No. 648,622. Patented May 1, 1900.

E. K. HUTCHISON.

PRESSURE REGULATOR FOR DAMPERS.

(No Model.) (Application filed Apr. 19, 1899.) 2 Sheets—Sheet 1.

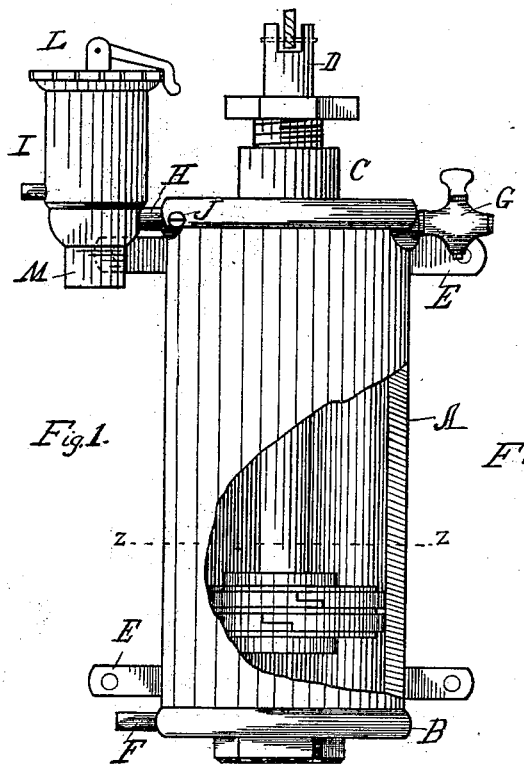


Fig. 1.

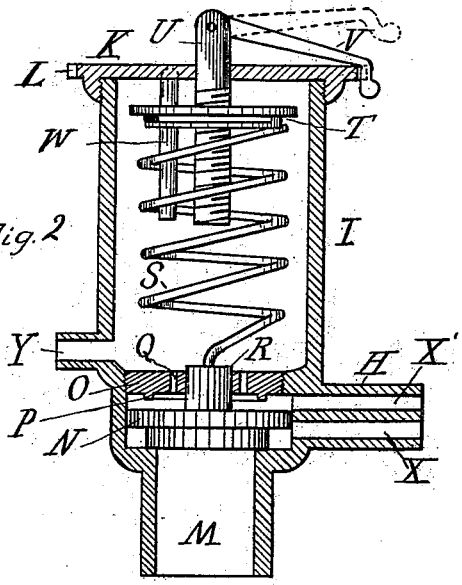


Fig. 2.

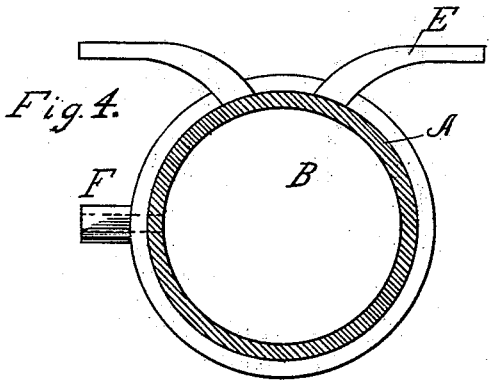
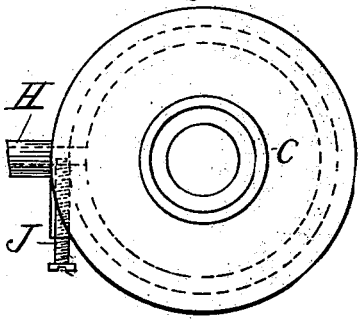


Fig. 4.

Fig. 3.



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PRESSURE REGULATOR FOR DAMPERS.

(No Model.) (Application filed Apr. 19, 1899.) 2 Sheets—Sheet 2.

