(No Model.) 2 Sheets—Sheet 1.

T. H. HOLMES.

REGULATING VALVE.

No. 436,177. Patented Sept. 9, 1890.

FIG. 1.

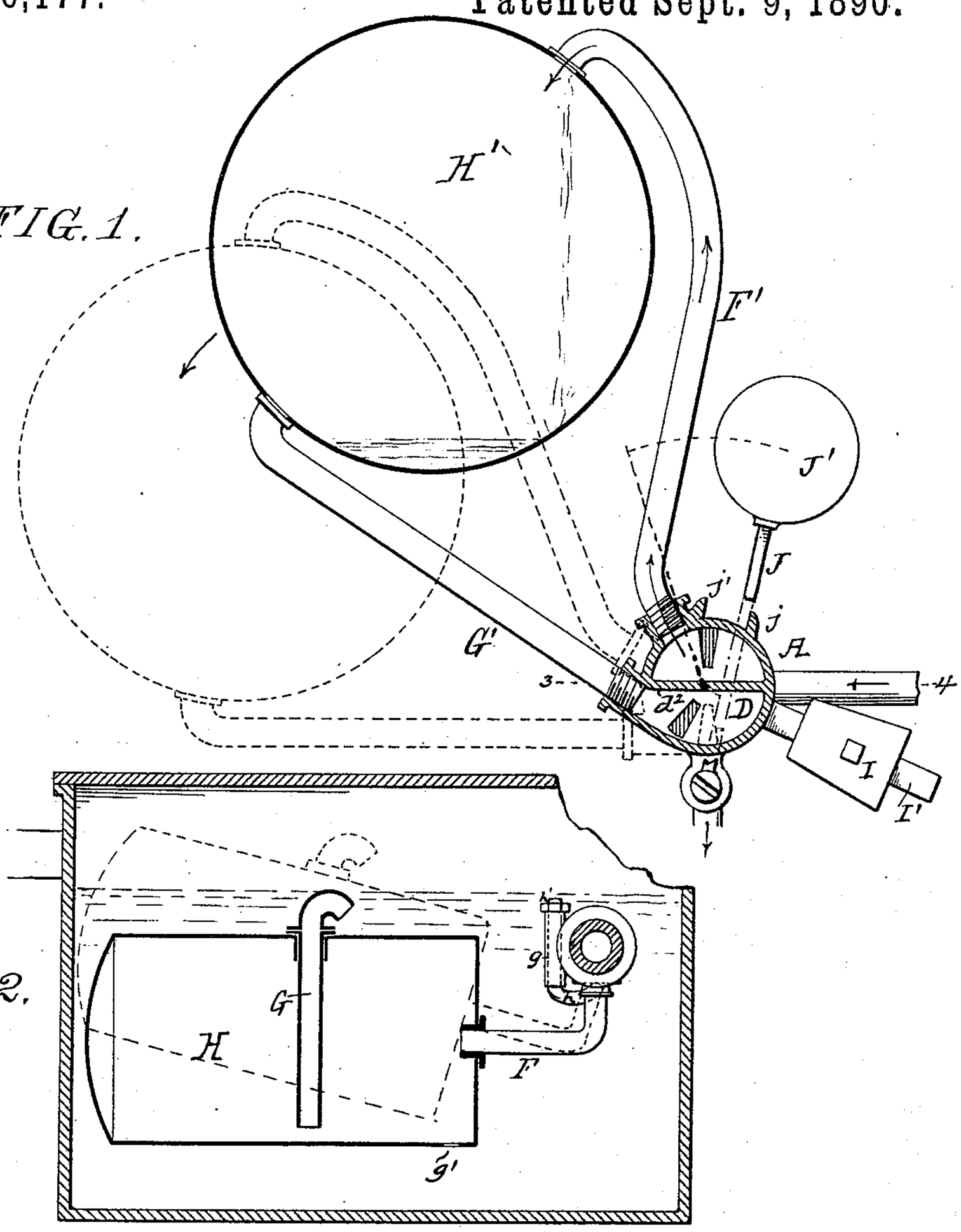


FIG. 2.

