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E. L. EASON, JR

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SELF CLEANING SLUSH PUMP VALVE

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Fig. 1.

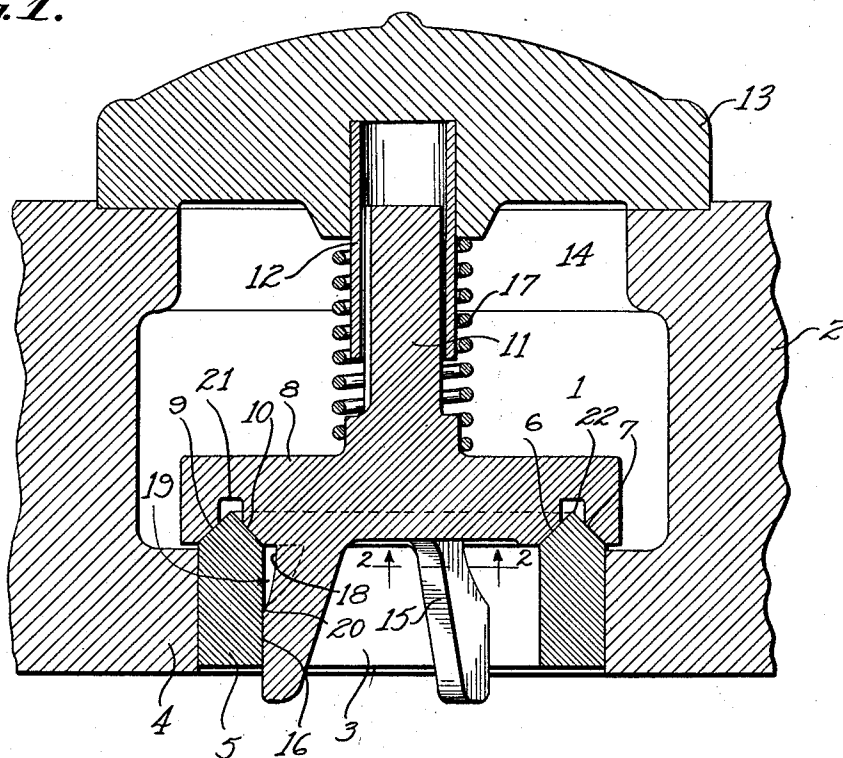
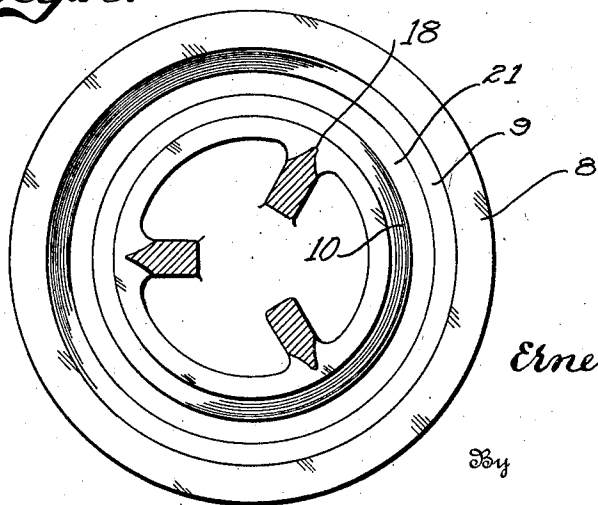


Fig. 2.



Inventor
Ernest Lloyd Eason, Jr.
By *Lyon & Lyon*
Attorneys

UNITED STATES PATENT OFFICE

ERNEST LLOYD EASON, JR., OF WHITTIER, CALIFORNIA

SELF-CLEANING SLUSH PUMP VALVE

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This invention relates to pumps, and particularly to pumps that are used for pumping water carrying sand or mud and popularly called slush pumps. The invention relates particularly to the valves of such a pump. A valve has come into use for such pumps which involves in its constructions the use of a hardened seat having two substantially conical faces which form the faces on which the valve closure seats. The valve operates without the use of packing and in its operation any grit or sand which is caught between the valve disk and the seat is ground up or moved off of the seat by the repeated closing of the valve. This valve is also known as a self-cleaning valve by reason of the fact that such sand or grit lodging on the seat will eventually move off of the seat, as it cannot penetrate the face of the hardened seat or the seat face of the valve closure. Heretofore it has been customary to employ non-metallic packing for such a valve, but in practice it is found that sand and small pebbles in the water being pumped become forced into the packing and destroy it, which necessitates the frequent changing of the packing and the temporary shutting down of the pump while the packing is being renewed.

This invention may be regarded as an improvement on the slush pump valve of this type. The valve includes in its construction a valve closure in the form of a disk having guide wings that extend down into the valve opening through the seat and which operate as guides in the opening and closing movement of the valve. It has been found in practice that in the operation of these valves the sand and grit in the water being pumped tends to produce erosion in the hardened valve seat, and the object of this invention is to provide a valve of this type having a construction which will eliminate or prevent this erosion.

Further objects of the invention will appear hereinafter.

The invention consists of the novel parts or combination of parts, to be described hereinafter, all of which contribute to produce an efficient self-cleaning slush pump valve. A preferred embodiment of the invention is de-

scribed in the following specification, while the scope of the invention is pointed out in the appended claims.

In the drawing:

Figure 1 is a vertical section taken through a slush pump valve embodying my invention.

Figure 2 is a cross-section through the valve, taken about on the line 2—2 of Figure 1. This section shows the underside of the valve disk in bottom plan.

