No. 747,514. PATENTED DEC. 22, 1903.

C. C. TOZIER.

FEED WATER REGULATOR.

APPLICATION FILED MAR. 25, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

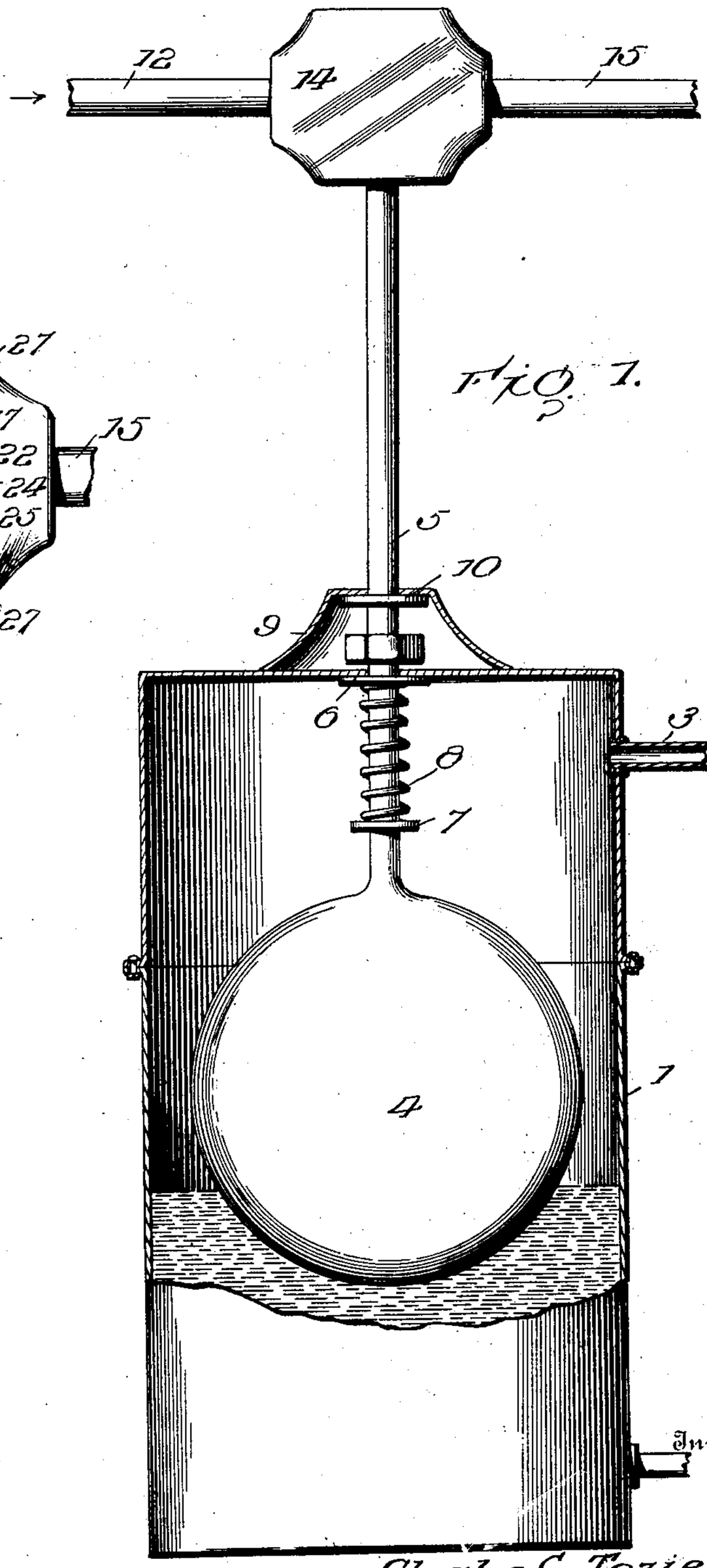

FIG. 1.

