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REFRIGERATING UNIT

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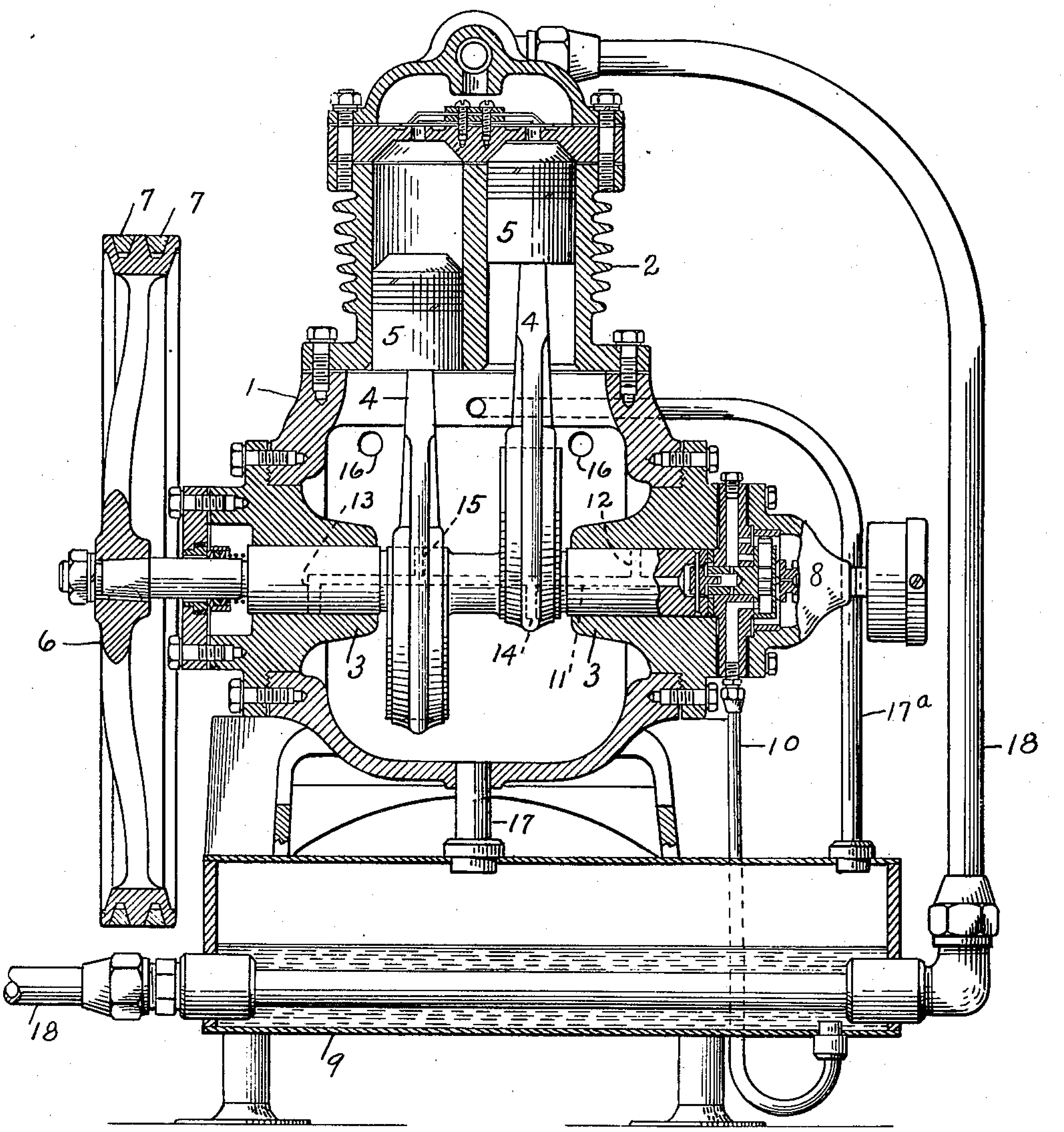

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REFRIGERATING UNIT

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6 Claims. (Cl. 62—115)

This invention relates to improvements in refrigerating units and more particularly to the production of an oil separator in a refrigerating unit of the compression type, employing a refrigerant appreciably soluble in the lubricant.

Normally, the compressor operates intermittently to maintain a pre-determined range of temperatures in the evaporator. While the compressor is idle during the "off" cycle, the pressure in the crank case rises due to the increased temperature of the evaporator and during the building up of the pressure in the crank case a dissolving of the vapors of the refrigerant returning from the evaporator in the lubricant in the crank case takes place. When the compressor begins to operate during the "on" cycle, the pressure in the crank case is reduced. Under the influence of the reduced pressure and the agitation due to the operation of the cranks the refrigerant distills out of the lubricant. If this action is sufficiently rapid, frothing takes place. Under extreme conditions, there may be enough froth to fill the entire crank case so that the froth is pumped into the cylinders. Under the influence of compression, the vapors of the froth dissolve in the lubricant and there results a certain amount of liquid which must be forced through the discharge valves. This is injurious to the pistons and discharge valves and also reduces the efficiency of the refrigerating unit. The return of this excessive amount of lubricant to the crank case involves additional complications.

It is an object of this invention to employ the pressure type of lubrication to the working parts of the compressor and to provide an efficient separator for separating the vapors of the refrigerant from the lubricant so that the compressed vapors of the refrigerant carry very little or no lubricant with them into the condenser.

