

No. 770,635.

PATENTED SEPT. 20, 1904.

L. B. FULTON.
FEED WATER REGULATOR.
APPLICATION FILED JULY 1, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

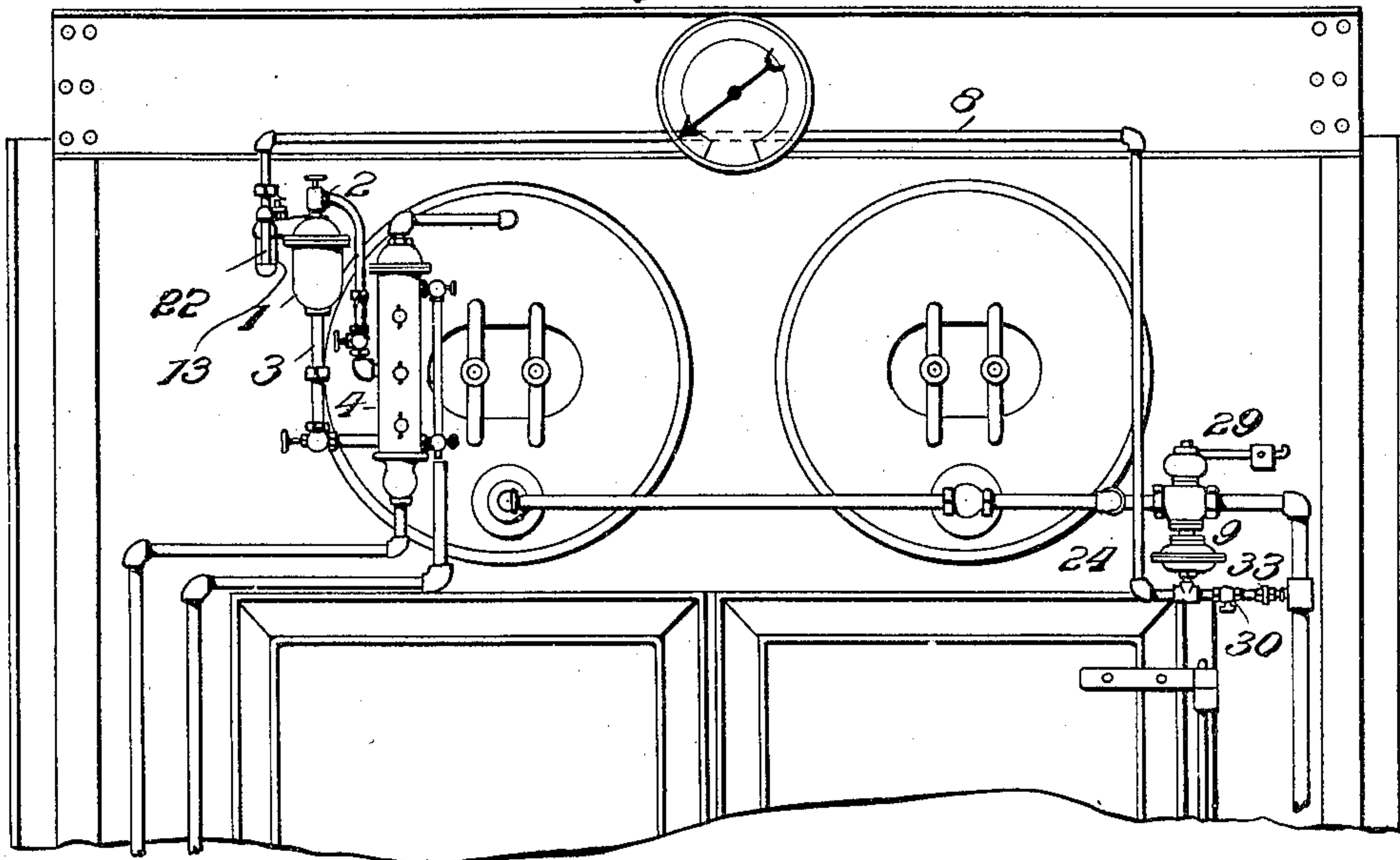
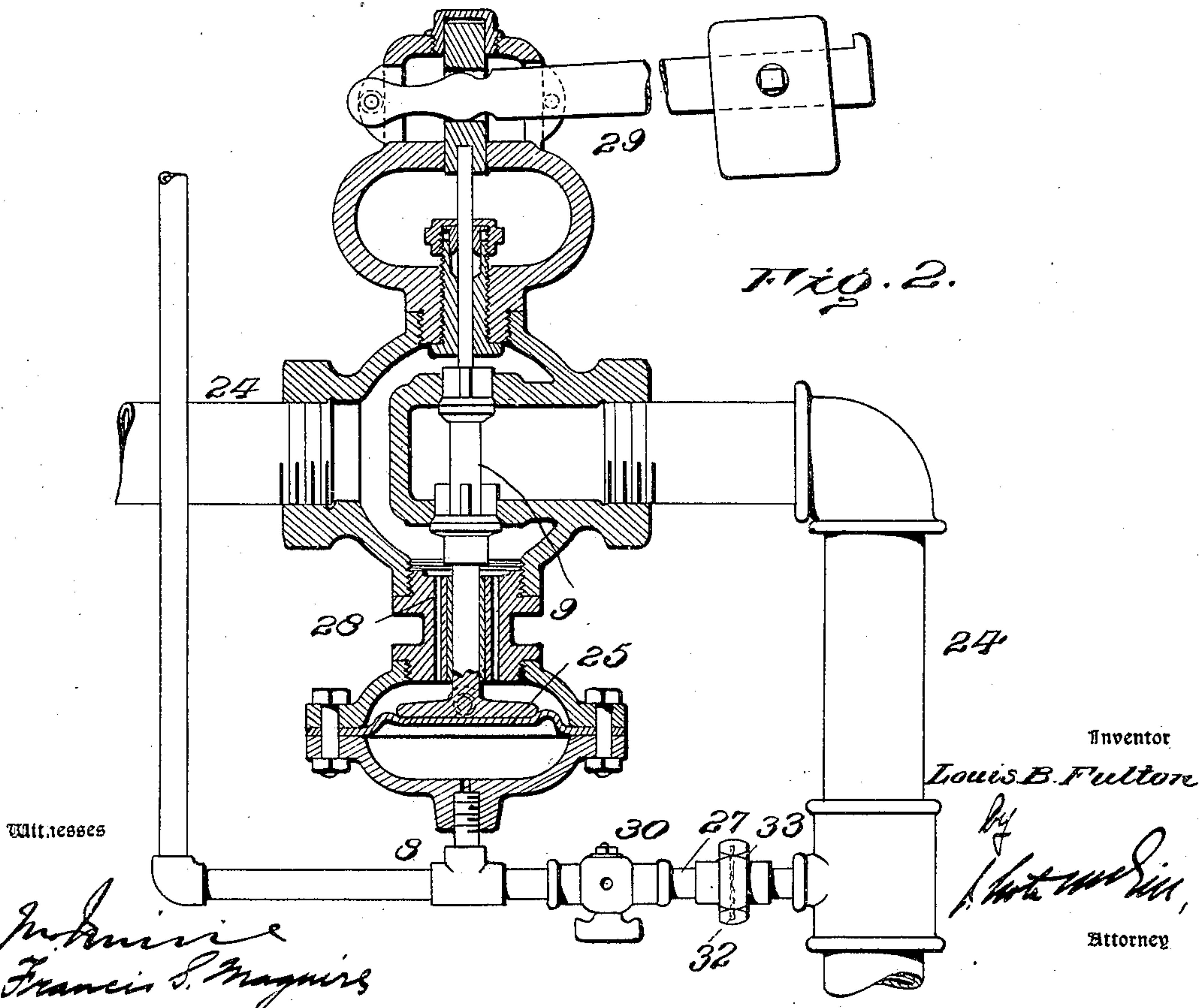