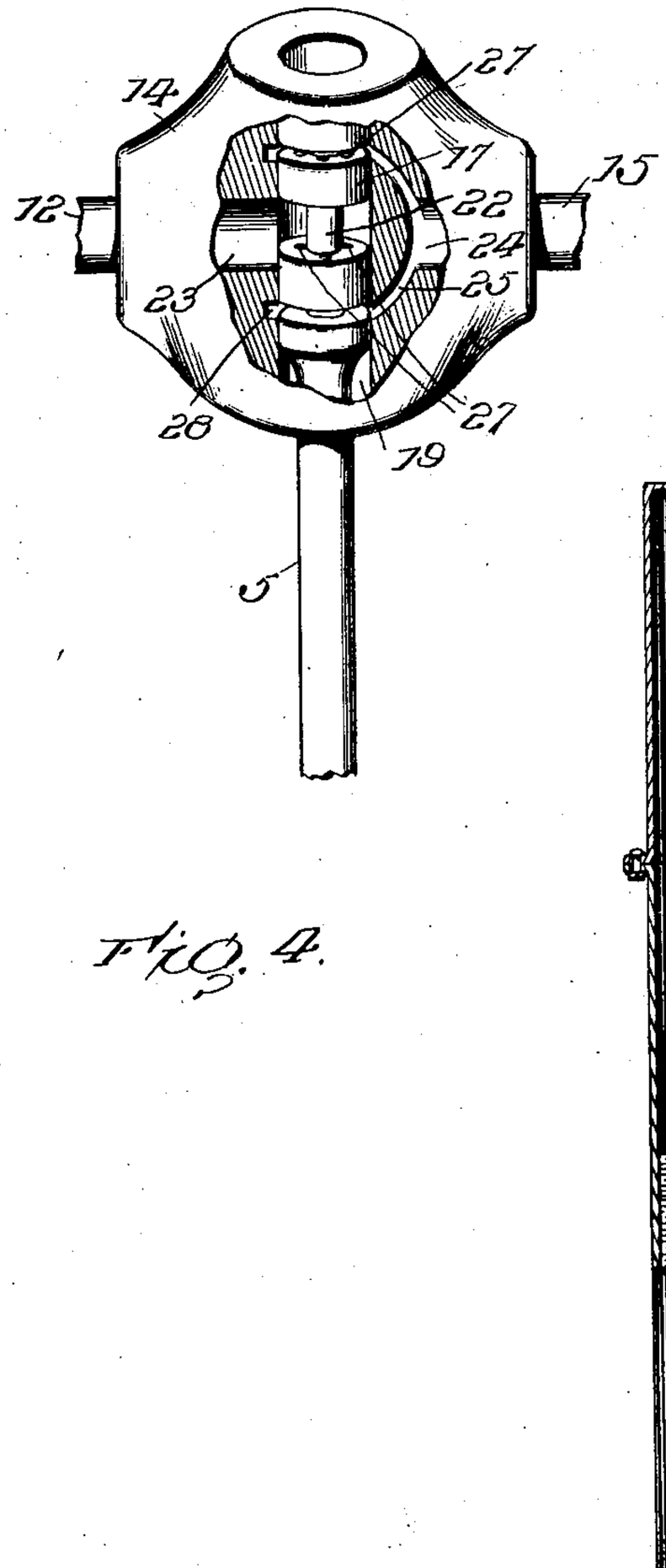

FIG. 4.

Witnesses
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NO MODEL. 2 SHEETS—SHEET 2.

