THE GATHERER.

An Improved Railway Car.

The relative merits of the English and American patterns of railway car have been discussed of late on both sides of the Atlantic, and it has been clearly brought out that while the American system gains in safety to the traveller from attack and robbery, it loses in point of privacy. A pair of first-class carriages, which appear to combine both of these advantages, are, however, now being tried on the London and North-Western Railway. They are connected together by a covered passage, and a gangway runs from end to end of both. Small compartments open out of this gangway on each side, and at the extremities of the two cars there are single compartments having four seats, which are available as couches for sleeping in at night. Two sleeping berths are also suspended from the roof for use if necessary. Each of these compartments occupies the whole breadth of the vehicle, and opens by a door into a room where an attendant is waiting. The side compartments opening on the gangway are also provided with sleeping accommodation, in the form of couches which fold against the wall when not in use.

Care has been taken to provide good ventilation, and facilities for viewing the scenery; lavatories are attached; and the cars are lit and heated by means of oil and coal-gas. In this way the freedom and convenience of the Pullman car is to a certain extent combined with the personal independence of the ordinary railway carriage.

A Surgical Machine.

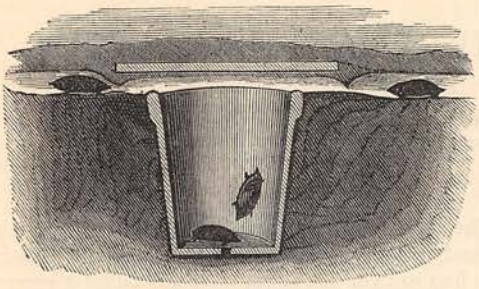
A machine for amputating bones has been invented by Dr. W. G. A. Bonwill, of Philadelphia, and presented by that gentleman to St. Bartholomew's Hospital. It consists of an iron standard carrying an arrangement of multiplying gear which, by means of an endless cord passing over pulleys, transmits rapid rotatory motion to either small drills or very fine circular saws, as the case may require. These tools are attached to the ends of a series of rods on universal joints, which permit the operator to move them in any direction he pleases while they are going at a very high speed. The machine is only employed for cutting bone, and by means of the drills the fractured pieces of a bone can be held in a particular position; while by means of the circular saws the shaft of the bone can be entirely severed in a few seconds, or pieces of any desired shape cut away. For simple amputations a fine straight saw is employed, and its holder is attached by an eccentric to the main gearing, so that a quick reciprocating motion is given to it by turning a hand-wheel. The slow movement of the surgeon's hand is thus transformed into a very rapid movement of the cutting tool, and the operation is more neatly and more swiftly performed than by the old manual method. The apparatus has not been tried in England yet, but it has already found favour among the surgeons of the United States.

An Electric Lamplighter.

The time-honoured flame enclosed in a brass box pierced with fine holes, which the lamplighter carries with him to light the street-lamps, is familiar enough; but a more scientific apparatus has been substituted for it in the shops of the Louvre at Paris. Instead of being capped by a flame the pole is fitted with a spiral of fine platinum wire, the ends of which are connected by flexible conductors to a galvanic battery. The circuit of the battery is interrupted by a small hand-key or press-button let into the handle of the pole just as the knob of an electric bell is let into the wall of a room. On pressing this button with his finger the lamplighter completes the circuit of the battery, and the current traversing the fine spiral of wire heats it red-hot and kindles the gas. Of course the advantage of this apparatus is that there is little danger of setting fire to anything with it, for the wire is only heated up whilst it is being applied to light the gas. It is, therefore, superior to a wick of cotton-wool steeped in spirits of wine, or a lamp, match, or taper; but, though valuable in this respect for shops and houses, it is not well adapted for street-lighting, owing to the necessity of transporting the battery with it.

A New Safety-Lamp.

