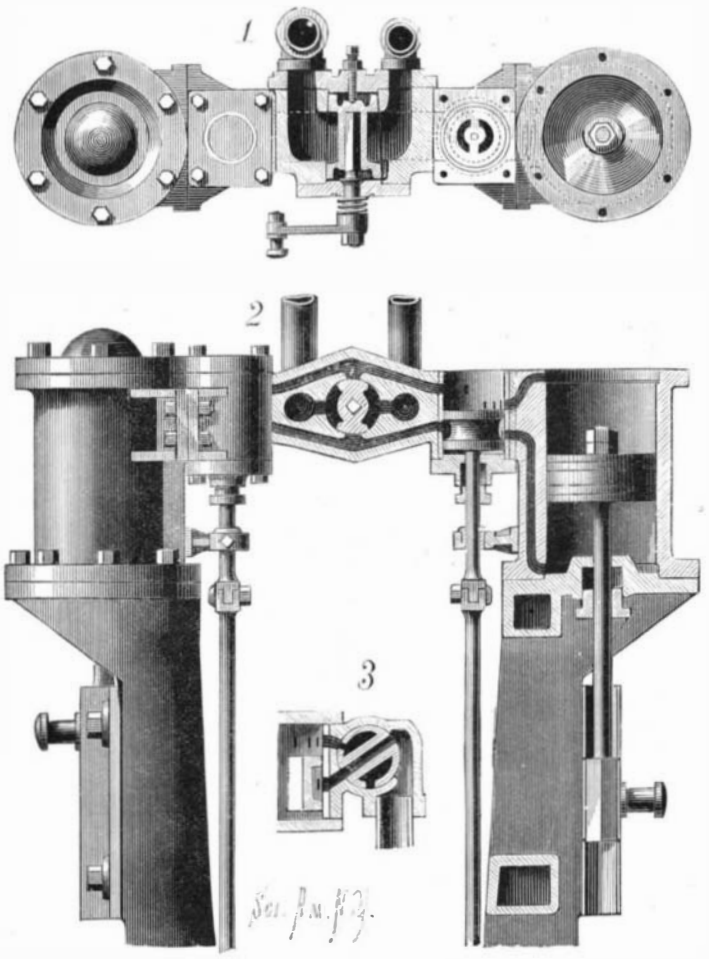
REVERSING VALVE FOR HOISTS, ELEVATORS, ETC.

Fig. 1 is a plan view, the valve and its casing being in section, of the engine cylinders, Fig. 2 is a side elevation and section of the same, and Fig. 3 shows the valve used in single engines. Each cylinder has the usual ports connecting with its opposite ends, and controlled by a suitable valve in the usual manner. Arranged midway between these cylinders is the reversing valve, of conical shape, but the taper being only sufficient to admit of its being ground to a good fit. The valve is fitted to work within a case directly connecting the two cylinders; this arrangement serves to brace the cylinders and to make the whole simple and easy of access. The valve is divided longitudinally into two compartments by a central partition, as clearly indicated in Figs. 1 and 2, which also show the ports and the steam and exhaust pipes. One of the ports formed by the partition serves to pass steam to, and the other to exhaust steam from, the engine cylinder valves.

At one end of the valve is a set screw, passing through the end cap of the casing, and a lock nut by which the valve can be adjusted. Steam pressure serves to keep the valve seated; and when steam is down, the valve is seated by a spring on the reversing spindle on the outside of the casing. Placed on this spindle is an arm by which the valve is shifted. The spindle is not secured to the valve, so that the latter may be removed whenever necessary by simply taking off the end cap of the casing.

When the valve is in the position shown in Fig. 2, the ports leading to the cylinder valves are closed; it will be readily perceived that the steam can be admitted to either side of the piston by turning the valve in one or the other direction. It will also be seen that the passage for live steam for one direction in the motion of the engine becomes the exhaust passage in an opposite moving direction of the engine, and *vice versa*. In Fig. 3 is shown a valve designed for single cylinder engines; the arrangement of the ports is clearly shown. The engine can be controlled from a distance by means of a rope or wire connected with the reversing lever; this method is especially advantageous when the engine is applied to work an elevator. This invention has been patented by Mr. E. L. Moore, and particulars can be obtained from Messrs. Moore Brothers, of Portsmouth, Ohio.



MOORE'S REVERSING VALVE FOR HOISTS, ELEVATORS, ETC.

Suggestions for Construction from Nature.

PROFESSOR COCKERELL, R.A.

