

THE GATHERER.

A New Fire-Escape.



This is an ingenious as it is most certainly a very valuable invention, not only on account of its extreme simplicity, but also from its unquestionable fitness for the purposes of escape from the windows of burning buildings. It may be easily made by any one, and a reference to the accompanying diagram will explain its construction. It consists of a maple stick an inch thick, two inches wide, and about fifteen inches long, and having five holes of the size of the rope to be used. In the lower single hole is the loop for the feet. The lowering rope passes through *a*, and runs up to and through *b*, then down to and through the hole at *c*, and again running up it passes through the hole at *d*. When in action, this upper free end is fastened to some fixed object, the wood is grasped by the left hand, the lower end of the rope as it leaves *c* is held by the right hand, the feet are placed in the loop, and the descent is commenced, which may be taken as rapidly as desired, as the speed is regulated by the right hand paying out the sliding rope.

The Vocalion.

"Vocalion" is the name now given to the new musical instrument invented by Mr. Baillie Hamilton, and recently tried at Harrow. It resembles a small organ in form, and is constructed so as to approximate in tone to the human voice. Some patterns have one key-board, others two, with accompanying pedals. The sound is caused by the blast from a bellows impinging on parallel bands of brass, of which there are sometimes three to each note. The sound is still further enriched and regulated by metal ligatures attached to the bands and capable of being constrained. The likeness to the human voice is also assisted by the form given to the resonant cavities and mouthpieces from which the notes are emitted. The tone has a peculiar sweetness and pathos, which grows upon the listener, and is particularly adapted for sacred music.

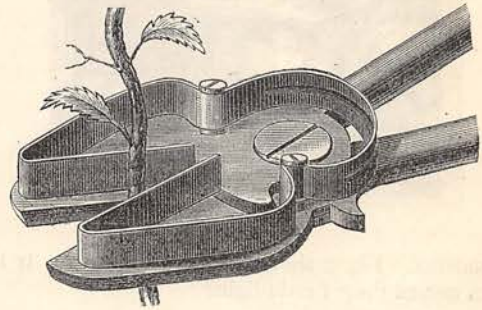
A New Material for Paper.

The list of vegetable materials from which paper may be made increases yearly. Straw of all kinds—wheat, rice, and flax—has been brought into service; attempts have been made to utilise the fibres of leaves and such presumably unpromising material as the refuse of the sugar-cane, when all the sugar has been extracted; wood has been tried with more or less success; but perhaps the most satisfactory results have attended the use of various grasses, notably Diss grass, and Esparto, both of which are grown largely in North Africa. And now a new grass—the Elephant

grass of British Burmah—bids fair to prove of value. A quantity of the dried grass has recently been sent to England, and after being boiled in caustic soda and bleached, has been made into paper, with fairly satisfactory results. This is indeed good news for all of us, since the greater the number of available materials for its manufacture, the lower the price of paper, and the better and cheaper the periodical and book literature of the day.

New Flower-Shears.

The engraving represents a new kind of scissors specially devised for cutting and trimming flowers, branches, fruits, &c. They are furnished with a bow-spring extending to the ends of the blades, turning



inwards, and running parallel with the cutting edge of the shears. When a stem or twig has to be removed, it is held between the ends of the spring, as shown in the woodcut. This is an improvement upon the common scissors, which require the stem to be held with one hand while the cutting is done with the other—an operation that is often awkward and disagreeable, particularly in the case of thorny boughs or twigs.

A New Reading-Lamp.

The construction of this novel and useful invention may be easily understood by glancing at Fig. 1. *b* is a straight metallic tube sharply bent at its upper end, and terminating in a gas-tight connection, *a*, which may be attached to any ordinary gas-burner. The lower end of the tube carries a metallic frame supporting a paper shade, *c*, in the centre of which is the burner. This appliance may be easily fixed by simply passing the union bend up between the gallery and glass globe of the bracket or chandelier, and drawing it gently down over the burner; the gas may then be turned on and ignited at the burner under the shade. As all the metallic parts are tubular, the "lamp" is of ex-

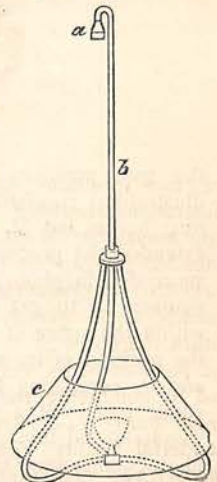


FIG. 1.

trepreneur's lightness; its weight, which (shade included) is only 9 oz., does not affect the balance of any good



FIG. 2.

chandelier. Fig. 2 shows the lamp in action. It has been named the "Pendulight."

