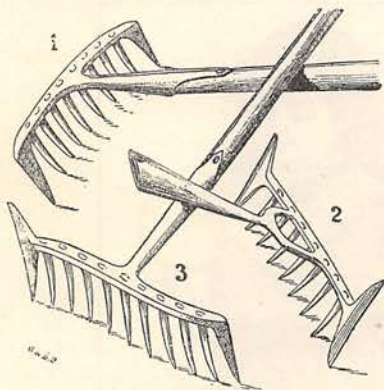


THE GATHERER: AN ILLUSTRATED RECORD OF INVENTION AND DISCOVERY.

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 New Garden-Rake.

A new rake, which combines the features of a rake, hoe, and drill, has been devised by the Rev. J. H. Cole,



and is shown in our engraving. In the weeding and hoeing rake (Fig. 1) the end teeth are made of steel and chisel-shaped to uproot weeds, and the back of the rake is bent to effect this better. These teeth also serve for opening drills for seed, or for hoeing. Fig. 2 is a form specially designed for the use of ladies: and in this the cutting teeth are doubled, so that by turning the rake on its back two drills can be drawn at a set distance apart. If a narrower space is required between the drills the distance can be divided. Fig. 3 is a form with reverse curves to allow one side to be used as a pulling and the other as a pushing rake.

Electric Smelting.

The electric current from a dynamo is now used by a smelting company at New York to produce aluminium and its alloys from corundum and other ores. A furnace is formed, with carbon rods through it, and these are heated by the current to a very high temperature, sufficient to fuse these refractory ores, and liberate the metal in vapour, which condenses and is collected. Copper-aluminium alloys are thus prepared, a 30 horse-power dynamo giving 5 lbs. of aluminium daily, in the form of a rich alloy or aluminium-bronze. Silicon is also obtained in the same way from silicious sand. Clay yields an alloy of aluminium and silicon which, when mixed with copper, gives silicious-aluminium-bronze. Copper-aluminium-nickel, boric oxide, and pure aluminium are also produced by the same process, which is likely to be a valuable one.

A New Box-Wood.

Specimens of a new box-wood plant have been received at Kew from Capetown, and named the *Buxus Macowani*, after Mr. Macowan, director of the Botanic Garden of Capetown. The box grows in the forests of Kaffraria, and is being used at the Cape as a substitute for box-wood in engraving; but one practical authority

states that it does not cut so smoothly as ordinary box-wood, and exhibits black specks in the wood. Another report is that it exhibits a closeness of grain equal to the best Abyssinian box-wood. The tree grows to a height of about 30 feet, and the trunk as a rule is from 12 to 14 inches in diameter. As the supply of common box-wood is diminishing, the new species may help to make up for this deficiency.

A Gigantic Sea-Weed.

The ship *Clever*, Captain John Stone, recently reported at Montevideo having seen in the equatorial seas the remains of a gigantic sea-weed. A boat was put out and the floating weed was measured. It proved to be over 500 yards in length, and some pieces of it brought by the ship are said by botanists to be portions of a fine specimen of the *Macrocystis pyrifera*.

A Chronometer Oven.

An oven has been designed to heat chronometers and watches so as to find their rate at different temperatures. The oven is shown internally in the accompanying figure. It is of copper and contains



water, A A, at top and bottom, which is heated by a gas-flame below at B. There are sliding shelves, FFF, of woven brass, on which the various chronometers or watches, E E E, are laid. The temperature of the oven is brought and kept to a given degree by means of a small capsule of ether, C, which, expanding, bulges the capsule, thereby moving a rod, O, which regulates the supply of gas to the flame. A thermometer, N, passing into the interior, shows the temperature on inspection.

Metal Tennis Rackets.

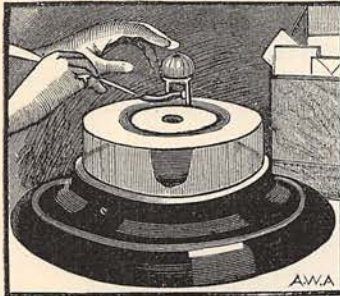
Tennis rackets are now made of steel tubing, both the handles and frames. They are less liable to break than the ordinary wooden rackets, and can be given a very ornamental appearance. They are made of mild steel, and mounted with Delta metal, nickel, or silver.

