Praise Him while Phœbus lends you
The lustre of his eye,
And while a Zephyr tends you
To waft your hymn on high.

When life's spring morn was flowering
You laughed when I was gay,
But now the night is lowering,
Methinks I hear you say :

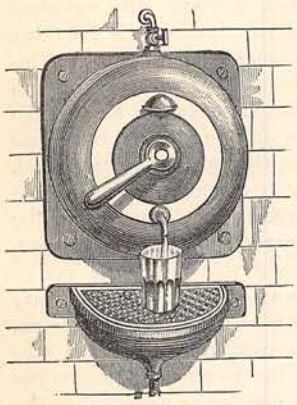
" Prepare—for day is over,
And darkling night begun,
Prepare, my weary rover,
To greet the Morning Sun ! "

JOSEPH SENIOR.

THE GATHERER.

A Wall-Filter.

At the International Health Exhibition is exhibited a very convenient household or garden filter, which can be attached to the wall in the manner illustrated.



The filter is connected with the main service pipe, with an intervening stopcock as shown, and the water is drawn off by turning the handle in the centre of the filter. The action of the filter is both chemical and mechanical; and it consists essentially of a disc of thick close-woven paper, made of pure vegetable pulp, having animal charcoal deprived of phosphates incorporated with it. This filter is contained in the recess formed by the raised surface of the wall-plate. The filtering capacity of the arrangement is such that fifteen gallons of water will pass through one twelve inches in diameter in an hour, and hence no reservoir is required to hold the filtered water, as it can be drawn off in sufficient quantity to make the filter serve as a drinking fountain. The paper should be replaced every few days ; but this is easily done. Main-pipe filters are also made upon this principle, which are capable of filtering 50,000 gallons of water per day.

Glass Pulleys.

A firm of glass-workers in Pittsburg, Pennsylvania, are now making glass pulleys to take the place of iron ones, which have a much higher coefficient of friction, and wear the ropes and belts out faster. The new pulleys are made in a mould, and require care in the manufacture. They are about 13 inches in diameter, and 2½ to 3 inches wide, with a groove in the centre to receive the cable. The rim, or tire, only is of glass, the body being an iron "spider," or frame. They are suitable for cable tramways, and though a little more expensive at first, are believed to be more economical in the long run. The glass is made extra tough and strong, as ordinary glass will not do, and the annealing process takes seventy-two hours. The same firm are also making wheels, and other parts of machinery, out of glass.

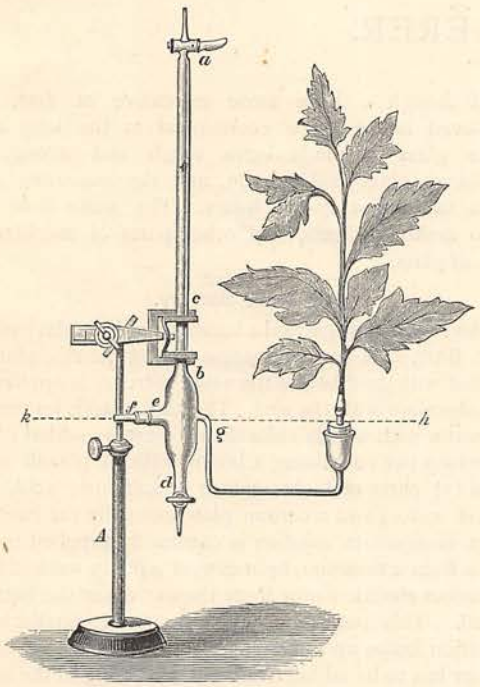
A Gold Battery.

