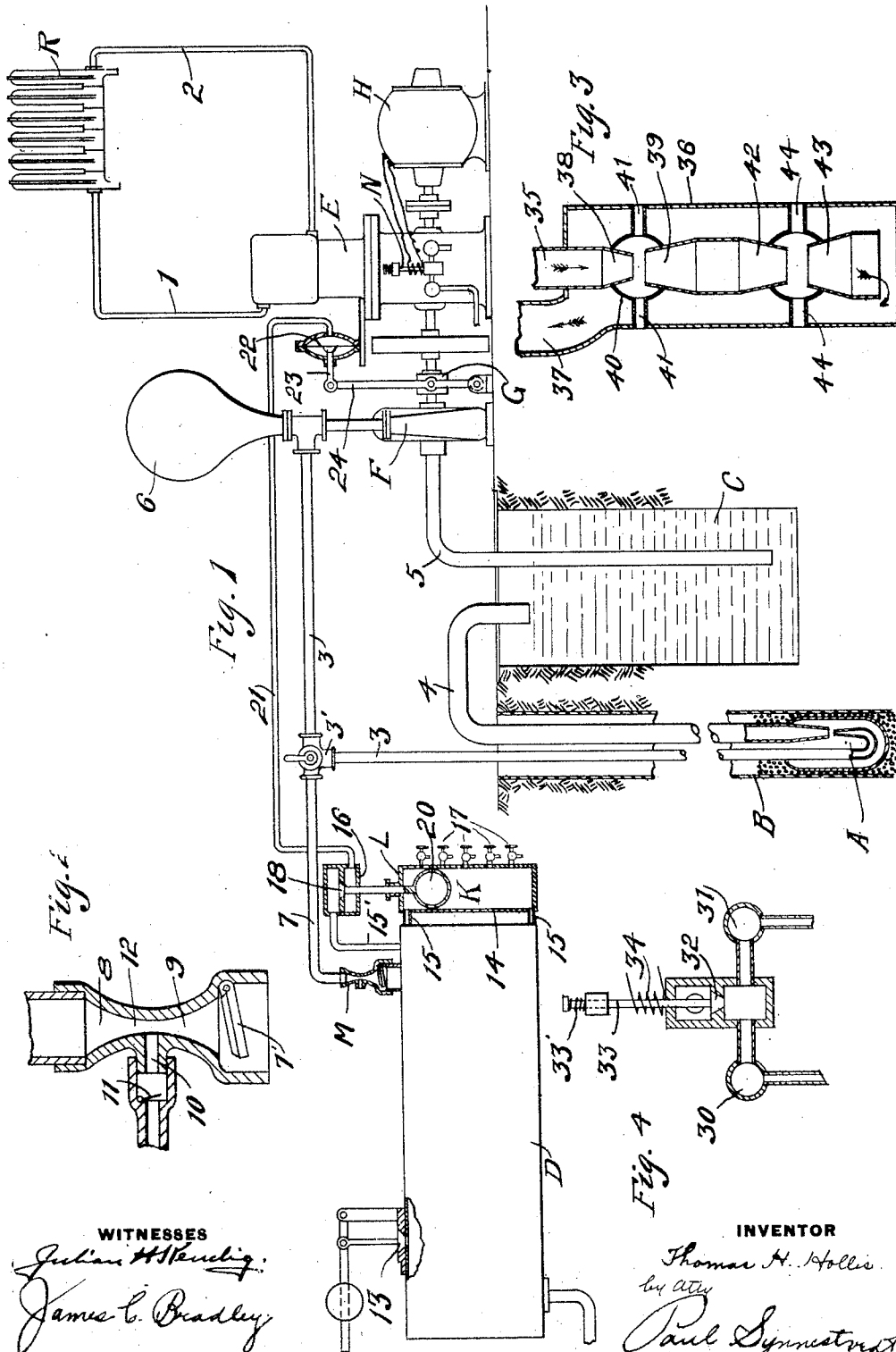


T. H. HOLLIS.
WATER DISTRIBUTING SYSTEM.
APPLICATION FILED APR. 28, 1911.

1,059,609.

Patented Apr. 22, 1913.



UNITED STATES PATENT OFFICE.