The Gun-Camera.

Mr. Muybridge, the well-known American photographer, recently exhibited some interesting photographs of moving animals to Sir Frederick Leighton, P.R.A., and a number of brother-artists, with a view to illustrating the use of instantaneous photographs in the fine arts, in permitting artists to study from life

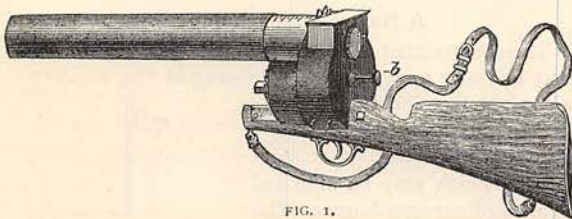


FIG. 1.

the true positions of animals in motion. These illustrations consisted chiefly of the attitudes of running horses, but M. Marey, a French *savant*, has just extended the process to the flight of birds. He has succeeded in photographing a flying bird in such a manner as to get twelve successive pictures of it within the space of a second. Each picture shows the position of its wings at the instant when taken, and by combining the twelve views in a zootrope a single image of a flying bird is reproduced with wonderful fidelity. The apparatus by which these photographs were taken is illustrated in Fig. 1. It is called the "gun-camera," from its likeness to a fowling-piece, and the fact that it is aimed at the

bird like a gun. It consists of a barrel containing the object-glass, and at the middle of the piece behind the barrel is mounted a cylinder containing a clockwork, seen in Fig. 2. On pressing the trigger of the gun the clockwork begins to go, and to rotate a central axis carrying the apparatus for shutting out and letting in the rays of light coming through the object-glass, so that they may fall upon the sensitised plate behind. This apparatus is made up of a rotating

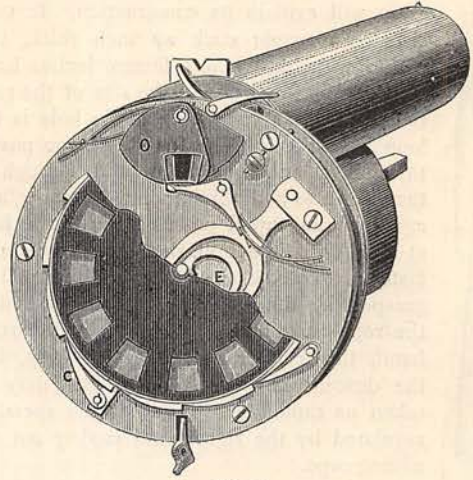


FIG. 2.

disc with one straight slit, which permits the light to pass twelve times per second, for an interval of $\frac{1}{30}$ of a second each time. Behind this disc is another with twelve windows in it, behind each of which is a sensitised dry plate. This disc also turns on the central axis, but in an intermittent fashion which permits it to pause twelve times a second, so as to expose each window and the plate behind to the ray reaching it through the slit in the front disc. This is

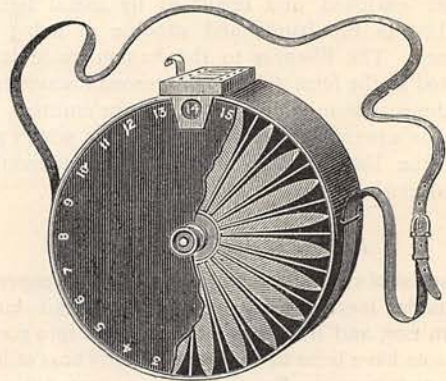
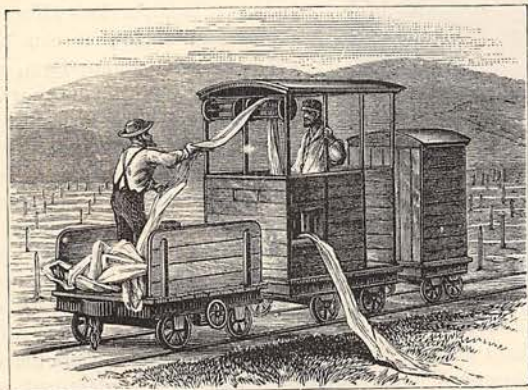


FIG. 3.

done by means of an eccentric, E, assisted by the catch, C. A shutter, O, arrests the rays passing through the front slit when the twelve photographs have been taken. By means of a press-button, b (Fig. 1), the plates are kept in position. A good focus is obtained

by lengthening or shortening the gun-barrel, and for this a suitable scale is provided. Fig. 3 is a case or pannier for holding twenty-five dry plates, and it is simply slung round the shoulders.



