Dec. 13, 1960 D. L. ROGERS 2,963,984

PUMP LINER ADJUSTER

Filed Oct. 27, 1958

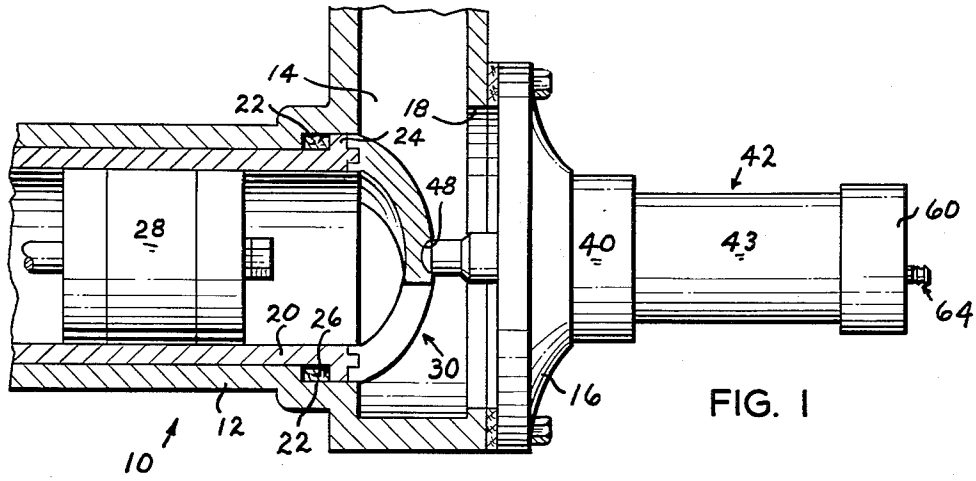


FIG. 1

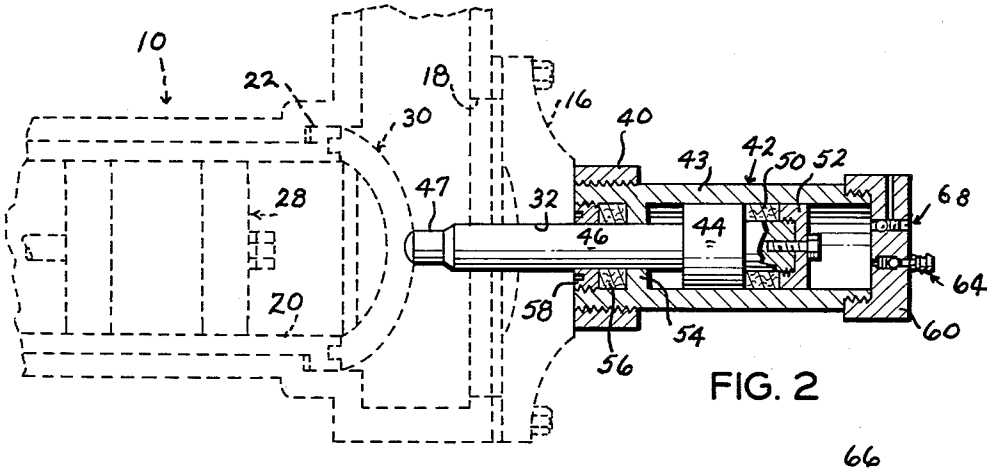


FIG. 2

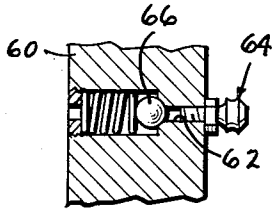


FIG. 3

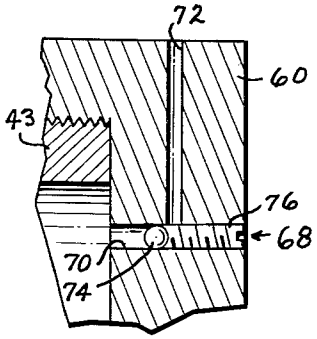


FIG. 4

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PUMP LINER ADJUSTER

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2 Claims. (Cl. 103—216)

The present invention relates to the oil industry and more particularly to slush pumps.

Heavy duty slush pumps, commonly known as "mud hog pumps," are used in the oil industry for pumping drilling fluid down the bore of drill pipe. These cylinder and piston equipped high pressure pumps are provided with cylinder liners, longitudinally adjustable with respect to the cylinder wall, to maintain a seal with the piston; this adjustment is conventionally accomplished by a liner cage in contact with a screw threadedly carried by the cylinder head, which is moved by tightening the screw which in turn moves the liner and compresses packing between the liner and the cylinder wall.

The principal objection of this type of arrangement resides in the fact that the adjusting screw oxidizes or becomes corroded and can not be easily turned to move the liner cage and liner.

