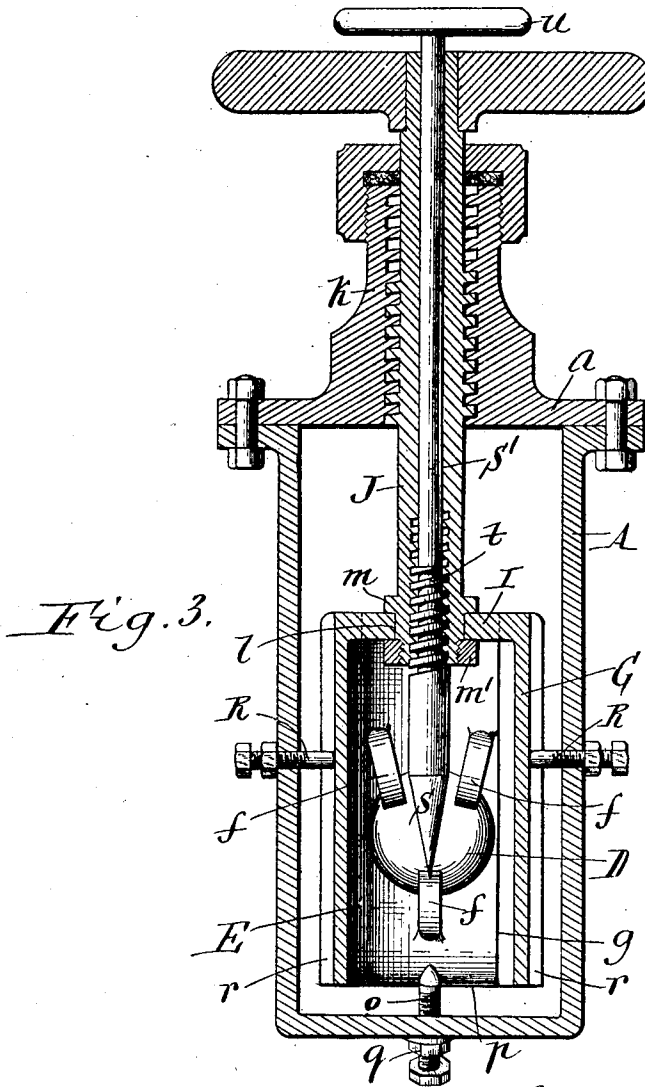
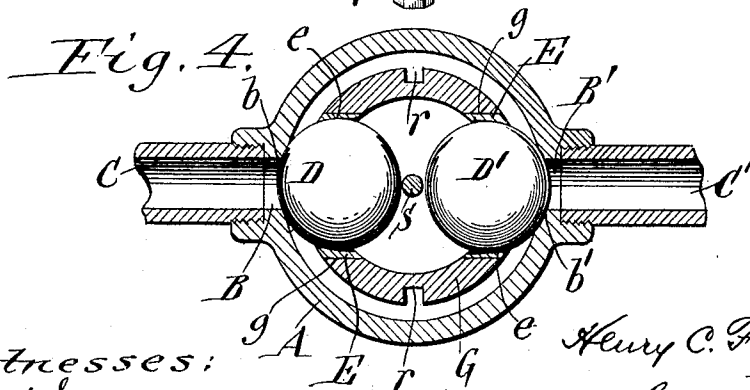


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GATE VALVE.
APPLICATION FILED MAY 31, 1907

904,056.

Patented Nov. 17, 1908.

2 SHEETS—SHEET 2.



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GATE-VALVE.

No. 904,056.

Specification of Letters Patent.

Patented Nov. 17, 1908.

Application filed May 31, 1907. Serial No. 376,465.

To all whom it may concern:

Be it known that I, HENRY C. FARRELL, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Gate-Valves, of which the following is a specification.

This invention relates to gate valves and has the object to produce a valve of this character of simple and durable construction in which the passage way is opened or closed by one or more ball-stoppers which are easily moved toward and from their seats by reliable actuating means.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a vertical section of my improved gate valve. Fig. 2 is a transverse section in line 2—2, Fig. 1. Fig. 3 is a vertical section of the valve at right angles to Fig. 1. Fig. 4 is a transverse section in line 4—4, Fig. 1.

Similar letters of reference indicate corresponding parts throughout the several views.

A represents the body or casing of the valve which is closed at its upper or front end by a head *a* and provided on diametrically opposite sides with ports or passage ways B, B¹ which are adapted to be connected at their outer ends with pipes C, C¹ while their inner ends form valve seats *b*, *b*¹.

D, D¹ represent two ball shaped stoppers which are arranged in the casing and have compound movements, one of which is laterally toward and from the seats *b*, *b*¹ and the other axially relatively to the valve stem and into and out of the path extending from one port of the casing to the other. Each of these stoppers is mounted loosely on the central part of a supporting arm E, preferably by engaging the ball stopper on the outer side of its center with the bore of an opening *e* in the supporting arm, so that the outer side of the ball projects beyond the outer side of the arm and then confining the ball in said bore by means of a plurality of lugs *f*, *f* formed integrally on the inner side of the supporting arm and bent against the ball so as to engage the same on the inner side of its center.

