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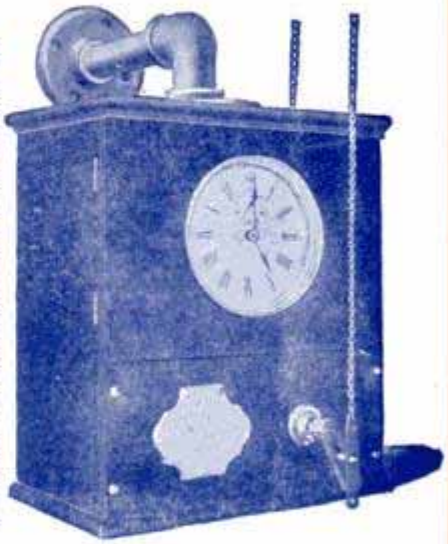

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CONTENTS.

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(Give your name, address, age, education, present occupation and line of work you want to take up)

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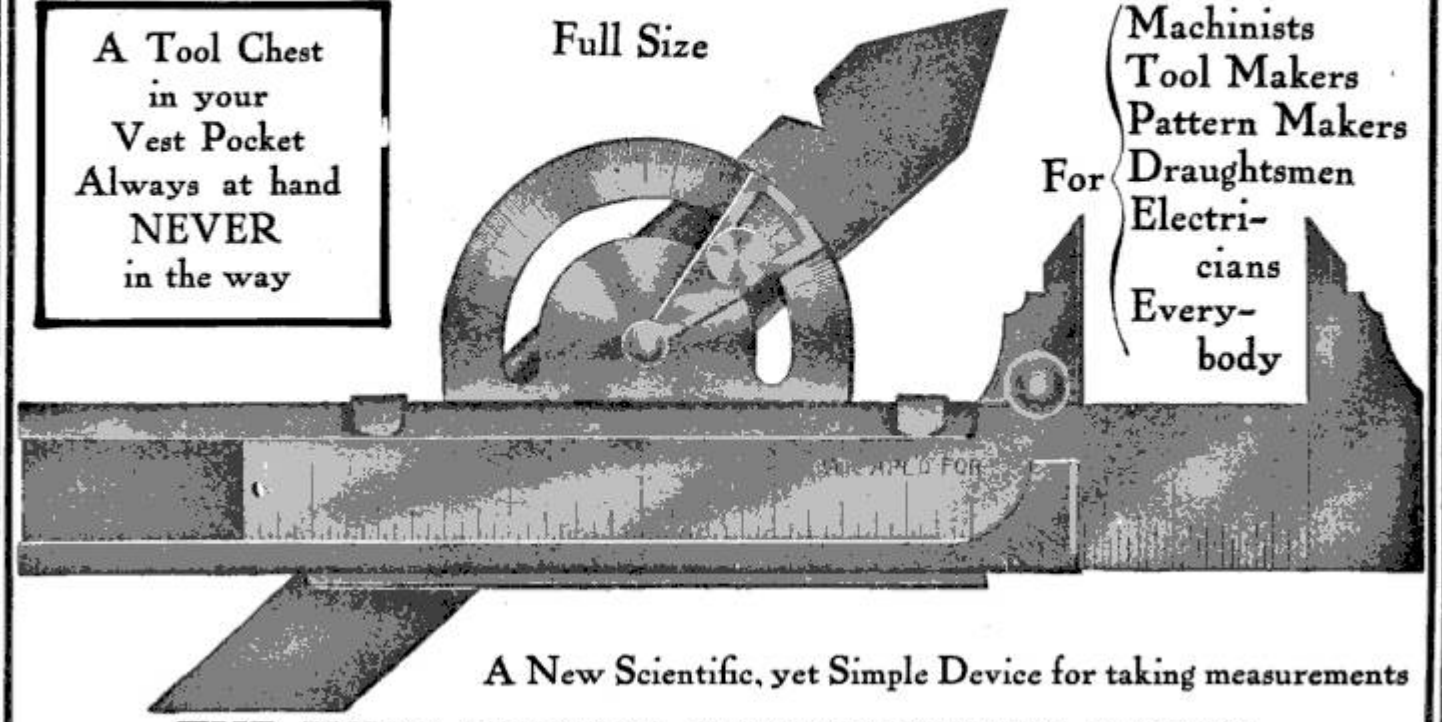

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I am pleased to be in a position to state to you that KORNIT will, within a few weeks, be manufactured for the first time in the United States at OUR FACTORY, Newark (Belleville Station,) New Jersey.

WHEN this transpires I firmly believe it will mark one of the most important epochs that has occurred in the manufacturing world for many years and also one that will not be excelled in the near future. Everything possible is being done to rush our factory to a speedy completion. Our factory manager told me yesterday that inside of three weeks they would be grinding Horn Meal, which is the first step in producing *Kornit*. Then just as soon as our huge Hydraulic Presses are finished and put in place we shall be in a position to produce *Kornit* complete. All our other machinery will be in working order by that time. Different machines are arriving and being set up every day.

BIG PROFITS MAKE BIG DIVIDENDS

The Kornit Manufacturing Company is receiving letters and calls by almost every mail from different manufacturers who wish to buy *Kornit* to use in their business. One rubber manufacturer in Newark, where our factory is situated, told Mr. Emanuel, our factory manager, the other day, that he was just as anxious as we were to have the time come when we could sell him Kornit, for it would save him many thousands of dollars every year by using Kornit instead of hard rubber. I feel assured that we will have a market for Kornit just as soon as it is produced. Here is indeed what I consider one of the best opportunities to make an investment, which will pay enormous dividends, that will ever be presented to you.

THE STORY OF KORNIT

By President Chas. E. Ellis.

KORNIT was invented by JOHANN GUSTAV BIERICH, a subject of the Czar of Russia, residing at Menkenhof, near Livenhof, Russia, and is a Homogeneous Horn or Hoof substance. Kornit is produced by grinding horn and hoof shavings and waste into a palpable powder and then pressing under heavy hydraulic pressure with heat into a homogeneous slab. This slab produces a substance which can be sawed or turned the same as ordinary wood. It is of a beautiful black consistency and Is EXTREMELY VALUABLE as a NON-CONDUCTOR FOR ELECTRICAL SUPPLIES. It is a matter of record that the electrical industry in this country AT THIS TIME DOES NOT HAVE a satisfactory material for heavy or high insulating purposes. A slab of Kornit one inch thick was tested in Trenton, New Jersey, by the Imperial Porcelain Works and was FOUND TO HAVE RESISTED 96,000 VOLTS OF ELECTRICITY. It may be interesting to note here that the heaviest voltage which is transmitted in this country is between Niagara, Buffalo and Lockport, New York. The voltage transmitted by this company is between 40,000 and 50,000 volts. Kornit is equally as good as a non-conductor for electrical purposes and supplies as is hard rubber.

The average price of hard vulcanized rubber for electrical purposes is to-day considerably over one dollar per pound—at the present writing something like $1.25 per pound.

KORNIT CAN BE SOLD AT TWENTY-FIVE CENTS PER POUND and AN ENORMOUS profit can be made at this price, so that it CAN EASILY BE SEEN that where KORNIT is EQUALLY AS GOOD and AS A MATTER OF FACT, in many instances, a BETTER non-conductor than hard rubber, it can compete in every case where it can be used with great success on account of its price. For electrical panel boards, switchboards, fuse boxes, cut-outs,

etc., there are other materials used, such as vulcanized paper fibre, slate, marble, etc. A piece of vulcanized paper fibre, 3x4x1 inch, in lots of 1,000, brings 20 cents per piece. A piece of Kornit of the SAME DIMENSIONS could be sold with the ENORMOUS PROFIT OF OVER 100 PER CENT, at ten cents. The absorptive qualities of Kornit render it such that IT IS FAR PREFERABLE to that of vulcanized fibre. It will not maintain a flame. Of all the materials which are now in the electrical market for supplies and

MR. JOHANN GUSTAV BIERICH, THE INVENTOR OF KORNIT, IN HIS SUMMER GARDEN AT MENKENHOF, RUSSIA.

insulators there is, as we have stated above, none that are satisfactory. Kornit will fill this place. Its tensile strength per square inch averages from 1,358 pounds to 1,811 pounds, which the reader can readily see IS MORE THAN SATISFACTORY. This test was made by a well-known electrical engineer, who is now acting in that capacity for the United States Government with a Standard Riehle Bros. testing machine.

Waste horn and whole hoofs are being sold by the ton to-day principally only for fertilizing purposes. There is one town alone, Leominster, Mass., where they have an average of eight tons of horn shavings every day. These waste horn shavings are now only being sold for fertilizing material. These eight tons of horn shavings manufactured into Kornit and sold for electrical purposes would easily bring $3,000. At this price it would be selling for less than one-fifth of what hard rubber would cost, and about one-half what other competitive materials would sell for, even though they would not be as satisfactory as Kornit.

Kornit has been in use in Russia about four years. In Riga, Russia, which is the largest seaport town of Western Russia, the Electrical Unions there are using Kornit with the greatest satisfaction, finding it preferable to any other insulating material.

The expense of manufacturing Kornit from the horn shavings is not large, as the patentee, Mr. Bierich, has invented an economical and satisfactory process which produces an article that, in the near future, will be used in the construction of almost every building in this country.

Besides electrical insulators, Kornit can be used for the manufacturing of furniture, buttons, door handles, umbrella, cane, knife and fork handles, brush and sword handles, revolver handles, mirror backs, picture frames, toilet accessories, such as fancy glove boxes, jewel cases, glove stretchers, shoe lifts, etc.; office utensils, such as paper knife and pen holders, ink stands, pen racks; medical instruments, such as syringes, ear trumpets, etc., etc.; pieces for games, such as draughts, chessmen, dominoes, checkers, counters, chips, cribbage boards, etc.; telephone ear pieces, stands, etc.; piano keys, typewriter keys, adding machine and cash register keys, tea trays, ash trays, scoops, mustard and other spoons, salad sets, cigar and cigarette cases, cigar and cigarette holders, match boxes, and hundreds of other useful and ornamental articles, all at a large and remunerative profit.

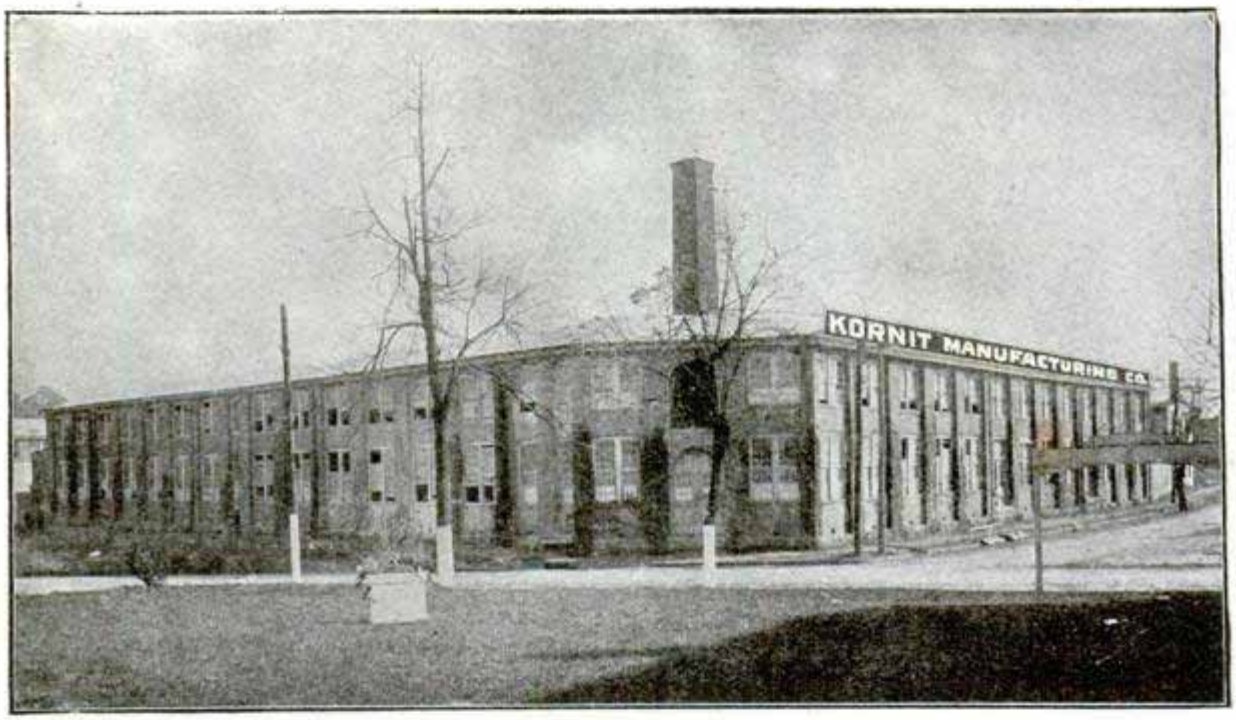
THE GREAT DEMAND FOR KORNIT IN THIS COUNTRY

THERE is one manufacturer ALONE here in New York that uses 60,000 square feet of insulating material for panel boards every year. He is now using slate and marble, but IT IS NOT SATISFACTORY, for the reason that in boring and transportation IT BREAKS SO EASILY. KORNIT WILL ANSWER THE PURPOSE OF MANUFACTURING PANEL BOARDS VERY MUCH MORE SATISFACTORILY. On 60,000 square feet of Kornit there would be a net profit of over $30,000, or 50 cents for every square foot used. THIS ONE EXAMPLE is cited to show you THE ENORMOUS PROFITS which can be made. There are a great many other panel and switchboard manufacturers in this county. You may be interested to know that a panel board is a small switchboard. There is one or more on every floor of all large buildings where electricity is used. They each have a number of switches mounted on them, so that

those in charge can turn certain lights on or off, and by these panel boards all the electrical power in the building is controlled. They must be of a reliable non-conducting material. Kornit can be used for this purpose almost exclusively. The largest electrical manufacturing concerns in Riga, Russia, ARE USING KORNIT ONLY FOR THIS PURPOSE, after having tried all other so-called non-conducting compositions. The electrical trades alone can consume a great many tons of Kornit every day in the year. If only two tons of Kornit is manufactured and sold every working day in the year IT WILL ENABLE THE KORNIT MANUFACTURING COMPANY TO PAY 16 PER CENT DIVIDENDS EVERY YEAR. Of course, if four tons a day are sold the dividends would be 32 per cent. per year. THIS IS NOT IMPROBABLE. AN EXPERT ELECTRICAL ENGINEER who holds one of the most responsible positions here in New York City made the statement, after thoroughly examining and testing Kornit for electrical purposes, that in his most conservative estimation there can be ten tons of manufactured Kornit sold every working day in the first year. This would mean that the Kornit Manufacturing Company would pay a dividend out of its earnings the first year of over seventy-five per cent. (75%). This is probably more than will be paid the first year, but there certainly seems to be a good prospect of paying a large dividend the first year.

THERE WILL BE SUCH AN ENORMOUS DEMAND FOR KORNIT AFTER IT BECOMES INTRODUCED THAT FROM YEAR TO YEAR THE DIVIDENDS EARNED WILL BECOME LARGER AND LARGER. THIS IS THE BEST OPPORTUNITY TO MAKE AN INVESTMENT THAT YOU HAVE EVER HAD.

It is a well-known fact that THE MOST LEGITIMATE AND PROFITABLE way to MAKE MONEY is by manufacturing some product that is "NECESSARY" and ONE THAT CAN BE FULLY CONTROLLED so that nobody else can manufacture the same article. Look at Sugar (which is protected by a high tariff); at Standard Oil, the Telephone, the Telegraph, and we might go on and enumerate many more monopolies. THEY ARE THE BIG MONEY MAKERS OF TO-DAY. KORNIT CANNOT BE MANUFACTURED BY ANYBODY IN THIS COUNTRY EXCEPT OURSELVES OR OUR AGENTS. We own all the patents issued by the UNITED STATES GOVERNMENT to the inventor, MR. JOHANN GUSTAV BIERICH, IN RUSSIA. These patents HAVE BEEN BOUGHT from Mr. Bierich and ARE DULY TRANSFERRED TO THE KORNIT MANUFACTURING COMPANY, and the same is DULY RECORDED IN THE PATENT OFFICE OF THE UNITED STATES.



KORNIT FACTORY, NEWARK, N. J. (BELLEVILLE STATION).

OUR FACTORY

OUR factory is located in Newark (Belleville Station), N. J., and will be in complete working order within a few weeks. AND KORNIT WILL THEN BE A WELL-KNOWN AND UNIVERSALLY USED ARTICLE IN THE ELECTRICAL AND OTHER TRADES OF THIS COUNTRY EARNING AND PAYING LARGE AND SATISFACTORY DIVIDENDS EACH AND EVERY SIX MONTHS. A few shares obtained now may be the foundation

support in the unknown years that are to come. We leave it to you if it would not seem good judgment to take immediate advantage of this opportunity. Anyway, please write me at once and let me know just what you will do. If it is not possible for you to take shares now, write and tell me how many you would like and how soon it will be convenient for you to do so, provided I will reserve them for you. As soon as I receive your letter I will answer it WITH A PERSONAL LETTER AND WILL ARRANGE MATTERS AS YOU WISH TO THE BEST OF MY ABILITY.

REMEMBER, I HAVE A GREAT MANY THOUSAND DOLLARS INVESTED IN THE KORNIT MANUFACTURING COMPANY, and the minute you buy a share or more in this Company we become CO-PARTNERS as CO-SHAREHOLDERS. It is for our mutual benefit to watch and guard each others' interests. I WILL BE GRATEFUL IF YOU WILL WRITE ME TO-DAY, so that I may know just what you will do.

I know you will agree with me that you have never had presented to your notice a better opportunity to make an investment where such large profits can be made because of the exclusiveness of control, and the great demand and the low cost of the raw material, which is now almost practically thrown away. Join me in this investment, and I assure you it is my sincere belief that in the future you will say: "That is the day I made the most successful move in my whole life."

Now is the time for you to take advantage of this magnificent opportunity to make an investment in these shares. I EARNESTLY BELIEVE that in a few years THESE SHARES WILL BE WORTH FROM FIFTY DOLLARS TO ONE HUNDRED DOLLARS each on account of the LARGE DIVIDENDS which the company will earn and regularly pay each and every six months. It is a well-known fact that $10 shares that pay fifty (50) to one hundred (100) per cent. dividends will readily sell in the open market for $50 to $100. YOU CAN GET THEM FOR TEN DOLLARS A SHARE NOW. THE OUTLOOK FOR THE KORNIT MANUFACTURING COMPANY is such that it seems impossible for the earnings to fall far short of these figures. If the company only makes and sells two tons of Kornit a day for the first year, and makes a profit of only two hundred dollars per ton, it would mean a profit of over sixteen per cent. (16%) the first year. If this business were doubled the second year, of course the earning capacity would more than double and the dividends would be

PRESIDENT CHARLES E. ELLIS.

over thirty-two per cent. (32%). Prominent and well-known Electrical Engineers assure me that this product cannot help and is bound to make enormous profits. I would recommend that you send for as many shares as you may wish at once. You, in my conservative opinion, can safely count on the large earning capacity of these shares. I will at once write you a personal letter with full information, and send you our illustrated book, "A Financial Opportunity," containing a score of photographs of the KORNIT industry, taken in Russia.

Please let me hear from you.

Yours very truly,

CHARLES E. ELLIS,
PRESIDENT.

717B Temple Court,
New York City, New York

[Mr. Ellis besides being President of this company is also President of two other large and successful companies, owning shares therein valued conservatively at over $250,000.00. Mr. Ellis has other investments in New York City real estate, bonds, stocks and mortgages to the amount of many more hundreds of thousands of dollars. Any bank or mercantile agency will tell you his guarantee is as good as gold. THIS is a successful man who wishes you for a Co-partner as a Shareholder and Dividend Receiver in this Company. Remember, you will do business personally with Mr. Ellis in this matter.]

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POPULAR MECHANICS

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[This article is third in a series on What Occupation a Young Man Should Choose.—Editor.]

WHY A YOUNG MAN SHOULD ENLIST IN THE NAVY

BY GEORGE DEWEY, ADMIRAL OF THE NAVY

It gives me much pleasure to comply with your request for my views on this subject. It is very near my heart, for it is upon the young men of the country that we must depend for the defense of our country's honor on the sea; and when the advantages of enlistment are better known, there should be no lack of applicants for positions in our naval service.

The naval career offers many advantages to a young man; but primarily he should have a taste for the sea, and then, in order to rise, in this career as in all others, he must apply himself diligently to acquiring all the details of a life full of interesting features. The Navy needs active, intelligent young men, and to those who will devote themselves to learning their profession every encouragement is held out.

Enlisting at seventeen years of age, the recruit at once becomes self-supporting; he is supplied with a complete outfit of clothing, and from that time until he dies, provided he remains in the service of the government, he is cared for in sickness or in health; and after thirty years of service if he is still an enlisted man, or upon reaching the age of sixty-two if he holds a commission, he may retire and receive for the remainder of his life three-fourths of the sea pay to which he was entitled at the time of his retirement.

The pay at first may seem small, when compared with what a brother may receive in civil life; but the young man should remember that in addition to his pay the government provides him with quarters and food, and that the naval life gives him an opportunity of visiting various parts of the world. This last consideration alone must counterbalance much that comes to a man in civil life, for there is nothing which broadens and educates as does travel.

In August last, Lieutenant Henry B. Soulé, U. S. Navy, who entered the service as an enlisted man, wrote a letter which is so much in the line of this subject, "Why a Young Man Should Enlist in the Navy," that I quote the following:

"My personal experience has been that no man who shows the least desire to learn and to improve himself in the naval service will ever lack assistance from officers or enlisted men of longer experience.

"No concern on shore offers more for the intelligence invested than does the Navy to the average American boy. As the law stands today, a boy can enter the service at 17 years, reach warrant rank with a salary of from $1,200

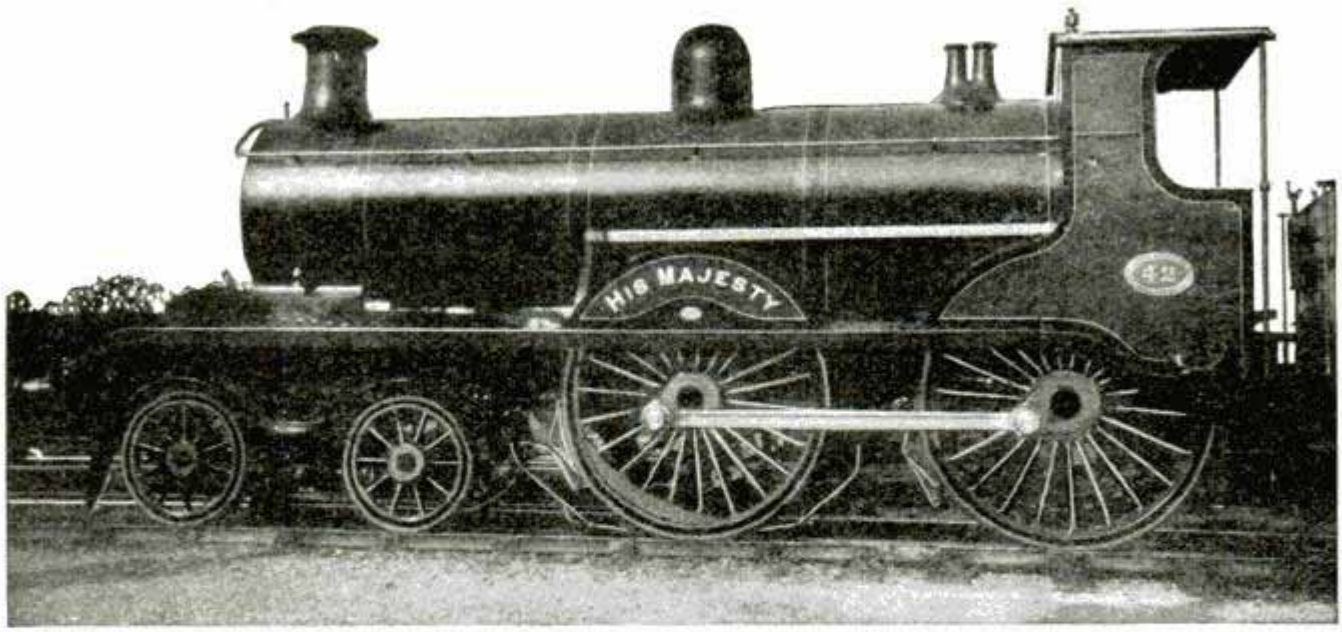
to $1,800 a year by the time he is 24 or 25 years of age, secure a commission in the line three years later, and enjoy the rank of full Lieutenant at the age of 30. From then on, his promotion is just as rapid and he will just as surely reach the grade of Rear-Admiral, as any other officer of similar rank.

"Should a young man lack the ambition or education to reach one of these higher grades (commissioned rank), he can still win out against his brother in civil life if he sticks to the service. During the thirty years an enlisted man is required to serve before retirement, his pay will average $40 per month. He ought to save $30 of that if he is as careful of his earnings as he would have to be in civil life, and should have $9,000 in the bank, not counting interest, when he is ready to retire at the age of 47, with $40 a month for the remainder of his life. Can you beat that in the factory, in the store, or on the railroad?"

But a young man should not be discouraged because he fails to obtain an officer's commission, nor must he expect to win this prize unless he devotes himself honestly to the work of preparation. The examinations are severe, and rightly so; for the young man who pursues a course at the Naval Academy has to work hard all of the time in order to obtain his commission, so it is but just that the young man whom we are considering should also have to work for it.

A last consideration which I trust will appeal to every American is the patriotic desire of a young man to serve his country. The deeds of naval officers have added many brilliant names to our country's roll of honor; and when a young man enters the Navy he may feel that it is quite possible his own name may sometime be added to the list.

NOTABLE ENGLISH LOCOMOTIVES--No. 2



THE ROYAL ENGINE--To run this locomotive is the height of ambition of every railroad engineer in Great Britain. It is used exclusively for drawing King Edward's special train. When in service an inspector invariably rides with the engineer and fireman. None other is permitted. The beauty of the ponderous machine is largely due to the entire absence of ornament and visible parts. It was specially built to order, the greatest possible care being taken in the selection and testing of every piece that entered into its construction. The engine is capable of very high speed: As will be noticed from the illustration it is a center crank drive.

George Dewey

Admiral of the Navy.

A MECHANICAL WIZARD

Harry Houdini, the international prison breaker and handcuff king, gave a remarkable demonstration in the United States jail at Washington. The warden of the prison invited him to make the test. Houdini was allowed first to examine the locks and doors and was then taken to a cell, searched, stripped nude, and in that condition was locked in another cell. The cell containing his clothes was also locked. The apartment in which he was left was the one which had been occupied for ten months by Guiteau, the assassin.

The warden makes the following official statement: "Mr. Houdini in about two minutes managed to escape from that cell, and then broke into the cell in which his clothing was locked up. He then proceeded to release from their cells all the prisoners on the ground floor. There was positively no chance for any collusion or confederacy. Mr. Houdini accomplished all of the above-mentioned feats, in addition to putting on all his clothing, in twenty-one minutes."

How was it done? That is precisely what the officials would like to know, for the condition of the test was that the expert should be left alone.

BATTLESHIPS SHORT LIVED

The battleship is short lived. Like some new garment which an ever-changing fashion puts aside as unfit for use although but little worn, so with the modern battleship. It is modern only a few short years and must then move down the line to make way for the newer, better, larger and faster ships.

From the "Constitution" to the "Oregon" was a long step, but no other vessels of the American navy so attached themselves to the hearts of the people. During that long cruise from the Pacific to the Atlantic the daily question was "What of the 'Oregon'?" And when without an hour's delay, with no stoppage of her machinery while at sea, she reported for duty cleared for action and in fighting trim it did make the Yankees feel good.

But the grand ship "Oregon" has passed her meridian; she has now been assigned to home guard service, and is ordered into the second class of defense, where for many years she will still be useful.

The trip which the "Oregon" made was alone worth all she cost, as a demonstration of the superiority of American machinery over all the world.

BOARDS MADE OF GROUND CORK

Cork in its natural state is considered the most perfect non-conductor of heat and cold. A composition board consisting of cork and some adhesive materials to hold it together and render the product damp proof is now made. These boards come in sizes 1 ft. wide, 3 ft. long and from 1 in. to 4 in. thick. They can be easily sawed to fit; in fact can be worked up like ordinary lumber.

The cork board is used in insulating all kinds of cold storage rooms, pipes, etc., and in houses, especially those constructed of cement.

NEED OF POSTAL CHECK SYSTEM

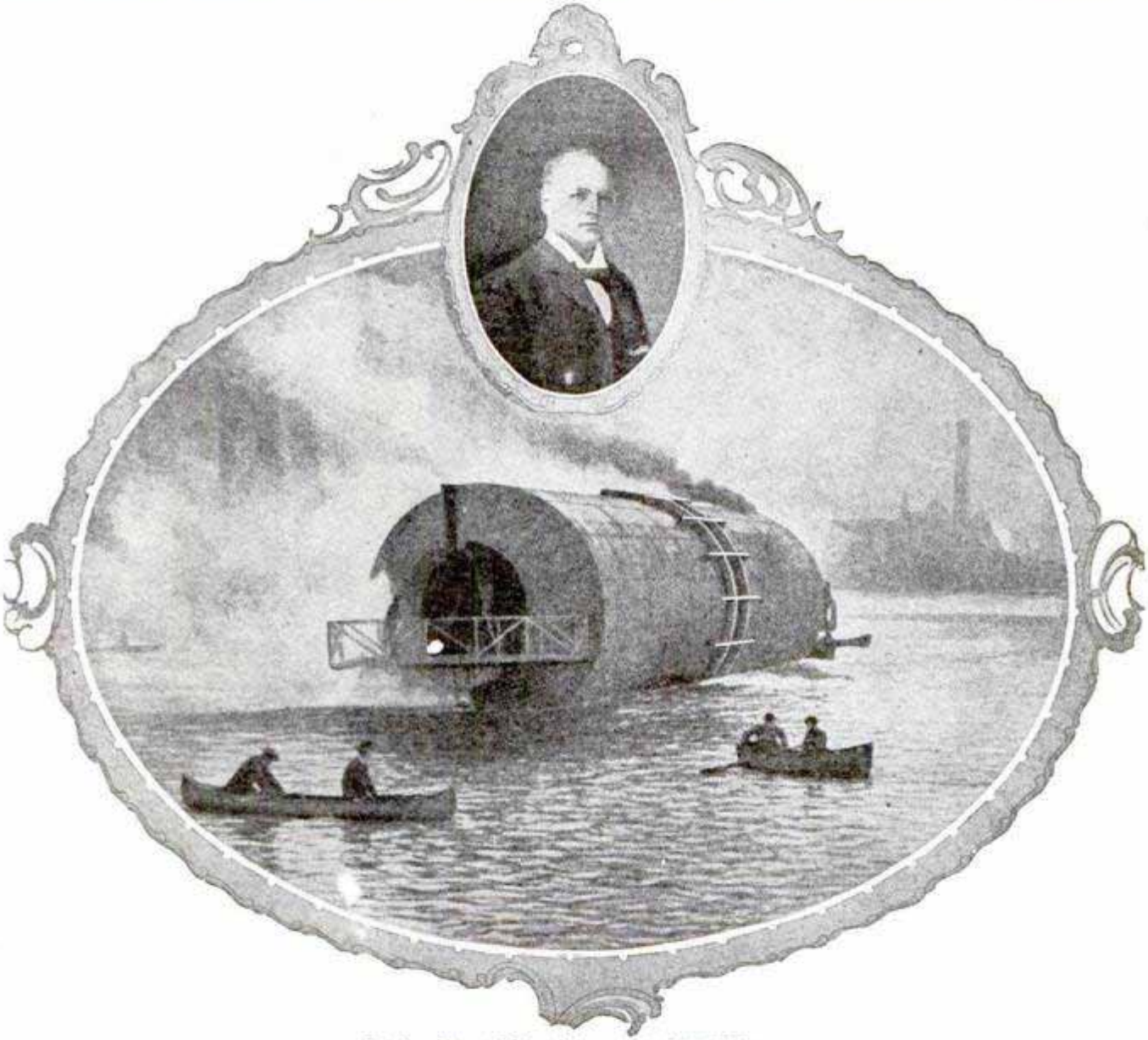
There is a great and growing demand for a postal check system. What is understood to be the beginning of a general movement in all large cities has already been put in operation in Chicago. The banks have formed a trust in which the large ones insist and the small ones dare not refuse to impose a system of heavy taxation on checks from other cities. It means a taxation on Chicago depositors amounting to hundreds of thousands of dollars annually. This at a time when the bank stocks are from two to six times above par and several of them erecting million dollar edifices in which to do business. A charge of 10 cents on a 50-cent check is an imposition. The banks and express companies of the country will fight to the limit against a postal check or postal note currency in small denominations, but the mass of the people need it; they want it; and they are going to have it. Some of our congressmen will do well to profit by the lesson of recent events. The people will not permit themselves much longer to be used as mere voting machines to put in office men who are there for what there is in it for themselves regardless of the rights of the public. The sorting out process is well under way, and honesty in high places is becoming more of a necessity every day.

Acetylene searchlights were used on an English farm the past season, so that harvesting might be carried on at night, says the Acetylene Journal. A field of 15 acres was cut in less than half one night by two reapers each cutting a 6-ft. swath.

PLANS TO CROSS OCEAN IN TEN HOURS

Proposed Craft is a Roller Boat 800 Ft. Long to Travel 180 Miles an Hour

The project of the roller boat is again being exploited on a large scale. F. A. Knapp, the inventor, presented his plans to the Engineer's Club of Toronto. In his address he reviewed his former experience of a few years ago, and startled his hearers with the announcement that it was possible to cross the Atlantic in 10 hours.



Roller Boat That Traveled 200 Miles

The previous roller boat was 110 ft. long, operated by means of two locomotives running on endless rails within the boat. These engines were placed one at each end, and rolled the boat forward, by climbing up inside just as a squirrel spins the wheels of his cage by mad attempts to ascend the bars of the circular prison. The demonstration was given in Toronto bay, and a trip made down the St. Lawrence to Prescott, a distance of 200 miles. Short paddles were placed at the middle of the boat to give a better purchase. Prominent engineers were emphatic in their predictions the craft would not advance, but only turn over in the water remaining in the same place. In this they were wrong, and some old and supposedly sound theories were knocked to pieces. They said it would not roll, but it did roll, although the speed was less than expected and did not exceed 6 miles an hour.

Mr. Knapp, who is a lawyer by occupation,

announced his intention to build another and larger boat, 200 ft. in diameter and 800 ft. long, which he expects will cross the Atlantic in 10 hours; in other words the passenger can take breakfast in New York and eat an evening dinner in London. The big cylinder is to be fitted with paddles, made of steel angles, 5 in. deep and extending its entire length. A speed of nearly 200 miles an hour would involve only 25 revolutions of the boat per minute.

As to wind pressure Mr. Knapp asserts the boat will roll into the wind instead of pushing dead against it. Steering will be accomplished by means of rudders at each end. In the proposed boat the steam turbine may be utilized which may easily be done by means of a driving gear at the end of the turbine shaft.

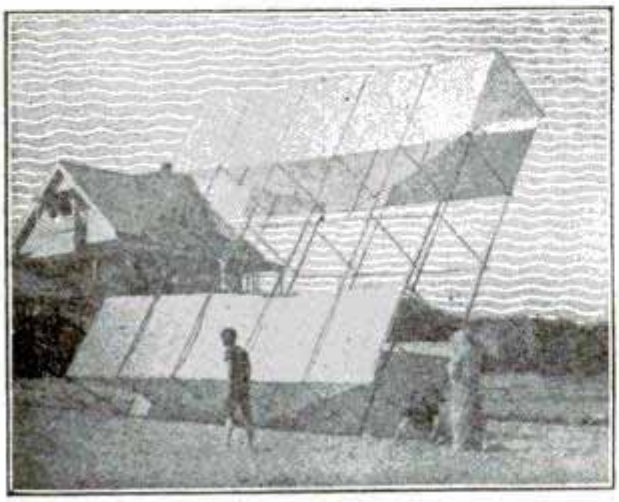
The Canadian Engineer says:

At the present time he is engaged on the design and construction of a tubular boat at the ship yards of the Canadian Shipbuilding Company, Toronto, which it is understood, will be ready for trial and operation in the spring of 1906. It is fully expected that this new type of boat will revolutionize the coal trade between Nova Scotia and Ontario.

