"You are bound in honour quite as much as if you were really married to her. Supposing you had been—supposing it was all over before you had seen me?"

"What a mercy it was not!"

"But supposing it had been?"

"You ask me a horrible question. I never thought of it before; but there must be a great many maimed lives——"

"Oh, Maurice!"—with a little moan that seemed wrung out; "you put it painfully, but it must be. Could I build my life on the honour of the man I loved best in the world and the happiness of the woman I loved best in the world? Oh! do go away!"

She got up and walked about the room, her hands up to her head in an agony.

"I shall not go away!"

"What shall I do? Oh! what shall I do?"

"Do?"—with a short laugh. "Come!"

"No."

"I'll tell you what: you are an unreasonable woman. You have no consideration for my happiness. I don't believe you know what love is, that you hesitate and consider."

"I don't hesitate," put in Rachel; but he took no notice, and went on.

"You talk about Katie; her affection for me is a mere farthing rush-light compared with the great furnace I could light up in your heart. I could make you love me, Rachel!"

"Don't I——"

"No, you don't; you don't care. I've been a fool to fancy for one moment that you did. Now I come to think of it, you have never shown any love for me; but somehow you are there—you have crept into my heart. I never asked you to. I didn't want you; in fact, I didn't think much of you at first. You're nowhere beside Katie. I never tried to attract you; I made you no pretty speeches; I didn't admire you; but I found out one day that I loved you. And you—you meek little saint!—you don't know the meaning of the word."

"I wish I didn't! But no—it has been very sweet; but now it's very bitter—bitter as death. Go, Maurice—go! I'm weary—tired out. I cannot struggle against you any longer."

"That's just precisely the reason why I shall not go. If you are going to give in, I prefer to stay."

"It's temptation I am fighting against; it's my sense of duty."

"It is that you don't love me, then!"

"Not *love* you? Look at me! Don't you see? Where are your eyes?"

"My own——"

"No—not that! Stop"—pushing him back—"you don't see. Look again. Look at my hands: how thin they are! Look at my face: does it look happy? Don't you know what I ail? It's heart-sickness."

"Is it? I am so glad!"

"You cruel boy!"

"I'll soon teach you to call me cruel," taking her in his arms and kissing her, in spite of her feeble resistance. "If you are really so bad as all that, it will be Katie's *duty* to give me up; and, of course, you wish her to do her duty."

"Oh, no, I don't!"

"That won't do. The first essential of goodness is to be unselfish."

"Yes, I know."

"And it is very wicked and selfish of you not to wish your sister to do her plain duty, and be more unselfish than yourself."

Rachel looked puzzled.

"Don't you see?"

"Somehow, you're wrong; but I don't see quite where it is."

"I dare say not. Never mind; leave it to me. I don't mind saying 'good-bye' now—at least, I mind awfully. I shall be glad when the time comes that we shall never say 'good-bye' again. But I am a wise general—I know when to retreat."

THE GATHERER.

A New Shoe-Tie.

A simple and effective clasp for preventing the untying of shoe-laces in ladies' boots and shoes has been recently introduced from Paris. The device consists of an ornamental spring clutch, which clasps the knot, or tie, on the lace and prevents it from slipping, while at the same time it looks like a buckle on the shoe.

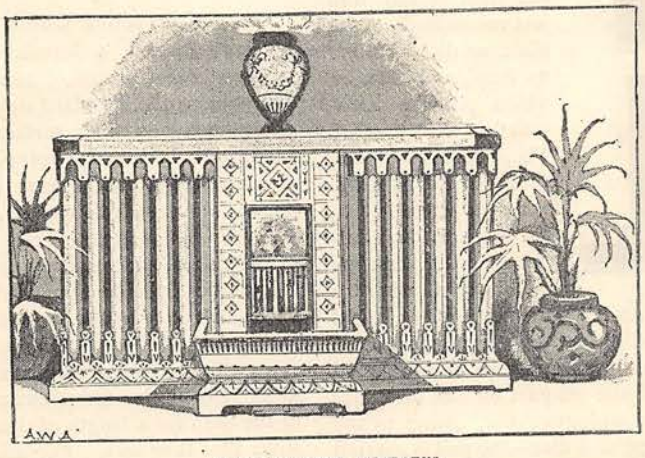
A Giant Gas-Flame.

