Feb. 8, 1927. 1,616,913

J. R. McCALLUM

FORCE FEED LUBRICATION FROM COMPRESSOR BLADE

Filed Dec. 14, 1925 2 Sheets-Sheet 1

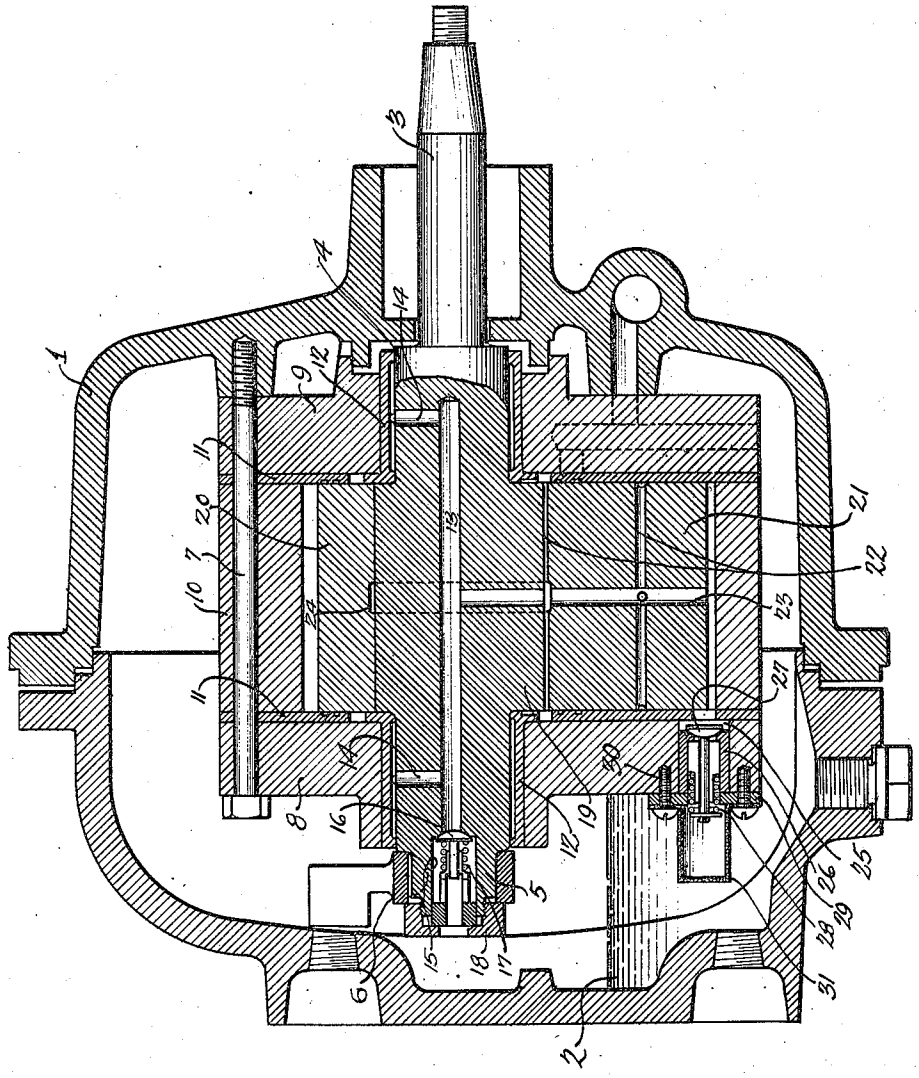


Fig. 1

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FIG. 2

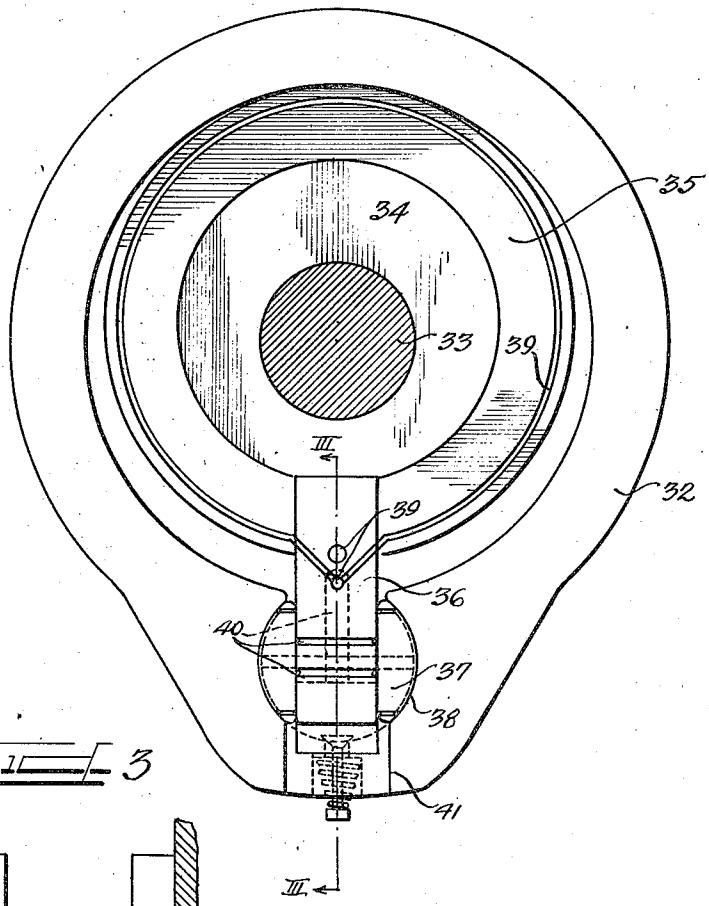
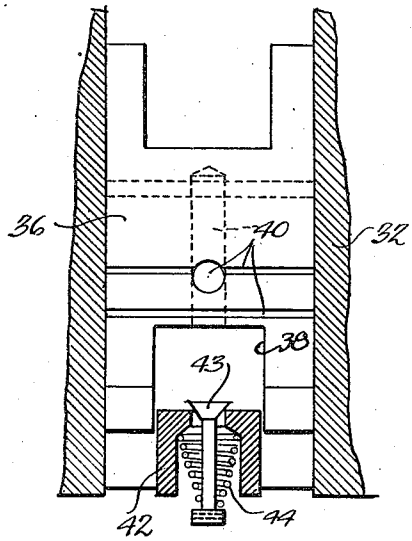


FIG. 3



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UNITED STATES PATENT OFFICE.

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FORCE-FEED LUBRICATION FROM COMPRESSOR BLADE.

Application filed December 14, 1925. Serial No. 75,190.

This invention relates to rotary compressors and more particularly to force feed lubricating means governed by the reciprocating blade of a rotor or piston forming a part of the compressor.

It is an object of this invention to provide a forced feed lubricating mechanism for the moving parts of a compressor.

It is also an object of this invention to provide a rotary compressor with a plurality of control valves adapted to govern the flow of oil from the compressor housing into the compressor casing to permit the oil entering the casing to be distributed, to the various parts needing lubrication, by the action of the reciprocating blade carried by the compressor piston or rotor.

It is an important object of this invention to provide an improved and simplified system of lubricating the parts of a rotary compressor by a forced feed arrangement controlled by the reciprocating blade of the compressor rotor.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a longitudinal vertical section taken through a rotary compressor equipped with a forced feed lubricating mechanism embodying the principles of this invention.

