Sunday evening a fuse blew out and the letter L was dark. That evening more people had their attention called to the theater than ever before.—J. V. GREGORICH.

BIMETALLIC CONDUCTOR

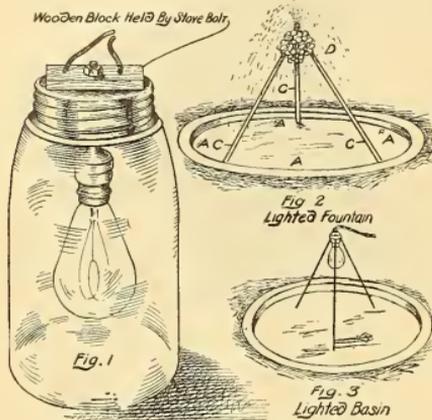
A bimetallic conductor is one made up of steel core with a copper shell. The general use of this conductor is for ground wire, telephone wires and in long spans of transmission lines where mechanical strength is necessary. This conductor is stronger than copper and has a better conductivity than steel.

The irrigation pumping system of the Utah Lake Irrigation Company, Utah, is now ready to deliver water to farmers. The electric pumps have a capacity of 36 cubic feet per second.

ILLUMINATED WATER DISPLAYS

There are few things more effective than the illumination of a small fountain — perhaps on the lawn, or arranged in a window or even upon a banquet table. It is easy to insert a lamp inside a Mason fruit jar. Two holes in the zinc cover let the wires through, and tape and pitch cover let the wires through, and tape and pitch insulate the wires and keep out the water.

With a lamp enclosed as described and sunk in an acquarium or in the basin of a fountain, there



Plans for Water Displays

will be no trouble from overheating the lamp, for the water surrounding the fruit jar conducts away the heat. Fig. 1 shows this cheap and effective device. A good coating of pitch or asphalt makes the top watertight and the jar may be sunk in the fountain basin, held in place by a bit of rock and the lamp will thoroughly illuminate the water immediately around the jar. Several of these jars sunk in various parts of the basin may be used and wierd effects may be obtained by painting the inside of one or more of the jars in various colors. With connections from each jar to a controlling commutator similar to that used with a flashing sign, all manner of lighting effects may be worked out. Another very pleasing effect may be secured by cementing pieces of colored glass to the glass jars in the fountain.

Another effect may be obtained by suspending in the center immediately above the basin, one of the lamp-enclosing, glass jars and then arranging several jets to spring from the edge of the basin and converge against the central jar which is covered with a mosaic of glass, colored in

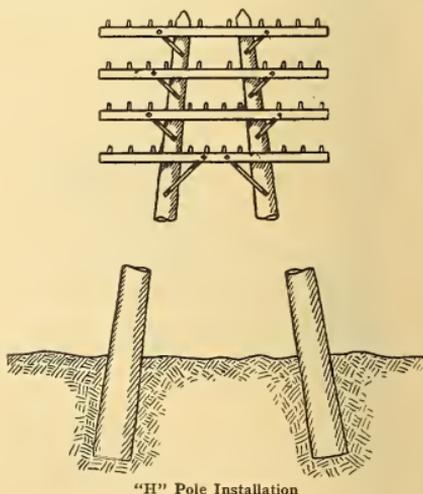
accordance with the whim of the person arranging the display.

With a lawn fountain of suitable size four jar lamps may be placed at (A, A, A, A) Fig. 2. Three pipe supports (C, C, C) are fixed in the concrete of which the basin is made and support the jar covered lamp (D), which has colored glass and other showy material cemented upon it. Water flows through one of the pipes (C), another of the pipes carries the wires to supply current to the lamp, while the third pipe may be used to carry compressed air in more elaborate arrangements, the air being used to atomize the whole or a part of the jet issuing from (D), thus surmounting the fountain with a cloudlike spray.

The writer has seen a still simpler arrangement, in which there was only the basin, the gold fish, and a single incandescent lamp supported over the basin upon a little wire tripod, Fig. 3. The attractiveness of this simple display must be seen to be appreciated. — JAMES F. HOBART.

