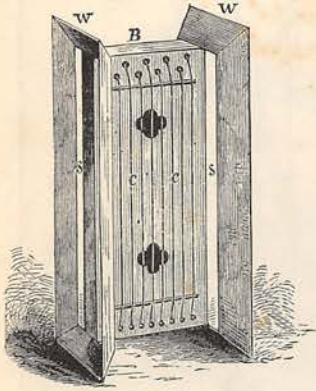


THE GATHERER.*

A New Æolian Harp.

A modern Æolian harp is shown in the accompanying figure. It is the device of MM. Frost and Kastner, and consists of



a rectangular box, B, having two sounding-boards, each provided with eight catgut strings, C C. In order to direct the current of air with more force against the strings, two side-wings, w w, are fitted to the box, with narrow apertures, s s, which allow the wind to pass. The box is 50½ inches high, 10½ inches wide, and 3 inches thick. The distance between the two "bridges," or length of the sonorous parts of the strings, is about a metre (39.4 inches). The width of the wings is 5½ inches, and the narrow spaces between the sounding-board and the wings, 16½ inches. The angle of inclination of the wings is about 50 degrees. It has often been remarked that our telegraph lines form a rudimentary Æolian harp.

Back Springs for Boots.

The elastic springs usually placed at the sides of boots have a constricting effect on the foot, and are, moreover, apt to fray and become unsightly. Recently, a new boot has been introduced by a Bristol manufacturer, in which a single spring is placed at the back of the boot, in the space above the heel. The elastic is said to be safer there from friction, and therefore less liable to wear out, and to give the ankles more freedom to move. Elastic spring boots are very convenient, and it is to be hoped that the new plan, which deserves a trial, will overcome the drawbacks of the side-springs above mentioned.

Bleaching by Petroleum.

Mr. Charles Toppan, an American chemist who has prepared several useful petroleum products for surgical purposes, has now made a bleaching solvent, chiefly from petroleum compounds. It is applied to cotton goods, of which some tons are daily bleached at present. The compound has a solvent action on certain vegetable gums, and while improving the lustre of the goods it renders them lighter without impairing their strength. It has also been applied to such grass fibres as the ramie, esparto, flax, and

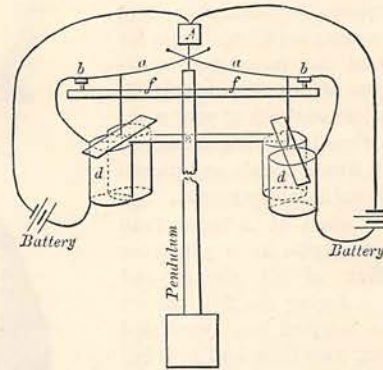
China grass. The fibre or fabric to be bleached is boiled in the solvent, and afterwards treated with chloride of lime and acid in the usual manner. The new material has also been used to deglutinise silk cocoons, especially in the case of perforated cocoons, where the chrysalis, in escaping into the moth state, cuts the filaments and destroys the silk for reeling purposes.

An Automatic Shoal Sounder.

There has recently been brought forward a simple and ingenious appliance for indicating the depth of shoals in exploring rivers or shallow lakes. It consists of a long sounding-rod (10½ feet long, or more) hanging vertically over the boat's side, and turning freely on a horizontal centre. This centre is in the middle of a dial marked with feet and inches. In passing over a shoal the one end of the rod drags on the bottom, and the other points out on the dial the depth in feet and inches. Moreover, after a little experience, by noting the jars of the rod a fair idea can be got of the character of the bottom.

Distributing Time by Electricity.

In the United States there is now a Time Telegraph Company, which has clock-dials in the houses of subscribers, that indicate correct time by electrical regulation from a standard clock. The mechanism moving the hands on these dials is of an ordinary step-by-step kind, but it is controlled by the armature of an electro-magnet, through which electric currents are sent from the controlling clock at intervals of a minute or a second, according to the degree of accuracy required. These currents are sent from the main clock by an automatic key or circuit-closer, which will be



understood from our engraving, where A is the support of the pendulum, which carries a tilting arm, f f, at the ends of which are knife-edge contacts, b b. The two springs, a a, are also provided with knife-edge contacts; the meeting of these contacts completes the circuit through the coils of their respective electro-magnets, d d. The armatures of these magnets are attached to a rocking arm, which also moves the springs a a, so that the contacts are not made until the pendulum swings a little past the centre, when this contact is made, and the spring applies its force to swing the pendulum, reducing to a

