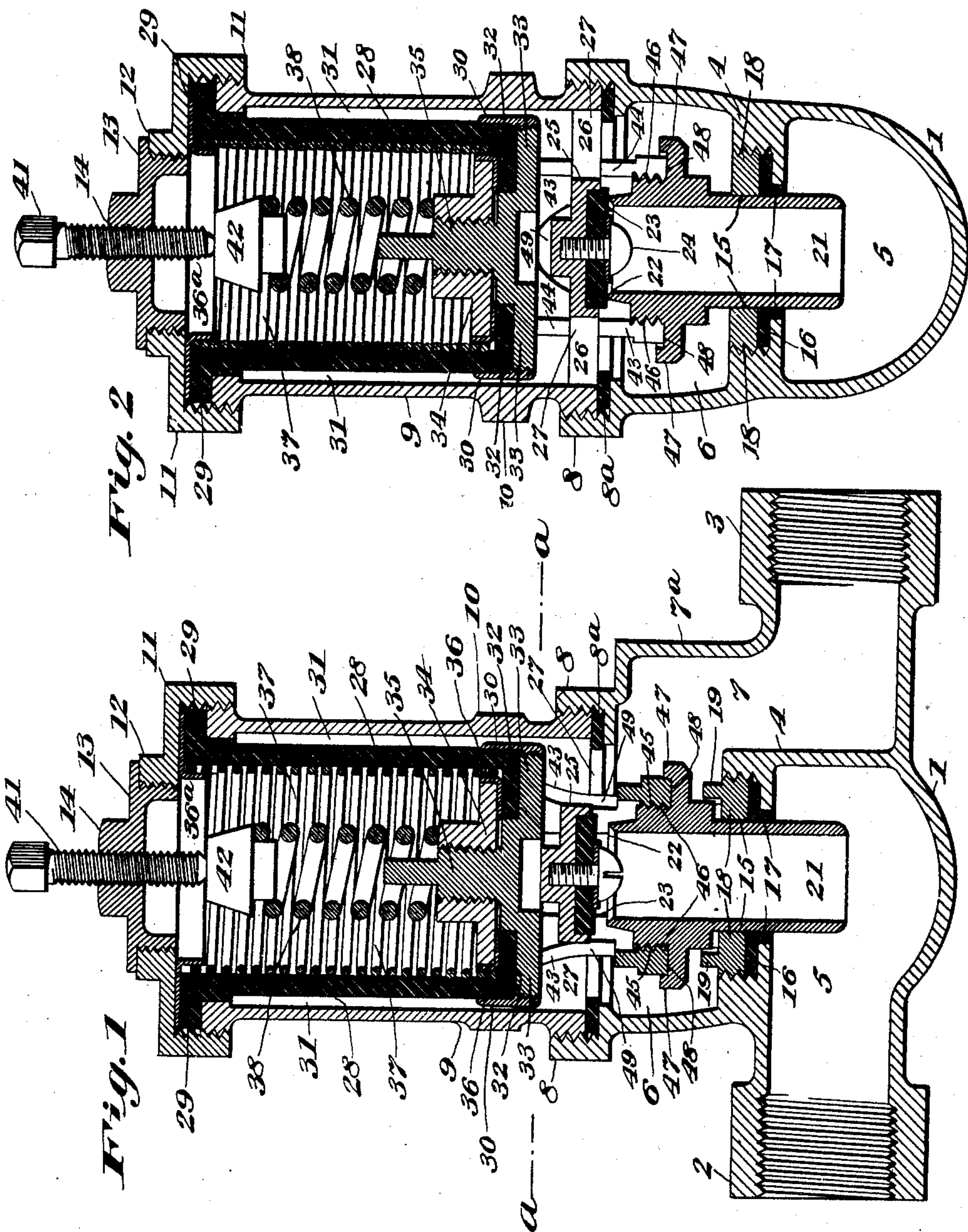


A. E. BURNETT, JR.
WATER PRESSURE REGULATOR.

(Application filed May 19, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
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No. 711,282.

Patented Oct. 14, 1902.

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WATER PRESSURE REGULATOR.

(Application filed May 19, 1902.)

(No Model.)

