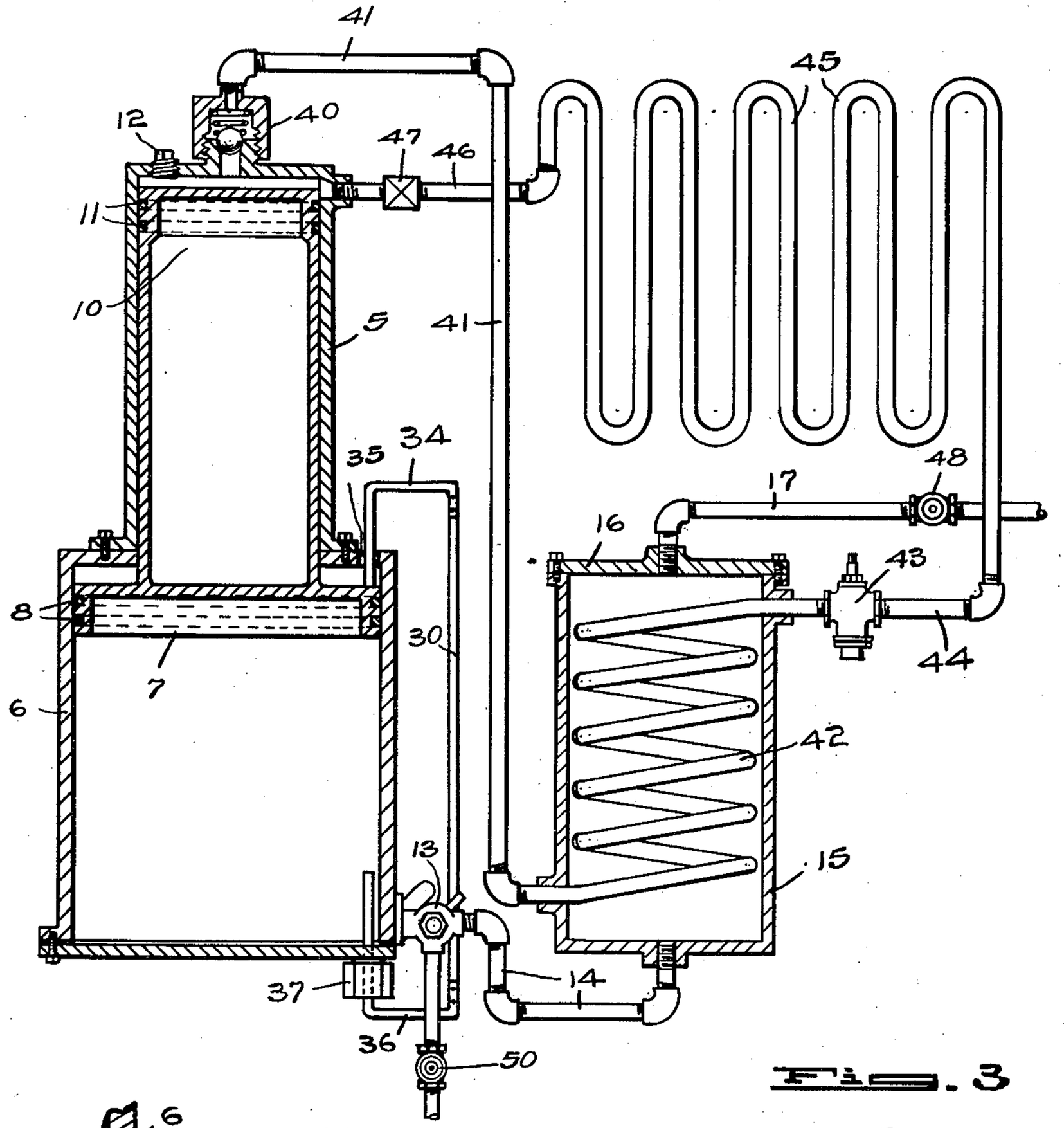
E. P. CARLSON.

