

Nov. 3, 1942.

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2,300,973

COMPRESSOR

Fig. 1.

Filed Aug. 29, 1941

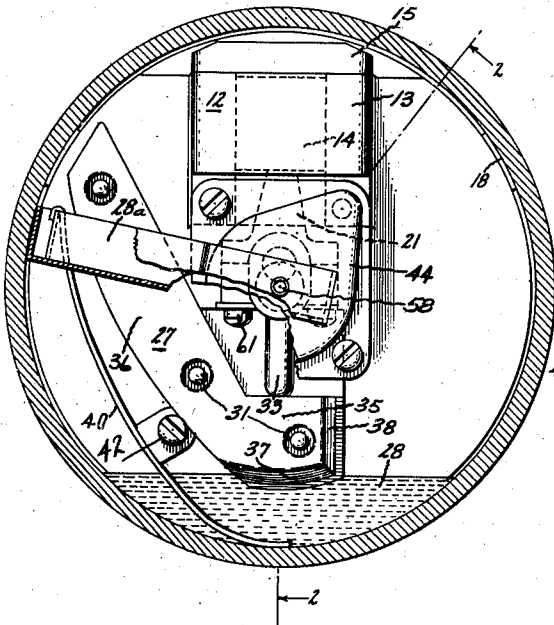


Fig. 3.

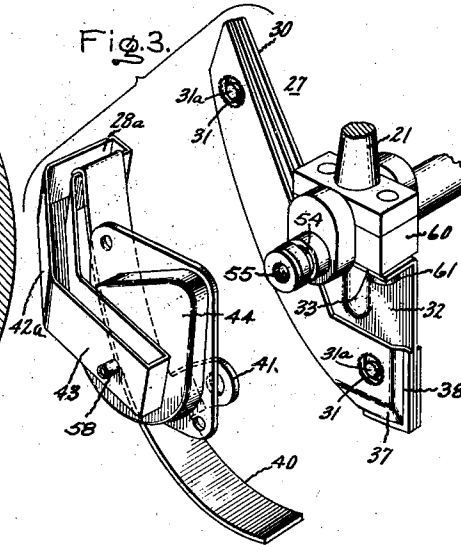
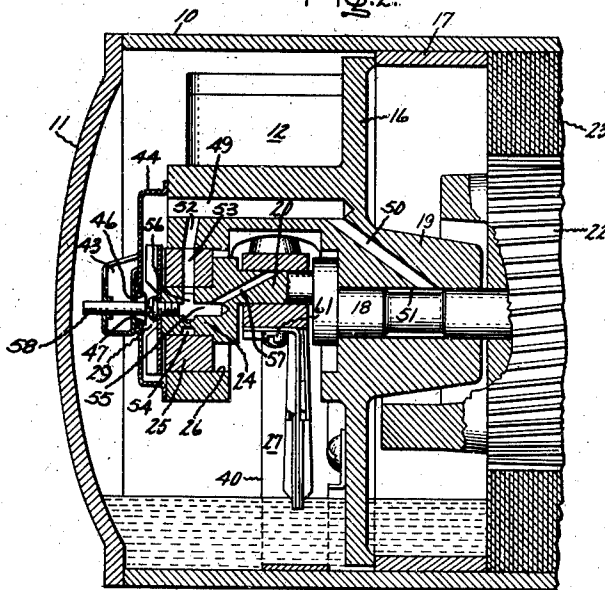


Fig. 2.



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## UNITED STATES PATENT OFFICE

2,300,973

## COMPRESSOR

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Application August 29, 1941, Serial No. 408,740

5 Claims. (Cl. 230—206)

My invention relates to compressor units and more particularly to lubricating means for use in compressors or the like.

It is an object of my invention to provide a new and improved means for conducting lubricant from a lubricant reservoir to the parts of a compressor requiring lubrication.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention reference may be had to the accompanying drawing in which Fig. 1 is an end view, partly broken away of a compressor unit of the hermetically sealed type embodying the principles of my invention, Fig. 2 is a sectional view of the apparatus disclosed in Fig. 1 taken along the lines 2—2 of Fig. 1 and Fig. 3 is an exploded partial view of the parts comprising a lubricating system embodying the principles of my invention.

Referring to the drawing, there is illustrated the motor compressor unit of the hermetically sealed type comprising a shell 10 generally cylindrical in form closed by an end plate 11. Within the casing there is provided a compressor 12 embodying a cylinder 13 having a cylinder bore within which a piston 14 is suitably arranged for reciprocation in order to compress a working fluid. The upper end of a cylinder bore is closed by a muffle box 15 containing suitable intake and exhaust valves and passages for the conduction of working fluid to and from the compressor 12.

The compressor is suitably secured within the casing 10 by means of a frame 16 generally circular in shape but having cut-away portions at the upper and lower parts thereof to provide communication through the frame. The frame is suitably located longitudinally by means of a securing ring 17 and the frame is suitably retained against the ring 17 as by calking at a plurality of points as indicated by the numerals 18. In order to provide reciprocation of the piston 14, there is provided a shaft 18 suitably journaled in the bearing portion 19 of the frame 16, the shaft 18 being provided with a crank portion 20 to which there is secured a connecting rod 21, the other end of the connecting rod being operatively attached to the piston 14 in any suitable manner.