2 Sheets—Sheet 2.

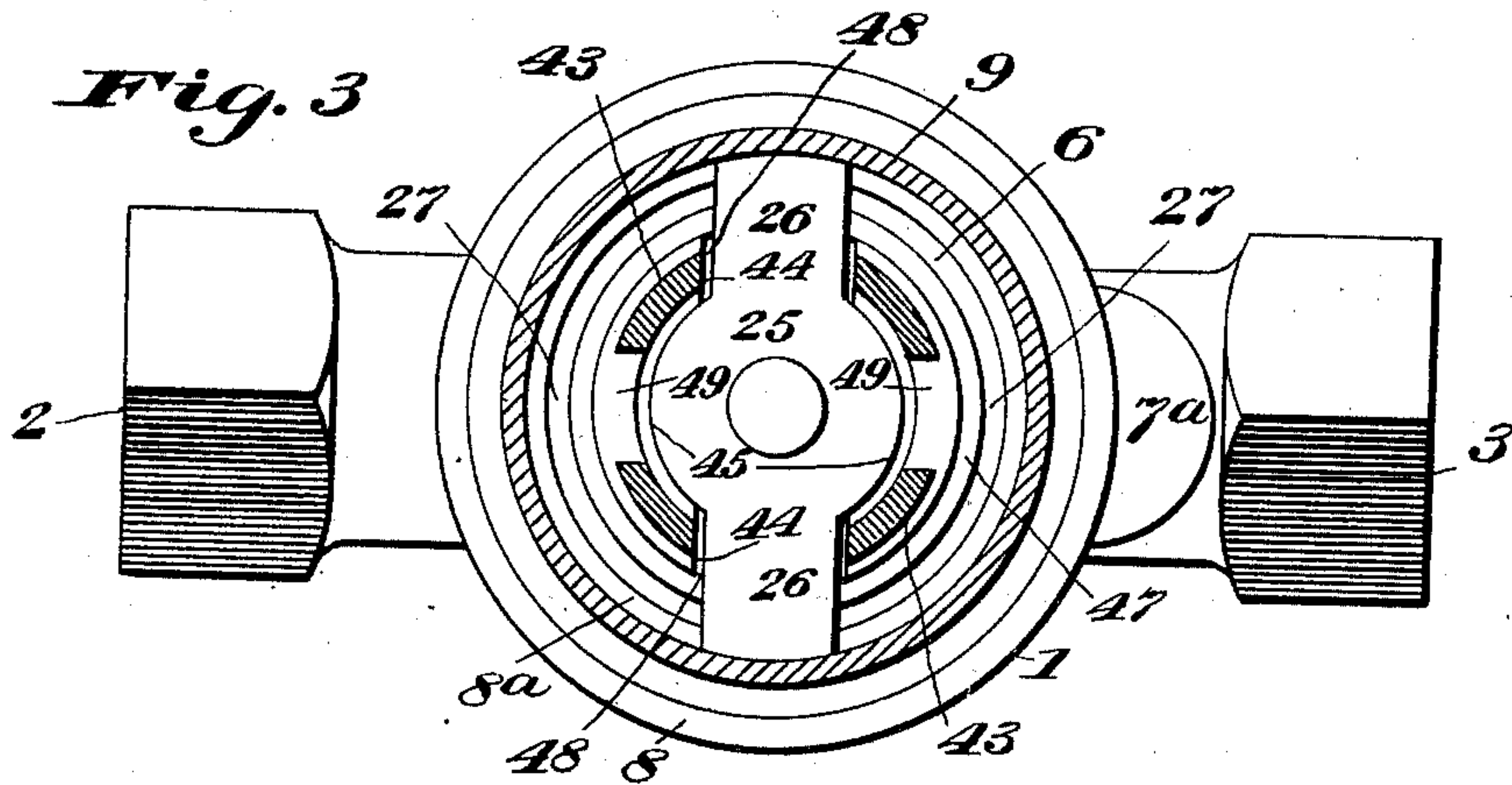


Fig. 4

