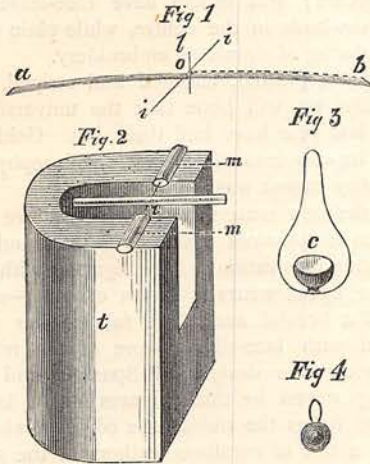


THE GATHERER.

A Wheatstraw Balance.

It may be useful to some of our readers to know how a makeshift chemical balance can be made out of a wheaten straw. A straw stem, *a b* (Fig. 1), is suspended by its middle point, *o*; from one of the



extremities, *a*, is hung a little fixed pan, *c* (Fig. 3), and on the other end is moved a little sliding weight (Fig. 4), which indicates the weight by its distance from the axis, *o*. The straw should be very sound and slightly curved. The point *o* is to be marked with a pen, and on either side of this middle point the other points, *a b*, are marked off with a decimètre scale. One side, *o b*, is to be subdivided into centimètres and demi-centimètres. The axis of suspension is made by thrusting a very fine needle, *i*, through the straw at the middle point, *o*, well up above the centre of the stem. This needle is to be supported in little tubes of glass, *m m*, as in journals, and these are to be fixed horizontally in a hollowed base of wood, *t*. A vertical needle is planted at the point *o* in the straw to act as the indicator of the balance, showing when the beam is level or otherwise. The capsule, *c*, is made of fine note-paper, glued to a loop of fine iron, or better, platinum wire. The weight is a little ball or ring of iron, or platinum, of say half a decigramme, and is suspended from the degrees of the scale, *o b*. The balance is to be carefully adjusted by adding wax and lead shot to the lighter end, and shifting the vertical lever. To prevent the beam oscillating too far it can be checked at either end by proper stops.

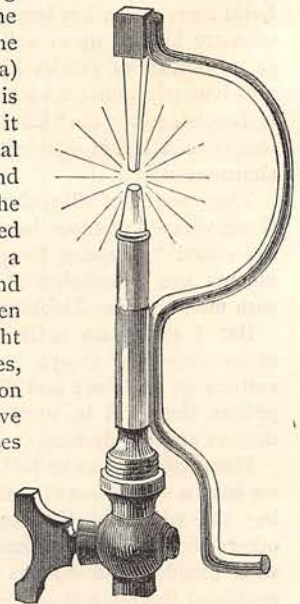
The Stars and Fire-damp.

It is noticed that the stars twinkle more brightly before a fall of the barometer, and M. Somzée, the well-known Belgian mining engineer, has suggested that the fact might be of use as a warning to miners in fiery collieries; for a fall in the barometer is usually

attended by a greater discharge of gas from the seams. His plan is to establish observatories connected by telegraph to the mining districts, and to advise the coal-masters of the brightness of the stars. The same information could be automatically conveyed by an apparatus like the photophone, in which a ray of light sends an electric signal along a wire. M. Somzée's idea is ingenious, but actual trial alone can test its value. The same may be said of the proposal made by Prof. Rossi to employ the microphone in detecting explosions of fire-damp. It appears that an explosion is preceded by delicate atmospheric waves, and as the microphone is sensible to these and could render them audible, his idea is to employ it in mines to warn miners of a coming "fire."

A New Lime-Light.

