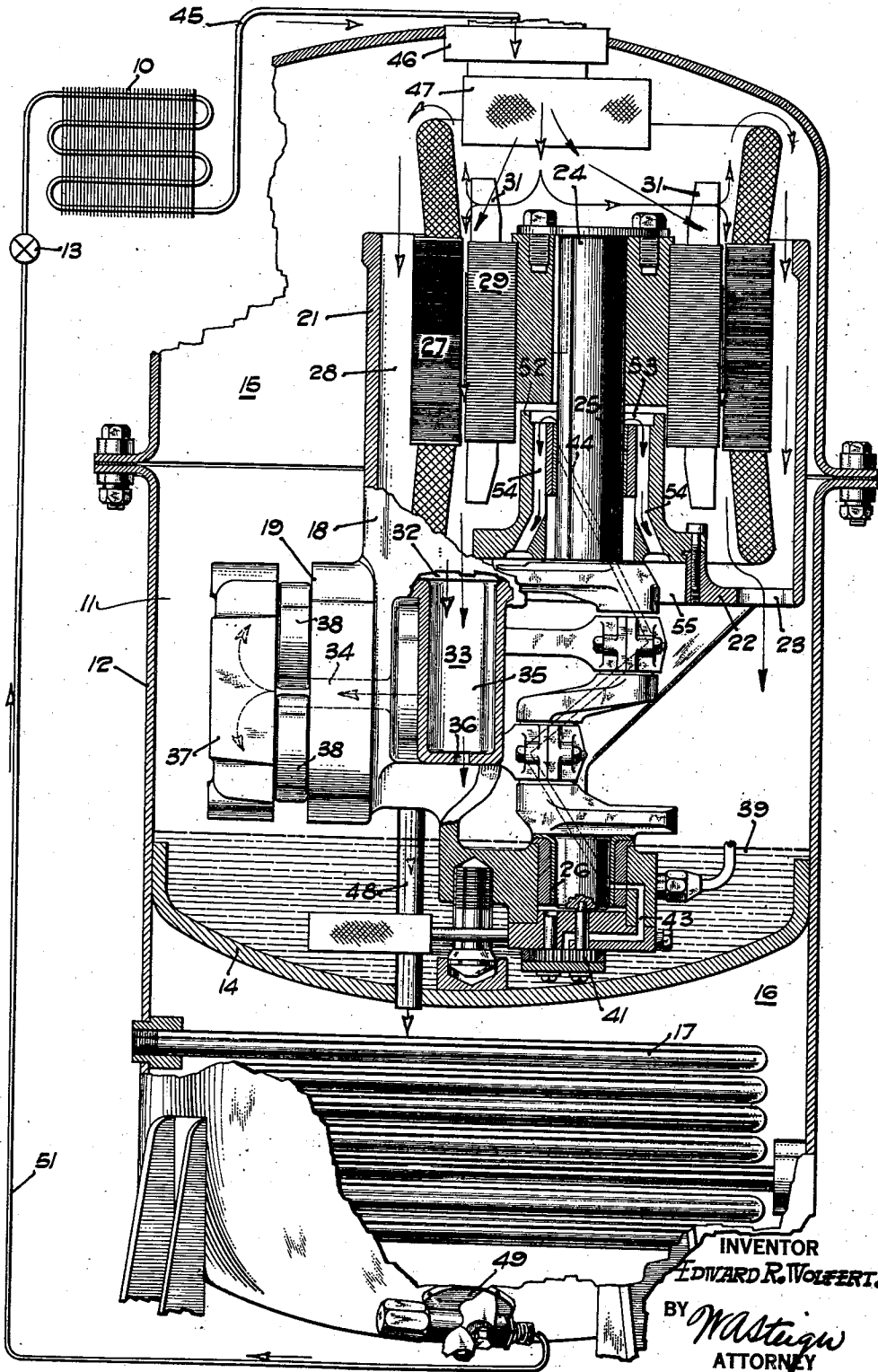


May 12, 1942.

E. R. WOLFERT
REFRIGERATING APPARATUS

2,283,025

Filed March 8, 1939



UNITED STATES PATENT OFFICE

2,283,025

REFRIGERATING APPARATUS

Edward R. Wolfert, Springfield, Mass., assignor
to Westinghouse Electric & Manufacturing
Company, East Pittsburgh, Pa., a corporation
of Pennsylvania

Application March 8, 1939, Serial No. 260,513

6 Claims. (Cl. 230—58)

My invention relates to refrigerating apparatus, more particularly to an enclosed motor compressor unit therefor in which the motor is cooled by the refrigerant vapor flowing to the compressor, and it has for an object to provide improved apparatus.

