

No. 771,100.

PATENTED SEPT. 27, 1904.

E. F. SHALLOW.
WATER GAGE FOR BOILERS.

APPLICATION FILED APR. 30, 1904.

NO MODEL.

3 SHEETS—SHEET 1.

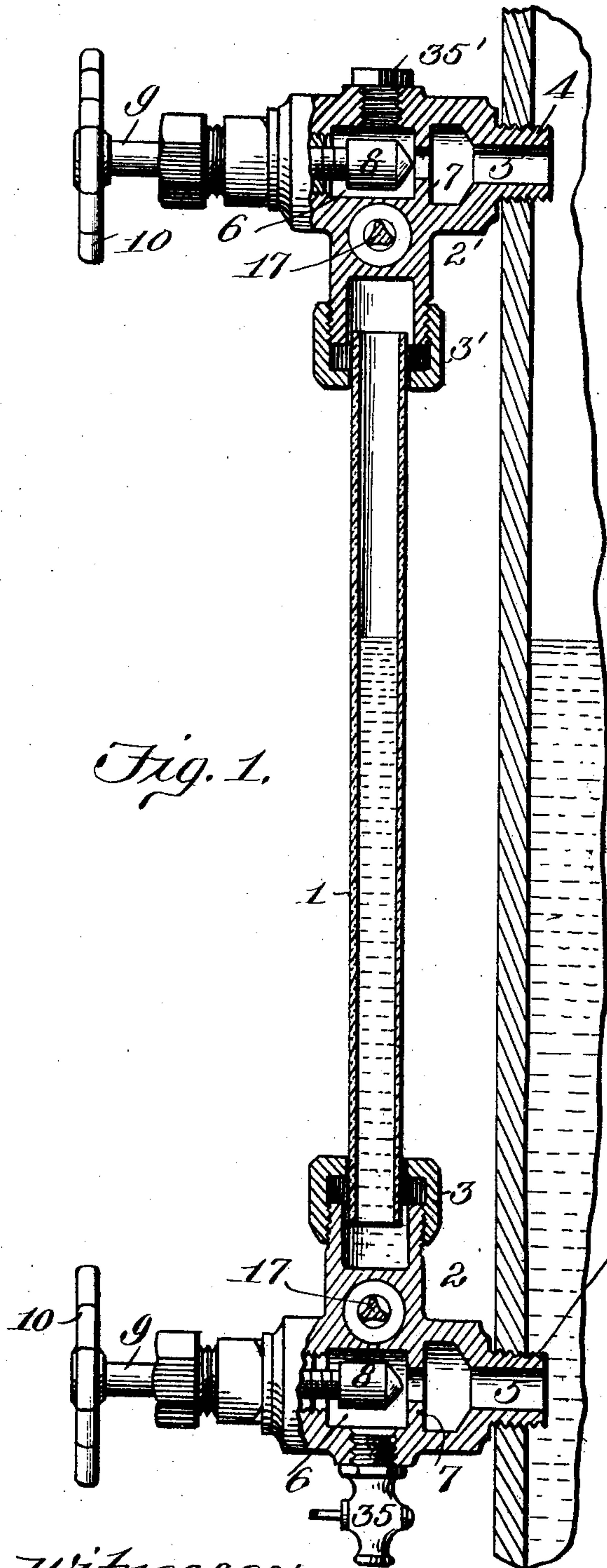


Fig. 1.

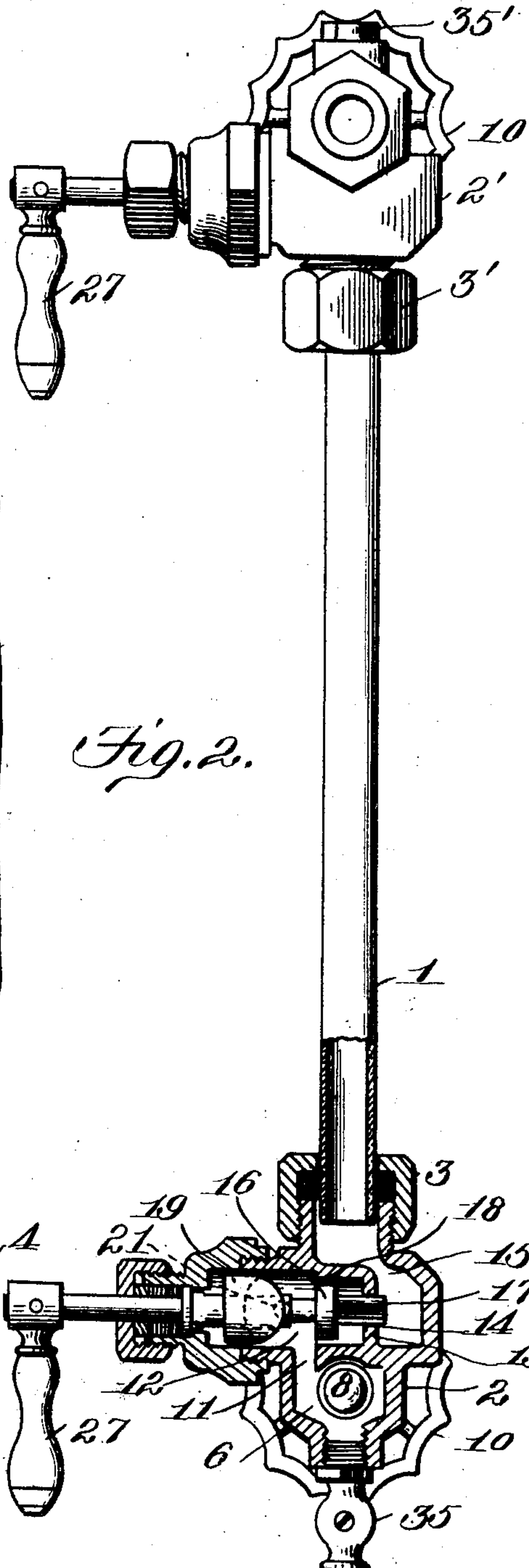


Fig. 2.

Witnesses:
C. D. Hesler.
James L. Norris, Jr.

Inventor.
Edward F. Shallow
By James L. Norris, Jr.
Att'y.

