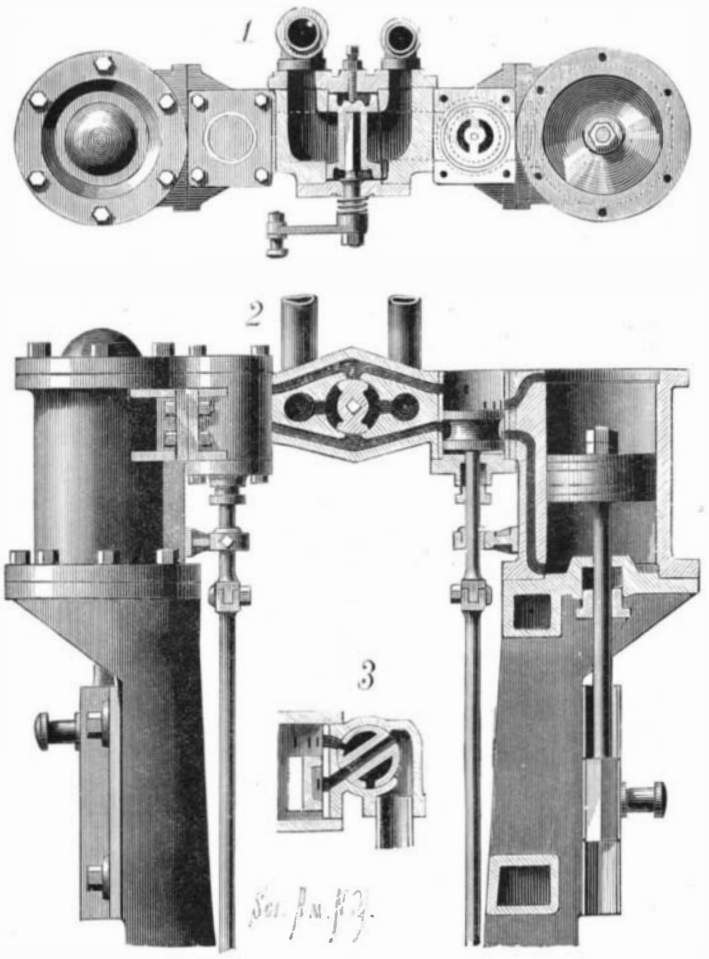
REVERSING VALVE FOR HOISTS, ELEVATORS, ETC.

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 more than 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. Hignette describes 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.

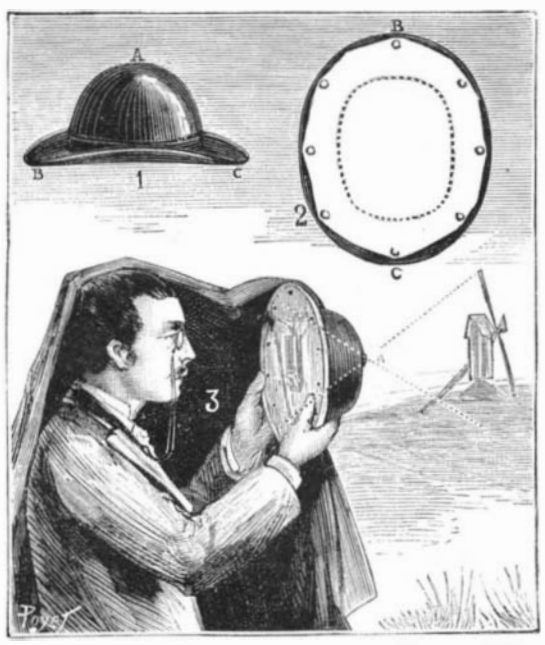


Fig. 1.—THE DERBY HAT AS A CAMERA OBSCURA.

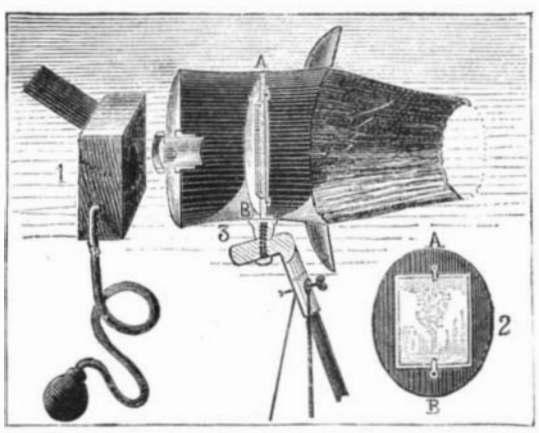


Fig. 2.—BEAVER HAT CONVERTED INTO A PHOTOGRAPHIC CAMERA.

