

LIFE-FURROWS: A SONNET.

TWO horses, harnessed to a plough, stand still,
 Waiting the voice whose words they've learned
 to know :
 Then, at the ploughman's signal, proudly slow
 They plod with patient footsteps up the hill ;
 And since with sturdy hand and steady will
 The keen-edged share is driven to and fro,
 Up-hill and down alike the furrows go

True as a line, unturned by any ill.
 Are not our lives just like the ploughman's share ?
 The Providence that rules them may decree
 That we plough up the hill through toilsome
 days,
 And obstacles may meet us everywhere ;
 Yet if our hands be true in all our ways,
 The furrows will be straight and fair to see.

G. WEATHERLY.

THE GATHERER.

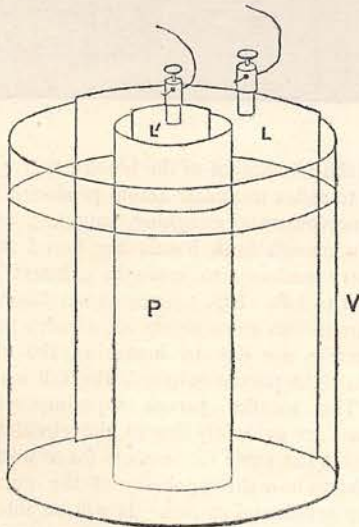
A New Art Decoration.

A new method for reproducing oil-paintings has been invented by Mynheer Bogaerts, a native of Holland, who has opened an exhibition of imitations of the Flemish masters in London. The specimens are remarkable for their fidelity to the originals, and copy even the marks of the painter's brush. The cost of the process is also low, a picture measuring 30 inches by 40 inches being producible for fifteen shillings either on canvas or panel. In the decoration of walls and panels, the "Peinture-Bogaerts" is, therefore, likely to find its own field.

Aniline Dyes by Electricity.

The beautiful dyes which chemists obtain from coal-tar, thus making one of the ugliest of substances yield the colours of the rainbow, are now prepared by electricity from certain aniline solutions. The method

for carrying on the process of manufacture consists of a glass vessel or cell, V, containing a large plate of platinum, L; a cylindrical pot of porous clay, P; and within the latter a second smaller plate of platinum, L'. The vessel is also partly filled with water slightly acidulated with sulphuric acid, and having in solution the organic salt which yields the dye under the influence of oxygen or hydrogen which has just been set free from combination with another body. The plate, L, is connected to the negative pole of a battery of sixteen or twenty bichromate of potash cells; and the plate, L', is connected to the other pole, while both plates are separated by the porous pot. With this arrangement the current from the battery decomposes the water, and oxygen is liberated at one pole, while hydrogen escapes at the other. The nascent gases acting on the aniline salt reduce the aniline colours, which deposit on the plates, sometimes on that connected to the negative pole of the battery, and sometimes on that joined to the positive pole.



is due to M. Goppelsroeder, of Mulhouse, in Switzerland, who exhibited a number of his products in the recent Paris Electrical Exhibition, together with pieces of silk richly dyed in them. The apparatus

Illuminating Tile for Cellars.

Underground cellars and vaults are found in connection with so many shops and warehouses that a notice of an improved means of illuminating them from the pavement cannot be without interest to our readers. The engravings represent a new method which has been devised for the express purpose of introducing as much light as possible into the cellar. It consists of an illuminating lens made of crown-glass, and of the shape of a semi-prism, with a very large reflecting surface, and is shown in the woodcuts as attached to a pavement plate or frame. Its upper portion has a raised centre and radiating grooves, with bevelled sides (which being depressed are protected from fracture) so as to increase the extent of surface. The downward part of the lens is a semi-prism bearing an

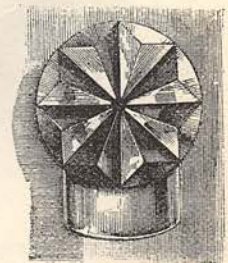


FIG. 1.

