THE GATHERER.

A Recuperative Gas-Lamp.

An ingenious and powerful gas-lamp was exhibited at the Crystal Palace Gas Exhibition. It is illustrated in Fig. 1, which is an external view, and Fig. 2, which is a vertical section. Referring to this figure, the lamp-body is fitted with a semi-globular glass, *b*, and contains the concentric tubes *d d'*, *e e'*. The connection between the outer tube and the lamp-frame is made with the reflector plate *g*. The gas supply-pipe *t* is fitted at one side of the lamp *r*, and led into the chimney *c*, from which it descends to the burner *v*. The air for maintaining combustion enters first through holes in the body of the lamp at *k*, and passes upward between the tube *d*, and an outer screen, to the cross-tubes, whence it descends in the interior of the pipe *d'*, to the burner. The products of combustion rise between the tubes *d* and *d'*, and in heir exit part with some of their heat to the entering air, retaining sufficient warmth however to keep up a draught in the chimney and carry off the water of combustion. Air is admitted at *h*, between the reflector and glass, to keep the latter cool if required. The ventilating tube is fitted to the top of the lantern when it is fitted up as a bracket light. The light is shadowless, and the products of combustion are carried from the room.

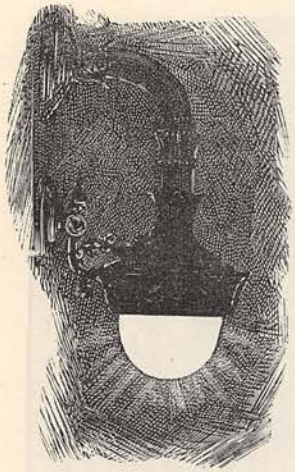


FIG. 1.

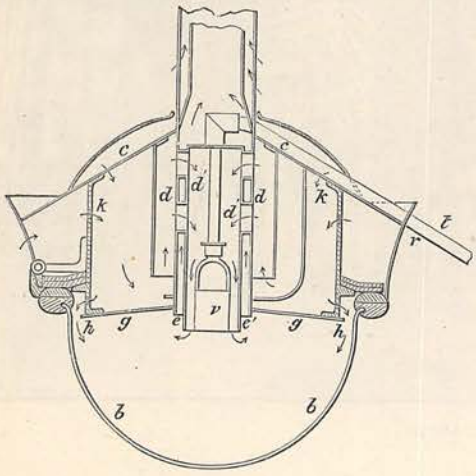


FIG. 2.

The Telephone in Diving.

Interesting experiments have indicated that the telephone can be most usefully employed in diving. In one instance, which was distinguished by its complete success, the length of the cable connecting the "receiver" in the helmet of the diver with the "transmitter" above water was 600 yards. The diver could, it was soon ascertained, communicate or speak with ease, and ask for such tools as he required from time to time, in any position which his work rendered it necessary for him to occupy.

A Treadle Hair-Brush.

The rotary hair-brush is one of the luxuries of civilisation, as all must allow, but it has not hitherto been a private luxury. Perhaps the machine invented by Mr. Willoughby, and shown in the figure, will bring it into more general use outside the hairdresser's shop, say in barracks, hospitals, and so on. The treadle behind the chair is worked by the foot of the user; and a flexible steel shaft is employed to transmit the power to the brush. This shaft permits the brush to turn in any direction, thereby allowing the brush to be manipulated with far greater freedom than the older brushes of the kind having pulleys and rubber bands. While upon this subject we may mention that an electric rotary brush has also been on view at the Westminster Aquarium Electric Exhibition, the power being an electric current led to the brush by wires.

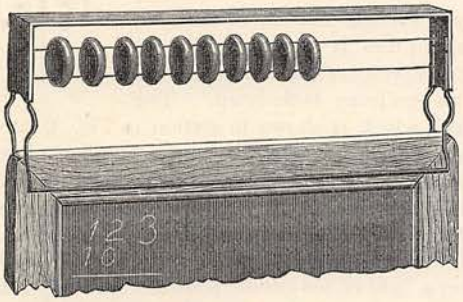
A Tubular Plant-Label.

A good plant-label which will not soil in wind and wet is a desideratum, and hence the prize offered by the Society of Arts for one. This prize is not settled yet, but meanwhile the plan recommended by a German paper may be useful. This consists in enclosing the slip of paper or wood, with the name on it, in a tube of stout glass, say 8 inches long and $\frac{1}{4}$ inch

diameter internally. For house plants and conservatories, chemists' test-tubes will serve—the end being corked, and a wire running through the latter to carry the label.

