

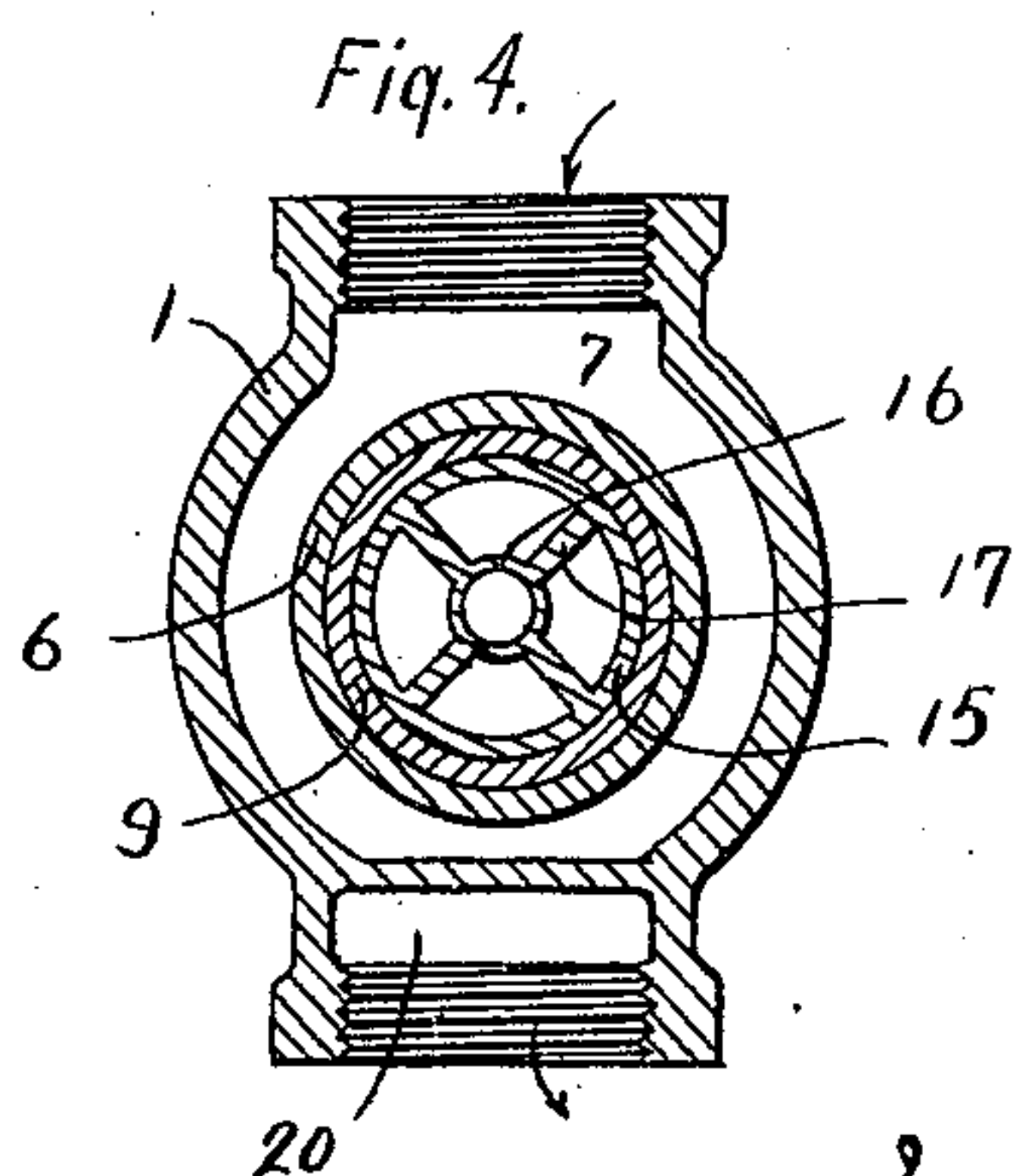