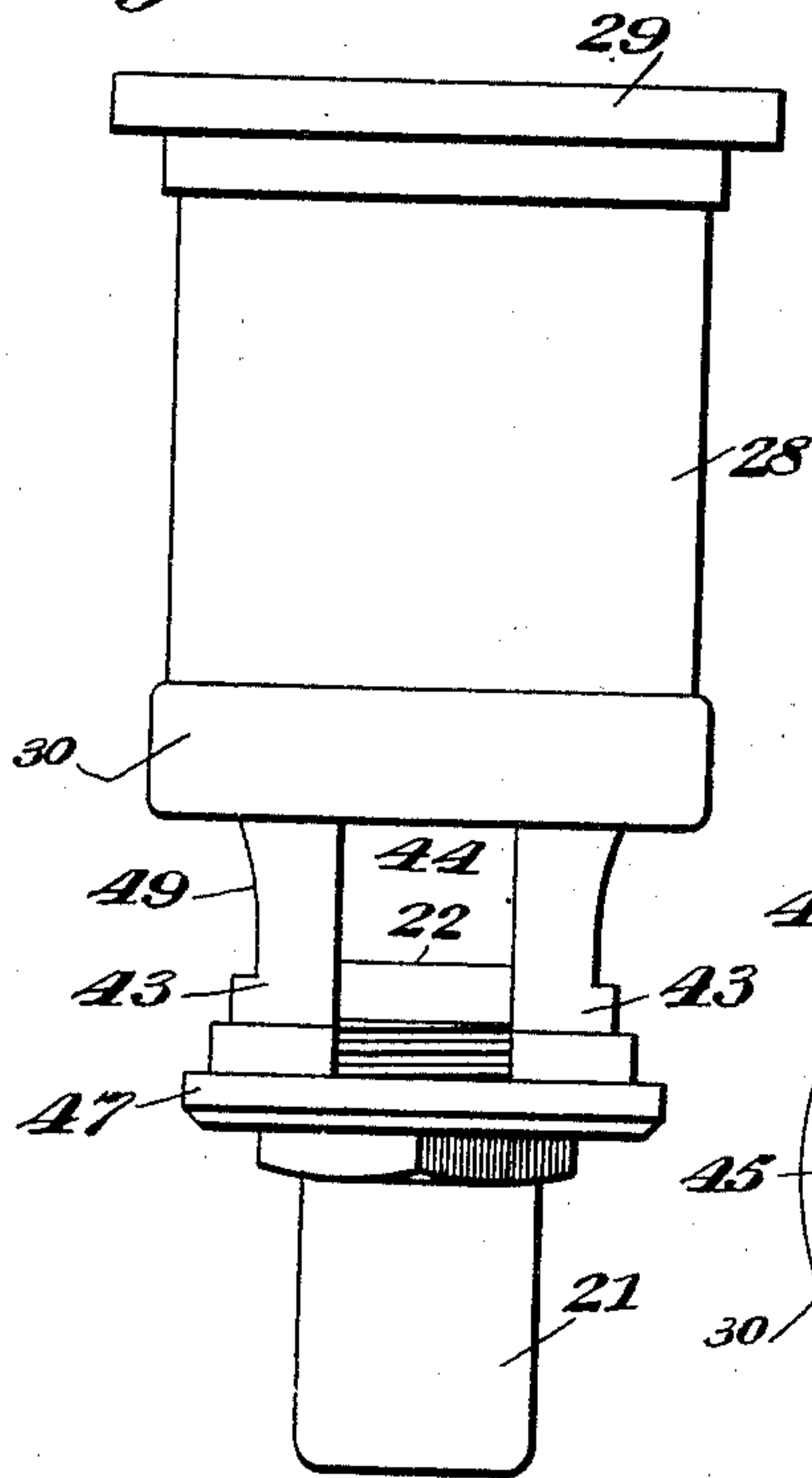


Fig. 5

