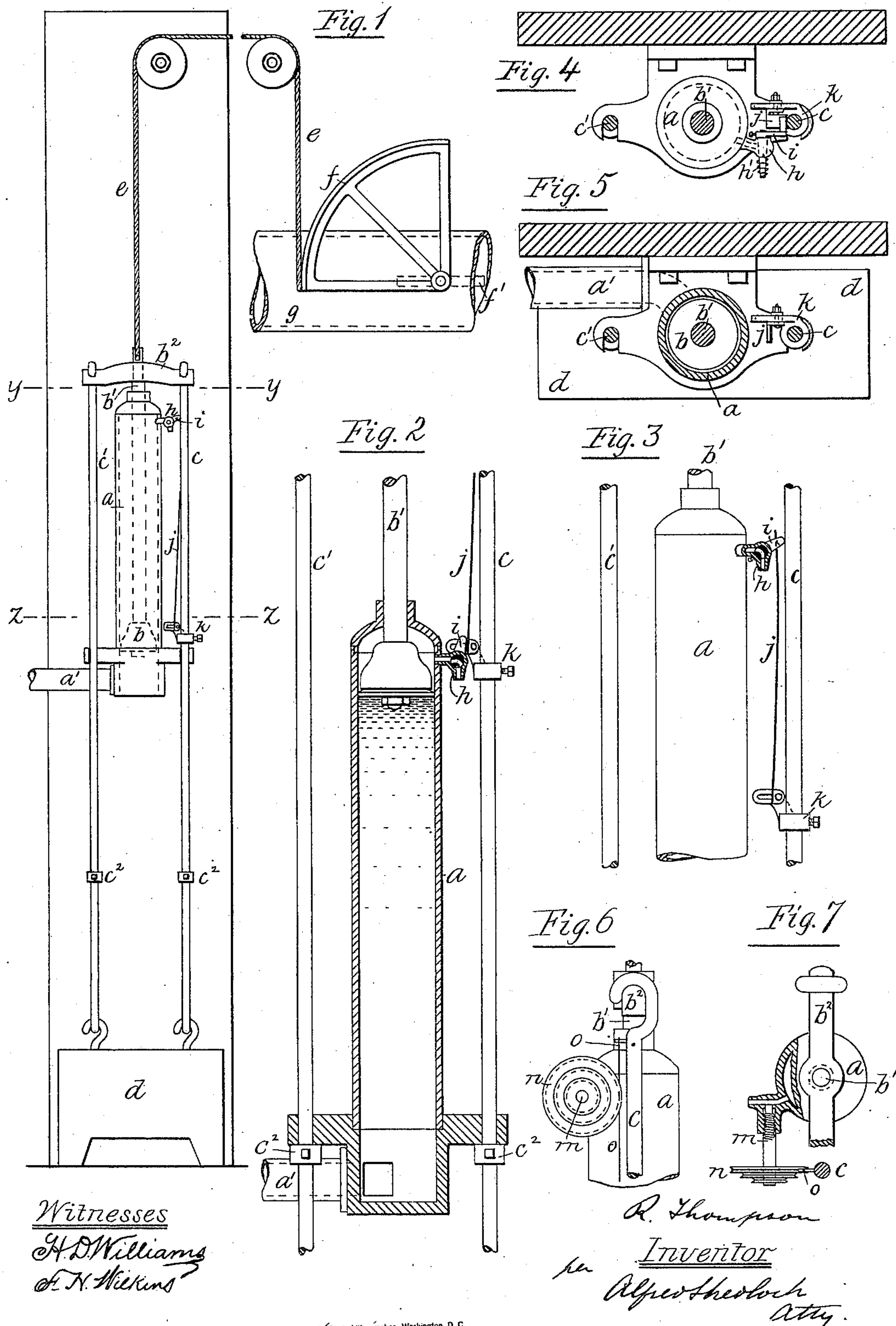


(No Model.)

R. THOMPSON.
DAMPER REGULATOR.

No. 302,692.

Patented July 29, 1884.



UNITED STATES PATENT OFFICE.

RICHARD THOMPSON, OF NEW YORK, ASSIGNOR TO GEORGE H. CLARKE,
OF BROOKLYN, N. Y.

DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 302,692, dated July 29, 1884.

Application filed November 10, 1883. (No model.)

To all whom it may concern:

Be it known that I, RICHARD THOMPSON, a citizen of the United States, and a resident of New York, county and State of New York, have invented a new and useful Improvement in Damper-Regulators, of which the following is a specification.

This invention relates to that class of damper-regulators in which the movement of the damper is controlled by means of a piston in a cylinder actuated by the variations of the steam-pressure in the boiler. It is found in the application of this class of damper-regulators, to give good results, that the resistance of the piston offered to the steam acting on it shall be variable, and this result has heretofore been accomplished by means of adjustable weights or springs. Now, my present invention embraces simple and effective means for this purpose which consist in providing the upper end of the cylinder with a cock which admits air to the top of the piston, said cock being actuated by a guide carried by one of the side bars connected to the piston-rod, so that its opening is reduced as the piston rises, thus offering an increased resistance thereto by reason of the confined air in the cylinder having a gradually-decreasing aperture to escape from. This guide is adjustably connected to the side bar both as regards the position of the piston when it commences to close the cock and as regards the extent the cock is closed by it. This adjustability of the resistance offered to the piston I have found in practice of great advantage, as no two dampers require the same adjustment of the regulator to cause them to operate properly.