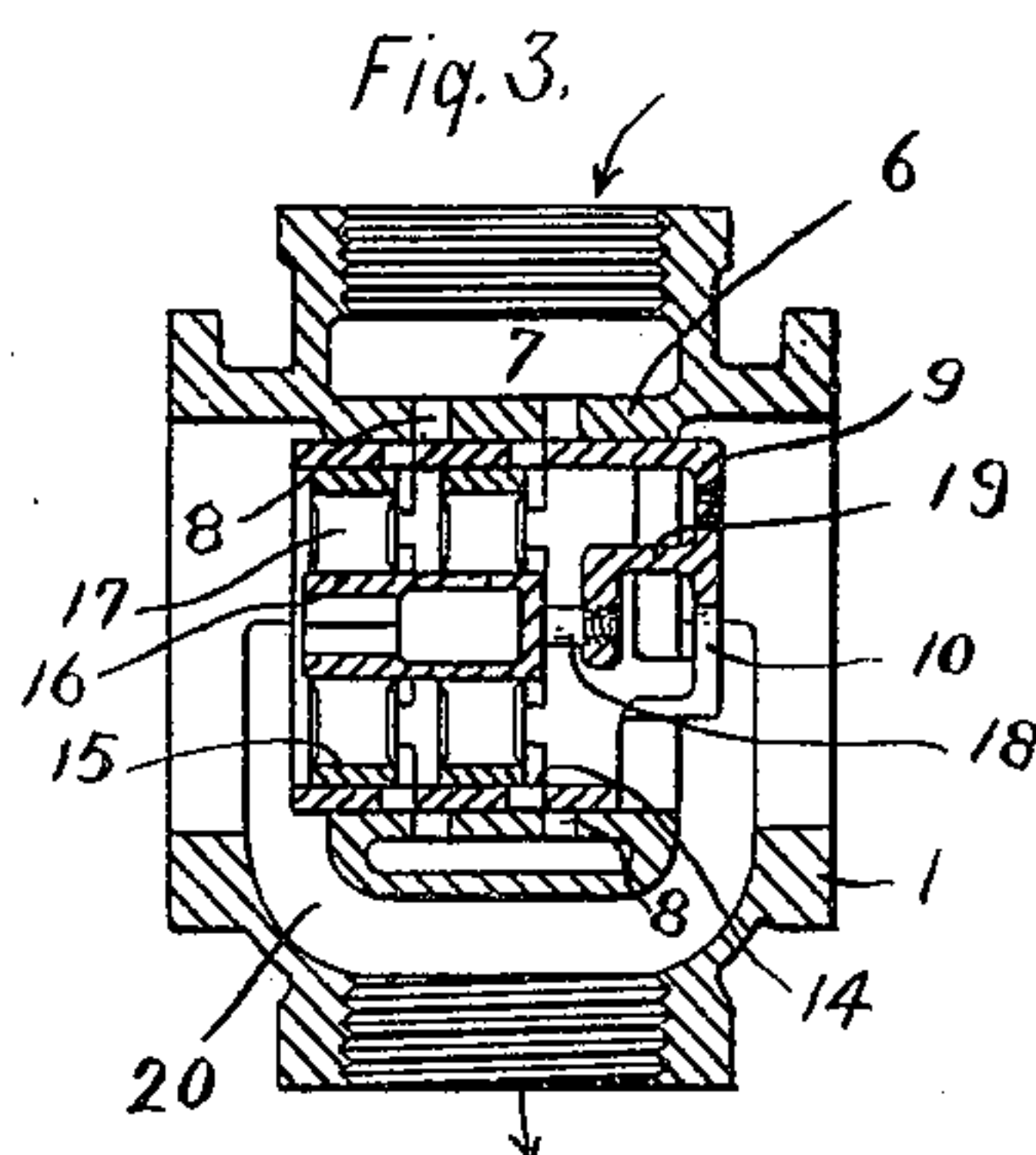
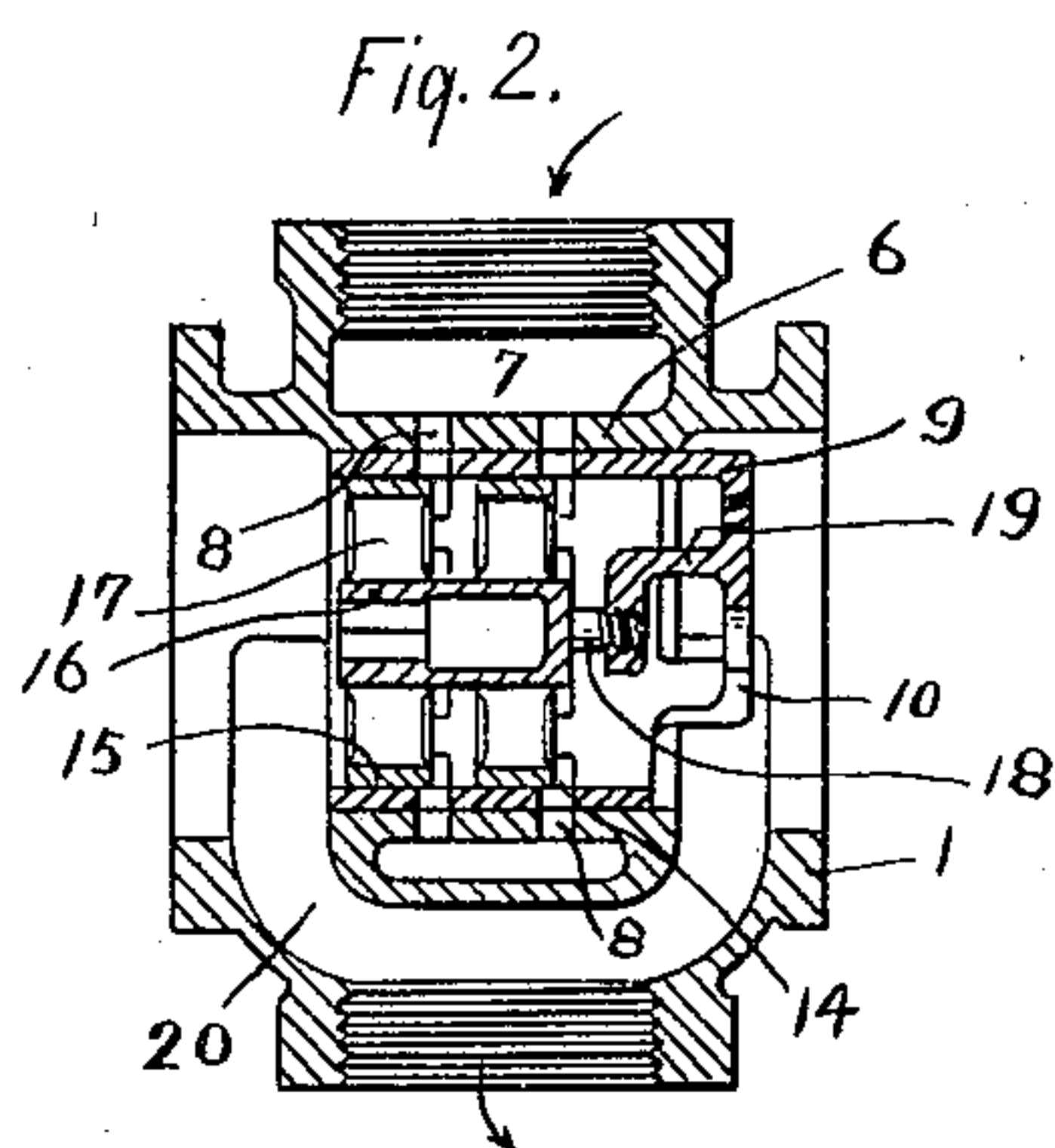
