

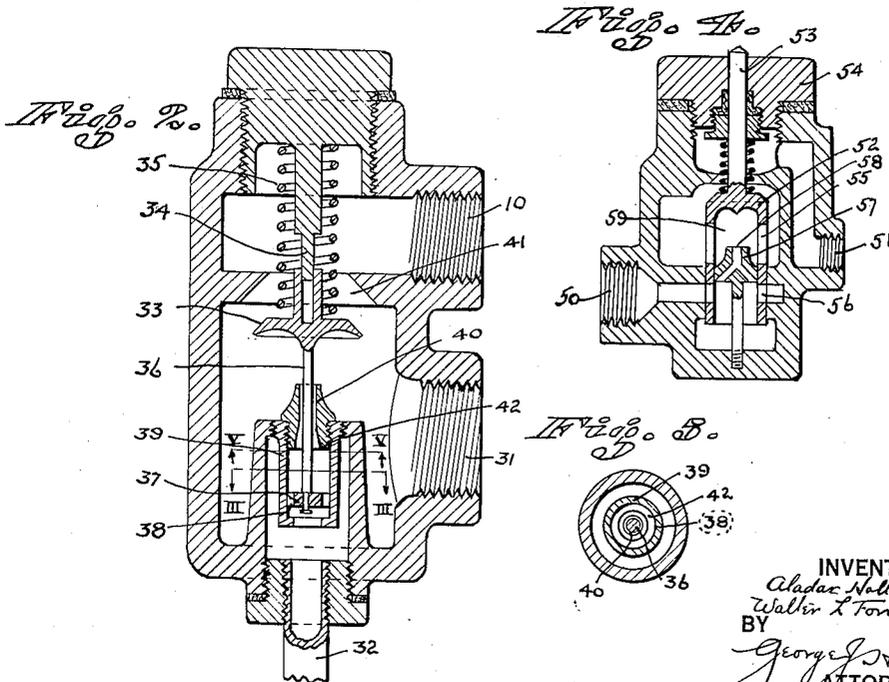
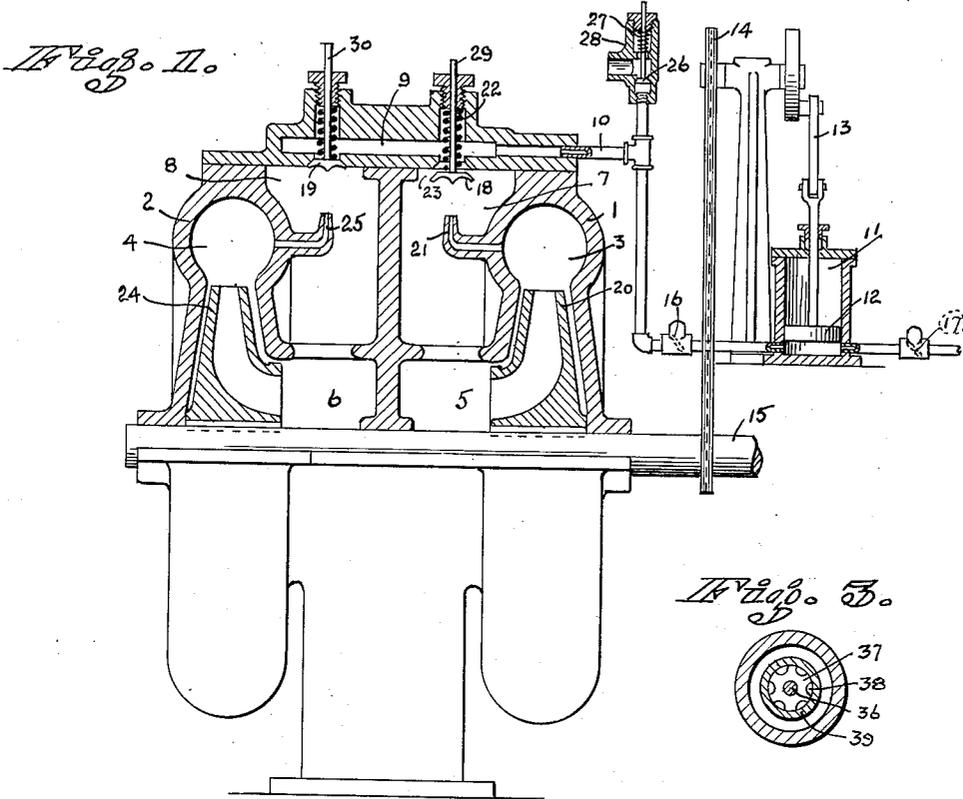
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PRIMING MEANS

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PRIMING MEANS.