An interesting galvanic battery has been devised by Mr. Burr. Its peculiar feature is that the zinc plate is gilded with gold before the usual mercury is applied to amalgamate with the zinc. The zinc plate is immersed in water with a little chloride of mercury added ; and a porous pot containing a bichromate of potash solution (3½ parts of bichromate, 1 of sulphuric acid, and 10 of water) and a carbon plate complete the battery. The bichromate solution is constantly supplied to the cells from a reservoir, by means of a pump worked by a Griscom electric motor from the current of the battery itself. This pump by supplying fresh depolarising solution keeps up the strength of the battery. A little water has to be added from time to time to the solution round the zinc plate. Mr. Burr holds that the gold reduces local action on the zinc, and saves waste of zinc. Such a battery, thanks to the circulating depolarising liquid, has been known to work 600 hours consecutively with a consumption of 1 lb. of bichromate of potash per cell per week. It is adapted for electric lighting, which when done by means of batteries is much more expensive than when done by dynamos ; but is suitable for small installations, such as yachts, offices, &c., of ten or twenty lamps.

A New Cable Tramway.

A new cable tramway for streets has been brought out in America by Messrs. Orvis and Adams. Its distinctive feature is the placing of the wheels of the cars underground, in the same tunnels which the cables run through. Nothing of the propelling gear is visible in the street ; and in the places where the rails of the ordinary tram-line run are two narrow longitudinal slits or grooves communicating with two tunnels under the street. In these tunnels, which are of oval cross-section, the rails are laid, and the wheels of the car travel along them. The car itself is supported

over the wheels by two iron flanges or keels, which run in the slits above-mentioned, and by a bifurcated support are borne by the axles of the wheels. The cables, of which there is one in each tunnel, run over pulleys mounted on the sides of the tunnels. These tunnels are of iron, and connected together cross-wise by iron flanges bolted together. The use of two cables—one a high-speed, the other a low—permits the cars to be run at fast or slow speeds when desired, by the driver causing one or other cable to be gripped by the catching mechanism of the grip-car.



The Potetometer.

"Potetometer" is the name given to an instrument for measuring the transpiration of water by plants. As shown in the illustration, it consists of a glass tube, *a d*, open at both ends, and blown out into a bulb near the lower end; an aperture also exists on either side of the bulb at or about its middle. The two ends of the main tube are governed by stopcocks, *a d*, and the greater length of the tube is graduated. A perforated india-rubber stopper is fixed into one aperture of the bulb *e*, and a tube, *g h*, fits hermetically to the other. The latter tube is expanded into a cup at *h*, to receive the caoutchouc stopper, into which the end of the shoot to be experimented upon is properly fixed. The shoot is fixed by caoutchouc and wire, or silk, as shown at *i*, and is done so that a clean-cut end of the shoot is level with a tube passing through the perforated stopper, *e*, of the bulb. This is provided for by the bending of the tube *g h*. The tube *f*, passing through the stopper *e*, is intended to admit air-bubbles, and so equalise the pressure, while at the same time affording a means of measuring the absorption of water by the transpiring shoot. The apparatus is filled by placing the lower end of the main tube under water, closing the tubes *f* and *i* (with india-rubber tubing and clips), and opening the stopcocks *a* and *d*. Water is sucked in from *a*, and the whole apparatus carefully filled. The cocks are then turned, and the cut end of the shoot fixed into *i*. Care must be taken that no air remains under the cut end at *i*, and the end of the shoot must be at the level *k l*. The tube *f* may then be opened. The leaves of the shoot transpire water, which is replaced through the stem at the cut end in *i*, from the water in the apparatus. A bubble of air passes through the tube *f*, and ascends into the graduated tube *a c*. The descent of the water-level in this tube enables the experimenter to read off the amount of water used in a given time. The apparatus is the invention of M. Moll, a Dutchman, and is likely to be useful in the science of vegetable physiology.

A Mercury Galvanometer.

M. Lippmann, the inventor of the Lippmann capillary electrometer, has devised an ingenious galvanometer, or electric current measurer. He takes an ordinary mercury manometer, or pressure indicator, and embraces the thicker mercury column between a magnet. Platinum wires are let through the glass to the mercury in the thicker tube, and the electric current is sent through the liquid metal. Now the mercury, being a movable or fluid conductor, experiences a magnetic repulsion due to the mutual action of a magnet on an electric current, discovered by Ampere; and this alters the equilibrium of the gauge. The movement of the mercury is seen in the smaller tube, as a rise of the column, and is considerable for a comparatively feeble current. The rise or fall of the mercury measures the strength and indicates the positive or negative quality of the mercury.

