

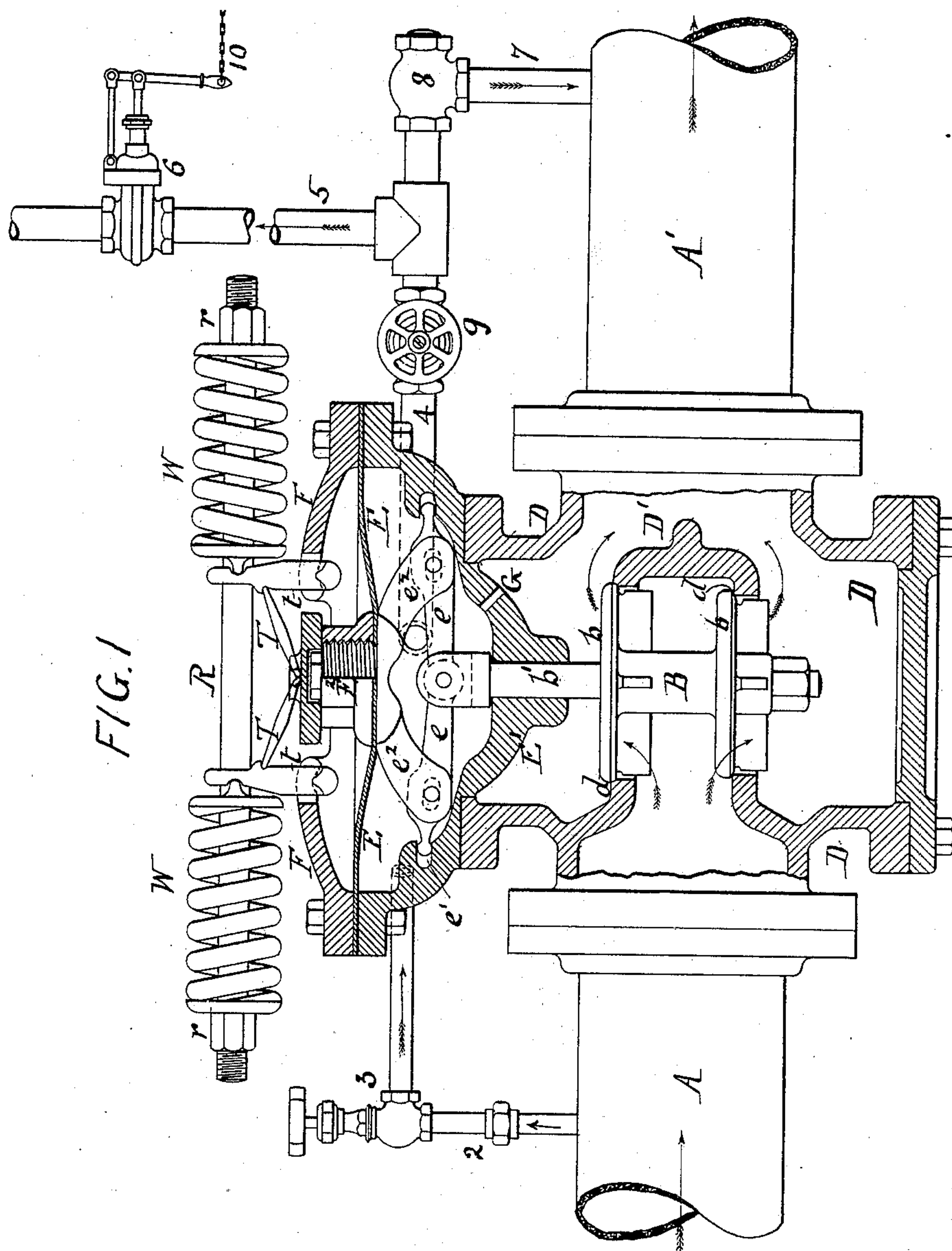
(No Model.)

2 Sheets—Sheet 1.

J. M. FOSTER.
SAFETY STOP VALVE.

No. 566,452.

Patented Aug. 25, 1896.



