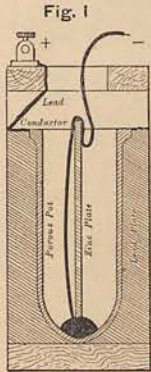


THE GATHERER: AN ILLUSTRATED RECORD OF INVENTION AND DISCOVERY.

Correspondents are requested, when applying to the Editor for the names and addresses of the persons from whom further particulars respecting the articles in the GATHERER may be obtained, to forward a stamped and addressed envelope for reply, and in the case of inventors submitting specimens for notice, to prepay the carriage. The Editor cannot in any case guarantee absolute certainty of information, nor can he pledge himself to notice every article submitted.

Electric Light in Omnibuses.



The London Road Car Company have been making trials of the electric incandescent light to replace oil lamps in their vehicles. The small incandescent lamp used is fed by the current from a voltaic battery under the seats, or in any other convenient position. The battery used is known commercially as the "Eclipse," and consists of four cells, each cell containing a plate of zinc in dilute sulphuric acid, and a plate of carbon in a solution of nitrate of soda. A porous clay diaphragm separates these liquids from one another, the diaphragm taking the form of a pot holding the carbon and solution of nitrate of soda. The external vessel is of vulcanite, and the whole battery weighs very little. While upon this subject, we may refer to a new accumulator which has been brought out by M. Phillip Bailly, a French engineer. Its construction will be understood from Fig. 1, which represents a section through the accumulator. The negative consists of a plate of zinc amalgam in a porous pot, which has in its conical bottom a quantity of mercury to keep up the amalgamation of the zinc. A copper wire coated with gutta-percha passes down to the mercury, and serves as the negative (—) electrode to the zinc plate as shown. A lead plate is wrapped round the porous pot, and forms the peroxidised plate of the battery. It consists of sheet lead cut into a fringe as shown in Fig. 2. Smaller filaments of lead wool are woven round the strips of the fringe. These



lead plates are "formed" into peroxide of lead by the action of the electric current. A conductor of lead goes from this lead plate to the terminal which is the positive (+) pole of the cell. The containing vessel is of celluloid, a material now used for lining the interior of battery boxes. The cell is of course filled up with dilute sulphuric acid. The lead being in the form of "wool" is said to give a larger supply of electricity, weight for weight, than more solid lead plates in accumulators. We may add that the "lithanode" or solid peroxide of lead mentioned in a recent GATHERER, as applied to accumulators, has also been used for primary batteries. Two cakes of lithanode, placed one on each side of a carbon plate, form the depolarising plate of the cell; zinc being the oxidising plate opposed to them.

A Gigantic Lathe.

An enormous lathe has been made for the use of the French navy department. It is stated to be a machine-shop in itself, and capable of mortising, shaping, boring, and moulding large masses of steel for armour-plating, shafts, and so on. It weighs 340 tons, and is worked by an engine of 25 horse-power.

Paper from Tobacco Waste.

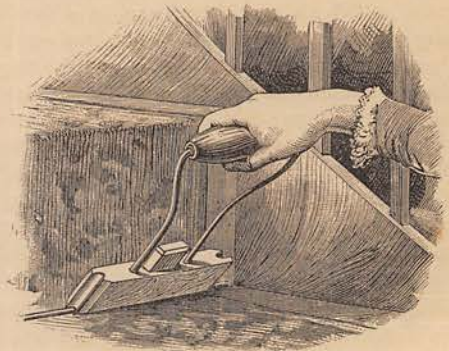
The waste cuttings and stems of tobacco are now used in manufacturing paper pulp. They are much cheaper than waste linen rags; and the paper made from them is said to be as good as that from the rags

An Electric Rock Drill.

A New York inventor has devised a rock drill actuated by electricity. The drill is fixed in a frame and operated by the rotation of a dynamo-electric motor fed with current by means of insulated wires. These wires of course bring the current from the generating machine, which can be fixed in any convenient place. Whether the new drill will prove as satisfactory as the compressed-air drills now in use remains to be seen. If, however, it cannot supply air to the working like the pneumatic drill, it will not vitiate the air already there.

Transparent Lacquer.

Colourless lacquer has been introduced from America and applied to metals to preserve them from oxidation without affecting their lustre. Gold and silver articles have been treated with it as well as the common metals.



A Metal Rod Cleaner.

A handy appliance for cleaning metal rails, such as stair-rods, in their places, is shown in our figure. The cleaner is a grooved piece of wood lined with chamois

leather, and fitted with a convenient handle as shown. The lined groove is the cleaner, and a friction powder is supplied to it as required. The contrivance is about 6 inches deep by 4 inches wide.