Electricity in the Bleachfield.

At Le Breuil-en-Auge (Calvados), France, there is a large bleachfield belonging to M. Paul Duchesne-Fournet, where linen is bleached on a great scale. The pieces of linen are each over a hundred yards long, and much time is required to lift them from the bleaching-ground by hand, and transport them to the stores. Steam-power cannot be employed for this purpose owing to the smoke from the engine smutting the linen, and the proprietor has introduced electric power with decided advantage. He has run an electric tramway through the grounds, and the locomotive not only transports the linen to and from the field, but lifts it off the ground. This is done by simply causing the electric current to rotate large drums for winding up the cloth, instead of rotating the wheels of the locomotive. The electricity is supplied by a set of Faure accumulators, such as we have previously described in the GATHERER. It will be remembered that these reservoirs of electricity are composed of lead plates covered with peroxide of lead and immersed in sulphuric acid and water. The tender containing these accumulators runs in front of the locomotive, which is fitted with a dynamo-electric motor, connected to the wheels of the car in such a manner that when the current from the accumulators is sent through its bobbin, the revolution of the bobbin turns the wheels of the car and starts the locomotive. Stoppage of the current stops the car, and reversal of the direction of the current through the bobbin reverses the motion of the car. Brakes are added to bring the train speedily to rest. When the linen has to be lifted from the field, the electric motor is caused to rotate the large drums, over which the linen passes

into a waggon, as seen in the illustration. This arrangement has been working with every success for the last three months at the bleachfield in question.

Sea-weed Leather.

A French chemist, M. Alexandre St. Ives, has succeeded in extracting from sea-weed a composition like starch and sugar, which is well adapted for manufacturing artificial leather and transparent materials. The sea-weed after being washed in pure water, or water impregnated with lime or potash, is dried, then pounded, and treated in a conical boiler to a bath of steam or hot water. A soluble substance is thus extracted, and the residue on cooling assumes a gelatinous or leathery consistency. Sea-weed is an abundant and cheap commodity, but its uses have hitherto been few.

Guano from Bats.

Some ancient bat-inhabited caves recently discovered in Uvalde County, Texas, North America, are so deeply paved with rich guano from the bats which have lived there, that steps have been taken to utilise the produce in the interest of agriculture. One cave, termed the Cibolo Cavern, is about 400 feet in length, and the deposit of guano is in some places over 30 feet thick. This is, however, only an outer vestibule leading to an inner cave which has never been explored, and to which the birds retire to sleep. It is believed to be at least two miles deep; and the Uvalde Cave is said to be several times larger. It will be seen therefore that there is a large supply of the fertiliser to be had, and analysis shows it to be worth from £10 to £12 per ton. Several shipments of the guano have already been made, and steps are being taken to erect a factory for the production of sulphate of ammonia from it.

A Life-Raft.

Rafts have saved many lives at sea, and the very name brings a sense of security which a more easily capsized boat does not give. It is probable that life-rafts have been too much neglected as a safeguard

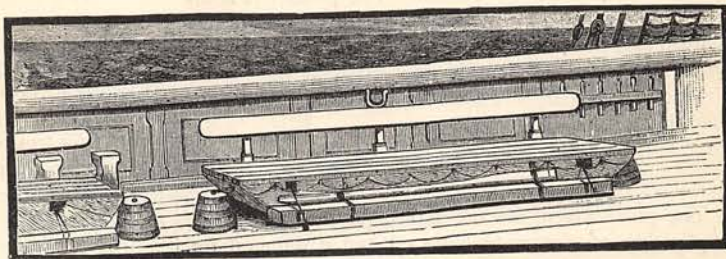


FIG. 1.

against wreck, but recent trials at Harwich of a new raft, devised by Mr. E. S. Copeman, show that they are coming again to the front. Our first illustration

represents Mr. Copeman's raft lying at rest on the deck of a ship ready for use in an emergency, and serving at the same time as a deck seat, while the second one