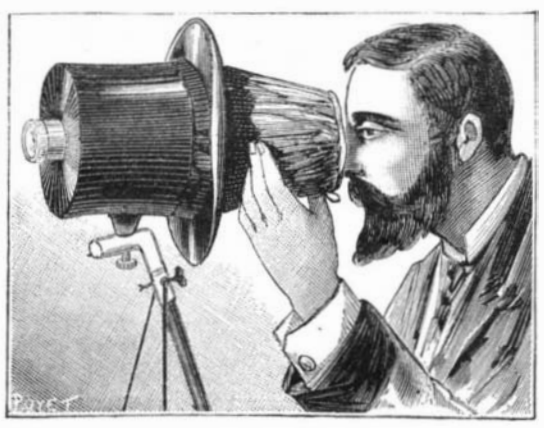


Fig. 3.—MODE OF USING THE APPARATUS.

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.*

The New Orleans Exhibition.

Aside from the cotton exhibit, the showing of minerals from various sections of the country, yet undeveloped, is by far the most striking, if not the most important, feature of the Exposition. But even in this part of the display a lack of judgment on the part of the managers is to be seen. Surely a ton of ore from a certain locality is amply sufficient to denote the quality of its deposits; it seems but a waste of valuable space to permit the exhibit of 20, 30, or 50 tons, as is the case in some instances.

It might have been explained to the enthusiastic Arizonians, for instance, that a half ton of ore, or a ton at the most, was amply sufficient to illustrate the richness of Iron Mountain. It was scarcely necessary that they should bring the mountain along with them; and those enterprising gentlemen from New Mexico who discovered the petrified forest should have been induced to leave a larger part of it at home in the ground, that a few longitudinal and cross sections would have sufficed to show how fine a polish this really curious fibrous stone is capable of receiving.

The exhibits from the Southern coal and iron fields, when considered along with the statistics of the recent output, does much to show that at no distant day the South may be looked to to supply its own fuel and iron ware. The Alabama iron people say they have inexhaustible beds of the best iron ore, with coal and limestone close at hand, and that ere long they will be making iron for from $9 to $10, against the $16 and $17 which it costs to make it in Pennsylvania. Indeed, if the limitless coal and iron fields in the South and West, represented at New Orleans by specimens, should ever be simultaneously worked, the time may yet come which was prophesied long since by an enthusiastic Yankee, when Newcastle will furnish a good market for American coal, and in Sheffield be found a ready sale for American steel.

The product of the California vineyards, a part of the agricultural department, attracts, as might be expected, not a little attention from foreigners, and may even be said to be more or less of a revelation to natives. New Orleans, probably more than any other city in the country, is a wine drinking city, by reason of its large French, or rather Creole, population. Like the inhabitants of the *Quartier Francais* in New York, the Creoles would not knowingly drink any wine of American growth, in the belief that it is rough and acidulous, and contains too many headaches to the quart. But in tasting this California wine at the Exposition, the Creole palate could scarcely have failed to recognize an old and much valued friend, for, as is well known, the major part of the California wine crop—last year it was fifteen million gallons—goes into bottles labeled Bordeaux, Rheims, etc. Part of this, an immense quantity, crosses the ocean, and after a short sojourn in a French laboratory, where it is fortified, loaded, and otherwise adulterated, comes back as French wine, and commands an enhanced price as such. But the Zinfaudel and Riesling wine of Sonoma needs no French label to give it a value, and though by no means up to the standard of the choice French vintages, is said by good authorities to have more body than the average of French wines, and a *gout* not at all inferior.

These California wines, as exhibited, are said to show unusual improvement over the product of former years. The viticulturists of the State observe more care than formerly in selecting the proper soil and exposure for the different descriptions of grape. The necessity for cultivation, too, is becoming more and more recognized, and the result is that the vines are more mature. The fact that the demand for California wines is greater than the supply does much, it is said, to encourage the grower to look after the quantity of his product rather than its quality. There is an inclination, as the statistics show, to give a large quantity of grapes of the rougher and less prized descriptions, because requiring little cultivation, and only a small quantity of the finer qualities, which require much care and labor—just enough to induce the middleman or dealer to take the whole cellar on a general average.

