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COMPRESSOR

Filed June 4, 1928

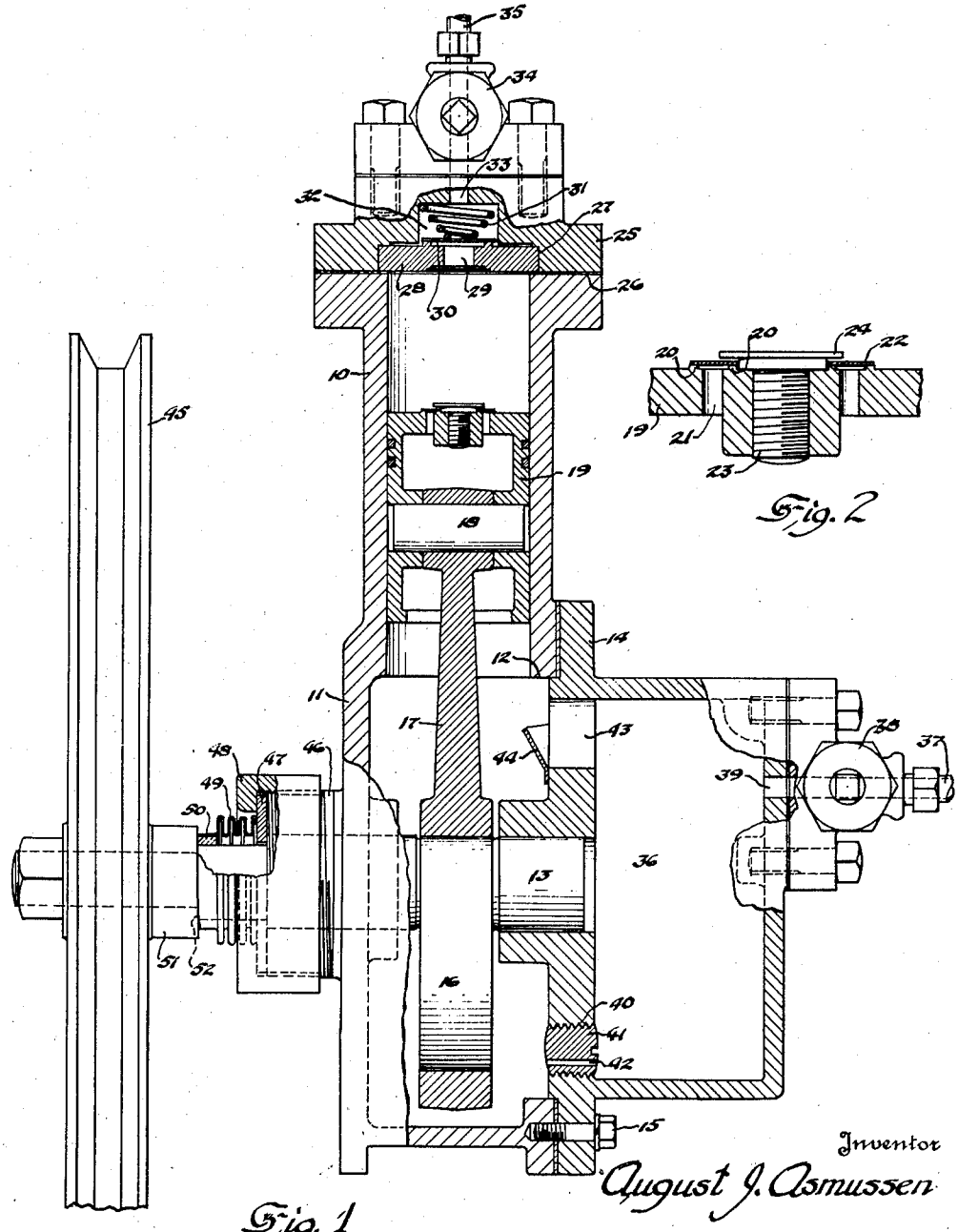


Fig. 1

Fig. 2

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COMPRESSOR

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This invention relates to pumping mechanism and particularly to those types thereof adapted for use in connection with mechanical refrigerating systems, the principal object being the provision of a new and novel construction therefor by which the amount of lubricant passing through the refrigerant circuit with the refrigerant will be minimized.