It will be remembered that about a year ago M. Fleuss invented a diver's helmet which supplied its occupant with pure air for breathing purposes by chemical means. The same principle has recently been applied by M. Fleuss to the construction of a new safety-lamp for miners. The apparatus consists of a stand, oxygen-chamber, cover, and spirit-tank. The oxygen-chamber is spherical in shape and made of stout copper-plate. It is filled with oxygen pumped in at a pressure of 260 pounds on the square inch, and its outlet is a small pipe, furnished with an escape-valve and regulator, opening close to the wick of the lamp. Above this gas reservoir is a tank containing methylated spirits and fitted with a wick-holder and wick. Beside the wick is placed a thin iron rod, upon which is fastened a piece of lime. When the wick is lighted a stream of oxygen is turned on it from the little pipe by means of the regulator and valve, and the flame being blown on the block of lime produces a brilliant light. The whole is enclosed in a copper case fitted with a bull's-eye lens. The case is double-walled, and the intervening space is filled with water, through which the products of combustion have to pass on their way to the outer air, through an escape-valve on the top of the cover. The lamp is independent of the outer air, which is effectually excluded, and thus it is specially adapted for use below water or in fiery mines.

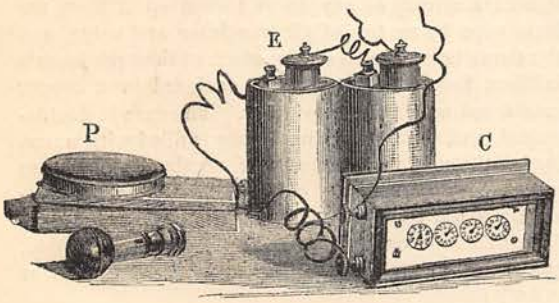


A Simple Mole-Trap.

Moles have their good as well as bad qualities. If, on the one hand, they cut up our lawns, on the other they destroy an enormous number of worms and grubs that would otherwise ruin young plants and crops. People to whom they are of service will allow them to remain unmolested, but those who like trim lawns will be anxious to get rid of the industrious miner, and to such the appliance represented in the woodcut will be useful. It is the simplest form of mole-trap, probably, in existence, and if skilfully employed cannot but prove effectual. A glass or earthenware jar of considerable depth is sunk into the ground under the runs. The moles, while scampering along their subterranean passages, in due time fall into the jar, out of which they are unable to extricate themselves in consequence of the slippery sides, which afford them no footing. The jars may be visited from time to time and the captive moles removed.

A Registering Stamp.

It is frequently advisable to record the number of letters sent out from a place of business, but hitherto it could not be done otherwise than by counting them. To supply this want Messrs. Ferguson and Kempe, of the Postal Telegraph Service, have taken advantage of the fact that letters are usually stamped on leaving an office, and have combined an electrical or mechanical registering apparatus with the hand-stamp. Either the pad for inking the stamp or the pad on which the letter is placed in order to be stamped is mounted on spring supports, and electric contacts are so arranged in conjunction with these springs that when the pad, P, in the figure receives the stamping pressure a current of electricity is transmitted from two voltaic cells, E, to a small counter, C, in which it moves the unit hand one division. When the stamp is operated by a lever, the contacts are arranged to be made by the play of the lever, and spring pads are not required. Where electricity cannot be conveniently employed the counter is combined with the hand-stamp itself, and operated mechanically. The stamp is fitted to move back a little in the handle against the forward pressure of a spring, and this movement, by the intervention of a pawl and ratchet wheel, actuates a small counter, likewise in the handle.



A Discovery in Shipbuilding.

Professor Raoul Pietet, the well-known Swiss physicist, announces a discovery in the art of naval architecture which, if feasible in practice, will greatly increase the speed of ships. It consists in a method of constructing the keel so as to diminish the resistance of the water to the lowest figure. Vessels built on the plan of the professor, instead of sinking their bows deeper in the water as the speed increases, will raise them further out so as to expose only their sides and bottom to the liquid friction. They will thus, as it were, glide over the water instead of pushing their way through it, and he anticipates that steamers built on this plan will attain a speed of forty miles an hour. A model steamer of the new design is now being built at Geneva, and when finished will ply upon the Lake Leman.

A Simple Balance.

