

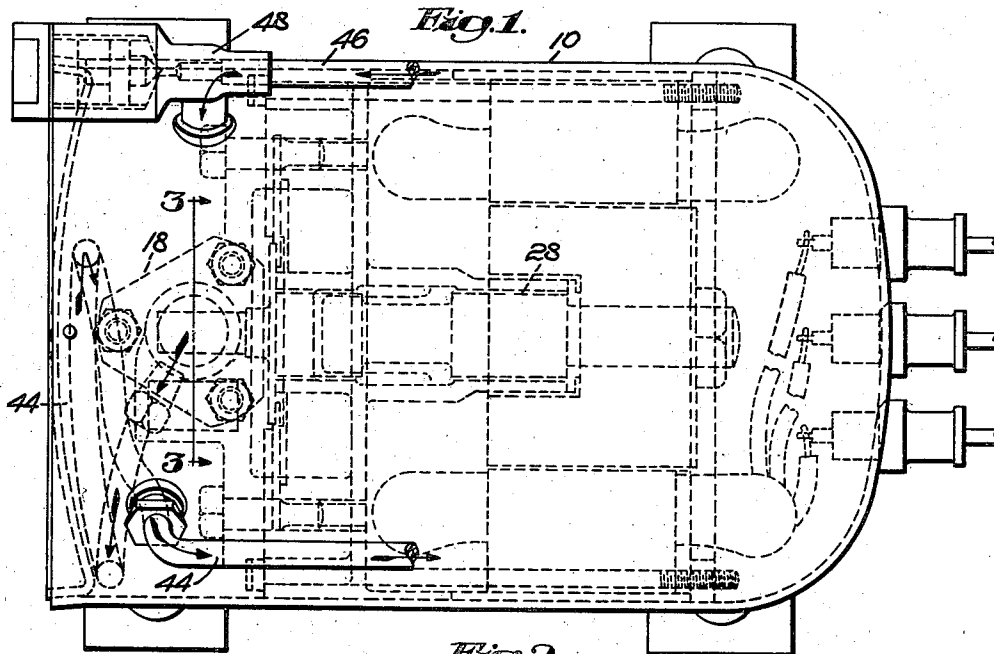
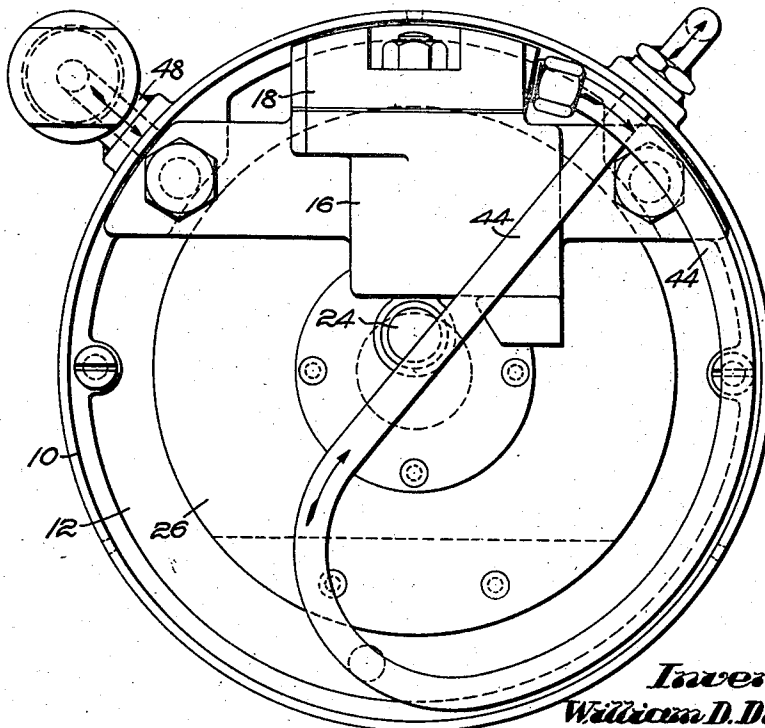
Feb. 25, 1936.