inclined flat reflecting surface and an inclined back face that may be flat, or nearly so, concave or convex. In the middle of the cone or peak of the upper part a

point or needle. The needle traces a fine line on a square of smoked glass, C, which is raised to a convenient height on a movable platform. The float is

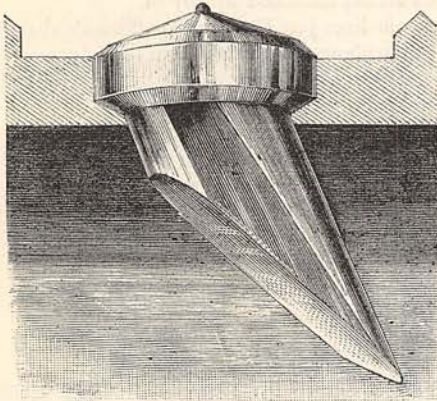


FIG. 2.

metal spur projects to protect the lens, and the iron frame in which it is set carries knobs between the tiles, so that passers-by are prevented both from slipping and from injuring the lens.

Bent Spokes for Wheels.

To mitigate the shock on carriage-wheels, Herr Nordmann, of Dresden, gives the spokes a curving shape, so as to make them exert a certain resilience or resistant spring. After being cut the straight ash-wood spokes are steamed and bent while hot in iron presses, then dried at a moderate temperature. The curvature is proportioned to the load and kind of carriage for which they are designed.

The Kyrograph.

If we try to keep the hand quite steady for some time, small tremulous movements begin, over which we have no control. These have been experimentally

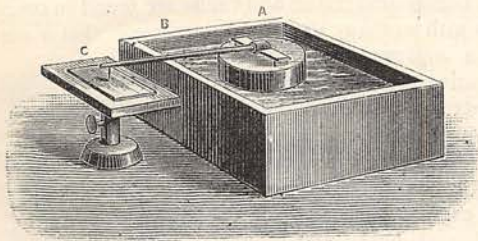


FIG. 1.

studied by Mr. Percy R. Wilde, M.B., who has invented an instrument for the purpose, termed a kyrograph, which we illustrate in Fig. 1. It consists of a flat tin float, A, about 5 inches in diameter, and 1 1/2 inches deep, made in the form of a box. Across its top is placed a support for the hand, which carries at its centre a socket. Into this is placed one end of a rod or vulcanite, B, 10 inches long, which serves as an indicator and is fitted at its outer end with a marking-

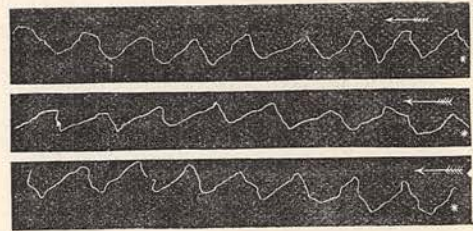


FIG. 2.

placed in a trough containing water, and the hand or hands are lightly rested on the float. Their involuntary motions are then traced on the pane of smoked

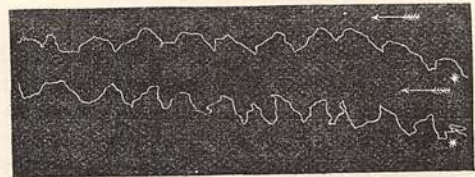


FIG. 3.

glass. By means of these diagrams Mr. Wilde has discovered that the tremulous motions of the hand are partly regular and due to the rhythm of the respira-

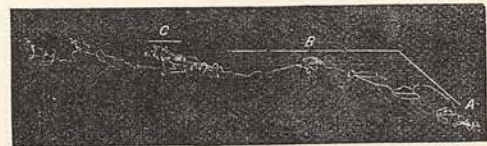


FIG. 4.

tion and the circulation of the blood ; partly irregular and due to reflex muscular action produced by sudden shocks, nervousness, coughing, laughing, and so on. Curiously enough both hands are found to have an involuntary tendency to move in a lateral direction, from right to left. Fig. 2 represents a diagram of the regular tremulous movements of a man's hand. The larger curves are due to breathing, the rise taking place while the person inspires, the fall while he expires. The smaller curves superimposed on the larger ones are evidently due to the circulation. Fig. 3 represents the same movements for a woman ; and Fig. 4 shows how the regularity of the curve is disturbed by accidental causes. It will be interesting to see how far training of the hand in art or mechanical skill affects these movements, and in this regard the kyrograph may prove a useful instrument, as well as in the diagnosis of certain diseases, especially those affecting the nervous system.

