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PUMPING SYSTEM

Filed March 15, 1928

Fig. 1.

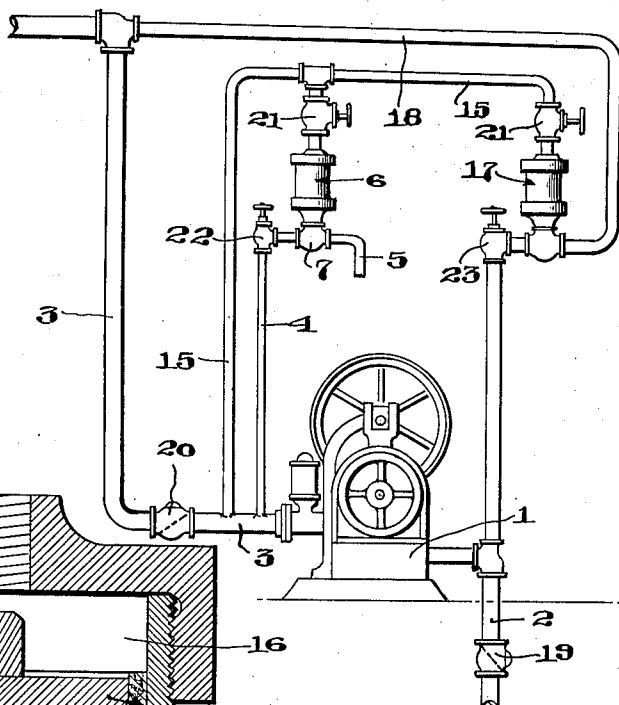
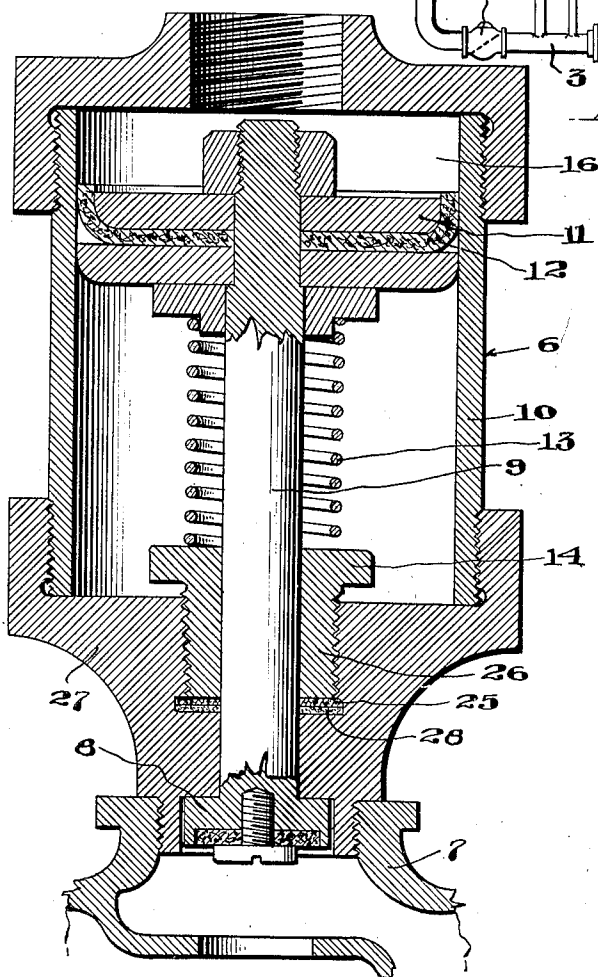


Fig. 2.



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PUMPING SYSTEM.

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This invention relates to a pumping system and more specifically to an automatic pump priming valve and system for priming pumps, particularly water pumps of the type which are intermittently operated due to varying demand for or use of the water or fluid pumped.

An object of the invention is to provide means controlled by discharge pressure of a pump for exhausting air from the pump and its suction line and to supply the suction of the pump with water from the discharge side of the system to enable the pump to quickly pick up its suction, and materially reduce the time required for such action as well as resulting in a saving of fuel in that the required quantity of water may be pumped in a shorter space of time due to the exhausting of air from the pump and its suction line, not only upon the starting of the pump but during its operation, since the formation of air slugs or pockets during the pumping action will bring the priming mechanism into operation to exhaust such air from the system.

Another object of the invention is to provide a novel type of pressure operated valve for use in the pumping system and embodies a valve disc normally held open, and closed by discharge pressure of the pump and a novel form of stuffing box for the valve stem which serves the dual function of lubricating the stem and making a fluid tight packing for the stem.

With these objects in view, the invention consists in various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a pumping system of the preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

Fig. 1 is a view in side elevation of the pumping system.

Fig. 2 is a vertical section through the improved valve structure.

Referring more particularly to the drawings, 1 indicates a pump of any approved construction which draws a supply of fluid from the pipe 2 which has communication with a supply source and discharges the fluid through the discharge pipe 3 to a suitable destination such as a tank or the like.