Ink Paste.

Consolidated ink in the form of paste is now sold in small squares, each of which turns two thimblefuls of water into a strong and bright ink.



An Abacus for Slates.

The sketch represents a handy and cheap American abacus or counter for young children, which can be attached to slates to help them in their sums. The frame is of brass, and the clips at the lower part are fastened to the top frame of the slate. The balls or counters are strung on two wires as shown, and easily shifted so as to make different groups. One of these devices will outlast several slates, and it is worthy the attention of English teachers.

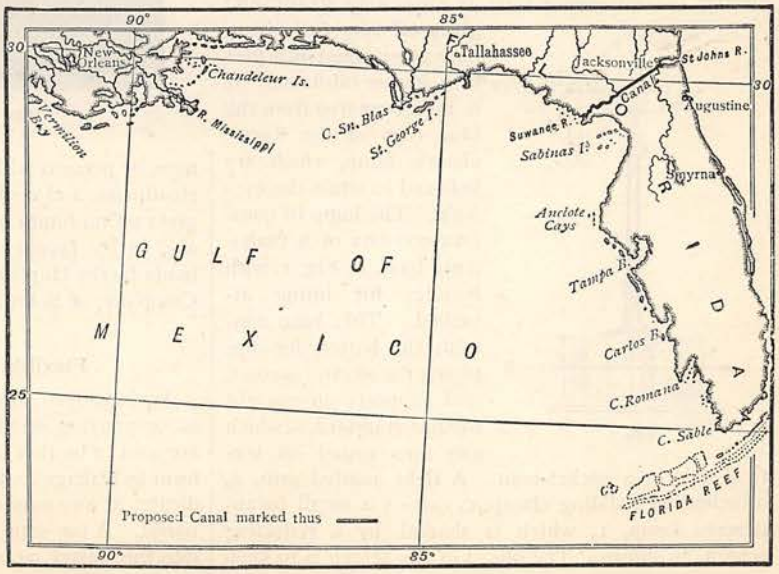
Hydrogen Whistles.

Some years ago Mr. Francis Galton devised a set of small whistles to give very shrill notes, shriller than the human ear can appreciate, in order to test the hearing power of insects, which are known to hear very shrill sounds. A whistle will not give its proper note unless its depth is one and a half times greater than its width, and since a whistle giving a note of 24,000 vibrations per second is only 0·14 inch deep, it follows that the width must be very small. Mr. Galton now finds that if hydrogen be used instead of air, the number of vibrations per second produced by a given whistle is increased thirteenfold. This result is due to the fact that the number of vibrations per second caused by whistles is inversely proportional to the specific gravity of the gas that is blown through them, and hydrogen is thirteen times lighter than air. Mr. Galton's whistles are fitted with a piston at their lower end, so that by varying the depth of the whistle the pitch of the note can be varied at will. With one having a bore of 0·04 inch in diameter, and set to a depth of 0.14 inch, the hydrogen blast gives 312,000 vibrations per second, a note far above the range of the human ear, but probably audible to many insects.

A New Ship-Canal.

Following closely upon the new Egyptian Canal, which we noticed a few months ago, the suggestion for a water-way across the Florida Peninsula comes before the public. A company has been already formed to connect the Atlantic with the Gulf of Mexico by means of a ship-canal having its eastern entrance at Jacksonville upon the St. John's River, and the western outlet in the classical Suwanee stream—"way down upon the Suwanee River."

One feature of this canal will be the absence of lock or dam throughout the entire length of sixty miles. The course of this new water-way is marked upon the accompanying map, and it will be at once perceived how great a saving in distance will be accomplished when the undertaking is completed. The navigation around the southern shores of the peninsula is extremely dangerous, and the course is so marked out by wrecks that the annual loss of vessels passing those terrible banks is estimated at 5,000,000 dollars (£1,000,000 sterling). If only on this account the canal will be a public benefit; the expenditure in its construction being estimated at only 20,000,000 dollars. But this is not all the saving. Putting aside the time and the distance (800 miles) saved by the canal, we have excellent authority for stating that the insurance charges will be thereby reduced 1 per cent.; the freight upon grain will be less by 15 to 20 per cent., and on cotton 1 to 2 dollars per bale. When, therefore, we consider that the immense amount of commerce now carried on round the peninsula will pass through it, and when we read that this amounts to three times



the quantity passing through the Suez Canal, we can estimate the enormous saving which this short channel will effect. We can only wonder that so useful a project has never before been considered and carried out.