A more particular object is to avoid entrainment, in the stream of refrigerant vapor flowing in contact with the motor, of lubricating oil escaping from a motor bearing.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawing, forming a part of this application, in which:

The single figure shows the motor compressor unit and the condenser in vertical section, the remainder of the refrigerant circuit being shown diagrammatically.

Referring to the drawing in detail, the refrigerating system comprises an evaporator 10, an expansion valve 13 for regulating the flow of refrigerant to the evaporator and for reducing the pressure thereof, and a condensing unit indicated generally by the reference numeral 11 and enclosed in a casing 12. The casing 12 is divided by a partition 14 into an upper chamber 15 for housing the motor compressor unit and a lower chamber 16 forming the refrigerant condenser. The latter contains coils 17 through which water is circulated for condensing the compressed refrigerant.

The motor compressor unit within the chamber 15 is separate from the casing and is supported therein in any suitable manner. It includes a main frame or stationary member 18 comprising a compressor cylinder block 19 in which the compressor cylinders are formed, and a motor frame or housing 21 having a bottom wall 22 and open at the top. The bottom wall 22 is formed with an oil drain opening 23. The motor compressor unit further includes a shaft 24 journaled in bearings 25 and 26 attached to the main frame member 18. The bearing 25 is disposed in the lower portion of the motor housing and is bolted to the wall 22. The bearing 26 is mounted on the lower end of the member 18.

The motor includes a stator 27, which is pressed into the inner cylindrical surface of the motor housing 21, the latter serving as a frame for the motor. The stator is formed to provide a plurality of circumferentially spaced refrigerant passages 28. The motor further includes a rotor 29 which is overhung on the shaft 24 above the

bearing 25 and which may be provided with gas-impelling vanes 31.

The frame member 18 is formed with an opening 32 in the wall 22, which opening constitutes a vapor outlet for the motor housing and a vapor inlet for the compressor. The frame member 18 is further formed with a passage 33 extending from the opening 32 to the several cylinders of the compressor. The passage 33 includes a horizontal branch or portion 34 and a vertical portion 35 extending somewhat below the portion 34. An opening 36 is formed in the bottom wall of the portion 35. The plane on which the section through the opening 32 and the passage portion 35 is taken is disposed forwardly of the plane on which the remaining section is taken. The compressor includes a cylinder head 37 and valve assemblies 38 which may be of any suitably known construction and which are not, therefore, described in detail.

The bottom portion of the chamber 15 constitutes an oil reservoir containing a body of oil 39. The frame member 18, at its lower end, carries an oil pump 41 which is driven by the shaft 24 and which is immersed in the oil 39. The oil pump supplies oil to the several bearings, including the bearing 25, through a passage 43 and a passage 44 drilled in the shaft 24.

In the operation of the above-described refrigerating system, the refrigerant vaporized in the evaporator 10 flows through a suction conduit 45, a fitting 46 and a strainer 47 into the upper end of the chamber 15. It then flows downwardly in contact with the stator and rotor of the motor, through the passages 28 and the gap between the rotor and the stator. From the lower end of the motor housing, it flows through the opening 32 and the passage 33 to the compressor cylinders, wherein it is compressed. The compressed refrigerant is then discharged through a conduit 48 to the condenser chamber 16 wherein the same is condensed by the cooling coil 17. The condensed refrigerant is then conveyed through a fitting 49, a liquid line 51 and the expansion valve 13 to the evaporator 10.

As the refrigerant vapor flows in contact with the stator and the rotor, it extracts heat therefrom and thereby maintains the motor sufficiently cool. The motor housing also serves as an oil separating chamber, as described and claimed in my application Serial No. 243,410, filed December 1, 1938. However, prior to the present invention, difficulty was encountered due to entrainment of oil from the bearing 25 in the refrigerant. The oil escaped from the top of the

bearing 25 and spilled over the outside of the bearing to the bottom of the motor housing and into the passage portion 35 in contact with the refrigerant flowing therethrough. Due to the relatively great quantity of oil thus flowing, a considerable amount of oil was entrained in the refrigerant vapor and carried into the cylinders.

