Feb. 4, 1930. H. STREHLER 1,745,387

DEVICE FOR ALTERNATELY FILLING AND EMPTYING MEASURING VESSELS

Filed March 8, 1928

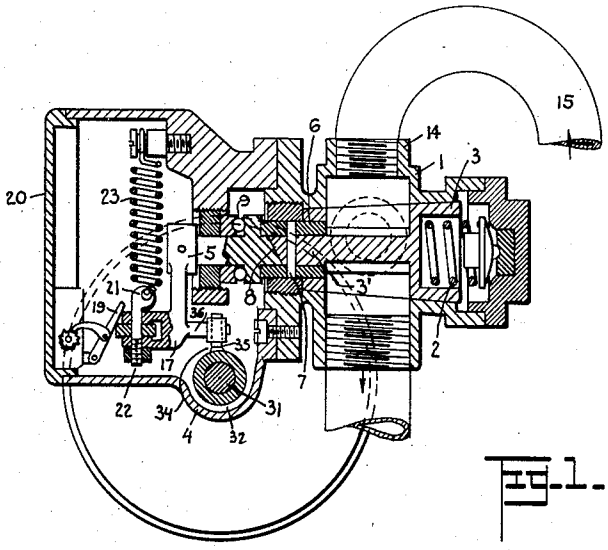


Fig. 1.

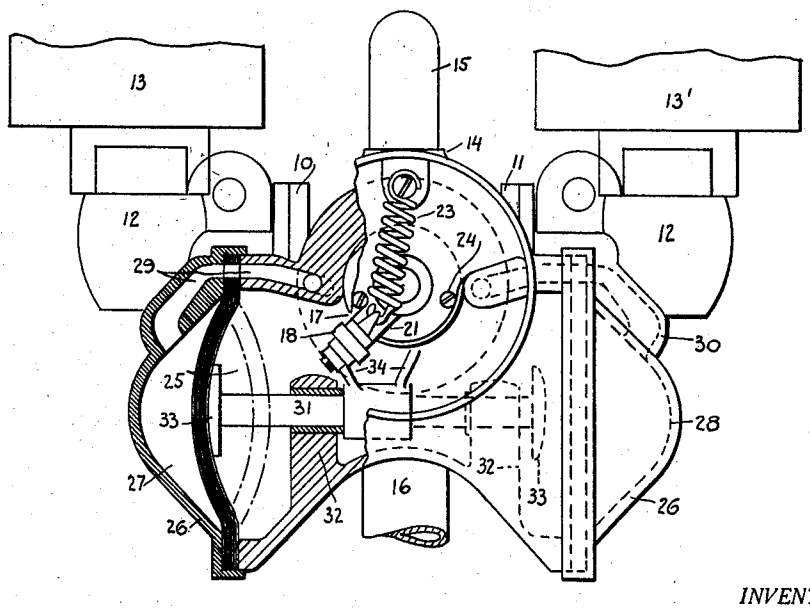


Fig. 2.

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DEVICE FOR ALTERNATELY FILLING AND EMPTYING MEASURING VESSELS

Application filed March 8, 1928, Serial No. 260,087, and in Switzerland April 21, 1927.

My invention relates to an automatic change-over device for use in alternately filling and emptying vessels filled under pressure, wherein a reversing member actuated by the said pressure serves for connecting the measuring vessels with the pressure and discharge pipes.

The invention has for one of its objects to provide an improved device of this kind so constructed that the reversing mechanism shall not be contacted by the liquid in the apparatus.

According to an important feature of the invention the change-over member for actuating a rotary valve that is operatively connected with it and controls the pressure and discharge pipes, is reciprocated by two diaphragms which close each a chamber, which chambers are connected with the two connecting pipes between the rotary valve and the measuring vessels.

The invention consists in the construction, arrangement and combination of parts described hereinafter and pointed out in the claim.

One embodiment of the invention is diagrammatically illustrated by way of example in the accompanying drawing, wherein:—

Figure 1 is a vertical section taken through one form of apparatus according to the invention, and

Figure 2 is a front elevation, partly in section, as viewed from the left-hand of Figure 1.

Like reference characters designate like parts in both views.

