April 24, 1934. H. A. GREENWALD 1,955,958

PUMP FOR REFRIGERATING APPARATUS

Filed Aug. 22, 1932 2 Sheets-Sheet 1

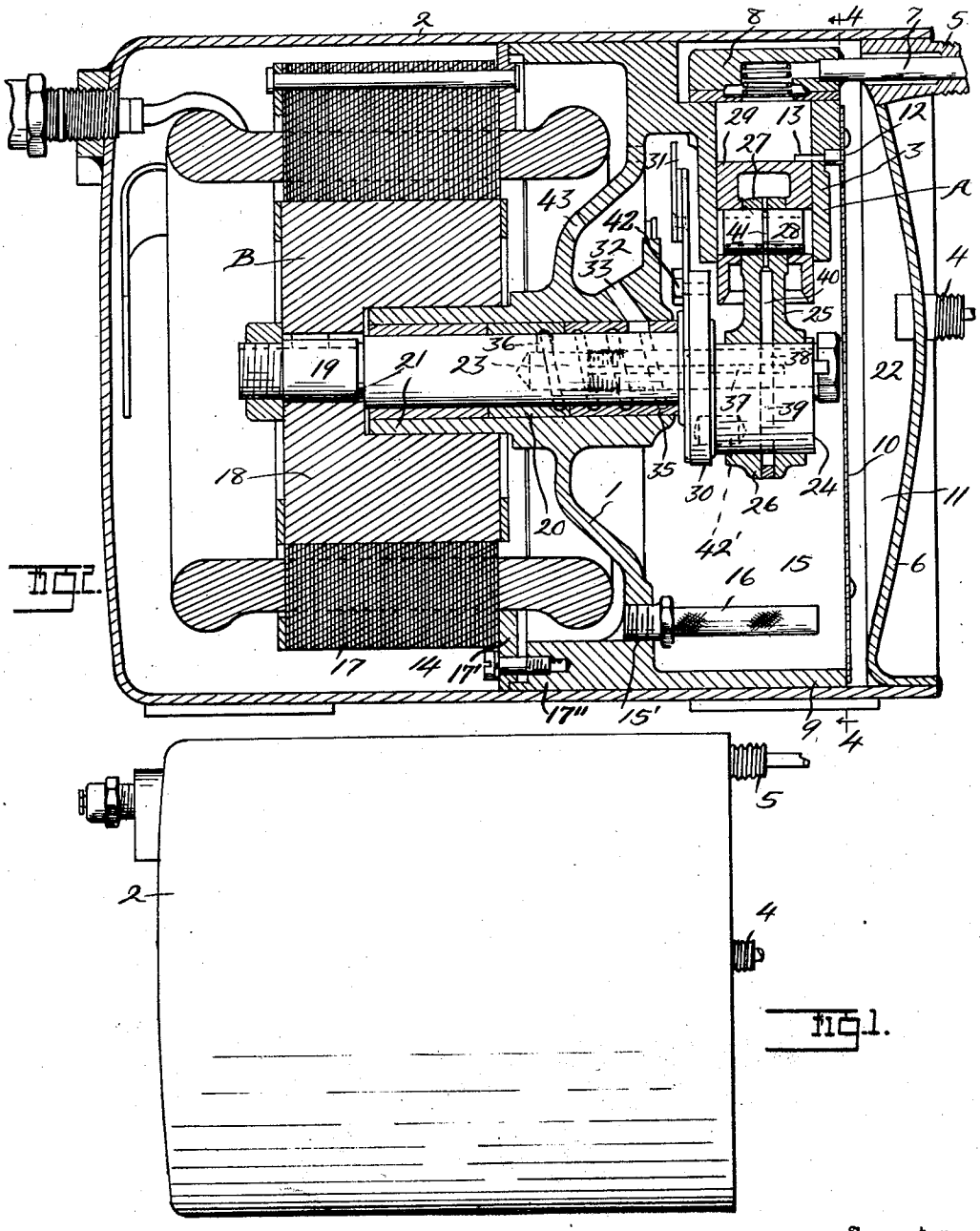


FIG. 1.

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Fig. 4.

