Feb. 3, 1931. M. O. SCHUR 1,790,845

VALVE

Filed Nov. 3, 1928

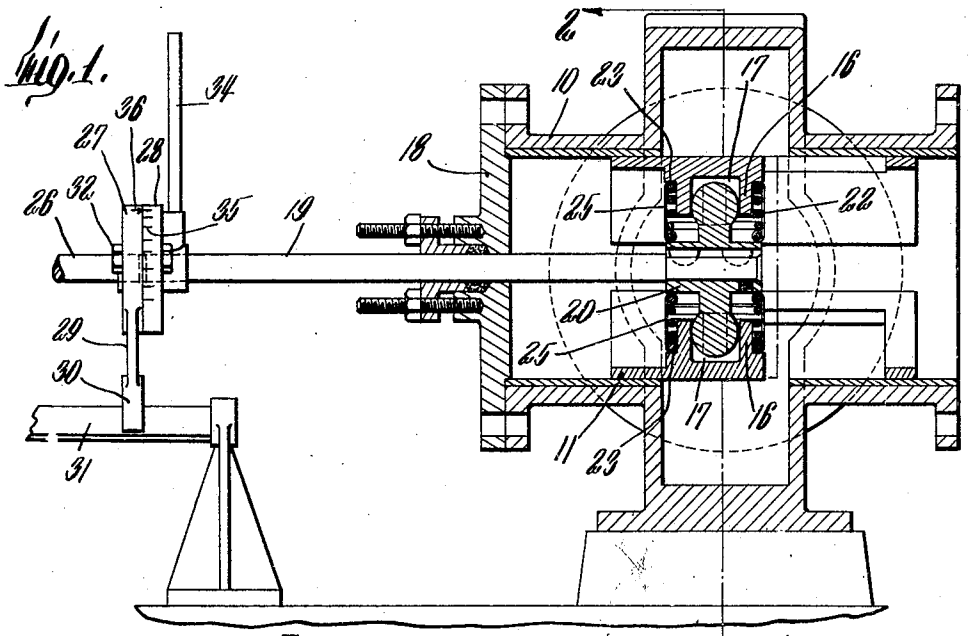


Fig. 1.

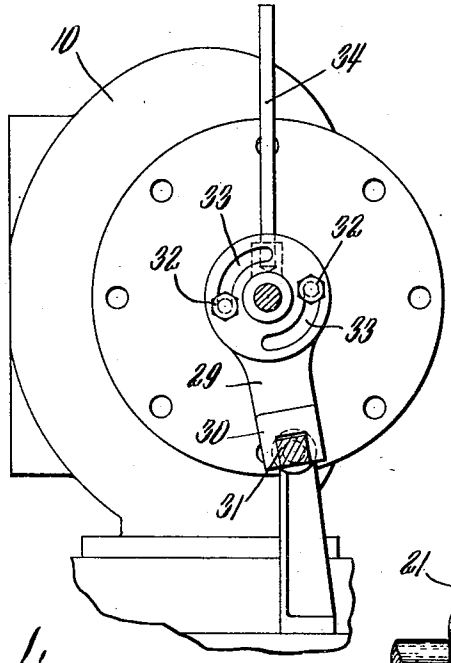


Fig. 3.

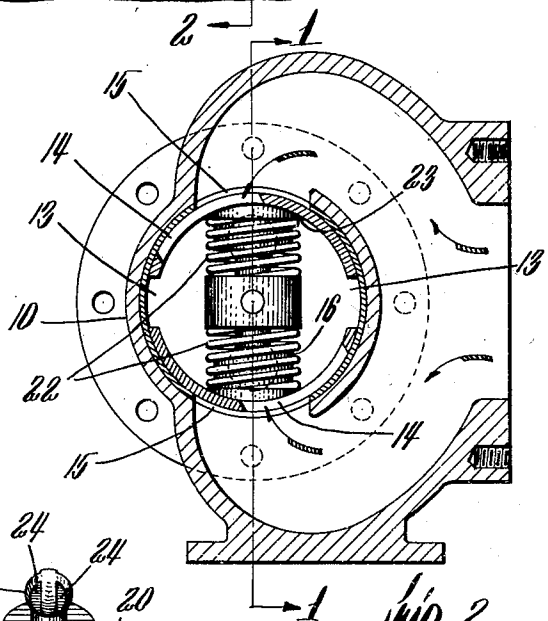


Fig. 2.

