D. M. HOSFORD.

FLUID DISTRIBUTING SYSTEM.

APPLICATION FILED JUNE 8, 1908.

929,852. **Patented Aug. 3, 1909.**

Fig. 1.

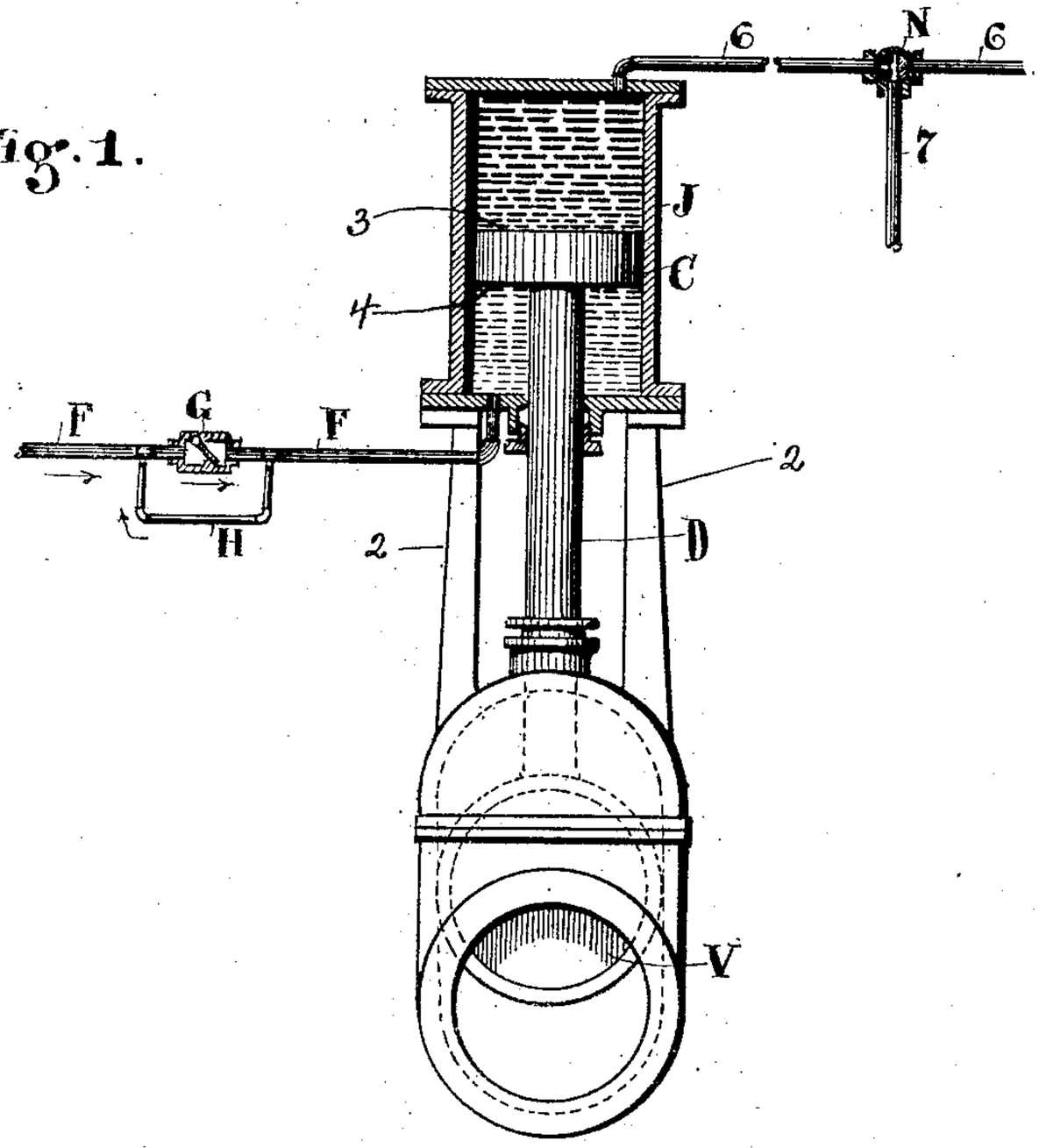
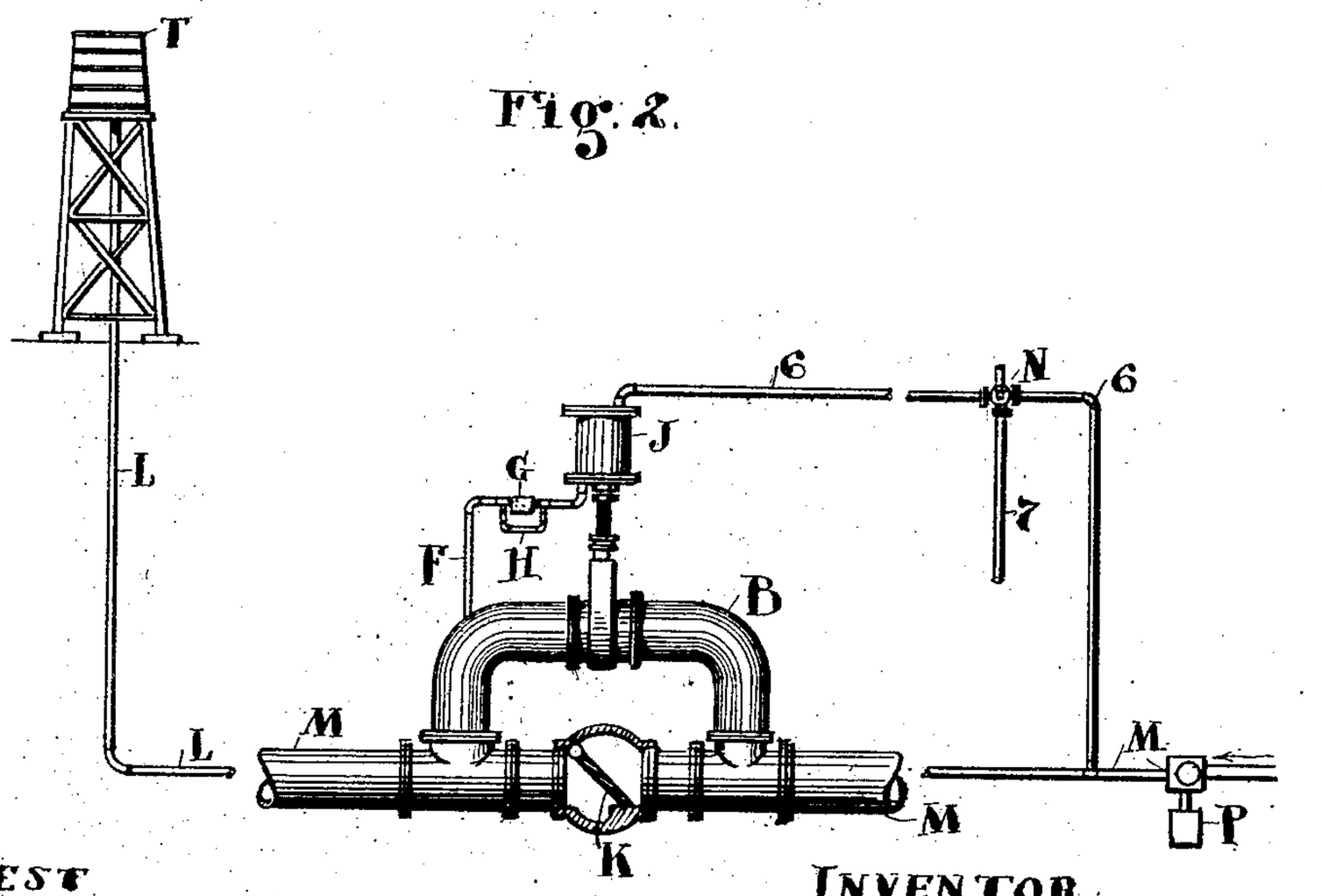


Fig. 2.



