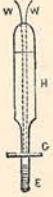


## THE GATHERER.

### An Electric Match.

A simple little candle-lighter has been devised by Mr. J. E. H. Gordon. As shown in the woodcut, it consists of an ebonite handle, H, through which run two silk-covered copper wires, W W. The handle is fitted with a flat ebonite disc or guard, G, to protect the hand from the heat of the fire or burner, E. This consists of a rod of fireclay surrounded by a spiral of platinum wire connected in circuit with the wires W W, and when traversed by the current from an electric incandescence lamp it glows red-hot, and will light a lamp or candle.



### A Submarine Balloon.

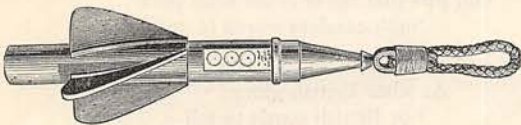
At the forthcoming International Exhibition of Naples will be exhibited in action a submarine observatory or balloon, which will sink people to the bottom of the Mediterranean shore waters, where they can enjoy the natural aquaria there to be seen. It is a balloon of steel with three compartments—one for the actuating mechanism and floating bladder, one for the captain, and one for the passengers to the number of eight. There are glass windows for looking out at the fishes, shells, and weeds; and the height of the balloon in the water is regulated at will by means of the collapsible bladder. A telephone connects the balloon, which is "captive" and cannot float away, with the shore or a boat above.

### A New Glass.

M. Sidot, a tutor at the Lycée Charlemagne, has discovered a glass without flint or silicate in it. The new material is a phosphate of lime fused at a very high temperature, and, owing to its freedom from flint, it cannot be damaged by any acid, the corrosive hydrofluoric acid which eats ordinary glass having no effect on it. M. Sidot's glass will therefore be specially useful in chemical experiments.

### An Aluminium Log.

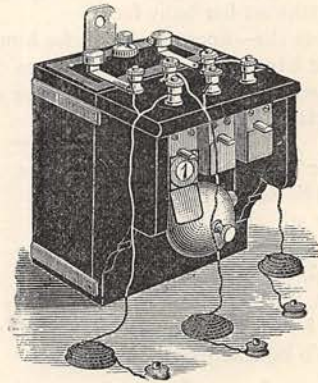
Aluminium alloys are now coming to the front as a substitute for brass. The alloys found most suitable are those of Mr. Webster, which are of a white or yellow colour as desired, and are adapted for guns, ships' propellers, stove-grates, fire-irons, musical instru-



ments, bells, gongs, and many other purposes both useful and ornamental. The figure illustrates a ship's log of aluminium, which does not corrode in the least in sea-water, and has no galvanic action. Wire ropes, sounding machines, and even telegraph wires are made of these alloys.

### New Tracing-Paper.

A new tracing-parchment has been lately introduced into Germany. It is good drawing-paper for pen or pencil, and allows lines to be erased with the knife or india-rubber. It is moreover exceedingly tough, while being suitable for making tracings. To produce blue copies of a drawing made on it, the following instructions are given:—Take ammonia-citrate of iron, 2 lbs. 5½ oz. avoird.; red prussiate of potash, 1 lb. 9 oz. avoird.; dissolve separately in water, then mix and make the whole up to one gallon, and preserve from the light. Ordinary paper on which the copy is to be produced is brushed over with this solution and kept in a dark room till required. To make a copy the tracing is put into the copying frame with its face to the glass, and a sheet of the prepared paper under it. The light of day is then allowed to pass through the tracing until the paper below becomes olive-green. The latter is then washed in cold rain-water in a dark room, and the blue lines appear.



A Combined Battery and Bell.

A combined electric bell and battery to work it is shown in the illustration. There are three separate circuits and press-buttons for connecting in three separate rooms, and indicators are attached to show the room from which the bell has been rung. Of course more circuits and indicators can be added if desired. The battery is enclosed in an ebonite box and sealed as it requires no attendance. The whole arrangement is very compact, neat, and handy.