Fig. 2.



Witnesses

Witness
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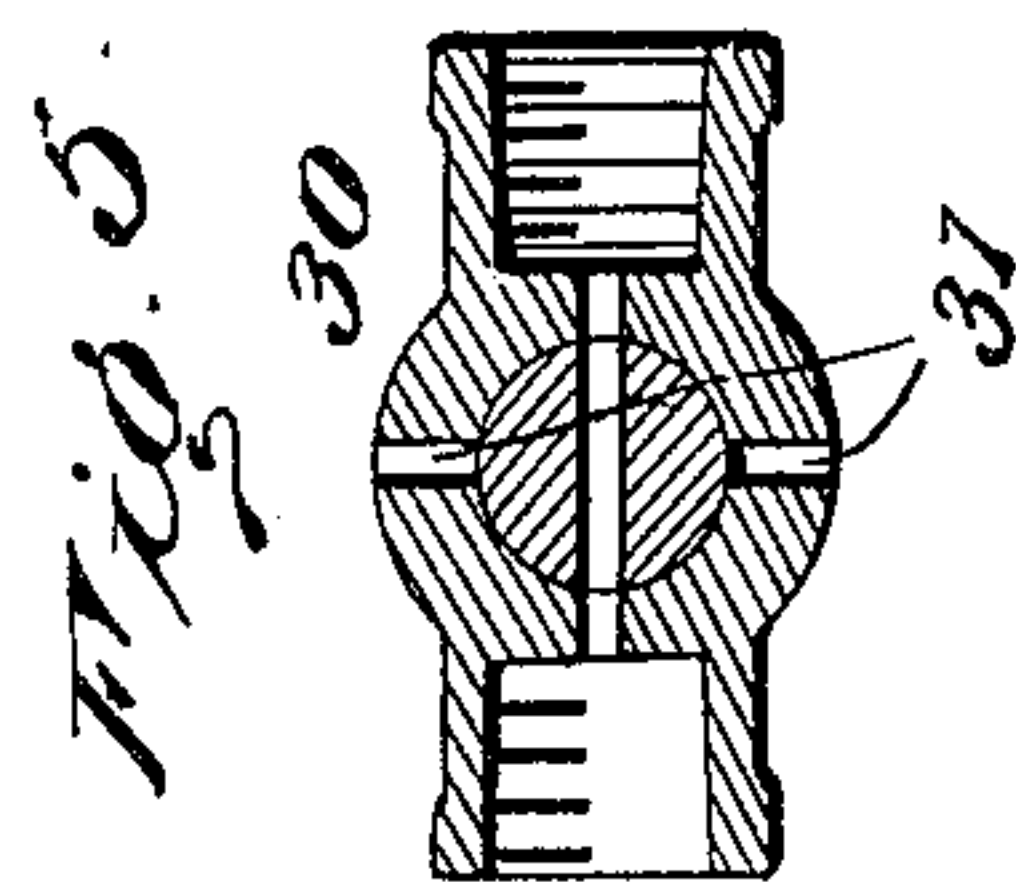