"H" POLE CONSTRUCTION

The telephone pole construction illustrated is commonly termed a "Figure H." It is used when a very heavy lead must be raised to an exceptional height and would cause too much strain to be thrown on one pole no matter how large and solid it might be. This fixture is usually constructed of straight, light, sound



"H" Pole Installation

poles which are securely fastened together at the top with crossarm braces and bolts as shown— GEORGE MADISON.

THE ELECTRIC ARC

Most of us are familiar with the electric arc as produced between two carbon rods. It is employed in more ways than we generally believe—in the common arc light, in the moving picture machine, as a part process in the manufacture of blue-print paper, in most systems of wireless telephony, and even by the enterprising safe cracker as one of the tools of his trade. Replacing the carbon with mercury, it is also used in the mercury light and in the mercury arc rectifier for electric automobiles.

When two carbon rods, which are connected to a source of current, are brought into contact a strong current flows. Just before separation the resistance is very great and the carbon is raised to a high temperature, a portion of it being converted into carbon vapor, which is a sufficiently good conductor to allow a steady current to flow through it. The arc proper, then, is that white-hot carbon vapor through which the electric current flows. To maintain a steady arc between carbon points, it is necessary to employ a potential of at least 40 or 50 volts; if less is used the arc will be unsteady. This is generally explained by assuming a back pressure of about 39 volts, the seat of which is in the positive carbon.

From the above, it is evident that the essential part in the production of an arc is the vaporization of the carbon. It would seem that any substance which conducts electricity and is easily vaporized ought to produce an arc. And such is the case. For instance, who has not noticed the blinding green flame which sometimes flashes out of the switch-box of the street car? That is an arc pure and simple. If the blade were left slightly open, instead of being quickly pulled back, the arc would have continued and have melted away the copper blade in the same manner as in the common type of arc lamp the carbon rods are consumed. Besides copper, zinc, iron and mercury afford arcs very nearly as brilliant as those of carbon. They differ from it, however, in one respect; while carbon requires a potential of at least 45 volts to form an arc, zinc, iron and mercury will arc at as low as 20 volts.

The following will prove interesting for those who care to experiment with these arcs. First of all some source of current is needed. While direct current is desirable, it is hardly convenient at as low a voltage as 20 and at an amperage of 25. A large, step-down transformer on alternating current, giving about 20 volts, is just the thing. A small reactance coil or resistance

of high carrying capacity should be connected in series with the arc to control the current.

Get two zinc rods such as are used in salamoniac wet batteries and fasten a wire to each Turn on the current and slowly bring the ends of the rods into contact and then slowly separate them. A deep blue flame or arc will appear between the ends of the zincs, melting them quickly and liberating a great deal of zinc vapor.

A copper arc may be produced by employing two sharp pointed copper wires (No. 12) as electrodes. The two wires must first be heated in the flame of a Bunsen burner. While still red-hot bring into contact. A heavy flame will appear upon separation, quickly melting the electrodes and throwing off a number of sparks.

Iron furnishes a steady arc. Take two hat pins and fasten each in a binding post with the points touching lightly. Upon applying the current the point of contact becomes red-hot, melts and then begins to arc. This arc does not appear to be composed of iron vapor, but rather of iron in the liquid state. This is further strengthened by the fact that the arc cannot be blown out. So quickly are the electrodes consumed that they appear to literally burn up.

Fill a thimble with mercury and use for the other electrode a zinc point. When the zinc is lowered gradually into the mercury and its point immersed and then gradually withdrawn, a brilliant arc of almost pure white color appears. The action is so violent that the mercury is splattered about and the remainder soon vaporizes. It might well be to state that both the Vapors of mercury and zinc are poisonous in large quantities and while small amounts of them are not dangerous they can, at least, make one very ill. The safest way is to have all the windows wide open and to operate the arc only for a very short space of time.