According to the drawing, a four-way rotary valve comprises a valve casing 1 and a valve in the form of a plug 3 that is normally held seated by a spring 2. Mounted on the valve casing 1 is another casing 4 wherein a short axle 5 is mounted coaxially with the said plug. The head 3′ of the plug is fixed by a cotter pin 7 in a bushing 6 and abuts in the latter against one end of the axle 5, the abutting faces of the same lying aslant to the longitudinal axis of the spigot, so that by turning the axle 5, which is held against axial displacement by a thrust ball-bearing 9 provided at its end remote from the spigot, the latter can be lifted from its seat against the action of the spring 2, to facilitate the turning of the valve.

Elbows 12 are connected to two lateral tubular branches 10 and 11 of the valve casing, which elbows carry the two measuring vessels 13 and 13′ which are to be filled alternately, the same being indicated in Figure 2 in thin lines. The pressure pipe of a pump is connected to the branch 14, and a discharge pipe 16 is connected to the branch 15.

A crank arm 17 is fast on the axle 5 and has its free end bent towards the front (see Figure 1, left-hand); this end carries an anti-friction roller which serves for actuating a lever 19 of a counter mechanism that is mounted on a cover 20 of the casing 4 and does not belong to the present invention. The axle 22 of the roller 18 has its upper end formed as an eye 22 connected with a spring 23 which serves to move the crank arm 17 out of its middle position into the one or other end position and to hold it therein. These two end positions of the arm 17 lie 90° apart and are limited by stops 24.

The casing 4 has its two sides closed each by a diaphragm 25 and cap 26, which form two chambers 27 and 28, one at each side. The chamber 27 is connected by a duct 29 with a lateral branch pipe (pipe connecting valve and measuring vessel), and the chamber 28 is connected by a duct 30 with the other lateral branch pipe of the valve-casing, so that the filling pressure acting in the respective measuring vessel is transmitted into the respective chamber 27 or 28 and bulges inwards the diaphragm 25 closing the respective chamber, as shown in Figure 2 at the left hand.

Between the two diaphragms 25 the reversing member for the valve has the form of a rod 31 which is slidable axially in two bearings 32 and has at each end a disc 33 having a domed outer face. Fast on the rod 31 between the two bearings 32 is a fork 34 into which extends with sufficient play an arm 36 of the crank 17 carrying an anti-friction roller 35. The two bearings 32 limit the stroke of the rod 31.

The described reversing device operates, briefly, as follows:—

The measuring vessels are filled under pressure, and as shown in Figure 2 the vessel 13 is to be filled. When it is full and under pressure the diaphragm 25 will be bulged to the right by the pressure which will also act in the chamber 27, whereby the rod 31 will be shifted more than half its stroke to the right. By means of the appropriate arm of the fork 34 the crank 17 is rotated to the right against the action of the spring 23 a little beyond its middle position. The spring 23 then rotates the crank 17 into the other end position indicated by a broken line in Figure 2, play in the fork 34 permitting this movement. The valve is thereby reversed, so that the measuring vessel 13 is placed in communication with the discharge pipe, and the measuring vessel 13′ with the delivery pipe of the pump. When the valve is reversed the counter is also actuated. When the measuring vessel 13′ has been filled, the described cycle of operations commences afresh.

As compared with known reversing devices having a piston, blade or vane serving as reversing member, the described and illustrated reversing device has the advantage that the reversing mechanism does not come into contact with the liquid and apart from the stuffing box of the axle 5, there are no movable parts that require to be packed. In order to avoid places at the diaphragms which might become leaky, the connecting rod 31 is not rigidly connected with them.

Various modifications may be made in the details of construction described above without departing from the scope of the invention.

I claim:—

In apparatus of the character described, the combination of a rotary valve having a crank arm for operating the same, pressure and discharge pipes controlled by said valve for communicating with vessels to be alternately filled under pressure and emptied, two chambers connected each with a pressure pipe, which chambers are closed each by a diaphragm arranged facing the other diaphragm, a reversing member in the form of an endwise movable rod arranged to be reciprocated by said diaphragm, said rod carrying a fork into which said crank arm extends with play, and a means connected to said crank arm tending to hold the same in either of its end positions corresponding to the end positions of said rod.

In testimony whereof I affix my signature.

HANS STREHLER.