To overcome this difficulty, according to the present invention, the bearing 25 is formed with an annular dam or weir 52, thereby forming an annular recess 53 which is adapted to receive the oil escaping from the top of the bearing surface. The bearing 25 is further formed with vertical passages 54 cored or otherwise formed therein and extending from the recess 53 to an opening 55 in the wall 22.

The oil discharged from the top of the bearing surface of the bearing 25 is received by the recess 53 and then flows by gravity, out of contact with the stream of refrigerant, through the passages 54, the opening 55 and then through the bottom portion of the chamber 15 to the body of oil 39. Thus, the oil is drained to the reservoir out of contact with the stream of refrigerant, and entrainment of oil from the bearing 25 in the refrigerant is thereby substantially avoided.

What I claim is:

1. A direct-connected, vertical shaft, motor and compressor unit comprising a compressor and a motor for driving the same, the unit being constructed and arranged so that refrigerant vapor to be compressed in the compressor first flows in contact with the working parts of the motor to cool the same, the unit having a bearing disposed adjacent the path of the refrigerant vapor flowing to the compressor in such position that oil spilling from the top of the bearing would spill into said path of refrigerant vapor, means for supplying oil to said bearing, said bearing having an annular recess at the top for collecting oil from the bearing, and the unit having an oil drain passage formed therein extending from said recess to a region outside said stream so as to avoid entraining of said oil in said stream, and means for supplying oil to said bearing other than through said oil drain passage.

2. In refrigerating apparatus, a vertical shaft, direct-connected motor compressor unit having a fluid-tight casing enclosing the motor and the compressor, the unit being arranged so that the refrigerant vapor to be compressed first flows in contact with the motor to cool the same, the unit including a bearing for the motor disposed adjacent the stream of refrigerant vapor flowing to the compressor in such position that any oil which might spill from the top of the bearing would contact said refrigerant vapor, means for supplying oil to said bearing, said bearing having an oil drain passage formed therein for draining oil to a point where it will not intermingle with said stream of refrigerant vapor and the upper portion of said bearing being formed so that the oil escaping from the top of the bearing surface flows into said passage and does not spill over the outer surface of the bearing, and means

for supplying oil to said bearing other than through said oil drain passage.

3. In refrigerating apparatus, an enclosed, vertical shaft, motor and compressor unit comprising a compressor and a drive motor disposed above the same and connected thereto, the unit including a frame member providing a compressor housing, a motor housing, and a compressor inlet passage having its inlet in communication with the lower end of the motor housing, the unit being constructed and arranged so that refrigerant vapor to be compressed first flows downwardly through the motor housing in contact with the working parts of the motor to cool the same and then enters said compressor inlet passage, the unit having a bearing disposed adjacent the path of said refrigerant vapor, an oil reservoir adjacent the lower end of the unit, and means for delivering oil from the reservoir to said bearing, the unit having an annular recess adjacent the top of said bearing for receiving oil from the bearing and a passage closed to the stream of said refrigerant vapor for draining oil from said annular recess to a point outside of said stream from which the oil may drain to said reservoir.

4. A motor and compressor unit as set forth in claim 3, wherein said annular recess and said passage are formed in said bearing.

5. In refrigerating apparatus, a motor and compressor unit constructed and arranged so that the refrigerant vapor flows in contact with the working parts of the motor to cool the same before entering the compressor, said unit having a bearing one end of which is disposed adjacent the stream of refrigerant vapor in such position that any oil spilling from the bearing at said end would contact the refrigerant vapor in said stream, said bearing having an annular space for collecting oil escaping from the bearing surfaces at said one end, said unit having a passage extending from said annular space to a region outside said stream of refrigerant vapor for conveying oil from the former to the latter to avoid its entrainment in the stream of refrigerant vapor, and means for supplying oil to said bearing other than through said passage.

6. In refrigerating apparatus, a motor and compressor unit comprising a compressor and a motor for driving the same, the unit being arranged so that refrigerant vapor to be compressed first flows in contact with the working parts of the motor to cool the same, the unit having a bearing one end of which is disposed adjacent the path of said refrigerant vapor in such position that any oil spilling from said end of the bearing would contact said refrigerant vapor, means for supplying oil to said bearing, and means other than said oil supply means for collecting oil from said one end of the bearing before it becomes entrained in the refrigerant vapor and draining the same out of contact with said flowing refrigerant vapor to a region outside of the path thereof.

EDWARD R. WOLFERT.