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REFRIGERANT COMPRESSOR

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2 Sheets-Sheet 1



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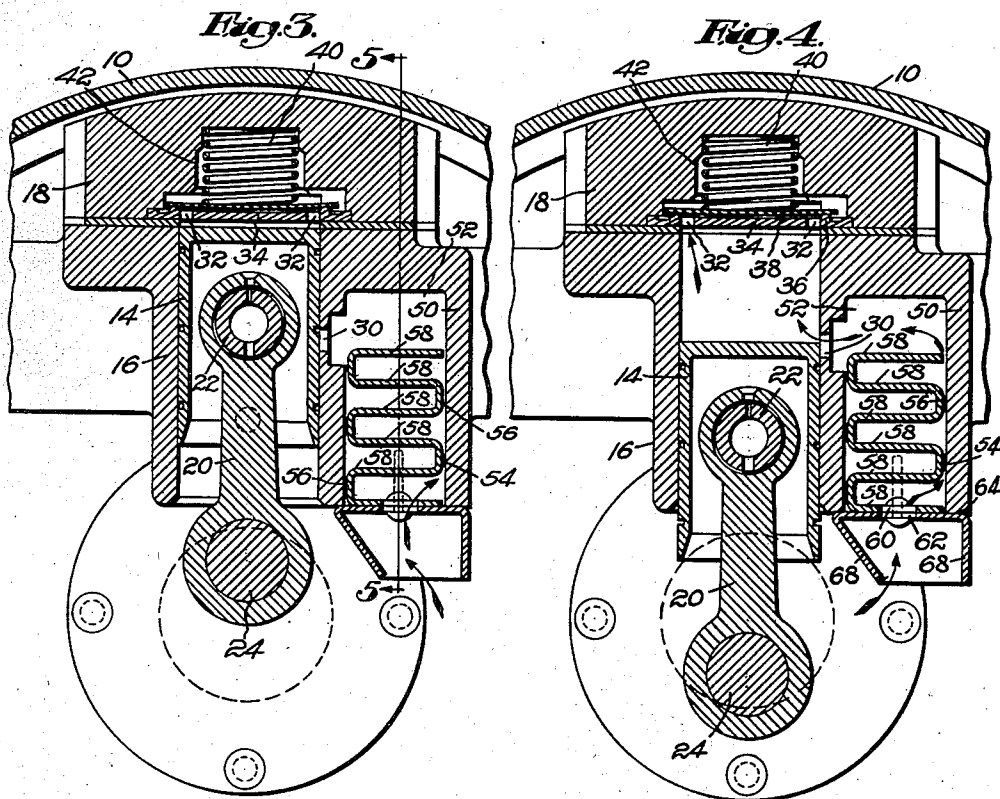
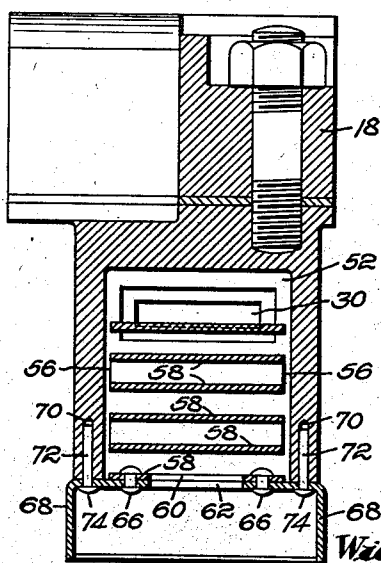


Fig. 5.



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UNITED STATES PATENT OFFICE

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REFRIGERANT COMPRESSOR

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10 Claims. (Cl. 230—172)

This invention relates to a refrigerant compressor for use in a compressor-condenser-expander circuit and is concerned with a compressor of the so-called "sealed unit" type in which there is a housing enclosing the driving motor and the gas pump and in which the housing presents a chamber into and through which the refrigerant returning from the expander passes directly to the pump intake port.

The present invention is concerned with improvements relating to the pump intake port and aims to increase the efficiency of the compressor to silence the sound of gas rushing into the cylinder and to eliminate, or at least to minimize, the admission of lubricating oil to the intake port.

The invention will best be understood by reference to the following description when taken in connection with the accompanying drawings of one specific embodiment thereof, while its scope will be pointed out more particularly in the appended claims.

In the drawings:

Fig. 1 is a plan of a compressor embodying the invention;

Fig. 2 is an end elevation of the same with the cover removed to show the interior parts;

Fig. 3 is a sectional view on an enlarged scale, on line 3—3 of Fig. 1, showing the piston at the end of its upward compression stroke;

Fig. 4 is a section similar to Fig. 3, but showing the piston in its lowermost position; and

Fig. 5 is a sectional view on line 5—5 of Fig. 3.