A Lightning Observatory.

With a view to study the phenomena of thunderstorms, observatories are being erected on the Schneekoppe in Upper Silesia. Each station is provided with two lightning-rods fixed on the top of iron masts 53 feet high. The masts are well insulated from the earth: each rising from a strong timber frame standing on glass insulators, which are placed in lead vessels filled with sulphuric acid. Contact with earth can, however, be made by switches if desired. The lightning-rods are to be fitted with platinum, gold, and carbon points, in order to test the respective merits of these materials. We may also mention that recent statistics of lightning-strokes in Schleswig-Holstein, Baden, and Hesse show that oak trees are most frequently struck, and beech-trees least frequently. The geological nature of the soil, and especially its capacity for water, seems to have an important influence on lightning. The marshy lands of Schleswig-Holstein are the most dangerous; and the east coast, with inlets of the sea, the least dangerous. In Hesse the low plain of the Rhine is the most dangerous. Where houses accumulate there appears to be less danger. As regards soil: if lime be taken as 1, the relative dangers on other soils are—sand, 9; loam, 22. Soft-roofed houses are oftener fired than hard-roofed ones, and windmills or towers than hard-roofed buildings. These results are of course only to be taken generally. We may add that during the severe thunderstorm in London on August 17th last a curious flash of lightning was seen, which threw out fire-balls as it traversed the sky.

Sugar-Making by Diffusion.

In America a system of extracting sugar from cane by diffusion has been worked out. Instead of crushing the sugar-cane between rollers in the ordinary way, the cane is cut up and water is forced through the chips in confined cells, thus extracting the sweet juices, which are afterwards evaporated. The system is to be practically tried on the plantation of Governor Warmouth in Louisiana. It is expected to allow of the maximum quantity of sugar being extracted from the cane.

A New Heat-Measurer.

A new apparatus for measuring delicate changes of temperature was recently exhibited by Mr. C. V. Boys. The Radiomicrometer, as it is called, consists of a thermo-electric junction of wire forming one side of a parallelogram or single circuit of copper wire, suspended in a magnetic field, so that when a current of electricity traverses the wire, the parallelogram will turn across the lines of magnetism of the field. The wire carries a mirror which reflects a beam of light on a scale, after the manner of the well-known electrical instrument, the reflecting galvanometer. When a ray

of heat falls on the thermo-electric junction, a current is set up in the wire parallelogram, which thereupon turns, and the mirror turning with it, deflects the beam of light up the scale. The degrees of deflection are a measure of the temperature. Mr. Boys has one of these instruments, which shows the heat cast on a penny by a candle-flame at a distance of 1,168 feet; and he estimates that one can be made which will indicate a change of temperature at the thermo-electric junction of $\frac{1}{100,000,000}$ of a degree of heat.

The Bathymeter.

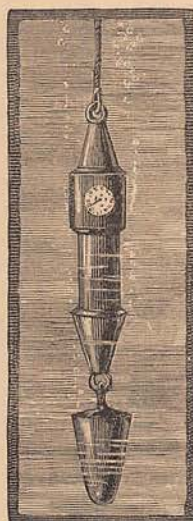


FIG. 1.

The accompanying figures illustrate the apparatus, which is chiefly serviceable for taking flying soundings, that is to say, soundings while the ship is going ahead at good speed. Fig. 1 represents an outside view, and Fig. 2 a vertical section. The sounding-line is made of phosphor-bronze wire, fastened to the eye *a*, and a sinker is attached at the other end to the eye *b*. Small holes, *c c*, are provided in the outer casing, and through these the water passes to the interior and presses on a hollow corrugated tube, *d*, hermetically sealed. On the top of this tube is a catch, *e*, acting on a lever, *f*, which works the pointer, *g*, on the dial. When the apparatus is lowered into the water, the pressures due to the water as it sinks down are registered on the dial in fathoms, and the readings require no calculation. A spring catch retains the pointer in place until the apparatus is taken out of the water. After the reading is taken the pointer is released and the sounder is ready for another cast.

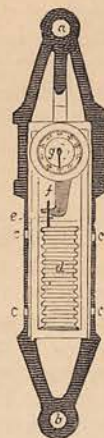


FIG. 2.

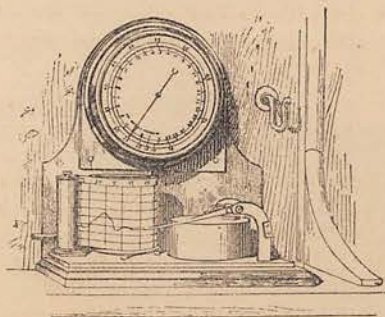
Vegetable Leather.