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minimum the work required to make the contacts. Sparking at the contact points is prevented by introducing a shunt or by-path of high resistance for the current to flow by until the contacts are opened, when the shunt is also thrown out of circuit. The knife-edge contact pieces are made of platinum-iridium, a very refractory inoxidisable alloy, which is found to answer the purpose well. One of the main clocks in the recent electrical exhibition at Philadelphia controlled eighty dials in this manner. On some of the clock circuits in operation in American towns the electric current is supplied by dynamo machines. Another American time-regulating agency employs the telephone to transmit correct time. A transmitter connected with a clock sends a current which causes every telephone in connection with it to "buzz" at every hour and every minute, or second, except the forty-ninth! The buzz is so low that it does not interfere with ordinary talking on the telephone, and yet it is so contrived as to tell the exact time to a person listening, just as a watch or clock-face tells it to a person looking at it.

Soldering Platinum.

In soldering platinum by the older method, a very high temperature is required to fuse the gold employed as solder; but by a new process, due to Mr. Pratt, F.C.S., the ordinary gas blow-pipe can be employed. He uses auric chloride (AuCl_3) on the solder, and heats it to 200°C . in the blow-pipe, when it loses part of its chlorine, and afterwards, at a still higher temperature, runs in pure gold, which effects the junction of the platinum. Platinum wire, ribbon, or crucibles can be soldered in this way by enclosing some of the auric chloride between them and heating the salt until it blackens, then binding the two surfaces together with the blackened salt between them. On still further increasing the temperature, the gold melts and solders the parts. The joint should be hammered into shape while the gold is hot.

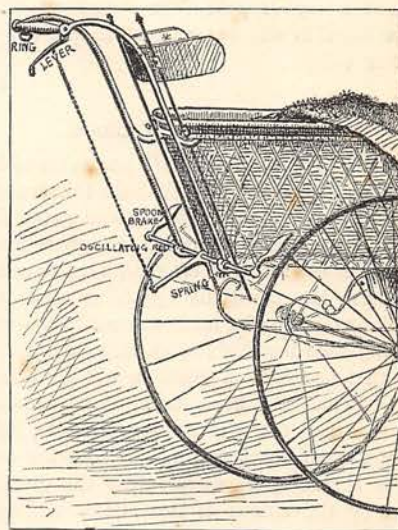
Salting Paths.

Every one knows how difficult it is to remove weeds from the garden walk when they have once become rooted and grounded. Salt is one of the remedies most frequently employed, and the following is said to be the best way of applying it. Boil the salt in water, one pound to the gallon, and pour the mixture boiling hot out of a watering-pot with spreading rose. This will keep weeds and worms away for two or three years. In subsequent applications the solution may be somewhat weaker. It will be as well to take care that none of the liquid falls on the garden mould.

A Brake for Perambulators.

Accidents caused by perambulators escaping from their attendants when going down-hill, or due to their being unintentionally set in motion when left unattended on the pavement outside a shop-door or

elsewhere, are unfortunately of frequent occurrence. To obviate these, Mr. Brooke-Hitching has devised and patented the brake for perambulators which we illustrate, and which is shown at the International Inventions Exhibition at South Kensington. To one end of the driving handle of the carriage a lever is attached, which hangs freely, when not in use, in



such a way as not to inconvenience the nurse. This lever is connected by means of a chain to a pin fixed in an oscillating rod, whose bearings are secured to the body of the carriage. At each end of this rod are spoon brakes, like those commonly used on bicycles, acting on the two back wheels of the perambulator. When the lever is lifted, which can be done without taking the hand from the driving handle, the chain draws up the pin and thus rotates the rod to which the brakes are attached and presses them upon the wheels. A hanging ring is attached to the driving handle above the free end of the lever, and by slipping this ring over the end of the lever, the latter may be secured and the brakes thus held firmly and automatically over the wheels, so that the perambulator may safely be left unattended. A check-spring is attached to the pin which rotates the brake rod, and serves to lift the brakes from the wheels when they are not required. This brake, which removes the danger of accidents, is equally suitable for invalid-carriages.

Concentrating Rays.