A Handy Book-Rest.

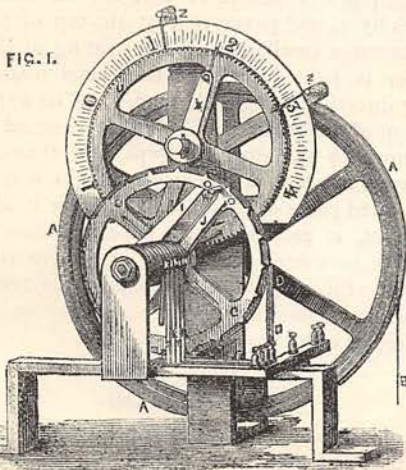
The annexed woodcut represents a new book-rest which has several useful features. The fixed hollow standard is of iron, and the movable rod fitted to it carries one or two tables or rests, composed of four leaves hinged to a central board. Perhaps the most convenient point about this stand is that the rest may either be kept flat—when the books are wanted for show rather than for use—or inclined by means of brass rods pivoted to the adjustable



sleeve on the standard, in which position the books are comfortably placed for reading purposes. Each of the folding leaves is furnished with a spring clip to prevent the books or papers from slipping off. The rest may easily be carried to any part of a room, and it also turns upon its standard, so that it may be used with the smallest amount of trouble.

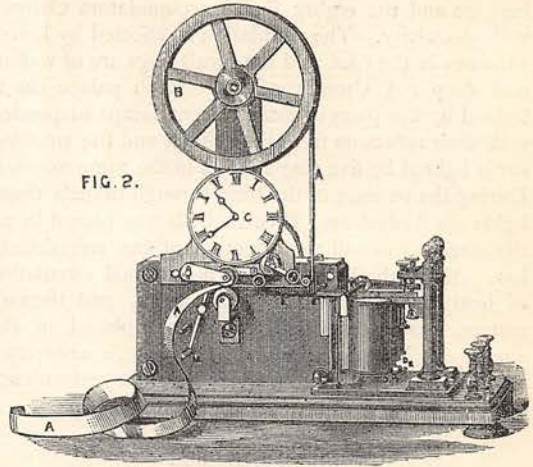
A Flood Recorder.

An ingenious apparatus for self-registering the variations of level in a river or dam was exhibited by the Seine Conservancy Board at the recent Paris Electrical Exhibition. It is termed Morquet's Fluviograph, after the inventor M. Morquet, Ingénieur des



Ponts et Chaussées. It consists of a float of hard wood, which is free to rise or fall inside a metal cylinder with the level of the stream. This float is connected to a fine wire, B, which passes round a pulley, A, as shown in Fig. 1. The fall of the float turns this pulley from left to right, and its rise from right to left. On the shaft of this pulley is fixed a toothed wheel, C, whose teeth make contact in succession with the spring, D, as the wheel revolves. At each contact a current of electricity is sent to the re-

FIG. 2.