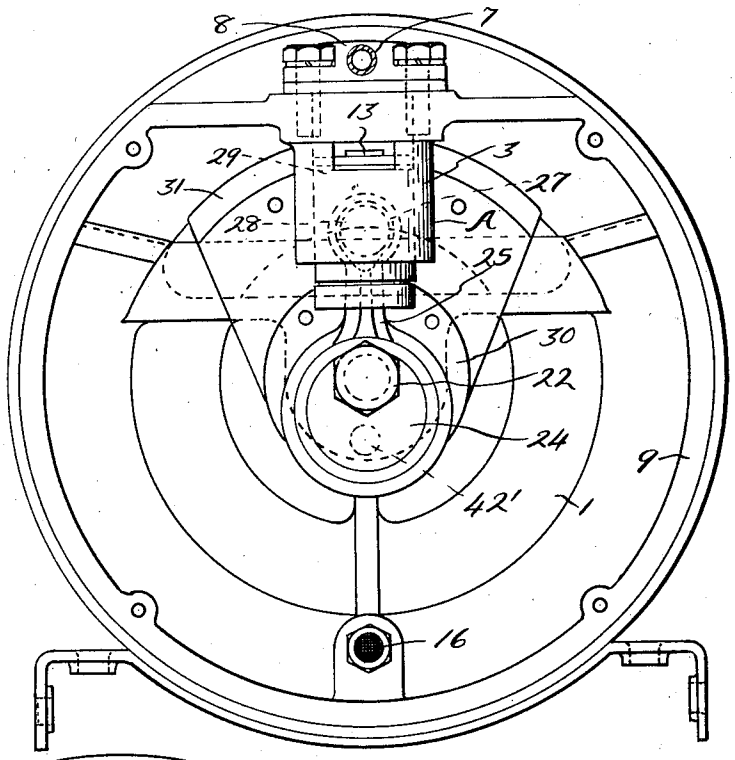
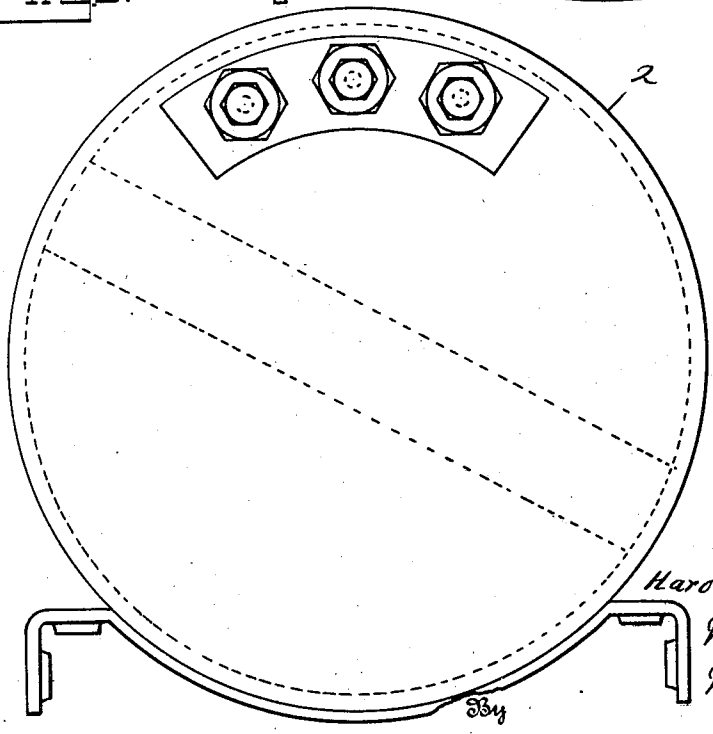


Fig. 3.



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PUMP FOR REFRIGERATING APPARATUS

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Application August 22, 1932, Serial No. 629,962

26 Claims. (Cl. 230—206

This invention relates generally to refrigerating apparatus and consists of certain novel features of construction, combinations and arrangements of parts, that will be hereinafter more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a side elevation of an assembly embodying my invention;

Figure 2 is a vertical longitudinal sectional view through the structure illustrated in Figure 1;

Figure 3 is an end elevation of the structure illustrated in Figure 1;

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 2.