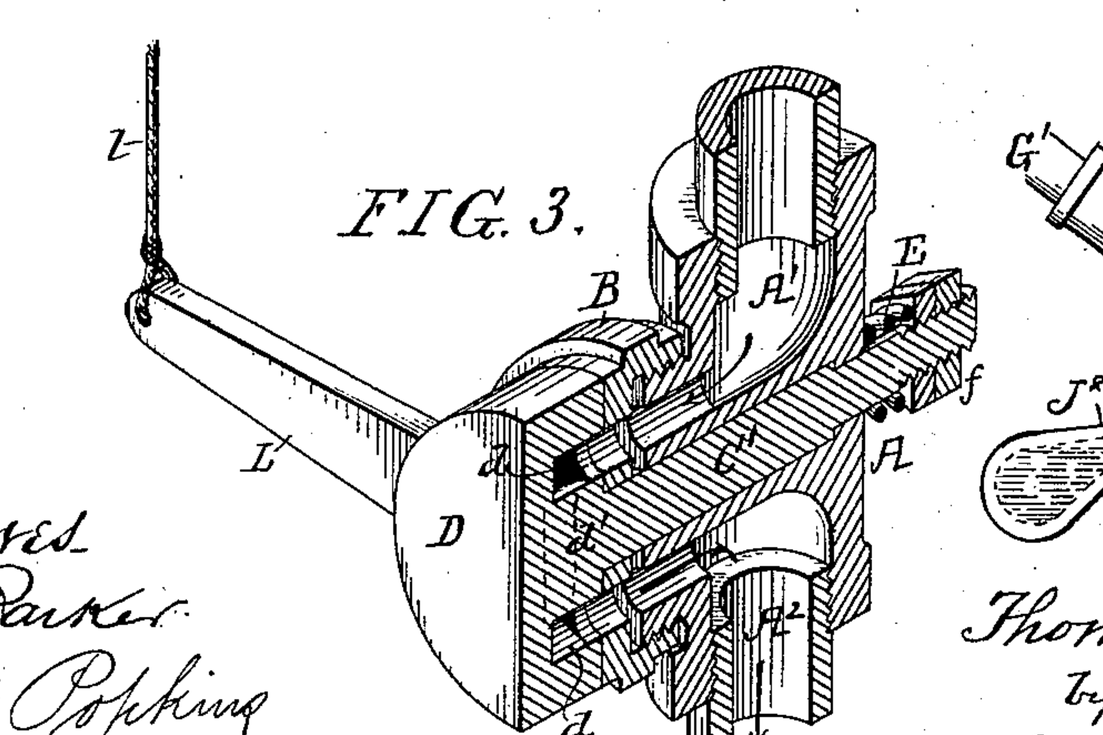
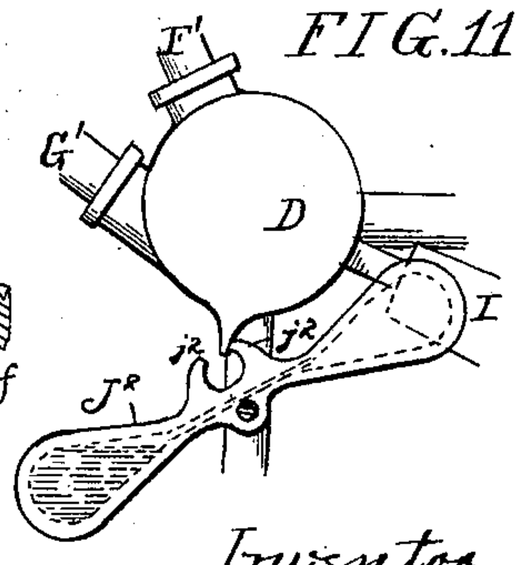


FIG. 3.

FIG. 11.



Witnesses
John E. Parker.
Albert Popkins

Inventor
Thomas H. Holmes
by his attorneys-
Howson & Howson

(No Model.) 2 Sheets—Sheet 2.

T. H. HOLMES.

REGULATING VALVE.

No. 436,177. Patented Sept. 9, 1890.