A natural gas-well, which was recently discovered on the Westinghouse property, Pittsburg Oil Region, U.S., has been burning with a flame 80 feet high. It starts from a 6-inch pipe, itself 75 feet high, so that the tip of the flame, as measured by the engineer, was 155 feet above the ground. The successful finding of gas near Pittsburg has led to several firms boring fresh wells, in order to utilise the gas in their manufacturing operations. At the Pennsylvania Tube Works the use of coal is discontinued, because the gas fuel is found superior to it in the manufacture of wrought-iron tubes, and costs about one-half.

How to Select Tinned Foods.

In consequence of some recent cases of corrosive poisoning from eating tinned tomatoes, a well-known New York doctor has made careful inquiries into the general question of poisoning by canned goods, and has come to the conclusion that the cause of the evil is

to be found in a poisonous amalgam of muriate of zinc and muriate of tin which has been used by some "canners." He lays down the following rules for the guidance of those purchasing canned goods:—(1) Reject every can in whose cap two holes, soldered over, are found. (2) Reject every can that does not show the line of resin around the edge of the solder of the cap, the same as is seen on the seam at the side of the can. (3) Reject every can that does not bear upon it the name of the wholesale dealer, as well as the name of the company and the town where manufactured. When the wholesale dealer is ashamed to have his name on the goods, avoid them. (4) Press up the bottom of the can. If decomposition is commencing the tin will rattle, just as the bottom of the oiler of a sewing-machine does. If the goods are sound, the can will be solid, and there will be no rattle. (5) Reject every can that shows any rust round the cap on the inside of the head of the can.



HOUSE-WARMING APPARATUS.

House-Warming Apparatus.

It is a common experience that the hall of a house is usually the coldest part of the dwelling. Plenty of cold air finds its way naturally into the hall, without special provision requiring to be made for it. This is particularly true of the structure reared by the jerry builder. Now, as has been pointed out by a well-known ventilating engineer, all that is needed to send a genial warmth throughout the whole house is to thoroughly warm the hall or lobby. This can be done in a simple but effective way. Let us take the case of a small house of ordinary dimensions, say of two storeys. A large coil of pipes, forming a square or oblong box or table, is placed against the wall of the hall, and connected below, by a flow and return pipe, with a boiler in the basement or other convenient spot. The boiler need not require setting, but stands on the floor next the chimney (with which it would communicate) like a stove, and would be filled with water from a supply cistern placed, of course, at a higher level than the coil-box in the hall. This coil-table, if of fair size, will have a great deal of heating surface in a small space, in the form of pipes or other appliances, so that the little amount of heat acting upon a large surface will amply warm the hall, the heated air gradually permeating the whole house and robbing the cold English spring of many of its terrors. By placing the coil-box inside a painted metal case and fixing a marble slab on the top, it may be turned into a handsome hall table or cabinet. If a chimney were available in the hall or lobby, an equally effective but more elaborate arrangement, such as that figured in our woodcut, could be substituted for the box of coils. In this case the vase on the top will take the place of the supply cistern, and as every part of the apparatus is full of water, only a healthy hot-water warmth is given off.

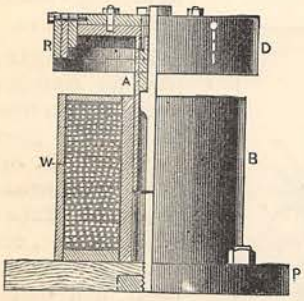
Removing Motes from the Eye.

The following plan for removing foreign bodies from the eye is given by Dr. C. D. Agnew, an American physician. Take a splinter of soft wood, say pine or cedar, and whittle it into the shape of a probe, making it about the length of an ordinary dressing probe. Then take a small loose flock of cotton, and laying it upon your fore-finger, place the pointed end of the stick in the centre of it. Then turn the flock of cotton over the end of the stick, winding it round and round so as to make it adhere firmly. On looking at the end of such a probe with a two-inch lens, it will be seen to be quite rough, the fibres of cotton making a kind of file, which, being soft, will do no harm to the cornea on being brushed over it. When about to remove the foreign body, get the patient to lean his head on your breast, draw the upper lid up with the forefinger of your left hand, and press the lower lid down with the middle finger, then lightly sweep the surface of the ball to which the mote is attached, with the end of the cotton probe. "When," says Dr. Agnew, "the foreign body is lodged in the centre of the cornea, it is most important not to break up the external elastic lamina, for if you do, opacity may follow, and the slightest opacity in the centre of the cornea will cause a serious diminution in the sharpness of vision."