WITNESSES:

Edith J. Griswold
S. C. Connor

INVENTOR

John M. Foster

BY

Howson and Howson
his ATTORNEYS

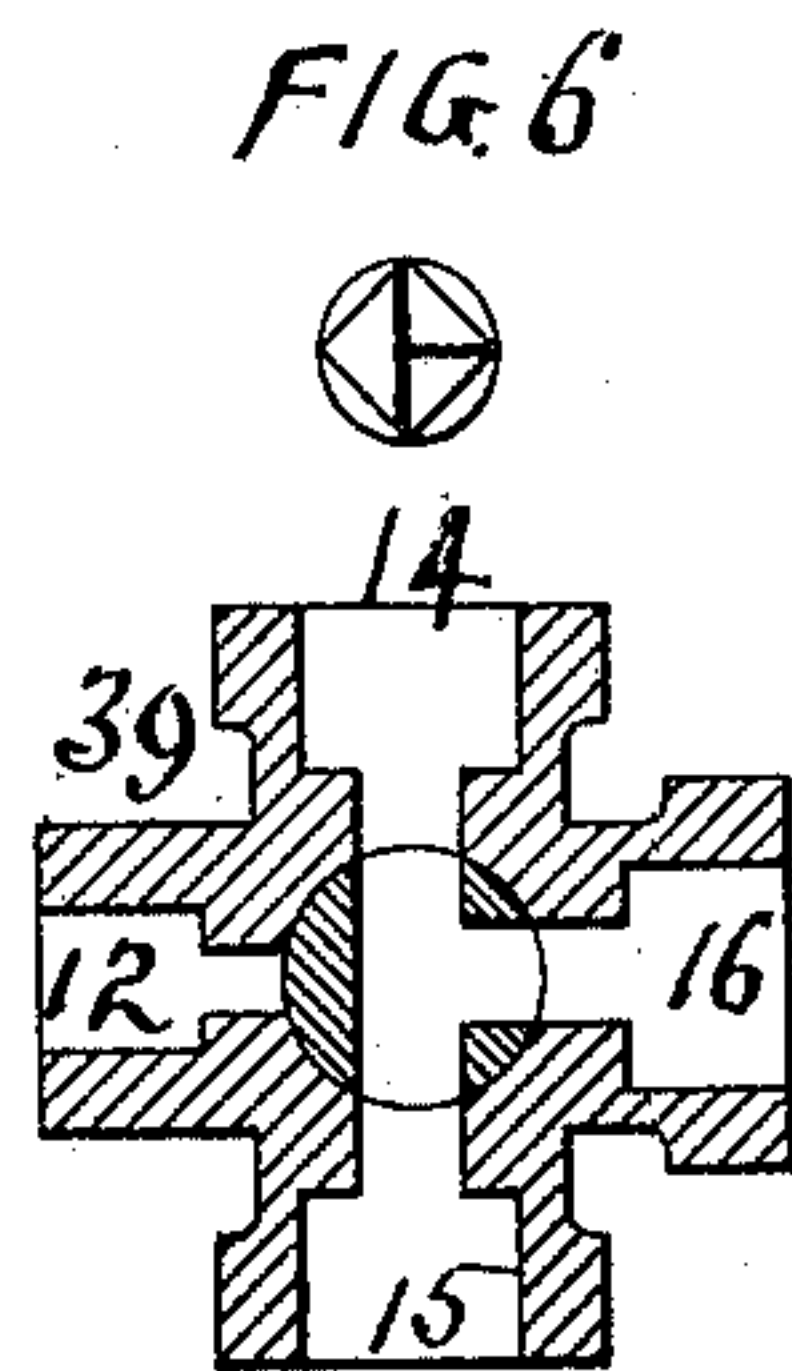
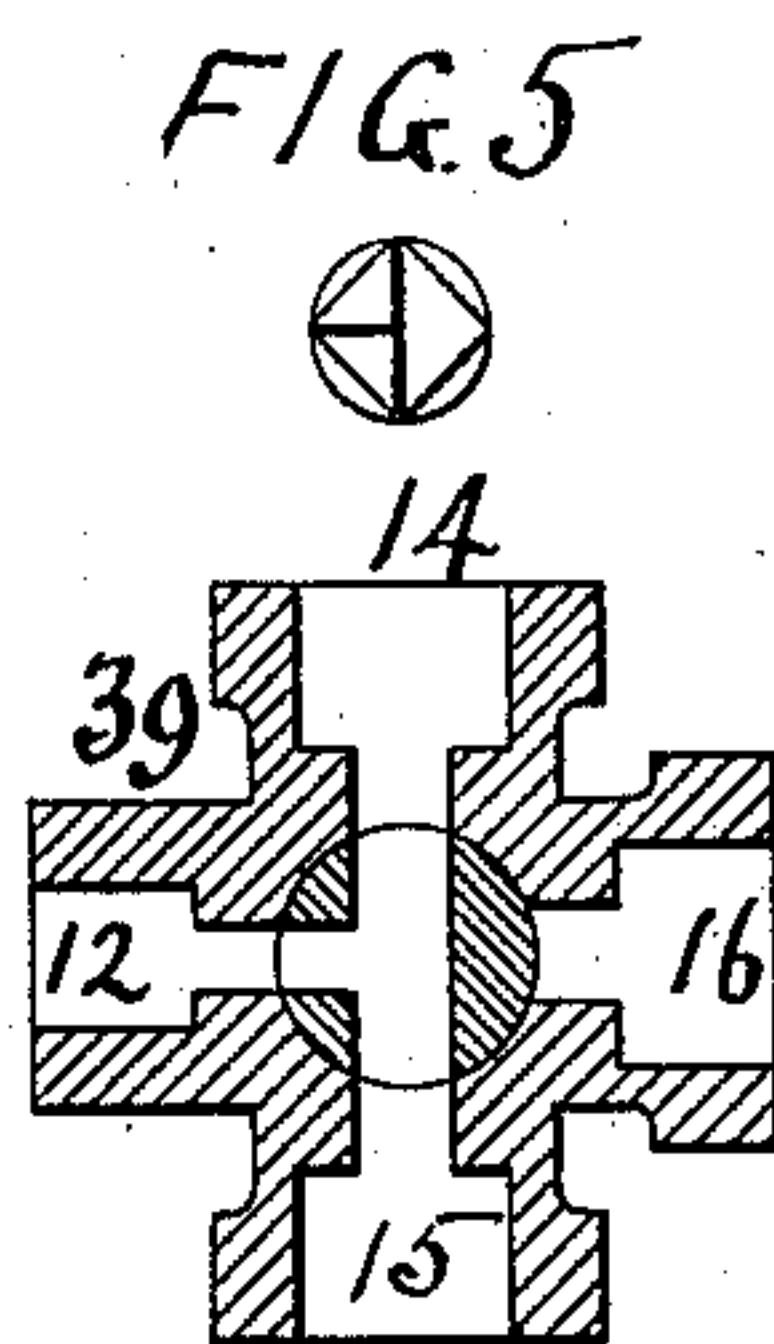