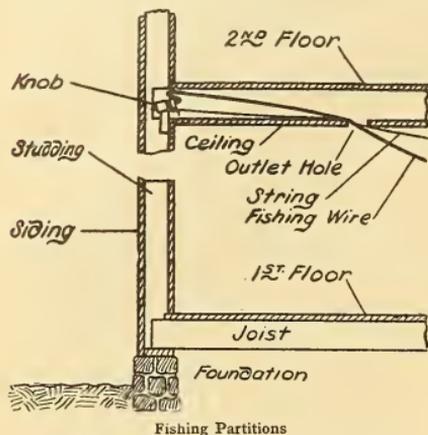
It will be noticed that while many of these metals produce arcs very nearly as brilliant as those of carbon, none of them has its high melting point and consequently its lasting qualities. And, indeed, carbon is a material unique in its combination of easy vaporization and high melting point—a fact which fully accounts for its wide adoption for arc light work.—

FERNAND PINCOFFS.

John J. McCarthy of Newton, Mass., has patented a fire alarm system which may be connected through a thermostat to the electric light circuit in the building. In case a fire occurs the thermostat, if located near it, fuses and allows current from the lighting circuit to ring a bell.

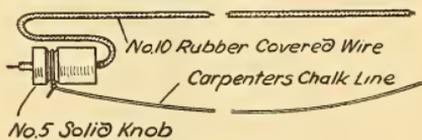
IMPROVED DEVICE FOR FISHING PARTITIONS

No. 10 rubber covered wire and a No. 5 porcelain knob will serve to fish wire into the partition of an old frame building.



Fishing Partitions

Referring to the drawing, the porcelain knob engages on a hook bent in the end of No. 10 copper conductor. When the conductor with the knob in place reaches the space in the side



Detail of Fishing Device

wall, the knob is dislodged by loosening up on the chalk line and suddenly withdrawing the No. 10 wire.—GEO. V. JEROME.

PAINT MIXING MACHINE

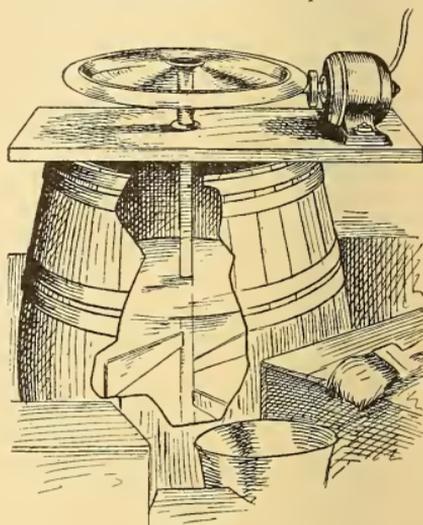
As a considerable amount of painting had to be done on our farm, I devised the following paint mixing machine which greatly reduced the work of mixing and also mixed the paint far better than it would have been possible to do by hand.

A medium sized oil barrel was procured and also the rear wheel of an old coaster brake bicycle. The head of the barrel should be removed and the entire coaster brake taken off the bicycle wheel. A board about six inches wide and long enough to project over the end of the barrel so as to hold a small motor, was then

obtained. In the center of this board a hole was bored large enough for the shaft, upon which the paddles are located, to revolve freely. This bearing must be kept oiled. The shaft was then fastened on the hub of the bicycle wheel.

Any small motor of $\frac{1}{2}$ horsepower or over will furnish sufficient power. In our case we used the washing machine motor. The pulley, if possible, should be removed and reversed on the shaft. The small projecting end must then be tightly wound with adhesive tape. If the pulley has no projecting end, the pulley itself may be wound with tape. The rest of the drawing is self-explanatory.

When the lead and oil are first placed in the



Paint Mixer

barrel, they must be stirred for about ten minutes. Then the stirring outfit can be lowered into the barrel, the rim of the wheel resting on the pulley of the motor.—WILSON S. SUTFIN.

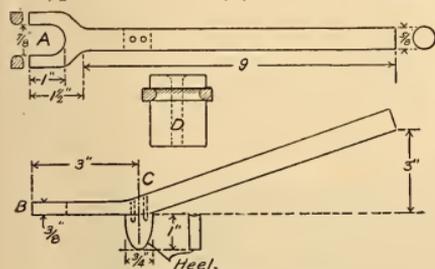
PRE-COOLING REFRIGERATOR FRUIT CARS

A new idea to save ice in the transportation of fruit is used by the Pacific Fruit Express Company, Roseville, Cal. The car interior is cooled off before the ice is put into the car's refrigerator.

