

No. 819,378.

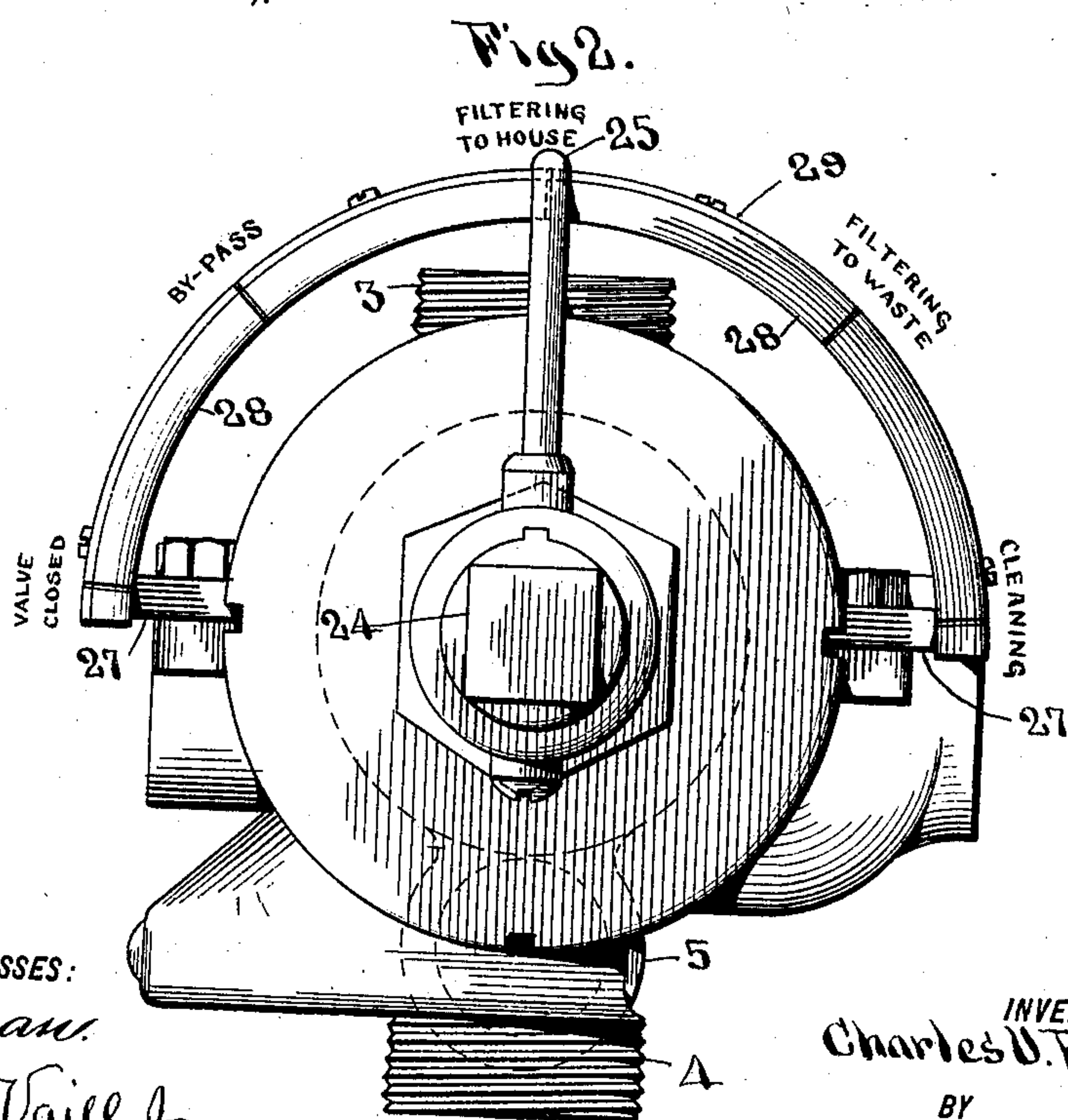
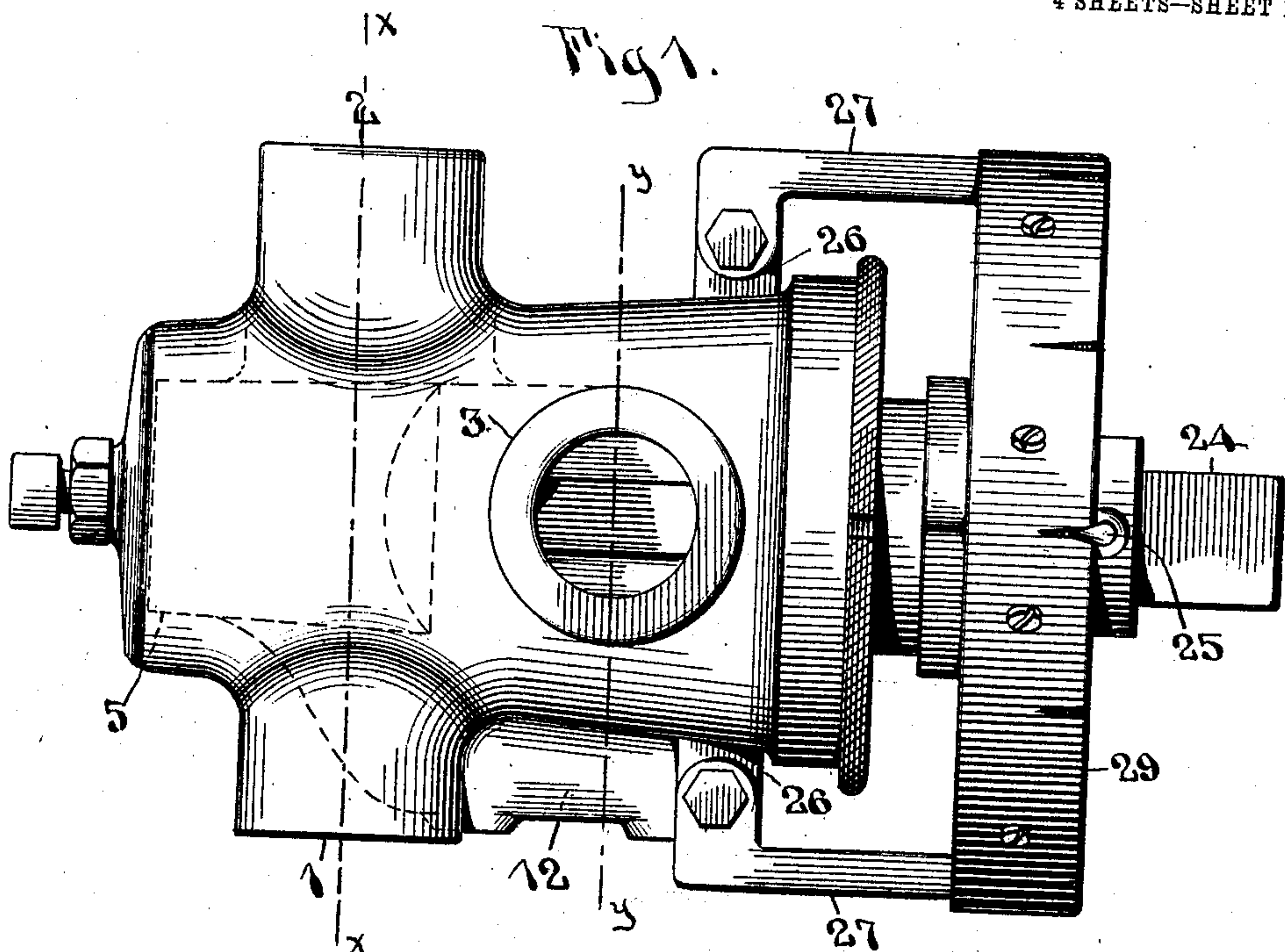
PATENTED MAY 1, 1906.

C. V. ROBERTS.

VALVE.

APPLICATION FILED JUNE 26, 1903.

4 SHEETS—SHEET 1.



**WITNESSES:**

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**INVENTOR**

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Charles U. Roberts,

BY

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4 SHEETS—SHEET 2.

Fig 3.