The oxy-hydrogen lime-light invented by Mr. Drummond is in itself a beautiful light resembling that of the sun, and the reason why it is so rarely used outside of theatres is mainly the high price of the oxygen gas necessary to produce it in conjunction with hydrogen, and also the rapid destruction of the quicklime which is heated by the impact of the two burning gases. To overcome these drawbacks M. de Khotinsky, a distinguished officer of the Russian fleet, now resident in Paris, has devised a way of preparing the oxygen more cheaply from permanganate of potash, and of constructing the burner so that the lime lasts much longer. The piece of lime (or magnesia) forming the new burner is of a tapering shape, and it is supported in a vertical position with the small end downwards. Under the lime a double pipe, formed of a cylinder enclosing a smaller one, opens out, and the oxygen and hydrogen or coal gases are brought separately up these pipes, and allowed to mingle on the tapering lime above them. The mingling gases heat the lime from the point upwards in a uniform fashion all the way round, and as there is no sudden difference of temperature in the lime, it endures for a long time.

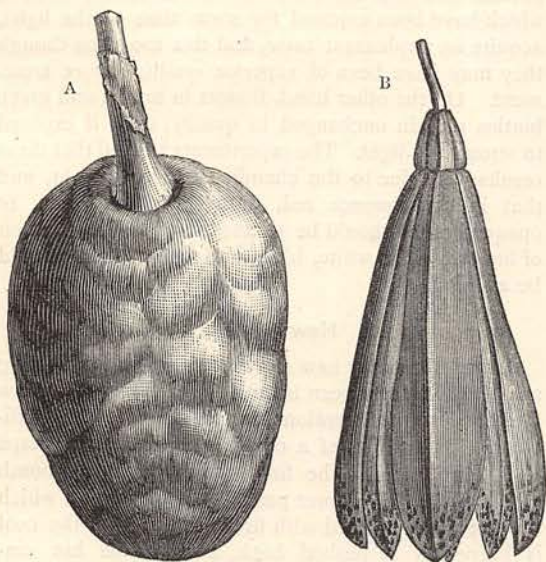


The burner is enclosed in a hazy globe of glass, the better to diffuse the light: and one consuming a cubic foot of oxygen and a cubic foot of coal-gas is said to yield a light equal to one and a half Carcel lamps.

M. de Khotinsky proposes to deliver compressed oxygen to the houses of private consumers, but it is doubtful if his system will gain ground in face of the electric light.

A New Garden Plant.

Mr. Masters has recently named and described a very interesting new garden plant lately discovered in Colombia, and introduced into England by Mr. Carder. It has a horizontal underground stem, or rhizome, about the thickness of one's finger, sending out from its under surface a number of stout unbranched root-fibres, many of them ending in tubers. These tubers, A, are said to be edible, being full of starchy matter, stored away for the future use of the plant, but being true root-tubers and therefore unable to produce buds, they cannot be used like those of the underground stem-tubers of the potato for purposes of

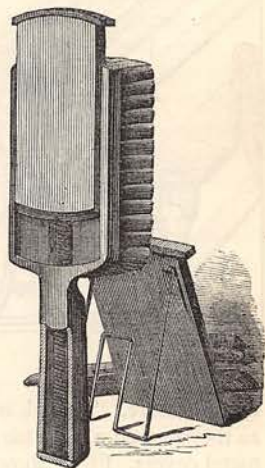


propagation. The leaves are ovate-lanceolate, five or six inches long by two wide, having parallel nerves or veins, with transverse branching or secondary nerves forming with the primary almost square interspaces. The flowers, B, are two inches or more long, regular, shaped like an elongated bell, and droopingly arranged on a forking umbellate flowering branch. The perianth segments or petals are in two rows, the outer a brilliant red slightly tinged with green and dotted with small dark spots at tips; inner a little more pointed, and of a bright yellow colour, with a red midrib, and tips green with dark spots. The fruit is a leathery capsule with round pitted seeds about the size of a small pea. It is named *Bomarea Shuttleworthii*, after its English cultivator, Mr. Shuttleworth.

A Pocket Toilet Companion.

There is no reason why a hair-brush should not be made to be a good deal more serviceable than, as a rule, it is at present. By slightly increasing its size

and altering its construction, it might be transformed into a very useful article. The engraving shows how it can be made to do duty not only for brushing the hair, but for holding a comb, mirror, tooth-brush, and other toilet odds and ends. This brush is provided with a hollow handle, so as to accommodate the comb and tooth-brush. The hollow in the back of the brush is closed by a sliding mirror, which is furnished with a movable wire brace, in order that the glass may be supported in an upright position. In this same hollow there is room enough for pins, buttons, and the like small articles, the usefulness of which is best appreciated when they are urgently wanted and cannot be obtained at a moment's notice.