The Largest China Vase in the World.

It has been left to a well-known firm of English potters to produce a china vase that is not only the largest in the world, but is also a beautiful work of art. The chief feature of the vase is a globe representing the earth, which is supported on a pedestal rising from a square plinth and surmounted by a figure of Ceres, who, aided by a number of Cupids, is occupied in showering her gifts of fruitfulness and plenty upon the earth. Round the centre of the globe runs a frieze divided into four panels, on which more Cupids are seen busied in the pursuits typical of the four seasons. The subjects are separated by brackets, on which are other figures emblematic of the seasons. The pedestal contains a splendid frieze, on which are represented as many as sixty Cupids occupied in rural work. The plinth supporting the whole is ornamented in keeping with the general design. The colour of the globe is a subdued green called celadon, the figures are china bisque, and the other decorations white glazed china. From the pedestal to the top of the figure of Ceres, the vase is eleven feet high, and the diameter, including the

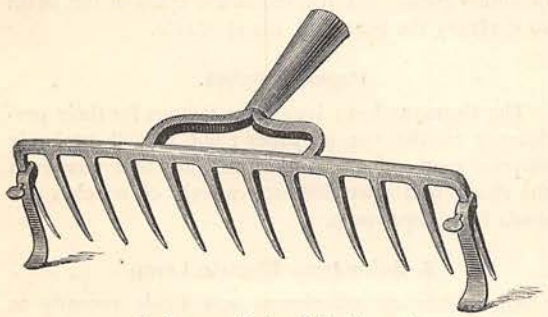
ornamental figures, is six feet four inches. Notwithstanding its massive proportions, it is elegant and chaste, the design, which is by Mr. L. H. Jahn, being in the Renaissance style and thoroughly artistic. The figures have been modelled by the distinguished French sculptor, M. Carrier, and the whole has been constantly superintended by Messrs. Brownfield and Sons. Before the vase left their works at Cobridge for the International Exhibition at the Crystal Palace, it was allowed to be inspected on one day only by the workpeople of the Potteries district, and 25,000 persons availed themselves of the opportunity of seeing it. The vase cost £3,500.

Burns from Nitric Acid.

Nitric acid, when spilt on the skin, gives rise to a very painful kind of burn accompanied by blistering. No good remedy has hitherto been found for these burns; but Mr. Irving, a chemist, now finds that sulphurous acid, diluted with water, is an excellent cure, reducing the blister if formed, and removing the painful irritation.

Automatic Wings.

Aërial locomotion is a subject which the French treat in a serious scientific spirit, and the French Academy of Sciences have recently awarded three prizes to pioneers in this domain. M. Gaston Tissandier, the balloonist who now makes trips in the air with a balloon propelled by electricity, is one of the prizemen; another is M. Tatin, who designed the membrane propeller of Tissandier's electrical balloon. M. Tatin's prize was, however, obtained for an ingenious artificial bird of his design. This bird actually flies like a living bird by strokes of the wing, the power being derived from clockwork inside the body.

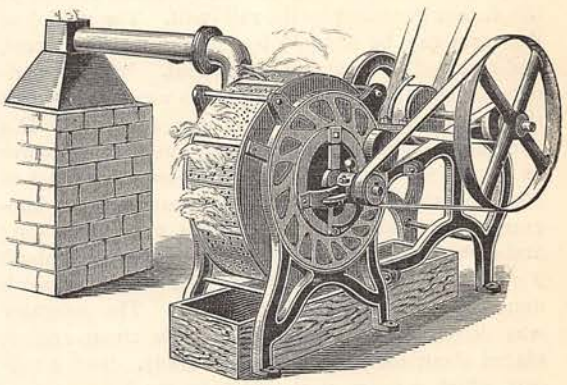


A Lawn Rake Attachment.