A New York inventor comes to the front with a revival of the water jet boat which he states will drive a steamship at 100 miles an hour by means of gas engines. The scheme is impracticable but illustrates the attention which high speed ocean travel is receiving in these days.

AEROPLANE FALLS 300 FEET

Charles Hamilton fell 300 ft. with his aeroplane at Ormond Beach, Florida, but survives to try again. A rope 800 ft. long was fastened to a 60-hp. touring car and to the aeroplane, which resembles a mammoth box kite. When the car started the aeroplane rose like a bird and in a few seconds was 200 ft. in the air. The wind was blowing 50 miles an hour and the sky craft rose to 300 ft. At this moment Hamilton lost his cap, the dropping of which was to be the signal for the tow-driver to stop. As the car slowed down it looked as if the aeroplane was the stronger, for it pulled the car backward on its first speed notch. The plane gave a three-quarters dive, but righted, when the rope caught on a flag pole. The plane was not greatly damaged and Hamilton while rendered unconscious for a few minutes suffered no broken bones. He will hereafter use two 90-hp. cars in towing.



Ready for Flight

FINEST NAVAL SCHOOL IN THE WORLD

A great naval training station is being constructed at Lake Bluff, on the shore of Lake Michigan, a few miles north of Chicago. There will be nothing in all the navies of the world to equal it, and $2,500,000 will have been spent when it is completed.

The school will accommodate 1,000 men, and the finest naval training in the world will be given. Later the plan is to increase the buildings to take care of 2,000 men. Everything that modern science can suggest will be provided to make the place attractive and healthful, and Lake Michigan and the other great lakes will afford all necessary opportunity for cruising. One or more men-of-war will be attached to the station to provide the real thing in learning how to work the guns and sail the ship.

The American Navy gives its young men a training in electricity, steam, and navigation which cannot be secured anywhere else and pays them well for their time while learning. When their course is completed in case they decide to return to private life they do so with a prestige, training and experience which no college or school gives, and which enables them to secure the most desirable positions at good salaries.

Uncle Sam is a generous schoolmaster.

Many young men seem to think it is necessary to have the assistance of some influential congressman or senator in order to join the Navy. Such is not the case at all. Recruiting officers frequently visit all the large cities and will gladly give full information on request.

MECHANICAL CARICATURE PHOTOGRAPHS

Extraordinary Results in Picture Making--How It Is Done

One of the latest and most striking results which have been produced in connection with the possibilities of modern photography is the caricature photograph recently perfected by J. Ellsworth Hare, of Chicago. By the discovery of a practical application of a well known fact with regard to the nature of photographic films and their actions under the influence of heat as well as the influence of certain well known chemicals Mr. Hare has succeeded in producing perfect specimens of caricatures by a purely photographic process. When it is taken into consideration what an important part photography on the one hand and caricature sketching on the other have played in the development of modern illustrating the importance of the new discovery becomes at once apparent.

As is well known to all photographers the ordinary photographic plate is supplied with a collodion film which, under ordinary conditions and at the ordinary temperature, is firm and insoluble. Such a film naturally will produce upon exposure an exact impression. If the film is subjected to a moderate degree of heat, however, it will become soluble and run.

Mechanical Caricature of Mr. Bryan

Dr. Mary Walker

In manufacturing ordinary photographic plates the collodion film is flowed onto a plate that has received a coat of gelatine. This causes it to adhere firmly to the glass plate. The caricature photograph, however, is produced by the use of what is known as a stripping plate, in which the film is flowed onto a plate which has been merely edged with a gelatine coating. This leaves all of the plate but the edge plain glass to which the gelatine does not adhere. By the use of a knife blade the film in this kind of plate can be readily removed, which constitutes the first step in the process of caricature photography.

By the application of heat from a gas lamp the film can be easily stretched into almost any conceivable shape, with the drawback, however, as any amateur can testify, that the image is liable to be blurred and in fact hopelessly distorted. In order to control the stretching in such a way as to get the desired result the film is treated with a chemical preparation the ingredients of which are a secret of the inventor of the process. In order to better illustrate the work, two characters of national reputation are selected, and who will readily be recognized by our readers: Mr. Bryan and Dr. Mary Walker. The degree of success which has been attained in applying this formula in accurately controlling the re-shaping of the image is shown in the illustration representing a man walking down the street. The figure of the man is represented in the picture caricaturized while all of the other objects shown retain their normal form. In the caricature of Dr. Walker, it will be noticed the steps are scarcely changed while the figure is extended to appear several times its actual height.

Applying this principle to a single figure of a human being any portion of the person may be altered as desired, thus producing an accurate caricature. The possibilities are limited only to the ingenuity of the photographer. One ear may be elongated; the nose extended to appear a foot in length while all the other features remain unchanged; one cheek can be inflated like a balloon, or the neck stretched to the size of a finger or drawn out larger than the body.

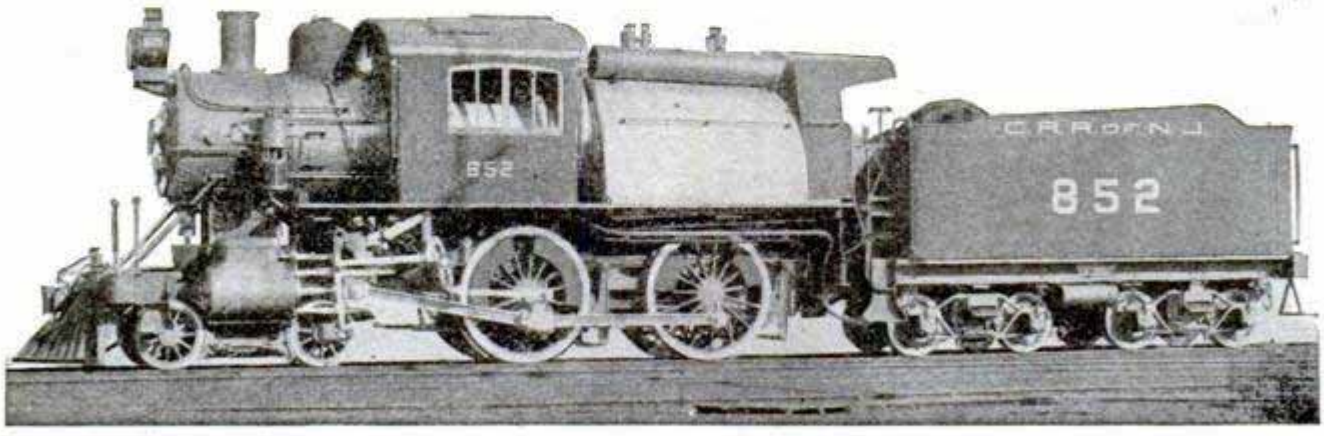
Thus by the application of a series of simple principles we have a perfect specimen of a caricature produced by purely mechanical means.

NEW AMERICAN LOCOMOTIVE

The illustration shows the new American type locomotive, several of which have been built for the Central Railroad of New Jersey. It is believed to be the heaviest yet built of this type. The service will be hauling a 134-ton passenger train over heavy grades. The Walschaert valve gear is used. Cylinders are 19 by 26 ins.; weight of engine 158,000 lbs.; boiler pressure 200 lbs.; height above rail 14 ft., 8½ ins.; tank capacity 5,000 gal. water, 12 tons coal.

DISCOVERS LOST DREDGE

A dredge-boat which cost $65,000 was sunk in Lake Ontario during a storm on October 26, 1902. All efforts to locate the dredge proved fruitless until a few weeks ago when a fisherman who has long searched, found it in 78 ft. of water. He marked the place with a buoy and received the reward of $500. The dredge is 2½ miles from shore and will be raised at once, when it is hoped to determine the mysterious cause of its going down.



Heaviest Engine of Its Type Ever Built

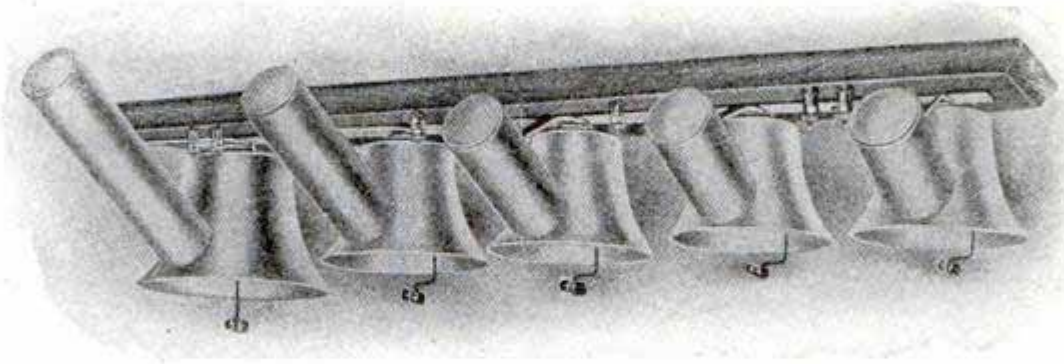
ELECTRIC HOUSE CHIMES

Silver toned bells sounding sweet chimes throughout the house is one of the luxuries which is now obtainable at a price within the reach of the many, where formerly the cost of a single chime frequently amounted to hundreds of dollars. The chimes may be placed in any part of the house, or concealed in out-of-the-way places, and the several sets operated electrically from one master clock.

The chimes can be set to sound the quarter, or half hours, or only the hours, or by turning a switch, cut out of action entirely when not wanted.

Small bells with exquisitely sweet tones are supplied for residences, and larger ones with farther reaching sound, for clubs, schools, or stores. By running wires to each room in a house a secondary dial will give the exact time in each room without any attention whatever. An occasional winding of the master clock does for all.

By touching an electric button the chimes may be made to play whenever wanted, as for instance while guests are being seated in the dining room and at such other times as may be appropriate.



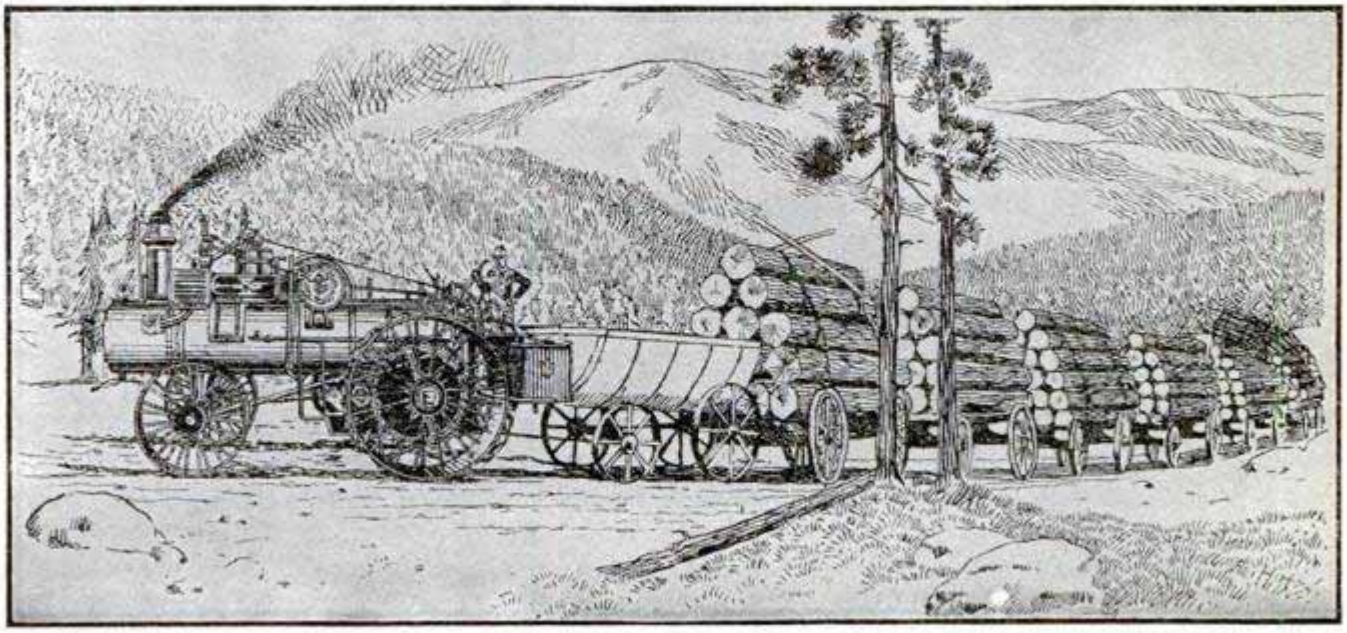
Silver Toned Bells

FILLING FOR CRACKS IN FLOORS

For filling cracks in floors boil paper pulp and fine sawdust together for several hours and mix with glue dissolved in linseed oil. Put on the filling and leave till partly dry, then cover with paraffin and smooth with a hot iron.

HAULING LOGS IN COLORADO

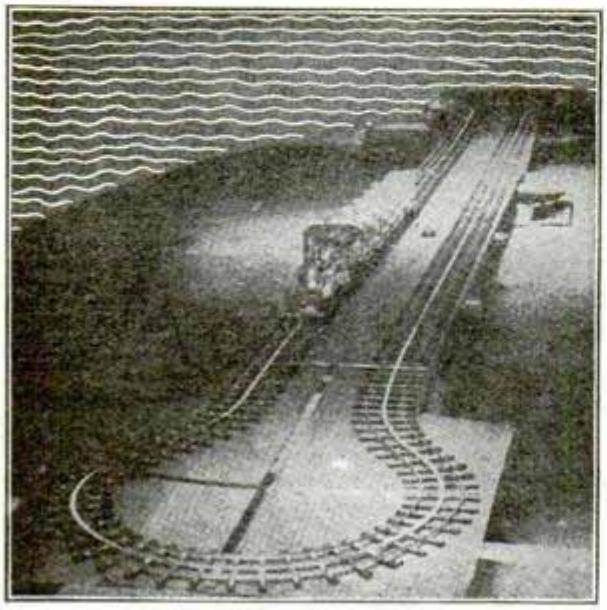
Hauling heavy loads with traction engines is far more common in the far West than elsewhere in this country. The illustration shows a wagon train loaded with 70 tons of logs, drawn by a steam traction motor.



Wagon Train Loaded with 70 Tons of Logs

MODEL RAILWAY ON BANQUET TABLE

At the close of a banquet given by the Maharajah of Gwalior to the Prince of Wales, who is now touring India, a centerpiece in the form of a temple and decorated with electric lamps and flowers was hoisted



Locomotive and Train 8 Ft. Long

to the ceiling by pulleys and revealed a perfect model railway on the table underneath. The locomotive and train were 8 ft. long and the cars carried decanters, cigars, cigarettes and matches.

The train was started by closing a circuit, one point of which was a flat spring. As long as this was held down by weight the train moved, but the lifting of a decanter or box of cigars resting on the spring allowed the spring to act, thus breaking the circuit and stopping the train.

ELEVATED CAR ATTRACTS COMPASS NEEDLE

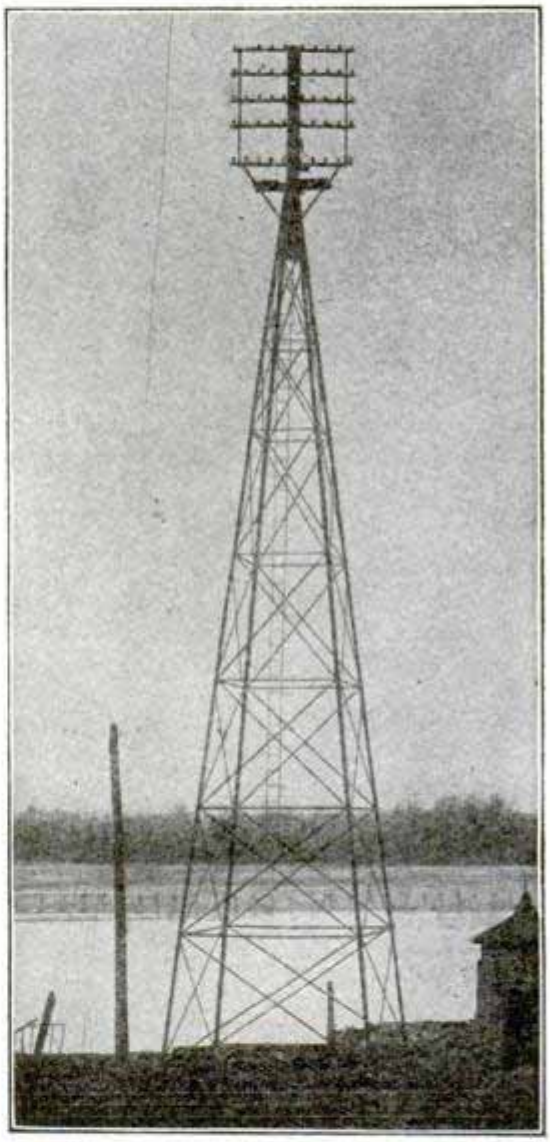
A short time ago while passing along Third avenue, New York, I peeped into a show window that contained a mariners' compass and observed the magnetic needle in an oscillating movement, which, to my astonishment, proved to be caused by the passing elevated trains. These trains usually consist of six cars each, every other car being without a motor.

As soon as a train approached the needle would be attracted toward the first car, then as it passed, toward the next car with a motor, and so on until the last car had passed, when it would remain pointed toward the train until it was a hundred yards off. Then as the magnetizing forces from the train diminished the needle would gradually return toward the north pole.

The train on this occasion, was going due south. No movement of the needle was noticeable when trains from the south were passing, as the thoroughfare at this point is very wide.—Contributed by Charles Weslow, Harrison, N. J.

STEEL TELEPHONE TOWERS AT KANSAS CITY

Steel towers 80 ft. high, are used at Kansas City, Mo., for suspending the long distance telephone wires over the Missouri



Courtesy W. O. Pennell, Eng.

Steel Telephone Tower

river. The span is 1335 ft. and fifty No. 8 steel wires are used; they are the direct wires from Kansas City to Omaha and Chicago of the Missouri & Kansas Telephone Co. The wires "dead end" on a steel terminal about 700 feet beyond the towers, and are at a sufficient elevation over the river to clear the smoke stacks of river steamers.

STEAM AUTO AMBULANCES FOR THE ARMY

The first important change since the Civil War in facilities for removing dead and wounded men from the battlefield has been made by the United States War Department in the adoption of a new steam automobile army ambulance. One of the machines has been under test for the past few weeks at Fort Myer, Va. It is an 18-hp. car, with the regulation touring-car chassis, upon which is mounted a body in the form of a miniature hospital.

From the high top fall heavy curtains bearing the emblem of the red cross. Within are two long seats, which are folded up against the wall when wounded soldiers are to be carried. Then heavy oak poles, or standards, are unhooked from the ceiling and set in place in the middle of the car, dividing it into two compartments. Two stretchers can be placed on the floor of the car and two above, like the upper berths in a sleeping car. These upper stretchers are supported on one side by hooks in the poles and on the wall side by leather straps. There is a step at the rear of the car for the ambulance surgeon and room on the driver's seat for two medical attendants.

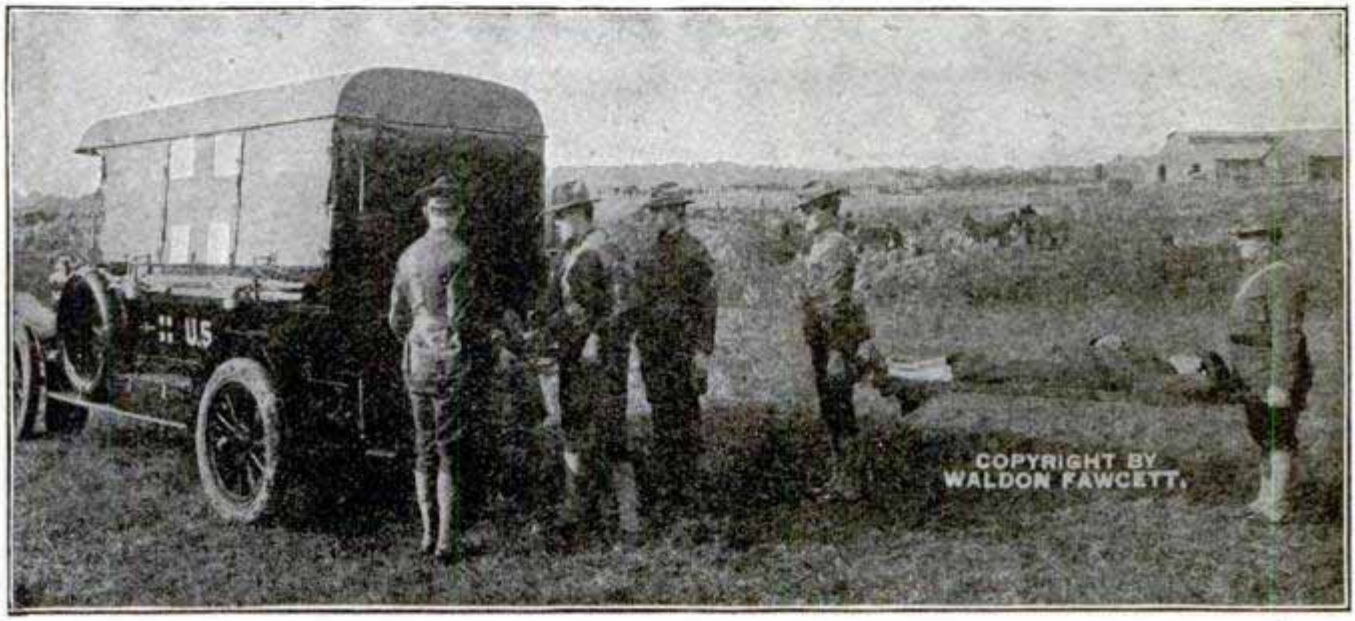
Steam was chosen for power for several important reasons: Steam autos are good hill-climbers, they are dependable in any weather and very free from vibration, an important consideration in moving wounded men. In tests the machine traveled over plowed ground at the rate of six miles an hour, and behaved splendidly under several high-speed trials.

DRY DOCK SAILING SAFELY

The great floating dry-dock, the Dewey, described recently in this magazine, and which is making the longest trip ever attempted by such a craft, is proceeding safely and satisfactorily on its way to Manila. The Suez canal has already been widened to permit of its passage. The canal will be closed to all other vessels while the Dewey is going through.

Daily reports by wireless telegraph keep the Navy Department advised of the progress made.

In connection with this remarkable trip, it is more interesting than satisfactory to learn that the three vessels towing the dock are all British built, and that the great steel hawsers used were also made in England. The firm which imported the towing lines paid freight, duty and insurance and then furnished them for $1,000 less than American manufacturers bid. Of the towing vessels the Washington Post says: "Here is a magnificent American production, planned by American brains and built of American materials with American hands, and conveyed to an American possession by British vessels! Here is a theme for the champion of American ships. It is not a condition to be proud of."



Placing the Wounded on Stretchers in a U. S. Army Auto Ambulance

The British postal department will not transmit mail (postcards, etc.) enclosed in transparent envelopes with the address written on the contents. Such mail is too difficult to sort. The practice has been greatly in vogue in Canada, but will probably be prohibited in the domestic mails there, also.

PAPER MAKING A GREAT INDUSTRY

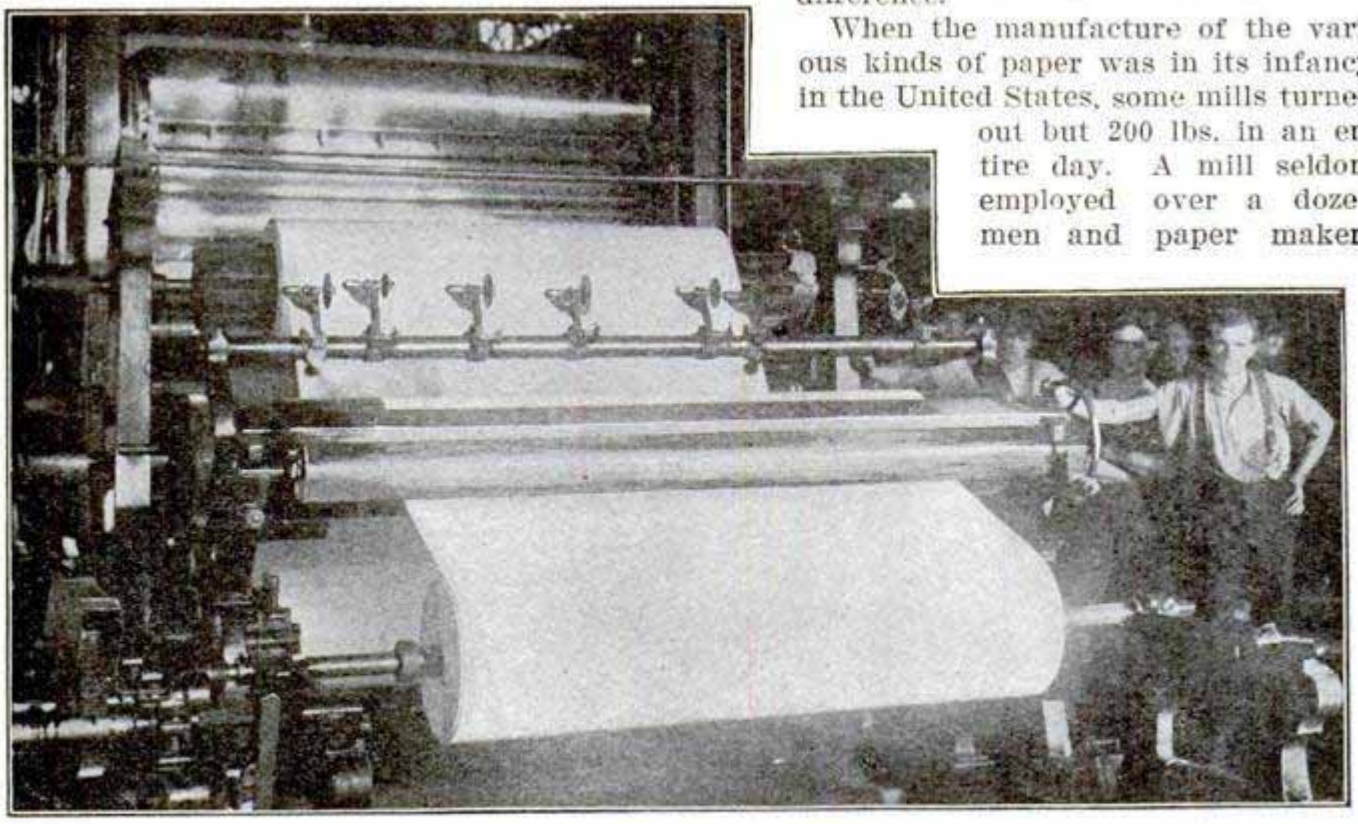
The Digesters

Requiring Much Skill, Ability and Capital

To compare a paper mill completed in 1906 with the small establishments called by that name fifty years ago is like comparing the Sunday editions of a great metropolitan daily with a backwoods country weekly. Paper as made to-day requires large capital, a single mill often costing as high as $1,000,000, and built to make only one class of paper at that. Machinery of great size and weight, but built with the nicety of a watch is required, and in the operation of the plant, expert paper men and chemists whose experience has cost years of study and thousands of dollars.

The art of paper making is not found in books, nor taught in any other school but in the mill itself. Like the making of steel, success depends very largely upon the judgment of the workmen, for the very condition of the atmosphere enters largely into the quality of the product. As a matter of fact, with the exception of the most expensive papers, the same men, using the same materials, and the same machine rarely are able to make next week exactly the same sheet they turned out a week ago. The layman can detect no difference, even the expert may find it difficult to distinguish between the two, but nevertheless there is a difference.

When the manufacture of the various kinds of paper was in its infancy in the United States, some mills turned out but 200 lbs. in an entire day. A mill seldom employed over a dozen men and paper makers



Paper Coming Out of Machine

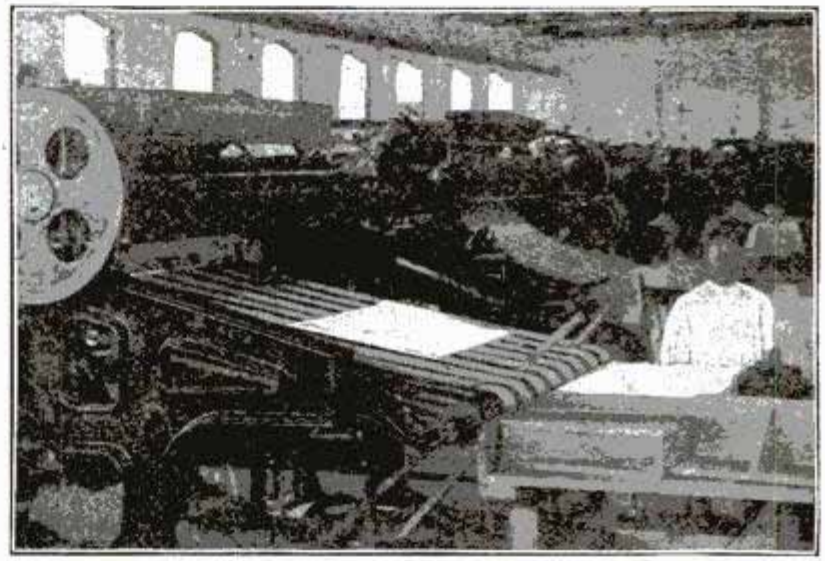
were a transient class who lacked steady employment. Rags were so scarce that they sold as high as 10 or 15 cents a pound, and other materials from which paper could be made were then practically unknown. Three things have been responsible for the change which marks the enormous present-day production—a production which in value amounts to $127,000,000 annually. In the first place there has been a generous increase in the supply of rags. Second, the introduction of wood pulp to take the place of rags; and, third, the introduction of machinery which will turn out webs of paper at the rate of 300 to 500 ft. per minute.

Even after the introduction of pulp for the making of newspaper, rags were for a long time used altogether in the manufacture of book and writing papers, but to-day wood pulp has entered this department also, with excellent results, and is growing in favor. The method of obtaining rags is well known to all. Collecting, sorting, baling and shipping is the story in a nut shell. A queer fact about these rags, too: Several tons of the same kind of rags are worth more per pound than a few hundred pounds.

The raw material for the wood pulp mills is chiefly spruce and poplar. On arriving at the pulp mills from the forests, the spruce logs are cut into short lengths and the bark removed. Next they are cut into chips and the chips go to digester tanks in which they are cooked with sulphuric acid. In one digester 10 to 12 tons of pulp are produced in a day. The pulp is next bleached and washed in tubs, after which it goes into beating machines, where it is thoroughly cut up and mixed by means of mechanical knives, and where both the coloring and sizing are added. A soda fibre is produced from softer woods, such as poplar, by the use of a solution of caustic soda in the digesters instead of sulphuric acid. These two fibres represent the chemical methods of producing pulp. A mechanical pulp is also made by holding the logs of wood against a grindstone.

Pulp mills may be operated entirely separate from a paper mill, and, in fact, there are nearly a hundred of them in the United States which manufacture pulp for sale, while, of course, in other cases it is made by the same mill that makes the finished paper. By pressing some of the moisture from the pulp, when so desired, it can be made into sheets until such time as it is to be used in the paper machines. Where made at the paper mill it goes from the beaters into what are known as "stuff chests" and is kept agitated until it comes time to pump it onto the paper machines.

The pulp goes onto the great modern paper machines spread upon a moving endless wire cloth. This is supported by a series of metal rollers which are so set as to maintain a perfectly even surface. Simultaneously with the moving of the pulp upon the endless wire cloth, the fibres are made to interlace by means of a lateral motion of the rolls, and the water which carries the pulp in suspension gradually passes through the meshes of the cloth. At a certain point in the machine, the web of pulp leaves the wire cloth for metal rolls covered with woolen felt. After being carried between the rolls of several presses it comes in contact with heated cylinders which are for drying.

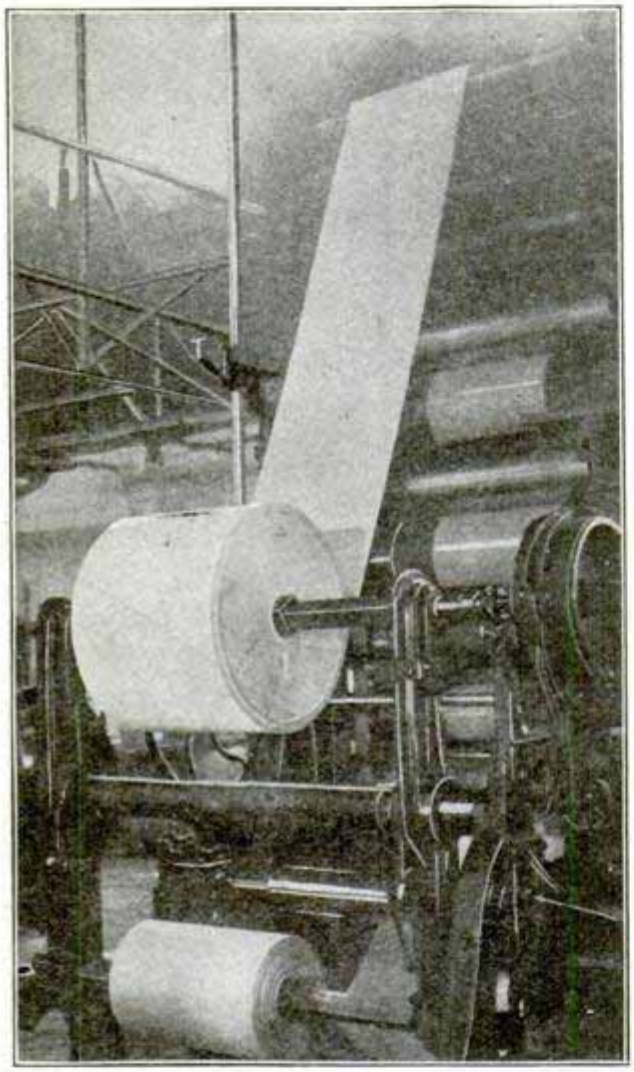


Machines that Cut the Paper Into Sheets

The paper is now ready for its glazed surface, which is obtained with the calenders—machines with metal rolls arranged in several tiers. Between the rolls the paper passes under pressure. The widest paper machines of the present day produce webs of paper 165 inches wide, and at the rate of 40 tons every twenty-four hours. Widths of this kind can, of course, be slit into narrower ones and rewound—another mechanical operation.

That which is to be fine writing and book papers requires a higher gloss than is given it by the calenders and this is obtained by supercalenders where the rolls are alternately of compressed paper and iron. From the

supercalenders the paper which is to be ruled or which is to be packed and shipped in sheets, is taken to a cutting machine. From the rolls it is fed into this machine and an arrangement of continuous tapes delivers it to a table in the sized sheets desired. Here each sheet is inspected with



Putting On the Finish

great rapidity and each soiled or defective one thrown out.

Perhaps the most interesting mechanical device in connection with the entire process of the making of writing paper is the automatic ruling machine. Piles of paper in large sheets are placed at one end of this machine. The ink receptacles are filled with the color of ink desired and the machine is put in motion. Mechanical fingers carefully and rapidly lift each sheet from the pile to be ruled separately and feed it onto tapes which carry it between tiny wheels, the edges of which act as pens. The upper series of wheels through which it passes rule one side of the paper while the lower series simultaneously rule the other, and the ruled paper is promptly delivered at the opposite end of the machine without the touch of a human hand. When desired another machine makes the necessary folds and creases for the small double sheets of letter paper.