ATTEST

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FLUID-DISTRIBUTING SYSTEM.

No. 929,852. Specification of Letters Patent. Patented Aug. 3, 1909.

Application filed June 8, 1908. Serial No. 437,224.

To all whom it may concern:

Be it known that I, DANIEL M. HOSFORD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Fluid-Distributing Systems, and do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a new system of liquid distribution, the same being constructed and adapted to operate, substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation partially in section and more or less diagrammatic, as a whole, of the gate valve mechanism and the associated valves, as hereinafter fully described. Fig. 2 is a more or less diagrammatic view of an installation or plant embodying my new system, as also hereinafter more fully described.

The system or installation thus shown is designed more especially for the distribution of water under pressure, and may be employed on a small or on a large scale with equal adaptability to conditions.

A common use of the invention is in connection with water supply for villages and towns, in which a reservoir or tank T is adapted to receive and hold a supply of water under such head and pressure as will maintain the supply in the mains when the pumping station or source of pressure ceases to do its work. A pump or pumping station or its equivalent is, therefore, a necessary constituent of the system. The invention resides between these two points, the pump P and tank T, and comprises what I prefer to call a "long distance" gate valve V, adapted to control the flow of liquid to the tank directly through or from the mains, and to be open or closed according as to whether there is to be normal or specially high pressure put upon the system. This arrangement of parts also provides for the direct discharge of the tank into the main past a check valve K in case pressure by the pump is diminished or for any reason falls below the pressure due to the head of the liquid in the tank or reservoir. This will appear more clearly hereinafter, and in connection with the said hydraulically operated gate valve V and check valve K. I employ the check valve G and three-way valve N, and pipe connections in which said valves severally are located.

At the bottom of Fig. 2 are shown a relatively small pipe L, which leads to the tank, and mains M, which, presumably, distribute the water to the town, and said pipes obviously would be of widely different proportions, but of course are open one into the other, and the same proportion applies at the right of Fig. 2 with the two sizes of pipe M.

Now, recurring to the operation of the system, if it be desired to increase the pressure in the main pipe between the pump and the tank to a degree greater than the head due to the height of the tank or reservoir will afford, and at the same time permit of the tank or reservoir feeding into the main pipe should the pump fail to operate, I divide the main pipe at a point where the special high pressure service is to stop into two paths including by-path or pass B, which passes around check valve K in the main line, and said valve is so arranged that it will close with any flow of the liquid toward the tank or reservoir and open with any flow of or away from the tank or reservoir into the mains. In the secondary or by path B there is placed the so-called "long distance" hydraulically operated gate-valve V. This valve is normally open for the flow of liquid in either direction, but may be closed from any pre-arranged station having a three way valve N, and when closed the pressure in main M from the pump to the valves V and K may be raised to the maximum, with the tank shut off. But should the pump fail, the mains will be supplied from tank or reservoir T through check valve K, even though the attendant at N should fail to open the three way valve and thus open gate valve V.

A cylinder J is mounted centrally above

said gate valve V on supports 2, and a piston C in said cylinder is connected with valve V by a rod D. The position of valve V is therefore controlled by piston C. The fundamental principle of this valve lies in the fact that said piston rod is so enlarged that the areas of the two faces 3 and 4 thereof are unequal, the lower surface of the piston being reduced in proportion to the cross section of the piston rod. This difference in area makes all the difference needed to effect the automatic closing of gate valve V with reasonable promptness when pressure upon opposite sides of the piston is equal, and the opening of said valve can only occur with excess pressure from beneath. Such excess pressure is through pipe F from the main and by way of by-pass H, while pressure over or upon piston C is through suitable piping 6 to main pipe M at any desired point, and at which point a three-way valve N and a drain 7 are located. In the pipe connection F I place a check valve G, and the by-pass H is a comparatively small pipe about this valve. This allows the liquid to flow from the tank or reservoir into cylinder J freely, but owing to check-valve G in the direct line and the relatively small pipe of the by-pass, the liquid will flow from the cylinder to the tank or reservoir slowly, thus cushioning the action of valve piston C.