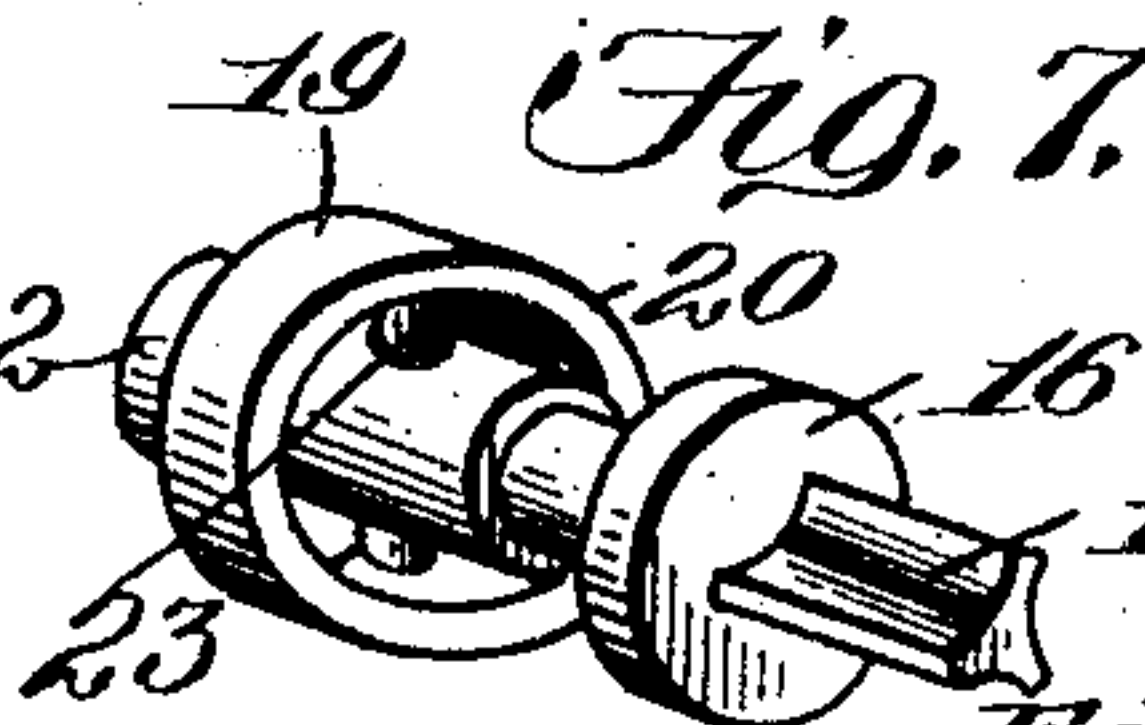
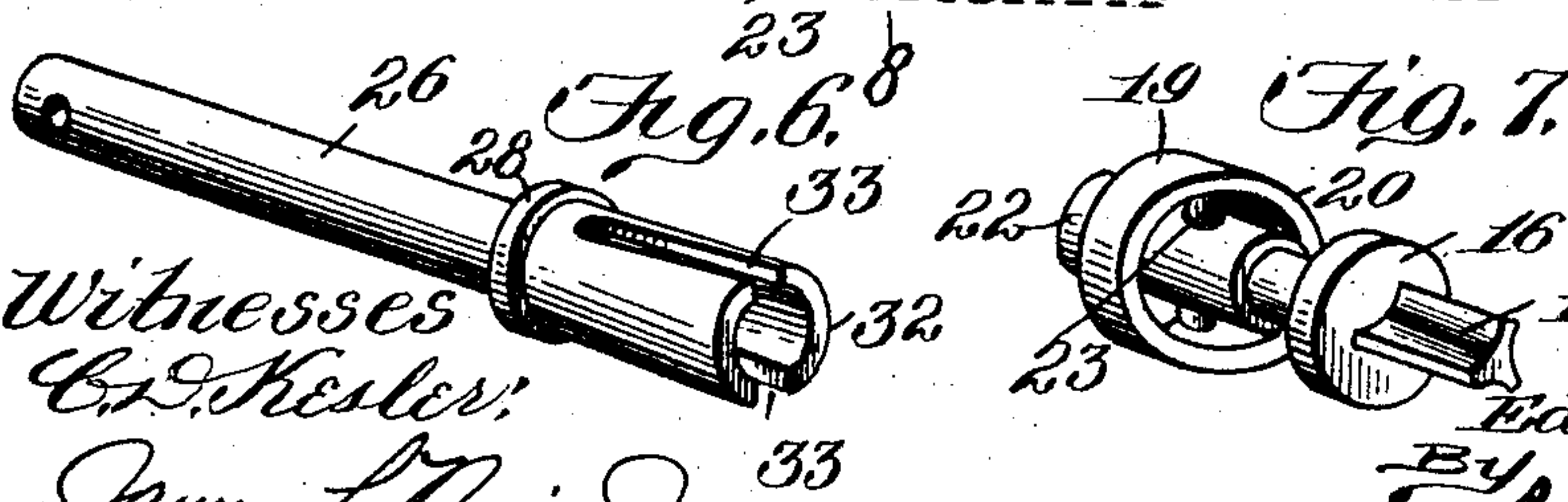
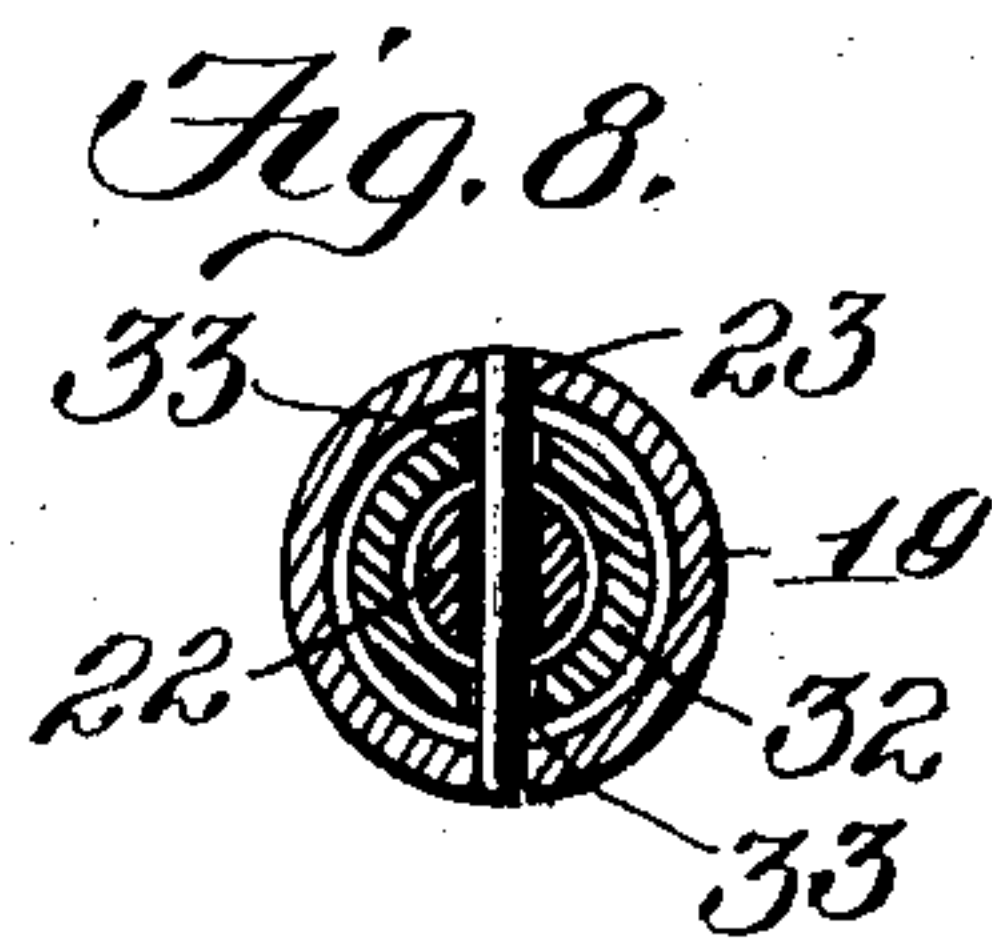
