

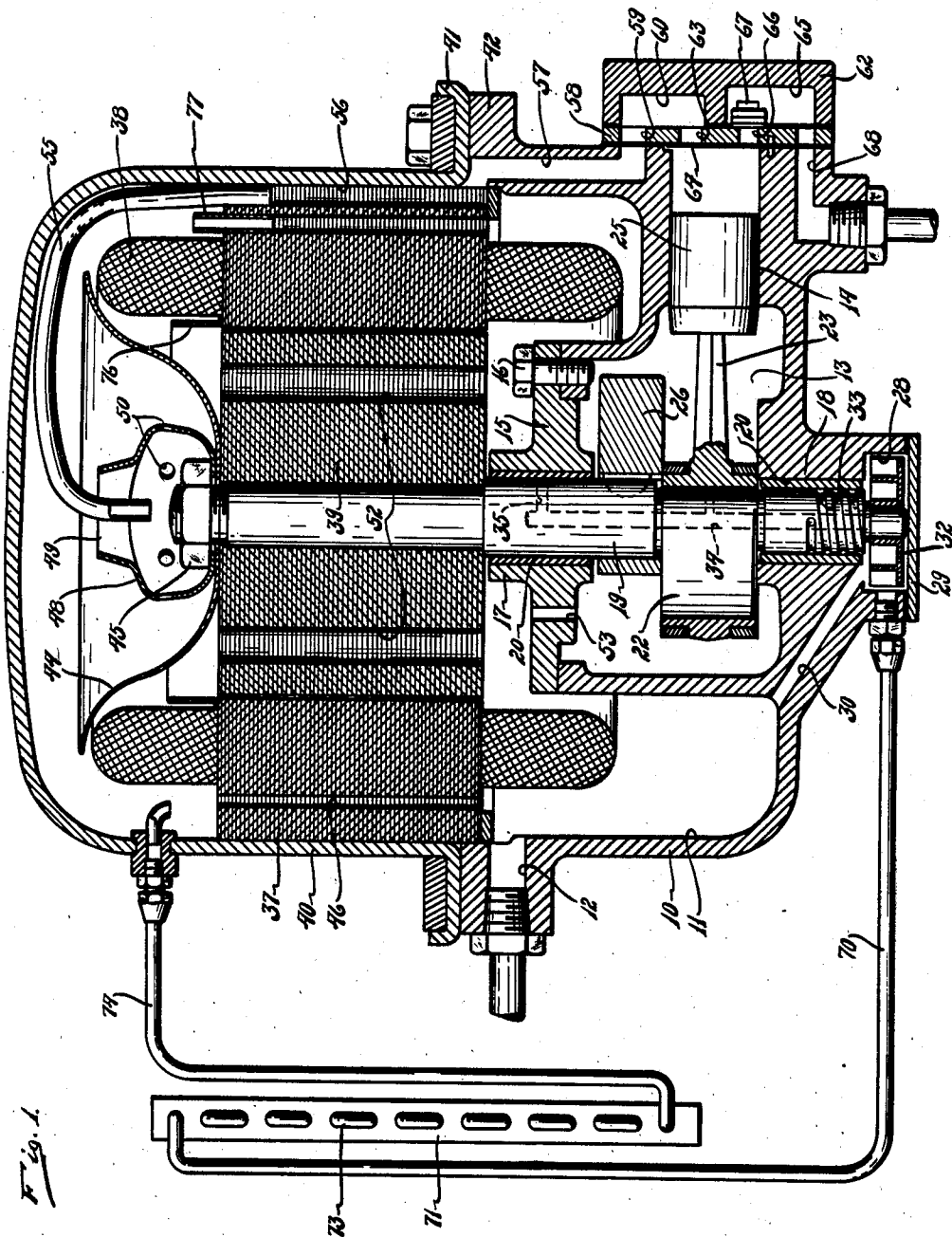
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REFRIGERATING APPARATUS

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REFRIGERATING APPARATUS

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This invention relates to an improvement in refrigerating apparatus and particularly of the compressor type wherein provision is made for cooling the compressor.

The invention consists of a sealed casing within which is housed a motor compressor unit, and wherein the drive shaft of the motor compressor unit operates a centrifugal pump for delivering the oil collected in the sump to a radiator or condenser and then returns the cooled oil to the upper portion of the casing wherein the oil is allowed to drain back to the sump and thereby cool the motor.

The invention further consists of a receptacle or chamber connected to the drive shaft above the rotor of the motor and into which the low pressure refrigerant is received and the oil separated therefrom. Suitable means is provided for conducting the refrigerant from the chamber to the intake port of the compressor.

The invention consists of certain other novel features of construction and combination of parts, which will be hereinafter described and pointed out in the claims.

In the accompanying drawing, Figure 1 is a vertical sectional view and partly in elevation, illustrating an embodiment of the invention.