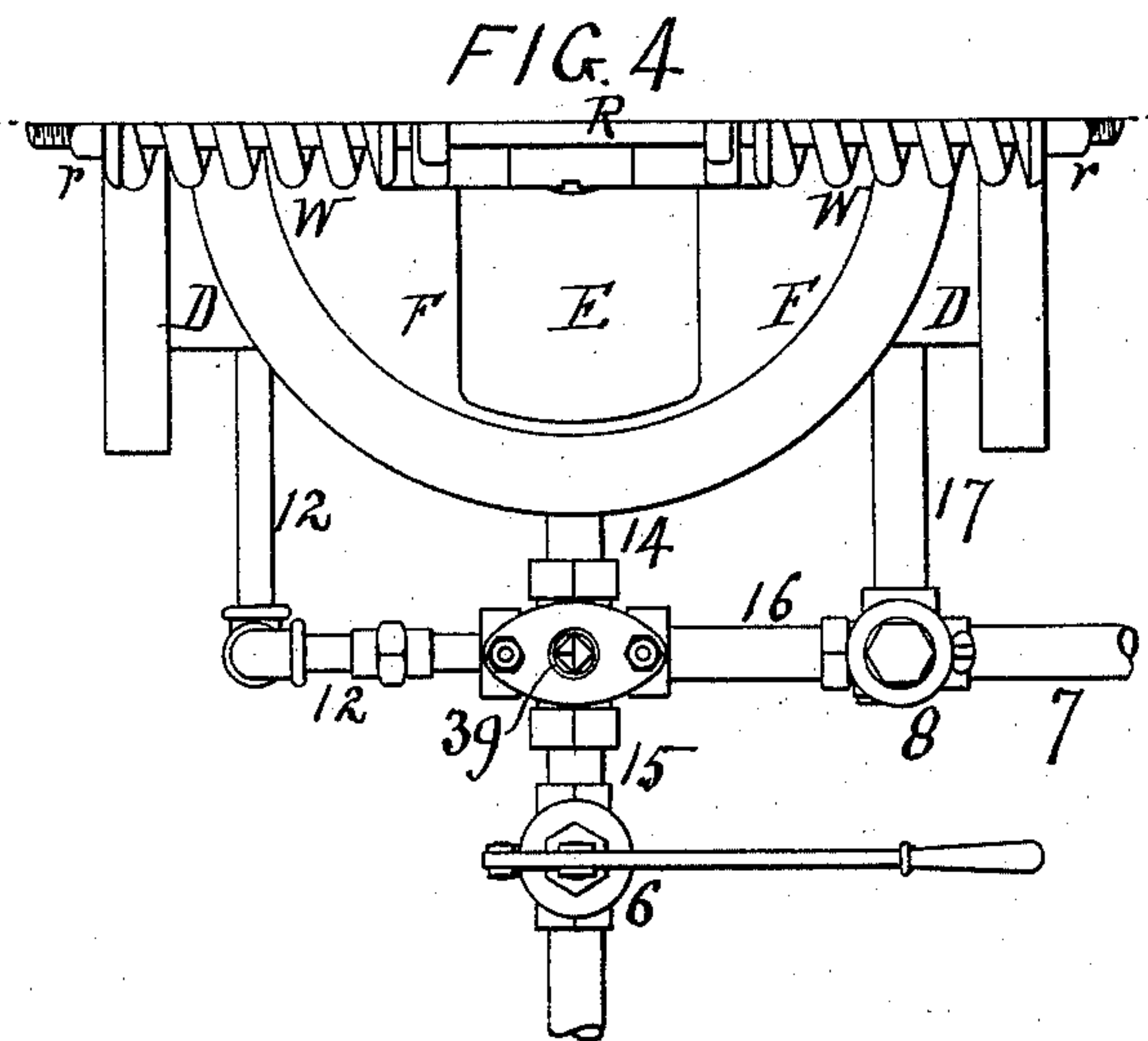
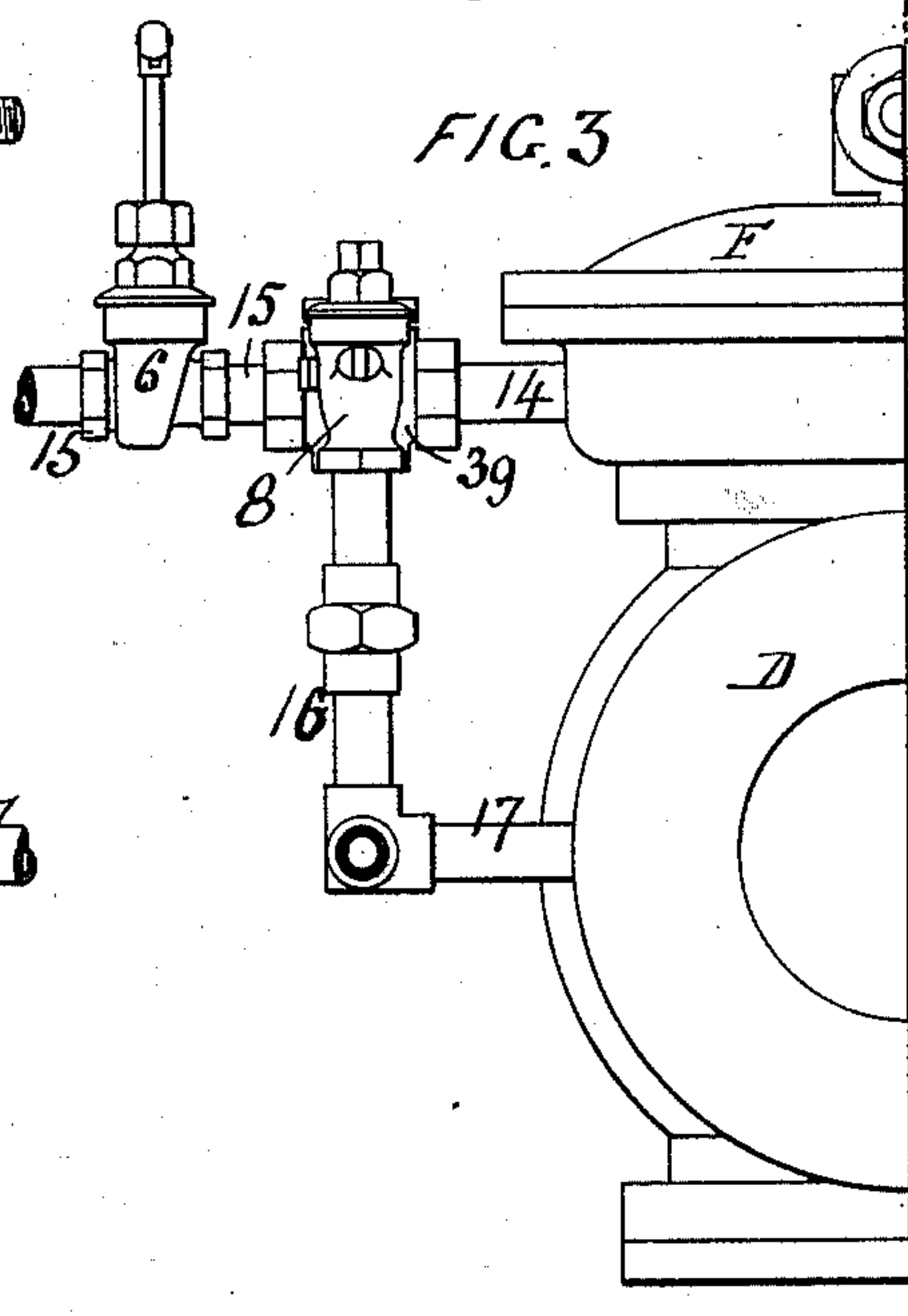