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Our invention has for its object valve means to automatically establish vacuum in the suction side of the centrifugal pumps and the like and which will close the communication between the pump chamber and the vacuum producing means after the vacuum chamber of the apparatus has been filled with the fluid which the apparatus is intended to handle.

A further object is a valve of the character described wherein a substitution of the pumped fluid for air or fluid of less density will actuate the valve to prevent leakage from the pressure side to the suction side of the apparatus after the pump has been primed.

A further object is a priming means of the character described, a movable element actuated by the fluid adapted to be actuated by the fluid being pumped to close communication between the suction or vacuum producing means and suction side of the pump.

Further objects will appear from the drawings and specifications which follow:

These objects we accomplish by connecting the suction chamber with the pump preferably at its highest point with a conventional suction pump, and introducing between the said suction chamber and the said pump, valve means through which the pump normally draws the air from the suction chamber, thus priming the suction portions of the apparatus with the fluid to be actuated therein.

Upon filling the suction chamber of the said apparatus with the said fluid a fluid jet is established. The velocity pressure of the fluid issued therefrom is employed to actuate the movable suction valve to close the communication between the suction producing pump of the said apparatus.

In a modified form of our priming means the movement of the said valve not only closes the port between the suction side of the apparatus and the suction producing pump but also closes off the fluid jet thus preventing the by-passing between the high and low pressure sides of the apparatus when the priming valve is closed.

By referring to the accompanying drawing our invention will be made clear.

Fig. 1 is a side view of a pair of centrifugal pumps with the suction and discharge

chambers shown partly in section and adapted to be primed by our priming means in combination with a conventional air pump.

Fig. 2 is a cross section of another form of my priming valve.

Fig. 3 is a cross section of Fig. 2 on the line III—III thereof.

Fig. 4 is a simplified form of the valve of Fig. 2 adapted to be employed in priming vacuum chambers of relatively small capacity.

Fig. 5 is a cross section of that portion of Fig. 2 as indicated by the section line V—V.

Throughout the figures similar numerals refer to identical parts.

The invention is particularly adapted to prime a plurality of pumps working in parallel or series and I have found it particularly valuable in priming pumps on fire department apparatus.

In the figures:

One pump casing is shown by the numeral 1 and a second pump casing by the numeral 2, the high pressure chambers being indicated at 3, 4 respectively, and the suction chambers at 5, 6 respectively.

Communicating with the said suction chambers are the jet compartments 7, 8 and thereabove a passage 9 connecting through the pipe 10 with the conventional air or suction pump 11, the latter being actuated by the piston 12, crank 13 and pulley 14 from any source of power as the centrifugal pump shaft 15.

By the reciprocation of the piston 12 the air is drawn through the one way valve 16 and discharged through the second one way valve at 17, thus abstracting air through the pipe 10 from the compartment 9 and therefore when either or both of the check valves 18, 19 are opened it will likewise abstract air from the chambers 7, 8 respectively, thus priming the pumps 1 and 2.

As these pumps are primed the rotation of the runner 20 will establish fluid pressure in the chamber 3, which being discharged through the nozzle 21 will, through its velocity pressure impacting against the underside of the valve 18 cause the valve 18 to rise, overcoming the compression of the spring 22 until the port 23 has been throttled and the valve 18 thereupon drawn tightly upon its seat by the said suction pressure from the air

pump, and close the port 23 thus closing off communication between the jet chamber 7 and air pump 11.

Likewise when the fluid rises in the pump 2, impeller 24 establishes pressure in the chamber 4 and causes the jet of fluid to discharge through the nozzle 25, against the underside of the air valve 19, causing it to close the communication between the air pump 11 and suction chamber 6.

The pumps will therefore continue to operate fully primed until such time as either of them lose their priming when the cycle of priming will be automatically repeated as above described.

Any number of suction chambers may thus be primed from the single air pump 12. When both valves 18, 19 are closed the pump 12 may be unloaded by any conventional unloading valve or may continue to draw air through the one-way inlet valve 16 by unsealing the poppet valve 26 which is drawn down against the adjustable compression spring 27 in the valve chamber 28, thus admitting air under restraint of the spring adjustment 27 to the air pump.

