(No Model.) 2 Sheets—Sheet 1.

W. VANDERMAN.

AUTOMATIC AIR VALVE.

No. 312,042. Patented Feb. 10, 1885.

Fig. 1

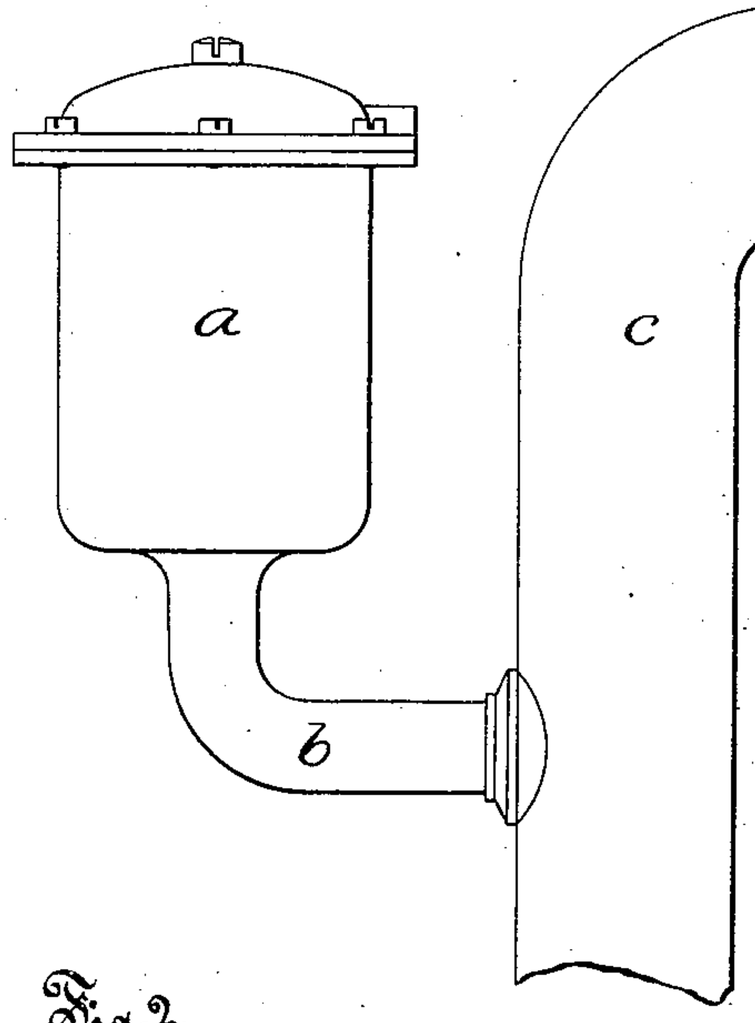


Fig. 2