A Long-Pull Electro-Magnet.

Mr. Stanley Currie has invented an electro-magnet which has the great advantage over ordinary electro-magnets of exercising an attraction, or pull, over the armature for a distance of 3½ inches from its poles. An ordinary electro-magnet only attracts its armature with any practical force at a distance of half an inch. The new magnet is therefore much better adapted for engineering purposes, and it has been successfully applied to the working of railway semaphores and "points" from the signal-box without the exertion of muscular force by the signalman, who simply starts

and stops the electric current in the magnet. Our figure illustrates the new magnet, which consists of a bobbin or coil of silk-covered copper-wire, W, of No. 18 Birmingham wire gauge, enclosed in a shell or cylinder of soft iron, B, fixed on a soft iron base-plate, P. The interior of the bobbin is hollow and lined with soft iron. Into the hollow, or tube, runs a stem of soft iron, A, encased in brass tubing and attached to the armature disc, D. This armature consists in reality of three parts—the stem of soft iron just mentioned, a flat plate, or disc, forming its head, and a flange, which projects downwards all round. These three parts are so contrived as to assist each other. Thus, the stem is first attracted with force by the bobbin, when a current traverses it; then the flange is forcibly pulled down; lastly, the flat disc, or head, experiences the attraction. The weight of metal is so proportioned that the whole pull of the magnet on the armature is sensibly constant in strength; but, owing to the three parts—stem, flange, and disc—the pull is exerted through a much longer range than it would have been if the armature had consisted, as is usual, of a plain piece of solid soft iron. In working semaphores, the electro-magnet is mounted on the signal-post and the semaphore-arm is counterweighted. When the pull of the magnet is brought into play, the arm is worked by a simple mechanical device.



Magnesium Search-Lights.

The electric arc light is faulty as a search-light in misty weather, owing to its lack of penetrative power in a damp atmosphere. The light of magnesium wire is not open to the same objection, and is being tried abroad for searching purposes. The purer the metal the better the light, and hence the magnesium prepared by the electrolytic process of Grätzel is best suited for the purpose. Grätzel recently exhibited at Berlin a ball of pure magnesium fifteen centimetres in diameter.

Flint Bricks.

M. Hignette, a French engineer, has utilised the waste sand of glass factories for the production of silicious bricks, which are of a fine white colour, and architecturally very strong and durable. The sand is subjected to a high pressure by hydraulic means, and then baked in furnaces at a high temperature. The bricks are light and resist the action of the sun, rain, and acids.

Rhythm and Walking.

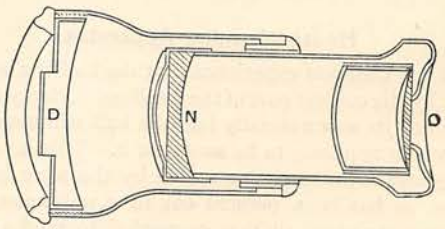
M. Marey, the French physiologist, who has made a number of interesting observations on the flight of birds and the walk of animals, including man, has recently been studying the effect of rhythm on the human march. This was done by means of an electric bell beating time while the man under test walked a certain distance, which was recorded by an electric "odograph." M. Marey finds that the length of step increases little until 65 steps per minute are taken; it then increases until 75 steps per minute are taken, and afterwards decreases as a higher rhythm is reached. The speed or pace of travel increases with the acceleration of the rhythm up to 85 steps per minute, then falls off at higher rhythms.

Correcting Coins by Electricity.