gistering part of the apparatus, which may be at a distant place, and as the teeth are placed at equal spaces apart, the degree of rise (or fall) of the water-level can thereby be recorded. Moreover, by means of a small toothed pinion on the shaft of the pulley, the toothed wheel, w, can be rotated to right or left; and the pointer, x, which it carries can be moved to right or left along the graduated limb of the dial, o. By means of two contact-pieces, z z, which can be set at any part of the dial representing a dangerous level of the water, an alarm-bell can be sounded when that level is reached; for the contact-pieces are in connection with an electric bell, and the pointer, x, is in circuit with a voltaic battery. The recording part of the fluviograph is simply a Morse telegraph instrument fitted with two sets of electro-magnets, D₁ D₁, D₂ D₂, and two inking wheels. When the level sinks one electro-magnet comes into play, and blue marks are made on the strip of moving paper, A, which is carried by the wheel, B. When the level rises, the other electro-magnet by the attraction of its iron armature presses its inking wheel against the paper and makes red marks. One of these marks is made for every two inches of rise or fall as the case may be.

The Electric Light in Trains.

The new Pullman express running from London to Brighton, which is said to be the best-equipped train in the world, has been fitted with Edison's incandescent electric lights, fed with electricity from the accumulators or electric reservoirs of M. Faure. The

train consists of four Pullman cars, each 58 feet in length, and providing a continuous passage from end to end of 232 feet. That next the engine is a parlour car, and is divided into three compartments having seats and tables, lavatory and dressing-room. The second carriage is furnished like a drawing-room, and has at one end a ladies' boudoir, and at the other a storeroom and locker. It is reserved for ladies travelling alone or accompanied by gentlemen. The third car is for refreshments, and the fourth is for smoking in. Part of the latter car contains the luggage and the eighty Faure accumulators charged with electricity. The ventilation is effected by louvre windows in the roof, and the furnishings are of walnut and deep red Utrecht velvet. Each palace car is lighted by five pairs of incandescent lamps suspended with their reflectors from the ceiling, and the smoking car is lighted by five single lights in the same manner. During the passage of the train through tunnels these lights are flashed on. Electric bells are placed in all the carriages to call the attention of the refreshment bar. Along the floor there is a continual circulation of heat by means of hot-water pipes, and thermometers, barometers, and clocks are placed in the carriages. To make the train complete, a newspaper stand and letter-box are provided for the convenience of passengers.

Floral Blacking.

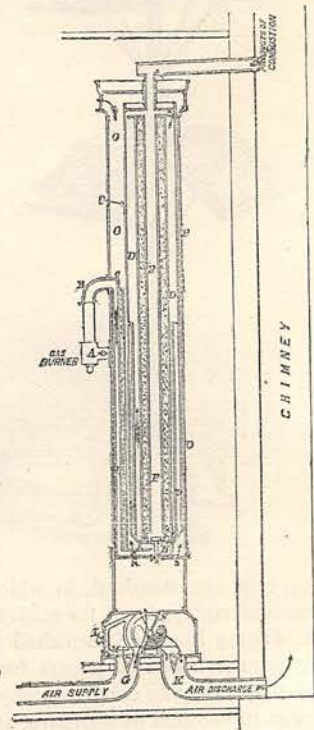
In Mexico there is a tree which absorbs water vapour from the air and exudes it in the form of water from its trunk and branches in so great a quantity that the ground underneath is literally soaked with it. Indeed, some recent explorers in one of the arid Mexican deserts came upon a forest of these trees which had turned the dry soil into something like a morass; and the attention of botanists has been directed to it as a substitute for the eucalyptus in desert tracts of country, such as the pampas of South America, the sands of the Sahara, or the plains of Cyprus. In Australia, however, they have a greater curiosity in the shape of a plant with flowers possessing the singular property of giving to boots all the lustrous qualities of Day and Martin's best blacking, by simply rubbing the flower upon the leather. The plant in question is a species of hibiscus (*H. Rosa sinensis*) which grows in New South Wales; and four or five of the flowers, with the anthers and pollen removed, are sufficient for each boot. They yield a gummy juice which gives a glossy skin to the leather.

A Sanitary Stove.