Our engraving shows an ingenious device by means of which an ordinary garden rake may be made available for clearing a lawn of grass or leaves, or for removing fallen leaves from flower-beds. The attachment consists of a pair of feet which may be clamped to the outer teeth of the rake by means of screws, which will, of course, keep the teeth of the rake at any height from the surface that may be desired. All who have experienced the difficulty—and what gardener has not?—of removing leaves and cut grass from a lawn or flower-bed without injuring the roots and plants, will find this latest addition to their outfit useful.

A Tea-Dryer.

A very useful machine for drying moist tea, hops, and other produce has been invented by Mr. J. Greig, Edinburgh, and is at present at work in Ceylon and India. As shown in the engraving, the machine consists of a cylindrical hollow receptacle with wire-cloth sides. Dry air which may be warmed to any desired temperature is led, by the flue shown, into this cylinder, where it circulates through the tea in every part, and the revolution of the latter in the blast, which is effected by the belts and pulleys illustrated, secures a thorough drying. The steam which results escapes through the wire-cloth in clouds. The machine illustrated is capable of drying one and a half chests of tea (one charge) in a few minutes. It is also applicable to the drying of grain, draff, and so on; and air heated to a temperature of 600° Fahr. is frequently used with it.



A One-Rail Electric Line.

It a recent GATHERER we gave an account of M. Lartigue's one-rail line for conveying esparto grass from the Algerian hills to the sea-ports of that country, and we have now to chronicle the adaptation of electric motor power to the working of such a line. An experimental line of this kind was recently exhibited at Paris, in the Agricultural Exhibition held at the Palais de l'Industrie, where it was shown drawing passengers. The passengers sat in iron chairs, or panniers, back to back, like the travellers in an iron jaunting-car, and thus helped to balance each other, or rather to equilibrate the load upon the rail. The whole load, including freight and cars, is supported on the single rail by small wheels, which run in a groove along the surface of the rail. A train of cars is drawn by a dynamo-electric locomotive carried on a platform car, similar to the freight-cars, and containing, besides the motor, the starting and stopping switches, the brakes, and a rheostal for graduating the strength of current, and thus the speed of travel. The electric current driving this electric locomotive arrives from a stationary generator at one end of the line, by two conductors insulated from the ground. One of these conductors communicates with the rail itself, the other with the dynamo-electric

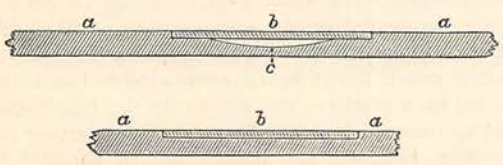
locomotive, by means of the usual copper brushes, which are fixed on a hinged support to allow them some play. The brushes are in connection with the commutator of the dynamo, and the current traverses the bobbin of the latter, which consequently revolves and works the driving-wheel of the locomotive, thereby keeping the train in motion. The current returns to the distant generator by the rail itself. The motion of the train can be stopped by cutting off the current, and reversed by reversing the current. In the experimental line a Siemens D-6 dynamo was employed on the motor, and the generator was a Siemens D-2 dynamo, capable of generating 5 to 6 horse-power of electric energy. The electric locomotive weighed 260 kilograms, and the train of five panniers 900 kilograms, or a total of 1,160 kilograms, or about a ton; and with this weight a speed of 11 kilometres (about 7 miles) per hour was reached. The maximum work done was at the rate of 3 horse-power. The generator was driven by a Herman-Lachapelle steam-engine, placed about 100 yards from the railway. Such a railway, which appears at present to be much more practical than the "telpherage," or single wire-rope electric railway of Mr. Jenkin, is likely to be useful in cities, in mines, and in forests or prairie lands, especially if steam or water power is readily available to drive the generator.

A Standard of Light.

The International Electrical Congress which held a recent meeting at Paris have adopted the absolute standard of light proposed by M. Violle. This is the light emitted in the normal direction by a square centimetre surface of platinum at the melting point, namely, 3,286° Fahr. The amount of light in question is considerable, being rather more than two French standard Carcel lights, each of which is equivalent to 9·5 standard English candles. Violle's standard is not adapted for practical purposes, but is intended as something fixed in nature which one can always refer to. Practical standards will be compared with it. A new practical standard proposed is the light emitted by a fine platinum wire heated by an electric current and standardised.