Should either pump lose its vacuum, the difference in pressure between the discharge 17 of the air pump and the chamber 7 or 8 will be increased at which time the valve spring as 22 will function to automatically open any of the valves as 18 or 19.

In some cases it may be advantageous to provide pins 29, 30 respectively which may be pushed to unseat the valves 18 or 19 in order to bleed any trapped air in the chamber 7 or 9, even though the pump has not lost its vacuum.

Referring particularly to the construction of priming valve shown in Fig. 2, the connection at 10 is made to the air pump 11 and a connection at 31 is made to any fluid chamber which it is desired to prime, and a connection 32 is made to the pressure side of the apparatus, from the impellers.

In this figure the valve 33 slides freely upon the guide stem 34 and is normally forced downward by the spring 35 and carries an extension stem 36 and a piston valve 37, the latter provided with peripheral slots as 38.

The piston valve 37 slides in the valve casing 39 and at the upper portion thereof is fitted the nozzle 40 of a materially larger bore than the stem 36 so the jet of fluid may issue from said nozzle around the stem 36 whenever the valve 33 and piston 37 are in the full line position of the figure.

When the piston valve 37 rises to its limit the valve 33 closes the port 41 and likewise the piston 37 seats against the lower periphery 42 of the valve 40 thus closing the egress of fluid from the nozzle 40.

Assuming that the chamber communicating with the inlet 31 is to be primed until

fluid pressure is established in the pipe 32 the parts will operate as follows:

The air pump will withdraw air through the port 41 and outlet 10 thus priming through the passageway 31 at which time pressure fluid will be forced through the pipe 32 and by the slots 38 and through the nozzle 40 and by its velocity pressure forces the valve 33 to slide upward on the stem 34 closing the port 41 and likewise closing the piston 37 against the peripheral edge 42.

The chamber connected with 31 will at this time be fully primed and fluid discharge between the pressure 32 and into the suction side 31 will be cut off by the valve 37 seating against the edge 42.

In the simplified construction shown in Fig. 4 the fluid pressure side of the pump is connected at 50 and a conventional air suction pump at 51.

Fig. 4 is particularly adapted to use with small centrifugal pumps.

A hollow valve is shown at 52.

This valve has a stem 53 normally sliding in the cap 54 and has a plurality of large peripheral ports at 55 and of smaller peripheral ports at 56.

A fixed piston is shown at 57 having a jet outlet at 58 communicating with the opening 59 within the valve 52.

The operation is as follows:

A conventional air pump withdrawing air through the outlet 51, ports 55, nozzle 58, ports 56, and passageway 50 draws the fluid up from a normal level to fill the turbine casing.

As the fluid fills the casing the rotation of the impeller develops a fluid pressure which is delivered through the passage 50 and the said fluid passing up through the nozzle 58 impacts against the valve 52 forcing it to rise.

During the discharge of the air and fluid through the nozzle 58 a free outlet is obtained through the ports 55 and passageway 51.

When the valve 52 rises the ports 56 are closed from communication with the passage 50 and thereafter the difference between the pressure in 50 and 51 retains the valve 52 in its upper position with both air and fluid communication cut off between 50 and 51.

Should the pressure difference between 50 and 51 drop below the predetermined point, the valve 52 again drops and the cycle of priming above described is repeated.

We claim:

1. Priming means comprising a vacuum chamber, suction means, an air valve and port between said chamber and said means, a pressure compartment and a rotor between said chamber and said compartment, a nozzle adapted to discharge a pressure jet from said compartment against said air valve and

tending to actuate said valve to close said port when pressure has been established in said compartment by said rotor.

2. Priming means comprising a vacuum chamber, suction means, an air valve and port between said chamber and said means, a spring associated with said air valve, a pressure compartment and a rotor between said chamber and said compartment, a nozzle adapted to discharge a pressure jet from said compartment against said air valve and tending to actuate said valve to close said port when said jet is established by said rotor action.

3. Priming means comprising a vacuum chamber, suction means, an air valve and port between said chamber and said means, a pressure compartment and a rotor between said chamber and said compartment, a nozzle adapted to discharge a pressure jet from said compartment against said air valve and tending to actuate said valve to close said port when pressure has been established in said compartment by said rotor, and a nozzle valve adapted to close said nozzle when said air valve is actuated.