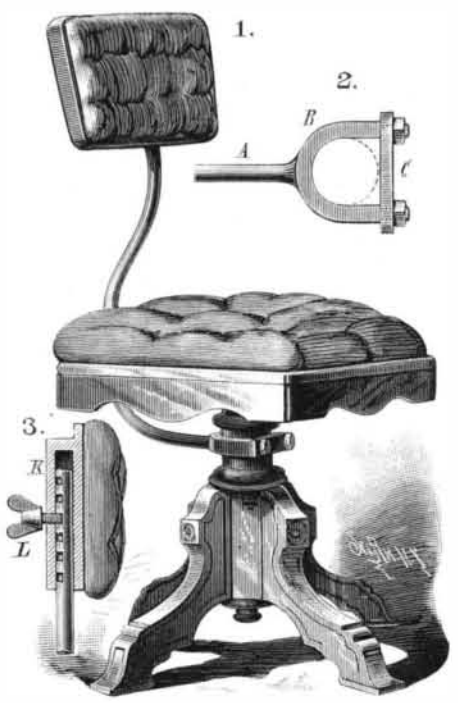
At the World's Fair, as at the recent exposition in Philadelphia, there is a dearth of instruments of precision and a plethora of money-making applications of well known laws among the domestic exhibits. There are, however, some notable exceptions to this at New Orleans. A carefully contrived pendulum for measuring high altitudes is shown by a Washington manufacturer, among many other mathematical apparatus. It was devised by a young engineer named Loring, or rather it is an improvement on an alleged improvement upon a similar instrument, which repeated trials some time since proved to be not at all times to be relied upon.

A New York surgical instrument house shows an electrical apparatus for lighting up certain parts of the human body. It is somewhat similar to those already experimented with, but is said to be far more efficient, and to give much better results. It consists of a curved tube containing a fine wire of silicious bronze to conduct the current to the incandescence lamp on the end, and which permits the constant flow of a column of water around the lighting bulb to prevent the generation of heat.

There is also shown an ingeniously contrived instrument, which is said to be invaluable in certain delicate obstetrical operations, and is the handiwork of Dr. Blake White, of the New York Board of Health. New York, it may be said, though making a poor show as a State, is represented in the manufacturing exhibits of nearly every other State.

BACK FOR PIANO STOOLS.

The back rest shown in the engraving, recently patented by Jeannette D. Baldwin, of Moore's Hill, Indiana, can be secured to piano stools of all kinds without interfering with the turning and revolving of

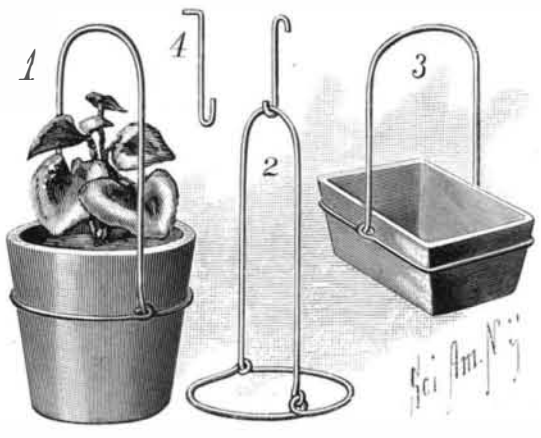


BALDWIN'S BACK FOR PIANO STOOLS.

the stool. A curved bar, A, is provided at its lower end with a fork, B, to receive the upper end of the stool. The ends of the prongs of the fork are screw-threaded to receive nuts which hold the cross plate, C, the latter being by this means drawn up tightly to clamp the fork on the stem. The bar, A, curves as shown in Fig. 1; its upper part being made straight and rectangular, and provided in the back with a series of notches. The notched section passes into a pocket on the back of a frame, K, whose front is upholstered to form the back rest proper. The back may be held at any height, the binding screw, L, entering one of the notches. The rod does not interfere with the revolving of the seat, and the entire back rest can easily be removed from or secured on the stool. The device is equally applicable to any revolving chair.

WIRE FLOWER POT HOLDER.