Herr J. Muller, a German mining engineer, has introduced the practice of bringing light coins of silver and gold to the standard weight by electro-deposition of the metal on their surfaces. The coins form the "cathode" of the electrotyping bath, and a band of silver or gold, as the case may be, is used as the anode. For silver coins, the solution which is decomposed by the electric current consists of 15 grammes of chloride of silver freshly precipitated in a saturated solution of cyanide of potassium, to which water has been added to make one litre of solution. Two Leclanché cells form the source of the current. As 100 milligrammes of silver are found to be deposited in an hour by this arrangement, the coins are exposed in the bath for a length of time sufficient to supply the silver that they lack. For slight deficiencies there is no defacement of the inscription.

A View-Meter.

The Iconometer, or image-meter, is a contrivance for enabling photographers to ascertain at a glance the



suitability of a view for photographing, and the lens required to take in the view shown by the instrument. It resembles an opera-glass in external appearance, as will be seen from our figure, which represents a section through it. The arrangement of the lenses is, however, reversed, O being a convex lens, and N a concave lens, so that a diminished image of the scene is presented to the eye. In order that the landscape as seen through the Iconometer may correspond to that included on the senstive plate, a metal screen having a rectangular aperture of suitable proportions is fixed at the large end of the instrument, D, and by sliding the lens-carrying portion in or out a position can be found corresponding to each lens carried. These positions are determined by trial, and marked on the tube of the instrument by the user.

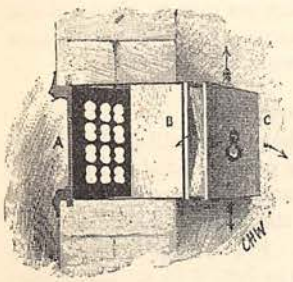
Making Koumiss.

"Koumiss," which many visitors to the Healtheries found so refreshing, can be made in the following way:

—Fill a quart bottle to the neck with pure milk ; add two table-spoonfuls of white sugar, after dissolving it in a little water over a hot fire ; then add a small quantity of compressed yeast. Tie the cork up well and shake the mixture thoroughly, then place it in a room at a temperature of 50° to 95° Fahr. for six hours, and finally cool in ice over-night. The koumiss will be found cool and refreshing in the morning. It is necessary for the success of the attempt that the milk and yeast be pure and fresh, and the bottle sound. The bottle should be opened with care on account of the effervescence ; and if the liquid is seen to be curdled it should not be drunk, as this indicates that the fermentation has been over-done.

The Radiator Ventilator.

Our illustration shows the mode of applying Ellison's "radiator" ventilator, which is one of the best of the new means of supplying fresh air to an apartment without creating a draught. An outer grating in the wall admits the fresh air, which strikes upon a "radiator" inside the box, B, and is deflected in four directions by a metal deflecting plate inside the box. Thus deflected, the air enters the room by the four sides of the ventilator, C, which is pulled out a certain distance from the wall—say, from ½ inch to 1½ inches. The ventilator should be fixed from 4 to 8 feet above the floor, and, if placed behind a hot-water pipe, the fresh air will be warmed before it enters the room.

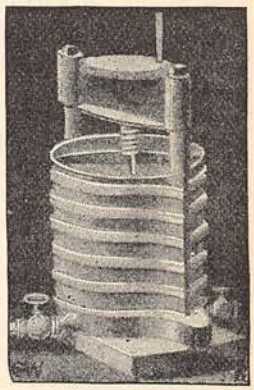


The Hoeschotype.