In the construction shown, the compressor is preferably made of a casting 10 wherein is formed a chamber 11 in which the low pressure refrigerant is received and the oil collected. The low pressure refrigerant from an evaporator is delivered to chamber 11, through an inlet port 12. Formed within the casting 10 is a crank-case 13 and a cylinder 14 which has communication with the crank-case 13. A cover plate 15 is secured by bolt 16 to the top of the crank-case and the cover plate 15 and the bottom of the casting are provided with suitable journals 17 and 18 for a drive shaft 19. Suitable bearings 20 are provided in the journals 17 and 18 for the shaft 19. The drive shaft 19 is provided with an eccentric 22 on which is mounted an end of a pitman or connecting rod 23, the pitman 23 being connected to a piston 25 which reciprocates within the cylinder 14. A suitable counterweight 26 is connected to the shaft 19.

Formed in the base of the casting and beneath the crank-shaft is an oil well 28 which is closed by means of a cover plate 29 suitably secured to the casting. The well 28 has communication with the chamber 11, by means of a passage 30 for supplying oil to the well. The drive shaft 19 extends into the well 28 and mounted on the shaft is a centrifugal pump 32. The drive shaft at its lower

end is provided with a spiral groove on its outer surface 33 for conducting oil from the well 28 to the hollow passage 34 in the shaft 19. Suitable radial passages 35 are formed in this shaft and have communication with the passage 34 for conducting oil to the bearings 20 and crank-case.

Mounted upon the casting 10 is a stator 37 of an electric motor provided with windings 38. A rotor 39 is mounted upon the drive shaft 19 and adapted to be rotated within the stator. A hood 10 or casing 40 envelops the electric motor and is provided with an annular flange 41 at its base, which is supported upon an annular flange 42 formed on the casting 10. The flanges 41 and 42 are connected together by means of bolts or other means for forming a hermetically sealed compartment for the motor compressor unit.

Mounted upon the rotor 39 is a dish like shield 44 which projects or flares over the windings 38. This shield is connected to the drive shaft 19 by means of the nut 45 which locks the rotor to the shaft 19. This shield is provided to prevent the oil from flowing down onto the motor, and any oil that is collected in the shield from the low pressure refrigerant which is stored in the upper portion of the casing or hood 40, will be thrown out of the shield by centrifugal force upon the rotation of the motor and will pass down through openings 46 formed in the stator and between and along the walls into the chamber 11.

A low pressure refrigerant receiving chamber or receptacle 48 is mounted upon the rotor 39 and within the shield 44 and is connected to the drive shaft by the nut 45 so that this chamber 48 and the shield 44 will rotate in unison with the rotor. The receptacle or chamber 48 is open at its top as at 49 for the ingress of the low pressure refrigerant and is also provided with a plurality of orifices 50 in the walls thereof, through which lubricant may be discharged to the shield 44.

Upon the operation of the motor and compressor, low pressure refrigerant is drawn from an evaporator (not shown) through the passage or inlet 12 into the chamber 11. The refrigerant will be drawn upwardly into the hood or casing 40 and as it passes through the motor and openings 52 formed in the rotor 39, the oil will be separated to a large extent from the refrigerant and allowed to fall back into the chamber 11. Some of the oil or lubricant will pass through openings 53 in the cover plate 15 into the crank-case 13. The lower pressure refrigerant will collect in the upper portion of the hood or casing 40 and enter into the chamber or receptacle 48.

A tube or piping 55 extends through the opening 49 of the receptacle 48 and projects a suitable distance within the receptacle. This tube forms a passage for the low pressure refrigerant and conducts it to a passage 56 formed between the stator 37 and the hood 40. The refrigerant is conducted from this passage 56 into a passage 57 formed in the casting 10 and is delivered through a port 59 in the valve plate 58 positioned over the cylinder 14 and into a passage 60 formed in the cylinder head 62. The valve plate 58 is provided with a port 63, normally closed by a reed valve 64. However, upon the suction stroke of the piston 25, this valve is opened and the low pressure refrigerant is drawn from the passage 57 and through the port 63 into the cylinder 14. The cylinder head 62 is provided with a passage 65 which has communication with the cylinder 14 through a port 66 formed in the valve plate 58. This port 66 is normally closed by a valve 67 but upon the compression of the refrigerant by the piston, this valve is unseated and the compressed refrigerant will be delivered into the passage 65 where it is delivered to a passage 68 formed in the base of the casting 10. From the passage 68, the refrigerant is conducted to a condenser (not shown), where the refrigerant will be liquefied and then conducted through suitable valve means before being delivered to an evaporator.