A cheap balance for delicate weighings can be made as in the accompanying figure by fixing on a baseboard, B, an upright hollow standard, A, constructed of four strips of dry light wood fastened at the edges by screws. Into this tube a square rod, C, is caused to glide, and adjusted as regards height by the screw D. A strip of mirror-glass is held against the face, F, of the standard, A, by means of small brass bands. From the projecting pin, E, a fine spiral spring, *a*, is hung, and it carries at its lower end a scale-pan of nickel-plated brass 1½ inches in diameter. Just above the scale-pan is attached a bright white bead, *c*, which serves as an index in reading off the indications of the scale. To use the balance, the thing to be weighed is put into the pan, and the support, C, is raised until the latter hangs in front of the mirror. The eye is then made to range the white bead, *c*, with its reflection, *c'*, in the mirror behind, as shown in Fig. 2, and the sliding

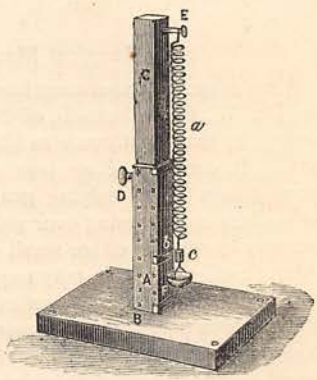


FIG. 1.

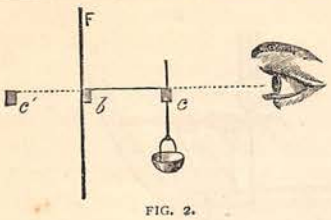


FIG. 2.

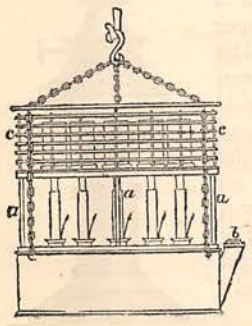
bar or index, *b*, is shifted along the mirror until its upper edge just touches the line of vision between the bead and its reflection. Keeping *b* in its place, the substance is then removed from its place, and weights substituted until the bead is brought back to its old position in a line with the slide, *b*. Of course the weights in the pan are equal to the weight of the substance.

A Steam Catamaran.

A new passenger boat in the shape of a steam catamaran has appeared in the waters of New York. A catamaran in the American sense is a boat with two hulls separated by a considerable distance; but in its primitive form, as seen on the Brazilian coasts, it consists of two logs of light timber fitted with a mast, sail, and sleeping-berth. The new vessel is the invention of Mr. J. Eversten, of Troy, New York, and though its draught is very light, its carrying capacity is enormous. One 60 feet long and having a breadth of 6 feet for each hull is capable of taking 400 passengers. The propeller is hung between the two hulls, and on the platform connecting them are built two decks of the kind common on American river steamers. The upper deck is broad and open, and as it has only the pilot-house and captain's cabin to intercept the view, it is a favourite promenade with passengers.

A Fire-damp Consumer.

A novel apparatus for clearing mines of fire-damp and other inflammable gases by slowly burning them up has been invented by Herr Koerner, a German engineer, and tried successfully in a coal-pit near Langendreer, Westphalia, where nine cubic mètres of explosive gas issuing from a seam were harmlessly consumed by it in about seven minutes. It is based on the fact that the metals platinum and palladium, if heated red-hot, will effect the slow and gradual combination of carburetted hydrogen with the oxygen of the air. The apparatus consists of five palladium burners, shown in the figure between *c c*, and an oil reservoir, *b*, at the bottom of the consumer. This reservoir is filled with ligroïne or benzine oil, and asbestos wicks convey the oil through glass pipes, *a*, to the burners, where the wick is coated with palladium, and protected by wire gauze. The vapour of ligroïne keeps the palladium at a dull red heat, and the combustible gases are slowly oxidised at its glowing surface.



A Paralune.