THOMAS H. HOLLIS, OF PITTSBURGH, PENNSYLVANIA.

WATER-DISTRIBUTING SYSTEM.

1,059,609.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed April 28, 1911. Serial No. 623,917.

To all whom it may concern:

Be it known that I, THOMAS H. HOLLIS, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Water-Distributing Systems, of which the following is a specification.

The invention relates to apparatus for pumping and storing water for distribution under pressure. The invention has for its primary objects; the provision of improved and simplified means for supplying a distributing tank with both air and water under pressure; the provision of an improved arrangement for pumping water and supplying it to a distributing tank under air pressure by means of a jet pump; the provision of a pumping and distributing system of a very cheap and simple character and one having a minimum number of movable parts, and capable of operating an indefinite period without repair or replacement; and the provision of a distribution system in which the power operating means may be utilized for other purposes, and advantageously so used in so far as the efficient and uniform operation of the system itself is concerned. Certain embodiments of the invention are illustrated in the accompanying drawings, wherein:—

Figure 1 is a diagrammatic side elevation showing the general arrangements of the parts of the apparatus, Fig. 2 is an enlarged section through the inspirator shown in Fig. 1, Fig. 3 is an enlarged section through a modified form of jet pump which may be employed, and Fig. 4 is a sectional view of the governor employed.

The principal parts of the apparatus as shown in Fig. 1 are as follows: A is a jet pump located in a well B from which it is desired to pump water; C is a receiving tank to which the jet pump discharges; D is a distributing tank through which water is supplied under pressure; E is a motor, preferably a two cycle explosion engine for supplying the power to operate the system; F is a rotary pump, preferably of the Curtis type direct connected to the crank shaft of the engine E; G is a clutch mechanism for disconnecting the engine and pump; H is a dynamo also connected to the crank shaft of

the engine; L is a float device for controlling the movement of the handle of the clutch G; N is an electric governor for controlling the supply of explosives to the engine E; and M is what may be termed an inspirator, such member serving to supply air to the tank B in a manner to be hereinafter more particularly set forth.

The apparatus is particularly designed for use in country and other houses where the power usually available in cities is not to be had, and under these conditions the electric generator H is a desirable adjunct to the pumping system, inasmuch as the power may be utilized for lighting purposes, and the pumping apparatus may just as well be operated at night to store water in the tank D for consumption during the day. A two cycle explosion motor is employed because of its simplicity and the absence of movable valve parts, and the use of the generator in this connection is particularly desirable in that it serves as a brake or drag upon the motor tending to steady the operation of the motor and render its action smooth and uniform. The hot water in the water jacket of the engine may be utilized if desired by connecting the circulation pipes 1 and 2 to a house heating radiator R.

The outlet pipe 3 leading from the rotary pump F supplies water under pressure to the jet pump A in the well B, and water is thus forced upward from the well through the pipe 4, such water discharging into the receiving tank C preferably located adjacent the pump, the water thus supplied to this tank being of course somewhat in excess of the water pumped under pressure through the pipe 3, such excess depending upon the pressure in the pipe 3 and the relative size of the pipes 3 and 4. The water in the tank C is supplied to the pump F by means of the inlet or suction pipe 5. A tank or air chamber 6 is preferably connected to the pipe 3, such chamber tending to render the flow of water more uniform.

Also connected to the outlet side of the pump F is the discharge pipe 7, which pipe 7 is shown as connected to the pipe 3, but it might obviously be connected to any other point on the outlet side of the pump. This pipe 7 leads to the storage or distributing tank D, and a portion of the water circu-