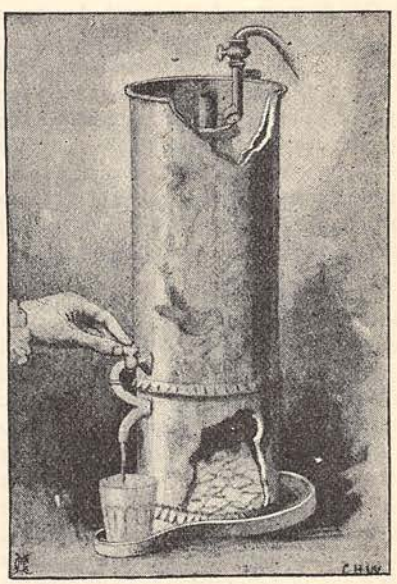
A new process of copying paintings, termed the "hoeschotype," has been introduced with good results. The inventor uses only five colours—yellow, red, blue, grey, and black. These form the basis of a large key-map of tints, each colour being in five grades, each containing one, two, three, four, and five fifths of the colour in question. In combining these over 1,600 shades can be produced ; the colours being, of course, transparent. The original painting to be reproduced in colour is first photographed, and copies printed. One of these copies is now taken in hand by an artist, who by reference to his colour-scale ascertains for each spot in the picture the amount of yellow it contains, and he covers that particular spot with an equivalent shade of grey, painting out at the same time with white all parts of the print which will contain no yellow. This process finished, a negative is produced from this painted sheet, and a print taken on sensitised gelatine mounted upon plate-glass. This gelatine print only represents a picture of those parts in which the artist wishes yellow to appear, and in different degrees of density. That is to say, after this gelatine is washed, and rolled up with yellow transparent pigment, an impression can be taken from it on paper. Similarly gelatine printing surfaces are prepared for the other colours ; and they are all printed one above another on one sheet in perfect register, with the result that a very faithful copy of the original painting is obtained. The presses now used are capable of turning out prints 25 by 35 inches in size. While upon this subject we may mention that a new sensitised photographic paper has recently been introduced. The colour of the photograph when developed is a warm red shading into purple ; and the plate can be developed readily by gas-light.

New Modes of Filtering.

The use of carbon-paper as a filtering material has been introduced in the filter we illustrate herewith. Stout filter-paper, having from ten to twenty per cent. of animal charcoal incorporated with it, is cut into discs, and pairs of these discs are arranged in closed compartments, forming a pile or chambered cylinder as shown. Thus a filter of six compartments, like that in the figure, has twelve sheets of filter-paper for the water to pass through. The filter is connected to the water-main, and acts by the water-pressure. The unfiltered water passes in at one side, and after filtration flows into the supply-pipe under pressure. Fresh discs are readily put in to replace the old, by opening the chambers. While upon this subject, we may mention the Refrigerating Filter, which not only filters but cools the water. As shown in the engraving, it consists of a Maignen filter (previously described in the GATHERER), enclosed in an artistic stoneware vase, and fitted with a non-oxidisable tin pipe embedded in ice, through which the filtered water is made to pass before it is drawn off. The ice is



A CARBON-PAPER FILTER.



THE REFRIGERATING FILTER.

contained in the pedestal of the filter, which in the figure is purposely cut away to show it. The filtering medium in these filters is, it may be remembered, a mixture of pure carbon and lime spread over asbestos cloth, and it both strains and purifies the water.

A Pupil Photometer.

A new apparatus for measuring the diameter of the pupil of the eye is shown in Figs. 1 and 2. It consists of a tube of brass about 1·9 inches long and 1·5 inches in diameter, with one end closed by a disc, round the border of which a series of holes are pierced. These holes are drilled in pairs, lying along the radii of the disc, and the distance between the holes forming a pair varies from ·05 inch to 0·28 inch as one goes round the disc. A cap with a radial slot admitting a pair of holes to be seen is fitted over the disc end of the tube, as shown in Fig. 1. The distances of the holes in fractions of an inch are marked round the tube, as shown in Fig. 2. To find the diameter of the pupil of the eye, look through the open end of the tube at a light, when two spots of light will be seen, as in Fig. 1. The cap is then turned until these two spots appear just to touch at their edges. The diameter of the pupil will then be given by the number on the scale round the tube which is below the particular pair of holes uncovered. Further, since the diameter of the pupil varies with the intensity of the rays of light falling on it, the instrument forms a photometer with a healthy eye. Having found the diameter of the pupil due to a standard light observed at a certain distance, D, the observer then substitutes the light to be measured, and moves to a distance, D^1, which gives him the same diameter of pupil, or, in other words, which makes the same spots of the photometer appear to touch. The intensity of the last light will, therefore, bear the same proportion to the intensity of the standard light as the square of D bears to the square of D^1. Both D and D^1 require, of course, to be carefully measured.

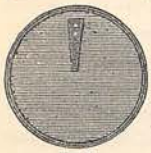


FIG 1

FIG 2

A New Safety Bearer.