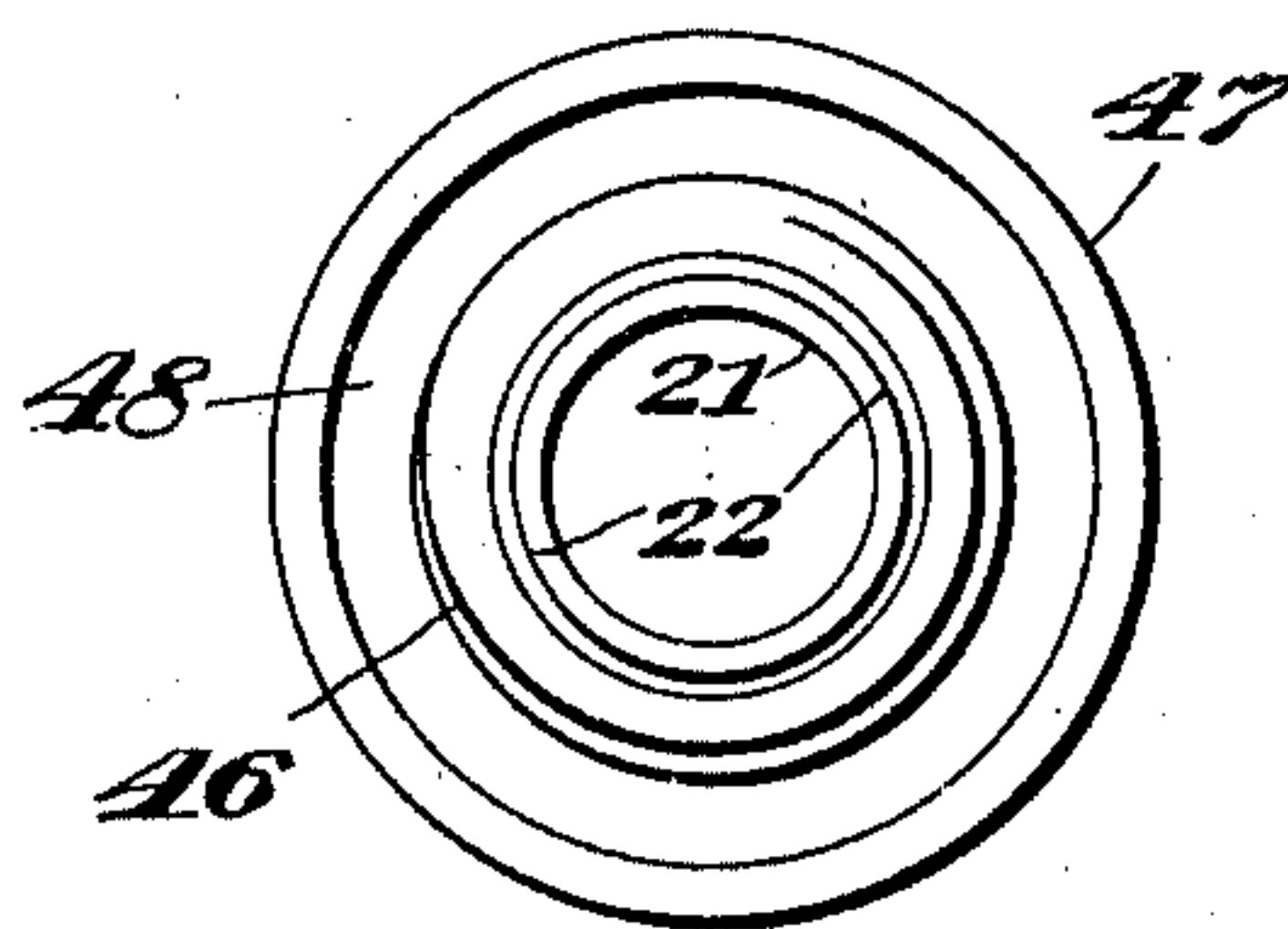
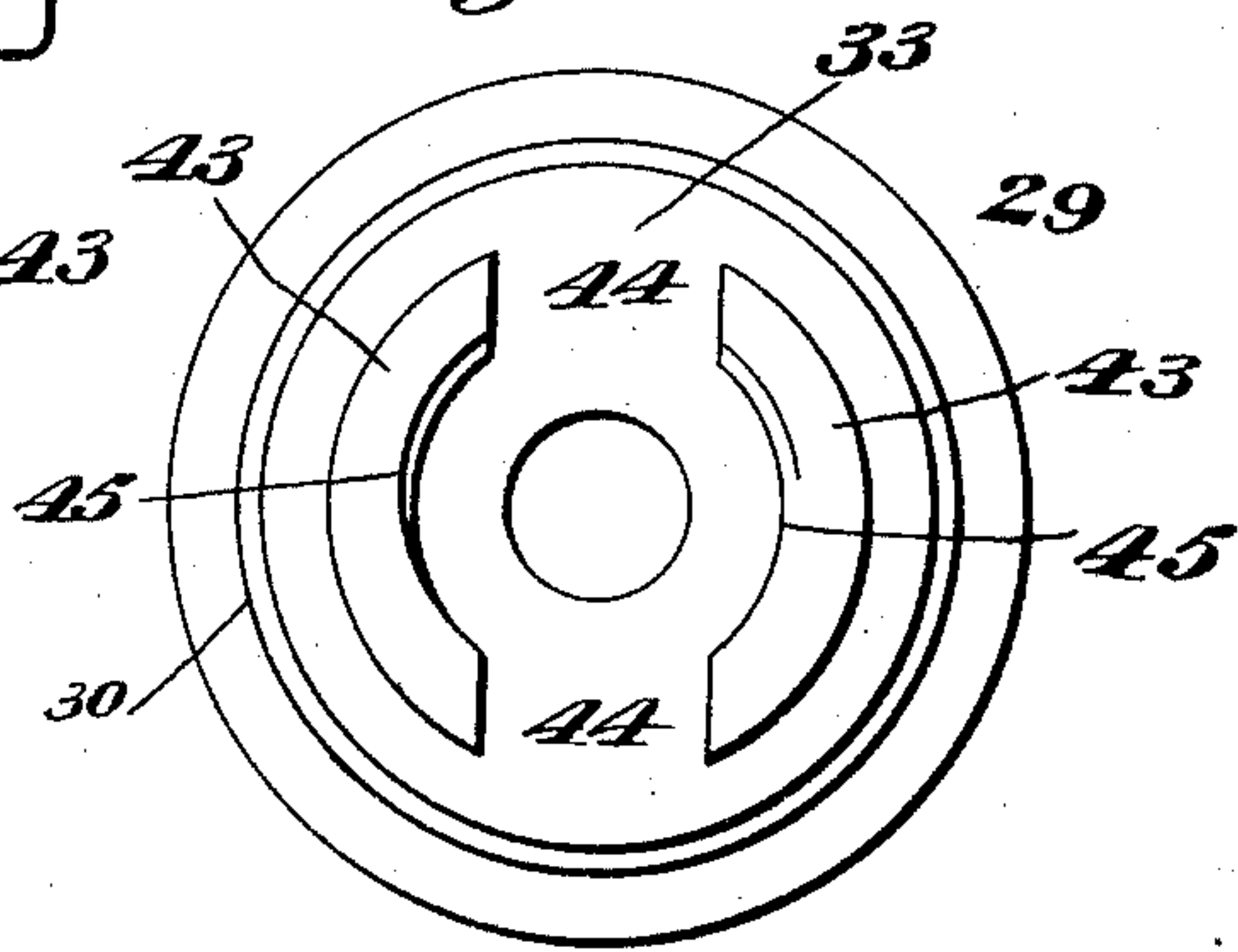