An invention lately patented by Mr. William J. Hesser, of Plattsmouth, Nebraska, consists of a holder for suspending pots containing plants and flowers. A piece of wire of suitable size and length is bent to the form plainly shown in Fig. 2. The flower pot, of whatever shape, is placed in the lower or ring portion of this frame, which may be suspended by means of



HESSER'S WIRE FLOWER POT HOLDER.

the hook, Fig. 2. The hook, shown in Fig. 4, may be formed with a point by which to connect it to the side of a post or board by driving into the wood. In connection with this holder, the inventor purposes to employ skeleton wire stands with cross bars and brackets, from which to suspend the holders, thus making a simple, useful, and ornamental contrivance that will afford the most room for the pots and will give the least obstruction to the light. The device is simple and efficient, and since but a single piece of wire is used, it is more rigid and better than if the bail were hooked into eyes made in the ring portion.

A New Time Check System.

The problem of insuring punctuality of the workmen in large establishments has long been troublesome.

Latterly electrical and automatic devices have been used with more or less success. The *Commercial Bulletin* describes one of these, whose origin is due to Rhode Island, that regulates the time for the entire establishment by an electric regulator in the mill office. At the hours of starting or stopping work, gongs ring simultaneously in all the departments, and the machinery is started. One large machine shop where the system is in successful operation employs five hundred hands, who are distributed among twenty-four departments, each of which has an appropriate letter, each man being known by a particular number. Every night each hand is given four circular brass checks stamped with the letter of his department and his own number. Two of these are small and thick and two large and thin, the first to be deposited by each man as he leaves the workshop, the latter when he enters it.

In the basement of every building there is an electric dial connected with a series of metal boxes stamped with the hours of the day, and so connected with the dial that as the hands of the latter revolve fifteen minutes, the circle of boxes revolves one place. Above these boxes project a pair of tubes running to every floor, with openings at each floor for the reception of checks. When a man enters the room at the top of the building at one minute of one, and drops his check stamped with his letter and number, it falls into the box stamped one o'clock; if the check is dropped at one minute after the hour, the hands of the dial and the system of boxes have revolved, and he is taxed with a quarter hour's lateness. The checks are collected at the end of the day, and arranged on tabulated boards, so that at a glance the time of the man at his post can be ascertained.

The number of checks given out provides for a man's entrance and exit at morning, noon, and night, with an extra pair of checks in case he should be called out and return during the day.

In every room there are two openings in the tubes, one labeled OUT, the other IN. Every time a man leaves the workshop, he must deposit a small thick check in the first tube, and every time he enters it a large thin one in the second, the checks falling and registering themselves in the manner described above. Owing to the difference in the shape of the checks and their respective openings, the confusion caused by a man's slipping an inward check into the outward receptacle is entirely avoided.

A difficulty which was at once experienced when the system was introduced was the advantage which might be taken by the workmen on the upper floors. A man might enter the lower floor, promptly deposit his check in the receptacle on that floor, and, unless noticed by some passing foreman, loaf and chat for ten or fifteen minutes about the stairs and passage ways, his check registering him as having arrived and reported promptly for work. This objection has been avoided by preparing the checks with a little boss or circular projection in the center, the openings in the tubes being made to correspond. This boss is large in the checks to be deposited on the upper floor, and small in those used on the lower. Consequently, a man cannot deposit his telltale check anywhere but in the proper receptacle in his own room under the eye of his foreman. In spite of the complexity of the new system, the results have been satisfactory.

A Decimal System of Time.

The following is an extract from a paper read before the Canadian Institute, Toronto, Canada, by Prof. W. J. Loudon. The system proposed is based on the decimal system.

The present day of 24 hours would be divided into ten divisions, so that each hour, if we might so call it, on the new system would correspond to 2 hours 24 minutes. This hour would be again divided into 100 divisions, called minutes if necessary, each minute on the new system thus corresponding to 1·44 minutes, a good fractional unit. Again, this new minute division could be subdivided for accurate measurements into 100 divisions, called seconds. The advantages arising from such a system would be:

1. The abolition of the so-called A.M. and P.M. nuisance—what has already been accomplished by the 24 hour system.

2. All the advantages to be derived from the adoption of any system based on our scale of 10—namely, the inconveniences arising from the continual use of vulgar fractions and the use of symbols for each unit in the ordinary affairs of life.

3. The fact that the time in hours and minutes (which for all practical purposes is sufficient) is indicated immediately by the clock. This is the most important advantage, because in the present system we have always to multiply by five before we know the time—thus 1 means five minutes past, 2 means ten, 11 means fifty-five past, or five to, and so on; and this would really overcome the great difficulty experienced by most children in learning to tell the time.