HYDRAULIC PUMP.

APPLICATION FILED JUNE 17, 1918.

1,353,216. Patented Sept. 21, 1920.

Fig. 1



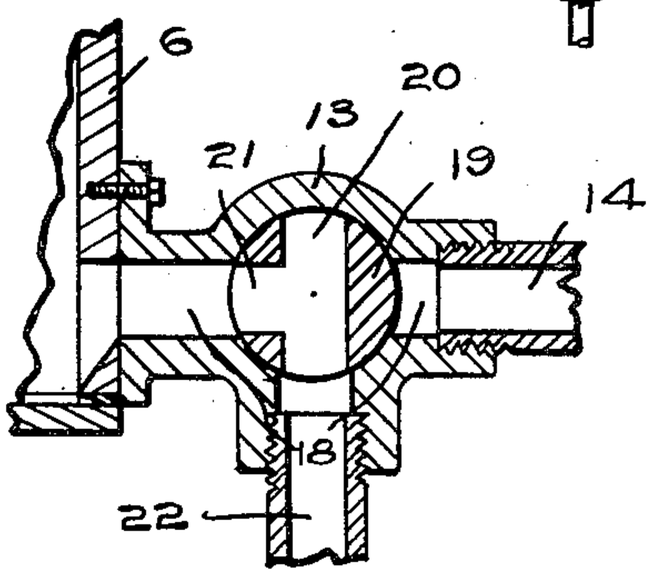
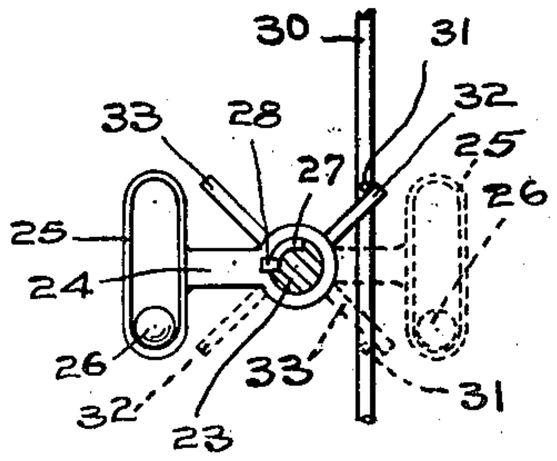


Fig. 2

Fig. 3



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HYDRAULIC PUMP.

1,353,216. Specification of Letters Patent. Patented Sept. 21, 1920.

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To all whom it may concern:

Be it known that I, EDWARD P. CARLSON, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a certain new and useful Improvement in Hydraulic Pumps, of which the following is a specification.

My invention relates to improvements in pumps and the object of my invention is to provide a pump of cheap and simple construction that may be built relatively small in size and that is adapted to be hydraulically operated by connecting it with a water supply pipe through which water under pressure is permitted to flow.

My apparatus is especially intended for use in homes and in small places where a larger and more expensive plant can not be maintained.

My invention consists in the novel construction, adaptation and combination of parts as will be more clearly hereinafter described and claimed.

I accomplish this object by devices illustrated in the accompanying drawings, wherein—

Figure 1 is a view partly in elevation and partly in section of a refrigerating apparatus constructed in accordance with my invention;

Fig. 2 is an enlarged sectional view of a three-way valve embodied in my invention; and

Fig. 3 is a view in elevation illustrating the mechanism used for operating the three-way valve, certain parts being shown in section.

Referring to the drawings, throughout which like reference numerals indicate like parts, the numeral 5 indicates an ammonia cylinder of relatively small diameter that is open at its bottom end and is secured to the top side of a hydraulic cylinder 6 of larger diameter, in axial alinement therewith.

7 is a piston that is disposed within the hydraulic cylinder 6 and may be provided with suitable piston rings 8.