A Parisian *modiste* has devised a dainty moonshade or "paralune" to keep the moonbeams from spoiling the complexion. Most people would consider the invention needless, but the originator holds that the moonrays have a detrimental effect on the skin. The paralune is a delicate shade of white silk lined with green or crimson, and it is stated to be in favour with those Parisian ladies who have ventured into the country.

For the use of the latter, too, a picturesque cork *sabot* has been introduced as a kind of goloshes, to enable them to walk on the damp woodland paths or visit farmyards with impunity. The paralune is probably a passing fancy; but if it should ever come into regular use it is likely to be of chief service in the city streets and boulevards, where the electric light makes an artificial moonshine.

Boat-lowering Gear.

Mr. Carpenter's boat-detaching gear has the special advantage of employing no hooks, and being operated with great facility in a moment. As will be seen from Figs. 1 and 2, it consists in fixing the two lowering

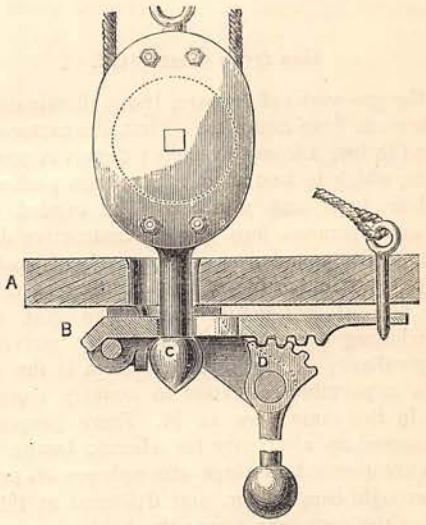


FIG. 1.

pulleys to the bow and stern of the boat by means of an ingenious sliding clamp. The action of this clamp will be understood from Fig. 2, where C is the lowering pulley, having a projecting knob on its under side; A is a fixed plate rigidly attached to the keel of the boat; and B is a sliding plate beneath it, which effects the clamping movement in the following manner. The sliding plate, B, is fitted with a rack which gears with a crank-lever, D, as shown; and both the plates, A and B, have holes cut in them. Now, when the crank-lever, D, is horizontal the hole in the sliding plate, B, is in a line with the axis of the hole in A, and the projecting knob of the lowering pulley can pass through both plates, and therefore to release the boat from the

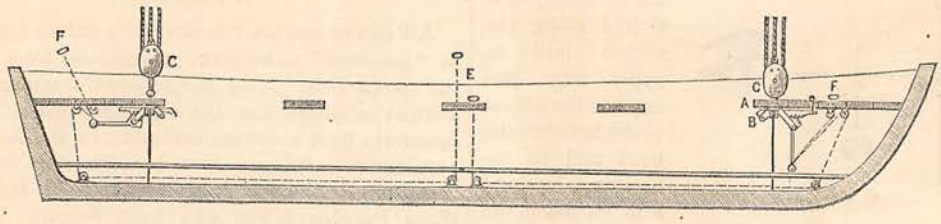


FIG. 2.

pulleys it is only necessary to pull the lever horizontal. On the other hand, when the lever is vertical, as shown in the figure, the hole in the sliding plate, B, is shifted to the right of the axis of the hole in A, and the projecting knob of the pulley is then jammed tight in the two holes. This is the position which corresponds to the suspension of the boat from the pulleys.

To facilitate the movements of the apparatus, lines run from the lever, D, along the bottom of the boat to one point, E, where a man by working these lines can engage both ends of the boat simultaneously. The short lines going to the points, F, at the stem and stern enable the men there when coupling on to raise the crank-lever without stooping under the thwarts.

Gas from Castor Oil.

At the gas-works of Jeypore, India, illuminating gas is now made from castor oil. First, the castor-seed is crushed to free it from the shells; then it is ground to a paste, which is heated in a pan, then packed into horsehair bags and pressed. The exuded oil is then manufactured into gas by destructive distillation, and 82 pounds, or one maund, of castor oil produces 750 cubic feet of 26½-candle gas, or 1,000 cubic feet of 18½-candle gas. The cost of the oil, including everything, is about £1 per maund. One peculiarity of the Jeypore system is the supply of gas in portable reservoirs to country customers, much in the same way as M. Faure proposes to retail stored-up electricity for electric lamps. The gas is compressed to three atmospheres of pressure in a wrought-iron holder, and delivered at the residence of the consumer, where the holder is connected to the pipes supplying the house.

