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J. A. SERRELL & J. A. DONNELLY.

VALVE DEVICE FOR STEAM HEATING SYSTEMS.

(Application filed Oct. 25, 1900.)

(No Model.)

FIG. 1.

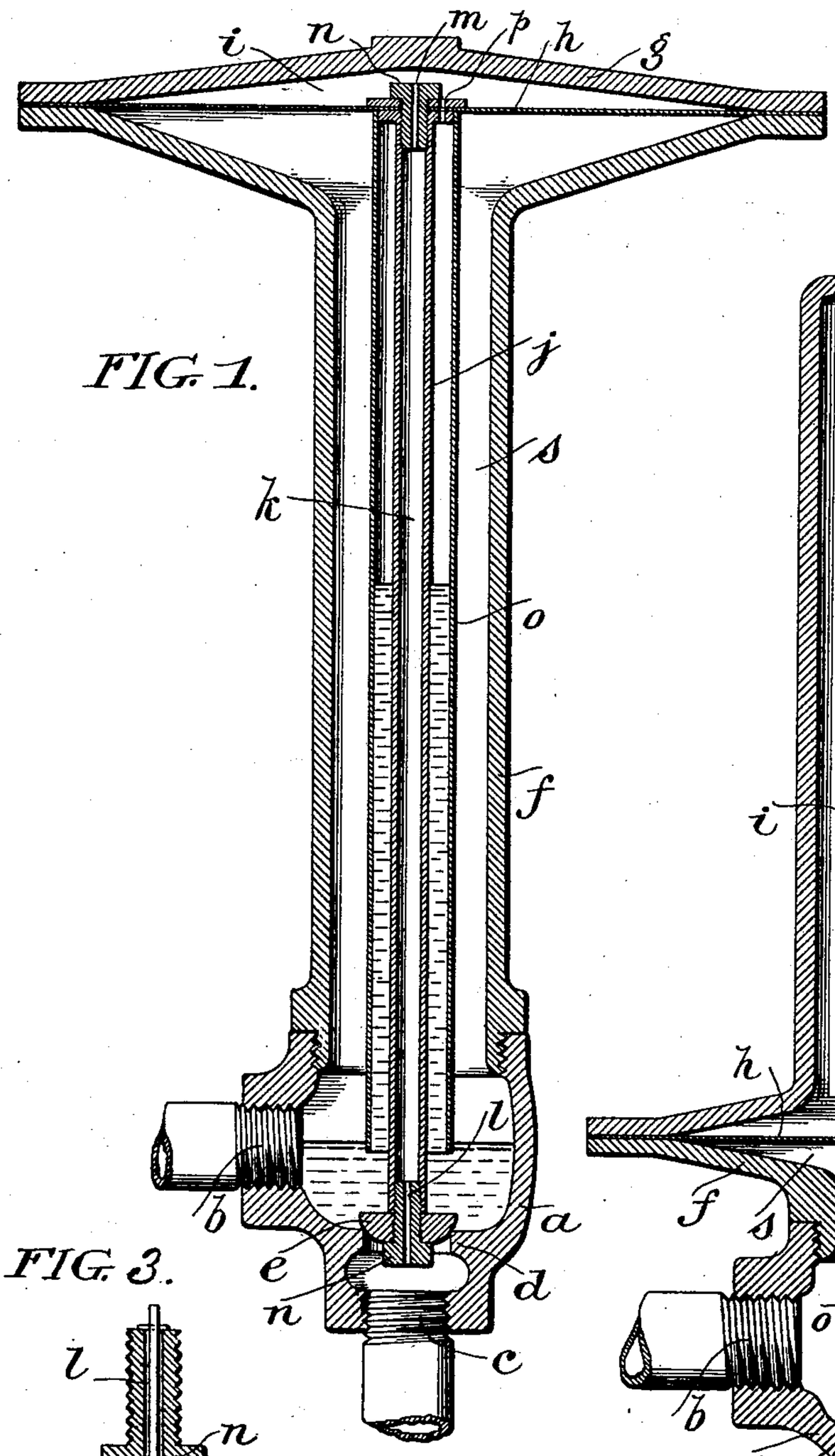

FIG. 2.