### Algin.

Mr. Stanford, a Scotch chemist, finds that sea-weed, when steeped for twenty-four hours in water containing a little carbonate of soda, yields a glutinous mass, which can be filtered clear after heating the mass. This is "algin," which when dry resembles gum tragacanth, and it differs from albumen in not coagulating when heated, and from gelose in not gelatinising when cooled. Mr. Stanford thinks that in algin the paper-maker will find a new substitute for rags, and that it

can be used to stiffen cloth instead of starch. Being nitrogenous it can be used for mixing with cattle food, and it has been applied as a lining to steam-boilers in the form of a non-conducting carbon cement. Over 20,000 square feet of it have already been applied to boilers and piping. In its insoluble form algin resembles horn, as a substitute for which it can be used when pressed into moulds.

#### A New Pen-knife.

Knives with a variety of tools in them have generally been voted troublesome and unhandy; but the pretty knife with tortoiseshell or mother-of-pearl handle introduced to our notice is evidently an exception to the rule. It is designed for the use of the student, the botanist, tourist, and others; and contains within itself a magnifying-glass, a pair of scissors, a corkscrew, a file and nail-trimmer, a pair of nickel tweezers, a tortoiseshell tooth-pick, and two blades—one a dagger-blade of large size, and a small pen-blade. The microscope is a new attachment to a pen-knife, but in these days of amateur science a very useful one. It only remains to add that the price is moderate, and the instrument can go into the waistcoat pocket.

#### Artificial Limbs.

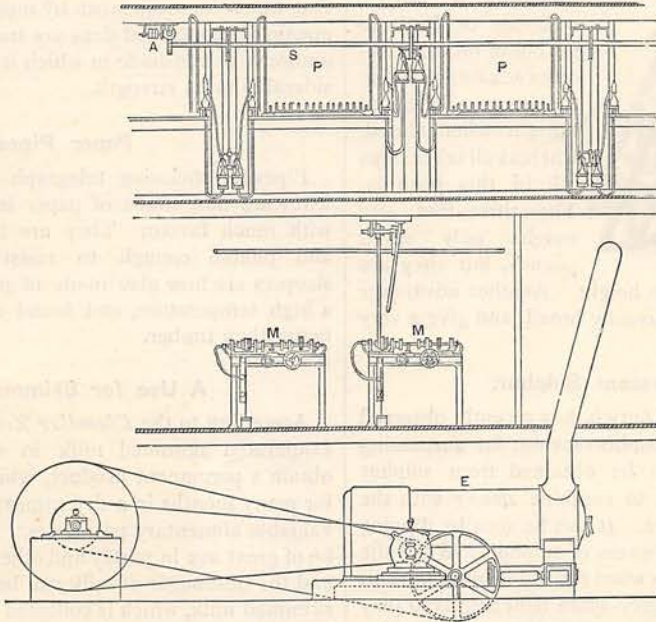
At the Amsterdam International Exhibition a series of artificial arms and legs, of an efficient and inexpensive kind, are now attracting considerable interest. They are the invention of Count de Beaufort, and consist of an ingenious combination of leathern sides, cords, india-rubber springs, and wooden fingers or toes. The movements of the muscles are very well imitated by these arrangements, which offer a valuable substitute for the real limbs. The price for an arm is only 25s., and that for a leg 45s.—a veritable boon to poor folk.

#### An Electric Light Factory.

A model electric light factory, in which the bulk of the work is done by automatic means, has been established by Messrs. Wright and Mackie. The manufacture of electric lamps is carried on here with a minimum of manual labour, the bulbs being

blown by machinery, and the mercury-pumps for exhausting them being worked by mechanism. The woodcut shows the general arrangement of the factory, where E is the steam-engine on the basement, supplying power to the whole factory; M M are two glass-blowing machines, such as we described in a recent number of the GATHERER; and P P are mercury-pumps for exhausting the lamps. The incandescence lamp consists, as is well known, of a vacuum bulb of glass with a carbon loop inside, and the light is produced by sending a current of electricity through the loop. These bulbs are blown

by boys in the machines described, and a handy lad will turn out far more and better bulbs in the same time with these machines than the most skilful glass-blower working by hand in the old way. The machines are really glass lathes, and a piece of tubing put into the mandrils is rapidly rotated in a blowpipe flame, while air is let into it to swell it out into a bulb as it softens. The carbon filaments are prepared by carbonising the bass-broom fibre in a plumbago crucible,



