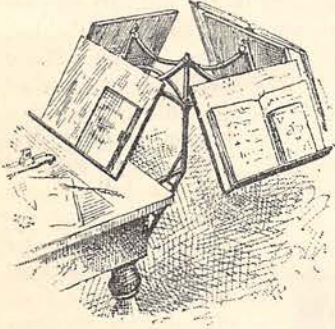


THE GATHERER.

A Useful Book-Rest.

Those who have frequently to make use of heavy works of reference, such as dictionaries or atlases, will find the handy American device which we illustrate of great service.



It consists, as the figure shows, of a bracket which can be attached to the corner of a table or reading-desk, and which supports a spindle on which turns a frame, at the ends of whose arms are shelves for holding books.

The advantage of

this reading-desk when several books have to be consulted at the same time, or compared with one another, is evident, especially as the number of shelves and the length of the arms carrying them are unlimited.

Ailsa Craig Fog-Siren.

Ailsa Craig, the rocky boss which rises out of the sea at the entrance to the Frith of Clyde, is very dangerous to mariners, especially in foggy weather, and the Commissioners of Northern Lights have recently erected a powerful air-siren with self-acting apparatus on the island. The machinery consists of five eight-horse-power Crossley gas-engines, which actuate two sets of double-cylinder air-pumps, compressing the air to a pressure of five pounds per square inch, and deliver it to receivers connected with the north and south signal sirens. The communications between the siren and holders are closed by valves, which are opened once every three minutes by the action of cams. The air thus delivered blows a blast on the fog-horns or sirens, which is different for the north and south horns.

Is there a Magnetic Sense?

Sir W. Thomson, the eminent physicist, recently delivered a lecture before the Midland Institute on the six gateways of knowledge, using the word "six" as a supposed improvement on the old phrase, "five gateways of knowledge." The sixth or additional gateway was the sense of heat as distinguished from the sense of touch; but in reality the sense of heat is probably only another function of the sense of touch, and there was no absolute need to add another to the conventional five senses. Sir William also suggested that there was probably a "magnetic sense," that is to say, he believed that some people might be found who could tell the presence of magnetism acting on their person. The idea is an old one; but it is not so well known that recent experiments have been made under

the auspices of the Physical Society on this very subject, and persons have been found who, when their heads were placed between the poles of a strong electro-magnet, could tell when the magnet was excited, by a peculiar unpleasant sensation in the head, all danger of collusion or guess-work being removed. A person suffering from neuralgia also felt the pain increase in the magnetic field. Whether this fact indicates a "magnetic sense," or merely a strain produced in the head on the ordinary sense of touch, is however a very doubtful point.

A Miniature Sun.

The passage through Hell Gate connecting Long Island Sound with the East River, at New York, is difficult and dangerous owing to whirlpools and rocks, and for the last fifteen years the work of blasting these rocks has been going on. The illumination of the Sound by night is now to be undertaken, and a gigantic iron lattice-tower or mast 250 feet high is to be erected, and fitted on the top with a powerful electric light, or miniature sun, which will not only light the whole passage, but miles of the approach on either side. The light will be shed downwards by reflectors.

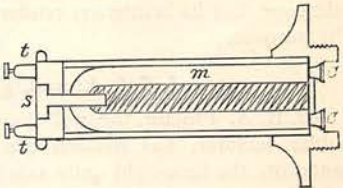
An Air-Filter.

It is of high importance to breathe pure air, especially during sleep or in sickness, and the air-filter or purifier of Mr. Maitland Tate, which can be readily applied to the ordinary chimney-board or other openings admitting fresh air from without, will be found of great value. It is kept in action by the heat of a lighted candle, lamp, or gas-jet, or by the heat of the fire in the room, and it provides a constant change of air.

The Telephonograph.

Mr. T. W. Giltay has succeeded in performing the curious experiment of recording a telephone message in the phonograph, as it was received, and reproducing the message by that instrument at a later time. Mr. Giltay used a skeleton telephone, such