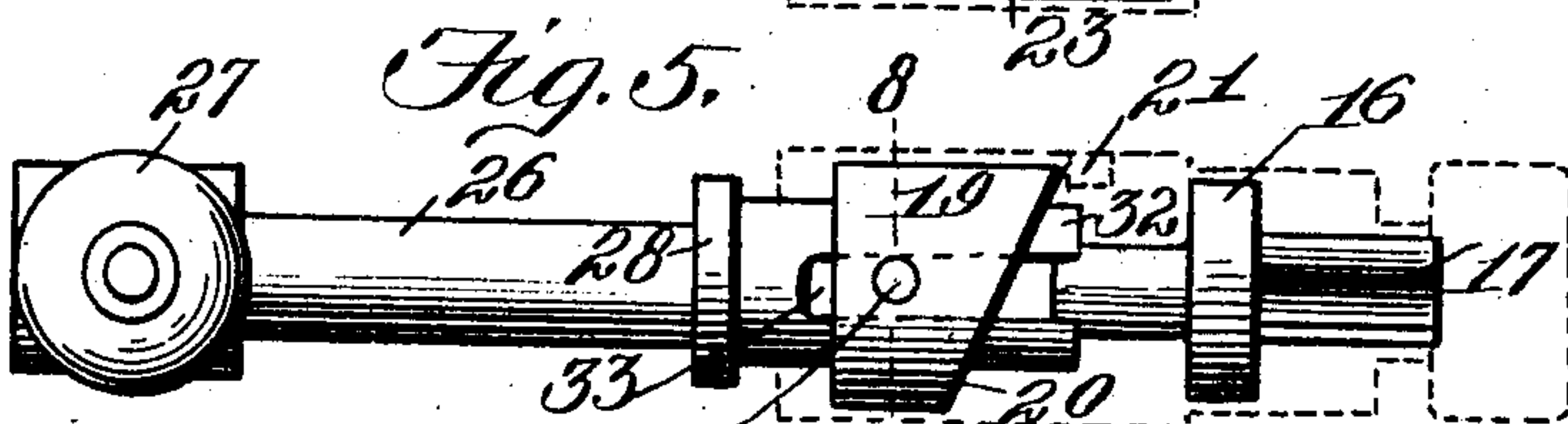
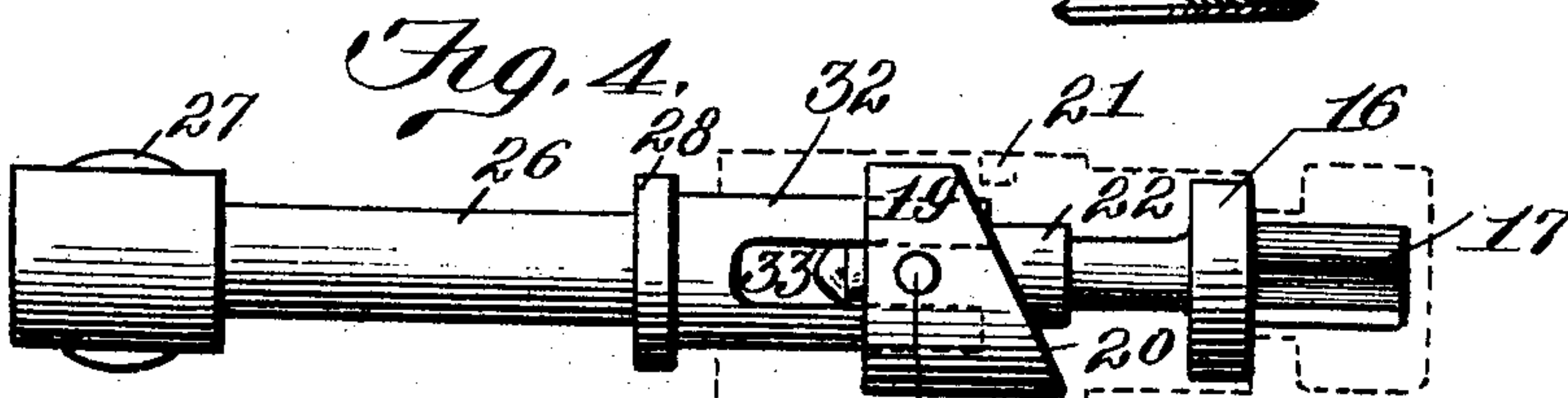
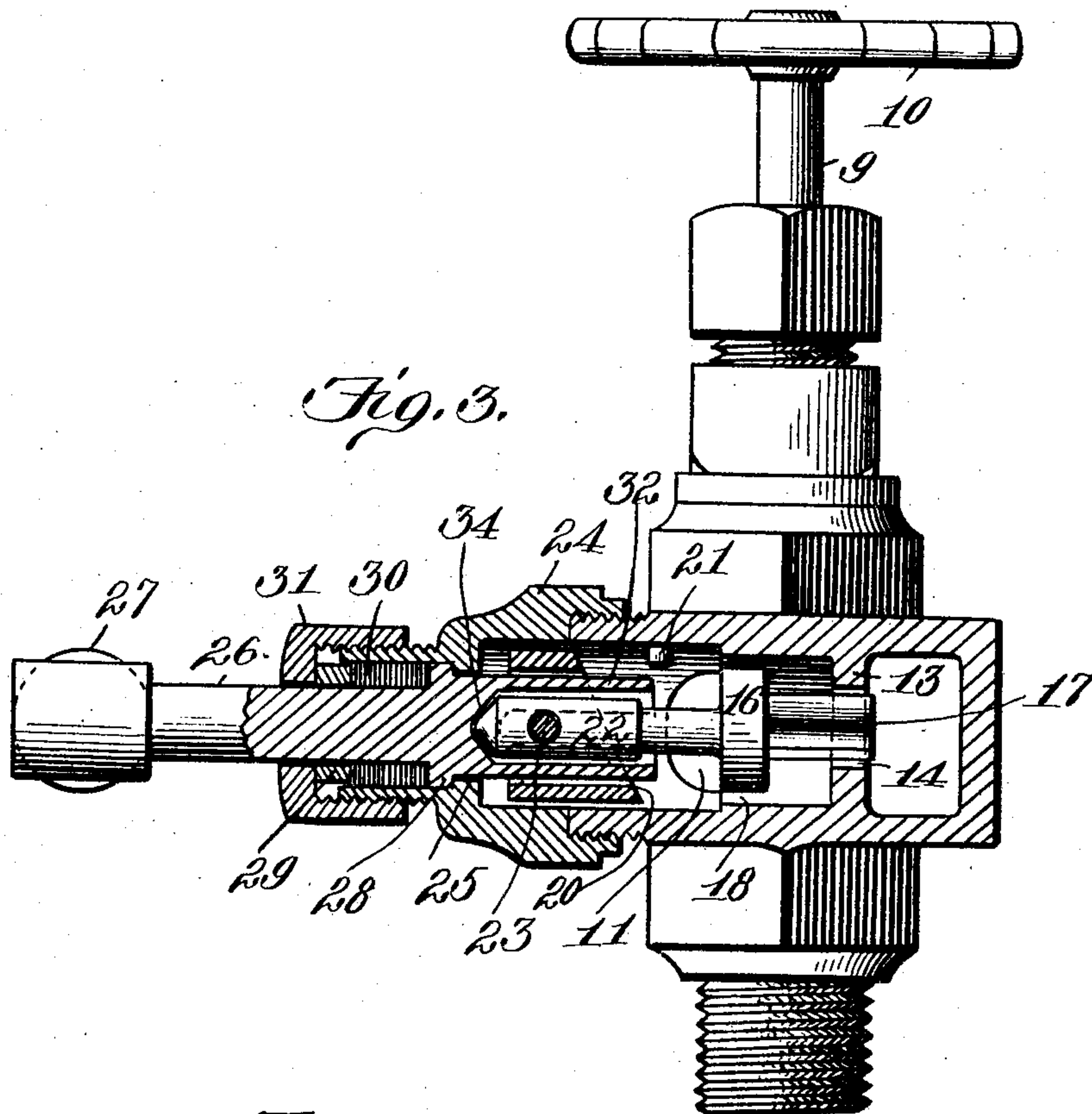
No. 771,100.