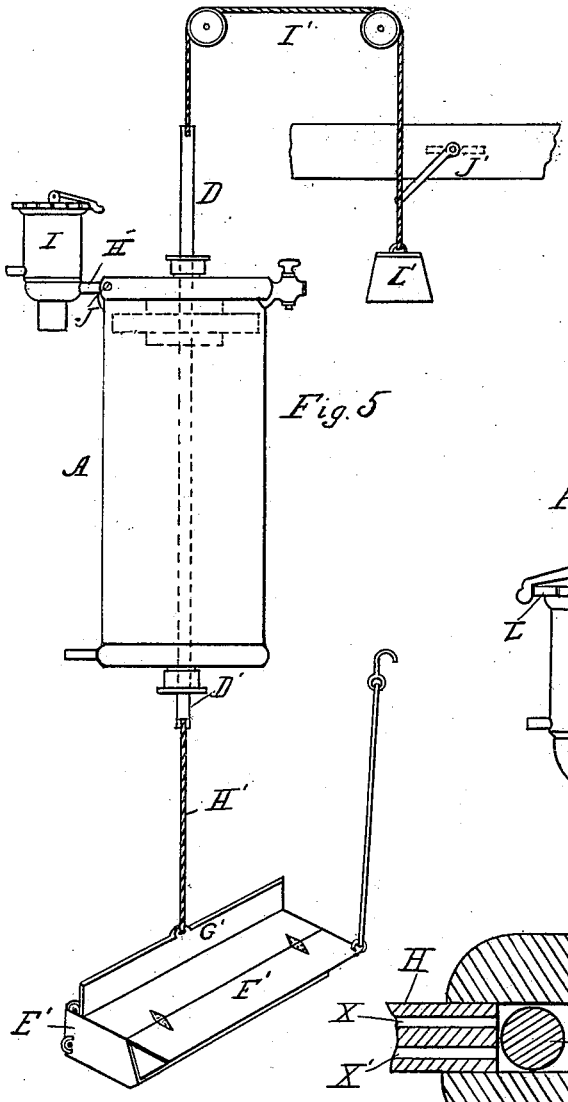

Fig. 5

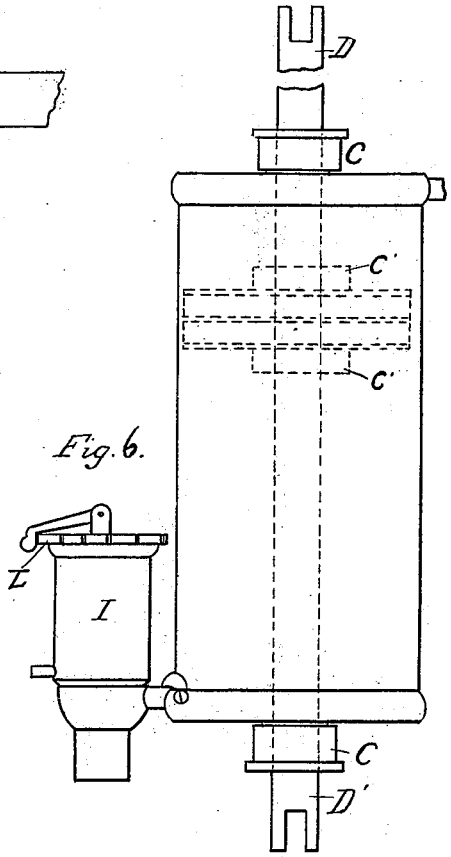

Fig. 6.

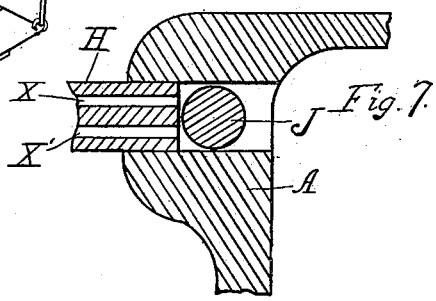

Fig. 7.

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PRESSURE-REGULATOR FOR DAMPERS.

SPECIFICATION forming part of Letters Patent No. 648,622, dated May 1, 1900.

Application filed April 19, 1899. Serial No. 713,555. (No model.)

To all whom it may concern:

Be it known that I, EPHRAIM K. HUTCHISON, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Pressure-Regulators for Dampers, &c., of which the following is a specification.

The object of my invention is to provide a pressure-regulator for dampers and like mechanism; and it consists, essentially, of a cylinder with a piston operating therein, the rod or stem of which is connected with the rod or chain attached to a damper or other mechanism to be regulated, and this cylinder has at one end a peculiarly-formed valve which automatically by the pressure of steam drives the piston in one direction, and it is so constructed that all steam or water of condensation will be promptly ejected after or during each operation, thereby making the mechanism perfect in all details, requiring no special care or attention to keep it in order, as will now be set forth in detail.

