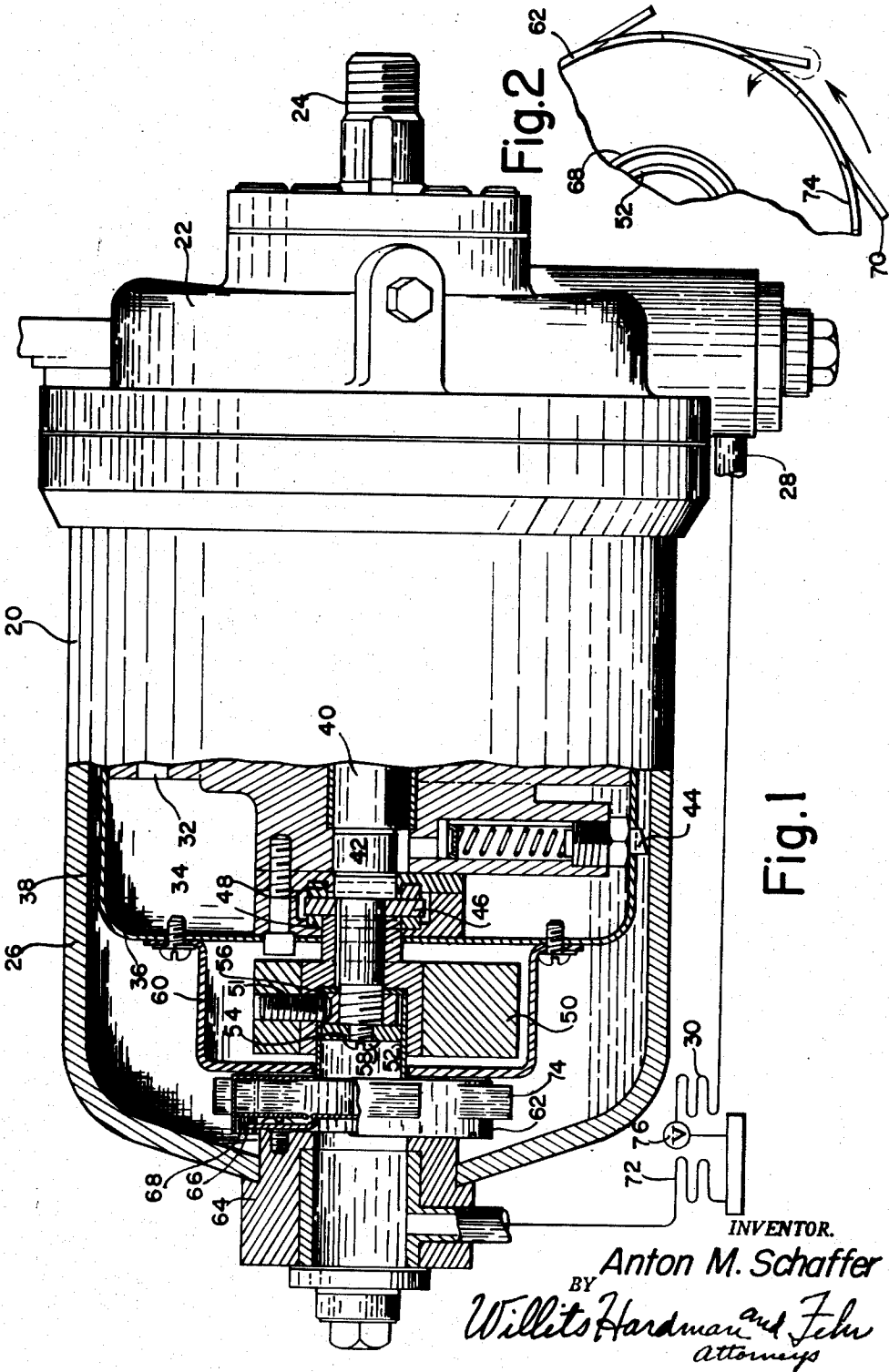


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REFRIGERATING APPARATUS
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REFRIGERATING APPARATUS

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This invention is related to refrigerating apparatus in one particular application but more generally relates to means for separating vapor from liquid particles.