Air is drawn from cooling rooms, in which the temperature is kept at about eighteen degrees F. by direct expansion ammonia coils and is forced into the cars, thus reducing their temperature and effecting a considerable saving in ice during transportation.

PORCELAIN KNOB REMOVER

Where knobs are held by nail and leather heads this little tool will remove the knob by simply placing the fork (A) of the tool on the neck of the knob and prying it loose. By its use a knob is seldom broken and when removing temporary work or replacing wires it will be found very useful. To make the device, secure a piece of soft steel about $\frac{3}{8}$ by $9\frac{1}{2}$ inches and have a blacksmith hammer it out to $\frac{5}{8}$ inch round to within $1\frac{1}{2}$ inches of end (B). With a hacksaw



Plans for Porcelain Knob remover

and file make a slot in the flat end $\frac{1}{8}$ inch wide and one inch deep as shown at (A) and round off the inside corners so as to have it fit the knob nicely.

To make the heel, secure a piece of iron or steel $\frac{3}{8}$ by $\frac{3}{4}$ by 1 inch and shape as shown to fit $\frac{5}{8}$ inch handle. Then rivet this heel to the handle about three inches from the flat end, at (C), to act as a fulcrum.

OUTDOOR NIGHT LIGHT AT OBSERVATORY

A few feet outside the Creighton University Observatory, at Omaha, Nebr., in the meridian of the transit, are two four inch iron pipes set upright in the ground, one on either side of the building, and termed "north" and "south piers." They are about four feet high and their object is to serve as supports for small instruments. As work often has to be done at night, electric lamps are used. Electric terminals which are convenient, weather and foolproof are provided in the pier.

A flange was screwed on the four inch pipes, before they were set up, to support a twelve inch circular iron plate on which the instruments rest. The flange and plate are separated by a two and one-half inch section of a five inch pipe. Five bolts, which passed outside the five inch pipe, hold the pieces firmly together.

Into the five inch section three holes are drilled, and taped to fit what a plumber would call

half inch plugs, which can be removed only by a special wrench.

It takes but a moment to remove a plug with



Instrument Pedestal

the special wrench, and to insert a receptacle plug.

The pier ends of the connectors are sunk into holes bored into a wooden ring inside the five inch collar. This ring is secured to the collar by five screws, which have their heads inside the pier. Alternating current at 110, or six volts, is obtainable, and through one receptacle a sounder may be connected to the observatory chronograph and clock circuit.—W. F. RIGGE.

MIRROR LIGHT FIXTURE

Get a $\frac{1}{8}$ inch brass elbow from the plumber, file the back side flat; that is, the rim near one of the holes, then take a piece of sheet brass or heavy tin about $\frac{5}{8}$ by $1\frac{1}{2}$ inches and solder this on the flat side after boring two or three small holes for screws. After soldering together, finish up smooth with a file or on a buffing



Mirror Fixture

machine, then add a piece of fixture tubing. Take the ebonite bushing that comes with the socket and screw it into the upper hole of the elbow. Push the lamp cord through the tube and attach the socket. Fasten the fixture to the mirror frame as shown.—GEORGE CLINE.

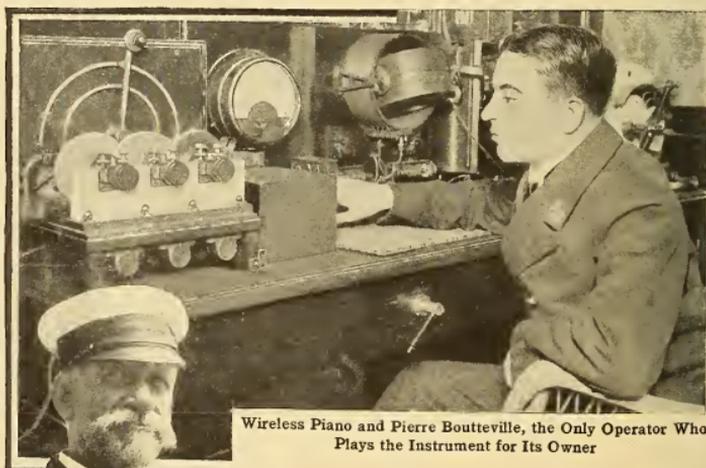


WIRELESS PIANO ON BOARD THE HIRONDELLE

Wireless operators on board ships along the Atlantic coast and near New York were mystified recently by the sound of music in their head phones. The mystery was not solved until the steam yacht *Hirondelle*, the property of Prince Monaco, ruler of the little European state in

which Monte Carlo is situated, docked in New York harbor.