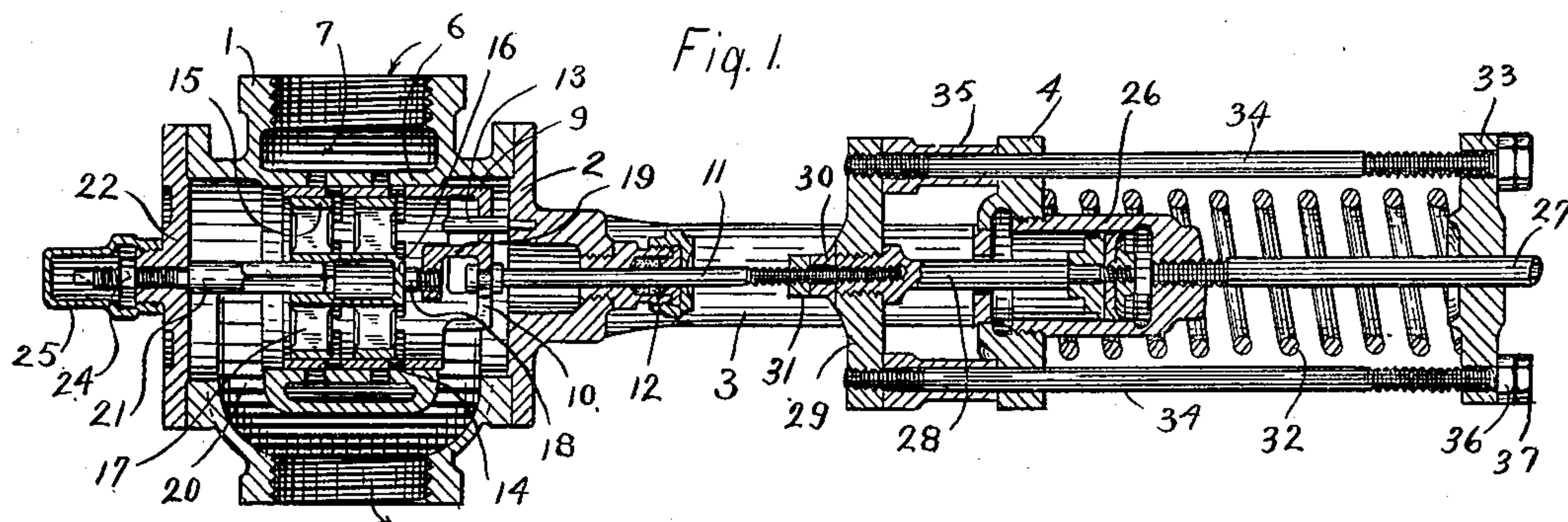
No. 627,771.