Steel from Refuse Pyrites.

Experiments are now being made at the iron-works of Ferre-Noire, France, for utilising the residue of iron pyrites in making steel. The pyrites are made into bricks with hydraulic lime, and by simple exposure to the atmosphere an ore is obtained which yields very good steel. The lime eliminates the sulphur, and there is no phosphorus. The large banks of refuse pyrites owned by the company are likely to be utilised in this way.

An Electric Reading-Lamp.

Reading or writing by the light of an oil or gas-lamp is known to be injurious to the eyes, and Professor Pickering has traced the evil to the heat of the

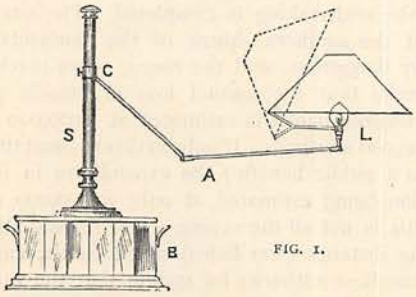


FIG. 1.

flame drying the humours of the eye. Unsteadiness of the flame is also taxing to the sight if the lamp is burning badly. For these reasons Mr. J. Munro recently designed the electric reading-lamp which we illustrate, and which was brought before the notice of the Athenæum Society during the present session. The electric incandescence light is absolutely steady and gives off very little heat, only about one-tenth part of a gas or oil-flame. It is moreover free from the blue rays of the "arc" electric lamp, which are believed to strain the eyesight. The lamp in question consists of a mahogany base, B, Fig. 1, with handles for lifting attached. This base contains the battery for supplying the electric current, and supports an upright tubular standard, S, which can turn round its vertical axis in a socket-joint. A light jointed arm, A, attached to a sliding clamp, C, carries a small incandescent lamp, L, which is shaded by a reflecting screen, as shown. The object of the screen is to keep the intense white-hot carbon filament from the line of sight, so as to prevent the eye from being dazzled by it. The screen is movable about the lamp, and the latter can be brought into any position with respect to the reader and his book, by simply bending the arm, or wheeling it round the vertical axis of the stem. The arm is also made to fold up and shut inside the tubular standard, S, by a vertical slot cut in its side. This position is shown in Fig. 2, which represents the device in use as an ordinary table-lamp. The battery, which is shown in section in Fig. 3, consists of seven hexagonal cells formed of carbon plates, C, each cell enclosing a porous pot, P, containing a rod of zinc, Z; and exciting solutions of the kind prepared by Mr. G. V. Holmes, and Dr. S. H. Emmens, are filled into the cells. Such a battery will keep a lamp giving a light of ten-candle power for six hours without failing. Fresh solution can easily be supplied to the battery by lifting off the cover. Each supply of liquids charges the battery afresh for another night's work. The advantage of the lamp for students and literary

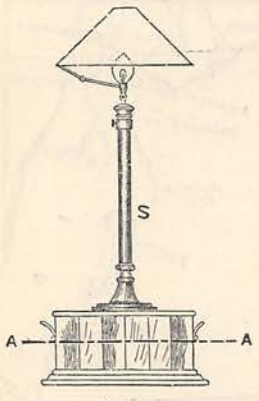


FIG. 2.

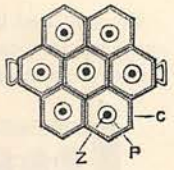


FIG. 3.

FIG. 4.—THE LAMP IN USE.

men, or persons with failing eyesight, lies in the purity, steadiness, and coolness of the light. The fact that it gives off no fumes of combustion to vitiate the air is also in its favour for night-workers. The lamp is made by the Duplex Electric Light, Power, and Storage Company, of Soho Square.

Flexible Self-gauging Faucet.

An improved form of faucet is represented in the accompanying woodcut, the chief advantages of which are said to be that it is not so liable as the ordinary form to leakage and wear, and at the same time it indicates at any moment the level of the liquid in the barrel. A tap or tube-shaped plug having been screwed into the barrel near the bottom end, a flexible tube,

about as long as the barrel is deep, is fastened on to its outer end. To the free extremity of this flexible

tube is secured a metal valve-seat, to which is attached a ball valve and cage. When the tube is in an upright position the valve is seated, but when it is lowered for the purpose of drawing liquid from the barrel, it falls back with the cage and so allows the contents to escape. Near the top of the barrel spring-clips are inserted to keep the tube vertical, and they are provided with a padlock to prevent theft. It will be seen that the action of this appliance is extremely simple.