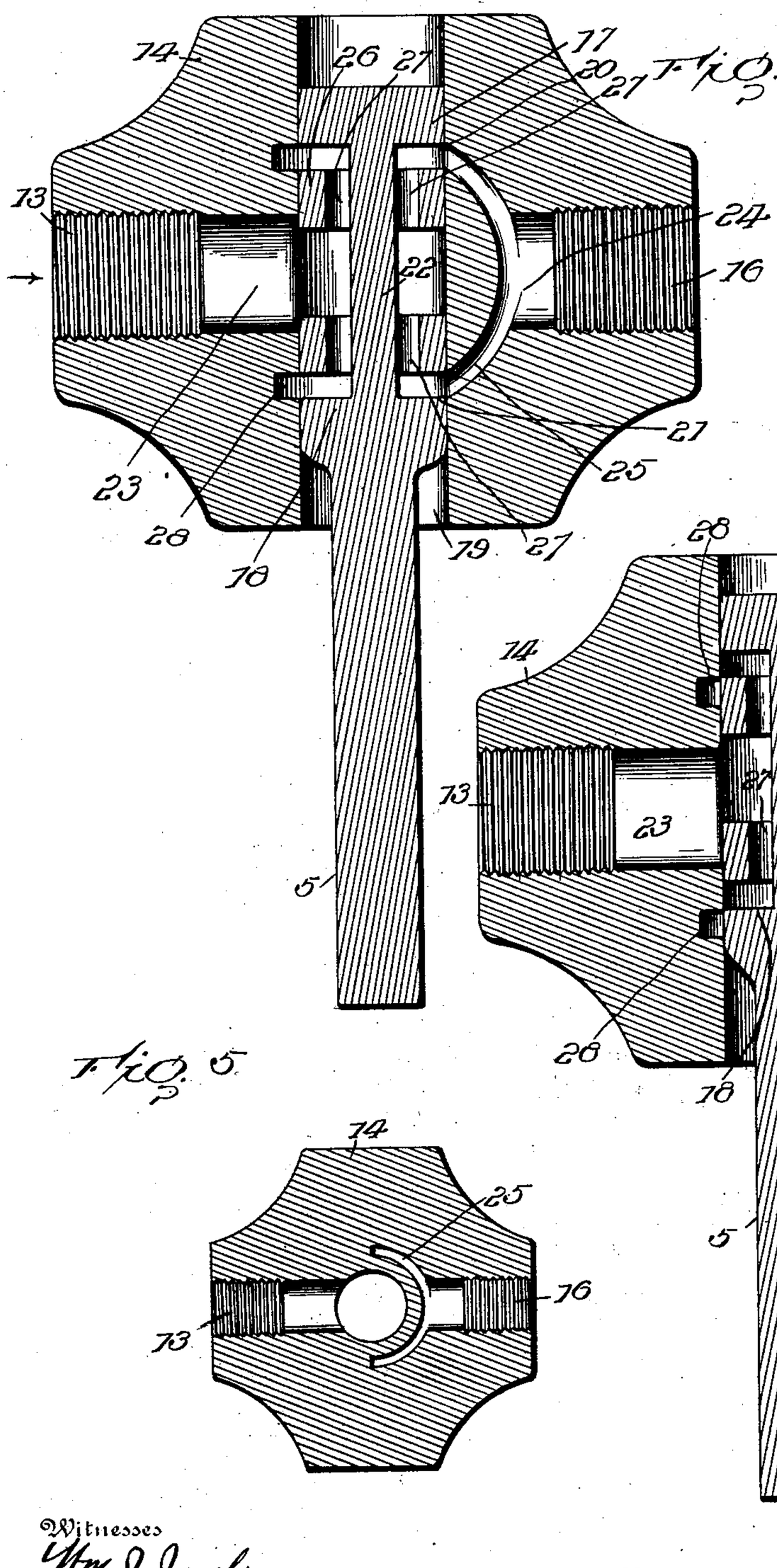

FIG. 2.

