No. 694,033. Patented Feb. 25, 1902.

J. A. SERRELL.

VALVE DEVICE OR FITTING.

(Application filed Nov. 9, 1900.)

(No Model.)

FIG. 1.

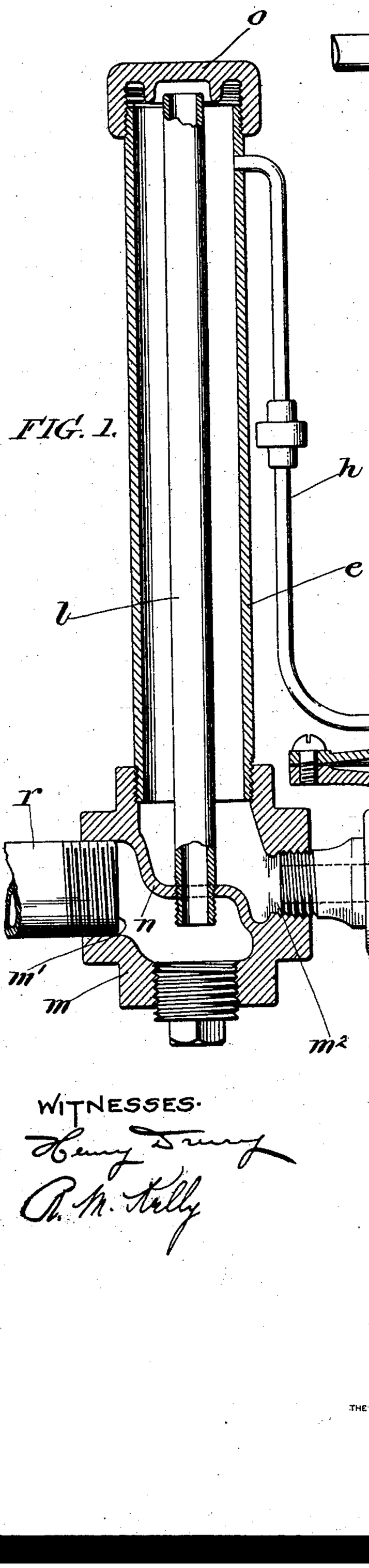
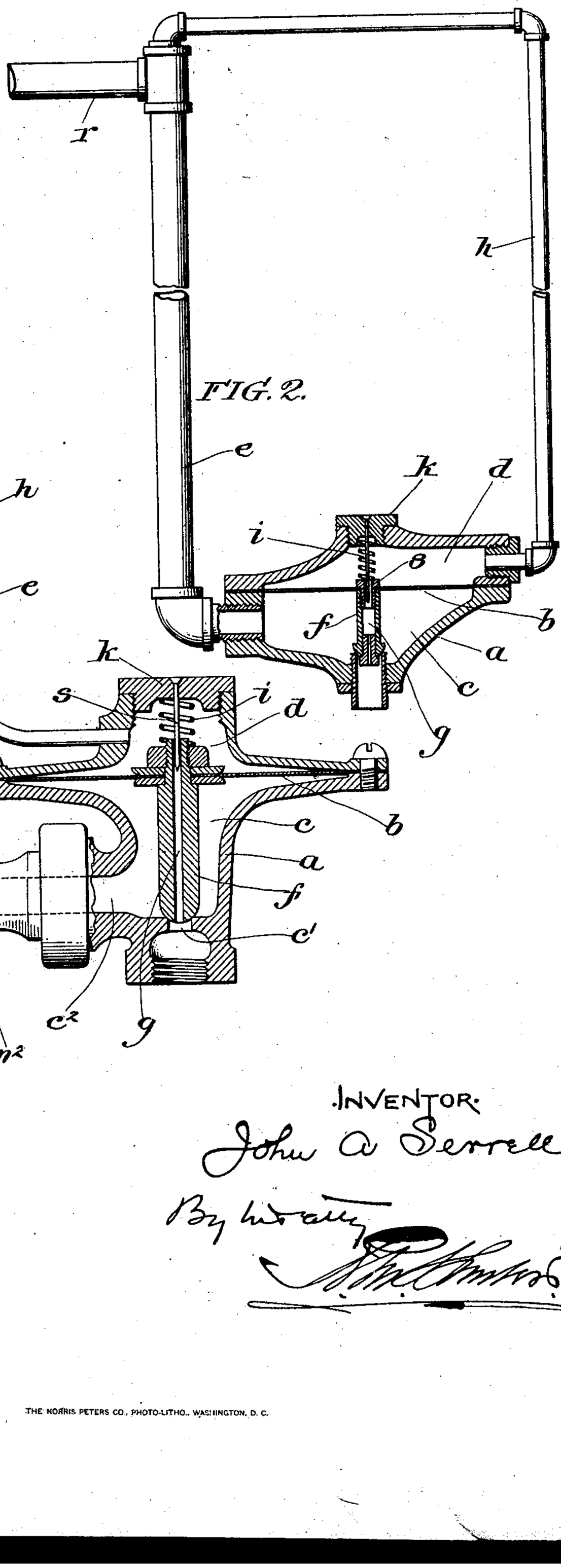