Figure 2 is a transverse vertical view taken through a compressor, showing the compressor shaft in section and equipped with a modified form of force feed lubricating means.

Figure 3 is a fragmentary detail section taken on line III—III of Figure 2, showing parts in elevation.

As shown on the drawings:

The reference numeral 1 indicates an outer housing of a compressor, said housing adapted to carry a lubricant 2 in the lower portion thereof. Projecting into the housing 1 is a compressor shaft 3 provided with an enlarged shank 4, the inner end of which is reduced in diameter to afford a bearing extension 5 which is journalled in a suitable bearing 6 mounted within the housing 1. The shank 4 is rotatably mounted within a compressor casing rigidly secured in position within the housing 1 by means of bolts 7 or other suitable retaining means. The compressor casing comprises a pair of spaced end plates 8 and 9 separated by a spacing ring 10 and grooved apertured bearing plates or disks 11. The bearing plates 11 are provided with integral bearing sleeves 12 which enclose the ends of the shank portion 4 of the compressor shaft. The shank 4 is provided with a longitudinal lubricating passage 13 and with radial passages 14, the inner ends of which communicate with the longitudinal passage 13. The shaft extension 5 is provided with a recess 15, the inner end of which communicates with one end of the axial passage 13 and affords a valve seat for a check valve 16 controlled by means of a spring 17. The check valve mechanisms are held in place by means of a retaining cap 18 threaded on the reduced end of the shaft extension 5. The spring 17 normally acts to hold the check valve 18 seated in closed position to close one end of the axial passage 13.