AN ELECTRIC LIGHT FACTORY.

and mounting them in a loop shape on platinum wires let through the glass of the bulb. When all this is done, the bulbs are finally exhausted of air by the modified Sprengel air-pumps shown at P. These pumps are worked by a shaft, S, turned at A by belting from the power shaft, which is driven by the engine E. The saving of hand-labour is so great by this arrangement that incandescence lamps can now be manufactured at a fraction of their cost by the older methods.

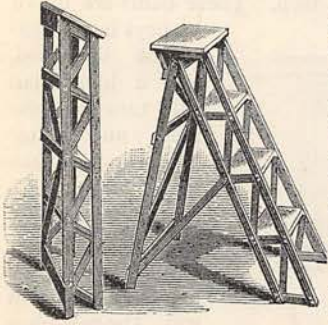
#### Artificial Gutta-percha.

A German chemist, Herr Maximilian Zingler, has patented a new process for making a substitute for gutta-percha. About 50 kilogrammes of powdered copal, and 7½ to 15 kilogrammes of sublimed sulphur, are mixed with double the quantity of oil of turpentine, or 55 litres of petroleum, and heated to 150° C. in a boiler with stirring apparatus. The mass is then allowed to cool to 38° and mixed with 3 kilogrammes of casein in weak ammonia-water, to which a little alcohol and wood-spirit has been added. The mass is then heated to the former temperature until it is a thin fluid. It is then boiled with a 15 to 25 per cent.

solution of nutgalls or catechu, to which about half a kilogramme of ammonia has been added. After being boiled for several hours the mass is cooled, washed in cold water, kneaded in hot water, rolled out, and dried. The new product is said to be much cheaper than real gutta-percha, to resemble it exactly, and to wear equally well.

#### Lattice Steps.

A light, strong step-ladder has been designed by Mr. Hatherley, and is shown in the accompanying woodcut. Every part is made of wood, and there are no hinges, webbing, or cords to get out of order. Another advantage is that the steps will stand upright when closed, whereas all other steps fall in this position. The three-foot size weighs only seven pounds, but they are made up to eight feet in height. Another advantage is that the treads are unusually broad, and give a very good footing.



#### Phosphorescent Sulphur.

Herr K. Heumann, of Zurich, has recently observed that a very brilliant phosphorescence, far surpassing that of phosphorus, can be obtained from sulphur when it is heated so as to combine *slowly* with the oxygen of the atmosphere. It can be seen by dipping a heated glass rod into flowers of sulphur. When the blue flame, which appears when the rod is made too hot, is blown out, a peculiar grey-white light begins to play round the rod, quite different from the ordinary blue sulphur flame. Very pretty rays of this grey light, some four inches long, can be obtained by heating sulphur up to 180° C. in an air-bath. Analysis shows that the product is mainly sulphurous acid in small quantities.

#### A New Electric Lamp.

Messrs. Sowerby and Probert have patented a new method of making electric incandescence lamps. According to the old plan the carbon filament was made of charred cotton or woody fibre, but by the new process the filament is built up by electric deposition of carbon from a hydro-carbon gas. Such a gas is placed in the glass bulb of the lamp, which has two platinum wires fused into it, and when powerful sparks are sent through the gas between these two wires a bridge of solid carbon is deposited between them. In this way the filament is built up from the decomposed gas, and a weaker current then serves to render it incandescent. The gas is finally withdrawn by a mercury-pump and the lamp is ready for use.