FIG. 2.



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VALVE DEVICE OR FITTING.

SPECIFICATION forming part of Letters Patent No. 694,033, dated February 25, 1902.

Application filed November 9, 1900. Serial No. 35,928. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. SERRELL, of Bayonne, Hudson county, State of New Jersey, have invented an Improvement in Valve Devices or Fittings, of which the following is a specification.

My invention relates to valve devices and fittings; and it consists of the improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

It is the object of my invention to enable the discharge of water of condensation from a radiator, drain-pipe, or other steam heating apparatus to be controlled automatically by the accumulation of water of condensation without the use of a float.

It is also an object of my invention to enable the water of condensation to accumulate for the purpose of operating the discharge-valve without interfering with the discharge of the air and uncondensed vapors and to enable the same to be discharged while the valve for controlling the water of condensation is closed.

In carrying out my invention I employ a pressure-motor operatively connected with the discharge-valve and having one side subjected to the hydrostatic pressure of the accumulation of water of condensation so arranged that a given pressure of the water of condensation will operate the motor and valve and permit the water to escape. By interposing a stand-tube between the radiator, pipe, or apparatus to be drained and the pressure-motor the necessary column of water may be obtained to produce the required hydrostatic pressure, and the operation of the motor may be controlled and adjusted to a certain hydrostatic pressure by subjecting it to the proper amount of tension. By connecting the opposite side of the motor by means of suitable ducts with the radiator, pipe, or apparatus with which the valve device is connected and with the discharges beyond the discharge-outlet I am enabled to effect the discharge of the air and uncondensed vapors while the main discharge-outlet for the water of condensation is closed.

The device may be used either in a system or apparatus in which the steam is circulated at pressures above the atmosphere or in those systems in which the air and water of condensation are drawn out by a partial vacuum or lower pressure created in the returns by suitable exhausting devices.

In the accompanying drawings, Figure 1 is a vertical sectional view of a valve device embodying my invention, and Fig. 2 is a similar view illustrating a modification.

a is a motor-chamber divided internally by a flexible diaphragm *b* into a lower water-compartment *c* and an upper low-pressure compartment *d*. The lower water-chamber *c* is provided with a discharge-outlet *c'* and a water-inlet c^2, which latter communicates with a stand-tube *e*.

f is a valve-piece operatively connected with the flexible diaphragm *b* and adapted to control the discharge-outlet *c'*. Between the outlet *c'* and the upper chamber *d* is a passage-way *g*, which, as shown, consists of a duct through the valve-piece *f* and diaphragm *b*.

h is an air pipe or duct leading from the low-pressure chamber *d* to the stand-tube *e* and communicating through the stand-tube with the inlet for the air and water of condensation.