Each of the supporting arms is arranged in a recess *g* in the side of an axially movable carrier G which is of substantially cylindrical form. At its upper end each arm

E is provided with an inwardly projecting lug *h* which is pivoted by a transverse pin *i* to the head I at the upper or outer end of the carrier. The axial movement of the carrier together with the supporting arms and stopper is effected by a valve stem J having an external screw thread working in an internal screw thread in the bonnet *k* of the casing head *a* and loosely coupled at its inner end with the carrier head I so as to compel the carrier to move axially with the stem but permit these parts to rotate independently of each other. This loose connection between the stem and carrier head is preferably produced by forming a central opening *l* in the head I for the reception of the stem and confining the said head against axial movement on the stem by a collar or shoulder *m* arranged on the stem above the head and a screw nut or shoulder *m*¹ arranged on the stem below said head, as shown in Figs. 1 and 3.

Upon moving the carrier forwardly or inwardly so that the stoppers stand in front of the seats *b*, *b*¹ the supporting arms are moved laterally outward so that the stoppers engage said seats and close the ports. The preferred means for this purpose shown in the drawings consist of two abutments or screws *o*, *o* arranged in an inclined position in the bottom of the valve casing and adapted to be engaged at their inner conical ends by rounded or beveled faces *p*, *p* at the lower ends and inner sides of the supporting arms, as shown in Fig. 1. As the carrier moves inwardly the supporting arms engage at their inner or front ends with the abutments and are thereby moved laterally outward so that their stoppers are firmly pressed against the seats *b*, *b*¹ and prevent passage of liquid through the valve. Upon moving the carrier axially outward or backward the supporting arms clear the abutments and permit the stoppers to retract from their seats. By turning the abutment screw forward or backward the operation of the valve can be accurately adjusted and wear may also be taken up by the same. After adjustment the abutment screws are held against displacement by jam nuts *q*, *q* arranged thereon and bearing against the outer side of the casing.

For the purpose of preventing the carrier from turning and displacing the stoppers

relatively to their seats while opening and closing the valve, a retaining device or guide is provided which preferably consists of two screws R, R passing through threaded openings in diametrically opposite sides of the casing and entering longitudinal grooves or ways r, r in opposite sides of the periphery of the carrier. These retaining screws are held in place by jam nuts r^1 . If desired, only one guide screw and groove may be employed but the use of two of such screws and grooves makes it easier to assemble the parts and also holds the carrier more reliably in place.

In gate valves the stopper on the inlet or pressure side of the casing usually wears more rapidly than the stopper on the outlet or non-pressure side thereof. When it is desired to reverse the stoppers so that the slightly worn stopper at the outlet port takes the place of the considerably worn stopper at the inlet port this can be done by first withdrawing the retaining screws from the carrier, then turning the latter half way around and then replacing the retaining screws in the grooves of the carrier.

In order to adapt the valve for use under high pressure service, means are provided which supplement the supporting arms in holding the stoppers against their seats. The preferred means for this purpose shown in the drawings consist of a spreading wedge or cone S which is moved into and out of the space between the ball stoppers by means of a shifting rod S^1 which is arranged axially in the valve stem and carries the wedging cone at its inner end, an external screw thread t arranged on the shifting rod and working in an internal screw thread in the bore of the valve stem and a handle u applied to the outer end of the retaining rod. Upon turning the latter forwardly after the stoppers bear against the seats, the wedge enters between the stoppers and presses them laterally outward in opposite directions and holds the same firmly in place. Preparatory to opening the valve by means of the carrier, the retaining rod is first turned backwardly sufficiently to withdraw the wedge from between the stoppers and release the same. If desired, the abutment screws o, o may be dispensed with in which case the lateral

movement of the stoppers toward their seats may be effected solely by the wedge S.

I claim as my invention:

1. A gate valve comprising a casing having a seat, a ball stopper having a compound lateral and axial movement relatively to said seat, and means for shifting said stopper comprising a carrier movable axially in the casing relatively to said seat, a supporting arm pivoted on said carrier and provided with an opening which receives said stopper and the bore of which bears against the stopper on one side of its center, and means for confining the stopper in said opening, substantially as set forth.

2. A gate valve comprising a casing having a seat, a ball stopper having a compound lateral and axial movement relatively to said seat, and means for shifting said stopper comprising a carrier movable axially in the casing but transversely relatively to said seat, a supporting arm pivoted on said carrier and provided with an opening which receives said stopper and the bore of which bears against the stopper on one side of its center, and means for confining the stopper in said opening consisting of lugs arranged on said arm and bearing against the stopper on the opposite side of its center, substantially as set forth.

3. A gate valve comprising a casing having a seat, a ball stopper having a compound lateral and axial movement relatively to said seat, means for shifting said stopper comprising a carrier movable axially in the casing but transversely relatively to said seat, a supporting arm pivoted on said carrier and provided with an opening which receives said stopper and the bore of which bears against the stopper on the outer side of its center, and lugs formed on the inner side of said arm and bent against the stopper on the inner side of its center, substantially as set forth.

Witness my hand this 27th day of May, 1907.

HENRY C. FARRELL.

Witnesses:

THEO. L. POPP,
E. M. GRAHAM.