(No Model.)

J. G. STAMP.

HYDRAULIC SUPPLY SYSTEM.

No. 471,278. Patented Mar. 22, 1892.

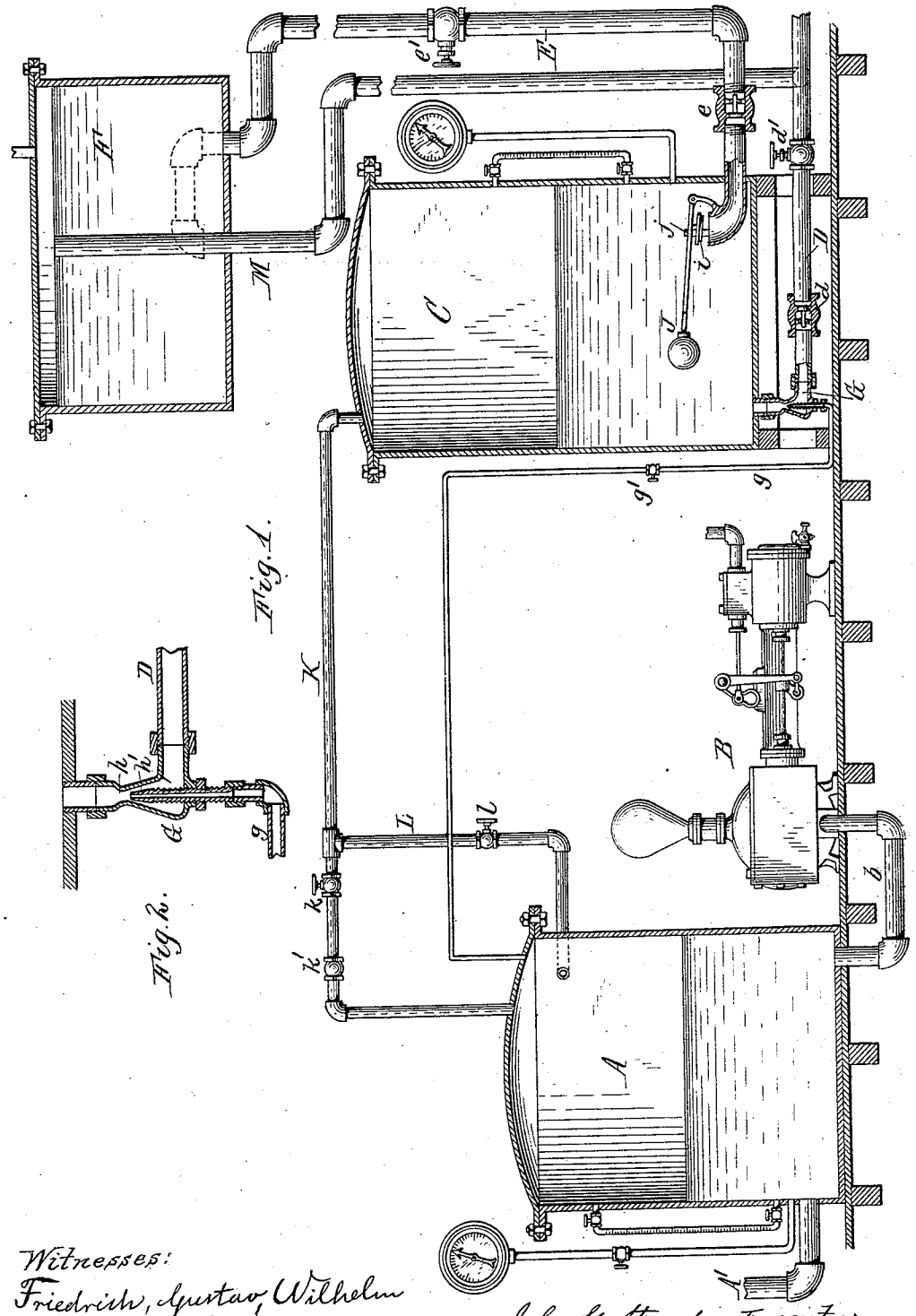

Fig. 1.

Fig. 2.

Witnesses:
Friedrich, Gustav, Wilhelm
Emil Neuhart.

John G. Stamp Inventor.
By Wilhelm & Bonner Attorneys.

UNITED STATES PATENT OFFICE.

JOHN G. STAMP, OF BUFFALO, NEW YORK.

HYDRAULIC SUPPLY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 471,278, dated March 22, 1892.

Application filed November 14, 1891. Serial No. 411,932. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. STAMP, a citizen of the United States, residing at the city of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Hydraulic Supply Systems, of which the following is a specification.

This invention relates to an improved water-supply system which is adapted for supplying the upper stories of a high building, which are above the height to which the pressure in the mains will lift the water, and more particularly for buildings having a hydraulic elevator.