It is, therefore, the principal object of the present invention to replace such liner adjusting screws with hydraulic cylinder means for adjusting the liner.

Another object is to provide hydraulic cylinder means for connection with a pump cylinder head and liner cage which may be actuated by hydraulic fluid under pressure or by the pressure generated by a conventional grease gun.

Another object is to provide a device of this class which may be installed on conventional pumps presently in use.

A further object is to provide a device of this class which includes a release valve for relieving the pressure on the hydraulic cylinder for servicing the latter.

Another object is to provide a device of this character wherein the pump liners may be readily and quickly adjusted for more efficient operation of the pump by the operator thereof each time the pump is greased.

The present invention accomplishes these and other objects by providing an internally threaded flange which is rigidly secured to the outer surface of each cylinder head in coaxial relation with respect to the threaded hole for the adjusting screw. Hydraulic cylinder means is threadedly connected at one end to the flange: The hydraulic cylinder includes a shaft axially connected to the piston thereof and which extends inwardly of the cylinder head through the adjusting screw bore and has its inward end arranged to contact the liner cage. Valve means, carried by the free end of the hydraulic cylinder, permits injection of fluid under pressure for forcing the shaft against the liner cage and moving the liner.

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 cross-sectional view, partly in elevation, of a mud hog pump cylinder, illustrating the relative position of the device when connected thereto;

Figure 2 is a vertical cross-sectional view of the device in operative position, illustrating, in dotted lines, the adjacent parts of the pump;

Figure 3 is a fragmentary cross-sectional view, on an enlarged scale, of the valve inlet means; and,

Figure 4 is a fragmentary vertical cross-sectional view, on an enlarged scale, of the valve release means.

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 the pressure end of a compound pump including a cylinder 12, pressure chamber 14 and a cylinder head 16 closing an opening or bore 18 in the pressure chamber. The pump cylinder is provided with a liner 20 in intimate contact with the inner wall of the cylinder. An annular recess 22 formed in the cylinder wall adjacent the pressure chamber 14 cooperates with an annular shoulder 24 on the liner for retaining packing 26 within the recess 22. The liner 20 is movable longitudinally with respect to the wall of the cylinder 12 for compressing the packing 26 and maintaining a seal between the liner and the cylinder wall. A pump piston 28 is reciprocable within the liner 20 for pumping fluids, not shown. The liner 20 is conventionally moved by means of a liner cage 30 interposed between the end of the liner 20 and the cylinder head 16. An adjusting screw, not shown, is threadedly engaged within a central bore 32 (Fig. 2) in the head with the inner end of the screw contacting the cage 30 while the head end of the screw projects outwardly of the outer surface of the head so that the screw may be tightened or moved inwardly of the head to in turn move the cage 30 and liner 20. The above description forms no part of the instant invention other than to set forth a workable combination with which the instant invention is designed to be used.

In carrying out the invention an internally threaded tubular member or flange 40 is rigidly secured, as by welding, to the outer surface of the cylinder head 16 in coaxial alignment with the adjusting screw bore 32. Hydraulic cylinder means 42 is threadedly received at one end by the flange 40. The cylinder means 42 includes a cylinder body 43 and a piston 44 having an axially connected shank or shaft 45 which is closely received by the adjusting screw bore 32 and which projects inwardly of the pump cylinder head 16. The inward end of the shaft 46 is reduced in diameter, as at 47, and is adapted to fit in a central recess 48 formed in the liner cage 30. The piston 44 is provided with packing 50 and a removable head end 52 opposite the shaft 45 for periodically replacing the packing 52 and maintaining the same sealed with the inner wall of the cylinder body 43. An annular shoulder 54 formed on the inner wall of the cylinder body adjacent its theadedly connected end acts as a stop for receiving packing 56 and a packing ring 58 for sealing with the periphery of the shaft 46.

The free end of the cylinder body 43 is closed by a removable head 60. The head 60 is longitudinally drilled through (Fig. 3) on an axis parallel with the wall of the cylinder body 43, as at 62, and provided with a conventional grease gun fitting 64 for admitting fluid or grease, not shown, into the bore of the cylinder body 43 for forcing the piston 44 and shaft 46 inwardly toward the liner 20. A spring actuated valve 66 prevents loss of any hydraulic fluid pressure through said fitting 64. Pressure relief valve means 68 (Fig. 4) carried by the cylinder body head 60 permits releasing the hydraulic fluid when desired. The relief valve means is formed by a bore 70 drilled through the head 60 on an axis parallel with the wall of the cylinder body 43 and a lateral bore 72 perpendicular to the bore 70 for communication between the bore 70 and the periphery of the head 60. A valve 74 seats against the inward end of a screw 76 threadedly received by the bore 70. Partially removing

the screw **76** permits communication between the bores **70** and **72** and releases hydraulic fluid to the atmosphere.