Several household articles, such as glass fish-globes, paper-weights made of a pyramid of glass balls, and the lenses of stereoscopes, have been found to act as a burning-glass in the sun, and to have set fire to light materials, such as cloth and paper, thereby causing danger to life and property. Brightly-tinned or nickel-wash dishes have also been known to focus the sun's rays by reflection, and tend to bring about similar consequences. A curious case of the kind is reported from America. When the late President

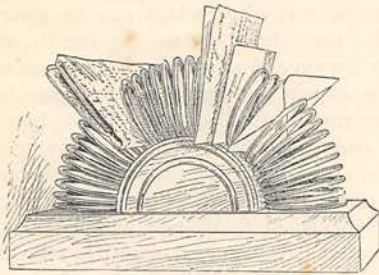
Garfield was shot, an inventor persuaded the physician that by the concentration of a powerful electric arc light on the wounded spot, it would be possible, perhaps, to discover the bullet inside. A single arc light, fed by a six-light Brush dynamo, was employed and focussed, by an elliptical hand-mirror, on the back of a substitute for the wounded President; but when the main current was switched on the lamp, the man gave a start and a cry of pain. On examination, it was found that his skin was seared over a spot two inches in diameter.

An Electric Lamp Clock.

The town hall of Melbourne (Victoria) is to have a new clock with four large iron dials thirteen feet in diameter. The hours are to be marked round the dial by electric incandescent lamps set like gems into cup-like hollows in the rim, and electro-plated to reflect the light. These lamps will be lighted at night by electricity. A row of smaller incandescent lamps will also be set along each hand of the clock to show it in the dark, so that people at a distance will be able to tell the time. It has also been stated that a London firm propose to apply the electric arc lamp to light the interior of a large weathercock which, having coloured bull's-eyes at the ends, would show the direction of the wind by the colour of the beams issuing from them.

A Spiral Letter-Rack.

Our engraving illustrates a new and simple form of letter-grip, in which the rack or holder consists of two or more spirals of nickel-plated steel wire, fixed at the



ends and bent round a semicircular frame of wood, as shown. Letters and other papers are simply stuck into the open spaces between the coils of wire, and there held.

Winds as Fertilisers.

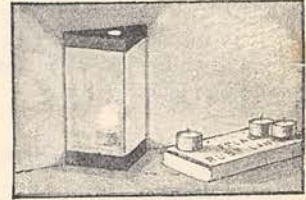
The district of Limagne, in Auvergne, is one of the most fertile in all France. It lies east and north-east of the Dômes mountain chain, and is swept by the prevailing winds of that region, which, according to M. Alluard, transport the fertilising dusts of the volcanic hills and shed them, by means of rain or snow, upon the soil below, thus, as it were, supplying the latter with fertilising chemicals. Phosphoric

acid has been found in the volcanic dust of the Dômes; so also have potash and lime. From an examination of dust brought down by rain on the Puy de Dôme, M. Alluard estimates that nearly 400 grammes of dust descend on a square metre in a year. A Gallo-Roman temple, which once stood on the summit, is said to have disappeared underground. Another fact mentioned by M. Alluard in support of the view advanced by him is that there is often a light mist in the Limagne district, whereas to the west and south-west of the Dômes the atmosphere is usually clear and bright.

A Pocket Ruby Lamp.

The device illustrated is intended for photographers on their travels, and is especially useful for amateurs.

The left-hand side of the illustration shows the lamp lit and ready for use; the right-hand side shows the lamp folded up for putting in the pocket or the hand-bag. The sides of the lantern are of a red cloth, which gives



a ruby-coloured non-actinic light. The top and bottom are of japanned tin, and admit the air for the flame without wasting the light. For producing the latter, night-lights or any convenient illuminant may be used. The lamp folds into a packet 6 inches long by 4 wide, and $\frac{3}{4}$ inch thick.

A Novel Method of Lighting Railway Stations.

In America it is proposed that the locomotives which carry the electric headlight, shall be provided with an illuminator so arranged that a flood of light shall be cast backwards over and alongside the cars. By this means the platform can be lighted by the engine-lights at the very moment when a powerful light is required.

The Soil of Manitoba.

