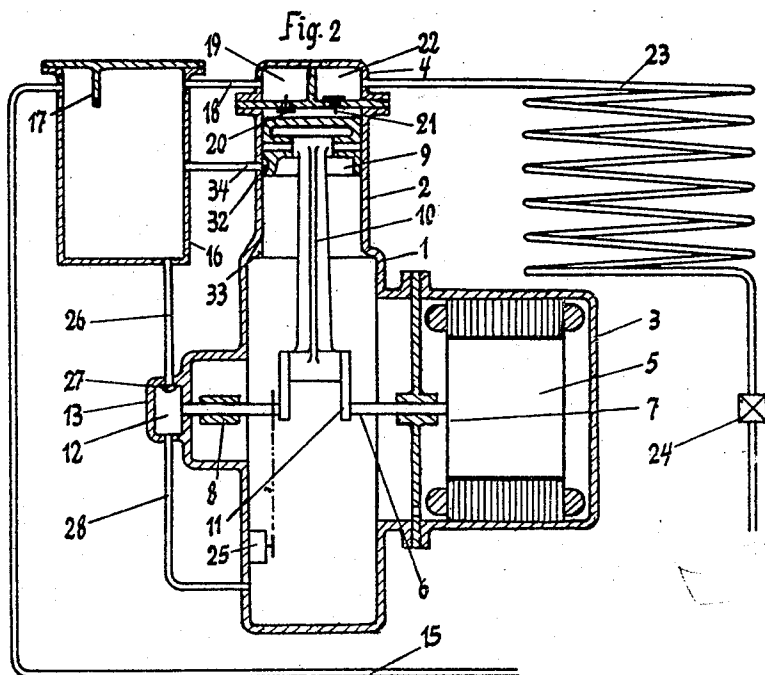
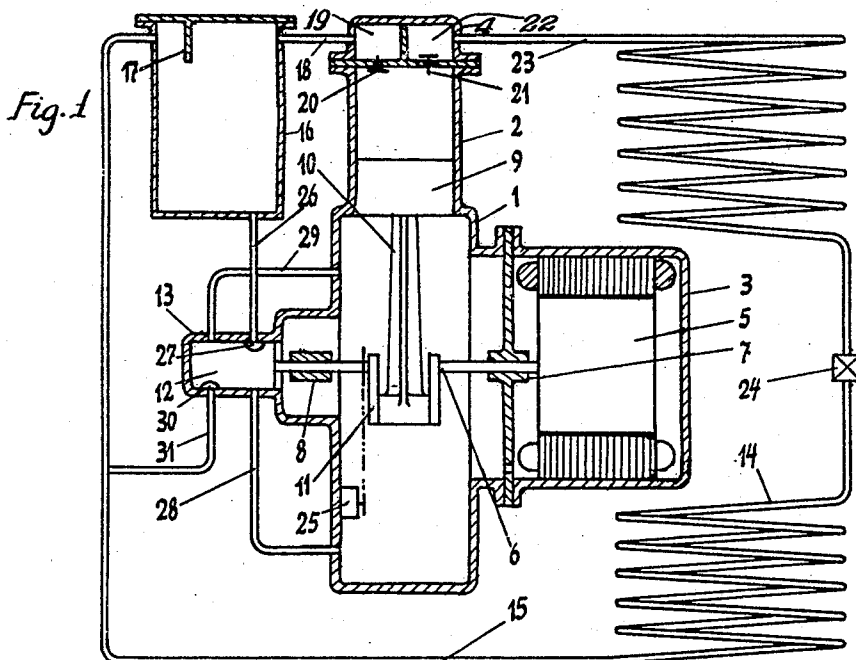


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COMPRESSION REFRIGERATING MACHINE WITH OIL COLLECTING
SPACE IN THE CRANK CASE
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COMPRESSION REFRIGERATING MACHINE
WITH OIL COLLECTING SPACE IN THE
CRANKCASEWilly Hirche, Leopoldshain, Gorlitz-Land, Ger-
many; vested in the Alien Property CustodianApplication August 29, 1939, Serial No. 292,383
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4 Claims. (Cl. 62—115)

The invention relates to a compression refrigerating machine, in which the crank case is constructed to provide an oil collector with the crank case shut off on all sides. In such machines it is unavoidable, that traces of oil escape from the crankcase between piston and cylinder wall and that, on the other hand, refrigerant vapours get from the stroke space of the cylinder into the crank case. Both these occurrences are detrimental to the operation of the machine. Travelling oil particles reduce the oil quantity in the crank case and deposit it at other points of the plant thereby reducing its efficiency. Refrigerant vapour which has leaked into the crank case increases the pressure in the crank case, renders difficult the running of the engine, finally condenses and impairs the lubricating capability of the oil.