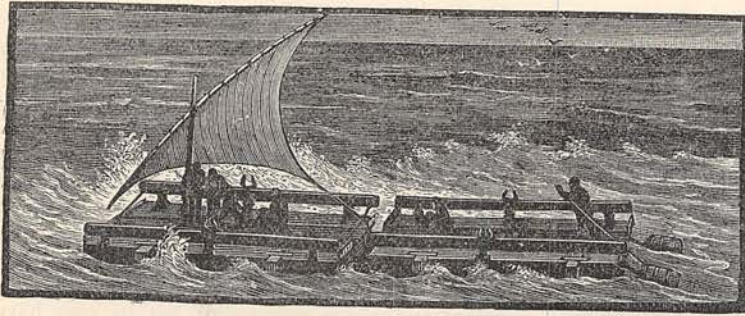


FIG. 2.

shows it in action on the sea. As will be seen, the raft or catamaran consists of two or more seats or benches, formed of air-tight pontoons or boxes, from twelve to twenty feet long and two feet square, and lashed together with spars. The back rail of the seat serves as a bulwark to the raft, and a frame fitted to the top of each seat becomes the floor of the raft between the two pontoons. Such a contrivance can easily carry ten persons on board and others clinging to it. Being on deck, it is readily got at and launched; and being uncapsizable, is likely to inspire confidence in the shipwrecked.

A Railway Station Indicator.

It would be very convenient for passengers travelling by the Metropolitan District Railway, or on certain suburban lines, if each carriage were provided with one of the station indicators invented by Mr. Rogers, and recently exhibited at the Crystal Palace. The dial of the indicator and its apparatus are exhibited in the figure. Several station names are marked in succession on the dial, and a pointer, moved by an electric current, indicates the name of the approaching station. The pointer is actuated by the electro-magnets through the toothed wheel shown, and the electric current operating thus, mechanism may either be sent by the guard at the proper time or by the front wheels of the train closing an electric contact automatically.



Insulite.

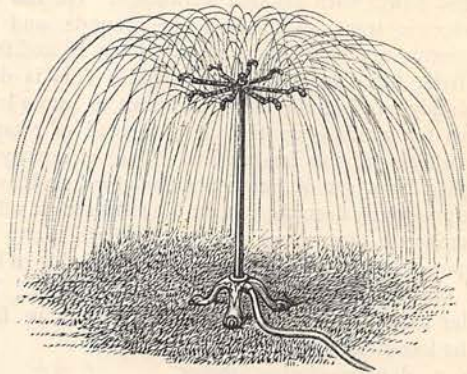
The prospects of electric lighting and the general application of electricity have created a demand for insulating materials to confine the electric current on the wires conveying it, and Dr. John Fleming has been fortunate enough to discover a new insulator, which has been pronounced most satisfactory by several eminent electricians, including Sir W. Thomson. Hitherto we have relied mainly on india-rubber,

gutta-percha, glass, stoneware, silk, and ebonite for insulating electricity upon wires, but the new material, "insulite," is prepared by a secret process from wood,

sawdust, cotton waste, water-pulp, and other fibrous materials. It is impervious alike to damp and acids; it can be easily moulded to any form, or cut to any pattern; so that it is available not only for coating wires, but for making battery jars, telegraph insulators, or frames for electric apparatus. Ebonite for the last purpose is not very satisfactory, owing to its liability to decompose under the action of light, while slate soaked in paraffin is difficult to work; but the new material is free from these objections, and moreover it can be manufactured at a relatively lower cost. Doubtless it will have its own imperfections, but at present it is not easy to see what they are.

A Lawn "Sprinkler."

The skilful yet simple piece of apparatus here sketched will doubtless be of much interest to those who possess lawns or other plots of useful or ornamental grass-land. Under ordinary water-pressure the horizontal arms carried by the upright tube rapidly revolve, and scatter the water over an area of as much



as forty feet in diameter. This artificial shower falls as gently as rain in April, and if occasionally brought into play during periods of drought, will keep the sward in a fresh-looking and healthy as well as ornamental condition. The arms may be unscrewed, and the stem will then form a very convenient and portable fountain.

Poteline.

A new artificial product, capable of many useful applications, has been brought out in France, by M. Potel, who calls it "poteline." It is prepared by mixing gelatine, glycerine, and tannin, and is stated to be quite impervious to the air. When heated it

is liquefied and takes all the contours of an object immersed in it or serving to hold it. Corks which exclude the air can readily be made from it, and viands enclosed in a skin or bag of it are preserved from putrefaction by the exclusion of germs.

A New Incandescent Lamp.