A process for making a substitute for leather from gutta-percha and sulphur has been brought out in France. Raw cotton and oxide of antimony are well mixed with these ingredients, and the whole vulcanised by steam. The artificial leather is said to be useful for making the soles and heels of shoes.

Antipyrin and Pain.

In a recent communication to the French Academy of Sciences, M. Germain Lée recommends the removal of pain by hypodermic injections of antipyrin.

The injection is, it appears, followed by a disagreeable feeling of tension lasting a few seconds ; but when it passes, the pain, whatever its cause, is said to abate at once. Antipyrin does not produce vertigo or somnolence, and to its sedative action is added a curative one which morphia does not possess. It is recommended for many ailments, including acute rheumatism and lumbago.



A Recording Anemometer.

The Gordon Recording Anemometer, which we illustrate, is a useful instrument in navigation. It not only indicates on a dial but records on a chart the force or pressure of wind currents. It registers the length of time between each blast, and enables the officer to see whether a storm is increasing or abating. In short, it gives a record of the wind experienced by a ship throughout her voyage. The record is made, as will be seen, by a marking stylus on a drum of revolving paper.

A Light-Ray Telemeter.

It has been pointed out by M. Genglaire that the electric light can be utilised for finding the distance of an object at sea or elsewhere. Suppose the electric arc lamps with reflectors to be placed one at the stem, the other at the stern of the ship, and their beams caused to meet on the distant object ; the length of the base-line between the lamps, and the angles the beams make with it, will give the distance by simple trigonometry. If the two rays be of equal length, the angles at the base are equal, and their sum taken from 180° gives the angle at the apex. A table could be calculated giving the distance for every probable value of this angle.

We may refer to a recent report that the plants and exotics used at entertainments by the Czar in his Winter Palace, St. Petersburg, were suffering from the electric arc lamps employed to illuminate the salons of the palace. It turns out, on investigation, that the damage to the plants is rather to be attributed to the sudden removal of the plants from the hot forcing-houses into the cold winter air without sufficient protection, than to any blighting influence of the electric light. It will also be interesting to entomologists that the electric lights in the city of Ottawa, Canada, have led to the taking of several rare insects, attracted by the brilliant radiance. One objection to the electric light in houses and private offices is the necessity of having a steam-engine or gas-engine to

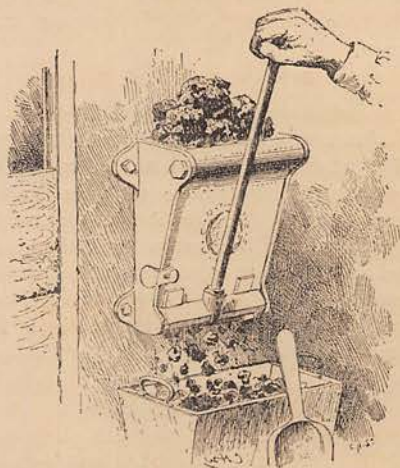
drive the dynamo. This objection has been met in Paris by the formation of a company to supply compressed air for the purpose in question. A central station has been provided, with engines of 3,000 horsepower to compress the air, and mains are being laid down in the streets to distribute the compressed air to the theatres permitted by the Government to substitute electric light for gas. It is expected that compressed-air engines and electric lamps will diminish the risk of fire in such places. The offices of a Parisian paper are also to be lighted by this means.

Cutting Flowers.

In cutting flowers for transmission by rail or post, it is common to choose blooms either quite or nearly developed. Hence they arrive in a spoiled condition and do not last long. A recent writer points out that cut buds of a considerable number of hardy plants will open in the most perfect manner if placed with their stems in water. Daffodils, lilies, the iris, gladiolus, peony, and many other flowers, can be cut in the bud, and sent to a distance, where they will open if treated in this manner. This fact would seem to be not generally known.

A Coke-Breaker.

Our illustration shows a domestic device for crushing or breaking coke. The coke is supplied to the machine in lump, and the handle is worked up and down. The down-stroke breaks the coke and the up-stroke liberates the broken pieces, which fall in a heap below. It is stated that with this contrivance a lad can break a hundredweight of coke in twenty minutes. The breaker is 14 inches long by 11 inches



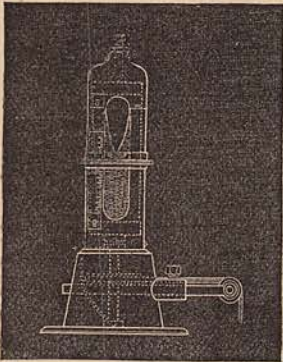
wide : the handle being 24 inches long. It consists of a cast-iron hopper or receptacle which is fastened to the wall. The front of the hopper is movable by means of the handle, and crushes the coke by its pressure backwards. At the bottom is an open slit permitting the pieces to fall out. Other things besides coke can of course be broken by it for household or other purposes.