In refrigerating apparatus, there is a tendency for the refrigerant in passing through the compressor to pick up lubricant in the compression chamber and to carry it through the refrigerating system. This often has caused the collection of lubricant in objectionable amounts in the condenser and the evaporator of the system. Various forms of separating means have been devised for separating lubricant from refrigerant especially between the compressor outlet and the condenser inlet. These separators usually rely on a change in the direction of flow to throw the lubricant out of the refrigerant.

It is an object of my invention to provide a simple effective rotating deflector which prevents the entrance of liquid particles but provides a means for the passage of vapor for flow into an outlet.

It is another object of my invention to provide a simple rotating device in which rotating deflectors throw off particles of liquid from a vapor which then flows free of the liquid particles through apertures adjacent the deflectors.

It is another object of my invention to provide a simple effective rotating deflector which prevents the escape of lubricant from the compressor unit while it permits the escape of refrigerant for flow to the condenser.

In one particular example, these objects are attained by providing within a compressor casing a rotating cup arrangement shielding the outlet from the compressor chamber. The cylindrical walls of this cup-shaped member have tongues or deflectors which are struck out in the trailing direction to provide apertures beneath the tongues through which the refrigerant vapor flows while the particles of lubricant are thrown outwardly by the deflecting tongues.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the invention is clearly shown.

In the drawing:

Figure 1 shows a rotary refrigerant compressor embodying one form of my invention together with the remaining parts of a refrigerating system illustrated in diagrammatic form; and,

Figure 2 is a fragmentary view of the cup-shaped rotating member shown in Figure 1.

Referring now to the drawing, there is shown

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a compressor 20 having compressing means 22 driven by some suitable driving means through a drive shaft 24 which protrudes from the compressing means 22. Mounted upon the compressing means 22 is a sealed casing 26. The compressing means 22 has an inlet 28 connected to the outlet of the evaporating means 30 while the outlet 32 of the compressing means 22 discharges into a discharge chamber 34 which is formed by a sheet metal casing 36 at one side of the compressing means 22 within the casing 26. The refrigerant flows to the right in Figure 1 out of the chamber 34 through passages extending on either side of the outlet 32 and thence flows in the opposite direction through the passage 38 between the inner casing 36 and the outer casing 26.

The extension 40 of the drive shaft 24 within the casing 26 is provided with an eccentric portion 42 which cooperates with a reciprocating vane to form a lubricant pump. This lubricant pump draws in lubricant through a lubricant inlet 44 in the bottom of the casing 26. The eccentric portion 42 pumps this lubricant through out the bearing surfaces of the compressing means 22. The extension 40 of the drive shaft 24 is also provided with a thrust disk 46 operating between the thrust bearing members 48 on its opposite faces for preventing axial movement of the drive shaft. The extension 40 of the drive shaft 24 is also provided with a counterbalancing weight 50 keyed to the shaft and held in place by the nut 56 which is threaded on the end of the extension 40. This nut 56 is locked by the set screw 51.

In the pumping of the refrigerant from the inlet 28 to the outlet 32 in the compressing means 22, some of the lubricant is picked up and carried along by the refrigerant. To keep as much as possible of the lubricant in the casing 26, there is provided an efficient rotary separator which separates the particles of lubricant from the refrigerant vapor. For this purpose, there is connected to the extension 40 of the drive shaft 24 a sleeve 52 to which is connected a disk 54. The disk 54 is locked in place by a screw 58 threaded through it into this end of the drive shaft 24. The set screw 51 extends through a slot in the sleeve 52 to prevent rotation of the sleeve 52 with respect to the drive shaft 24.