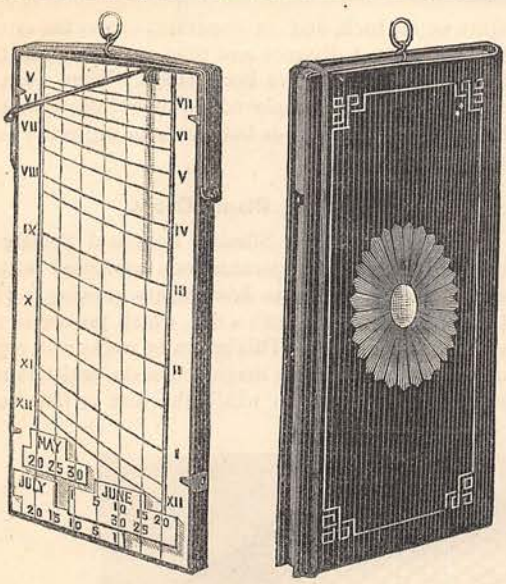
Caution about Toy Pistols.

Some toy pistols may be regarded as harmless enough weapons, but considering the alarming number of accidents (some of which were fatal) to boys that followed the last celebration of the Fourth of July in the United States, a word of caution to parents will not be amiss. The pistol is made of cast-iron and has a barrel two inches long. It is a breech-loader and intended for blank cartridges, the powder being held in a metal case either by a paper wad or by folding in the end of the cartridge. The trigger is rudely made, and there is *always* a risk of accidental discharge when the hinged barrel is being returned to its place after the insertion of the cartridge. In that case an ugly wound is inflicted in the palm; other bruises result from fragments of the wad or of metal shot off with considerable violence. Mischievous boys have even put shot or missiles of various kinds in the barrels, and have incurred great danger to themselves and the public by so doing. In several instances lockjaw was the consequence of the wounds to the nerves of the hands. In fact the fatalities assumed such serious proportions, that the Philadelphia authorities this year altogether forbade the use of these toys on Independence Day.

As a good deal of this kind of amusement is in vogue amongst ourselves on Guy Fawkes Day, the Queen's Birthday, and other holidays, parents would do well to prohibit their children henceforth from employing this pistol. No doubt the inventiveness of youth will very speedily find another and, we trust, a safer outlet for the exuberance of their spirits.

A Chimneyless Lamp.

The chimney of an ordinary lamp is intended to create the draught of air necessary to feed the flame with oxygen, but chimney-glasses are troublesome and breakable, and Mr. Hoyne, an American, has obviated their use by employing a revolving fan to create the air current required. His lamp is illustrated herewith, and it yields a very white steady flame. The fan is placed in the pedestal of the lamp, where it is driven by clockwork, and draws air in through the holes round the foot of the stand. This air passes round the outside of the oil-vessel which is contained in the bulge of the lamp, and thus helps to cool the oil while on its way to the flame. The evaporation of oil and consequent smell is thereby kept down, and danger from explosion reduced. The clockwork runs for thirteen hours, and makes no appreciable sound. The naked flame is, of course, a brilliant object to the eyes; but to tone it down an opal screen is supported over it upon a light framework. For artists and microscopists in want of a bright light, the "Empress" lamp is likely to prove useful.



A Solar Watch.

