No. 813,008. PATENTED FEB. 20, 1906.

H. W. KIMES.

PUMPING APPARATUS.

APPLICATION FILED OCT. 9, 1905.

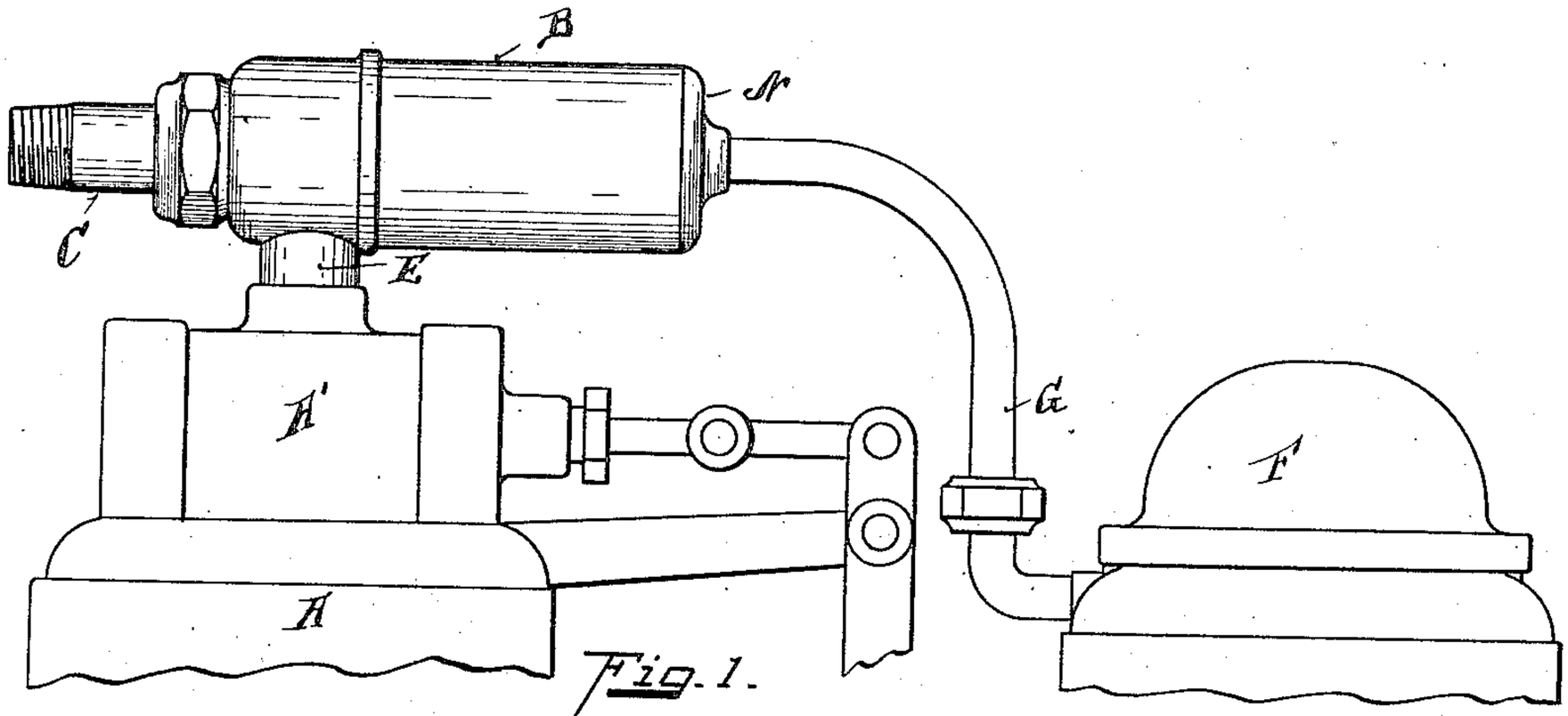

Fig. 1.