Fig. 6



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UNITED STATES PATENT OFFICE.

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WATER-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 711,282, dated October 14, 1902.

Application filed May 19, 1902. Serial No. 108,019. (No model.)

To all whom it may concern:

Be it known that I, ALFRED EUGENE BURNETT, Jr., a citizen of the United States of America, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Water-Pressure Regulators, of which the following is a specification.

This invention relates to certain improvements in pressure-regulators, and more especially in that class of such devices which are adapted for use in connection with water-pipes for regulating and equalizing pressures, so that pressure from the main is prevented from acting directly upon the various house connections, and consequent damage to the house connections is thereby prevented.

The object of the invention is to provide a regulating or equalizing device of this general character of a simple and inexpensive construction and of a strong and compact nature which shall be adapted to control and regulate the pressure at which the water-supply is maintained within the house system, so that upon the opening and closing of the various faucets of the house system the full pressure from the main is prevented from acting upon the house connections.

The invention consists in certain novel features of the construction, combination, and arrangement of the several parts of the improved regulating device, whereby certain important advantages are attained and the device is made simpler, cheaper, and otherwise better adapted and more convenient for use than various other forms of regulator heretofore employed, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my improvements, Figure 1 is a sectional view taken vertically and axially through the improved regulating device, and Fig. 2 is a sectional view similar to Fig. 1, but taken through the device in a plane at right angles to the plane of the section in Fig. 1. Fig. 3 is a sectional view taken transversely through the improved pressure-regulating device in the plane indicated by the line *a a* in Fig. 1. Fig. 4 is a side elevation showing the valve of the device, together with

the actuating mechanism therefor, detached. Fig. 5 is a plan view of the valve of the device detached from its actuating mechanism, and Fig. 6 is an under side view showing the actuating mechanism for the valve.

As shown in the views, the improved pressure-regulating device has a casing or body portion 1, formed at one side with a threaded connection adapted to receive the end of a street-pipe and at the opposite side with a similar connection 3, adapted to receive the end of a house-pipe. The interior of the casing or body portion 1 is formed with a partition 4, by which said interior is divided into a chamber or compartment 5 at the lower part of the casing and adapted for communication with the inlet 2 and an upper chamber or compartment 6 at the upper part of the casing and adapted for communication with the outlet 3 of the casing through a passage 7, produced in a lateral extension 7^a at one side of the casing.

The casing or body portion 1 is formed at its upper part with a circular and interiorly-screw-threaded orifice 8, in which is adapted to be received the screw-threaded lower end of a cylindrical shell 9, a packing-ring 8^a being arranged between the meeting faces to prevent leakage. The lower part of the shell 9 is formed with a hexagonal or otherwise-formed face 10, adapted to be engaged by a wrench or similar tool for connecting the shell with the casing or disconnecting it therefrom, and the upper end of the shell 9 is open and is also provided with external screw-threads to receive a screw cap or cover 11, extending across the top of the shell and provided with a square or other face 12, by means of which it may be turned.

In the cap or cover 11 is formed a central circular opening with which is engaged a screw-plug 13, having a square nut 14 and serving to close the said opening. By this construction it will be readily understood that by removal of the plug 13 access may be had to the interior of the shell for purposes to be hereinafter explained without disturbing the connection between the cap and shell.

The partition 4 in the interior of the casing or body portion 1 of the device has a horizontally-extended portion in which is formed a central circular opening 15, alined with the

axis of the cylindrical shell 9 and affording communication between the lower chamber 5 and the upper chamber 6 of the casing, and in the passage thus produced through the partition is arranged for vertical sliding movement a valve-tube 21, the lower end of which is open for the passage of fluid from the chamber 5 into said tube. To provide a tight joint between the valve-tube 21 and the walls of the opening or passage 15, wherein said tube is arranged to move, I employ a screw-threaded plug 18, held in a countersunk recess in partition 4 and having the upper part of the opening 15 formed in it, a flexible packing-ring 16 being held in said recess beneath the plug, with an edge portion 17 downwardly directed within the opening 15 and adapted for close contact with the outer side of the valve-tube 21 to prevent leakage around the same. The plug 18 is formed with lugs 19 to be engaged by a tool in a well-known way.