On board this yacht is a wireless piano, as it may be called. Many experiments have been made to produce musical notes and with this Telefunken equipment good results



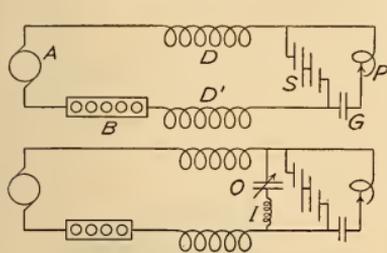
Wireless Piano and Pierre Boutteville, the Only Operator Who Plays the Instrument for Its Owner



Prince of Monaco and his Steam Yacht *Hirondelle*

are obtained with practically undamped waves. The *Hirondelle* station, here diagrammatically shown, consists of a dynamo (A) of 1500 volts

which charges the condensers (G) after passing through the lamp bank (B) and choke coils (D D'). The oscillating circuit is condenser (G), sparker (S), and the primary coil of the oscillation transformer (P). Direct current is used, giving no pulsation to the note which is as pure as can be. By making the condenser (O) variable



Elementary Diagram of Piano's Circuit

different frequencies of the note are obtained, and in this manner tunes are played. Another remarkable thing is that the noise in the transmitting room is very slight. The condensers are small, all being kept in a box a foot square. The sparker is revolving, the speed, however, having no effect on the spark variations of the note frequency, which is obtained by pressing keys like those of a piano. The transformer for the antenna is of the Tesla form, one spiral in the primary to nearly 30 or 40 in the secondary.

Prince Albert, owner of the *Hirondelle*, is accompanied by scientists and artists who are assisting him in making a study of oceanography, particularly with reference to the Atlantic.

CONSTRUCTION OF UNIQUE VARIABLE CONDENSER

This condenser is for use in the wireless transmitting circuit and has the advantage of being variable in very small steps.

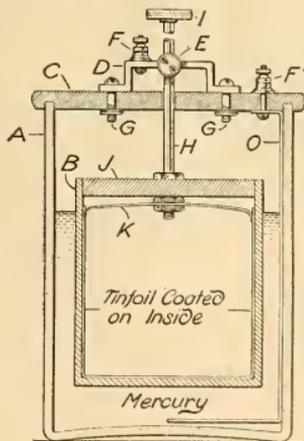
(A) is a glass jar about eight inches inside diameter and twelve inches high. A piece of black fiber (C) grooved out as shown fits over the edge of the jar and serves as a top. If fiber is not available, well seasoned mahogany shellacked and finished is a good substitute.

In the center of (C) is bolted a brass casting (D) which has a threaded screw (E) that in turn clamps the rod (H) in place. (O) is a strip of copper or brass which fits close to the side of the jar (A) and extends down to the bottom connecting the binding post (F') with the mercury (M).

(F) is a brass binding post bolted to (D) thereby affording connection to the rod (H) and consequently to the other side of the condenser. The knob (I) is of fiber and is fitted to the brass rod (H). At the other end a circular piece of mahogany (J) is bolted and this piece of wood is made a tight fit and glued to the flint glass jar (B), which is about 7 by 6 inches, after the latter has been covered with tinfoil on its inside surface. (K) is a brass strip about $\frac{1}{2}$ inch wide which serves to connect the coating of tinfoil with the rod (H).

The novel part is a quantity of mercury or very salt water. When the rod is pushed down it acts directly on the jar (B) and pushes it down. The mercury or water rises and as more active conducting area is brought into play the capacity increases. When the rod is raised the capacity is decreased.

