SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXXVIII. No. 9. [NEW SERIES.] NEW YORK, MARCH 2, 1878. [$3.20 per Annum. [POSTAGE PREPAID.]

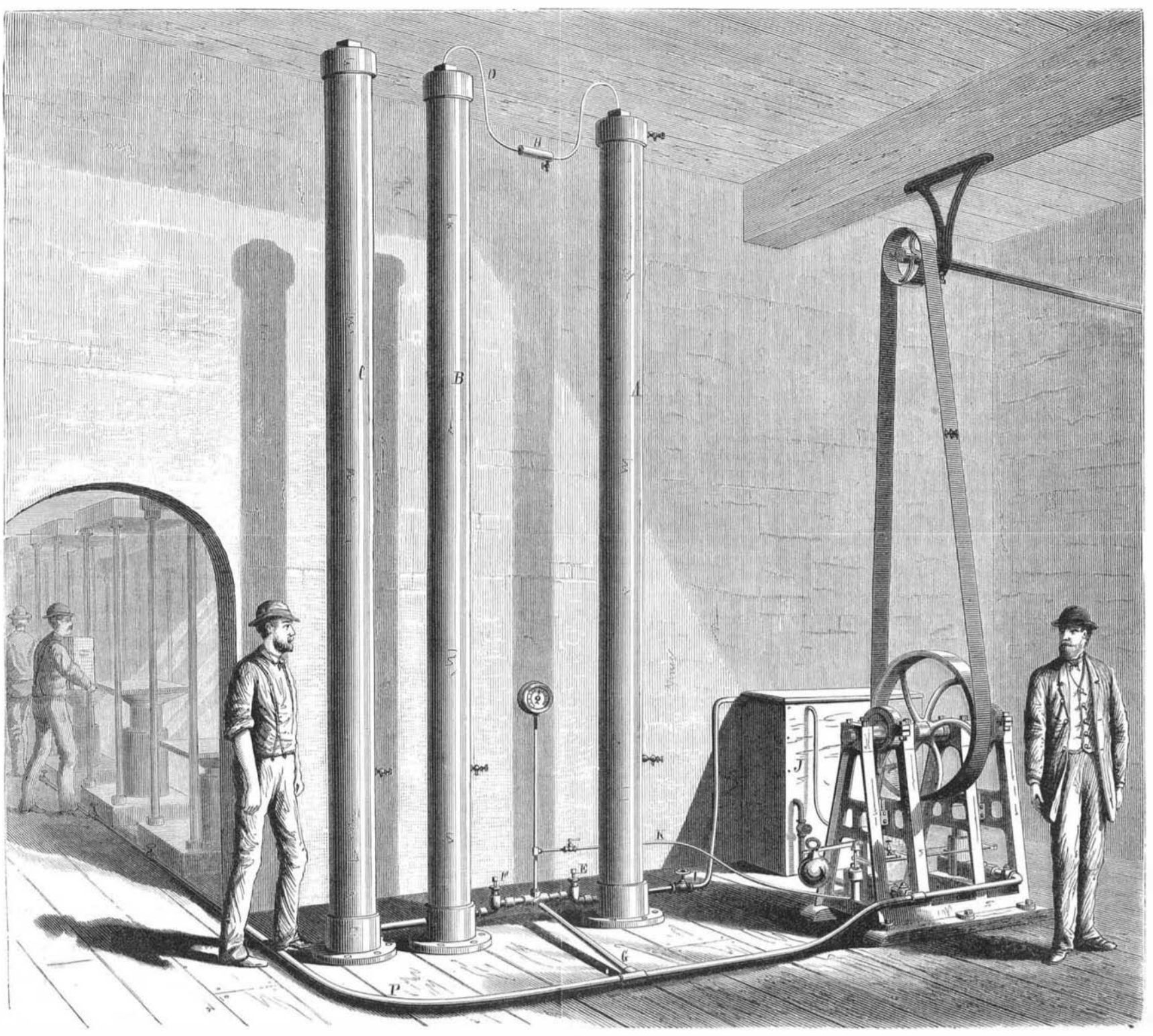
KINNEY'S HYDRO-PNEUMATIC ACCUMULATOR.