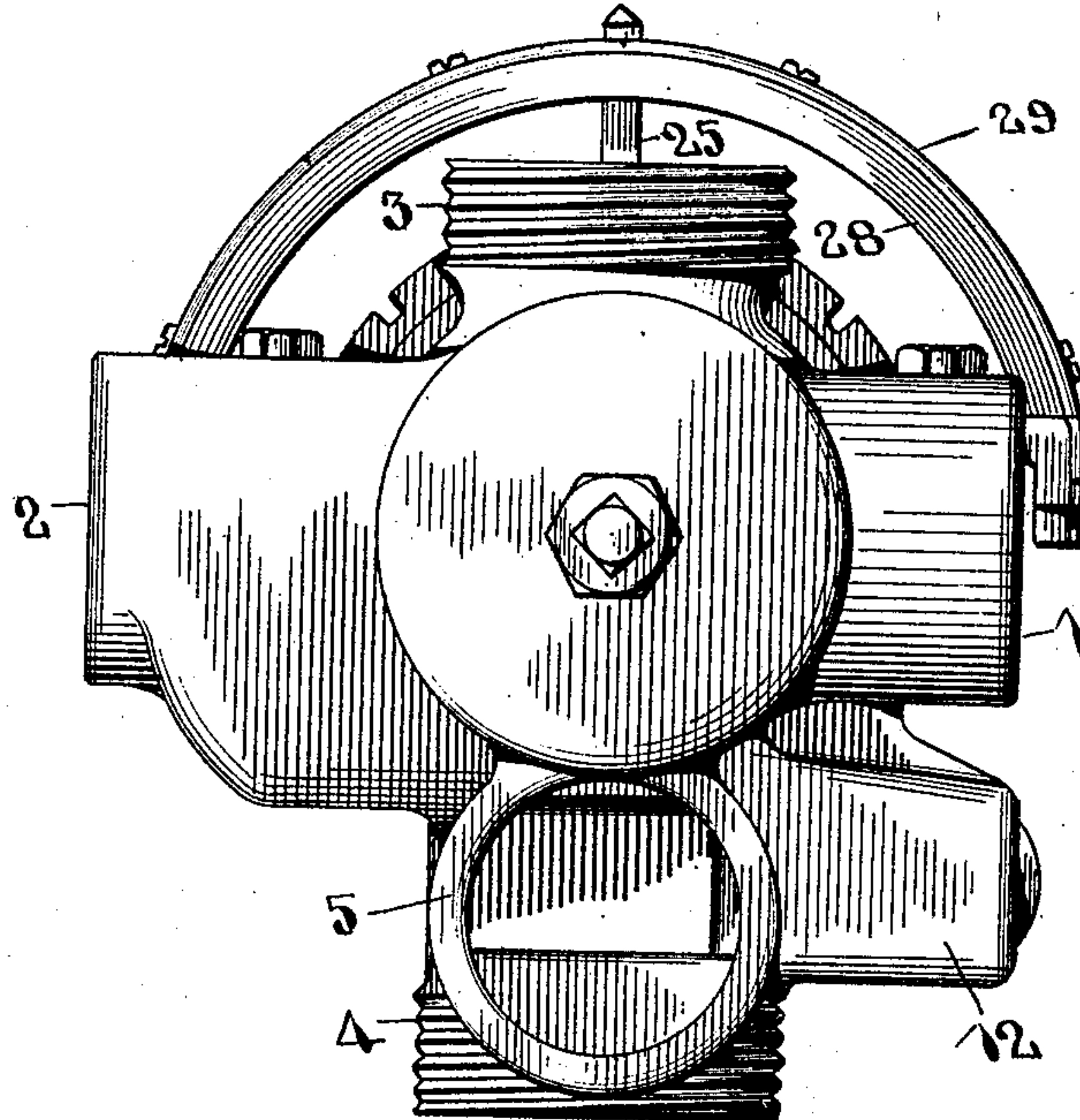
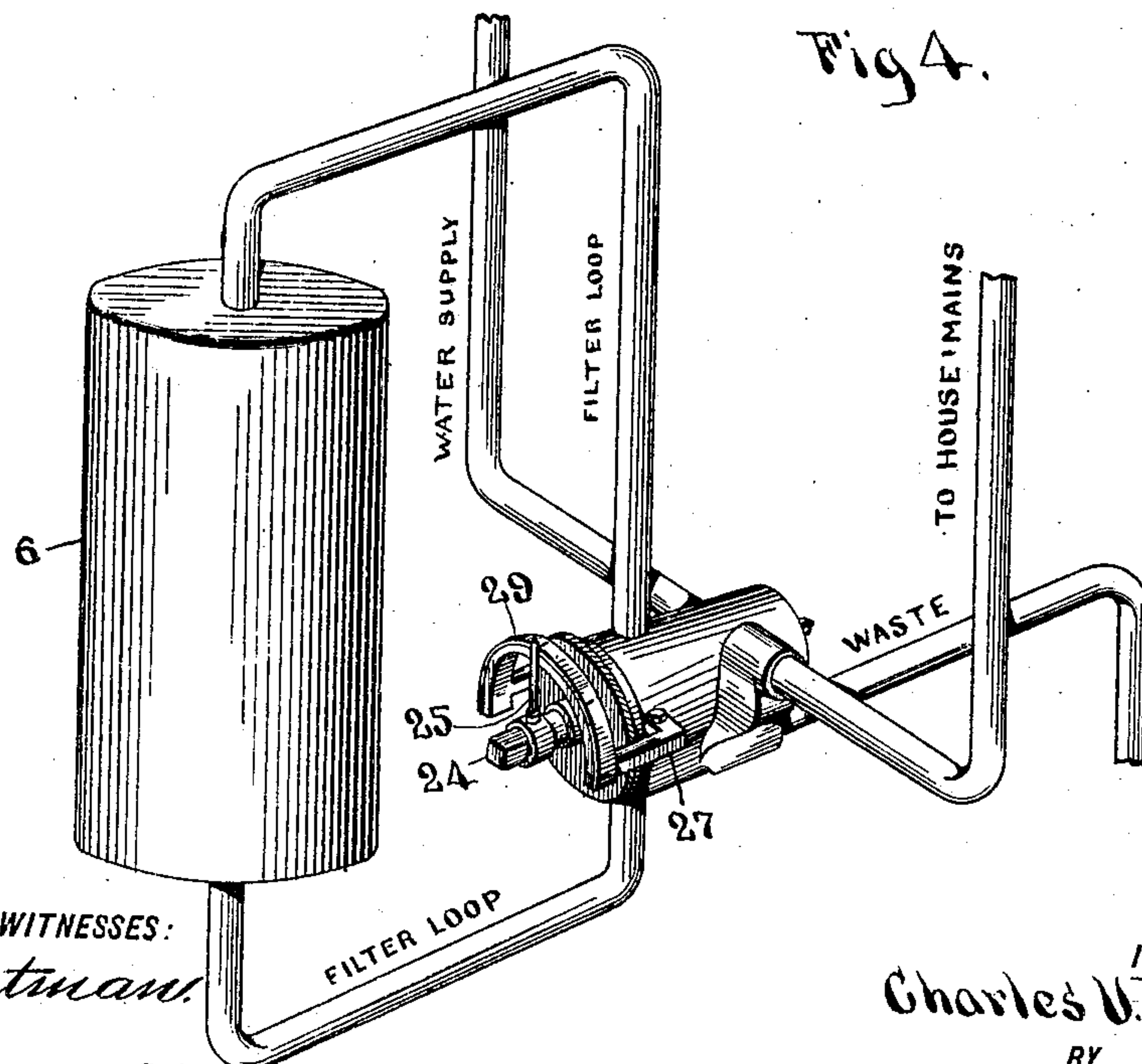


Fig 4.



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4 SHEETS—SHEET 3.

Fig 12.

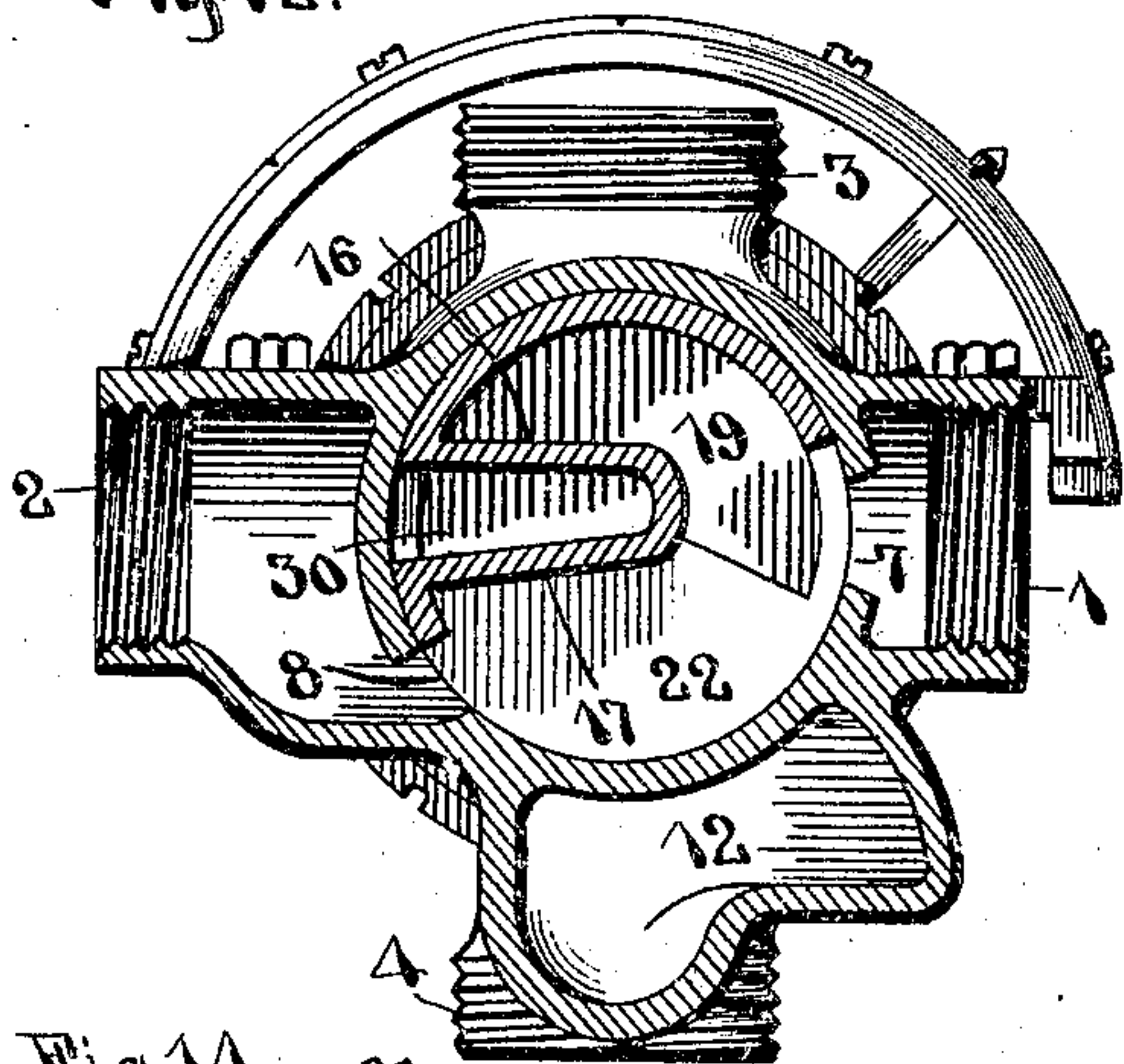


Fig 13.

