(No Model.) 2 Sheets—Sheet 1.

J. W. UPSON.

AUTOMATIC REGULATING DEVICE.

No. 523,250. Patented July 17, 1894.

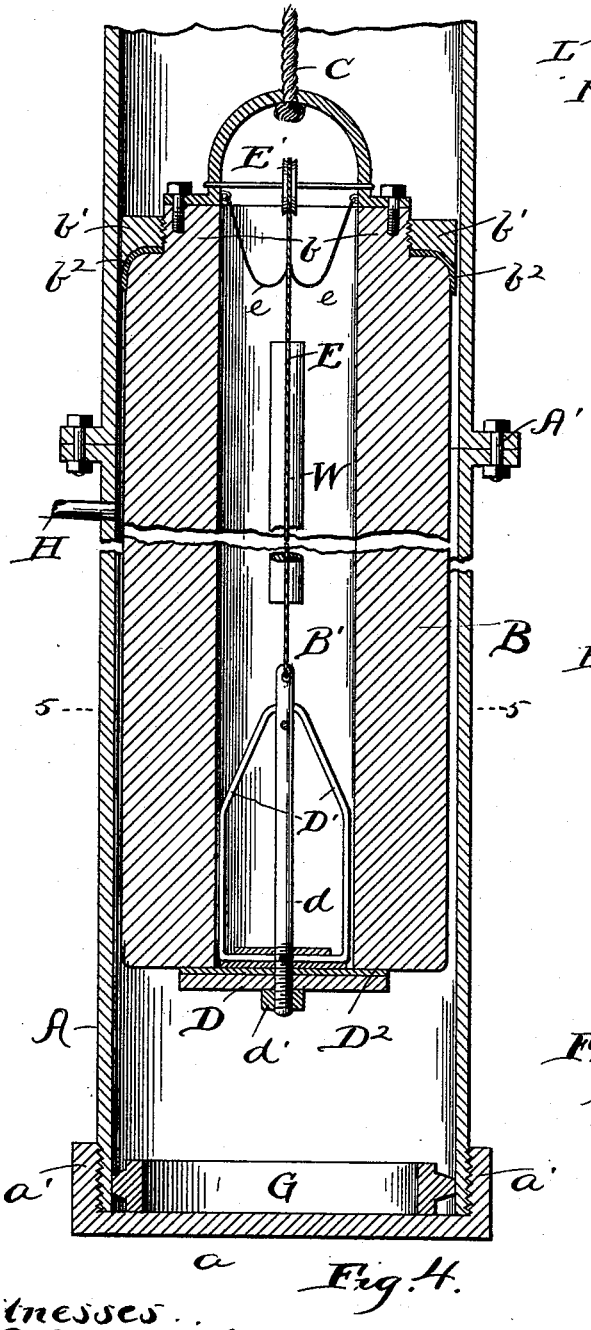


Fig. 4.

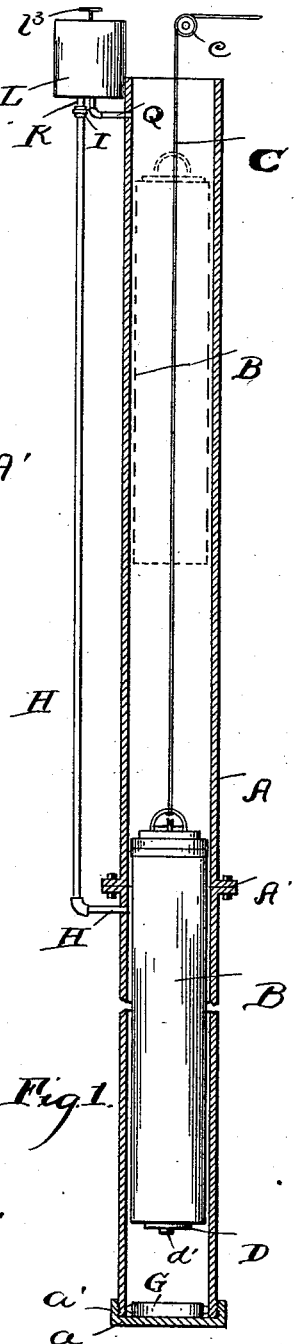


Fig. 1.