The upper end of the valve-tube or part 21 is provided with an annular valve-face 22, extended around it and made, by preference, in knife-edge or V form, as shown in the drawings, and this valve-face is adapted when the tube or part 21 is raised or moved in one direction for close contact upon the under side of a valve-disk 23, preferably formed from rubber or other similar material and held by a screw 24 or otherwise to a central bearing piece or part 25, supported by horizontally-arranged arms 26, extended across the lower end of the shell 9 and shown in Figs. 2 and 3, the construction being such that openings 27 27 are provided upon opposite sides of the said arms 26, so that the pressure of the fluid within the chamber 6 of the casing may be exerted upwardly into the interior of the shell 9.

The valve-tube or part 21 is actuated to move vertically to raise the valve-face 22 into contact and lower it out of contact with the valve-disk 23 by means of an actuating mechanism which is in the nature of a compressible and resilient or elastic piston and is adapted to be compressed by increase in fluid-pressure within the device having connection with the valve-tube or part 21 to move it in one direction when so compressed and when the fluid-pressure within the device falls is adapted by its resilience or elasticity and through its connection with said valve-tube or part 21 to move the latter in an opposite direction. This actuating mechanism comprises a cylindrical hollow body portion or jacket 28, preferably formed from rubber or other waterproof and elastic substance, having its upper end open and formed with an external flange or projecting lip 29 of annular form, adapted to rest upon the upper edge of the cylindrical shell 9 and to be held clamped tightly between said edge and the cap 11 when said cap is screwed down upon the shell, as shown in Figs. 1 and 2. The lower portion of the jacket 28 is extended

down within the interior hollow of the shell 9 and is made of a diameter less than the interior diameter of said shell, whereby an annular water-chamber 31 is provided between the shell and jacket, as shown in the drawings. 70

The lower end of the jacket 28 is formed with an intumed annular flange or bottom 32, which is clamped securely between a bottom or base plate 33 and a nut 34, which is screwed upon a threaded and upwardly-extended central projection or stud 35, produced upon the base-plate 33 and directed up within the jacket 28. 36 indicates a metallic packing engaged between the flange 32 and the nut 34 to form a tight joint between these parts, and 36^a represents a similar packing arranged between the upper flange or lip 29 of the jacket 28 and the cap or cover 11 of the shell. The base-plate 33 is provided with a marginal raised flange or annulus 30, screwed upon it and extended up outside the lower part of the jacket to close the joint between the two parts and hold them securely together. 75 80 85 90

To prevent collapse of the rubber jacket 28 under the water-pressure exerted in the annular chamber 31 against the side walls of said jacket, I prefer to provide said jacket with an internal armor formed of a metal wire 37, bent into spiral form and arranged to fit snugly within the interior hollow of the jacket, as shown in Figs. 1 and 2 of the drawings, the spiral form of said wire coil serving to permit it to expand or lengthen and contract or shorten to accommodate the distension or compression of the rubber jacket. 95 100 105

38 indicates a stout spiral spring arranged within the hollow of the compressible jacket 28, being central therein with its lower end engaged upon the nut 34 and its upper end held by a block 42, against the upper face of which bears an adjusting-screw 41, extended through the screw-plug 13 of the cap or cover 11 of the shell in such a manner that the turning of said adjusting-screw 41 serves to regulate the tension exerted by the spring 38 downward upon the nut 34 and lower part of the resilient piston. The opening in the cap or cover through which the plug 13 is screwed is of a diameter sufficient to permit the introduction of the spring 38, so that repairs may be effected without removal of the cap 11 from the shell. 110 115 120

The base-plate 33 is formed with downwardly-extended arms 43 43 of semicircular form in cross-section, as shown in Figs. 3 and 6, and these arms 43 are extended downwardly within the interior of the device and through the chambers or passages 27 27 at opposite sides of the arms 26, being separated by spaces or openings 44, so that the piston of the actuating mechanism and the valve-tube or part 21 are permitted to play vertically in the device. The lower ends of the arms 43 43 are formed with internal partial screw-threads 45, which are adapted for en- 125 130

gagement with opposite sides of a screw-threaded surface 46, formed upon an enlarged upper portion of the valve-tube or part 21, so that the said valve-tube or part is thereby held to the arms and is caused to move in the hollow of the device in unison with the movements of its actuating mechanism. The length of the arms 43 43 is such that the valve-tube or part 21 is supported beneath the valve-disk 23, as shown in the drawings, and in proper position for engagement and disengagement therewith when moved vertically by its actuating mechanism above described. Below the screw-threaded surface 46 the valve-tube or part 21 is provided with an annular outwardly-extended flange 47, the upper surface of which is formed with an annular recess or channel 48, in which the lower ends of the arms 43 43 are adapted for secure engagement when the valve-tube or part 21 is screwed up tightly between the arms 43, and the outer wall of this circular or annular recess or channel 48 by engagement upon the outer sides of the arms 43 serves to bind said arms and prevent them from being spread apart, so that they are held from disengagement with the valve-tube 21.