FIG. 4.

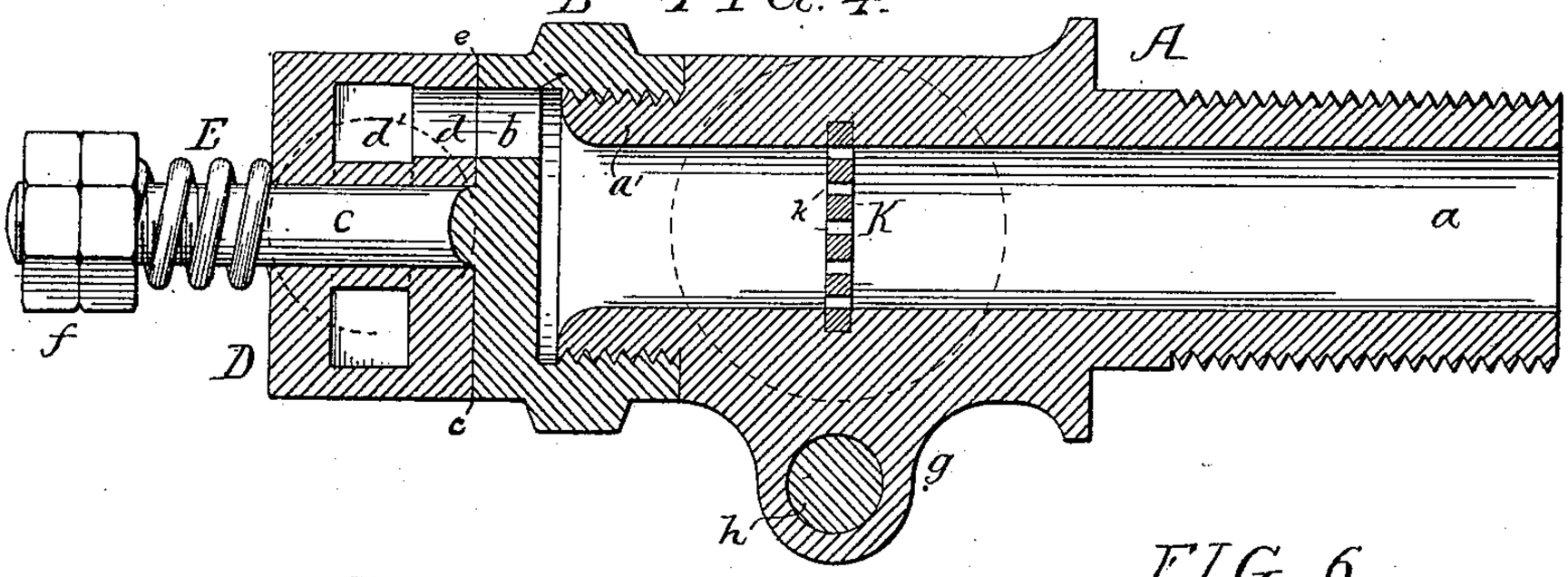


FIG. 6

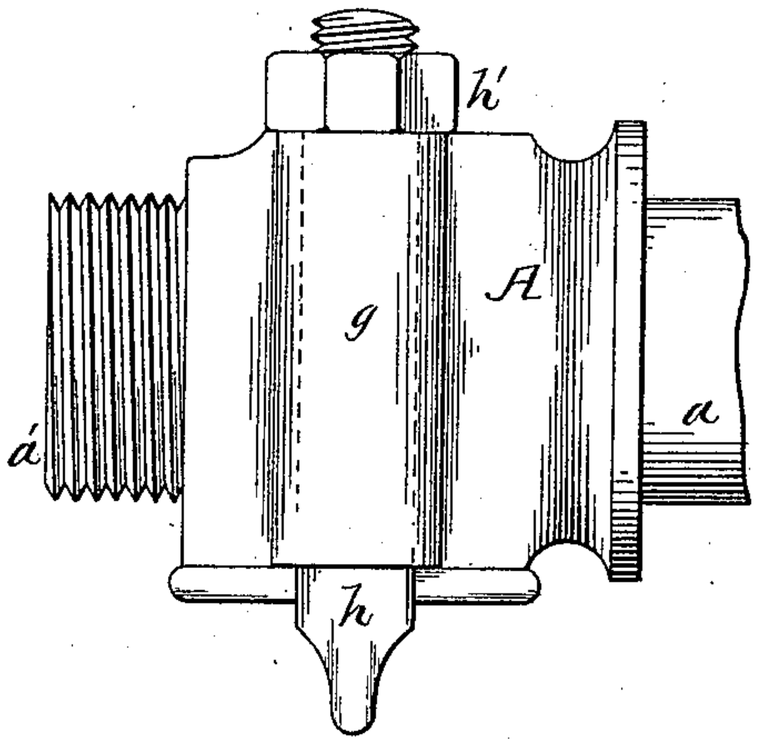


FIG. 5.