Witnesses.
E. B. Gilchrist
C. F. Burgess

Inventor.
James W. Upson
By Lyon & Lyon
his Attorneys

(No Model.)

2 Sheets—Sheet 2.

J. W. UPSON.

AUTOMATIC REGULATING DEVICE.

No. 523,250. Patented July 17, 1894.

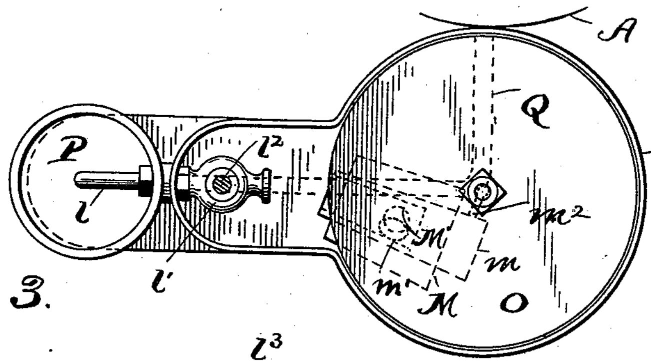


Fig. 3.

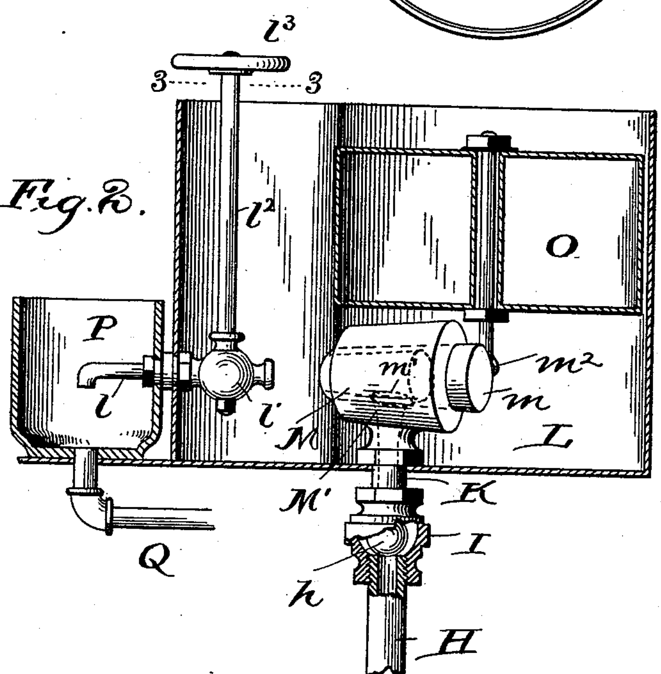
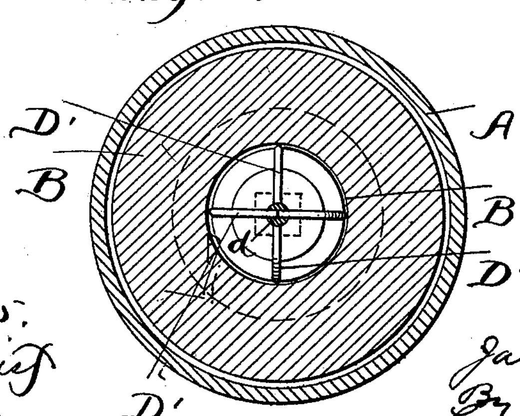


Fig. 2.

Fig. 5.



Witnesses.
E. B. Gilchrist
[illegible]

Inventor.
James W. Upson
By Leggett and Leggett
his Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES W. UPSON, OF CLEVELAND, OHIO, ASSIGNOR TO GEORGE D. UPSON, OF SAME PLACE.

AUTOMATIC REGULATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 523,250, dated July 17, 1894.