One of the novelties of the Smoke Abatement Exhibition at South Kensington is the Sanitary Gas Stove of Mr. Schönheyder, of which the figure is a sectional view. In this stove the noxious gases formed by the burning of the coal-gas are never allowed to come into contact with the air of the room. Pure air from outside the building is passed through the heated stove before it enters the room, and then escapes by a flue or chimney. If it is desired merely

to warm the air of a room without changing it, the supply-pipe leading outside is closed and the air of the room allowed to circulate through the stove. Again, if it is desired to ventilate the room without further warming it, the air is allowed to enter at the top of the stove and escape into the discharge-flue.

The stove has the outward appearance of a column, having one or more Argand gas-burners, A, placed at a convenient height as shown, and giving light to the room if need be. The heated products of combustion pass by the bent tube, B, through the pipe, C, to the chamber, E, and thence through the annular space, D D, to the vent at the top. In doing so it heats the sides of a cylinder, P, which in turn heats the air for supplying the room. This air is admitted to the stove by the supply-pipe, G, and ascends through the space, O, where it is heated by contact with P, then escapes into the room



at the top of the stove through holes as shown by the curved arrow. On entering the room it is cooled by contact with the ceiling and walls, and therefore sinks until it escapes into the chimney through openings in the base of the stove and the air discharge-pipe, K. To heat the air in the room without ventilating it, the door, L, at the base is opened, when the slide, M, closes both the supply and discharge pipes, G and K, so that the air of the room enters by L, and passes out at the top of the stove. For summer ventilation without heating of the air, a burner is lighted and the foul gases made to pass away directly through the pipe, F. The warm air at the top of the room is allowed to descend through the stove to the discharge-pipe and thence to the chimney, in which a sufficient draught is created by the heated gases of combustion entering it above. A valve, N, is provided at the base for changing from summer to winter ventilation, and there is also an arrangement in the box, E, whereby the temperature of the air passing through the stove may be raised or lowered at will.

An Aërial Car.

An ingenious contrivance for travelling in the air has been patented by Monsignor Capel and the Re

A. de la Pauze. It consists of a light car of bamboo or steel tubing, covered with oiled silk or waterproofing, and having stretched above it, on a mast, a level awning of oiled silk or coated canvas. This plane surface aids the buoyancy of the car by reason of its large surface pressing on the air below. It can be inclined either upwards or downwards at will, so as to direct the rising or sinking of the vehicle. Stays extend from the mast to the ends of the car, and carry bearings on which are mounted universal joints, to which a fan or propeller is attached. These are driven by motive-power contained in the car, either in the form of electricity or compressed air. The vessel is mounted on light wheels, and in order to start it is run along the ground, while the awning is inclined, so as to gradually lift it into the air. On the other hand, in descending the awning is inclined in the opposite direction.

Tar-dipped Hurdles.

Wattled hurdles are sometimes used for sheltering plants, as well as penning sheep, and though inexpensive in themselves, the fact that they only last two or three years owing to decay at the roots is a drawback to their use. Mr. G. F. Wilson, of Weybridge, has however found it a good plan to dip the whole hurdle in tar. Thus treated they are weatherproof, and have the appearance of being black-varnished. The idea has been acted on at the Walton-on-Thames Gas Works, where hurdles are now regularly dipped in tar for farmers. The preservative material in the tar is creosote, which is now so largely used in preserving wooden telegraph-poles. The oil of creosote is forced into the pores of the wood under pressure. Since the decay chiefly takes place at the part in and near the ground, however, it is a waste of money to soak the whole post, and hence M. Mirandolle, of Amsterdam, has recently introduced the method of impregnating only the lower part of the pole. As the hurdles, too, give way mainly at the parts which enter the ground, perhaps a saving might be effected by simply dipping the lower part in tar.

Film Flowers.