New Microscope Slides.

Slides for microscopes are usually made of a strip of glass having a disc of thin glass fixed to its surface by Canada balsam, or other suitable cement. For thick



objects the thicker strip of glass is sometimes hollowed out into a recess for holding the object; but all these slides leave the thin covering disc projecting above the surface of the other, and thus tend to produce some accident to the slide. Mr. Bernard Piffard has introduced the plan shown in the accompanying figures, where *b* is the thin covering disc, *a a* the thicker strip, which in one case is hollowed out at *c*. The disc comes flush with the surface of the strip, and thus any obstructing edges are avoided.

A Subterranean Fish.

An interesting fact in natural history is announced by Cavalier Moerath, an Italian civil engineer. While engaged in prospecting for water in Italy, M. Moerath tapped a spring with an "Abyssinian" tube-well, and to his surprise pumped out of it a tiny living fish. The fish had passed from the spring through perforations in the pump of $\frac{1}{8}$ inch diameter. It was found to be destitute of eyes, showing that it belonged to a subterranean species.

Electric Light Effects.

An "artificial moon" is the latest spectacular effect produced by the electric light. The arrangement is due to Dr. Brandt. It consists of a frame containing eight Edison incandescent lamps, and covered in front by a translucent disc. The light produced is about 2,000 candles, and gas-jets are quite unsuitable from the heat and fumes which would be produced in such a small space. Apparitions are also produced by suddenly lighting incandescent lamps concealed in such a way that they throw their light on the object which before was in obscurity. While upon this subject we may mention that there are some pretty effects of illumination to be seen at the Health Exhibition of an evening. A fountain is lighted by incandescent lamps in such a manner that the water glows; and when it falls its spray seems to consist of golden drops. This fountain of gold is also made to play up through a beam of the white moonshine light of the electric arc; and coloured glasses are inserted in the track of the beam to diversify the beauty of the spectacle.

Paper Watches.

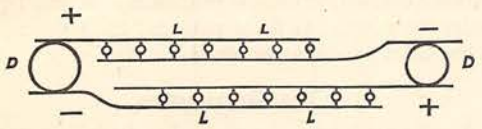
The Germans have long been famous for their proficiency in the use of paper; but it will probably surprise many of our readers to learn that now even the finest and most delicate wheels of watches are made from paper-pulp.

A Submarine Electric Lamp.

An interesting experiment was made recently at Greenock on the *Tilly*, a small steamer built on the Clyde for the Batavian fisheries. The ship has been fitted with a powerful electric arc-lamp of 15,000-candle power, which can be lowered into the sea, and is intended to be used in the fisheries for attracting the fish to the nets. Flexible conductors convey the current to the lamp, which can be raised or lowered by davits and pulleys from the ship's side. The lamp is enclosed in a flint-glass cylinder 9½ inches in diameter by 14½ inches long, and is protected by a copper grating. At the trial on the Clyde, the lamp was submerged for four hours while lighted, and the appearance of the illuminated water was very beautiful.

Distributing Electricity.

The figure illustrates a new method of distributing electricity to electric lamps or locomotives on an electric railway, which we owe to J. S. Beeman. In this method two dynamos or batteries, D D, are employed, instead of one as in the ordinary method; and the circuit is, so to speak, doubled, the lamps L L L L



being crossed as shown between the wire from the positive pole (+) of one dynamo and the negative pole (—) of the other dynamo. The method gives two groups of lamps of equal power; and if the wires be rails, the electric locomotive will have equal speed at any part of the line. In the figure the dynamos are shown by the hieroglyphic now being adopted by electric engineers to represent them graphically. It consists of a circle flanked by two straight lines, symbolising the bobbin or commutator and the brushes. One of the lines may be made thicker than the other to distinguish the + and — poles, after the manner of the customary battery symbol ⫞| where the thick line curiously enough represents the *negative* pole.

A Sheathed Razor.