The amount of capital represented in the paper industry of this country to-day is close to $200,000,000. Some 50,000 people depend upon it for a livelihood and the number of establishments engaged in either the pulp or paper industry, or both, is about 775. The per capita consumption of paper is 56 lbs., according to the last census report. Our annual exports of paper exceed $6,000,000 in value and our imports are close to $4,000,000.

America is a land of paper.

TELEGRAPH LINE 6,600 MILES LONG

An unusual feat in telegraphing was accomplished recently in Australia. This consisted in transmitting messages over a distance of 6,600 miles. Broome, on the extreme west coast of Australia was connected to Cape York, on the extreme northeast over the line shown in the illustration. "Communication was maintained for 15

Map Showing Route

minutes at a key speed of 20 words per minute, without any indication of lag in the signals," states the Electrical Magazine, London.

BALLOON CAUSES SHORT CIRCUIT

One of the strangest of causes of a short circuit, is reported from Vienna. A balloon descended in a neighboring village, and let down its anchor rope in order to give some mail to be posted. This done, the rope was released, and in rising caught upon some electrical conductors carrying current at 15,000 volts. The result was a remarkable display of fireworks and the disabling of the electric system for several hours.

WELLMAN NORTH-POLAR AIRSHIP VOYAGE DECLARED POSSIBLE

By Carl E. Myers, Aeronautic Engineer

I am of the opinion that the north-polar airship voyage projected by Mr. Walter Wellman for the Chicago Record-Herald, with M. Santos-Dumont as pilot, in an airship to be built by M. Godard, of Paris, France, will be successful.

This criticism from the viewpoint of a consulting and constructive aeronautic engineer of 27 years' continuous experience should have the more weight because I own to a certain prejudice against north-polar expeditions, based upon extensive reading of past adventures in the polar regions by various means, including the ill-fated Andrée balloon attempt.

While I do not favor polar expeditions as a whole, because of waste of life and

Carl E. Myers

Walter Wellman

money without commensurate results, I am distinctly in favor of well planned aeronautic efforts to discover the poles, if discover them we must, and with equipage in every way as complete in its line as previous polar marine expeditions have provided.

Among such equipment I do not include the Andrée balloon, which I considered woefully inadequate to reach the pole except by the most limited chance. To succeed there must be provided competent propelling and steering appliances and a gas vessel more impervious to hydrogen than was the Andrée balloon.

Of first consequence is the absolutely gas-tight balloon, with facilities for automatic adjustment of equilibrium in air, avoiding loss of gas or ballast as the vessel expands by heat or altitude and shrinks by cold or leaks. Surely no sea voyager will expect success with a leaky vessel, which cannot be even "bailed out," and is unprovided with oar or rudder. Such was Andrée's balloon, to tempt the frozen north without a guide. Such a wind-blown attempt should have been prefaced during several seasons by the flight of thousands of toy balloons suitably marked, to learn the course of aerial currents, as the coast surveys are provided with floating bottles to aid in preparing sea navigation charts.

Santos-Dumont

Given a tight gas vessel, Mr. Wellman's previous polar experience should fit him for polar adventuring, as M. Dumont's experience fits him for aerial adventure, and his practice with large and powerful airships fits him for supervising such constructions if confined to lines entirely within his experience. Whatever novelties in structure or principle are introduced should be well tried in favorable or safe localities before tempting the polar regions beyond recall or repair. Anything otherwise would be folly.

I consider Alberto Santos-Dumont as one of the few individuals possessing ideas derived from airship experiences making him competent to pilot this aero-polar vessel. Most of the popular theories on aerial navigation are incompetent, if not blundering, and they lack proof in practice.

Without going into details at this time regarding equipment, I am, from the attention which I have given this matter during many years past, confident that the average chances with the propelled airship expedition are about ten to one in its favor compared with expeditions based on any previous attempt. Among such I do not class the Andrée balloon, which had not even the ghost of a chance. As I have no present knowledge of exact appliances to be included in the coming expedition, I can not be more certain of results, but I have every confidence in belief that with the facilities and experience existing already in America, an American aero-polar expedition could be created and operated even more certainly than with European constructions, and in much less time.

We have combined in the United States the best constructive talent and facilities in all the world, unhampered by old methods, or old time systems which follow beaten tracks and ideas instead of cutting across lots. The one feature which has made Santos-Dumont most successful has been his deviation from old time aeronautics, to the amazement of his French constructors by his aeronautic heresies. Because of these heresies and the testing of them he has acquired an unusual experience and established confidence in air navigation where it did not exist before.

I have had a kindred opportunity in America for such experiments with no restraint whatever, till there now seems no impediment, save one. The simple reason why such influential results have not been attained in America as in Europe, and earlier inaugurated, is chiefly want of power. The development of aerial navigation in its widest sense rests only on the attainment of requisite power. That power is—the "almighty dollar." With it any project can be floated, and it is the only present impediment to aeronautical supremacy in America.

Had Santos-Dumont been merely an impecunious inventor, like most airship fanatics and balloonatics in America, delving for daily bread, his success would have lingered in waiting on his hampered opportunities. Fortunately he had the power in hand. He deserves the utmost credit for having launched it in air, to return to his hand like a well-flung boomerang. A greater reward awaits any American of wealth who shall use it to the exploiting of aeronautics, as I have repeated by tongue and pen these many years past.

Surely none has demanded that aerial navigation should appear or it would have appeared on demand. The time certainly is ripe for aerial adventuring. There is the entire aerial realm to conquer—the portals at your very doors.

A hundredth or a thousandth part of the means spent already in polar voyaging by sea and ice would have accomplished polar discovery by airships ere this. It seems to me that nothing but accident pure and simple can prevent Mr. Wellman's accomplishing this result if provided with such aerial equipment as is now at hand, or readily to be created at command.

The encouragement of such expedition by the Chicago Record-Herald is on a line with our pioneer news organs of the day, and as a financial speculation it can not fail of success. The World moves. Fifteen years ago I attempted to inspire New York and San Francisco newspapers with the idea of a trans-continental airship voyage, but got no encouragement. I had then built seven airships. I have built twelve more since. One of these in 1900 flew 700 miles. It made 120 voyages of a half hour each, describing all possible aerial evolutions, and returned to the port of departure each time, on a time schedule and clock. Its track through the air was followed, more slowly, by a hand-and-foot screw-propelled airship each day during five weeks' continuous daily experimenting.

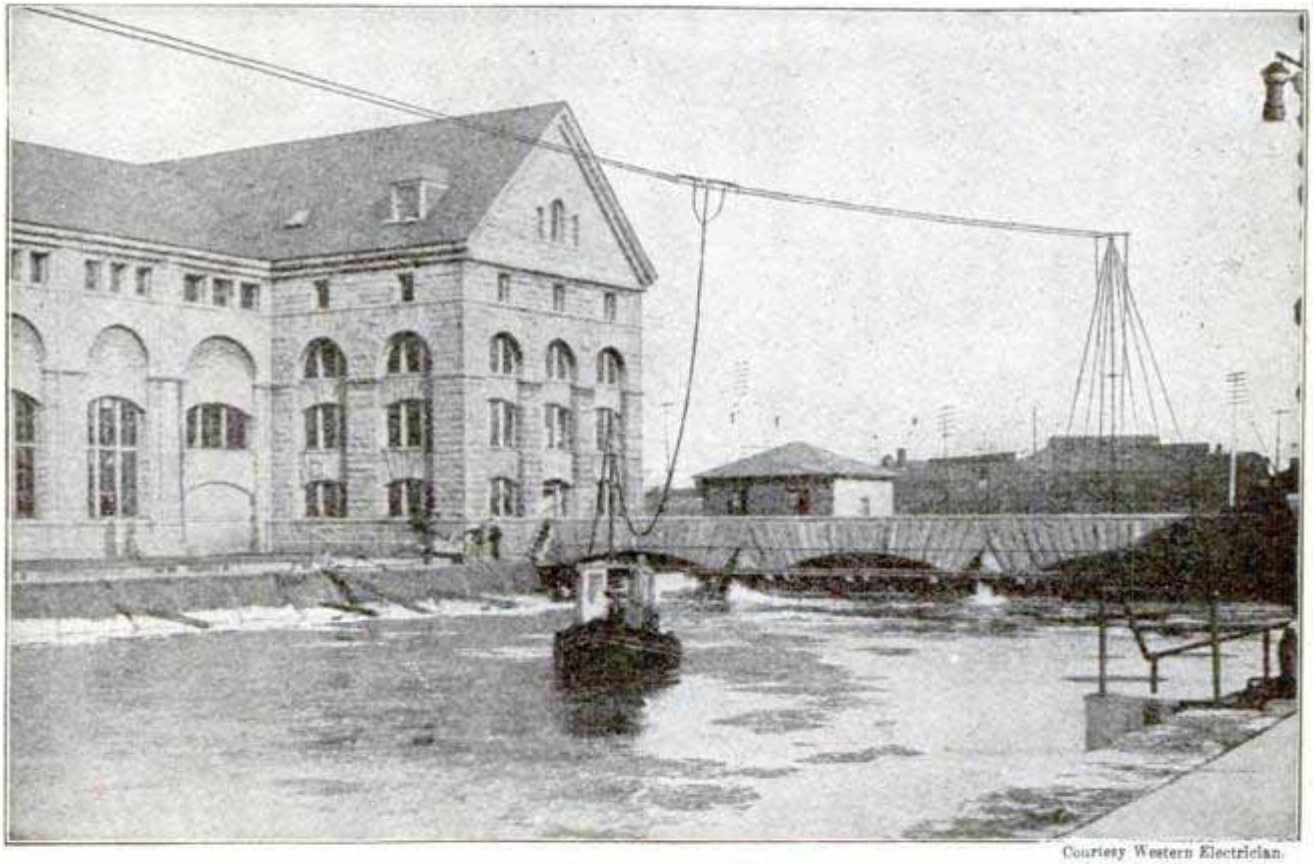
Not one single development of novelty embraced in these flights has since been

demanded by the public, and therefore remains unwrought. There has been no field for them. The machines which I have built since are mere child's play, to amuse the public, whose amusement is the only public demand for airships or air navigation in America. The last of these was operated at the State Fair, Syracuse, N. Y., September, 1905, in presence of 60,000 spectators. In November following, it made a journey of 2,000 miles from my balloon farm at Frankfort, N. Y., to San Antonio, Texas, enclosed in two trunks. When expanded to a length of 54 feet and 16 feet diameter, with a high speed motor, screw propeller and guiding planes, with myself on board, it amused 100,000 spectators during a ten days' fair and came back home 2,000 miles again in two trunks as common baggage.

This does not represent the status of air navigation. It only represents the present public demand. There is no other demand for air navigation till public or private sources or necessities warrant it.

Meanwhile I not only believe in the easy possibilities of aero-polar discovery, but know them.

TROLLEY BOAT AT NIAGARA



Courtesy Western Electrician.

Trolley Boat to Disperse Floating Ice at Niagara Falls Power Plant

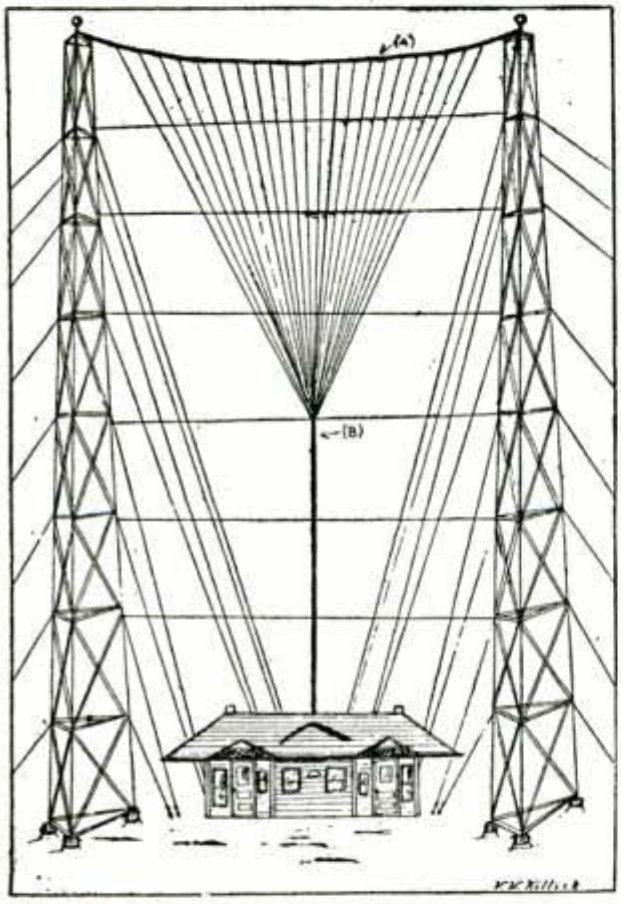
The power company at Niagara Falls has built and put in operation a trolley boat. This unusual craft is 25 ft. long, 10 ft. wide, and has a draft of 3½ ft. It is propelled by an ordinary street car motor; and a street car controller is used. Two overhead wires —one for the return current—are suspended 40 ft. above the water, and the wires leading from the trolley to the boat are long enough to enable the boat to go to any part of the canal which supplies water to the power station, and which is 400 feet in length. The motor is geared to the propeller shaft in the ratio of 64 to 18. The boat is strongly built as its work is to break the ice in the canal and insure a free supply of water for the turbines.

Steel kegs are now used by a manufacturer as receptacles for white lead. The keg prevents the lead from drying out, is noncollapsible, closes tightly, requires no coopering, lessens the fire risk and can be used after the lead is removed.

MOST POWERFUL WIRELESS STATION EVER BUILT

Will Soon Connect Pacific Coast with Honolulu and May Reach the Orient

About the time this reaches our readers service will be inaugurated between the Pacific coast and Honolulu by means of the largest wireless telegraph station ever built. The work has been done by a local company, which already has connected some fifteen



Towers 300 Ft. High

coast points by wireless system. This new station is built on the top of Mt. Tomalpias, 2,600 ft. above the sea, and 15 miles from San Francisco. The station includes two towers, each 300 ft. high, trianguiar structures tapering from 20 ft. at the base to 4 ft. at the top. The towers are of Oregon pine and oak, resting on a cement base and guyed with steel cables. Six hundred tons of rock were blasted away to make the platform. The towers were first built at sea level, then taken down and shipped by rail to the summit and set up again. Three thousand pounds of copper wire are stretched between the towers. The largest induction coil ever built is installed in the station. Two thousand miles of No. 30 silk insulated copper wire, wound on a core 16 ft. long, was used, the completed coil weighing 4 tons, producing a spark 15 ft. long and as large as a man's body. Its capacity is expected to be 500,000 volts. More than a ton of specially prepared beeswax paper was used in insulating. The station is expected to be able to pick up vessels on the Pacific within a range of 2,500 miles, and as soon as similar stations are completed at Honolulu, Philippine Islands and the coast of China, the Pacific ocean gap will be filled. While private enterprise is busy the government has not been idle.

Very recently the United States government has authorized the erection of lofty wireless telegraph towers at several important points on the Pacific Coast—notably at Mare Island Navy Yard, at the Naval Training School on Goat Island, at Benecia Barracks, California, and at Brementon Naval Station, Washington. The new wireless system is to be very generally used in the future by the War Department.

Pacific Coast army officers are greatly interested in the announcement of General Greeley, Chief U. S. Signal Officer, that, as a result of exhaustive experiments, receivers have been perfected that will enable the army to intercept and read the messages sent by any system of wireless telegraphy now in use. With the receivers in question the United States Signal Corps claims to have placed its code of secret inter-communication ahead of that of the naval system. The invention is absolutely secret, and is to remain so.

At the present time the United States Navy uses three systems of wireless telegraphy, viz.: the Fessenden, the Arco-Slaby and the De Forrest. With the new invention of the Army Signal Corps, the messages sent by any of the warships can be intercepted and used. It is understood that the army will install the improved wireless receivers in every fort in the country.

Pacific Coast army officers assert that the invention places the army in a position to cause considerable trouble to any foreign government in the event of a clash, and the news of the invention abroad will doubtless attract very great interest in military and naval circles of foreign powers.

The California naval-militia people are all earnestly hoping that Congress will pass the bill now pending, which proposes to have a reserve force which may be called out in time of war, and to place the naval militia on a sound and more practical basis.

POPULAR CHEMISTRY

By Max D. Slimmer, M. A., Ph. D.

This Department will appear regularly in the future and will contain talks on chemical subjects of general interest written in unscientific language "so that you can understand it." It is hoped that the readers of Popular Mechanics will assist us in making this section of the magazine as helpful as possible and with this end in view suggestions as to articles of interest or inquiries on chemical subjects will always be appreciated. In this connection its editor will be pleased to answer for our readers questions that may be addressed to him. Should the questions involve analytical work or extended research for which a charge should be made, such work will not be undertaken, nor any liability incurred for payment for same without first submitting the price and receiving positive instructions to proceed. Address all inquiries with self-addressed and stamped envelope to Dr. Max D. Slimmer, 357 Dearborn Street, Chicago.

LUBRICATION

When two bodies are brought solidly in contact, resistance is offered to their relative motion. This resistance is known as friction. Frictional resistance varies greatly with different materials, being least between polished and hard, and greatest between soft and rough surfaces. It is due to the interlocking of projecting particles upon surfaces in contact; the power necessary in overcoming friction is used in unlocking or tearing apart these projecting particles. When such projections are forcibly broken off, abrasion or wear is the result. Friction between surfaces of unequal hardness results in abrasion of softer surfaces. Friction due to the interlocking of projecting particles is naturally greater in rough than in smooth materials. There is another sort of friction found among very smooth materials. This is due to what is known as the cohesion or adhesion of the materials in question, and is greatest between absolutely smooth surfaces composed of similar materials.

It has long been known that when two absolutely smooth surfaces are brought into very intimate contact, an actual welding of the materials composing them may result. For instance: Two sheets of glass ground absolutely true and perfectly clean, when brought together, will adhere with such force that they can only be separated by breaking. That this is not due to atmospheric pressure is shown by the fact that the same results are attained in a vacuum. To what extent such welding can take place is shown by the following experiment performed by Mr. Robert Austin. A rod of absolutely pure lead was placed upon a sheet of gold and brought into intimate contact by pressure. At the end of three days it was found that particles of the gold had actually diffused into the lead for a distance of some inches.

Dissimilar materials do not adhere as readily as do similar ones. For this reason it is customary that the axle be of different material from the bearing. As a rule, the axle is steel, while the bearing is some softer material which can be readily replaced when worn out.

Materials used for reducing friction are known as lubricants; they may for convenience be divided into two classes, solid, semi-solid and liquid. The first class consists principally of mineral materials, such as graphite and steatite. The second and third classes are composed of animal and vegetable materials as well as of substances of mineral origin. In general, a material to be a good lubricant must have certain properties.

1. *Viscosity or fluidity.*—This property of lubricating material is commonly measured by the number of seconds required for a given amount of the same to pass through a narrow opening of standard size under definite conditions. Experiments have shown that the best lubricant for any specific purpose is the one having just sufficient viscosity to keep the bearing surfaces apart. Material of higher viscosity, instead of reducing the driving power required, may actually increase it. As the viscosity varies with temperature it is always necessary that oil should be tested for viscosity at the temperature at which it is to be used.

2. *Freedom from tendency to change under the influence of air.*—Such changes are of two sorts, gumming and spontaneous ignition. When oils are exposed to the air that absorbs oxygen they grow thicker. This action is a true oxydation, and in cases where the oil is finally divided enough, as for instance in oily cotton waste, may become so rapid as to cause the same to burst into flames. Oils that absorb much oxygen are known as drying oils, and should never be used for lubricating purposes. Linseed oil, corn oil and all fish oils with the exception of sperm oil, belong to this class and gum

readily. The gumming of oils not only increases their viscosity to a marked degree, thus being an additional load on the machinery, but also necessitates frequent cleaning of the bearings. Mineral oils do not absorb oxygen, therefore, do not gum or give rise to spontaneous combustion, as do those of animal and vegetable origin.

3. *Acidity.*—Acidity of lubricating materials is to be carefully avoided at all times, as all acids attack metal, causing roughing of the bearing surfaces and increasing friction. The acids of mineral oils is due to faulty manufacture, insufficient care having been taken to remove all the acid used in refining the same. Animal and vegetable oils are combinations of so called fatty acids with glycerine, and on exposure to air and moisture, particularly at high temperatures, they split up. For this reason it is never advisable to use anything but pure mineral oils in places where moisture and high temperatures prevail.

4. *Stability toward temperature changes.*—In this connection the volatility, flashing point, and point of solidification are of importance. The volatility of an oil must not be so low that the oil evaporates while in use for ordinary lubricating purposes. The oil should show no loss of weight after ten hours at a temperature of 212 degrees Fahrenheit. Cylinder oils should naturally be tested at a higher temperature. The flash and firing point of oil should be sufficiently high to assure one of freedom from burning or charring when used at high temperatures. The flash also enables one to judge of the volatility of oil, the lower the flashing point, the more volatile the oil is. The point of solidification of lubricating materials should be low enough so that the oil remains liquid under all conditions of use.

STEEL RAILWAY INSPECTION MOTOR CAR

A new car for railway inspection work for either summer or winter is run by a 12-hp. gasoline engine and can be operated at any speed up to 35 miles per hour ahead and 12 miles per hour reverse. The frame of the car is made of steel and it is fitted

Courtesy Fairbanks Morse & Co.

Inspection Motor Car

up with leather upholstered seats, glass front and canopy top. The rear seats can be removed to make space for material or packages. The weight of the car is 1,650 lbs.

The total railroad mileage of the world is 510,740.

NEW KIND OF GRAFTING IN WASHINGTON

Membranes from rabbits' eyes have been grafted on the eyes of a Washington, D. C., man in the hope of restoring his sight, which he lost two years ago when a highwayman dashed a solution of concentrated lye in his face. The conjunctiva membranes from the rabbit were sewed under the lids with a delicate needle, and promising results have followed, though success will not be assured for several months, sight returning gradually, if at all.

ELECTRIC SIGNAL MAPS

The District Railway of England has adopted a novel signaling system by which the signalman may watch the progress of the train during its passage through the section under his control. A complete diagram of the section, showing tracks, switches, etc., is placed in the tower facing the signalman, and electric lights behind the diagram show the position of the train until it has passed into the next section.

To distinguish steel from iron apply a drop of nitric acid and let it remain for a moment, then rinse with water. If the metal is iron, a whitish-grey spot will remain; if steel, a black stain.

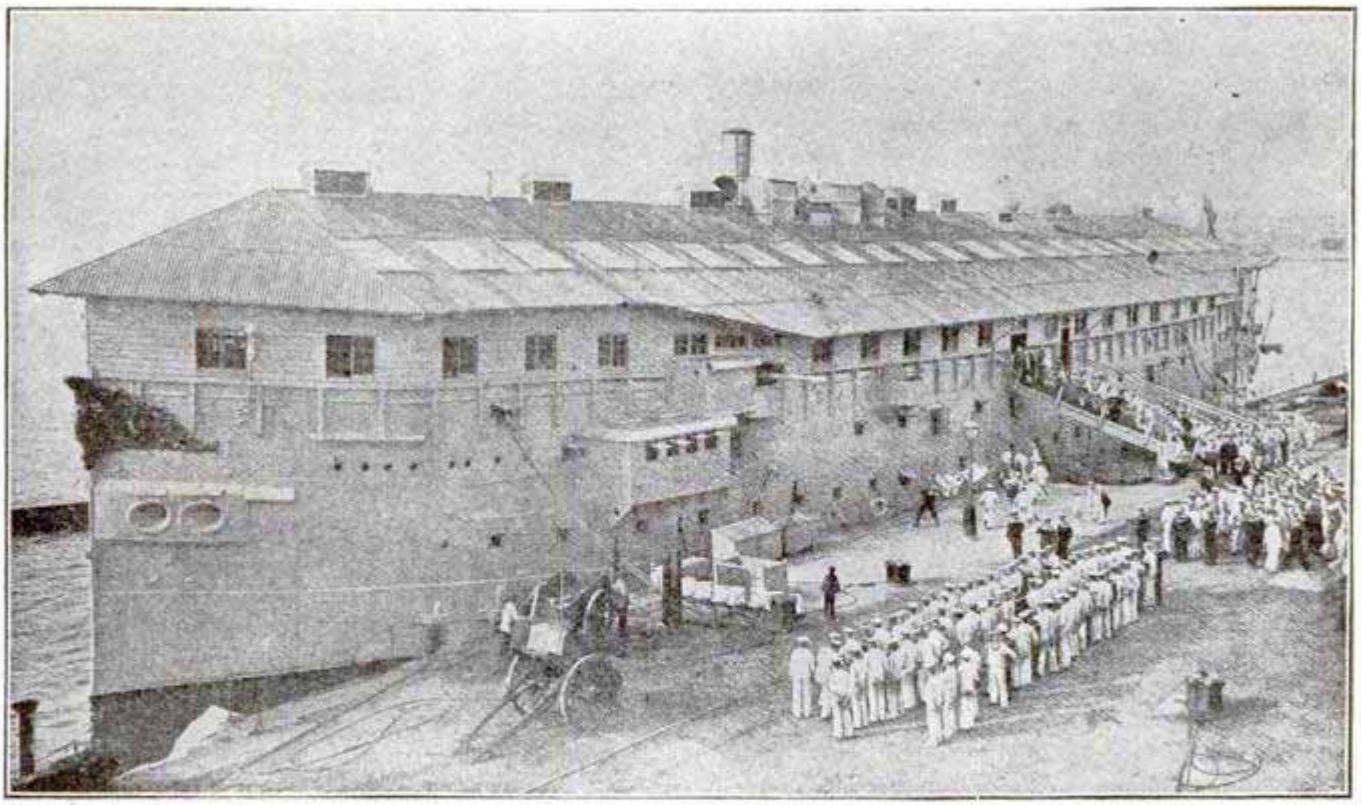
PAY ADMITTANCE FARE ON MONTREAL STREET CARS

In Montreal, Canada, passengers now pay their fare before they enter the car. This gives the conductor no occasion to enter the car and leaves him always on the rear platform. There is no front entrance, hence all the passengers must enter and leave the car by the rear door. In fact there are two rear doors, one through which the passenger enters, and the other used exclusively for exit. As a part of this system the rear platform is unusually large and provided with guide rails which separate the getters-on from the getters-off. This not only prevents confusion, but saves much time.

The manner of collecting the fare is decidedly unique. Under no circumstances can the conductor touch the fare, which must be deposited by the passenger in a fare box, which is presented as the passenger enters the door of the car. The conductor will make change, or sell tickets but the passenger deposits the fare, whichever it may be, in the box. The coin or ticket does not fall until the conductor presses a button; this gives opportunity to see if the amount is correct and the coin genuine. When once the coin drops it cannot be removed except at the company's office. After the cashiers count the day's receipts the count is checked by weighing the different coins and also the tickets. The public good-naturedly refer to the fare box as the "teapot."

The total coal production of the world is now about 790 million tons per year. Of this England and possessions produce rather less than a third and the United States something more than a third.

SCHOOL FOR MARINE STOKERS



English Training School for Stokers

A school for training stokers has been established at Portsmouth, England. The steamship "Nelson" has been fitted up to serve as the school and has just gone into commission. The illustration shows the recruits marching on board.

HOW TO MAKE A HOTBED

Either a temporary or a permanent hotbed is quite simple to make and will hasten the blooming season of garden annuals a number of weeks. For the temporary hotbed place fermenting stable manure with a small amount of straw or litter in it in a broad flat heap and compact it by tramping. The heap should be 9 ft. wide and any multiple of 3 ft. in length and for the latitude

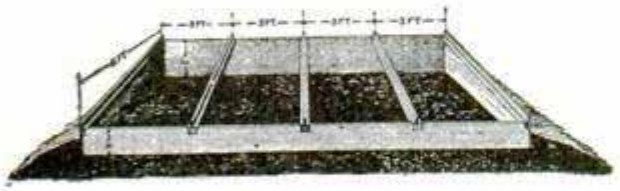


Fig. 1--Temporary Hotbed

of New York City, 14 or 16 in. deep. Both the depth and breadth of the heap should increase farther north.

Make a frame 8 in. high at the front, and 12 in. high at the back with tapered boards at the ends, and place it upon the manure heap. Over the area enclosed by the frame scatter evenly 3 in. of good garden loam. Then place the sash upon the frame. If the weather is apt to be severe while the hotbed is in use, bank the frame with manure. Let the hotbed heat up and give it about three days for the temperature to subside before planting any seeds. A safe temperature is between 85 and 90 degrees.

For heating a permanent hotbed either fermenting manure or radiating pipes from the dwelling or greenhouse heating plant may be used. Where manure is to supply the heat, provide a pit 2 to 2½ ft. deep and support the sides and ends by a lining of plank supported by posts 4 ft. apart. A brick wall 9 in. thick (Fig. 3) would be better still. Have the lining come flush with the surface of the soil. The pit should be located on naturally well-drained ground and

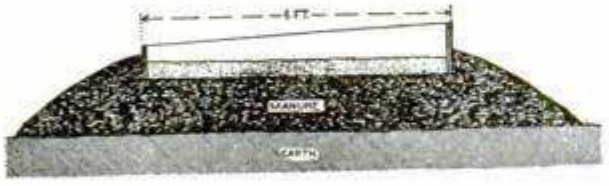


Fig. 2--End View, Temporary Bed

furnished with a tile drain from the bottom of the excavation, to prevent water accumulating. As standard hotbed sash are 3 ft. by 6 ft. in size, the pit should be some multiple of 3 ft. in length and as wide as the length of the sash, or 6 ft. The plank or brick lining may extend above the ground to allow for placing the sash. The pit should then be filled to ground level with manure and a layer of soil, as shown in Fig. 3.

To make your own hotbed sash, use white pine or cypress. Make the two ends of the sash of sound timber, 3 in. wide at the top end and 4 in. wide at the bottom end, mortised to receive the ends of the sash bars, and with a tenon at the ends to pass through the side pieces which should be 2½ in. wide. The sash bars should run lengthwise of the sash, only, but may be braced through the middle by a transverse bar placed through the long bars below the plane occupied by the glass. To place the glass in the sash fill the rabbet in the sash bar with soft putty, then press the glass, crowning side up, firmly into the bed of putty and fasten securely with shoe nails, or wire brads. Place the pane nearest to the front, or lowest side of the hotbed when the sash is in place, first. Bed the next light in the

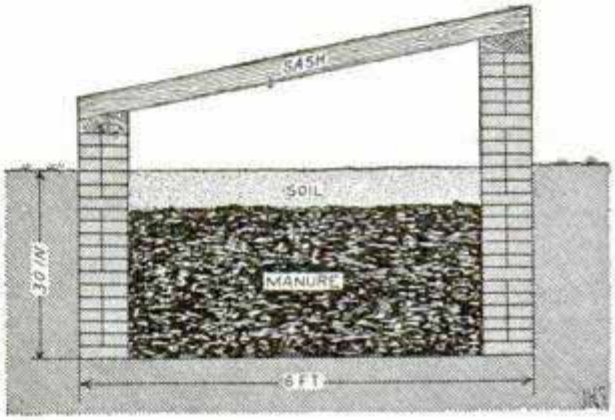


Fig. 3--Permanent Hotbed

same manner and place it so as to lap about 3-16 in. over the top edge of the one first placed, like shingles on a roof. Drive brads below the lower corners of the second pane to prevent it slipping down under the under one. Continue in this way until the frame is filled. A three-course frame is preferable to a two-course frame, breakage being less with small glass.

During cold nights a protection of burlap, board shutters or straw mats will be necessary and on bright days the sash must be lifted a little at the high side of the frame to permit the hot air to escape. Hotbeds should be watered in the mornings of bright days only.

White pine is the best material for pattern work in general. This wood is easily worked, does not injure the tools, takes glue and varnish nicely and is sufficiently durable.

TREATMENT FOR THOSE SHOCKED BY ELECTRICITY

[Through the courtesy of the United Gas Improvement Co. of Philadelphia, we are enabled to reproduce the text and illustrations from their unique pamphlet on the treatment of persons injured by electric shock; which they have issued for the benefit of the many systems in which the company is interested.—Editor.]

To give proper assistance to persons shocked by electricity, it is necessary to have on hand the following materials, contained in the company's emergency kit for electric shock cases, as shown in Fig. 1:

(a) A bottle of aromatic spirits of ammonia;
(b) A bottle of ordinary ammonia, with sponge attachment;
(c) A package of bi-carbonate of soda (ordinary baking soda);
(d) A tin cup;
(e) A pair of tongue pliers;
(f) A towel;
(g) A package of antiseptic cotton;
(h) A roll of antiseptic bandaging;
(i) A roll of adhesive tape.

In case of electric shock instantaneous death or only temporary unconsciousness may result. The treatment in both cases is as follows, and it should be carried out in every instance, even though the person is apparently dead, for he might be only temporarily unconscious:

TREATMENT:—*Send for a doctor at once,* in the meantime acting as follows: Carry the patient immediately into fresh air. Place him on his back on a flat surface, with a coat rolled (not folded) under the shoulders and neck, in such a way as to allow the head to fall backward enough to straighten the wind-pipe, as shown in Fig. 2; at the same time open the shirt wide at neck and loosen the trousers and drawers at waist, and have an assistant rub his legs hard.

The sleeves and trouser-legs should be rolled up as far as possible, so that the rubbing may be done on the bare skin, and the shirt and undershirt should be torn down the front so that they may be thrown back, leaving the chest and stomach bare, as shown in Fig. 10.

Open his mouth, forcing the jaw, if necessary.

If the jaw is rigid it can be forced open

Fig. 1--Emergency Kit

by placing the forefinger back of the bend of the lower jaw-bone, and the thumbs of both hands on the chin, pulling forward with fingers and pressing jaw open with thumbs, as shown in Fig. 3.

Place something (piece of wood shown in Fig. 1) between the teeth to keep the jaws open and to prevent the patient biting his tongue, using something large enough to prevent any danger of his swallowing it accidentally; grasp the tongue with the tongue-pliers, as shown in Fig. 4, having an assistant hold it out while you are helping the patient to breathe, as described below.

In the absence of tongue-pliers, the tongue may be grasped between the index and second fingers, after they have been covered with a handkerchief.

Clear froth from the mouth by putting in

Fig. 2--First Position of Person Under Treatment

Fig. 3--Method of Opening Jaw When Rigid

your forefinger as far as possible and bringing up the froth with a scooping motion. Have the assistant who is holding the tongue slowly pass the bottle of ammonia, with sponge attachment, under the patient's nose about once a minute when the patient is breathing in, and when his arms are being extended above his head, as shown in Fig. 10.

While you are preparing the patient as just described, an assistant should force the air out of the lungs by pressing the *base of the ribs* together about once every four seconds, as shown in Fig. 5. Do not press vertically, but press on the patient's side (palms of hands over lower ribs) in such a manner as to force as much air out of the lungs as possible.

After the clothing has been loosened, the jaw forced open, as shown in Fig. 4, the froth cleared from the mouth and the tongue grasped, begin artificial breathing at once as follows:

ARTIFICIAL BREATHING.

Kneel far enough behind the head of the patient to prevent interference with the man holding the tongue. Bend the patient's arms so that the hands meet on the chest; grasp the patient's forearms firmly, as close as possible to the bent elbows.