We illustrate herewith a new accumulator wherein air is made the reservoir of power. The apparatus is especially adapted for use with the hydrostatic press, in which connection it affords important advantages in economy of power and saving of time. The principal features are the stand pipes, wherein air is confined and compressed by water columns, which water is conducted to the press cylinder and operates the ram. The pumps, which force in the water against the elastic air backing, work continuously until a given water pressure is attained, when, by suitable mechanism, valves are opened which prevent any further delivery, the pumps merely moving the water to and fro without pressure. It will be noticed that this arrangement enables power to be accumulated and stored until wanted, and at the same time obviates the use of the safety valve as a means of relief from over-pressure. The apparatus remains inactive until a portion of the power is expended. Then, when the pressure falls below the fixed point, the valves close and the pumps again operate. Of course the power can be taken from the accumulator as rapidly as may be desired, so that there is no delay for the pump gradually to move the ram; while the action of the pump takes place between the operations of the press, its duty being simply to restore the water in the accumulators which has been used in forcing down the ram. The same water is used over and over again, circulating between a reservoir, the accumulators, and the pump cylinder. Air once compressed in the accumulators is kept there indefinitely, there being no means for its escape. It will be further obvious that the dispensing with the safety valve materially reduces the power necessary to run the pumps, and that the power stored up is susceptible of easy regulation.

In our large illustration, A, B, and C are the accumulators, constructed of wrought iron pipe and securely closed at top and bottom. A and B are connected at their upper ends by the drop pipe, D, and at the lower portions by a pipe containing valves, E and F. To a union between these valves is connected the pipe, G, leading from the pump; and also the small tube leading to the pressure gauge. It is first necessary to charge the accumulators. To this end the stop valve, F, is closed and valve, E, opened. The pump is then set in motion to fill the tube, A, with water. The air from A is thus driven through the pipe, D, into B, so that in the latter it becomes subjected to a pressure of two atmospheres. The stop valve, H, in pipe, D, has sufficient play on its spindle to act as a check valve to prevent reflux of the water. The valve, I, is then opened and the water in A then flows into the reservoir, J. When the tube is emptied the valve, I, is closed and the pump set in operation to force in water into both A and C, until the pressure reaches the maximum required for working. During the last charge sufficient water is forced over the bent pipe, D, to fill both legs and to serve as a seal for the valve in said pipe. The tube, A, then empties of water through valve, I, which is afterwards closed. The stop valves, E and F, are then opened, and the compressed air equalizes itself in the three tubes. The required volume to work the press is then pumped into the tubes, and the relief arrangement is set to prevent the pump forcing any more water until the pressure is reduced. The same method is followed in charging a number of tubes, as the extra ones act merely as an extension of those shown.

In Fig. 2 is shown a section of the relief mechanism which automatically governs the pumping. Connected with the gauge pipe is a tube which leads to the small cylinder, K, in which is a plunger which supports a weighted lever. By adjusting this weight the plunger may be set to lift at any desired pressure. As the lever is lifted the arm, L, acting upon a projection on the end of a rod, operates the latter so as to open the valve, M. This opens communication between the pump cylinder, N, and tank, J, so that instead of the pump drawing water from the reservoir by the inlet at O, and forcing it to the tubes by an orifice opposite to said inlet, it merely causes a circulation from the tank to inlet, O, thence out at valve, M, and back to the tank. The pumps thus continue doing no work, and hence taking little or no power from the driving engine, until the pressure in

[*Continued on page* 130.]



KINNEY'S HYDRO-PNEUMATIC ACCUMULATOR.

BAILEY'S TESTING APPARATUS.

The accompanying illustration is taken from a photograph of a set of testing, indicating, and recording apparatus recently constructed by Messrs. Bailey & Co., Salford, England. This apparatus covers a diversified field, as will be seen from our description, and yet there is a certain similarity of principle which appropriately groups the several members of the series together.