A very pretty pastime, imagined by M. Plateau, member of the Royal Academy of Sciences, Belgium, consists in making artificial flowers out of fine wire filled in with soap-bubble films, which take an iridescent aspect when seen by light reflected from their surfaces. The flowers of M. Plateau were made by taking fine iron wire about half a millimètre in diameter, and bending it into the shape of the desired flower. The woodcuts illustrate one of these figures in plan, side view, and perspective. On forming the shape the wire is lightly oxidised by keeping it a few seconds in feebly nitric acid, and after being washed, it is immersed face downwards in liquid glycerine, to a very slight depth in order to avoid any

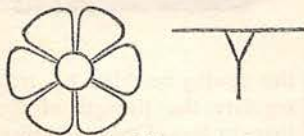


FIG. 1.

film in the fork of the stem. On holding the flower at a window in such a position that the sky is reflected in the films filling up the spaces between the contour of the wire, the films soon begin to grow iridescent and discover the most lovely tints. The glycerine is prepared for yielding the films by dissolving in forty parts of hot distilled water one part of good Marseilles soap newly bought and cut up small. If the solution on cooling is turbid, it should be filtered until clear. Three volumes of this liquid are then to be mixed with two volumes of Price's glycerine and well agitated, then allowed to settle until all the bubbles are expelled. This liquid will last for several days and will be found to produce very good soap-films.

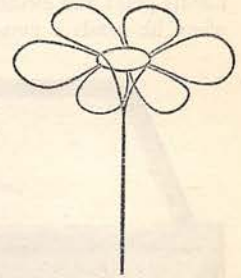


FIG. 2.

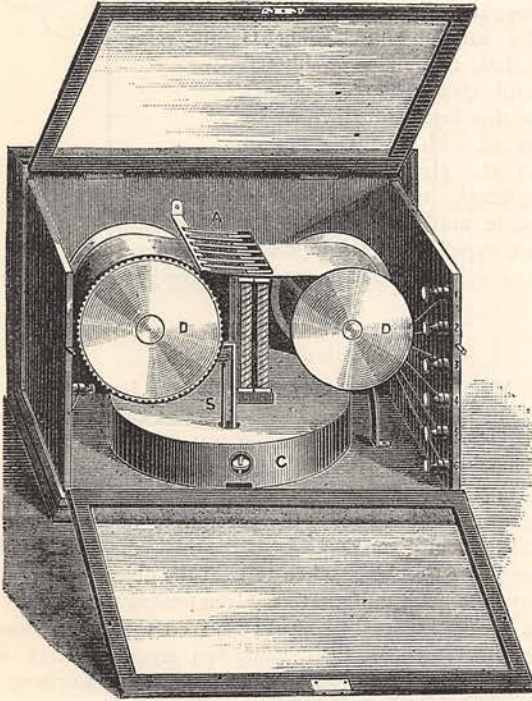
Colouring Metals.

Metallic objects may be coloured by immersing them in a bath formed of 640 grains of lead acetate dissolved in 3,450 grains of water, and warmed to from 38° to 90° Fahr. This mixture gives a precipitate of lead in black flakes, and when the object is plunged into the bath the precipitate deposits on it. The colour given depends on the thickness of the skin, and care should be taken to treat the object gradually, so as to get a uniform tint. Iron treated thus acquires a bluish aspect like steel; zinc, on the other hand, becomes brown. On using an equal quantity of sulphuric acid instead of lead acetate, and warming a little more than in the first case, common bronze may be coloured red or green with a very durable skin. Imitations of marble are obtained by covering bronze objects warmed to 100° Fahr. with a solution of lead thickened with gum tragacanth, and afterwards submitting them to the action of the above-mentioned precipitate of lead.

A Tell-tale for Watchmen.