The lime-light and the electric light are the two best known forms of light for spectacular effects, or for projecting views of objects upon a screen so that a large body of people may see them. Both these kinds of light, however, have their drawbacks for general use; they are expensive and difficult to manipulate. For primary schools or private experiments they are out of the question; hence

it is that the new source of light, discovered by Dr. Regnard and illustrated in our figure, is likely to prove serviceable. It acts by the ignition of a mixture of air and petroleum vapour in contact with platinum. The lamp consists of a Bunsen burner, having its mouth closed by a netting of platinum wire; the lower part of the burner is connected by an india-rubber pipe to a bottle containing petroleum; and the bottle is also connected by a second pipe to the nozzle of a small hand-bellows. On blowing the bellows a stream of air mingled with petroleum vapour flows to the burner, and, being lit at the platinum cage, heats the latter white-hot. A brilliant flame suitable for projecting transparent pictures on a screen, or lighting up large halls, is the immediate result.

The Colour of Water.

Two theories are usually advanced to explain the blue colour of water when seen in large masses, such as the Lake of Geneva or the Mediterranean Sea. Professor Tyndall's theory is that small solid particles suspended in the water do not reflect the lower or red rays of the spectrum. The other theory supposes that the colour is due to the absorbent action of the water itself on the white light before and after reflection by these particles. However, some recent experiments by Mr. John Aitken, communicated to the Royal Society, show that the latter theory is the likeliest. The greater the number of white reflecting particles, the greener the water appears to be, and hence the gradual deepening of the green to blue as the shore is left. The waters of Lake Como owe their darkness to the absence of reflecting particles; those

of the Lake of Geneva owe their brilliant blue tinge to the presence of such particles. Mr. Aitken produced a similar blue in Lake Como by scattering finely-divided chalk in the centre of that lake. The brilliancy of the colour depends on the shade of the particles, and is greatest with white particles. Springs often yield a bright blue water, but our English rivers are generally dull owing to the dingy colour of the silt.

A Weather-proof Ventilator.

At the recent naval exhibition held in Fishmongers' Hall, London, a useful ventilator for ships was exhibited by Mr. John Gibbs. The special advantage it possesses over the old-fashioned open ventilator is that, whatever the weather, the rain cannot enter it. Fig. 1 represents the mouth of the ventilator as now made; and the air passing into the bell-mouth impinges on a deflecting plate behind, and is thus directed

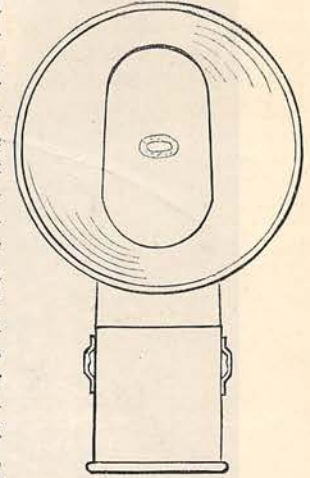


FIG. 1.

down the shaft through an opening provided for the purpose. Any water finding an entrance is caught by a projecting rim and allowed to run out. Another form of this ventilator, constructed to avoid any trimming or setting, is shown in Fig. 2. These ventilators are self-acting and not likely to get out of order. They may be used in conjunction with Boyle's ventilator for extracting vitiated air from below. At a recent trial on the Mersey a ship's hose was allowed to play on them, but no water found its way into the shaft below.

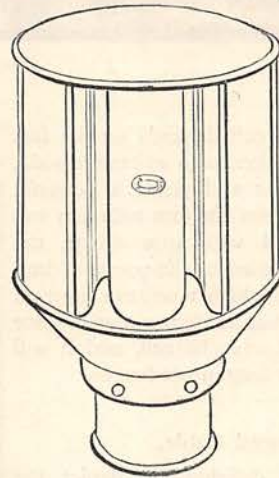


FIG. 2.