The piston 7 is integrally connected with another piston 10 of smaller diameter that projects upwardly into the ammonia cylinder 5 and is provided near its top end with suitable piston rings 11. The two pistons 10 and 7 being integrally formed will reciprocate simultaneously. The top end of the ammonia cylinder 5 is provided with an opening that is adapted to be closed by the plug 12 and through which opening a charge of ammonia gas or other refrigerating gas may be introduced.

The hydraulic cylinder 6 is connected near its lower end with a three way valve 13 which in turn connects with a pipe 14 that communicates with the interior of a condenser tank 15.

The condenser tank 15 is preferably of cylindrical form and is provided on its top end with a removable cover 16 through which extends a pipe 17 that may be connected with any suitable source of supply of water under pressure, as for instance, with the water supply pipe of a house.

The three way valve 13, shown in Fig. 2, is provided with a passageway 18 that extends therethrough and with a cylindrical valve member 19 that intersects the passageway 18 at right angles thereto and is provided with passageways 20 and 21 which may be turned in an obvious manner to establish communication between the inlet pipe 14 and the interior of the hydraulic cylinder 6 or between a discharge pipe 22 and the interior of the hydraulic cylinder 6.

In the position shown in Fig. 2 the valve member 19 is turned so that communication between the hydraulic cylinder 6 and the outlet pipe 22 is established but communication between the interior of the cylinder 6 and the inlet pipe 14 may be obtained by rotating the valve member 19 through an angle of ninety degrees in a clockwise direction.

The valve member 19 terminates in an axial shaft 23, as shown in Fig. 3, upon which is mounted a lever arm 24 that has a runway 25 provided on its outer end and is adapted for the reception of a weight 26 which may be in the form of a ball that will roll from end to end of the runway 25.

The shaft 23 is provided with a circumferential slot 27 for the reception of a fixed key 28 in the lever arm 24, the slot 27 being of greater width than the key so that the lever arm 24 may be moved from the horizontal position shown in Fig. 3 to a vertical position or slightly past a vertical position before the key 28 will engage with the wall of the slot 27 and begin to turn the valve.

It will thus be seen that if the lever arm 24 is lifted from the inclined position shown in full lines in Fig. 3 until it just passes a vertical position the ball 26 will roll from one end of the runway 25 to the other end

and the weight of such ball acting through the lever arm 24 will carry the lever arm 24 down into the horizontal position shown by broken lines in Fig. 3 and will turn the valve member 19 through an angle of ninety degrees thereby closing the outlet opening and opening the inlet to the hydraulic cylinder 6.

The lever arm 24 is lifted from its horizontal position on either side of the vertical by a rod 30 that is provided with a transverse pin 31 and is adapted to fit within bifurcations or slots in the ends of arms 32 and 33 that are fixedly secured to the lever arm 24.

The rod 30 is fixedly secured at its top end to an L-shaped member 34 that projects downwardly through an opening 35 in the top of the hydraulic cylinder 6 and the bottom end of the rod 30 is fixedly connected with an L-shaped member 36 that projects upwardly through a stuffing box 37 in the bottom end of the hydraulic cylinder 6.

It will thus be seen that as the piston 7 approaches the top end of the cylinder 6 it will engage with the L-shaped member 34 and lift the rod 30 thereby causing the lever arm 24 to be thrown from the position shown by dotted lines in Fig. 3 to the position shown by full lines and causing the valve member 19 to be moved from the inlet position to the outlet position.

As soon as the valve member has been thrown into the outlet position the water which has been flowing into the cylinder 6 will begin to discharge and gravity will move the pistons 7 and 10 downwardly within the cylinders until the piston 7 strikes against the top end of the L-shaped member 36 and moves the rod 30 downwardly far enough to throw the lever arm 24 from the position shown in full lines to the position shown in dotted lines in Fig. 3, thereby moving the valve member 19 through an angle of ninety degrees in a clockwise direction from the position in Fig. 2 and establishing communication between the inlet pipe 14 and the interior of the cylinder 6 at the same time that it closes communication with the discharge pipe 22.

