

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.

A Double Safety-Lamp.

There has recently been devised a double safety-lamp for miners, which we illustrate in Figs. 1 and 2. The idea is to duplicate each part of the lamp, so

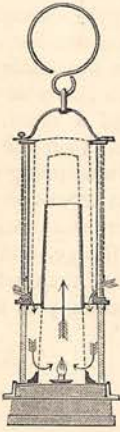


FIG. 1.

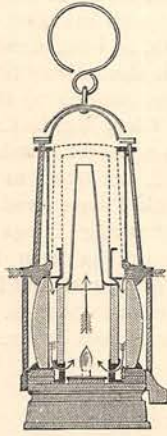


FIG. 2.

that if by injury any one part is broken, the lamp still retains its serviceable and safe character in an inflammable atmosphere. It will be seen that Fig. 1 represents the inner lamp, and Fig. 2 the outer or duplicate lantern. The arrows show the in-draught and out-draught of the air supplying the flame.

A Toothless Saw.

In the Central Hudson workshops at Greenbush, New York State, there is a Bessemer steel circular saw without teeth, which cuts a steel rail in two in about two minutes. The disc is 38 inches in diameter and $\frac{3}{8}$ inch thick at the edges. It is revolved at a very high speed by an engine of 90 horse-power, and is kept cool by water dropping on it. Nevertheless a ring of flame surrounds it while in action. Such a saw will divide 3,000 rails before it is worn out. Steel rails after several years' use become battered at the ends, and the object of the saw is to cut off these ends and render the rest of the rail good for use in branch and switch lines.

An Electric Submarine Boat.

A submarine boat, propelled by electricity, has recently been tried at Liverpool. It is cigar-shaped, the length being thirty-seven feet, and the breadth six feet at the middle, both ends tapering. A conning tower is mounted on the top of the boat, and her depth of immersion is regulated by external inclined planes controlled from within. There is a rudder placed aft, and also a self-acting arrangement for keeping the

boat horizontal. The electric power to drive the screw is stored in fifty accumulators, and serves to drive the vessel for—it is said—ten hours, at a speed of about nine miles per hour. These cells also maintain glow-lamps to light the interior and work a pump, to empty the water-ballast tanks used in submerging the boat. The crew consists of two men, and compressed air is provided for their inspiration.

The Photoscopic Compass.

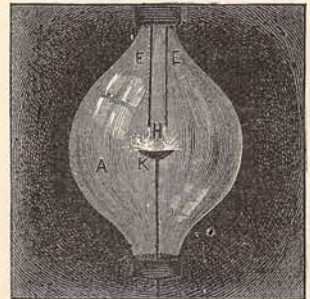
Amongst the exhibits at the Liverpool Exhibition is a "photoscopic compass" for mariners, which can be placed on the roof of the wheel-house out of harm's way; but which can be read by the man at the helm in the wheel-house by means of mirrors placed at suitable angles to reflect the compass-face for him to see it.

Poison from Mincing Machines.

Mr. Chodwick-Brown has drawn attention in a medical contemporary to the use of lead in the construction of certain mincing machines, whereby lead-poisoning may be produced. He was induced to make the inquiry by observing the blue line on the gums which is a characteristic of lead-poisoning, and he remarks that obscure forms of dyspepsia may be caused by the lead in these machines acting on the moist acidulous food in them. The substitution of wood or some harmless metal ought, in his opinion, to be made for lead in these machines.

Diamond Steel.

In the course of some recent lectures on "Impurities in Metals," which were delivered at the Royal Institution by Professor W.C. Roberts-Austen, the chemist to the Mint, he performed the curious experiment of turning malleable iron into steel by means of diamond dust, in such a manner that all present could see the process going on. He took a glass vessel, A in the figure, into which descended two terminal wires, E E, from a voltaic battery. These were connected together by a loop of fine malleable iron wire, H. A small pan, K, supported below the iron loop, held a little diamond dust. The loop H was then rendered white-hot, or incandescent, by the passage of an electric current through it, just as the carbon filament of an elec-



tric lamp is heated, and then brought into contact with the carbon dust. It was at once fused into globules of steel where the contact was made between the iron and the powder.

An Echo Fog-Signal.

The echo fog-signal of Mr. Della Torre has been tested at Fort Carroll by the United States Navy Department. It consists of a single-barrel breech-loading rifle, provided with a large funnel or speaking-trumpet on the muzzle, a box of cartridges, and a tripod. The first experiment was made from a tug at a distance of half a mile from the fort. On discharging the rifle a distinct echo was heard from the fort by those on board the tug. When a boat intervened between the tug and the fort two echoes were heard, one after the other. The sound was reflected back from both boat and fort. A passing steamer about a mile away also gave an echo. The plan is expected to be useful in foggy weather for ascertaining if ships or icebergs are near. The experiments were favourably reported on.