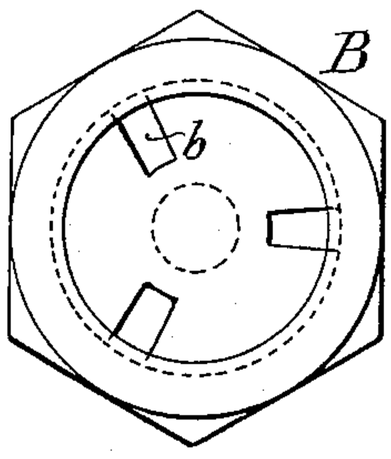


FIG. 8.

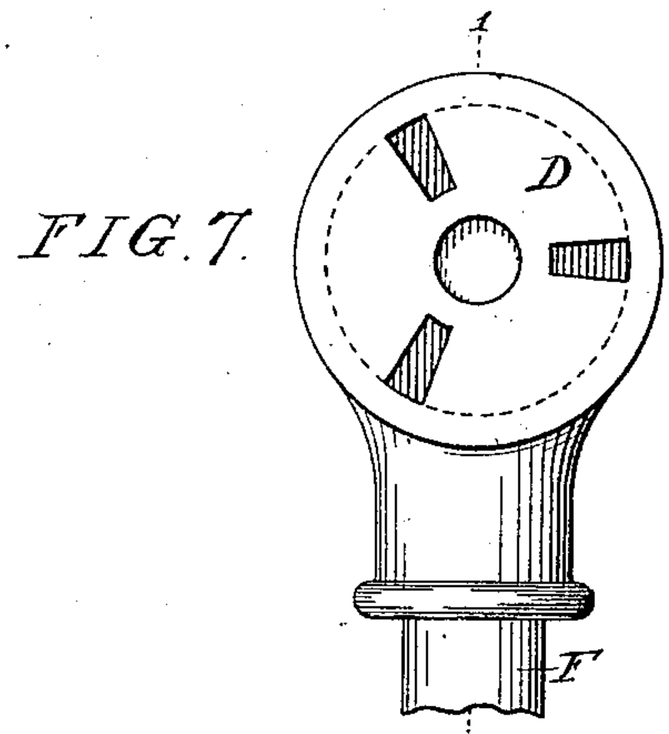
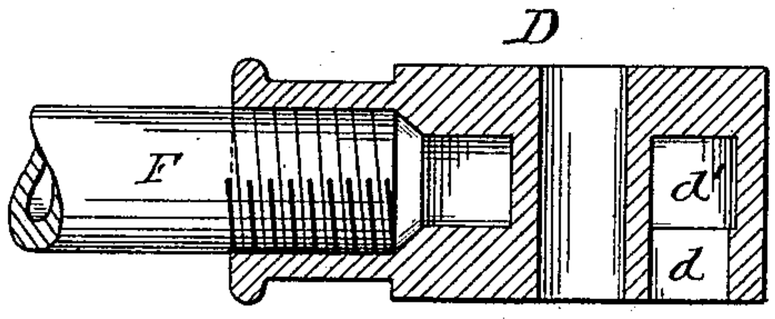


FIG. 7.



