Nov. 23, 1926. 1,607,658

T. C. WHITEHEAD

PUMP

Filed April 27, 1925

Fig. 2

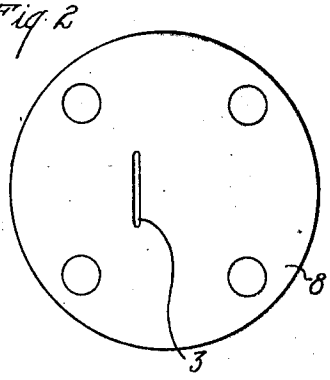



Fig. 4

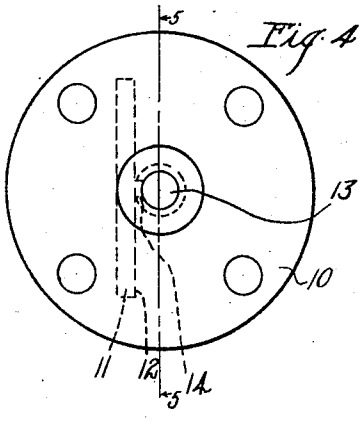



Fig. 1

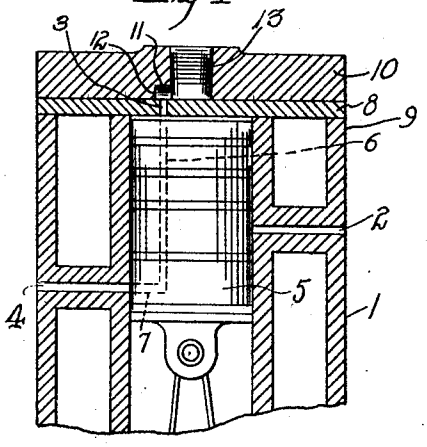



Fig. 3

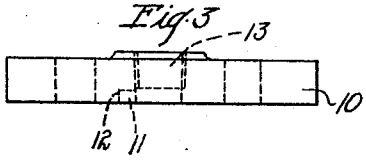



Fig. 5

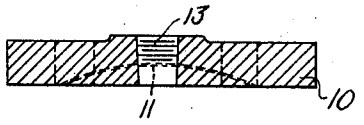



Fig. 6

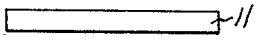
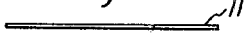



Fig. 7




Inventor
Thomas C. Whitehead

By Whittemore Hulbert Whittemore
& Belknap Attorneys

Patented Nov. 23, 1926. 1,607,658

# UNITED STATES PATENT OFFICE.

THOMAS C. WHITEHEAD, OF DETROIT, MICHIGAN.

## PUMP.

Application filed April 27, 1925. Serial No. 26,229.

This invention relates generally to refrigerating apparatus and refers more particularly to the pumps thereof used for compressing the refrigerating medium.

In the accompanying drawing;

Figure 1 is a fragmentary vertical sectional view through a pump embodying my invention.

Figure 2 is a top plan view of the plate 8.

Figure 3 is a side elevation of the cylinder head 10.

Figure 4 is a top plan of the construction shown in Figure 3.

Figure 5 is a sectional view taken on the line 5—5 of Figure 4.

Figure 6 is a detail top plan view of the leaf valve.

Figure 7 is a side elevation of the construction shown in Figure 6.

In the construction of pumps for the purposes described, it is desirable to obtain a noiseless operation. It is also desirable to have a construction in which the inlet port will open automatically even when pumping from comparatively high vacuum. Heretofore valves have been held to their seats either by gravity or by other resilient pressure, consequently they often failed to operate when pumping from high vacuum inasmuch as there was not sufficient gaseous pressure to raise the valves from their seats. Moreover such valves made considerable noise while in operation. Constructions have also been provided in which noiseless leaf springs have been used as valve members for controlling the passage of the fluid, however the segmental recesses for the leaf springs were usually in alignment with the outlet passages for the fluid, hence no provision was made for backing the central portions of the springs when in bowed position. As a result the pressure against these light springs caused the same to break and thereby render the device inoperative. Moreover the arrangement of passages and segmental recesses was such that the flow of the fluid through the segmental recesses, which incidentally had to be relatively wide to provide passages for the fluid, was retarded by the leaf springs even when they were in open bowed position. With the present invention the objectional features just referred to have been overcome by providing a construction in which the segmental recesses for the leaf springs are preferably offset with respect to the outlet passages for the fluid, consequently the arcuate bases of the segmental recesses serve as efficient backing for the springs when in bowed position, and the fluid will have a free and unobstructed passage laterally from the segmental recesses to the outlet passages when the springs are in bowed position. Moreover a narrow segmental recess will suffice for the spring.