Another object is to provide a mechanism by which the lubricant being returned to the compressor of a mechanical refrigerating system with the refrigerant will be separated out from the refrigerant and will be fed to the compressor at a predetermined rate for lubricating the same.

Another object is to provide a separating chamber in connection with the base of the compressor of a mechanical refrigerating system and in which the lubricant and gaseous refrigerant being returned to the compressor from the expansion element will be separated from each other, means being provided for feeding a predetermined amount of lubricant to the compressor during normal operation of the same, and further means being provided for automatically returning to the chamber any excess lubricant that may collect in the compressor.

The above being among the objects of the present invention the same consists in certain features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawing, and then claimed, having the above and other objects in view.

In the accompanying drawing which illustrates a suitable embodiment of the present invention, and in which like numerals refer to like parts throughout the several different views,—

Fig. 1 is a side elevation of a compressor constructed in accordance with the present invention, certain parts thereof being broken away to show a section of the same as taken in a plane passing through the axis of the cylinder.

Fig. 2 is a fragmentary enlarged vertical sectional view showing the valve in the piston head.

I show a compressor having a cylinder 10 cast integrally with the crank case 11. One side of the crank case is provided with an opening 12 to permit the insertion of the crank 13 and is closed by a wall 14 secured to the crank case by screws such as 15 or other suitable means. The crank 13 has bearing in the wall 14 and also in the opposite wall of the crank case and has formed thereon the eccentric 16 which is engaged by the lower end of the connecting rod 17. The upper end of the connecting rod 17 is connected by the pin 18 to the piston 19. The head of the piston 19 is provided with a pair of concentric annular ridges 20 which serve as valve seats, a plurality of openings 21 extend from between the ridges 20 to the lower face of the piston head. An annular valve member 22 overlying the ridges 20 is adapted to close the openings 21 to the passage of refrigerant on the upstroke of the piston, and is limited in its upward movement on the down-stroke of the piston by means of the screw member 23 threaded into the head of the piston and provided with the flange 24 which overlies the upper inner surface of the valve member 22. Instead of the usual outlet valve plate between the cylinder and cylinder head which completely separates the cylinder from its head in conventional constructions and thereby necessitates two gaskets in order to effect a proper seal between the cylinder head, cylinder and valve plate, in the present construction I bring the cylinder head 25 directly against the cylinder with the interposition of a single gasket 26 only therebetween, and I provide a recess 27 in the lower face of the cylinder head of slightly greater diameter than the bore of the cylinder 10. In this recess 27 I place my valve plate 28, which is of the same depth as the recess 27, so that when the cylinder head 25 is drawn down onto the cylinder 10 by suitable means (not shown), the gasket 26 not only serves to seal the escape of gas between the cylinder 10 and valve plate 28 but also between the cylinder 10 and cylinder head 25. By this means a single gasket accomplishes the same result as two gaskets do in conventional construc-

tions and results in a construction that is more simple and more economical to produce than the conventional constructions.

The plate 28 is provided with a central opening 29 which is normally closed by the valve member 30 which overlies the same and which is constantly urged to closed position by means of the coil spring 31 held in compressed condition between the valve member 30 and the upper wall of the recess 32 in the cylinder head 25. The recess 32 is connected by means of a passage 33 to a conventional form of valve mechanism 34 from which the gas compressed by the compressor may escape through the tube 35 to a condenser (not shown).