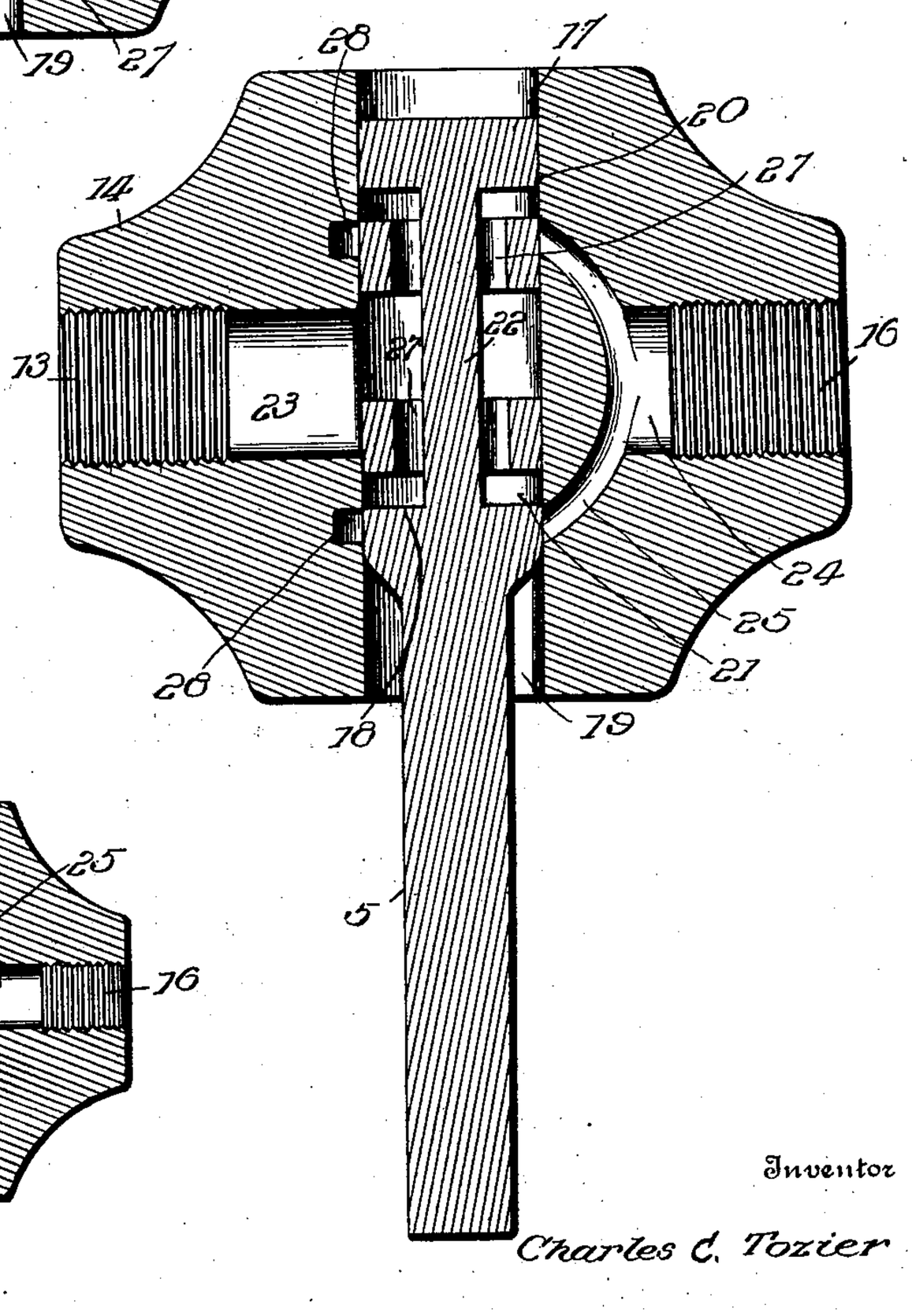

FIG. 3.

FIG. 5

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No. 747,514. Patented December 22, 1903.

UNITED STATES PATENT OFFICE.

CHARLES C. TOZIER, OF SKOWHEGAN, MAINE, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO TOZIER VALVE MANUFACTURING COMPANY, OF SKOWHEGAN, MAINE, A CORPORATION.

FEED-WATER REGULATOR.

SPECIFICATION forming part of Letters Patent No. 747,514, dated December 22, 1903.

Application filed March 25, 1903. Serial No. 149,555. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. TOZIER, a citizen of the United States of America, and a resident of Skowhegan, in the county of Somerset and State of Maine, have invented certain new and useful Improvements in Feed-Water Regulators, of which the following is a specification.