1. Firmly press the patient's elbows against the sides of his body so as to drive the air out of the lungs, as shown in Fig. 6; then

2. Raise the arms slowly with a sweeping motion until the patient's hands meet above

Fig. 4--Method of Inserting Block in Mouth

(or behind) the patient's head, as shown in Fig. 7; then

Fig. 5--Forcing Air Out of Lungs

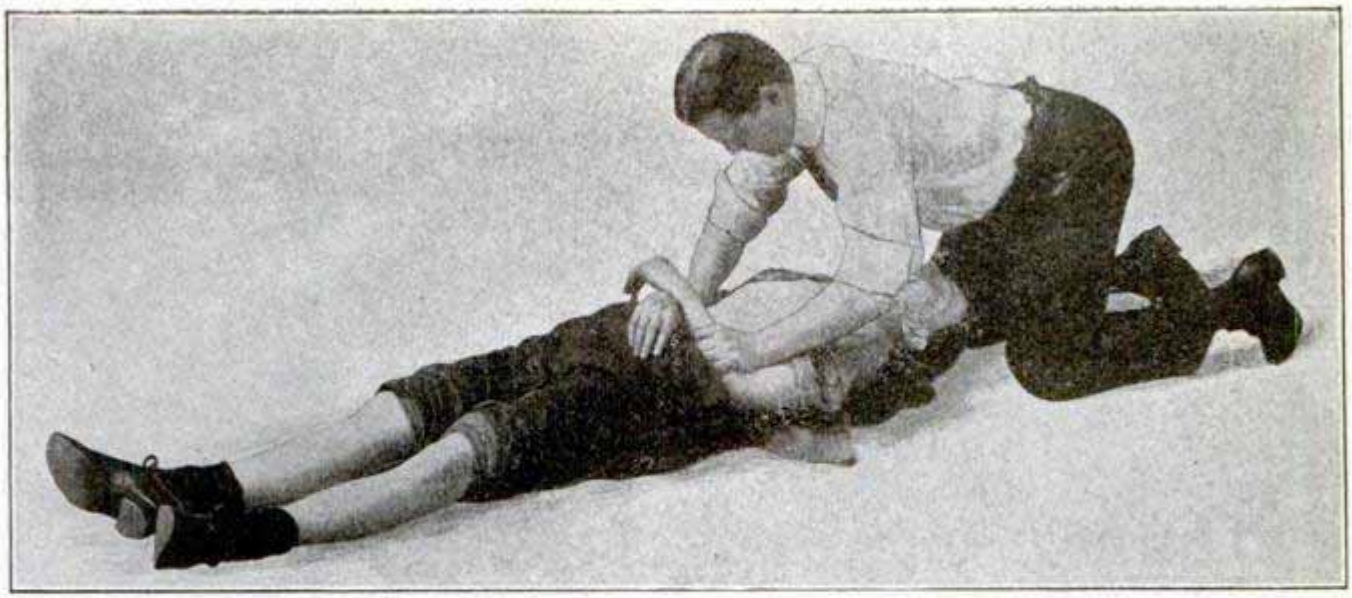


Fig. 6--First Movement in Artificial Respiration

3. While you have the patient's arms stretched out in line with his body, give them a slow, strong pull, until you have expanded or raised his chest as high as it will go, as shown in Fig. 8; then

4. Bring the arms, with bent elbows, down against the sides, and press them firmly as before, as shown in Fig. 6.

This action should be continued about fifteen times a minute until the patient begins to breathe. You must guard against a tendency to make these motions too fast; they must be done slowly. A good plan is to count four slowly—"one," as the pressure is given on the sides, as shown in Fig. 6; "two," as the arms are being extended above the head, as shown in Fig. 7; "three," as the strong pull is given, as shown in Fig. 8; and "four," when the arms are again being bent and returned to the sides, as shown in Fig. 9.

Do not let your hands on the forearms slip away from the elbows; the best result comes from grasping close to the elbows, as shown in Fig. 9.

The operator must appreciate the fact that this manipulation must be executed with methodical deliberation, just as described, and never hurriedly, or half-heartedly. *To grasp the arms and move them rapidly up and down like a pump-handle is both absurd and absolutely useless.*

Each time the arms are pulled above the head and the chest expanded, the assistant who is holding the tongue should pull the

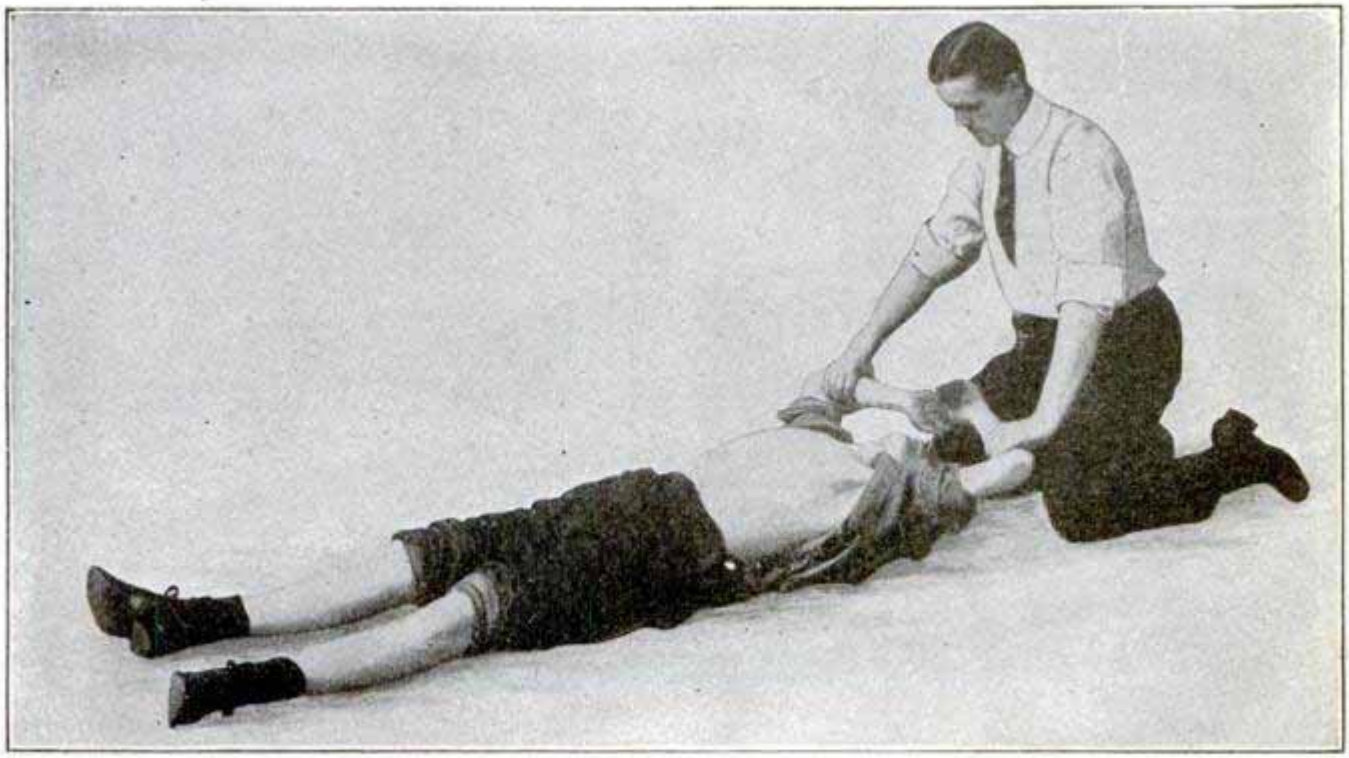


Fig. 7--Second Movement in Artificial Respiration

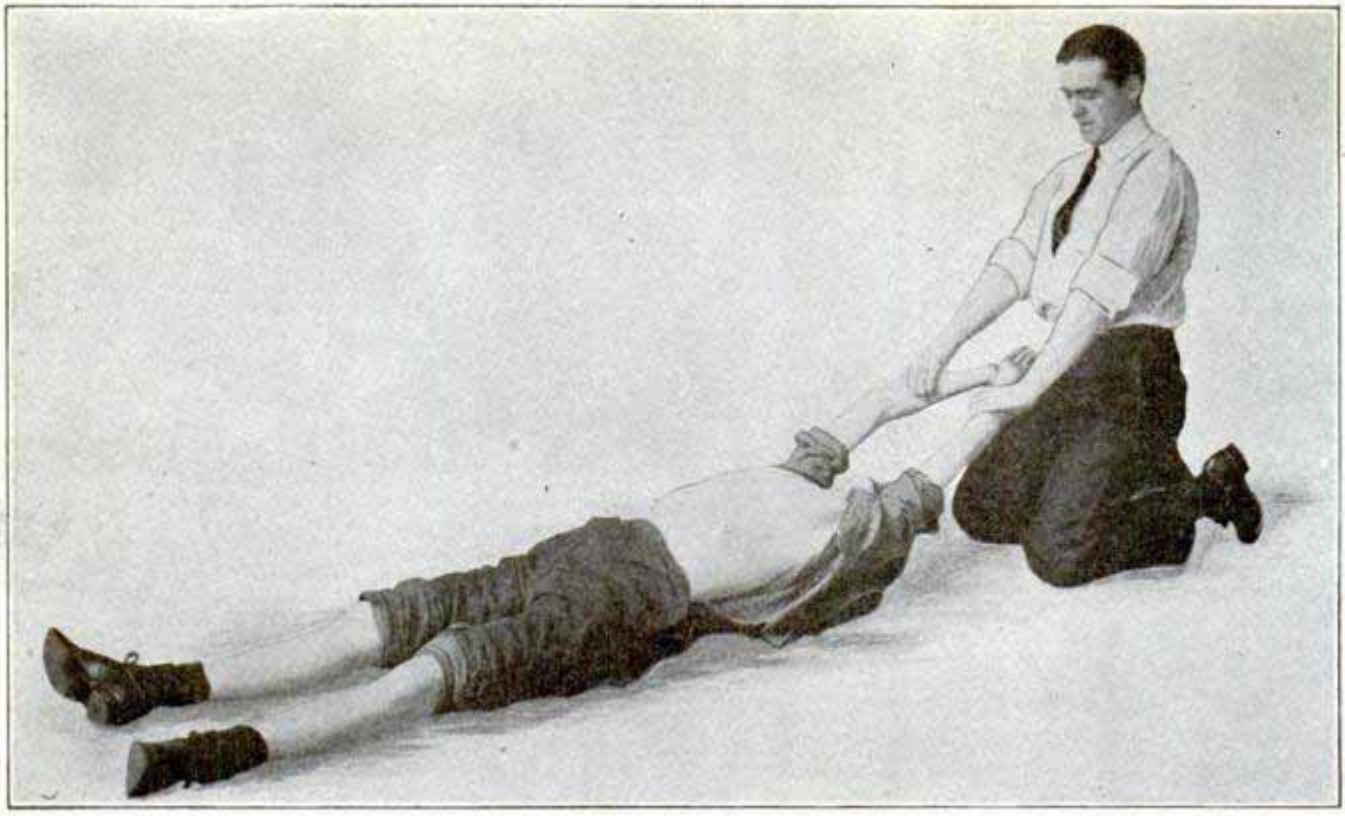


Fig. 8--Third Movement in Artificial Respiration

tongue out and downward, and another assistant should, from time to time, slap the chest with a towel or cloth wet with cold water, as shown in Fig. 10.

When the patient is breathing by himself, the process of artificial breathing can be stopped, but the process of pressing the sides *every other* time he breathes out, should be started as follows:

Do not press vertically, but press on the patient's side (palms of hands over lower ribs) in such a manner as to force as much air out of the lungs as possible, Fig. 5. You can carry out this pressing action most successfully, if, on beginning, you move your hands in and out with every breath, pressing very lightly, until you have established a rhythmical motion of your hands in unison with the patient's breathing; then you can begin to press hard at every other out-going breath.

The object of doing this is to strengthen his breathing. By making the pressure every other time he breathes out, you give

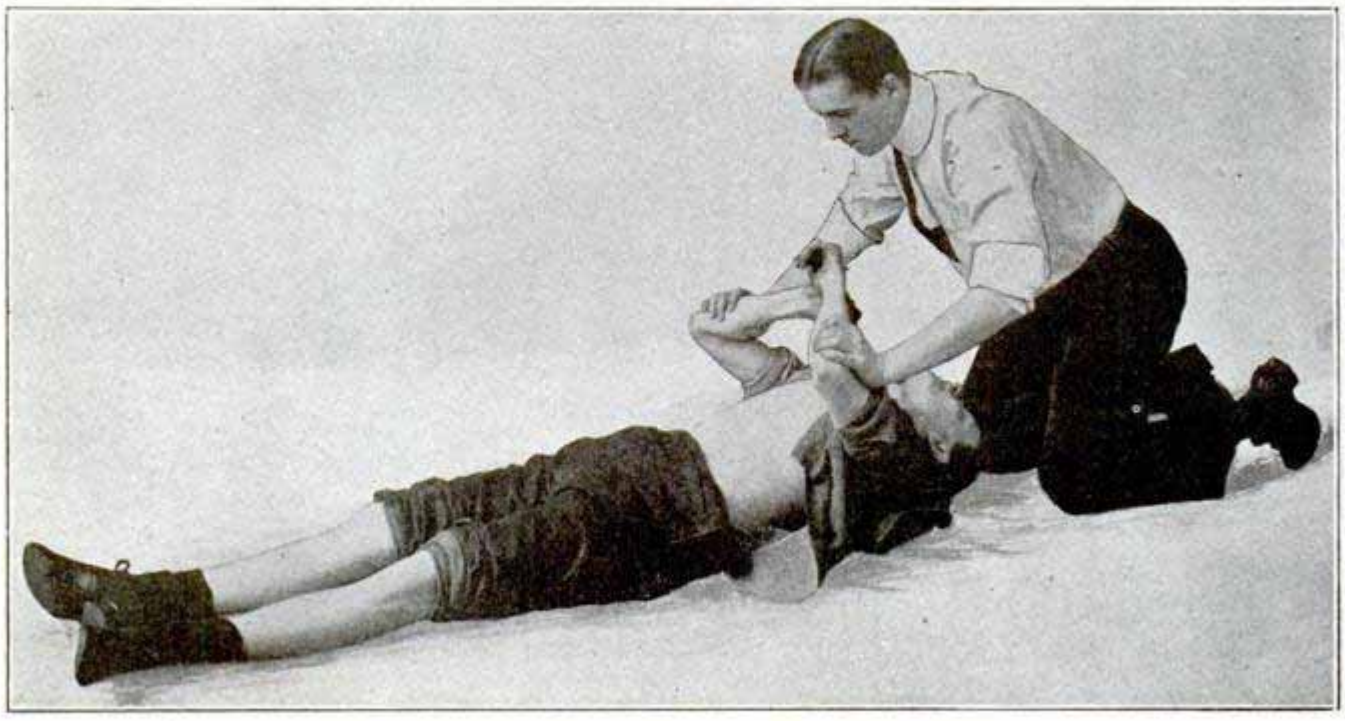


Fig. 9--Fourth Movement in Artificial Respiration

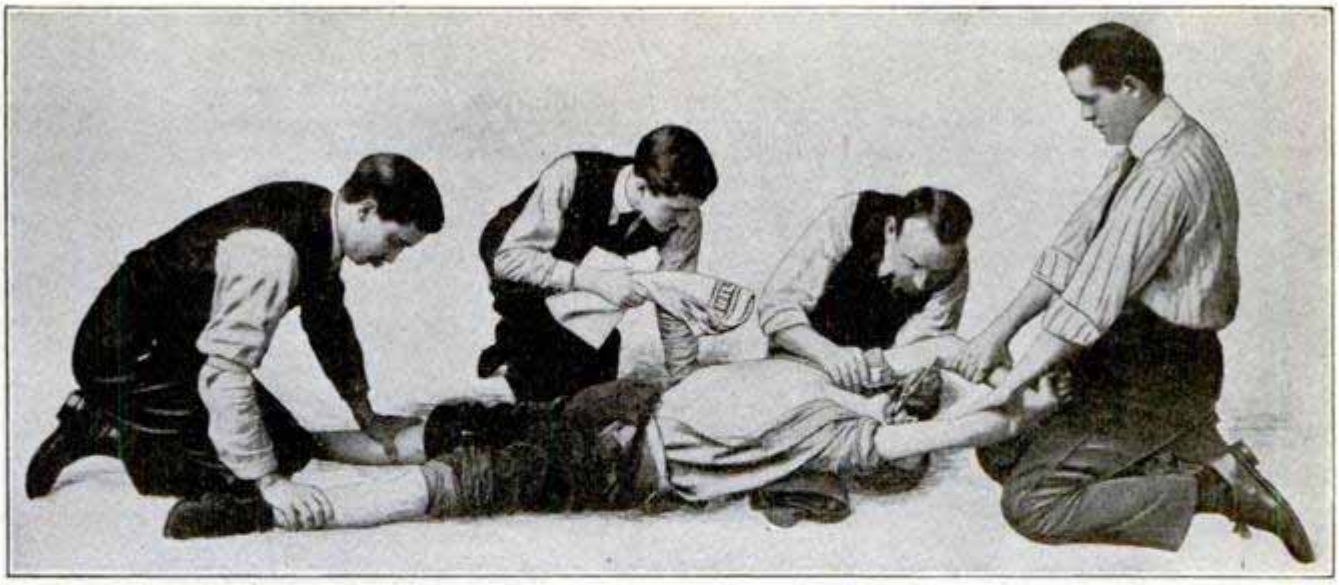


Fig. 10--Positions of Assistants

him an opportunity to take a breath himself, and this natural effort to breathe is in itself strengthening to the action of the lungs.

Continue this pressing action until the man is conscious and breathing well by himself.

The rubbing of the legs and arms should continue as long as the artificial breathing, or pressing action, is necessary, and the holding of the tongue, and the passing of the bottle of ammonia with sponge attachment under the nose, as long as he is unconscious, as shown in Fig. 5.

After he becomes conscious, give him a half-teaspoonful of aromatic spirits of ammonia in a third of a glass of water. After you have brought him around, surround him with bottles of hot water.

Beer bottles are easily obtained, and should be filled with hot water and covered with a paper or cloth to prevent burning the flesh. Hot bricks, also covered, or gas bags filled with hot water will answer as well.

Then cover him with a coat and watch him. See Fig. 11.

In performing artificial breathing, if the patient does not show any signs of coming to life promptly, you should not be discouraged, but should continue the motions regularly for *at least one hour*, summoning such assistance as you may need. Cases are known where patients showing no signs of life after an hour's work have still recovered, and their recovery was due entirely to the faithful persistence of the person in charge.

Persons shocked by electricity need *fresh* air; therefore, bystanders should not be permitted to crowd around a

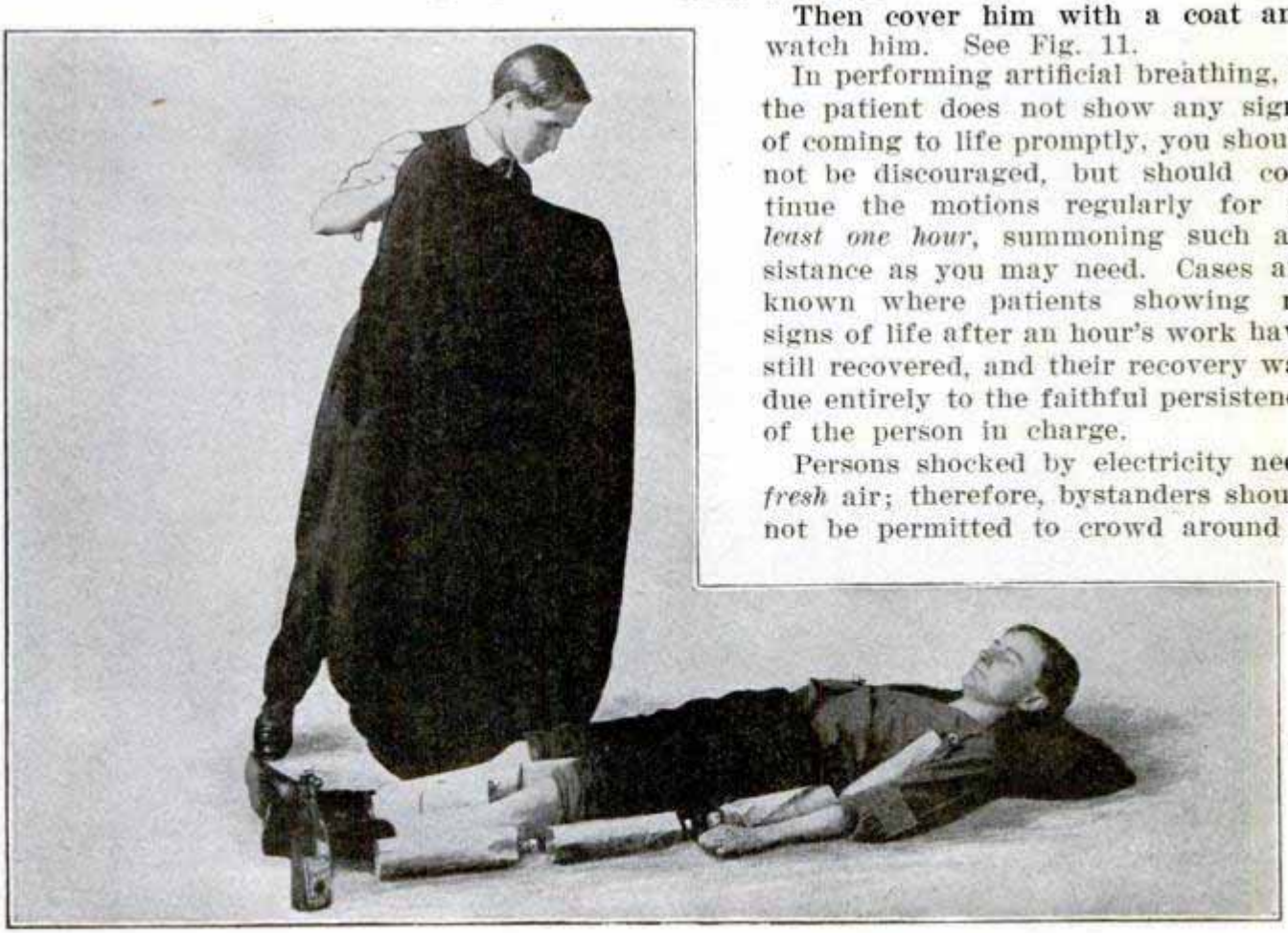


Fig. 11--Treatment After Patient Becomes Conscious

patient, and no one should be allowed to approach him except those carrying out these instructions.

The recovery of a person unconscious from electric shock may be hastened by the use of oxygen, which should be administered at the discretion of the doctor.

BURNS CAUSED BY ELECTRICITY.

Electric shocks are often accompanied by various types of burns, which should be treated as follows:

Have the injured attended by a doctor as soon as possible. In the meantime cover the burned surface with cotton, saturated in a strong solution of bi-carbonate of soda and water (as much soda as the water will absorb), and then wrap with light bandaging. In the absence of soda, carron oil may be used in the same manner.

Even apparently slight burns should be treated by a doctor, as the injuries are likely to prove more serious than those resulting from ordinary burns.

Should the articles contained in the company's emergency kit for electric shock cases not be on hand when needed, after sending for a doctor, every effort should be made to revive the patient, by following the course of movements described until the doctor arrives and the necessary articles are secured.

HEAVIEST RAILROAD RAILS

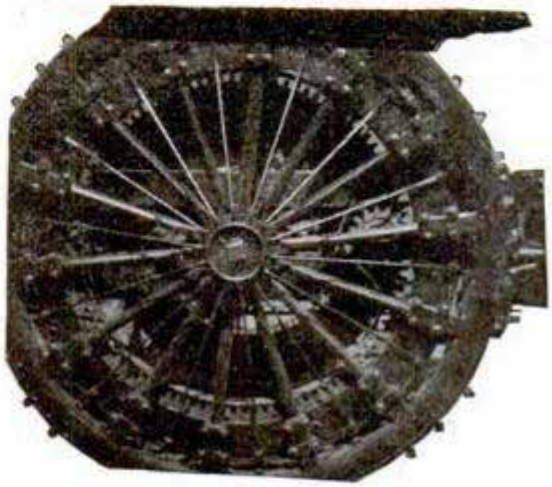
What are believed to be the heaviest rails in use on any steam railroad in the world are on the belt line around Philadelphia. They weigh 142 lbs. to the yard. Concrete with 9-in. girders are used with heavy ballast to make a firm roadbed. One railroad official states this section of roadbed will last for 25 years without repairs. This would mean a material reduction in maintenance expense to the road using these rails.

HOME-MADE MOTOR WAGON

Made in California

A California rancher, Arthur Mills, wanted a motor wagon and decided to build one himself. The machine has been in operation some two months with excellent satisfaction, during which time it has traveled more than 200 miles over rough mountain roads.

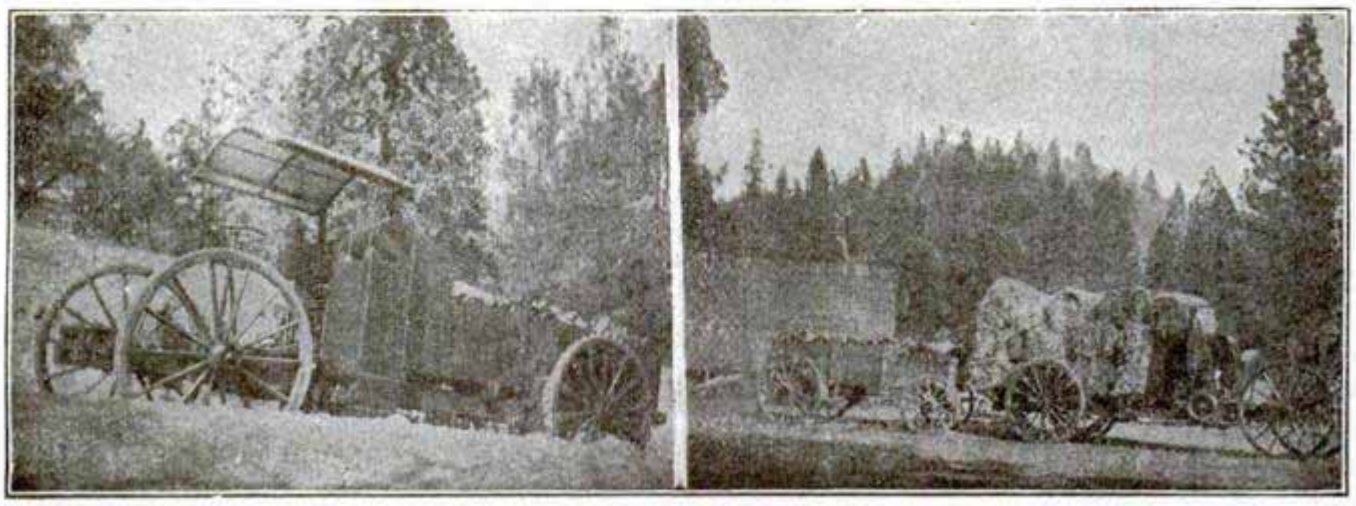
The driving and steering gear can be placed on any ordinary city truck with slight alterations to the truck. In the motor



Arrangement of Gears

shown the power is two-cylinder marine type, water-cooled gasoline engine, coupled to the rear wheels as drivers. There are three forward speeds and one reverse. The drive is from a countershaft with a radial play when wagon turns that takes the place of a differential gear. The steering gear works on a knuckle and swivel from center of axle. The wagon is 20 ft. long; the front wheels 4 ft. 10 in. diameter; rear wheels spiked to secure a better hold.

With a trailer attached an average load of 5,500 lbs. has been hauled.



Showing the Motor Wagon in Service

TRAVELING HOTEL AND STORE

Electric Lights, Cold Storage and Complete Force of Hotel Servants Change Hardships of Frontier Life Into Comfort

A hotel and restaurant with a well equipped store containing a full line of

The Portable Cold Storage

goods from a needle to a suit of clothes, and all on wheels for transportation from place to place is the latest attempt to supply the wants of a construction camp. The railroads have for some years fitted up old box cars with some rude bunks and a stove for shelter at night, and in other old cars installed a cook stove at one end and a pine board table with long board seats running lengthwise, for a boarding car. This ancient equipment is taken to the place where construction work is to last some time, a side track built and the boarding cars set out. The accommodations are a great improvement on tenting, especially in wet or cold weather, but naturally fall short of providing all the comforts of home.

A company has been formed and has constructed cars especially to serve as boarding houses and restaurant. The operators will contract to board 100 or 1,000 men for any length of time, at any place reached by a railroad track. A trained force attends to all the usual work of hotel servants, sweeping, making beds, laundry, cooking, waiting on table, etc. Hot and cold water for the toilet and bath are piped into each car and the workmen not only live well, sleep comfortably, but rest in easy chairs when the day's work is done. The plan is intended for use not only for railroad construction work, but for the accommodation of any considerable number of men for any work.

Another new feature is the cold storage car where meats, fruits and other perishables can be kept until used. A zero temperature can be maintained in this car if necessary.

This means the constructing force, perhaps a hundred miles from the nearest base of supplies, can have the same healthful, varied diet they would in any large city. An electric light plant is also part of the outfit, lighting all the cars at night.

One car is fitted up as a traveling store. It carries a full line of all those things men wear. Extra heavy boots and gloves, overalls, jackets, shirts, tobacco, knives and an assortment found in a small general store. All these conveniences go to make possible the securing of a much better class of men for work in places which otherwise would involve many hardships.

NOVEL FIRE ENGINES IN NOME

Nome, Alaska, had a narrow escape from destruction by fire last fall. The fire started at three o'clock in the morning and burned several hours. It was finally subdued when a machinery firm hauled two portable upright boilers to the water's edge, set them up and made steam connections to a horizontal pump. The connections were completed and two good sized streams turned on the fire in 45 minutes. The figure of the engineer of the boiler at the left is partly hidden by smoke from the conflagration.

Courtesy Valve World.

This Outfit Saved Nome

In Denmark milk is transported in huge wooden casks of 210 cu. ft. capacity, fastened to the floors of covered freight cars; two to a car. Milk is shipped to Berlin in this way.

TROLLEY ELECTRIC VEHICLE

A trolley electric vehicle is being tried in Philadelphia. It is similar in principle to the trackless trolley cars in use in Europe, which have been described fully in this magazine. There is this difference: the European cars are operated on public highways by means of an overhead trolley wire, but require no tracks. The Philadelphia plan contemplates use of the vehicles both over the tracks of the street railway company, and as feeders to and from points at present beyond the end of the tracks. For the extension work the electric motor of the vehicle receives its current from storage batteries carried under the body of the wagon. By using the trolley for the greater part of the trip storage batteries of much smaller capacity are possible than would otherwise be necessary.

Trolley and Storage Battery Express

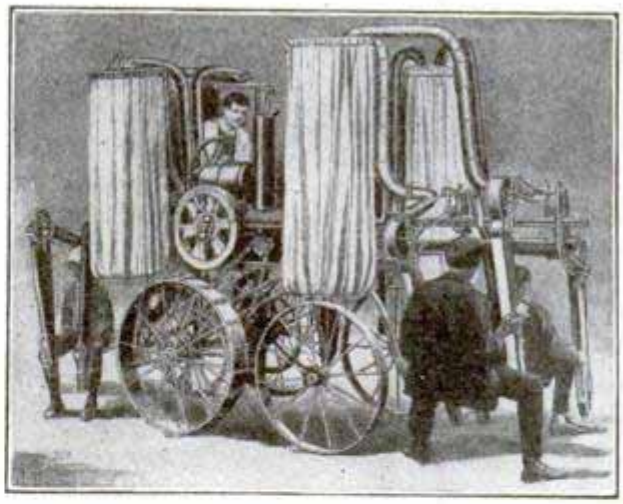
It is suggested the plan will prove the solution of package delivery in cities, as heretofore where the street railways have undertaken the city express business, it has been necessary to establish depots at frequent intervals, and transfer the packages for the district from the car into light horse delivery wagons. This has been done at a considerable loss of time and extra expense.

Under the new arrangement, the electric express wagon can run with its own storage power and make all the collections from stores whether on a street car line or not, and when the load is secured, take the car track and use the trolley power out to the district to be served, and then follow residence streets at will. The system is to be worked only in conjunction with and in cooperation with the street railways. The capacity of the storage batteries and power of the electric motor vary according to the size of the vehicle, load to be carried, and distance to be run beyond the car tracks. The batteries can be recharged while the vehicle is running on the car lines with trolley current.

The system is recommended for ambulance, police and fire department service; and for heavy teaming such as coal, for which 12-ton wagons are already to be had.

MOTOR COTTON PICKER

A machine operated by a 5-hp. gasoline engine has been built for picking cotton. It is self propelling and requires one driver and four assistants who guide the "gatherers." These pickers consist of rapidly moving teeth which pull the cotton from the boll after which it is drawn through tubes and deposited in large sacks, by means of a current of air. The sacks are emptied at the bottom as fast as filled, into bags and carted to the gin.



Cotton Picking Machine

The boys who guide the gatherers sit on a seat which is fastened to the iron frame of the machine, and take one gatherer in each hand.

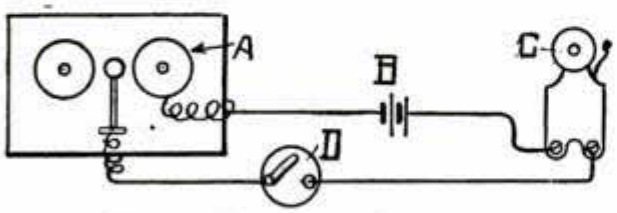
All the articles appearing in this department are reprinted in book form at the end of each year.

SHOP NOTES

Contributions to this department are invited. If you have worked out a good idea or know of one, please send it in.

METHOD OF CONNECTING A BELL TO A TELEPHONE

Referring to the illustration: A is the telephone gong from which the wire is run to the extension bell and which must be

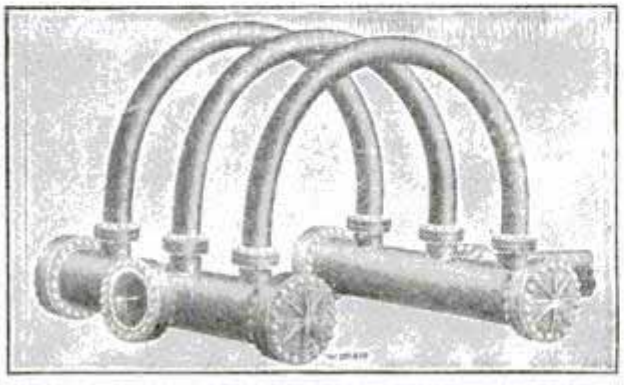


Bell and Telephone Connection

insulated; B, batteries; C, one-stroke extension bell to any part of the shop; D, switch. With this method of connecting the bell will sound the different rings, instead of one continuous ring, until the switch is turned. It will rarely be necessary to turn the switch. —Contributed by A. C. Esty, 2643 Humboldt avenue S., Minneapolis, Minn.

EXPANSION STEAM PIPES

The illustration shows a recent installation of pipe bends to take care of the expansion and contraction. Three wrought steel pipes were used of 8 in. diameter, instead of a single, larger pipe, on account of greater flexibility. A leading manufacturer makes the following recommendations: For bends 12 in. and smaller to regular dimensions and for all purposes up to 200 lbs. pressure use full weight steel pipe; 14 in. to 16 in. outside diameter up to 200 lbs., use ⅜ in. thick; 18 in. outside diameter and larger, up to 150 lbs., use ⅜ in. thick; same sizes up to 200 lbs., use ½ in. thick; if pressure exceeds 200 lbs., it is better to make the bends of extra strong pipe up to 8 in. diameter, and pipe ½ in. thick on the larger sizes.

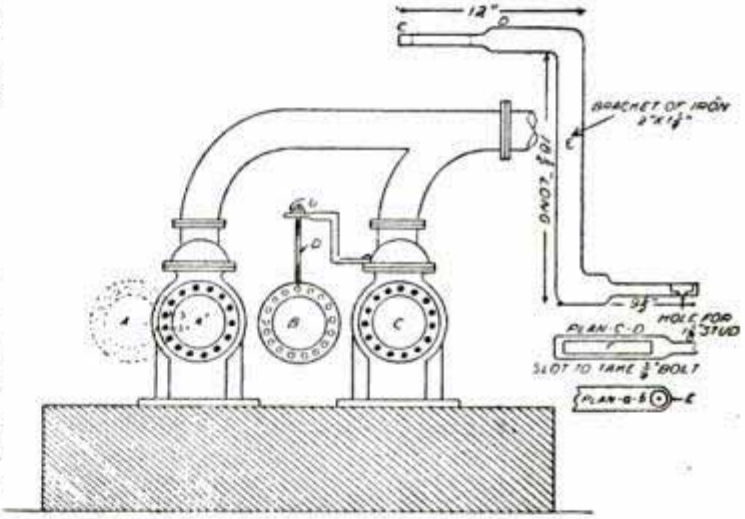


This Method Gives Greater Flexibility

HOW TO MAKE A BRACKET FOR LIFTING WATER CYLINDER HEADS

In the small water works plant where no traveling crane is installed, a bracket for taking off and replacing water cylinder heads will be found a convenience.