Integrally formed on the compressor shaft shank 4 is an eccentric 19. Engaged around the eccentric portion of the compressor shaft between the disks 11 is a piston 20 provided with an integral radially directed blade or vane 21 having a plurality of transverse lubricating grooves 22 therein. The vane is also provided with a longitudinal groove 23 which communicates with the transverse grooves 22 and with the longitudinal groove 13 of the compressor shaft. The outer end of the groove 23 opens through the end of the blade 21 and communicates with the chamber within the compressor casing ring 10. The inner peripheral surface of the piston 20 is provided with a lubricating groove 24 which also communicates with the intake groove 23 in the blade 21.

The casing end plate 8 is provided with a recess 25 in which a valve socket 26 is seated. The inner end of the valve socket is provided with an opening and a valve seat for receiving an oil inlet control valve 27. The valve 27 is controlled by means of a coil spring 28 engaged around the valve stem. The valve socket 26 is held in position by means of an apertured retaining plate 29 secured to the outer face of the casing end plate 8 by means of screws 30 or other suitable means. The screws 30 also serve to hold an oil intake screen cap 31

in position upon the outer face of the retaining plate 29. The screen cap 31 projects into the lubricant 2 within the housing 1.

When the compressor shaft 3 is rotated by a suitable driving means, the shank portion 4 and the eccentric 19 formed thereon are rotated, thereby causing the piston 20 to have a continuous rolling contact with the inner periphery of the casing ring 10 thereby imparting a reciprocating motion to the blade or vane 21. This operation of the blade 21 produces a pumping action in the lower portion of the compressor casing so that when the blade moves upwardly, a suction action is produced causing opening of the intake control valve 27 thereby permitting the lubricant from the housing 1 to be drawn through the screen cap 31 through the open valve and into the chamber within the casing ring 10. On the downstroke of the blade 21 the lubricant within the compressor casing is compressed thereby causing the intake control valve 27 to be automatically closed. The lubricant which is compressed is accordingly forced into the blade passage 23 and then outwardly through the various lubricating passages 22 and also into the lubricating passages 13 and 14 of the compressor shaft. It will thus be seen that lubricant is distributed to parts of the compressor requiring lubrication. The valve 16 acts as a check valve, permitting escape of oil from the passage 13 when the pressure is excessive and also serves as a check valve to prevent return of the lubricant from the interior of the housing 1. It will thus be seen that a forced feed lubrication system is created adapted to work automatically and depending upon the operation of the reciprocating blade 21 of the compressor.

Figures 2 and 3 cover a modified form of the device and disclose a compressor casing 32 which is adapted to be mounted within a compressor housing containing oil, similar to the arrangement illustrated in Figure 1. Mounted within the compressor casing is a compressor shaft 33 carrying an eccentric 34 around which a compressor piston 35 is engaged. The piston 35 is provided with a radially directed blade or vane 36 adapted to slidably coact with a rocker 37 mounted within a recess 38 provided in the lower portion of the compressor casing. The compressor piston is provided with lubricating grooves and passages 39 and the blade 36 is provided with lubricating passages 40. Seated within a suitable recess 41 provided in the lower portion of the compressor housing is a valve socket 42 provided with an opening and a valve seat against which an intake control valve 43 is adapted to seat. The intake control valve 43 is normally held in closed position by means of a control spiral spring 44 engaged around the valve stem.

In the modified form of the device as shown in Figures 2 and 3 the operation is similar to that described in connection with the compressor shown in Figure 1. In the modified form the blade 36 is adapted to be reciprocated when the compressor shaft 33 is rotated, thereby causing a pumping action to take place in the compressor casing 32. When the blade 36 is elevated, a suction action is produced thereby causing automatic opening of the control valve 43 to permit lubricant from the compressor housing to be drawn through the valve socket 42 into the recess 38 of the compressor casing. When the blade 36 moves downwardly, the valve 43 is automatically closed and the lubricant within the casing is compressed, thereby causing the lubricant to be forced into the lubricating passages 40 of the blade 36 and then through the lubricating passages 39 of the rotor for distribution to the parts of the compressor requiring lubrication.

It will thus be seen that an improved and simplified system of forced feed lubrication is provided for rotary compressors of a type having a reciprocating blade mechanism similar to that disclosed by the drawings.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. The combination with a compressor housing containing a lubricant, of a compressor casing mounted therein, a passaged compressor shaft in said casing projecting outwardly through said housing, an eccentric formed on said shaft within said casing, a grooved piston on said eccentric within said casing, a valve in said casing for controlling the flow of lubricant from the housing into said casing, and a passaged blade integrally formed on said piston adapted to be reciprocated by the action of said shaft and eccentric to open said valve and draw lubricant from said housing into said casing by suction and then automatically close the valve and force the admitted lubricant through the passages of said blade and shaft to lubricate the compressor parts.