A New School-Desk and Seat.

In furnishing a school-room regard must be paid not only to economy of space, but to the ease with which the different articles may be shifted about, so as to suit the varying requirements of classes. What is called the "Comprehensive" school-desk and seat appears to fulfil these demands, so far as sitting and desk accommodation is concerned, in a thoroughly practical way. The desk and foot-board are combined in one piece, and may be raised or lowered for the use of adults or children. The desk for writing is supported by a "snug" or stay, which may be turned in when the desk is wanted to be perfectly level for drawing or needlework purposes.

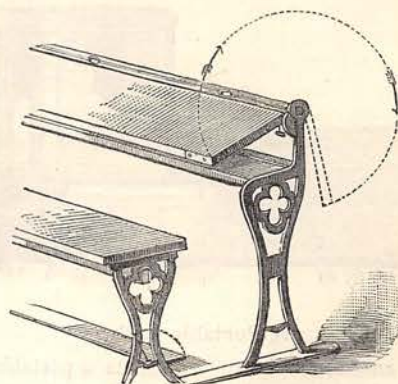


FIG. 1.

These desks and seats may also be employed in chapels or lecture-rooms, the desk in either case being folded over to form a back to the seat. Below each desk there is a bookshelf, which is also a

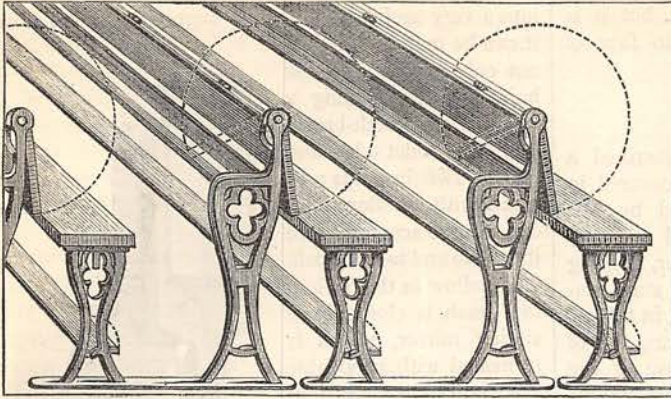
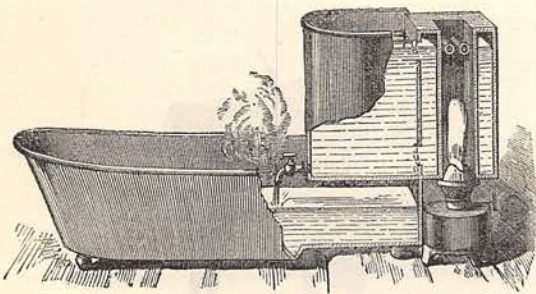


FIG. 2.

useful feature. The ink-wells need never be removed, as they rest on a rigid bar, and are protected by hard metal covers. Fig. 1 shows the desk and seat arranged for school use; in Fig. 2 it is represented as placed for a lecture-hall or chapel.

Sweet-Flag Candy.

A good digestive candy for children and dyspeptics is made in America from the roots of the sweet-flag by washing and slicing them fine, then placing them in a pan with enough cold water to cover them, and slowly heating it over a stove or fire until the water boils. If the candy is to be used rather as a sweet-meat than a medicine, the roots should be treated four or five times in this way, each time pouring off the water. To each two cupfuls of the boiled roots add a cupful and a half of white sugar, then water sufficient to cover them, and allow the whole to simmer slowly on the stove till the water has quite boiled away. The candy is then to be emptied out on buttered plates and stirred frequently till dry.



A Portable Bath.