Asbestos Rope.

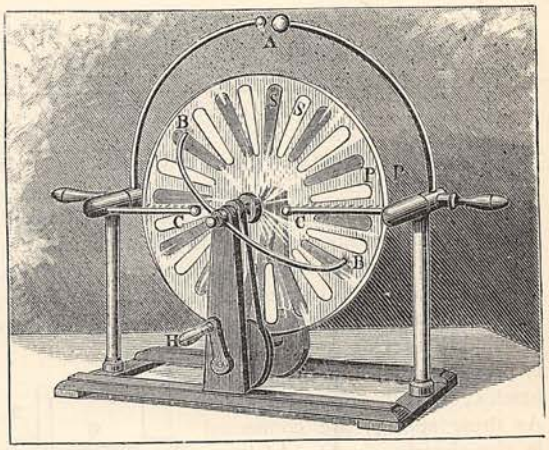
Asbestos rope for fire-escapes, theatres, and other purposes in which an inflammable rope would burn up and become useless, is now made by the United Asbestos Company. It is spun from fine Italian asbestos fibre, and is about one-fourth the strength of an ordinary rope of the same diameter. Rope 1½ inches thick has a breaking stress of a ton, and twenty feet of it weigh 13¾ lbs. The breaking strength of a rope $\frac{11}{16}$ inch in diameter is 4 cwt., and twenty feet of it weigh 3½ lbs.

Electric Flannel.

A new fabric, devised by Dr. Claudet, a French doctor, is said to be efficacious against rheumatism, and we mention the fact for what it may be worth. The material is, however, in itself interesting, and contains per 1,000 parts by weight of wool, 115 parts of oxides of tin, copper, zinc, and iron. Some of the woollen threads are saturated with these salts and woven into the rest of the web. The flannel is said to form a dry battery, or "pile," and according to the tests of M. Deincourt, professor of physics at the Rheims Lyceum, it liberates electricity in considerable quantity, especially when the skin is transpiring freely. While upon this subject we may mention that a new kind of electric conductor, called the "tissu conducteur," is now in use. It consists of bands of cloth in which metal wires of iron or copper, forming the conducting part, are woven into the rest of the fabric.

A New Electrical Machine.

An electrical machine of a new kind, giving very long sparks with little trouble, has been devised by Mr. Wimshurst. It is shown in the accompanying illustration. It consists of two circular plates, PP, of glass, 14½ inches in diameter, mounted on an ebonite spindle in such a way that on turning the handle, H, the two plates rotate in opposite directions. Both plates are well varnished, and set round on the opposite faces with slips or sectors of thin brass, SS, those on one plate alternating with those of the other. Two metal brushes, BB, connected by a curving brass rod, sweep over the sectors as the plates revolve, and connect the pair of sectors, which are at opposite ends of a diameter. Metal-toothed combs, CC, are attached to the prime conductors to collect the charge of electricity, as in the ordinary glass disc machine; and two sparking-balls (A) are attached to these conductors. The action of the machine is not clearly explained yet; but it is believed that the



friction of the air between the two plates, which are only ⅛ inch apart, has something to do with it. Such a machine can be made for seventeen or eighteen shillings, and it will yield a spark four or five inches long.

A Burglar-Alarm.

In these dynamitic days, when even the agents of the law may enter a person's house by stealth, an electric alarm to announce the fact is, perhaps, the only resource of the English citizen who likes to feel that his house is his castle. The burglar-alarm which we illustrate is a thoroughly reliable one, and has been in use under the writer's notice for a long time with every success. The arrangement consists of an electric system of wires, which includes a battery to supply the electricity, an indicator to tell the door or window opened to admit the burglar, a bell to sound the alarm, and

the "keys," or contact-makers, which complete the electric circuit to ring the bell and work the indicator. Fig. 1 represents this arrangement, where B is the bell, I the indicator, and K a key. There are usually a number of keys, one to each door and window which is likely to be opened, or to the treads of stairs, and so on. In ordinary when the door or window is closed the key does not make contact, and the electric circuit remains open; but when the door is opened

