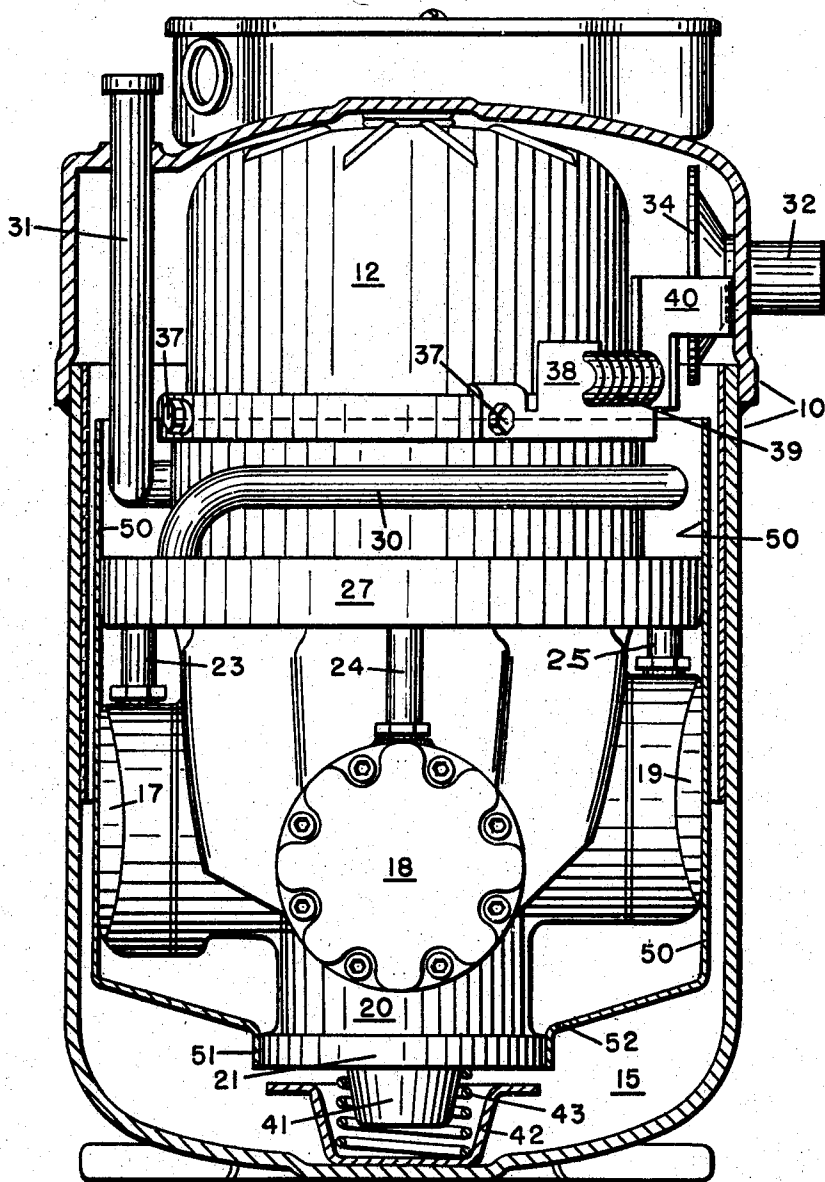


Dec. 30, 1969

R. W. AYLING
REFRIGERANT COMPRESSOR HAVING BUILT-IN
LIQUID RETURN PROTECTION
Filed June 19, 1968

3,486,687



INVENTOR:
ROBERT W. AYLING,
BY *Robert J. Palmer*
ATTORNEY

1

2

3,486,687 REFRIGERANT COMPRESSOR HAVING BUILT-IN LIQUID RETURN PROTECTION

Robert W. Ayling, Staunton, Va., assignor to Westinghouse Electric Corporation, Pittsburgh, Pa., a corporation of Pennsylvania

Filed June 19, 1968, Ser. No. 738,294

Int. Cl. F04b 39/02, 39/00

U.S. Cl. 230—206

8 Claims

ABSTRACT OF THE DISCLOSURE

A hermetic refrigerant compressor with a vertical crankshaft has an outer shell with an oil sump in its bottom, and has a suction gas tube with an outlet in its upper portion. A cylindrical inner shell is supported at its bottom by a crankcase wall of the compressor, and extends in heat exchange contact with the cylinder heads and the muffler of the compressor. Refrigerant liquid flowing from the suction gas outlet drains into the inner shell, and is evaporated to prevent it from accumulating in the oil sump and diluting the oil. The inner shell has a small oil bleed hole in its bottom.

BACKGROUND OF THE INVENTION

The field of the invention is hermetic refrigerant compressors having vertical crankshafts, such as are disclosed in my U.S. Patents Nos. 3,171,588 and 3,259,307. Such compressors have oil sumps in their bottoms, and have suction gas tubes with outlets in their upper portions. Oil and any refrigerant liquid in the suction gas flow into the oil sumps. Under some conditions such as "flood-back," and reversal of a heat pump in which such a compressor is used, a substantial quantity of refrigerant liquid can drain into the oil sump, and so greatly dilute the lubricating oil that the bearings of the compressor may be damaged. This invention prevents substantial quantities of refrigerant liquid from draining into such an oil sump by evaporating it within an inner shell around and in contact with heated components of the compressor.