Prior to my invention the upper stories of buildings were supplied by a steam-pump which elevated the water to a tank on the roof or in the uppermost story of the building and from which the occupants of such stories obtained their supply.

The object of my invention is to utilize the air-pressure in the pressure-tank of the hydraulic elevator for forcing water to such upper stories, and thus dispense with a separate pump for that purpose and save the running expense thereof.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved supply apparatus. Fig. 2 is a longitudinal section of the air-injector on an enlarged scale.

Like letters of reference refer to like parts in both figures.

A represents the closed pressure-tank or compression-chamber of a hydraulic elevator, and A′ is the pipe through which water is conducted under pressure to the usual actuating-cylinder of the elevator. This cylinder and the system of pulleys and lifting-cables operated by the same are not shown in the drawings and form no part of my invention.

B is the pump, and *b* the pipe through which water is delivered into the pressure-tank.

C is a water-elevating tank or chamber adapted to contain water and having an inlet-pipe D and a delivery-pipe E. The inlet-pipe D is connected with the supply-main and provided with a check-valve *d* for preventing backward flow of the water and a hand-valve *d′* for shutting off or regulating the supply. The delivery-pipe E is also provided with a check-valve *e* and a hand-valve *e′*. This delivery-pipe extends to the top of the building and is preferably connected with a storage-tank F on the roof, with which the service-pipes of the upper stories of the building are connected. If desired, however, the storage-tank may be dispensed with and the service-pipes be connected directly with the delivery-pipe E.

G is an air-injector arranged in the inlet-pipe D of the tank C at or near its junction with the elevating-tank C, and *g* is an air-pipe leading from said air-injector to the air-space of the pressure-tank A and having a regulating-valve *g′*. The injector G consists of a shell or casing having a tapering throat or valve-seat *h* and a nozzle *h′*, terminating in said throat and connected with the air-pipe *g*, as more clearly shown in Fig. 2. Upon opening the valve of this air-pipe and the valve of the water-supply pipe D, compressed air passes from the pressure-tank A through the pipe *g* and the injector-nozzle *h′* and into the elevating-tank C. The compressed air issuing from the nozzle *h′* produces a vacuum which causes the water in the supply-pipe D to be drawn into the injector and forced with the compressed air into the elevating-tank, thus increasing the volume of water in said tank and the pressure of the air confined therein.

The nozzle of the air-injector is externally screw-threaded and arranged in a threaded opening in the lower end of the injector-shell, so that it can be adjusted toward or from the valve-seat of the injector for regulating the quantity of water admitted to the elevating-tank.

The delivery-pipe E extends into the elevating-tank, and its upwardly-turned mouth is controlled by an automatic valve *i*. This valve is preferably controlled and carried by a float J, the stem of which is pivoted at its inner end to an arm or bracket arranged on the pipe E. The upward movement of the float is limited by a bow or strap *j*, formed on the pipe E and embracing the float-stem. So long as the water-level stands above the mouth of the pipe E the float, by its tendency to rise, keeps the valve open, so as to allow

the water to enter the delivery-pipe; but as soon as the water-level falls below the mouth of said pipe the float descends by gravity and closes the valve, thus preventing the escape of the air from the elevating-tank through its delivery-pipe. The elevating-tank is provided with gages for indicating the height of the water and the air-pressure therein.

K is a return-pipe connecting the air-space of the elevating-tank C with the air-space of the pressure-tank A, and having a hand-valve *k* for interrupting the flow of air through the same, and a check-valve *k'*, which permits the air to pass from the elevating-tank to the pressure-tank, but prevents the air in the pressure-tank from flowing into the elevating-tank through the return-pipe.

L is an auxiliary air-pipe leading from the pressure-tank A to the return-pipe K and connected with the latter between its cut-off valve *k* and the elevating-tank. This auxiliary pipe is provided with a cut-off valve *l* and is used for supplying air to the elevating-tank above the water in the same in starting the apparatus.

M is an overflow-pipe arranged in the storage-tank F and connected with the main supply-pipe D, so that when the water in said tank rises above a predetermined level it overflows into the pipe D.