It is reassuring to the owner of property to know that the watchman he employs is trustworthy and regularly goes his rounds, and the little apparatus illustrated herewith is devised to put an end to all doubts on this score. It has been designed by Messrs. Elliott, of London, and has been satisfactorily tested during several months. Generally the watchman in a large factory has to visit every part of the premises periodically during the course of the night, and hence every such part is connected electrically to the central indicator shown in the figure. A press-button like that of an electric bell is provided at each point, and when the watchman arrives there, he presses the button and sends a current to the indicator. This is contained in a glass case, which is kept locked so as not to be tampered with. It consists of two drums, D, carrying a band of paper which passes

under a series of needle-points, A, attached to as many armatures of electro-magnets placed below. These drums are moved together through the action of the pinion, S, by clockwork contained in the box, C, and as the paper unrolls off one drum it rolls on the other. For every stage on the watchman's beat there is a needle-point and electro-magnet in the indicator, and when he sends a current from any stage, the corre-



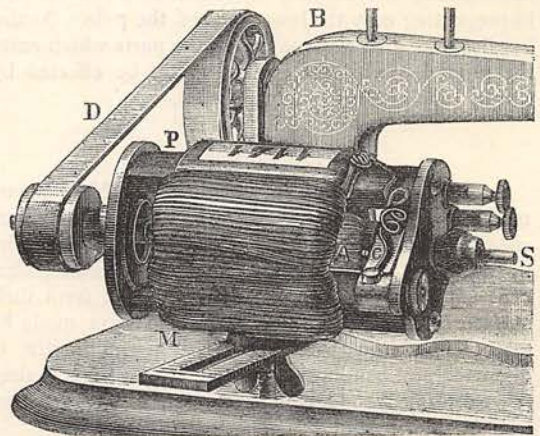
sponding needle is caused by the electro-magnet to perforate the band of paper. An examination of the latter shows whether the watchman has faithfully visited all his posts in the night, and by ruling the paper with cross-lines, and by regulating the clock-work, the times at which the visits were made can be determined; but this measure is usually needless.

Mica Masks.

Masks of mica are now made by Herr Raphael, of Breslau, for protecting the faces of workmen exposed to intense heat, dust, or the fumes of noxious chemicals. Such for example are metal-workers, stone-masons, and glass-melters. The mask is formed of arched plates of mica, which are quite transparent, and fitted to a metal frame covered with asbestos to render it unattackable by heat or acids. The space between the arched mica and the eyes allows the workman to wear spectacles if his eyesight is bad, or coloured shades if the light is strong, without fear of breakage, since mica is a poor conductor of heat. When the mask has to be worn a long time, fresh air can be supplied to the head by means of an india-rubber tube which passes out to the shoulders, and has a funnel-shaped end closed by a moistened sponge.

Griscom's Electric Motor.

One of the neatest little electric motors yet invented is that of Mr. Griscom, of the Electro-Dynamic Company of Philadelphia, seen at the Electrical Exhibition in the Crystal Palace. As shown in the illustration, it consists of an electro-magnet, M, made in the form of a flat iron ring, having two opposite sections wound with insulated wire, which when traversed by a current turn the remaining bare portions above and below into magnetic poles of opposite kind. One of these poles—the positive—is shown at P; the other, or negative, is hidden, but is directly opposite to P. Between these two poles a bobbin of wire, A, made after the pattern of the revolving bobbin in a Siemens dynamo-electric machine, is mounted on a shaft, S, which carries at its other end a driving pulley. A commutator, C, like that used in dynamo-electric machines, conveys the current from a voltaic battery both to the coils of the bobbin and to those of the electro-magnet round it. The magnet being thereby excited, the movable bobbin begins to revolve on its shaft, and communicates its motion to the driving belt, D, which in turn rotates the fly-wheel of a sewing-machine, B, or other apparatus it is desired to work. The commutator interrupts the current at every revolution of the bobbin in such a way as to produce continuous rotation of the latter, and consequent steady movement of the sewing-machine. The total weight of this little motor is only two and a half pounds, and when excited by the current from six cells of the kind supplied with it, it is capable of performing 1,000 foot-pounds of mechanical work per minute, or in other words, it is said to be able to lift one pound to a height of 1,000 feet. The battery is enclosed in a box, to which a pedal is attached, so that the person working



the sewing-machine by treading on the pedal can regulate the strength of the current, on immersing more or less of the metal plates in the exciting liquid. The maximum speed of a sewing-machine in good order when driven by Griscom's motor is about 900 revolutions per minute.