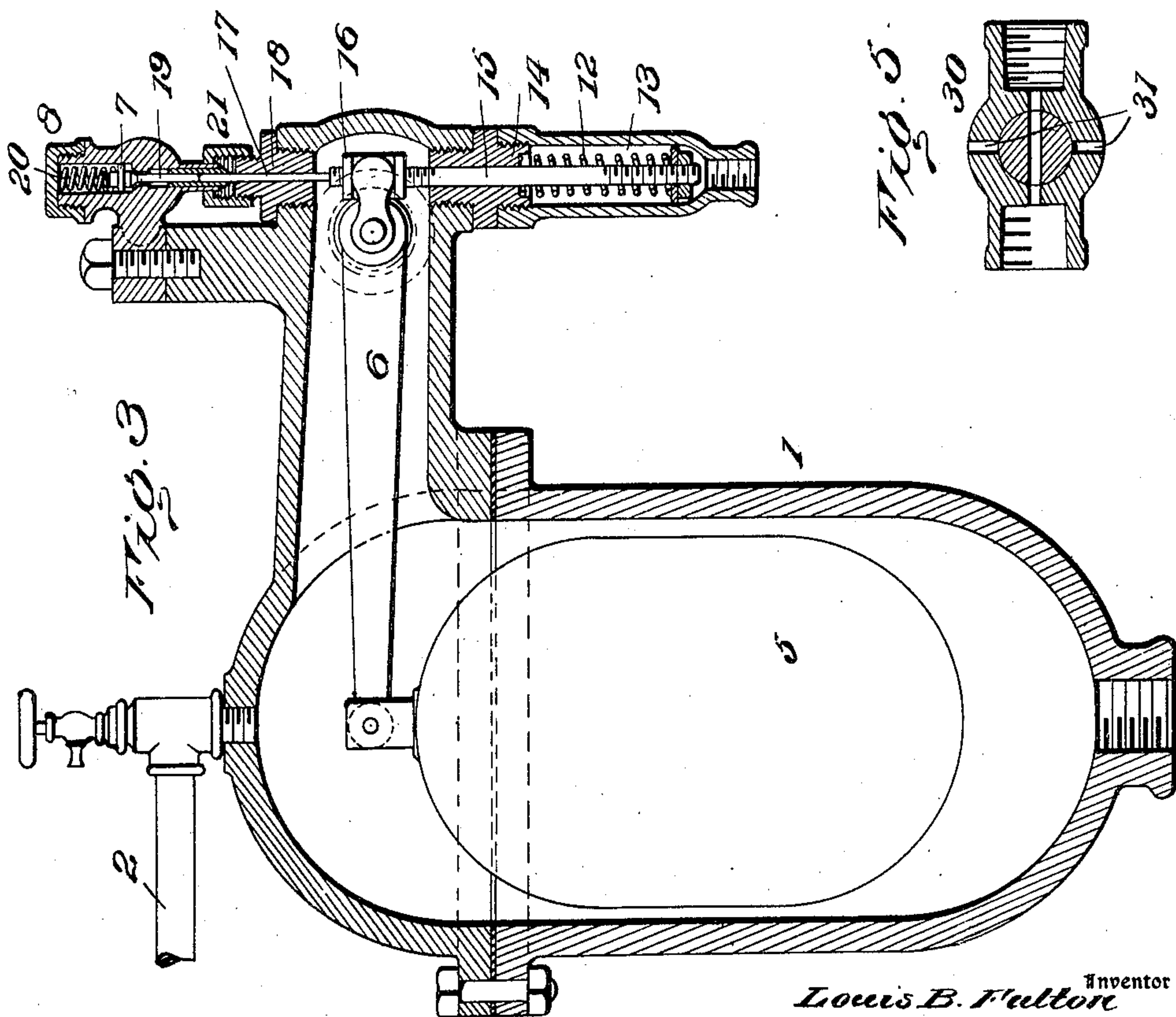
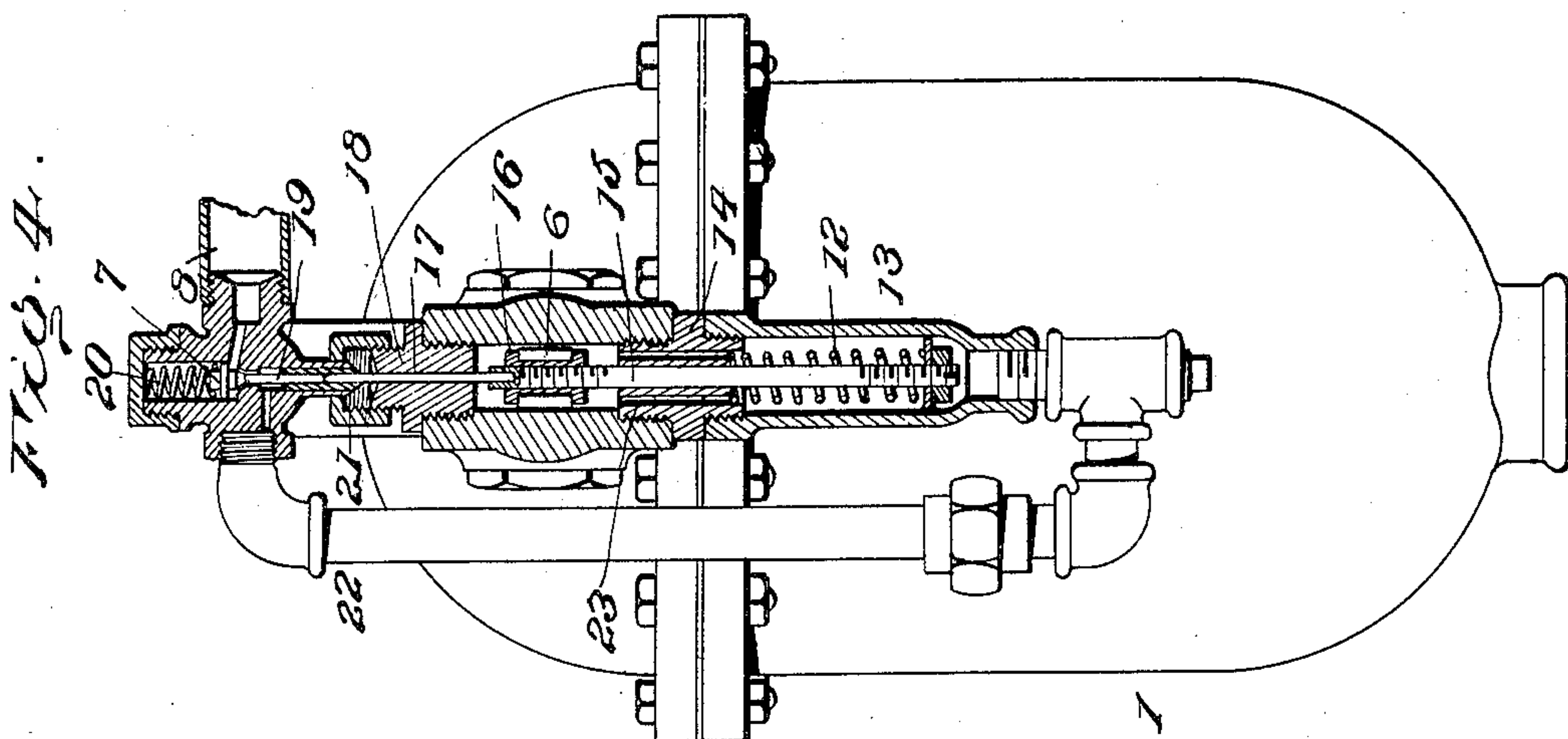
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Witnesses