Operation

In operating the respective pump liner adjusting screws, not shown, are removed from the pump heads **16** and a flange **40** and one of the hydraulic cylinder means **42** is connected to each pump cylinder head **16** as disclosed hereinabove for existing pumps. Obviously the pump cylinder head **16** and flange **40** may be integrally formed when constructing new pumps or for use as replacement heads. Thereafter the hydraulic cylinder piston **44** is actuated by a grease gun or the like, not shown, thus forcing the inward end **47** of the shaft against the liner cage **30** and liner **20** thus compressing the liner packing **22**. Hydraulic fluid under pressure in the cylinder body **43** then maintains a constant pressure against the liner **20** for more efficient operation of the pump **10**. Whenever it is desired to replace packing within the hydraulic cylinder means **42** or to replace the liner **20**, the hydraulic fluid is released through the bores **70** and **72** as disclosed hereinabove.

Obviously the invention is susceptible to some change or alteration 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 liner adjuster attachment for a compound pump having a cylinder equipped with a liner movable longitudinally with respect to the cylinder wall and having a centrally bored pump cylinder head closing the cylinder, said pump having a liner adjusting cage interposed between said pump cylinder head and the adjacent end of said liner and in intimate contact with the latter, including: an internally threaded annular flange secured to the outer surface of said cylinder head in co-axial alignment with the bore therein; a hydraulic cylinder having an inner end threadedly engaged by said flange and having an externally threaded outer end, said hydraulic cylinder having a partition wall spaced outwardly of said inner threaded end, said partition wall having a central bore co-axial with respect to the bore in said pump cylinder head; a piston reciprocably mounted in said hydraulic cylinder; a shaft fixed to said piston and extending slidably through said partition wall and the inner end of said hydraulic cylinder and through said pump cylinder head, said shaft having its free end disposed in the pump and bearing against the liner adjusting cage; a packing ring surrounding said shaft and threadedly engaged with the wall forming the bore of said hydraulic cylinder adjacent its inner end; packing interposed between said packing ring and said partition wall for sealing around said shaft and preventing entry of a fluid medium under pressure from said pump into said hydraulic cylinder; a hydraulic cylinder head threadedly engaged with the outer end of said hydraulic cylinder, said hydraulic cylinder head having a bore therethrough; and a valve mounted within the bore of said hydraulic cylinder head for admitting a fluid under pressure and moving said piston thereby adjusting said liner.

2. A liner adjuster attachment for a compound pump having a cylinder equipped with a liner movable longitudinally with respect to the cylinder wall and having a centrally bored pump cylinder head closing the cylinder, said pump having a liner adjusting cage interposed between said pump cylinder head and the adjacent end of said liner and in intimate contact with the latter, including: an internally threaded annular flange secured to the outer surface of said cylinder head in co-axial alignment with respect to the bore therein; a hydraulic cylinder having an inner end threadedly engaged by said flange and having an externally threaded outer end, said hydraulic cylinder having a partition wall spaced outwardly of its inner threaded end, said partition wall having a central bore co-axial with respect to the bore in said pump cylinder head; a piston reciprocably mounted in said hydraulic cylinder, said piston having a diametrically reduced outwardly directed threaded end defined by an abrupt shoulder medially the ends of said piston, a piston head threadedly engaged with the outwardly directed end of said piston; packing interposed between said piston shoulder and said piston head for sealing with the wall of said hydraulic cylinder; a shaft fixed to the end of said piston opposite its head end, said shaft extending slidably through said partition wall and the inner end of said hydraulic cylinder and through said pump cylinder head, said shaft having its free end disposed in the pump and bearing against the liner adjusting cage; a packing ring surrounding said shaft and threadedly engaged with the wall forming the bore of said hydraulic cylinder adjacent its inner end; packing interposed between said packing ring and said partition wall for sealing around said shaft and preventing entry of a fluid medium under pressure from said pump into said hydraulic cylinder; a hydraulic cylinder head threadedly engaged with the outer end of said hydraulic cylinder, said hydraulic cylinder head having a bore therethrough; and a valve mounted within the bore of said hydraulic cylinder head for admitting a fluid under pressure and moving said piston thereby adjusting said liner.

References Cited in the file of this patent

UNITED STATES PATENTS

2,518,787	Huhtala	Aug. 15, 1950
2,770,510	Collins	Mar. 13, 1956
2,786,425	Yarbrough	Mar. 26, 1957
2,784,040	Head	Mar. 5, 1957
2,802,424	Lee	Aug. 13, 1957