In the operation of the improved pressure-regulating device when the device is connected with the street and house systems the water under high pressure from the street system will be supplied by way of the connection 2 to the chamber 5 and will exert its pressure through the bore of the valve-tube or part 21 and within the upper chamber 6 of the casing, so that water will be supplied from said chamber 6 through the passage 7 to the connection 3 for the house system. When water is drawn off from the house system, the pressure within said system will of course fall below the pressure at which water is maintained in the street system, and the spring 38 of the actuating mechanism will be permitted to force the lower end of the elastic piston downward to the position shown in Fig. 1, whereby the valve-face 22 will be lowered out of engagement with the valve-disk 23 to provide an opening through which the water may flow freely from the bore of the valve-tube into the chamber 6 of the casing. In this downward movement of the piston the rubber jacket 28 thereof will be distended or lengthened, and the internal arms thereof, formed of the wire 37, will also be distended; but the extent of such distension of these parts will not be sufficient to permit collapse of the walls of the jacket. When the withdrawal of water from the house system is ceased, the pressure within said system will at once be increased, and the increased pressure will be exerted within the chamber 6 of the casing in an upward direction beneath the base-plate 33 of the piston or actuating mechanism in such a way as to compress said piston against the tension of the spring 38, whereby the lower portions of the piston are caused to be moved up-

ward, carrying with them the valve-tube 21, until the valve-face 22 thereon is engaged with the valve-disk 23 to close the bore of said tube against the flow of water from the chamber 5, supplied by the street system to the chamber 6, communicating with the house system. The pressure thus exerted to move the piston will also be exerted within the chamber 31, surrounding the same, and will act to hold the side walls of the rubber jacket against being distended, whereby said walls are held out of frictional contact with the walls of the shell 9.

In this construction of regulating device it will be seen that the closing of the passage against water supplied from the street system to the house system is controlled by the pressure exerted within the chamber 6, which has connection with the house system, while the opening of said passage for such supply of water is controlled and effected by the resiliency of the spring of the actuating mechanism, and it will consequently be obvious that if the energy of the said spring be increased the pressure upon the house side will rise proportionately, while if the tension of said spring be decreased an effect exactly opposite will be attained.

The improved regulating device constructed according to my invention is of an extremely simple, compact, and inexpensive construction and is of a very durable nature, since the rubber jacket, which is the part most liable to wear, is effectually held against frictional contact with the walls of the shell and is consequently protected against becoming worn. The device is also of such a nature as to permit of being readily and quickly repaired and taken apart and assembled and is capable of being adjusted so that it may be readily adapted for use in different locations.

It will also be obvious from the above description that the improved regulating device constructed according to my invention is capable of considerable modification without material departure from the principles and spirit of the invention, and for this reason I do not wish to be understood as limiting myself to the precise form and arrangement of the several parts of the device herein set forth.

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

1. In a pressure-regulator, the combination of a casing having chambers one adapted for communication with a street system and the other for communication with a house system, a valve device arranged to control the flow of fluid from one chamber to the other and a resilient actuating device operatively connected with the valve device and controlled by the variations in pressure within the house system, and comprising a compressible cylindrical jacket the outer surfaces at the bottom and sides of which are arranged to re-

ceive the pressure of the house system and a tension device inclosed within said compressible jacket and arranged to exert its resistance against the pressure of the house system, substantially as set forth.

2. In a pressure-regulator, the combination of a casing having chambers one adapted for communication with a street system and the other for communication with a house system, a valve device arranged to control the flow of fluid from one chamber to the other and a resilient actuating device operatively connected with the valve device and controlled by variations in pressure within the house system, and comprising a compressible cylindrical jacket, the outer surfaces at the bottom and sides of which are arranged to receive the pressure of the house system and a spring the tension of which is exerted against the pressure upon the house system said spring being inclosed within said cylindrical jacket, substantially as set forth.

3. In a pressure-regulating device, the combination of a casing having chambers one adapted for communication with a street system and the other for communication with a house system, a valve device arranged to control the flow of fluid from one chamber to the other and a resilient actuating device operatively connected with the valve device and controlled by variations in pressure within the house system and comprising a compressible jacket, the bottom and sides of which are exposed to the pressure of the house system and the sides of which are provided with an internal extensible armor and a spring the tension of which is exerted against the pressure upon the house system, substantially as set forth.

