THE GATHERER:

AN ILLUSTRATED RECORD OF INVENTION, DISCOVERY, LITERATURE, AND SCIENCE.

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 or work submitted.

An Automatic Well Cleaner.

FIG. 1.

At the Warwick Show of the Royal Agricultural Society, an automatic grab for cleaning out wells was exhibited by a Wantage firm. The implement is illustrated in Figs. 1 and 2, where A A are the tongs which are lowered into the well. These are provided with teeth at their extremities to catch the rubbish or stones, S S, on the bottom. The tongs are lowered and raised by a rope or chain, E E, attached to an eye, D. The jointed strut, F, allows the prongs to close on the object, so that it can be hauled up to the surface. For mud without large stones, a pair of scoops is employed instead of the prongs.

Making India-Rubber.

Isoprene, a hydrocarbon discovered by Greville Williams among the products of the destructive distillation of india-rubber, can be made by the action of heat on oil of turpentine, and when brought into contact with a strong aqueous acid—for instance, hydrochloric—it is converted into a tough elastic solid, which is true india-rubber. Quite recently Dr. Tilden, F.R.S., found that some isoprene made from turpentine and kept in bottles had become thick and that lumps of a yellowish solid floated in it. This proved to be caoutchouc, and Dr. Tilden accounts for it by supposing that a small quantity of acetic or formic acid had been produced by the oxygen of the air. The rubber thus formed is indistinguishable from Para-rubber, and unites with sulphur to form vulcanite.

Has the Earth a Cometary Tail?

It is well known that the tails of comets stream away from the sun, and are of very low density. Various hypotheses have been propounded to explain their movement away from the sun; but the most promising is that of a Russian physicist, who ascribes it to the repulsion of the solar radiation acting on a mass of extreme tenuity, whilst, on the other hand, the attraction of gravitation operates between the solar mass and the solid nucleus of the comet. The same physicist accounts for the mysterious terrestrial phenomenon of the zodiacal light in the same way. He believes that the earth has also a tail of cosmic dust, not luminous of itself but by reflecting the sunlight.

A Sea-Stilling Net.

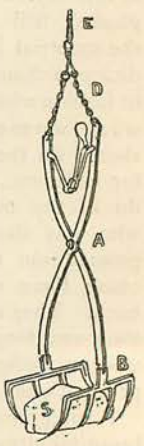
Baron d'Alessandro recently submitted to the French Salvage Society a species of net for stilling the waves around a vessel instead of a layer of oil. Sailors have observed that floating seaweed keeps down the waves, and Baron d'Alessandro's net is an imitation of these weeds. It floats on the surface without offering a resistance to the wind. A netting 1,000 yards square, having a mesh of five centimètres, was recently floated outside the breakwaters of the Quiberon Peninsula, and the results were so satisfactory as to cause the French Minister of Marine to appoint a special commission to report on the invention.

Silicon Films.

Mr. H. N. Warren, a well known chemist, has prepared films of silicon by decomposing silicon hydride by the electric discharge inside a glass tube. The films are deposited in the glass, and are chemically pure. Films consisting of silicon and carbon are also produced in the same way by mixing the silicon hydride with coal gas. Mr. Warren has hopes of being able to coat the carbon filaments of electric incandescent lamps with the silicon, so as to protect them from oxidation in the atmosphere.

Masrium.

Two years ago Johnson Pasha discovered a curious mineral in the bed of an old river of Upper Egypt, the Bahr-Bela-Ma, which on being analysed in the Khedivial Laboratory of Cairo was found to contain what appears to be a new element. Masrium, as it has been called after the Arabic name of Egypt, behaves like the metals of the alkaline earths and of the zinc group. Its oxide, for example, is white, and resembles the oxide of calcium. Its sulphate is also white, and combines with sulphate of alumina to form alum. The metal itself has not as yet been isolated, but its atomic weight is about 228.



AN AUTOMATIC WELL CLEANER.—FIG. 2.

The Fusibility of Steel.