In the sketch, E shows the form of bracket necessary. Procure a piece of iron, 40 in. long by 2 in. wide and 1¾ in. thick and dress it round at the end as shown at



Bracket for Removing Cylinder Heads

E in plan a-b. Drill a 13/16-in. hole to fit freely over a 1⅛-in. stud, and counter-bore it to a depth of ⅞ in. to receive a 1⅛-in. hex-nut. Forge the bar to shape, as shown in the sketch, making it 9½ in. long on the lower arm, 18½ in. high and 12 in. long on the upper arm (see plan F.). Make the slot indicated in F wide enough to take in a ¾-in. bolt and about 6 in. long, in order to allow for prying the cylinder head clear of the studs while taking it off. Use a piece of ¾-in. round iron, 24 in. long, threaded on each end for 4 in. of its length, with a hex-nut and a washer, to take the head off with.

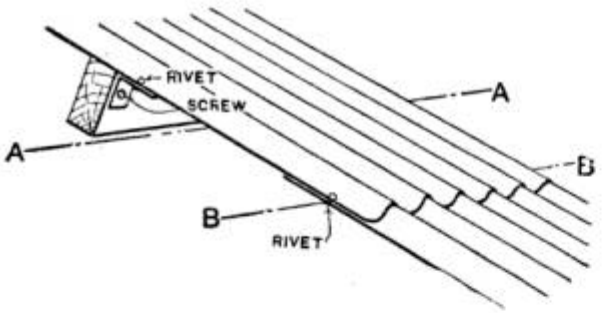
The position of the cylinder head, as shown by the dotted lines at A, represents it hanging to two studs of the cylinder A, at

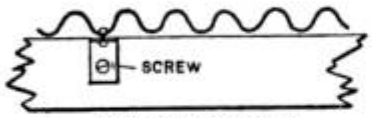
S and S'. By putting the head on the studs in this manner it allows for the use of the bracket on the other cylinder, if necessary. It is also very convenient to cut a gasket for the head joint while hanging in the position shown at B, says the National Engineer, and if in any doubt as to the safety of the bolt or the bracket it is a very easy matter to place a block on the pump foundation directly under the head.

DURABILITY OF COPPER ROOFING

In commenting on copper as a roofing material a correspondent of the Metal Worker describes the capitol roof at Washington, D. C., which was placed on the building after the close of the Civil War. It is of 40-oz. copper in sheets 8 ft. long by 24 in. wide with 2½-in. corrugations. The illustrations show the mode of application, the lapping of the sheets and their fastenings.

Strap for Conductor Pipe.





SECTION ON A A

SECTION ON B B

Fastening Copper Roofing

The cleat on the under side of the sheet is fastened to the copper by a rivet and screwed into the purlin with an ordinary wood screw. These fasteners are spaced about 2 ft. apart in every five or six corrugations. Where two sheets are brought together they are simply lapped and riveted as shown, the rivet allowing for longitudinal expansion by the sheet's buckling, while the lateral expansion is allowed for by the buckling of the corrugations. No solder is used on the main part of the roof, the protection against storms being afforded by the lapping and riveting of the sheets. In spite of the long use of this roof it is in excellent condition, and has had but few repairs.

On a building where rectangular copper down spouts were used entirely, straps designed like the one illustrated were used to hold the conductors in place. These straps in design conformed with the architecture of the house and made an attractive appearance.

CLEANING IRON BRIDGES BEFORE REPAINTING

"The sandblast furnishes the best method of removing dirt and rust from iron bridges preparatory to repainting," declares C. J. Bogardus of the Erie R. R., "but it is rather too expensive," and adds:

"The least expensive way is to scrape the iron well and to remove dust and scale by pounding it off with a special form of hammer made with a hammer face on one side and a chisel point on the opposite side. This enables one to get into many places about a bridge that could not be reached with the ordinary hammer. Of course, this tool cannot be utilized in all cases, and where such is the case, we use a tool similar to a chisel, only larger, for cleaning off the paint and rust between the ties, etc. After the metal is well hammered and scraped, it is best to use wire brushes and then dust it off before painting. It is very essential that the iron work be thoroughly cleaned in order to get the best results."

VARNISH FOR PATTERN WORK

Shellac cut with grain alcohol is the best varnish for pattern makers. Put the gum in a glazed earthenware jar and cover it with grain alcohol. For fine, light work add a little more alcohol. Never add oxalic acid to the varnish to clear it when old. Rather throw it out and prepare a fresh supply.

"A little drop of oil,
A little bit of care;
Saves a lot of toil,
Avoids a lot of wear."

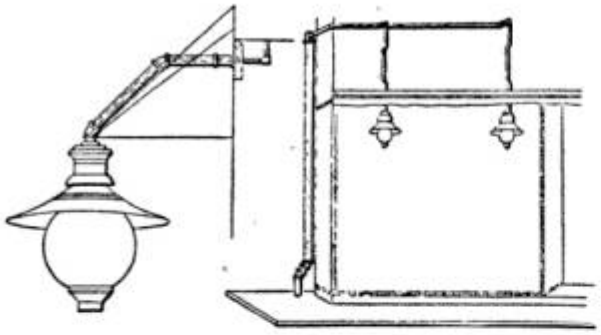
PLAN OF PIPING FOR INSTALLING OUTSIDE GAS LAMPS

The installation of gas lighting fixtures outside of show windows so as to prevent trouble from freezing and protect the gas from cold temperatures was described in a paper read by Arthur Murray, of Detroit, before the Michigan Gas Association.

When only one or two gas lamps are to be installed in front of a store or business place, and there is a ⅜-in. drop with good supply inside the window, attach a ½-in. pipe to this, carry it out through the window and extend it down to the lamp with two 45-degree ells. Drill four 3/16-in. holes in the top of the lamp and place a 2 by 1¼-in. reducing coupling so as come on the outside of the opening in the top of the lamp.

From this reducer extend 1¼-in. pipe, or casing, back to within 1 in. of the window sash and there use a reducing tee with a ½-in. branch pointed upward, from which use a return bend to conduct heat from the inside and thus exclude water from rain or snow storms. The end of the reducing tee should fit closely around the ½-in. run.

Where three or more lamps are to be installed run a riser, cased with a larger pipe, on the outside of the building in the least conspicuous place and let it open into the basement or cellar. Place a tee "bull-headed" on the top of the casing to exclude



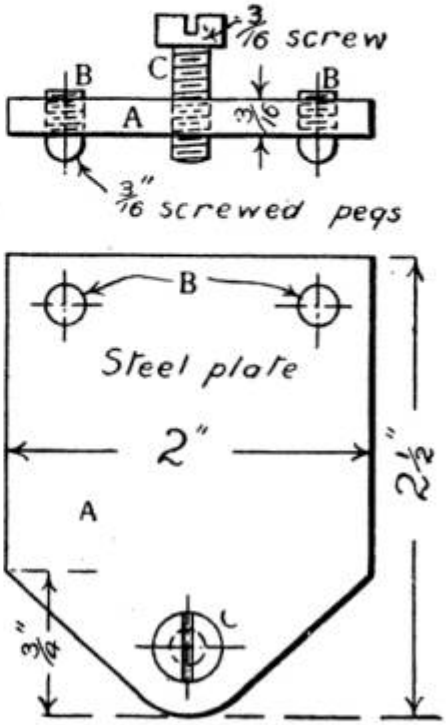
Piping Out-Door Gas Lights

water from rain. It is also necessary to case run or drops. Take a drop from side branch of the tee and where possible carry all drip water back to the riser, where a large drip is placed in the cellar. Where it is impossible to carry all drip back to the riser place an additional drip or extra riser between the store front and carry it back to the basement. Case this also and place a stop in the bottom to let out drip water.

Never use beeswax which has been adulterated with tallow or paraffin wax for pat tern work. It will not adhere to the wood.

ANGLE-PLATE FOR DRILLING ANGULAR HOLES

In drilling a hole slightly angular, as is at times necessary, do not pack up with bits of metal, says The Model Engineer, London,



Useful Angle-Plate

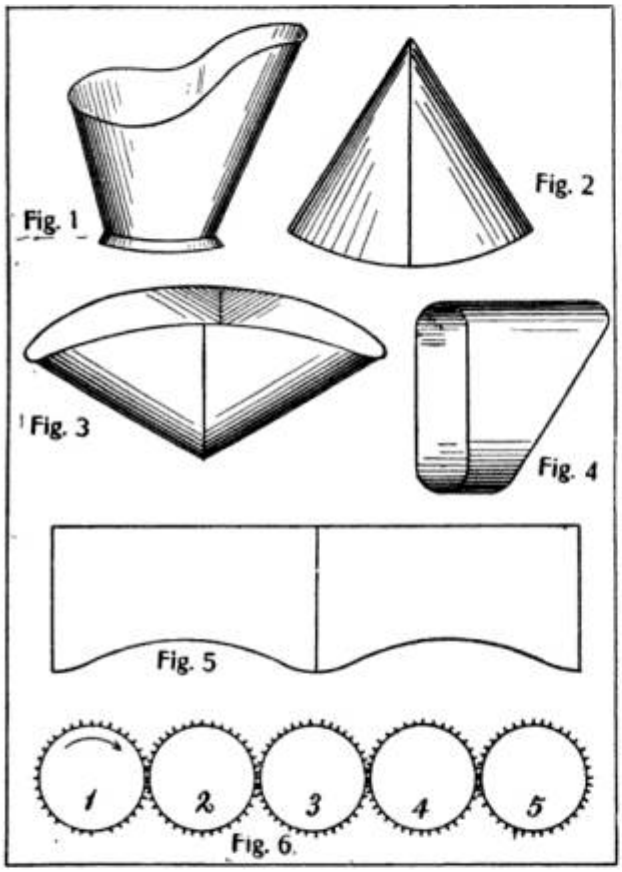
but make an angle-plate which will prove useful many times. File a piece of good straight steel plate, A, to the dimensions shown, drill and tap two 3/16-in. holes and fit two pegs, BB, made from screws, with the ends rounded as shown. At the other end drill and tap a 3/16-in. hole and fit a screw, C (either an ordinary cheese-head screw, or a knurled head screw). To use, move C up and down, according to the angle wanted.

TO RECOLOR ALCOHOL THERMOMETERS

The loss of color in alcohol thermometers is not always due to fading, says a contemporary, but may be caused by the color settling to the bottom of the bulb. To stir it up well, the thermometer should be alternately plunged in water heated to near the capacity of the thermometer, or the boiling point, if the thermometer registers more than 212, and an ice bath. This will cause the alcohol to flow rapidly up and down in the tube and, of course, stir up the sediment in the bulb and color the alcohol again, thus making it easily visible against the scale. Many a thermometer has been discarded as useless when it might easily have been recolored in this way.

THE POWER OF IMAGINATION AS APPLIED TO MECHANICS

That power or faculty of the mind called imagination may seem a little out of place when brought under a mechanical heading, yet this particular power plays an important part in all occupations that produce something from an invisible design. Every person has this power to a certain extent but, like the muscles of the body, in some it is weak and in others strong, owing to lack of exercise. This power can, however, be developed to a state approaching perfection.



To judge the ability of a mechanic by his imaginative power is not wise: Some men are expert workmen with their hands after the work has been laid out for them, but are weak in head work; others have strong imaginative power and can produce great things in their minds only, but cannot produce anything with their hands.

This power or faculty may be divided into two classes, the weak and the strong. In the weak class we find the fellow who thinks that he has a machine firmly stamped upon his mind—when the machine is constructed, its dimensions are three or four times larger than he had expected them to be, and in his mind he had crowded into the space of a few square inches, enough pieces to fill a bushel basket. The weakness of this faculty has caused the downfall of many an inventor. The reason is this: The inventor, as a rule, has no means and is compelled to interest moneyed men; his invention, whatever it may be, is seen in the mind only, therefore we will call it an imaginary machine, sufficiently developed to convince the grocer or merchant, who does not understand mechanics, that his (the inventor's) idea is an assured success. The half-developed invention is constructed and the first one is a failure. The backer becomes discouraged and quits. The inventor discovers his faults, but for want of capital he cannot try again. When the imaginative power is weak, only part of a complicated object is seen. While the brain is busy with one-half of an object the other half vanishes from the mind. In the strong class we find the fellow who can picture to himself nearly correctly an object or an imaginary machine. A man of this class can construct a mechanical device and the first trial proves the value of his idea.

Those who have learned to lay out sheet iron or heavy plate work realize the value of this faculty when developed. He who follows that occupation must be able to imagine how the flat sheet will look when rolled or bent into shape. A flat plate may be laid out for bending or rolling into some irregular shape; looking at the plate one man will see just how it will look when bent, while another can form no idea at all.

Figures 1, 2, 3 and 4 are objects rolled or bent into shape. Can you imagine how they looked before they were formed? In other words, in what shape was the flat sheet cut? What would Fig. 5 make if rolled into a circle? Fig. 6 shows a train of gears. Assuming that 1 runs to the right, can you see in the mind the direction of the other four? When the mind is on 5, does 1 vanish from it? It requires practice to concentrate the mind upon each imaginary gear and control its motion. From the diagram this may be made clear. If 1 moves in a right-hand direction, all the odd numbers, 1, 3 and 5, move towards the right, while 2 and 4 run in the opposite direction.

For the benefit of those interested the next number of Popular Mechanics will contain a plan of Figs. 1, 2, 3, 4 before rolled, and of Fig. 5 after it is rolled to a circle.—Contributed by Paul S. Baker, Muscatine, Ia.

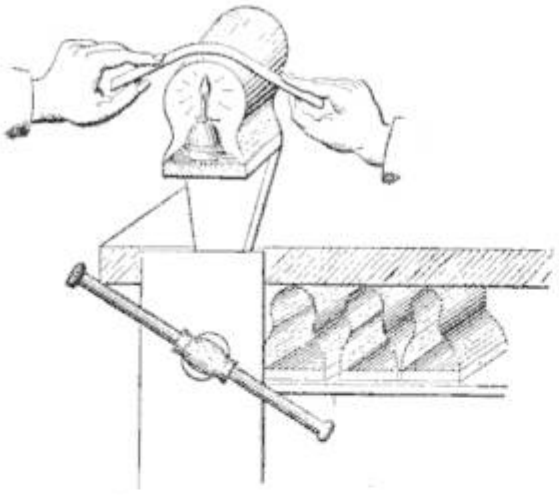
Bayberry tallow applied to the surface of hot iron patterns is quite as good as the mixture of beeswax and tallow, frequently used for this purpose.

HOW TO BEND WOODEN STRIPS

In pattern shops it is frequently necessary to cover a pattern with narrow strips of wood curved to conform to the curves and angles of the surface. These strips are first heated, says Wood Craft, and then, while hot, bent on a device called a "bender."

One of these benders may be made of a length of ordinary stovepipe. Nail the pipe to a board and put a spirit lamp inside of it. That part of the pipe above the flame will become very hot. Now, try taking a strip of pine, ½ in. wide, 12 in. long and ⅛ in. thick, placing it crosswise on the pipe over the heated part and pressing both ends of the strip downward. As soon as the wood is heated through, it will conform to the shape of the pipe and will remain in that shape when removed.

Benders from a tube 1 in. in diameter to 12 in. are required in the pattern shop, more particularly in putting stove patterns together. Small benders are rested on a frame and a gas jet is introduced through a slot on the under side. The illustration shows one form of bender with a lighted spirit lamp within it. This bender has a handle by which it may be held in a vise when in use. Those underneath the bench on a shelf have no handles and are handy



Bending Strips of Wood

to place anywhere. The opposite end from where the lamp enters the bender is closed by a block to which the sheet iron is nailed, holding it rigid.

These thin strips are fastened to the follow-board in the following way: The form when ready to cover is given a coat of shellac, and when this is dry it is sandpapered lightly then thinly greased with tallow or lard. This will hold the strips close. To hold a strip so that others can be glued edgewise against it, use pattern makers' tacks.

TO SLING A PLANK EDGEWISE

A plank on edge is better for supporting a swinging scaffold than a plank laid flat, says the American Machinist, as it is stiffer on edge. The method of slinging a plank edgewise by a rope so that it will stay is shown in Fig. 1. A clove hitch is made

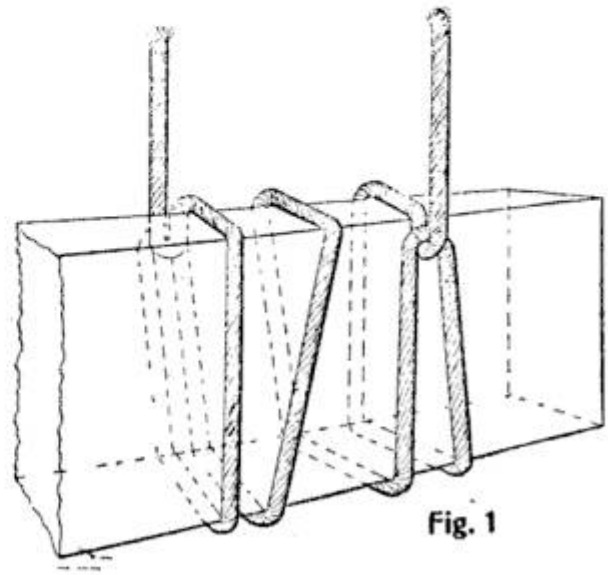


Fig. 1

Fig. 2

around the end of the plank; then one of the parts is twisted around the plank until the ends lead as shown.

To shorten a piece of rope without cutting it, try the sheep's shank shown in Fig. 2. The rope is brought back on itself, making two or more bights, and a half hitch is taken around each bight. This knot will not slip, and will nearly fall apart of its own accord if the strain is released, so that when there is a liability of this happening, it is well to pass a piece of wood through the loop A at each end and pull the rope tight on them.

HEAT LOST BY RADIATION

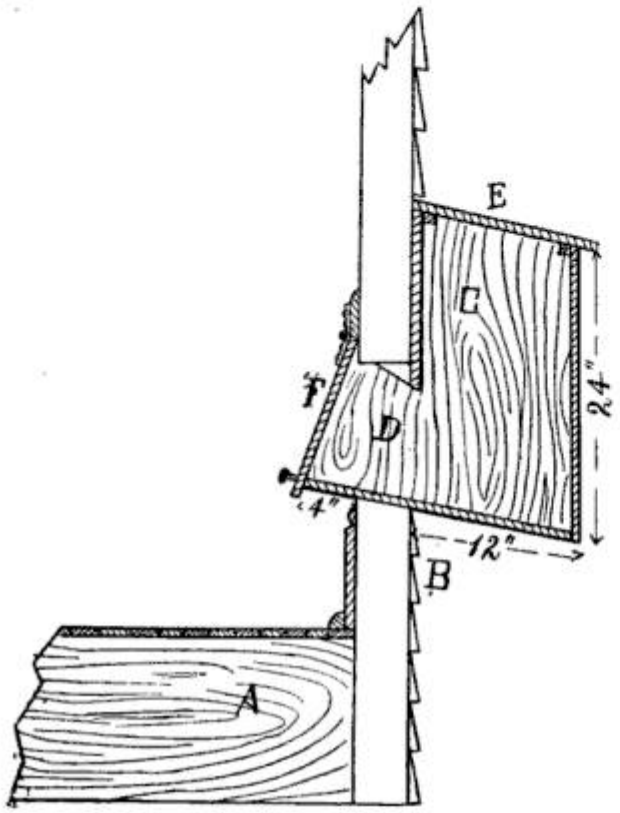
The amount of heat lost by radiation from bare pipes containing steam at 100 lb. pressure has been estimated to be about equal to two tons of coal a year for each 10 sq. ft. of pipe surface. It has also been found that 88 per cent of this loss can be saved by the best pipe covering.

The painter can keep the water in the brush troughs from freezing in cold weather by the addition of salt or a little glycerine. Neither will hurt the brushes.

HANDY COAL BOX FOR HOUSE

In place of the dirty coal bucket setting in the kitchen beside the range a coal box like the one illustrated may be used, eliminating a large amount of dirt and cleaning.

The box is fastened on the outside of the



Substitute for the Coal Bucket

kitchen, within easy reach of the range. It may be of any size, but is amply large if made 12 in. wide, 15 in. long and 24 in. high. An opening, about 8 or 9 in. high, through the wall, with a slanting hinged door on the inside, admits the coal to the kitchen. The coal is deposited in the box from the outside, and is fed to the opening within by gravity. Referring to the illustration, the parts indicated are: A, kitchen floor; B, side of house; C, coal box; D, opening in wall; E, removable lid outside; F, hinged lid within kitchen.—Contributed by Wm. O. Tischendorf, Mt. Vernon, Ind.

RECHARGING DRY BATTERIES

Dry batteries can be recharged, if not too far gone, by the following simple method:

Bore two holes in the top down through the composition there, one on each side of the carbon. Pour into these holes about one gill of diluted sulphuric acid (3 parts water and 1 part acid), and plug the holes up with common soap. Let the batteries stand about 12 hours, when they will be nearly as good as new. The batteries I used were ones thrown away by a telephone company as worthless. That was six months ago, and they are in service yet.—Contributed by Wm. J. Slattery, Emsworth, Pa.

PURITY OF SCRAP LEAD

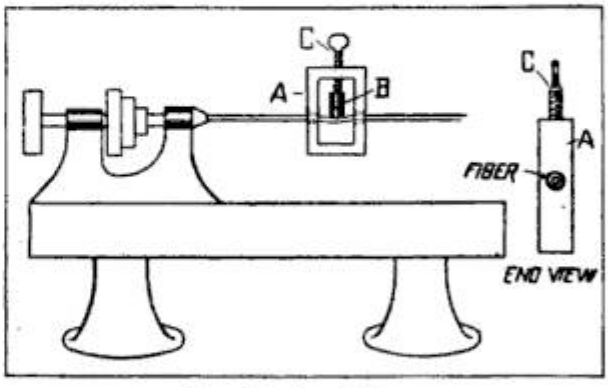
Old lead pipe, or scrap lead, is not always suitable for the purpose to which it is to be put. Often it contains foreign matter of an offensive nature and quantities of water. Sometimes this accumulation of water causes an explosion, more frequently occurring where the water is frozen. As an illustration of this, a kettle may be half filled with melted lead and then scrap lead containing water or ice added. The steam will cause an explosion, possibly blowing out half the lead in the kettle.

Because of frequent remeltings of old lead, it gradually comes to contain a considerable per cent of tin and antimony, but these metals are beneficial, serving to harden the pipe and making it preferable to that made of pure metal, which corrodes more rapidly when exposed to moisture. Underground telegraph and telephone cables are encased in lead pipe containing from 3 to 4 per cent tin, on account of this fact.

In melting scrap lead place a stick of wood in the bottom of the lead kettle and let it boil for some time. This will reduce the oxide and a good clean metal will result when the dross is skimmed off.

WIRE TRUING DEVICE

The wire-truing device illustrated has been used by F. F. Berry, 104 Reed av., Peoria, Ill., daily on hollow tubing 3-32 in. in diameter, with satisfactory results, neither twisting nor breaking the tubing.



For Truing Wire

Part A is made of hard wood 2½ in. wide, 1 in. thick and 3½ in. long with holes made in the sides and plugged up with fiber which is more durable than the hard wood.

Holes for the wire are a little more than 3-32 in. in diameter. B is made of round hard wood and the screw, C, which is made of common iron, sets in loosely. This is said to be an excellent device for hand work on small wire.

STEEL SQUARE AND PIPE WRINKLE

The diameter of pipe necessary to carry the contents of two smaller pipes may be determined roughly by the use of the steel square, says the Engineer.

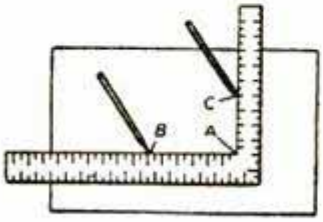


Fig. 1

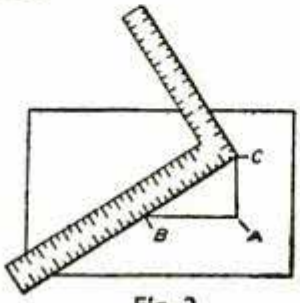


Fig. 2

On a board or sheet of paper mark off the diameters of the two known pipes, as AB and AC, Fig. 1. Then measure across as in Fig. 2. The distance is the required diameter.

HOW TO PIPE WATER-COOLED MOTORS

In the left-hand illustration, showing a four-cylinder water-cooled motor, the cylinders are cast in pairs and the honeycomb radiator forms the front end of the bonnet. From the base of the radiator the water is drawn by the gear-driven pump to the base of the water jacket, surrounding the rear pair of cylinders. From the jacket it passes from the center of the top of the jacket to the base of the jacket for the front pair of cylinders and finally exits from the top of this pair to the top of the radiator. In this way the back pair of cylinders gets the cold water and the front pair the warmed water from the rear.

This method is incorrect. It is better to have the water in both cylinders as near the same temperature as possible, says the Motor Age. Where the water is distributed to both cylinders evenly, as shown in the second drawing, the cooling is more even. Where the water is introduced to rear cylinders first, the hot water enters the front cylinders at a higher temperature than that of the water in the rear cylinders, which is cooled by the force of the air through the radiator.

HOW TO BABBITT A LOOSE PULLEY

Remove the old babbitt from the pulley and make a base a trifle larger than the diameter of the pulley, to which fasten a round piece of wood, standing vertically as shown at A, Fig. 1. Place the pulley upon the core base, and after leveling across the rim, move it so that core P stands exactly in the center of the hole in the hub (Fig. 2).

Bring a collar (previously put on), of the same size as the core, up against the bottom of the hub and secure it in place by means

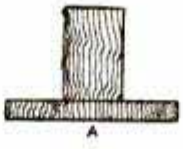
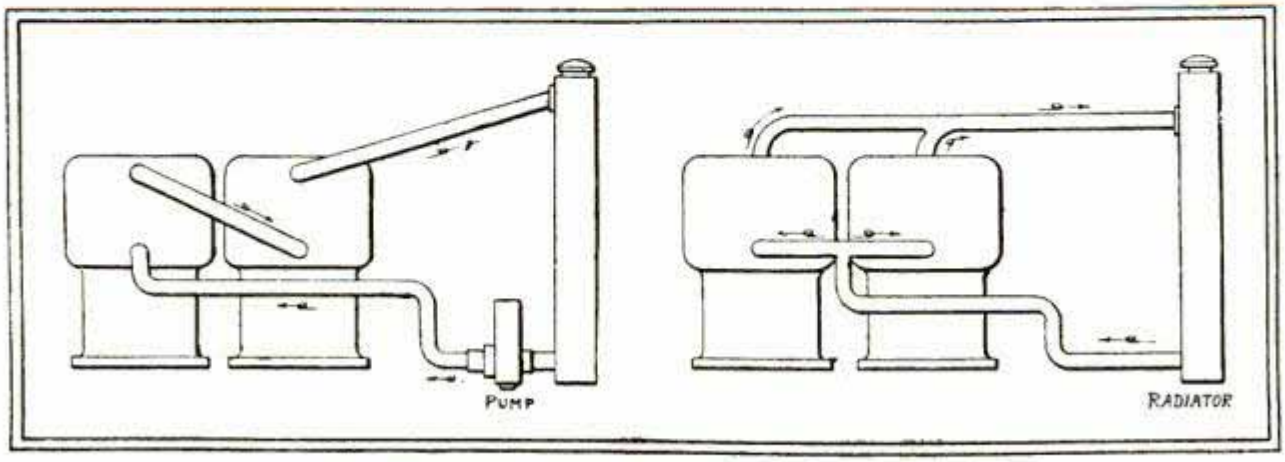


Fig. 1

Fig. 2

of the set screw, directs a writer in the Engineers' Review. Fill the crack between the collar and the hub with plaster of paris. Plug the oil hole with wood, pour babbitt metal in around the core and allow it to cool. When the babbitt is cool, remove the core, which will have shrunk some. Then scrape the babbitt until a good fit to the shaft is made.

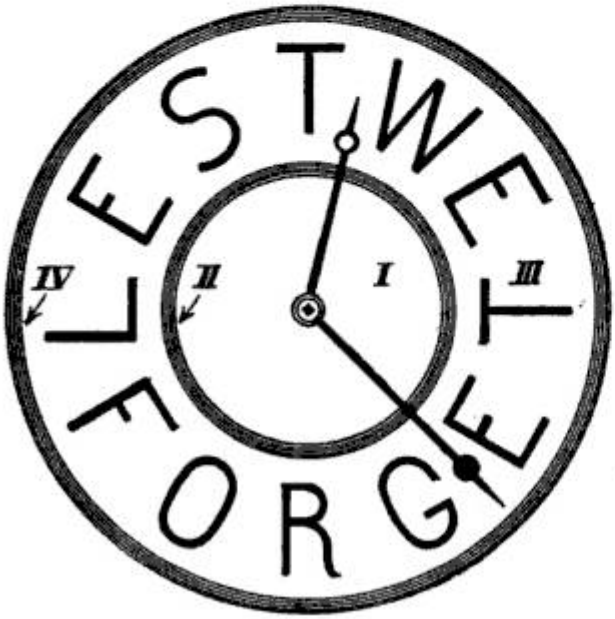


Incorrect and Correct Way of Piping in the Water System

A NOVEL CLOCK DIAL

We made a unique clock dial for our shield clock in the following manner:

Taking out the old dial, which was made of metal, we applied to it two coats of white enamel, allowing the first coat to dry before applying the second. We then painted in aluminum a circular band on the

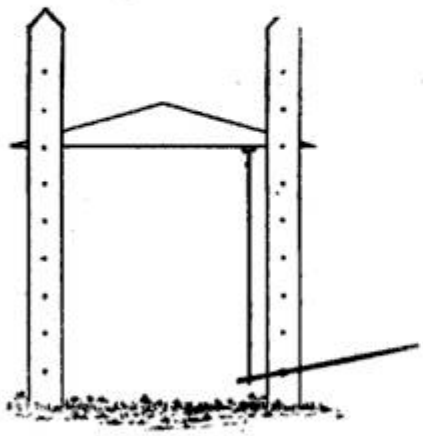


Novel Clock Dial

dial about 2 in. from the center. A band of aluminum was painted on the edge of the dial, also. Between these bands there was one of white enamel, and on this we painted in black enamel the inscription, "Lest we forget," letting each letter represent a figure. Referring to the illustration: I and III indicate white enamel; and II and IV indicate aluminum.—Contributed by Gordon M. Backus, Hackensack, N. J.

RAISING ROOF OF HAY BARRACK

An improved method of raising the roof of a hay barrack is described in the Country Gentleman. The old way has been to use a screw which was more expensive to start with and a time-consumer in operation. The new method is by means of a lever, the use of which is clearly shown in the cut.



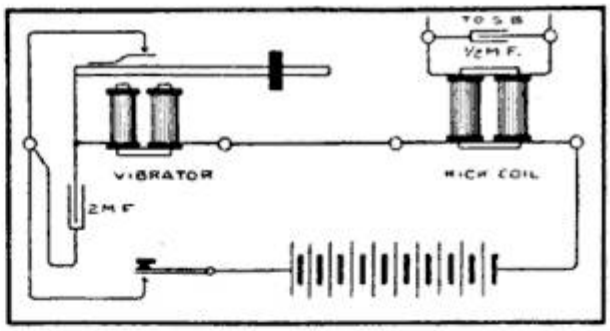
REMEDY FOR SLIPPING SET SCREWS

When the set screw on the pulley of the governor shaft of a 10-hp. engine persisted in working loose, a correspondent of the National Engineer remedied the matter as follows:

The spindle was taken out and a ¼-in. hole drilled lengthwise of it, between the spindle and governor pulley—near the place where the set screw was located. A wire nail, a trifle larger than the hole drilled, was then driven into the hole and prevented the set screw from slipping again.

HOME-MADE RINGING DEVICE FOR TELEPHONE EXCHANGE

To make this device, which with ten cells of batteries will furnish sufficient ringing current for a small exchange, procure a vibrating bell, a ½ M. F. condenser, a 2 M. F. condenser, a push button switch and a kick coil such as is used in telephones in place of a generator.



Circuit Arrangement for Ringing Apparatus

Remove the gong and tapper of the bell and solder a piece of No. 12 iron wire, 5 in. long to the tapper rod. Upon this place a light weight which can be moved up or down to govern the speed of the vibrator. Screw the vibrator and kick coil to any convenient base, says the Telephone Journal, and arrange the circuit as shown in the sketch. Place the push button switch in a convenient position, preferably near the crank of the hand generator. Connect the ½ M. F. condenser across the terminals of the secondary winding of the kick coil, and the other condenser across the make and break contacts of the vibrator.

When the operator rings, pressing the switch closes the battery through the primary circuit of the kick coil and vibrator, this causing the secondary of the coil to deliver an alternating current. The ringing cam is operated in the usual manner.

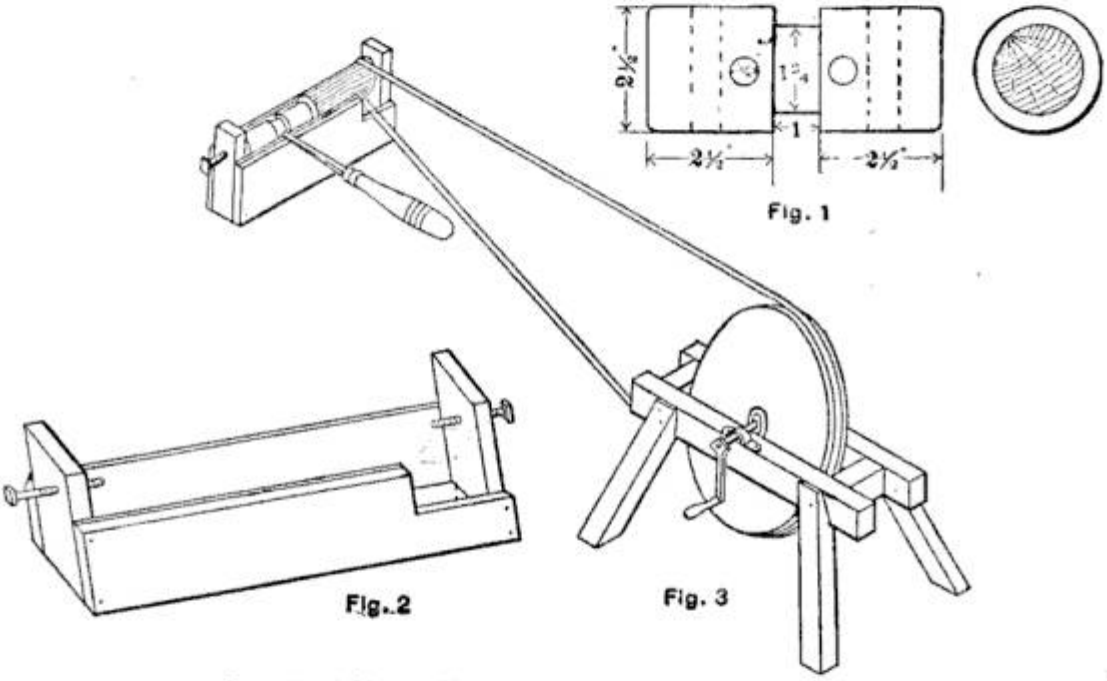
HOME-MADE LATHE RUN BY A GRINDSTONE

The boy who can find use for a lathe can make one for himself which will do for ordinary purposes. Fig. 2 shows the lathe. Make the ends 4 by 2 in., and the side pieces, 6 by 1 in. by 18 in. long, leaving between the ends 14 in. Nail the parts together securely. Bevel off the side pieces, leaving about 3-16 in. square edge to act as rests for the tools. Screw through each end, rather tightly, a coach or lag screw with the point ground conical on the grindstone; these to act as lathe centers. Cut away part of one of the side pieces, as shown, to clear for the belt.

