C. E. HUXLEY.

VALVE.

APPLICATION FILED FEB. 23, 1907.

934,614.

Patented Sept. 21, 1909.

2 SHEETS—SHEET 1.

Fig. 3.

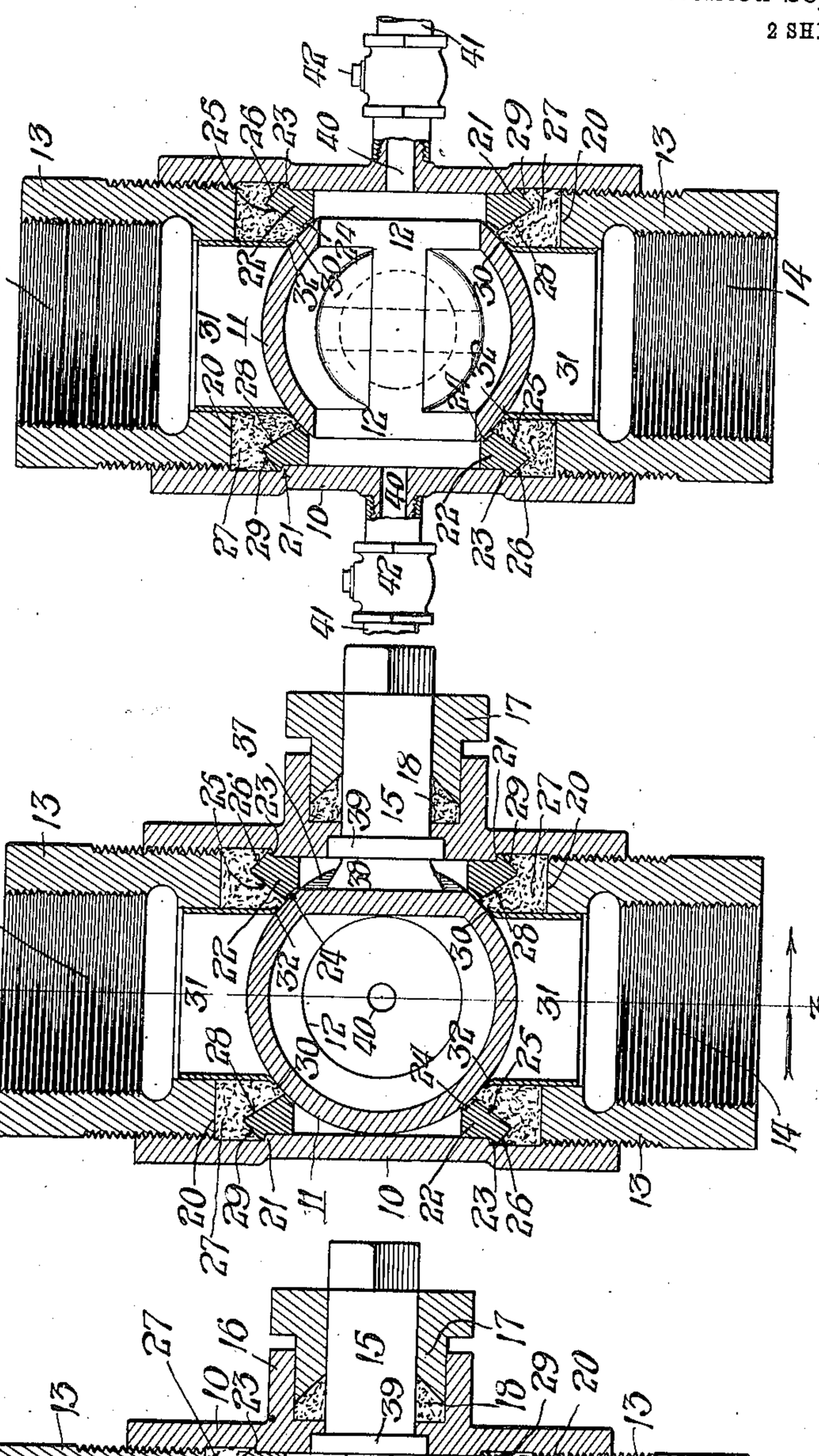
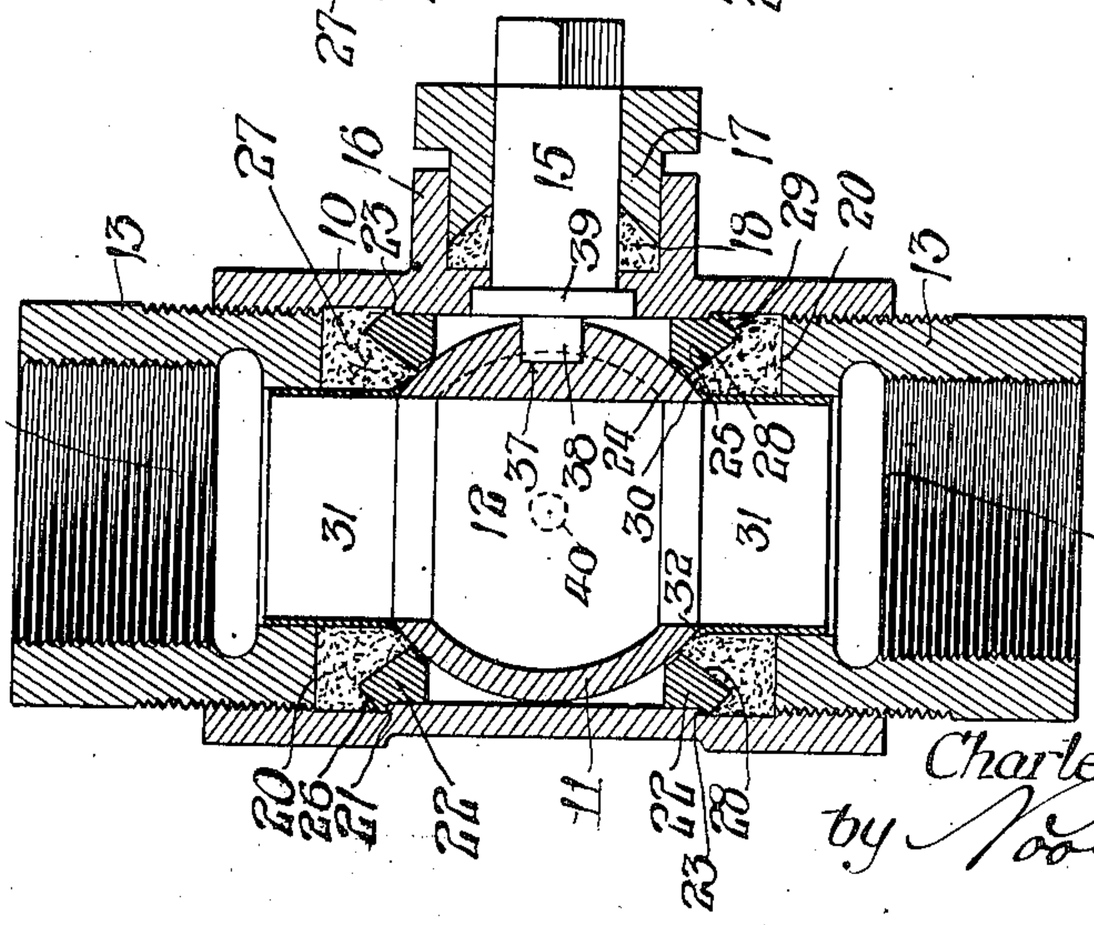


