No. 775,468. PATENTED NOV. 22, 1904.

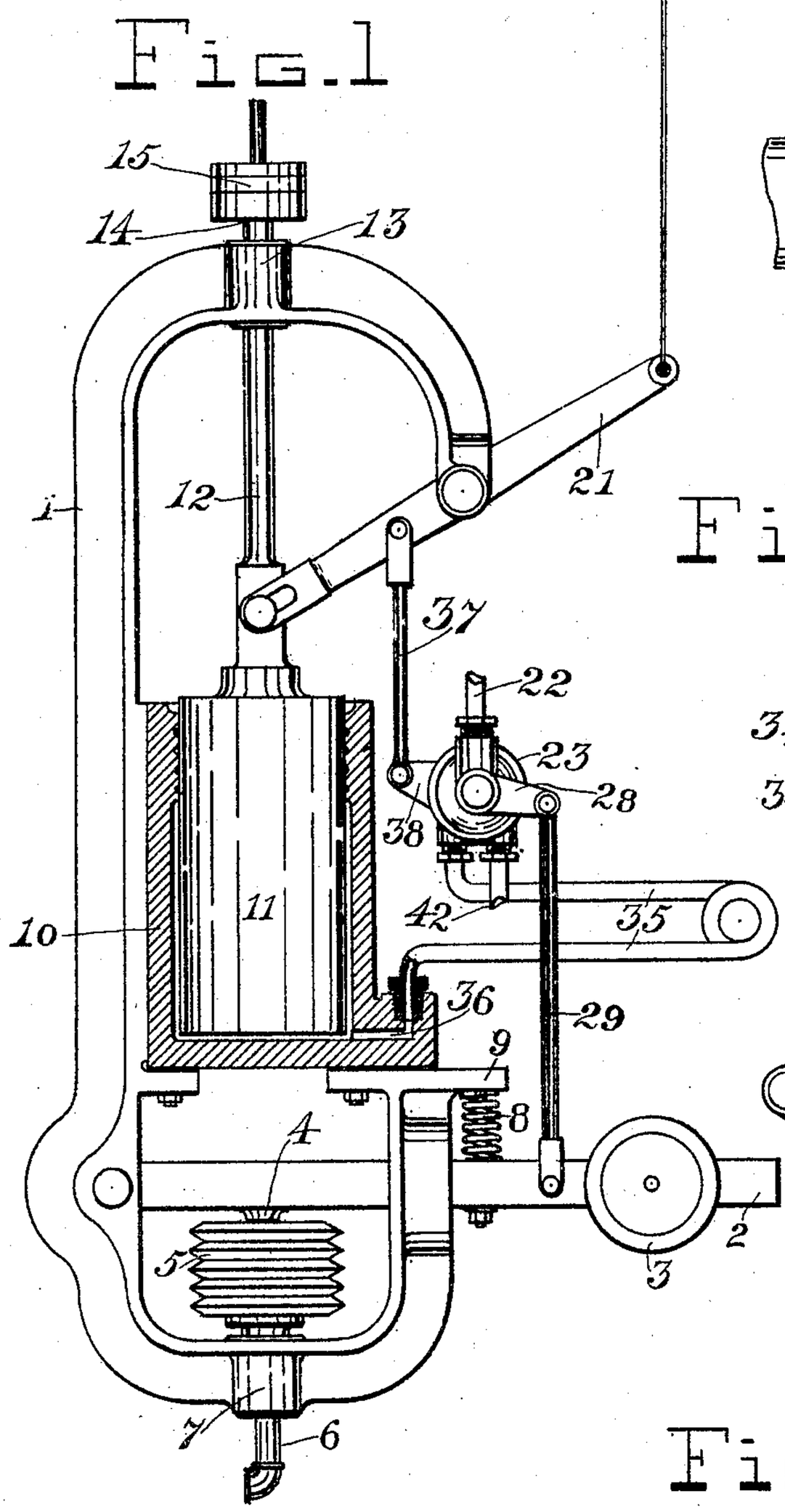
J. D. BOWNE.

DAMPER REGULATOR.

APPLICATION FILED JAN. 27, 1904.

NO MODEL.

