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SLUSH PUMP VALVE COVER

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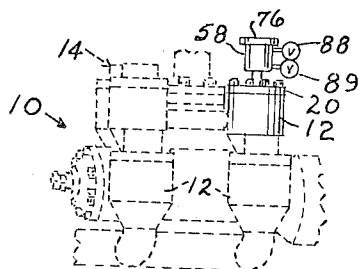


FIG. 1

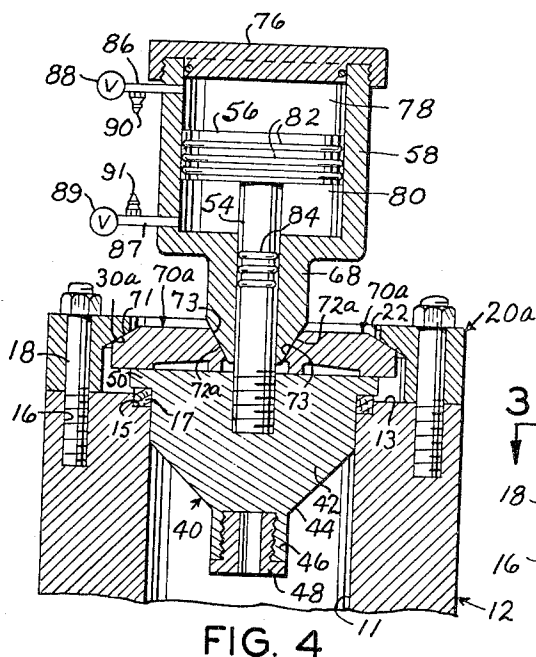


FIG. 4

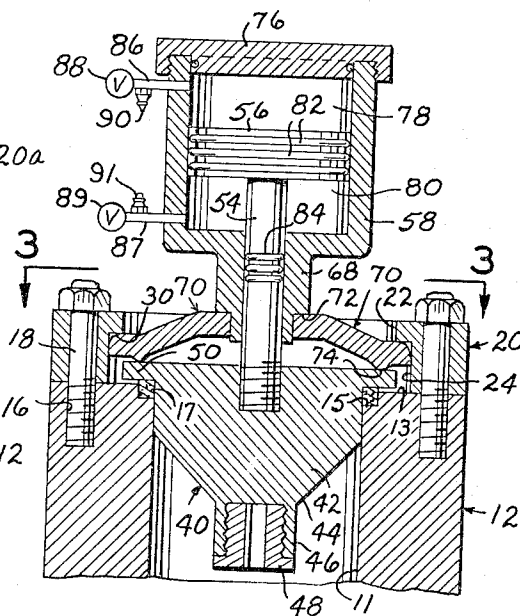


FIG. 2

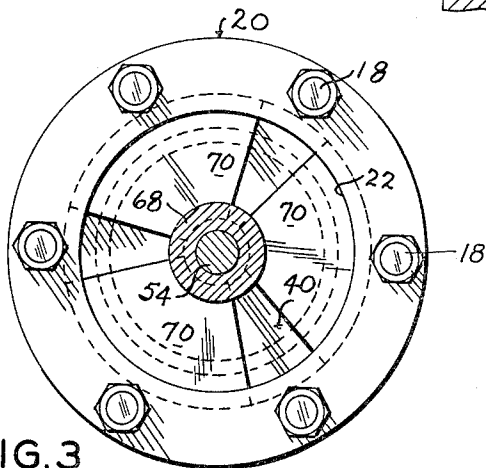


FIG. 3

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SLUSH PUMP VALVE COVER

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The present invention relates to pumps and more particularly to an improved valve cover or cap for slush pumps.

The present invention is an improvement over my two co-pending applications for Slush Pump Valve Cover, filed July 17, 1964, Ser. No. 383,459 and August 12, 1964, Ser. No. 389,003.

Slush pumps of relatively large capacity are conventional equipment in oil well drilling and are used for circulating the drilling fluid. These pumps have generally cylindrical shaped upwardly open intake and exhaust fluid transferring bodies, commonly called "valve pots" which are respectively equipped with fluid intake and exhaust valves. The valve pots must be provided with means permitting access to the valve therein to service the valve. To accomplish this a cap or cover is usually provided at the upwardly disposed end of each valve pot which is usually attached to the valve pot by a plurality of stud bolts or bolts and nuts. A recent improvement comprises a ring or disk-like cap which is threadedly secured to the valve pot by a single threaded member. This single member frequently works loose during operation of the pump resulting in malfunction of the associated valve. Furthermore, the type of cover in which a plurality of bolts holds the cover in place requires considerable time to remove and replace each cap or cover resulting in extensive shut down time.

It is, therefore, the principal object of the invention to provide an improved replaceable valve cover or cap for a slush pump.

Another object is to provide a valve cover or cap which employs a single shaft and pressure containing body which is connected in a novel manner with each respective valve pot body.

Still another object is to provide a device of this class which employs a plurality of segmental valve cover locking members which are forced toward and held in a locking position within the valve pot body.