Figure 1 is a front elevation of a damper-regulator embodying my improvements thereon. Fig. 2 shows a part of the same enlarged and partly in section. Fig. 3 is an enlarged view of the upper part of the cylinder and adjustable cock. Fig. 4 is a transverse section cut through the line $y y$, enlarged. Fig. 5 is a transverse section cut through the line $z z$, enlarged. Fig. 6 shows a side elevation of a modification; and Fig. 7 is a plan of the same, partly in section.

a represents the cylinder; a' , the pipe connecting the lower part of the same to the boiler;

b , the piston; b' , the piston-rod; b^2 , the cross-head; c and c' , side bars supporting the weight d , which is so proportioned as to counterbalance the energy of the steam acting against the under side of the piston at the maximum pressure at which it is desired to use the steam; e , a chain or rope connected to the cross-head b^2 and segment f of the damper f' , located in the flue g .

The cylinder a is provided with a cap, through which the piston-rod b' passes. A stuffing-box is not a necessity here, as the quantity of air which will escape around the piston-rod, if it is a good sliding fit in the cap, will not materially affect the proper working of the apparatus.

The regulating-cock h is fastened in the cylinder just above the highest point the piston ever reaches. This cock has its discharge-nozzle downward, so that any water that may accumulate above the piston is freely discharged therefrom, and a small pipe may be attached thereto to carry such water below the bottom of the cylinder, if desired, to avoid soiling the outside of the same.

To the plug of the cock h is secured by means of a set-screw the lever or arm i , having at its upper end a projecting pin or roller adapted to bear against the side bar c , or the spring-guide j , carried thereby, this roller or pin being held thereto by means of the spring h' on the end of the plug of the cock h . The length of the guide j is about two-thirds of the distance through which the piston is designed to move, as it is generally found better to offer no other resistance than the counterweight d to the movement of the piston during the first part of its travel. This guide j is a flat straight spring bent at its lower end, through which a bolt passes to secure it to an offset slotted arm forming part of the collar k , secured to the side bar c . The upper end of the guide j bears against the side bar c . It may be bent to rest against the rear side of the side bar to assist in holding it in place.

The normal position of the parts with the damper open is shown at Fig. 1, the plug of the cock h being set in relation to the lever i by means of the set-screw which connects them, according to the speed at which it is desired the air shall escape from the cylinder

during the first part of the movement of the piston. When the roller or pin on the lever *i* is struck by the guide *j*, it rides along the outer face of the same, and so gradually closes the cock, thus offering a gradually-increasing resistance to the movement of the piston. The extent of this gradual closing of the cock is governed by the inclination given to the guide *j*, which is provided for by the slot in the offset-arm of the collar *k*; but in no case should the cock be caused to entirely prevent the air leaving the cylinder. In some cases it may be desirable to remove all opposing resistance to the downward movement of the piston. This I provide for by setting the guide *j* sufficiently high, so that the roller on the arm *i* of the cock shall pass beyond the end of the guide when the piston is in its highest position. The cock is then opened by its spring *h'*, and the roller on the arm comes in contact with and rolls along the side bar *c* as the piston descends, and forces the upper end of the guide *j* away from the side bar *c*, as shown at Fig. 3, which, by reason of its flexibility, again comes in contact with the side bar *c* when the roller passes. The limit of the upward position assumed by the piston is governed by means of the adjustable collar-stops *c² c²* on the side bars, *c c'*.

In the modification shown at Figs. 6 and 7, *m* represents the plug of a screw-cock, located at the upper end of the cylinder, and provided with a set of cone-pulleys, *n*. A cord, *o*, fastened at its upper and lower ends to the side bar *c*, is passed around one of the pulleys, according to the amount of variation the passage of the cock is to have for a full stroke of the piston, and the size of the opening when the piston is in its lowest position may be readily fixed by turning the screw-plug so that the pulley slips in the cord.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with a cylinder damper-regulator, of an air-cock and means, substan-

tially as described, connected to and controlled by the piston moving in the cylinder, and adapted to gradually partly close the cock, as set forth.

2. An air-cock attached to the cylinder of a damper-regulator, in combination with an inclined guide on a bar secured to the piston working in the cylinder, substantially as and for the purpose set forth.

3. In a cylinder damper-regulator, a flexible inclined guide on a bar secured to the piston, in combination with an air-cock provided with an arm attached to the cylinder, whereby the cock is gradually and partly closed as the piston ascends and open when it descends, substantially as and for the purpose set forth.

4. An inclined guide on a bar secured to the piston adjustable in relation thereto and as to its inclination, in combination with an air-cock provided with an arm and attached to the cylinder, substantially as and for the purpose set forth.

5. In combination, the cylinder *a*, cock *h*, having arm *i*, piston *b*, rod *c*, and guide *j*, substantially as and for the purpose set forth.

6. The flexible guide *j*, collar *k*, with slotted offset-arm, and rod *c*, connected to and carried by the piston *b*, in combination with air-cock *h*, arm *i*, and cylinder *a*, substantially as set forth.

7. In combination, the piston *b*, rod *b'*, side bars, *c c'*, adjustable collar-stops *c²*, weight *d*, guide *j*, air-cock *h*, arm *i*, and cylinder *a*, substantially as set forth.

In testimony whereof I have hereunto set my hand, at New York, county and State of New York, this 5th day of November, A. D. 1883.

RICHARD THOMPSON.

Witnesses:

H. D. WILLIAMS,
ALFRED SHEDLOCK.