

G. S. THOMPSON.  
 FLUID PRESSURE VALVE.  
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1,281,712.

Patented Oct. 15, 1918.

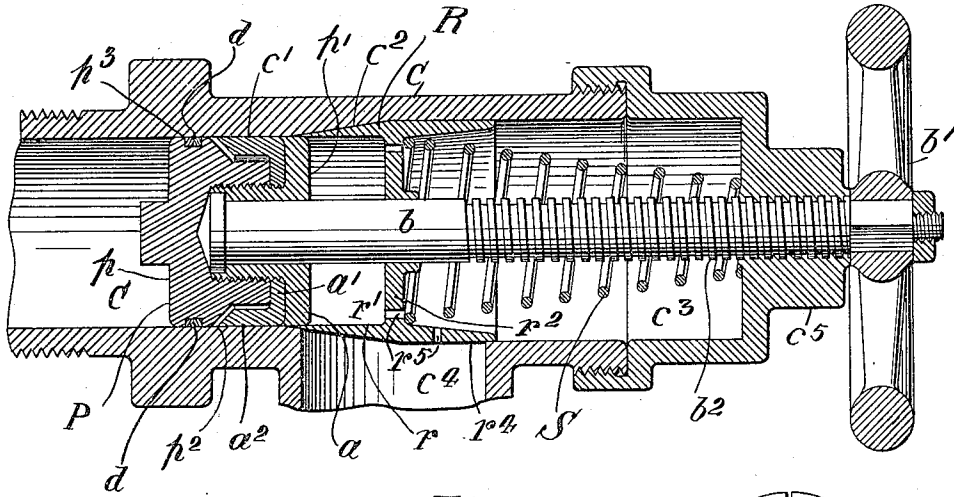


Fig. 1.

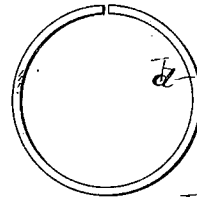


Fig. 3.

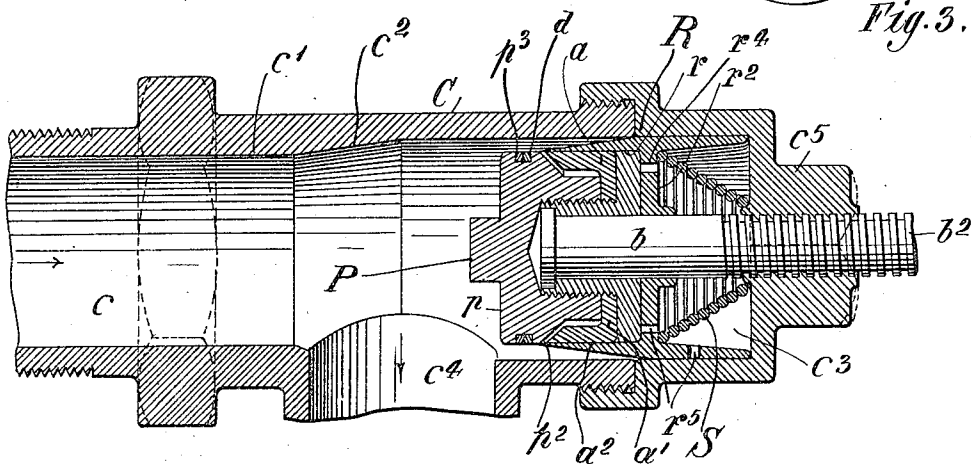


Fig. 2.

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# UNITED STATES PATENT OFFICE.

GEORGE S. THOMPSON, OF HOCKESSIN, DELAWARE.

## FLUID-PRESSURE VALVE.

1,281,712.

Specification of Letters Patent.

Patented Oct. 15, 1918.

Application filed October 1, 1914. Serial No. 864,426.