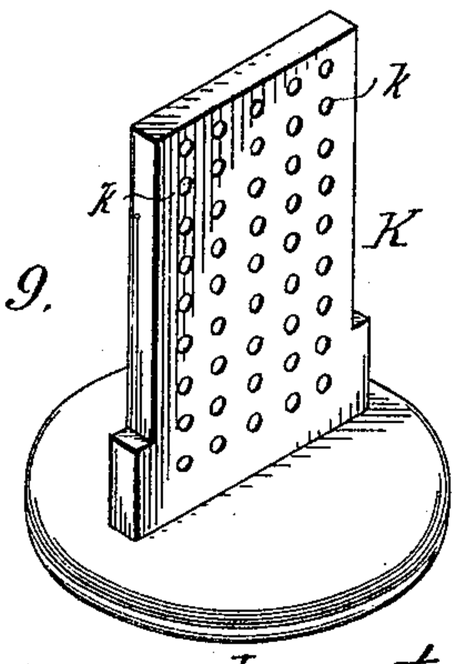
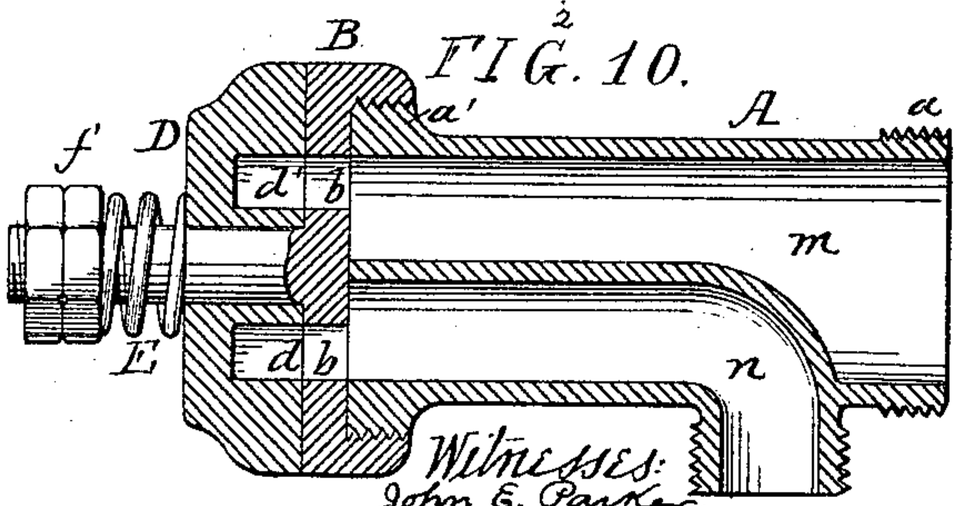


FIG. 9.

FIG. 10.



Witnesses:
John E. Parker
Albert Popkins

Inventor:
Thomas H. Holmes
by his Attorneys.
Howson & Howson.

UNITED STATES PATENT OFFICE.

THOMAS H. HOLMES, OF PHILADELPHIA, PENNSYLVANIA.

REGULATING-VALVE.

SPECIFICATION forming part of Letters Patent No. 436,177, dated September 9, 1890.

Application filed January 19, 1889. Serial No. 296,851. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. HOLMES, a subject of the Queen of Great Britain and Ireland, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Regulating-Valves, of which the following is a specification.

The object of my invention is to construct a regulating-valve for use in connection with a device for automatically cutting off steam or water supplies, my invention being especially applicable to steam-traps, the valves of which have to be frequently repaired.

A further object is to construct a steam-trap embodying my invention that will be simple and effective, as fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a side view, partly in section, of my improved steam-trap and regulating-valve. Fig. 2 is a view of a steam-trap of different form in which my regulating-valve is used. Fig. 3 is a view of my improved valve used for cutting off steam or water from a pump or other device. Fig. 4 is a longitudinal section of my valve in detail. Fig. 5 is a side view of a portion of the valve. Fig. 6 is an end view of the valve-seat. Fig. 7 is a face view of the valve proper. Fig. 8 is a section on the line 1 2, Fig. 7. Fig. 9 is a detached perspective view of the strainer. Fig. 10 is a longitudinal section on the line 3 4, Fig. 1, and Fig. 11 is a view of a modification.