Solar timepieces are of two kinds—those which mark the hour by the deflection of the shadow on the dial, and those which tell it by the length of the shadow. The latter plan has been adopted in the little French device illustrated herewith. It is the invention of M. Combette, and consists of a mahogany boardlet on which is placed a calendar-card for the three months of a season. Those represented on the figure are May, June, July. A needle with a hole bored at the end, as shown, is attached to the upper part of the card in order to project the shadow. To take an observation the card is held up to the light by the little ring on its top, and the needle is fixed at the top of the vertical line corresponding to the current day of the month. Thus the engraving shows the shadow cast along the line corresponding to the 15th and 25th of June. The dial is to be turned to right and left until the shadow exactly coincides with this line, when the luminous point projected by the eye of the needle indicates the hour, to the right for morning, and to the left for evening. On the 20th of June the sun is at his greatest height, and five days earlier or later, namely, on the 15th and 20th of that month, he is at the same height, so that the same line answers for both dates. The accompanying figure also shows the dial folded up for the pocket.

A Naphtha Locomotive.

The employment of naphtha as fuel for the locomotive has been successfully accomplished on the Tamboff to Saratoff railway in Russia, by M. Poretsky, the engineer. By its means steam was got up in less time than when burning wood or coal; the engine requires less cleaning than when the latter fuels are used, and less time is lost in taking in a fresh supply of the oil than in replenishing the tender with coal or wood.

An Electrical Balloon.

The dynamo-electric machine has proved itself so useful as an electric motor, and the "secondary battery" of M. Faure or of M. Planté is so convenient a reservoir of the electric power, that M. Tissandier, the eminent French aëronaut, has applied these apparatus to the propulsion of a balloon. His experimental arrangement is now being tried at the Paris Electrical Exhibition, and is illustrated in the following figures. The first gives a view of the propeller in all its details. The second shows the balloon itself with car, screw propeller, and guide-sail attached. The balloon is of an oval shape, about $3\frac{1}{2}$ mètres in length and $1\frac{1}{3}$ mètres in diameter. It has a capacity of 9 cubic mètres, and when filled with pure hydrogen gas, an ascending force of about 2 kilogrammes. The motive apparatus consists of a double-bladed screw propeller formed of a pliant cane bent in the form shown at A, Fig. 1, and filled in with stout cloth. This is rotated by the revolving armature of a small dynamo-electric motor, B, of the kind constructed by M. Trouvé. This little engine weighs only 220 grammes (about half a pound), and drives the screw at the rate of $6\frac{1}{2}$ turns per second. This propels the balloon through calm air at a speed of a mètre per second. The secondary battery of M. Planté, from which the electricity is derived that actuates the motor and makes its armature revolve, is shown at C. It is simply a glass vessel containing two lead plates rolled up together with a layer of flannel between, and immersed in water dashed with sulphuric acid. The electricity is stored in this arrangement from a voltaic battery or other generator, and is tapped for use when required. With two of these secondary cells the balloon is kept moving for forty minutes at the above-named velocity. It is to be regretted that M. Tissandier did not employ the new Faure accumulator or secondary battery in his experiments, for it has a greater storage power for electricity than the

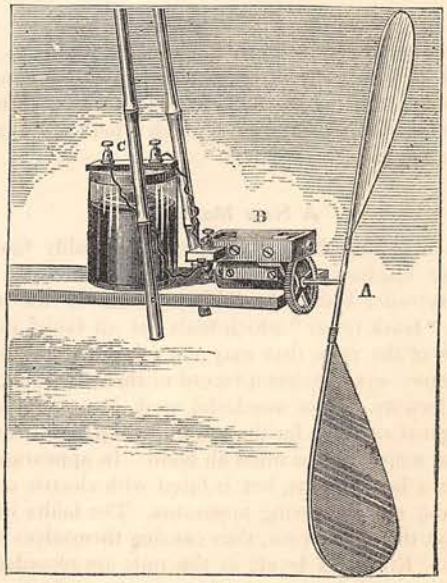


FIG. 1.

Planté model; but his results are sufficiently interesting. He estimates that a dynamo-electric machine giving 6 horse-power of work will weigh 300 kilogrammes, and require 9,000 kilogrammes of a Planté secondary battery to actuate it. An elongated balloon of 3,000 cubic mètres in volume filled with hydrogen will raise this weight of apparatus easily and allow a margin of 1,000 kilogrammes, or nearly a ton, for passengers and baggage. In calm weather such a conveyance could travel at the rate of from 20 to 25 kilomètres (12 to 15 miles) per hour. This rate could, of course, only be kept up for a limited time—quite sufficient, however, to carry passengers across the Channel. In rough weather the arrangement would not be very practicable, owing to the drifting force of adverse winds. However, if balloons are to be propelled mechanically at all—and in this direction the true solution of aërial travel lies—it will doubtless be by means of stored electricity, which is both safe against fire and easy to manipulate.

