Sept. 10, 1963 A. P. S. HYDE 3,103,180

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Filed Jan. 24, 1961 2 Sheets-Sheet 1

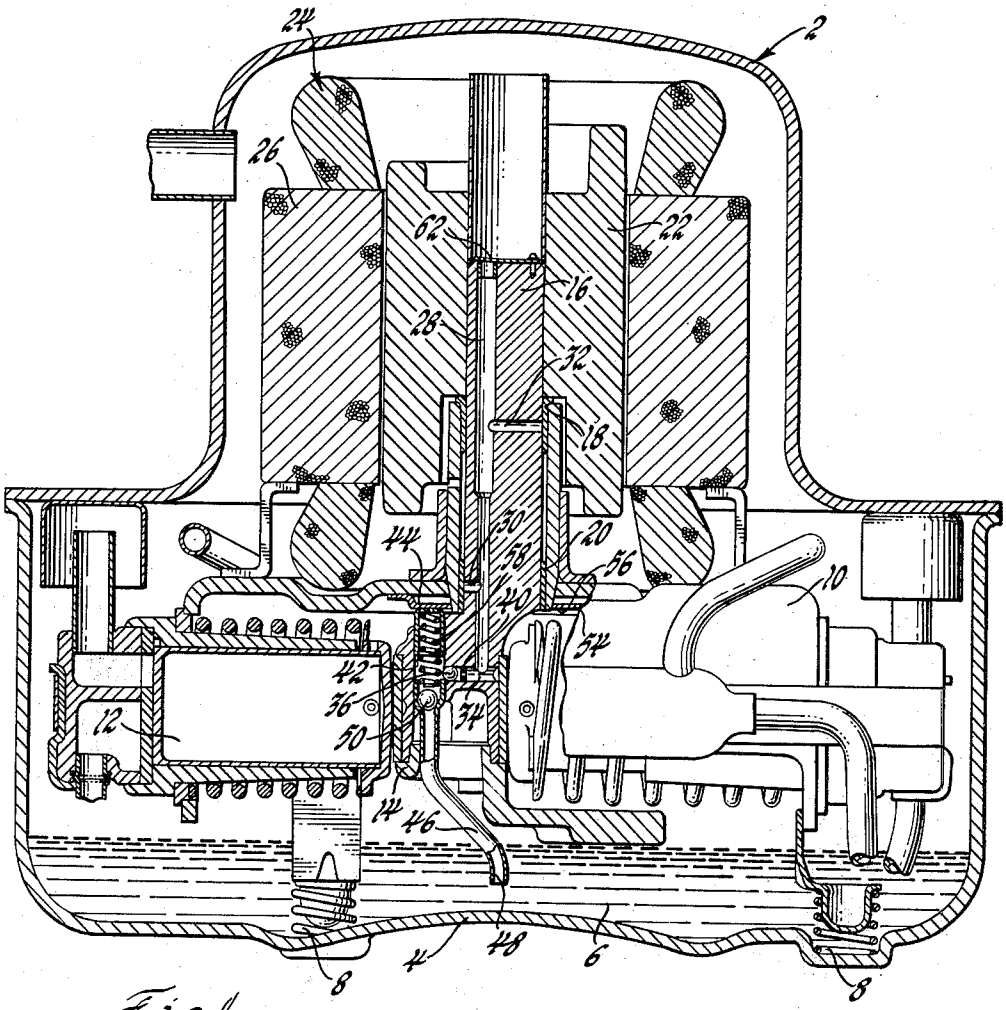


Fig. 1

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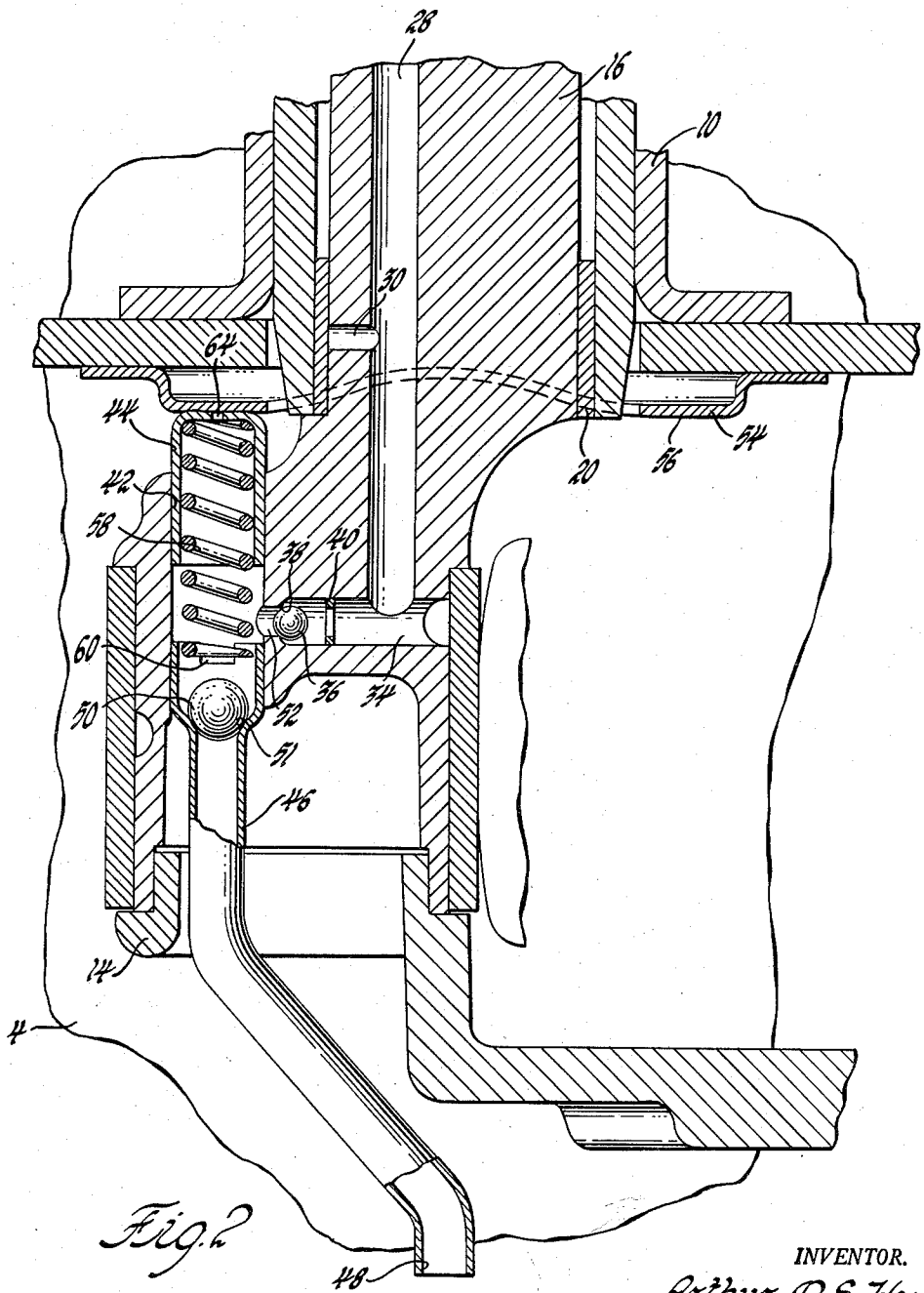


Fig. 2

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This invention relates generally to lubrication means and particularly to lubricant pumping devices for lubricating revolving and reciprocating parts such as shafts and the like.

An important object of this invention is to provide a plunger-type pump whose operating movement is obtained from rotation of the member which supports the pump.

A further object of my invention is to provide a pump on an eccentric portion of a shaft which utilizes the rotational movement of the shaft to operate the pump in a reciprocating manner parallel to the shaft axis.

Still another object of the invention is to provide a pump on an eccentric portion of a rotating shaft which is offset from the axis of the shaft but whose intake is on the axis of the shaft so that the pump is primed by rotation of the shaft.

For these and other objects of this invention, reference may be made to the accompanying detailed description and drawings in which:

FIGURE 1 is a view in elevation with parts in section of a compressor having a motor driven shaft which is lubricated by the novel lubricating device.

FIGURE 2 is a view similar to FIGURE 1 but showing only the pumping portion thereof with parts greatly enlarged to better understand the construction and operation of the invention.

Referring now to FIGURE 1, a compressor indicated generally by a numeral 2 is shown. The compressor 2 includes an outer housing 4 in which is located in the bottom thereof a lubricant supply 6. The compressor assembly itself is resiliently supported on the bottom of the compressor housing 4 by a plurality of small springs 8 which receive depending portions of a compressor frame 10. The compressor includes a plurality of horizontally disposed cylinder and piston assemblies 12 which are operated by an eccentric portion 14 formed on an end of a shaft 16. The shaft 16, it will be noted, is journaled for rotation in a set of axially displaced bearings 18 and 20, respectively. The shaft 16 has fixed thereto the armature 22 of a motor indicated generally by a numeral 24. The motor 24 is provided with a winding 26. The compressor, of course, is driven by energization of motor 24 which causes rotational movement of shaft 16 and eccentric portion 14.

The construction described so far is conventional and no claim is made therefor. The novel features of this invention will now be emphasized.

