

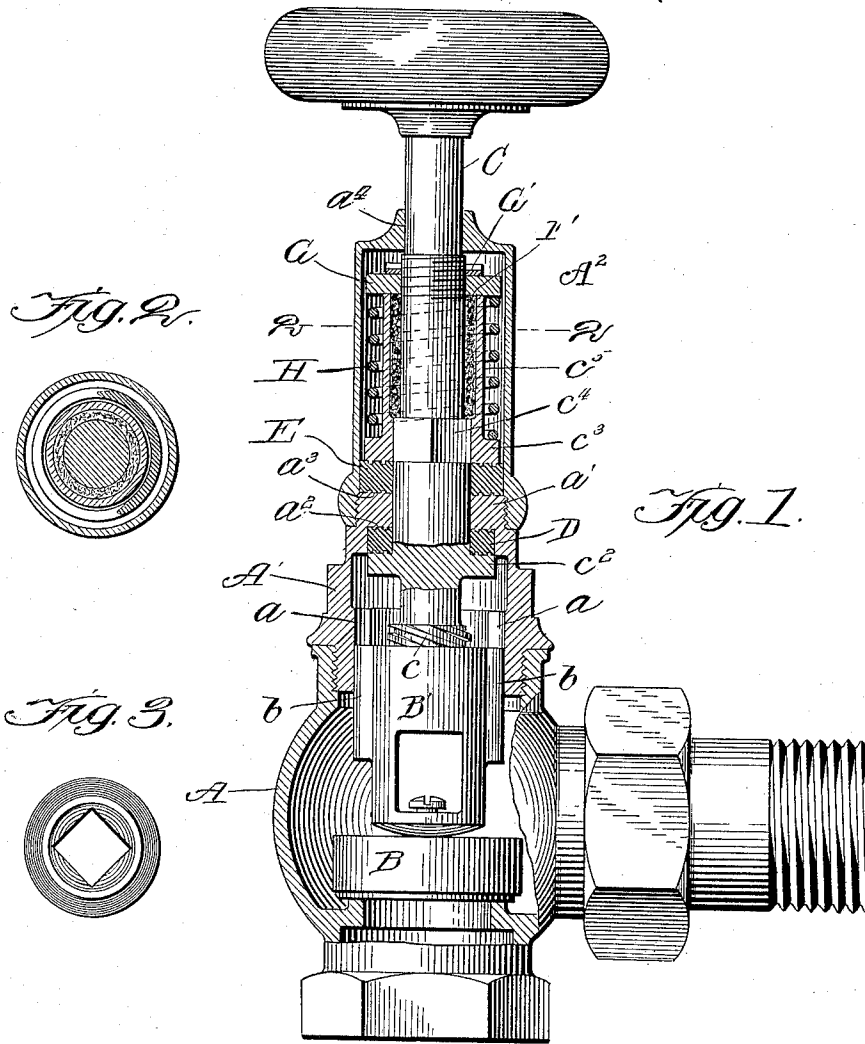
G. D. HOFFMAN.

VALVE.

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1,007,696.

Patented Nov. 7, 1911.



Witnesses:
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UNITED STATES PATENT OFFICE.

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VALVE.

1,007,696.

Specification of Letters Patent.

Patented Nov. 7, 1911.

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To all whom it may concern:

Be it known that I, GEORGE D. HOFFMAN, a citizen of the United States, residing at Western Springs, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Valves, and declare the following to be a full, clear, and exact description of the same, such as will enable others, skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to valves provided with revoluble stems past which leakage of fluids must be prevented, and it has for its object to provide a simple and reliable seal for such stems which will insure against leakage either inwardly or outwardly.

Further objects will be apparent from the following detailed description of a preferred embodiment of my invention taken in connection with the accompanying drawing which illustrates said embodiment. The various features of novelty whereby my invention is characterized will, however, be pointed out with particularity in the claims.

In the drawing, Figure 1 is a central longitudinal section through the valve; Fig. 2 is a section taken on line 2—2 of Fig. 1; and Fig. 3 is a plan view of a sleeve surrounding the stem proper.

Referring to the drawing, A represents a valve casing and B a valve controlling a port within said casing.