2. The combination with a compressor housing containing a bath of lubricant, of a compressor casing mounted therein, a control valve in said casing controlling the flow of lubricant from said housing into the casing, of a piston in said casing, an eccentric within said piston for operating the same, and a passaged blade on said piston adapted to be reciprocated to cause automatic operation of said valve and a force feed of the lubricant to the operating parts of the compressor.

3. The combination with a compressor housing containing a bath of lubricant, of a casing therein, a valve in said casing, a grooved reciprocating piston blade in said casing for controlling the operation of said valve, and a grooved eccentric shaft adapted to be rotated to actuate the piston blade to first cause lubricant from the housing to be drawn into the casing by suction and then cause the admitted lubricant to be distributed by pressure through the casing.

4. The combination with a compressor casing and the reciprocating piston blade thereof, of a valve in said casing adapted to be governed by the operation of said piston blade, and an eccentric shaft adapted to be rotated to actuate the piston blade to permit a lubricant to be drawn into the casing by suction and then distributed through the casing by force feed.

5. The combination with a compressor housing containing a bath of lubricant, of a casing mounted therein, a piston in said casing, a passaged eccentric shaft mechanism for operating the piston, a relief valve connected with said passaged eccentric shaft, a passaged blade formed on said piston, and a lubricant intake valve in said casing governed by the operation of said blade to permit lubricant to be automatically admitted by suction into the casing and then distributed by forced feed through the passages of said blade and shaft to the operating parts of the compressor, said relief valve permitting escape of the lubricant when the pressure becomes excessive.

6. The combination with a compressor housing containing a lubricant, of a compressor casing mounted therein, a passaged shaft in said casing, a control valve in said shaft, a piston surrounding said shaft, a passaged blade on said piston adapted to be reciprocated when the shaft is rotated, and a control valve connected with the casing adapted to be operated by the action of said blade to permit oil to be admitted into the casing to be distributed by force feed by the action of said passaged blade.

7. The combination with a compressor and a reciprocating piston blade thereof, of a valve in the compressor adapted to be controlled by the operation of said piston blade to permit the compressor to be lubricated by forced feed.

8. The combination with a compressor housing containing a bath of oil, of a compressor casing mounted within said housing, a reciprocating blade forming a part of said compressor, a spring controlled valve in said casing, a screen connected with said valve to permit the oil to be filtered before passing through the valve, said blade adapted to govern the operation of said valve to first draw lubricant from said housing through said screen and valve into said casing and then distribute the admitted lubricant by forced feed to the operating parts of the compressor.

9. The combination with a compressor and the reciprocating blade thereof, of a valve mechanism mounted on said compressor adapted to be automatically actuated by the operation of said reciprocating blade to cause a lubricant to be drawn through said valve by suction and then distributed through the compressor by compression.

10. The combination with a compressor and the reciprocating piston blade thereof, of a plurality of valves on the compressor adapted to be governed by the operation of said piston blade to permit a lubricant to enter the compressor and be distributed therethrough by forced feed due to the action of said reciprocating blade.

11. The combination with a compressor and the piston blade thereof, of an eccentric shaft for operating the piston blade, and a valve mechanism governed by the operation of said blade to permit lubricant to be drawn into the compressor by suction and then distributed by compression due to the action of said blade.

12. The combination with a compressor embodying a piston and a blade co-operating therewith reciprocating in a lubricant, of passages and valve mechanism associated with said blade whereby lubricant is pumped thereto under pressure to lubricate relatively movable contacting parts of said compressor.

13. The combination with a compressor casing, of a piston therein having rolling contact therewith, a passaged eccentric in said piston, a passaged shaft for rotating the eccentric to cause operation of the piston, a valve in said shaft, a second valve in said casing, and a passaged blade on said piston co-acting with the casing to perform its usual and normal function in the compressor and also act as the piston for the forced feed lubricating mechanism.

14. The combination with a compressor casing, of a rotatable eccentric therein, a valve in said casing, a piston surrounding said eccentric and having rolling contact with the interior of said casing, and a blade formed on said piston adapted to co-act with the casing to compress and discharge a liquid and also adapted to automatically control the operation of said valve to cause a lubricant to be distributed by force feed.

In testimony whereof I have hereunto subscribed my name.

JAMES R. McCALLUM.