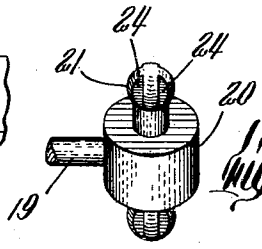


Fig. 4.

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UNITED STATES PATENT OFFICE

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VALVE

Application filed November 3, 1928. Serial No. 317,019.

This invention relates to a valve for regulating the flow of a fluid through a pipe, and is more especially designed for use with fluids which carry with them particles of solid material. Where fluids carry solid particles, there is usually a tendency for the solid matter to collect in corners of the valve chambers or at other points where the flow is locally slack. These collections of solid matter are often liable to cause serious clogging of the valve so that the proper actuation thereof may be hindered or prevented. A specific example of service for which the valve is designed may be found in the control of a flow of "white water" in a pulp or paper mill. When pulp stock is diluted to a desired consistency for use in a paper-making machine or other apparatus, it is customary to employ whatever "white water" is available for this purpose in order to save the fine fiber material suspended therein. The rate at which such diluting liquid is added to pulp stock may be advantageously controlled by automatic apparatus operating a valve which is capable of adjustment to regulate its range of capacity. Such a valve, as hereinafter described, may comprise a piston which is operable by a stem and is both rotatable and reciprocable, one of these motions being an operating motion while the other is an adjusting motion. In a valve of this type, accumulations of fiber are liable to impede the action of the piston unless provision is made to overcome this difficulty. According to the present invention a valve piston is provided which is capable of yielding inwardly to some extent when an obstruction is encountered. To this end the piston may be longitudinally split into a plurality of parts, or partly split from one or both ends to permit an inward yielding, the parts being pressed outwardly against the wall of the enclosing casing by springs or other suitable means.

For a more complete disclosure of the invention, reference may be had to the description thereof which follows, and to the drawing, of which,—

Figure 1 is a longitudinal section of a valve embodying the invention, taken on the line 1—1 of Figure 2.

Figure 2 is a transverse section taken on the line 2—2 of Figure 1.

Figure 3 is an end elevation of the valve casing and control member.

Figure 4 is a perspective view of one of the inner parts of the valve.

Referring to the drawing in detail, 10 represents the cylindrical casing of the valve in which a hollow piston 11 is slidably fitted for rotation and longitudinal reciprocation. This piston as shown is longitudinally split into a plurality of separate parts, two such parts being illustrated in Figures 1 and 2. Clearance is provided as at 13 between the two parts of the piston so as to permit the parts to approach each other. Each of the parts may be provided with a suitable aperture 14, the parts being movable to bring these apertures into and out of registry with corresponding inlet ports 15 opening through the side wall of the casing 10, so as to regulate the flow through the valve. As shown on the drawing the casing is open at one end, the open end being connectible with an outlet pipe (not shown) to which liquid passing through the valve is discharged. The piston parts are each provided with a suitable boss 16 extending inwardly therefrom, each boss being provided with a central recess 17. Through the closed end 18 of the casing a valve stem 19 projects, the stem having on the inner end thereof a member 20 from which lugs 21 project radially, these lugs being equal in number to the parts of the piston. The outer end portions of the lugs 21 are preferably spherical in shape and are adapted to fit within the recesses 17 so that each piston part may rock on its lug. The lugs are sufficiently short to provide ample clearance between their outer ends and the bottoms of the recesses 17 so as to permit inward movement of the piston parts. In order to press the parts outwardly against the wall of the casing, suitable helical springs 22 may be provided, these springs being adapted to surround the bosses 16 and to be held in place thereby. These springs are normally under compression, one end bearing against a face of the member 20, the other end bearing against the inner face of a piston

part, or, as shown in Figure 1, a convenient shoulder 23 formed on the boss 16. These springs thus hold their respective piston parts resiliently against the wall of the casing 10. In order to permit escape of liquid from the recesses 17 when the piston parts are moved inwardly, the end portions of the lugs 21 may be notched as at 24. Suitable covers 25 may also be provided to surround the springs 22 in order to prevent the accumulation of solid material within the springs 22 or within the recesses 17. The covers 25, which are shown in Figure 1 but are omitted in Figure 2 in order to show the working parts, may be of rubber, canvas, or any other suitable flexible material.