PATENTED SEPT. 27, 1904.

E. F. SHALLOW.
WATER GAGE FOR BOILERS.
APPLICATION FILED APR. 30, 1904.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses
C. S. Kessler

James L. Norris, Jr.

Inventor
Edward F. Shallow
By
James L. Norris
Att'y.

No. 771,100.

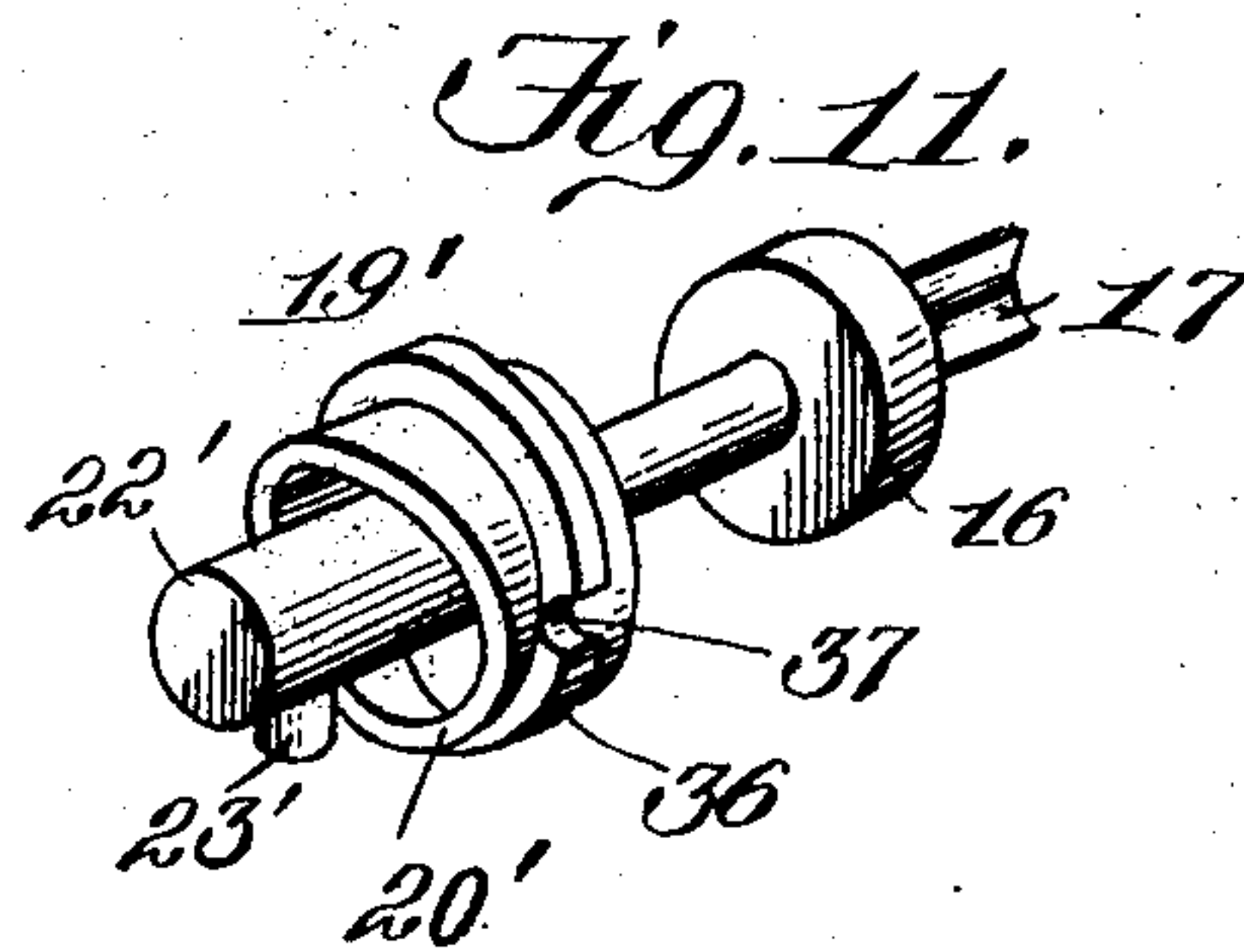
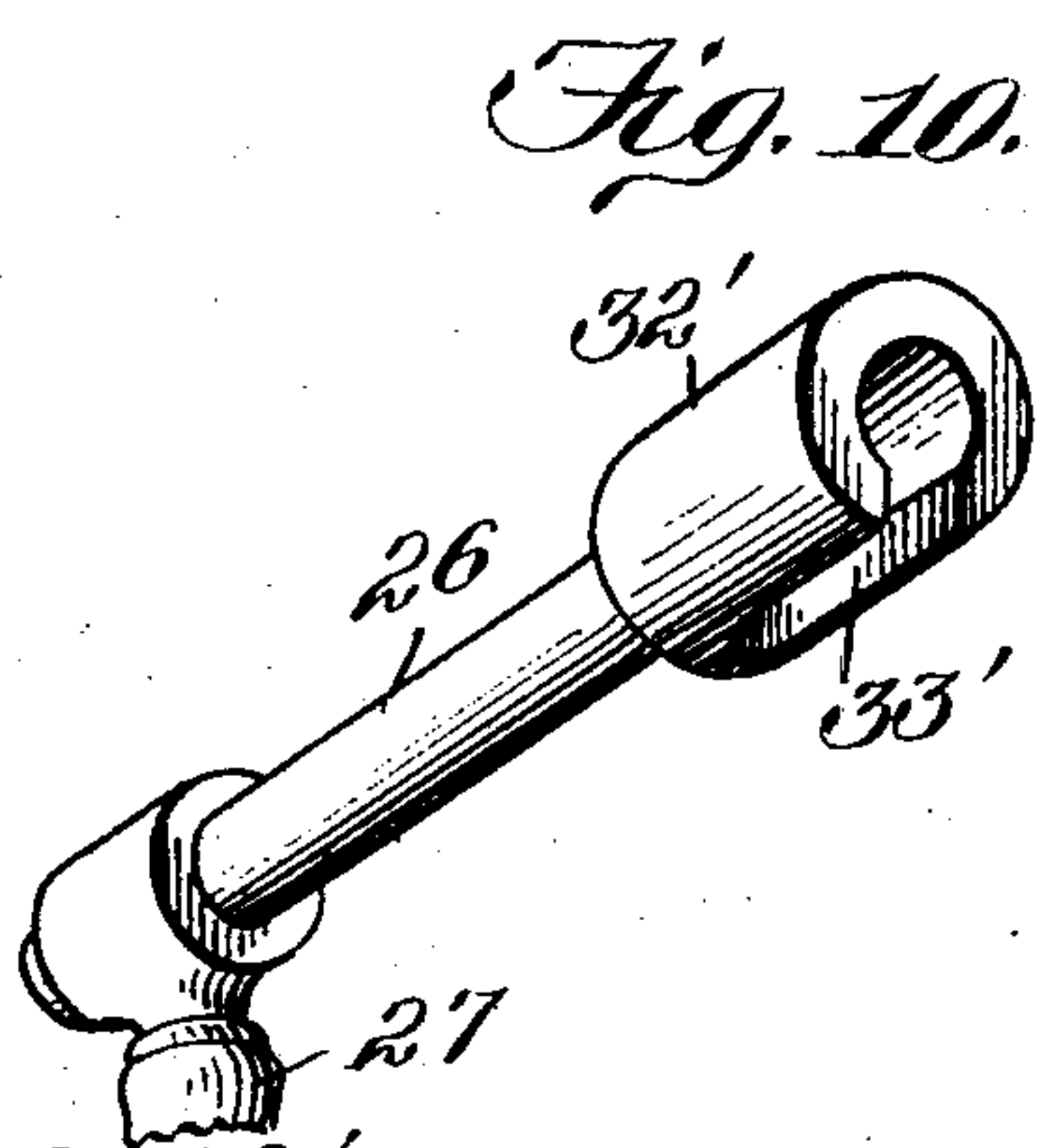
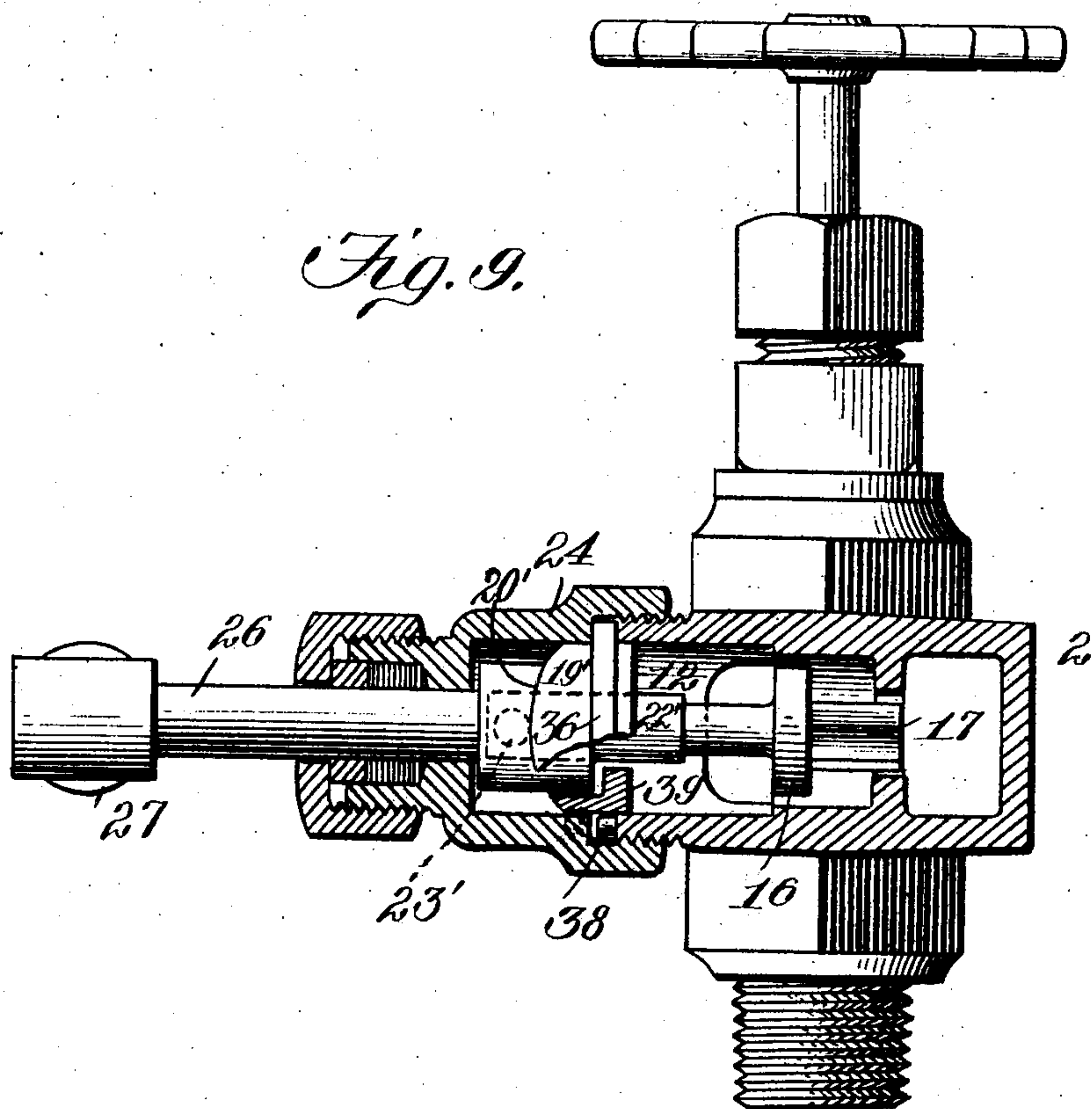
PATENTED SEPT. 27, 1904.