Fig. 1



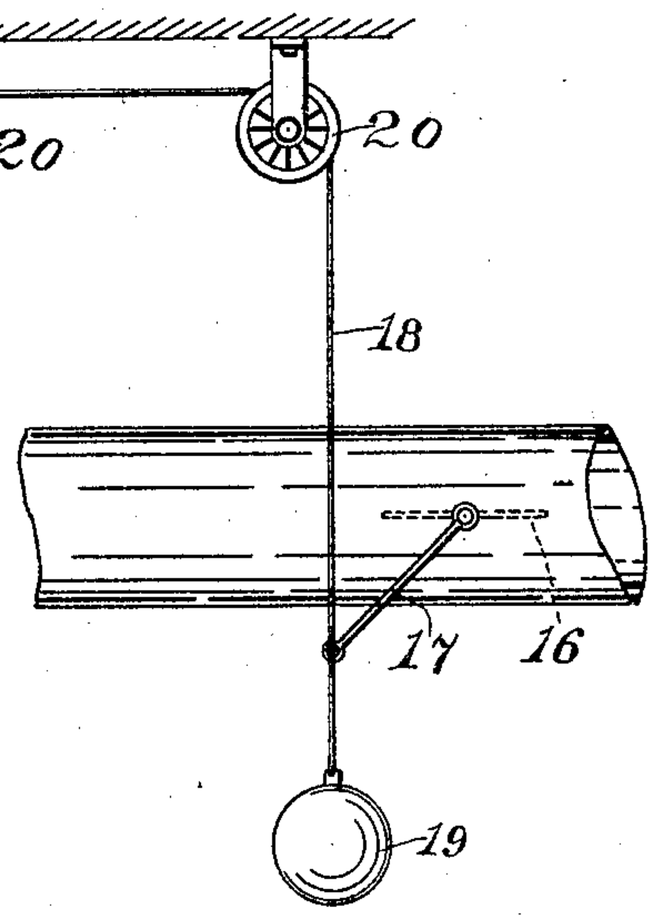


Fig. 2

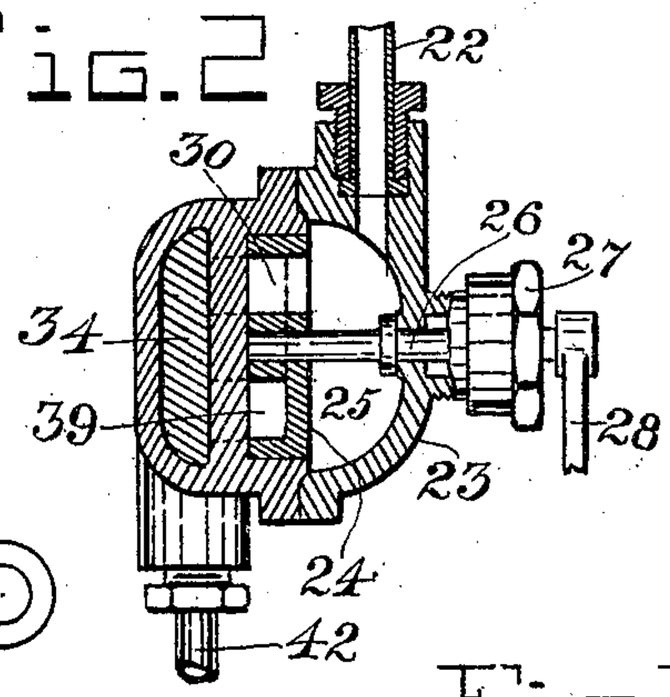


Fig. 3

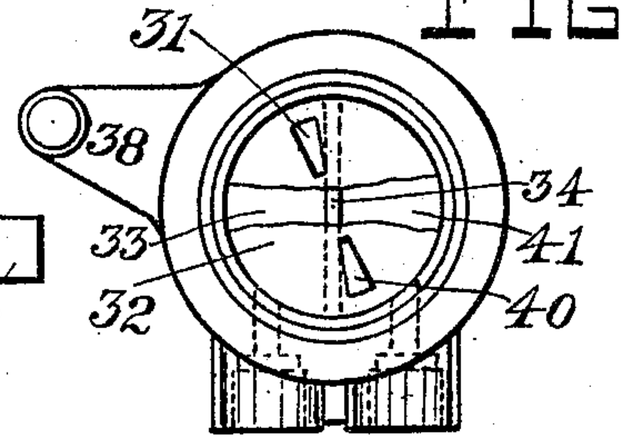
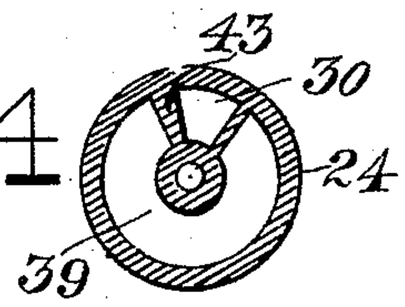


Fig. 4



Witnesses

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No. 775,468. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

JOHN D. BOWNE, OF NEW YORK, N. Y.

DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 775,468, dated November 22, 1904.

Application filed January 27, 1904. Serial No. 190,831. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. BOWNE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Damper-Regulators, of which the following is a specification.

My invention relates to damper-regulators.

The object of my invention is to produce an arrangement of mechanical devices belonging to the class designed to turn, by means of water-pressure from an exterior source, dampers controlling the draft in flues or smoke-pipes of steam-boiler furnaces which shall operate with an even movement free from abrupt changes of position and in which the velocity of movement may be varied or regulated with respect to the pressure of water served to the apparatus.

I accomplish the stated object by means of the elements and their association, as illustrated in the accompanying drawings, of which—

Figure 1 is a side view, partly in vertical section, showing all the parts assembled. Fig. 2 is a vertical sectional view of the water-valve casing and internal parts. Fig. 3 is a face or plan view of the water-valve seat, and Fig. 4 represents a circular sectional view of the cylindrical water-valve to show its interior formation.

Like numbers refer to like parts throughout.

Each constituent element is described in detail, and its individual office, together with the mode of operation of the whole, is explained hereinbelow.

Considering the drawings, in Fig. 1 is shown the G-frame, (marked 1,) which may be suitably supported near a boiler. Numeral 2 designates the main lever, pivotally secured to the frame and provided with the sliding weight 3 of customary construction and operation. Lever 2 has also the fulcrum-block 4, which rests upon the center of any effective diaphragm contrivance or metallic expansion-chamber 5 which I prefer to employ. A steam-pipe 6 passes through the boss 7 in the lower part of frame 1 and applies pressure interiorly to the expansion-chamber. The downward pull of lever 2 and its weight 3 may be either wholly or in part balanced by coil-spring 8, attached to the lever and to a projecting angle 9 of the frame. In the G-frame above the expansion-chamber is placed the hydraulic cylinder 10, containing and guiding the vertically-acting plunger 11. A stem 12 rises axially from the plunger and passes through a boss 13 in the top of the frame. The up-and-down movement of plunger 11 is thus additionally guided. At its uppermost extremity the stem 12 has a shoulder 14, and one or more balance-weights 15 are placed upon the stem, as shown, and will be again referred to.

The damper 16 is operated, through arm 17, by cord 18, kept taut by weight 19 and passing over pulleys 20 or like devices. Cord 18 is fastened to the outer end of plunger-lever 21, fulcrumed in frame 1 and pivotally connected with the stem 12 of the plunger. As the plunger rises and falls, therefore, the damper is correspondingly closed or opened.

As previously stated, the plunger is actuated by water-pressure from an external source. Number 22 designates the supply-pipe. It is connected with the casing 23 of the cylindrical rotary water-valve 24 and opens into the receiving-chamber 25 on one side of that valve. (See Fig. 2.) The valve-rod is marked 26. It passes out of the casing through stuffing-box 27, and the crank-arm 28 is then attached to it. A connecting-rod 29 pivotally couples the crank-arm 28 and main lever 2. Clearly when the lever lifts by excess of steam-pressure in chamber 5 the water-valve is rotated to the left, as illustrated. Sufficient movement in this direction will bring the supply-port 30 of the water-valve (see Fig. 4) in register with port 31 of the seat 32, (see Fig. 3,) and water under the outside pressure, whatever it may be, will enter the delivery-chamber 33 on the left of partition 34 in the back of the valve-casing, as shown in Figs. 2 and 3. From the delivery-chamber the water passes through the resilient pipe-loop 35 to duct 36 of cylinder 10 and is delivered beneath the plunger. With-