A Large Diamond.

The large diamond of 457 carats, found in South Africa in 1884, has now been cut, and weighs about 200 carats. The Kohinoor weighs only 106 carats, the Regent of France 136 $\frac{3}{4}$ carats, and the Great Mogul 279 carats, but it is a lumpy stone, and not cut in proper brilliant form, like the Cape stone. There is also a Portuguese stone, the Braganza diamond, but it is doubtful if it is a diamond at all, and not merely a fine topaz. If it is a diamond, it is by far the largest known. There are other diamonds of great value; but the new stone is expected to go far to eclipse them. It is the property of a syndicate at present; but probably it will find a purchaser in time.

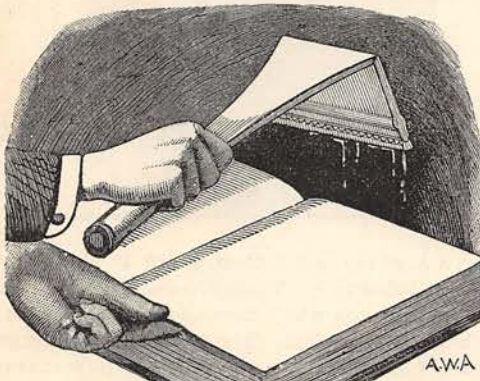
An Automatic Inkstand.

The "Carlyle" inkstand which we illustrate is designed not to spill when upset, and to keep the ink free



of dust. It consists of a reservoir and a dipping-well, into which the ink is pumped from the reservoir when required by pressing the india-rubber knob shown on the top of the stand. The broad base of the stand prevents it

being toppled over, but if it should, only the small quantity in the well can spill. The stand forms a rest for the pen, and is opened by taking up the pen



LETTER DAMPER.

and closed by putting it down again. We may also mention a reservoir "damper" or brush for copying letters, brought out by the same makers. It is shown in the second figure herewith as it appears in use. A

reservoir in the handle holds sufficient water to last for several days; and on inverting the damper it moistens the brush.

Photographing by Lightning.

Mr. A. S. Barker, of Philadelphia, has taken very fair photographs by the light of a flash of lightning. They were taken after dark at 7 p.m., and the actinic effect has been estimated as equivalent to an exposure of $\frac{1}{300}$ part of a second in bright sunlight.



A Help for Infant Schools.

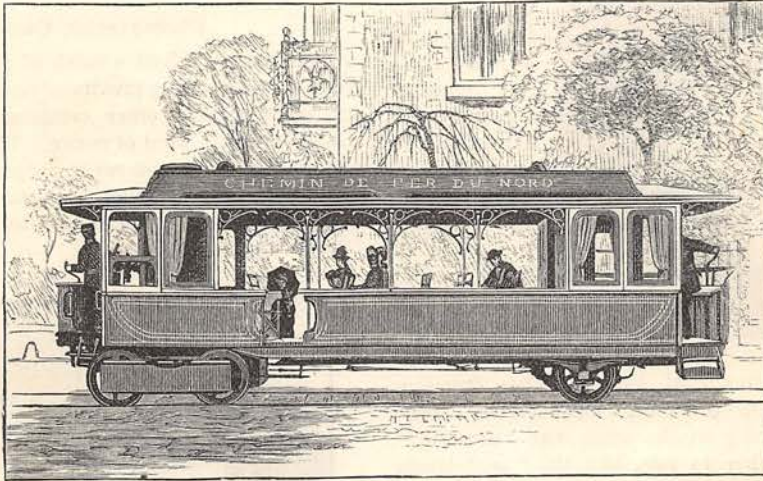
The old-fashioned counting frame, with its hundred and forty-four sliding wooden balls of various colours, has proved a very valuable help to teachers of young children. But its size and costliness render its use in large schools—especially of poor children—difficult, if not impossible. A light and more portable substitute has lately been devised by an official of the Nottingham School Board, which we illustrate this month. The apparatus is very simple and easily handled. It consists of a ring of stout wire, whose ends are secured in a small wooden handle. On the wire run eighteen beads of six colours, arranged three and three, so as to cover about half the wire, and thus provide a ready and inexpensive medium for teaching little ones the alphabet of figures and of colour.