Yet another object is to provide a device of this class which may be connected with existing slush pump valve pots without modification thereof or which may be incorporated in the design of valve pots to be manufactured.

The present invention accomplishes these and other objects by connecting a valve cover receiving ring to the upwardly open end of a valve pot. A pressure containing housing and shaft means, secured to the valve cover, cooperate with the ring in forcing valve cover lock members against the valve cover.

Other objects will be apparent from the following description when taken in conjunction with the accompanying single sheet of drawings, wherein:

FIGURE 1 is a fragmentary perspective view of a conventional slush pump illustrating, by solid lines, the relative position of one of the devices of the present invention when installed thereon;

FIGURE 2 is a vertical cross-sectional view, to a different scale, of the device connected with a fragment of a valve pot body;

FIGURE 3 is a horizontal cross-sectional view, partly in elevation, taken substantially along the line 3-3 of FIG. 2; and,

FIG. 4 is a vertical cross-sectional view similar to FIG. 2 illustrating an alternate segmental valve pot cover locking means.

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Like characters of reference designate like parts in those figures of the drawings in which they occur.

In the drawings:

The reference numeral 10 indicates a fragment of a conventional slush pump having a plurality of generally cylindrical shaped bodies or valve pots, indicated at 12, respectively, housing fluid end intake and exhaust valves. A conventional removable valve pot cover is indicated by the numeral 14.

Referring more particularly to FIG. 2, a fragment of the valve body or pot is indicated at 12 having a central bore 11 and of the type having its upwardly disposed end wall drilled, as at 16, for receiving a plurality of stud bolts and nuts 18. The upper end surface 13 of the valve pot is counterbored, as at 15, for receiving a packing ring 17. The above description is conventional with a valve pot to which the device of the present invention is to be connected.

A cylindrical ring 20, diametrically equal with respect to the valve pot 12, replaces the conventional valve pot cover 14. The ring 20 is centrally bored, as at 22, and counterbored from its downwardly disposed end, as at 24, to form a downwardly facing annular shoulder 30. The ring 20 is similarly drilled for receiving the bolts 18. A step diameter valve pot plug 40 is coaxially received by the bore 11 of the valve body. The plug 40 includes a central body portion 42 closely received by the inner wall surface of the packing ring 17 and the bore 11. The depending portion of the plug 40 is formed to define an inverted truncated cone 44. An internally threaded sleeve 46 is integrally connected coaxially in depending relation to the cone 44. A centrally bored valve stem bushing 48 is threadedly received by the sleeve 46. The plug 40 is characterized by an upper outstanding flange-like top or head portion 50, diametrically smaller than the ring bore 22 and greater than the diameter of the packing ring 17, so that a peripheral portion of the plug head 50 overlaps a portion of the valve pot end surface 13.

One end of a piston shaft 54 is threadedly connected coaxially to the upper end of the valve pot plug 40. A piston 56 is coaxially connected to the other end of the shaft 54. A piston housing 58 surrounds the piston 56 and includes a neck portion 68 slidably surrounding the piston shaft. A plurality, preferably three, segmental locking members 70 are positioned around the shaft 54 with one arcuate end portion of each locking member 70 disposed within the counterbore 24. The opposite or inwardly disposed end of each locking member 70 surrounds the piston shaft 54 in spaced relation. The depending end of the piston body neck portion 68 is diametrically reduced and is interposed between the inwardly adjacent end surface of the members 70 and the shaft 54 and forms an annular shoulder 72 which overlies and contacts a portion of the upper surface of each locking member 70. A depending projection 74, formed on the depending surface of each locking member 70 adjacent its outwardly directed arcuate end, contacts the upper surface of the valve pot plug flange portion 50, adjacent its peripheral edge, to form a fulcrum point for the locking members 70.

A cap or cover 76 is connected to the upwardly disposed end of the piston body 58 to close the latter and define upper and lower pressure chambers 78 and 80 on opposing sides of the piston 56. Seals, such as O rings, 82 and 84, respectively, surrounding the piston 56 and shaft 54, form pressure tight seals. Tubular members 86 and 87 are connected with the wall of the piston body adjacent its upper and lower ends, respectively, in communication with the pressure chambers 78 and 80. Relief valves 88 and 89 are respectively connected to the free ends of the tubes 86 and 87. Grease gun fittings 90 and 91 are connected to the tubes 86 and 87 between the respective relief valve and the piston body 58.

Downward movement of the innermost end portions of the locking members 70 pivot the locking members about their fulcrum points 74 so that their outermost arcuate end edges contact the annular shoulder 30 thus forcing the valve pot body 40 against the sealing ring 17 to seal the valve pot fluid tight. This action is accomplished by opening the valve 88 and applying pressure to the pressure chamber 80 as by a grease gun, or the like, not shown, connected with the grease fitting 91 thus forcing the piston body 58 downwardly with respect to the piston 56 so that the shoulder 72 on the piston body neck contacts the wedge members 70 to force their inner end portions toward the upper surface 13 of the valve plug body. Grease, not shown, under pressure within the chamber 80 maintains the members 70 in valve pot cover locking position. When it is desired to release and remove the locking members 70, grease gun pressure is applied to the upper pressure chamber 78 through the grease fitting 90 wherein the relief valve 89 is opened to relieve the pressure in the chamber 80 to permit the piston body 58 to move upwardly with respect to the piston 56 and its shaft 54 thus releasing the locking members 70.

