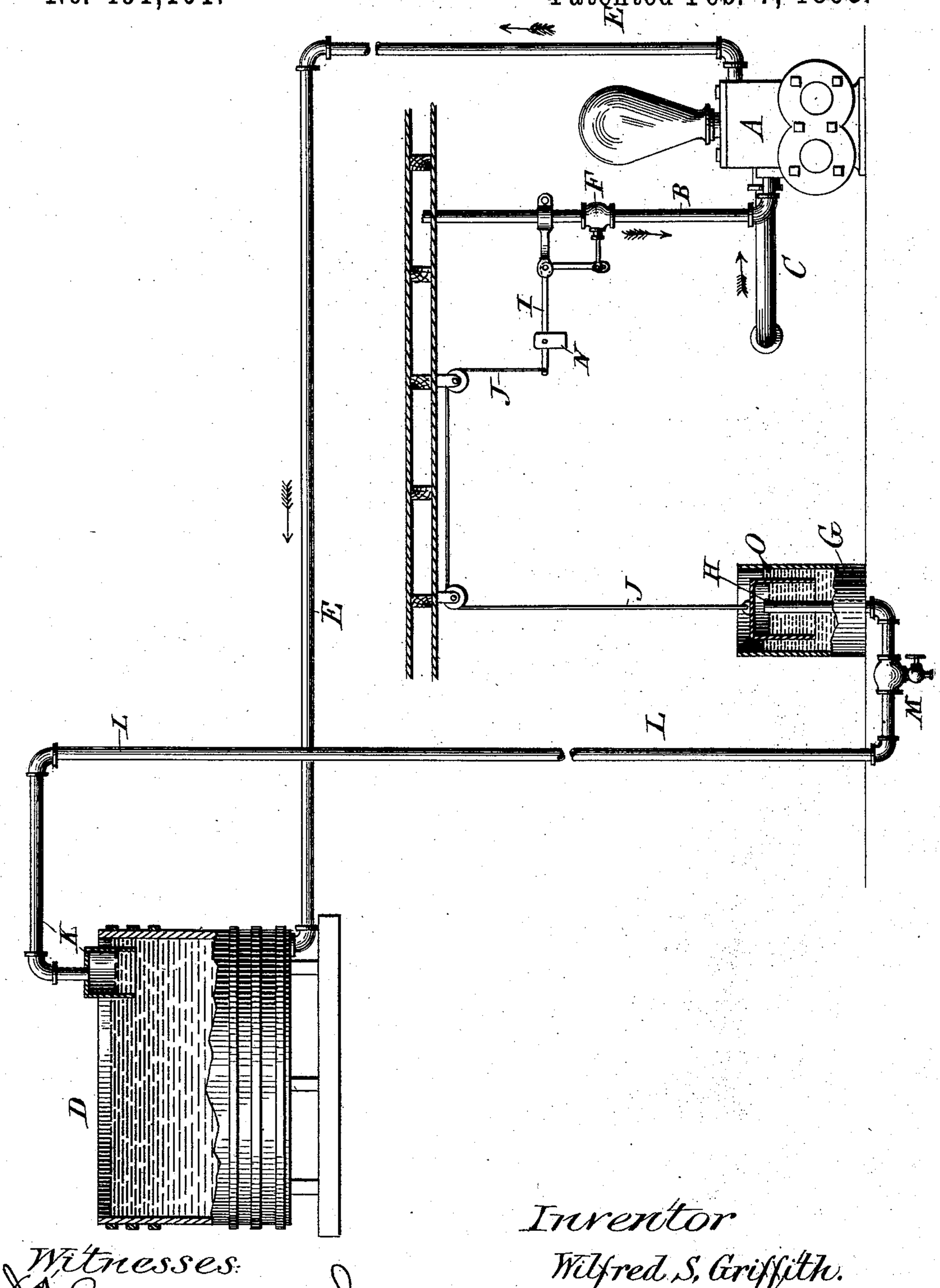
(No Model.)

W. S. GRIFFITH.

PUMP REGULATOR.

No. 491,101. Patented Feb. 7, 1893.



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UNITED STATES PATENT OFFICE.

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PUMP-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 491,101, dated February 7, 1893.

Application filed November 20, 1891. Renewed November 3, 1892. Serial No. 450,807. (No model.)

To all whom it may concern:

Be it known that I, WILFRED S. GRIFFITH, a citizen of the United States, residing at Ambler, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Pump-Regulators or Governors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to pump regulators or governors for tanks or reservoirs for the temporary storage of water or other liquids, and has for its object to provide a new and improved means for automatically controlling the action of the pump, engine, or other motor employed in filling the tanks, by the rise and fall of the liquid contained in the latter, the pump being stopped when the water or other liquid reaches a predetermined level; and being started again when by reason of its withdrawal it falls below that point, whereby an approximately constant volume of liquid is maintained in the tank.

My invention consists in arranging within the supply tank a fixed air-chamber open at its lower end, and with its lower end slightly below the predetermined level of the water or other liquid in the tank; into which air-chamber the water or other liquid rises as it is forced into the supply tank; and in connection with said air-chamber an air-pipe leading from said air-chamber into a smaller tank in which is placed another air-chamber depending from a cord, chain, lever or rod, connected with the controlling mechanism of the pump, engine, or other motor used to fill the supply tank; whereby when the liquid in the supply tank rises above the lower end of the fixed air-chamber it operates to compress the air in that air-chamber and forces air through the pipe leading from it into the small tank, thus causing the depending air-chamber in the small tank to rise, and through its connections to stop the pump. When the level of the liquid in the supply tank is lowered by reason of draft thereon, the air in the two chambers and pipe will expand, thus allowing the depending chamber to overcome its counter-balance in the small tank and start the pump.