E. F. SHALLOW.
WATER GAGE FOR BOILERS.

APPLICATION FILED APR. 30, 1904.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses:

C. D. Kesler,
James L. Norris, Jr.

Inventor

Edward F. Shallow
By *James L. Norris,*
att'y.

UNITED STATES PATENT OFFICE.

EDWARD FRANCIS SHALLOW, OF PHILADELPHIA, PENNSYLVANIA.

WATER-GAGE FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 771,100, dated September 27, 1904.

Application filed April 30, 1904. Serial No. 205,708. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FRANCIS SHALLOW, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Water-Gages for Boilers, of which the following is a specification.

This invention relates to new and useful improvements in water-gages for boilers, but is also adapted for use in other appliances or apparatus wherein a liquid is kept under pressure and in which it is necessary that the height of the liquid be kept visible.

The principal object of my invention is to provide in a water-gage or analogous appliance a simple and effective valve which in the event of the breakage of the water-glass through overpressure of water or steam or accidentally will instantaneously and automatically close, and thereby prevent the passage of water or steam to the glass or to the atmosphere.

A further object of my invention is to provide a valve of the character above set forth which after having automatically closed, owing to the breakage of the water-glass and a new water-glass has been placed in position, can be readily opened.

A further object of my invention is to provide a means for maintaining the valve in its open position, if desired.

My invention has for its further object to construct a water-gage for boilers or like appliances which shall be simple in construction, strong, durable, efficient in its use, and comparatively inexpensive to manufacture.

In describing and illustrating my invention I shall set forth two of the preferred embodiments of the same; but it is to be understood that I do not limit myself to the construction thus disclosed, but may make such changes, variations, and modifications as properly come within the scope of the protection prayed.

Referring to the accompanying drawings, forming part of this specification, Figure 1 is a side elevation, partly in section, of a water-gage embodying the main features of my invention, showing part of a boiler to which the

same is attached. Fig. 2 is a view, partly in section, taken at a right angle to Fig. 1. Fig. 3 is a top view, partly in section, of the lower housing, Figs. 1 and 2, wherein is shown my improved valve in its open position, the water-glass being intact, the valve being ready to instantaneously and automatically close should a fracture of the glass take place. Fig. 4 is a diagrammatic view showing the valve in its closed position after a fracture of the water-glass. Fig. 5 is a diagrammatic view wherein the valve is shown locked in its open position, the controlling-handle having been given a half-turn. Figs. 6 and 7 are detail views of the controlling-spindle and the valve and part of the mechanism therefor. Fig. 8 is a sectional view taken on line 8 8, Fig. 5. Fig. 9 is a top view, partly in section, of a valve-housing, showing a modified form of the means for opening the valve, the valve being shown in its open position; and Figs. 10 and 11 are detail views of the modified form of my invention shown in Fig. 9.

The reference character 1 denotes a glass tube having its lower and upper ends extending within valve-housings 2 and 2', respectively, and held steam and water tight therein by stuffing-boxes 3 and 3'. As the valve-housings 2 and 2' and the mechanisms therein arranged are similar in construction and the same reference characters refer to like parts of each, I will for convenience describe only the lower housing, 2, and its mechanism.

The housing 2 has a threaded extension 4, adapted to be screwed into a boiler or other apparatus, and through said extension is a central opening or port 5, forming a passage for water or steam to a main chamber 6 of the housing. Arranged between the opening or port 5 and the chamber 6 is a partition 7, having an aperture forming a valve-seat for the cut-off valve 8. The valve 8 when closed serves to prevent the passage of water or steam from the boiler to the chamber 6. Secured to the valve 8 is a valve-stem 9, passing through a stuffing-box at the other end of the chamber 6 and provided on its other end with a hand-wheel 10. The valve-stem 9 is provided along part of its length with threads adapted to work

within a threaded head suitably secured to the housing, so that the valve 8 may be opened and closed by turning the hand-wheel 10.