The water of condensation, air, and uncondensed vapors enter the stand-tube, and as the valve *f* is normally closed the water will accumulate in the water-chamber *c* and stand-tube *e*, while the air and uncondensed vapors will escape through the ducts *h* and *g* to the outlet *c'* beyond the closed valve. When, however, a sufficient column of water has accumulated in the stand-tube *e*, it will operate the diaphragm *b* by hydrostatic pressure, and the valve *f* will be opened to permit the water to escape. The height of the column of water and the amount of hydrostatic pressure necessary to operate the valve *f* may be regulated and adjusted by applying tension to the diaphragm *b*, as by the spring *i*, the tension of which may be adjusted by the screw-cap *k* in the top of the low-pressure chamber *d*. The connection of

the air-duct *h* is such that the duct will not become sealed by the column of water in the tube *e*, and the accumulation of water will not obstruct the discharge of the air and uncondensed vapors. In the construction shown in Fig. 1 this is effected by leading the air and water of condensation into the stand-tube *e* through a tube *l*, arranged within the stand-tube and open at its top into the upper part thereof.

m is a chamber having an inlet *m'*, communicating with the radiator, pipe, or apparatus to be drained, an outlet m^2 to the inlet c^2 of the motor-chamber, and an opening at the top into the stand-tube *e*. This chamber is divided internally by a partition *n* between the inlet *m'* and outlet m^2, and the tube *l* opens through this partition. The air and water of condensation enter through the inlet *m'* and pass through the tube *l* into the stand-tube *e*, where the water falls to the bottom and passes through m^2 and c^2 into the chamber *c*, while the air and uncondensed vapors pass off through the duct *h*. In this construction the stand-tube *e* is provided at the top with a screw-cap *o*, which may be removed to permit the insertion or removal of the inner tube *l*.

In cases where a sufficient drop from the radiator-outlet can be obtained to provide the requisite water column below the radiator the construction shown in Fig. 2, in which the inner tube *l* is omitted, may be employed. In this case the stand-tube *e* is connected at the top with the radiator-outlet *r*, and the duct *g* communicates at the top of the stand-tube. The water will flow directly into the stand-tube and thence into the motor-chamber, while the air will pass off through the pipe *h*.

When the valve device is used in a system in which a partial vacuum or lower pressure is maintained in the outlet or discharge side, the air and uncondensed vapors will be drawn by the lower pressure through the ducts *h* and *g*, and by making these sufficiently small there will be no appreciable waste of steam. To prevent the contracted passage-way *g* being clogged by particles of foreign matter, a pin *s* may be employed fixed to the body of the chamber *a*, to the cap *k*, and projecting into the opening *g*. As the diaphragm moves under the variations in pressure the pin *s* will remove any particles of matter which might otherwise become clogged in the constricted portion of the duct *g*.

The details of construction which have been shown may be varied without departing from the invention.

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

1. A valve device consisting of a chamber divided internally into a water-compartment and an air-compartment, said water-compartment being provided with a water-inlet and a discharge-outlet, a valve-piece to control said discharge-outlet, a pressure-motor operatively connected with said valve-piece and having its opposite sides exposed respectively to the air and water compartments, a stand-tube communicating with the water-inlet of said water-compartment and extending at an elevation above said motor, whereby said motor may be operated to open the valve by the hydrostatic pressure of the column of water in said stand-tube acting against the pressure in said air-compartment, and means acting on said pressure-motor to regulate the pressure acting against the pressure in said water-compartment.

2. A valve device consisting of a chamber divided internally into a water-compartment and an air-compartment, said water-compartment being provided with a water-inlet and a discharge-outlet, a valve-piece to control said discharge-outlet, a pressure-motor operatively connected with said valve-piece and having its opposite sides exposed respectively to the air and water compartments, a stand-tube communicating with the water-inlet of said water-compartment and extending at an elevation above said motor, whereby said motor may be operated to open the valve by the hydrostatic pressure of the column of water in said stand-tube acting against the pressure in said air-compartment, and an air-duct between the outlet side of said valve device beyond the valve-piece and said air-compartment.