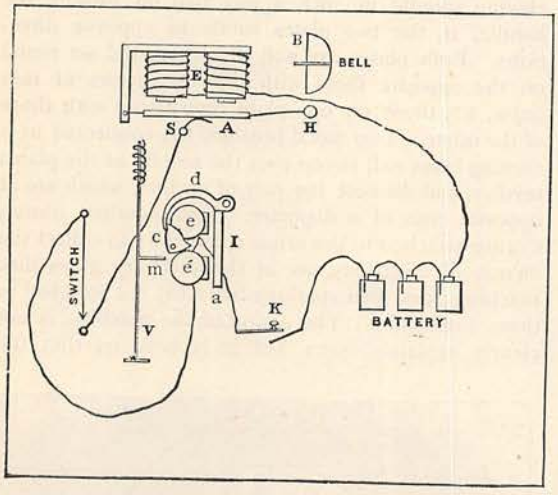


FIG. 1.

the key makes contact. Such a key is shown in Fig. 2, and consists of a metal frame, E, supporting a contact or press-button, P, with a spring, G, attached. The other end of this contact, C, is made conical, and touches two springs, S S, when the button is not pressed back. This device is inserted in the sash of a window, or the post of a door, in such a way that when the door or window is closed the button is pressed back, and the conical head, C, separates the springs, S S. As these springs are connected in the electric circuit, it follows that when they are not joined through the conical piece the circuit is open, and the current does not flow. But when the door is opened the press-button springs forward, contact is made between the springs, and the circuit is closed. The bell, therefore, rings, and the alarm is given. The bell is struck by the hammer, H (Fig. 1), which is attached to the armature, A, of the electro-magnet, E, which is traversed by the current. The spring, S, interrupts the circuit of the bell every time the armature moves towards the poles —that is to say, at every stroke of the bell—and thus a continuous ringing is kept up. A switch is inserted in circuit to throw the whole alarm out of gear by day time, when no precautions are needed. The particular key closed, or window entered, is shown by the indicator, I, in the following manner:—This indicator consists of a small electro-magnet, *e e'*, having a soft iron armature, *a*. This armature is attached to a

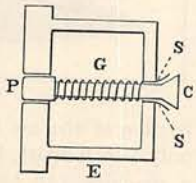


FIG. 2.

crank-shaped detent, *d*, which holds up a little cam-piece, *c*, as shown. When the armature is attracted to the poles of the electro-magnet, *e e'*, by the passage of the current through the coils of the latter, the detent, *d*, releases the cam-piece, *c*, which falls upon the arm, *m*; and as the cam-piece, *c*, carries on its axle a small indicating-needle which moves in front of the dial of the indicator, the movement of the cam-piece is shown by the deflection of this needle. Each needle signifies a particular window or door key. By pushing up the vertical rod, V, which carries the projecting arm, *m*, the cam-piece is re-set, and the needle brought to its normal position. Such an alarm can also be used as a fire-alarm, provided little thermostats, or keys, which close the circuit whenever there is an excessive rise of temperature in a room, be included in the circuit of the bell and indicator. The apparatus would also serve as a frost-alarm in a greenhouse; and it answers by day as an ordinary electric bell. In short, it is a very useful device, and would not cost more to fit up in a new house than the ordinary bells, while it gives assurance of safety, and is far more convenient than the ordinary old-fashioned bells.

A Thousand-Pound Prize.

A grand prize of one thousand pounds is offered by the Grocers' Company for the encouragement of original research in Sanitary Science. It is to be awarded once every four years, and is intended as a reward for original investigations which shall have resulted in important additions to sanitary knowledge. A subject for investigation will be proposed quadrennially, and a period of at least three and a half years will be allowed for investigation. This prize, known as the "Discovery Prize," will be open to universal competition, British and foreign; and the first award will be made in May, 1887. Every candidate must deliver, at the Hall of the Grocers' Company, a letter in which he declares himself to be a candidate for the prize, and stating the treatise on which he bases his candidature; and such treatise must be an original printed work, written in or translated into English. In addition to the Discovery Prize, the Grocers' Company offer three "Research Scholarships," each of the value of £250 per annum, tenable for a year, with eligibility for reappointment. These scholarships are intended as stipends for persons engaged in making exact researches into the causes of important diseases, and into the means by which the respective causes may be prevented or obviated. Candidates must be British subjects, and when competing for a first appointment must be under the age of thirty-five years. Each candidate must make an exact statement of the research which he proposes to undertake, and must declare that if appointed he will conform to the conditions under which the scholarships are held. All applications must be made to the Court of the Grocers' Company, London, who, in awarding the scholarships and prizes, propose to act with the advice of a committee of scientific men, including John Simon, C.B., F.R.S.; John Tyndall, F.R.S.; John Burdon Sanderson, M.D., F.R.S.; and George Buchanan, M.D., F.R.S.