This invention relates to certain new and useful improvements in feed-water regulators of that class in which is employed a float and a balanced valve, the float being disposed within a water column or chamber which is in communication with the steam and water spaces of the boiler and operatively connected with the valve, whereby the height of the water in the boiler serves to control the movement of the float and the latter in turn controls the valve to regulate the supply of water to the boiler.

The present invention has for its objects, among others, to improve upon this class of devices as outlined in general above and to render the same more positive and efficient in operation, less expensive in manufacture, and more sensitive to the influence of the change of water-level in the boiler. It pertains, further, to a novel construction of the valve employed, the latter being so constructed as to receive water at its center and discharge from both ends or sides at the same time, whereby the force of the current of inflowing water is exhausted equally in both directions and the valve will work as easily when the water is being discharged as it does when no water is passing through the valve. By this construction the valve works much easier, and thus I am permitted to employ a much smaller float, occupying less space and requiring less pressure to actuate it. I place my valve directly in the service or supply pipe and connect it directly with the stem of the float, and thus obtain a direct and positive reciprocal action.

The valve has ports which feed directly into an annular chamber or channel, so that the valve may turn in any position within its casing and discharge at any point. This not only insures certainty of action, but permits of the turning of the valve, so that the point of wear may be changed, so as to avoid undue and uneven wearing of the same and its bearing on the casing.

The valve operates without guides and its parts are not exposed to the force of the water, thus lessening the wear and permitting of the turning of the valve as may be required. Another essential feature of the present construction is that the valve is perfectly balanced in any and all positions. When in use, the water from the service or supply pipe is all about the center, and back pressure from the boiler passes back through the annular channel and extends all around the valve both above and below the center, so that both the pressure from the supply-pipe and the back pressure are equally distributed at all times when the valve is in action. When not in action, the water passes through it and discharges from both sides or ends, thus equalizing the force of the current from the supply.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically defined by the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the numerals of reference marked thereon, form a part of this specification, and in which—

Figure 1 is an elevation, with a portion broken away and parts in section, showing the application of my improvements. Fig. 2 is an enlarged sectional view through the valve-casing with the valve in its open position. Fig. 3 is a similar view with the valve shown in its closed position. Fig. 4 is a perspective view of the valve-casing with a portion broken away. Fig. 5 is a section through the valve-casing at right angles to Figs. 2 and 3.

Like numerals of reference indicate like parts throughout the several views.

Referring to the details of the drawings, 1 designates a tank or water-column, which may be of any suitable shape, material, and

capacity, and this tank is designed to be supported in position in any suitable manner adjacent to or at any required distance from the boiler. (Not shown.)

2 is a pipe designed to connect the tank 1 with the water-space of the boiler, while 3 is a pipe designed to connect the tank with the steam-space of the boiler. The tank being air-tight and connected with the steam and water space of the boiler will have its water-level at all times the same as the water-level of the boiler. The tank may be constructed in any suitable manner, in the present instance being shown as formed in sections secured together in any well-known way, thus permitting of the insertion and removal of the float when necessary.

4 is a float disposed within the tank and designed to be governed in its height by the height of the water in the boiler, and consequently in the tank. The stem 5 of this float passes through an opening in the top of the tank and through a washer 6, secured to the under side of the said top, while between this washer and a washer or collar 7 on the stem at a point above its connection with the float is a spring 8, which serves to force the float down, so that the water may pass through the valve, as will hereinafter be made apparent.

9 is a cap on the top of the tank, and 10 is a plate or collar, (here shown as stationary,) and on the stem 5 between this plate or collar and the top of the tank is a nut 11, by means of which the tension of the spring and the height of the float may be adjusted. By means of the construction just described the piston or stem of the valve, which is also the stem 5 of the float, is forced up, so that the nut 11 will strike the plate 10.