During the refrigerating cycle, a quantity of oil is collected in the chamber 11, and to cool this oil and to utilize it for cooling the motor, the oil is conducted from the chamber 11 by the passage 30 to the well 28 where the centrifugal pump 32 will discharge the oil from the well through a conduit 70 connected to the well and deliver it to a radiator or condenser 71. The radiator or condenser is here shown as made up of sinuous tubing 73 and into which the oil is delivered and cooled by any suitable means such as a fan, water or what not. The oil is delivered from the condenser 71 through a conduit 74 which extends into and through the hood or casing 40. The oil is delivered over the stator 37 and drains back into the compartment 11 through the passages 46 and in this manner, effects a cooling of the motor. A suitable baffle 76 is mounted upon the stator for preventing the oil from getting onto the rotor 39 and an overflow pipe 77 is also provided in the stator 37 for forming an additional means for conducting the oil into the chamber 11.

From the foregoing, it will be observed that provision is made for removing the oil from the casing housing and the motor compressor unit, by means of a centrifugal pump and delivering it to a condenser or radiator located exteriorly of the casing, where the oil may be cooled and returned to the casing in a cooled condition for cooling the motor. Furthermore, provision is made for collecting any oil that may become separated from the low pressure gas as it is delivered into the upper portion of the hood of casing 40 and from which the oil is discharged by centrifugal force due to the rotation of the motor and this oil is returned to the chamber 11, through the passages 46 formed in the stator.

The provision of the chamber 48 into which the low pressure refrigerant is delivered prior to its delivery to the cylinder 14, also rotates with the rotor and any oil which may be contained within the refrigerant will be extracted therefrom, due to the rotary motion imparted to the chamber receptacle 48, so that the refrigerant is freed to a large extent of the oil before its delivery to the compressor. This chamber also acts

as a muffler in reducing the noise due to the suction created by the compressor in drawing the low pressure refrigerant into the cylinder 14.

The oil separated from the refrigerant in the receptacle 48 is delivered to the shield 44 through the orifices 50, and this separated oil is discharged from the shield by centrifugal force over the stator and beyond the baffle 76, where it may drain into the chamber 11 through the passages 46.

As will be noted overflow pipe 77 is larger in diameter than holes 46 and in the event more oil is pumped to the top of the motor than will pass through holes 46 the remainder will pass through the overflow 77 to the reservoir below.

Although only a preferred form of the invention has been illustrated, and that form described in detail, it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. In a refrigerating apparatus a casting having a low pressure refrigerant and oil chamber and a compressor chamber, a compressor mounted in said compressor chamber, a motor for said compressor, a casing for enclosing said motor and connected to said casting, a drive shaft for said motor and compressor, said casting having a low pressure inlet and high pressure outlet for the refrigerant, said motor causing separation of entrained lubricant from the low pressure refrigerant by centrifugal action as the refrigerant passes through said motor, said separated low pressure refrigerant being directed to the top of said casing and the oil into the oil chamber of the casting and a receptacle carried by said motor having communication with said casing for receiving the separated low pressure refrigerant and means associated with said receptacle for conducting the low pressure refrigerant to the compressor.

2. In a refrigerating apparatus, a casting having an oil chamber and a compressor chamber formed therein, a compressor mounted in said compressor chamber, a motor mounted upon said casting, a drive shaft for said motor and compressor, a casing connected to said casting for enclosing said motor and providing a chamber between the top thereof and said motor for the low pressure refrigerant, a shield disposed over said motor and connected to said drive shaft, a receptacle disposed over said motor and connected to said drive shaft for receiving low pressure refrigerant and oil from said casing chamber, said receptacle being subjected to rotary motion by said motor and causing a separation by centrifugal force of the oil from said refrigerant, said oil being delivered into said shield and discharged from said shield due to the rotation of the shield with the motor, and means associated with said receptacle for conducting the low pressure refrigerant to the compressor.

3. In a refrigerating apparatus a casting having a crankcase and a cylinder of a compressor formed therein and an oil and a low pressure refrigerant chamber arranged about said crankcase, means for delivering low pressure refrigerant to said chamber, a piston movable in said cylinder, a drive shaft journaled in said crankcase for operating the piston, an electric motor connected to said drive shaft, a hood for enclosing said motor and connected to said casting, said motor causing separation of entrained lubricant from the low pressure refrigerant by centrifugal action as the refrigerant passes through said

5 motor, said separated low pressure refrigerant being directed to the top of said hood, a receptacle carried by said motor having communication with said hood for receiving the separated refrigerant, and means for conducting the refrigerant from said receptacle to the cylinder.

4. In a refrigerating apparatus, a casing having a low pressure refrigerant and oil chamber, pumping mechanism and an electric motor

mounted in said casing, said motor causing a separation by centrifugal action of the entrained oil from the low pressure refrigerant as the refrigerant passes through said motor, a receptacle mounted upon and rotating with said motor for receiving the separated low pressure refrigerant, and means for conducting the refrigerant from said receptacle to said pumping mechanism.

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