A specimen of the black soil of Manitoba, taken from a farm near Birtle, has been analysed by an English chemist. The specimen was sandy and of a dark colour, owing to the large quantity of vegetable matter it contained. The sand and gravel were chiefly fragments of quartz, with spangles of mica and other minerals derived from waste of older rocks. The proportion of nitrogen was high as compared with the best English pasture soils. Potash and phosphoric acid were abundant. The only element of fertility threatening to become deficient is lime. The proportion of magnesia is high, a fact which is important in a wheat-raising soil. The actual quantitative analysis is given as—organic matter and water, 9.70 per cent.; small stones and gravel, 1.41 per cent.; gravelly sand, 2.45; coarse sand, 64.20; fine sand, 11.70; clay, 10.54 per cent. The finer earth, when

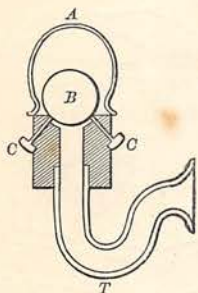
sifted and dried at 100° Centigrade, contained 10·07 per cent. organic matter and water; silica, 83·41 per cent.; ferric oxide and alumina, 4·195 per cent.; carbonate of lime, 0·96 per cent.; magnesia, 0·487 per cent.; potash, 0·271 per cent.; phosphoric acid, 0·195 per cent.; chlorine, 0·060 per cent.; and sulphuric acid a trace. The total nitrogen was 0·412 per cent.; total minerals soluble in water, 0·048 per cent.; total potash (K_2O), soluble in water, 0·0081 per cent.

Catalpa Sleepers.

The catalpa is an American wood of very rapid growth, and owing to its remarkable durability, is now being used in the South-Western States for railway ties or sleepers. In a recent address to the Agricultural Society in Ohio, General Harrison, of Indiana, referred to a catalpa log which had been used as a foot-bridge across a stream in Wabash County for over one hundred years, and showed no signs of decay.

The Valve Telephone.

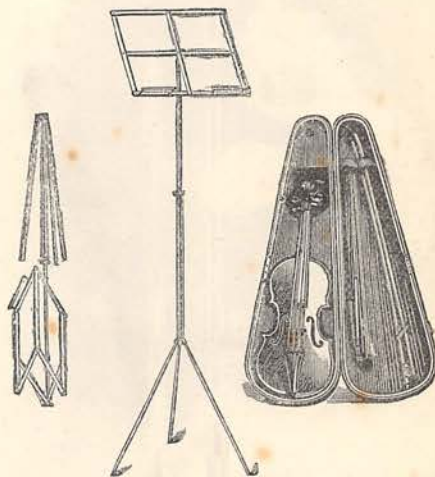
In the carbon telephone transmitter of Edison, and also in the carbon-platinum one of Blake which is now so extensively used in this country, the sound-waves first impinge upon a drum, or tympanum, which conveys their pressure to the current regulator, or microphone, placed behind it. In a new instrument brought out by Professor Silvanus Thompson, the sound-waves impinge directly on the microphone without the intervention of a tympanum. This device follows directly from the discovery of the microphone by Professor Hughes. That discovery showed that a tympanum was not absolutely necessary, since the microphone could be constructed so delicately that the sound-waves could operate it by direct action. In the instrument of Professor Thompson, which has been called the "valve telephone," there is a speaking-tube, into which the person speaks, and its further end is almost entirely, or entirely closed by a ball which resembles a ball-valve. The ball, as shown



at B, in the figure, rests on contact pieces, C C, insulated from each other, but in circuit with the electric current and the telephone line. The ball and the contacts on which it rests are of carbon, or other conducting materials—for example, sulphur-bronze—and the whole forms a microphone, because the current passes from one contact to the other through the ball, which rests upon them and connects them. The waves of sound passing up the tube, T, are intended to impinge upon the ball and vibrate it. A glass cover, A, may be placed over the ball, and in practice the contacts C C are platinum-tipped screws supporting the ball.

The vibrations of the ball upon its contacts cause the electric current to vary in a corresponding manner, after the well-known microphonic fashion, and thus to

transmit a current which, when received at the other end of the line in a receiving telephone, causes the latter to emit sounds which are an imitation of those spoken into the transmitter. M. Bassano and others have also brought out a transmitter which is so far similar that the microphone (in this case of the ordinary pencil form) is placed across the end of a speaking-tube, in order to receive the waves of sound proceeding up the tube.



A Folding Music-Stand.