Regulating-valves employed in connection with steam-traps, through which water of condensation and steam passes, wear away very quickly, owing to the fact that scale or other foreign matters gain access to the steam-pipes when put up or when repairs are being made, and owing also to the cutting action of the steam itself; but by constructing the valve in accordance with my invention the wearing-faces of the valve can be readily removed from the valve-casing, chucked to a lathe, turned off accurately, and replaced in a comparatively short time.

Referring to Fig. 1 and the views illustrating the details of my invention, A is the body of the valve having a screw-threaded stem *a*. The valve and its stem are hollow for the passage of steam or water. The valve-body A is reduced at *a'*, which portion is threaded to receive the removable valve-seat B, (shown more clearly in Fig. 6,) said valve-seat B having an internal thread adapted to the portion *a'* and having suitable ports *b b*, through which steam or water can pass. The face *c* of the valve-seat is at right angles to a longitudinal line drawn through the valve and is turned accurately. A portion of the periphery of the valve-seat is hexagonal or many-sided, affording an opportunity for the application of a wrench, by which the valve-seat is removed from the valve-body A.

Projecting from the face of the valve-seat B is a post-pivot C, on which oscillates the valve D, having orifices *d d*, which are opposite the openings *b b* of the valve-seat at certain portions of the movement of the valve. These ports or openings *d* communicate with each other through a passage *d'* in the valve proper. The face *e* of the valve is also ground off at right angles to a longitudinal line through the body A.

The valve proper D is kept to its seat B by a pressure-spring E or other suitable device on the post C, the tension of this spring being regulated by means of a nut or nuts *f* on the threaded end of the post C, on adjusting which the pressure of the valve upon the valve-seat can be regulated as desired.

I place within the valve-body A a strainer K in the form of a plate, Fig. 9, with a series of perforations *k*. This plate is placed in the inlet-passage, and is passed up through an opening held in place by an L-shaped bolt *h*, which passes through a sleeve *g* in the body A, and has at its upper end a securing-nut *h'*, as shown in Figs. 2 and 5. This strainer-plate K prevents the passage of any small pieces of iron or other foreign matter which might otherwise gain access to the valve and cut the seat of the same, and the special construction enables me to make the strainer very light, and having the securing devices independent of the strainer only one opening in the body of the valve is necessary for its application thereto.

The valve, as shown in Fig. 4, is especially adapted for use in connection with the steam-trap shown in Fig. 2, in which a float H is connected to the valve proper D by a tube F, which communicates with the passage *d'*. This float H has an outlet-pipe G, which ex-

tends nearly to the bottom of the float and projects through the upper portion of the same, as shown in Fig. 2, said float also having a small outlet g'.

It will be understood that I do not claim the construction of this float and its inlet and outlet pipes; but I will describe the operation of a trap built on this principle, so as to impart a clear understanding of the construction and operation of my improved valve. The water of condensation from the steam-pipes flows through the passages in the body A of the valve, through the ports b b in the seat, through the ports d in the valve proper D, and thence through the tube F into the float. When steam commences to pass through the passages described, it enters the float and forces the water out through the tube G and the small opening g', and the float being relieved of the weight of the water will rise to the level shown by dotted lines, thus cutting off the inlet-opening. The float H will then slowly fill with water entering through the small opening g' in the bottom, and will gradually move the ports b in line with the ports d', and all the water of condensation which has accumulated in the pipes will pass through the valve, and the operation above described is repeated. I prefer, however, to construct the valve as shown in Fig. 10 when used in connection with a steam-trap, which I also prefer to construct as shown in Fig. 1, the valve-body A in this instance having two passages m n, the passage m being the inlet-passage and n the exhaust-passage. The valve-seat B also has inlet and exhaust ports, as also has the valve proper D, the valve in this case having a plate d^2, which divides the chamber d' into two parts, as shown in Fig. 1.