Referring now to the drawings, wherein I have illustrated one embodiment of my invention, A is a pump in which the refrigerant is compressed and B is an electric motor for driving the same. As shown, the pump A and motor B are located upon opposite sides of a transversely extending partition 1 within a hermetically sealed casing 2. The pump cylinder 3 is preferably integral with the partition 1 and is wholly within the casing 2. In the present instance, refrigerant from the cooling unit (not shown) of the refrigerating apparatus is supplied through an inlet nipple 4 to the casing 2 and is discharged therefrom through an outlet nipple 5 to suitable tubing (not shown) leading to the condenser of the apparatus. As illustrated in Figure 2, the inlet nipple 4 extends through the end wall 6 of the casing at approximately the center thereof, while the outlet nipple 5 is fixed to the wall 6 adjacent the top of the casing and surrounds a tube 7 projecting laterally from the cylinder head 8. Preferably the partition 1 is provided upon the right side of the cylinder 3 with a substantially annular ring portion 9 to which a relatively thin flat disc or baffle 10 is secured so that a chamber 11 is provided at the inner end of the nipple 4. Preferably the disc 10 has an opening 12 in registration with the inlet port 13 in the cylinder so that the refrigerant from the inlet nipple 4 may enter the cylinder 3 of the pump, and the connections between the disc 10 and ring portion 9 are such that oil received in the chamber 11 from the inlet nipple 4 may seep between the disc 10 and ring portion 9 and seek its level in the pump and motor chambers 14 and 15 respectively in the casing 2, but dirt, scale and other foreign matter discharged from the inlet nipple 4 will be trapped in said chamber 11 at the bottom thereof. In this connection it will be noted that an opening 15' is provided in the partition 1 for establishing communication between the chambers 14 and 15 and that a suitable filter 16 is provided in said opening 15' for preventing any lint from the windings of the motor B from passing into the pump chamber 15. Preferably the stator 17 of the motor is arranged so that a portion thereof is located in the oil in the chamber 14. As shown in Figure 2 such stator 17 is secured to a plate 17' which in turn is secured to the annular flange 17. The rotor 18 of the motor is above the oil level and is fixed to a shaft 19 journaled in bearings 20 in a cylindrical portion 21 of the partition 1. Preferably this cylindrical portion 21 extends axially of a portion of the rotor 18 and terminates substantially flush with the right hand end of the shaft 19. 22 is a bolt secured within an axially extending passage 23 in the shaft 19; 24 is an eccentric on the bolt 22 in vertical alignment with the cylinder 3; and 25 is a connecting rod having a portion 26 on the eccentric 24 and having a reduced end portion 27 upon a suitable wrist pin 28 within a piston 29 in the cylinder 3. 30 is a counterweight member on the bolt 22 and having a portion 31 adapted to dip into the oil in the chamber 15. 32 is a pocket in the partition 1 for receiving the oil thrown by the counterweight member. 33 is a passage for the oil from the pocket 32 to the bearings 20; 35 is a spiral passage in the bearings 20 for the oil; and 36 is a transversely extending passage in the shaft 19 for conducting the oil from the spiral passage 35 in the bearing into the axial passage 23 in the shaft. 37 and 38 respectively are connecting axial and transverse passages in the bolt 22; 39 is a transversely extending passage in the eccentric for receiving the oil from the passage 38; and 40 and 41 respectively are connecting passages in the connecting rod 25 for supplying the oil to the wrist pin 28. Thus oil picked up by the portion 31 of the counterweight member will be thrown into the pocket 32 where it will be moved by gravity into the spiral passage 35. Due to the construction and arrangement of this spiral passage about the shaft 19, oil from the passage 33 will in effect be pumped into the passages 37 and 38 respectively in the bolt 22 from which it will be moved by centrifugal action through the passages 39, 40 and 41 respectively to the engaging surfaces of the eccentric 24, connecting rod 25 and wrist pin 28. Thus the bolt 22 constitutes a conduit for oil in addition to carrying the eccentric 24.

Referring to Figure 2 it will be observed that

the counterweight member 30 is practically against the bearings 20, hence being close there is less overhang and the load on the bearing is consequently less. Preferably the portion 31 of the counterweight member is secured by screws 42 to the portion 30 while the latter is held to the eccentric 24 by a dowel pin 42' and the bolt 22, hence the screws 42, bolt 22 and pin 42' not only serve as driving elements between the parts but also serve to position and maintain the proper relationship therebetween. It will also be noted that there is an opening 43 in the partition 1 in line with the passage 33. Preferably this opening 43 is formed when the passage 33 is formed and constitutes a vent for the motor chamber 14. In use this vent 43 prevents a difference in pressure in the chambers 14 and 15 and obviates any possibility upon starting the motor B of pressure building up in the chamber 14 and causing the oil in said chamber to be driven therefrom through the opening 15' into the chamber 15.