*To all whom it may concern:*

Be it known that I, GEORGE S. THOMPSON, a citizen of the United States, and a resident of Hockessin, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in Fluid-Pressure Valves, of which the following is a specification.

My improvements relate to valves for controlling the flow of liquids and fluids under pressure, and are particularly applicable where a perfectly tight and effective valve seal is desirable for the prevention of leakage when the valve is closed. The advantages of the so called "cup" packing of flexible material as a means of attaining a tight joint against fluid pressure of any kind are well known and indisputable, but this form of packing has not heretofore been adapted for use where the valve is of the piston type and travels in a path at right angles, or approximately so, to one of the valve ports, as for instance in many forms of discharge or blow-off valves, &c., for the reason that when said lateral port is reached by the cup packing the latter will be expanded beyond the area of its valve seat and its return thereto impeded if not prevented.

The main object of my present invention is to overcome this difficulty, and to admit of the use of a cup packing under the conditions above designated while preserving the share, integrity and usefulness of the cup packing itself, so as to attain a perfect seal with this type of valve when closed irrespective of the pressure to which the packing is subjected internally,—it being a well known axiom concerning the cup packing that the greater the internal pressure the more perfect the seal, in contra-distinction to ordinary annular packings which are apt to leak when subjected to extraordinary fluid pressure.

To this end my invention consists essentially in the use, in conjunction with a valve of the piston type provided with an annular cup packing, of a receiver in alinement with the piston valve into which the cup packing recedes during the retractile movement of said piston valve and before the latter begins to open the lateral port, said receiver then yielding before the further retractile movement of the piston and being received in turn into a compartment or extension of the valve casing provided for the purpose,—the re-

ceiver automatically returning to its normal position in coincidence with said lateral port during the advance of the piston valve to its seat and normal position beyond said lateral port, all as hereinafter more fully set forth, incidental features of the invention consisting in the specific construction and arrangement of parts.

In the accompanying drawings,

Figure 1, is a central longitudinal sectional elevation of a valve embodying the essential features of my invention, showing the relative positions of the parts when the valve is closed;

Fig. 2, is a similar view showing the relative positions of the parts when the valve is open;

Fig. 3, is a view of a split-packing ring used to protect the cup packing.

C, represents the valve casing generally, inclosing the elongated valve chamber *c*, formed with the cylindrical valve seat *c'*, conoidal receiver seat *c<sup>2</sup>*, and retraction chamber *c<sup>3</sup>*, said casing C, being also formed with the lateral discharge port *c<sup>4</sup>*, opening into the valve chamber *c*, at the rear of the aforesaid valve seat *c'*.

Resting normally in its closed position on the valve seat *c'*, is the cylindrical valve piston P, provided with the flexible cup packing *a*, the inner or transverse edge *a'*, of which is clamped between the piston members *p*, *p'*, which screw together. The outer annular contacting flange *a<sup>2</sup>*, of the cup packing *a*, is positioned in a space *p<sup>2</sup>*, between the piston members *p*, *p'*, which space is sufficient in area to admit of the partial collapse of said packing flange *a<sup>2</sup>*, when relieved of internal pressure.

The valve piston P, is advanced and retracted by means of the screw valve stem *b*, actuated by the handle *b'*, or any other mechanical expedient,—the screw *b<sup>2</sup>*, in the arrangement shown in the drawings engaging with the stationary nut *c<sup>5</sup>*, forming part of the casing C.

Seated normally in the casing in coincidence with the lateral port *c<sup>4</sup>*, and extending across the same is the protector sleeve R, the object of which is to inclose and sustain the cup packing *a*, when the valve piston P, is retracted. This protector sleeve R, when the valve P, is closed and fully on its seat *c'*, extends to the latter, its open edge and the side walls *r*, of the receiving chamber *r'*, then forming a continuation of

the valve seat  $c'$ , so that, as the valve piston is retraced by the screw  $b^2$ , the rear face of the valve piston and the cup packing  $a$ , will be drawn into said receiving chamber  $r'$ . The depth of the latter corresponds to the combined peripheral width of the member  $p'$ , of the valve piston and of the bearing flange  $a^2$ , so that by the time the valve piston P, is retracted sufficiently to bring the member  $p'$ , of the valve piston into contact with the rear wall  $r^2$ , of the sleeve R, the outer edge of the bearing flange  $a^2$ , of the cup packing  $a$ , will be within the annular side wall  $r$ , of the protector sleeve R.