Mr. F. I. R. Carulla of Derby has made the curious observation that the inside of a mild steel bar has a lower fusing-point than the outside, so that its core can be melted out, leaving the outer shell of the bar in its solid form. As the shell is of a tougher quality than the inside, any finishing of articles by paring off the shell on the lathe or planing machine is therefore to be avoided, and Mr. Carulla, in bringing his discovery before the Iron and Steel Institute, has expressed the opinion that the forging press should be used to fashion articles as nearly as possible into their finished state.

A Steam Tree-Feller.

Our engraving shows a combined tree-feller and cross-cut saw working by steam in the middle of a wood. The machine is not large, and can be fixed to the tree in two minutes. The smaller size will fell or saw trees four feet in diameter, and, as it weighs only four hundredweight, can be carried about by four men. It will saw down an oak of three feet diameter in five minutes, and eight trees, averaging thirty inches in diameter, in an hour. It works in any position, and can be readily applied by any man of ordinary intelligence following the printed instructions. The steam is conveyed to it by means of a flexible pipe from the generating boiler, as shown in the figure.

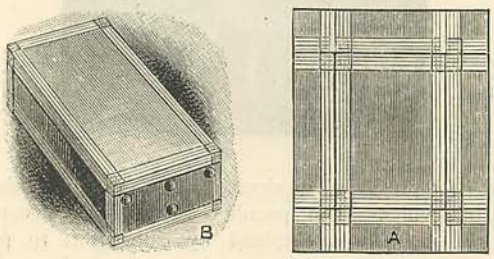
Tanning by Mimosa.

The bark of the Australian mimosa or "mangosa" tree is now used for tanning leather, to which it imparts a reddish hue. Like the leaves of the eucalyptus or gum tree it has also been employed for preventing the formation of crust in boilers. The deposit does not cake when the bark is present, but remains friable, and is easily scoured out of the boiler.

Manganese Putty.

A substitute for red-lead cement is to be found in the new German manganese putty which is adapted for steam engines, boilers, water and gas pipes, as well as for painting on iron to preserve it from rust. As its cost is about half that of red lead cement, its properties are well worth the study of engineers.

A New Box.

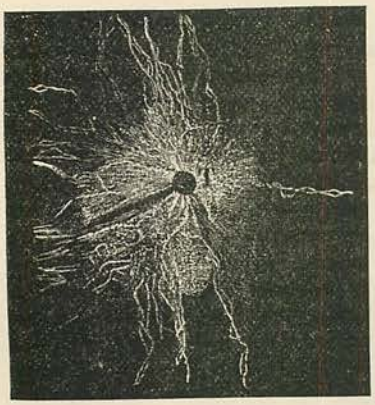


The little box which we illustrate is made by machinery from a single piece of board, which is first cross-cut, as shown at A, and then formed into the box B. The corners are pressed inwards from the outside, or "grooved," and the ends are doubled one over the other, and fastened by studs. The prepared boards are easily stored, and a separate machine applies the studs, thus forming them into boxes.

A STEAM TREE-FELLER.

The Electric Octopus.

Such was the name given to a radiating electrical discharge produced at the Crystal Palace Electrical Exhibition, and illustrated herewith. The current employed was of the alternating or see-saw type,



and its "pressure" or electromotive force was about 100,000 volts. The peculiar Medusa-like structure of the flash was obtained by causing it to pass from the terminal T over the surface of a glass plate, two feet square. While upon this subject, we may remind the reader of Mr. Tesla's experiment, in which a flame like that of a torch appears at a terminal, excited by an alternating current of very high pressure. This flame has been something of a mystery, in that it does not consume the terminal as the flame of a torch consumes the pitch. Mr. William Crookes, F.R.S., the well-known chemist, has lately given an explanation of it, which appears to be correct. The nitrogen of the air is really burning: that is to say, combining with the oxygen of the air to form nitrous and nitric acids. Some lightning flashes are believed to be alternating or see-saw, and their pressure is enormous. Hence they also produce combustion of the nitrogen of the air, with the formation of nitric acid; but luckily for us the surrounding atmosphere does not catch fire, else, as Mr. Crookes points out, the earth would be deluged with nitric acid.

Telling the South.