Little can be said in favour of the use of bearing-reins, and much against it; still, if in exceptional cases a bearing-rein is in any way necessary, a word of commendation may be given to a new elastic safety bearer recently patented. It consists of two strong elastic straps, with rings and hooks, which can be inserted between the flat and the round parts of the bearing-rein. Then, if the horse stumble or slip, the elastic bearer gives the animal room to recover itself, without injury to the mouth; for on extreme pressure the rein expands many inches, returning to its original length immediately.

A Pocket Anemometer.

A hand-anemometer for measuring the speed of the wind has lately been invented by Mr. Francis Galton, F.R.S. It consists of Robinson's cups and a dial indicator, giving the velocity in miles per hour, the time being taken by a sand-glass. To take an observation, the dial is allowed to record until the sand has run out of the glass, and the instant this has occurred the dial is thrown out of gear with the shaft of the cups, and the number of miles read off. When not held by hand, the instrument should be fixed on a piece of stout iron tubing firmly rooted in an exposed place. Professor Douglass Archibald has also made an advance in trying to measure the wind at different altitudes by means of anemometers attached to kites. Such measurements in the open atmosphere are freer from the effects of cross-currents than down among trees and houses. The data he has obtained prove that the velocities are more uniform at greater heights; for example, at 98 feet the velocity recorded was 864 feet per minute, at 217 feet it was 1,207 feet per minute, whilst at 310 feet and 646 feet the velocities were found to be 1,648 feet and 1,769 feet per minute. Atmospheric electricity renders the prosecution of the observations dangerous unless proper precautions are taken.

Niagara Falls.

These wonderful falls have often filled the hearts of those who regret to see power wasted, with a grief altogether too deep for tears. This sorrow generally finds vent in a pathetic statistical account, showing the amount of the loss. For example, taking the height of the falls to be 150 feet, it is estimated that 1,165,000,000 cubic feet of water fall over every hour. Exclusive of the velocity with which the water reaches the brink, the power of the falls is calculated to be about 5,000,000 horse-power, or nearly one-fourth of the whole steam-power of the earth. Accordingly, four such falls as those of Niagara, working day and night, would replace the work now done for man by the steam-engine. By the time the power of the existing falls has been fully utilised, perhaps the three other falls may have been discovered!

The Oldest Tree.

The oldest, and at the same time the largest tree in the world, so far as known, is a chestnut near the foot of Mount Etna. It is hollow and large enough to admit two carriages driving abreast. The circumference of the main trunk is 212 feet. The Grizzly Giant, monarch of the Mariposa Grove, measures 92 feet in circumference.

A Local Anæsthetic.

Experimenters have long sought an anæsthetic which, when applied externally to a given part of the body, would render it feelingless for a time. According to a report from Germany, this has been accidentally discovered by a student. The substance is hydrochlorate of cocoine. Getting some of the hydrochlorate in his eye, the student was surprised to find that it caused the surface of the latter to become insensible. Further trials only confirmed the first observation. An eminent oculist then performed an operation for cataract on the eye of a woman, without

pain to her, by the help of a few drops of the substance applied to the surface of her eye. Recent experiments by M. Grasset also show that when injected under the skin it permits of painless operations on other parts, without producing sleep or general insensibility.

An Atmospheric Motor.

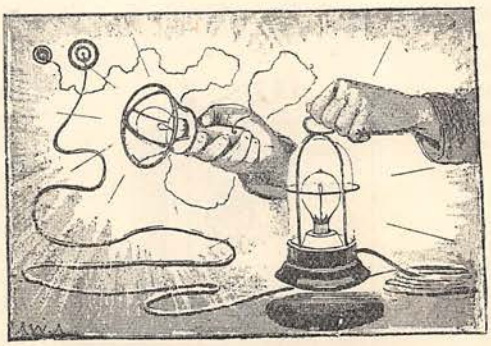
A small and ingenious motor for farm and household purposes has recently been invented. It is useful for pumping water, cutting chaff, and work of this kind requiring no great power. The working cylinder is of bronze, and the engine takes no harm if left unused for some time. Coke is best to burn in its furnace, as it gives no smoke; but gas or wood is burned in some of the types manufactured. The power is obtained from the pressure of the atmosphere on the piston acting against a vacuum created by condensation of steam; and the engine is double-acting—that is, the piston is impelled twice for each revolution of the fly-wheel. The vacuum is produced by means of a small supply of cold water obtained from the engine itself when engaged in pumping—one gallon per minute being required for the 1 horse-power size. The types at present made are of ¼, ½, 1, and 2 horse-power, and the expense for fuel is said to be only one farthing per horse-power per hour. The motor is said to be free from explosive tendencies, and to require no skilled attendance.