C is a single-piece valve stem having a screw-threaded portion c at its lower end for engaging with a cooperating screw-threaded member B' connected to the valve. The member B' is mounted within the valve casing in such a manner as to be free to move from or toward the port which the valve controls without, however, having capacity for rotary movements. This may be accomplished by providing feathers b which engage within guides a on the interior of the valve casing or a bonnet A' rigidly secured to the casing. The valve is moved from and toward the port which it controls by rotating the stem, the mere rotation of the stem without axial movement thereof raising and lowering the valve by reason of the screw-threaded connection.

The end wall a' of the bonnet A' forms a pair of annular seats surrounding the stem, one of the seats a^2 being directed in-

wardly and the other, a^3 , being directed outwardly. The valve stem has thereon an annular flange c^2 which lies beneath the seat a^2 . D is a thick ring or washer of any suitable anti-friction material arranged between the flange c^2 and the cooperating seat on the casing. It will be seen that when the ring is clamped tightly between the flange and the seat on the valve casing, a tight seal is provided which effectually prevents leakage in either direction past the stem. Great difficulty has heretofore been experienced in providing means for effectively maintaining this seal under all conditions to which a valve in actual use may be subjected. It will be seen that a downward pressure upon the valve stem might loosen the sealing arrangement sufficiently to permit leakage. In accordance with my invention I provide a second seal consisting of the seat a^3 on the valve casing, an annular flange c^3 on the valve stem outside of this seat, and a ring E, similar to the ring D, interposed between the seat a^3 and the flange c^3 . The flanges c^2 and c^3 are mounted upon or connected to the stem in such a manner as to be adjustable from and toward each other without, however, making it possible for fluid to pass along the stem between the stem and the flanges. When, therefore, the flanges are adjusted toward each other so as to clamp the members D and E firmly against the cooperating seats on the casing, absolute tightness is secured under all conditions; for a downward pressure on the stem, while tending to open a passage adjacent the lower flange will to the same extent force the upper flange toward its cooperating seat and increase the tightness at this point; while an upward pull upon the stem would increase the tightness on the underside so that no fluid could pass into or out of the casing along the valve stem even though the upper flange were unseated slightly.

While the arrangement of the annular flanges upon the stem may be greatly varied I have found that the construction shown in the drawing is extremely simple and efficient. As shown, the flange c^2 forms an integral part of the stem while the flange c^3 is detachable from the stem. The stem preferably has a cross-section other than circular throughout that portion c^4 along which the flange c^3 is adapted to position itself. The flange itself is made in the form of a

collar which fits about the portion c^4 of the stem so as to be slidable along but nonrotative upon the stem. Furthermore the member c^3 is preferably provided with a sleeve c^5 extending outwardly therefrom and surrounding the stem, the collar and sleeve forming a gland. The space between the sleeve and the stem is filled with packing F of any suitable material. Since the sleeve and the stem are practically stationary with respect to each other there is no wear upon the packing and consequently no danger that leakage will occur at this point. The sleeve and its attached flange are forced toward the other flange and locked in the desired position in any suitable way, as, for example, by means of a nut G screw-threaded upon the stem directly beyond the outer end of the sleeve. The nut engages with the end of the sleeve and, by turning the nut, the sleeve and its flange may be pressed downwardly with any desired degree of pressure. At the same time of course the flange c^2 is drawn upwardly so that tight joints are provided adjacent both of the flanges. It will be seen that the material between the sleeve and the stem may be packed in very tightly since the only relative movement between the sleeve and the stem may be effected by means of the nut upon the stem, a powerful leverage being afforded upon the sleeve for moving it. In case of wear, it is only necessary to tighten the nut slightly.

G' is a lock nut or the like for holding the nut G in place.

In order that absolute tightness may be insured even though wear or expansion may take place, I provide a spring H which surrounds the sleeve c^5 and bears at its opposite ends against the nut G and the flange c^3 , respectively. This spring is made of such a length that normally it is under considerable tension so that it is always exerting a force tending to move the flange c^3 away from the nut G. However, it is the purpose to have the flanges held positively against their seats and therefore under normal conditions the nut G is intended to engage with the end of the sleeve. If any wear should occur, however, the spring will be free to follow its expanding tendency so as to force the stem upwardly and the flange c^3 downwardly.

It will be seen that all of the movable parts upon the stem are locked to the stem in such a manner that there is very little danger of disarrangement. Thus the sleeve cannot rotate upon the stem and so it does not tend to unscrew the nut which can rotate. Similarly the spring bears at its ends against two members which have no tendency to rotate relatively to each other and therefore do not exert a twisting force upon the spring.