SUMMARY OF THE INVENTION

A hermetic refrigerant compressor having a vertical crankshaft, has an outer shell with an oil sump in its bottom, and a suction gas outlet in its upper portion. The compressor has a cylindrical crankcase wall just above the oil sump, and fitted to this wall is the bottom of an inner shell having an open top just below the suction gas inlet. The inner shell extends around and in heat exchange contact with the cylinder heads and the muffler of the compressor, and has a small oil drain hole in its bottom. Refrigerant liquid and oil in the suction gas flow from the suction gas outlet into the inner shell, and are heated by the contact of the latter with the crankcase wall, the cylinder heads and the muffler so that the refrigerant liquid is evaporated and prevented from diluting the oil in the oil sump. The oil drain hole permits oil to drain from the inner shell into the oil sump but is too small to permit any substantial flow of refrigerant liquid.

DESCRIPTION OF THE DRAWING

The drawing is a side view of a refrigerant compressor embodying this invention, with the inner and outer shells shown in cross-section.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

Referring to the drawing, a generally cylindrical outer shell 10 has an upper portion extending around a motor

cover 12, and has a lower portion with an oil sump 15 in its bottom. An electric motor (not shown) within the cover 12, has a rotor (not shown) attached to crankshaft (not shown) of the compressor. The compressor has cylinders with heads 17, 18 and 19, and another cylinder with a head (not shown) opposite the head 18, and has a cylindrical crankcase wall 21 below the cylinder heads. Discharge gas tubes 23, 24 and 25 extend from the respective cylinders into a muffler 27 which is connected to a discharge gas tube 30 extending around the motor cover 12, and having a vertically extending portion 31 for connection to a condenser coil (not shown). A suction gas tube 32 from an evaporator coil (not shown) extends through the upper portion of the shell 10, and has a diverging outlet 34 containing a filter (not shown). The motor cover 12 has a bracket 38 connected thereto by studs 37. The bracket 38 is attached to one end of coiled spring 39, the other end of which is attached to bracket 40 which is attached to the shell 10. Bearing housing 41 extends below the crankcase wall 21, and has a spiral spring 43 therearound. The spring 43 is within cup 42 in contact with the bottom of the latter. The cup 42 is on the bottom of the shell 10.

The construction described so far in connection with the drawing is generally that of my previously mentioned Patent No. 3,171,588 which may be referred to for explanation of the operation of the compressor. This invention adds to the compressor, a cylindrical inner shell 50 having a central opening in its bottom, and having a cylindrical bottom portion 51 extending around such opening, and force fitted to the crankcase wall 21. The shell 50 also extends in heat exchange contact with the cylinder heads 17, 18 and 19, and in heat exchange contact with the previously mentioned other cylinder head (not shown), and also extends in heat exchange contact with the muffler 27. The shell 50 has an open upper end below the suction gas tube outlet 34. The bottom of the shell 50 has just above its bottom portion 51, a small oil bleed hole 52. The hole 52 is too small to permit the flow of any substantial amount of refrigerant liquid which may be within the shell 50, into the oil sump 15.

Oil and any refrigerant liquid within the suction gas flow through the suction gas tube outlet 34 into the inner shell 50 which is seen to operate as an accumulator. The refrigerant liquid flowing into the shell 50 is evaporated by heat from the muffler 27, the cylinder heads 17, 18 and 19, the crankcase wall 21, and the other heated components of the compressor such as the discharge gas tubes 23, 24, 25 and 30 which the inner shell 50 surrounds. The drain hole 52 permits oil to drain into the oil sump 15, but is too small to permit any substantial quantity of refrigerant liquid which may be within the inner shell at times, including start-up, to flow into the sump 15.

Thus, the compressor is seen to have built-in protection against dilution of its lubricating oil, and the resulting damage to its bearings.

I claim:

1. In a refrigerant compressor having an outer shell with an oil sump in its bottom, and a suction gas outlet in its upper portion; said compressor having, and said shell extending around, a crankcase having a wall near and above said bottom, cylinders having heads, above and joined to said crankcase, a muffler above and connected to said cylinders, a discharge gas tube above and connected to said muffler; the improvement comprising an inner shell supported within said outer shell around said wall, said heads, said muffler, and around said tube, said inner shell having an open top below and arranged to receive refrigerant liquid and oil from said outlet, having a bottom around said wall with an oil drain hole therein, said bottom of said inner shell being in heat exchange contact with said wall.

3

2. The improvement claimed in claim 1 in which said inner shell is in heat exchange contact with said heads.

3. The improvement claimed in claim 2 in which said inner shell is in heat exchange contact with said muffler.

4. The improvement claimed in claim 1 in which said inner shell is supported by said wall.

5. The improvement claimed in claim 4 in which said inner shell is in heat exchange contact with said heads.

6. The improvement claimed in claim 5 in which said inner shell is in heat exchange contact with said muffler.

7. The improvement claimed in claim 4 in which said inner shell is in heat exchange contact with said muffler.

4

8. The improvement claimed in claim 1 in which said inner shell is in heat exchange contact with said muffler.

References Cited**UNITED STATES PATENTS**

3,065,901	11/1962	Neubauer	230—58
3,162,360	12/1964	Privon et al.	230—206

ROBERT W. WALKER, Primary Examiner

U.S. Cl. X.R.

230—232