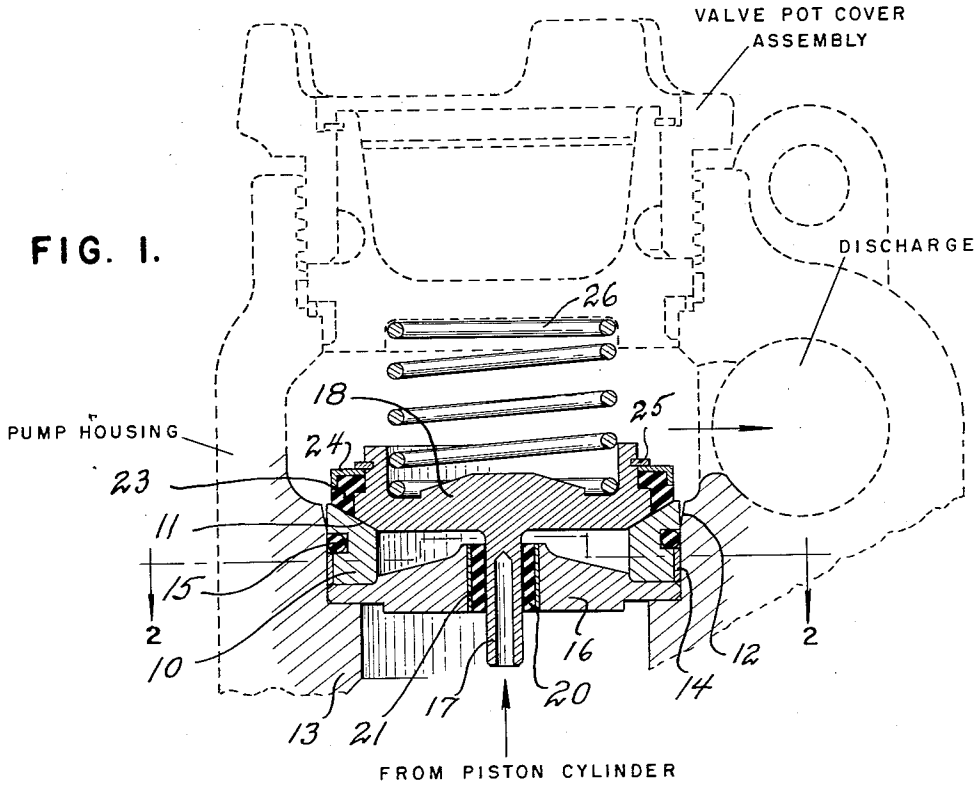
May 9, 1961 F. A. BYNUM 2,983,281

CHECK VALVE FOR A HEAVY DUTY PUMP

Filed Feb. 3, 1958

FIG. 1.



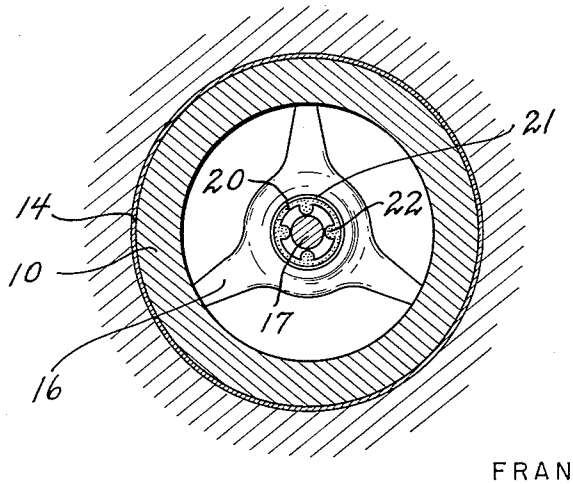




FIG. 2.

INVENTOR.
FRANK A. BYNUM,
BY Earl Babcock.
ATTORNEY

United States Patent Office 2,983,281 Patented May 9, 1961



2,983,281

# CHECK VALVE FOR A HEAVY DUTY PUMP

Frank A. Bynum, Duncan, Okla., assignor to Halliburton Company, a corporation of Delaware

Filed Feb. 3, 1958, Ser. No. 712,761

1 Claim. (Cl. 137—543.23)

This invention relates to check valves, and more particularly to check valves adapted for use in heavy duty pumps, such as those used in the oil fields for forcing cement slurry, mud or other abrasive fluid into a well under high pressure.

Some of the problems encountered in attempting to provide a suitable pump for use in the oil fields are set forth in the U.S. Patent to Owsley, No. 2,216,573, granted October 1, 1940. Cement slurry is abrasive, heavy and viscous, and, unless it is kept in motion it is apt to lodge and solidify.

Particular care must be exercised in the construction of the valves and valve pots for oil field pumps. The arrangement illustrated in the above mentioned Owsley patent has been found to be very well suited for this use. As there shown, both the suction and discharge valves of a pump are so designed that the fluid enters at the bottom of the pot and flows upwardly and out without a reversal of direction so that there is little tendency for the fluid to remain stationary, and the internal efficiency of the valves is good.