De-silvering Lead by Electricity.

Professor Keith, of New York, has brought out a process for extracting silver from lead by electrolysis; and large works are now being built at Rome, New York, to introduce it on a commercial scale. The lead is cast into thin plates having copper bars fused into them, to serve as electrodes for conveying the electric current to the plates, when put into the electrolysing "bath." This is contained in vats lined with asphalt, and consists of a solution of sodium acetate mixed with dissolved lead sulphate. In this solution the lead plates, each enclosed in a muslin bag, are suspended, and the current from the positive pole of an Edison dynamo is allowed to flow from the plates into the solution, and thence by the "cathodes," or another series of plates, back to the negative pole of the dynamo. Scrapers are caused to pass between these two sets of plates (the anodes and cathodes) in order to scrape off the lead deposited on them by the action of the current, and a constant circulation of the solution is kept up. When the lead is all deposited the muslin bags contain the residual silver, antimony, arsenic, and other impurities. The silver is then separated from these by ordinary chemical methods. The lead, which with a current of 1,000 amperes is deposited at the rate of 10 lbs. per hour per vat, is very pure, but requires to be melted and recast, in order to be used for practical purposes.

Electric Hand-Lamps.

Our engraving represents two of the new incandescent lamps which have been fitted on board H.M.S. *Colossus*. It will be seen that they are hand-lamps, and can be moved about within the range of the flexible conductors which supply the current to their filaments. M. Trouvé, the well-known Parisian electrician, has devised a portable hand-lamp of a similar kind, which carries its own battery or source of electricity. This battery is of bichromate elements, and keeps the lamp lit for nearly three hours. While upon this subject, we may mention the new incandescent lamp of M. Diehl, recently exhibited at the Philadelphia Electric Exhibition. This lamp has no external connections at all, but acts by induction. Inside the bulb there is a small "secondary" coil in circuit with the carbon filament, and outside the stem of the bulb is a "primary"



ELECTRIC HAND-LAMPS.—FIG. 1.

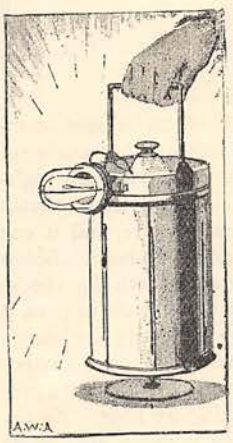


FIG. 2.

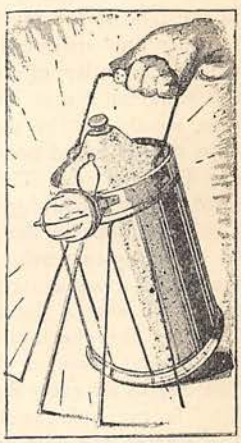


FIG. 3.

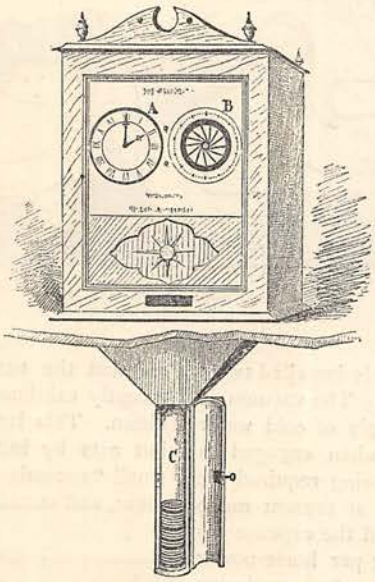
coil, which is connected in circuit with the dynamo and a current interrupter. The current thus interrupted in the primary coil outside induces a current in the secondary coil inside the lamp, and this current it is which lights up the filament. The idea is ingenious, but it is not stated whether there is really any gain in light or saving of expense by the plan.