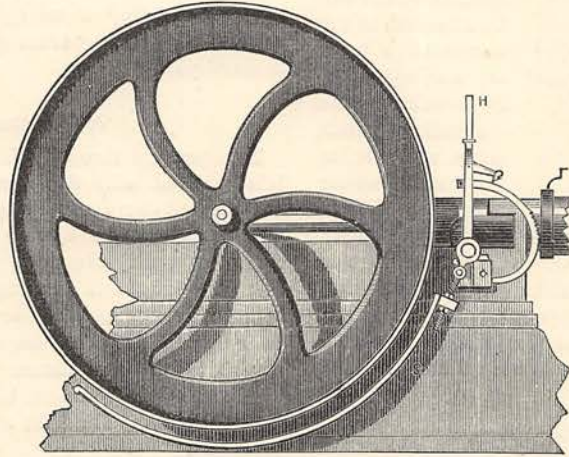
as is shown in our figure, where *m* is a horse-shoe magnet, having small coils of wire, *cc*, on its poles; these coils being connected to the terminals, *tt*, for connection in circuit with the telephone line. A regulating screw, *s*, was added to bring the coils very close to the metal diaphragm of a phonograph, and when the sonoric currents passed through them, the poles of the magnet attracted the iron diaphragm of the phonograph, more or less, thus setting it into vibrations corresponding to the original speech or sounds delivered to the tele-



phone transmitter at the other end of the line. The vibrations of the diaphragm were, of course, impressed on the yielding tin-foil of the phonograph by the stylus attached to the diaphragm, and the message thus printed could be reproduced afterwards.

A Finger-Power Brake.

A brake designed to bring all kinds of gas and steam-engine machinery to a standstill on short notice, in case of accidents in factories or workshops, has been devised by Mr. J. G. Rockhill. It is so constructed as to be adjustable to any required power, and its action is so simple that a boy can work it with ease. The handle, H (see the figure) is pressed, and the brake locks itself by means of a ratchet attached. The brake is also useful in case of bands or belts breaking. The principle is obvious from the illustration, the wheel being stopped by the friction-strap, S, which is brought to bear against its rim.



A FINGER-POWER BRAKE.

Invisible Wire.

Platinum wire has been drawn out so fine by Mr. H. F. Read, of Brooklyn, New York, that the unaided eye cannot perceive it, though the touch detects it if it be laid on a smooth card. A small No. 18 gauge platinum wire was enclosed in a close-fitting tube of silver, made by folding silver-foil $\frac{1}{10}$ inch thick closely over it. This was then drawn out, and a short length cut off, which was also drawn out, then cut, and the drawing repeated. The last result of this process was treated with dilute acid to remove the silver. The invisible wire was intended for the cross-wires of a telescope, but its brittleness rendered it quite unfit for the purpose.

A Safe Lime-Light.

Mr. R. A. Proctor, the well-known astronomer and public lecturer, has devised the following plan of rendering the lime-light quite safe from explosion with or without care. In the ordinary unsafe arrangement the reservoirs containing the oxygen and hydrogen gases under pressure have a jet in common, from which the mingled gases issue to play upon the cylinder of lime, and produce the brilliant white flame. The improvement consists in having the jet made double, so that each gas issues separately, and there is no danger of one gas diffusing into the other, and thereby producing an explosion on being ignited.

Artistic Alarms.

Now that electricity is in a fair way of coming into our homes, an attempt has been made to produce an artistic electric bell, which deserves some praise; for, as a rule, no attention has hitherto been paid to this aspect of electric household appliances, if we except the pretty designs for electric illumination. In the "Owl" bell, the clapper has a crescent shape, and hits the bell when actuated by the ordinary electromagnetic arrangement which is concealed behind.

It works with a No. 2 Leclanché cell, and all the fittings are of a tasteful description. These are supplied with the bell in such a form that any novice can fit it up for himself. A mechanical watchman in the form of a *dragon vigilante* has also been brought out in France. The opening of a door or window in its vicinity actuates a clockwork, which rings an alarm-bell and wakes the house. The principle of the apparatus is similar to the bell

above described, but a bronze dragon takes the place of the owl.

An Electrified Lounge.

Not very long ago it was discovered in a New York sitting-room that a lounge was electrified, and several ladies experienced a smart shock on making use of it. Investigation showed that the belts of a small motor near the lounge generated frictional electricity by rubbing on their pulley, and this communicated itself to the couch.

Effects of Pressure on Life.

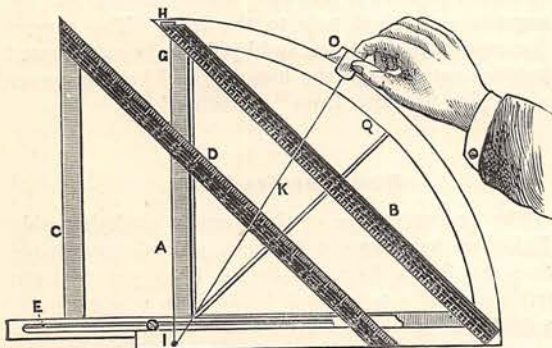
M. Regnard, a French physiologist, has made some very interesting experiments on the effects on life of a high water-pressure. The experiments were carried out by means of a water-press of MM. Cailletet and Ducretet, giving a pressure of 1,000 atmospheres, that is to say, such a pressure as would exist at a point 10,000 metres below the surface of the sea. Yeast subjected to this pressure for an hour fell into a state of sleep or latent life, and on being withdrawn from the press it was only after an hour that active life returned and the yeast operated as a ferment. Vegetable algæ, and seeds of the garden cress, also fell into sleep and only recovered slowly. The same may be said of leeches at a pressure of 600 atmospheres, molluscs, and infusoria. The leeches, indeed, only awoke some hours afterwards. Fishes deprived of their swimming bladders were submitted to a pressure of 100 atmospheres with impunity; at 200