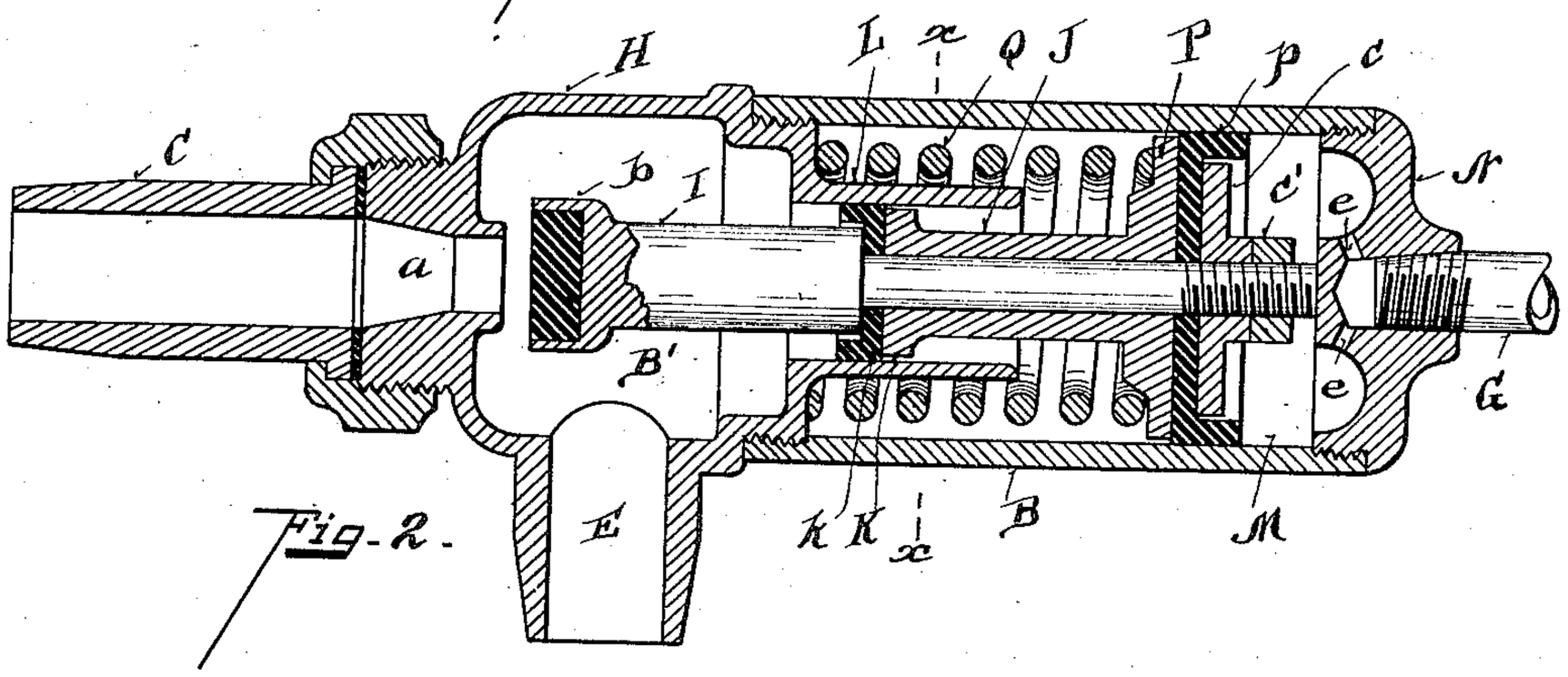

Fig. 2.

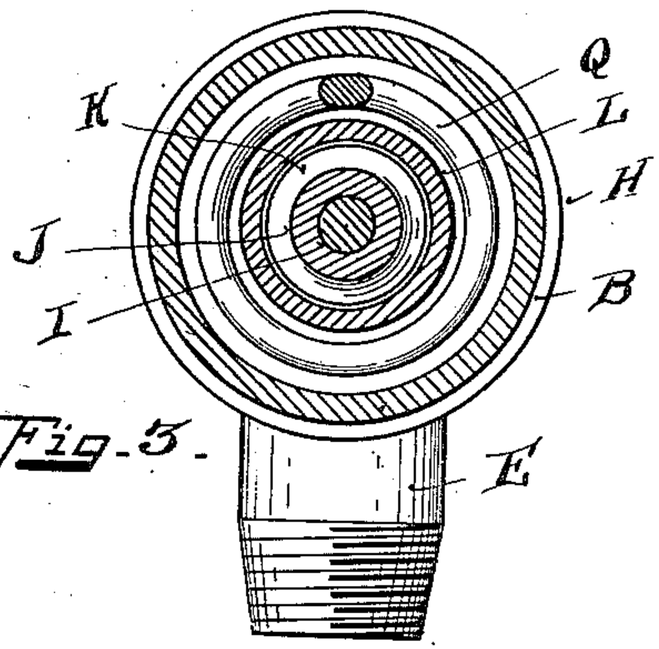

Fig. 3.

Witnesses

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PUMPING APPARATUS.

No. 813,008. Specification of Letters Patent. Patented Feb. 20, 1906.

Application filed October 9, 1905. Serial No. 282,038.

To all whom it may concern:

Be it known that I, HUGH W. KIMES, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Valve Pumping Apparatus, of which the following is a specification.

This invention relates to a motor-valve appliance adapted to be used as a connection between a fluid-pressure motor and a pump, the parts being so arranged that the valve is thrown by a change of pressure exerted on the valve at either end, respectively, by the working pressure for driving the motor and the load upon the pump.

The primary object of this invention is to combine a motor and a pump with a valve controlling the fluid-pressure of the motor and connected to the working chamber of the pump, so arranged that the pressure, say, of the water from a street-main will drive the motor and operate the pump to raise water from a cistern to a storage-tank until the pressure in the storage-tank acting on the motor-valve will close the same and stop the motor, and that when the pressure in the tank becomes less than the water-main pressure the valve will automatically open and start the motor, thereby maintaining a constant supply or storage in the tank. This valve is especially to be used as a connection between the motor and pump of the kind shown in my application, Serial No. 279,193, filed September 19, 1905.