A correspondent of Wood Craft rigged up a lathe like this to make some wooden wire strainers 2½ in. diameter and 6 in. long out of some 3x3-in. studding, work he would otherwise have been obliged to do by hand. Fig. 1 shows the shape of these strainers. To turn them proceed as follows:

Cut off pieces of 3x3-in. stock, 12½ in. long and chop off the corners roughly. Deeply countersink these pieces in the center of each end and put them between the centers to run fairly free. Connect up the grindstone as shown, using old reins for belting, piecing them together with wire lacing and butt joints. Run the belt around the end of a chunk of wood, before fixing the wood between the centers, and then round the grindstone. Now get a small boy to turn the grindstone while you operate the lathe. Do one-half at a time (each piece making two strainers) and then turn the piece end for end and finish. Use an ordinary wood chisel. Bore holes as shown in Fig. 1. These strainers can scarcely be distinguished from those bought at the stores, and are only illustrative of the work that can be done on this simple lathe.

The lathe may be fastened to anything wooden, as a house, fence, gate, etc., at a distance requiring a good long belt to maintain the right tension.



Practical Home-Made Lathe Run by a Grindstone

METHOD OF SOLDERING

Clean the parts thoroughly of all grease, rust or scale and wet them with prepared acid. Hold the soldering copper on each part until the article is well tinned and the solder has flowed to all parts.—Contributed by Alex. Betzer, 442 Austin avenue, Chicago.

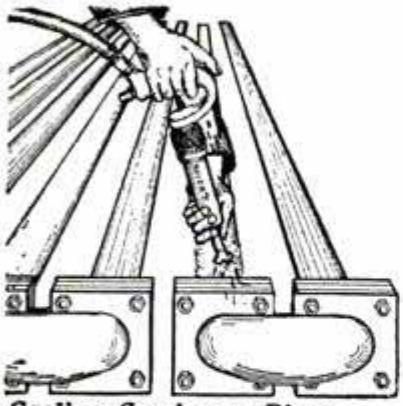
BLUEPRINTS FROM TYPEWRITTEN MATTER

When a number of copies of a specification or other paper are wanted, and none of the ordinary methods is convenient or desirable, make blueprints from the typewritten sheet, suggests a correspondent of the American Machinist.

Write the matter out on the typewriter, putting a piece of carbon paper in back of the sheet to give the printing density on both sides of the paper, then proceed with the blueprints in the usual manner. Use manifolding paper, the grade called unglazed onion skin. For white prints use new carbon paper and make the prints from that, in which case the letters will appear on a white ground. The carbon paper is more expensive than the white paper.

SCALING PIPES WITH PNEUMATIC HAMMERS

Pneumatic hammers are being used in ice and refrigerating plants for scaling condenser pipes. The method is shown in the illustration. The care of the condenser is very important in a plant of this kind, as by a few weeks' negligence the cost of production is greatly increased.



Scaling Condenser Pipes

PORTLAND CEMENT COUPLING FOR PIPE

Needing a coupling for ½-in pipe, and not having one, I used portland cement, making a thick putty and putting it on just as in wiping a solder joint. The same method can be used on bursted pipes, and the cement will hold like a coupling. I also stopped a leak in a heater with a thin paste of cement.—Contributed by Walter Weber, 643 W. 46th street, Chicago, Ill.

REMOVING HARD OLD PAINT

Hard old paint can be removed in the following manner: Dissolve 1 lb. potash in 3 pt. water and heat the mass, then add dry ochre until it is like rough stuff. Spread this on the paint and let stand until the paint softens. Then scrape off the mixture, directs the Master Painter, wash the paint clean, then dry and sandpaper.

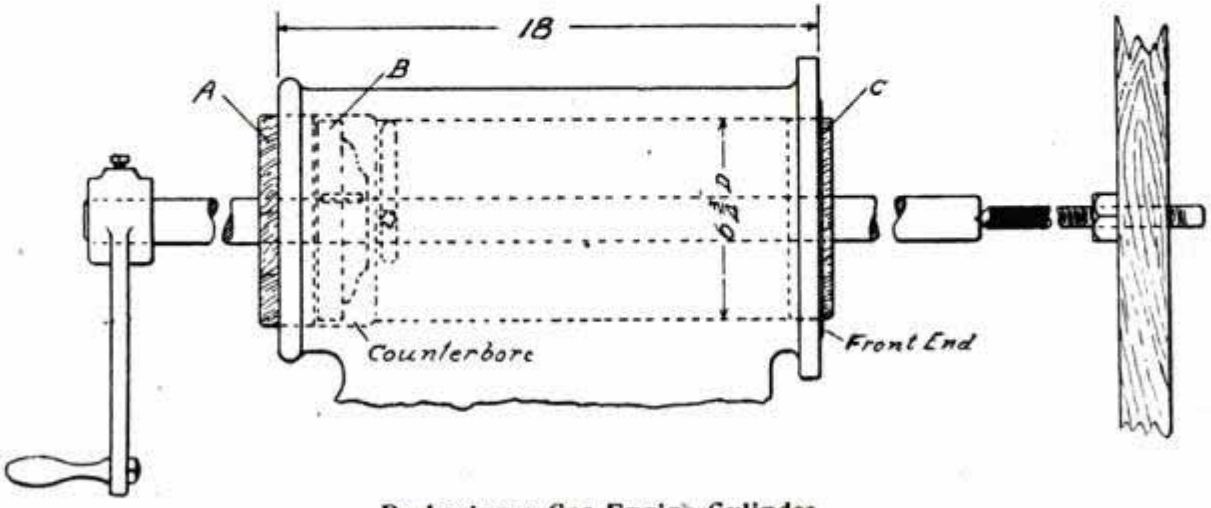
TO MEND AN OLD SHINGLE ROOF

Cut pieces of tin about 7 in. by 2 in. from old cans that are not too rusty and slip these pieces under the joints and cracks in the shingles. Do not nail the tin, as the nails would split the shingles. In this way an old roof can be made to last several years. —Contributed by Gordon M. Backus, 32 Euclid avenue, Hackensack, N. J.

RE-BORING A GAS ENGINE CYLINDER

An 8-hp. gas engine cylinder which was solid with the bed and entirely too large for any of the machines in the shop, was re-bored by a correspondent of Canadian Machinery, by the following method, which proved economical, accurate and a time-saver.

Three hardwood collars were put on a long, true boring bar, as shown in the sketch. The front end of the cylinder was true, the piston not traveling to within 1½ in. of the end of the cylinder. The back end was not worn on account of the counter bore. A hardwood collar (maple), A, was made to fit the boring bar on the inside and a tight fit in the counter bore outside. Close to that was put another collar, B, to fit bar as before, only this was turned to the size the cylinder was to be re-bored to, and as close to this as possible was the cutter, the hardwood collar, C, was fitted at the other end a tight fit to act as a guide or steadier to keep the bar in perfect alignment. On getting a cut started it was found that the bar had a tendency to feed ahead of itself, so a long rod was threaded and a check nut put on, and the same slacked off steadily, and with a crank on the end of the boring bar what had seemed an impossible proposition was accomplished in about one hour.



Re-boring a Gas Engine Cylinder

DO YOUR OWN BINDING

The subscriber who wishes to bind his Popular Mechanics or any other paper may do so himself at practically no cost. The illustrations are almost self-explanatory and the sizes given are for six numbers of Popular Mechanics which make a very handy size book, it being 1¼ in. thick, 7 in. wide and 9¾ in. long allowing the cover to overlap ⅛ in. at top, bottom and right side.

Figure 1 shows the size and shape of the cloth covering which can be of book binders' cloth, thin table oilcloth, old window curtain or other material in this line on which paste or mucilage can be used. It also shows the position of the two pasteboard or mounting-board backs each 6⅛ by 9¾ in., which are to be firmly pasted in place. Fig. 2 shows the outside cover, the backs and an inside cover 9¾ by 15 in. of same material as outside, all in place to be pasted together as shown in Fig. 3.

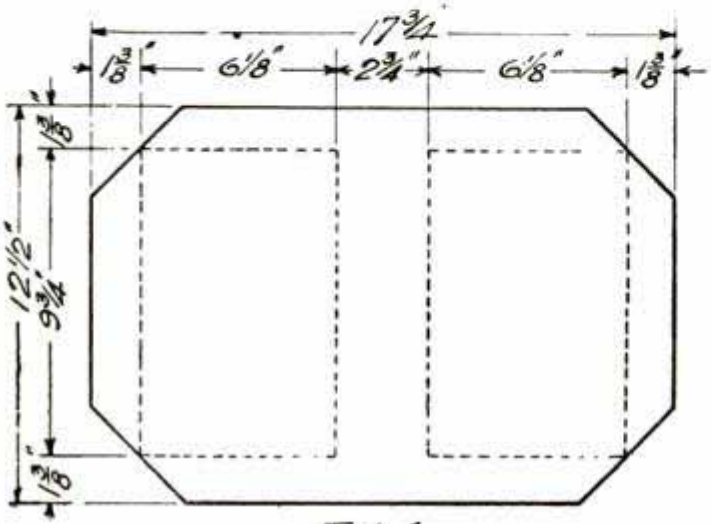


Fig. 1

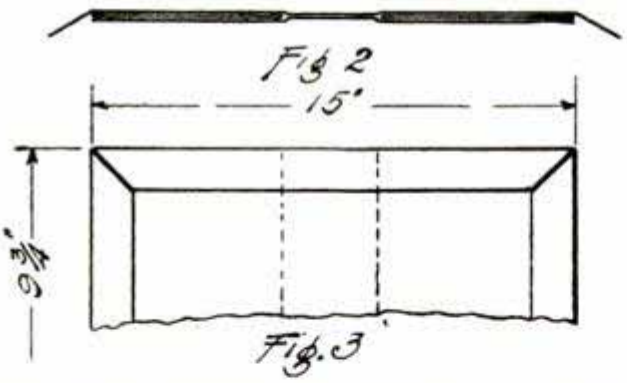


Fig. 2

Fig. 3

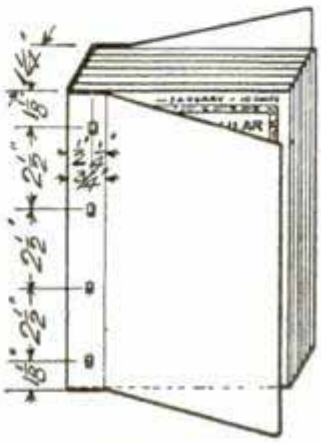


Fig. 4

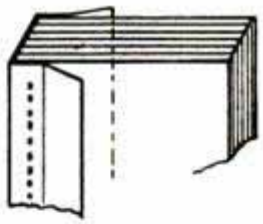


Fig. 5

Figure 4 shows the completed job, where the cover is mounted on the magazines and firmly secured by means of good strong paper fasteners, cord, or whang. Fig. 5 shows another way of attaching the cover which is in some respects neater. This is done by first sewing on a good firm piece as shown and then pasting the complete cover over this, thereby hiding the rough stitches and giving it a finished or book-like appearance. A good flexible back can be made by substituting leather, oilcloth, etc., for the cardboard backs. The writer has used this idea in many cases with very satisfactory results and hopes that many Popular Mechanics subscribers will take the time and pains to avail themselves of this very easy way of preserving their papers.—Contributed by C. M. Shigley, 676 N. High street, Columbus, Ohio.

HOW TO ESTIMATE THE HORSE POWER OF A GAS ENGINE

The horse power of a high grade four-cycle gas engine may be closely estimated by the following rule:

Each square inch of the area of the piston head will give you about 7-16 of a horse-power. This contemplates the engine in perfect condition, igniting at just the right point, etc., running at a speed of 250 R. P. M. The ordinary cheap gas engine sold in the market today will do but little better than ¼ hp. to each square inch of piston head surface. The Prony brake is the only thing where accuracy is required.

AN EMERGENCY WRENCH

When on a break down job it is necessary to make a wrench in a hurry, the one illustrated is a good one, says a correspondent of the Blacksmith and Wheelwright.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

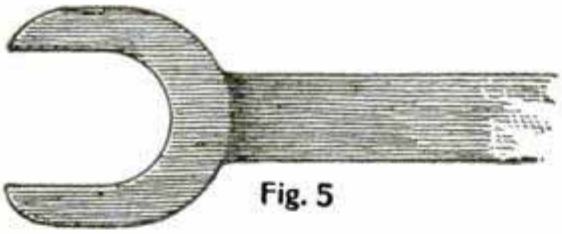


Fig. 5

Take a piece of iron 1¼ by ½ in., or according to the strength of the key required (Fig. 1) and upset the ends a little. With a pair of fullers make the iron like Fig. 2 which shows the edge. Of ¾-in. round iron make an ordinary link like Fig. 3 and weld one end on the bar (Fig. 4.) Then cut the link half through and bend it over to lay on the other side. This makes a good strong wrench (Fig. 5) for any class of work.

WATCHMAKERS' OIL

In a bottle about half full of good olive oil, put thin strips of sheet lead. Expose to the sun for a month's time. Then pour off the clear oil. This is a cheap method of making a first-class oil for any light machinery. The oil will not corrode or thicken.—Contributed by Alex. Betzer, 442 Austin avenue, Chicago.

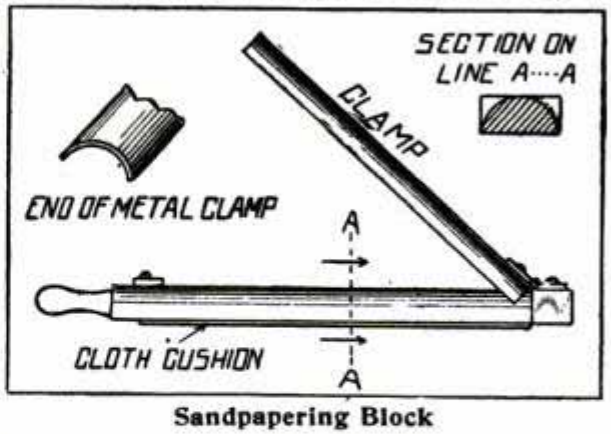
ENCAUSTIC PASTE FOR COPYING PHOTOGRAPHIC PRINTS

Encaustic paste may be bought ready prepared or made at home, as desired, and few photographers realize with what excellent results it may be used, says the Camera and Dark Room. To make the paste, melt 1 oz. of white wax and add to it 6 dr. oil of lavender. When thoroughly mixed, add 1 dr. gum elemi and stir the mixture until it is quite cold.

For copying prints in which there is a tendency to show grain, put a little piece of the paste in the center of the print and rub it in well with a piece of cotton wool, working in a circular direction and rubbing until the wax apparently is all removed. Use the paste in the same way to brighten a print.

HOW TO MAKE A SANDPAPER BLOCK

The block may be made either wide or narrow. For ordinary use a piece of wood 6 in. longer than the width of a sheet of sandpaper and 2 in. wide by 1 in. thick will do. Round off the back side leaving 1 in. at one end. Out of a piece of heavy tin or sheet metal make a piece to fit the rounded side and hinge it to the square end of the wood. On the flat face of the wood fasten a piece of heavy cloth or ingrain carpet. Work the rounded end down to a good handle. Fasten a button on the handle end to hold the metal clamp down. Now by wrapping the sandpaper around the wood and clamping the edge on the back, you



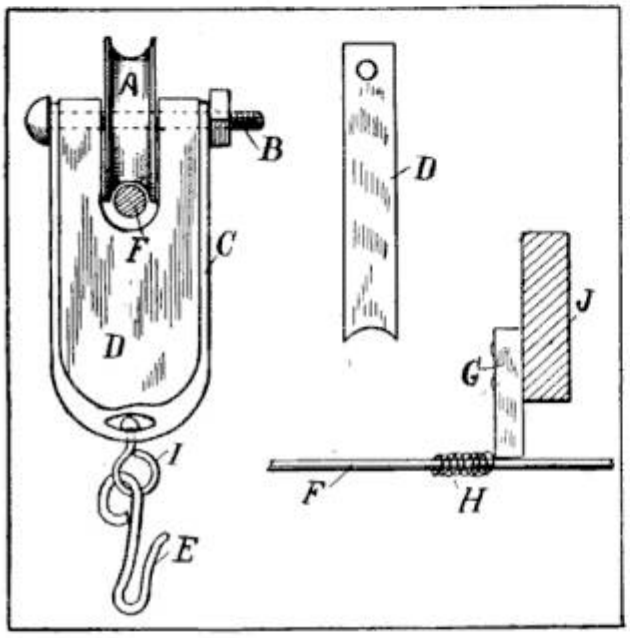
Sandpapering Block

have a rasp that will last longer, do better work and is more easily handled than most blocks.—Contributed by Wm. F. Hoag, Judsonia, Ark.

In hardening small tools that are liable to warp, heat carefully and insert in a raw potato, then draw the temper as usual.

HOW TO MAKE A SIMPLE LANTERN CARRIER

A lantern carrier, made as illustrated, has been in use in my horse stable for nearly a year, and has been very satisfactory. This carrier can be made at little or no expense. The parts are: A, small grooved wheel about 1 in. in diameter with ¼ in. hole through it; B, ¼ in. by ¼ in. bolt; C, weight hook of an old steelyard scale; D, piece of soft pine grooved so that it will fit in the weight hook, as the weight hook is too wide inside for the wheel; E, heavy wire hook bent at one end to hang the lantern on and



Lantern Carrier for Stable

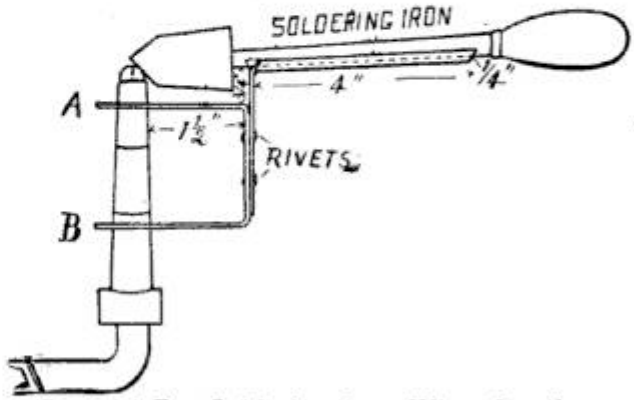
with the other end put through the swivel loop, I, and bent around; F, heavy wire track, stretched tight, upon which the carrier runs; G, stopping block, which is pushed down a few inches and nailed to a joist, J; H, coil spring slipped on the track in front of the stopping block for the carrier to bump against; should it run farther than is desired, the spring will prevent breakage.

The stopping block should be placed far enough away from the wall so the lantern cannot swing and strike it, and the carrier should be equipped with a swivel, I, as the lantern sometimes turns one way or the other, and without the swivel would twist the carrier on the track so that it wouldn't run well. This carrier is a good one, as the lantern cannot be knocked down by loose stock.—Contributed by J. C. Mannel, Lincoln, Kansas.

Dry ochre or any other dry pigment is too coarse for priming.

HANDY SOLDERING IRON HOLDER TO USE OVER A GAS JET

From 1-in. hoop iron cut one piece 7⅛ in. long to make the top part and another piece 4¼ in. long. Bend these pieces as shown in the sketch and then rivet them together. Make two holes in the ends (A, B) for putting the device on the gas jet.—Contributed



Support For Soldering Iron When Heating

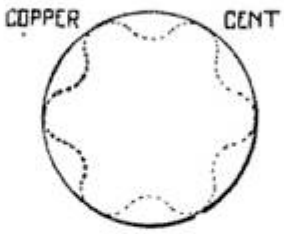
by Wm. T. Ackerman, 1211 N. Stockton street, Baltimore, Ind.

CEMENT FOR PIPE JOINTS

Grind, wash, mix and regrind to a fine powder, 15 parts chalk and 50 parts graphite. Add 20 parts ground litharge and mix to a stiff paste with 15 parts boiled oil. This preparation, says Domestic Engineering, will remain plastic for a long time, if stored in a cool place.

DISK FOR TURNING LAMP WICKS

Many times the disk that is used to turn lamp wicks, becomes unsoldered and is lost.



In this case, take a copper cent and file it with a small rat-tail file to the shape shown in the sketch. Drill a hole in the center and solder the cent to the stem. If the wick is hard to turn up or down, this gives a better grip than the original disks with their finely milled edges. I have also used this to advantage on hand bike pump connections.—Contributed by Stoke Richards, Santa Clara, Cal.

Do not use varnishes that contain resin in any quantity for exterior work.

HOW TO MAKE A DESK LIGHT

From an electrical supply dealer get some office cord, a socket and bulb.

To make the plug which is to fit into the wall socket, get a burnt-out bulb and break the glass; inside there is a small glass tube, break this also, being careful not to break the wires inside of it. To these small wires attach the cord. Cut a piece of rubber to the shape shown in Fig. 1, and fit it in to keep the wires apart. Then bind the wires with tape, to keep them away from the brasswork and prevent short-circuiting.

Cut some pieces of wood, about ¼ in. thick to the following dimensions: One piece, 8 in. by 4 in. (back); two pieces, 8 in. by 3½ in. (top and bottom); one piece 8 in. by 2½ in. (shade); two pieces 4 in. by 3½ in., with a hole in one piece for the socket (ends); one piece 8 in. by 1 in. by ½ in. (standard); one piece 5 in. by 3 in. (base

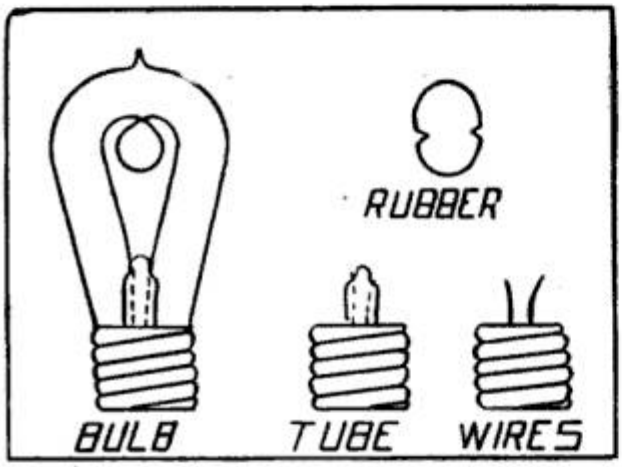


Fig. 1

of standard). Fig. 2 shows the back, Fig. 3, the socket end and Fig. 4, the base for the standard, the other pieces are used just as cut.

Of these pieces of wood make an oblong box as shown in Fig. 5. Fit a piece of tin in the back for a reflector. Bevel one edge of the piece for the shade and fasten it on so as to throw the light downward. Cut two pieces of tin, C, to fit over the ends and hold the shade firmly.

Attach the socket to the cord, when you will have the plug at one end and the socket at the other. Put the socket through the hole cut in one end of the box and fit a rubber washer around it inside the box. Then insert the bulb, put the plug in the wall socket and turn on the light.

If the device is too low, bend two pieces of tin about 1 in. wide in the form of the standard and fasten them to the back of the box as at A and B, Fig. 2, so as to let the box slide up and down on the standard cut from the wood, which is fastened to its base (Fig. 4.)—Contributed by R. W. Purdy, Chicago, Ill.

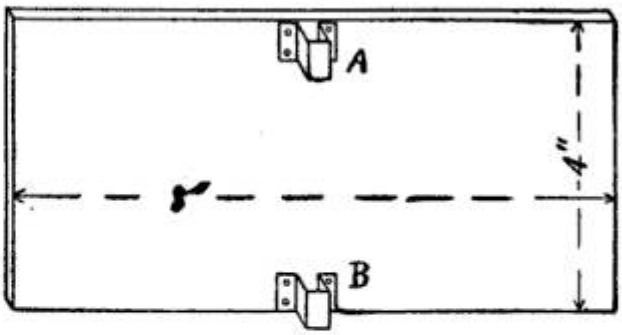


Fig. 2

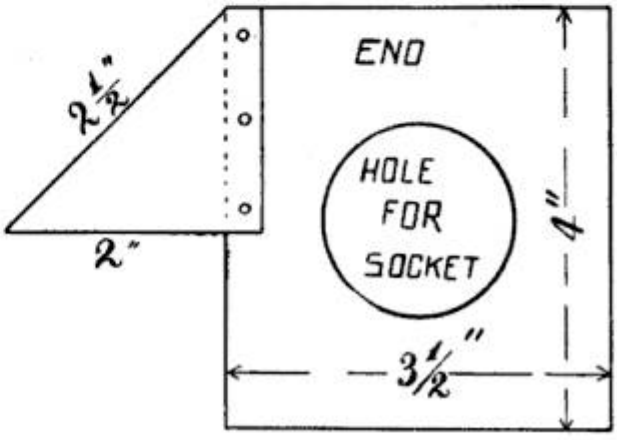


Fig. 3

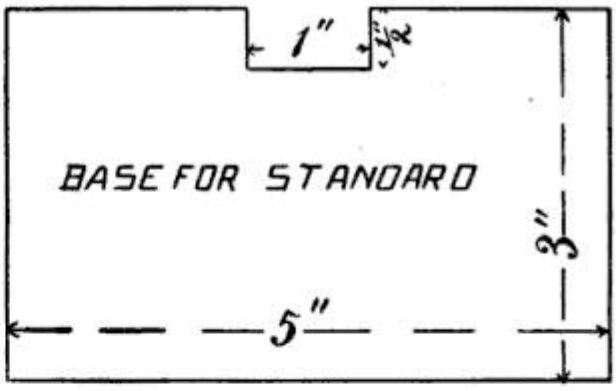


Fig. 4

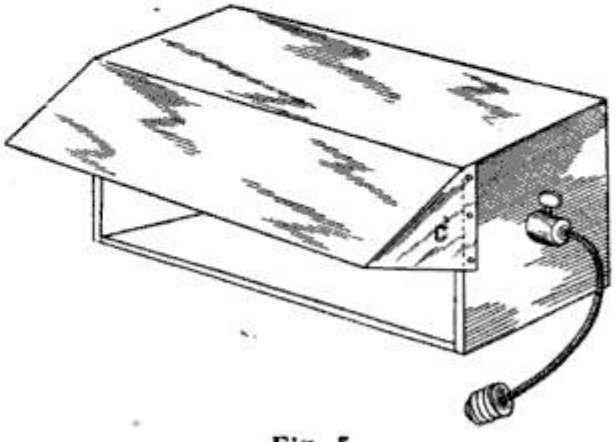


Fig. 5

HOLE JEWEL FOR A WATCH

When the jeweler requires a hole jewel and has not one to fit, he can make one out of a small chip from a glass rod.

Put the chip of glass on a piece of charcoal and heat it with a blowpipe until it draws up into a round ball; then stick it on the end of a match with sealing wax and rub it on an oilstone until it is flat; turn it over and rub the other side until you get the required thickness. Then, with a small drill and turpentine, drill a hole the size of the pivot. Polish the hole with diamond dust on a copper wire and countersink with a large drill for the oil cup. The whole jewel can be polished with dust on a piece of peg wood.

I have drawn down a glass rod and broken off roller jewels, also. Either of these jewels can be bought cheaply, but the glass jewels are better than the brass ones commonly soldered in.—Contributed by Henry F. Shaw, jeweler, Dalton, Mass.

IMPROVED SOLDERING OR TINNING ACID

Into 1 lb. muriatic acid put all the zinc it will dissolve and 1 oz. sal ammoniac. Add as much clear water as there is of the acid.—Contributed by Alex. Betzer, 442 Austin avenue, Chicago.

FASTENING A ROPE TO A RING: A DEFENSE

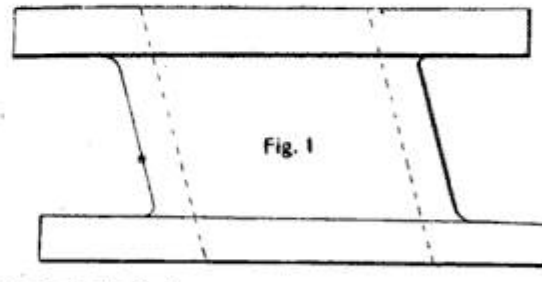
Regarding the discussion of the methods of fastening a rope to a ring, which appeared in our September, 1905, number, Joseph B. Keil, of Marion, O., writes:

Mr. Joannis has not correctly analyzed the operation of the fastening, as described by me, when in use. It does provide two wearing surfaces in that the two thicknesses of rope passing through the ring are worn simultaneously, and not separately, as Mr. Joannis seems to think. Moreover, the simple knot in which the ring is tied does not bend the rope so short as in the round turn of Mr. Joannis' method, and hence does not strain the rope so much locally.

For tightening screw connections, dissolve powdered shellac in 10 per cent ammonia and paint the mass over the screw threads after they have been thoroughly cleaned; then screw the fitting home. The joint will be impervious to hot or cold water.

HANDLING PIPE OFFSETS

While installing some 8-in. pipe, a correspondent of the Engineers' Review used the offset fitting shown in Fig. 1 to overcome an offset caused by the 8-in. flange being riveted crooked to a new return tank for the elevator. Fig. 2 shows the elevation of the two elevator pumps and tank which, being crowded well together, required the use of close nipples; it also shows how the piping was run and what fittings were used.



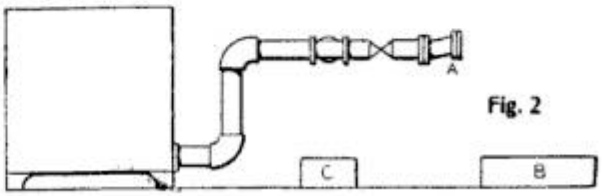


Fig. 2

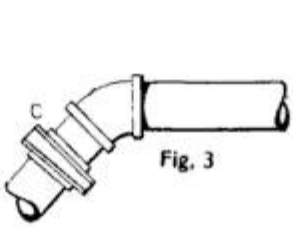


Fig. 3

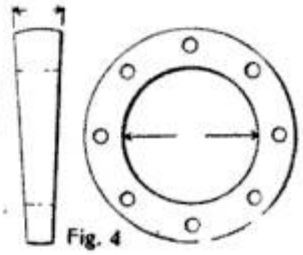


Fig. 4

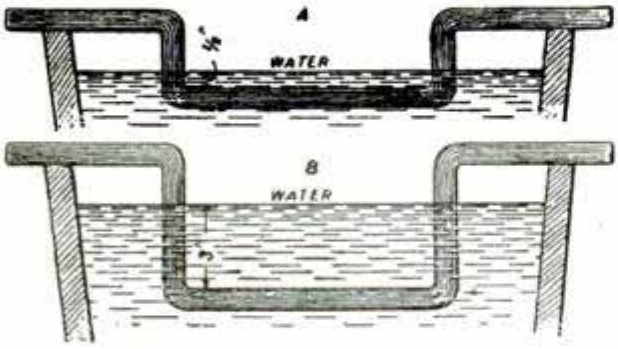
Flange connection was made to pump B, and when trying to connect to the same, it was found that the center of the pipe was 1/16 in. lower than the center of the suction opening of the pump, caused by the crooked thread in the flange pitching down. Cutting a crooked thread on a nipple was tried but the nipple was too short to give enough pitch. Then the special casting, Fig. 1, was made and used as at A, Fig. 2, making a connection without undue strain.

In turning an 8-in. pipe line to make an angle less than 135 degrees and more than 90 degrees (Fig. 3) a 45-degree ell, a short nipple and a flange union, between which was inserted the dutchman shown at Fig. 4, were used to get the right angle. The holes in the casting were drilled large enough to allow the bolts to pass through. The slant was ¾ in. in 11½ in. of pipe.

To render rough woodwork almost noninflammable, two heavy coats of ordinary lime whitewash is recommended by a painters' journal.

METHOD OF TEMPERING AN ANVIL

Have ready a tub with a good force of water coming up through a pipe from the bottom so that it will boil, and bend some irons for the anvil to rest on and let them hang in the tub (See illustration). One of these irons should go into the water deeper



Supports for the Anvil

than the other (A and B), says a correspondent of the Blacksmith and Wheelwright.

Let the horn end of the anvil in deepest to give the thin end a chance to draw the temper. Have the thin end ½ in. in the water, but let the horn end go in 3 in. deep. Heat up to an even cherry red. Lay on the iron in the water and let it remain there until the face is cold. If not hot enough so that you can touch it with the file set it on the fire block side down.

FOR ROUGH HANDS

This is the season when the machine operator's hands are liable to become sore and stiff from exposure. A correspondent of Machinery recommends this: Take a four-ounce bottle and put in same three ounces glycerine, one ounce alcohol, and from twenty to thirty drops of carbolic acid. After washing the hands, and while they are a little damp, apply a few drops and thoroughly rub it in. A good time to use it is at night.

PACKING CAST-IRON PIPES FOR HEATING

Place the pipes in the desired position and put a roll of oakum around each and pack it firmly into the hub of the pipe with a calking tool. Use either of the following preparations, recommended by the Florists' Review, for filling the remaining space:

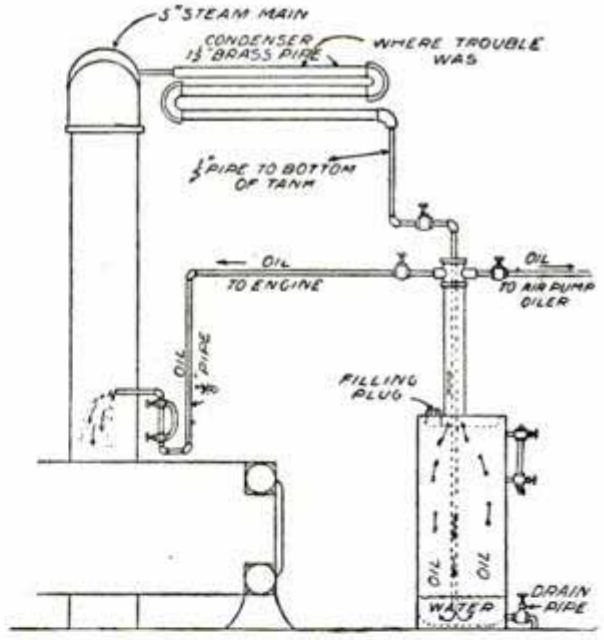
Sal ammoniac, 2 oz.; sulphur, 1 oz.; clean iron filings or borings, 12 lb. Add water to form a paste. Or,

Iron filings, 4 lb.; fireclay, 2 lb.; powdered potsherds, 10 lb. Make a paste with strong brine.

ASPHALTUM PREVENTS RADIATION OF HEAT

Painting pipes with asphaltum insulates them sufficiently to keep considerable heat from radiating, declares a correspondent of the National Engineer. In a plant where the exhaust steam was used in the heating system, the pipes of the system had been given two coats of asphaltum, and it was impossible to keep the building warm all that winter. That it was the asphaltum that caused the trouble was not discovered until later.

In another plant the writer had re-arranged the cylinder lubricating system by substituting a central oil reservoir for individual cups, as shown in the sketch, with a marked saving of oil. This reservoir was constructed of boiler plate to safely withstand a pressure of 120 lbs. Overhead in the engine room were a number of small



Trouble With Asphalt Painted Pipes in Oiling System

pipes, including the condenser pipes shown in the illustration. These pipes were painted with asphaltum one Saturday afternoon when the plant was not running. Then the trouble began with the sight feeds. No change had been made except in painting the pipes, and on examination these were found to be too hot to furnish the condensation necessary for the proper working of the sight feeds. The paint was scraped away and there was no further difficulty.

HOME-MADE WINDMILLS FOR PUMPING AND POWER

[The editor is indebted to the State Agricultural Experiment Station, of Nebraska, for much of the data used in the preparation of this series of articles.]

PART II.

MERRY-GO-ROUND WINDMILLS.

In constructing the merry-go-round mill the builder must put a check upon himself and resist the temptation to make it too large. The extremely large mills of this type, mounted upon towers, however well they may be anchored, are likely to be upset by the wind. Small and medium-sized mills are more satisfactory.