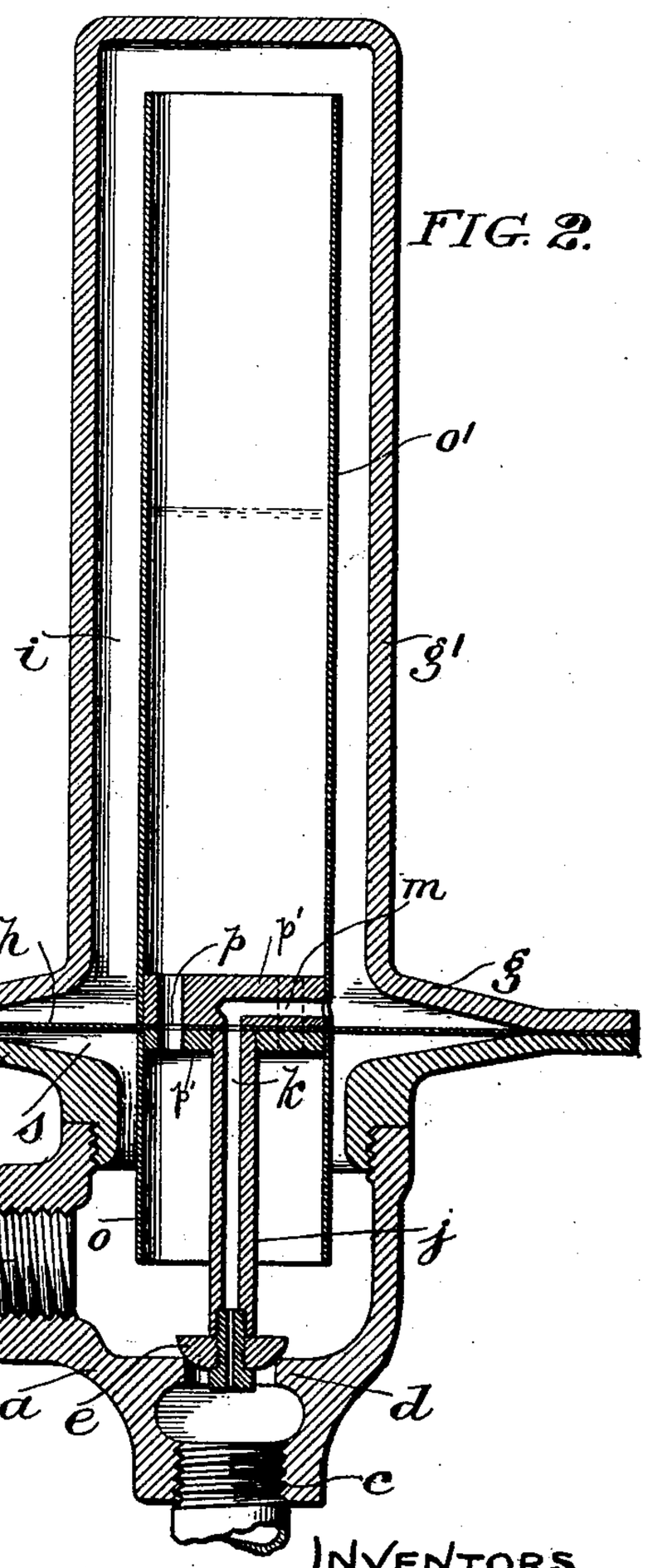

FIG. 3.

WITNESSES.

Harry Dewey

A. M. Kelly.

INVENTORS

John A. Serrell and

James A. Donnelly

By their atty

Thos. G. Orwig

UNITED STATES PATENT OFFICE.

JOHN A. SERRELL, OF BAYONNE, NEW JERSEY, AND JAMES A. DONNELLY, OF BROOKLYN, NEW YORK, ASSIGNORS TO THE AMERICAN STEAM HEATING SPECIALTY COMPANY, A CORPORATION OF NEW JERSEY.

VALVE DEVICE FOR STEAM-HEATING SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 696,202, dated March 25, 1902.

Application filed October 25, 1900. Serial No. 34,253. (No model.)

To all whom it may concern:

Be it known that we, JOHN A. SERRELL, of Bayonne, Hudson county, State of New Jersey, and JAMES A. DONNELLY, of the borough of Brooklyn, Kings county, State of New York, have invented an Improvement in Valve Devices for Steam-Heating Systems, of which the following is a specification.

Our invention has reference to valve devices for steam-heating systems; and it consists of the improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

More particularly, our invention relates to that class of automatic valves in which the valve-piece is operated by a pressure-motor having one side in communication with the inlet side of the valve device and the other side in communication with the outlet side and is provided with a vent adapted to be closed automatically when the conditions on the inlet side require the opening of the valve passage-way; and it consists in the employment of a tube communicating at one end with the inlet side of valve-body and at the other end with the vent in the pressure-motor, which is adapted to be sealed by an accumulation of water of condensation on the inlet side to close the vent and cause the pressure-motor to operate the valve-piece.