Referring now to the drawing, the numeral 1 designates a cylinder, preferably of a refrigerating pump having an inlet passage 2 and outlet passages 3 and 4 respectively for the gaseous refrigerating medium which is adapted to be compressed within the cylinder by means of a piston 5. This piston may be reciprocated within the cylinder by any suitable means (not shown) and is preferably provided with a longitudinally extending passage 6 and a communicating transversely extending passage 7. As shown, the outlet passage 3 is preferably a narrow slot that is located in a plate 8 detachably held upon the upper end of the cylinder block 9 by means of a removable head 10. To provide an efficient construction for the purposes hereinbefore set forth, the slot 3 is preferably off-centre in the plate 8 and is adapted to be closed by a light leaf spring valve 11 located in a segmental recess 12 that is off-centre in the head 10. This recess 12 is preferably just wide enough to receive the leaf valve 11 and is preferably connected intermediate its ends to the central outlet passage 13 in the head 10 by means of the short transversely extending passage 14.

In use, when the piston 5 is upon its suction stroke, the leaf valve 11 will seal the slot 3. As the piston moves downwardly the transversely extending passage 7 in the piston will be out of registration with the outlet passage 2, and communication between the inlet passage 2 and the space within the cylinder between the piston 5 and plate 8 will be cut off. Therefore this movement of the piston 5 will create a vacuum until the upper end of the piston uncovers the inlet passage 2, whereupon the gas to be compressed will be drawn in through the passage 2 and will be compressed within the cylinder by the piston on its upward or return stroke. When the pressure in the cylinder is sufficiently high, the gases will force the leaf valve 11 from its seat, bowing it upwardly into the segmental recess 12 and

permitting the compressed gas to pass laterally through the transverse passage 14 to to the central exhaust passage 13. A further upward movement of the piston will place the passage 7 in registration with the outlet passage 4. This will permit the gases left between the piston and plate 8 to escape through the passages 6, 7, and 4 respectively.

Thus, it will be apparent from the foregoing description that the valve 11 will operate automatically for controlling the outlet passage 3. Inasmuch as this valve is a light leaf spring, it will also be apparent that it will operate noiselessly. Furthermore, the arrangement of the discharge passages 3, 12, 13 and 14 respectively is such that the compressed refrigerating medium will pass freely from the outlet passage 3 in the plate 8 to the exhaust passage 13 in the head 10 when the spring valve 11 is bowed in the recess 12. Moreover, the bases of this segmental recess will serve as an efficient backing for the bowed spring, hence breaking due to abnormal pressure is obviated entirely. It will also be noted that the construction comprises very few parts, therefore it may be manufactured at a comparatively low cost.

While it is believed that from the foregoing description the nature and advantages of the invention will be readily apparent, I desire to have it understood that I do not limit myself 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 I claim as my invention is:

A pump including an open ended cylinder having a gas inlet port in a side wall thereof, a head for the cylinder having an outlet passage and having a segmental recess extending laterally from said outlet passage and communicating therewith, a plate between said cylinder and head having a port offset from the center thereof and in communication with said recess, a valve in said segmental recess controlling the flow of gases through said port, and a piston in the cylinder for compressing the gases received through said inlet port, said valve being unseated automatically from the port when the pressure in the cylinder is greater than the pressure in the exhaust passage aforesaid.

In testimony whereof I affix my signature.

THOMAS C. WHITEHEAD.