Fig. 2.

Fig. 1.



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2 SHEETS—SHEET 2.

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Fig. 8.

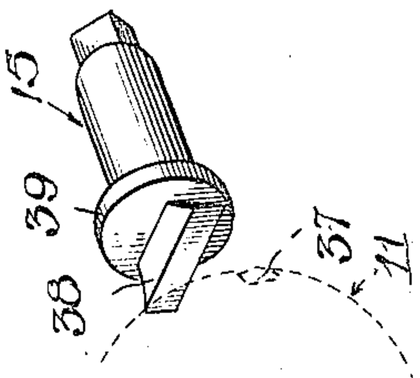


Fig. 7.

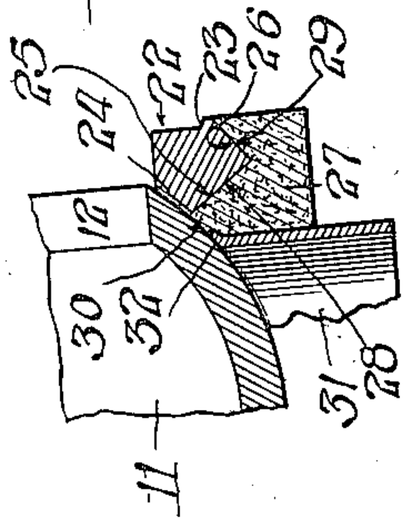


Fig. 6

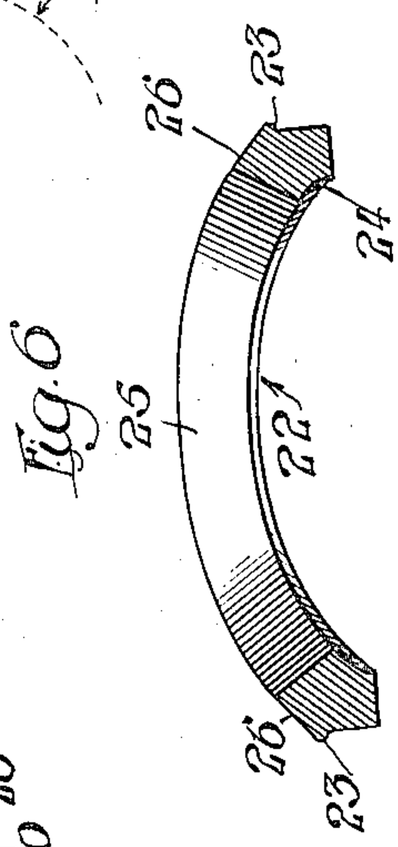


Fig. 4.

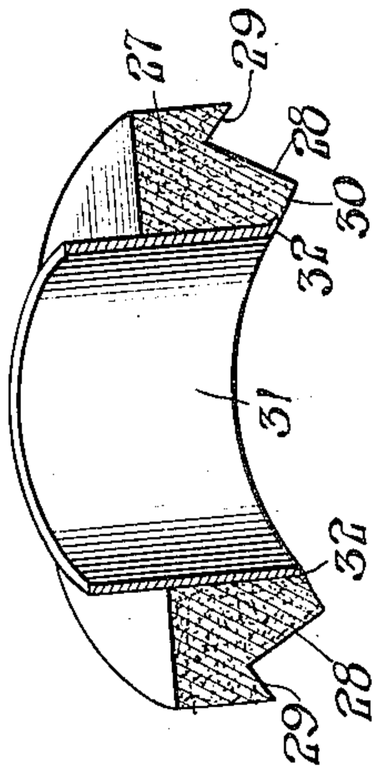
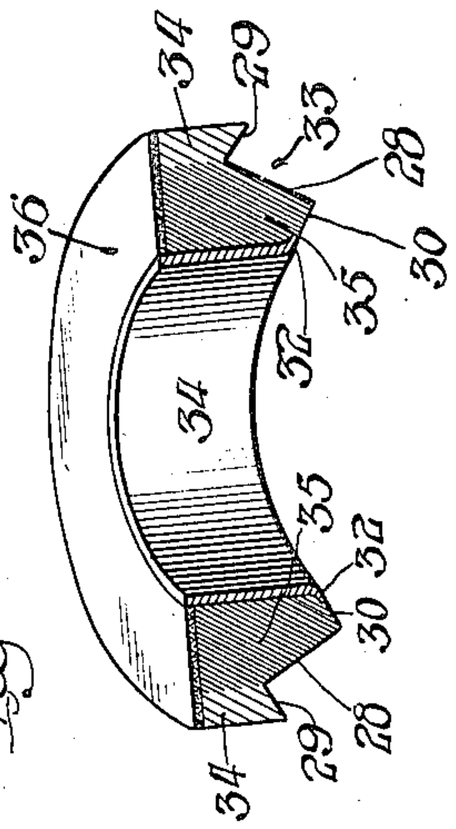


Fig. 5



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UNITED STATES PATENT OFFICE.

CHARLES E. HUXLEY, OF BUFFALO, NEW YORK.

VALVE.

934,614. Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed February 23, 1907. Serial No. 358,792.