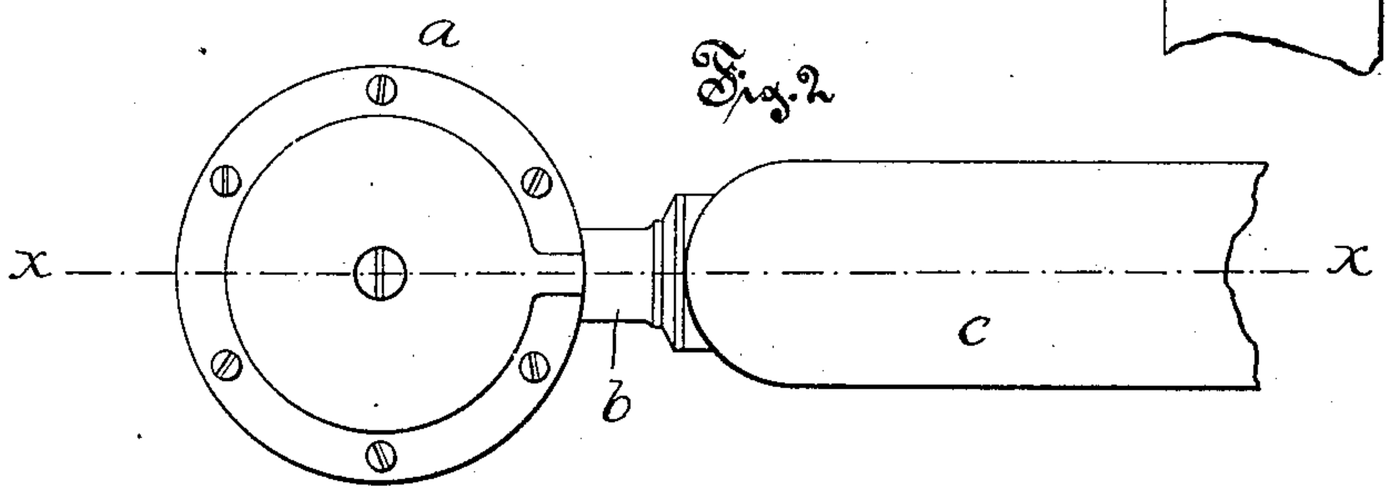
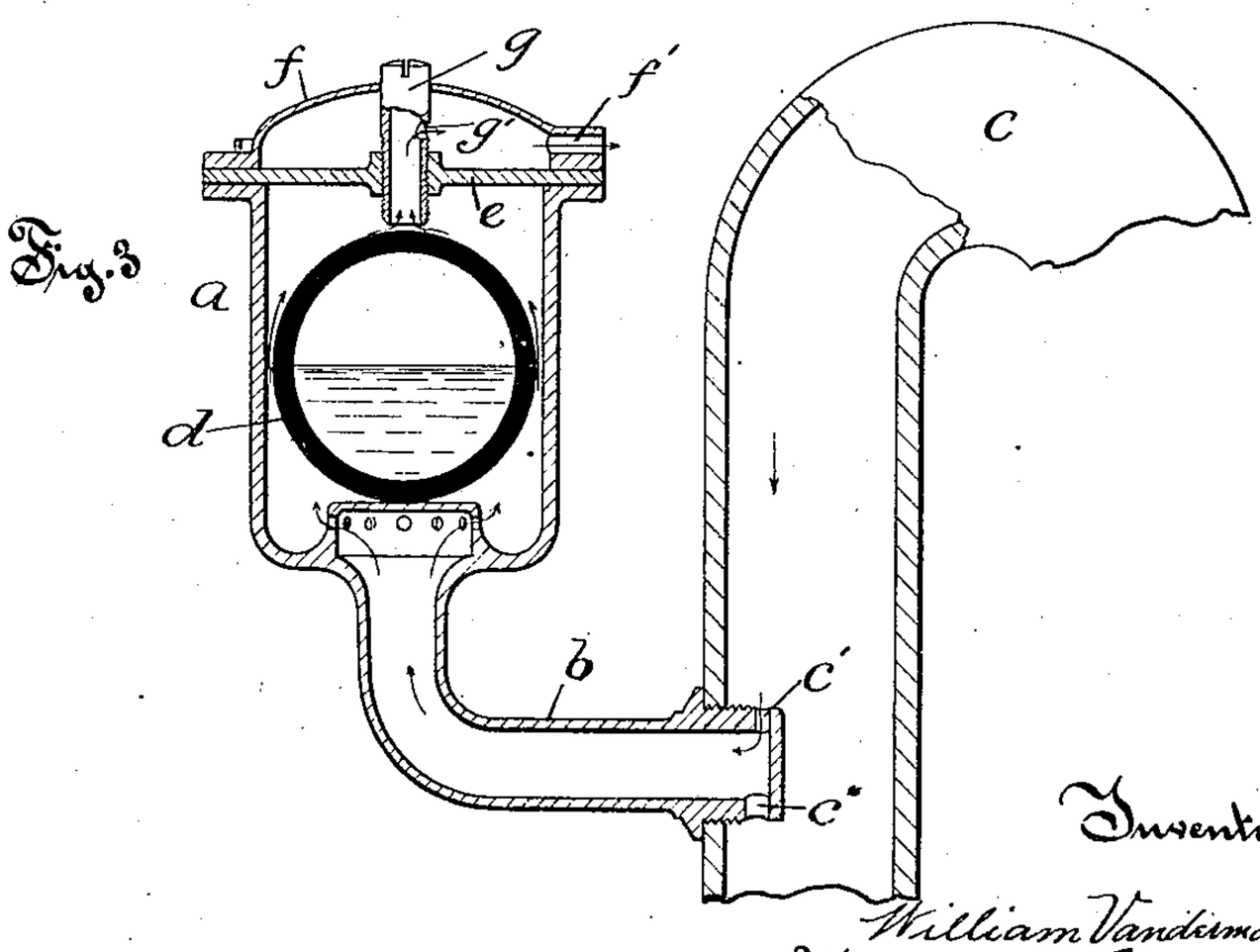


Fig. 3



Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

W. VANDERMAN.

AUTOMATIC AIR VALVE.