What I claim as my invention is:

1. In a refrigerating apparatus, a hermetically sealed casing having a transversely extending partition dividing the same into two chambers for the reception of an electric motor and a compressor respectively, the partition being provided at substantially the center thereof with a substantially cylindrical portion for receiving a drive shaft between the motor and compressor, and provided at substantially diametrically opposite points of said cylindrical portion with openings, one of said openings permitting the flow of oil between the compartments, and the other of said openings constituting a vent for the motor compartment.

2. In a refrigerating apparatus, a hermetically sealed casing having a transversely extending partition dividing the same into two chambers for the reception of an electric motor and a compressor respectively, the partition being provided at substantially the center thereof with a substantially cylindrical portion for receiving a drive shaft between the motor and compressor, and provided at one side of said bearing with an opening permitting the flow of oil between the compartments, and means associated with said opening for preventing lint from the windings of the motor within the motor compartment from passing into the compressor compartment.

3. In a refrigerating apparatus, a hermetically sealed casing having a transversely extending partition dividing the same into two chambers for the reception of an electric motor and a compressor respectively, the partition being provided at substantially the center thereof with a substantially cylindrical portion for receiving a drive shaft between the motor and compressor, and provided at one side of said bearing with an opening permitting the flow of oil between the compartments, and a filter secured in said opening and projecting into the compressor compartment so as to prevent lint from the windings of a motor within the motor compartment from passing into the compressor compartment while permitting the flow of oil between said compartments.

4. In a refrigerating apparatus, a hermetically sealed casing, and a casting within the casing having a portion constituting a compressor cylinder and provided at one side of said portion with a ring portion, said cylinder being provided on said side with an inlet port, a disc fixed to the ring portion and cooperating with the casing to form a chamber, and means for discharging refrigerant and oil into said chamber, said disc having an opening in registration with the inlet port in the cylinder for the passage of the refrigerant, and the connections between the disc and ring portion being such that the oil discharged from said means may seep through into the casing but dirt, scale, etc., discharged from said means will be trapped in said chamber.

5. In a refrigerating apparatus, a hermetically sealed casing provided longitudinally thereof with three chambers, means for discharging refrigerant and oil into one of said chambers, the connections between that chamber and the next adjacent chamber being such that oil received within the first chamber may flow into the second chamber but that dirt, scale, etc., received within the first chamber will be trapped therein, and the connection between the second and third chambers being such that oil received within the second chamber is free to flow into the third chamber.

6. In a refrigerating apparatus, a hermetically sealed casing having a motor chamber and a compressor chamber and a common partition therebetween provided with an opening through which oil may flow from one chamber to the other, and means associated with said opening for prevening lint from the windings of a motor within the motor chamber from entering a compressor within the compressor chamber.

7. In a refrigerating apparatus, a casing, a transversely extending partition within said casing and provided with a substantially tubular portion for receiving a rotating shaft, a pocket for oil above said portion, and a passage for oil leading from the pocket to the tubular portion, a shaft in the tubular portion and having a passage therein for oil, and a bearing for the shaft within the tubular portion having means for conducting oil from the first mentioned passage to the passage in said shaft.

8. In a refrigerating apparatus, a casing, a partition within said casing and provided with a substantially tubular portion and means for conducting oil to said portion, a shaft in said portion, a bolt extending axially of said shaft, a bearing for the shaft located in the tubular portion and having means for receiving oil from the conducting means aforesaid, and means for throwing oil into the means aforesaid, including a counterweight member on the bolt in such close proximity to the bearing that the load on the bearing is practically nil.