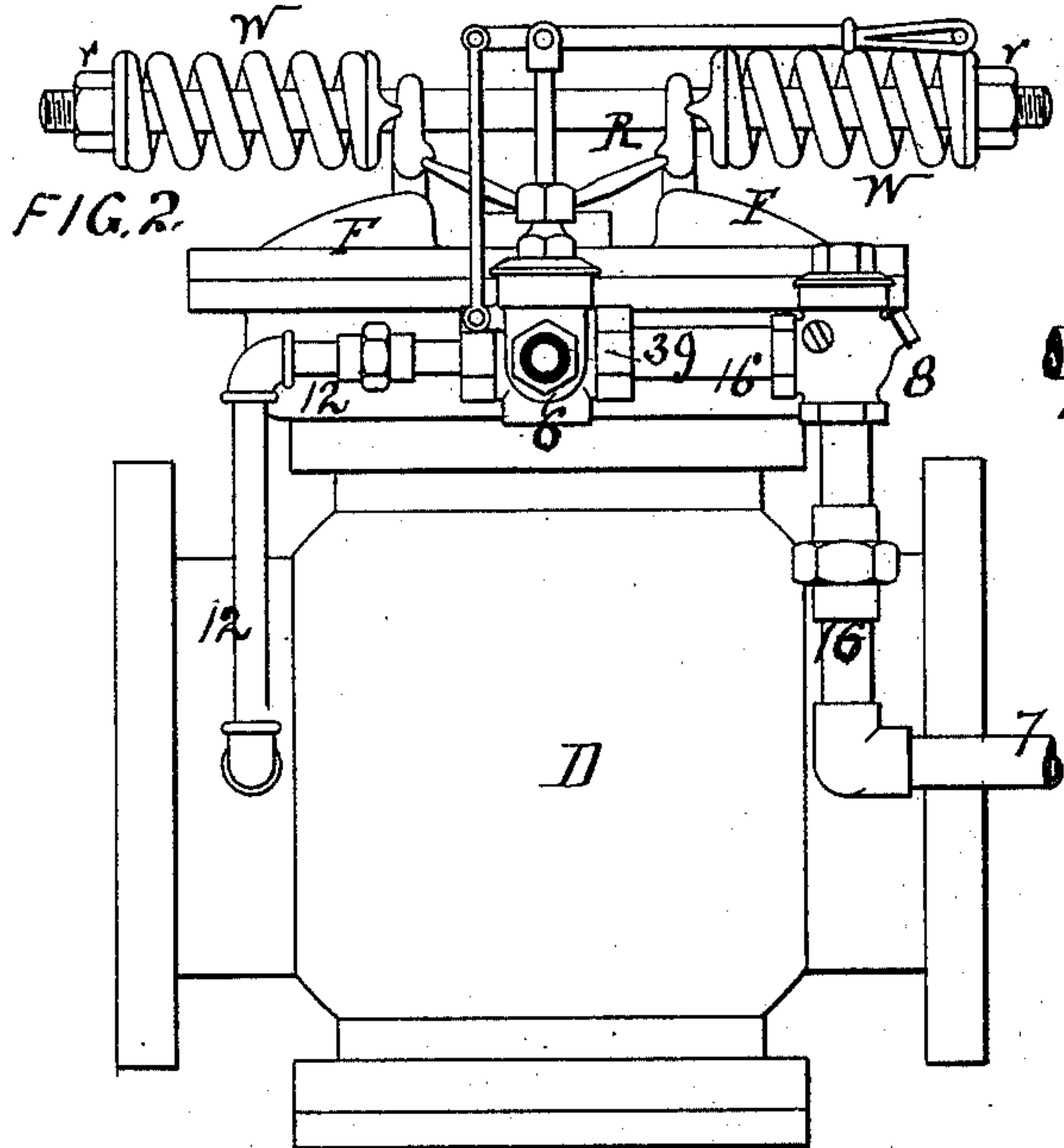
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2 Sheets—Sheet 2.