Salt water could be substituted for the tinfoil but the increased weight which would result would not warrant the decrease in initial cost. If built carefully along these lines a good instrument will result. Dimensions are purposely omitted as each experimenter can follow his own ideas as regards size.



Cross Section of Condenser

This condenser may be used in conjunction with a condenser of fixed capacity by hooking the two up, remembering always that in parallel the resulting capacity is the sum of their individual capacities and in series the resulting capacity equals 1 divided by the sum of the reciprocals of their individual capacities.—HAROLD PETERSON.

ETHER CONTROL TO BANISH WAR

By LIVINGSTON WRIGHT

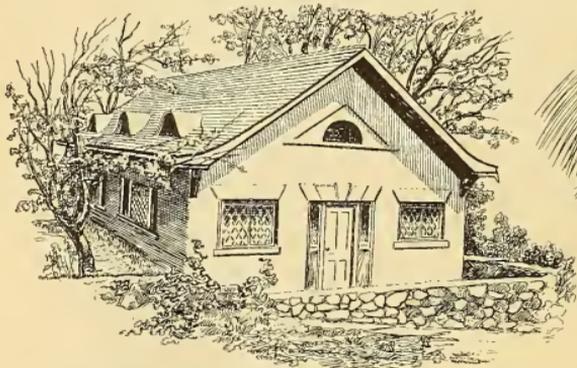
What bids fair to be one of the most amazing inventions of the age is being brought to final test by United States Navy officials in a tiny building in Gloucester, Mass.

John Hays Hammond, Jr., whose father is the only man in the world said to have a power uncanny in locating and estimating the value of mining properties and who gained a celebrity undesired by himself by being captured by the Boers in the famous "Jameson Raid" in South Africa, has been working on the mighty problem of utilizing wireless to control boats and other

upon his stupendous achievement: "There are different ways of getting at 'World Peace.' If you can go to a nation and show it an article costing \$20,000 that will put out of commission a battleship costing \$12,000,000, you have done something to really discourage huge armaments."

Hitherto, it has been possible to operate a torpedo from shore at an eight mile speed, but the control has always lacked the vital point of security against the interference of an enemy. In a word, a hostile battleship against which a land operated torpedo might be directed could

Bungalow Which May Hold Secrets of Startling Invention



John Hays Hammond, Jr.

objects from land. He is 28 now, a Yale graduate, and the present machines and apparatus hidden away in the mysterious, little, concrete, bungalow structure on his father's estate off the point, at Gloucester Harbor, represent not only the long experienced inventor's work but also the aid of a group of experts from Yale's Lawrence Scientific School and the government. What is now going on in the mysterious bungalow may be the final engine for completing the worthlessness of the heavy armored battleship, for Hammond, Jr.'s principle in his torpedo device is no less than this startling procedure! The perfection of this device comprised no less than fifty patents. Thousands of dollars represent the cost of experimental equipment.

There is a pat and grimly humorous tang to the words of young Hammond in commenting

with its own wireless impulses interfere with and negative those of the land station.

Hammond's invention not only makes this interference impossible but actually turns such interference into a giant power to help his own machine, for instead of his radio impulses being weakened, they are strengthened.

When the Navy Department heard that Hammond was operating a boat out in the harbor by means of his radio impulse device and it was found that he could send the craft any way he chose at a speed of 35 knots an hour, a rate faster than the fastest war craft, a request was speedily made to him to develop fully his experiments with a slower type. As a result of this request, Hammond fitted up the bungalow for these radio tests.

He can do some hair-raising stunts in this little

bungalow laboratory, too. The other day, while a curious little electrical machine lay on the table near him, Hammond said to an employee: "Whistle for lights on." The employee obeyed and the room was ablaze. Now," said Hammond, "whistle for lights off." The room was in darkness!

Needless to say, the visitor felt as if he were in the midst of "the spirits," but to the experts about Hammond and to those who know something of the wonderful power of radio impulse, it is simply taking advantage of the forces of Nature. The great event is in finding the man who can use these forces! It is just this thing of getting a hitch on unused force that is the secret of Hammond, Jr.'s astonishing achievements.