According to the invention the foregoing inconveniences are obviated in that arrangements are provided, which return to the proper place the refrigerant vapour which has penetrated into the crank case and the lubricant which has been removed from the crank case.

The drawing illustrates two embodiments of the invention.

Fig. 1 shows in vertical section one embodiment, and

Fig. 2 the second one.

The crank case designated by 1 merges at its top into the cylinder 2, whereas the motor casing 3 is connected with one of its sides. The crank case is air-tightly closed at all sides by the motor casing 3 and by the cylinder head 4. The crank shaft 6, carrying the rotor 5 of the driving engine, is journaled at 7 and 8 in the crank case. The piston 9 is reciprocated in the cylinder 2 by the crank 11 and the connecting rod 10. The shaft 6 carries at the end opposite the rotor a cylindrical slide valve 12 which tightly fits in the lateral extension 13. The refrigerant vapour is conducted by the evaporator 14 through pipe 15 into the upper portion of a closed container 16, in which it strikes against a partition 17, on which the oil particles separate which have been drawn along, whereupon the refrigerant vapour flows through a pipe 18 into the suction chamber 19 of the cylinder head 4, through the valve 20 into the stroke chamber of the cylinder, then through the valve 21 into the pressure chamber 22 and finally into the condenser 23 from which the condensed refrigerant, together with the oil particles drawn along, flow again through a pipe 18 into the suction chamber 19 of the cylinder head 4, through the valve

20 into the stroke chamber of the cylinder, then through the valve 21 into the pressure chamber 22 and finally into the condenser 23, from which the condensed refrigerant together with the oil particles which have been drawn along flow again through an expansion device 24 back into the evaporator.

The lower portion of the crank case serves as oil collector. In this lower portion a pump 25 or any other distributor element is arranged, to lead the lubricant to the lubricating points. On the head of the connecting rod a scoop may be arranged which dips into the collected oil and throws the oil about in the crank case. The oil also moistens the running surface of the cylinder and is wiped off by the piston. At this occasion traces of oil get over the piston into the stroke chamber of the cylinder, are drawn along by the refrigerant vapours and get into the separator 16 together with the refrigerant through the condenser and evaporator. In the separator the oil collects on the bottom and flows into a pipe 26 connected to the casing 13. Opposite the mouth of the pipe 26 the rotary slide valve 12 has a pocket-like indentation 27 in its circumference, which indentation fills with oil if it is opposite the mouth of pipe 26. During the rotation of the slide valve 12 the indentation or pocket 27 comes opposite a pipe 28 extending from the crank case, so that the oil from the pocket 27 returns through the pipe 28 into the crank case.

The rotary slide valve does not admit of a direct communication of the container 16 with the crank case, as one of the pipes 26, 28 is always shut off when the other communicates with the pocket 27, so that, for instance when the machine is tilted during transport, the content of the crank case cannot flow into other parts of the plant. On the other hand the oil is periodically returned from the container 16 into the crank case during the operation of the engine.

During the pressure stroke of the piston refrigerant vapours can get between piston and cylinder wall into the crank case. For returning these vapours a pipe 29 extends from the upper portion of the crank case, i. e. the steam chamber, and terminates in the casing 13 opposite an indentation or pocket 30 in the rotary slide valve. A pipe 31 terminating in the suction pipe 15 branches from the casing 13 opposite the line along which the indentation or pocket 30 rotates. If the pressure in the crank case has increased by vapours which have penetrated into the case, a periodic pressure equalization is effective.

ed by the rotary slide valve and through the pipes 29, 31 in that the indentation or pocket 30, each time it is opposite the pipe 29, is filled with steam of higher tension and allows the same to flow into the pipe 31 as soon as the indentation or pocket is opposite the mouth of this pipe.