To all whom it may concern:

Be it known that I, CHARLES E. HUXLEY, a citizen of the United States, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Valves; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to improvements in rotative plug valves and the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

My invention is herein shown as applied to that type of valve commonly known as a blow-off valve wherein the closure is made of generally spherical form and is provided with a through-out that is adapted, by rotation of the closure, to register with the through-ports of the valve casing or shell.

Among the objects of the invention is to provide an improved seat for the closure embracing packing devices by which a steam or fluid tight joint is provided between the closure and the seat; to provide means for connecting the stem with the closure in such manner that the closure is movable toward and from its seat relatively to the stem; to provide means for cleaning the valve from substances which tend to remain in the hollow closure and in the casing, and to otherwise generally improve the construction and operation of valves of this character.

As shown in the drawings:—Figure 1 is an axial section of the valve embodying my improvement, showing the closure in its open position. Fig. 2 is a similar view showing the closure in its closed position. Fig. 3 is an axial section, taken on line 3—3 of Fig. 2. Fig. 4 is a perspective sectional view of one form of compressible packing gasket for the annular valve seat. Fig. 5 is a like view of another form of packing gasket. Fig. 6 is a similar view of the rigid ring of the seat which supports the compressible gasket. Fig. 7 is an enlarged sectional view of the metal and compressible members of the packing device showing the manner in which the valve closure fits thereon. Fig. 8 is a perspective view of the valve stem.

As shown in the drawings, 10 designates a generally cylindric valve case and 11 a spherical closure or ball therein which is provided with a through-port 12. In the illustrated construction the valve is adapted for double connection with pipes leading to spaces of unequal and varying pressures, and the closure or ball is packed on both sides thereof. The provision for double connection comprises two interiorly threaded, hollow plugs 13, 13, that enter the ends of the casing and have screw-threaded engagement therewith. The bores of said hollow plugs constitute the inlet and outlet ports 14, 14 of said casing or shell. In some instances, as where the valve is adapted to be connected at one end with a pipe communicating with a pressure space and discharges at its other end into the atmosphere, but a single pipe connection and a single packing is employed.

15 designates a valve-stem which is connected at its inner end with the valve-plug and extends outwardly therefrom through an opening in the casing wall and a hollow neck 16. A stuffing-box comprising the parts 17 and 18 prevents the escape of steam or fluid from the casing outwardly around the stem.

The packed seats at both sides of the closure are alike in their construction and the following description of one answers for both. Each seat device comprises a rigid ring 22, made preferably of metal, and a compressible gasket 27, both held in place between suitable shoulders 20 and 21, the former formed by the inner end of the hollow plug 13 and the latter by an annular interior offset of the casing. The packed seats embrace novel features of construction and are made as follows:

The ring 22 is formed with an exterior annular ledge or flange 23 adapted to fit flat against said shoulder 21. The ring is cut away at its inner end to form an interior, inclined annular face 24 constituting a portion of the seat for the closure as will hereinafter more fully appear. Said ring 22 is further provided at its outer end with a longer, inclined, interior annular surface 25 and also with a shorter exterior, inclined annular surface 26, as more clearly shown in Fig. 6. The compressible gasket 27 is formed with a flat outer end for engagement with the shoulder at the inner end of the hollow plug 13. At its inner end the gasket is provided with an annular groove of general V-shape in cross-section, forming

the elongated, inclined, annular surface 28 which fits against the inclined or conical surface 25 of the ring and the shorter inclined, annular surface 29 which fits against the exterior inclined, annular surface 26 of the packing rings. The gasket is also formed to provide at its inner end, radially inside the inclined annular surface 28, a short inwardly and laterally inclined surface 30 which, when fitted to the ring 22, is generally parallel with the inclined or conical seat 24 of said ring and constitutes a portion of the valve seat against which the valve closure fits.

31 designates a ring or sleeve which fits closely within the gasket 27 and is made of such strength as to resist inward collapsing of the gasket when the closure is pressed up against the same. The ring or sleeve 31 is turned radially outwardly at its inner end to form a flange 32 that is embedded in the compressible gasket of the packing, as more clearly illustrated in Figs. 4 and 7 and constitutes the radially inner portion of the valve seat. The final seat of the valve, when heavy pressure is exerted thereon, is composed in part of the outer ring 22, the flange 32 of the inner ring or sleeve 31, and the intermediate face 30 of the compressible gasket. When the valve is first assembled the closure does not press against the ring 22, but in the presence of pressure and heat the gasket is compressed sufficiently for the closure to be forced against the inclined or conical seating surface 24 of said ring 25 so that the parts constituting the seat produce a composite seat. The compressible gasket is, therefore, protected on both sides by the rigid rings. Moreover, the said rings receive the greatest wear due to wire drawing of steam when the valve is moved from its closed to its open position. The internal supporting ring or sleeve 31 is made of a length to extend outwardly beyond the packing or seat rings and fits closely in the inner end of the hollow plug 13.