9. In a refrigerating apparatus, a hermetically sealed casing, a casting within said casing having a partition portion extending transversely of the casing and dividing the latter into two chambers, one for an electric motor and one for a refrigerant compressor and having an annular flange projecting laterally into the compressor chamber and terminating short of an end of said casing, means for discharging refrigerant and oil into the casing between the flange and end aforesaid, and a disc secured to said annular flange in substantially parallel relation to said end in such a way that oil received within said casing between said disc and end may seep between the disc and annular flange portion and seek its level in the compressor and motor chambers aforesaid but that dirt, scale and other foreign matter received within said space will be trapped in said space.

10. In a refrigerating apparatus, a hermetically sealed casing, a casting within said casing having

a partition portion extending transversely of the casing and dividing the latter into two chambers, one for an electric motor and one for a refrigerant compressor and having an annular flange projecting laterally into the compressor chamber, said flange having an opening therethrough and having a tubular portion cooperating with said opening to form a cylinder of the compressor, and a head for said cylinder located between said flange and casing.

11. In a refrigerating apparatus, a hermetically sealed casing, a casting within said casing having a partition portion extending transversely of the casing and dividing the latter into two chambers, one for an electric motor and one for a refrigerant compressor and having an annular flange projecting laterally into the compressor chamber and terminating short of an end of said casing, said flange having an opening therethrough and having a tubular portion cooperating with said opening to form a cylinder of the compressor, one wall of said tubular portion having a refrigerant inlet opening therein, means for discharging refrigerant into the casing between the flange and adjacent end of the casing, and means for directing the refrigerant to the opening in said tubular portion including a disc secured to said flange in substantially parallel relation to said end and having an opening registering with the opening in said tubular portion.

12. In a refrigerating apparatus, a hermetically sealed casing, a casting wholly within said casing and having a partition portion extending transversely of the casing and dividing the latter into two chambers, one for an electric motor and one for a refrigerant compressor, and having an annular flange projecting laterally into the compressor chamber and terminating short of an end of said casing, and a disc secured to the annular flange in substantially parallel relation to said end and having an opening therein through which refrigerant may flow, the connection between said disc and flange being such that oil received in the space between said disc and end may seep between the disc and flange portion and seek its level in the compressor chamber but that dirt, scale and other foreign matter received in said space will be trapped in said space.

13. In a refrigerating apparatus, a hermetically sealed casing, a casting wholly within said casing and having a partition portion extending transversely of the casing and dividing the latter into two chambers, one for an electric motor and one for a refrigerant compressor, and having an annular flange projecting laterally into the compressor chamber and terminating short of an end of said casing, and a disc secured to the annular flange in substantially parallel relation to said end and cooperating with said end, partition and adjacent walls of the casing to form a chamber for oil and refrigerant, the connections between said disc and flange being such that oil received in said chamber may seep between the disc and flange portion and seek its level in the compressor chamber but that dirt, scale and other foreign matter received within said chamber will be trapped therein.

14. In a refrigerating apparatus, a hermetically sealed casing, a casting within said casing having a partition portion extending transversely of the casing and dividing the latter into two chambers, one for an electric motor and one for a refrigerant compressor, said partition being provided with a screened opening permitting the passage of oil from the compressor chamber to the motor chamber and preventing any lint from the windings of the motor from passing into the compressor chamber.

15. In a refrigerating apparatus, a hermetically sealed casing, a casting within said casing having a partition portion extending transversely of the casing and dividing the latter into two chambers, one for an electric motor and one for a refrigerant compressor, said partition being provided with a screened opening permitting the passage of oil from the compressor chamber to the motor chamber and preventing any lint from the windings of the motor from passing into the compressor chamber, said partition being also provided with an opening forming a vent for the motor chamber, said vent being so constructed and arranged that it prevents a difference in pressure in the chambers and obviates any possibility upon starting the motor of pressure building up in the motor chamber and causing the oil in said chamber to be driven therefrom through the screened opening into the compressor chamber.

16. In a refrigerating apparatus, a casing, a rotatable shaft in said casing, a partition in the casing having a tubular portion receiving said shaft, and having a pocket for oil and a passage for oil leading from said pocket to the interior of said tubular portion, said shaft being provided with a passage for oil, and means for pumping oil from the passage in the partition to the passage in the shaft including a bearing for the shaft in said tubular portion and having a spiral passage about and opening towards said shaft.