In the accompanying drawings, Figure 1 is a side view, with the cylinder partly in section, of my improved pressure-regulator for dampers, &c. Fig. 2 is a central vertical section of the operating-valve; Fig. 3, a top view of the valve-cap, showing the throttling-screw; Fig. 4, a horizontal of the cylinder through line *z* of Fig. 1; Fig. 5, a typical plan of arrangement and attachment for applying to dampers, ash-pit doors, &c.; Fig. 6, a view of cylinder, showing the valve attached at its lower end; and Fig. 7 is an enlarged sectional view showing the operation of the throttling-screw J.

I desire in constructing this invention to so modify and simplify the various parts of the regulator as to greatly cheapen its construction and at the same time maintain its efficiency.

In my former patent, No. 608,966, it will be seen that I employ a cylinder in connection with which I use two operating-valves, one designed to move the piston in one direction and the other to control its return movement. I find by experience that I can dispense with one of the valves, and in so doing I can construct a machine just as efficient without cross-heads and guides, thus making a simpler and more compact apparatus and greatly facilitating its adjustment when put up.

The cylinder A herein is provided with a removable cap B at its lower end and with a stuffing-box C at its upper end, in which the piston-rod D operates. The cylinder has near each end arms or brackets E, whereby it is secured to a wall or other object. The screw-cap B or cylinder itself near B has at one side a vent-tube F for the purpose of draining the bottom of the cylinder. The upper end of the cylinder has at one side a vent-tube with a petcock G, and directly opposite is a tube H, which leads to the bottom of the operating-valve I. The tube H of the cylinder proper has therein a throttling-screw J for purposes which will be referred to herein.

The valve I is composed of a shell open at its upper end and provided with a screw-cap K, having peripheral notches L at regular intervals. The lower end of the shell is reduced and terminates in a steam-inlet tube M, on which is seated a valve N, this valve having its upper half diametrically larger than the lower half, so that the larger portion of the valve fits snugly within the shell. Above the valve is a horizontal partition-wall O, secured within the shell by screw-threads, so that it is made adjustable to and from the valve N. On the lower side of this adjustable partition is an annular rib P, against which the valve N seats itself. Two or more holes Q are formed through the partition-rib P for the passage of steam or condensation.

The valve N has a stem R, which passes centrally through the partition, and the upper end of the stem has a socket which receives the lower end of a spiral spring S, the upper end of the spring being coiled around a disk T. This disk is threaded centrally to receive a threaded stem U, which is socketed in the cap K and provided at its upper end with a hinged arm V, the free end of which is bent downwardly, so that it engages with the notches L. A vertical pin W, which passes freely through a hole in the disk T, enters the cap K and serves to hold the disk T from turning when the lever or arm V turns the stem U for the purpose of adjusting the tension of the spring on the valve N. The tube H at the base of the shell has two ports, the lower one, X, communicating with the shell

at a point below the main body of the valve N, and the other port X′ communicates with the shell above the valve. This tube H connects with the cylinder A, as shown at Fig. 1, at its upper end. On the opposite side from the tube H, but above the partition O, is a discharge-port Y, through which the steam and water of condensation escape after the cylinder-piston has been operated.

In general I prefer to locate the cylinder A in a vertical position, as shown; but it is obvious that with a system of weights properly applied the cylinder can be placed horizontally. I particularly call attention to the fact, however, that the operating-valve I may be placed at either end of the cylinder, as shown, for instance, in Fig. 6, and the use of the valve at the lower end may in many cases be advantageous, and in place of using the ordinary cord or chain for connecting the piston-rod with the damper-arm a push-rod may be employed. It will also be noted that I provide the piston with a stem or rod at each end, as shown at D D′, Figs. 5 and 6, in which case a stuffing-box C is used in each cylinder-head. In practice the piston should have a jam-nut C′ on each side, so as to provide clearance between the piston and the cylinder-heads.