A music-stand which folds up into a portable form without being taken to pieces has been brought out by a Newbury firm. The accompanying woodcuts illustrate the stand when erected, when partially folded up, and when inserted in the lid of a violin-case for transport. All screws, bolts, and springs which are troublesome in ordinary stands are dispensed with, and the stand folds up by the jointing of its parts. Its height can be varied at will to suit any performer; and as it is constructed of thin metal and tubing, it is likely to be durable.

A New Sewage Process.

At the instance of Dr. Thresh a new process for treating sewage has been tried at Buxton. Its principal feature is the use made of one of the mineral waters of the neighbourhood, derived from the lower coal formation, about two miles above the town. This contains 1·2 grains of iron per gallon in the state of ferrous carbonate, held in solution by carbonic acid. On exposure to the air the carbonic acid escapes, and the iron, taking up more oxygen, subsides in the state of ferric hydroxide, in combination with many of the organic impurities in the water. The results are said to be very satisfactory. The sewage before treatment contains 11·74 parts per million of free ammonia, and 1·60 parts per million of albuminoid ammonia. After treatment these figures are reduced to 4·00 and 0·30 respectively. This purification comes far within the limit proposed by the Rivers Pollution Commissioners. As such mineral waters are not uncommon, the trial at Buxton may lead to others elsewhere.

A Siphon Fountain.

Some interesting experiments can be made with the siphon tube shown in our illustration. It is made by bending a piece of glass tubing 0.2 inch in bore and a metre long (39.4 inches). The first bend should be



6 inches from one end, and to an angle of 100° . Two inches further it should be bent to an angle of 90° . The other end of the tube is to be drawn out to a point, leaving an orifice about one millimetre (0.4 inch) in diameter. Twelve inches from this end it is to be bent twice at right angles in the same plane as that of the bends at the other end of the tube. The large end is to be ground off obliquely and placed in a vessel of water tinged with aniline red. After starting the water with the siphon in the position shown, lift the siphon so that part of the orifice in the vessel is out of the water, and the large bubbles will run up the tube. Again, lift the orifice entirely out of the water, allowing a larger bubble to enter, and replace it in the water. The long bubble will pass slowly down the thick tube and up the pointed end with a rush which throws a jet of spray into the air. This mimic fountain may be made to rise ten or fifteen feet.

An Electric Torpedo Launch.

A waterman's wherry, fitted with a Reckenzaum electric motor and propeller, driven by the current from fifty half-horse-power accumulators, was experimentally tried on the Thames at Westminster

Bridge, for patrol purposes, during the past winter. An electric arc lamp of about 3,000-candle power was fitted up in the bows of the boat, and provided with a reflector to direct the beam over the water, and a switch to extinguish it at will. Owing to its noiseless and rapid motion through the water, and the brilliance of its search-light, the launch appeared well adapted for police and scouting purposes on the river. It has recently been stated that a foreign Government have instructed M. Reckenzaum to prepare a larger craft, propelled by electricity in a similar manner, for the purposes of torpedo warfare. The new vessel is required to cross and re-cross the Channel.

A Textile Shield.

The Indians of Mexico have a plan of wetting their blankets to form them into shields in warfare. They are hand-woven, and fulled until thick and water-proof. It is found that they even turn aside bullets, either by causing them to glance, or by swaying to the blow, and thus defeating the penetrative force of the missile.

Compressed Teak.

The increase in the price of boxwood has led to the use of compressed teak as a substitute in the manufacture of loom-shuttles, and so on. The teak is put into a steel die and compressed by a hydraulic ram under a pressure of fourteen tons per square inch. The timber thus prepared is rendered very dense, homogeneous, and capable of taking a high polish.

Decimal Time.

It has been proposed to subdivide the time decimally, each hour consisting of 100 minutes, and each minute of 100 seconds. It is not likely, however, that such a change will be brought about immediately, if ever. We mention it simply because the subject of marking time has of late received more than usual attention through the introduction of the so-called "universal time." In the International Inventions Exhibition, there are some new dials for clocks and watches (see figure) which indicate both local and universal time. The dial marks the hours 1 to 12 in the ordinary way; but inside the circle of these hours is another dial, which revolves once in 24 hours in the same direction as the hour hand. This dial bears the hours of universal time, 1 to 24. By this arrangement the hour hand indicates both local and universal time. The dials can be adjusted for any longitude.