With these and other objects in view, reference is made to the accompanying drawing which illustrates an embodiment of this invention with the understanding that minor changes may be made without departing from the scope thereof.

The figure on the drawing is a view partly in section and partly in side elevation of the crank case and cylinders of a compression refrigerating unit.

The crank case 1, cylinders 2, crank bearings 3, connecting rods 4, and pistons 5 are of the usual standard construction and, therefore, need no detailed description. The crank shaft is provided at one end with a pulley wheel 6 driven by the belt 7 from a motor, not shown. At the opposite end of the crank case, an oil pump 8 is mounted upon the outer side of the bearing 3. This pump may be of any particular type adapted to draw oil or lubricant from the bottom of the sump 9 through the pipe 10 to the intake side of pump 8 and discharge the lubricant under pressure through the oil duct 11 having branches 12 and 13 leading to the bearings 3 and ducts 14 and 15 leading to the bearings of the connecting rods 4. The lubricant having accomplished its mission in lubricating these parts, it is collected in the bottom of the crank case 1.

The low side or the evaporator is connected to pipes discharging through apertures 16 into the upper portion of the crank case 1. The lubricant and such vapors of the refrigerant as may be dissolved in the lubricant are drained from the bottom of the crank case through pipe 17 to the oil sump 9 which is preferably in the form of a cylindrical casing, as shown. The lubricant and dissolved vapors will settle to the bottom of the sump, as indicated. The gaseous refrigerant delivered under pressure from the cylinders 2 is carried by pipe 18 to the condenser, not shown, and in accordance with this invention the pipe 18 is passed longitudinally through the sump 9 adjacent the bottom thereof. The vapors of the refrigerant passing through the pipe 18 have been raised, by the action of the compressor, to a very high degree of temperature and in passing through the lubricant in the bottom of the sump 9 the temperature of the lubricant will be increased to such a degree as to expel the major portion of the vapors of the gaseous refrigerant which may be carried over into the sump. The lubricant in draining from the crank case trickles down the sides of the pipe 17 and the vapors of the gaseous refrigerant expelled from the top of the lubricant in the sump 9 will pass upward through pipe 17 into the crank case and be drawn up by the pistons 5 into the compression cylinders 2 while the substantially pure lubricant is circulated from the bottom of the sump by means of the pump 8 through the working parts of the compressor. If desired, the refrigerant expelled from the top of the lubricant in the sump 9 may be conducted from the top of the sump casing through pipe 17a to the top of the crank case, as shown.

By this construction, it is seen that the lubricant is continually circulated from the sump through the bearings into the crank case and into the sump and such vapors of the gaseous refrigerant as may be dissolved in the lubricant are expelled by the high temperature in the sump and practically no lubricant is carried over from the compressor to the condenser.

What I claim is:

1. In a self-contained closed refrigerating system, the combination of a sealed compression unit employing a pressure lubricating system for the operating parts of the compressor, a refrigerant appreciably soluble in the lubricant, and means for returning the vapors of the refrigerant from an evaporator to the crank case of the compressor, with an oil sump below the crank case, means for draining the lubricant and vapors of the refrigerant dissolved therein into the sump, means for distilling the dissolved vapors from the lubricant within the sump and returning the distilled vapors to the crank case, and means for delivering the vapor-free lubricant from the bottom of the sump to the lubricating system.

2. The structure of claim 1 wherein the means for distilling the dissolved vapors includes conducting the highly heated refrigerant from the compressor by a pipe leading through the lubricant and dissolved vapors collected in the sump to the condenser.

3. The method of separating vapors of refrigerants appreciably soluble in lubricants in compression refrigerating machines in self-contained closed refrigerating systems having operating parts operating in a crank case and lubricated by a pressure lubricating system, which consists in draining all of the lubricant and vapors of the refrigerant dissolved therein from the crank case to an enclosed space and distilling therein the dissolved vapors from the lubricant by the application of the heat of the compressed refrigerant to said space, and returning the distilled vapors to the compressor and vapor-free lubricant to the lubricating system.

4. The method of separating vapors of refrigerants appreciably soluble in lubricants in compression refrigerating machines in self-contained refrigerating systems having operating parts working in a crank case and lubricated by a pressure lubricating system, which consists in distilling the vapors dissolved in the lubricant collecting in the crankcase and delivering the distilled vapors to the compressor and circulating the vapor-free lubricant through the lubricating system.

5. In a self-contained closed refrigerating system, the combination of a sealed compression unit employing a pressure lubricating system for the operating parts of the compressor, a refrigerant appreciably soluble in the lubricant, and means for returning the vapors of the refrigerant from an evaporator to the crank case of the compressor, means for draining all of the lubricant and vapors of the refrigerant dissolved therein from the crank case, means for distilling the dissolved vapors from the lubricant and returning the distilled vapors to the crank case, and means for delivering the vapor-free lubricant to the lubricating system.

6. In a self-contained closed refrigerating system, the combination of a sealed compression unit having lubricated operating parts of the compressor working in a crank case, a refrigerant appreciably soluble in the lubricant, and means for returning the vapors of the refrigerant from an evaporator to the crank case of the compressor, the combination therewith of an oil sump communicating with the crank case, means for draining the lubricant and vapors of the refrigerant dissolved therein into the sump, means for distilling the dissolved vapors from the lubricant within the sump and returning the distilled vapors to the upper part of the crank case, and means for delivering the vapor-free lubricant from the bottom of the sump for lubricating the said working parts.

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