Referring to the drawings and to the embodiment of the invention selected for illustration, there is shown a refrigerant compressor comprising a housing 10 presenting a chamber 12 (see Fig. 2) within which is housed a gas pump or compressor comprising a piston 14 (see Fig. 3) which reciprocates in a cylinder 16, the latter having a cylinder head 18. As shown, the piston is reciprocated by a connecting rod 20, one end of which is connected to the piston by a wrist-pin 22, and the other end to a crank-pin 24 which is carried by a fly wheel 26 secured to a shaft 28.

The cylinder is provided with a lateral intake port 30 which is covered and uncovered by the piston, as shown by a comparison of Figs. 3 and 4. During the upward stroke of the piston, the gas in the cylinder is driven through a plurality of openings 32 in a plate 34 which presents a seat 36 for a disk or wafer valve 38 which is normally seated by a spring 40. When the gas is driven upwardly by the piston, the valve rises from its seat against the resistance presented by the spring, and the gas passes into an outlet chamber 42

whence it is conducted by a pipe 44 (see Fig. 2) to the exterior of the housing. In practice this pipe is connected to the condenser of the system. The gas, after passing through the condenser and the expander in series, returns to the compressor through a pipe 46 (see Fig. 1) and fitting 48 to the chamber 12. In practice the gas enters the chamber 12 at a pressure of approximately seven pounds per square inch and the chamber is completely filled with gas at this pressure. When the piston descends (compare Figs. 3 and 4), it displaces a certain amount of gas by raising the pressure of the gas in the chamber and driving gas toward and through the intake port into the cylinder when the port opens.

As shown, the cylinder 16 is provided with a lateral extension 50 (see Fig. 3) presenting a secondary chamber 52 which communicates at its lower end with the primary chamber 12 and at the upper portion of its side with the intake port 30. Disposed in this secondary chamber is a baffle 54 forming therewith one or more restricted passages 56 (herein on all sides) between the primary chamber and the upper portion of the secondary chamber. As shown, this baffle is conveniently made of sheet metal bent into zig-zag formation and presenting a vertical series of shelves 58. The lowermost shelf is provided with an opening 60 which registers with a like opening 62 in a skirt 64 suitably attached as by rivets 66 to the baffle and having a downwardly directed flange 68. The skirt is suitably secured to the cylinder extension 50 as by providing the latter with the drilled holes 70 into which pins 72 provided with heads 74 are driven. Screws might be used equally as well.

The secondary chamber, the baffle and the restricted passages about the latter perform three important functions. The baffle constitutes a muffler which silences the noise which would otherwise be occasioned by the rushing of the gas through the intake port. The baffle also serves as a means to collect the oil formed by the stream of gas on its way to the intake port. The oil is caught by the many edges of the baffle, collects on its shelves and is drained back into the primary chamber 12. The depending flange on the skirt encourages the return of the oil to the primary chamber because the oil descending upon the flange collects on its lower edge and drops into the chamber. The third function of the described construction is to increase the volumetric efficiency of the compressor. This increase is found in practice to be about twenty per cent. It appears to be due to the fact that during

the downward stroke of the piston gas is driven past the baffle into the upper portion of the secondary chamber, and when the piston starts its upward stroke and before the intake port is closed, the chamber and baffle constitute a species of trap which traps the gas and resists backward flow of the latter to the primary chamber. In practice it is found that the pressure of approximately seven pounds in the primary chamber is thus stepped up to nine or ten pounds in the upper portion of the secondary chamber, thus materially increasing the amount of gas above the upper head of the intake port when the piston in its ascent closes the latter.

Having thus described one embodiment of the invention, but without limiting myself thereto, what I claim and desire by Letters Patent to secure is:

1. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a primary chamber having an inlet to receive the gaseous refrigerant, means presenting a secondary chamber within said primary chamber, a restricted passage between said chambers, and a baffle between said chambers, and a pump housed within said primary chamber and without said secondary chamber, said pump having its intake communicating with said primary chamber by way of said restricted passage and said secondary chamber, said baffle being distinct from and disposed without said pump along the line of such communication.

2. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a primary chamber having an inlet to receive the gaseous refrigerant, means presenting a secondary chamber within said primary chamber, a restricted passage between said chambers, and a baffle between said chambers, and a pump housed within said primary chamber and without said secondary chamber, said pump having its intake communicating with said primary chamber by way of said restricted passage and said secondary chamber, said baffle being distinct from and disposed without said pump along the line of such communication, said pump comprising a cylinder having an open end exposed within said primary chamber, and a piston having one end exposed within said primary chamber and serving to raise the pressure in the latter when said piston moves toward said open end.

3. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a primary chamber having an inlet to receive the gaseous refrigerant, means presenting a secondary chamber within said primary chamber, a restricted passage between said chambers, and a baffle between said chambers, said baffle presenting a succession of oil-collecting surfaces, and a pump housed within said primary chamber and without said secondary chamber, said pump having its intake communicating with said primary chamber by way of said restricted passage and said secondary chamber, said baffle being distinct from and disposed without said pump along the line of such communication.

4. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a primary chamber having an inlet to receive the gaseous refrigerant, means presenting a secondary cham-

ber within said primary chamber, a restricted passage between said chambers, and a baffle between said chambers, said baffle presenting a downwardly directed surface to promote the return of oil to said primary chamber, and a pump housed within said primary chamber and without said secondary chamber, said pump having its intake communicating with said primary chamber by way of said restricted passage and said secondary chamber, said baffle being distinct from and disposed without said pump along the line of such communication.

5. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a primary chamber having an inlet to receive the gaseous refrigerant, means presenting a secondary chamber within said primary chamber, a restricted passage between said chambers, and a baffle between said chambers, said baffle presenting a vertical succession of horizontal oil-collecting surfaces, and below said surfaces a vertical surface to promote the return of oil to said primary chamber, and a pump housed within said primary chamber and without said secondary chamber, said pump having its intake communicating with said primary chamber by way of said restricted passage and said secondary chamber, said baffle being distinct from and disposed without said pump along the line of such communication.

6. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a primary chamber having an inlet to receive the gaseous refrigerant, means presenting a secondary chamber within said primary chamber, a restricted passage between said chambers, and a baffle between said chambers, said passage being disposed about said baffle, and a pump housed within said primary chamber and without said secondary chamber, said pump having its intake communicating with said primary chamber by way of said restricted passage and said secondary chamber, said baffle being distinct from and disposed without said pump along the line of such communication.

7. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a chamber having an inlet to receive the gaseous refrigerant under more or less pressure, and a gas pump within said chamber, said pump comprising a cylinder having a lateral intake port communicating with said chamber to receive gas therefrom, and an outlet for the compressed gas, said cylinder having an open end communicating with said chamber, and a piston working in said cylinder and covering and uncovering said lateral intake port, said piston having one end exposed to the gas within said chamber and in its movement toward said open end raising the pressure of the gas in said chamber and driving a charge of the gas through said lateral intake port into said cylinder.

8. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a chamber having an inlet to receive the gaseous refrigerant under more or less pressure, and a gas pump within said chamber, said pump comprising a cylinder having an intake from said chamber and an outlet for the compressed gas, said cylinder having an open end communicating with said chamber, and a piston working in said cylinder and having one end exposed to the gas within said chamber and in its movement toward said open end raising the

pressure of the gas in said chamber and driving a charge of gas into said cylinder intake.

9. In a refrigerant compressor for use in a compressor-condenser-expander circuit, the combination of a housing presenting a primary chamber having an inlet to receive the gaseous refrigerant under more or less pressure, a gas pump within said chamber, said pump comprising a cylinder having an intake and an outlet, and having an open end communicating with said chamber, and means presenting a secondary chamber within said primary chamber and communicating with said pump intake and a restricted passage communicating with said primary chamber, said pump comprising also a piston working in said cylinder and having one end exposed to the gas within said primary chamber and in its movement toward said open end raising the pressure of the gas in said primary chamber and driving a charge of the gas through said restricted passage into and through said secondary chamber and through said cylinder intake into said cylinder.

10. In a refrigerant compressor for use in a

compressor-condenser-expander circuit, the combination of a housing presenting a primary chamber having an inlet to receive the gaseous refrigerant under more or less pressure, a gas pump within said chamber, said pump comprising a cylinder having an intake and an outlet, and having an open end communicating with said chamber, and means presenting a secondary chamber within said primary chamber and communicating with said pump intake and a baffle forming with said secondary chamber a restricted passage communicating with said primary chamber, said pump comprising also a piston working in said cylinder and having one end exposed to the gas within said primary chamber and in its movement toward said open end raising the pressure of the gas in said primary chamber and driving a charge of the gas through said restricted passage into and through said secondary chamber and through said cylinder intake into said cylinder.

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