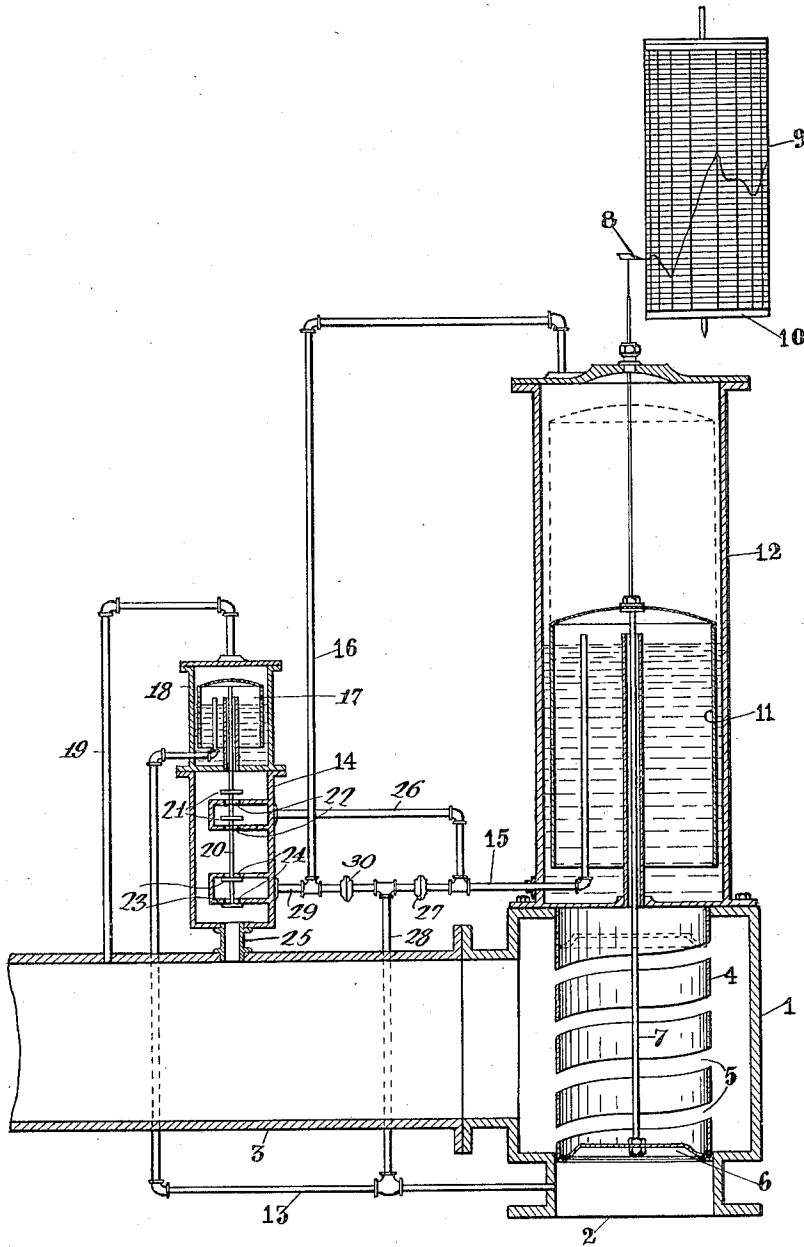


F. L. CROSS.
VALVE.

APPLICATION FILED AUG. 21, 1909.

Patented Apr. 1, 1913.

1,057,621.



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VALVE.

1,057,621.

Specification of Letters Patent.

Patented Apr. 1, 1913.

Application filed August 21, 1909. Serial No. 513,974.

To all whom it may concern:

Be it known that I, FRANK L. CROSS, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Valves, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to valves and more especially to those adapted for gas distributing systems, and to features thereof whereby they may be used either as means for obtaining a constant drop in pressure
15 in a main, or for obtaining a constant volume if a constant head is maintained, the valve recording its movements in such manner that the amount of fluid passing through it per unit of time or in a given time can
20 be readily determined.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

25 The drawing is a diagrammatic view partly in section of a valve embodying features of the invention.

As herein illustrated, the valve is shown as adapted for delivering a constant volume under varying conditions, or, in other
30 words in maintaining a constant drop in pressure in a conduit.

Referring to the drawings, a hollow casing 1 is interposed between the discharge mouth 2 of one main or conduit and the
35 intake 3 of another. A cylindrical shell 4 is secured in the casing 1 in substantially axial alinement with the mouth 2 which delivers into one end thereof, and is preferably of substantially the same internal diameter.
40 A helical port 5 is formed in the cylindrical shell and extends continuously from end to end thereof. A disk closure 6 is reciprocable in the cylinder and when moved away from the discharge opening 2 uncovers a greater
45 or less area of the spiral or helical port 5 in direct proportion to the distance it moves from the discharge opening. The closure is mounted on a stem 7 extending through the casing wall and carries at its upper end a
50 recording instrument 8 of any preferred type adapted to trace upon any suitable chart, as for example, a record sheet 9 mounted on a cylinder 10 as herein indicated. The closure may be moved up and down by any
55 preferred means automatically in proportion

to the difference in pressures in the mains or conduits.