The annexed woodcut represents a portable bath, which is furnished with a reservoir for water, and with a heating apparatus, the former being sufficiently raised to allow the bather the advantage of the entire capacity of the bath. The tank, large enough to hold water for all ordinary ablutions, is stationed at one end of the bath, and is of course supplied with a tap by

means of which the water may be drawn off. The heating chamber adjoins the tank, and is composed of inner and outer walls or casings, closed at the top and bottom, thus making a water chamber, and communicating with the reservoir through passages above and below. The central space formed by the inner walls of the heating chamber constitutes the channel for the out-flow of heat from the lamp.

Light and Liquids.

Some very interesting experiments have recently been made, showing the effect of the colour of glass bottles on liquids contained therein. It has been proved that liquors contained in colourless bottles, which have been exposed for some time to the light, acquire an unpleasant taste, and this too even though they may have been of superior quality before treatment. On the other hand, liquors in brown and green bottles remain unchanged in quality, even if exposed to strong sun-light. The experiments proved that these results were due to the chemical action of light, and that in consequence red, orange, yellow, green, or opaque bottles should be selected for the preservation of liquors, while white, blue, and violet glass should be avoided.

New Grates.

Among the many new stoves and grates for abating smoke which have been invented of late, the "Nautilus Grate" deserves mention for its simplicity and efficiency. It consists of a coal-basket similar in shape to a nautilus shell, the fire being made in the mouth of the shell. The lower part of the mouth, on which the fire rests, is lined with firebrick; and as the coal is burned it is pushed back, so that the hot cinders are behind and the fresh fuel in front. The recesses of the shell which are just over the mouth serve to limit the amount of the air passing over the fire, and being heated they help to burn the gases which are led away through them to the flue. The "Engert Grate," or "Coking Box," has a box beside the fire, in which the fuel is gradually coked, whilst the hydro-carbons evolved are passed through the fire and consumed. The arrangement is shown in Fig. 1, where *a b c d* is a section of the ordinary grate, *e* is the coking box behind, which is filled with coal, and *f* a plate which forces the coke forward at will by aid of a screw turned by the poker. When all the coals have been pushed forward into the fire, the plate is screwed back again and the box is refilled. The sliding-plate

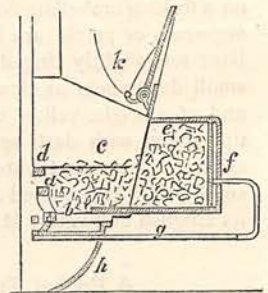


FIG. 1.

is moved by two bars, *g*, which come to the front of the grate; *h* is an iron plate regulating the draught from below; and *k* is a movable plate to throw the flame forward. The ordinary appearance of the grate

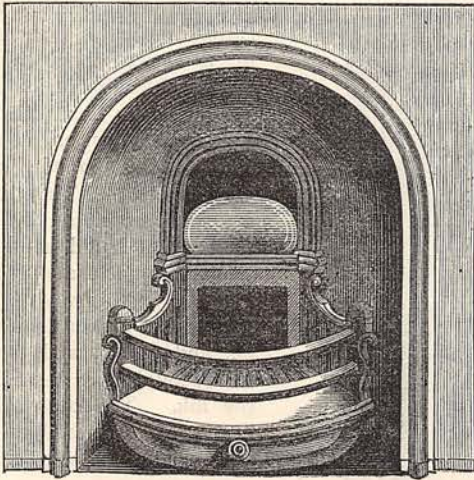


FIG. 2.

is shown in Fig. 2. The "Miser Grate," recently exhibited at South Kensington, is another novelty which promises well. The cost of fuel is estimated by the exhibitors at a penny to a halfpenny per day. When first lighted the smoke passes directly to the flue; but on shutting a damper, part of the draught goes through a series of openings in the back of the fire, and part over the top of the vertical combustion chamber. The "Smoke Abater Shovel" is designed to prevent smoke in ordinary grates, by introducing the fresh coal in a close pan underneath the burning embers. The shovel is wedge-shaped and covered in, so that when it is inserted into the fire, the lid is opened by a slide in the handle, and a piston pushes forward the charge into the heart of the fire.

