June 25, 1929. H. A. GREENWALD ET AL 1,718,350

VALVE FOR PUMP ASSEMBLIES

Filed March 21, 1927

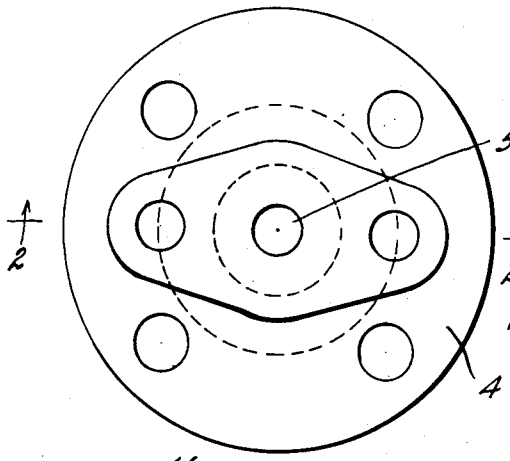


Fig. 1

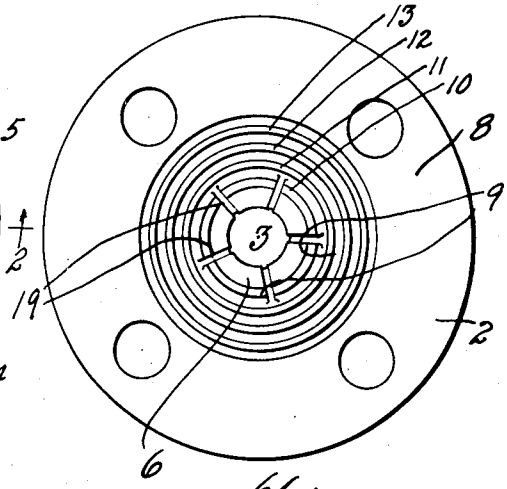


Fig. 4

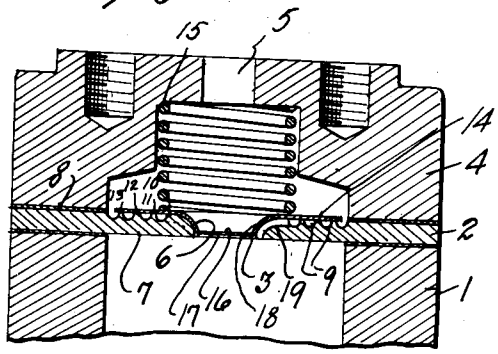


Fig. 2

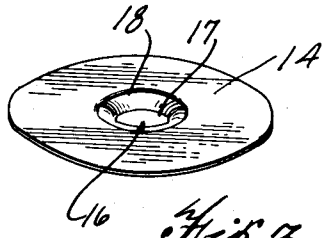


Fig. 3

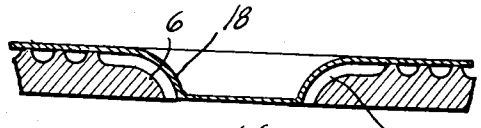


Fig. 5

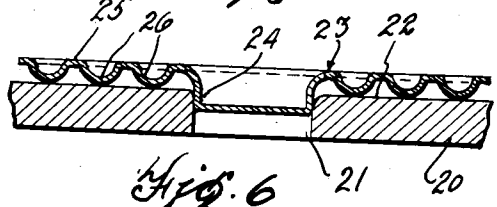


Fig. 6

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VALVE FOR PUMP ASSEMBLIES.

Application filed March 21, 1927. Serial No. 177,150.

This invention relates generally to pump assemblies designed particularly for refrigerating apparatus and the like and consists of certain novel features of construction, combinations and arrangements of parts as will be hereinafter more fully described and particularly pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a top plan view of a pump assembly embodying our invention.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a detail perspective view of the valve.

Figure 4 is a top plan view of the intermediate plate.

Figure 5 is a view similar to Figure 2 but showing a slightly modified form of construction.

Figure 6 is a vertical sectional view through a slightly modified form of construction.

Referring now to the drawing, 1 is a pump cylinder in which the refrigerant gas is adapted to be compressed, 2 is a plate having a central opening 3 constituting an outlet for the cylinder, and 4 is a detachable head having a central outlet opening 5 for the compressed gases discharged through the outlet opening 3. As shown, the cylinder 1 and head 4 preferably correspond to that shown and described in co-pending application Serial No. 139,421 and the plate 2 is clamped between the upper end of the cylinder 1 and the lower face of the head 4 in a manner similar to the plate 2 in said co-pending application, but in the present instance the walls 6 of the opening 3 flare upwardly from the lower face 7 of the plate to the upper face 8 thereof, and the latter is preferably provided about said opening 3 with a series of upwardly opening annular grooves or channels 9 that are spaced equidistantly apart and are concentric with the central opening 3, the innermost curve 9 being preferably located adjacent to the upper edge of said opening. Thus annular portions 10, 11, 12 and 13 respectively of the plate constitute multiple seats for a suitable valve.