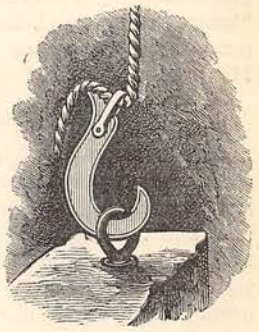
A razor has lately been produced by a Sheffield firm, which, instead of closing in the ordinary manner like a pocket-knife without spring, is placed in a scabbard somewhat like that of a sword, save that the handle of the razor, or the tang which in this case takes its place, enters the sheath first and is at the bottom. This tang is made rather longer than usual, and exactly fits into an aperture at the bottom of the sheath, so that the sheath may be reversed and thus form the handle of the razor when it is in use.

A New Speed Indicator.

At a recent meeting of the Physical Society of London, Sir A. Campbell and Mr. W. T. Goolden exhibited a beautiful apparatus for indicating the speed of revolution of the shaft of a marine engine. It consisted of a screw turned by the shaft of the engine, and keeping the same velocity as the latter. On this screw was a nut in the form of a disc with an india-rubber tyre. The disc rolled on a cone of brass kept turning at a uniform rate by means of clockwork, and the rotation of the disc was contrary to that of the cone. Now it is obvious that the disc rolling as it does on the cone, and carried by the screw, will take up a position on the screw dependent on the velocity of the surface of the cone at that point. If then the velocity of the screw changes, the disc or nut will change its position on the screw, and in doing so it passes over a series of electrical contacts, by which currents of electricity are made to actuate a set of counters which may be placed at a distance. These counters indicate the speed of the engine-shaft; and by adding recording apparatus a register of the speeds can be obtained. The clockwork driving the cone is automatically wound from the screw by the engine-shaft.

A Self-adjusting Hook.

An improved hook for raising heavy bodies, such as a block of stone, or a bale of goods, has recently been introduced by an American inventor. The novelty consists of the ready means of attaching the rope to the hook, and of altering the length of rope above the hook, without the intervention of a pulley. Near the top of the hook —the end furthest from the point and the weight, that is — a link is attached to it in the usual manner by means of a bolt. The link is of such a length that there is just convenient space between it and the lower edge of the hook to admit a rope,



and the edge is so inclined to the perpendicular that the distance between the link and the edge of the hook gradually decreases, and the link would, if there were no rope between them, actually touch the hook. Now, the edge of the hook being serrated, when a rope is slipped through the link, and the weight of the body suspended by the hook allowed to assert itself, the rope is securely clamped between the link and the serrated edge of the hook.

An Ancient Tree.

At a recent meeting of the Berlin Medical Society, photographs were shown by Professor Virchon of a gigantic plane-tree in the island of Cos. Tradition says that Hippocrates held medical consultations beneath its shade. The tree stands in the market-place of the town of Cos, on the east side of the island; and its limbs, supported by marble pillars, spread nearly over the entire market.

A New Pyrometer.

Mr. T. Carnelly and Mr. T. Burton have devised a new pyrometer of some interest. It consists of a copper coil or tube which is placed in the muffle, kiln, or furnace, and through it flows a stream of water. The temperature of the water is taken as it enters and leaves the coil, and from these observations the temperature of the furnace is given by a table. By its means temperatures up to 650° have been determined to within 25°.

A New Bell.

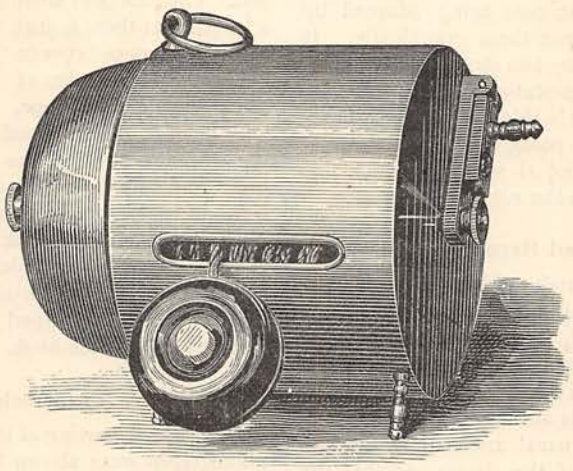
A new form of bell for churches, factories, and so forth, has been patented in America by Mr. Bowers. It is in the form of a truncated cone, and the lip, or "hammer swell," is made of extra thickness within the shell, while the head is made concave. These modifications of the ordinary bell are said to give a louder and better resonance.

