SELF CLEANING SEALED CONCRETE PUMP VALVE

Inventor: Richard L. Wise, Columbus, Ohio

Assignee: The Jolger Machine Company, Columbus, Ohio

Filed: Mar. 16, 1972

Appl. No.: 235,162

U.S. Cl. 137/242, 137/329.01, 137/625.45, 251/170

Int. Cl. F16k 5/08, F16k 41/00

Field of Search 277/35, 83, 92; 417/519, 900; 251/301, 309: 137/242, 625.21, 625.44-625.47

References Cited

UNITED STATES PATENTS

678,271 7/1901 Mueller 137/332
967,460 8/1910 Straub 137/242
1,746,609 2/1930 Schellin 251/170
2,017,975 10/1935 Kooyman 417/510

ABSTRACT

A valve for controlling the inlet to and outlet from a sucking and pumping cylinder of a concrete pump. The valve is of partially cylindrical form and is oscillated through an angle of 180° between inlet-closing position and inlet-opening position where it closes the cylinder beyond the inlet. The valve is carried by rotatable discs that rotate on trunnion shafts, the discs being provided with seals which prevent the concrete from reaching the shafts and their bearings. Also, the discs are provided with lugs which serve to agitate and break-up the ambient concrete as they rotate.

6 Claims, 2 Drawing Figures
Concrete pump valves have been provided which have included mounting discs that carry a semi-cylindrical valve plate and are rotatable about a common axis to move the valve from closing and opening positions relative to an inlet leading radially into the pump cylinder. The valve plate and mounting discs are located in a cavity in the cylinder and are subjected to the concrete in the cylinder which tends to get behind the respective discs, especially during the pumping stroke, to cause clogging and wear on the discs and the associated pivot shafts and bearings.

The present invention overcomes the above-mentioned disadvantages by having effective seals between the rotatable mounting plates and associated walls of the cavity in which they are mounted and by having concrete-agitating and breaking lugs or teeth on the peripheries of the discs, so that each time they are rotated in the oscillation of the valve, they will agitate and break-up the concrete. Thus, the concrete is prevented from moving behind the discs and reaching the pivot shafts and bearings and is prevented from setting and accumulating adjacent the plates.

The best mode contemplated in carrying out this invention is illustrated in the accompanying drawings in which:

**FIG. 1** is an axial sectional view through a concrete pump cylinder showing a valve embodying this invention mounted therein.

**FIG. 2** is a transverse sectional view taken along line 2—2 of FIG. 1.

With reference to the drawings, a portion of a concrete pump of a well-known type is illustrated and includes a pumping and sucking cylinder indicated generally at 10 having an annular inlet fitting 11 leading radially thereinto. This fitting carries a collar 12 which has a valve seat 12a, at its inner extremity, on which a valve plate 13 is adapted to seat. Collar 12 can be adjusted inwardly as it wears, to move the seat 12a inwardly, by means of bolts 11a and shims 11b which mount the fitting 11 on the cylinder 10. The valve plate 13 is of such form that it has a convex outer surface 15 and the valve seat 12a is complementary to this surface. Beyond the inlet in the direction of the pumping stroke of the piston (not shown), the cylinder is provided with a collar 16, coaxially disposed therein, and having a valve seat 16a, at its inner extremity, which is complementary to the valve surface 15 and upon which it will seat during the sucking cycle of the pump. Collar 16 can be adjusted inwardly as it wears, to move the seat 16a inwardly, by means of bolts 16b and shims 16c. During the pressure cycle of the pump, the valve 13 will close the inlet 11 by being seated on the seat 12a, as indicated in FIG. 1. The valve is oscillated between these two positions by a suitable control arrangement 17.