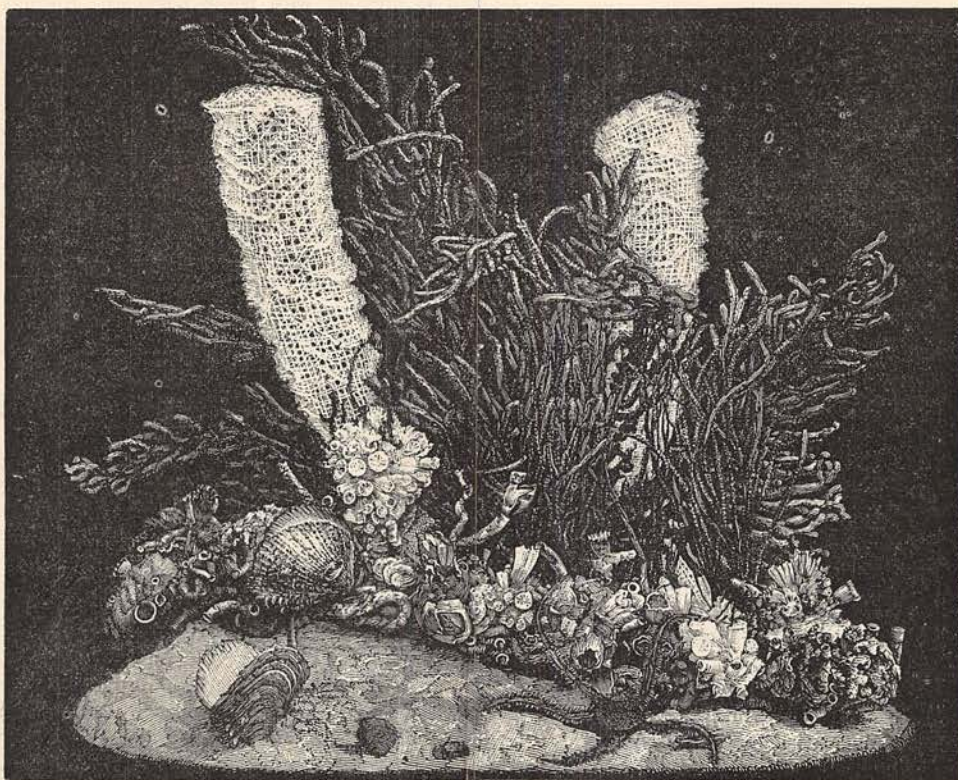
A Sixpenny Voltaic Cell.

A very cheap but efficacious voltaic cell, suitable for ringing electric bells in houses, can be prepared from an old iron milk or meat tin and some scrap or gutter zinc. Purchase a porous clay pot, such as are sold by electrical instrument makers for twopenny; place it in the milk-tin, and fill up the tin with a solution of caustic soda. The zinc is to be rolled up

and stuck into a plug of cork or wood saturated in melted paraffin wax, then inserted into the pot, which is filled with water. Wires are soldered to the zinc and the milk-tin to serve as electrodes carrying off the

A Panorama Photograph.

The process of instantaneous photography has reached such a degree of perfection that it is very probable we shall be able, at no distant date, to secure



A SHELL-COVERED CABLE.

current. The action of the cell depends on the fact that iron in an alkaline solution, such as caustic soda, is "electro-negative" to zinc and yields a powerful current. If the space between the iron milk-can and the porous pot be packed with iron filings, the efficiency of the cell is increased by the points of iron giving off the hydrogen gas which tends to collect on the iron plate. Such a cell has an electro-motive force nearly equal to that of a Leclanché cell, and it will ring an electric bell quite as long, if not longer.

A Shell-covered Cable.

Poets and artists have delighted to depict the strange and beautiful things believed to reside in the depths of the sea; and the accompanying illustration of a piece of submarine cable picked up from the floor of the East Indian ocean, in the neighbourhood of Singapore, is a striking testimony to the truth of their imaginations. The specimen in question was exhibited by the Eastern Extension Telegraph Company at the Crystal Palace, and it is to the kindness of Mr. Hesse, the secretary of that company, that we are indebted for our illustration.

by its means not only magnificent impressions of landscape, but also records of great historical pageants, and of less imposing, though not less interesting, scenes of every-day life. Messrs. West and Son, of Gosport, have produced by this process a panorama of Portsmouth Harbour as viewed from the Semaphore in the Royal Dockyard, which, whether regarded as a work of art or from a strictly technical point of view, leaves nothing to be desired. The composition is excellent. In the centre lies the *Serapis* troopship, to right and left may be seen such vessels as the famous old *Victory*, the *Inflexible*, the *Duke of Wellington*, the *Glutton*, and other huge "craft," besides a multitude of tugs, yachts, and rowing-boats. In another part of this large photographic plate—which is four and a half feet long—is admirably represented the launch of H.M.S. *Canada*, testifying—by the way, as it were—to the immense utility and practical importance of the instantaneous process. The whole scene is full of life and "go"—the ripple on the water, the foamy backwash of steamers, the smoke from funnels, the flutter of bunting, are all reproduced with a really wonderful fidelity to nature. It has only to be added that this panorama does great credit to English photography.