3. A valve device consisting of a chamber divided internally into a water-compartment and an air-compartment, said water-compartment being provided with a water-inlet and a discharge-outlet, a valve-piece to control said discharge-outlet, a pressure-motor operatively connected with said valve-piece and having its opposite sides exposed respectively to the air and water compartments, a stand-tube communicating with the water-inlet of said water-compartment and extending at an elevation above said motor, whereby said motor may be operated to open the valve by the hydrostatic pressure of the column of water in said stand-tube acting against the pressure in said air-compartment, and an air-duct between the outlet side of said valve device beyond the valve-piece and said stand-tube above the level assumed by the column of water therein.

4. A valve device consisting of a chamber divided internally into a water-compartment and an air-compartment, said water-compartment being provided with a water-inlet and a discharge-outlet, a valve-piece to control said discharge-outlet, a pressure-motor operatively connected with said valve-piece and having its opposite sides exposed respectively to the air and water compartments, a stand-tube communicating with the water-inlet of said water-compartment and extending at an elevation above said motor, whereby said motor may be operated to open the valve by the hydrostatic pressure of the column of water in said stand-tube acting against the pressure

in said air-compartment, an air-duct between the outlet side of said valve device beyond the valve-piece and said air-compartment, and an air-duct between the air-compartment and the stand-tube above the level assumed by the column of water therein.

5. In a valve device, the combination of a valve-piece for controlling the discharge-outlet, a motor-diaphragm operatively connected therewith and having one side subjected to the hydrostatic pressure of the accumulation of water of condensation, and a duct between the other side of the motor-diaphragm and the discharge side beyond said discharge-outlet.

6. In a valve device, the combination of a valve-piece for controlling the discharge-outlet, a motor-diaphragm operatively connected therewith and having one side subjected to the hydrostatic pressure of the accumulation of water of condensation, a duct between the other side of the motor-diaphragm and the discharge side beyond said discharge-outlet, and a duct between said side which communicates with the discharge beyond the outlet and the radiator or apparatus with which said valve device is connected.

7. In a valve device, the combination of a valve-piece for controlling the discharge-outlet, a motor-diaphragm operatively connected therewith, a stand-tube communicating with the radiator or apparatus with which said valve device is connected and opening on the side of the motor-diaphragm on which the discharge-outlet is located, the other side of the diaphragm being subjected to the pressure in the radiator or apparatus with which the valve device is connected, and a duct between said side of the diaphragm and the outlet side of the valve device beyond the discharge-outlet.

8. In a valve device, the combination of a valve-piece, for controlling the discharge-outlet, a motor-diaphragm operatively connected therewith, and a stand-tube communicating with the radiator or apparatus with which said valve device is connected and opening on the side of the motor-diaphragm on which the discharge-outlet is located, said valve-piece being provided with a passage-way *g*, forming a duct between the other side of the diaphragm and the outlet side of the valve-piece beyond the discharge-outlet.

9. In a valve device, the combination of a valve-piece, for controlling the discharge-outlet, a motor-diaphragm operatively connected therewith, a stand-tube communicating with the radiator or apparatus with which said valve device is connected and opening on the side of the motor-diaphragm on which the discharge-outlet is located, said valve-piece being provided with a passage-way *g*, forming a duct between the other side of the diaphragm and the outlet side of the valve-piece beyond the discharge-outlet, and a pin projecting into said passage-way to keep it free from particles of foreign matter.

In testimony of which invention I have hereunto set my hand.

JOHN A. SERRELL.

Witnesses:
JOHN G. EADIE,
WILLIAM M. TREADWELL.