#### A Self-opening Umbrella.

Ever since the days when good Jonas Hanway astonished the simple London folk by sheltering himself

from rain and heat under the capacious canopy of an umbrella, that useful article has undergone periodical improvements. The latest and most ingenious novelty is that now under notice, in which we are introduced to an umbrella that practically opens itself by simply pressing upon the ordinary hand-spring. Perhaps the most useful feature is the ease with which it may be opened. When one requires to put up an ordinary umbrella one has—as everybody knows—to hold the stick in one hand and open with the other. In the case of the self-opening umbrella, however, it can be opened with one hand although that hand may also be carrying a bag, book, or other article. It may be added that while the mechanism by means of which the self-opening is controlled does not increase the size of the umbrella or sunshade in which it is used, it adds considerably to its strength.

#### Paper Pipes.

Pipes for enclosing telegraph and electric lighting wires are now made of paper in America, and meet with much favour. They are impervious to water, and pliable enough to resist breaking. Railway sleepers are now also made of paper, hard pressed at a high temperature, and found to serve the purpose better than timber.

#### A Use for Skimmed Milk.

According to the *Chemiker Zeitung*, Mr. Müller has evaporated skimmed milk in a vacuum, so as to obtain a permanent product, which can be preserved for many months in a dry atmosphere, and which has valuable alimentary properties. He thinks that it may be of great use in pastry and other kinds of baked food, and the best sugar of milk can be made from it. The skimmed milk, which is collected in dairies and cheese factories, is usually given to animals or wasted in sewage; but it can be utilised by Müller's process.

#### A New Tram-Rail.

The "Channel Rail" is a novel form of tramway-rail, which is likely to prove useful. A section of it is shown in the accompanying woodcut, where the rail, in the form of a channel, is bolted down by a bolt, E, which can be screwed from the top into a metal plate, G, beneath the wooden sleeper T. To lift the rail and replace it the screw is simply undone, whereas at present the whole roadway has to be taken up to lay new rails.



#### A New Electric Boat.

A new iron vessel, to be propelled by electricity, has been built at Millwall. She is forty-six feet long, and is driven by a Siemens dynamo, fed with electricity from 365 accumulators of the Faure-Sellon-Volckmar pattern. The speed obtained is eight knots per hour. The boat will be exhibited at the Vienna Exhibition of Electrical Appliances during the autumn.

### Photography for Amateurs.

The modern system of dry-plate photography is so simple and convenient in practice, that many only require some useful instructor, to take up the subject. Such an instructor is the little book, "The Amateur's First Handbook," written by Mr. Ellerbeck and published by Messrs. Cussons and Co., of Liverpool. It describes all the necessary apparatus and the methods for taking photographs with dry plates in a very clear and practical style.

### Electricity and Amber.

Amber, or fossil resin, is washed out of a tertiary mud-bed in the Baltic Sea and cast up by the tide. The electric light, however, is now employed to search for it on the sea-bottom under water, and thus the latest development of electricity is made to serve in seeking for the amber or *elektron* of the Greeks, which in the hands of Thales first showed the electric power and gave its name to the science of electricity.

### A Searing Stamp.

A new defacing stamp for post-offices has been introduced by Mr. Chatenet. By the old stamp, thick bars of ink cross out the used postage-stamp, but by the new stamp the "Queen's head" is seared by platinum wires rendered red-hot by the passage of an electric current through them. This is a far more efficacious defacement, and will be useful for a variety of similar purposes.

### A Tidal Buoy.

Captain Cator's tidal buoy is a simple appliance, apparently well adapted for use in foggy weather particularly. It is arranged somewhat after the fashion of a ship's log and, like it, is towed astern. The motion of the vessel causes the screw of the buoy to rotate, the revolutions depending of course upon the speed of the ship, and varying as it varies. Attached to the spindle of the screw is a hammer that is made to strike a gong, the number of whose beats per minute indicates the rate of speed. These buoys are perhaps specially suited for vessels of the navy sailing in squadrons, their employment in this respect being serviceable during the prevalence of fog and also for squadron evolutions. They would, for instance, be found useful in denoting to a ship astern the speed of another ahead.