The reservoir recorder is one of a number made to indicate the fluctuations of the water in the reservoirs of the Sheffield Water Works, and in connection with the other instruments has been described in the *Engineer*. The drum performs a revolution once a week, being driven by a small turret timepiece, strong enough for the purpose, and the clock beats seconds. A friction clip in connection with the set dial enables the drum to be set to the true time without difficulty. The diameter of the drum is 12 in., and its length is 3 ft., a fluctuation of 6 ft. being recorded, thus giving a scale of 6 in. to a foot. This reduction of scale is obtained in a very simple manner, the float pulley upon which the chain is fixed being double the circumference of the pulley which actuates the pencil, and which is guided by the two horizontal brass bars over the top of the drum, in order to prevent any possible error from backlash of the mechanism, or by wear and tear in the ordinary course of use. The float, it will be observed, is balanced by a small weight attached to a chain, which is fastened to the pencil block; this enables a very sensitive diagram to be taken. The illustration at the bottom of the engraving shows a diagram, which will scarcely require any further explanation.

Somewhat similar in design is the recorder for indicating the blast of smelting furnaces, in the left hand corner of the engraving; the dimensions of the drum and of the timepiece are similar to the reservoir recorder, but the instrument has been constructed for a different purpose. The improved hot blast fire brick stoves now used for heating the air used for the blast furnaces are worked intermittently, and the results depend a very great deal—in fact, we may say altogether—upon the regularity of the performance and punctuality of the men who have charge of them. This will be understood by those engaged in blast furnace operations. In a very simple manner each blast furnace has its performance recorded upon the revolving diagram. In all, the performances of twenty-one engines are indicated and recorded upon the drum. Each engine has its own separate and independent pencil, which records its performance on the paper, and this is done in the following manner: A pipe leading from the blast pressure terminates at a cross bar opposite the drum, to which the pencil mechanism is fastened; when the blast comes on a small piston is caused to project forward forcing the pencil upon the paper; the joint is made air-tight by means of an elastic diaphragm, about an inch in diameter. There are means of adjustment and other details which have required great care in their development, and to which it may not be necessary to refer. As the diagram makes a revolution once a week, it will be apparent from our description that the number of hours worked by each blast engine can be at once seen by the length of the stroke which its pencil has made upon the paper. By then comparing the number of strokes made per minute, or per hour, by each engine, important calculations may be made and statistics obtained which will bear upon economy of manufacture.

We also illustrate a set of machines made for the Imperial College of Physical Science, at Yokohama, Japan, for that Government. In the background is shown a cement tester. Most testers for this purpose have faults which interfere with accuracy, owing to the vibration which is imparted to the machine during the process of testing, as extra weight and strain are being put upon the material under tests. Sometimes it is done by a screw which lifts a lever, and sometimes by means of a movable weight which slides along a lever, similar to small weighing machines. This machine, which is called hydrostatic, has the weight — which consists of a long can into which a small stream of water flows—placed at the end of a lever; this enables the test to be applied in a very gradual and nearly imperceptible manner, without any vibration; in fact, the operator may sit down and watch the machine after the tap has been turned on until the fracture is effected. The height of the water in the cistern is indicated by means of a glass tube, similar to the water gauge glass of a steam boiler, the graduation being painted down the can or cistern. When the material is broken a small trigger closes the tap and prevents any further supply of water.

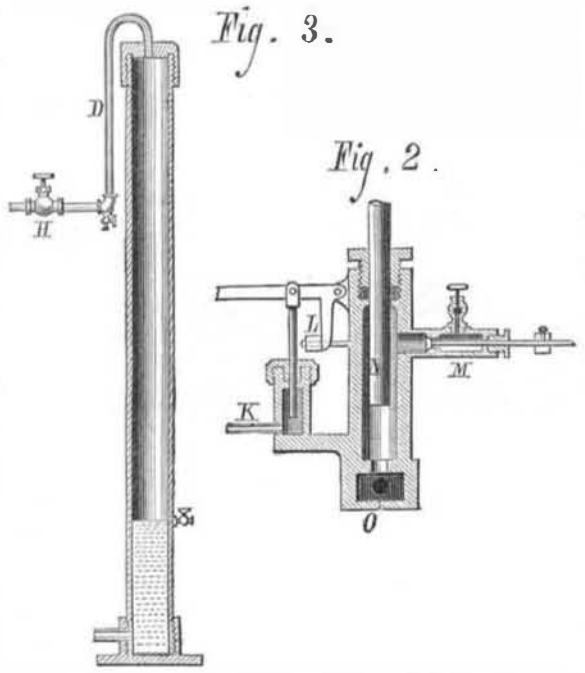
The instruments in the foreground consist of a Prony dynamometer for indicating the power exerted to drive small machines; weights are placed upon a lever which acts upon a friction brake; the revolutions are counted by means of a small compact friction brake dynamometer. The larger one is the bevel wheel dynamometer, which will indicate the power exerted by machines up to four horse power.