The wall 14 for the compressor crank case forms one wall for a chamber 36. Refrigerant in the gaseous state is led into the chamber 36 adjacent its upper portion through the tube 37, valve mechanism 38 and passage 39. The wall 14 adjacent the bottom of the chamber 36 is provided with an opening 40 closed by a plug 41 and the plug 41 at a point above the bottom of the chamber 36 is provided with a small opening 42. The wall 14 adjacent the top of the chamber 36 is provided with a relatively large opening 43 and secured to the crank case side of the wall 14 adjacent the lower edge of the opening 43 and extending upwardly and inwardly of the crank case therefrom is a baffle member 44.

In operation the gasified refrigerant from the expansion element of the refrigerating mechanism which is ladened with lubricant is discharged through the passage 39 into the chamber 36 where, because of the volume of the chamber 36, its speed is reduced and the lubricant is separated out and deposited in the bottom of the chamber 36. Supposing that the compressor is in operation, the lubricant in the bottom of the chamber 36 passes through the opening 42 in the plug 41 and into the bottom of the crank case of the compressor where it is picked up and thrown around by the lower end of the connecting rod 17 in order to reach and lubricate the wearing surfaces of the compressor. Some of this lubricant is unavoidably picked up and mixed with the refrigerant which is being passed through the piston and being compressed above it. The opening 42 is so proportioned that the flow of lubricant into the crank case of the compressor from the chamber 36 is of a proper amount to provide the necessary lubrication of the wearing surfaces of the compressor without supplying an excessive amount thereof. Furthermore, in view of the fact that the opening 42 is positioned above the bottom of the chamber 36, any sediment or other foreign matter that may be carried through the circulating system will be deposited in the bottom of the chamber 36 and will there be trapped below the opening 42 and be prevented from re-circulating through the system. Also, any sediment, scale or like foreign matter that may be present in the compressor will be picked up with the lubricant being returned to the chamber 36, as described later, and there be trapped.

It will be apparent that if the compressor has remained stationary for a sufficient length of time, any lubricant that may have built up its level in the chamber 36 will flow through the opening 42 until the lubricant in the chamber 36 and in the crank case of the compressor has reached an equal level in both places. If no means were provided for returning this excessive amount of lubricant to the chamber 36 upon operation of the compressor, it will be apparent that an excessive amount of lubricant might find its way into the refrigerant circulating system. In order to overcome such a possibility, the baffle 44 previously described is provided so that if there is an excessive amount of lubricant in the crank case when the compressor is started up, or during normal operation, such lubricant being thrown around by the connecting rod 17 and eccentric 16 will find its way above the baffle 44 and drop into contact with the same and will thus be conducted back into the chamber 36 through the opening 43 where it will be fed back to the crank case at the proper rate of feed through the opening 42 to provide sufficient but not excessive lubrication for the compressor. I find that by this means a substantially minimum amount of lubricant is passed through the compressor with the refrigerant.

The crank 13 is provided with the usual fly wheel 45 thereon outside of the crank case in order to provide means for transmitting driving effort thereto. The shaft between the fly wheel 45 and crank case 11 is sealed against leakage of refrigerant in the following manner: The crank case 11 is provided with a bossed extension 46 within which the crank 13 bears. A ring member 47 is clamped against the outer end face of the portion 46 by means of the nut member 48 threaded on the extension 46, suitable gaskets being provided between the contacting faces. The ring member 47 has permanently secured thereto a metal bellows 49 to the outer end of which is permanently secured a sleeve member 50 which surrounds the crank 13 and is adapted to bear against the end face of the hardened collar member 51 drawn up against the shoulder 52 on the crank 13 by the hub of the fly wheel 45. The pressure of any gas within the crank case of the compressor that may escape past the bearing of the shaft 13 to the bellows 49 serves to expand the bellows 49 and urge the collar 50 into closer contact with the collar 51, thereby making the seal between the same more effective. The bellows 49 is, of course, placed under an initial compression upon assembly so that

pressure acts at all times to maintain the collars 50 and 51 in contact.