The continued retraction of the valve piston P, by means of the screw  $b^2$ , to open the port  $c^4$ , will consequently also retract the protector sleeve R, against the resistance of the spring S, which is interposed between said sleeve R, and the end of the casing, and which tends constantly to press the sleeve R, forward into the position shown in Fig. 1, with its conoidal front portion in contact with the correspondingly shaped seat  $c^2$ , in the casing.

If it is desired to open the port  $c^4$ , fully, the retractive movement of the valve piston P, may be continued until the rear edge of the protector sleeve contacts with the end or head  $c^5$ , of the casing, as shown in Fig. 2.

As the valve piston P, is returned to its seat by means of the screw  $b^2$ , it is obvious that the spring S, will hold the protector sleeve R, in engagement therewith until said sleeve contacts with its seat  $c^2$ , when the continued advance of the screw will carry the valve piston out of and beyond the said sleeve R, into the position shown in Fig. 1. In this connection it may be stated that the conoidal seat  $c^2$ , and the front edge of the receiver sleeve R, may be formed in such manner that said edge will overlap slightly and form practically a portion or extension of the valve seat  $c'$ , so that the rear of the valve piston will always be in engagement with the annular wall  $r'$ , of the receiver R, as clearly shown in Fig. 1.

The transverse wall or partition  $r^2$ , of the protector sleeve R, as well as its rear extension  $r^4$ , may be formed with holes  $r^5$ , to relieve air compression as the sleeve is retracted into the chamber  $c^3$ .

It will be seen from the foregoing that the flexible cup packing  $a$ , is thus constantly reinforced, sustained and protected against the effect of internal pressure, no matter how severe,—its contacting flange  $a^2$ , being free to yield inward within a prescribed limit, but being confined in expansion to the actual cylindrical area of the valve seat. Hence after retraction and during reseating, the packing or contacting flange  $a^2$ , is presented in perfect alinement with the seat  $c'$ , to be compressed evenly and uniformly

against the same by the internal fluid pressure, thereby attaining a perfect liquid seal.

In order to preserve and maintain this liquid seal it is desirable to protect the cup flange  $a^2$ , from contact with foreign or gritty substances which may be present in the fluid controlled, the pressure of which tends constantly to force such extraneous matter between the periphery of the valve piston and its seat. This I accomplish by the use of one or more elastic resilient split packing rings  $d$ , positioned in an annular groove  $p^3$ , formed for the purpose in the front member  $p$ , of the valve piston, thus effectually excluding by reason of peripheral contact and tension of the ring or rings against the seat  $c'$ , all solid matter from the space  $p^2$ , occupied by the cup packing flange  $a^2$ , as will be readily understood by reference to Fig. 1, of the drawings.

I thus render practicable the use of a flexible cup packing in this type of valve, with all the attendant advantages of a close and effective seal. Furthermore the protection of the cup packing is effected automatically by means of the constant elastic resilient pressure exerted against the protector sleeve, the advance or retraction of the valve by means of the usual screw stem in the ordinary manner being all that is necessary in the way of manipulation.

What I claim as my invention and desire to secure by Letters Patent is,

1. A valve of the character designated, comprising an elongated valve chamber with a cylindrical valve seat, a conoidal seat adjoining said valve seat and a valve retraction chamber, and a lateral discharge port opening into the valve chamber at the rear of said valve seat and in front of the retraction chamber, a cylindrical valve piston normally resting on the valve seat and provided with a flexible cup packing, and a protecting sleeve normally seated in said conoidal seat and extending across said lateral port and adapted to inclose and sustain said cup packing when the piston is retracted.