### Maignen's Filter.

A very good filter was recently exhibited at the Metal Trades Exhibition in the Agricultural Hall. It is held to be free from the defects of filters in which the filtering material is cemented down, and of others in which there are carbon blocks. These are difficult to clean, for one thing, and the result is impure water. In Maignen's filter the medium is carbo-calcis in a powder or grains in the form of a layer. Fig. 1 illustrates

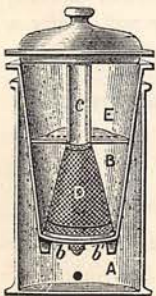


FIG. 1.

the cottage filter, which consists, as shown, of a reservoir, A, for the filtered water; a filter case, B, which is removable; and a specially woven asbestos cloth, D, tied on the filtering frame, which is a hollow perforated cone with outlets, *b b'*, and an air-pipe, *c*. On the outside of this cloth the layer of carbo-calcis is deposited by being used with the first water put into the filter. This layer arrests the impurities put into the filter. A screen, E, protects the filtering medium. Fig. 2 shows another and larger form of Maignen's filter, suitable for large consumers of water.

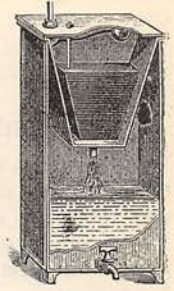


FIG. 2.

### An Electric Gun.

A new species of rifle without lock or trigger has been constructed in Paris. In it the charge is fired by means of a platinum wire, rendered incandescent by an electric current contained in a small battery in the stock of the gun. Whether the novelty has any practical advantage over the ordinary gun would be difficult to say, but it is probable that the aim will be less liable to disturbance with no trigger to be pulled. The current is started by a slight pressure on a push-button or key—thus involving, we fear, the greater liability to accident.

### Metalloidion.

Metalloidion is a new term, meaning a mixture of any metallic oxide with collodion. Collodion is, as is well known, the solution of gun-cotton in a mixture of alcohol and ether, which is so largely used in photography. Dr. Aron now employs minium or oxide of lead, mixed with collodion, as the material in an electric accumulator which absorbs or stores the current. The Metalloidion is laid over plates of lead, as in the Faure accumulator previously described in the GATHERER.

### Fuller's-Earth Electrodes.

When the electric current is applied to the body, a good contact between the wires and the skin can be made by fuller's-earth made into a paste with salt and water, or water and sulphate of zinc. The paste requires no ligatures to hold it on, and being soft, adapts itself to all the sinuosities of the surface.

### Novel Dredge for Shell-Fish.

A dredge for shell-fish has recently been patented which presents several features of considerable ingenuity. It is stated to bear some sort of resemblance to a potato digger. It is furnished with a plough to cut up the sand, a grating for raising the shell-fish out of the sand, and a wire net or bag to receive the fish while permitting the sand to wash through. The ploughshare is fastened to the grating and the forward end of the plough beam is supplied with an axle that carries two wheels for guiding the share and regulating the depth of the cut. Near the same end of the beam will be found a bent lever, having at its lower end a shoe for riding on the sand, and at its upper an eye

for holding a cord that travels under a pulley and thence forward, upward, and out of the water. By pulling this cord the shoe is depressed so as to raise the beam and make the plough run on the surface.

#### A Selenium Light Regulator.

Selenium is a substance which has a high resistance to the passage of an electric current through it, and this resistance diminishes when light falls upon it in proportion to the intensity of the light. The current of electricity passing through it, therefore, becomes stronger when the light falls upon it and weaker when the light is withdrawn. This property has been applied by M. Tommasi to regulate the position of the electric candle of M. Jablochhoff, and keep the "arc" giving the light always in the focus of the reflector, however low the candle burns. The light is focussed on a selenium cell with a current traversing it, and this current is made to actuate an electro-magnet which holds the candle in position. When the light sinks as the candle burns, the current falls in the selenium cell, the electro-magnet ceases to hold the candle in position, and, having a coiled spring beneath its end, the candle rises in its socket till the light of the "arc" reaches its old position, and the selenium cell operates once more in electrifying the magnet and holding the candle in its new place.