Compound Carbons.

In the Trinity House lighthouse experiments are now in progress to determine the relative advantages of gas, oil, and electricity for lighthouse illumination. The carbons used in the electric arc lamp are of a compound nature, that is to say, each carbon, instead of being a solid rod, is a collection or sheaf of small rods, forming one thick rod. This arrangement is found to give a better light than the solid rod, which is apt to "crater," or become hollow in its burning end. Compound rods—which, we may add, were patented by Mr. J. Munro—do not crater in this way.

A Portable Electric Bell.

Messrs. Weedon and Irish have devised a portable electric bell which appears to be very convenient. It is illustrated in the figure, where the cylinder is the bell and battery, with from eighteen to thirty yards of flexible connecting wire rolled inside, and having the bell-push attached as shown. To use the bell it is only necessary to leave the cylinder at the place where the attendant is, and carry the push to the place where attendance may be required. Visitors to the sea-side, invalids in a garden, captains at sea, and others will find uses for the bell which the ordinary fixed electric bells could not serve. Such a bell can be also fixed up if need be, and, according to the makers, the battery will run for twenty months without re-charging.



A PORTABLE ELECTRIC BELL.

Asbestos Boxes.

Mr. Toope, at the Health Exhibition, exhibits a new application of asbestos which, in some countries, and for special purposes, may be very useful. This is an asbestos box or safe, made of asbestos and silicate formed into a solid stone-like material. The boxes are claimed to be "sound-proof" and "vermin-proof," as well as fire-proof, and they are, notwithstanding their massive appearance, exceedingly light. Such a box might be useful for preserving papers in.

New Stains.

Amateurs often wish to stain pine and other woods to resemble the more expensive mahogany. For pine, a wash of one part nitric acid in ten parts of water will answer admirably, if the wood does not contain much resin, and shellac varnish may be used to give a polish to the surface when the wood is quite dry. A glaze of carmine or lake will produce a rosewood finish. If the wood is new, asphaltum which has been thinned with turpentine will give a good mahogany tint.

Temperature Tubes.

Dr. F. Guthrie, president of the Physical Society of London, has found that glass tubes containing mixtures of water and triethylamine serve to indicate temperature. The mixtures of liquid become turbid at certain temperatures, and hence by putting glass bulbs or tubes containing known proportions of the liquids under the tongues of fever patients, the temperatures of the latter can be ascertained.

The Gravimotor.

A self-impelling roller skate has been invented by Mr. T. P. Hall, an American, which comes into operation when the body is suffered to press on the wheels. The device consists of a skate-frame having a small spring motor underneath. The latter is composed of two wheels, revolved by the spring in tension, by the intervention of toothed gearing. On relieving the frame from the weight of the body, the wheels cease to revolve.

The Pressure of the Sea.

It is often asked, when an ocean-going vessel has been lost at sea, and it is supposed she has foundered, why none of her timbers rise to the surface again and float, as submerged wood will nearer shore. The explanation is that if the vessel has been sunk in deep water, the pressure to which it is subjected will be so great that a certain quantity of water will be forced into the pores of the wood, and thus render it so heavy that, even when detached from the ship, a piece of the timber could not float. It is because of this constantly and rapidly increasing pressure, too, that a diver cannot descend to any very great distance below the surface. Fishes have, however, been caught at a depth at which they must have borne a pressure of no less than eighty tons to each square foot of their bodies.

A Cure for Steamed or Frosty Glass.

A very thin coat of glycerine applied on both sides will prevent a window-pane from becoming obscured by steam or hoar-frost—in fact, glycerine may be used in this way to prevent a film of condensed moisture gathering on any article.

PRIZE COMPETITIONS.

Those readers who intended to compete for the Essay Prize are reminded that September 1st, 1884, is the latest day for receiving MSS. Full particulars will be found in the June number of the Magazine.