Patented June 27, 1899.

J. C. DEAN.
STEAM PUMP REGULATOR.

(Application filed Nov. 25, 1898.)

(No Model.)



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN C. DEAN, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE DEAN BROTHERS STEAM PUMP WORKS, OF SAME PLACE.

STEAM-PUMP REGULATOR.

SPECIFICATION forming part of Letters Patent No. 627,771, dated June 27, 1899.

Application filed November 25, 1898. Serial No. 697,439. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. DEAN, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Steam-Pump Regulator; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like figures refer to like parts.

My invention relates to improvements in steam-pump regulators of the class that govern and control the pressure of the water or fluid pumped and the speed of the pump.

The features of my invention will appear from the accompanying drawings and the description and claims following.

In the drawings, Figure 1 is a central longitudinal section of said steam-pump regulator, showing approximately the parts of the valve before beginning work. Fig. 2 is a section of the valve portion of the device, showing the valve after it has moved to the position it would approximately occupy when the pump is working under the highest pressure desired. Fig. 3 is the same, showing the valve in the position it would occupy when the steam is cut off. Fig. 4 is a central cross-section of the valve-cylinder and valve.

In detail, 1 is the valve-cylinder, to which is secured a frame comprising the cylinder-head 2 and arms 3, oppositely located and parallel to each other and secured at one end to said head and at the other end to the cross-bar 4.

The valve-cylinder 1 is provided with inlet and outlet openings, as indicated by arrows, the former for the entrance of steam from any suitable supply and the latter for the outlet thereof to the cylinder of the pump. Said valve-cylinder 1 is provided with a valve-casing 6, preferably integral with it and cylindrical and so placed, as shown, that the inlet steam-chamber 7 extends from the inlet around the casing or substantially around it. The casing is provided with ports 8, consisting of slots that extend in series around said casing. Two series of these ports are shown. Within the valve-casing 6 the regulated valve 9 is placed, it being here shown as a hollow cylindrical sliding piston-valve. It fits snugly within the valve-casing, and it also at one end has an arm 10, to which the valve-stem 11 is secured, said valve-stem passing through a

suitable stuffing-box 12, that is screwed into a threaded aperture in the cylinder-head 2. Said valve 9 is prevented from rotating by the pin 13, that is secured to the inner face of the cylinder 2 and extends through a suitable hole in the cross-arm 10. Said regulated valve 9 is provided with ports 14 similar to the ports 8 in the casing and adapted at times to register with said ports. Within said regulated valve 9 I provide a device for adjustably predetermining or limiting the area of said ports 14 in the regulated valve. The device here shown consists of two rings 15, secured to the hub 16 by suitable spokes 17, the rings being separated so as to leave a space between them and being sufficiently far apart to simultaneously and equably limit the ports 14 in the valve 9. Said device is secured to the regulated valve 9 by a threaded bolt 18, integral with the hub 16 and entering a threaded hole in a little bracket 19, that is integral with or otherwise secured to the arm 10. It is then obvious that by rotating the device or rings 15 by reason of the threaded connection just described they will be moved longitudinally within the valve 9 to limit the size of the ports in said valve. With this construction there need not be a very snug fit between said rings 15 and the valve 9. During the operation of the regulator these rings 15 move with the valve 9 and practically are a part thereof. The steam which passes through the ports 14 and escapes by the rings 15 enters the chamber within the valve 9 and therefrom escapes into the outlet-chamber 20 of the valve-cylinder 1. This valve-chamber consists of a large passage-way from the center around the two opposite sides of the cylinder and to the outlet, so that the steam entering the interior will pass both to the right and left in escaping.