Sir Christopher Wren reflected that the hollow spire which he had seen or built in so many varieties was, after all, but an infirm structure, and he sought that model which should enable him to impart to it the utmost solidity and duration. Simple was the original from which he adopted his idea. He found that the delicate shell called *turretella*, though extremely long and liable to fracture from its base to its apex by the action of the water amid the rocks, was rendered impregnable by the central column, or newel, round which the spiral turned. Therefore, in his spire of St. Bride's, he establishes the *columella* in the center, round which he forms a spiral staircase to the top issuing on stages of arched apertures, thus giving us (if not the most beautiful) certainly the most remarkable and enduring spire hitherto erected. When Brunelleschi was charged with the erection of the dome of Sta. Maria at Florence, of nearly equal diameter with that of the Pantheon, but at morethan twice its height from the pavement, upon a base raised on piers, and by no means of the strength and cohesion of the original model—the Pantheon—it was apparent that in giving it the same solidity, the weight would be insupportable on such a foundation. How was this object to be accomplished? Brunelleschi reflected that the bones of animals, especially of birds, possessed solidity without weight, by the double crust or hollow within. But, above all, he remarked that the dome which completes the architecture of the human form divine was constructed with a double plate connected by the light and fibrous but firm walls of the hollow *cancelli*, so that strength and lightness were combined in the utmost degree. Brunelleschi followed this model in his dome of Sta. Maria, and the traveler now ascends to the lantern between the two crusts of plates forming the inner and outer domes. Michel Angelo adopted this contrivance in the dome of St. Peter's, and almost all the subsequent domes are upon the same idea.

Glass Sand Bricks.

M. Hignettedescribes a new ceramic product from the waste sands of glass factories, which often accumulate in large quantities, so as to occasion great embarrassment. The sand is subjected to an immense hydraulic pressure, and then baked in furnaces at a high temperature, so as to produce blocks of various forms and dimensions, of a uniform white color, which are composed of almost pure silex. The crushing load is from 370 to 450 kg. per square centimeter (between 2 and 3 tons per square inch). The bricks, when plunged in chlorhydric and sulphuric acid, show no trace of alteration. The product has remarkable solidity and tenacity; it is not affected by the heaviest frosts or by the action of sun or rain; its resists very high temperatures, provided no flux is present; it is very light, its specific gravity being only 1·5; and it is of a fine white color, which will make it sought for many architectural effects in combination with bricks or stones of other colors.

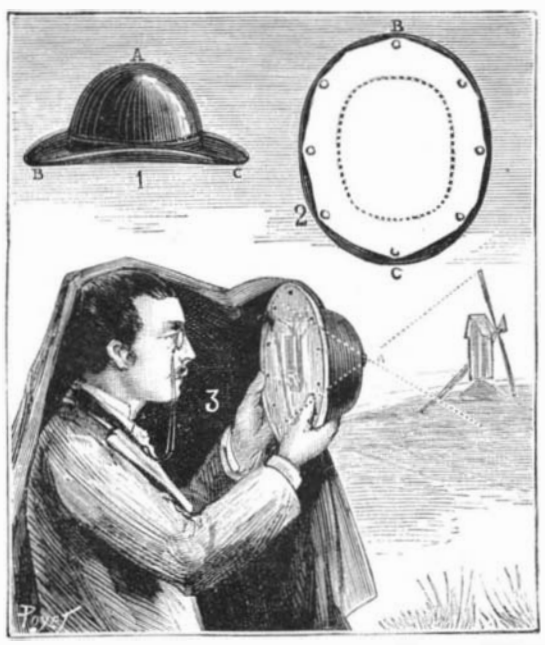


Fig. 1.—THE DERBY HAT AS A CAMERA OBSCURA.

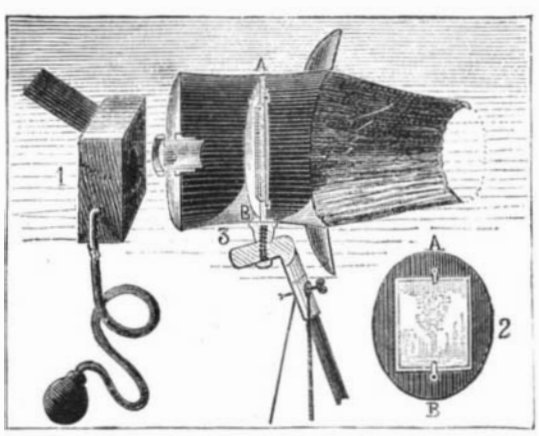


Fig. 2.—BEAVER HAT CONVERTED INTO A PHOTOGRAPHIC CAMERA.