atmospheres they fell into the same sleepy state, but quickly recovered; at 300 atmospheres they died; at 400 they became rigid, and remained so even when putrefaction set in. This rigidity was accompanied by increase of weight, as was proved by fixing and weighing the limbs of frogs.

The Percentograph.

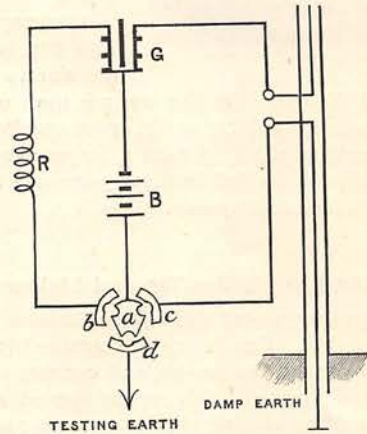
Our engraving represents a device for reducing common fractions to decimals, and is particularly designed for use by railway and other traffic companies, to determine the percentages and proportions in dividing rates, revenues, or expenses on the basis of mileage; but its general usefulness is extensive.

A stationary triangle, A, has a percentage scale, B, arranged along its hypotenuse or longest side; a similar triangle, C, is fitted to slide in the fixed triangle, and is likewise furnished with a scale, D, along its hypotenuse, which represents the series of numbers whose percentages are to be obtained. The numbers in the scales B and D increase from the right upward to the left, the former extending from 0 to 100, and the latter from 0 to 1,000, or from 0 to any number higher than 1,000, according to the value given to the graduations. Thus if each graduation is made to count 2 instead of 1, the scale D would indicate 2,000 as the highest number. In the illustration the scale D is marked off to indicate both 1,000 and 2,000 at the end, two sets of numbers being used, one double the other, to mark the graduations. When the scale D is moved against the scale B, the graduations will exactly register with each other, and the percentage number will correspond with the numbers whose percentage of 1,000 or 2,000 they represent. The base of the movable triangle is provided with a slot, E, and a set-screw, by means of which it may be adjusted and held in any position. The vertical side of the stationary triangle is provided with a cord, G, which serves as



a marker on the scale D. This cord is connected to set-screws, H I, and is arranged at right angles to the base of the instrument. A second cord, K, is attached to a collar loosely mounted on the pin I, and its other end is attached by a set-screw, O, to a slide which moves on a segmental bar, Q, the circle of which is drawn from the pin I. This cord is used

to mark the percentages on the scale B, and also to mark the numbers on both scales. Suppose we wish to ascertain the relative proportion of railway lines in interest aggregating say 1,400 miles: move the scale D until 1,400 intersects cord G on its upper edge, then tighten the set-screw. The cord K is then moved till it intersects the number of miles forming a part of the 1,400, when the relative proportion will be shown on the stationary scale B. Thus if cord K be moved till it cuts 490 miles, the scale B will indicate 35 per cent.



A Lightning-Rod Tester.

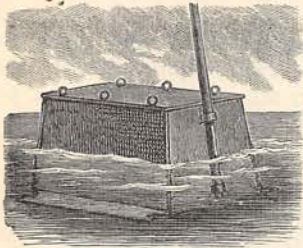
Mr. Samuel Vyle has devised the following plan for testing lightning-rods, which is a very necessary precaution. Inside the rod run wires to the top and bottom, the latter carrying the testing current through the "earth" connection, which is the part most liable to fail. The testing apparatus consists of a galvanometer, G (see figure); a battery, B; a resistance coil, R; and a "switch," a, b, c, d, consisting of four brass pieces. This apparatus is seen to be in good order by inserting a brass plug between a and b, then between a and c; and the lightning-rod itself is tested by inserting plugs between a and b, and a and c; the earth connection being tested by inserting them between a and b, and a and d. While upon this subject, we may mention a recent proposal to connect the telegraph-posts on a line of railway with the rails by means of a lightning-wire. The idea is to discharge the atmosphere by this means, and thereby prevent lightning-strokes.