lated under pressure through the pipe 3 passes through this pipe 7 and into the tank D, the amount of water passing through the pipe 7 being the excess flowing up through the pipe 4 over that passing down through the pipe 3 in case the level of the water in the receiving tank C is maintained constant. Now if the distributing tank D were placed at an elevated point, the water might be distributed therefrom to the various hydrants employed without the necessity of other instrumentalities, but as it may not be feasible to place the tank at an elevation, and as the pressure desired is more than what could ordinarily be obtained by placing the tank at an elevated point, additional provision is provided for securing pressure in the tank D. This additional provision consists in an air supply in the tank under pressure, and this air supply in the tank is secured by means of the inspirator shown in section in Fig. 2, and located in the pipe 7. This inspirator consists of a pair of opposing nozzles 8 and 9, with a small air inlet tube 10 leading into the nozzles at their point of juncture, such air inlet pipe being provided with an inwardly opening check valve 11. Under the well known law of hydraulics the pressure in the portion 8 of the inspirator is transformed into velocity at the point 12, and the rapidly flowing water tends to drag in air through the tube 10. By this arrangement a large quantity of air under pressure is secured in the tank D, the apparatus ceasing to draw in air when the pressure in the tank reaches a point somewhat below the pressure in the pipe 7. After such pressure is attained, the water in the inspirator tends to flow out through the pipe 10, but such outflow is prevented by the check valve 11. A check valve 7' prevents a back flow in the pipe 7 when the pump stops. A release valve 13 is provided for preventing the fluid in the tank from attaining too high a pressure, and thus stopping the flow of water to the tank before the proper supply is provided.

The inspirator M plays an important part in securing the proper operation of the jet pump A inasmuch as it produces back pressure in the pipes 3 and 7 or in other words an accumulation of pressure in such pipes. A jet pump requires a certain amount of operating pressure and this could not be secured without the inspirator or other equivalent back pressure means, as any pressure which would otherwise accumulate in the pipe 3 would be reduced to a negligible amount if the pipe 7 were unobstructed.

In order to stop the operation of the engine when the level of the water in the tank reaches a predetermined height, the controlling float mechanism K is employed. This mechanism consists of a casing 14 connected to the tank by means of the pipes 15 and provided

with a series of gage cocks 17, by means of which the height of water in the tank may be tested, and a casing 16 provided with a valve 18 having a downwardly projecting stem carrying the ball float 20, the casing 16 being connected with the air space in the tank D by means of the pipe 15'. When the water in the tank rises so as to engage the float 20, such float is raised, thereby opening the valve 18 and permitting the compressed air from the tank to flow through a pipe 21 leading to a diaphragm 22. This diaphragm is connected by means of the rod 23 to the clutch lever 24, so that when the height of water in the tank rises above a predetermined point, air flows through the pipe 21 and actuates the diaphragm 22 to operate the handle 24 and throw out the clutch. In case the tank D is placed in a cellar or other closed space, a pipe extending to the outer air is connected to the air inlet of the inspirator to insure pure air. A three-way cock 3' is preferably provided for regulating the flow of water through the pipes 3 and 7.

The operation of the apparatus briefly stated is as follows: The engine E being started, the clutch 24 is shifted to the right, thus connecting up the rotary pump F. The rotation of the pump runners or blades causes the pump to draw water from the tank or well C through the inlet pipe 5, and discharge it under pressure through the pipe 3. This water passes down through the well to the jet pump A, and a supply of water is forced upward through the pipe 4 and into the receiving tank C. A portion of the water from the pump also passes through the pipe 7 and into the distributing tank D, the passage of such water through the inspirator M drawing in a quantity of air, whereby any desired amount of pressure may be accumulated in the tank D for subsequent use in forcing the water from the tank to any desired point of distribution. The operation of the explosion engine E also operates the generator H, such generator serving as a drag upon the motor, tending to make its operation uniform, and the power from the generator being utilized for lighting or other purposes.

If desired the current from the motor may also be utilized to control the admission valve of the engine, thus constituting substantially an electric governor. As shown in Fig. 4, 30 is the gas admission valve, and 31 is the air admission valve, the flow from such valves uniting and passing through the valve 32 to the cylinder of the motor. This valve 32 is governed by means of a solenoid rod 33 having its upper portion of iron and its lower portion of brass, and normally held up to maintain the valve open by means of the spring 33'. Around the bar passes the coil 34 connected to the generator in the manner shown. The energizing of the coil

34 beyond a certain point causes such rod to move down and close the valve 32. The type of governor employed however, is immaterial and any other type may be employed.