In Fig. 5 I have shown a form of compressible gasket differing in its structure from that shown in Figs. 1, 2, 3 and 4. In this form of device, the compressible gasket 33 is made of rubber and is reinforced or centrally supported by a ring 34 that is made of a length equal to the length of the gasket. The inner part 35 of said gasket 33 is hardened and is vulcanized to the internal supporting ring, while the outer part 34 thereof is relatively soft so as to fit closely and reliably the interior wall of the valve casing. The material of said ring is further strengthened by an annular layer 36 of canvas or other fibrous material which is attached to the rubber during the vulcanized process and therefore forms a permanent part thereof. In both forms of the packed seat it will be observed that the compressible gasket 27 or 33 is forced by the screw-threaded hollow plug inwardly between the ring 22 on the one side and the rings 31 or 34 on the other side against the closure so as to insure a firm and reliable fit of said gasket against the closure. Moreover, said pressure has also the effect of pressing the outer part of the gasket firmly against the inner wall of the casing due to the wedging action of the inclined surfaces 26 of the ring and 29 of the gasket. Said closure is connected with the stem 15 in such manner that it is movable toward and from its seat relatively to the stem so that it readily follows the wearing seat. As before stated, if the valve be designed to operate with pressure on one side only, but one packed seat is employed, as the pressure which holds the closure to its seat is in one direction only. When connected to operate in connection with spaces having variable pressures two packed seats are employed.

Referring now to the manner of introducing the stem 15 into the casing and attaching the same to the closure, the same is made as follows:—The closure is provided at one side thereof with a groove 37 and the stem is provided at its inner end with a flat extension or wing 38 which enters said groove, whereby is provided an interlocking connection by which the closure is rotated through rotation of the stem. The stem is also provided in rear of said extension or wing 38 with an annular flange 39 which fits in a suitably shaped annular recess in the inner wall of the casing around the opening therein through which the stem extends, thereby forming a bearing for the stem and also providing between the rear face of the flange and adjacent surface of the wall a fluid tight joint. The stem is inserted into the casing before the closure, the packed seat and its associated hollow plug 13 are in place, the stem being of such length that it may readily pass downwardly into and be inserted through the neck 16 from inside the casing. Thereafter the closure is dropped into the open end of the casing in such position that the wing or extension of the stem enters said groove of the closure. Thereafter the packed seat is inserted into place and the screw-plug screwed into the casing to force the seat home. This construction permits movement of the closure relatively to the stem in the direction of the central axis of the casing, and thereby permits the closure operating under the action of pressure against one side thereof to be forced up closely against its seat and to also follow the wearing seat and insure a reliable fluid tight joint.

As a further and separate improvement I have provided means for cleaning the port of the closure and also the interior of the casing of material tending to remain in said

port or to cling or adhere to the casing. Such cleaning of the valve is effected by forcing steam or like cleaning agent through the casing and closure port at a time when the port is in the proper position to receive the steam or other cleaning jet. Said improvements may be applied to forms of hollow plug valves differing from the construction herein shown. This improvement consists in providing the valve casing walls with openings 40, 40 with which are connected suitable pipes 41, 41, one of which communicates with steam or like fluid under pressure, while the other communicates with a waste-space. The pipes 41 are provided with cut-off valves 42. When it is desired to clean the valve, the closure is turned to the position shown in Fig. 3 to bring the through-port in line with the openings 40 of the casing and thereafter the valves 42 are opened to permit the cleaning fluid to be forced through the valve, with the evident result of cleaning away all matter that tends to cling thereto.