#### Hints in Lightning-Storms.

Colonel Parnell, R.E., gives the following useful hints to avoid being struck by lightning. Carry as little metal of any kind on the person as possible. Shelter inside the nearest brick or stone building when the storm approaches. If none near, stand still, or better, lie down on your face, disregarding the rain, which acts as a protection. Avoid the shelter of trees or doorways, under walls, eaves, hayricks, &c. Go into a stone house, but not an outhouse, such as a barn or stable. Temporary shelters of this sort are to be shunned, especially if the building is wooden. Iron is safer. In the open, low, dry, stony ground is safer than high, wet, or grassy ground. Leeward sites are safer than windward ones. Field labourers should leave their tools behind on seeking shelter. In-doors, the kitchen fireplace is to be avoided. Choose a room or passage where there is no fireplace. Keep clear of walls, especially outer walls. Keep clear of metals, especially pipes; of wires, cisterns, window-bars, looking-glasses, pianos, gilt frames, balconies, &c. Close all doors and windows. Keep the chimneys clean—the soot and heated air draw the discharge. Paving close round the walls guards a building; so also do dry and well-drained foundations.

#### Reducing Lead by Electricity.

An American chemist has devised a method of reducing lead from its ores by means of a current of electricity. The ore is ground and placed on a pool of mercury contained in a glass tube. Over the mercury is put diluted hydrochloric acid, and the current of electricity from four Daniell or two Bunsen

cells is sent through the liquids by means of a rod of plumbago dipping into the acid, and a rod of electric-lamp carbon dipping into the mercury. After the electrolytic action is complete, the lead is found to be reduced from its ore and amalgamated with the mercury, from which it can be extracted in the usual way. The positive pole of the battery is connected to the plumbago, and the negative to the carbon.

#### Corrugated Boiler-Flues.

One of the most prominent objects of the interesting Metal Trades Exhibition at the Agricultural Hall, Islington, were the corrugated flues for marine boilers exhibited by the Leeds Forge Company. The flues are cylindrical, but corrugated so that they have a screw-nail appearance. These flues are stronger than the ordinary ones, and last much longer. The company showed a boiler of the Royal Mail Steam Packet Company's sloop *Moselle* fitted up with the flues, and the interior of the boiler was furnished like a drawing-room, and lighted by electricity. The lighting was done by the Economic Electric Company, by means of a primary or voltaic battery of their construction.

#### Thought Reading.

##### A LETTER TO THE EDITOR.

SIR,—When I read your article on "Thought Reading" in the February number of your Magazine, I determined to get all my friends to try the experiments described therein. It may be interesting to your readers to know that I have met with singular success. I have found two or three young ladies who possess the faculty, when blindfolded, of being able to describe objects placed behind them upon which the attention of persons present is wholly concentrated, and I may add that this is accomplished without any contact whatever. Imagined objects are also described, historical scenes or pictures are rendered, and familiar quotations agreed to be thought of are sometimes successfully named. With contact, real or imaginary pains on the part of the thinker are felt by the subject. The experiments were commenced with contact, but are found to be more successful without. The "willing" experiments are also performed without contact.

No doubt there will be great individual variations, and a series of carefully recorded observations is being made of the experiments with the above subjects for scientific purposes, and if any of your correspondents will kindly communicate to me the results of their studies, or send them to Professor Barrett, Royal School of Science, Dublin, they will confer a real favour upon those who are endeavouring to elucidate the subject.—I am, yours faithfully,

MALCOLM GUTHRIE.

2, Parkfield Road, Liverpool.

#### STORY COMPETITION.

*Intending Competitors are reminded that all MSS. must reach the Editor not later than September 1st, 1883.*