Lubricated Signal Wires.

An American railway company now uses signal wires running in tubes filled with petroleum oil. Some of the wires are 1,100 feet long, and are easily operated. The pipes are laid on stakes driven into the ground 8 feet apart, and are $\frac{3}{4}$ inch in diameter inside; whilst the wire is $\frac{3}{16}$ inch in diameter. The pipes run parallel to the railway, and follow the curves as well as the straight parts of the line.

Illuminating a Pond.

In the new *Cirque Nautique* of Paris, the ring where equestrian and other ordinary circus entertainments are performed during the earlier part of the evening, is submerged by means of machinery, the floor being lowered and its place occupied by water. This water is illuminated in the middle by a powerful electric arc light under the surface, and the swimming performers appear like fishes in a luminous sea, or better still, like mermen and mermaids.

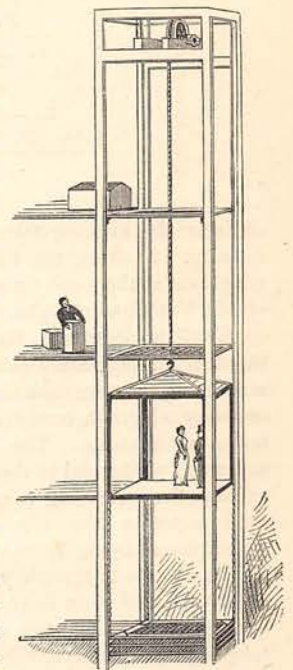
A Colour Photometer.

Captain Abney, R.E., and General Festing, R.E., have devised an ingenious combination of the electric arc light and the spectroscope, for testing the luminosity of different colours, and the perception by the eye of different colours. It is thus adapted for examining persons to see if they are colour-blind. The ray of white light, after being decomposed by passage through a series of prisms, gives the component red, green, or blue rays on a screen in sharp defined blocks or sections, which can readily be compared, or on which the powers of the eye for distinguishing colours can be tested. While upon this subject we may mention a new photometer of a simple character which has been constructed by a well-known firm of Dublin instrument makers. It consists of two quadratical prisms

of paraffin wax fixed together along one side, but with a layer of silver or tin foil between. When a ray of light from a lamp falls on one of these prisms, the latter appears luminous by the reflection of the ray from the foil; and by allowing the ray of another lamp to fall on the other prism, the distance of the lights from their respective prisms can be so adjusted that both of these shall appear equally luminous to the eye. When this is so the relative intensities of the two lights are, of course, inversely proportional to the squares of the distances of the lamps from the prisms.

A Safe Hoist.

A plan for making the wells or openings of hoists safe is shown in our engraving, and can be applied to any hoist. It is simply to close the well at every stage with a light frame of strong lattice-work. The frames have a hole in the middle to allow the hoist-rope to pass, and they are removed and replaced by the cage as it rises and sinks. In rising the cage carries the frames with it on the top of the cage, and deposits them in their old places as it descends; while similar frames are hung from the bottom of the cage, as shown, and in like manner are left near each landing as the cage rises, and are stacked at the bottom of the well as it descends. There is thus always a platform at or near each aperture, and if a person steps into the hoist-well, he either steps on the frames in their places, or, if the cage is above him, he can only fall a few feet, until he is caught by the frames suspended below the cage.



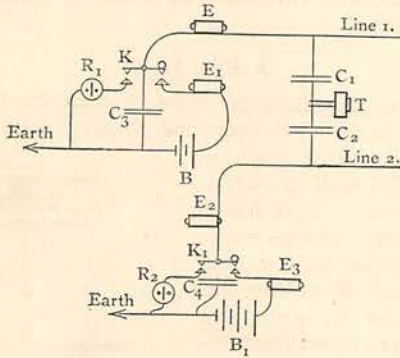
Dermatine.

"Dermatine" is the name given to a new artificial product intended as a substitute for gutta-percha, india-rubber, and leather. It can be made of any thickness and as pliable as required. It is said to be suitable for the "packing" of machinery, for railway buffers, rings, tubes, for boot-soles, and for insulating electric wires. It is prepared from copal gum, preferably the kauri or manilla gum. The gum in powder is dissolved in turpentine or naphtha in a jacketed pan fitted with stirrers. For india-rubber, sulphur is added, and albuminous matter prepared from lichen or other vegetable products. The whole is boiled and masticated, and more albuminous matter added. Slaked

lime or French chalk may also be added, and a proportion of old rubber. The process, in fact, admits of considerable variation, according to the properties of the particular kind of dermatine required.