The rings 15 are rotated for adjustment, as above set forth, by the following means: Its hub is provided with an angular or square inner surface or seat to receive the square-ended rod 21, which fits loosely in such seat, being in no manner secured to the hub 16 or rings 15. Said rod is carried by the cylinder-head 22, through the center of which it extends. It has a shoulder on it that abuts against the inner face of said cylinder-head. The outer end of the rod 21 is threaded to receive the nut 24. Its extreme outer end is

flattened for the wrench, whereby it can be rotated. When said rod 21 is thus rotated, the rings 15 are rotated, the screw connection between the rod 18 and arm 19 thus causing
 5 the longitudinal movement of said rings for adjustment with relation to the valve 9. The parts are covered with a cap 25, that screws on a projection from the head 22.

The cross-bar 4 is centrally apertured and
 10 internally threaded to receive the pressure-cylinder 26. A pipe 27 leads to this cylinder from the outlet-pipe of the steam pump or pipe or other vessel that receives the fluid under pressure from the pump, so that the
 15 fluid is under the same pressure in the cylinder 26 as in the outlet-pipe leading from the pump. Within the cylinder 26 a piston or plunger 28 is placed, with its outer end screwed into a threaded aperture in the cross-head 29.
 20 The valve-stem 11 is screwed in a threaded recess in the outer end of the piston 28, making said valve-stem and the piston continuous; but their screw connection permits the combined length of them to be changed,
 25 whereby the regulated valve 9 may be adjusted with relation to the valve-casing 6 and the inner stationary valve 15. This adjustment of the piston or stem of the valve is effected in the following way: A gage-disk 30
 30 is secured on the threaded end of the valve-stem 11 by means of a spline or otherwise, so that it will slide longitudinally thereon, but will not rotate independently of said stem. To the left of said gage-disk there is placed a lock-
 35 nut 31. The valve 9, therefore, is adjusted to the right or to the left by loosening the lock-nut 31 and rotating the gage-disk 30, and thereby the valve-stem 11, whereby said valve 9 will be moved to the left or to the
 40 right, as the case may be. After the proper position of the valve is obtained the lock-nut 31 is turned back tightly against the gage-disk 30.

The water or fluid in the cylinder 26 under
 45 pressure tends to force the piston 28 to the left, but this is prevented until the desired limit of pressure is reached by the spiral spring 32, that is coiled about the pressure-cylinder. It abuts against the cross-bar 4 at
 50 one end and at the other end against the cross-head or yoke 33, tending to push the latter to the right. The cross-head 33 is connected with the cross-head 29 by a pair of parallel guide-rods 34. These pass loosely through
 55 apertures in the cross-bar 4 and screw into the cross-head 29. Threaded sleeves 35 are placed between the cross-head 29 and the cross-bar 4 to limit the movement of such cross-head 29 and the rods 34 to the right.
 60 On the right-hand ends of the guide-rods 34 a set-nut 36 is placed and preferably a lock-nut 37 also. The tension of the spring 32 is adjusted by the set-nut 36. By screwing it to the left the cross-head or yoke 33 is
 65 crowded against the spring 32, compressing it. By screwing said nut to the right the spring slowly relaxes.

The right-hand half of the device, as shown in Fig. 1, is not essentially new and its mode of operation is well understood. The tension
 70 of the spring 32 is so adjusted by the means I have described that it will resist the pressure of the water or fluid coming from the pump into the cylinder 26 up to a certain point whatever pressure may be desired—
 75 that is, the spring will prevent the water or fluid under pressure from crowding the piston 28, valve-stem 11, and valve 9 to the left until the pressure has become so great in the cylinder as to overcome the resistance of the
 80 spring.