If the three-way valve N is at a position where the pressure from the main pipe is shut off from cylinder J and the drain 7 open, there is no pressure on the top of the piston but exhaust from over said piston instead, and owing to the pressure on the lower side of the piston through pipe F and by-pass H, the valve V should be wide open. But if the three-way valve N should now be placed in such position that the pressure from the main pipe can enter the valve cylinder J through pipe 6, the piston would be forced downward due to the excess area of the upper face of the piston and the said long distance valve V would be closed.

Presumably the check valve K and gate valve V are located relatively near to the reservoir or tank, while valve N may be at a great distance therefrom.

Among the advantages of the foregoing I may note first that, normally, the liquid has an unobstructed passage-way from the tank or reservoir to the service lines but that both the artificially sustained pressure from the pump, and the back pressure from the tank may be open to the main at the same time. Secondly, that, in a system of water works for small towns and villages, it has been customary to have a tank or reservoir at some high point, which was filled intermittently by means of a pump. Of course, the pressure in the main piping could not in that case be increased higher than the pressure due to the height of the tank or reservoir, which had its overflow, and in case of fire no additional pressure could be obtained. On the contrary, with my improved system of valves and connections, the pressure in the main distributing pipes can be raised to an excess pressure in case of fire or the like, dependent on the capacity of the pump, and at the same time leave the tank with a full head so that it will supply the main piping in case the pump is shut down and the operator fails to open the gate valve. Such excess pressure, obviously, is obtained by the closing of gate valve V under pressure upon piston C through pipe 6, with three-way valve N open to the main, check valve K being closed also. Then in case the artificially sustained pressure is weakened below tank pressure, the pressure from the tank will assert itself and supply the main. I can, therefore, throw pressure into the main and into the tank at the same time by opening gate valve V, as shown, and this is the normal working relation, or I can cut off pressure to the tank by closing valve V through pipe 6.

From the foregoing description it will be understood that the pump is for any suitable water connections, and that the tower or receptacle is an auxiliary to the system designed to be used more particularly when the pump fails to operate. In that case the water would flow past valve K even though valve V were closed, but such flow of water from the reservoir would open valve V through the line F if the drain valve N should be opened.

What I claim is:—

1. A system of fluid distribution comprising a pump and a reservoir and pipes operatively uniting said parts, a check valve in said pipes adapted to be forced to its seat by back pressure from the pump, a by-pass, a gate valve positioned in said by-pass, and a fluid controlled piston connected with said gate valve and normally under operative control of the pressure from the reservoir to open said valve.

2. In water distribution, a set of pipes and a reservoir open thereto, one of said pipes having a check valve and a by-pass about said check valve having a gate valve to govern the flow of fluid to the reservoir, and means to close said gate valve comprising a cylinder, a differential piston therein operatively connected with said gate valve and pipes for the admission of water to opposite sides of said piston, one of said pipes having a three-way valve to control the flow of water on the larger side of said differential piston, and the other pipe having a check valve and a by-pass substantially as shown and described.

3. A system of fluid distribution comprising a pump and a reservoir and service pipes

operatively uniting said parts, a check-valve in said pipes adapted to be forced to its seat by back pressure from the pump, a by-pass, a gate valve positioned in said by-pass, a fluid controlled piston connected with said gate valve and normally under operative control of the pressure from the reservoir to open said gate valve, and valved pipe connections between said piston and said service pipes whereby said gate-valve may be closed by the pressure from within said service pipes.

In testimony whereof I sign this specification in the presence of two witnesses

DANIEL M. HOSFORD.

Witnesses:
E. M. FISHER,
F. C. MUSSUN.