Referring more particularly to FIG. 4, there is illustrated a similar valve pot cover installation in which similar parts are associated in an identical manner with the exception of the shape and action of the segmental locking members, indicated by the numeral 70a. In this embodiment the ring body 20a is provided with a downwardly facing tapered shoulder 30a which slidably receives a tapered or beveled upper outer edge surface 71 of the respective segmental members 70a. The locking members 70a, when forced radially outward, bear against the upper surface of the valve pot plug 40 in a wedging action to seal the plug head or flange 50 with the sealing ring 17. This is accomplished by forming an inverted cone-shaped or tapered wall 72a on the depending end portion of the piston body neck 68 surrounding the piston shaft 54 and by forming cooperating beveled end edge surfaces 73 on the inwardly disposed end of the respective wedge members 70a.

Grease pressure applied to the chamber 80 will force the wedge members 70a radially outward to compress the packing ring 17 and seal the valve pot fluid tight. Conversely grease pressure applied to the chamber 78 releases the wedge members 70a for removal from the valve pot.

It seems obvious that the rings 20 or 20a may be omitted by forming a counterbore in the wall of the valve pot to form the locking member receiving shoulder 30 or 30a.

Obviously the invention is susceptible to some change or alternation without defeating its practicability, and I therefore do not wish to be confined to the preferred embodiment shown in the drawings and described herein, further than I am limited by the scope of the appended claims.

I claim:

1. A valve cover for a slush pump of the type having an upwardly open valve pot, said valve pot having an upper end surface, comprising: a ring coaxially secured to the upwardly open end of said valve pot, said ring having an inner wall forming a downwardly facing annular shoulder adjacent its end surface opposite its connection with said valve pot; a valve plug supported by the upper end surface of said valve pot within said ring; means on said valve plug coacting with the annular shoulder on said ring for locking said valve plug in place, said means comprising segmental members having an arcuate end surface contacting the annular shoulder and extending at their other ends toward the vertical axis of said valve pot, a shaft

axially connected vertically to said valve plug, a piston connected with the other end of said shaft, a housing surrounding said piston and forming a chamber at opposing ends of said piston, said housing having a neck portion surrounding said shaft in contact with the adjacent end portions of said segmental members; and means connected with said housing in communication with each chamber for moving said housing with respect to said piston.

2. Structure as specified in claim 1 in which said segmental members are each provided with a depending lug portion forming a fulcrum point in contact with an outer peripheral portion of said valve plug; and in which said housing neck portion is provided with an annular flange contacting an upwardly disposed end surface of each segmental member whereby said segmental members are fulcrumed against said valve plug when said housing neck portion is moved toward said valve plug.

3. Structure as specified in claim 1 in which the end surfaces of said other ends of said segmental members are beveled to form a cone-shaped recess around said shaft and in which said housing neck end portion is provided with a tapered end surface engaging the beveled end surfaces on said segmental members whereby said members are forced radially outward of the axis of said valve pot when said housing is moved toward said valve plug.

4. A valve cover for a slush pump of the type having an upwardly open valve pot, said valve pot having a valve plug seat formed therein and having an inner wall forming an annular downwardly facing shoulder opposite said seat, comprising: a valve plug supported by said seat; a plurality of segmental members radially disposed on said valve plug, each said member having an arcuate end surface engaged with the downwardly facing annular shoulder and extending at their other ends toward the vertical axis of said valve pot; means engageable with said segmental members for locking said valve plug against said seat, said means comprising a shaft axially connected vertically to said valve plug, a piston connected with the other end of said shaft, a housing slidably surrounding said piston and forming a pressure chamber at opposing ends of said piston, said housing having a neck portion surrounding said shaft in contact with the adjacent end portions of said segmental members; and means connected with said housing in communication with each chamber for moving said housing with respect to said piston.

5. Structure as specified in claim 4 in which said segmental members are each provided with a depending lug portion forming a fulcrum point in contact with an outer peripheral portion of said valve plug; and in which said housing neck portion is provided with an annular flange contacting an upwardly disposed end surface of each segmental member whereby said segmental members are fulcrumed against said valve plug when said housing neck portion is moved toward said valve plug.

6. Structure as specified in claim 4 in which the end surfaces of said other ends of said segmental members are beveled to form a cone-shaped recess around said shaft and in which said housing neck end portion is provided with a tapered end surface engaging the beveled end surfaces on said segmental members whereby said members are forced radially outward of the axis of said valve pot when said housing is moved toward said valve plug.

No references cited.

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