4. Priming means comprising a vacuum chamber, suction means, an air valve and port between said chamber and said means, a spring associated with said air valve, a pressure compartment and a rotor between said chamber and said compartment, a nozzle adapted to discharge a pressure jet from said compartment against said air valve and tending to actuate said valve to close said port when said jet is established by said rotor action and a nozzle valve adapted to close said nozzle when said air valve is actuated.

5. Priming means for a plurality of vacuum chambers, in combination with a suction means, an air valve and port between each of said chambers and said suction means, a pressure compartment and rotor associated with each of said chambers, a nozzle adapted to discharge a pressure fluid jet from each of said compartments against the respective air valve whereby said air valve is actuated to close its respective port when pressure has been established in the respective compartment.

6. Priming means for a plurality of vacuum chambers, in combination with a suction means, an air valve and port between each of said chambers and said suction means, an adjusting spring adapted to function with a fluid jet to actuate said air valve, a pressure compartment and rotor associated with each of said chambers, a nozzle adapted to discharge a pressure fluid jet from each of said compartments against the respective air valve whereby said air valve is actuated to close its respective port when pressure has been established in the respective compartment.

7. Priming means for a plurality of vacuum chambers, in combination with a suction means, an air valve and port between each of said chambers and said suction means, a pressure compartment and rotor associated with each of said chambers, a nozzle adapted to discharge a pressure fluid jet from each of said compartments against the respective air valve whereby said air valve is actuated to close its respective port when pressure has been established in the respective compartment, and a nozzle valve for each nozzle and connected with the corresponding air valve constructed and adapted to close said nozzle when the corresponding air valve is closed.

8. Priming means for a plurality of vacuum chambers, in combination with a suction means, an air valve and port between each of said chambers and said suction means, an adjusting spring adapted to function with a fluid jet to actuate said air valve, a pressure compartment and rotor associated with each of said chambers, a nozzle adapted to discharge a pressure fluid jet from each of said compartments against the respective air valve whereby said air valve is actuated to close its respective port when pressure has been established in the respective compartment, and a nozzle valve for each nozzle and connected with the corresponding air valve constructed and adapted to close said nozzle when the corresponding air valve is closed.

9. In combination with a centrifugal pump having a vacuum chamber, an impeller and a pressure compartment, a suction pump, an air valve and port between said pump and said chamber, means constructed and adapted to introduce pressure from said compartment to actuate said valve to close when pressure has been established in said compartment by said impeller.

10. In combination with a plurality of centrifugal pump stages each stage having a vacuum chamber, an impeller and a pressure compartment, a suction pump, an air valve and port between each of said chambers and said pump, means constructed and adapted to introduce pressure from each respective compartment to actuate the corresponding air valve to close said port when pressure has been established in the corresponding compartment by the corresponding impeller.

11. The combination set forth in claim 9 wherein there is a spring associated with said air valve functioning with said means to actuate said valve.

12. The combination set forth in claim 10 wherein there is a spring associated with each of said air valves functioning with the corresponding means to actuate said valve.

13. The combination with a centrifugal pump having a vacuum chamber, an impeller and a pressure compartment, a suction

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 pump, an air valve and port between said pump and said chamber, a nozzle from said compartment constructed and adapted to discharge a fluid jet to actuate said valve
 5 when pressure is established in said compartment.

10 14. In combination with a plurality of centrifugal pump stages each stage having a vacuum chamber, an impeller and a pressure compartment, a suction pump, an air valve and port between each of said chambers and said pump, a nozzle from each of said compartments positioned to discharge a fluid jet to actuate the corresponding air
 15 valve.

15 15. In combination with a centrifugal pump having a vacuum chamber, an impeller and a pressure compartment, a suction pump, an air valve and port between said
 20 pump and said chamber, a nozzle from said compartment constructed and adapted to discharge a fluid jet to actuate said valve when pressure is established in said compart-

ment, and means actuated by the air valve closing said nozzle when said valve closes. 25

16. In combination with a plurality of centrifugal pump stages each stage having a vacuum chamber, an impeller and a pressure compartment, a suction pump, an air valve and port between each of said chambers and said pump, a nozzle from each of said compartments positioned to discharge a fluid jet to actuate the corresponding air valve, and means actuated by the air valve closing said nozzle when said valve closes. 30

17. The combination set forth in claim 15 wherein there is a spring associated with said air valve functioning with said means to actuate said valve. 35

18. The combination set forth in claim 16 wherein there is a spring associated with each of said air valves functioning with the corresponding means to actuate said valve. 40

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