The Sensophone.

A new telegraph instrument, called the "Sensophone," has been brought out in America. It derives its name from the fact that the message is received on the finger by the sense of touch, instead of by the ear as in the well-known "Sounder." Otherwise the apparatus is similar to a "Sounder," and consists of an electro-magnet, which is traversed by the signal currents from the telegraph line, and attracts an armature. The armature operates a small probe or style, which rests against the finger with its point,

and presses into it so as to be felt by the receiver. The attraction of the armature actuating the probe is interpreted by the receiver, and written down as the message. Of course, the advantage of the plan is that no sound is heard, and therefore the telegraph is a silent one. A person may also write down the message with one hand while receiving it on the other.

in April and March, engage notice as a cheap source of sugar. They have a luscious taste when fresh, and when dry resemble inferior figs in flavour. The natives eat them in both states, and with or without rice. The flowers have recently been analysed by Prof. A. H. Church, who shows them to contain over 3 per cent. of cane-sugar, and over 52 per cent. of "invert"



A STEAM CARRIAGE.

Bamboo Oil.

Oil is now extracted from the bamboo at Alima by M. Manas, a companion of M. de Brazza. The oil is not only very useful for lubricating purposes, according to report, but it is said to serve like olive oil in cooking. It is further proposed to acclimatise the oleaginous bamboo of the Alima in the marshy lands of other French colonies.

A Steam Carriage.

The figure illustrates a steam carriage, which gained a gold medal at the Antwerp International Exhibition. It is designed by Mr. Rowan for towns, and to run on rails or tramways. In summer the middle is open, but in winter it may be closed, and heated by steam pipes from the boiler. The total length is 31 feet, and the width 7 feet 2 inches. The total weight is $7\frac{1}{2}$ tons, and it will carry 50 passengers. One man is sufficient to stoke, drive, and brake; another serving as conductor. Its tractive force is 25 horse-power, and it will mount gradients of 1 in 20, or turn curves of $16\frac{1}{2}$ yards radius. It can be run at a speed of 12 $\frac{1}{2}$ miles per hour. The engine is seen at the end of the car, and it is of a very convenient form for the purpose; the passengers feeling no heat from it while in the car.

Flower-Sugar.

The "Mahwa" flowers or corollas of the *Bassia latifolia*, a tree of Central Hindoostan, which flowers

sugar. Prof. Church does not therefore think that the flowers are likely to be a profitable source of cane-sugar, but that they contain mainly dextrose and levulose.

A Pocket Actinometer.

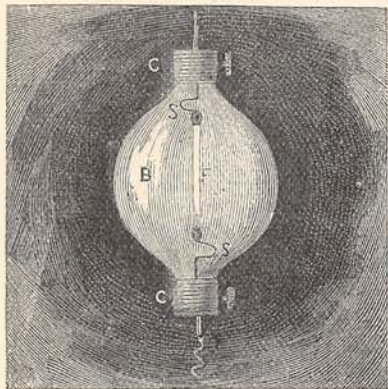
A pocket actinometer for the use of photographers has been devised, and is illustrated in the accompanying figure. It consists of a reel of special bromide paper, which is almost as sensitive as the dry photographic plate itself, and will keep unimpaired for a long time. The sensitive paper is drawn out beneath a glass plate, on the under side of which is a piece of tinted paper. Light arrives at the sensitive paper by an orifice in the glass, and the time taken to turn it to the same tint as the test paper measures the exposure to be given to the photographic plates. The reel holds enough paper for 500 exposures; and a form of the apparatus which can be carried on the watch-chain holds sufficient paper for 150 exposures. We may add that the inventor has also introduced a handy tripod stand for cameras, the legs of which, made on the telescopic principle, are, when folded up, only 21 inches long.



A New Electric Light.