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182

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UNITED STATES PATENT OFFICE.

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FEED-WATER REGULATOR.

SPECIFICATION forming part of Letters Patent No. 770,635, dated September 20, 1904.

Application filed July 1, 1904. Serial No. 214,989. (No model.)

To all whom it may concern:

Be it known that I, LOUIS B. FULTON, of
Pittsburg, in the county of Allegheny and
State of Pennsylvania, have invented certain
5 new and useful Improvements in Feed-Water
Regulators; and I do hereby declare the fol-
lowing to be a full, clear, and exact descrip-
tion of the invention, such as will enable others
skilled in the art to which it appertains to
10 make and use the same.

Heretofore all feed-water regulators em-
ploying controlling-valves which are seated or
unseated by boiler-pressure exhaust into the
atmosphere while water is being fed to the
15 boiler and also during the time water is shut
off from entering the boiler. This means a
considerable loss of steam or boiler-pressure,
resulting naturally in an increased expendi-
ture of fuel to maintain the boiler-pressure.
20 To prevent waste of steam and avoid depend-
ing upon the boiler-pressure to effect the seat-
ing of the controlling-valve, I have hereto-
fore devised means for effecting the seating
of such valve by the pressure in the feed-line,
25 such invention being the subject-matter of a
pending application for Letters Patent No.
201,496, filed April 4, 1904.

The object of my present invention is to pre-
vent all waste of either steam or water conse-
30 quent upon the release of pressure upon the
piston or diaphragm of the controlling-valve.

By means of the present improvement I am
enabled not only to effect the seating of the
controlling-valve by the overpressure in the
35 feed-line, but I avoid all waste of water as well
as of steam, since that which has heretofore
escaped to the atmosphere is fed to the boiler.

Further objects are to reduce to a minimum
the cutting action on the escape or auxiliary
40 valve and to enable the stricture-opening to
be readily freed of obstruction.

The invention will be hereinafter fully set
forth, and particularly pointed out in the
claims.

45 In the accompanying drawings, Figure 1
shows the general outline of a feed-water regu-
lator embodying my present improvements,
portions of the boiler and furnace being indi-

cated. Fig. 2 is a view of portions of the
pressure-pipe, with the controlling-valve 50
shown in section. Fig. 3 is an enlarged ver-
tical sectional view through the auxiliary
valve and trap-casing. Fig. 4 is a cross-sec-
tional view on line 4 4, Fig. 3. Fig. 5 shows
parts of the stricture device. 55