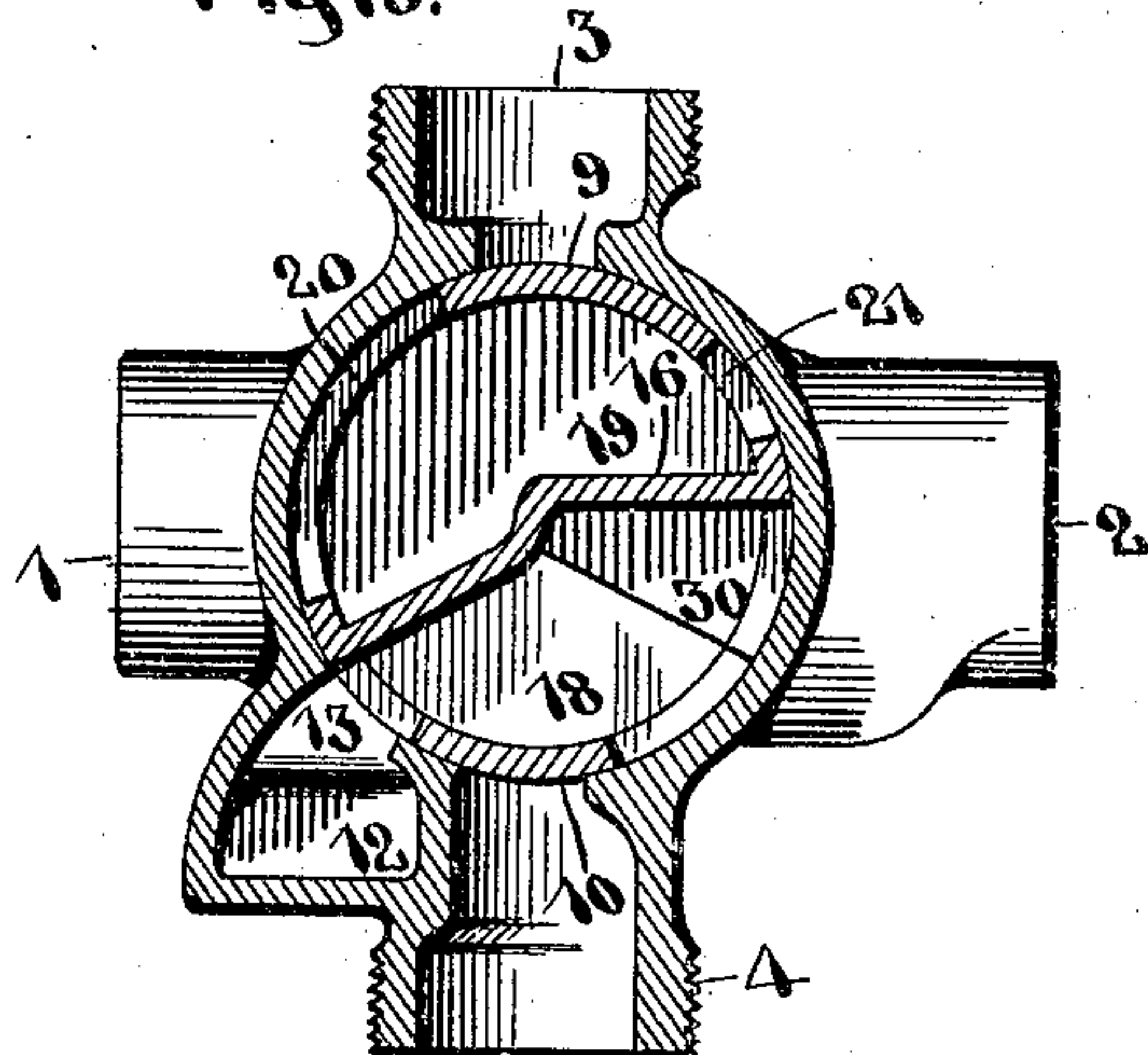


Fig 14.

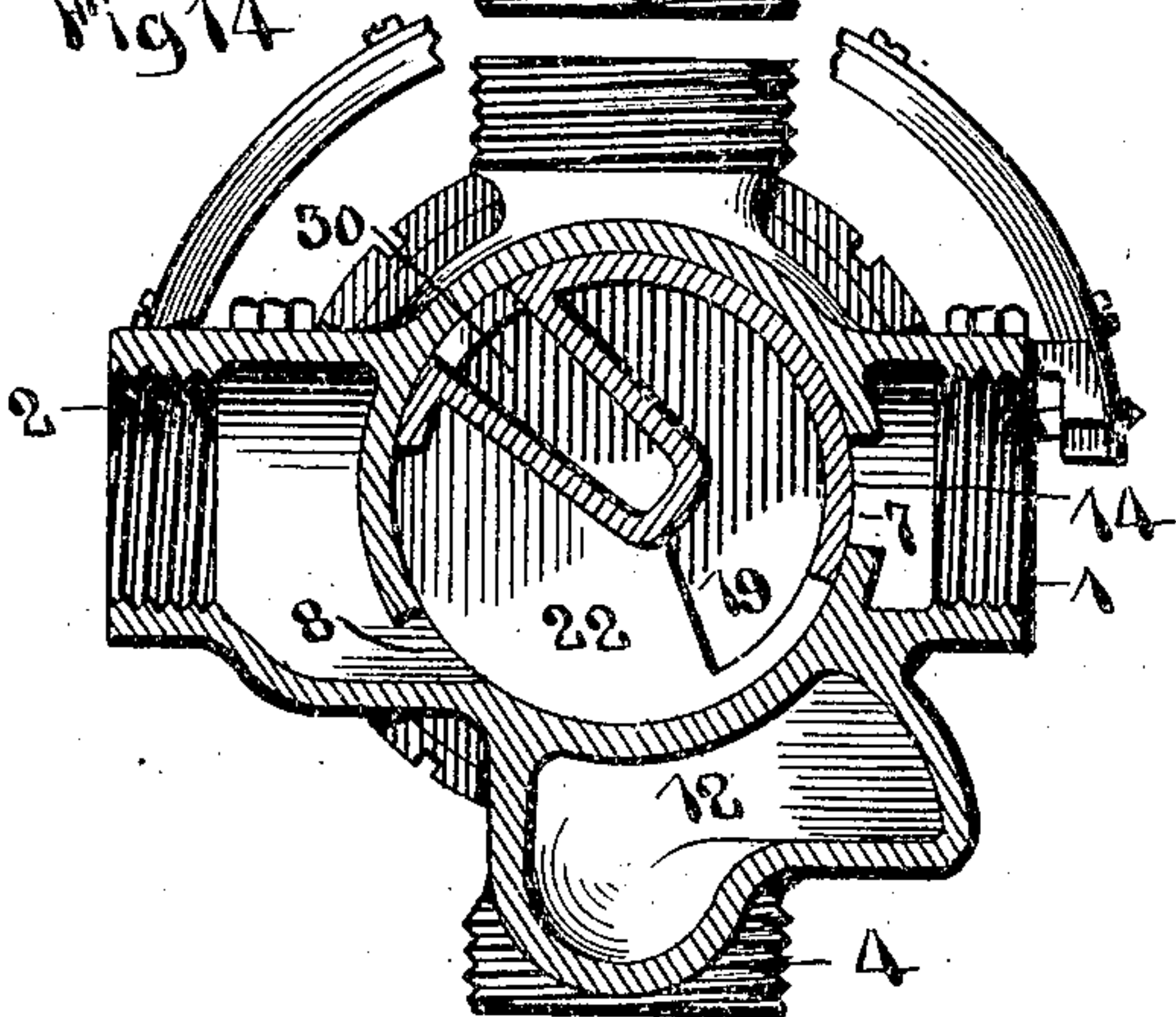


Fig 15.