J. M. FOSTER.
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No. 566,452.

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WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN M. FOSTER, OF ELIZABETH, NEW JERSEY.

SAFETY STOP-VALVE.

SPECIFICATION forming part of Letters Patent No. 566,452, dated August 25, 1896.

Application filed April 27, 1896. Serial No. 589,354. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. FOSTER, a citizen of the United States of America, and a resident of Elizabeth, county of Union, State of New Jersey, have invented an Improved Safety Stop-Valve, of which the following is a specification.

My invention consists of an improved safety stop-valve to be applied to piping for conveying steam or other fluid under pressure, as from the generator to the point of consumption, the main object of my invention being to construct such a safety stop-valve that it will automatically and immediately shut off the supply in case of a burst or breakage on the delivery side of the valve, and so that the valve can be quickly closed also from points at a distance from the valve, as in case of an accident requiring the immediate stoppage of the engine, and finally that it can be easily and quickly reopened.

In the accompanying drawings, Figure 1 is a vertical sectional view of one form of my improved appliance. Fig. 2 is a side elevation of a modification. Fig. 3 is a half end elevation of the same. Fig. 4 is a corresponding half plan, and Figs. 5 and 6 are views of a three-way cock used in connection with the construction shown in Figs. 2, 3, and 4.

In carrying out my invention I employ a balanced valve in the main piping, controlled by a diaphragm which is subjected to fluid-pressure on the delivery side of the valve, tending to open the valve, such action being opposed by a spring or springs tending to close the valve to its seat.

While I may use either a diaphragm or piston, I will here show and describe my valve as provided with a diaphragm, which I prefer; but it should be understood that by the use of the term "diaphragm" in this specification I do not exclude the use of a piston. Again, while I may use either adjustable springs or adjustable weights to counteract the fluid-pressure on the diaphragm I prefer to use springs; but by that term "springs" in this specification I do not exclude the use of their equivalent adjustable weights.