12 is a pipe leading from the aqueduct or any other suitable source of supply, and this pipe is engaged in a screw-threaded opening 13 in the chamber or casing 14, in which works the valve soon to be described.

15 is a pipe engaged in a threaded opening 16 in the opposite side of the casing 14 and is designed to be connected with the boiler for conducting the water thereto.

The upper end of the stem 5 is formed with an enlargement having the heads 17 and 18, which work steam and water tight within the longitudinal bore 19 of the casing 14, the adjacent faces thereof forming shoulders 20 and 21, between which is the reduced portion 22, around which is an annular chamber 23, as seen clearly in Figs. 2, 3, and 4. It is to be noted that the longitudinal bore 19 of the casing 14 intersects the passage 23, which communicates with the inlet-pipe 12, and is also at right angles to the passage 24, communicating with the outlet-pipe 15, and communication is afforded between the chamber 23 and said passage 24 by means of the passage 25, which extends substantially half-way around the casing, as shown, so that water at all times may be found extending all the way from the lower part of the valve to the upper part thereof and back of the lining 26, through which there are a series of ports 27, preferably, though not necessarily, four in number, as seen in Fig. 4. 28 represents annular grooves at the top and bottom of the chamber 23. These grooves communicate with the curved passage 25 when the valve is in one position, as indicated in Fig. 2.

The piston may be provided with suitable spring-packing at points adjacent its shoulders, so as to insure a perfectly-tight joint, and it is of course evident that variations in the dimensions may be had without in any wise affecting materially the results, as it is evident that the same may be varied according to the size of the boiler and the pressure; but these I consider details which come fully within the scope of the present invention.

With the parts constructed and arranged substantially as hereinbefore set forth the operation is as follows: As seen in Fig. 2, the valve is in the position open, and the water entering through the pipe 12 will take the following course: It passes first into the chamber 23, which, as above stated, extends entirely around the reduced portion of the piston and forms the chamber into which the water rushes after passing through said supply-pipe 12. The water is then forced through the ports 27, whereby the water is forced upward and at the same time downward into the grooves 28, which are of sufficient capacity to carry the same amount of water which is forced through the ports 27. From thence the water passes through the curved chamber or passage 25, so that water is present in the casting or casing extending all the way from the groove 28 in the lower part of the valve to the groove in the upper part thereof and back of the lining. The water from the grooves 4 passes through the before-mentioned ports, so there will be equal pressure at all times pressing to the right and to the left, the pressure on the right or the one side being the same as the pressure on the other side, so that it keeps the valve in its position without exerting any more force on the one side than on the other. The water passing through the passage 25 enters the chamber 24 and from thence through the pipe 15 to the boiler, and as the water in the boiler reaches the proper height the water in the tank or receptacle 1 will assume the same level, forcing the float 4 upward and forcing the piston from the position in which it is seen in Fig. 2 to that in which it is seen in Fig. 3, in which latter position the valve shuts off the water from the passage 25. In this position the water from the passage 25 presses against the solid portion of the valve, as indicated. As the float is raised by the rise of the water in the tank 1 the nut 11 will

strike the plate or washer 10 and close the valve, allowing no water to pass through to the boiler until the water in the boiler is lowered, and thus bringing about a corresponding lower level of water in the tank 1, when the float 4 will fall, and if the weight of the float and piston is not sufficient to bring the valve down into working position the spring 8 will serve to accomplish this end.

From the above it will be seen that I have devised a novel, simple, and efficient form of water-regulator and valve therefor, and while the structural embodiment of the invention as herein disclosed is what I at the present time consider preferable it is evident that the same is subject to changes, variations, and modifications without departing from the spirit of the invention or sacrificing any of its advantages. I therefore do not intend to restrict myself to the details of construction herein disclosed, but reserve the right to make such changes, variations, and modifications as come properly within the scope of the protection prayed.