The operation of the valve 9 may now be set forth in connection with the means for regulating it, which have been explained. When the pump is started, the parts occupy
 85 the position shown in Fig. 1—that is, the opening between the ports in the valve-casing and the ports in the valve is very slight, sufficient only to permit the admission of enough steam to start the pump with the de-
 90 sired initial speed. When the pump has to do moderate work—say to pump water under a pressure of fifty pounds to the square inch—the rings 15 are set substantially as shown in Fig. 1, so as to reduce the ports 14 to about
 95 one-half their full area. This, until further adjustment of said rings, limits the maximum capacity of the steam-pump and limits the supply of steam to what is necessary for accomplishing the work under such pressure.
 100 Assuming the rings 15 to be in the position shown in relation to the valve 9, as the pressure of water or fluid in the valve-cylinder 26 increases it slightly and gradually crowds the piston 28, valve-stem 11, and valve 9 to the
 105 left, thus increasing the passage-way for steam from the port in the valve-casing to the port in the valve 9, letting in more steam as the work of the pump and pressure increases. However, after the valve 9 is thus
 110 moved to the left so far that the opening from the ports in the valve-casing to the ports in said valve 9 equals the opening out of the ports in the valve 9 to the inner chamber as limited by the rings 15 the further movement
 115 of said valve 9 will not increase the steam-supply, although the opening from the ports in the valve-casing and the ports in the valve increases, and no further change occurs until the valve 9 has been moved so far to the left
 120 that it has cut off the ports in the valve-casing, so that the opening from the ports in the valve-casing and the ports in the valve has become less than the predetermined outlet-opening from the ports in the valve to the in-
 125 ner chamber. Further movement of the valve to the left will, however, decrease the supply of steam until it is finally cut off, as seen in Fig. 3. The valve 9 is so adjusted that it will cut off the ports in the valve-casing when the
 130 desired maximum pressure has been reached. The middle position of the valve 9 is shown in Fig. 2, where its ports register fully with the ports in the casing; but since the outlet-

opening from the ports in the valve to the inner chamber has been reduced about one-half by the adjustment of the rings 15 it is clear that the steam-supply is no greater than when the ports in the casing and valve registered half and half with each other. Where, however, the work of the pump is for a time to be increased—say to pump water under a pressure of one hundred and fifty pounds to the square inch—the engineer removes the cap 25, turns the rod 21 so as to turn the rings, and causes a longitudinal movement thereof to the left until they cease almost wholly to overlap the ports 14 in the valve 9, as desired. Then the supply of steam when the pump is well under way is sufficient to accomplish the greater work of pumping water under the high pressure mentioned. In other words, when the engine changes its work to make it heavier or lighter the rings 15 are moved to the left or to the right, so as to modify the said ports in the valve to suit the work of the pump. Attention is also called to the fact that the rings shut off the ports 14 of the valve 9 on the inner side, so that the supply of steam cannot exceed a certain limit regardless of how the ports in the valve register with the ports in the casing.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A steam-pump regulator including a valve-casing with ports in it, a hollow valve with ports to register with the ports in the casing, a ring or plate secured to said valve and adapted when moved to limit the area of the ports in said valve, means for adjusting the position of said ring or plate and means

controlled by the pressure of the fluid being pumped for actuating and regulating said hollow valve.

2. A steam-pump regulator including a valve-casing with ports in it, a regulated hollow valve with ports to register with the ports in the casing and having a bracket or arm extending from its wall inward with a threaded aperture, a ring fitting snugly within said valve and adapted when moved longitudinally to limit the area of the ports in the valve, a screw-threaded bolt connected with said ring and fitting in the threaded aperture in said bracket or arm, and means for rotating said ring whereby it will be longitudinally moved.

3. A steam-pump valve-regulator including a valve-casing with ports in it, a regulated hollow valve with ports to register with ports in the casing and provided with threaded aperture, a ring fitting in said valve to limit the area of its ports and provided with a hub with an angular opening therein, a threaded bolt secured to said hub and fitting the threaded aperture in the valve, and a rod rotatably mounted in the casing with its inner end angular in cross-section to fit loosely in the hub of said ring and its outer end so formed that it may be rotated.

In witness whereof I have hereunto affixed my signature in the presence of the witnesses herein named.

JOHN C. DEAN.

Witnesses:

V. H. LOCKWOOD,
M. C. BUCK.