With this construction, a disk valve 14 of light gauge spring metal is used to control the passage of the compressed gas from the outlet opening 3 in the plate to the discharge opening 5 in the head. As shown this valve 14 is normally held upon the recessed upper face of the plate 2 by means of the coil spring 15 in the head 4, and is preferably provided at its center with a depressed cup-shaped portion 16 that is movable in the opening 3 in the plate. Preferably the base 17 of this cup-shaped portion is flat and is normally flush with the lower face 7 of the plate, while the walls 18 of said cup-shaped portion flare upwardly from the base to the flat body portion of the valve. Thus the cup-shaped portion 16 in the opening 3 centralizes the valve with respect to the opening and is shaped to cut down the clearance space of the cylinder. Preferably clearance in the form of spaced longitudinally extending curves 19 in the flaring walls 6 of the plate 2 (see Fig. 2), or an annular space 20 between the cup-shaped portion 16 of the valve and the flaring walls 6 (see Fig. 5) is provided to facilitate the escape of the compressed gas from the cylinder and to prevent the valve from rising too high.

Thus, from the foregoing description, it will be apparent that the cup-shaped central portion 16 of the valve is substantially rigid and therefore will maintain its shape, whereas the flat marginal portion of the valve is free to flex upwardly and downwardly with respect to said cup-shaped portion. In use the valve 14 will be raised bodily during the compression stroke of the piston (not shown) in the cylinder so that the compressed gas will escape through the opening 3 to the opening 5 in the head. However due to the flexible construction and yieldable nature of the valve, and the arrangement of the grooves 9 with respect to the opening 3, the annular seat portions 10, 11, 12 and 13 respectively will be successively uncovered or covered by the valve. Thus when the valve is seated portions of the gases will be trapped in the grooves 9 and a multiple seal is provided between said valve and plate 2.

In Figure 6 we have shown a slight modification in which the plate 20 has a central outlet opening 21 for the compressed gas but preferably has a smooth plane top surface 22 which constitutes a seat for a disk valve 23. In this instance the valve 23 has a substantially rigid cup-shaped portion 24 in the central opening 21 in the plate and has an annularly corrugated marginal portion 25 that normally rests upon the plane top

surface 22 of the plate 20. As shown, these corrugations 26 are concentric with the cup-shaped portion 24 and constitute multiple sealing means.

While it is believed that from the foregoing description, the nature and advantage of our invention will be readily apparent, we desire to have it understood that we do not limit ourselves to what is herein shown and described and that such changes may be resorted to when desired as fall within the scope of what is claimed.

What we claim as our invention is:

1. In a valve, the combination of a seat having a port, a valve having a substantially rigid central portion associated with said port and a flexible outer sealing portion, there being a plurality of separate contacting and sealing points between said flexible portion and said seat.

2. In a valve, the combination of a seat having a port, and a disk valve having a flexible portion normally engaged with said seat and a depressed substantially rigid portion received in said port.

3. In a valve, the combination of a seat having a port and a plurality of ridges about said port, and a valve having a substantially rigid central portion associated with said port and a flexible outer portion adapted to engage said ridges to establish a fluid-tight seal.

4. In a valve, the combination of a seat having a port, and a valve having a substantially rigid central portion associated with said port and a flexible outer sealing portion provided with a plurality of sealing elements adapted to engage said seat.

5. In a valve, the combination of a seat having a port, and a valve having a substantially rigid central portion associated with said port and a flexible outer sealing portion provided with a plurality of laterally spaced annular sealing elements adapted to engage said seat.

6. In a valve, the combination of a seat having a port provided with upwardly flaring walls, a disk valve having a flexible portion adapted to engage said seat and a depressed substantially rigid portion received in said port, clearance being provided between the depressed portion of said valve and the flaring walls of said port.

7. In a valve, the combination of a seat having a port and a plurality of spaced ridges, and a valve member having a substantially rigid central portion associated with said port and a flexible marginal sealing portion adapted to engage said ridges, the arrangement of said ridges and the construction of said valve being such that said ridges are adapted to be successively uncovered and successively covered by the flexible marginal sealing portion of said valve.

8. In a valve, the combination of a seat having a port, a valve having a substantially rigid central portion normally engaged with the wall of said port and having a flexible sealing portion, and a plurality of separate contacting and sealing points between said flexible portion and said seat.

In testimony whereof we affix our signatures.

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