The accompanying drawing represents in elevation my invention applied to the ordinary water-tank and supply-pump.

In the drawing A represents a steam pump of any preferred type; B is the pipe supplying steam to the same.

C is an inlet pipe for supplying water to the pump.

D is the supply-tank or reservoir located at any required distance from a height above the pump.

E is the supply pipe leading from the pump and entering the supply-tank D at the top, bottom or side, as preferred.

F is the throttle-valve which controls the admission of steam to the pump.

G is a small tank in which floats the depending chamber H, the latter being connected with the bell crank lever I by means of the cord J or other suitable connection passing over suitable guide pulleys.

The valve F may be of any preferred type of balanced valve. One arm of the bell crank lever is link-connected with the stem of this valve, the other end of the lever being provided with an adjustable weight N for a purpose to be hereinafter described.

K is a chamber open at its lower end and constructed of metal or other suitable material, which should be permanently held in a fixed position relatively to the supply tank D. It will be understood that the mouth or lower end of the air-chamber K should be placed slightly below the desired level of the liquid in the supply-tank.

L is a pipe leading from the air-chamber K into the small tank G, preferably entering the tank through the bottom, the opening or mouth of said pipe L is placed within the tank G and above the level of the liquid contained therein and within the depending air-chamber H. In the lowest bend of the pipe L is placed a trap M for the purpose of collecting any water or liquid which may enter the pipe L; and this trap M is fitted with a suitable valve or cock for drawing off said liquid, thus preventing the obstruction of the pipe thereby.

The small tank G is partly filled with water,

oil or other liquid; and, if water is used, for the prevention of its evaporation, a small quantity of non-volatile oil is poured on the water between the walls of the tank G and the air-chamber H as shown at O.

The construction and arrangement being as described, its operation is as follows: The pump being started, the water is forced into the tank D through the pipe E until it rises to the level of the mouth or lower end of the air-chamber K. The water continuing for a time to rise, the air confined in the chamber K, pipe L, and depending chamber H will be compressed and will exert an upward pressure on the depending chamber H thus slacking the connection J, and allowing the weight N on the long arm of the bell-crank lever to depress the same, closing the valve, and shutting off the steam, when the operation of the pump ceases and no more water will be forced into the supply tank D. The weight on the bell crank lever N will keep the valve F closed until the level of the water in the supply tank D is lowered, thereby permitting the expansion of the air confined in the pipe L and air-chambers K and H, and causing the air-chamber H to sink in the tank G, thus overbalancing the weight N and reopening the valve F.

The purpose of making the weight N adjustable is to properly proportion the force required to actuate the bell crank lever and the weight of the float or air-chamber H.

It will be readily understood that other and various devices may be successfully employed to secure pneumatic regulation and control of the pumping apparatus. For example, flexible or collapsible air chambers might be substituted for the air chambers shown in the drawing, and the pressure of the liquid on the flexible air chamber in the supply tank would collapse the air chamber in that tank, and correspondingly expand the flexible air chamber in the small tank, thus raising the level of the liquid in that tank and elevating a float connected with the controlling mechanism of the pump; and, vice versa, on the falling of the level of the liquid in the supply tank the pressure of the liquid in the small or secondary tank would collapse the flexible air chamber therein, and correspondingly expand the air chamber in the supply tank. Or the liquid in the secondary tank might be dispensed with, and a weight connected with the controlling mechanism of the pump placed directly upon the expansible air chamber in the secondary tank and arranged to rise and sink with the expansion or contraction of the air chamber therein. The air chamber K also, may be placed outside the tank D, it being only necessary that the water in the tank D shall have access to the lower part of the air chamber K to compress the air therein, and force it through the pipe L into the air chamber H. The connections between the air chamber or float in the small tank and the controlling mechanism of the pump may also be varied in several ways and numerous details; as, for instance, the connection may be made rigid instead of flexible, or direct instead of indirect, as shown. While, therefore, I have described what I deem the best means of applying pneumatic regulation to pumps, I do not intend to be confined to the means shown herein, but

What I claim as new, and desire to secure by Letters Patent is:

1. The combination of a supply tank, automatic mechanism for filling the same, an open-bottomed air-chamber fixed in the tank so that the rise of the liquid therein will compress the air in the chamber, a secondary tank, an open-bottomed air-vessel suspended in the secondary tank, and air pipe extending from the air-chamber in the supply tank into the secondary tank above the surface of the liquid therein and under the secondary air-chamber, and connections between the secondary air-chamber and the mechanism for controlling the automatic tank-filling mechanism, substantially as described.

2. The combination of a pump, a supply pipe, a supply tank, an air-chamber connected with the latter so as to permit the rising of the liquid therein to compress the air in said air-chamber, a secondary air-chamber, a pipe connection between said air-chambers, and connections between a movable part of the secondary air-chamber and the controlling mechanism of the pump, substantially as described.

3. The combination of a pump, a supply pipe, a supply tank, an open-bottomed air-chamber arranged in the supply tank so as to permit the rising of the liquid therein to compress the air in the chamber, a secondary tank, a secondary open-bottomed air-chamber suspended, in the secondary tank, an air-pipe extending from the primary air-chamber into the secondary tank under the secondary air-chamber therein, and connections between the secondary air-chamber and the regulating mechanism of the pump, substantially as described.

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