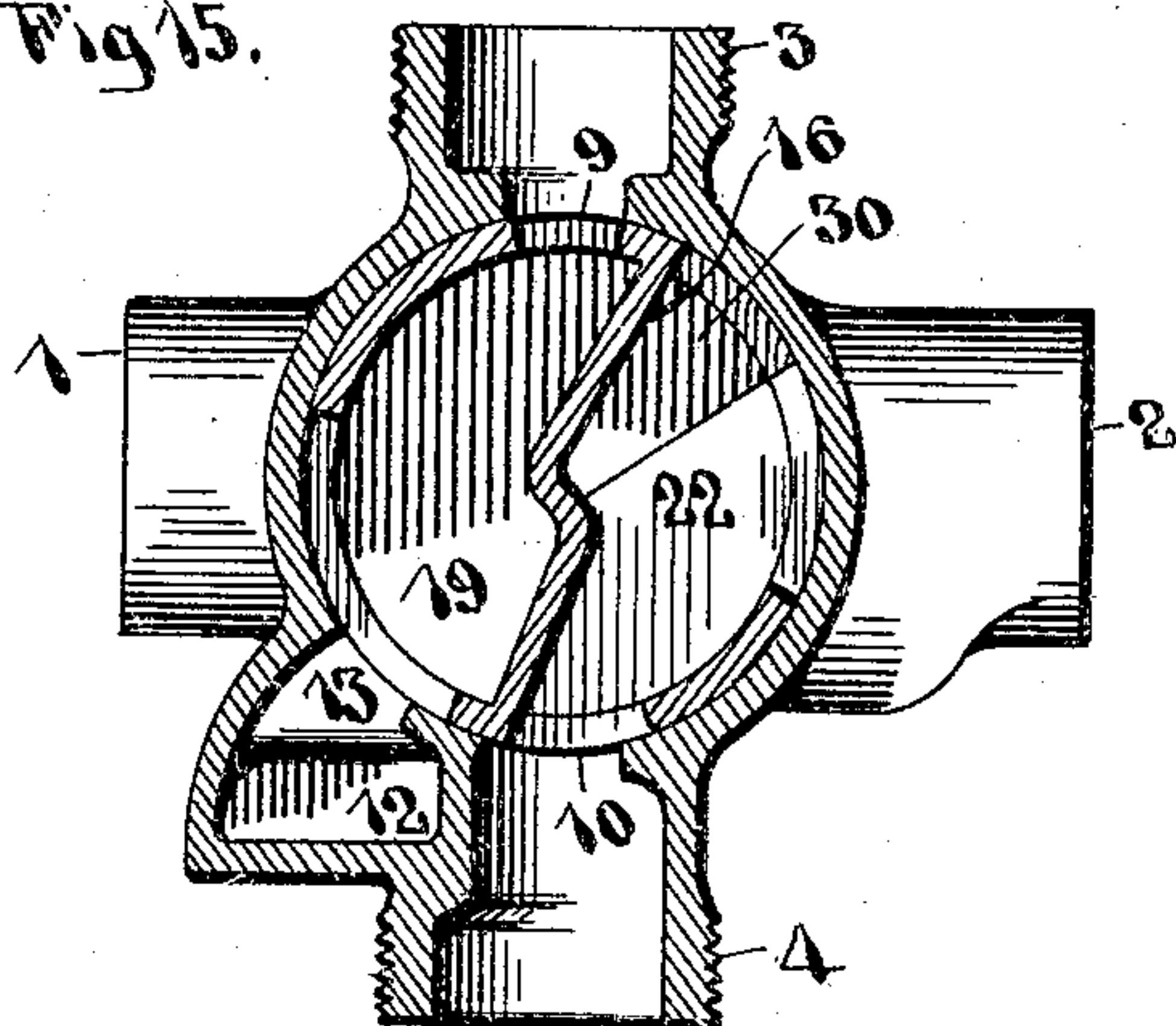
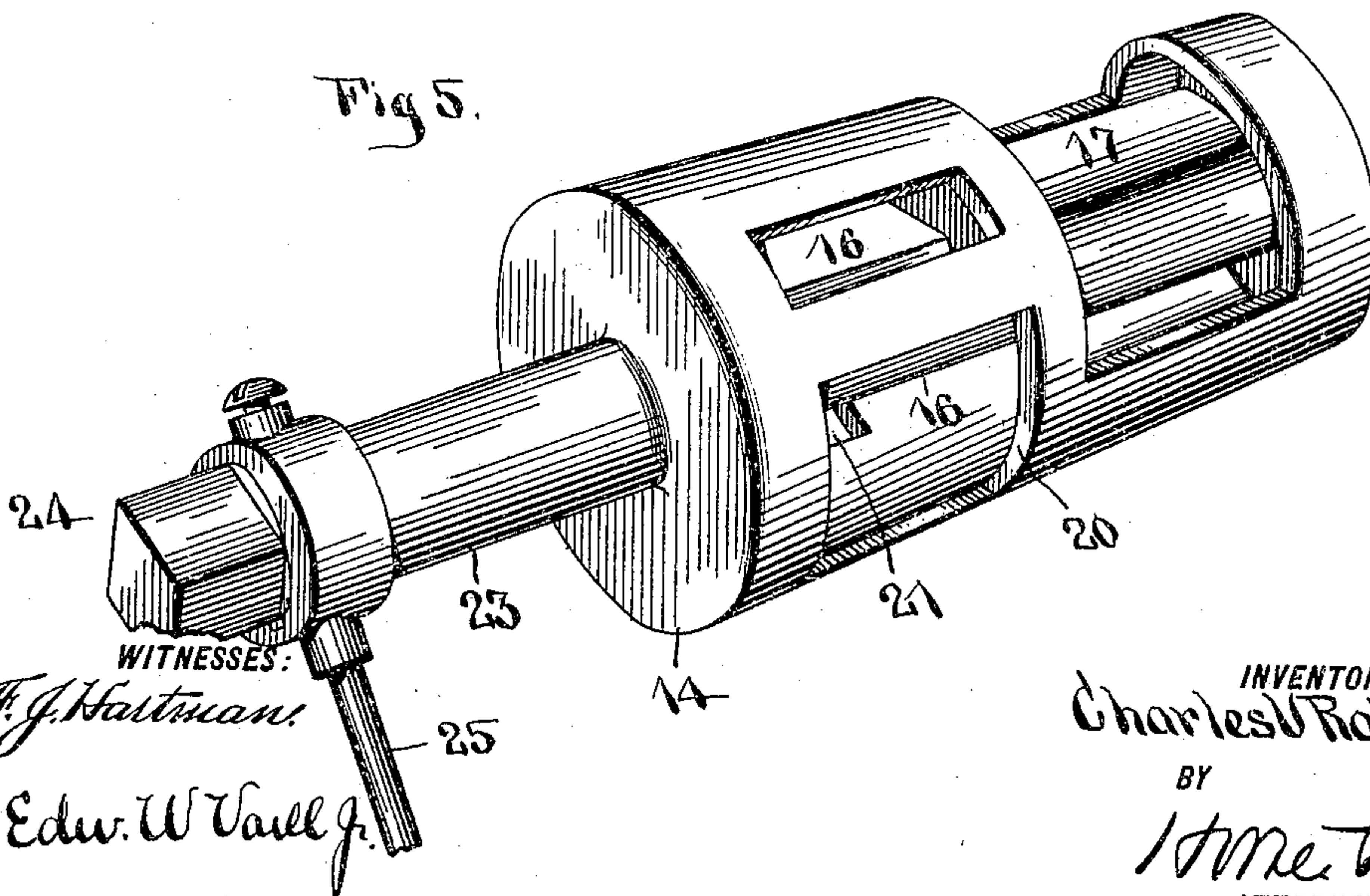


Fig 5.



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4 SHEETS—SHEET 4.

Fig 6.

