

(No Model.)

L. SCHUTTE.
STOP VALVE.

No. 529,879.

Patented Nov. 27, 1894.

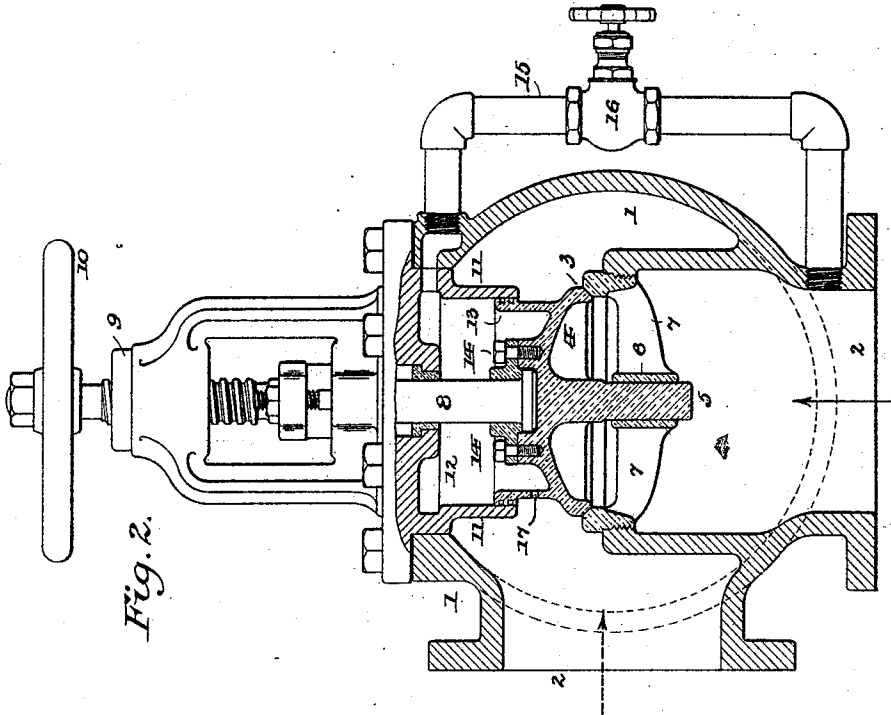


Fig. 2.

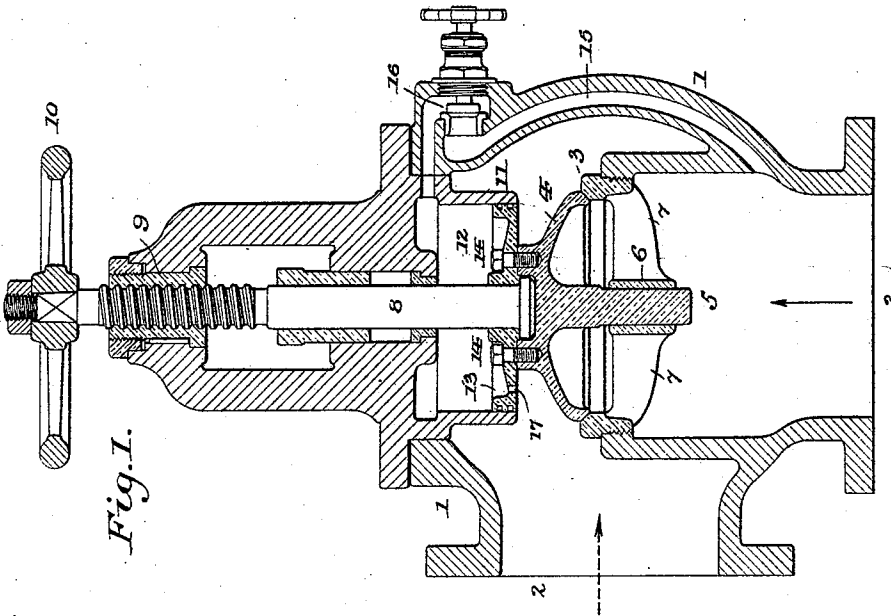


Fig. 1.

Witnesses:

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UNITED STATES PATENT OFFICE.

LOUIS SCHUTTE, OF PHILADELPHIA, PENNSYLVANIA.

STOP-VALVE.

SPECIFICATION forming part of Letters Patent No. 529,879, dated November 27, 1894.

Application filed June 26, 1893. Serial No. 478,799. (No model.)

To all whom it may concern:

Be it known that I, LOUIS SCHUTTE, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Stop-Valves, of which the following is a specification.

This invention has reference to stop valves, and relates more particularly to that type of valves in which the valve proper is moved from and against its seat to open and close the passage by means of connections extending to the outside of the casing, usually in the form of a screw threaded spindle.

The object of the invention is to facilitate the operations of opening and closing the valve by relieving the operating devices of the excessive strains due to the pressure exerted by the fluid being controlled.

The invention consists in combining with the valve proper at one side, a movable diaphragm or piston located in a chamber which is in communication with the space at the opposite side of the valve, the communicating passage being controlled independently of the valve so that the pressures of the two sides of the valve whether due to the fluid under control, to atmospheric air, or to other influences, will be approximately equalized, thereby balancing the valve.

The invention also consists in the details of construction and combination of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1, is a vertical section through a valve and its casing having my invention embodied therein. Fig. 2, is a similar view showing my invention embodied in a slightly modified form.