This sleeve extends through an aperture in a shield 60 which encloses the counterbalancing weight 50 and has its flanges fastened to the inner casing 36 as shown. Outside of the shield 60, the sleeve connects to a flat cup-shaped

member 62 having the closed end of the cup connected to the sleeve 52. The open end of the cup surrounds an outlet member 64 in the end of the casing which is located coaxially with the drive shaft 24. Fastened to the inner face of this outlet member is a shielding disk 66 having an inner flanged opening. The rim of the cup-shaped member 62 surrounds this shielding disk 66. It also is provided with an internal disk 68 which is placed parallel to the shielding disk 66 and extends substantially to the flange of the shielding disk 66 so as to prevent the flow of refrigerant around the rim of the cup-shaped member 62 into the outlet member 64. The two disks 66 and 68 therefore form a seal for the open side of the cup-shaped member 62.

To provide a means for normal flow of refrigerant vapor into the outlet 64, apertures are formed in the cylindrical portion thereof by striking out deflecting tongues 70 in the trailing direction of rotation. These tongues 70 extend from the leading edge of the apertures over the apertures in the trailing direction. Since the cup-shaped member 62 is connected by the sleeve 52 to the adjacent end of the drive shaft 24, it rotates at compressor speed which may be from 1200 to 3000 R. P. M. When this cup-shaped member 62 is rotated at a sufficient speed, the particles of lubricant in liquid form cannot enter the apertures because they are thrown outwardly by the deflecting tongues 70 because of centrifugal force. However, the necessary flow of refrigerant vapor from the interior of the casing 26 through the outlet fitting 64 to the condenser 72 provides a sufficient pressure difference to force the vapor through the apertures 74 which are formed by striking out of the deflecting tongues 70. The deflecting tongues 70 extend substantially tangentially to the cylindrical surface of the cup-shaped member 62.

Through this arrangement substantially all of the lubricant is retained within the compressor casing 26, and the refrigerant vapor flows to the condenser 72 practically free of lubricant. The refrigerant flows from the condenser 72 to the evaporator 30 under the control of a suitable flow control device 76. Better evaporating conditions in the evaporator are made possible by the substantially complete freedom of lubricant in the evaporator.

While I have chosen as an example of my invention the separation of particles of lubricant in liquid form from refrigerant vapor, it should be understood that the separation is not dependent upon these particular fluids but is applicable to all mixtures containing liquid particles in vapor.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A compressor including a casing having an inlet and an outlet for gaseous refrigerant, a compressing means having its inlet connected to the inlet in said casing and having its outlet discharging into the interior of said casing, the interior of said casing forming a lubricant reservoir, a rotatable means connected to and rotated coincidentally to the operation of said compressing means, said rotatable means including a rotatable cup shaped portion having its rim extending around the outlet of said casing for shielding said outlet and preventing the direct flow of refrigerant into said outlet, the cylindrical part of said cup shaped portion having apertures therein through which the refrigerant flows to said outlet and deflectors extending in a trailing direction over said apertures to deflect lubricant from entering said apertures, and shielding means for substantially closing all entrances to the interior of said rotatable means except through said apertures.

2. A compressor including a casing having an inlet and an outlet for gaseous refrigerant, a compressing means having its inlet connected to the inlet in said casing and having its outlet discharging into the interior of said casing, the interior of said casing forming a lubricant reservoir, a rotatable means connected to and rotated coincidentally to the operation of said compressing means, said rotatable means including a rotatable cup shaped portion having its rim extending around the outlet of said casing for shielding said outlet and preventing the direct flow of refrigerant into said outlet, the cylindrical part of said cup shaped portion having apertures therein through which the refrigerant flows to said outlet and deflectors from each leading edge in a trailing direction over each of said apertures to deflect lubricant from entering said apertures, and shielding means for substantially closing all entrances to the interior of said rotatable means except through said apertures.

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