According to this invention, the valve plate 13 is mounted for this oscillation by means of a special arrangement which includes a pair of mounting discs or annular plates 20. The valve plate 13 extends over the peripheral edges of these plates, and its outer surface 15 is concentric with such edges to which it is secured. Each plate 20 carries a trunnion pivot shaft 21 extending outwardly therefrom and the common axis of these shafts is the axis of the cylindrically curved surface 15. Each of the plates 20 is of serrated form at its periphery to provide spaced lugs or teeth 22 for agitating and breaking up ambient concrete. Where the ends of the valve plate 13 overlap the edges of the plates 20, the teeth are shortened as indicated at 22a. At the location of the valve 13, the cylinder 10 is enlarged to provide a cavity including disc-receiving chambers 23 at each side thereof. These chambers are circular, being slightly larger in diameter than the discs so that there is an annular space 23a around each disc. An outer wall for each chamber is indicated at 23b. The plates 20 are rotatably mounted in the respective chambers 23 by means of the pivot shafts 21 so that the valve plate 13 oscillates about the common axis of these shafts. In so oscillating, the lugs on the edges of the plates will agitate and prevent the setting of any concrete which tends to enter into the spaces 23a and any concrete adjacent the plates in the cylinder cavity.

Also, according to this invention sealing means is provided between the respective plates 20 and associated walls 23b to prevent the concrete from passing on from the spaces 23a, between the plates and walls to cause clogging therebetween, and from reaching the pivot shafts 21 and associated bearings to cause wear thereof. This means comprises annular or ring seals 25 disposed between the inner surfaces 20b of the plates 20 and the spaced wall surfaces 23b. These ring seals 25 are of a common type, which permits relative rotation of the associated surfaces 20b and 23b but provides an effective seal therebetween. Each seal embodies a metal ring 26 which extends laterally into opposed grooves in the respective surfaces 20b and 23b and which carry yieldable sealing rings 27 that cooperate with inclined annular shoulders 28 of the respective grooves. The shoulders 28 and rings 27 are thus so arranged that pressure in the space between the surfaces 20b and 23b will increase the sealing action. To provide this pressure, that space will be supplied with oil under pressure by suitable means (not shown).

Thus, it will be apparent that this invention provides a valve for a concrete pump, the valve being of the semi-cylindrical type oscillatable about its axis. The valve is carried by rotatable discs which are provided with projections adjacent its peripheral edges which will agitate ambient concrete. Also, sealing means is provided and prevents concrete from getting behind the plates so as to interfere with rotation thereof or cause undue wear on the plates and associated pivot shafts and bearings.

Having thus described the invention what is claimed is:

1. In a concrete pump having a cylinder with an inlet passage leading thereinto, said inlet passage having a valve seat and said cylinder having a passage with a seat, a valve, means for mounting the valve for oscillation between said seats, said valve comprising a plate member having a convex surface of semi-cylindrical form adapted to seat on either of said seats to control flow through said passages, said means for mounting said valve comprising a pair of axially spaced discs pivoted in said cylinder for rotation about an axis corresponding to the axis of said convex semi-cylindrical surface of said valve plate, and projections on said discs adjacent the peripheries thereof for agitating and breaking up concrete in said cylinder and ambient to said discs, said projections being formed as lugs on the circumferences of the discs.
3,765,439

2. The combination of claim 1 in which each of the discs is disposed in a chamber at the side of said cylinder, said chamber having a wall spaced outwardly from the circumference of the respective disc to provide an annular space around the disc, said lugs extending into said space to agitate and break up any concrete in said space.

3. The combination of claim 2 in which each of said discs has an outer face spaced from the inner face of an adjacent wall of said chamber, said discs carrying pivot trunnions rotatably carried by bearings in said wall at said axis, and sealing means between the outer faces of said discs and the adjacent wall faces to preclude passage of concrete from said annular spaces to said shafts and bearings.

4. The combination of claim 3 in which said sealing means comprises sealing ring units located between the circumferences of said discs and said shaft axis and extending into opposed grooves in the faces of the discs and the faces of the adjacent walls.

5. The combination of claim 1 in which said valve plate member has ends which project over the discs and overlap part of the circumferences thereof extending arcurately therearound but terminating inwardly of the outer faces of the respective discs, said lugs being removed at the portions of the disc circumferences where the plate overlaps those circumferences.

6. The combination of claim 1 in which each of said valve seats is formed on the inner end of a collar, and means for inwardly adjusting each collar to compensate for wear.