Referring more particularly to the parts, in the drawing shown, 1 represents a valve-chest formed in the pump casing 2. The water being pumped passes through a valve opening 3 which is formed through a pump wall 4. The valve opening is formed in a removable ring 5, the upper portion of which projects into the valve chest, and is formed with two intersecting conical seat faces 6 and 7 which form the valve seat. The valve closure is in the form of a disk 8 the under face of which is formed with two conical seat faces 9 and 10 which seat respectively on seat faces 7 and 6 of the valve seat. The upper side of the disk is provided with an upwardly projecting stem 11 which is guided loosely in a sleeve 12, the upper end of which is attached on the under side of a valve bonnet 13 which closes the opening 14 through which the valve closure is introduced. The under side of the valve disk is provided with a plurality of guide-wings 15 formed integral with the disk and which extend down into the valve opening 3. Toward the end of each wing is provided a guide face 16 which lies adjacent to the cylindrical face which constitutes the edge of the opening 3.

A coil spring 17 is provided, the upper end of which thrusts against the under side of the valve bonnet and the lower end of which thrusts against the valve disk. This spring holds the valve on its seat until the pressure rises sufficiently in the pump chamber to open the valve and, of course, operates to return the valve to its seat on the receding stroke of the pump plunger.

It has been found in the practical use of valves of this type that the seat faces 6 of the valve seat tend to erode through the action of the sand carried in the water.

According to my invention, in order to prevent the erosion referred to above, I provide each wing 15 at its root, that is to say, at its point of connection to the disk 8, with a relatively sharp edge 18 which projects toward the edge of the opening 3 and extends in the same general direction as the axis of the valve. I prefer also to form a recess 19 on the outer side of the wing at this point, that is to say, the edge 18 commences at the point 20 (see Figure 1) and extends in an upwardly and inwardly inclined or slightly curved line, as shown in Figure 1. The action of the edge 18 and the recess 19 is to prevent the formation of eddy currents or swirls in the pumped liquid near the outer face of the wing, and their presence prevents to a large extent the erosive effect of the sand on such a seat.

In the operation of the valve, the guiding of the disk 8 by the wings is effected through the contact of the faces 16 with the edge of the opening 3, but in other respects the valve operates in the usual way.

It is customary to provide the under side of the valve disk 8 with an annular channel or groove 21, which is located over the edge 22 of the valve seat where the conical seat faces 6 and 7 intersect. This prevents the forcible grinding of sand or pebbles between the valve and the seat on the edge 22 and operates to preserve this edge intact.

What I claim is:

1. In a slush valve for a slush pump for pumping water carrying mud and sand, the combination of a member having a valve opening with an annular hardened seat at the opening, and a valve closure in the form of a disk having a face to come upon the seat, said valve closure having a plurality of guide wings extending from the face of the disk into the said opening, each guide wing having a guide face disposed toward the end of the wing for engaging the edge of the opening to guide the valve disk, and having a recess on its outer side at a point adjacent the disk with a relatively sharp edge extending in substantially the same direction as the axis of the valve at each recess, and projecting toward the edge of the opening, said recess and edge co-operating to prevent sand in the slush from eroding the face of the valve seat.

2. In a slush valve for a slush pump for pumping water carrying mud and sand, the combination of a valve seat in the form of a ring with a substantially conical hardened seat face, and a valve closure in the form of a disk having a substantially conical face to come upon the said seat face and having a plurality of guide wings extending from the inner face of the disk into the opening of the ring, each guide wing having a guide face disposed toward its end for engaging the edge of the opening to guide the valve, and having a recess on its outer side adjacent the

under side of the disk with a relatively sharp edge at said recess projecting outwardly toward the seat, and extending in substantially the same direction as the axis of the valve, said recess and said relatively sharp edge co-operating to prevent the sand in the slush from eroding the said seat face.

3. In a slush pump valve for slush pumps for pumping water carrying mud and sand, the combination of a ring-shaped seat having two intersecting, conical, hardened seat faces so that the seat for the valve is of V cross section, and a valve closure in the form of a disk having conical seat faces on its under side to seat upon the said conical seat faces of the valve seat, said valve closure having a plurality of guide wings extending from the inner face of the disk into the opening of the ring-shaped seat, each guide wing having a guide face at its outer end for engaging the side of the opening through the valve seat to guide the valve and having a recess on its outer side adjacent the under side of the disk with a relatively sharp edge at said recess located inwardly toward the axis of the valve so as to leave a space between the edge and the inner face of the seat, said edge projecting toward the said seat faces and extending in substantially the same direction as the axis of the valve, said recess and said relatively sharp edge cooperating to prevent the sand in the slush from eroding the said seat faces.

4. In a slush valve for a slush pump for pumping water carrying mud and sand, the combination of a member having a valve opening with a hardened annular seat at the opening, and a valve closure in the form of a disk having a face to come upon the seat, said valve closure having a plurality of guide wings extending from the face of the disk into the said opening, each guide wing having a guide face disposed toward the end of the wing for engaging the edge of the opening to guide the valve disk, and having a relatively sharp edge adjacent to the disk and located inwardly toward the axis of the valve so as to leave a space between the edge and the inner face of the seat, said edge projecting toward the edge of the opening and extending in substantially the same direction as the axis of the valve, and operating to reduce the effect of erosion by sand on the face of the valve seat at a point opposite the wing.

Signed at Los Nietos, Calif., this 18th day of January, 1929.

ERNEST LLOYD EASON, JR.