Solid Petroleum.

Professor N. Ditmarr, a German chemist, has discovered a way of solidifying petroleum oil, so that it can be readily and even safely transported. The process is kept secret as it is a valuable one; but the liquefaction of the petroleum is effected by treating it with a little vinegar. In its solid state it is said to be far less explosive than when liquid, and this in itself is an important gain.

A Substitute for Glass in Photography.

Prepared gelatine plates have been introduced by Professor E. Stebbing as a substitute for glass in photography. The gelatine is rendered insoluble by the application of chromic acid, and the sensitive film of silver bromide then applied. Film negatives on gelatine have several advantages over glass ones; for instance, they are light, and thus more easily transported, and, being tougher, are less liable to breakage.

A Sponge Ornament.

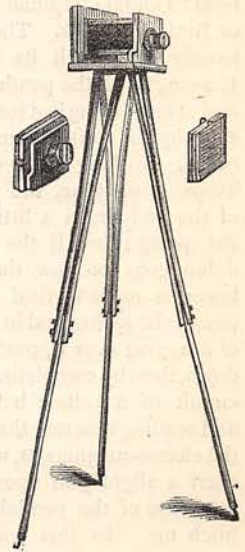
A very pretty and refreshing ornament for a room may be made out of an old sponge, or a large cheap new one. Having dipped it in warm water, squeeze out half the fluid and put into the holes the seeds of millet, barley, cress, purslane, red clover, grasses, and so on, according to taste. The seeds, however, should be such as will germinate easily and yield a variety of harmonious colours in their leafage. Place the sponge thus seeded on a vase, or hang it in a window, facing the sun. Sprinkle with water every morning during the week, and it will soon be green with vegetation.

A Pigmy Camera.

At the recent exhibition of photographic appliances in the rooms of the Society of Arts, a very small camera termed "le Mer-

veilleux" attracted considerable notice. It is represented in the engraving with its tripod, hinged focussing screen, and dry slide. It is a "bellows" camera, folding up for transport into a space less than one inch deep, and opening out when the photograph is to be taken. The lens is a first-class meniscus achromatic one, covering the sensitive plate to the extreme edge, and giving a distinct image throughout. The weight of the camera, lens, slide, and top of the stand is only 1 lb., so that it can readily be carried in the coat-pocket, while the light folding stand can be used conveniently as a walking-stick.

For tourists and amateur photographers, and others, this little instrument is likely to prove very handy.

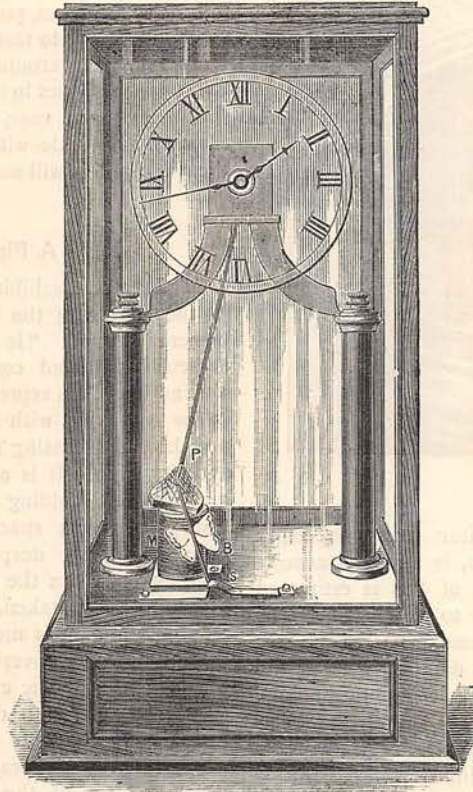


Transparent Leather.

