Feb. 21, 1939. L. M. CROSLEY 2,147,767

PISTON COMPRESSOR PUMP

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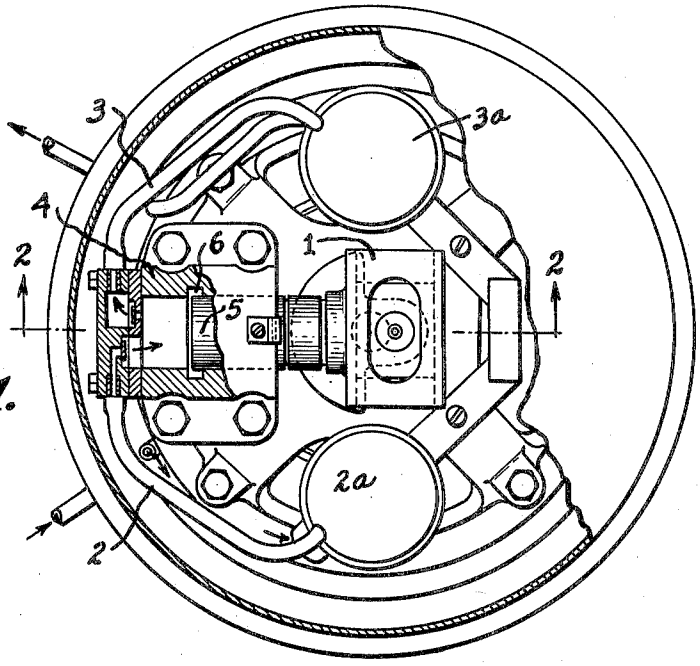


FIG. 1.

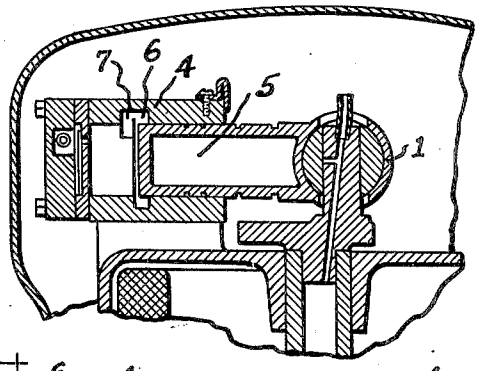


FIG. 2.

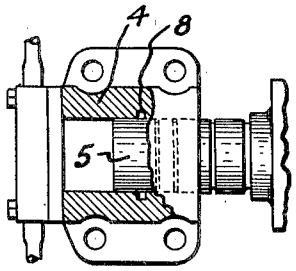


FIG. 3.

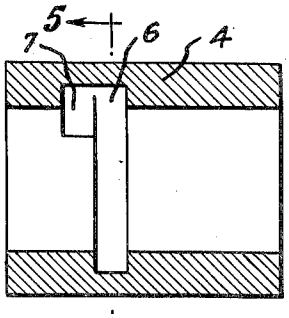


FIG. 4.

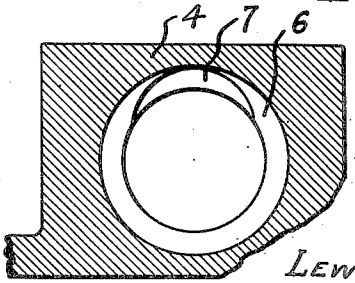


FIG. 5.

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PISTON COMPRESSOR PUMP

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2 Claims. (Cl. 230—172)

My invention is directed specifically to ways of modifying standard compressor pumps for refrigeration systems so as to vary the displacement of the pumps for adapting them to different refrigerant gases, and also to increase the efficiency of the compressors without altering the displacement.

If it is assumed that the displacement in a domestic refrigerator compressor is of a value of 100, which is proper for sulphur dioxide gas as a refrigerant, this value would have to be reduced to around 60 for a compressor used in the same system, if freon gas were substituted for the sulphur dioxide. According to my invention, I wish to make a standard compressor pump for the maximum desired displacement, and modify it to bring about less displacement without adding any parts, and also without introducing an element which will set up a "hammer" or noise, or which will require an additional muffler to avoid noise.

Other objects which may be regarded as independent are the elimination of leak back of oil or gas in a piston type compressor in which the piston is without rings, which will interfere due to their location.