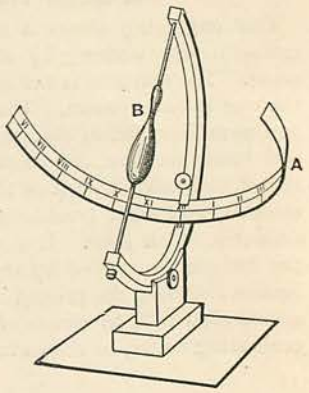
A military correspondent kindly calls our attention to an omission from our paragraph, on page 506 (July 1892), on this subject. The rule is, before noon you must count forward, after noon, you count backwards. This is a well known method in the army, and is taught to many infantry non-commissioned officers.

A Sandwich Indicator.

At many entertainments, in summer and winter alike, sandwiches play a much more prominent part among the refreshments than they used to do. And we are no longer restricted to the ham, beef, or tongue, of the last generation: writers in our own pages have shown what variety is possible. Some form of indicator has become necessary, and a very handy one has just been registered by Mrs. de Salis. It consists of a prettily stamped little metal dagger, which is thrust into the pile of sandwiches, and supports, by a tiny chain, a little frame, in which may be slipped a card indicating the kind of sandwich to be found on the dish.

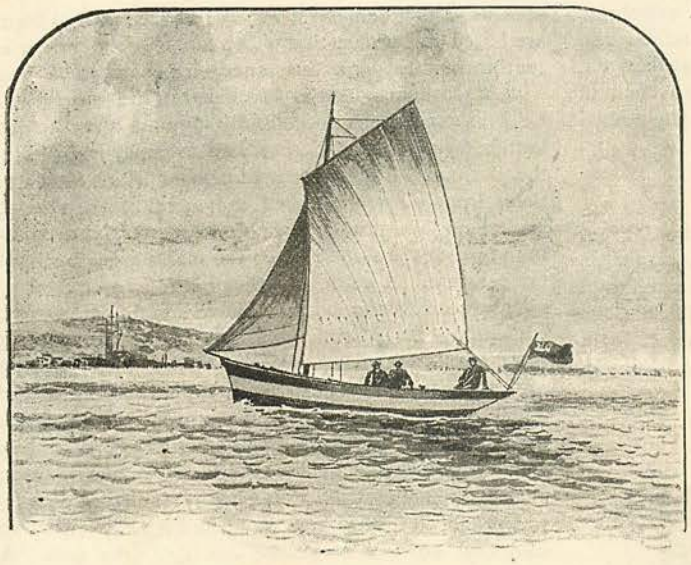
A Mean Time Sundial.

An ordinary sundial does not always keep the same time as does a clock or watch, for the solar day varies with the position of the earth throughout the year. Thus, when the earth is in perihelion the solar day is longer than the sidereal day, and the shadow of the gnomon is longer in coming round again to noon than when the earth is in aphelion. The mean time of a clock or watch corresponds to the average length of the solar day, and the "equation of time" gives the difference between the time by a clock and by a sundial. In short, it has to be added or subtracted from the dial time to give the clock time, and it sometimes amounts to over sixteen minutes. Major-General J. R. Oliver has recently invented a dial which makes its own correction for the equation of time, and shows the mean time like a clock. The apparatus is illustrated herewith, and consists of a semicircular arc, A, graduated with the hours, and a gnomon, B, shaped like a ninepin in place of a straight edge. The form is such that the shadow of its edge compensates for the equation of time, whatever the position of the sun below or above the equator. It is adapted for any latitude, and by means of the clamping screws shown, the two arcs are properly adjusted. Moreover, it can be set to show any required standard time, for example, that of Greenwich.



A Hundred Miles an Hour by Rail.

An electric railway between Chicago and St. Louis on which the cars will travel at a speed of a hundred miles an hour and perform the journey in less than three hours has been projected in the United States, and bids fair to be executed without loss of time. The cars, of a cigar shape, and neither large nor heavy, are to be propelled by electric motors connected to the axles of two driving wheels on each, and the current is to be supplied from a central station at a convenient point on the line. Telephones and electric lights will be provided throughout the route, and electric power is to be supplied to the district surrounding the central station. Meanwhile the works for utilising a portion of the water power of Niagara Falls are proceeding



AN ELECTRIC SAILING LAUNCH.