A process for manufacturing transparent leather has been invented by a Mayence firm. Ordinary skins are shaved of their hair, cleaned, then stretched on frames and rubbed with a composition consisting of glycerine, salicylic acid, picric acid, and boric acid. Before they have become quite dry the skins are taken into a dark room and impregnated with a dilute solution of bichromate of potash, and then dried. After this they are coated with shellac varnish, and are ready for use. The leather is said to be well adapted for uses in which great strength is required, such as the making of thread for sewing leather, small belts for lathes, looms, or sewing machines, in lieu of gut. The transparent leather is several times stronger than ordinary leather.

The Butterfly Clock.

At the recent Paris Electrical Exhibition there was a very pretty and excellent little electric clock on view, under the name of M. Lemoine, the inventor. The peculiar feature in it was the pendulum, which, as will be seen from the illustration, swung to and fro over the poles of a double electro-magnet, M. Suspended from the bob of the pendulum, P, by a short cross-arm, there hung a loose vertical rod, which carried a vane of thin transparent mica, cut into the pattern of a butterfly's open wings, and hence the term "Pendule Papilionome," or Butterfly Clock. The rod loosely hung with its vane, B, swings with the pendulum, and at each swing just touches the copper spring, S, underneath. So long as the clock keeps good time, the point of the rod drags a little on the spring; but if the pendulum goes too slow, the rod becomes more vertical as it passes the spring, and instead of dragging over it, pushes it down, thereby completing the circuit of a voltaic battery, and sending a current through the electro-magnets, M, which exert a slight pull upon the iron base of the pendulum bob and give it a gentle hitch up. In this way the pendulum recovers its proper rate, and the clock is made to keep good time. This device is similar to that used in the well-known electric clocks of M. Hipps, of Neuchâtel.



Artificial Porcelain.

A process for making a new kind of ware which resembles porcelain, without the necessity of baking the clay, has been invented by Dr. R. Martin, of Sonneberg in Thuringia. The new ware is in fact a mixture of clay and water-glass, which hardens by evaporation. The clay is mixed with infusorial earth, cellulose, or fibrous materials, and made into a paste, then poured into the proper moulds, and afterwards dipped into the water-glass solution. Owing to the porous nature of the clay the solution is absorbed throughout the mass, and when the latter hardens it resembles stone-ware. The durability of the new compound is not so great as that of the genuine porcelain, nor does it resist the dissolving action of water so well; but it is cheaper, and the objects made from it, such as vases, dolls'-heads, &c., are highly ornamental.

Printers' Ink from Cotton Waste.

M. Bertrand, a French chemist, has introduced a process for cleaning cotton waste of its oil and blackness and utilising the product for printers' ink. The cotton waste is subjected in a closed vessel to the action of bisulphide of carbon, or other liquid having a great affinity for oil and capable of evaporating at a low temperature. The oil and grease appropriated by the more fluent liquid is run off into a receptacle and gently heated. In this way the bisulphide of carbon is driven off, and the oil and grease left behind is used in making the ink. The cotton thus cleaned is as useful to engineers as it was originally.

The New Art of Lustra Painting.

With reference to the papers on this interesting subject which recently appeared in our pages, readers of the Magazine will be glad to learn that Mr. Jas. Elliott, the artist who invented the process, has very courteously offered to supply further information on the subject to any who may desire it. His address is 98, Piccadilly, London, W.

PRIZE POEM COMPETITION.

AWARD.

The Prize of Five Pounds in this Competition has been awarded to the Rev. G. R. TAYLOR, Ashwellthorpe Parsonage, Wymondham, Norfolk, for his Poem entitled "A Life-Picture—in Five Panels," which will appear in our pages in the course of the present volume. The following have been highly commended:—Miss ELLA EDERSHEIM, Loders Vicarage, Bridport; Miss G. VERRALL, St. Tudy, Bodmin; Miss ELLINOR M. DICKSON (aged 14), Bevois Hill, Southampton; W. MAURICE ADAMS, London. The number of Poems sent in being as many as 111, it will be seen that the adjudication of the Prize was no light task.

Many of the manuscripts had to be excluded, owing to the absence of authentication and other neglect of the published rules of the Competition, showing that the senders could not have been bonâ fide readers of the Magazine, and therefore were not eligible to share in the Competition.