The operation of my improved supply apparatus is as follows: The cut-off valves of the return air-pipe K, the auxiliary air-pipe L, the injector-pipe *g*, and the delivery-pipe of the elevating-tank are closed and water is supplied to the elevating-tank by opening the valve of the supply-pipe D. Compressed air is then admitted into the elevating-tank above the water by opening the valve of the auxiliary air-pipe, so as to place the body of water in the elevating-tank under pressure, after which the valve *e'* of the delivery-pipe E is opened to allow the water in the elevating-tank to rise into the storage or supply tank F. The valve of the auxiliary air-pipe is then closed and the valves of the injector-pipe *g* and the return-pipe K are opened. The compressed air passing through the injector enters the elevating-tank and forces the water in the supply-pipe D into the elevating-tank, whereby the volume of water in the latter is augmented and the air-pressure increased and maintained at the proper degree to elevate the water in the elevating-tank to the top of the building. The air in the compression-tank A fluctuates as the elevator runs up and down, and when the pressure in the tank falls below that in the elvating-tank a portion of the air in the latter rushes into the pressure-tank until the pressure in both tanks is equalized, the pressure in the two tanks, after such equalization being about the average of the degrees of pressure in the respective tanks before the fall of the pressure in the compression-tank A. The air borrowed from the pressure-tank for expelling and lifting the water in the elevating-tank is thus largely returned to the compression-tank A whenever the pressure in the latter falls below the normal.

By means of the valves in the several pipes, the supply of water to the elevating and roof tanks and of the air to the injector can be properly regulated in accordance with the ordinary consumption of water.

As the surplus of water in the roof or supply tank F flows back into the supply-pipe D of the elevating-tank C through the overflow-pipe M, the air-injector may be operated continuously while the elevator is in use, the air pressure in the elevating-tank whenever it rises above that in the compression-tank being equalized between the two tanks, as before described, and the air-injector maintaining the requisite air-pressure in the elevating-tank to lift the water into the roof-tank.

In the drawings, the delivery and overflow pipes E M are represented as connected with the roof-tank; but, if desired, said tank may be discarded and the delivery and overflow pipes be connected together above the level, to which the pressure in the water-mains will lift the water, as indicated by dotted lines in Fig. 1, by which arrangement the water is permitted to circulate through the delivery, overflow, and supply pipes E, D, and M, and the elevating-tank, as in the first-described construction, so that the air-injector may be operated continuously.

By the use of my improved supply system, the additional pump heretofore required for supplying the upper stories is dispensed with, thus saving not only the cost of an extra pump, but effecting a considerable saving in the consumption of fuel and steam.

The water-elevating tank may be located in proximity to the compression-tank of the elevator, so that the entire apparatus can be conveniently controlled by one attendant.

The auxiliary air-pipe L is not indispensible, as the elevating-tank could be supplied with the necessary compressed air to start the apparatus by means of the air-injector; but this means of supplying the tank would be slow, owing to the small bore of the injector-nozzle, and I therefore prefer to employ the auxiliary pipe.

I claim as my invention—

1. The combination, with a compression-tank, of a water-elevating tank having a water-inlet and a delivery-pipe, an air-injector connected with the inlet of the elevating-tank, and an air-pipe connecting the injector with said compression-tank, substantially as set forth.

2. The combination, with a compression-tank, of a water-elevating tank having a water-inlet, a delivery-pipe, and an air-injector connected with the inlet of the elevating-tank, an air-pipe connecting the injector with the compression-tank, and a return air-pipe lead-

ing from the elevating-tank to the compression-tank and provided with a check-valve, substantially as set forth.

3. The combination, with a compression-tank and a water-elevating tank having supply and delivery pipes, of an air-injector arranged in said supply-pipe and connected with the compression-tank, a return air-pipe leading from the elevating-tank to the compression-tank and provided with a check-valve, and an auxiliary pipe connecting the compression-tank with the elevating-tank, substantially as set forth.

4. The combination, with the compression-tank, of a water-elevating tank having supply and delivery pipes, an air-injector arranged in said supply-pipe and connected with the compression-tank, a return-pipe leading from the elevating-tank to the compression-tank and having a check-valve and a cut-off valve, and an auxiliary air-pipe leading from the compression-tank to the return-pipe and having a cut-off valve, substantially as set forth.

5. The combination, with a compression-tank and a water-elevating tank provided with a delivery-pipe, of an automatic valve applied to the mouth of the delivery-pipe, and an air-injector arranged in the supply-pipe of the elevating-tank and connected with the compression-tank, substantially as set forth.

6. The combination, with a compression-tank, of a water-elevating tank having a water-inlet and a delivery-pipe, a valve applied to the mouth of said delivery pipe, a float arranged in the elevating-tank and controlling said valve, and an air-injector arranged in the supply-pipe of said tank and connected with the compression-tank, substantially as set forth.

7. The combination, with a compression-tank, of a water-elevating tank having supply and delivery pipes, and an injector arranged in the supply-pipe of the elevating-tank and connected with the compression-tank, and a storage-tank connected with said delivery-pipe and having an overflow communicating with the supply-pipe of the elevating-tank, substantially as set forth.

Witness my hand this 5th day of November, 1891.

JOHN G. STAMP.

Witnesses:
CARL F. GEYER,
FRED. C. GEYER.