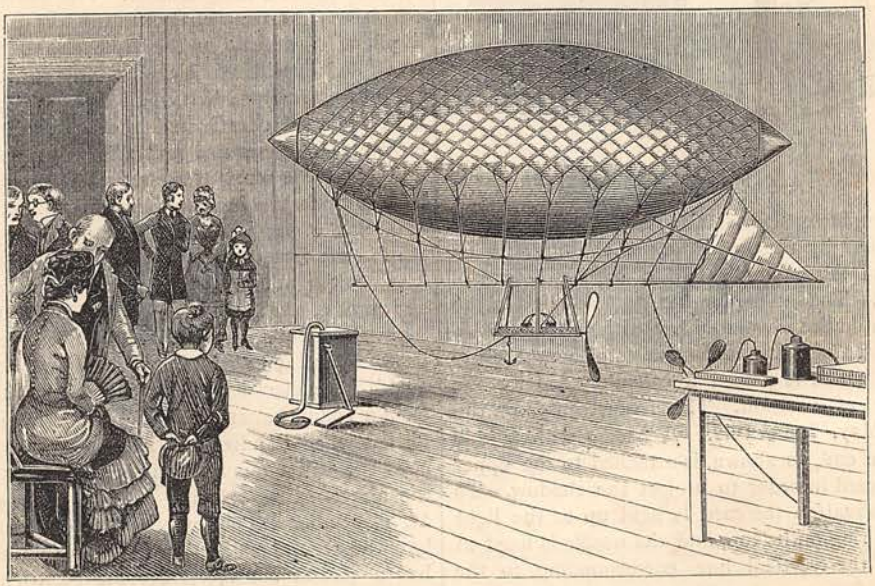


FIG. 2.

A New Machine.

An invention which we hope will speedily find its way to England has just come into use upon the Pennsylvania Railroad. This machine is an automatic "track tester" which finds out all faults in the gauge of the rails, that may not be apparent to the inspectors' eyes, makes a record of them and indicates their locality. This wonderful work is accomplished with great rapidity, for the track tester passes over the rails at a speed of 20 miles an hour. In appearance it is like a baggage-car, but is fitted with electric clocks and the self-registering apparatus. The faults in the rail jolt the delicate car, thus causing themselves to be noted. Errors in levels in the rails are recorded by pencils on ruled paper, working down to a fault of an eighth of an inch, and an apparatus shows the errors in the gauge. A distance and time register shows the places where faults have been noted. Were such a machine constantly employed no accidents from the giving way of "chairs" or bolts or from neglected rails could occur.

Hearing Plants Grow.

At a meeting of the Silesian Botanical Society a few weeks ago, an apparatus was exhibited which enabled the spectators to *hear* plants growing. The plants were connected with a disc which possesses an indicator in the centre. This indicator works with regularity and, upon a highly magnified scale, registers the growth of the plant with which the disc is thus connected. The metal disc and indicator when brought into contact with an electric hammer interrupt the electric current at each of the dividing interstices of the disc and produce a sound the result of the action of growing plants, which thus becomes audible.

Chess Problem Competition.

PRIZE AWARD.

The Editor begs to announce that the Prize of Five Pounds offered in this Competition will be DIVIDED *between*

W. C. SELL, 14, Banbury Road, South Hackney; *and*
J. W. PARSONS, 40, Charrington Street, Oakley Square, N.W.;

whose Problems are, all things considered, of equal merit. No other competitor has proved himself worthy of special commendation.

Music Competition.—Our readers are reminded that MSS. for this Competition cannot be received later than November 1st, 1881.