Japan Clover.

A clover of Japan, the *Lespedeza striata*, is coming into use in the Southern States of America. It is said to be relished by all kinds of stock, and is grown largely in orchards, where it displaces weeds and some wild grasses. It also grows on waste lands where other forage plants would thrive but poorly.

A Vacuum Speed-Indicator.

An ingenious apparatus for telling the speed of engines is here illustrated. It consists of a cylindrical



glass tube, sealed at the top, and partly filled with a transparent fluid unaffected by ordinary cold. At the lower end this is mounted on a spindle carrying a wheel, which is driven by a gut band from the engine. The tube being rapidly rotated in this way, the liquid rises up its sides to a height according to the speed; and a

scale shows the speed of the engine-revolutions. Any speed between 200 and 1,000 revolutions a minute can be read off. The apparatus was adopted as a standard for trying industrial machines at Newcastle. We may add that a "Motograph," or engine tell-tale, has recently been brought out, which enables a captain of a vessel to know whether his orders to the engineer are in force, by showing him at once whether the engines are going ahead or astern.

A Night Sight for Guns.

A device has been adopted at the Elswick works of Sir W. Armstrong and Co., which enables guns to be armed in all degrees of dusk or darkness. It is said to be even better for sighting than daylight, and not to fatigue the eye. The device consists in focussing the rays from electric lamps in two minute points of light which are easily adjusted. This is effected by means of two small spherical lenses. As most war-ships now have the electric light, the device is readily applied there.

A New Steel Gate.

A new kind of folding steel gate and shutter has been introduced into England from America. The gate folds into a narrow compass and leaves the gangway clear. For the doors of hoists or strong rooms and for cases of fire the device is likely to be useful, especially as a very young person can shut and lock it. It is constructed of vertical channel steels in pairs, channel to channel, with proper framing and stiffeners. The gate or shutter does not obstruct the air or light, and the latter can be applied to bed-room windows as a security against burglars.

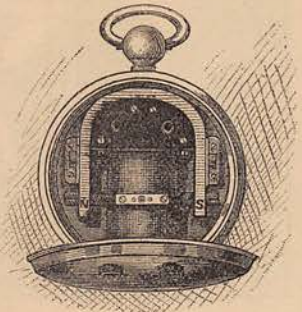
A Bicycle Ambulance.

It has been proposed to utilise bicycles as ambulances, by removing the trailing wheels from two machines, and connecting them at that point by a pole fixed to the curved bar which carried the trailing wheels. This keeps the two remaining wheels apart, and unites them into one vehicle. A hammock is then slung from the seats of the bicycles by means of proper cross-pieces with hooks; a bamboo is also fastened longitudinally above the seats; and straps are employed to make all secure.

A Pocket Voltmeter.

The figure shows a pocket voltmeter for measuring in volts, the electro-motive force, or, as it is often

called, the "potential difference" of an electric circuit. It is in size and shape like a watch; the figure showing half of the actual size. The interior is simply an Ayrton and Perry Magnetic Voltmeter, and the reading is given in volts by a pointer or hand traversing the dial-face which is on the front of the instrument. In the back case two holes admit the testing wires, which are connected to the electric circuit at the points whose potential difference is to be determined. The ends of the wires are caught in springs until the measurement is made. The apparatus weighs six ounces, and measures up to forty volts.



Bottles for Drains.

A church at North Greenfield in Wisconsin has been drained by means of empty champagne wine bottles. The necks and ends were broken off and the bottles run into each other, neck to bottom, so as to make a channel or pipe, which has satisfactorily carried off the surplus water.

Silver in Volcanic Ash.