5 Adjoining the chamber 6 and communicating therewith through a slot-like opening 11 is a substantially cylindrical chamber 12, having its inner end closed by a partition 13, provided with a central opening 14, communicating with a passage or conduit 15, leading to
10 the glass tube 1. Within the chamber 12 is arranged a valve of novel construction adapted to seat against the partition 13 and close the opening 14. This valve consists of a disk provided on its cut-off face with a guiding member 17, which extends through the opening
15 14 for guiding the valve to its seat. The valve 16 and guiding member 17 have passages to permit of the movement of water and steam from behind the valve 16 and through the
20 opening 14 when said valve is away from its seat. In the drawings I have shown the valve 16 as being of slightly smaller diameter than the chamber 12, thereby forming a passage
25 18 between the periphery of the valve 16 and the wall of the chamber 12, and the guiding member 17 as provided on its periphery with flutings. Within the chamber 12 and behind the valve 16 is a tube 19, having an exterior
30 diameter approximately equal to the interior diameter of the chamber 12 and having its inner end beveled to provide a cam-surface 20, which rides against a stud or projection 21, formed on the wall of the chamber 12. Secured to the rear face of the valve 16 is a
35 rearwardly-extending stem 22, having a diameter somewhat smaller than the inner diameter of the tube 19. The stem 22 extends through the tube 19 and is attached thereto by means of a pin 23, extending diametrically
40 of the tube 19 through a transverse opening in the stem 22.

The housing 2 at the rear end of the chamber 12 is exteriorly screw-threaded, and upon said threads is screwed the threaded shoulder
45 of a coupling 24. The coupling 24 has a cylindrical interior of the same diameter as the chamber 12 and which forms a continuation of said chamber when the threaded shoulder of the coupling is screwed upon the threads
50 of the housing. The coupling 24 is further provided at its rear end with a shouldered opening 25, and through this opening extends the spindle 26 of a controlling-handle 27. The spindle 26 has a shoulder 28, which bears
55 against the shoulder of the opening 25 of the coupling 24. Loosely mounted on the spindle 26 is a disk or washer 29, between which and the outer face of the shoulder 28 is arranged packing 30. A jam-nut 31, screwed upon a
60 threaded extension of the coupling 24, bears against the disk or washer 29 and compresses the packing 30 between the shoulder 28 and the washer 29, thereby causing the packing to expand within the opening 25 and prevents

the escape of water or steam therethrough. 65 The spindle 26 is provided on its inner end with an open-ended tubular extension 32, the inner and outer diameters of which are approximately equal to the diameter of the stem 22 of the valve 16 and the inner diameter 70 of the tube 19, respectively, so that said tubular extension may pass over said stem and within said tube. Slots 33, extending longitudinally of the tubular extension 32, receive the pin 23, which connects the stem 22 to the
75 tube 19. A conical depression 34, formed in the inner end of the tubular extension 32, is adapted to receive the conical or pointed end of the stem 22 when the valve 16 is opened and aids in centering said valve. 80

Each of the housings 2 and 2' has a threaded opening communicating with the chamber 6. In this threaded opening of the chamber 2 is screwed a petcock 35 for drawing off the water within the glass tube 1, passage 15, and
85 chambers 12 and 6 when the cut-off valves 8 are closed. The threaded opening in the housing 2' is closed by means of a threaded cap 35'. The housing 2' may therefore be employed either as an upper or lower housing. 90

The operation of my invention is as follows: When the cut-off valves 8 of the housing 2 2' are opened, water and steam will fill the chamber 6 of said housings 2 2', respectively, and thence passing through the openings 11 will fill
95 the chambers 12. Assuming that the valves 16 are away from their seats, the water and steam will move through the openings 18 between said valves and the walls of the chambers 12 and through the openings 14 into the passages 15 and are permitted to circulate through
100 the glass tube 1. Normally, therefore, or when the glass tube 1 is intact, there will be equal pressures at opposite sides of the valves 16. In other words, the valves 16 will be balanced so that under such normal conditions
105 there will be no tendency of the valves 16 to move in either direction. Should, however, the glass tube 1 be broken from any cause, the pressure against the cut-off faces of the valves 110 will be relieved, and the pressure against the opposite faces becomes effective to instantaneously and automatically close the valves 16 and stop the flow of either water or steam to the tube. The broken tube may then be replaced
115 by a new one. This having been done, it is necessary to open the valves 16 before water or steam can again fill the tube 1. The controlling-handle 27 is then turned, and the slotted tubular extension 32 of the spindle 26 will engage the pin 23, connecting the tube 19 to the valve-stem 22, and thereby cause the cam-surface 20 to ride upon the stud or projection 21 on the wall of the chamber 12. The tube 19 will therefore move backward and draw with
120 it the valve-stem 22, and thereby open the valve 16. It will be evident that the valve 16 cannot return to its seat until the handle 27

has made a full revolution inasmuch as the tube 19, to which the valve is connected by means of the stem 22 and pin 23, is held against longitudinal movement by the stud or projection 21 engaging the cam-surface 20. The valve 16 may therefore be set or locked in its open position by giving the handle 27 only a half-revolution, whereby the highest part of the cam-surface 20 will be brought against the stud or projection 21. It will furthermore be evident that the outer edge of the cam-surface 20 of the tube 19 has a cutting action against the wall of the chamber 12, and therefore serves to prevent scale from forming in the chamber 12.

In Figs. 9, 10, and 11 of the drawings I have illustrated another embodiment of my invention. The valve 16 is there shown as having a rearwardly-extending stem 22', provided near its free end with a pin or projection 23', which extends at an angle to the stem. Within the chamber 12 and its extension in the coupling 24 is a tube 19', having its outer end beveled to provide a cam-surface 20'. The tube 19' has an external annular flange 36, adapted to be clamped between the housing 2 and the coupling 24 to secure the tube 19' in place. A notch 37 in the flange 36 receives a key 38, formed on the housing, and prevents the tube 19' from turning. The stem 22' extends through the tube 19', so that when said stem is rotated the pin or projection 23' on the end thereof will ride upon the cam-surface 20' and draw the valve 16 from its seat. An annular flange 39, formed on the interior of the tube 19', near the inner end thereof, is adapted to abut against the inner end of the tubular extension 32' of the controlling-spindle 26. The tubular extension 32' has a single longitudinal slot 33', in which slides the pin or projection 23' of the stem 22'. It will therefore be evident that when said valve 16 is closed and the controlling-handle 27 is given a half-revolution the pin or projection 23' will ride upon the cam-surface 20' of the tube 19' and draw with it the stem 22', thereby opening the valve 16. At this point the valve 16 will be prevented from closing by reason of the fact that the pin 23' is on the highest part of the cam-surface 20'. When, however, the controlling-handle 27 is given a further half-revolution, the pin 23' will be free to slide in the slot 33' of the tubular extension 32' and permit the valve 16 to close.