I may say at the outset that in carrying out the details of construction of my invention I have adopted many of the features of

the Foster regulator described in Patents Nos. 534,951 and 550,217.

I will first describe my invention with reference to the construction shown in Fig. 1. My stop-valve may be placed at any suitable point in the main pipe A A', which conveys the steam or other fluid under pressure, the direction of flow being indicated by the arrow, A being the pipe on the admission side and A' the pipe on the delivery side of the valve.

The valve B is a balanced valve having two disks *b b*, seating in this case downward upon two circular seatings *d* in the inner circular casing D' within the outer casing D. Over this valve-casing is an upper dish-shaped casing E', closed in above by a flexible diaphragm E, which at its margin is clamped in place by an open cover-plate or hood F. The opening and closing of the balanced valve to its seat are controlled by means of the diaphragm E, through the medium of levers *e e*, resting at their outer ends in pockets in the casing E' and connected at their inner ends to the upper end of the stem *b'* of the valve, which stem passes up through the center of the casing E', preferably with a close fit. The center piece E² of the flexible diaphragm has arms *e*² with pin-and-slot connections with the levers *e e* at points between their opposite ends.

Upon the upper side of the center piece E², carried by the flexible diaphragm, are supported the adjacent ends of toggle-levers T, which bear at their outer ends against levers *t t*, pivoted on the cover F and acted on by spiral springs W on the horizontal rod R, substantially as described in Letters Patent No. 534,951, above mentioned, except that in the present instance I have shown two springs instead of one. The pressure of these springs can be adjusted to meet various requirements by means of the nuts *r r*.

There is a restricted communication between the delivery side of the valve and the space below the diaphragm, which I will term the "diaphragm-chamber," through a passage G.

There is communication between the piping A on the admission side of the valve and the diaphragm through piping 2, controlled

by a hand-valve 3. This hand-controlled valve is to be normally kept closed.

From another point of the diaphragm-chamber extends piping 4 5 to any suitable point of discharge, normally closed by a quick-opening gate-valve 6, whose lever is to be connected by mechanical or electrical connections (as chains, cords, or wires 10) to various distant points, such, for instance, as the chief engineer's room on a steamship or the office of a factory, or other suitable points from which it may be desirable to control the stoppage of the engine. A stop-valve 9 is provided in the piping 4. From the diaphragm-chamber I also provide a third communication, which may be through the same piping 4 and piping 7 to the main delivery-pipe A' at any desired distance beyond the stop-valve. There is a check-valve 8 in this pipe 7.

To open the valve B, supposing it to be closed, as indicated in the drawings, and supposing the stop-valve 9 to be closed, it is merely necessary to open the valve 3 in the piping 2, when the pressure on the under side of the diaphragm will raise the latter and with it the valve B, admitting steam or other fluid under pressure through the valve to the delivery side, and thence through the restricted passage G to the diaphragm-chamber on the under side of the diaphragm. When the valve B is once opened, the starting-valve 3 should be then closed and the stop-valve 9 opened.

The pressure of the springs W is so adjusted that it will not overcome the steam-pressure on the under side of the diaphragm to close the valve until the delivery-pressure is diminished markedly below the working pressure of the steam or other fluid. In case, however, there should be a break or burst on the delivery side of the stop-valve, as, for instance, in the main delivery-pipe A', near the engine, the pressure on the under side of the diaphragm will instantly diminish, particularly through the connection of the pipe 4 7, and the springs W W will close the valve B to its seat.

If the engineer or any one in authority in the engineer's room, or at the office of a factory, or at other distant points to which the connections 10 from the valve 6 extend, wishes to close the valve B, as, for instance, in the case of fire, or when an explosion is heard, or to stop an engine in case of accident, all that is necessary is to operate the chain or other connection to open the discharge-valve 6 and the pressure on the under side of the diaphragm E will be sufficiently diminished to result in the springs W closing the valve B. This valve B will then remain closed until the diaphragm E is again raised by the admission of pressure through the piping 2, and as the valve is balanced it can be easily opened against the pressure of the springs W.