There are two classifications under which a wireless wave driven boat or torpedo comes: the "polypulse" method, in which a number of differing impulses operate a particular receiving apparatus; and the "monopulse," when a single kind of an impulse operates and controls a single mechanism or all of them. Hammond's method falls into the latter class.

THE "WIRELESS SEASON"

With the passing of the summer months and the coming of autumn with its long, clear, cool nights, the period which might well be called the "wireless season" is at hand.

This is the time of year when the school boy and experimenter gets out his dust-covered instruments; the time when the more enthusiastic amateur is to be found sitting up at all times of night, industriously endeavoring to "tune in" that long distance station; the time when the commercial operator revels in a long series of records, the faint signals no longer eclipsed by the incessant roar of "atmospherics"; in short, the ideal time for all those interested in this wonderful field.

There is much to look forward to in the wireless field this year. The amateur knows definitely his relations with the government regarding the power and wave length he is permitted to use. A number of new high power stations have been put in operation since spring. New records are sure to be made and during the coming winter it is fair to predict that unbelievable distances will be covered by wireless.

CLUB MAINTAINS STATION BUILDING

The Wireless Club of Highland Park College, Des Moines, Iowa, whose members are engineering students, is said to be the only wireless club in the United States maintaining a building used exclusively as a wireless station. Its equipment

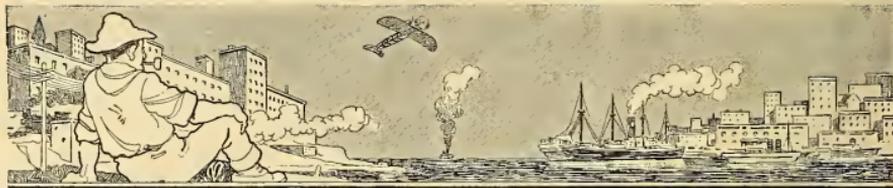


Wireless Club Building

includes a two kilowatt transformer and an aerial of No. 14, B. & S. gauge phosphor bronze wire. The aerial extends from the pole, seen in the right of the picture, to an extreme height of 100 feet. The station uses a long wave length and has a transmitting radius of 300 miles. It receives from stations as distant as New York, Washington and Key West. Its station call is "H. P." An operator is at the key from 6:30 to 9:00 P. M. daily. The club is also teaching a class of students.

A new edition of "Radio Stations of the United States" may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., enclosing fifteen cents with the request.

The book contains a list of land stations arranged alphabetically by name, a list of ship stations and an enumeration of all United States call signals with the name of the ship or land station to which the call is assigned. In addition to this, 45 pages are devoted to listing amateur stations licensed up to June 30, 1913, headquarters and territorial limits of each district being given.



On Polyphase Subjects

THE NEW NITROGEN-FILLED LAMPS

At least once a year people sit up and rub their eyes over the new inventions at the New York Electrical Exposition. The 1913 collection was formally opened to the public at Grand Central Palace on October 15th, and a number of extraordinary and really interesting achievements have been wrought during the course of twelve months, which the promoters of the 1913 exhibition arranged for the public's inspection and entertainment. Among these exhibits were some large models of the new and not yet entirely perfected nitrogen lamp, or more correctly the nitrogen-filled lamp, which promises to work further reductions in the cost of illumination. The new lamp is a tungsten lamp of high efficiency with the lamp filaments set in nitrogen gas instead of in vacuum. In other words, the new lamp is a nitrogen-filled incandescent using a tungsten filament. It has not been so many years ago since the consumers of electricity were smiling over the fact that the tungsten lamps would give them three times as much light for the same amount of current as the carbon bulb consumed. The new "nitro" bids fair to cut the tungsten consumption almost in half.

The first nitrogen lamps, which will be put on the market in about six months, will be large and suitable for outdoor illumination. The new lamp gives light whiter than the ordinary tungsten and comes nearer "daylight" than any commercial form. The new lamps at Grand Central Palace were four monster globes rated at 5,000 candle power, suspended from the four corners of the big central wall. These lights were turned on for five minutes at stated intervals every day. This system was adopted lest the blaze should dazzle the eyes of beholders, making it impossible for them to see anything else.

SWORN STATEMENT

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None.