A Station Indicator.

The names of stations are now indicated inside the cars on the New York elevated railways, by an ingenious pneumatic contrivance which enables the driver to display the name of the coming station, and ring a warning bell, by means of a small lever on his engine. The lever admits air from the reservoir of a Westinghouse brake to pipes connected with the indicators, and the names are in this way changed at will.

A Trunk Life-Buoy.

The trunk shown in the engraving can be used to save lives at sea. It is made of light wood or cork, and covered with waterproofing.



The sides slope upwards from the bottom, which is therefore heaviest in the water, and a wing or keel of cork is fitted along the bottom edges to further increase the stability of the buoy. A staff with flag is fitted at the side to act as a

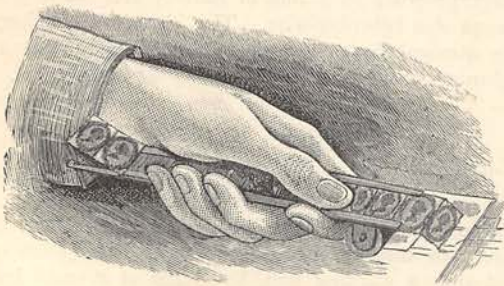
signal of distress. On the top are rows of eyes to sling a rope for holding on by, or for coupling two or more trunks together to form a larger buoy or raft. The interior is divided into compartments for useful articles, in the ordinary way.

An Electric Gas-Tap and Lighter.

An ingenious gas-tap and lighter has been imported from America. The device is contained in a small brass bulb below the gas-jet, and consists of a valve in the feed-pipe, which is rapidly opened or closed by means of an electric current actuating an electromagnet. At the same time as the valve is opened, an electric spark passes and ignites the gas. All this is done by pressing down a finger-key, which may be let into the wall. On letting the key spring up the valve closes, the gas is cut off, and the light is extinguished. This device is the most complete of its kind yet brought out, and does not require that the gas should be separately turned on by hand before the spark lights it.

A New Mode of Stamping Letters.

Business men who have to send out large numbers of letters or packets by one mail, have hitherto often had resort to pads of blotting-paper, or roller stamp moisteners, but a great improvement on these methods has recently been introduced, which will obviate much inconvenience and loss of time. We illustrate the new



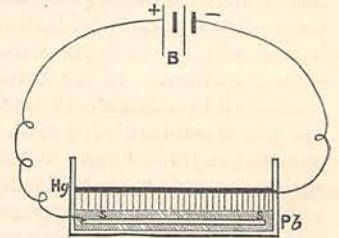
invention, and from the figure it will be seen to consist of a strip of metal whose edges are bent to form guides for a row of stamps. Near one end of this strip is a

slit, through which the surface of a flannel-covered cylinder projects. This cylinder is perforated slightly, and as it contains water the flannel surface is kept constantly moist. The cylinder is so arranged that it can readily be detached and re-filled with water when necessary. The method of using this machine is very simple. The row of stamps, being introduced to the metal strip, is pushed along by the thumb over the roller, which thus moistens each stamp as it passes, and the stamp need then only be pressed on to the letter or packet. The position of the roller below the stamp prevents the over-damping which is so objectionable a feature of many of the old stamp moisteners. Another and larger variety of this machine is also made, which will be useful for the application of gummed labels, &c.

Hydrogen Amalgam.

It is well known that mercury is used as an amalgam in extracting gold from its ores; the gold amalgamating with the mercury, which is afterwards driven off by heating, so as to leave the gold pure. Mercury used in this way is apt to "sicken," as it is termed, and lose its power of abstracting the gold.

To get over this drawback a new "hydrogen" amalgam has been introduced by Mr. Bernard C. Molloy, M.P. His arrangement for amalgamating is shown in



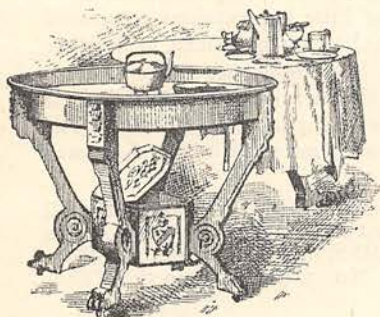
the figure, where s s is a layer of sand, saturated with a dilute acid or alkaline solution, having a lead plate, Pb, embedded in it. A porous diaphragm or plate separates a layer of mercury, Hg, from the sand. A voltaic battery, B, is connected through this arrangement, the positive or zinc pole to the mercury, and the negative or carbon pole to the lead. The current decomposes the solution, and hydrogen being liberated bubbles out through the mercury, and has the power of keeping the latter from "sickening."