The features of my invention are more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of my improvement, showing the top section of the motor and pump with the valve connection with the two instrumentalities. Fig. 2 is a longitudinal central vertical section of the valve and its pipe connections. Fig. 3 is a section on line *x x*, Fig. 2.

The drawings illustrate my improved valve connected to an ordinary main at one end and to the pressure-valve of a pump for which it is primarily designed.

A represents the top of a water-motor. A′ represents the valve-chamber thereon.

B represents the automatic valve-casing.

C represents a water-main pipe connected by a port *a* leading into the chamber B′ of the automatic valve. *b* represents a valve for closing the port *a*. E represents a pipe connecting this chamber with the valve-chamber A′ on the motor.

F represents the air-chamber of a pump. G represents a pipe connecting the same with the rear end of the valve-casing B. The pump connections with the sources of supply and with the storage-tanks are not shown.

The valve is constructed as follows: The casing is shown constructed of two parts. H represents that part of the casing connected with the motor and water-main, to which the valve-stem I, carrying the disk valve *b*, is easily connected for closing the port *a*. J represents the valve-stem, which is mounted and supported by differential piston-heads. K represents the piston-head of the smaller area, which reciprocates in a cylinder L, shown as integrally formed with the casing H. *k* represents the piston-packing of piston K. P represents the piston with larger area. *p* represents the packing thereof, which is secured in position by the nuts *c c′*. Said piston reciprocates in the cylinder M, which forms a part of the automatic-valve casing connected together by screw-threaded engagements, as shown in Fig. 2. N represents the head closing the piston P. To this head is connected the pump-pipe G. *e* represents ports communicating with the piston-chamber at the rear end of cylinder M′ for supplying pressure to the larger piston P. Q represents a coil-spring applied to the piston P to assist in closing the valve *b* against the pressure of the water-motor. The power of the spring is regulated to the conditions under which the valve is to operate.

The amount of the pressure of the pump on the larger piston P is determined by the height of the water in the storage-tank. The area of the larger piston must be sufficient to overcome the pressure of the spring and the pressure of the water-main on the smaller piston area K to close the valve *b*. Now when the storage pressure acting on the piston P becomes greater than the pressure or force acting on piston K the pistons and piston-rod will move forward, closing the port *a*, which will stop the motor, and when the storage pressure acting on the piston P becomes less than the motor-pressure acting on the face of the valve *b* the pistons and piston-rod

will move forward, opening the valve *a* and start the motor and operate the pump. The coil-spring applied to the valve of larger area is of material assistance in starting the opening movement of the valve and is an important auxiliary, and the valve will be opened and closed with a less amount of pressure variation upon opposite piston areas mounted upon the valve-stem than could be obtained without the use of a spring. It is also desirable to have the piston-closing movement positive and sensitive to the tank-pressure. By using the large area of the closing-piston a quick and positive closing of the valve is obtained. Now in opening the valve when the tank-pressure is reduced the spring assists in the quick movement of the valve and also overcomes the friction of the pistons moving in their cylinders, enabling a small piston area to be used for the opening movement. By the use of a single valve for closing the inlet-port and by employing differential pistons to effect the valve movements I obtain a material advantage over the employment of two valves. The contraction and expansion of metal interferes with the proper seating of two valves; besides with two valve-seats the liability of the sticking of the valves owing to sediments has in practice been found to interfere with the sensitiveness of an automatic device. In a single valve the contraction and expansion of the metal does not interfere with the seating of the valve. The movement of the larger area piston in its cylinder being in direct line with the valve on the end of the piston-rod insures the positive seating of the valve. I thus obtain a sensitive but reliable operating-valve, working automatically to stop and start the pump and motor, respectively.

Having described my invention, I claim—

1. The combination with a motor-fluid chest and a pump-chamber of a valve-casing, provided with a motor-fluid inlet and outlet, and a valve mounted upon a differential piston-rod journaled in said casing, a differential piston mounted on said rod, differential cylinders for said pistons, the larger piston area having pressure connections with the pump-chamber, and the smaller piston having fluid connections with the motor-fluid chest and supply-main, and a valve-seat in the casing in line with said valve, substantially as described.

2. The combination with a motor-fluid chest and a pump-chamber of a valve-casing, provided with a motor-fluid inlet and outlet, and a valve mounted upon a differential piston-rod journaled in said casing, a differential piston mounted on said rod, differential cylinders for said pistons, the larger piston area having pressure connections with the pump-chamber, and the smaller piston having fluid connections with the motor-fluid chest and supply-main, a valve-seat in the casing in line with said valve, and a compression-spring applied to the larger piston and tending to open the valve, substantially as described.

In testimony whereof I have hereunto set my hand.

HUGH W. KIMES.

Witnesses:
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