The pressure equalization between the steam space of the crank case and the separator 16 and the returning of the separated out oil from the container 16 into the crank case, may also be effected by pumps or other conveying elements of suitable construction.

In the form of construction shown in Fig. 2 the pressure equalisation is effected in another manner. In this instance a pocket 32 open towards the cylinder wall is provided in the lower part of the piston wall, and a recess 33 at the lower end of the cylinder in the side wall of the same. A pipe 34 extending from the container 16 terminates in the cylinder at the height of the pocket 32 when the piston is in its highest position. If the piston is in its lowest position, the pocket 32 is opposite the recess 33 which is open in downward and inward direction, the pocket fills with refrigerant vapour and gives the same up to the pipe 34 as soon as the pocket is opposite the mouth of this pipe. The returning of the oil from the container 16 into the crank case is effected in a similar manner as in the first example.

In the examples illustrated a compressor with reciprocating piston is employed, the inventive idea may, however, be applied also to refrigerating machines with rotary compressor. The invention is not limited to the position of the compressor cylinder opposite the crank case, as this cylinder may be vertical, as shown in the drawing, but also hanging or horizontal. The idea is common to all forms of construction to return to their proper place refrigerant vapour which has got into the crank case closed on all sides and oil which has escaped from the crank case, and to prevent collection of oil at any other point but in the crank case which forms the only oil collecting space. The invention is particularly advantageous for refrigerating plants with several evaporators.

I claim:

1. A compression refrigerating apparatus, comprising in combination with a compressor cylinder and crank case closed on all sides with an oil collecting space in the crank case, a gas and oil separator, conduits connecting the oil collecting space and the separator, and means in said conduits for controlling the return of oil from the separator to the oil collecting space and the return of gas to the separator including a cylinder interposed in the conduits, a plug rotatable in said cylinder and having surface indentations adapted during rotation of the plug respectively to receive gas and oil from the crank case and separator for return of the gas to the separator and the return of the oil to the crank case.

2. A compression refrigerating apparatus, comprising in combination with a compressor cylinder

and crank case closed on all sides with an oil collecting space in the crank case, a gas and oil separator, conduits connecting the oil collecting space and the separator, and means in said conduits for controlling the return of oil from the separator to the oil collecting space and the return of gas to the separator including a cylinder interposed in at least one of said conduits, a plug rotatable in said cylinder and having a surface indentation adapted during rotation of the plug to receive oil from the separator for return to the crank case and means in the other conduit to control the return of gas from the crank case to the separator.

3. A compression refrigerating apparatus, comprising in combination with a compressor cylinder and a crank case closed on all sides with an oil collecting space in the crank case, a gas and oil separator, conduits connecting the oil collecting space and the separator, and a controlled element adapted to effect a pressure equalization between the crank case and suction side of the machine and operative for controlling the return of oil from the separator to the oil collecting space and the return of gas to the separator, including an extension projecting from said crank case, a rotary slide valve in said extension and having pocket-like indentations in its circumference, an oil return pipe extending from said extension in the rotary plane of one of said indentations and terminating in the crank case, and a pressure compensating pipe extending from the other of said pocket-like indentations in the rotary plane of the other of said indentations and terminating in the crank case.

4. A compression refrigerating apparatus, comprising in combination with a compressor cylinder and a crank case closed on all sides with an oil collecting space in the crank case, a gas and oil separator, conduits connecting the oil collecting space and the separator, and a controlled element adapted to effect a pressure equalization between the crank case and suction side of the machine and operative for controlling the return of oil from the separator to the oil collecting space and the return of gas to the separator, including an extension of said crank case, a rotary slide valve in said extension and having a pocket-like indentation in its circumference, an oil return pipe extending from said extension in the rotary plane of said indentation and terminating in said crank case, a piston in said cylinder having a pocket-like indentation open towards the crank case wall, a connecting pipe extending from said separator to said crank case wall to said pocket-like indentation in the piston, a pocket in said crank case under said piston and open towards the inner and lower sides through which, when the piston is in the lowermost position refrigerant gas can flow into said indentation, a connecting pipe between the cylinder and the oil separator adapted to conduct gas of the refrigerating medium from said pocket into said separator.

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