The ammonia gas from the cylinder 5 is forced upwardly through the check valve 40 as the piston 10 moves upwardly within the cylinder 5 and such gas then passes through the pipe 41 into a coil 42 within the condenser tank 15 where it is condensed by the action of the cool water that is flowing therethrough. The liquid ammonia thence passes out of the coil 42 and through a reducing valve 43 where its pressure is greatly reduced and from whence it is discharged through a pipe 44 into the cooling pipes or coil 45 where it expands and produces a cooling effect in a well known manner.

After the ammonia has circulated through the coil 45 it returns through a pipe 46 and check valve 47 to the top of the cylinder 5.

When the device is to be operated the pistons 7 and 10 are moved to their lowermost limit and the apparatus is charged with ammonia gas. The water is then turned on by opening a valve 48 in the pipe 17 and will exert a pressure below the piston 7 to raise the piston 10 within the cylinder 5 and compress the ammonia gas sufficiently to force it past the check valve 40, through the condenser coil 42, past the reducing valve 43 and into the cooling coil 45.

When the cylinder 7 reaches the limit of its upward movement the valve 13 will be automatically closed to the inlet pipe 14 and opened to the outlet pipe 22 and the water within the cylinder 6 will begin to discharge.

As the water discharges the weight of the pistons 7 and 10 and the pressure of the gas above the piston 10 will move such pistons downwardly until the pressure of the gas above the piston 10 falls below the pressure of the gas within the coil 45 whereupon the gas from the coil 45 will flow past the check valve 47 into the space above the piston 10.

When the piston 7 reaches the limit of its downward movement the valve 13 will be automatically thrown to close the passage to the outlet pipe 22 and open the passage to the inlet pipe 14 so that the pistons 7 and 10 may again be moved upwardly by the pressure of the water and the ammonia gas compressed and forced through the condenser coil past the reducing valve and into the cooling coil.

The pipe 22 is preferably provided with a shut off valve 50 by which the outlet from the cylinder 6 may be closed or regulated to control the flow of water from said cylinder 6.

From the above description it will be seen that the operation of this refrigerating apparatus is automatic after it has been set in motion, the ammonia gas being compressed on the upper stroke of the piston 10 and forced through the various pipes and coils into the cooling coil and the pressure above the piston 10 being lowered when such piston is withdrawn to the bottom end of its cylinder thereby permitting the gas under a relatively low pressure from the cooling coil 45 to enter the top of the cylinder 5.

It is obvious that changes in the precise form of construction of the various parts embodied in my invention may be resorted to within the scope of the following claims.

What I claim is:

1. An apparatus of the class described comprising an ammonia compression cylinder, a hydraulic cylinder connected to the lower end thereof, a double piston having a head moving in the ammonia cylinder and a head moving in the hydraulic cylinder, a supply valve for the hydraulic cylinder, a

radial lever carried by the valve, a runway at the outer end of the lever, a weight in the runway adapted to move the valve to its limit in opposite directions, a C-shaped frame having its ends slidable in the upper and lower ends of said hydraulic cylinder with the exterior portion associated with the supply valve, and with the inner ends of the frame adapted to be engaged by the piston for operating the valve.

2. An apparatus of the class described comprising an ammonia compression cylinder, a hydraulic cylinder connected to the lower end thereof, a double piston having one head moving in the ammonia cylinder and the other head moving in the hydraulic cylinder, a water supply valve exteriorly of the hydraulic cylinder, a radial lever carried by the valve, a runway at the outer end of the lever, a weight in the runway adapted to move the valve to its limit in opposite directions, a C-shaped frame having its ends slidable in the upper and lower ends of said hydraulic cylinder and in position to be engaged by the valve adjacent its limits of movements in opposite directions, and coöperating means carried by the frame exteriorly of the cylinder and said valve for opening and closing the valve.

In witness whereof, I hereunto subscribe my name this 8th day of June, A. D. 1918.

EDWARD P. CARLSON.