I claim as my invention:—

1. A blow-off valve of that class in which the closure is held against its seat by pressure of the fluid, the flow of which the valve controls, comprising a casing provided with oppositely arranged inlet and outlet branches, a spherical closure therein provided with a through-port and an annular seat engaged by the spherical face of the closure when the closure is in its closed position, the closure being subjected on the inlet side of the valve to the pressure of the liquid in a manner to force the opposite face of the closure against the seat, a stem extending through the casing for rotating the closure, the closure being provided with a groove which is open at its end and the stem being provided with a lug which engages the groove, whereby the closure is bodily movable toward and from its seat and is held engaged with its seat by liquid pressure, at least one of the branches of the casing being arranged to permit the closure to be inserted therethrough into the casing at a time when the stem is in place, and the grooved portion of the closure being arranged to pass over the lug of the stem to connect the valve and stem.

2. A blow-off valve of that class in which the closure is held against its seat by pressure of the fluid, the flow of which the valve controls, comprising a casing provided with inlet and outlet branches, a spherical closure therein provided with a through-port, an annular seat located between one of the branches and said closure, the casing being provided with an interior annular shoulder, and outside of said annular shoulder with a screw threaded plug, between which and the shoulder the valve seat is held fixedly in place, a stem extending through the casing for rotating the closure, the closure being provided with a groove and the inner end of the stem being provided with a lug which engages the groove, thereby affording a rotative interlocking connection between the stem and closure, while permitting the closure to bodily move relatively to the stem toward and from its seat, the said closure and the branch in which it is contained being arranged to permit the closure to be inserted into the casing through said branch, when the seat is removed.

3. In a valve, a casing provided with a removable seat, a closure engaging said seat and a stem extending outwardly through an opening in said casing, said stem being of a length to be inserted into the casing and passed outwardly through said opening, the stem being detachably connected with the closure.

4. In a valve, a casing provided with a removable annular seat, a spherical closure engaging said seat, a stem extending outwardly through an opening in said casing, and an annular flange on said stem engaging an inwardly opening recess in the inner face of the casing wall, said stem being of a length to be inserted into the casing and passed outwardly through said opening, the stem being detachably connected with the closure.

5. A valve comprising a casing provided with an induction passage, a tubular plug in which is formed the eduction passage of the casing, said plug entering and fixed in said casing, a spherical, rotative valve closure in said casing provided with a through-port, and an annular seat between said hollow plug and an annular interior shoulder of the casing which opposes the inner end of said plug, said seat comprising a rigid ring and a compressible gasket between the ring and plug, and the seat being formed partly on said gasket and partly on said ring.

6. A valve comprising a casing provided with an induction passage, a tubular plug in which is formed the eduction passage of the casing, said plug entering and being fixed in said casing, a spherical, rotative valve closure in said casing provided with a through-port, and an annular seat between said hollow plug and an interior shoulder of the casing, said seat comprising a rigid ring resting on said shoulder, a compressible gasket between the ring and inner end of said plug and an internal supporting ring within the gasket, the face of the seat comprising in part said rings and in part the portion of the gasket between said rings.

7. A valve comprising a casing provided with inlet and outlet passages, a spherical, rotative closure in said casing and an annular seat between said closure and outlet passage, said seat comprising an internal and an external rigid ring separated adjacent to the closure, and an annular compressible gasket between said rings engag-

ing the closure, said internal ring being provided at its inner end with a flange which is embedded into the seat face of said gasket.

8. A valve comprising a casing provided with inlet and outlet passages, a spherical, rotative closure in said casing and an annular seat between said closure and outlet passage, said seat embracing an internal and an external rigid ring separated adjacent to the closure, and a compressible gasket between said rings engaging said closure, the external ring being formed at its outer end to form an annular inclined or wedge surface facing said internal ring and between which said gasket is compressed.

9. A valve comprising a casing provided with inlet and outlet passages, a spherical, rotative closure in said casing and an annular seat between said closure and outlet passage, said seat embracing an internal and an external rigid ring separated adjacent to the closure, and a compressible gasket between said rings engaging said closure, the external ring being formed at its outer end with annular, oppositely, inclined surfaces, one facing the internal ring and the other the casing wall, and the gasket being formed with an annular groove of general inverted V-shape in cross-section fitted over the inclined surfaces of the external ring and with an annular surface engaging said closure.