5 Instead of the type of pump shown at A, being employed, another style of jet pump, such as that shown in Fig. 3 may be used. In this pump, 35 is the inlet pipe, 10 36 is a closed casing, and 37 is the discharge pipe. The inlet pipe 35 is provided with a nozzle 38, which nozzle opposes the nozzle 39. A casing 40 surrounds the ends of the 15 the casing is conducted to the interior of the casing 40 through the pipes 41. Another nozzle 42 receives the discharge from the nozzle 39 and discharges to the nozzle 43, the nozzles 42 and 43 being connected by a 20 casing similar to the casing 40 to which water is supplied through the pipes 44. The advantage of this style of pump over that of the pump shown at A resides in the fact that the outlet water at relatively low velocity makes the turn as indicated by the 25 arrow, instead of the water at high velocity making such turn as is the case in the pump as shown at A, so that friction losses are somewhat reduced, and the pump is rendered somewhat more efficient.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is the following:—

35 1. In combination in a water distributing system, a power pump, a source of water supply from which water is to be lifted, a jet pump therein, a pipe for supplying water under pressure from the power pump to the 40 jet pump, a distributing tank, connections whereby the water lifted by the jet pump is supplied to the inlet side of the power pump, another connection from the outlet side of the power pump whereby a portion of the 45 water pumped under pressure by the power pump is supplied to the distributing tank, and back pressure means in said last connection whereby sufficient pressure is permitted to accumulate on the inlet side of the 50 jet pump to operate such pump.

2. In combination in a water distributing system, a power pump, a source of water supply from which water is to be lifted, a jet pump therein, a pipe for supplying water 55 under pressure from the power pump to the jet pump, a distributing tank, connections whereby the water lifted by the jet pump is supplied to the inlet side of the power pump, another connection from the outlet side of 60 the power pump whereby a portion of the water pumped under pressure by the power pump is supplied to the distributing tank, and back pressure means in said last connection constructed so as to draw in a supply 65 of air to the distributing tank and to pro-

vide a back pressure on the inlet side of the jet pump sufficient to secure the operation of such pump.

3. In combination in a water distributing system, a power pump, a source of water 70 supply from which water is to be lifted, a jet pump therein, a pipe for supplying water under pressure from the power pump to the jet pump, a distributing tank, connections whereby the water lifted by the jet pump is 75 supplied to the inlet side of the power pump, another connection from the outlet side of the power pump whereby a portion of the water pumped under pressure by the power pump is supplied to the distributing tank. 80 and an inspirator in the said last connection adapted to supply air to the tank and provide a back pressure in the said connection.

4. In combination in a water distributing system, a power pump, a source of water 85 supply from which water is to be lifted, a jet pump therein, a pipe for supplying water under pressure from the power pump to the jet pump, a distributing tank, connections whereby the water lifted by the jet pump is 90 supplied to the inlet side of the power pump, another connection from the outlet side of the power pump whereby a portion of the water pumped under pressure by the power pump is supplied to the distributing tank, an 95 inspirator in the said last connection adapted to supply air to the tank and provide a back pressure in the said connection, and means for preventing a backflow from the tank when the pump stops. 100

5. In combination in a water distributing system, a power pump, a source of water supply from which water is to be lifted, a jet pump therein, a pipe for supplying water 105 under pressure from the power pump to the jet pump, a distributing tank, connections whereby the water lifted by the jet pump is supplied to the inlet side of the power pump, another connection from the outlet side of 110 the power pump whereby a portion of the water pumped under pressure by the power pump is supplied to the distributing tank, and an inspirator in the said last connection for supplying air to the tank and providing 115 back pressure in the said connection, the said inspirator comprising a converging passage and a diverging passage with the reduced ends in alinement and provided with an air inlet.

6. In combination in a water distributing 120 system, a rotary pump, a source of water supply from which water is to be lifted, a jet pump therein having a supply connection from the outlet side of the rotary pump, a tank for receiving the water lifted by the jet 125 pump, a connection therefrom to the inlet side of the rotary pump, a closed receiving tank, another supply connection from the outlet side of the rotary pump to the receiving tank, an inspirator for creating back 130

pressure in the said last connection and operated by the water flowing through the connection to supply air to the tank with the inflowing water, and a check valve intermediate the receiving tank and inspirator to prevent a back flow from the tank.

In testimony whereof I have hereunto

signed my name in the presence of the two subscribed witnesses.

THOS. H. HOLLIS.

Witnesses:

JULIAN H. KENDIG,
HENRY L. LECHNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."