It is well known, that after a pump has been idle for any length of time, air accumulates in the pump and such air must be re-

moved before the pump will properly function in the pumping of water and to permit of the removal of air from the pump 1 and supply priming-water thereto, for priming the pump upon starting or at any time during its operation that the pump might become air bound, a bleed pipe 4 is connected to the discharge pipe 3 and is open to the atmosphere, as shown at 5, to permit the air to bleed out of the pump system and enable the pump to take up its suction rapidly and pump water. However, to prevent the escape of water or other fluid through the bleed pipe 4 and to provide automatic control of the bleeding of air from the pumping system, a pressure operated valve structure 6 is provided which includes a valve seat 7 with which a valve disc 8 co-operates. The valve disc 8 is mounted upon a valve stem 9 which extends into the cylindrical body 10 of the valve and has a piston 11 of any approved construction mounted upon its upper end. The piston 11 preferably has a flexible section 12 so as to provide fluid tight engagement with the inner wall of the cylindrical body 10. A spring 13 is placed within the cylindrical body 10 and engages against the packing nut 14 at one end and against the piston 11 at the other end, the said spring being tensioned to hold the valve disc 8 off the seat 7 and permit the escape of air to the atmosphere. The cylindrical casing 10 has communication, above the piston 11 with the discharge pipe 3 of the pump through a pipe 15 so that the chamber 16 above the piston 11 will be subject to the discharge pressure of the pump.

When the pump is started and is air bound, the air will alternately be compressed and expanded in the pump, causing the pump to become air bound, and the pressure in the discharge pipe 3 will be less than the tension of the spring 13, so that at such time, the valve disc 8 will be held off the seat 7 and the air will be permitted to escape or bleed from the pump. When the air has been exhausted from the pump and water is being pumped, a pressure will be built up in the space 16 within the cylindrical body 10 and above the piston 11 which will act on the piston and such force being greater than the tension strength of the spring 13 will force the valve disc 8 upon its seat closing the valve and preventing the escape of water or fluid through the bleed pipe 4.

It is necessary however, in enabling the pump 1 to quickly pick up its suction and

pump water, to provide a supply of priming-water to the pump and to permit automatic control of this supply of priming-water, a valve structure 17 is provided which is similar in construction to the valve structure 6 and controls the flow of water through the pipe 18 from any suitable source, preferably from the discharge side of the pumping system to the suction of the pump 1.

10 A check valve 19 is positioned in the pipe 2 to prevent the priming-water from flowing into the pipe and back flowing to the source of water supply while a check valve 20 is placed in the discharge pipe 3 to prevent 15 water or other fluid flowing from the destination to which the water is pumped, back into the pump.

The valve structure 17 is connected to the pipe 15 so that the piston therein will be 20 operated by discharge pressure of the pump 1 for cutting off the supply of priming-water to the pump suction after the pump has properly gained or picked up its suction and is functioning.

25 If it is so desired, suitable hand operated valves, as shown at 21, may be provided, in the connections between the valves 6 and 17 and pipe 15 to permit manual cutting out of either or both of the valves 6 and 17, and 30 also hand operated valves 22 and 23 may be provided in the bleed pipe 4 and the suction water supply pipe 18 to permit manual closing of either of these pipes.

The stem 9 of the valve structure 6 is lubricated and tightly packed by the stuffing box construction which includes the nut 14, a 35 leather washer 25 which engages the bottom of the recess 26 formed in the casing section 27. Hard grease or lubricant is placed between the washer 25 and the nut 14 as shown 40 at 28.

From the foregoing description, taken in connection with the accompanying drawings, it will be apparent that in starting, or at such 45 time during operation of the pump, that sufficient air is embodied either in the pump or its suction line as to prevent the proper discharge of water or other fluid by the pump,

the pressure in the discharge pipe 3 will be such that the springs 13 of the valves 6 and 17 will unseat their respective valve discs 8, 50 allowing the air to be bled from the pump and permit a supply of priming-water to flow to the pump suction. As soon as the pump assumes or picks up its suction and is discharging 55 water or other fluid as desired, a pressure will be built up in the chambers or spaces 16 in the valves 6 and 17 which will act on the pistons 11 and force the discs 8 against their respective seats, cutting off the supply of 60 priming-water to the pump suction and closing the air bleeding pipe 4, which will allow the pump to quickly and thoroughly clear itself of air and become primed for proper operation in a relatively short length of time. 65

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that these may be modified widely within the invention 70 defined by the claims.

What is claimed is:

1. In a pumping system, the combination with a pump, of an air relief valve, connected to the pump discharge and normally held open to permit bleeding of air from the pump, 75 means operated by discharge pressure of the pump for closing the valve, a priming-water supply controlling valve connected to the pump suction and normally held open to permit flow of priming-water to the pump and 80 means operated by the discharge pressure of the pump for closing said priming-water supply valve.

2. In a pumping system, the combination with a pump, of an air relief valve for permitting bleeding of air from the pump, a 85 priming water supply valve for controlling delivery of priming-water to the pump suction, springs normally holding said valves open, and pistons acted upon by discharge 90 pressure of the pump for closing said valves.

In testimony whereof we affix our signatures.

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