I prefer to provide an auxiliary casing

member or bonnet A^2 which is screw-threaded or otherwise fastened upon the bonnet A' , this auxiliary casing member surrounding the stem and the adjustable parts carried thereby so as to completely house them. The upper end of the member A^2 , through which the stem passes, forms a bearing as at a^4 which supports the stem against lateral strains.

It will now be seen that I have provided a simple and compact valve wherein absolute tightness about the stem may be secured without danger that the valve may be accidentally or mischievously manipulated so as to produce leakage. Even with the housing A^2 removed it would be almost impossible to tilt the stem sufficiently to cause leakage without applying enough pressure to completely destroy the device. With the auxiliary housing in place, however, the stem is securely supported near its outer end so that a lateral pressure upon the stem would have no effect upon the seals.

While I have described in detail a preferred embodiment of my invention I do not desire to be limited to the particular construction and arrangement shown since in its broader aspects my invention contemplates various other forms as will be evident from the definitions of my invention constituting the appended claims.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In combination, a valve casing, a rigid valve stem projecting into said casing, said casing having inwardly and outwardly directed seats surrounding said stem, an annular flange fixed upon said stem within and cooperating with the innermost seat, a flange mounted upon said stem outside of the outer seat so as to be slidable but not rotatable upon the stem, a steam-tight packing between the latter flange and the stem, and means for forcing the latter flange along the stem so as to bring both flanges into operative relation to their respective seats, and an auxiliary casing member surrounding the stem and affording a bearing therefor at a point outside of the outer flange.

2. In combination, a valve casing, a rigid valve stem projecting into said casing, said casing having inwardly and outwardly directed seats surrounding said stem, an annular flange carried by the stem inside of and cooperating with the inner seat, an annular flange slidably mounted upon said stem outside of and cooperating with the outer seat, said latter flange having a sleeve surrounding said stem, packing between said sleeve and the stem, and a nut screw-threaded upon the stem and engaging with the outer end of the sleeve.

3. In combination, a valve casing, a rigid

valve stem projecting into said casing, said casing having inwardly and outwardly directed seats surrounding said stem, an annular flange carried by the stem inside of and cooperating with the inner seat, an annular flange slidably mounted upon said stem outside of and cooperating with the outer seat, said latter flange having a sleeve surrounding said stem, packing between said sleeve and the stem, and a nut screw-threaded upon the stem and engaging with the outer end of the sleeve and the packing for forcing the sleeve and packing along the stem.

4. In combination, a valve casing, a rigid valve stem projecting into said casing, said casing having inwardly and outwardly directed seats surrounding said stem, an annular flange carried by the stem inside of and cooperating with the inner seat, an annular flange slidably mounted upon said stem outside of and cooperating with the outer seat, said latter flange having a sleeve surrounding said stem, packing between said sleeve and the stem, and a nut screw-threaded upon the stem and engaging with the outer end of the sleeve, and a spring surrounding the sleeve and engaging at its ends with the nut and the flange connected with the sleeve.

5. In combination, a valve casing, a rigid valve stem projecting into said casing, said casing having inwardly and outwardly directed seats surrounding said stem, an an-

nular flange carried by the stem inside of and cooperating with the inner seat, an annular flange slidably mounted upon said stem outside of and cooperating with the outer seat, said latter flange having a sleeve surrounding said stem, packing between said sleeve and the stem, and a nut screw-threaded upon the stem and engaging with the outer end of the sleeve, and an auxiliary casing member surrounding the stem and affording a bearing therefor outside of said nut.

6. A valve comprising a casing having a partition therein, a valve seat in the casing, a valve closure in the casing, a stem swivelly connected with the valve closure, packing around the stem on each side of the partition, a rigid collar on the stem on one side of the partition, a movable collar on the stem on the opposite side of the partition, a collar adjustable on the stem on the same side of the partition as the movable collar and a spring between said adjustable and movable collars for forcing the movable collar downwardly against the packing on one side of the partition and for forcing the rigid collar upwardly against the packing on the opposite side of the partition.

In testimony whereof, I sign this specification in the presence of two witnesses.

GEORGE D. HOFFMAN.

Witnesses:

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HARRY S. GAITHER.