At present, the incandescent electric lamps in general use in houses have a long thin carbon fila-

ment of comparatively high resistance, say from 50 to 100 ohms, though the small miniature lamps used for special purposes have a resistance much below this. These high resistance filament lamps are generally connected in "multiple arc," or parallel, that is to say, a number of them are connected abreast between the two conductors carrying the current. By



with this arrangement the same electro-motive force serves for all, and the current splits up between the lamps, and is subdivided between them. The plan however requires a complicated circuit, and a "heavy expense for copper conducting wires." M. Bernstein has therefore brought out a low resistance incandescent lamp, which can be strung on the same wire "in series," or one after another in line, like the "arc" lamps now so often seen. The resistance of M. Bernstein's lamp is only 0.7 or 0.6 of an ohm, and it requires a current of about ten ampères. The lamp is shown in the figure, where F is the carbon filament; which, in this case, is a tube of carbon, supported by copper springs, S S, to allow for its expansion, and connected to the conductors of the current by platinum wires, which are fused through the glass of a vacuum bulb, B, surrounding the filament. The air is, of course, exhausted from this bulb, and the carbon therefore lasts a long while since it is not "burnt," or oxidised, as it would be in the open air. Insulating caps, C, and other fittings, complete the lamp, which gives a large and brilliant white light of a steady character. As these lamps are intended to be connected "in series" one after another on a single wire, M. Bernstein has provided special means to keep the circuit closed, even if a lamp breaks, for unless he did so, the breaking of one lamp would put out all the others, by interrupting the current. A dynamo giving a current of 10 ampères and an electro-motive force of 200 volts would maintain 30 of these lamps in circuit, and this is as much as an ordinary house requires. M. Bernstein proposes to light districts by these lamps, using machines of 2,000 volts, and having 300 lamps in series; but the Board of Trade does not at present allow of currents of higher electro-motive force than 200 volts into houses, owing to their power of "shocking," and consequent inconvenience, and perhaps danger.

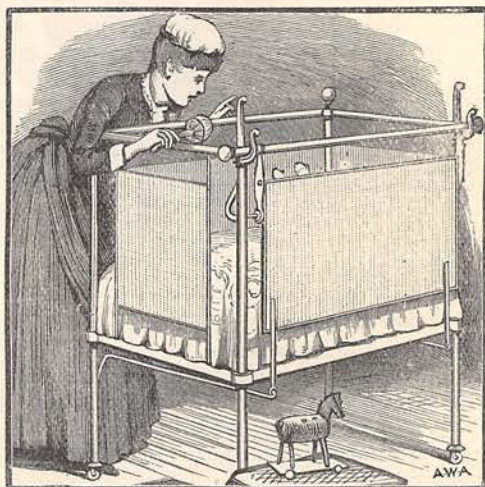
Refrigerating Tubes.

In New York pipes filled with liquified ammonia are now sold for refrigerating purposes. They are $3\frac{1}{2}$ inches in diameter and 2 feet long. The ammonia pipe

is connected to a coil of pipe surrounding a cylinder 10 inches high, made of wood and lined with felt or hair. This coil of pipe leads to a vessel of water, and when the communication is opened the ammonia is absorbed by the water, causing great coldness by the expansion of the liquid ammonia. In fact, a bottle placed in the coil box is brought to a temperature of -60° Fahrenheit in a few minutes by the change.

Photographic Cards.

We have received a batch of photographic cards from an enterprising provincial photographer, suitable for birthdays and other commemorative occasions, which deserve a word of notice. Their distinguishing feature is that the composite subjects—flowers, architectural views, landscapes, &c.—are all the products of photography, and thus a very soft and harmonious effect is produced.



A SAFETY COT.—FIG. 1.

A Child's Safety Cot.

The figures illustrate a new cot for children, which entirely prevents the sleepers from falling out while allowing them to be seen with ease. Fig. 2 shows the cot arranged for putting the child to bed; it has one side lowered. Fig. 1 shows it with the side closed up and fastened. In this case the child is supposed to be inside. One hand of the nurse is sufficient to open and close the side, which, however, cannot be opened by the child.



A SAFETY COT.—FIG. 2.

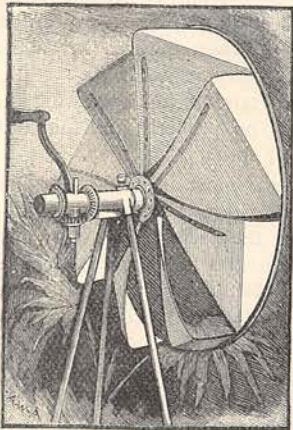
Dilatancy.