Referring to Fig. 1, 1 represents a valve casing provided as usual with ports 2, and an intermediate valve seat 3, adapted to receive a vertically moving valve proper 4, by means of which the passage through the casing is closed, the valve proper being guided by means of a depending tenon 5, extending loosely through a central socket 6, sustained by arms 7, extending inward from the valve seat. The valve is operated by means of a spindle 8, having its lower end attached to the valve by a swiveling connection, and its upper end threaded exteriorly and screwed into a nut 9, fixed to the casing, the exposed end

of the spindle being provided with a hand wheel 10, for turning the same.

The foregoing parts constitute a common and well known form of stop valve, and except in so far as hereinafter indicated, form no part of the present invention.

In applying my invention to a valve of this character, I provide the interior of the casing above the valve with a depending annular flange 11, surrounding the valve spindle, and forming an open chamber or cylinder 12. Within this chamber a movable diaphragm or piston 13 is fitted so as to move freely in a vertical direction, and is attached to the upper side of the valve proper, so as to move therewith. I prefer to attach this piston by forming the same at its center with an opening to receive the spindle, so that the piston can be seated upon the upper side of the valve to which it is securely fastened by means of screws 14, as plainly shown. The chamber 12 at the upper side of the piston communicates with the space at the opposite or lower side of the valve through a passage 15, formed in the valve casing, which passage is controlled by a stop valve 16, of any suitable construction. From this description it will be seen that when the fluid being controlled is passing in the direction indicated by the arrow in full lines, the valve 16 being opened, the fluid will pass to the chamber 12, and acting on the piston therein, will have a tendency to counteract the pressure of the fluid on the under side of the valve, and thereby balance the latter, so that the screw spindle will be relieved of the severe strain to which it would otherwise be subjected, the result being that but little power will be necessary to operate the valve. When the fluid being controlled is passing in the opposite direction, that indicated by the dotted arrow, a free communication being afforded between the chamber 12 and the space on the opposite side of the valve, the conditions as regards pressure or the absence of pressure at the two sides of the valve will be similar, so that like in the first case the valve will in effect be balanced.

The closing and opening of the valve proper is effected as follows:—Assuming that the pressure of the fluid being controlled is from

below, the main valve closed, and the communicating passage also closed, and it is desired to open the main valve; the valve 16 is first opened, thereby admitting the fluid under pressure to the chamber 12, which will act therein on the piston and will counteract the pressure at the under side of the main valve. The main valve is now opened by turning the hand wheel, the resistance being reduced to a minimum owing to the equalization of pressure. The valve 16 is finally closed.

In closing the main valve the communicating passage is opened, and the fluid admitted to the piston, and will, like in the first case, equalize the pressure. The main valve is then closed, and the valve 16 finally closed.

If the fluid is passing in the opposite direction, the operations of opening and closing the valve are as in the case first supposed, as far as the order named of opening the two valves is concerned, the difference being that in the latter case, the pressure of the fluid being controlled, does not act on the piston to balance the valve, the balancing effect being due to the similarity of conditions existing at the opposite sides of the valve, or in other words, to the absence of unequal pressures.

It will be seen that by varying the relative areas of the piston and valve proper and the distance between them, the effect of the pressure may be correspondingly varied according as the conditions encountered in practice may demand.

Ordinarily I propose to make the valve 4—and the piston 13—substantially equal in area so that the pressure in opposite directions will be equal and the valve accurately balanced. In large valves, where the connected valve and piston have considerable weight, and work in a vertical direction, the weight may be compensated for by reducing the size of the piston relatively to that of the valve, a balance being thereby preserved. In certain cases it may be desirable to partially balance the valve, which may be effected by differentiating the relative areas of the valve and piston, making either larger or smaller than the other, according to the direction in which the preponderance of pressure is to be applied; from which it will be understood that while my purpose is to provide a practi-

cally balanced valve the relative areas of the parts through which the balancing is effected may be varied to meet varying conditions encountered in practice.

In Fig. 2 I have illustrated a modification of my invention. In this case instead of forming the communicating passage in the casing of the valve as in the case first described, the passage is in the form of a pipe extending at the opposite side of the casing. The operation of this form of the valve is identical with that first described.

It is not necessary that the piston fit tightly within the chamber, and openings 17 may be provided so that the movement of the piston and valve may be free from undue friction.

I desire to be understood as treating the expression "piston" in the present case as synonymous with "diaphragm" and they are to be regarded as equivalents, as it is obvious that instead of the bodily moving of the piston described, a flexible diaphragm may be employed, the operation in both cases being identical as far as their application in the present instance is concerned.

Having thus described my invention, I claim—

In a balanced valve the combination of a casing having inlet and outlet ports, an annular valve seat between said ports, a pressure chamber opposite the valve seat, a valve fitted to said seat and movable in the direction of pressure, means for manually operating the valve, a piston or its described equivalent in the pressure chamber connected with, and adapted to be operated by, the valve operating means and substantially equal in area to the valve, a passage exterior to the valve seat and valve connecting the inlet port with the pressure chamber beyond the piston therein, said passage constituting the sole communication between the pressure chamber and inlet port and means for controlling said passage independent of the valve operating devices.

In testimony whereof I hereunto set my hand, this 31st day of May, 1893, in the presence of two attesting witnesses.

LOUIS SCHUTTE.

Witnesses:

DANIEL WATSON HILDRETH,
MAURICE FRANCIS SPILLIN.