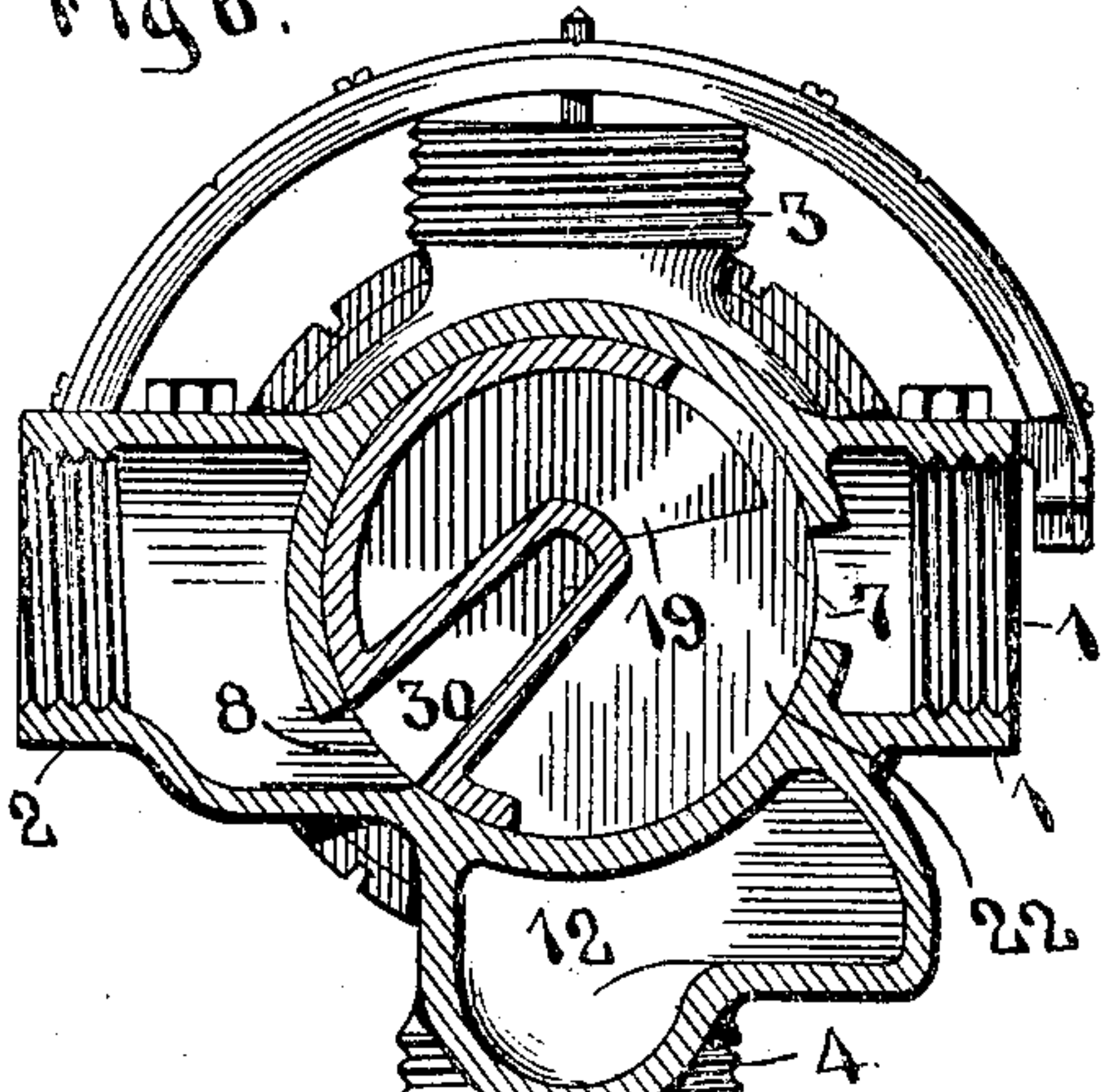


Fig 8.

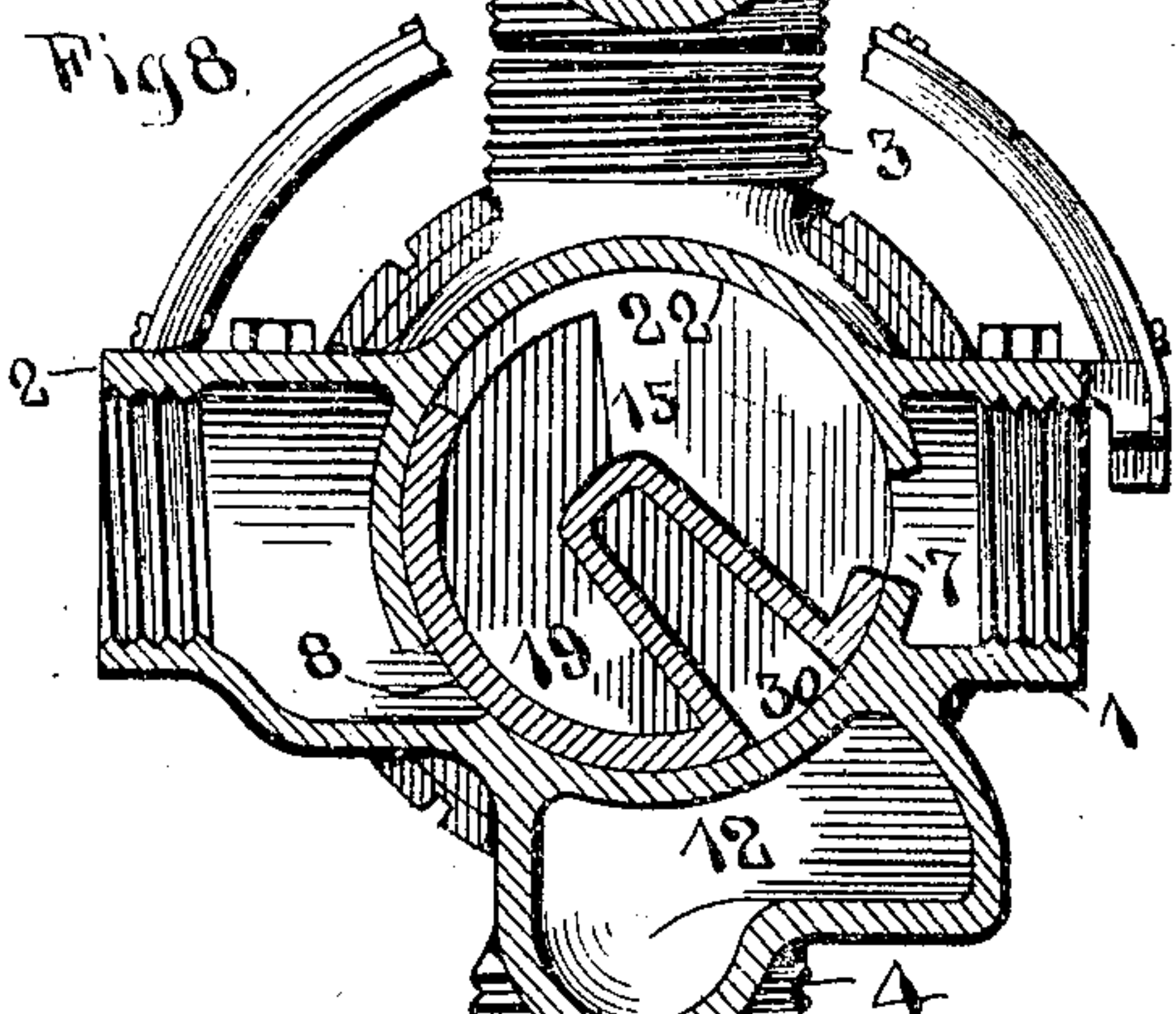


Fig 10.

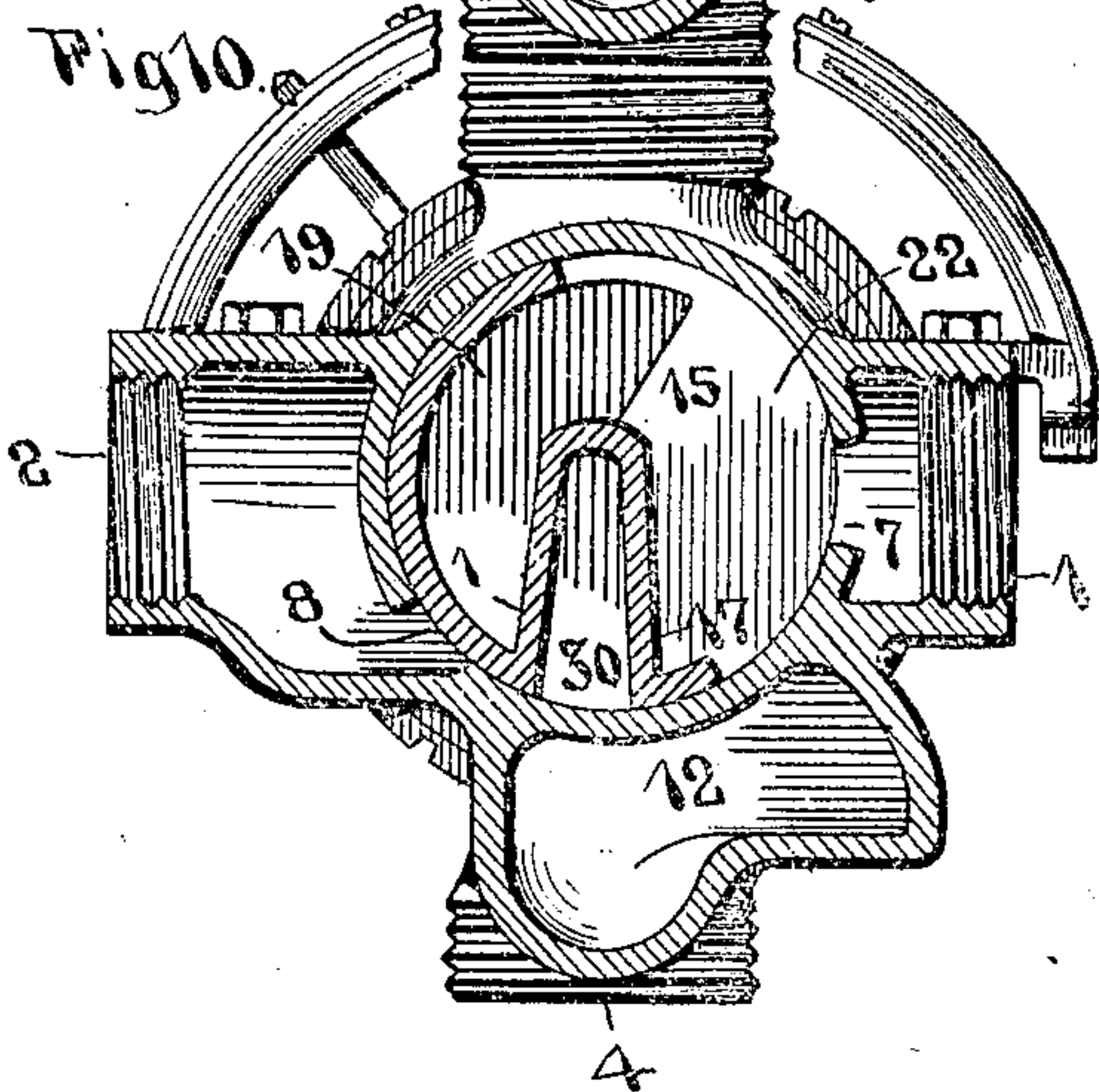


Fig 7.