17. In a refrigerating apparatus, a casing, a rotatable shaft in said casing, a partition in the casing having a tubular portion receiving said shaft, one end of the shaft being substantially flush with the adjacent end of said tubular portion, a bearing for the shaft in said tubular portion, a bolt extending endwise from said shaft, and a counterweight on said bolt substantially against the ends aforesaid of said shaft and tubular portion whereby both the overhang and load on the bearing are at a minimum.

18. In a refrigerating apparatus, a rotating shaft having a passage for oil, a tubular member receiving said shaft and having a passage for oil, the passages aforesaid being spaced apart longitudinally of the shaft, and means for conducting oil from the passage in the tubular portion to the passage in the shaft, including a bearing for the shaft in the tubular portion and having a spiral groove surrounding and opening toward said shaft.

19. In a refrigerating apparatus, a compressor drive including a shaft having an axial socket, a bolt secured in said socket and constituting an endwise extension of the shaft, an eccentric non-rotatably mounted on the bolt in spaced relation to the shaft, and a counterweight member on the bolt between the shaft and eccentric and secured to the latter.

20. In a refrigerating apparatus, a compressor drive including a shaft having an axial socket, a bolt secured in said socket and constituting an endwise extension of the shaft, an eccentric non-rotatably mounted on the bolt in spaced relation to the shaft, a counterweight member on the bolt between the shaft and eccentric, and a driving connection between the eccentric and counterweight member.

21. In a refrigerating apparatus, a casing, a partition dividing the casing into two chambers,

one for an electric motor and one for a refrigerant compressor and having an annular flange projecting laterally into the compressor chamber toward one end of the casing, means for discharging refrigerant and oil into the space between the flange and end aforesaid, and means secured to the flange in such a way that oil received in said space may seek its level in the compressor and motor chambers aforesaid but that dirt, scale and other foreign matter received within said space will be trapped therein.

22. In a refrigerating apparatus, a casing, a partition extending transversely of the casing and dividing the latter into two chambers, one for an electric motor and one for a refrigerant compressor, said partition being provided with a screened opening permitting the passage of oil from the compressor chamber to the motor chamber but preventing any lint from the windings of the motor from passing into the compressor chamber.

23. In a refrigerating apparatus, a casing, a partition dividing the casing into two chambers, one for an electric motor and one for a refrigerant compressor, said partition being provided with a screened opening permitting the passage of oil from the compressor chamber to the motor chamber and preventing any lint from the windings of the motor from passing into the compressor chamber, said partition being also provided with an opening forming a vent for the motor chamber, said vent being so constructed and arranged that it prevents a difference in pressure in the chambers and obviates any possibility upon starting the motor of pressure building up in the motor chamber and causing the oil in said chamber to be driven therefrom through the screened opening into the compressor chamber.

24. In a refrigerating apparatus, a casing, a rotating shaft within the casing, a stationary member within the casing having a tubular portion receiving the shaft, a pocket for oil above said shaft, and a passage for oil leading from the pocket to the tubular portion, the shaft aforesaid having connecting, transversely and longitudinally extending passages for oil, and a bearing for the shaft within the tubular portion and having a spiral passage for conducting oil from the passage in the stationary member to the transversely extending passage in the shaft.

25. In a refrigerating apparatus, a hermetically sealed casing provided at one end with an inlet for a refrigerant and oil, a casting within said casing having an annular flange adjacent the end aforesaid, said flange having a flattened portion provided with an opening and having a tubular portion extending transversely of the casing and cooperating with said opening to form a cylinder of a compressor, one wall of said tubular portion having a refrigerant inlet opening therein, and a disk secured to the flange between the tubular portion and said end in substantial parallel relation to said end and having an opening through which refrigerant received from the inlet in the casing may flow to the inlet in the tubular portion, the connection between the disk and flange being such that oil from the inlet in the casing may seep between the disk and flange and seek its level in the casing, but that dirt, scale and other foreign matter will be trapped between said disk and the end aforesaid of the casing.

26. In a refrigerating apparatus, the combination of a hermetically sealed casing, a transversely extending partition dividing said casing into two compartments, an electric motor and a refrigerant compressor respectively in said compartments, said partition having means to permit the flow of oil between said compartments, and means within the casing for initially receiving the oil so constructed and arranged that the oil may flow from the motor compartment into the compressor compartment, but dirt, lint, and other foreign matter will be trapped.

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