In order to rotate the shaft 18, there is pro-

vided a motor element comprising a rotor 22 suitably secured to the shaft 18 and a stator element 23, the laminations thereof being secured within the shell 10 as by means of securing rings 17. Suitable connections (not shown) are provided for conducting electric current to the windings of the motor. The outer end 24 of the shaft 18 is suitably journaled in a bushing 25 retained in suitably formed opening 26 in the cylinder block portion of the frame 16. The bushing is suitably retained within the opening 26 in any suitable manner.

I have provided means for lubricating the shaft 18 and the shaft extension 24 as well as the crank 20. This means comprises a lubricant conveyer 27 for conveying lubricant from a supply 28 thereof located in the bottom of the casing, a trough 28a for receiving lubricant from the conveying means 27, and a pump 29 for receiving lubricant from the trough. The conveyer 27 comprises in its illustrated form three closely spaced-apart metal sheet-like members 30 maintained in spaced-apart relationship sufficiently close together to retain between the adjacent surfaces thereof and for an appreciable length of time substantial amounts of lubricant so that the lubricant will tend to be thrown against the upper walls as a result of centrifugal force. In the illustrated form of my invention, the members are similar in shape, are substantially parallel, and are disposed in planes substantially perpendicular to the shaft. For example, the outside members may be provided with inwardly directed recessed portions 31 engaging the middle member on either side thereof, the three members being suitably secured at such points as by rivets 31a or welding, for example.

I have provided means for carrying the conveyor 27 on the crank portion 20 of the shaft. For this purpose, the central or middle member is provided with an upwardly extending portion 32 having a laterally directed flange 33 which is retained against the lower bearing shell 60 by the screws 61 which hold the parts of the crank assembly in assembled relationship. In the form of my invention illustrated in the drawing, the members 30 are provided with a generally horizontal portion 35 and an inclined portion 36 extending upwardly at an obtuse angle with respect to the horizontal portion 35, the lower surface of the portion 36 being generally curved. The space between the members 30 is closed along the bottom and free end of the horizontal

portion 35 as indicated by the numerals 37 and 38, respectively, thereby forming a scoop.

As will best be seen from Fig. 1, rotation of the shaft in clockwise direction will cause the crank portion to rotate about the shaft 18 as a center, thereby causing the conveyor 27 to move in a circular path whose center is below and to the left of the shaft 18. This motion will cause the conveyor to descend into the body of lubricant

28, move to the left therein, as viewed in Fig. 1, and then move upwardly. The scooping action of the conveyor 27 will cause lubricant to be forced into the spaces between the members 30.

The lubricant conveying means described above will throw off the lubricant collected at an angle of approximately 45° from the surface of the oil or lubricant supply 28 because of the effects of centrifugal force unless means is employed for its retention. Inspection of Fig. 1 will show that lubricant thus discharged from the liquid conveyor would strike the lower or central portions of the wall of the shell 10. I have provided means in addition to the arrangement of the parts of the scoop or conveyor 27 for retaining the supply of lubricant between the members 30 until such lubricant can be discharged against the upper wall portions of the casing. This means takes the form of a guard member 40 disposed below the conveyor 27 and preferably shaped substantially the same as the leading or lower edge of the inclined portion 36 of the conveyor. In order to support the guard member in position, I have provided an outwardly and laterally projecting flange 41 which may be suitably attached to the guard 40 or integral therewith, the laterally projecting portion having a suitable opening for the passage of a fastening member 42 therethrough and into threaded engagement with a suitably threaded bore in the lower portion of the frame 16. Inspection of Fig. 1 will show that as the lubricant conveyor moves to the left into proximity with the guard member 40, the open spaces on the lower side of the inclined portion of the conveyor will be substantially closed and lubricant picked up while the conveyor is moving through the body of lubricant will be maintained in the spaces between the members. Inasmuch as the leading edge of the members 30 and guard 40 are generally curved, the spaces between the members 30 will be substantially closed for a considerable portion of the upward clockwise movement of the lubricant conveyor. This period of time should be sufficiently long that when centrifugal force is effective to throw off the lubricant from the members 30, such lubricant will be thrown against the upper walls of the casing 10.

In order to collect the lubricant draining down the side wall of the casing, the trough 28a is supported closely adjacent the side wall of the casing as will be hereinafter described. The guard may be conveniently carried by or attached to the trough, as best seen in Fig. 3.

In order to conduct lubricant from the trough to the points of the compressor assembly requiring lubrication I have provided an impeller type lubricant pump 29 contained within a suitably fashioned casing 44. In order to conduct the lubricant from the trough 28a to the chamber 44, I have provided the trough with downwardly inclined portions 42a and 43, the latter having communication with the casing 44 through a passage 46 in the adjacent walls thereof. The portion 43 of the trough may be suitably secured to the wall of the chamber 44 as by providing an

outwardly extending boss 47 arranged to be extended through a suitable opening in the wall of the chamber 44, the edge thereof being turned over to engage the material adjacent the opening 46.