Although I have shown a chamber 36 formed as an integral part of the wall 14 for the open side of the compressor, it will be apparent that this is done for ease and economy of manufacture and that it may be formed separately therefrom when found advisable or desirable. It will also be apparent that the opening 40 is formed in the wall 14 primarily as a means for supporting the core for the chamber 36 during casting operations and that the same may be dispensed with if desired and the opening 42 formed directly in the wall 14. It will also be apparent that a screen or other filtering means may be provided for the opening 42.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. In a compressor for refrigerating systems, in combination with a crank case thereof, a container, a wall common to said container and said crank case, a wall of said container having a passage for introducing lubricant laden gasified refrigerant into said container, the first mentioned wall having a restricted opening connecting the lower portion of said container with said crank case, and said first mentioned wall having a larger opening connecting the upper portion of said container with said crank case.

2. In a compressor for refrigerating systems, in combination with a crank case thereof, a container, a wall common to said container and said crank case, a wall of said container having a passage for introducing lubricant laden gasified refrigerant into said container, the first mentioned wall having a restricted opening connecting the lower portion of said container with said crank case, said first mentioned wall having a larger opening connecting the upper portion of said container with said crank case, and a baffle positioned on the crank case side of said wall adapted to catch lubricant thrown about in said crank case and to return said lubricant to said container through said larger opening.

3. In a compressor for refrigerating systems, in combination with the crank case thereof, a container receiving and separating lubricant laden gasified refrigerant provided with an inlet and having an orifice in a wall thereof connecting the lower portion of said container with said crank case, said orifice serving to permit a throttled flow of lubricant from said chamber to said crank case, and said container having a gas outlet passage in a wall thereof connecting the upper portion of said chamber with said crank case.

4. In a compressor for refrigerating systems, in combination with the crank case thereof, a container into which the lubricant laden gasified refrigerant from an expansion element is led, said container having sufficient capacity to separate said lubricant from said refrigerant, said container having a restricted passage in a wall thereof connecting the lower part of said container with said crankcase whereby to feed said separated lubricant at a predetermined rate to said crank case during natural normal operation of said compressor, and said container having a second passage in a wall thereof connecting said container and said crank case for passing said refrigerant to said crank case from said container without material restriction in the flow thereof.

5. In a compressor for refrigerating systems, in combination with the crank case thereof, a separating container for lubricant laden refrigerant, said container having separate passages in the walls thereof for separately feeding the separated lubricant and refrigerant in said container to said crank case, said passage for said lubricant being of a size to throttle the rate of flow of lubricant therethrough during normal operation of said compressor.

6. In a compressor for refrigerating systems, in combination with the crank case thereof, a separating container for lubricant laden refrigerant, said container having separate passages in the walls thereof for separately feeding the separated lubricant and refrigerant in said container to said crank case, and a plug in said passage for said lubricant having a restricted orifice therein.

7. In a compressor for refrigerating systems, in combination with the crank case thereof, a separating container for lubricant laden refrigerant, said container having separate passages in the walls thereof for separately feeding the separated lubricant and refrigerant in said container to said crank case, and a plug in said passage for said lubricant having a restricted orifice therein leading from a point spaced above the bottom of said container to said crank case.

8. In combination with a compressor for refrigerating systems, a container in which gasified refrigerant is separated from lubricant carried thereby, said container having a substantially unrestricted passage in the upper portion of a wall thereof whereby said refrigerant free of said lubricant may be passed to the compressor, and said container having a restricted passage in the lower portion of said wall whereby said separated lubricant may be fed to said compressor at a predetermined rate during normal operation of said compressor.

9. In combination with a compressor for refrigerating systems, a container in which gasified refrigerant from an expansion element is separated from lubricant carried

thereby, said container having a passage in a wall thereof connecting said container and said compressor whereby said gasified refrigerant is freely passed from said container to said compressor, said container having a second passage of restricted size in a wall thereof connecting said container and said compressor whereby a throttled flow of said lubricant in said container is fed to said compressor, and means for returning excessive amounts of lubricant in said compressor to said container during normal operation of said compressor.

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