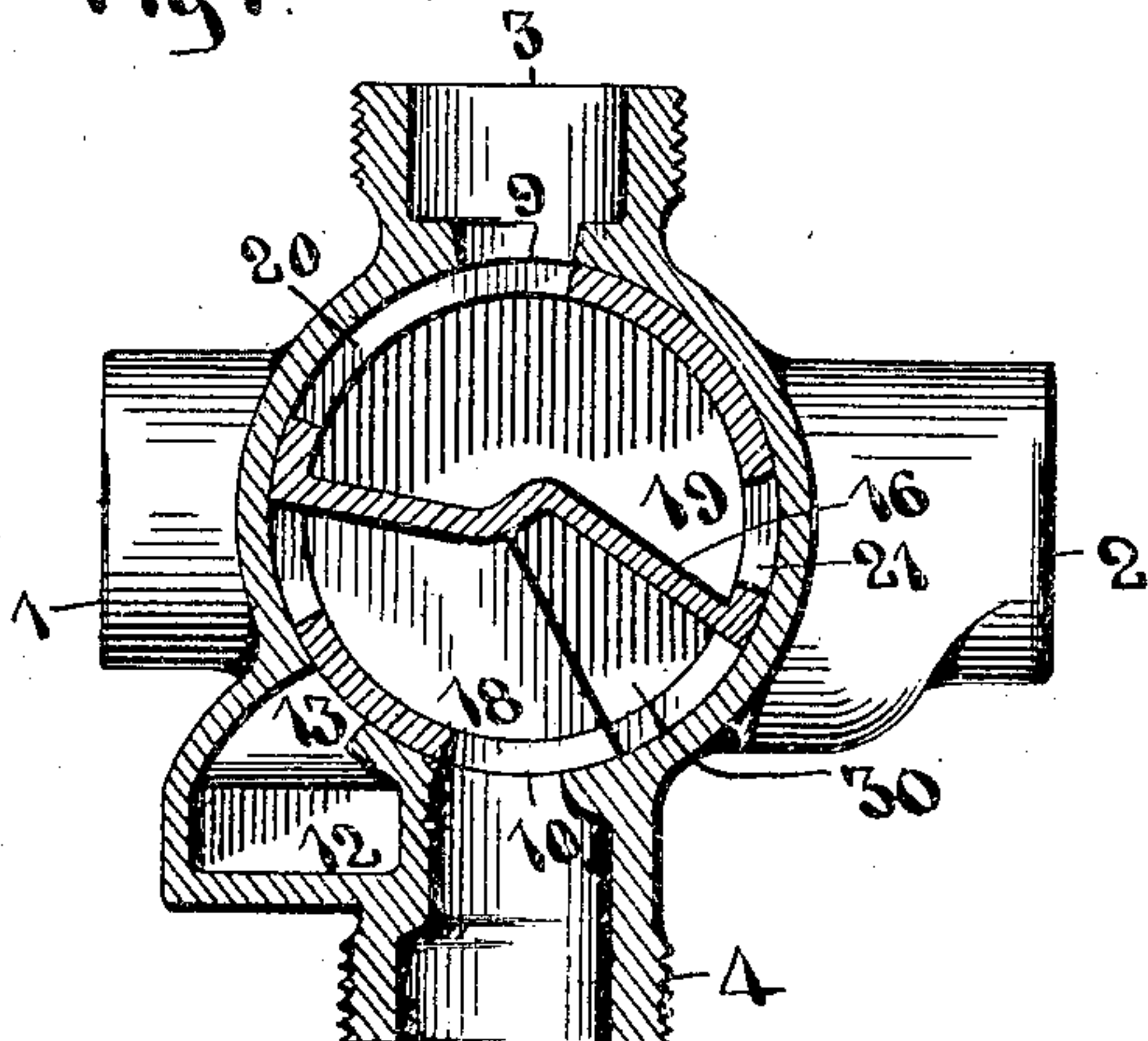


Fig 9.

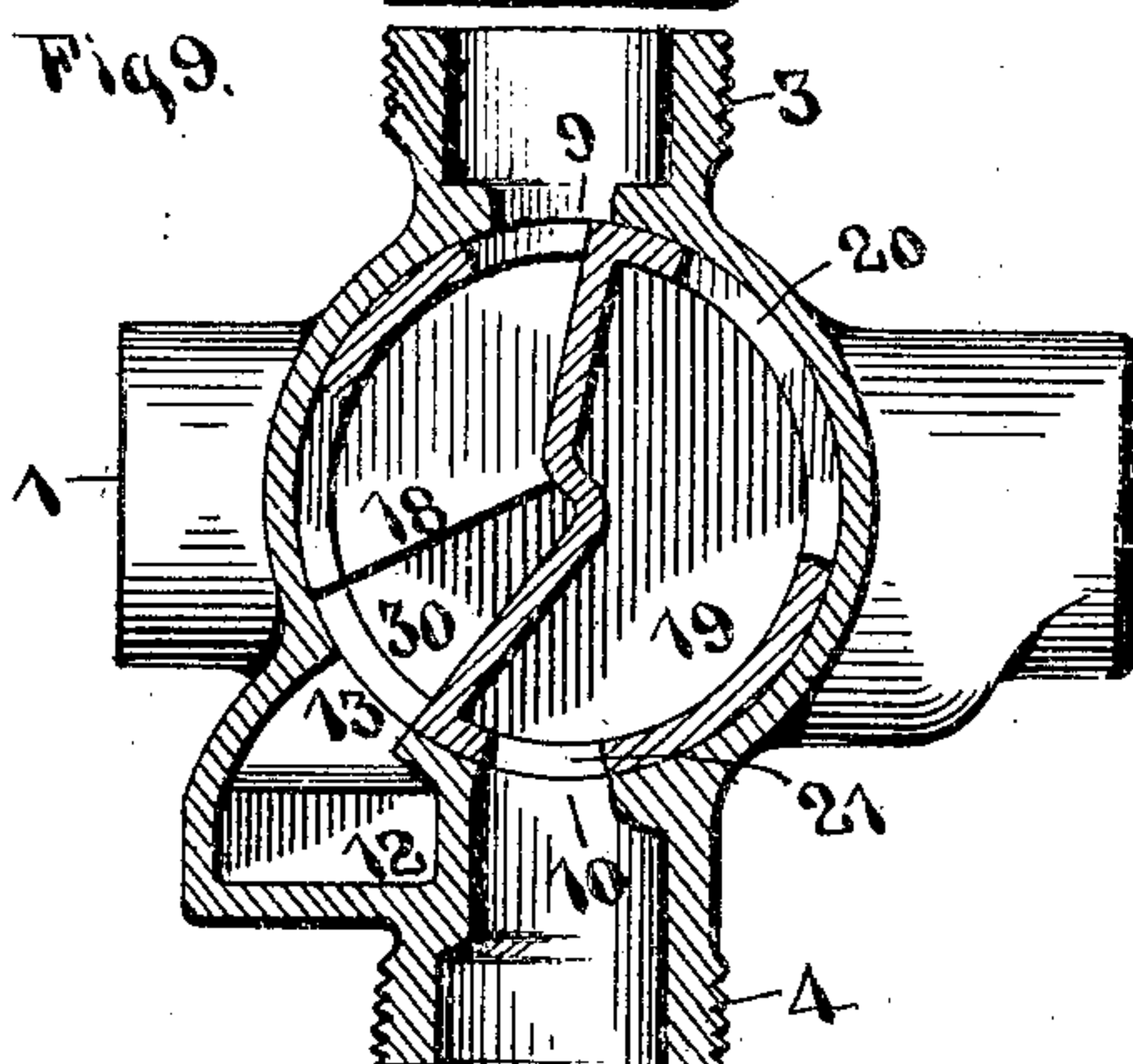
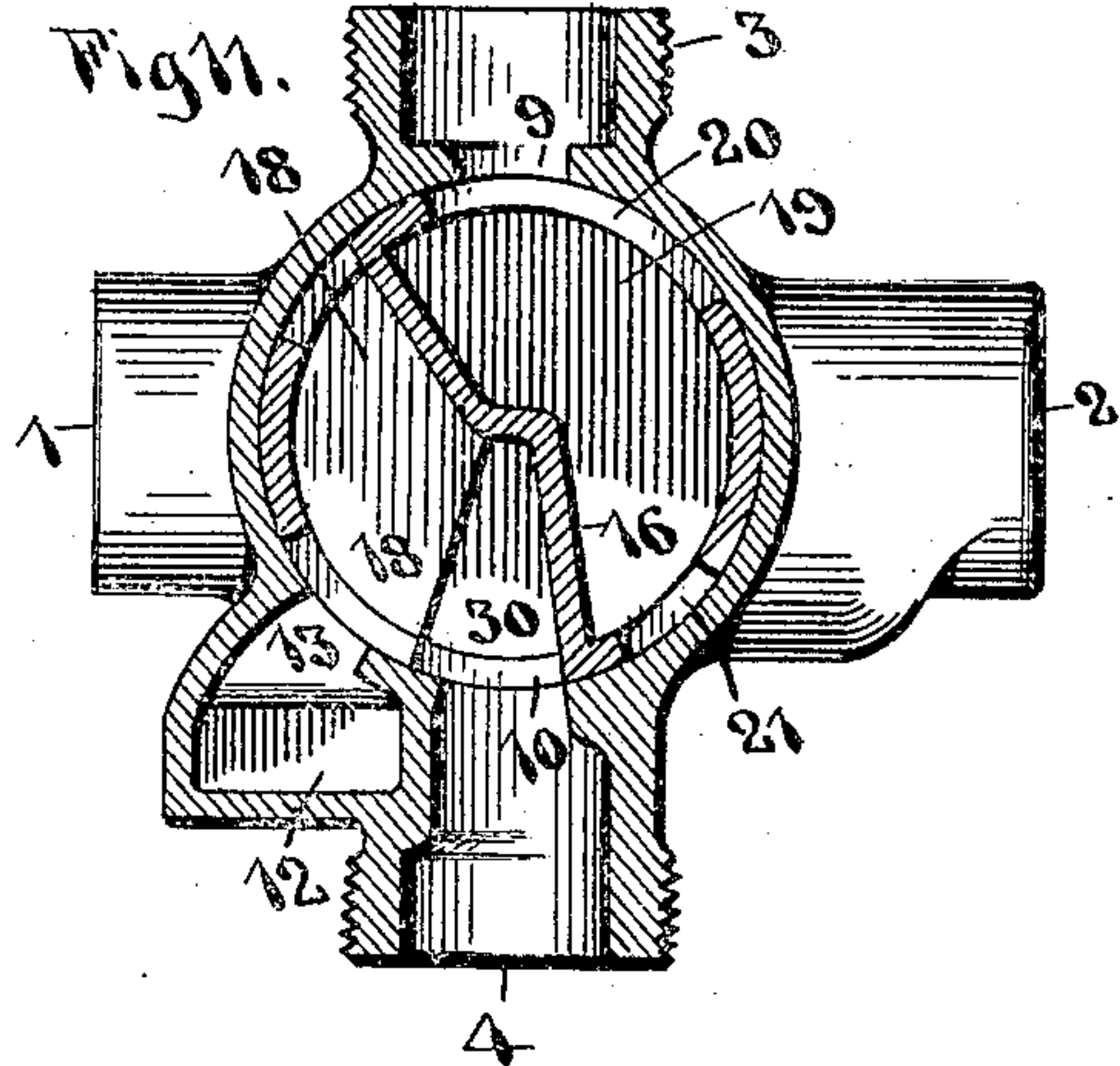