The valve is operated by actuation of the valve stem 19. As hereinbefore stated, the piston may be rotated or reciprocated. One of these motions is preferably used as an adjusting motion to vary the capacity of the valve, the other motion being used as a valve operating motion. If, for example, the valve stem 19 is operatively connected with a reciprocating rod 26 actuated by some mechanism to open and close the valve in accordance with the quantity of liquid required, the reciprocating motion of the valve piston is the valve operating motion and the piston may be rotationally adjusted to vary the capacity of the valve. This rotation may be conveniently accomplished by an adjustable connection illustrated in Figures 1 and 3, this connection comprising a pair of disks 27, 28 having mutually confronting faces. One disk is attached to the rod 26, the other being fixed to the stem 19. In order to prevent rotation of the rod 26, the disk 27 may be provided with a radially extending arm 29 having a forked end 30 which slides on a suitable fixed rail 31. The disks 27, 28 may be adjustably clamped together by any suitable means, such as a pair of bolts and nuts 32, the bolts passing through arcuate slots 33 which permit relative rotational adjustment between the two disks, and hence rotational adjustment of the piston 11. In order to adjust the capacity of the valve as desired, the bolts 32 are loosened and the piston is rotated as by a suitable handle 34 until the desired scale mark 35 on one of the disks is opposite a suitable index mark 36 on the other disk. The bolts 32 may then be tightened so as to fix the disks in relative position. Thus the capacity of the valve may be adjusted to the full width of the apertures 14 and 15 or to any intermediate width down to a narrow slot. Thus the sensitivity of the valve is also regulable since when a narrow slot is used, a given distance of piston motion results in a smaller change of flow through the valve.

The resilient mounting of the piston parts makes possible an inward yielding of these parts in case an obstruction is encountered. This is a valuable feature in cases where the liquid flowing through the valve carries suspended solid particles, such as pulp fibers, which are liable to clog in corners of the valve and to impede the action of the piston.

I claim:

1. A valve comprising a cylindrical casing having an inlet port and an outlet port, one of said ports having its orifice in the side wall of said casing, a hollow piston slidably fitted within said casing, and longitudinally split into a plurality of parts, one of said piston parts having an aperture therethrough movable into and out of registry with said orifice, and means for pressing said piston parts outwardly against the wall of said casing.

2. A valve comprising a cylindrical casing, a hollow valve piston slidably fitted in said casing for rotation and reciprocation and longitudinally split into a plurality of separate parts, one of said parts having an aperture therethrough, means resiliently pressing said parts outwardly against the wall of said casing, and means engaging said parts to impart rotary and longitudinal movement thereto.

3. A valve comprising a cylindrical casing having an inlet and an outlet port, one of said ports having its orifice in the side wall of the casing, a hollow piston slidably fitted within said casing and longitudinally split into a plurality of parts, one of said parts having an aperture adapted to register with said orifice, means for pressing said parts outwardly against the wall of said casing, and means for reciprocating and rotating said piston to move said aperture in and out of registry with said orifice.

4. A valve comprising a cylindrical casing having a side opening and an end opening, a hollow valve piston slidably fitted within said casing and longitudinally split into a plurality of parts, one of said parts having an aperture therethrough adapted to register with said side opening, means for pressing said parts outwardly against said casing, and means for rotating and reciprocating said piston to move said aperture into and out of registry with said side opening.

5. In a valve having a casing, a hollow valve piston slidable therein and longitudinally split into a plurality of separate parts, a boss extending inwardly from each said part, each said boss having a central recess, a valve stem, a member fixed to said stem having lugs extending into said recesses, compression springs surrounding said bosses and bearing on said member, whereby the parts are pressed outwardly by said springs and are moved by actuation of said stem.

6. In a valve having a casing, a hollow valve piston slidable therein and longitudinally split into a plurality of parts, a boss extending inwardly from each of said parts, each said boss having a central recess, a

valve stem, a member fixed on the inner end thereof, said member having radially extending lugs engaging in said recesses, helical compression springs surrounding said bosses and lugs and compressed between said piston parts and said member, and a flexible cover surrounding each said spring.

In testimony whereof I have affixed my signature.

MILTON O. SCHUR.