As herein shown, the by-pass 13 opens under a float 17, in a closed float chamber 18 communicating with the conduit 3
60 through a pipe 19. A stem 20 from the float draws a pair of closures 21 from inlet relief ports 22 in the regulator 14, when the float rises, and simultaneously seats a pair
65 of closures 23 on other inlet ports 24. An outlet pipe 25 connects the regulator with the conduit 3. The pipe 15 is connected by an unrestricted tube 26 with the regulator inlet ports 22, and through an ajutage
70 or restricted orifice indicated at 27 with a branch 28 of the by-pass 13. The float chamber pipe 16 of float chamber 12 is connected by an unrestricted tube 29 with the regulator inlet ports 24, and through an
75 ajutage indicated at 30, of equal orifice to the ajutage 27, with the branch 28. As a consequence, when the upper ports 22 are opened by pressure in the inlet 2 and
80 pipe 13 raising the float 17, the pressure in the pipe 15 is relieved and that in the pipe 16 is built up, as its relief ports 24 are closed. This depresses the float 11 and correspondingly closes or reduces the area
85 of the port 5 in the shell 4. Under reverse conditions reverse action obtains.

As herein indicated, a float tank 11 is connected rigidly to the stem 7 and is moved up and down in a suitable reservoir 12 on the casing by gas or fluid entering the shell through the discharge mouth 2, a by-
90 pass 13 leading from the outlet through an automatic regulator 14 of any preferred type and extending to the conduit 3 whereby fluid from the main is admitted to the float 11 or withdrawn from the same
95 through pipes 15 and 16 in direct proportion to the difference in pressure between the two conduits. Obviously, this regulator may be replaced by other apparatus which accomplishes the same result as it *per se*
100 does not form a part of this invention. In operation the rise and fall of the stem is recorded upon the record sheet and as the amount of fluid passing through the valve is a function of the area uncovered by the
105 closure, and this area is determined by the position of the closure, the record sheet gives accurate data for calculating the amount of fluid that has passed through the valve in
110 a given time or by proper calculation of

the sheet and timing of the cylinder, the line traced by the recorder may indicate in direct reading the flow through the valve. The amount discharged by the valve may be as readily determined as if the flow were through a weir, as the uncovered area of the port is directly proportional to the distance of the closure above the outlet 2. The helical port is in effect a single rectangular weir, and as the chances for error in calculating the flow through a weir are slight, because the only indeterminate flow is that at the corners caused by eddy currents, the construction gives a valve whose delivery is very readily calculated.

Obviously, changes in the details of construction may be made without departing from the spirit of the invention and I do not limit myself to any particular form or arrangement of parts.

What I claim as my invention is:—

1. In a fluid distributing system, the combination with an inlet main and an outlet main, of a valve controlling the flow between them provided with a helical port, a closure movable axially of the port, means for moving the closure adapted to be operated by differences in pressure in the fluid in said mains, and means for indicating the movements of the closure.

2. In a fluid distributing system, the combination with an inlet main and an outlet main, of a valve controlling the flow between them provided with a helical port, a closure movable axially of the port, means for moving the closure adapted to be operated by differences in pressure in the fluid in said mains, and means for indicating the movements of the closure.

3. In a fluid distributing system, the combination with an inlet conduit, and an outlet conduit, of a valve controlling the flow between them provided with a helical port, a closure movable axially of the port, a regulator operated by fluid under pressure in the mains, and means connecting the regulator and closure to operate the latter, and means for indicating the movements of the closure.

4. In a fluid distributing system, the combination of an inlet conduit and an outlet conduit, of a valve having a cylindrical shell into one end of which the inlet conduit discharges, said shell having a helical port opening into the outlet conduit, a closure movable axially of the shell, means for indicating the movement of the closure, and means adapted to be operated by differences in pressure in the fluid in said conduits and operatively connected to the closure to move the same.

5. In a fluid distributing system, the com-

bination with a valve having a cylindrical shell with an inlet at one end and a helical outlet port, a closure movable axially of the shell, and means for indicating the movements of the closure, of means controlled by differences in pressure set up in the contents of the system on either side of the valve and adapted to operate the valve.

6. In a fluid distributing system, the combination with a valve having a cylindrical shell with an inlet at one end and a helical outlet port, a closure movable axially of the shell, and an indicating instrument moved by the closure, of means controlled by differences in pressure set up in the conduits of the system on either side of the valve and adapted to operate the valve.

7. In a fluid distributing system, a valve consisting of a casing provided with inlet and discharge openings, a cylindrical shell extending into the casing from the inlet and having a helical port communicating with the discharge opening, a closure movable axially of the shell, a stem therefrom extending beyond the casing, an indicating instrument on the stem outside the casing and a pressure operated regulator for moving the closure.

8. In a fluid distributing system, the combination with a valve consisting of a casing provided with inlet and discharge openings, a cylindrical shell extending into the casing from the inlet and having a helical port, a closure movable axially of the shell, a stem therefrom extending beyond the casing and an indicating instrument on the stem outside of the casing, of a regulator controlled by differences in pressure in the contents of the system on either side of the valve and operatively connected to the closure to move the latter.

9. In a fluid distributing system, the combination with a valve consisting of a casing with inlet and discharge openings, a cylindrical shell extending into the casing from the inlet and having a helical port, a closure movable axially of the shell, a stem therefrom extending beyond the casing, and an indicating instrument on the stem outside the casing, of a float tank operatively connected to the stem, and a regulator adapted to admit fluid from the system into the float tank automatically when the difference in pressure at the inlet opening over that of the outlet opening decreases.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK L. CROSS.

Witnesses:

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A. M. SHANNON.