Inter-urban Telephony.

In Belgium all the leading towns are connected by trunk telephone lines; and Brussels can speak to Antwerp, Bruges, or Ghent. This has been done by



utilising the existing telegraph lines throughout the country. In short, the telegraph lines serve for the telephone at the same time. By an ingenious system of Mr. Van Ryssleberghe, first indicated, however, by an English electrician, the late Cromwell F. Varley, the delicate undulatory currents of the telephone are sent along the telegraph line at the same time as the ordinary telegraph currents traverse it, without interfering with these. The two kinds of current are separated at the end of the line, and while one kind excites the receiving telephone to speak, the other kind actuates the receiving telegraph instrument. The accompanying figure shows the arrangement used. There are two telegraph wires, line 1 and line 2 respectively, and there is an ordinary telegraph on both, working separately, while at the same time there is a telephone T, connected between them and used independently of the telegraphs. For this purpose the lines are insulated from each other by "condensers" C_1 and C_2 , which, while allowing the telephone T between them to act, stop the telegraph currents from crossing over from one line to the other. The telegraph apparatus at the ends of each line consist of the usual batteries B and B_1 , the signalling keys K and K_1 to interrupt the current, and condensers shown at C_3 , C_4 . The instruments marked R_1 and R_2 are the receiving instruments which receive messages from the other ends of lines 1 and 2. The arrows marked "earth" are the wires going to the ground connection usual in telegraph lines. The devices marked E, E_1 , E_2 , E_3 , are electromagnets essentially so made as to permit the signal currents from the key to pass through them into the line and have their "sharp ends," so to speak, taken off. In other words, these coils cause the signal currents to rise and fall gradually instead of suddenly, and hence the signal currents do not affect the telephone T, and make a clicking in it.

Condensing Milk in Vacuo.

At the Liverpool Exhibition there is a machine for condensing milk in a vacuum, a plan preferable to boiling it at atmospheric pressure, as the flavour is unimpaired. The apparatus consists of a large globular pan from which the air is exhausted by an air-pump. The milk then rises into it from a reservoir below and is boiled there, together with the sugar which is added to condensed milk.

A New Tennis Pole.

An iron tennis pole has been introduced, and is shown in the accompanying Fig. 1. The foot of the pole, which enters the ground by teeth, is allowed to remain there, and the pole itself is simply screwed into the socket when wanted for play. The cord of the net is passed over the pulley shown, and with one turn round the pin, is firmly fixed. The bottom cord is also fixed in the same way. A tennis screen is also shown in Fig. 2, and it is attached to the iron pole, or a separate one, as may be preferred.

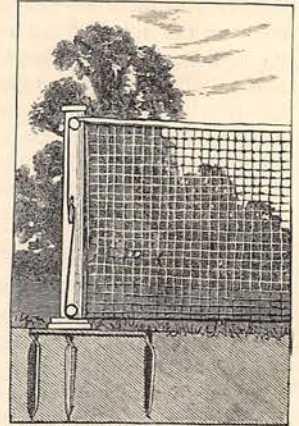
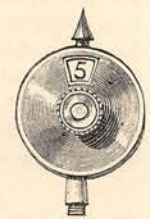


FIG. 1.

A handle permits the numbers to be changed by a simple action, which we need not describe.

The Perspectograph.

This is an ingenious instrument for drawing perspectives mechanically, and as such may be useful to engineers, architects, and draughtsmen in general, particularly as it makes no construction lines on the paper, but produces the clean outlines ready for inking and colouring. We need not enter into the details of the apparatus, which are purely geometrical; but we may note that it executes perspectives of round and elliptical buildings as well as square ones, and requires no special knowledge of perspective drawing in the user.

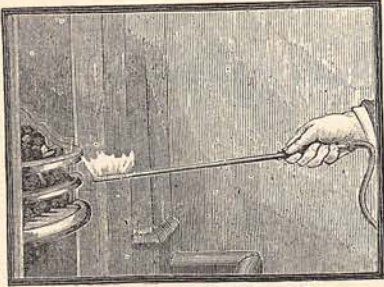


NEW TENNIS POLE.
FIG. 2.

The Luminosity of Leaves.

Dr. Gorham has discovered that the light reflected from green leaves consists chiefly of red and green rays, and by ascertaining the proportions of these colours reflected from leaves, and taking a revolving ring with the like proportions of colour on it, he has been able to mix these colours as it were in the eye and reproduce the tint of the leaves. He found during the inquiry, however, that the simple colours did not exactly reproduce the colour of the leaf required, but

that a certain admixture of black was necessary to this end. Black, it may be remarked, is well known to exist in the cellular structure of leaves in the form of carbon. It is deposited there, as is believed, from the absorption of carbonic acid gas from the atmosphere by the *stomata* or mouths on the under side of the leaf.