While my present invention, as shown and described, is similar in many of its detailed

features to the Foster regulating-valve of Patent No. 534,951, before mentioned, it will be seen that the valve in my present invention closes to its seat in a direction the opposite to that in which the valve in the regulator closes.

In the modification illustrated in Figs. 2 to 6, inclusive, I have shown my invention as embodied in self-contained form, that is, one in which the piping containing the valves or cocks is connected to and carried by the valve-casing D itself. In this construction the two valves 3 and 9 of Fig. 1 are replaced by a single four-way cock 39, having a three-way plug, as illustrated in Figs. 5 and 6. The piping 12 (corresponding to piping 2 of Fig. 1) is in this case tapped into the neck of the valve D on the admission side and connects with one branch of the four-way cock 39, which has a connection 14 with the diaphragm-chamber. The diametrically opposite opening of the valve 39 leads to the discharge-pipe 15, containing the quick-opening gate-valve 6, which may be controlled directly by hand or through the medium of chains or other connections from distant points. The fourth branch of the four-way cock leads to piping 16, containing the check-valve 8, and to the piping 7, which, as explained in connection with Fig. 1, is to be connected to the main delivery-pipe at any desired distance beyond the stop-valve. There may also be a connection, through a branch 17, Figs. 3 and 4, with the neck of the valve D on the delivery side. The other parts of the apparatus are the same as described with reference to Fig. 1. To open the stop-valve B in this construction, the three-way plug of the four-way cock is turned to the position illustrated in Fig. 5, when steam will be admitted to the diaphragm-chamber from the admission side, so that the valve B will be opened against the pressure of the springs. Then the three-way plug of the cock 39 is turned to the position illustrated in Fig. 6, thus cutting off connection of the diaphragm-chamber with the admission side and opening it to the delivery side, the piping 7, and the discharge-pipe 15, as is the case when the valve 3 of Fig. 1 is closed and the valve 9 of that figure is opened.

I claim as my invention--

1. A stop-valve for piping for conveying steam or other fluid under pressure, comprising a casing containing a balanced valve, a diaphragm open to the delivery-pressure to hold said valve open, springs to counteract said delivery-pressure to close the valve when the delivery-pressure diminishes below a determined point and means for adjusting the springs, substantially as described.

2. A stop-valve for piping for conveying steam or other fluid under pressure, comprising a casing containing a balanced valve, a diaphragm-chamber containing a diaphragm controlling said valve, piping connecting said diaphragm-chamber with the piping on the delivery side to subject the diaphragm to the

delivery-pressure to hold said valve open, springs to act on the diaphragm against the delivery-pressure and close the valve to its seat, when said pressure is diminished below
5 a determined point, and means for adjusting the springs, substantially as described.

3. A stop-valve for piping for conveying steam or other fluid under pressure, comprising a casing containing a balanced valve, a
10 diaphragm controlling said valve, adjustable springs to counteract said delivery-pressure, a restricted opening between the diaphragm-chamber and the delivery side of the valve and valved piping connecting the diaphragm-
15 chamber with the main delivery-pipe, whereby on a diminution of pressure there below a determined point, the stop-valve will be closed, substantially as described.

4. A stop-valve for piping for conveying
20 steam or other fluid under pressure, comprising a casing having a balanced valve, a diaphragm-chamber having a diaphragm controlling said valve, and a restricted passage connecting the said chamber with the deliv-

ery-pressure, springs to act on the diaphragm 25 in opposition to the delivery-pressure and a discharge-pipe leading from the diaphragm-chamber and containing a quick-opening gate-valve, substantially as and for the purposes set forth. 30

5. A stop-valve for piping for conveying steam or other fluid under pressure, comprising a casing containing a balanced valve controlling the flow of fluid, a diaphragm-chamber containing a diaphragm adapted to be
35 acted upon by the delivery-pressure, and controlling said valve, springs to act on the diaphragm in opposition to the delivery-pressure and a valved pipe directly connecting the admission side with the diaphragm-chamber, to
40 open the stop-valve, substantially as set forth.

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

JOHN M. FOSTER.

Witnesses:

EDITH J. GRISWOLD,
HUBERT HOWSON.