This steam-trap is constructed in the following manner: Tapped into the exhaust-chamber are tubes F′ and G′, these two tubes being attached one to the top and the other to the bottom of a cylinder or globe H′, Fig. 1, into which the water of condensation from the steam-pipes is forced. This globe H′ is balanced by a weight I, adjustable on a stem I′, projecting from the opposite end of the valve proper D; but it will be understood that the weight I can be dispensed with if the globe H′ is used as a float, as in Fig. 2. Pivoted to the body of the valve is an arm J, having at its upper end a weighted ball J′, and on the valve proper D are two tappets j j', which limit the extent of rocking movement of the arm J, and also push the arm over the center at certain portions of the stroke, so that the ports will be opened quickly.

The operation of the valve in connection with the steam-trap above described is as follows: After the globe H′ is emptied of the water the weight I moves the globe and valve to the position shown in Fig. 1, closing the exhaust-passage and opening the inlet, so that the water of condensation in the pipes will pass through the valve and pipe F into the globe H′. The ball J, being over the center, adds to the weight I and tends to keep the globe in elevated position, allowing the water of condensation to flow into the same until the weights I and J′ are overbalanced by the weight of the water in the globe, when said globe will fall in the direction of the arrow, carrying with it the lug j, which pushes the arm and its ball over the center, so that the arm will strike the lug j' and accelerate the downward movement of the globe, the inlet-ports being thus closed and the exhaust-ports opened quickly. The water from the globe then passes out the exhaust until the globe becomes so light that the weight I will overbalance both the weight of the globe and that of the arm J, when the globe will rise, the lug j' throwing the arm over the center again, and said arm striking the lug j will quickly open the inlet and close the exhaust, the above-described operation being repeated indefinitely.

In place of the weighted lever J a balance-beam J^2 may be used, as shown in Fig. 11. This beam is hollow, having enlargements at each end. The beam contains a certain amount of mercury, so that when the projection on the valve D strikes one of the lugs j^2 it tips the beam and the mercury flows to the lowest point, accelerating the movement of the valve D.

When my invention is used for controlling the passage of steam into a pump which supplies a tank and is intermittently operated, so as to keep the water in said tank at a proper level, I construct the valve in the following manner, referring to Fig. 3: A′ is the inlet and A^2 the outlet passage, B the movable valve-seat, and D the valve, which in this instance has a spindle or pivot C′ which passes through the valve-body A and is held in place by a spring E, the tension of which is adjusted by a nut f. The valve has passages d d and connecting-passage d', and in place of the tube F a lever L is secured to the valve D, and to this lever is attached a cord or rope l, connecting the lever with a float in the reservoir or tank above described, so that when the water in the tank falls the float will descend with it and the valve will be turned to the position shown in Fig. 3, allowing steam to pass from the inlet A′ to the outlet A^2 to the pump, which will thus be set in motion to force water into the tank, raising the float, and consequently moving the valve to again cut off communication and stop the operation of the pump.

I claim as my invention—

1. The combination, in a regulating-valve, of the valve-body A, the removable seat B, adapted to said body and having ports, with a valve proper D, the face of which is adapted to the face of the valve-seat, and said valve having ports and passages, substantially as described.

2. The combination of the valve-body A, the longitudinal passage therein, said valve-body having a threaded stem a', with a removable valve-seat B, adapted to said stem,

and also provided with passages, said removable seat having a post or pivot C, with the valve proper D, having ports and passages, a spring, and adjusting-nuts adapted to said post C for regulating the pressure of the valve against the face of the valve-seat, substantially as described.

3. The combination of the valve-body A and the seat having ports or passages therein, with a valve D, having ports *d d* and a passage *d'*, communicating with said ports, said ports and passage forming a passage through the valve, and devices for keeping the valve to its seat, substantially as described.

4. The combination, in a valve, of the body A and the inlet-passage through said body, with a perforated strainer-plate K, adapted to be inserted in said body, and an L-shaped bolt *h*, adapted to a sleeve *g* in the body A, with a nut *h'*, adapted to said bolt, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS H. HOLMES.

Witnesses:

WILLIAM D. CONNER,

HENRY HOWSON.