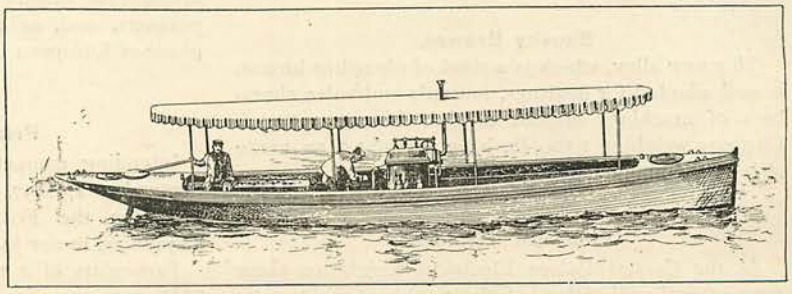
apace, and visitors to the Chicago Exhibition will probably see the scheme in operation. It has now been decided to employ fine wires and high pressure alternating currents for distributing the electricity at a distance, but of course transformers will be used to change the current into a more manageable and less dangerous form before it is actually used for light and power purposes.

A New "Sourdine."

In an operatic performance in Paris the cornets are fitted with a new Sourdine, or echo apparatus, which differs from those hitherto devised in not altering the natural tone of the instrument. It is simply a small chamber of silvered copper so constructed as to produce the echo when adjusted to the mouth of the trumpet.

Two New Launches.

Some well-known ship-builders of Dumbarton have constructed an electric launch, which can also be propelled by sails, for the service of the harbour of Sydney. The craft is illustrated above, and measures forty feet by seven feet, and three feet nine inches in depth. Her weight, inclusive of mast and sails, is five tons. She is built diagonally of pine, with stem, stern-post, and floors of oak, keel of English elm, and longitudinals of Canadian elm. The bottom is sheathed with copper, and the deadwood at the stern is cut away in order to make way for a bronze bracket, which carries the propeller and rudder. The electric power is derived from an accumulator of seventy-six E.P.S. cells, and it drives a series-wound electric motor in a water-tight casing of brass. The average working current is forty ampères at one hundred and fifty volts, and the speed eight miles an hour. Boats, fitted either for sailing, rowing, or electric propulsion, are also being made for river use by a London firm. A very handsome petroleum launch was exhibited at the Warwick Show of the Royal Agricultural Society. It is illustrated at the foot of the page, where the petroleum engine is seen amidships. These machines are made of different sizes, from seven to eighteen horse-power, and are useful for many purposes, agricultural and horticultural, as well as locomotive.



A PETROLEUM LAUNCH.

Liquid Air.

At a recent lecture given in the Royal Institution, London, Professor Dewar presented Lord Kelvin and others of his auditors with claret glasses of liquid oxygen and common air. The first to liquefy these gases was M. Cailletet, a Frenchman, but Professor Dewar's plan is an improvement on his, and consists in employing the rapid vaporisation of oxygen already liquefied to produce intense cold which liquefies other oxygen or air, as the case may be. A tube open to the air at one end, if plunged in the liquid oxygen, will show the two constituent gases of air, oxygen and nitrogen, liquefying together. Liquid oxygen is strongly magnetic and so is liquid air. When placed between the poles of an electro-magnet it is forcibly attracted to them. At the same time it is a very bad conductor of electricity. An electric spark, 2 inches long in ordinary air, fails to pass through a film of the liquid air $\frac{1}{10}$ millimetre thick. The boiling point of liquid air is 192° Centigrade *below* zero, while that of liquid oxygen is 182° C. below zero. The liquid oxygen has a bluish tinge, but it and the air are clear and limpid.

A New Preservative.

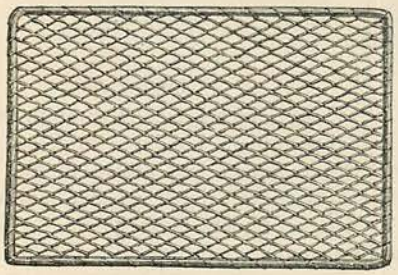
Cocoanut oil mixed with carbolic acid is found by Mr. Haly, of the Colombo Museum, to be an excellent

preservative of delicate specimens of the vertebrate animals, such as fishes, lizards, frogs, and snakes. They retain their brilliant colours in it unchanged, apparently for any length of time. A full account of Mr. Haly's experiments with it is given in the annual report of the Colombo Museum.