In order to illustrate the arrangements of the regulator, I show a typical plan of connecting up the various parts in Fig. 5, in which the cylinder shows a piston-rod projecting from each end. I show therein a throat E′ for an ash-pit door having the ordinary swinging door F′, such as is commonly used to be manipulated by hand. In practice such a door, particularly for locomotive boilers, is very objectionable, because the vibration frequently interferes with the operation of the door, and I have therefore provided a sliding gate G′, which is attached directly by means of the cord or chain H′ with the piston-rod D′, and I also show the upper piston-rod D connected by means of the cord or chain I′ with the arm of a damper J′ in the flue of the boiler, a weight L′ being used to draw the piston back. This weight is of course necessary where either the ash-pit door or the flue-damper is used. I illustrate these together in this instance for convenience. Ordinarily when a locomotive exhausts, the pull through the flue and the ash-pit causes the ordinary form of door F′ to vibrate, and this is impossible in the use of the slide G′.

The operation of the regulator-valve is as follows: There is a constant boiler-pressure at the pipe M against the lower side of the valve N, and we will assume that this valve has been so adjusted by the spring S that it will rise when the pressure reaches one hundred pounds per square inch and that the partition O has been adjusted so that in this case the valve will seat when the pressure falls to ninety-nine pounds, thus making the limit of operation one pound. The damper-arm to which the chain or cord is connected with the piston-rod D is so weighted as to keep normally the piston at the highest limit of its stroke, the damper thus being wide open. When the boiler-pressure rises to one hundred pounds, the valve N is raised from its seat, thus admitting steam through port X to the upper end of the cylinder and gradually forcing the piston downwardly and correspondingly closing the damper. During this downward movement of the piston the valve is seated against the rib P. Thus no steam can escape through the ducts X′ Q. When the piston reaches the lowest limit of its stroke, the damper is closed, the fire checked, and the steam-pressure decreases. When therefore the pressure falls to ninety-nine pounds, the valve N drops and the damper-weight slowly draws the piston upwardly, forcing out the steam and condensation through the ports X′ Q and correspondingly opening the damper. During this operation the use of the throttling-screw J becomes apparent, since the inflow of steam to the cylinder, as well as its discharge, can be so regulated that the closing and opening of the damper will be a gradual operation instead of being a succession of rapid movements, and in this manner the screw adjustment becomes a very important adjunct.

I do not relegate the use of this regulator to water or steam; but it is obvious that it may be employed wherever pressure is used—as, for instance, with compressed air or in the use of gases where automatic regulation is so important.

It will be noted that in putting up this machine only one pressure connection is required and that the same pressure which operates the valve also actuates the piston which moves the damper. Furthermore, while the pressure from the boiler drives the piston in one direction the steam contained in the cylinder and the condensation therefrom also does duty when the weight returns the piston by gradually passing the throttling-screw, and thus preventing a too-rapid return of the piston.

The machine as herein shown is capable of being adjusted for any boiler-pressure, and this adjustment may be made to the fraction of a pound without in any manner interfering with the damper, and the adjustments are capable of being made by exterior means on the machine.

What I claim as new is—

1. A pressure-regulator for dampers, composed of a cylinder having a piston therein, a valve-casing provided with a longitudinal port for connection with a boiler, an exhaust-port, and two lateral ports for connection with the said cylinder, a spring-pressed valve in the said valve-casing adjacent the said lateral ports, which valve when pressed upward by the steam from the boiler opens communication between the boiler through one of the said lateral ports and the cylinder and closes communication between the cylinder,

through the other lateral port, and the exhaust-port, and when the steam-pressure is lowered the valve descends and closes communication between the boiler and the cylinder and opens communication between the cylinder and the exhaust-port of the valve, substantially as set forth.

2. A valve for pressure-regulators composed of a casing provided with a longitudinal port at the base thereof for connection with a boiler, a lateral port for connection with a cylinder and an exhaust-port, a vertically-movable disk in the said casing normally seated to close the supply-port, an adjustable pressure-spring bearing against the said disk, an adjustable partition in the casing above the said disk having ports to connect with the exhaust-port of the casing and an annular rib on its under side against which the top of the disk abuts when in its raised position, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 27th day of March, A. D. 1899.

EPHRAIM K. HUTCHISON.

Witnesses:
H. Y. CUMMINS,
SAM W. ADAMS.