In connection with my present improvement
I employ a trap-casing 1 of the kind indi-
cated in Letters Patent No. 662,488, issued
to me November 27, 1900, such trap-casing
being connected at its top and bottom by pipes 60
2 and 3 to the water-column 4, the internal-dis-
placement body 5 controlling the position of
the lever 6, from which it is hung. When
water in the boiler falls sufficiently to un-
cover pipe 2, steam will enter the trap-casing 65
at the top and displace the water, the body 5
at once lowering, and when sufficient water is
supplied to the boiler to submerge the end of
pipe 2 the condensation of the entrapped steam
will cause the water to again rise in the trap- 70
casing and effect the raising of body 5. When
the latter is lowered, its lever 6 unseats an
auxiliary or escape valve 7, located in a pres-
sure-pipe 8, leading from the diaphragm-cas-
ing of the controlling-valve 9 to the top of 75
casing 1. In the present instance the outer
weighted extension of the lever is dispensed
with, a spring 12 being substituted. This
spring is located within a casing 13, depend-
ing from the lateral arm of the trap-casing, 80
to which it is secured by a threaded nipple
14, formed with a central longitudinal open-
ing. The spring 12 engages a rod 15, carry-
ing at its upper end a flanged block or head
16, with which the short arm of the lever en- 85
gages. To the upper end of this rod is se-
cured a second rod 17, which passes upwardly
through a plug 18 in the top of the casing, so
as to engage the stem 19 of the auxiliary valve
to effect the unseating of the latter, as against 90
the tension of its spring 20, when the dis-
placement-body is lowered. The lower por-
tion of the auxiliary-valve casing is joined to
plug 18 by a union joint 21, such joint being
preferably packed with plumbago to prevent 95
pressure from escaping.

Into one side of the auxiliary-valve casing opposite to that into which pipe 8 opens is secured a by-pipe 22, which at its lower end opens into the lower end of casing 13. In consequence when valve 7 is unseated the pressure medium by which the controlling-valve is normally seated instead of escaping to the atmosphere as heretofore will pass through pipe 22 into casing 13 and upwardly through the latter and through ports 23 in nipple 14, thus reaching the boiler through the trap-casing 1.

As pointed out in my before-noted application for patent, the controlling-valve 9 is located in the feed-line 24. This valve is shown in the present instance as a balance-valve having a headed rod contacting with a diaphragm 25, fitted in the bottom of the valve-casing into which the feed-line opens on the under side of the diaphragm—that is to say, a by-pass 27 leads from the feed-line to the valve-casing, to which is also connected the pressure-pipe 8. The diaphragm is open to the boiler on its upper side, ports 28 being provided for this purpose. The upward pressure of the feed-line acting on the lower side of the diaphragm is counteracted by a weighted lever 29, bearing downwardly on the controlling-valve. Within the by-pass 27 is located a stricture key or cock 30, having a small opening through which the water is forced to pass. To remove any obstructions that might lodge in this opening, it is only necessary to give the key a quarter-turn, when such opening may be cleaned by a wire or other instrument passed through openings 31 in the sides of the key-casing. (See Fig. 5.) Adjacent the key or cock a straining-screen 32 is secured within a joint 33. The stricture device allows a continuous circulation within the pressure-pipe while water is being supplied to the boilers.

In practice there is always an excess pressure in the feed-line over the boiler-pressure from ten to fifteen pounds. When the auxiliary valve is seated, the controlling-valve will be likewise held to its seat by the overpressure in the feed-line. When, however, the conditions in the boiler result in the lowering of the displacement-body, the auxiliary valve will be unseated, relieving the pressure on the under side of the diaphragm of the controlling-valve and allowing the latter to unseat. While the controlling-valve is so unseated and the boiler is being supplied with water there is a constant flow through pressure-pipe 8; but such of the water as passes through the auxiliary valve instead of escaping to the atmosphere, as heretofore, will pass through pipe 22 and into the trap-casing, and so to the boiler. In this way there is no loss or waste whatsoever, and the objection to escaping water is entirely obviated. Hence it will be seen that by means of my present improvement there is absolutely no waste of

either water or steam, and hence there is no unnecessary lowering of pressure in the boiler during the time it is taking water. As soon as the proper quantity of water has been supplied and water is again entrapped in casing 1 the displacement-body will rise, thereby tilting the lever so as to allow of the lowering of rod 17 as against the tension of spring 12, whereupon the auxiliary valve will be resealed, cutting off all escape through the pressure-pipe. Upon the restoration of pressure in this pipe the controlling-valve will be resealed by the overpressure in the feed-line.