A Gigantic Board.

A redwood board, which will figure at the Chicago Exhibition, is 16 feet 5 inches long by 12 feet 9 inches wide and 5 inches thick. It was sawn from a redwood tree at Elk River, Humboldt County, California, the trunk of which was 35 feet in diameter, 300 feet high, and, probably, 1,500 years old. The wood is rich in the grain and takes a fine polish.

A New Wire Mat.



The wire mat which we illustrate, is made by weaving steel spirals together and stretching them on an iron frame. The meshes are so open that the dirt falls through, and the mat, which can be used either side up, is readily cleaned.

Plate-Glass Bricks.

The damp quartz sand used in polishing plate-glass has its edges worn off in the process, and becomes mixed with about thirteen per cent. of powdered plate-glass, as well as two per cent. of iron particles from the oscillating iron plates which have applied it to the surface of the glass. This adulterated sand has recently been utilised in the preparation of glass bricks. It is first moulded into the form of bricks under a pressure of several thousand pounds on the square inch then heated to a temperature of 2,732° Fah., which welds it into a white glass capable of withstanding frost and acids. The glass bricks are capable of resisting a pressure of nearly 6,000 pounds on the square inch.

Bauxite Bronze.

This new alloy, which is a rival of phosphor bronze, is well adapted for bearings, journals and valve chambers of machines instead of the older gun metal. Castings weighing 1,500 lb. have already been made of it by the manufacturing company.

Electrical Heaters.

At the Crystal Palace Electrical Exhibition there were several applications of electrical heat to domestic utensils, which demand a word of notice. All of them are based on the fact that when an electric current is sent through a high resistance—for example, a fine wire of platinum—heat is developed in the wire. Mr. G. Binswanger has successfully applied this fact to kettles, frying-pans, flat-irons, and so on, by embedding the platinum wires in a special cement, which insulates them from each other and the metal of the utensil, while being fire-proof, not liable to crack, and expanding at about the same rate as the platinum with rise of temperature. A kettle was thus rendered electrical by simply coating the bottom outside with the cement, embedding the platinum wires in it, and connecting their ends to binding screws. When these binding screws are joined by flexible conductors to the leads of an electric light installation, the current flows through the platinum wires, and heats the kettle. A frying-pan which will cook an omelette or pancake in two minutes, at an estimated cost of $\frac{1}{20}$th of a penny for electric energy, was produced in the same way; and it need hardly be said that no soot or smoke can spoil the dish. A flat-iron which will keep hot as long as it is connected in circuit, was also exhibited, and the source of heat is the same as in the kettle or frying-pan; but in this case the platinum wires are inside the body of the iron, just above the steel sole-plate. In a pair of curling-tongs shown, the wires were confined in the hollow handles.

Two New Stories.

In a dress that is staidness itself, Messrs. Cassell have issued a thrilling story of adventure and romance, by Mr. Lawrence Fletcher, who gives it the appropriate title, "Into the Unknown." It would be as unfair as it would be difficult to attempt any summary of the incidents in the plot's unravelling, many of which are distinctly novel. The scene is laid in the familiar ground of adventurous romance, South Africa, and the characters are well-drawn. Ten years ago such stories were supposed to appeal only to boys, but experience has shown of late that many readers who are on the look-out for such works have long left boyhood behind.—The scene of the second story before us is far less familiar, being none other than Grecian Eubœa, for the story is "The Herb of Love," by Georgios Drosines, translated for the "Pseudonym Library" by Elizabeth M. Edmonds, and published by Mr. Fisher Unwin. It is a quaintly told story of the village superstition and belief in magic that lingers to this day among the Greek peasants, and, as a presentment of a little-known phase of European life, is specially interesting.

Prize Competitions.

Intending competitors are again reminded that September 1, 1892, is the latest date for receiving MSS. in the FOUR PART STORY COMPETITION announced in our January Number.

Particulars of a new SIX PART STORY COMPETITION were given in our July Number.