It is thought that the many advantages of my improved water-gage can be readily understood from the foregoing description, taken in connection with the accompanying drawings, and it will furthermore be evident that changes, variations, and modifications can be resorted to without departing from the spirit of the invention or sacrificing any of its advantages, and I therefore, as before stated, do not wish to restrict myself to the details of construction hereinbefore described

and as shown in the accompanying drawings, but reserve the right to make such changes, variations, and modifications as come properly within the scope of the protection prayed.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A rotatable and automatically-closable valve, said valve adapted to be automatically and non-rotatively moved to engage its seat, and means adapted when said valve is rotated to move the valve from its seat.

2. A rotatable and longitudinally-movable valve, said valve adapted to be longitudinally moved to its seat by pressure and when rotated to be moved in the opposite direction, and means for rotating the valve.

3. A valve-seat, a valve automatically closable to its seat by pressure, a stem fixed to said valve, a cam device and means engaging said cam device and adapted, when said stem is rotated, to move the valve away from its seat.

4. A valve-seat, a valve automatically closable to its seat by pressure, a stem fixed to said valve, a cam device, means engaging said cam device and adapted when said stem is rotated to move the valve away from its seat, and means for rotating said stem.

5. A housing provided with a valve-seat, a valve arranged in said housing and adapted to be automatically moved toward said seat by pressure, a stem for said valve, a cam-sleeve arranged in coöperative relation with said stem, said cam-sleeve adapted when said stem is rotated to move the valve from its seat, and means for rotating said stem.

6. A housing provided with a valve-seat, a valve arranged in said housing and adapted to be longitudinally and automatically moved toward said seat by pressure, a stem for said valve, a cam-sleeve arranged in coöperative relation with said stem, said cam-sleeve adapted when said stem is rotated to move the valve from its seat, and means for rotating said stem.

7. A housing provided with a valve-seat, a valve arranged in said housing and adapted to be automatically moved toward said seat by pressure, a stem for said valve, and a cam-sleeve arranged in coöperative relation with said stem, said cam-sleeve adapted when said stem is rotated to move the valve from its seat and to lock said valve in its open position.

8. A valve-seat, a valve, a valve-stem fixed thereto, a cam-sleeve surrounding said stem, and means engaging with the cam-sleeve for moving the valve in one direction and thereby unseating the valve and for locking the valve in its open position.

9. A chamber, a valve adapted to be normally balanced in said chamber, a controlling-spindle, a sliding connection between the spindle and valve to permit of the automatic movement of the latter toward its seat independ-

ently of the movement of said spindle, and means surrounding said spindle adapted when the spindle is rotated to unseat the valve.

10. A chamber, a valve adapted to be normally balanced in said chamber, a controlling-spindle extending in the same direction as the axis of the valve, a slotted connection between the valve and the spindle adapted to permit the valve to be automatically moved toward its seat by the excess of pressure on one side thereof when the pressure on the opposite side is reduced independently of the movement of the spindle, and means surrounding said spindle adapted when the spindle is rotated to unseat the valve.

11. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by excess of pressure on one side thereof when the pressure on the opposite side is reduced, and a cam device cooperative with said valve, said cam device adapted, when said valve is rotated, to open the valve.

12. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, and a cam device cooperative with said valve, said cam device adapted, when said valve is rotated to open the valve and maintain the valve in its open position.

13. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a cam device cooperative with said valve, said cam device adapted, when said valve is rotated, to open the valve, and means for rotating the valve.

14. A chamber having two ports, one of said ports communicating with a boiler and the other of said ports communicating with a water-glass, a valve adapted to close said latter port, said valve adapted to be balanced in said chamber and further adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, and a cam device cooperative with said valve, said cam device adapted, when said valve is rotated, to open the valve.

15. A water-gage comprising in combination with a gage-glass and a housing at each end of said glass, of a valve-seat in each of said housings, a rotatable valve adapted to engage said seat, a rotatable valve-stem fixed to the valve, a cam-sleeve arranged in an end of the housing and surrounding said stem, and means engaging with the cam-sleeve adapted when said valve-stem is rotated to move said valve from its seat.

16. A chamber, a valve adapted to be normally balanced in said chamber and adapted

to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a spindle extending in the same direction as the axis of the valve, a slotted connection between the valve and the spindle, said slotted connection adapted to permit the valve to close independently of the spindle, and means cooperative with the spindle adapted on the turning movement of the spindle to open said valve.

17. A chamber, a rotatable valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a stem fixed to said valve, a controlling-spindle provided with a tubular extension adapted to receive and rotate said stem, and means adapted when said spindle is rotated to cause the stem to slide within said extension and thereby move the valve from its seat.

18. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a stem for said valve, a controlling-spindle having a slotted tubular extension, said stem extending within said extension and provided with means adapted to slide within said slot, and means adapted when said spindle is rotated to cause the stem to slide within said extension and thereby unseat said valve.

19. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a stem for said valve, a controlling-spindle having a tubular extension adapted to receive said stem, and a cam device cooperative with said stem and adapted when said spindle is rotated to move said stem backward within said extension and thereby unseat said valve.

20. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a stem for said valve, a controlling-spindle extending within said chamber having its inner end slotted, said stem slidable within said slot, and a cam device arranged in cooperative relation with said stem and adapted when said spindle is rotated to cause said stem to recede within said slot and unseat said valve.

21. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a stem for said valve, a controlling-spindle having a tubular extension adapted to receive said stem, and a cam-sleeve surrounding said stem and tubular extension, said cam-sleeve adapted, when said

spindle is rotated, to cause the stem to slide within said extension and thereby unseat said valve.

22. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a stem for said valve, a controlling-spindle having a slotted tubular extension adapted to receive said stem, said stem having means extending within said slot, and a cam-sleeve surrounding said stem and extension adapted when said spindle is rotated to cause the stem to slide within said extension and thereby move the valve from its seat.

23. A chamber, a valve adapted to be normally balanced in said chamber and adapted to be automatically closed by the excess of pressure on one side thereof when the pressure on the opposite side is reduced, a stem for said valve, a controlling-spindle having a slotted tubular extension adapted to receive said stem, a cam-sleeve surrounding the extension and

stem, means extending diametrically of said cam-sleeve and through the stem and the slots of the extension, and means carried by the wall of said chamber adapted to engage said cam-sleeve for moving the valve away from its seat when the spindle is rotated.

24. A casing, a valve-seat therein, a valve automatically movable to its seat by pressure, a stem for said valve, a cam device arranged within the casing and surrounding said stem, means engaging the cam device and adapted when said stem is rotated to move the valve away from its seat, and means for rotating the stem, said cam device adapted, when said stem is partially rotated, to lock the valve in its open position.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDWARD FRANCIS SHALLOW.

Witnesses:

EDWARD F. SHALLOW, Jr.,
MICHAEL F. McCULLEN.