In the drawings, Figure 1 is a vertical sectional view of a valve device embodying our invention. Fig. 2 is a similar view illustrating a modification, and Fig. 3 is a vertical sectional view of the air-discharge plug of the valve-piece.

a is the usual body, having the inlet *b* and outlet *c* and provided with a valve-seat *d* for the valve-piece *e*, which controls the outlet.

f is a tubular extension of the body *a*, surmounted at the top by a cap *g*, between which and the top of the extension *f* is clamped a flexible diaphragm *h*, constituting a pressure-motor and dividing the space above the seat *d* into two compartments *s i*. The valve-piece *e* is connected with the diaphragm *h* by a tubular stem *j*, and the passage-way *k* in the stem communicates through the valve-piece *e* with the outlet *c* and through the diaphragm *h* with the compartment *i* by more or less contracted passage-ways *l m*, respectively. As shown, these communicating passage-ways *l m* are formed in tubular plugs or thimbles *n*, screwed into the stem *j* and the diaphragm *h* and valve-piece *e*, respectively.

o is an extended tube surrounding the stem *j* and closed at its upper end and having its lower end open and extending down to a greater or less distance into the valve-body. In the construction shown in Figs. 1 and 2 this tube *o* is carried by the diaphragm *h*. A small opening *p* is formed in the diaphragm *h* into the interior of the tube *o*.

In the construction shown in Fig. 2 the extension *f* is short and the cap *g* is formed with a hollow extension *g'*, in which is located an upper continuation *o'* of the tube *o*, which is carried by the diaphragm and open at the top. In this case the passage-ways *m* and *p* are formed through disks *p' p'*, between which the diaphragm *h* is clamped.

The valve device is connected by the inlet *b* with the outlet of the radiator, heater, or other device from which the air and water are to be discharged, and a partial vacuum or lower pressure is maintained at the outlet *c*. Supposing the valve-piece *e* to be closed on its seat and the body *a* to be free from water or the water to be at a level below the open end of the tube *o*, the air and uncondensed vapors will be drawn out from the inlet *b* by the lower pressure or partial vacuum at the inlet *c* and will pass through the tube *o*, orifice *p*, chamber *i*, stem *j*, and openings *l m*. This operation will continue as long as the lower end of the tube *o* remains unsealed; but when the water accumulates in the valve-body to a sufficient extent to seal the end of the tube *o* the further discharge of the air will be prevented. Consequently a partial vacuum or still lower pressure will be created in the chamber *i* and tube *o*, and a column of water will be formed in the tube *o*, as indicated in Fig. 1, until such a differential of pressure is obtained in the chambers *i* and *s* as will result in the operation of the diaphragm to lift the valve-piece *e* and permit the water to be discharged through the open thoroughfare.

To avoid the location of the extended diaphragm-chamber at an elevation, as in Fig. 1, and also to avoid the possibility of the water being drawn through the orifice *p* into the low-pressure chamber *i* the construction shown in Fig. 2 may be employed. In this case the body *f* is short, and instead of placing the tube *o* entirely below the diaphragm it is placed partly above and partly below. This enables the diaphragm-chamber to be placed low. As the water rises in the tube *o* it may pass through the orifice *p* into the upper portion of the tube *o'* until the required differential pressure is obtained on the chambers *s* and *i* to actuate the diaphragm and open the valve. To allow the water to pass freely from the tube *o* into the tube *o'*, and vice versa, auxiliary or additional openings *p* in the diaphragm may be provided.

To prevent the possibility of water being drawn back through the valve-piece *e* into the stem *j* and chamber *i*, which might occur if for any reason a lower pressure is temporarily produced in the radiator or heater, as by sudden condensation, a check-valve *t*, Fig. 3, may be arranged in the orifice *l*. This check-valve is normally held open by the lower pressure in the outlet *c*, but will instantly close when the pressure within the tube *j* becomes lower.

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

1. In an automatic valve device for steam-heating systems, the combination of a valve-body having a thoroughfare, a valve-piece to control said thoroughfare, a pressure-motor having one side in communication with the inlet side of said valve device and the other side in communication with the outlet side beyond the thoroughfare, and provided with a vent, and a tube communicating at one end with the inlet side of the valve-body and at the other end with the vent in said pressure-motor and adapted to be sealed by an accumulation of water in the inlet side of the valve device.

2. An automatic valve device for steam-heating systems, consisting of a valve-body provided with a thoroughfare, a valve-piece to control said thoroughfare, a pressure-motor dividing said valve device internally into two compartments, one of which communicates with the inlet side of the valve-body, and provided with a vent forming a communication between said compartments, a hollow stem connecting the pressure-motor with the valve-piece and forming communication between the other compartment and the outlet side of the valve-body beyond the thoroughfare, and a tube within the compartment on the inlet side communicating with the compartment on the outlet side through said vent in the pressure-motor and adapted to be sealed by an accumulation of water in the inlet side of the valve-body.

In testimony of which invention we have hereunto set our hands.

JOHN A. SERRELL.
JAMES A. DONNELLY.

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