Fig 11.



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# UNITED STATES PATENT OFFICE.

CHARLES V. ROBERTS, OF PHILADELPHIA, PENNSYLVANIA.

## VALVE.

No. 819,378.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed June 26, 1903. Serial No. 163,156.

*To all whom it may concern:*

Be it known that I, CHARLES V. ROBERTS, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Valves, of which the following is a full, clear, and complete disclosure.

Broadly, my invention relates to valves, and particularly to those valves which are adapted to use with water-filters.

The principal object of my invention is to provide a valve which by a simple turning of the handle thereof in different directions and to different points causes the communications between the different pipes which are connected to said valve to be established in a certain predetermined order and sequence, so as to cause the liquid which is controlled by said valve to flow in certain predetermined directions as required.

The valve which is the subject of my invention is particularly designed to be used in connection with water-filters which are adapted for use in dwelling-houses and other buildings and which require to be cleaned at certain intervals, depending upon the condition of water and the extent of use of the filter. Any form of filter may be used with said valve, provided said filter is adapted to be cleaned by reversing the flow of the water therethrough; but this form of valve is particularly adapted to be used with filters of a construction such as is described and claimed by me in a separate application for Letters Patent, Serial No. 163,155, filed June 26, 1903.

In the filter last referred to the different requirements of the flow of water are as follows: First, the water passes from the supply-pipe through the filter downwardly and then to the house-mains for use. This is termed "filtering to house" and is the normal condition required to be produced by the valve. Second, the water passes from the supply-pipe upwardly through the filter and then to the waste-pipe. This condition of the valve is for the purpose of cleaning the filter and is termed "cleaning." Third, the water passes from the supply-pipe downwardly through the filter and then to the waste-pipe, and this condition of the valve is for the purpose of settling the filter and washing away the loosened sediment before the water again enters the house-mains and is termed "filtering to waste." Fourth, the water passes from the supply-pipe through the

valve to the house-mains without entering the filter, and this condition of the valve is termed "by-pass." Fifth, the water-supply is entirely shut off within the valve and all flow stopped, which is termed "valve closed."

For a full, clear, and exact description of my invention for producing these results reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which—

Figure 1 is a plan view of my improved valve; Fig. 2, an end elevation thereof; Fig. 3, a view in elevation of the opposite end to that shown in Fig. 2; Fig. 4, a perspective showing my improved valve connected to a filter; Fig. 5, a perspective view of the cone or rotary part of the valve; and Figs. 6 to 15, inclusive, are pairs of sectional views taken alternately upon the lines X X and Y Y of Fig. 1, so that each of said views overlap and show the central portion of the valve between the different ports. The different points at which the valve may be placed are clearly indicated in Figs. 1 and 2 of the drawings.

Referring to the drawings, the numeral 1 indicates the port which is connected with the supply-pipe from the street-mains.

2 indicates the port to which is connected the pipe which carries the water to the house-main.

3 indicates the port which is connected with the pipe carrying the water to the upper end of the filter.

4 indicates the port which is connected with the pipe passing to the lower end of the filter.

5 indicates the port to which is connected the waste-pipe. These connections are clearly indicated in Fig. 4, in which the filter is indicated by the numeral 6.

The port 1 is provided with an opening 7 within the valve-casing, which communicates directly with the interior thereof, and the port 2 is provided with a similar opening 8, located, however, slightly below the horizontal diameter of the valve. The port 3 is provided with an opening 9, which communicates with the interior of said casing. The port 4 is diametrically opposite to the port 3 and also has an opening 10, which communicates directly with the interior of the casing. The port 5, which is located at the lower rear portion of the valve-casing, has a passage 12, which extends horizontally beneath the valve-casing for a short distance and then



curves laterally and then forwardly until a point is reached which is substantially in the same transversed plane with the ports 3 and 4, where said passage then communicates with the interior of the casing, as indicated at 13.

The valve-cone 14, which is best illustrated in Fig. 5 and also shown in section in each pair of the transverse sectional views, is provided with two sets of chambers in the forward and rear portions thereof, which have openings communicating with the exterior of said cone and some of which also communicate with each other.

15 indicates a partial transverse partition between the two sets of chambers, while 16 indicates a longitudinal partition in the forward chamber, and 17 indicates a pair of connected partitions which form a passage 30 from the forward chamber 18 to the rear of the cone and is adapted to communicate with either of the openings 7 and 8. The chamber 19 extends the whole length of the cone and has openings 20 and 21 adjacent its forward ends, which are adapted to communicate, respectively, with the openings 9, 10, and 13, which lead to the ports 3, 4, and 5, respectively. The chamber 19 also has an opening 22, which communicates with either of the openings 7 and 8 separately and also is large enough to include both of said openings 7 and 8, as indicated in Fig. 12. The central transverse partition 15, above referred to, and the end plates of the cone are represented in Figs. 6 to 15, inclusive, by light and heavy shading, respectively.

The forward or larger part of the valve-cone is provided with a stem or projection 23, which terminates in an angular portion 24 to receive a wrench, handle, or other means for rotating the cone. Said stem 23 is also provided with an indicator hand or arm 25, which is attached thereto in any suitable manner.

The exterior of the valve-casing is provided with lugs at diametrically opposite points near the larger end, to which are attached arms 27, which carry the semicircular segment 28. To this segment 28 is attached the indicating-band 29, which coöperates with the arm 25 to show the different positions of the valve-cone 14. The first position of the valve (shown in Figs. 6 and 7) is that which allows the water to pass from the supply through the filter in a normal direction and then to the house-mains, or, in other words, the valve is in the "filtering to house" position. When the valve is in this position, the water passes through the following openings or passages, 1, 7, 22, 19, 9, and 3, to the upper portion of the filter and from the lower portion of the filter through 4, 10, 30, 8, and 2 to the house-mains. In the second position of the valve (shown in Figs. 8 and 9)—the "cleaning" position—the water

passes from the supply-pipe through 1, 7, 22, 19, 10, and 4 to the lower part of the filter and from the upper part of the filter through 3, 9, 19, 30, 13, 12, and 5 to the waste-pipe. In the third position, or "filtering to waste," Figs. 10 and 11, the water passes through 1, 7, 22, 19, 9, 3 to the upper part of the filter and from the lower part of the filter through 4, 10, 18, 13, 12, and 5 to the waste-pipe. In the fourth position, or "by-pass," Figs. 12 and 13, the water passes from the supply-pipe through 1, 7, 22, 8, and 2 directly to the house-main, communication to and from the filter being entirely cut off, as indicated at 9 and 10 in Fig. 13. In the fifth or "valve closed" position the water is prevented from entering the port 1 and the opening 7 by the exterior of the cone, which is indicated in Fig. 14; but the other elements of the valve when the cone is in this position allow the water to pass from the house-mains through the waste-pipe by establishing communication among the passages in the following sequence: from the house-mains to 8, 22, 19, 13, 12, and 5 to the waste-pipe. This position of the valve allows all the water in the house-mains to be drained off directly to the sewer.