What is claimed as new is—

1. In a feed-water regulator, the combination with a receptacle having provision for connection with the steam and water spaces of a boiler, of a float adapted to be supported upon the water in said receptacle, a pipe for supplying water to the boiler, a valve-casing interposed in said supply-pipe, and a rotatably-mounted valve in said casing controlled by the float and balanced in any and all positions.

2. In a feed-water regulator, a receptacle having provision for connection with the steam and water spaces of a boiler, a float in said receptacle, a pipe for supplying water to the boiler, a valve-casing interposed in said pipe, and a rotatably-mounted valve in opposite ends of said casing and adapted to reciprocate with the float and constructed to discharge simultaneously from both sides.

3. In a feed-water regulator, a receptacle having provision for connection with the steam and water spaces of a boiler, a float in said receptacle, a pipe supplying water to the boiler, a valve-casing interposed therein, a valve carried by the stem of the float, and a nut on said stem movable between the top of the receptacle and a fixed abutment.

4. In a feed-water regulator, a receptacle having provision for connection with the steam and water spaces of a boiler, a float in said receptacle, a pipe supplying water to the boiler, a valve-casing interposed therein, a valve carried by the stem of the float, a nut on said stem movable between the top of the receptacle and a fixed abutment, and a spring around said stem between an abutment thereon and an abutment adjacent the top of the receptacle.

5. In a feed-water regulator, a valve-casing having a longitudinal bore, inlet and outlet openings, a curved passage affording communication between said bore and outlet-passage, and grooves within said bore and communicating with the ends of said passage and a valve movable in said bore.

6. In a feed-water regulator, a valve-casing having a longitudinal bore, inlet and outlet openings, and a curved passage affording communication between said bore and outlet-passage and grooves within the bore communicating with the ends of said passage, combined with a valve movable in said bore and having a reduced portion forming an annular chamber and a communication between said chamber and groove.

7. In a feed-water regulator, a valve-casing having a longitudinal bore, inlet and outlet openings, a curved passage affording communication between said bore and outlet-passage, and grooves communicating with said bore, combined with a rotatably-mounted balance-valve movable in said bore and having a reduced portion forming an annular chamber.

8. In a feed-water regulator, a valve-casing having inlet and outlet ports and a longitudinal bore, and a valve adapted to reciprocate in said bore, a restricted curved passage extending in opposite directions from the inner end of the outlet-port and having an annular chamber and longitudinal ports.

9. In a feed-water regulator, a valve-casing having inlet and outlet ports and a longitudinal bore, and a rotatably-mounted valve adapted to reciprocate in said bore and having an annular chamber and longitudinal ports, opposite ends of said casing having a curved passage affording communication between said bore and the outlet-port and grooves within the bore communicating with the ends of said passage.

10. In a feed-water regulator, a valve-casing and a rotatably-mounted valve therein having an annular chamber and ports constructed and arranged for the discharge of the water at both ends simultaneously.

11. In a feed-water regulator, a valve-casing having a longitudinal bore, grooves, and a curved passage communicating with said groove and with the outlet from said casing and a valve therein having an annular chamber and ports constructed and arranged for the discharge of the water at both ends simultaneously, said valve being free to turn within its casing and to discharge at any point.

12. A valve having longitudinal passages and an intermediate chamber communicating therewith, and annular chambers near opposite ends communicating with said intermediate chamber combined with a valve-casing having oppositely-disposed inlet and outlet, a longitudinal bore intersecting the inlet, grooves upon opposite sides of said inlet, and a curved passage connecting each of said

grooves with the outlet, substantially as described.

13. A valve-casing having oppositely-disposed inlet and outlet, a bore intersecting the inlet, grooves upon opposite sides of said inlet and a curved passage connecting said grooves with the outlet, combined with a valve adapted to reciprocate in said casing and having annular passages near opposite ends, an intermediate chamber, and longitudinal ports affording communication between said chamber and the annular passages, as set forth.

Signed by me at Skowhegan, Maine, this 16th day of March, 1903.

CHARLES C. TOZIER.

Witnesses:

A. B. LAMB,

ERNEST C. BUTLER.