Figure 8 shows a small mounted merry-go-round, consisting of a number of fans revolving about a central axis. A semi-circular hood which exposes half of the fans and shields the other half, revolves about the same axis and is guided by a large vane. This shield runs upon friction

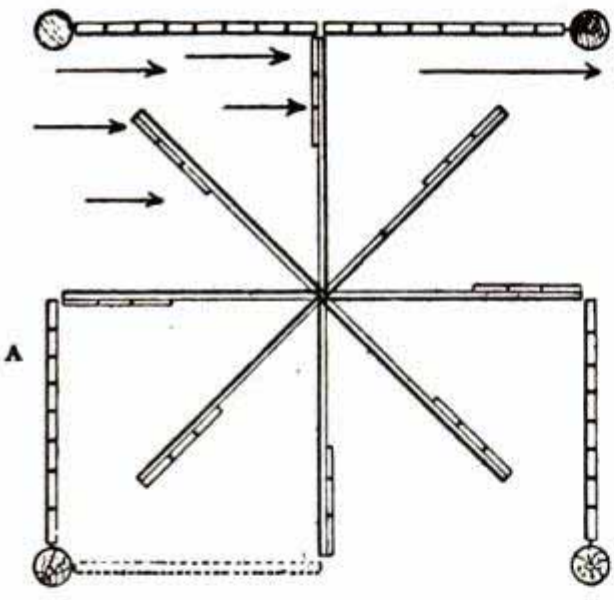


Fig. 9--Plan of Merry-Go-Round Mill

rollers, and to throw the mill out of gear, it is moved around to cover all the fans on the windward side. A smaller shield exposing more of the fans would do quite as well. The mill is simple in construction, costs little and can be mounted on a shed, crib, or other outbuilding.

In Fig. 9 is shown a ground plan for either a small or medium-sized merry-go-round. In diameter it may be from 20 to 25 ft. or more. Each of the four posts carries a gate arranged to turn backward through an angle of 270 degrees, (as from position A to position B) and which may be opened and closed to admit or shut out the wind. In a high wind the gates may be partly closed to check the mill, or entirely closed to stop it. The fans may be large or small as desired.

A huge merry-go-round located at Lincoln, Neb., measures 40 ft. in diameter with fans

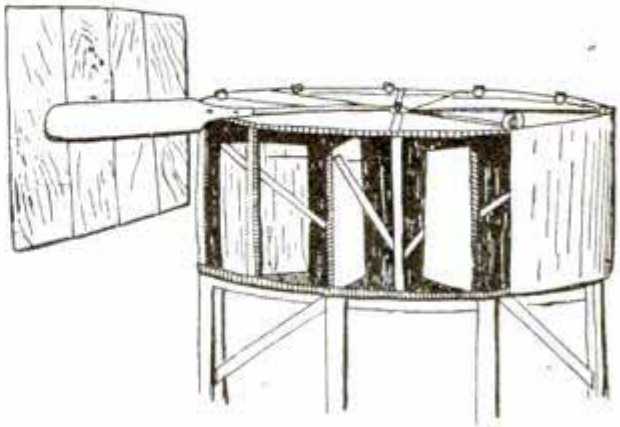


Fig. 8--Small Mounted Merry-Go-Round Mill

12 ft. high and runs on a circular steel rail. Mills of this size are, of course, much more expensive, and ofttimes defeat the owner's object in building his own mill. The merry-go-round is not as popular as the Jumbo and there are types more efficient, but it is the subject of considerable experimentation and may in time be greatly improved.

TURBINE MILLS.

In the turbine class are ranked several forms of mills: Holland mills, battle-ax mills, giant battle-axes, mock turbines (including several forms) and reconstructed turbines, that is, secondhand shop-made turbines, made over and erected by "home talent." These are named in the ascending order of their efficiency.

Fig. 11--Runs an 8-Hp. Feed Grinder

THE HOLLAND WINDMILL.

Who is not familiar with the old-fashioned Dutch or Holland mill? It has become integral by adoption with many of our landscapes, and glimmers back at us quaintly through our unstable memories of other years, until we wonder whether we viewed it in reality, or in heightened effect on some artist's canvas.

However that may be, the Holland windmill, modified somewhat to suit the American's ideas and needs is doing a good business uplifted amid the free prairie-bred winds of the West. In dimensions these mills range from 10 ft. to 36 ft. in diameter. They are mounted upon tall slender towers, or upon barns, sheds or milk houses. Sometimes the four fans are covered with duck, but more often with thin lumber. In some small places where the cattle of the town are herded together on the open prairie pasture land one mill will be erected to supply water for all the animals; often these town herds number upwards of a hundred head. Fig. 10 shows a mill that pumps for such a herd near Grand Island, Nebraska. It has canvas sails buttoned and tied in position in the ordinary way for use and furled when not in use.

Fig. 10

Another Holland mill (Fig. 11) at Chalco, Neb., runs an 8-hp. feed grinder, turning out a grist between 200 and 300 bushels of ground feed per day, elevating the grain and discharging the grist into bins automatically and requiring no superintendence.

Fig. 12--Six-Fan Holland Mill

The diameter of the wheel is 36 ft. In a good wind only two sails are used. This was rather an expensive mill, costing $150, but the results obtained have been commensurate and the mill will be useful fifteen years to come.

At a less cost, however, mills nearly as efficient may be built. For instance, the one shown in Fig. 12, which is of average size (20 ft. diameter) and runs a 6-hp. feed grinder. This mill cost just $50. It has six fans covered with thin wood instead of cloth. It is easier to slip a thin board into place than it is to unfurl and tie in place a duck sail. This mill will grind from 75 to 100 bu. per day according to the velocity of the wind.

Next month the battle-ax windmill will be discussed.

(To be continued.)

MAKING NOTES WITH THE CAMERA

Students and writers having occasion to do considerable research work at libraries may be able to greatly lighten their labors and increase the amount of work accomplished when some one perfects a note taking camera. With the aid of such an instrument it would be only the work of a moment to photograph a passage, or even an entire page of matter which could not be copied by hand in less than a half hour. Many of the most valued works of reference are so rare and valuable that the books cannot be taken from the libraries. This means the portions desired must be copied by hand. In some few cases private rooms are provided where one can read to a stenographer and thus save much time; but not many students can afford this expense. A further advantage is the absolute accuracy of the copy, a very essential matter in research work.

The note-taking camera will some day be a practical, obtainable instrument, says the British Journal of Photography. In fact, a writer in that journal relates having designed one 15 years ago, but their general use was prevented on account of infringing some patents then in force. There would seem to be a good opportunity for some bright inventor, photographically inclined, to bring out an instrument for this work, of such a size as can be conveniently carried in the pocket. For final use the photographs can be enlarged, or the image of the original film thrown on a screen by means of a lantern.

MECHANICS FOR YOUNG AMERICA

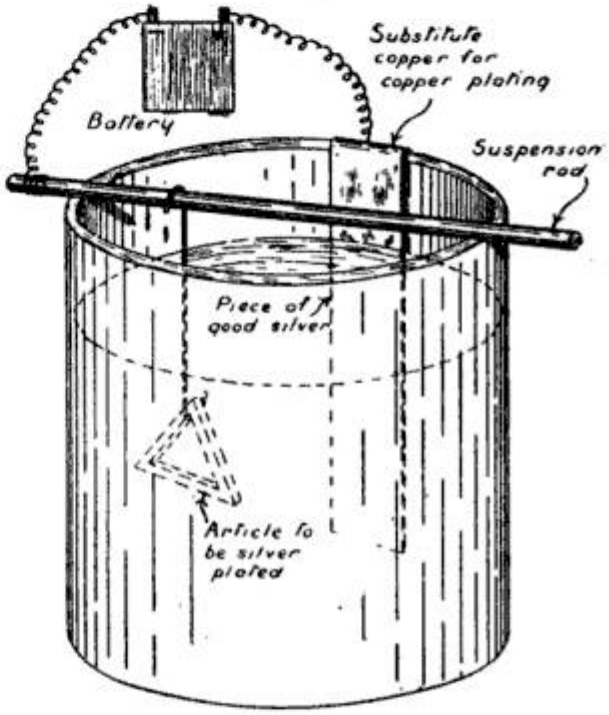
EASY METHOD OF ELECTRO-PLATING

Before proceeding to electroplate with copper, silver or other metal, clean the articles thoroughly, as the least spot of grease or dirt will prevent the deposit from adhering. Then polish the articles and rub them over with a cloth and fine pumice powder, to roughen the surface slightly. Finally, to remove all traces of grease, dip the articles to be plated in a boiling potash solution made by dissolving 4 oz. American ash in 1½ pt. of water. Do not touch the work with the hands again. To avoid touching it, hang the articles on the wires by which they are to be suspended in the plating bath, before dipping them in the potash solution; then hold them by the wires under running water for ten minutes to remove the potash.

For plating with copper prepare the following solution: 4 oz. copper sulphate dissolved in 12 oz. water; add strong ammonia solution until no more green crystals are precipitated. Then add more ammonia and stir until the green crystals are re-dissolved giving an intense blue solution. Add slowly a strong solution of potassium cyanide until the blue color disappears, leaving a clean solution; add potassium cyanide again, about one-fourth as much in bulk as used in the decolorizing process. Then make the solution up to 2 qt. with water. With an electric pressure of 3.5 to 4 volts, this will give an even deposit of copper.

A solution for silver-plating may be prepared as follows: Dissolve ¾ oz. of commercial silver nitrate in 8 oz. of water, and slowly add a strong solution of potassium cyanide until no more white precipitate is thrown down. Then pour the liquid off and wash the precipitate carefully. This is best done by filling the bottle with water, shaking, allowing precipitate to settle and then pouring off the water. Repeat six times. Having finished washing the precipitate, slowly add to it a solution of potassium cyanide until all the precipitate is dissolved. Then add an excess of potassium cyanide—about as much as was used in dissolving the precipitate—and make the solution up to 1 qt. with water. This solution with an electric pressure of 2 to 4 volts, will give a good white coat of silver in twenty minutes to half-an-hour; use 2 volts for large articles, and 4 volts for very small ones. If more solution is required, it is only necessary to double all given quantities.

Before silver-plating, such metals as iron,



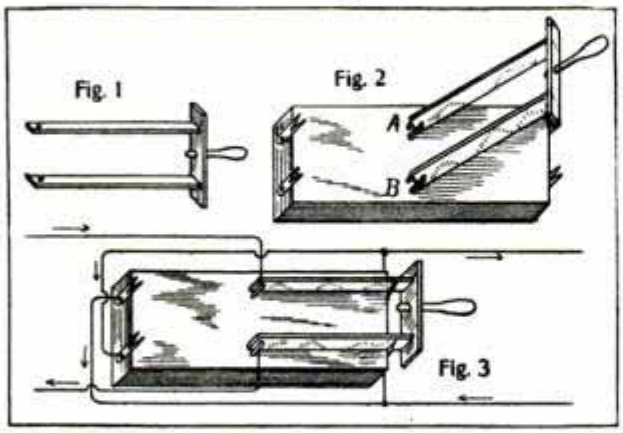
Electroplating Apparatus

lead, pewter, zinc, must be coated with copper in the alkaline copper bath described, and then treated as copper. On brass, copper, German silver, nickel and such metals, silver can be plated direct. The deposit of silver will be dull and must be polished, says the Model Engineer, London. The best method is to use a revolving scratch brush; if one does not possess a buffing machine, a hand scratch brush is good. Take quick, light strokes. Polish the articles finally with ordinary plate powder.

The sketch shows how to suspend the articles in the plating bath. If accumulators are used, which is advised, be sure to connect the positive (or red) terminal to the piece of silver hanging in the bath, and the negative (or black) terminal to the article to be plated. Where Bunsen cells are used, the carbon terminal takes the place of the positive terminal of the accumulator.

SIMPLE SWITCH FOR REVERSING A CURRENT

Take two strips of copper or brass and fasten them together by means of gutta



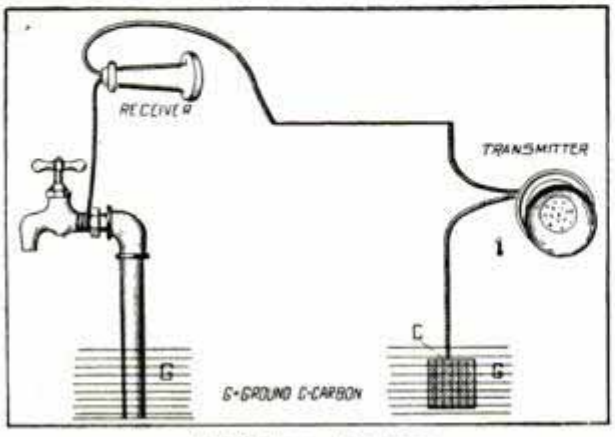
Simple Current Reversing Switch

percha (Fig. 1); also provide them with a handle. Saw out a rectangular block about one and one-half times as long as the brass strips and fasten to it at each end two forked pieces of copper or brass, as in Fig. 2. Fasten on the switch lever as at A and B, Fig. 2, so that it can rotate about these points. Connect the wires as shown in Fig. 3. To reverse, throw the lever from one end of the block to the other.—Contributed by R. L. Thomas, San Marcos, Tex.

INTERESTING ELECTRICAL EXPERIMENT

The materials necessary for performing this experiment are: Telephone receiver, transmitter, some wire and some carbons, either the pencils for arc lamps, or ones taken from old dry batteries will do.

Run a line from the inside of the house to the inside of some other building and fasten it to one terminal of the receiver. To the other terminal fasten another piece



A Unique Battery

of wire and ground it on the water faucet in the house. If there is no faucet in the house, ground it with a large piece of zinc.

Fasten the other end to one terminal of the transmitter and from the other terminal of the same run a wire into the ground. The ground here should consist either of a large piece of carbon, or several pieces bound tightly together.

If a person speak into the transmitter, one at the receiver can hear what is said, even though there are no batteries in the circuit. It is a well known fact that two telephone receivers connected up in this way will transmit words between two persons, for the voice vibrating the diaphragm causes an inductive current to flow and the other receiver copies these vibrations. But in this experiment, a transmitter which induces no current is used. Does the carbon and the zinc and the moist earth form a battery?—Contributed by Wm. J. Slattery, Emsworth, Pennsylvania.

HOME-MADE GRENET BATTERY

Procure an ordinary carbon-zinc sal ammoniac battery and remove the zinc rod. If the battery has been used before, it is better to soak the carbon cylinder for a few hours to remove any remaining crystals of sal ammoniac from its pores.

The truncated, conical zinc required is known as a fuller's zinc and can be bought at any electrical supply dealer's, or, it may be cast in a sand mould from scrap zinc or the worn-out zinc rods from sal ammoniac batteries. It should be cast on the end of a piece of No. 14 copper wire. Amalgamation is not necessary for the zinc one buys, but if one casts his own zinc, it is necessary to amalgamate it or coat it with mercury. This may be done as follows:

Dip a piece of rag in a diluted solution of sulphuric acid (acid 1 part, water 16 parts); rub the zinc well, at the same time allowing a few drops of mercury to fall on a spot attacked by the acid. The mercury will adhere, and if the rubbing is continued so as to spread the mercury, it will cover the entire surface of the zinc, giving it a bright, silvery appearance.

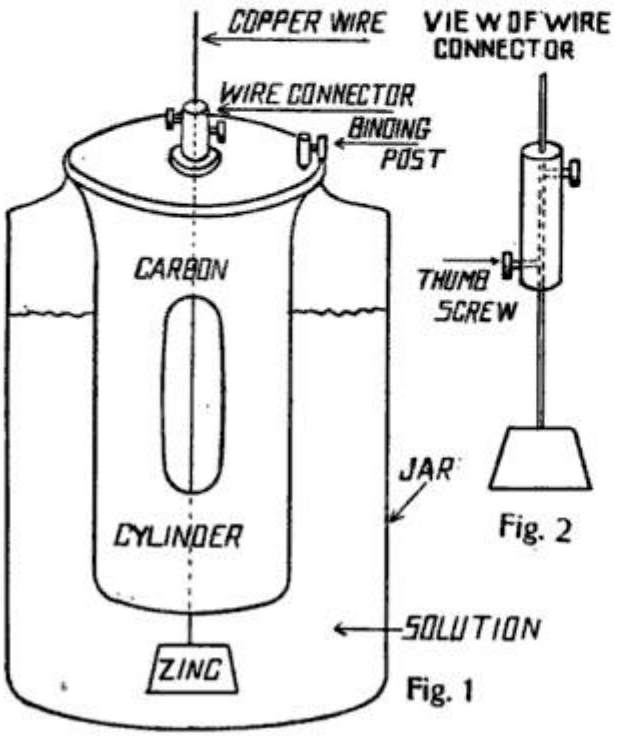
Next procure what is known as a wire connector. This is a piece of copper tube about 1½ in. long having two thumb screws, one on each end on opposite sides (Fig. 2). The upper screw is to connect the battery wire, the lower one to raise

and lower the zinc. The battery is now complete, and the solution (Fig. 1) must be prepared. Proceed as follows:

In 32 oz. of water dissolve 4 oz. potassium bichromate. When the bichromate has all dissolved, add slowly, stirring constantly, 4 oz. sulphuric acid. Do not add the acid too quickly or the heat generated may break the vessel containing the solution. Then pour the solution into the battery jar, until it is within 3 in. of the top. Thread the wire holding the zinc through the porcelain insulator of the carbon cylinder and also through the wire connector. Pull the zinc up as far as it will go and tighten the lower thumb screw so that it holds the wire secure. Place the carbon in the jar. If the solution touches the zinc, some of it should be poured out. To determine whether or not the zinc is touched by the solution, take out the carbon and lower the zinc. If it is wet, there is too much liquid in the jar. The battery is now ready for use.

To cause a flow of electricity, lower the zinc until it almost touches the bottom of the jar and connect an electric bell or other electrical apparatus by means of wires to the two binding posts.

This battery when first set up gives a current of about two volts. It is useful for running induction coils, or small electric motors. When through using the battery, raise the zinc and tighten the lower thumb screw. This prevents the zinc wasting away when no current is being used.—Contributed by H. C. Meyer, 132 West Logan St., Germantown, Phila., Pa.



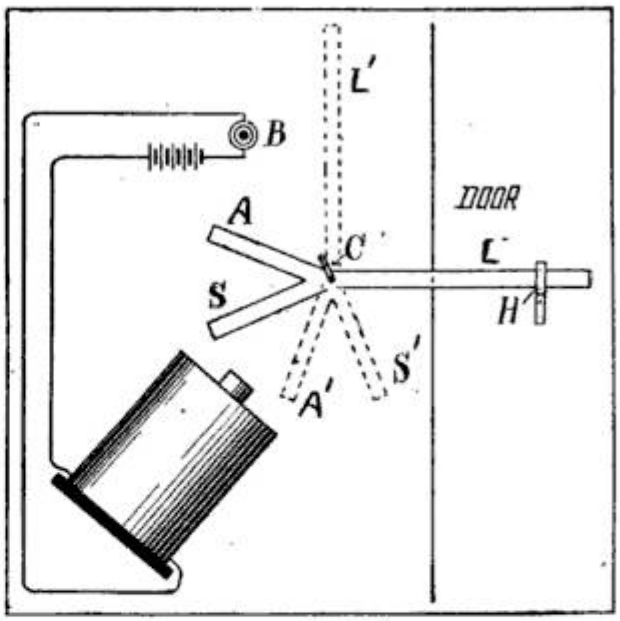
Details of Home-Made Battery

SIMPLE ELECTRIC LOCK

The illustration shows an automatic lock operated by electricity, requiring a strong magnet, but no weights or strings which greatly simplifies the device over many others of the kind.

The weight of the long arm, L, is just a trifle greater than the combined weights of the short arms, A and S. The fulcrum of the lever is at C, where there is a staple. The lever swings on one arm of the staple and the other arm is so placed that when the lever is in an upright position, with the long arm at L', it will not fall because of its greater weight but stays in the position shown. The purpose of this is to leave the short arm, A, when in position at A', within the reach of the magnet. Arm L rests on an L-shaped hook, H; in this position the door is locked.

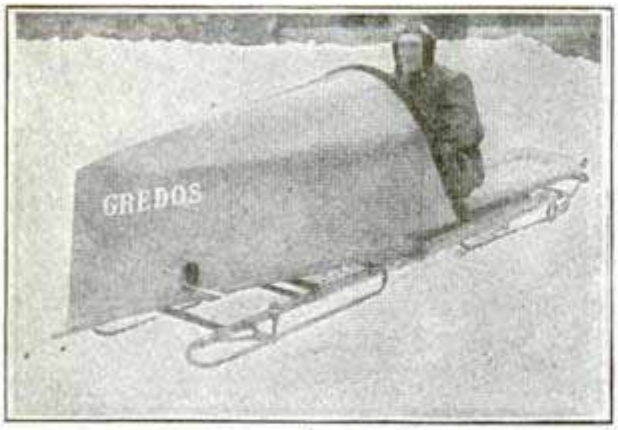
To unlock the door, press the button, B. The momentum acquired from the magnet by the short arms, A and S, is sufficient to move the long arm up to the position of L'. To lock the door, press the button and the momentum acquired from the magnet by the short arms, now at A' and S' is sufficient to move the long arm down from L' to the position at L.—Contributed by Benjamin Kubelsky, 597 W. Harrison street, Chicago, Ill.



Lock Operated by a Magnet

NEW ALPINE BOBSLEIGH

A new type of bobsleigh has made its appearance in the Alps where the sport of tobogaining is now at its height. The sleigh



Wind Splitter Bobsleigh

has a torpedo-shaped front built to cut the wind and will seat four or five people. It is very swift and requires skillful steering to control it. The coasters wear goggles to protect their eyes.

TENDENCIES OF FRENCH AUTO BUILDERS

Any general tendency on the part of French builders of automobiles is noted with interest by other makers and users of autos everywhere. At the recent Paris exposition the following changes were noted: An increase from 20 to 27 per cent in the number of cars having 24 to 30 hp. A falling off in cars of 14 to 20 hp. Only 2 per cent had 6-hp. motors, which is a less number than the year previous. The 8- to 9-hp. cars decreased from 17 to 6 per cent. Cars with more than 35 hp. increased from 8 to 18 per cent. Four-cylinders cars are decreasing; the one and two-cylinder are increasing. Four-cylinder engines are being cast in one piece. Jump spark ignition increased from 23 to 45 per cent.

BREAD MAKING IN HIGH ALTITUDES

A baker who had had all his experience in the east would meet with considerable difficulty were he to change his location to Denver, or Cripple Creek, Colorado, or other elevated city. Altitude affects both bread and cake doughs so that they rise very rapidly and for the one less yeast (or weaker) is required, while for the other less sugar, baking powder and ammonia and more flour is necessary. Rich mixtures like pound-cake, wine-cake, etc., require from three to four ounces to the pound less sugar and one-half the quantity of baking powder and ammonia used in the east. Ladyfinger mixtures, angel cake and sunshine cake, says the Baker's Helper, require about two ounces to the pound more flour.

MILKING MACHINE

A machine for milking cows exhibited at a Canadian fair the past fall created considerable amusement among the farmers who preferred the old-fashioned method, but was said to be a working success just the same.

The machine consists of an air-pump, a reservoir for milk and four cups to fasten to the cow's udders. These cups are shown in detail in Fig. 3. They resemble telephone receivers and are held on the cow in the manner shown in Fig. 3, by a rubber disk, B, through which the udder is thrust. A small tap is used to turn off the milk.

The farmer sits down at his stool and moves two levers alternately. These work the pistons of a double air-pump and suck the milk from the cow into the barrel of the air pump, and from there it falls by gravity into the receptacle. From one to three cows can be milked at once by this method.—Contributed by Fred Crawford Curry, Brockville, Ontario, Canada.

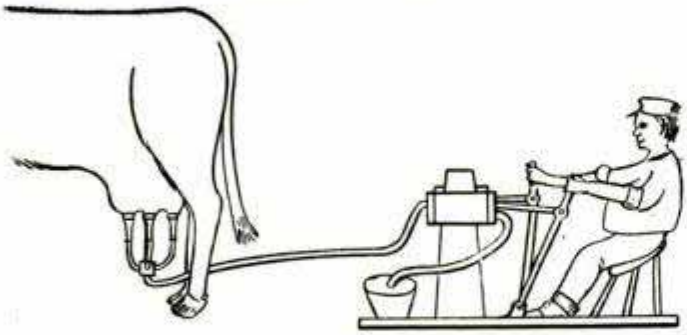


Fig. 1

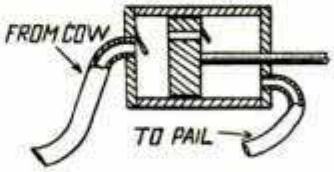


Fig. 2

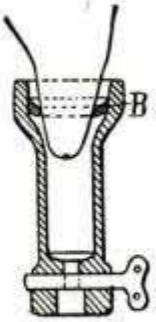
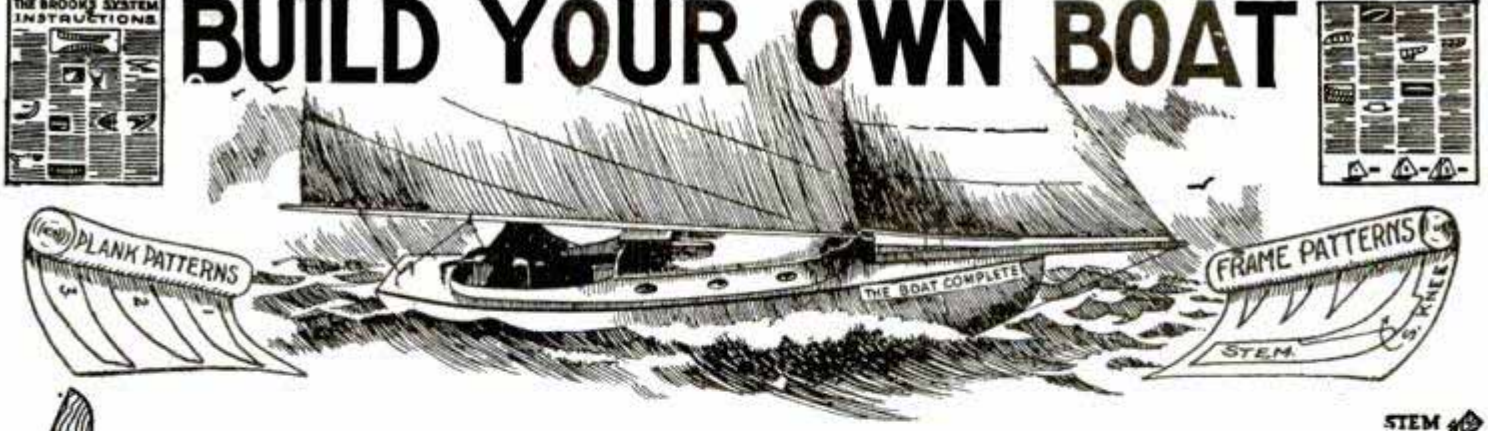


Fig. 3

Practical Milking Machine

BUILD YOUR OWN BOAT



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We tell you how to lay the pattern of each particular part on the proper piece of material and exactly how to cut—you cut. We then tell you how to fasten each part in its right place—what kind of a nail to use—how to drive it—you drive it.

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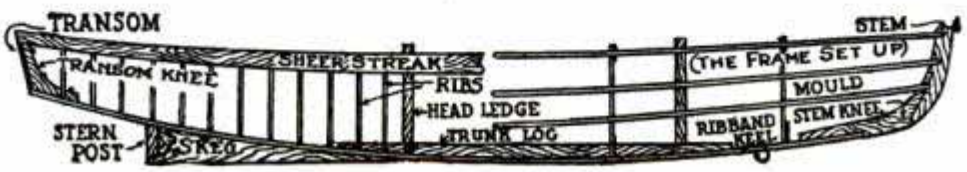

PHOTOGRAPHY ONE MAN'S DOOM; ANOTHER'S SALVATION

A photograph can unfailingly pronounce the guilt of one and as effectually declare the innocence of another. In these days no other agency is so greatly feared by the expert criminals of Europe, as photography. The scientific photographer has the most fascinating of all investigations in perfecting himself as an expert in criminology.

There is a positive difference in the size and shape of the red blood corpuscles of men, animals and birds; there are other features absolutely distinctive, and when shown enlarged upon a screen the difference is evident to any observer. A man in Wales was arrested for murder, the chief evidence being a blood-stained ax. The man claimed he had killed a goat. At the trial it was evident the stain on the ax was human, not goat's blood, and that an attempt had been made to clean the ax, which the prisoner had denied doing.

Almost the only clue found on a woman murdered in Paris was a short gray hair. This hair was photographed and shown in comparison with a hair taken from the beard of an accused man. He was released. Soon after another arrest was made and again the two hairs did not match. It was then discovered the hair in evidence was not a human hair, but a gray hair from an old, yellow dog. This discovery led to the arrest of a third man who owned such a dog, and he confessed to being the murderer.

The work is something giving scope for endless study and resourcefulness, and not every one could be more than ordinarily successful, but for one with natural ability to unravel mysteries, the possibilities for renown and remuneration are large.

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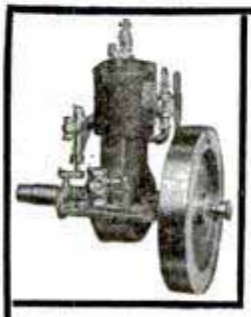

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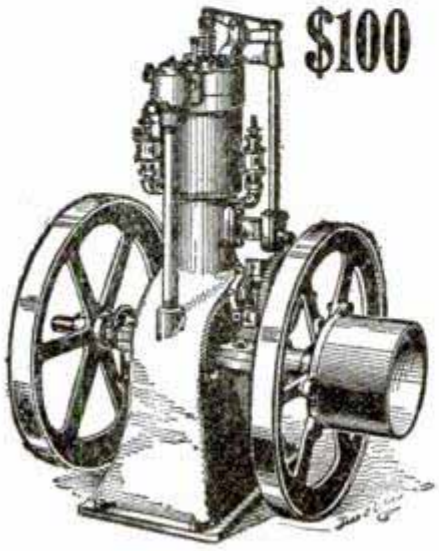

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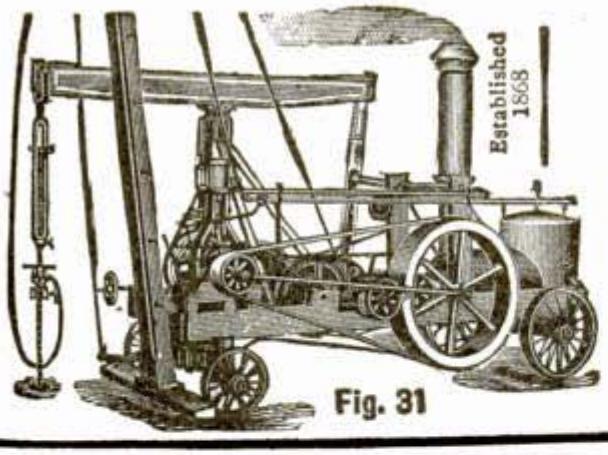

Fig. 31

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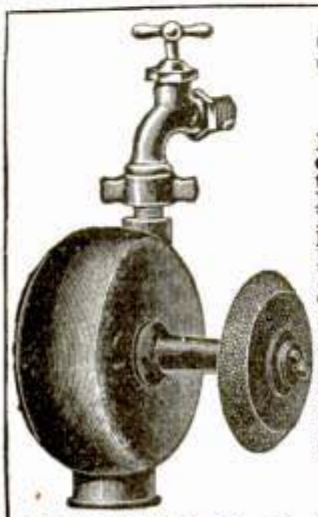

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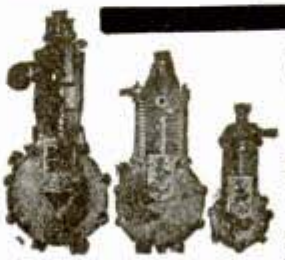

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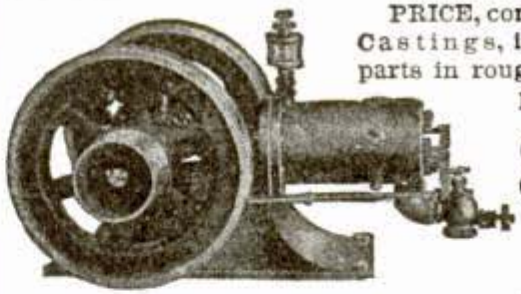

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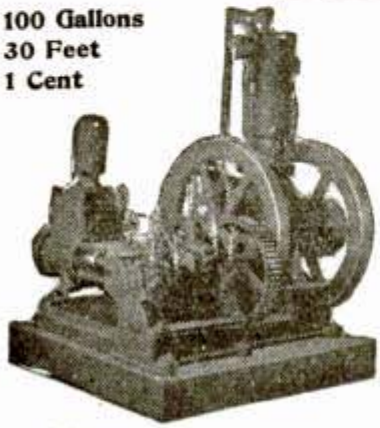

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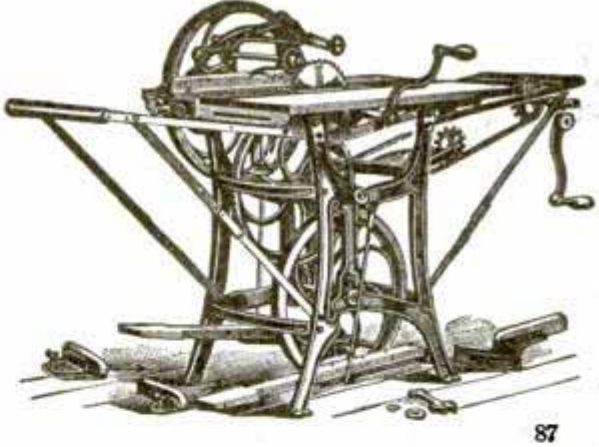

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10	"	"	"	"	1.26	"	"	13	"
12	"	"	"	"	1.70	"	"	17	"
5	"	Slim Taper Files		"	.57	"	"	7	"
5½	"	"	"	"	.66	"	"	7	"
6	"	"	"	"	.71	"	"	7	"

LET US KNOW THE KIND YOU USE. OUR PRICES AND FILES WILL SATISFY

OVER 500 DIFFERENT CUTS AND SIZES IN STOCK.

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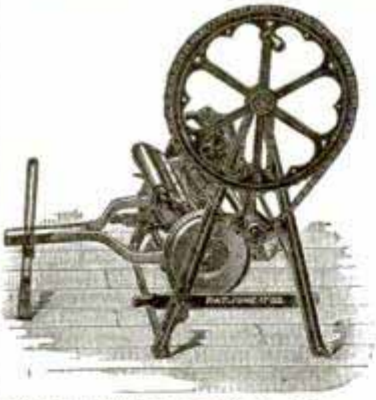
The Ideal Lawnmower Grinder



Sharpens any Lawnmower accurately in 10 to 15 minutes, makes the blades absolutely true, gives them a perfect clearance, does the work quicker and cheaper than it can be done by hand. Nothing like it on the market. Made for both hand and power use.

Write for full description and prices TODAY.

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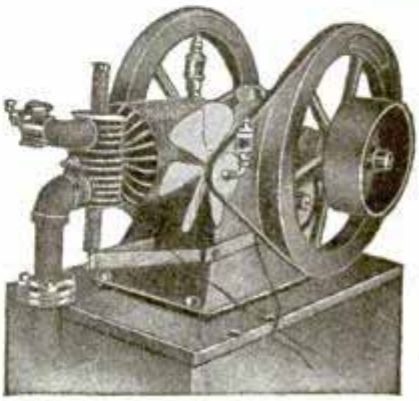
AIR-COOLED MOTOR MADE

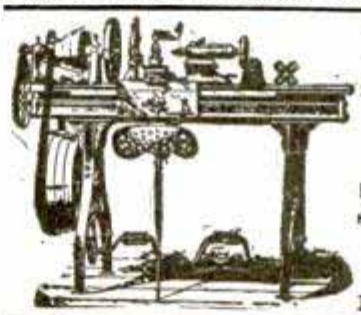
5 HORSE POWER

Bore 6x6. Plenty of cooling surface. No engine ever constructed with so few working parts. Can hold your hands on the pins after engine has been working all day. Write for agency. Gasoline tank outside.