KINNEY'S HYDRO-PNEUMATIC ACCUMULATOR.

[*Continued from first page.*]

the tubes falls below the regulated point. This is caused by the drawing off of water for use in the press by the pipe,

Fig. 3.



KINNEY'S HYDRO-PNEUMATIC ACCUMULATOR.

P; and this water, after acting upon the ram, is led back to the tank, J.

It will be clear that the operation of pumping to replace the power drawn off takes place while the press is not in action, so that this interval is turned to useful account, the work of the pump supplementing, as it were, that of the press. The apparatus is excellently adapted for use in connection with cotton presses, owing to the economy of time effected. Any number of presses can be operated from suitable apparatus of this kind, the workman in charge of each managing his press independently of the others; or a press having a long stroke can be caused to work instantly at any speed and with safety.

The machine is in practical operation in several places in this city, and may be seen at 141 West Broadway. For further information address the inventor, Mr. F. S. Kinney, 141 West Broadway, New York city.

New Inventions.

An Antiseptic Powder, invented by M. Fabien Jourdes, of Paris, consists of equal parts of bisulphate of alumina and potash, or alum, pure sulphate of lime, and biborate of soda, or borax, to be used dry or in solution.

An Awning for show windows has been invented by Mr. Edward De Courcy, of San Francisco, Cal., by which the light may be admitted at the top and shut off wholly or in part, thus enabling goods to be shown in strong light, or protected from it. This awning is hung and raised or lowered in the usual manner, but at some distance below the top of the window, the space thus formed being opened or closed by an extension of the awning, which winds upon a roller suspended from the top and capable of being raised or lowered.

An improved Sewer Trap, designed to prevent the flooding of cellars by back water from sewers, has been patented by Messrs. W. Torney and C. N. Tillotson, of Detroit, Mich. In the trap is a hinged float valve, of hemispherical shape, the upper flat face of which is lined with rubber or other packing material. When this valve is lowered, or in open position, the water passes freely from the drain pipe through the trap and into the sewer pipe; but when backwater enters the trap the valve is raised, closing the drain pipe, and thus preventing the water from rising.

A Medicated Suppository, composed of slippery elm bark, sassafras, Dover's powder, and extract of valerian, has been invented by Mr. F. D. Owen, of Joplin, Mo.

Mr. Geo. W. Cummings, Jr., of Big Rapids, Mich., has invented an Oscillating Chair, in which the legs are stationary, and the seat is connected with them by curved springs, which pass from the rear legs to the forward part of the bottom of the seat, and from the front legs to the rear portion. The springs cross each other, and are so secured by clamps to the legs and by screws to the seat as to prevent lateral motion.

Mr. H. M. Farnam, of St. Albans, Vt., has invented an improved Ventilator, consisting of a casing with a screened supply pipe and adjustable doors, and a curved exhaust pipe and damper above the supply pipe. The exhaust pipe is also provided with a compound cap, for preventing the entrance of rain or snow and for keeping up the draught.