10. A valve comprising a casing provided with inlet and outlet passages, a spherical, rotative closure in said casing and an annular seat between said closure and outlet passage, said seat embracing an internal and an external rigid ring separated adjacent to the closure, a compressible gasket between said rings engaging said closure, the external ring being formed at its outer end with annular, oppositely, inclined surfaces, one facing the internal ring and the other the casing wall, and the gasket being formed with an annular groove of general inverted V-shape in cross-section fitted over the inclined surfaces of the external ring, and with an annular surface engaging said closure, and means for pressing said gasket against said external ring.

11. An annular seat for valves comprising an internal and an external rigid ring separated at the seat face and formed to provide between them an annular wedge opening and a compressible gasket having an annular wedge portion between said rings and constituting at its inner end a portion of the seat face.

12. An annular seat for valves comprising an internal and an external rigid ring separated at the seat face and formed to provide between them an annular wedge opening and a compressible gasket having an annular wedge portion between said rings and constituting at its inner end a portion of the seat face, said internal ring being provided at its inner end with an inclined annular flange which is embedded in the face portion of said compressible gasket.

13. An annular seat for valves comprising an internal cylindric ring, an exterior ring formed at its outer end to provide opposing, oppositely facing, annular inclined surfaces, and an annular compressible gasket provided with two annular wedge portions, one fitting between the internal ring and the opposing inclined surface of the external ring and forming with said rings the seat face, and the other fitting the radially outer inclined annular surface of said external ring.

14. An annular seat for valves comprising an internal cylindric ring, an exterior ring formed at its outer end to provide opposing, outwardly facing, annular, inclined surfaces, and an annular compressible gasket provided with two annular wedge portions, one fitting between the internal ring and the opposing inclined surface of the external ring and forming with said rings the seat face, and the other fitting the radially outer inclined annular surfaces of said external ring, said gasket being made of rubber and vulcanized on said internal ring.

15. An annular seat for valves comprising an internal cylindric ring, an exterior ring forward at its outer end to provide opposing, outwardly facing, annular inclined surfaces, and an annular compressible gasket provided with two annular wedge portions, one fitting between the internal ring and the opposing inclined surface of the external ring and forming with said rings the seat face, and the other fitting the radially outer inclined, annular surface of said external ring, said gasket being made of rubber and vulcanized on said internal ring, the radially outer wedge portion of the gasket being made softer than the inner portion thereof.

16. An annular seat for valves comprising an internal cylindric ring, an exterior ring formed at its outer end to provide opposing, outwardly facing, annular inclined surfaces, and an annular compressible gasket provided with two annular wedge portions, one fitting between the internal ring and the opposing inclined surface of the external ring and forming with said rings the seat face, and the other fitting the radially outer inclined, annular surface of said external ring, said gasket being made of rubber and vulcanized on said internal ring, the radially outer wedge portion of the gasket being made softer than the inner portion thereof, and an annular fibrous facing web applied to the outer end of said gasket.

17. A valve comprising a casing provided with oppositely directed inlet and outlet branches, a spherical closure in the casing between said branches and provided with a through-port, a stem extending through an

opening in the casing for rotating the closure, annular seats located one between each branch and closure, there being in each branch an outwardly extending interior shoulder and a screw threaded plug, between which parts the seat is held in place and the valve being provided with a groove and the stem being provided at its inner end with a lug engaging the groove whereby the closure may move toward and from either of said seats relatively to the stem.

18. A valve comprising a tubular casing, hollow plugs entering and having screw-threaded connection with the ends of said casing, a spherical closure between said plugs, annular seats located one between each plug and the closure, said casing being provided with interior annular shoulders opposing said plugs between which and said plugs the seats are fixedly held in place.

19. A valve comprising a casing provided with oppositely directed inlet and outlet branches, a spherical closure in the casing between said branches and provided with a through-port, a stem extending through an opening in the casing for rotating the closure, annular seats located one between each branch and closure, there being in each branch an outwardly extending interior shoulder and a screw threaded plug, between which parts the seat is held in place and the valve being provided with a groove and the stem being provided at its inner end with a lug engaging the groove whereby the closure may move toward and from either of said seats relatively to the stem, at least one of said branches and the seat therein being arranged to permit the closure to be inserted into and removed from the casing through said branch when the seat is removed from the branch.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 30th day of November A. D. 1906.

CHARLES E. HUXLEY.

Witnesses:
JOHN W. VAN ALLEN,
JAS. D. FERRIS.