(SIGNED)

FRANK WILLIAM HARVEY, JR., Business Manager.

Sworn and subscribed before me this 21st day of March, 1913.

(SEAL.)

OLIVER WILLIAMS, Notary Public.

(My commission expires April, 1917.)



Short Circuits

Mrs. Robinson—And were you up the Rhine?
Mrs. de Jones—I should think so—right to the very top! What a splendid view there is from the summit!

* * *

A Dutchman named August ran a saloon. One day in came the landlord and said: "On account of Wilson's election I'll have to raise the rent \$10 on the first of December." "All right," said August.

Next day in came the whiskey salesman and said: "On December 1st whiskey will be 10 per cent. higher." "All right," said August.

Next day the bartender said: "December 1st you will have to raise my wages \$10 a month." "All right," said August.

Next day August put up a sign in his saloon that read: "Notice: the first of December will be the last of August."

* * *

"Eggs are getting so expensive that fried eggs will be used next year for trimming women's hats."

"Why not? I should think the effect would be chic."

* * *

The young man walked down Dearborn street with one shoe off and his coat turned inside out. A policeman stopped him.

"What's the idea?" he demanded.

"Well, you see, it's this way," replied the young man. "I'm taking a course at a correspondence school and yesterday those darn sophomores wrote to me and told me to haze myself."

* * *

The young mother had left the six-months'-old baby only a few minutes but upon going back to it discovered quite a large lump over one eye. Discovering three-year-old Henry in the vicinity she surmised the cause and questioned him.

"Henry, did you hurt the baby's eye?"

"No."

"Now I know better than that. If you do not tell me how you hurt the baby's eye I shall spank you."

"Well," said Henry, "I did throw a block at him, but I told him to look the other way."

* * *

Woodchopper—"I seen a lot o' bear tracks 'bout a mile north o' here—big ones, too!"
Hunter—"Good! Which way is south?"

Larry—A remarkable statistic, here, old chap, showing that every time I breathe some one dies.

Harry—Great Scott, man! Why don't you chew cloves?

* * *

The order which the comely young German woman handed in at the post-office savings bank was made payable to Gretchen H. Schmidt, and she had signed it simply Gretchen Schmidt. The man of the counter called her back to rectify the mistake just as she was turning away.

"See, you have forgotten the H," he explained.

The young woman looked at her receipt and then blushed a rosy red.

"Ach, so I haf," she murmured, and wrote hurriedly:

"Age 23."

* * *

Doris was radiant over a recent addition to the family, and rushed out of the house to tell the news to a passing neighbor.

"Oh, you don't know what we've got upstairs!" she cried.

"What is it?"

"It's a new baby brother!" And expectantly she watched the effect of her announcement.

"You don't say so! Is he going to stay?"

"I think so"—very thoughtfully. "He's got his things off!"

* * *

A Chicagoan who employs a Swedish maid overheard the following conversation the other day between her cook and the maid next door, also a Swede:

"How are you, Hilda?"

"I well, I like my job. We got cremated cellar, cemetery plumbing, elastic lights—and a 'hoosit.'"

"What's a 'hoosit,' Hilda?"

"Oh, a bell rings. You put a thing to your ear and say 'Hello,' and some one says 'Hello,' an' you say 'hoosit.'"

* * *

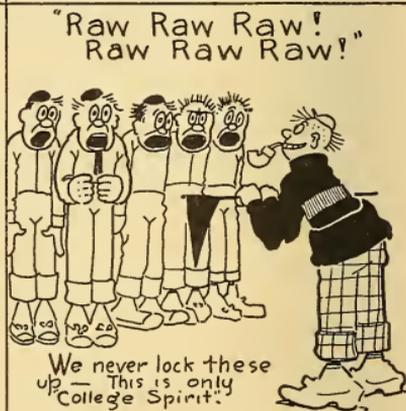
"Why didn't you send your man to mend my electric bell?"

"He did go, madam; but, as he rang three times and got no answer, he concluded that there was nobody at home."

* * *

"The saleslady's young man was a 'real guy.' He 'never blows his soup like common people—he fans it with his hat.'"

This Surely is a Funny World.



DE JALC