Weight, 900 lbs.



Air-Cooled Motor Co., - Lansing, Mich.



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9 to 13 inch Swing

List price, $65.00 and up according to size. When ready to buy send for Lathe Catalog and prices

W. F. & John Barnes Co.
100 Ruby St., : : Rockford, Ill.

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No Danger, Maximum Power, Lightest Weight, Simple, Reliable, Economical No Batteries, Self-Ignition by compression. Fully Guaranteed. Write for Catalogue P. M.

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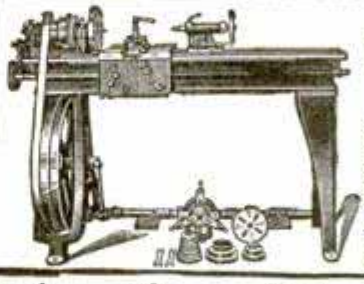

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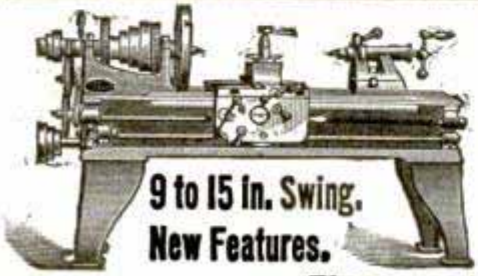

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BUILT UPON HONOR—ACCURACY, EFFICIENCY, MODERATE PRICES.

Foot and Power Lathes, all sizes. Send for Catalogue.

Sebastian Lathe Company, 107 Culvert St., Cincinnati, O.

THE LIGHTNING AGE.

Frank L. Stanton.

What's the world a-comin' to, a feller'd like to know,
When they're makin' ice to order an' manufacturin' snow?
An' now, as if to vex us, another thing we hear:
They're makin' rain in Texas without a word o' prayer.

The cities—they're gone out o' sight; it 'pears just like a dream,
For when they have a cloudy night they run the stars by steam!
And here's the lightnin', with a song, proclaimin' man is boss,
And all the street cars skimmin' 'long without a mule or hoss!

And here's that ringin' telephone, which never seems to tire,
But takes a man's voice, free o' charge, across six miles o' wire;
And here's the blessed phonygraf, which makes your memory vain,
An' like a woman, when you talk, keeps talkin' back again!

Lord! how the world is movin' on beneath the sun and moon!
I can't help thinkin' I was born a hundred years too soon;
But when I go—praise be to God!—it won't be in the night,
For my grave will shine like glory in a bright electric light!

Faster than an Auto
Cheaper than a Horse

GET A MANSON

It is speedy and reliable, adapted to all roads, and maintained at a moderate expense. Attachments designed for leasure and utility

Write us

Fowler - Manson - Sherman Cycle Mfg. Co.,

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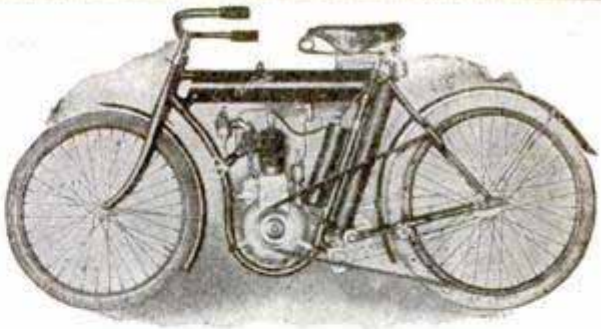

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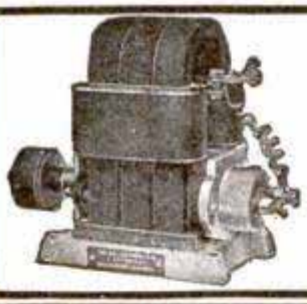

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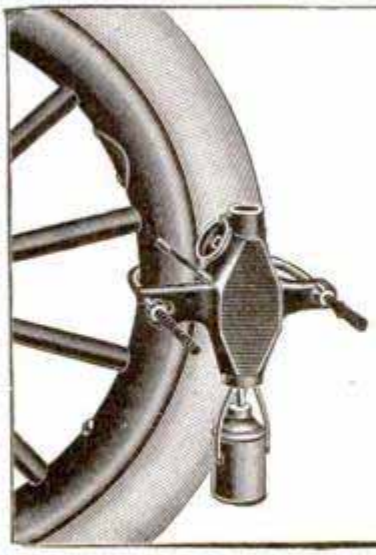
SOUTH BEND, IND.



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"Stitch-in-Time" Vulcanizer Co.
Topeka, Kan.,
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of all kinds. Write for prices and full information

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H. GRAHAM CYCLE CO., Inc.

Established 14 years. **601-603-605 Madison Street, CHICAGO, ILL.**

AUTOMATIC PIANO PLAYERS.—The piano playing attachment has developed more rapidly during the past five years than any other feature of piano manufacture. The idea is not new, a patent having been issued in England in 1694 for such a device, which was moderately successful. The use of the moving perforated strip of paper, which is most generally used, was invented in 1847, but not until recently was the prejudice against "mechanical" playing removed by the addition of several controlling features, which allows of considerable intelligent variation.

PROBLEM IN CHAIN WELDING.—Five sections of broken chain were sent into the blacksmith shop, each section containing three links, thus:

The foreman blacksmith told one of the fires to connect it up by three welds. How was it done? If not clear, refer to answer on another page of this issue.

USED SAND TO RAISE A FALLEN HORSE.—The off horse of a big brewery team had slipped and fallen on one car track with the wagon turned so as to block the other track, also. Driver and policemen were making frantic efforts to get the animal to its feet, when a keen-witted motorman came to their relief. When he had brought his car to a stop, he began operating the plunger that works the valve of the sandbox underneath the car, letting a little mound of sand run out. With his number plate to serve as a shovel he then spread the sand on the pavement around the horse's hoofs. When the horse felt the sharp sand, instead of the slippery pavement, beneath his feet, he readily arose.

TELEGRAPH POLES IN SERVICE 40 YEARS.—Away out near the farthest point on the American side of Behring sea a line of telegraph poles, erected in 1866, is still standing, sound and strong, says the Electrical Review. Their permanency is due, as explained by a recent scientific visitor to that locality, to the fact "that they are not subject to the ravages of tropical insects." Overlooking that spot stands a high, conspicuous, wireless-telegraph tower erected by General Greely in 1904. For thirty-eight years the old line has remained dumb. From the new tower electric signals flash and pulsate a thousand miles out to sea, calling to ships whose masts are tipped with the new St. Elmo's fire, and far across Siberian wastes, studded with mountain peaks, bearing a message from the new liberty-loving world to the liberty-longing millions of ancient empires. The world awaits the answer.

TO REMOVE SPLINTERS.—When a splinter of wood gets lodged beneath the nail and it would be torture to dig it out, try putting on a poultice of common yellow soap and sugar mixed into a soft paste with a silver spoon and put on a soft, clean rag. Tie it around the nail where the splinter is lodged and in the morning the bit of wood will be seen nearer the top of the nail, often sticking right out so that a slight pull is all that is necessary to remove it.

LONGEST WAGON 45 FT.—The statement was recently made in this magazine that a certain wagon 40 ft. long was believed to be the "longest ever made." One of our Iowa readers writes of a 45-ft. wagon which has been in use four years in Des Moines. Can any one beat this? If not, 45 ft. will be considered the champion.

ALUMINUM PAPER.—Aluminum paper is now manufactured in Germany and recommended as a substitute for tin foil. It is not the so-called leaf aluminum, but real paper coated with powdered aluminum, and is said to possess very favorable qualities for preserving articles of food, for which it is used as a covering. Chemical analysis has proven that aluminum paper contains but few foreign substances; occasionally it may contain up to 2 per cent of iron, but never any arsenic or other poisonous metals. Hence it appears that the powdered aluminum used for the manufacture of aluminum paper is relatively pure. The paper used is a sort of artificial parchment, obtained through the action of sulphuric acid upon ordinary paper. The sheets are spread out and covered upon one side with a thin coating of a solution of resin in alcohol or ether. Evaporation is precipitated through a current of air and the paper is then warmed until the resin has again become soft. Then powdered aluminum is sprinkled upon it and the paper subjected to strong pressure to fasten the powder thereon. The metallic covering so obtained is neither affected by the air nor by fatty substances. Aluminum paper is much cheaper than tin foil and will, so it is thought, become a strong competitor thereof.

For its main library and branches the City of Cleveland subscribes to 16 copies of Popular Mechanics.

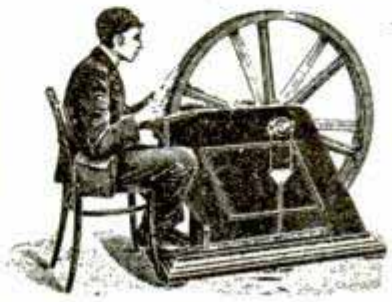
WOMAN RUNS DRY DOCK.—The only woman in the world owning and managing a dry dock is Miss Ella Lawless, at Jersey City, N. J. The business was established by her father and at his death she took up the work in which she has been very successful. Not long ago the power house was burned, but she has rebuilt, and installed larger and better machinery than before.

SAWS NAILS, PLASTER AND IRON POSTS.—A new saw is now on the market which saws through lath, plaster and nails as ordinary saws go through wood. It will even saw cast iron posts, and other untempered metals. Recently cast iron

posts in the front of an old building were sawed through, which saved taking out the posts and sending to a shop. The saving on this one job was $150. The handle is adjustable.

KNOWLEDGE OF MECHANICS REQUIRED.—The study of mechanics has taken a great stride during the past few years, and no young man's education is considered complete these days unless he has acquired some knowledge of machinery. It is proving useful in nearly every branch of business, and a good general mechanical knowledge will never come amiss. In the want columns of the newspapers there is a preponderance of advertisements calling for young men with technical knowledge, and employers complain of a scarcity of really well-equipped men along this line.—Motor Way.

MECHANICAL WAGES CALCULATOR.—This is a machine used in large establishments in England, for computing the time and wages of employes. Bands of celluloid are fastened, one band on a wheel, marked off into fractions of hours, and the equivalent value in money. By turning the wheels the calculation is made in an instant. The machine is specially useful in finding amounts due on piecework and determining the proportion of the total balance money that is due individually to any number of men sharing profits on the same contract, the divisions being proportional to each man's fixed daily or weekly money rate. When work is paid for on the premium system, the instrument can also be used for finding the time allowance that is to be added to the actual time occupied on the contract. The scale runs from 1d. to £20.



NEW CATALOGS.

THE MAYDOLE HAMMERS is the title of a handsome catalog issued by the David Maydole Hammer Co., of Norwich, N. Y. The book contains many illustrations of hammers for various purposes. The full line comprises 343 styles, sizes and finishes.

"DO IT NOW."—Don't wait until he's dead, poor devil, before you balance his account on your big book—only to put up the pitiful plea that he was really a good sort, after all, and will be missed. How often have you slighted or damned him alive, to sincerely regret his death—recognizing, then, that he was an honest, decent and just man—recalling many a kindness done you in the past, perhaps—remembering that his faults were few and his virtues many—that he was a good citizen and a good man for the community, in the main, and that you really owed him something which you cannot now repay—appreciation of his character and his work, as a whole, regardless of calumny and petty prejudice. How many times has this thought come to you as you balanced your books? But why not do it now, while there is yet time to give him his just due—while he is yet alive?—Sagebrush Philosophy.

ELECTRIC WIRING, DIAGRAMS AND SWITCH-BOARDS. By Newton Harrison. Illustrated; 250 pages; cloth. Price, $1.50. The Norman W. Henley Publishing Co., New York.

A thoroughly practical treatise covering the subject of Electric Wiring in all its branches, including explanations and diagrams which are thoroughly explicit and greatly simplify the subject. Practical every-day problems in wiring are presented and the method of obtaining intelligent results clearly shown. Only arithmetic is used. Ohm's law is given a simple explanation with reference to wiring for direct and alternating currents. The fundamental principle of drop of potential in circuits is shown with its various applications. The simple circuit is developed with the position of mains, feeders and branches; their treatment as a part of a wiring plan, and their employment in house wiring clearly illustrated.

MACHINE SHOP ARITHMETIC. By Fred H. Colvin and Walter Lee Cheney. Price, 50 cents. The Derry Collard Co., New York.

This little volume, now in its fourth edition, contains some of the problems of every-day shop happenings and affords their rapid and accurate solution by easy methods. All explanations are in clear language and the book contains a number of valuable tables.

THE SCIENCE YEAR BOOK FOR 1906. Edited by Major B. F. S. Baden-Powell. Cloth. Price, $1.25; postage, 25 cents. King, Sell & Olding, Ltd., London, W. C.

This valuable work contains a vast amount of authentic information in compact form, and sums up the progress of science during 1905 in a manner that gives one an idea of results actually attained. The work has notes and tables on astronomy, the earth and its inhabitants, physical and chemical notes, and meteorology. The progress of science in the following branches is stated. Anthropology, astronomy, botany, chemistry, cosmical physics, electrotechnics, engineering, geography, geology, medical science, meteorology, microscopy, natural history, photography, physics, and physiology. Besides this the book contains a directory of periodicals, public institutions, universities, societies, prizes and awards; biographical directory and diary.

REAL ELECTRIC TOY-MAKING FOR BOYS. Size 12 mo.; 140 pages; 107 illustrations, cloth. Price, $1.00. Thomas M. St. John, New York.

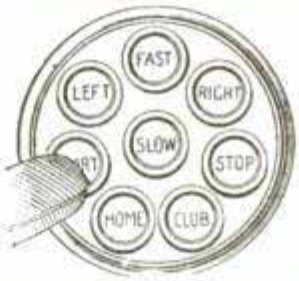
The boy with a tendency toward mechanics who possesses this book will derive a great deal of pleasure from it. The toys described are simple and the average boy can easily make them. The instructions are plain and the illustrations helpful. The work is educational, as well.

JUST BIDE A WEE.—The big steel dry dock Dewey goes meandering on her way wiping down the big Atlantic waves and making smooth water for vessels in her wake, and fending off the turbulent breezes that might endanger frailer vessels. As she is a Yankee craft she perturbs the minds of some of our transatlantic friends and is to them as a red rag to an English bull. When the bold Britons essayed to tow a big dry dock to Bermuda and another to Havana we did not get excited and kept on our boiled shirt and did not even soil the bosom with perspiration, and we ask why the other fellow cannot do the same.

Surely the Dewey is big enough and well lighted enough so that no one need run into her, and if we choose to string out tow lines a mile in length and jog along at the rate of four or five miles an hour, that's our business, and if memory serves us aright we do have some rights on the ocean even if we do not have many ships on its bosom. We can recommend Mrs. Soothlows Winsing Syrup to our nervous friends in Europe, a teaspoonful every hour for infants and more frequently for adults. Britannia may sing she "rules the wave," but just now the Dewey rules a mile or two of them "just as easy" as you can imagine.

No craft probably ever went to sea which has provoked so much jealousy in narrow-minded foreign shipping men as has this vessel. But please remember that it was a Dewey that won out in Manila Bay and came very near cleaning out an impudent "butter in" who poked his nose into our business to have it metaphorically twisted. Just bide a wee.—Am. Shipbuilder.

AUTO ANNUNCIATOR.—The latest annunciator for use in communicating orders to the chauffeur while running is shown in the cuts. The dial on the



left is the push button set inside the car; the dial at the right is the one for the driver. When a signal is given the desired order flashes with a white light.

TOO LATE TO CLASSIFY.

FOR SALE—4 h. p. steam engine (vertical), 2 steam pumps and one circulating pump suitable for creamery. Apply 467 W. Monroe St., Chicago.

FOR SALE—One B flat cornet, punching bag and Poco camera. M. S. Binney, Fullerton, Neb.

WANTED—Quick, bicycle motor. Address Frank R. Aldrich, Caney, Kan.

FOR SALE OR TRADE—Stevens four-barreled rifle, 22-25, 20-38, 40-45-90 calibers. Make offer. Lock Box 316, Logan, O.

WANTED.—I want one young man in every town to sell and install my electrical supplies. Prices absolutely the lowest. Sample flash-light, $45. Write to-day and start making money at once. Colby Electric & Merchandise Co., La Crosse, Wis.

TELEPHONES—$12.00 telephones only $6.50. Perfect long distance series telephones complete. A snap if you can use them. Send stamp for description. Herbert E. Smith, 4 Park Pl., Batavia, N. Y.

A reader who has noted the discussion as to whether the limit has been reached in the construction of mammoth locomotives, asks if a third rail laid in the center of the track would not solve the problem.

Railroad experts have decided that such a construction has no advantages, and many disadvantages, besides increasing the expense greatly and unnecessarily, even if practicable, which it is not. Better roadbed, with concrete construction and heavier rails are the lines along which improvement will be made.

CHIPS FROM THE WOODWORKER.—If you think you have a complaint to make to your boss, put it down in writing, and you will be surprised at the amount it will dwindle during the process. • • A good rust preventive for tools is made of one-half pound vaseline and one ounce blue ointment, thoroughly mixed, with a few drops of oil of wintergreen, to give a pleasant odor. Saturate a rag and wipe the tools liable to rust.

PATENT NOTES.

We have recently obtained three patents on machines for making cement blocks for Mr. Fred B. Dysart, of Superior, Nebraska. Mr. Dysart has had machines built according to his patents and they have proven so successful that he has organized a stock company under the name "Superior Cement Stone Company," in which the stock is held by a prominent banker, Mr. Dysart and a leading business man of Superior. Arrangements have been made to place the machines on the market. • •

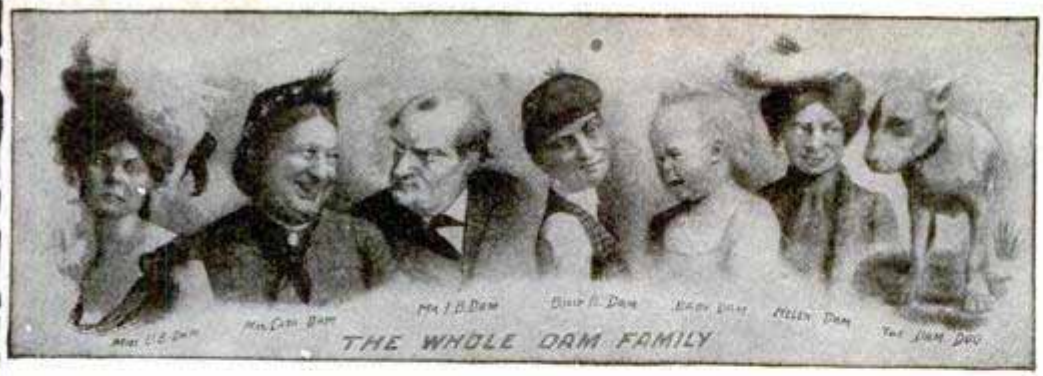
Mr. J. L. Morrison, of Joliet, Illinois, has recently obtained a patent on a collapsible dinner pail. His pail will hold the usual amount of food besides a can of coffee or tea, and after the contents have been removed, the pail can be folded up and placed in the pocket. Mr. Morrison is having dies made to manufacture these pails and expects to have them on the market in the near future. • •

Mr. C. P. Jones, of Colorado Springs, is the inventor of an ingenious arrangement for detecting burglars in their efforts to break into safes. His idea is to conceal in the floor in front of the safe, electric push buttons which are connected by suitable wires with an alarm device located in the police station and in the house of an officer of the bank. The buttons will be concealed under a mat placed in front of the safe and the burglar in trying to drill a hole in the safe door will push the buttons and thus operate the alarm. Unfortunately this invention cannot be patented because the idea of placing electric push buttons in the floor for the purpose of operating a signal is in common use.

Mr. F. J. Drake & Co., Chicago, have patented and put on the market a visible spark plug especially adapted to gas engines operating motor vehicles.

The Fore-Sight visible spark plug is constructed upon the principle of reduced voltage. An electric current of low voltage will arc or spark instead of following a path of high resistance formed by carbon or other deposits. A low voltage is obtained in this plug without reduced amperage. The cut shows an end view, greatly enlarged, of the multi-point sparking gap. It will be noticed there are really four spark points, thereby absolutely insuring a large, certain spark. • •

Popular Mechanics Patent Bureau.



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SAVE TIME AND LABOR! Let the "UNIVERSAL" prove itself to you for ten days. Your money back, and welcome, if for any possible reason you would rather have the money than the pen. Write for special introductory offer.

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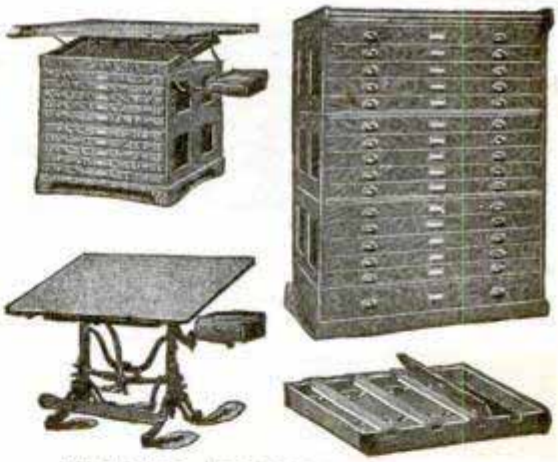

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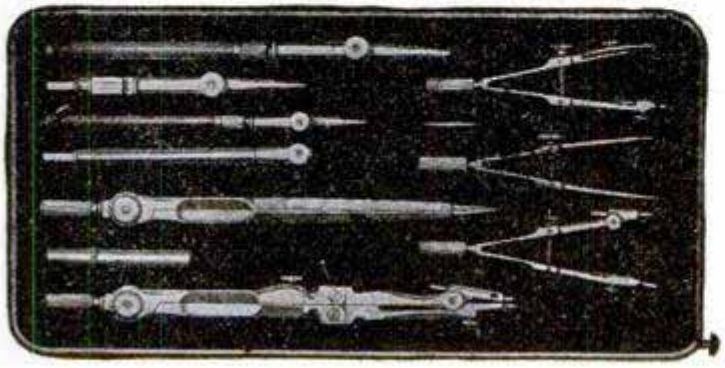
99 Alabama Street, Grand Rapids, Mich.

WANTED District Managers to post signs, advertise and distribute samples. Salary, $18 weekly. $3.00 per day for expenses. State age and present employment.

Ideal Co., Desk E, 37 Randolph St., Chicago.



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OF NEW YORK

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SURVEYING INSTRUMENTS

Write for particulars about our new Mechanics Steel Tape Rule.

TO BUILD MOTOR CARS.—The formation of a million dollar company is announced to build gasoline motor cars for short line and suburban steam railroad companies. The first cars will be built along the lines of the Union Pacific experimental cars.

SPANISH FLOATING COMMERCIAL SCHOOL.—A floating commercial school for boys between the ages of 15 and 20 has been organized in Spain and was open to a few pupils from the leading countries of Europe and North America, but the announcement reached the United States too late to benefit many American boys. The first cruise started February 1 of 1906, from Barcelona, Spain. The course includes three terms or cruises of about eight months' duration each, at a cost to each pupil of $475 per term. This includes lodging, board, laundry, medical attention and medicine. The commercial methods and necessities of nearly every country in the world will be studied. Further information may be obtained by writing Sr. D. Jaime Algarra Postius, calle Junqueras 16, Barcelona, Spain.

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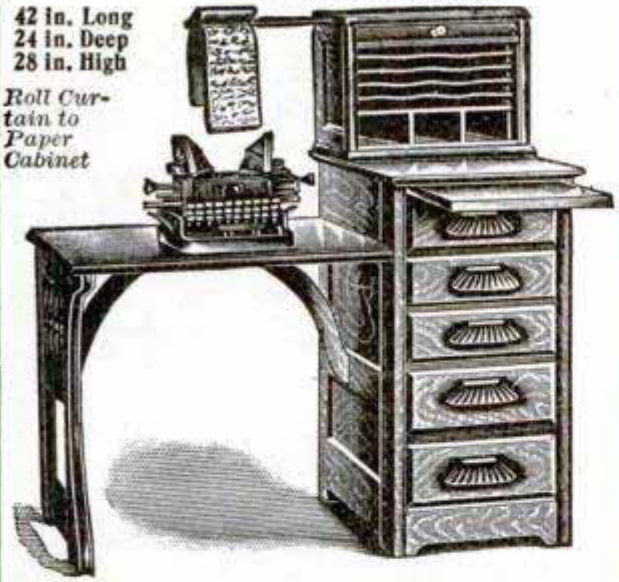

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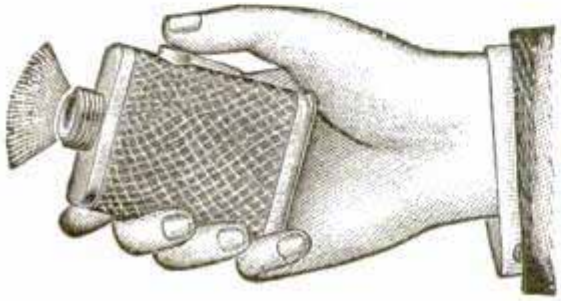

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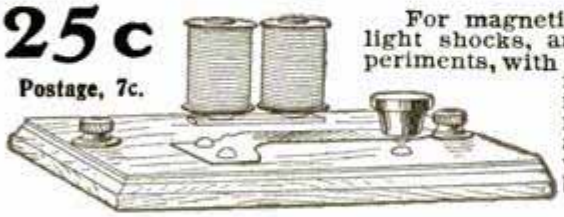

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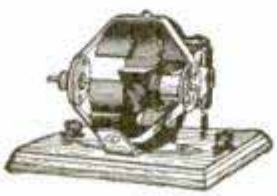

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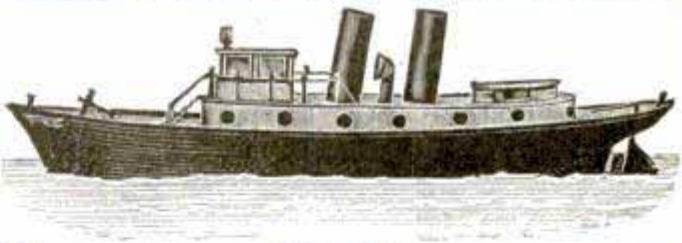

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Is jes' the thing globe-trotters like; but none of it in mine!
Give me the 'commodation on the Jonesville Junction line.
We've only got one train a day; she's passenger and freight;
She don't go slammin' through the town at some wild, breakneck rate.
Well, I guess not! for when we hear her lazy old "choo-choo!"
We gather at the depot for a visit with her crew.

There ain't a man or boy in town but knows Conductor Briggs
And Engineer Elnathan Clark and Fireman Jerry Wiggs,
And Brakeman Goff, with finger off and half a dozen scars
He's got one time or other while a-couplin' up the cars.
Them fellers, trav'lin' up and down the road year after year,
And haulin' lots of drummers, too, are purty sure to hear
The finest yarns a-goin'; they can tell 'em, too—and so
To hear 'em talk is 'bout as good as bein' at a show.

My nephew, born near Boston, says that in a parlor car
They never shout the stations out to tell you where you are.
You ask the darkey porter what's the town you're whizzin' through,
Says he: "It's New Orleans, I guess, or mebby Kal'mazoo,
Or Cairo or Skowhegan; fact is, boss, I don't jes' know,
For all towns look alike to me the way these flyers go."
So parlor-cars and flyers I respectfully decline
For something more in keepin' with the Jonesville Junction line.

The folks that ride in parlor-cars, so I've heard people say,
Are so polite they wouldn't dare to pass the time o' day
Without an introduction. They jes' set and set and set,
And tip the porter all the while for everything they get.
But on our 'commodation train that stops at every town
Why, everybody's in and out and skurryin' aroun'
With "Howdy-dos!" and "Fare-ye-wells!" and all their smiles and tears,
A feller gets his money's worth in what he sees and hears.

One time a tramp got on our train at Billville, eight miles down.
Conductor Briggs was readin', so he didn't get aroun
To find the man was stealin' till the train was nearly here.
And so the deadhead thought he'd saved that much of trampin' clear.
But Briggs he jes' locked both the doors, and caged the feller—see?
And backed that train up them eight miles to Billville—yes, siree!
And chucked him off, and says to him: "The walkin's mighty fine;
So don't you try to monkey with the Jonesville Junction line!"

ANSWER TO CHAIN PROBLEM.—The links of one of the sections, a, b and c, are split and used for welding the other four sections, says the Railway Review, A, B and C, thus:

STEAM TURBINE ANOMALIES.—It is said that a steam turbine may lose many of its blades, in one case nearly the whole of the blades of the intermediate diameter, without loss of economy. Does not this remind one of the story of the first screw propeller, which was of considerable length, but the little vessel broke her propeller shorter on a rock, and ran faster as a result? It has long seemed to some engineers that there was a tendency to put too many rings of blades into a steam turbine, and that possibly fewer might be tried with advantage At best a steam turbine is very much of a compromise. Where the steam should run fastest the blades move most slowly, and the less active low pressure steam has to pass by the most quickly running blades. No doubt trial and error have entered largely into the method of turbine design; yet there may be some advantage in using fewer blades.—Electrical Review, London.

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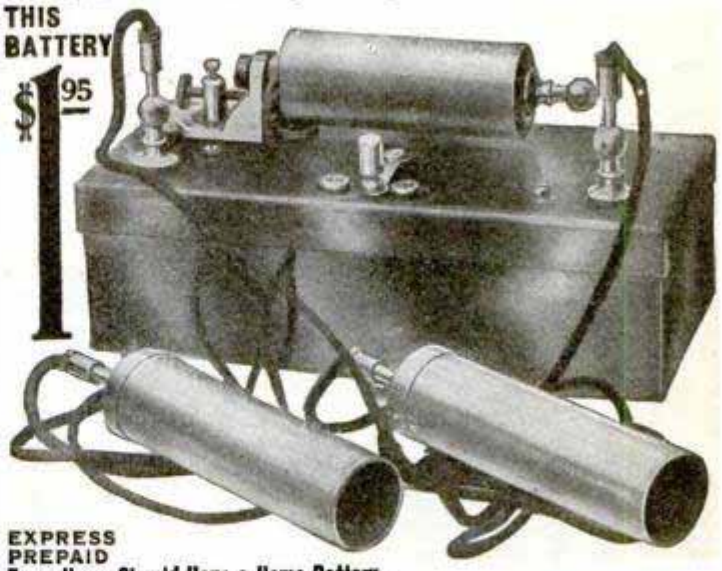

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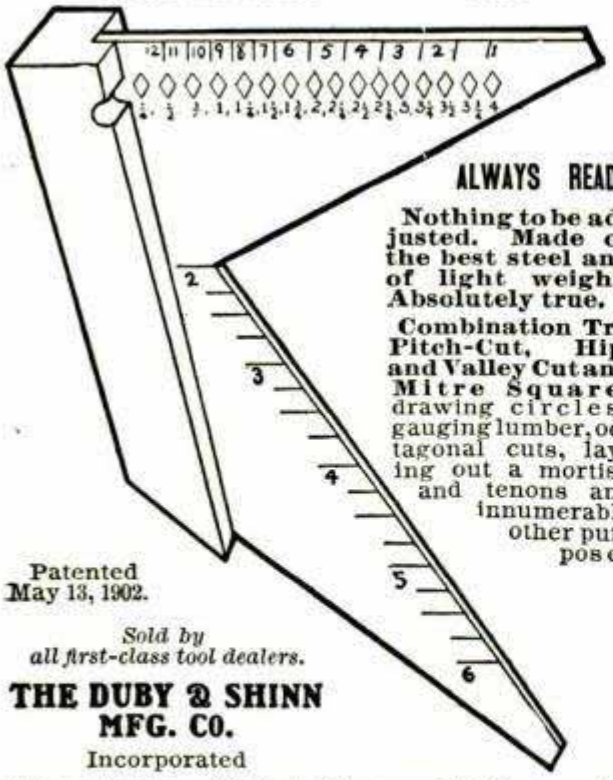

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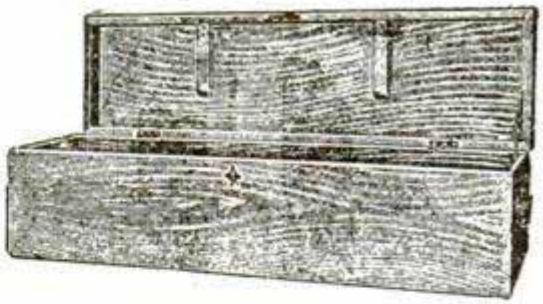

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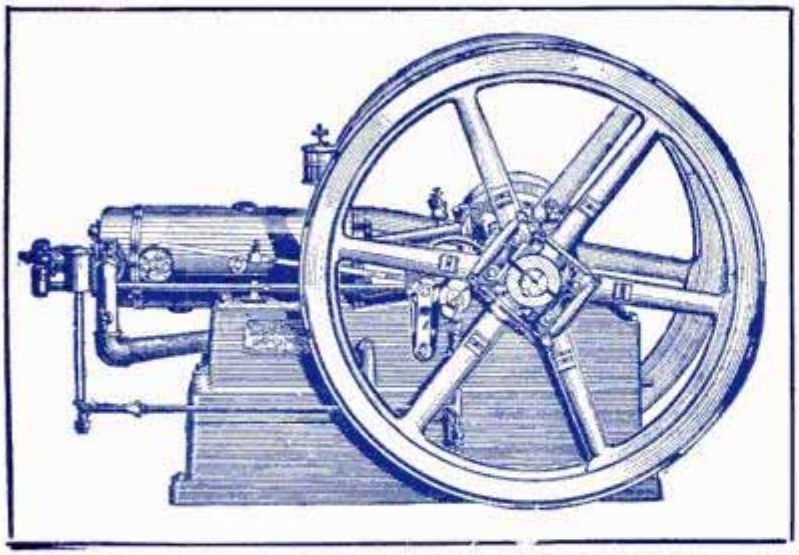

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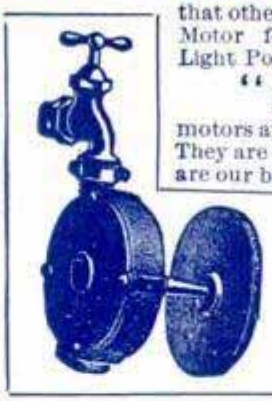

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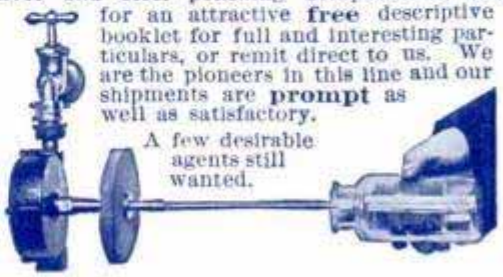

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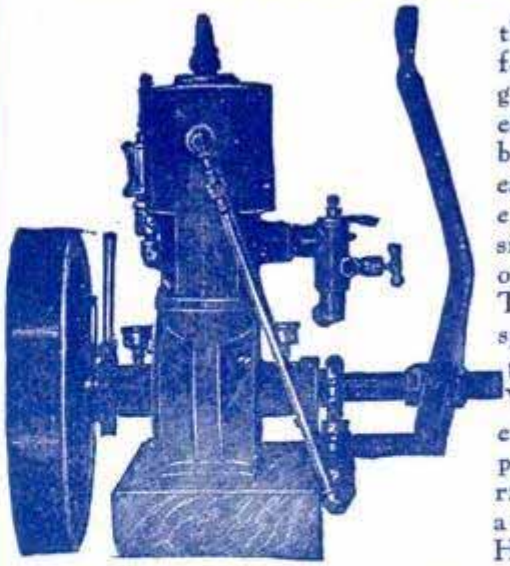

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