Application filed April 10, 1893. Serial No. 469,742. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. UPSON, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Automatic Regulating Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in weights and automatic regulating devices therefor, the object being to provide a steady power for operating, for instance, coal-feeding mechanism for boilers, although well adapted to various other purposes where uniform movement is necessary; and it consists in certain features of construction, and in combinations of parts, hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation partly in section. Fig. 2 is an enlarged detail, the same being an elevation, partly in section. Fig. 3 is a top plan relative to Fig. 2, partly in section on line 3—3, Fig. 2. Fig. 4 is an enlarged elevation in central vertical section of the lower portion of cylinder A, and weight B. Fig. 5 is a transverse section on line 5—5, Fig. 4.

A represents a hollow cylinder of large size, say ten or twelve feet, more or less, in height, and from eight to twelve inches, more or less, in diameter, in which cylinder operates a weight B that serves as the motive power. The latter is suspended by a cable, C, leading over sheave *c*, whence the cable is supposed to lead to a drum (not shown) where the power is applied and has connected therewith suitable mechanism for winding the cable thereon and thereby elevating weight B. The mechanism referred to may be substantially the same as employed in clocks of large size. Weight B, at its upper end, is reduced in size, as at *b*, said reduced portion being screw-threaded externally for receiving nut or cap *b'* that securely holds in place packing or washer b^2 seated upon the shoulder formed by the reduction of the upper end of the weight, and adapted to engage the surrounding wall of the cylinder, the construction and arrangement of parts being preferably such that a tight fit is had during the descent of the weight, and as little friction as possible in the ascent of the weight. Cylinder A may be composed of one or more sections, but is preferably made of two sections bolted or secured together at A', with the upper section turned out nicely internally to insure a nice surface for the packing of the weight to work against. The weight is provided, preferably centrally, with a vertical opening B' of considerable size, the same being closed at the bottom by a valve, D.

Valve D consists preferably of a metallic disk or plate and a gasket D^2 lining the top surface of said disk, and the valve is mounted upon a rod or stem *d* that extends upwardly a suitable distance into opening B', and the valve is provided with any suitable guides for holding the same in the proper position, preferable guiding means being shown in Figs. 3 and 4, wherein the same consists of several skeleton wings, D', suitably secured to the valve and adapted to reciprocate, during the opening and closing of the valve, easily in contact with the surrounding-wall of opening B'.

Suitable means are provided for retaining the valve normally in position closing opening B'. Preferable means for the purpose is exhibited in Fig. 4 wherein the valve-stem, at its upper end, has suitably attached a cord, wire, cable or chain, E, that leads thence upwardly over a pulley or sheave E', suitably supported at the top of the weight, and has attached, at its opposite end, a weight W that acts to hold the valve in its closed position, weight W preferably just somewhat more than counterbalancing the weight of the valve, its stem and guides.

Suitable means are preferably provided for limiting the displacement of the valve from its seat, said means consisting preferably of two cords, chains, or flexible members, *e*, suitably attached, at one end, to cord, chain or cable E, and, at their opposite ends to the upper end of the weight, the displacement of valve D from its seat being limited by the slack of flexible members *e* in the closed position of the valve. To prevent the weight, in

its lowermost position, from resting upon valve D, a stop is provided, the same being of any suitable construction and consisting, for instance, of a ring, G, removably resting upon the bottom head *a* of cylinder A, said ring having such dimensions that it shall completely receive the valve so that no portion of the load of weight B shall come upon the valve.

Head *a* of the cylinder is preferably removably secured to the cylinder, the same having an internally screw-threaded flange *a'* that screws over the correspondingly externally screw-threaded lower end of the cylinder, and valve D is preferably detachably secured to its stem by means of a nut, *d'*, upon removing which the valve can readily be removed as required in renewing gasket D^2.