Professor Osborne Reynolds has discovered a hidden property of a mass of hard grains, such as a quantity of shot or sand, to which he gives the name of "dilatancy." The property in question is a power to swell in bulk or dilate when the shape of the mass is

altered—a property, in fact, which is the reverse of sponge-like. It pertains to every mass of hard rigid granules; and it is seen when the outside or bounding granules are caused to retain their places. For example, a mass of shot in an india-rubber bag shows it. The sand on the sea-shore shows it when pressed by the foot, for it cannot yield to the tread without dilating and apparently sucking up the water in its pores. The pressure draws down the capillary surface, leaving the sand apparently dry round the foot. Professor Reynolds also attempts to show that the ether known to pervade space may be composed of rigid granules in contact, and capable by this property of "dilatancy" of transmitting light and other effects.

A Rotary Punkah.

Air propellers are well-known contrivances for ventilating premises; and now we have a hand rotary punkah for cooling and ventilating. This device is illustrated in the figure. The punkah, when driven by hand, compels air to travel in or out of a room at such a rate, that all the air in a medium-sized room may be changed by a man in every minute. For one turn of the handle the propeller turns twice. The punkah weighs under 1 cwt., and a



48-inch size can change 5,000 cubic feet of air a minute.

Catching Fire.

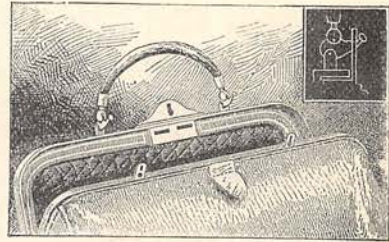
The subject of persons, and more especially ladies, getting their dresses on fire, has of late been under discussion, and the best and simplest remedy is said to be for the person to fling him or herself flat on the floor and roll over the burning parts. The flames in this way are much more easily extinguished than when the person remains erect. Of course, the additional remedy of wrapping up in a blanket is well known; out it is not always available. It must be often possible, however, to lie down prone.

Aluminium in Iron and Steel.

Mr. Nordenfeldt, the well-known torpedo engineer, has patented the addition of a certain proportion of aluminium to iron and steel castings in order to render them sound. It appears that the aluminium makes the molten metal more liquid, so that it fills up the moulds better, and allows imprisoned gases to escape. In this way he has succeeded in making very perfect castings of the softest wrought iron, which retain their ductility, but are much increased in tensile strength. The aluminium, or an alloy thereof, is added to the molten metal shortly before it is to be poured into the mould.

A Safety Hand-Bag.

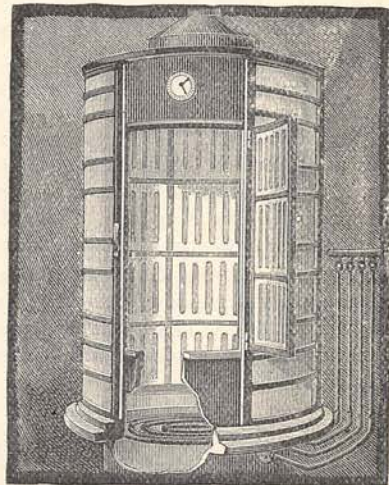
A hand-bag designed to prevent its being opened unawares is illustrated in the figure. Spurs are attached to



the hinges of the handle, and these lock into slots attached to the other lip of the bag as shown. This device locks the bag, so that while it hangs from the hand it cannot be opened. The new safety handle can, it is stated, be fitted to existing bags. Even as a preventive against accidental opening of the bag it seems a useful idea.

A Disinfecting Chamber.

The closet which we illustrate is designed to disinfect clothing or other articles, and it consists of a cast-iron base and frame lined with heat-reflecting tiles. A wrought-iron dome on the top allows the foul air to escape by means of a nine-inch flue; and a series of



gas-jets, shown below, with four separate supply pipes, are provided for heating purposes. Wrought-iron hooks, clips, and gratings are fitted up inside to hold the clothing, bedding, or other articles to be disinfected. With the gas full on for some thirty minutes a temperature of 270° Fahr. is obtained inside. This is a comparatively short time, and we understand the closet has been introduced into several large hospitals.

HANDWRITING COMPETITION.

The Editor regrets that, owing to the large number of entries in this Competition (over 4,000), it has not been possible to complete the Award in time for publication in this number of the Magazine.