2. A valve of the character designated, comprising an elongated valve chamber with a cylindrical valve seat, a conoidal seat adjoining said valve seat and a valve retraction chamber, and a lateral discharge port opening into the valve chamber at the rear of said valve seat and in front of the retraction chamber, a cylindrical valve piston normally resting on the valve seat and provided with a flexible cup packing, and a protecting sleeve normally seated in said conoidal seat and extending across said lateral port and adapted to inclose and sustain said cup packing when the piston is retracted, said sleeve when the valve is closed and on its seat extending to the latter and forming a continuation of the valve seat.

3. A valve of the character designated,

comprising an elongated valve chamber with a cylindrical valve seat, a conoidal seat adjoining said valve seat and a valve retraction chamber, and a lateral discharge port opening into the valve chamber at the rear of said valve seat and in front of the retraction chamber, a cylindrical valve piston normally resting on the valve seat and provided with a flexible cup packing, a protecting sleeve having a conoidal front portion normally seated in said conoidal seat and extending across said lateral port and adapted to inclose and sustain said cup packing when the piston is retracted, said sleeve when the valve is closed and on its seat extending to the latter and forming a continuation of the valve seat, and a spring within the chamber tending to constantly press the sleeve with its conoidal front portion in contact with the correspondingly shaped conoidal seat.

4. A valve of the character designated, comprising an elongated valve chamber with a cylindrical valve seat, a conoidal seat adjoining said valve seat and a valve retraction chamber, and a lateral discharge port opening into the valve chamber at the rear of said valve seat and in front of the retraction chamber, a cylindrical valve piston normally resting on the valve seat and provided with a flexible cup packing, a protecting sleeve having a conoidal front portion normally seated in said conoidal seat and extending across said lateral port and adapted to inclose and sustain said cup packing when the piston is retracted, said sleeve when the valve is closed and on its seat extending to the latter and forming a continuation of the valve seat, and a spring within the chamber tending to constantly press the sleeve with its conoidal front portion in contact with the correspondingly shaped conoidal seat, said sleeve having a transverse partition with openings therethrough.

5. A valve of the character designated, comprising a valve casing having a lateral port and a cylindrical valve seat and a conoidal receiver seat adjacent thereto, a piston valve provided with a cup packing, a valve receiver in alinement with said piston valve

into which said packing recedes during the retractile movement of the piston valve before the opening of said lateral port by said valve, said receiver having a portion fitted to said conoidal receiver seat and forming an extension of the valve seat, said receiver being adapted to yield before further retractile movement of said piston valve.

6. A valve of the character designated, comprising a valve casing having a lateral port and a cylindrical valve seat and a conoidal receiver seat adjacent thereto, a piston valve provided with a cup packing, a valve receiver in alinement with said piston valve into which said packing recedes during the retractile movement of the piston valve before the opening of said lateral port by said valve, said receiver having a portion fitted to said conoidal receiver seat and forming an extension of the valve seat, said receiver being adapted to yield before further retractile movement of said piston valve, said valve casing having an extension into which said receiver is received.

7. A valve of the character designated, comprising a valve casing having a lateral port and a cylindrical valve seat and a conoidal receiver seat adjacent thereto, a piston valve provided with a cup packing, a valve receiver in alinement with said piston valve into which said packing recedes during the retractile movement of the piston valve before the opening of said lateral port by said valve, said receiver having a portion fitted to said conoidal receiver seat and forming an extension of the valve seat, said receiver being adapted to yield before further retractile movement of said piston valve, said valve casing having an extension into which said receiver is received, said receiver being automatically returnable to its normal position with relation to the lateral port during the advance of the piston valve to its seat and normal position beyond said port.

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Witnesses:

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