The Maxim Gun.

At a recent meeting of the Society of Arts, London, Mr. Hiram Maxim described at some length the construction, and showed the mode of working his patent gun. He said the complication to which the reader of the paper had alluded was not a necessary part of the gun; it might have been made to load and fire itself without so much complication; but these complications were introduced in order to allow of the magazine for the cartridges being placed under the gun instead of over it, where it was more exposed, and of its continuing to fire automatically with no attention beyond that of one man who directed the fire.

Some other guns required two men to put the cartridges in at the top, and one to turn the crank for firing, and another to turn the gun about, which made the motion very slow, the cartridges falling into their place by the action of gravity. In this gun they were arranged in a belt from which they were taken one by one, and a belt might be made to hold 2,000, if necessary. The speed was adjustable by the trigger, and could be made as high as 600 per minute. The gun could be adjusted so as to have a horizontal fixed range between two points, and thus, if works destroyed in the day were repaired by the enemy in the night, the bearings and levels could be taken in the daytime, and fixed, and at night the gun could be kept firing between these two points all night, by simply a boy to move it slowly from side to side; and he should not be surprised to find that the boy, like the one they had heard of, had devised some plan for making the gun do this automatically.

There was such beautiful adjustment in every direction, that you could easily write your name on a screen with it. Having described the means by which the recoil from each shot was utilized to extract the empty cartridge case, Mr. Maxim concluded by saying that when once put into work, the gun would go on firing, if desired, until the man who paid for the cartridges was in a hopeless state of bankruptcy.

THE HAT AS A CAMERA OBSCURA.

Take a Derby hat and close the ventilating apertures at the sides, if it have any, and remove the wire gauze from the ventilator in the top (Fig. 1, No. 1). Next, cut an oval piece, equal to B C, out of a sheet of tracing cloth or translucent paper, and fix it to the brim by means of drawing pins (Fig. 1, No. 2). This screen should be slightly oiled, so as to make it transparent.

Next, having provided yourself with a cloak, wrapper, tablecloth, or something of the kind as a photographic veil, go to the window and point your objective (the ventilator) at any brilliantly lighted object.

If your head be inclosed in the improvised veil in such a way that your hat is also surrounded as completely as possible by its folds, you will see a reversed and reduced image of the object appear upon the screen. In a word, you will have a practical apparatus for demonstration which is analogous to the camera obscura, and which may be used at home or during a promenade (Fig. 1, No. 3).

If the hat is not provided with a ventilator, an aperture may be made in the crown by means of a red hot nail, or a punch, if you have one. This aperture should not be more than a tenth of an inch in diameter, and its edges must be very sharp. As a finishing touch, a blackened copper eyelet might be set into it.

Amateurs dream of light apparatus—that joy of the traveling photographer. Here is one represented in the accompanying engravings. A beaver hat, provided with a lens holder, is affixed to the tourist's cane. A special lining does duty for the black veil, and the device is operated by means of an ordinary shutter that is carried in the pocket (Fig. 2, No. 1). The tourist is supposed to have with him a portfolio containing some Stebbing's pellicular *cliches*, small frames of stiff cardboard, and a small square of prepared cloth mounted in a frame, serving as a ground glass screen, and to be fixed in the hat only at the moment of operating. The objective is removable, and is replaced at will by a conical button like those that ornament the Indian helmet. The amateur will be obliged to work bareheaded, as shown in Fig. 3.

It will be necessary to substitute a draw curtain for the ordinary draw frame.—*La Nature.*

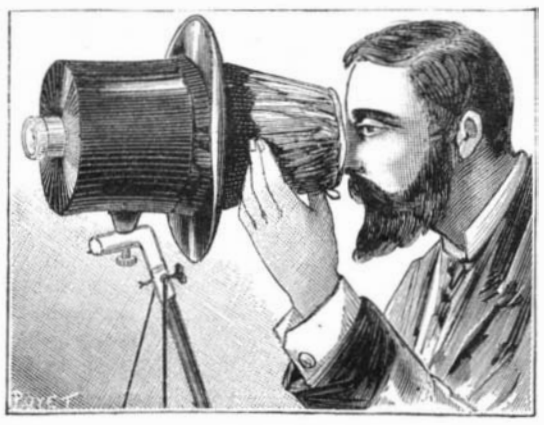


Fig. 3.—MODE OF USING THE APPARATUS.