out shock and with deliberate positive movement, the plunger rises and closes the damper to a greater or lesser extent, dependent upon the distance traversed. By reason of its connection with the rising leg of plunger-lever 21, through link 37 and casing-arm 38 the entire water-valve mechanism partakes of the upward movement, the flexible pipe-loop or return-bend 35 permitting such displacements; but the main lever 2 and weight 3 not being correspondingly raised from below exert a downward pull upon the valve crank-arm 28, tending to return valve 24 to its normal closed position with respect to the external water-source and to open communication, by way of the hollow chamber 39 of the valve, from supply-port 31 of seat 32 to discharge-port 40 of seat 32. Thus the water reaches the discharge-chamber 41 on right of the partition 34 (see Fig. 3) and passes off by the drain-pipe 42, as shown. As the water escapes the plunger falls and the damper opens again. It will be observed, however, that as the plunger descends the water-valve mechanism is bodily lowered, and unless the main lever 2 has also dropped by reason of lessened pressure, due to the reduced chimney-draft or steam consumed, the water-valve will again open and halt the plunger. In Fig. 4 it will be noted that one side wall 43 of supply-port 30 of valve 24 is thick enough to cover supply-port 31 of seat 32, and when that port is so covered the plunger neither rises nor falls excepting from an increase or decrease of pressure in expansion-chamber 5. While I do not confine myself to this particular thickening of wall 43, a possible position of equilibrium is thus afforded the apparatus wherein the operating-water is not wasted by constant alternations of supply and escape. In common with other contrivances for like purpose my invention establishes its own conditions of least motion—that is to say, of substantially constant steam-pressure.

Let it be supposed, for example, considering Fig. 1, that the balance-weights 15, held by shoulder 14 on stem 12, taken with the weight of the plunger, exactly equal the water-pressure. Obviously the plunger would not rise; but the less back pressure there is opposed to the entering water the quicker will be the rise of the plunger and operation of the damper. When the inflowing water, being much resisted, moves the plunger slowly, considerable pressure may be generated and maintained, because the draft is long in closing, while its opening movement is hastened. On the other hand, if the water enters quickly, encountering little opposition, the draft is shut off promptly and the boiler-pressure limited correspondingly. The mechanism described is thus effective in maintaining a relatively high or low pressure approximately constant, regulating, as stated, the velocity of movement with respect to the pressure of water served to the apparatus.

What I claim is—

1. In a damper-regulator, the combination with an expansion-chamber and a main lever operated thereby, of a hydraulic cylinder and plunger, a water-valve adapted to be actuated by said main lever and whereby water may be served to and discharged from said cylinder, a water-valve casing, means whereby said water-valve casing and valve are moved bodily by said plunger, and flexible piping connecting said casing and cylinder.

2. In a damper-regulator, the combination with an expansion-chamber and a main lever operated thereby and having a sliding weight, of a hydraulic cylinder and plunger, a water-valve adapted to be actuated by said main lever and whereby water may be served to and discharged from said cylinder, a water-valve casing, means whereby said water-valve casing and valve are moved bodily by said plunger, and flexible piping connecting said casing and cylinder.

3. In a damper-regulator, the combination with an expansion-chamber and a main lever operated thereby and having a sliding weight, of a hydraulic cylinder and plunger, removable weights attached to said plunger, a water-valve adapted to be actuated by said main lever and whereby water may be served to and discharged from said cylinder, a water-valve casing, means whereby said water-valve casing and valve are moved bodily by said plunger, and flexible piping connecting said casing and cylinder.

4. In a damper-regulator, the combination with a hydraulic cylinder, of a plunger within the cylinder having a projecting portion provided with removable weights, damper mechanism, a plunger-lever having one end pivotally connected with the plunger and the other with said damper mechanism, a movable water-valve casing attached to and supported by the plunger-lever, a water-valve in said casing, an expansion-chamber, and adjustable pressure-transmitting devices for conveying the movements of the expansion-chamber to said water-valve.

5. In a damper-regulator, the combination with an expansion-chamber and a main lever operated thereby and having a sliding weight, of a hydraulic cylinder and plunger, the said plunger having a vertical stem, removable weights attached to said stem, a plunger-lever operated by said plunger, a rotary water-valve adapted to be actuated by said main lever and whereby water may be served to and discharged from said cylinder, a water-valve casing connected with said plunger-lever and movable bodily thereby, and flexible piping connecting said casing and cylinder.

6. In a damper-regulator, the combination of a hydraulic cylinder and plunger, a water-

valve and casing adapted to be bodily moved by said plunger, said water-valve being constructed to supply and discharge said cylinder, an expansion-chamber, and means actuated by said expansion-chamber arranged to operate said valve independently of its said bodily movement.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN D. BOWNE.

Witnesses:
LOUIS C. GAERTH,
AUG. T. WILLINK.