I accomplish my objects by that method of procedure and consequent structure, of which examples will be illustrated and described, the novelty therein being set forth in the appended claims to which reference is hereby made.

In the drawing:

Figure 1 is a plan view of a compressor device for a domestic refrigerator, with the pump partly in section.

Fig. 2 is a detail section of the pump, on the line 2, 2 of Fig. 1.

Fig. 3 is a modification showing the use of a channel in the cylinder wall for prevention of oil leakage only.

Fig. 4 is a section of the cylinder alone, of the form shown in Figs. 1 and 2, but enlarged.

Fig. 5 is a section on the line 5, 5, of Fig. 4.

It will be understood that the particular compressor arrangement shown in Fig. 1 is no part of my invention, aside from the piston pump itself. I have illustrated a motor operated Scotch yoke 1, inlet and outlet passages 2 and 3 to the pump, and mufflers 2a and 3a eliminating noise of the intake and outlet of the pump.

The standard pump will have the cylinder 4 and the piston 5, which piston preferably does not have any rings. The displacement of this piston will be that required for its maximum duty.

According to my invention, I can cut down the displacement as desired without any additional parts in the pump, and with no modification of the stroke of the piston. If additional ports were to be used, an additional muffler would have to be employed. If the stroke of the piston were to be changed, a re-designing of the operating parts would be called for.

What I do is cut a chamber in the wall of the cylinder and port it into the compression space. The total area which is thus cut into the cylinder wall cuts down the displacement of the pump, and does not interfere with the suction stroke. It is much preferable to form the chamber as an annular one because it then functions to entrap oil and prevent leakage of the same under pressure out the back of the cylinder.

My preferred structure is shown in the drawing. Thus I cut a channel 6 in the cylinder of the pumps which I wish to modify, which channel may lie behind the inner end of the piston stroke, although for most quiet and effective operation, I prefer it to be located so that the piston just clears one wall of the channel in its inner position.

Then I form an additional cut 7 in the cylinder wall, which is preferably in the form of a crescent of approximately the depth of the channel as illustrated, again for the purpose of most quiet operation. This acts as a port.

A pump when so modified operates as follows: At the beginning of the compression stroke the gases can flow through the cut 7 and into the channel or annular chamber 6. The piston finally passes the cut 7, and thereafter its operation is normal. There is no sound created as the piston passes the cut 7 because there is no sudden building up of pressure at that instant. The cylinder ahead of the piston and the chambers in the cylinder wall are under substantially the same pressure at this point.

The effective displacement of the pumps is thus cut down to the desired one, without changing the stroke of the piston. When the suction stroke sets in the piston "draws" gases into the cylinder until it reaches the cut 7, and thereupon the compressed gases in the cylinder wall chambers will flow into the space ahead of the piston. Thus the cylinder will have its normal charge of gas at each stroke and will compress and expel the gases with a required displacement, with inconsiderable loss of power.

The annular chamber in the cylinder wall functions also as an oil trap against back leakage of oil and gases, as has already been noted. In Fig. 3 is shown a pump in which the annular channel or chamber 8 is so located as to serve only this

function, which alone justifies its presence in the cylinder.

I am enabled by my invention to make all compressors for a given refrigerator system alike, and yet by the simple milling operation on the cylinder wall to accommodate them to gas requiring different displacements, which is a very great saving in quantity production. Also the compression stored up in the cylinder chambers at one stroke of the piston is restored to the system at the return stroke so as to avoid mechanical loss, and no noise is set up, such as would result if an additional valve and port were provided. Also, I provide a simple oil trap, avoiding the necessity of extra precautions in packing the rear end of the piston.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a piston pump, means for modifying the displacement thereof, which comprises a chamber in the cylinder ported into the space ahead of the inner position of the piston, said chamber being in the form of an annular channel in the cylinder wall, the location thereof being such as just to overlap the inner position of the piston, and the port being a crescent shaped cut in the cylinder wall of the depth of the channel to the surface of the inner wall.

2. In a piston pump, an annular channel in the inner wall of the cylinder thereof located axially of said cylinder in a position to overlap the inner end of the piston in its position farthest removed from the cylinder head, and a partial annular chamber in the inner wall of said cylinder communicating with said first mentioned chamber and extending toward the cylinder head.

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