From preferably near the lower end of cylinder A leads pipe H that leads upwardly along side of the cylinder and, at its upper end, is connected, by means of a union, I, with a small section of pipe K that leads into a tank L adjacent the upper end of cylinder A. Within union I is located a check-valve, *h*, to prevent the return of liquid down through this pipe. Pipe-section K, within tank L, is in open relation with a lateral port M' in the casing M of a hollow plug *m* that discharges into tank L and has a lateral port *m'* adapted to register with port M' in the valve-casing. The plug, outside of the valve-casing, has a laterally-extending arm m^2 that is operatively connected in any suitable manner with a float O within tank L. The upper end of the tank may be left open, as shown, or is closed if it is desired to exclude dust and dirt. Tank L is provided with a spout *l* that discharges into a cup or receptacle, P, preferably of glass, located adjacent the tank and in open relation, by means of a pipe, Q, with the upper end of cylinder A. Spout *l*, within the tank, is provided with a valve *l'* the stem l^2 whereof extends up through the tank and, at its upper end, is provided with a crank or hand-wheel l^3 for opening or closing the valve as desired.

The arrangement of parts is such that the elevation of float O in tank L shall close valve *m* and thereby cut off the discharge of liquid into said tank.

The operation of the device is as follows:—Suppose weight B to be in the depressed position shown in solid lines, and suppose cylinder A to have been nearly filled with liquid. On elevating the weight, valve D will open and the liquid in the cylinder from above will flow down through opening B' in the weight, and when the weight reaches the top of the cylinder as shown in dotted lines, the liquid of course will approximately all be below the weight, and valve D will have assumed its closed position, whereupon weight B can only descend by forcing the liquid through pipe H, and the liquid passing through said pipe, by means of the connections hereinbefore described, will be returned to cylinder A above the weight, and by regulating the flow of liquid through spout *l*, by means of valve or cock *l'*, the descent of the weight could be regulated to a uniform movement provided the weight had always a uniform labor to perform. The weight of course has only its gravity as a motive power, and hence, if extra labor is required of the weight, the latter will press with less force on the column of liquid below it, and in case of only nominal labor to be performed, approximately the full gravity of the weight will rest on the column of liquid. Such varying pressure on the liquid would produce a variable discharge through a given opening in valve *l*, and hence the descent of the weight will vary according to the labor performed. To regulate the descent of the weight under such variable conditions of labor, is provided the governing mechanism already partially described. The passage of liquid from pipe H is through valve *m* into tank L, whence it passes through cock or valve *l'* and spout *l* into receptacle P and thence to cylinder A as hereinbefore indicated. When the liquid accumulates in tank L and thereby elevates float I', such lifting of the float actuates or turns the plug in valve-casing M to partially close communication between pipe H and tank L, and if the float is elevated its full throw, communication is entirely cut off between said pipe and tank. The descent of the float of course increases the flow into tank L. The action of the float, therefore, keeps the liquid in tank L approximately at the same level, and hence gives a uniform pressure at cock or valve *l'*. Hence, with a given opening at said cock or valve a uniform flow of liquid is had into receptacle P and thence into cylinder A, resulting in a uniform movement of weight B, and this too, regardless of the labor that the weight may have to perform.

What I claim is—

1. In combination, an upright cylinder, a weight adapted to operate in said cylinder, a passage-way leading from the portion of the chamber of the cylinder above the weight to the portion of the chamber of the cylinder below the weight, a valve for interrupting communication through said passage-way, suitable means acting to retain said valve in its closed position, a tank or container, L, a pipe or system of pipes and connections between said tank or container and the aforesaid cylinder for conveying liquid displaced below the weight and discharging the same into the cylinder above the weight, suitable regulating means or mechanism for controlling or regulating the discharge of liquid through said pipe or system of pipes, substantially as set forth.

2. In combination, a cylinder A; weight, B, provided with a central opening, B'; valve, D, suitable means acting to retain said valve in its closed position, tank or container L, a

pipe or system of pipes and connections between said tank and cylinder for conveying liquid displaced below the weight and discharging the same into the cylinder above the weight, suitable regulating means or mechanism for controlling or regulating the discharge of liquid through said pipe or system of pipes, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 14th day of March, 1893.

JAMES W. UPSON.

Witnesses:
C. H. DORER,
WARD HOOVER.