A Portable Green-house.

A green-house which is in reality a tenant's fixture and can be removed on leaving a particular house is a desideratum. Such an one is now made in a convenient size, 8 feet long by 5 feet wide and 7 feet high at the back. It is made of seasoned deal, glazed with sheet-glass, and fitted with the necessary gutters and pipes to carry off rain-water. The whole is supported by six stone blocks, which rest on the surface of the ground. The panes are puttied to the rafters, but not at the lap joints, so that there is freedom for expansion and contraction. The sides are attached to the wall-plate and back rail by hooks, and to the front by thumb-screws. Its chief advantage is that it can readily be dismantled and removed to another site.

A Check-Clock.

A clock which checks the time of workmen as they arrive at their works is a convenience which will be appreciated. Our figure illustrates one recently invented. It consists, as shown, of an ordinary clock, A, seen to the left of the dial; a slotted disc, B, seen to the right of the dial; and a tube, C, beneath the dial-face. The object of the latter is to collect the checks as they are delivered by the workmen into a narrow slit below the clock. The checks are piled up in the tube in the precise order in which they are delivered, thus telling the order of arrival of the workmen; and if a workman should put in the check of an absent comrade, who is found not to be present, that workman can be detected. The times of arrival are registered in the following way:—There is a certain number of slots in the disc B, say twelve, and it can be set so as to revolve, say once in an hour. Below the disc is a passage communicating with the check-tube; and when a slot allows a time-check to pass, it falls into the check-tube along with the workmen's checks, and takes its place amongst them. Copper time-checks for every five minutes are therefore provided for every slot, twelve making an hour. As the disc rotates, one falls every five minutes, and, by its position among the workmen's checks, gives the time within a few minutes at which the workmen arrived.



A CHECK-CLOCK.

A Simple Fire-damp Detector.

Mr. Garforth, of Normanton, has introduced the following simple plan of testing for fire-damp in mines. A small india-rubber ball with a hole in it, such as children use, is taken by the collier into the mine, and when he desires to test the air of any part he squeezes it, then allows it to expand, thus filling the ball with the air to be tested. He then squeezes it again, allowing the jet of escaping air to play upon the flame of his lamp; and if the well-known "blue cap" appears on the flame, and the latter lengthens out, he knows that the atmosphere contains fire-damp.

A Prolific Telegraph.

The new synchronous telegraph of Mr. Patrick Delane was recently tried on a single wire between Boston and Providence, Rhode Island, a distance of fifty miles. It would require a long special article to describe the technical intricacies of this system; but we may mention that by its means the single line can be made to transmit quite a number of different messages at the same time, so that a number of different places at each end of the trunk wire might communicate with each other by their own special circuit on the same wire. At the recent trials the wire was arranged into six different circuits, each having a message sent over it. There were six expert Morse operators to send and receive the messages at each end of the line; and by this means no less than 800 words were telegraphed in five minutes. In ten minutes some 2,200 words were signalled. Mr. Delane's apparatus is adopted by the Boston Multiplex Telegraph Company.

A Submarine Swamp.

American geologists have arrived at the conclusion that there exists a great submerged swamp or marsh south-east of Long Island. For a long time past the quantities of peat, fossil leaves, lignitic trunks and branches, which have been rolled in on the south-side beach of Long Island, between Water Island and Atlantic-ville, have attracted general attention. Professor Newberry, of Columbia College, estimates that the marsh runs fifty miles east and west, and half a mile north and south, and cites a great deal of evidence to show that the coast of North America in that region is slowly settling downwards.

1884 SHORT SPEECH COMPETITION.

The Editor has pleasure in announcing the award of the judges in this Competition. The Prize of One Guinea, offered for the best Short Speech in proposing the Toast of "The Bridesmaids" at a Wedding Breakfast, is awarded to

MISS CHARLOTTE A. PRITCHARD, Belle Vue Terrace, Upper Clapton, London, E.

Honourable Mention is awarded to

THE REV. J. GRANT, Cromdale, Strathspey, N.B., and MISS K. E. WEBB, Portland Place, W.