A Gas Poker.

The gas poker, as shown in the engraving, is a contrivance in the form of a poker, which when lighted at the end gives a flame of burning gas sufficient to kindle a fire when inserted into it, or to boil a kettle of water when placed in an ordinary grate without other fuel. For this purpose the handle end is connected to a gas-burner in the room by a piece of flexible india-rubber piping, and the other extremity, which is perforated with holes to permit the escape of the gas, is lit by a match or other means. Other uses for the appliance will suggest themselves to readers; but it is obvious that great caution in its use is necessary.

The Phonophore.

The "phonophore" is a name given to a new and simple device, whereby telegraph wires can be used for the ordinary telegraphic messages, and at the same time for telephonic messages. It may be regarded as either a condenser made of wires, or as an induction coil used as a condenser—that is to say, with one end of both the primary and secondary circuits free, or, in other words, insulated. The device consists simply of two pieces of insulated wire twisted round each other, and then wound on a bobbin. We are not yet told exactly how the inventor uses the apparatus; but it is clear that it operates by induction between one of the insulated wires and the other. The fine undulatory vocal currents of telephony are superposed on the ordinary strong currents, and separated from them by the device so as to be heard in the receiving telephone. The inventor has recently tried the apparatus with success on lines in Kent.

Diatomite in Skye.

A discovery of some importance to the Isle of Skye and its crofters has recently been made. This is the existence of "diatomite" in large quantities at Loch Quire, Loch Columkill, Glen Linsdale, and Sartel. Diatomite is so named from the diatoms entering into its composition, and it is used chiefly for absorbing

nitro-glycerine in the manufacture of dynamite, or as a non-conducting coating for boilers and steam-pipes, but it is also used in the manufacture of silicate and ultramarine paint. It is also peculiarly adapted for making the silicious glaze of pottery, and it is applied to other purposes. As the quantity in Skye is estimated at from 72,000 to 150,000 tons, there is a likelihood of profit coming to the island. The diatomite found in the bed of Loch Quire is overlaid by vegetable matter. The loch appears to have been a volcanic vent or blow-hole, which has been filled up with diatomite by the stream which flows through it.

A Use for Fire-Damp.

It is proposed to drill holes down from the surface into the workings of "fiery mines" to allow the fire-damp which accumulates in them to escape, much in the same way as gas is allowed to escape from the natural gas wells of Pennsylvania. The damp would then be collected in reservoirs and used as gaseous fuel, while the pits would be freed from danger of explosion.

Purifying by Lignite.

Mr. Kleeman of Schoeningen has, it is stated, discovered a new method of purifying beetroot-juice by lignite, which when powdered and mixed with the juice of beetroot or sugar-cane clarifies it. It is said to purify other turbid liquids in the same manner, and to remove the disagreeable odour they may have. A deposit is formed which leaves the liquid clear. Beet-sugars produced in this way have, it is said, an agreeable taste, and the syrups lose the flavour of beetroot.

A Reversible Lock.

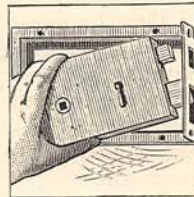


FIG. 1.

A lock has been devised for the rims or edges of doors, which can be reversed to suit doors having to open outwards or inwards, to the right or to the left—that is to say, in four ways. This convenience has re-

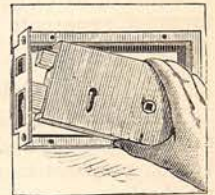


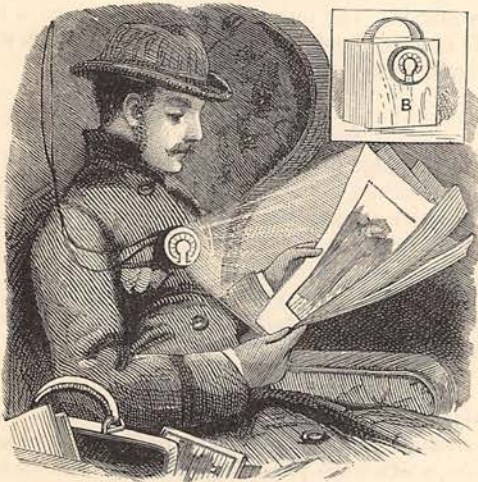
FIG. 2.

commended it to the Government and for Colonial uses. The figures give an idea of the arrangement of the new lock, the reversible part being fitted into a frame, from which it can be taken out and turned in the way desired, as shown.