It will be noted that in the usual use of my valve only three positions are employed, the indicator being immediately returned to the "filtering to house" position from the "filtering to waste" position. The "by-pass" position is intended for use only when the filter is being repaired, a new one substituted, or the filtering material changed, and the "valve closed" position is only used when the entire water-supply system is put out of operation. It will also be noted from a comparison of Figs. 8 and 9 of the drawings with Figs. 10 and 11 that in changing from the "cleaning" to the "filtering to waste" position the inlet-port from the water-supply is never closed and also that the outlet-port 4 is not closed during the change. This is an advantage from the fact that no strain is put upon the supply-pipe entering at 1 and also that no strain is put upon the filter by having the lower outlet-pipe closed, for if such were the case the water flowing through the pipes and into the filter with considerable pressure and velocity would act as a water-hammer and would put a great strain upon said parts and possibly cause them to leak or burst. This is true also during the change from the "filtering" position to the "by-pass" position, as will be seen by comparing Figs. 6 and 7 with 12 and 13, since as the opening 8 is closed by the end of the partition 17 on one side thereof, or that side which connects with the passage 30, the opening on the other side of the partition, or that which connects with the opening 22, is opened. It will thus be seen that the water is not suddenly shut off in going from one to another of the positions mentioned and is



only shut off when the valve is placed in the "closed" position.

I do not wish to be limited to the exact details of construction of the valve embodying my invention herein set forth, for changes may be made in the form, proportion, and arrangement of parts without departing from the spirit and scope thereof.

Having thus described my invention, what I claim to be new, and desire to protect by Letters Patent of the United States, is—

1. In a multiway valve, the combination of a supply-duct, means for directing the flow of the liquid in opposite directions through a chamber or looped duct, means for connecting either end of said looped duct with one of two outlet ducts without closing said supply-duct.

2. In a multiway valve, the combination of a supply-duct, an outlet-duct, means for directing the flow of liquid through a chamber or looped duct, a discharge-duct, means for connecting either end of said chamber with the discharge-duct and means for connecting the supply-duct directly with said outlet-duct without closing said supply-duct.

3. In a multiway valve, the combination of a supply-duct, an outlet-duct, means for directing the flow of the liquid in opposite directions through a chamber or looped duct, a discharge-duct, means for connecting either end of said chamber with the discharge-duct, means for connecting the supply-duct directly with said outlet-duct, and means for closing said supply-duct, said supply-duct being always open in the intervals between the operations of each of said means.

4. In a multiway valve, the combination of a supply-duct, means for directing the flow of the liquid in opposite directions through a chamber or looped duct, two outlet-ducts one of which may act as a discharge-duct, means for connecting one end of said chamber with either of the two outlet-ducts, means for connecting the other end of said looped duct with one of said outlet-ducts and means for connecting the supply-duct directly with one outlet-duct, said supply-duct being always open in the intervals between the operations of each of said means.

5. In a multiway valve, the combination of a casing having a supply-port, a pair of ports adapted to be connected with a looped duct, a discharge-port and an outlet-port, with a rotatable part having passages and chambers therein such that when the said part is in a central position the supply-duct is connected with one of said pair of ports, the other being connected with the outlet-duct; when in the next adjacent position on one side of the central position, the second of said pair of ports is connected with the discharge-port; when in the next adjacent position, a reverse flow is caused through said pair of ports; when in the first position on the oppo-

site side of the central position, the supply-port is connected directly with the outlet-port and when in the next adjacent position the supply-port is closed.

6. A multiway valve, comprising a casing having an inlet-port and outlet-port, a pair of ports adapted to be connected with a looped duct, a rotatable part for said valve and means within said rotatable part for directing the flow of the liquid in opposite directions through said looped duct and for connecting either end of said duct with said outlet-port without closing said inlet-port.

7. A multiway valve, comprising a casing having an inlet-port, two outlet-ports, a pair of ports adapted to be connected with a looped duct, a rotatable part for said valve and means within said rotatable part for directing the flow of the liquid in opposite directions through said looped duct and for connecting either end of said duct with either of said outlet-ports without closing said inlet-port.

8. A multiway valve, comprising a casing having an inlet-port and outlet-port, a pair of ports adapted to be connected with a looped duct, a rotatable part for said valve and means within said rotatable part for directing the flow of the liquid in opposite directions through said looped duct, for connecting either end of said looped duct with one of said outlet-ports and for connecting the inlet-port directly with the other outlet-port without closing said inlet-port.

9. A multiway valve, comprising a casing having an inlet-port, an outlet-port, a pair of ports adapted to be connected with a looped duct, a rotatable part for said valve, means within said rotatable part for directing the flow of the liquid in opposite directions through said looped duct, for connecting one end of said looped duct with the said outlet-port, for connecting the inlet-port directly with the outlet-port without closing said inlet-port, and for closing the inlet-port.

10. A multiway valve, comprising a casing having an inlet-port, an outlet-port, a discharge-port, a pair of ports adapted to be connected with a looped duct, a rotatable part for said valve and means within said rotatable part for directing the flow of the liquid in opposite directions through said looped duct, for connecting one end of said duct with either the outlet-port or the discharge-port, for connecting the other of said outlet-ports with said discharge-port and for connecting the inlet-port directly with the outlet-port without closing said inlet-port.

11. A multiway valve, comprising an inlet-port, an outlet-port, a discharge-port, a pair of ports adapted to be connected with a looped duct, a rotatable part for said valve, a means within said rotatable part for directing the flow of the liquid in opposite directions through said looped duct, for connect-



ing one end of said duct with either the outlet-port or the discharge-port, for connecting the other end of said looped duct with the discharge-port, for connecting the inlet-port directly with the outlet-port, and for closing said inlet - port, the arrangement of said means within said rotatable part being such that the inlet-port is not closed in the intervals between the positions of said part.

12. A multiway valve, comprising a casing having an inlet-port, an outlet-port, a discharge-port and a pair of ports adapted to be connected with a looped duct, a rotatable part for said valve having two sets of chambers therein formed by a partial transverse partition and longitudinal partitions separating the chambers of each set there being communication between said sets of chambers, said rotatable part having openings in its walls communicating with said chambers, the openings in one set of chambers being adapted to communicate with the inlet and outlet ports and openings in the other set of chambers being adapted to communicate with the pair of ports connected with the looped duct and with the discharge-port.

13. A multiway valve comprising a casing having an inlet-port, an outlet-port, a discharge-port and a pair of ports adapted to be connected with a looped duct, a rotatable part for said valve having two sets of chambers therein formed by a partial transverse partition and longitudinal partitions separating the chambers of each set, said sets of chambers having communication with each other, the walls of one set of chambers of said rotatable part having two openings adapted to communicate with the inlet and outlet ports and the walls of the other set of chambers having four openings adapted to communicate with said pair of ports and the discharge-port.

14. A multiway valve, comprising a casing having an inlet-port, an outlet-port, a drain-port, and a pair of ports adapted to be connected with a looped duct, a rotatable part retained within said casing and having two sets of chambers therein formed by a partial transverse partition, a substantially diametric partition separating two of the chambers of one set of chambers and two substantially parallel partitions forming a passage from one of said chambers to the rear of the rotatable part, each of the chambers of said named set having two openings adapted to communicate with the pair of ports and the drain-port and the second set of cham-

bers each having an opening adapted to communicate with the inlet and outlet ports.

15. A multiway valve, comprising a casing having an inlet-port, and outlet-port, a drain-port and a pair of ports adapted to be connected with a looped duct, a tapering part for said valve having two sets of chambers therein formed by a partial transverse partition formed by a sector slightly less than a semicircle, the chambers of the forward set being separated by a substantially diametric partition and the chambers of the rear set being formed by substantially radial partitions connected at their inner ends, one of said radial partitions forming substantially an extension of said diametric partition so that corresponding longitudinal chambers to communicate with each other, each of the chambers of the former set having two openings adapted to communicate with the pair of ports and the drain-port, and the rear chambers each having an opening adapted to communicate with the inlet and outlet ports.

16. A multiway valve, comprising a casing having an inlet-port and an outlet-port in one transverse plane, a pair of ports adapted to be connected with a looped duct and a passage leading to a drain-port in another transverse plane, a tapering part for said valve having two sets of chambers each set corresponding to one of aforesaid transverse planes and formed by a sector slightly less than a semicircle, the chambers of the forward set being separated by a substantially diametric partition and the chambers of the rear set being separated by substantially radial partitions connected at their inner ends, one of said radial partitions forming substantially an extension of said diametric partition so that corresponding longitudinal chambers communicate with each other, each of the chambers of the forward set having two openings adapted to communicate with the pair of ports and the passage leading to the drain-port, and each of the chambers of the rear set having an opening adapted to communicate with the inlet and outlet ports, one of the last-named openings being of sufficient width to include both of said last-named ports.

In witness whereof I have hereunto set my hand this 24th day of June, A. D. 1903.

CHARLES V. ROBERTS.

Witnesses:

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EDW. W. VAILL, Jr.