In order to provide lubrication for the portion of the shaft extending through the bearing portion 19 of the frame 16 and for lubricating the bearing 25 and also for lubricating the crank 20,

I have provided a plurality of passages communicating with the chamber 44. Thus, referring to Fig. 2, the oil pumped into the upper portion of chamber 44 by the impeller 29 will be directed to the right along the passage 49 and passage 50 to a recess 51 in the shaft 18, thereby providing lubrication for the shaft. In order to lubricate the bearing 25 and the shaft portion 24 turning therein, I have provided a passage 52 in the frame 16 and a passage 53 in the bearing 25 communicating with an annular groove 54 in the shaft portion 24. In order to lubricate the crank portion 20 of the shaft, I have provided a longitudinally extending bore 55 and a laterally extending bore 56 communicating with the groove 54, an inclined passage 57 extending from the end of the bore 55 to the central portion of the surface of the crank portion 20. Lubricant working out from between the relatively moving surfaces will drop into the lower portion of the casing which constitutes a lubricant reservoir, thereby returning to the body of lubricant 18.

In order to prevent the accumulation of refrigerant gas at the center of the lubricant pump chamber 44 and possible interference with the proper operation of the lubricating system, I may provide a suitable vent 58 communicating between the central portion of the chamber 44 and the interior of the compressor unit.

While I have shown a particular embodiment of my invention, I do not desire my invention to be limited to the particular construction shown and described and I intend in the appended claims to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a compressor assembly including a casing, a shaft, lubricant conveying means carried by said shaft, said means comprising a plurality of closely spaced-apart members, a supply of lubricant, means for rotating said shaft to move said members through said lubricant and collect lubricant between said members, and means to receive said collected lubricant from said conveying means, said members being disposed sufficiently close together to retain substantial amounts of lubricant between the adjacent surfaces thereof until said lubricant is thrown out or expelled by centrifugal force.

2. In a compressor assembly including a casing, a shaft, lubricant conveying means carried by said shaft, said means comprising a plurality of spaced-apart members, a supply of lubricant, means for rotating said shaft to move said members through said lubricant whereby lubricant is collected between said members and carried upwardly, means for maintaining said lubricant between said members during the initial portion of the upward movement of said members, said means including means for closing the space between said members adjacent the lower ends thereof, and means for receiving said lubricant from said conveying means.

3. In a compressor assembly including a casing, a shaft having a crank portion, lubricant con-

veying means carried by said shaft, said means comprising a plurality of spaced-apart members, a supply of lubricant, means for rotating said shaft to move said members through said lubricant whereby lubricant is collected between said members and carried upwardly, means for maintaining said lubricant between said members during the initial portion of the upward movement of said members, said means including means for closing the space between said members adjacent the lower end of said conveying means and a guard member disposed below said conveying means and being of substantially the same shape as the leading edge of said conveying means, said guard being positioned closely adjacent the leading edge of said conveying means during the initial upward movement of said conveying means in order substantially to close said spaces during said initial movement, said lubricant being discharged by centrifugal force against the upper walls of said casing as said conveying means is withdrawn from said guard, and means for collecting lubricant draining down the side walls of said casing.

4. In a compressor assembly including a casing and a shaft rotatably supported in said casing and having a crank portion, the combination of lubricant conveying means carried by said crank, said means comprising a plurality of spaced-apart members, each of said members having a generally horizontal portion at the lower end thereof and an inclined portion extending upwardly at an obtuse angle with respect to said horizontal portion, the space between said members being closed along the bottom and free end of said horizontal portion but open along the inclined portion thereof, means for rotating said

conveying means whereby said means is moved downwardly into, through, and upwardly out of said supply of lubricant, means for retaining lubricant between said members during the initial part of the upward movement of said conveying means including means for closing said space at the bottom thereof along the inclined portion of said members, said last mentioned means being disposed below and being of substantially the same shape as the leading edge of said conveying means, means for rotating said conveying means to cause movement through said lubricant toward said retaining means and upwardly along said retaining means closely adjacent to the leading edge of said member in order substantially to close said spaces and thence away from said retaining means as said members emerge from said lubricant supply whereby lubricant is thrown by centrifugal force against the upper walls of said casing, and means for collecting said discharged lubricant.

5. In a compressor assembly including a casing, a shaft, lubricant conveying means carried by said shaft, said means comprising a plurality of closely spaced-apart substantially parallel and similar members disposed in planes substantially perpendicular to said shaft, a supply of lubricant, means for rotating said shaft to move said members through said lubricant and to collect said lubricant between the adjacent faces of said members, and means to receive said collected lubricant from said conveying means, said members being disposed sufficiently close together to retain between the adjacent surfaces thereof substantial amounts of lubricant for an appreciable length of time.

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