The advantages of my present improvement are apparent to those skilled in the art. Not only does it embody all the advantages of the invention covered by my before-noted pending application for patent, the principle of which may be mentioned as residing in the seating of the controlling-valve by the excess pressure in the feed-line and not by the boiler-pressure, but in addition thereto all waste during the feeding operation is avoided. The danger of cutting the escape or auxiliary valve is reduced to the minimum. There being no escape to the atmosphere, this valve is subjected only to the difference in pressure between that in the feed-line and the boiler-pressure.

I claim as my invention—

1. A feed-water regulator comprising a controlling-valve located in the feed-line and seated and unseated by pressures acting in opposite directions, means, operated by the conditions in the boiler, for directly controlling one pressure medium, and means for allowing such pressure medium to continuously pass to the boiler when the controlling-valve is released.

2. A feed-water regulator comprising a controlling-valve located in the feed-line and seated and unseated by pressures acting in opposite directions, a pipe for conveying one pressure medium leading to such valve, means operated by the conditions in the boiler for relieving the pressure in said pressure-pipe, and means connecting the latter to the boiler so that the pressure medium when released will continuously pass to the boiler.

3. A feed-water regulator comprising a controlling-valve located in the feed-line, a pressure-pipe leading to such valve, a connection between the feed-line and such pressure-pipe, means operated by the conditions in the boiler for relieving the pressure in said pressure-pipe, and means connecting the latter to the boiler so that the pressure medium when released will pass to the boiler.

4. A feed-water regulator comprising a controlling-valve located in the feed-line and seated by the pressure in such line, means for relieving such pressure, means for actuating such latter means according to the conditions in the boiler, and means for allowing such released pressure to pass to the boiler.

5. A feed-water regulator comprising a controlling-valve located in the feed-line, and seated by the pressure in such feed-line, a pressure-pipe leading from said valve, an auxiliary valve in said pressure-pipe, means operated by the conditions in the boiler for actuating such auxiliary valve, and means connecting said pressure-pipe to the boiler.

6. A feed-water regulator comprising a controlling-valve located in the feed-line, a by-pipe leading from said feed-line to said controlling-valve for moving the same in one direction, a pressure-pipe leading from said valve and connected at its other end to the boiler, an auxiliary valve in said pressure-pipe, and means operated by the conditions in the boiler for unseating such auxiliary valve and allow the flow in the pressure-pipe to pass to the boiler.

7. A feed-water regulator comprising a controlling-valve located in the feed-line, a diaphragm for acting on said valve open on one side to the boiler-pressure, a by-pass leading from the feed-line and opening against the other side of said diaphragm, a pressure-pipe leading from such latter side and connected at its other end to the boiler, an auxiliary valve in said pressure-pipe, and means operated by the conditions in the boiler for unseating said auxiliary valve.

8. The combination with the trap-casing connected at top and bottom with a boiler, the displacement-body therein, and the lever from which said body is suspended, of the controlling-valve, the pressure-pipe leading therefrom through which pressure is conveyed for holding said valve seated, the auxiliary valve

in said pressure-pipe, a by-pipe connecting said pressure-pipe with said trap-casing, and means actuated by the lever for effecting the unseating of such auxiliary valve, the pressure in the pressure-pipe passing through said by-pipe when said auxiliary valve is so unseated.

9. In a feed-water regulator having a controlling-valve in the feed-line, a by-pipe leading from said feed-line and connected with the casing of said valve, a pressure-pipe, an auxiliary valve therein, means for unseating said valve, and a stricture device in said by-pipe comprising a casing having two sets of ports, one set opening through the sides of the casing to permit of the insertion of an instrument for the removal of obstructions, and a key having a stricture-opening designed to register with either set of ports.

10. A feed-water regulator comprising a controlling-valve located in the feed-line, a diaphragm for acting on said valve open on one side to the boiler-pressure, a by-pass leading from the feed-line and opening against the other side of the diaphragm for holding the controlling-valve to its seat, a pressure-pipe leading from such latter side of the diaphragm, and means operated by the conditions in the boiler for relieving the pressure in such pressure-pipe.

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

LOUIS B. FULTON.

Witnesses:

T. J. ORR,

WM. C. CHAPLIN.