New Deep-Sea Fishes.

The recent voyage of the French surveying ship *Talisman* has brought to light several remarkable deep-sea fishes, living in depths from 300 to 1,500 fathoms (over a mile deep). The *Macrurus globiceps*, a deep-sea "ganoid," has a tadpole appearance, and is plated with small bony armour about the head; the *Rustomius obscurus* resembles an eel, but has a long tactile organ or filament under the lower jaw, which gleams with phosphorescent light. These deep-sea fishes are frequently provided with eyes at different parts of their bodies—for example, along the sides and back—as well as in the head; and such eyes also produce light, acting the part of bull's-eye lanterns.

A Novel Table.

A piece of furniture which combines in itself table, cooking-stove, and pantry is a decided novelty, and one which is likely to be useful to many people, especially to men of business who find it necessary—as many do—to make their tea or other light meals in their offices. The arrangement of this remarkable



article will be understood from a reference to our illustration. The frame-work of the table is made rather deeper than usual, and is provided with a bottom, between which and the top of the table is a considerable space. The centre of this space is occupied by the stove, which may be had to burn either gas or oil. Round the lamp may be stored the various articles of table-ware. The top of the table is pivoted so that when moved it forms an independent table, supported by the main frame and a leg which is attached directly to it, and which closes up flush with one of the other legs when the top is covering the frame. Between the legs of the table is a box which serves to keep bread and other provisions in.

The Hand as a Telephone.

M. Dunand, a Frenchman, found that a "condenser," that is an apparatus made by separating two or more sheets of tin-foil by an insulating material such as paraffined paper, would receive telephone currents and give out speech, especially if the condenser were charged by another source of electricity before the telephone currents entered it. Reflecting that two living persons standing a little apart made a condenser—the bodies being, as it were, the tin-foil, the air the insulator, Mr. J. W. Giltay, of Delft, has succeeded in getting the person, and particularly the hand, to act as a telephone receiver. His arrangement was an Ader microphone forming the transmitter of the sounds, and two men for the receiver. The Ader microphone has an induction coil used in connection with it, the primary wire of the coil being in circuit with the carbons of the microphone and a battery. Mr. Giltay used three Bunsen cells for the latter. The secondary wire of the coil was in circuit with a battery of nine Leclanché cells, which charged up the two men, whom we will call A and B. Now, when music and speech were sent into the Ader microphone or transmitter, they were heard by B when A put his gloved hand over B's ear. The glove was a common

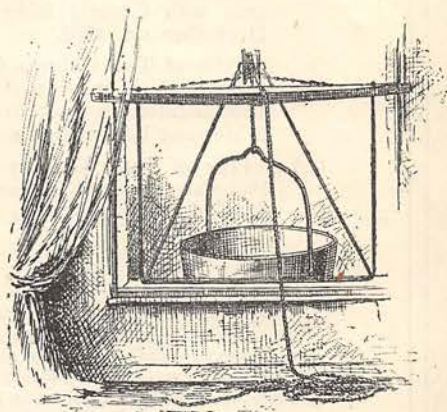
kid one. Singing and whistling came best; but Mr. Giltay thinks that speech, which came imperfectly, would be received very well with an induction coil of greater power. It is probable that had the two persons simply "laid their heads together," they would have mutually heard the words and songs—that is, provided their hair was dry and non-conducting.

A Marine Station.

The new marine station at Granton, Edinburgh, will be fitted with a floating laboratory having an abundance of sea-water at its service; a steamer fitted with modern dredging and sounding appliances, and biological apparatus; and a fine library of the latest works on marine life and philosophy. The staff has been appointed; and British and foreign naturalists are invited to make use of the station.

A New Fire-Escape.

During the past few years, many domestic fire-escapes have been invented, but for several reasons—cost, danger, cumbersomeness, amongst others—numbers of them have not long survived their intro-



duction. Recently a new window fire-escape has come into the field, it being the invention of a London merchant, Mr. Thomas Hale. The escape itself consists of a large bucket, made of strong sail-cloth, with a wooden bottom, and it is spacious enough to hold two adults or three or four children. The supporting apparatus comprises two upright iron rods, which rest upon the outside of the window-sill, and which are kept in position by a parallel bar placed against the inside of the window-frame. The rope to which the bucket is fastened runs through a pulley attached to the rods. The bucket can be let down from either inside or outside the window, and a person may let himself down in it unaided, and without danger. The escape can be carried and placed in position by one person, and it can be fixed ready for use in less than a minute. When not in use the entire apparatus can be folded up so as to occupy a very small space.