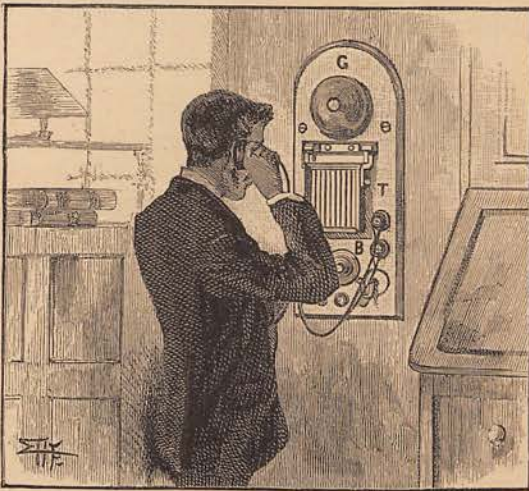
Professor Mallet has analysed the ash from the volcano of Cotopaxi which fell over the surrounding country on July 23, 1885, and found it to contain 1 part of silver in 83,600 parts of mineral dross. This is said to be the first discovery of silver in volcanic dust.

A Flat Lens.

A magnifying lens, which is flat on both sides, has been made at Jena, of a new optical glass introduced by Professor Abbe. The density of the disc varies in such a manner, that the refractive power is changed in the same way as by the curvature of an ordinary lens.

The Swinton Telephone.

The illustration shows a telephone board with microphone transmitter, and two receivers, brought out recently. As usual, on lifting the receivers from their hooks the connections are made for speaking. The call-bell push, B, is seen just over the receivers as they hang. The bell-gong, necessary for responding to the other stations, is shown at G, over all; and



beneath it is the microphone transmitter, T. The receivers are a form of bell telephone known technically as the "English Mechanic" receiver; and the microphone is a series of carbon pencils. The microphone is supported from the back board by india-rubber rods. It will be seen that there is no particular novelty in the appliance; but its appearance is neat.

Flashing Oils by Electricity.

The "flashing" point of a petroleum oil is, as is well known, the temperature at which it gives off inflammable gas. This has recently been determined by heating up the oil, and causing a series of electric sparks from an induction coil to pass between two metal points near the surface of the oil. The temperature at which the sparks fire the gas is observed on a thermometer.

Writing by Telegraph.

Mr. Elisha Gray, the well-known American inventor, has, it is stated, invented an auto-telegraph or telantograph whereby a person can write a message himself and have a fac-simile of it produced at the distant place. Several apparatus have been devised for this purpose before, including the telegraphic pen of Mr. E. A. Cowper. But Mr. Gray's apparatus appears to have some improvements. It is not necessary to use ink in writing the message; a pencil or a sharp point suffices, the pressure of the point serving to transmit the copy of the writing. Mr. Gray's invention is a secret yet as regards the means, but

if it answers to expectations it will have a certain sphere of usefulness. We may add here that M. Garel, a French inventor, has brought out a plan for multiple writing by electricity. It may be remembered that Mr. Edison's electric pen for this purpose, namely, producing copies of a writing by means of a stencil, worked by piercing a sheet of paper as it was moved over the surface in the act of writing. The "stencil" thus produced was laid over another sheet of paper, and ink pressed through the holes, thus printing a copy of the writing. M. Garel's plan is to place the paper on a carbon tablet or desk, and write with a carbon pencil. Both pencil and tablet are in the circuit of an induction coil delivering electric sparks which pass through the paper and perforate it, like the needle-point of Edison's pen. The stencil thus obtained is used in the ordinary way for getting copies.

A Safeguard against Insects.

It is stated by the *Lancet* that weak carbolic acid sponged on the skin and hair, or on the clothing, is a protection against the bites of gnats and other insects. The safest plan, according to the writer in question, is to keep a saturated solution of the acid. The solution cannot contain more than six or seven per cent., and it may be added to water until the latter smells strongly. This may be readily and safely applied with a sponge. Horses and cattle could, perhaps, be protected in the same way.

Crystallising by Pressure.

A French *savant* has recently made a number of experiments on the effects of pressure in crystallising liquids. Different liquids were solidified by subjecting them to great pressure in metal cylinders—for example, chloride of carbon and benzene. By means of thick glasses let into the sides of the containing vessel, he was able to send a beam of light through the liquid and watch it during its solidification. He found that the liquid became obscure during solidification, and transparent again after the crystals were formed. These formed from the circumference towards the centre. Benzene gave ferny-looking crystals. When the pressure was removed the crystals re-dissolved and the liquid became as it had been before the pressure was applied. We may add that another French physicist, M. Decharme, has made a number of experiments by which he is able to produce branching crystallisations by means of electrolysis. Some of these are very delicate and beautiful fern or moss-like structures, reminding one of hoar-frost on a window-pane. For instance, if a solution of nitrate of silver be spread on a pane of glass, and electrodes of platinum connected to a voltaic battery of several cells be dipped into the solution, an arborisation will be found to proceed from the negative pole, in the form of a moss or coral of pure silver. The electrodes may be varied in shape, either points or plates being used, with a difference in the figure produced.