The check valves of the present invention incorporate certain improvements over the valves shown in the above mentioned Owsley patent, and are adapted for use in a pump like that illustrated therein, or in other pumps in which similar problems are encountered.

Where abrasive fluids are being pumped through a valve, there is considerable wear both on the valve body and on its seat, and these parts have to be replaced frequently. The structure of the pot should be such that this can be done conveniently and rapidly. If a valve starts to leak excessively during the process of cementing a well, these parts may have to be replaced in the field, and the operation suspended while this is done, with the consequent hazard that the cement slurry will take an initial set unless the valve is repaired in a very short period of time.

In accordance with the present invention, both the valve body and its seat are mounted in the valve pot directly beneath the cover. They are not secured by threads or bolts, but are held in place by a friction ring. The cover is of a diameter sufficiently large to permit the valve seat and valve body to be pulled out with a simple screw jack or similar tool. Also, the structure of the valve seat and the mounting for the valve body are such that the valve body is properly centered with respect to the seat, and this remains true as these parts are replaced, even though the replacing operation is performed in a hurry or by one unskilled in performing the operation.

The objects of the invention will be clear from the above outline and from the following specification when taken in connection with the accompanying drawing, in which:

Figure 1 is a view in vertical cross section of a valve seat, a valve body and mounting means constructed in accordance with the invention, and with a valve pot and cover shown in dotted lines, and Figure 2 is a transverse



cross-sectional view of the apparatus of Figure 1, taken on the line 2—2 thereof.

Referring to the drawing in detail, it will be seen that the valve seat consists of a ring **10** having a cylindrical outer surface. This ring **10** has a beveled upper edge **11**, which constitutes the valve seat. It is mounted in a cylindrical recess **12** of the valve pot **13**.

The recess **12** is only slightly larger in diameter than the outside diameter of the ring **10**, and interposed between the ring **10** and the wall of the recess **12** is a copper friction bushing **14**. The parts are of such dimensions that the ring **10** is tightly held in the recess **12** by the bushing **14**, this manner of mounting being called an "interference fit," the copper deforming slightly as the parts are pressed into the recess **12**.

There is an O-ring **15**, of rubber or the like, fitted into a suitable groove on the ring **10** above the bushing **14**, to prevent any leakage along the outside of the ring **10** between it and the wall of the recess **12**.

Mounted in the recess **12** beneath the ring **10**, and also frictionally held by the bushing **14**, is a spider **16** which serves as a guide for the stem **17** of the valve body **18**.

The spider **16** has the outer ends of its spokes shaped to conform to the bottom of the ring **10**, as shown in Figure 1, and it also fits snugly in the recess **12** beneath the ring **10** and the bushing **14**, the diameter of the spider being approximately the same as the outside diameter of the bushing **14**.

The hub of the spider **16** contains a ferrule **20**, of rubber or the like, which is bonded to a smaller copper bushing **21** press fitted into a central bore through the spider. The ferrule **20** is vertically grooved to provide inwardly projecting lands **22**, as shown in Figure 2, which are in contact with and serve as a guide for the stem **17** of the valve body. There is thus little tendency for the valve to become stuck even though the fluid being pumped contains debris, sand or abrasive material.

The valve body **18** is, of course, provided with a beveled outer rim to conform to the shape of the valve seat **11**. In addition, it is provided with a rubber gasket **23**, the lower edge of which also conforms to the shape of the valve seat, as shown in Figure 1, this gasket being secured to the valve body by a suitable flanged washer **24** and its clamp **25**.

A coil spring **26** is mounted between the valve pot cover and the valve body **18** to exert downward force upon the valve body and tend to keep the valve closed during operation, in accordance with the usual practice.

Should the valve become worn excessively, it will be seen that the valve seat **10**, the spider **16** and the valve body **18** can readily be removed and replaced. All that is necessary to perform this operation is to remove the pot cover and the spring **26**, and then, apply a suitable hook to the spider **16** and pull the entire assembly out of the valve pot. If desired, a suitable screw jack may be placed upon the valve pot to exert the necessary lifting force on the hook.

A new valve seat, valve body and mounting means may then be pressed into the recess **12**, and the valve placed back in operation in a very short period of time.

While only one embodiment of the invention has been shown and described herein, it will be obvious that various changes may be made without departing from the spirit of the invention or the scope of the annexed claim.

I claim:

A check valve assembly comprising a valve pot suitable for use in a heavy duty pump, said pot having a recess, a ring mounted in said recess and having a beveled upper edge to provide a valve seat, a separate spider member mounted in said recess beneath said ring and provided with a centrally located bore therein, a securing bushing sur-

rounding a portion of said ring and frictionally securing both the ring and the spider member to said valve pot, a valve body adapted to rest upon said valve seat, said valve body having a stem projecting downwardly through the bore of said spider member, and means serving as a guide for said stem and valve body, said means including a ferrule of flexible material and having vertically extending grooves to provide lands which are in contact with said stem and serve to center the valve body with respect to its seat, and the entire assembly being such that the ring and spider member may be snugly fitted into the recess in the valve pot, but be readily pulled out of the valve pot for replacement.



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