4. In a pressure-regulator, the combination of a casing having chambers one adapted for communication with a street system and the other for communication with a house system, a valve device arranged to control the flow of fluid from one chamber to the other and a resilient actuating device operatively connected with the valve device and controlled by variations in pressure within the house system and comprising a compressible jacket the bottom and sides of which are exposed to the pressure of the house system, a spring arranged in the jacket and adapted to exert its tension against the pressure of the house system thereon and an adjusting-screw engaged with said spring for controlling the tension thereof, substantially as set forth.

5. In a pressure-regulator, the combination of a casing having chambers one adapted for communication with a street system and the other for communication with a house system, a partition extended between the chambers and formed with an opening, a valve-tube arranged for movement in said opening and having a bore adapted for communication between the two chambers, a valve-disk with which said tube is adapted for contact

when moved in one direction, a bearing-piece for the valve-disk having transversely-extended supporting-arms, and a resilient actuating device arranged above the valve-disk and having arms extended on opposite sides of the supporting-arms for the said disk and connected to said valve-tube, said device being controlled by variations in pressure within the house system and arranged to move the valve-tube, substantially as set forth.

6. In a pressure-regulator, the combination of a casing having chambers, one adapted for communication with a street system and the other with a house system, a partition extended between the chambers and formed with an opening, a valve-tube arranged for movement in said opening and having a bore adapted for communication between the two chambers, a valve-disk with which said tube is adapted for contact when moved in one direction, a bearing-piece for the valve-disk having transversely-extended arms, a resilient actuating device arranged above the valve-disk and controlled by variations in pressure in the house system, arms extended from said actuating device on opposite sides of the supporting-arms of the valve-disk and having lower ends curved in cross-section and formed with partial internal screw-threads, a screw-threaded surface on the valve-tube with which said partial screw-threads are engaged and a recess in the valve-tube in which the lower ends of the arms of the actuating device are engaged, substantially as set forth.

7. In a pressure-regulator, the combination of a casing having chambers adapted for communication, respectively, with a street system and with a house system, a partition extended between the chambers and formed with an opening, a valve-tube movable in said opening and affording communication between the two chambers, a valve-disk supported in the casing and with which the valve-tube is adapted for contact when moved in one direction, arms extended from the valve-tube at opposite sides of the valve-disk and a resilient actuating device arranged above the valve-disk and connected with said arms and controlled by variations in pressure in the house system, to move said valve-tube, substantially as set forth.

8. In a pressure-regulator, the combination of a casing having chambers adapted for communication, respectively, with a street system and with a house system, a valve device controlling the flow of fluid from one chamber to the other, a part extended above the casing and having its interior connected with that chamber with which the house system has communication, a cap detachably held upon said part and an actuating device operatively connected with the valve device and controlled by variations in pressure within the house system and comprising a tension device the resistance of which is exerted against the pressure of the house system and

a compressible jacket one end of which is held at its edges between the cap and the extended part above the casing, and the sides and other end of which are arranged to receive the pressure of the house system, substantially as set forth.

9. In a pressure-regulator, the combination of a casing having chambers adapted for communication, respectively, with a street system and with a house system, a valve device controlling the flow of fluid from one chamber to the other, a part extended above the casing with its interior connected with that chamber with which the house system has communication, a cap detachably connected with said extended part and provided with an opening, a plug detachably held on the cap over said opening and an actuating device operatively connected with the valve device and controlled by variations in pressure in the house system and comprising a compressible jacket one end of which is held at its edges between the cap and the extended part above the casing and the bottom and sides of which are arranged to receive the pressure of the house system and a spring held within said jacket and removable at the opening in the cap when the plug is detached from the cap and arranged to exert its pressure against

the pressure of the house system, substantially as set forth.

10. In a pressure-regulator, the combination of a casing having chambers adapted for communication, respectively, with a street system and with a house system, a shell detachably held to the casing and extended above the same and having arms extended across its interior, a partition extended between the chambers of the casing and formed with an opening, a valve-tube arranged for movement in said opening and having a bore adapted for communication between the two chambers of the casing, a valve-disk carried by the arms of the shell and with which said valve-tube is adapted for contact when moved in one direction and an actuating device held in the shell and controlled by variations in pressure in the house system and having parts extended past opposite sides of the valve-disk and connected with the valve-tube for moving the same, substantially as set forth.

Signed at Cincinnati, Ohio, this 16th day of May, 1902.

ALFRED EUGENE BURNETT, JR.

Witnesses:

JOHN ELIAS JONES,
L. M. JONES.