Damascening by Electricity.

Damascened metal, such for example as is seen in sword-blades, is usually the work of the hand. The metal is first cut into the device required, and the foreign metal is then filled into the chased pattern. By a recent process this can be done electrically. To explain the method followed, we will take the case of a copper plate which has to be damascened with silver.

The plate is first coated with an insulating varnish, and the device to be damascened into it is executed on the surface; the varnish being scraped away where the lines of the device come, as in engraving on glass. The plate is then immersed along with another plain copper plate, both face to face, in a solution of sulphate of copper. The engraved plate is connected to the positive pole of a battery, and the plain plate to



RAILWAY READING LAMP.—FIG. 1.

the negative pole; and the passage of the electric current between the plates causes copper to be etched out of the exposed lines of the varnished plate and deposited on the plain plate. Thus the lines of the device are bitten into the copper by a kind of electrical engraving. The bitten plate is then taken out of the bath, washed, and dried; and the foreign metal to be inlaid in the bitten lines is deposited there by one of the ordinary electrotyping processes. Silver being the substance chosen, a silver electrotyping bath serves the purpose. When the deposition is complete, the varnish is removed, and the plate polished and trimmed so as to resemble hand-damascening. The invention appears to be due to a Frenchman.

Colour Standards.

There is an imperishable enamel made at the Vatican factory for mosaic purposes; and Mr. F. Galton, F.R.S., proposes to use it for a colour standard by which the tints of the skin and hair, or other physiological colours, can be registered. A scale of durable colours would be obtainable by its means. The French standards of colour, issued some years ago by M. Broca, already show a tendency to fade, which it is expected the Vatican mosaics will be free from.

Maize-Meal Food.

Mamaliga is a dish eaten by the poor in Roumania, and as it is very cheap and nutritious it is recommended for home use. It is prepared by stirring Indian meal in boiling water until it becomes a thick batter. It is eaten hot, either by itself, or with onion,

dried fish, thick sour milk, or a slice of goat's cheese. Mamaliga is also eaten by rich Roumanians, but it is made from sifted meal, and has fresh butter added. A lady writer suggests that it might be introduced to English tables occasionally instead of soup.

An Electric Railway Reading-Lamp.

A very neat portable hand electric lamp has been introduced, for use in mines, gunpowder works, and other inflammable places, besides being adapted for use as a railway or carriage reading-lamp. Fig. 1 shows the lamp as now made, where the incandescent filament may be seen placed in the focus of a highly-polished parabolic reflector attached to the front of the box, B, which is of varnished teak, and has a flat, flexible leather handle on the top to carry the apparatus by. The box contains three or four accumulator cells, which, when fully charged by a primary battery or a dynamo, are sufficient to give a continuous light for ten hours. The size of the box is 6 by 5 by 4 inches, and the weight of the whole is only 6 lbs. Larger sizes than this are made for special purposes, but the size in question is used for railway reading. For this purpose the lamp is also separated from the box and cells by a length of flexible cord conductors, so that the box can be put under the seat of the carriage, or in the hat-racks, while the lamp is held in the hand, or fixed to the button-hole of the coat. Mr. Pitkin's lamp is one of the smallest and neatest of the kind yet devised. We may add that Mr. Warren de la Rue has modified his well-known chloride of silver battery for the purpose of keeping small incandescence lamps alight. To this end he has done away with the liquid solution of chloride of ammonium, and turned it into a solid or semi-solid substance, besides modifying the shape of the cells. Fig. 2 is a section through the new form,

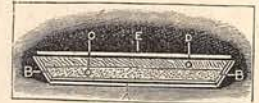


FIG. 2.

where A is a flat porcelain tray with slanting edges, B a sheet of silver foil laid in the bottom of this tray, C a layer of dry powdered chloride of silver, D a layer of vegetable jelly made by mixing a solution of chloride of ammonium, containing 2½ per cent. of the salt, with Ceylon moss or "agar-agar." This jelly is stiff enough to support a flat zinc plate, E, which with the silver foil forms the poles of the cell. A set of these cells, built one above another into a pile, form the battery used to keep the incandescent lamps going. Mr. J. W. Swan has also adapted his accumulators to the purpose of feeding a small Swan lamp, for use as a miner's lamp.

PRIZE COMPETITIONS.

Intending Competitors in Competition No. 4 (Ladies Dress Allowance) are reminded that August 3rd, 1886, is the latest date for receiving MSS. Full particulars of this and other Competitions, open to all readers of the Magazine, will be found in our June Number.