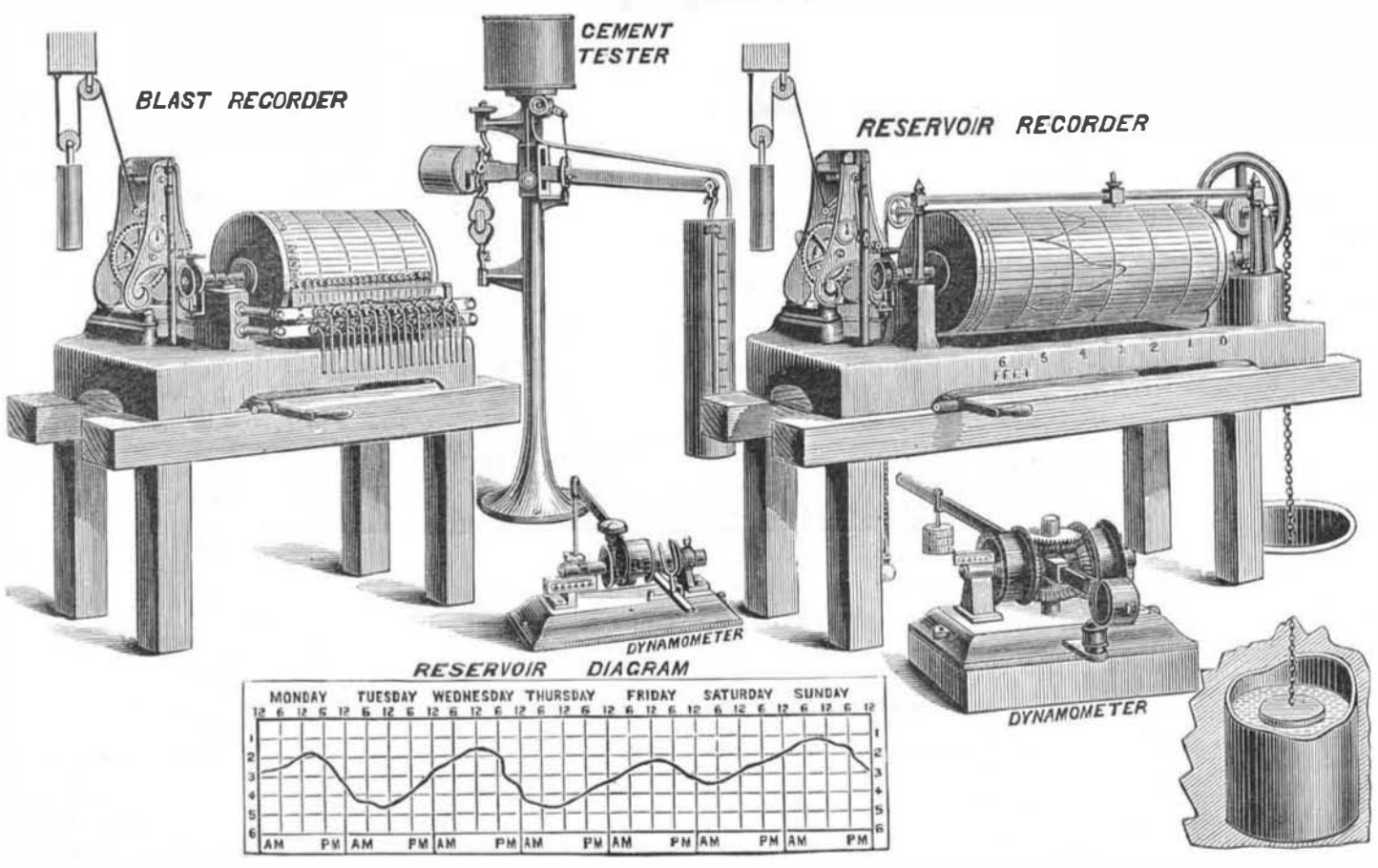
A Process for Treating Paper Boards so as to render them waterproof and give them the appearance of wood has been patented by Mr. Chas. Hansen, of Ebeltoft, Denmark. The object is to make a paper panel to take the place of wood, and the process consists in impregnating the paper with oil having a small quantity of drier, and afterward compressing and drying the boards.

An improvement in Corset Springs originates with Mr. Joseph Day, of Brooklyn, N. Y. It consists in a broad stay with fixed hooks, and an overlapping stay with hinged eyes, made of one solid plate of metal, with an extension projecting beyond the point of the hook, so as to be readily taken hold of for opening or closing.

Mr. Joseph F. Rose, of Tiverton, R. I., has invented a Night Chimney, or cylindro-conical case containing a chimney, which has an opening through its side and a slide door, and is fitted to the lamp burner by a cylindrical collar. The top is removable, and supports for holding a vessel can be attached for use when it is desired to warm a fluid.

A Truss and Supporter, invented by Mr. A. M. Dye, of Elkhart City, Ill., has a pad, consisting of a number of spheroids of soft rubber, strung on cords and contained in a flexible bag, and the supporter is a U-shaped stem and cup, all being arranged in a novel manner.

Mr. J. D. McLinden, of New York city, has patented a Ventilating Flue Cap, which revolves with a vane, and has a shield on the windward side to prevent the air from entering on that side, while flanges attached to the pipe deflect the air from other parts, thus preventing downward currents.



IMPROVED TESTING INDICATING, AND RECORDING APPARATUS.