It will be noted that the shaft 16 is provided with a longitudinally extending lubricant passage 28 from which extend radial passages 30 and 32 adapted to supply lubricant to the bearings 18 and 20. The lower end of lubricant passage 28 communicates with a transverse passage 34 in the eccentric portion 14. Passage 34 is valved at one end thereof by a ball check valve 36 adapted to engage its seat 38. The ball check valve 36 is generally limited in its movement in the passage 34 by a small retainer 40.

Located in the eccentric portion 14 is a downwardly extending cylindrical opening 42 in which is slidably mounted at the upper end thereof a piston pump plunger 44. The lower end of the cylindrical opening 42 is closed by a pump intake 46 whose intake opening 48 is located along the axis of rotation of shaft 16. The intake 48

may be closed by a check ball valve 50 which is adapted to engage its seat 51 in the intake at the lower end of cylindrical opening 42 in eccentric 14. A small passage 52 in eccentric 14 connects the cylindrical opening 42 between intake 46 and piston plunger 44 with passage 34. Mounted on the compressor frame 10 and encircling the shaft 16 is a cam 54 having a generally downwardly facing convoluted cam surface 56 which is generally normal to the axis of rotation of the shaft.

A small helical coil spring 58 is located in the pump chamber formed by the opening 42 and the plunger 44 which biases the plunger against the cam surface 56. The lower end of spring 58 is confined by a spring seat 60 secured above the ball check 50 in the pump intake 46.

Referring for a moment to FIGURE 1, it will be noted that the passageway 28 is provided with a small pressure relief valve 62 at the upper end thereof.

The operation of the lubricant pump means is as follows: Assuming the motor 24 to be energized so that it rotates the shaft 16 including its eccentric portion 14, the eccentric portion will impart reciprocating movement to the compressor pistons of the compressor piston and cylinder assemblies 12. At the same time, since the opening 48 of the pumping means extends into the lubricant supply 6 the offset portion of the intake will cause lubricant to be centrifuged to the underside of the ball check 50 unseating it and thereby priming the pump. At the same time, the piston pump plunger 44 will move up and down as it slides along the convoluted cam surface 56 causing alternate pressure reductions and increases in the chamber of the pump, thus causing lubricant to move past check 50 when unseated and into the passages 52, 34, 28 and 32, and 30 to thereby lubricate the bearings 18 and 20 as well as other parts of the compressor.

If, of course, the pressure created by the pumping assembly becomes too great, it will be relieved by unseating of the pressure relief valve 62 in which case it can return to the lubricant supply in the bottom of the compressor housing 4.

The lubricant pump may be utilized to lubricate the convoluted cam surface 56 against which the head of the piston pump plunger 44 bears by means of a small lubricant port 64 in the top of the plunger 44.

It is important to note that the pump is actually carried by shaft 16 and rotates therewith. This feature enables the pump to be primed because it is this manner of mounting the pump that offsets a part of the intake from the intake opening on the axis of rotation of the shaft.

It may also be emphasized at this point that the only real moving part of the entire pump assembly aside from the ball check valves is the plunger 44 which both slides along the convoluted cam surface 56 and reciprocates back and forth in the cylindrical opening 42 forming the pumping chamber of the pump. It is thus believed that an extremely simple but very effective lubricant pumping assembly has been provided which is particularly adapted for applications involving rotating shafts and the like.

I claim:

1. In combination with a shaft and means journaling said shaft for rotation about a vertically extending axis, an eccentric portion on said shaft, an annular convoluted cam surface mounted on said journaling means around said shaft generally normal to the axis thereof and spaced above said eccentric portion, a pump including a plunger guided by said eccentric portion for reciprocating movement parallel to said shaft axis, means yieldably biasing one end of said plunger against said surface, an intake for said pump supported by said eccentric portion and having an opening on the axis of rotation of said shaft adapted to extend into a lubricant supply whereby rotation of said shaft imparts reciprocating movement of said

plunger parallel to said shaft axis to operate said pump and said rotation primes said pump.

2. In combination with a lubricant passaged shaft and means journaling said shaft for rotation about a vertically extending axis, means for supplying lubricant to said shaft passages comprising an annular convoluted cam surface mounted on said shaft journaling means around said shaft generally normal to the axis thereof, an eccentric portion on said shaft having a cylindrical opening therein parallel to said shaft axis in valved communication with said shaft passages, a reciprocable pump plunger in said opening closing one end thereof, means yieldably biasing one end of said plunger against said surface, and valved means connected to the other end of said opening adapted to connect said opening to a lubricant source and including an intake for said pump supported by said eccentric portion and having an opening on the axis of rotation of said shaft adapted to extend into a lubricant supply whereby rotation of said shaft causes reciprocating movement of said plunger and pumping of lubricant to said passages and whereby rotation of said intake primes said pump.

3. The combination claimed in claim 2 which further includes pressure relief means in said passages.

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