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Fig. 4

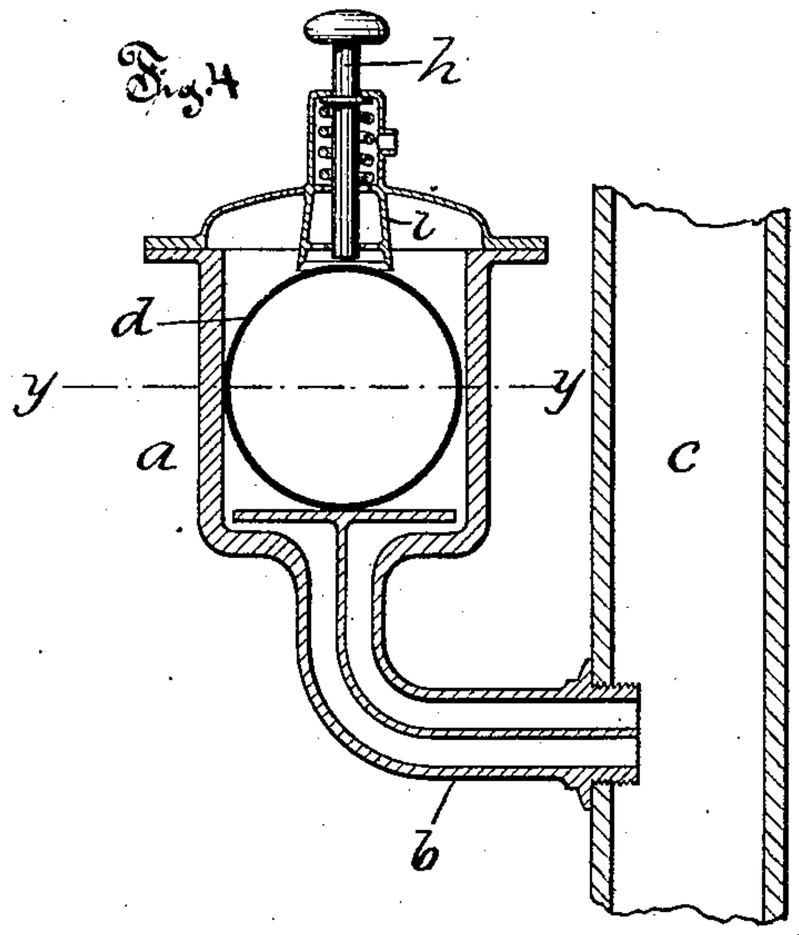


Fig. 5

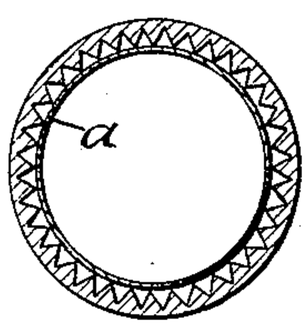
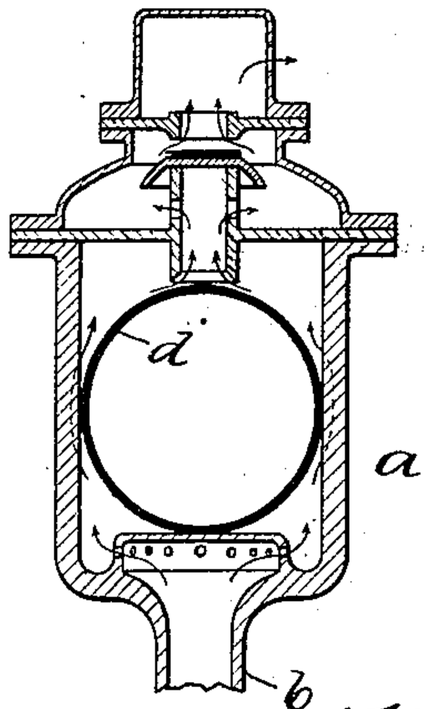


Fig. 6



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM VANDERMAN, OF WILLIMANTIC, CONNECTICUT.

AUTOMATIC AIR-VALVE.

SPECIFICATION forming part of Letters Patent No. 312,042, dated February 10, 1885.

Application filed October 17, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM VANDERMAN, of Willimantic, in the county of Windham and State of Connecticut, have invented certain new and useful Improvements in Automatic Air-Valves, of which the following is a description, reference being had to the accompanying drawings, where—

Figure 1 is a side view of my device as applied to a radiator or steam-coil. Fig. 2 is a top view of my improved valve. Fig. 3 is a view in central vertical section of same on line *x x* of Fig. 2. Fig. 4 is a view in central vertical section of a form of my device intended for light pressures. Fig. 5 is a view in cross-section of the latter form on line *y y*. Fig. 6 is a view in vertical section of a form of my invention including a check-valve above the rubber valve.

My improvement relates to the class of air-valves used on steam-coils, radiators, and similar devices for heating by steam, for the purpose of releasing the air and preventing the escape of water and steam from the pipes, and it effects this automatically.

The object of my invention is to provide an automatic air-valve for this and analogous uses that is simpler and more positive in action and cheaper in construction than prior devices, and yet not easily rendered inoperative. To effect this I inclose within a valve-body having inlet and outlet openings a hollow valve of india-rubber or an equivalent material of such shape and size that the cavity within the body is nearly fitted by it. This valve closes the outlet of the valve-body by rising as water fills it and by expanding under the heat of steam, allowing only air to escape unchecked. This valve-body, as a whole, is adapted to be attached to a steam-radiator by any ordinary means, as by a threaded stem.

In the accompanying drawings, the letter *a* denotes the valve-body as a whole, made, preferably, of iron, brass, or other metal; *b*, a stem fast to the body and having a threaded end, by means of which it is attached to the pipe *c* of a radiator or coil of steam-pipes. This stem extends within the pipe, and has on its upper side in the pipe an opening, *c'*, and on its lower side another opening, *c''*, of greater dimensions than the upper. The lower part of the valve-body has a flat seat with lateral openings, upon which rests the hollow valve *d;* or this seat may be annular in form, the main point being to provide a support for the valve that will allow a free circulation of air, steam, or water between the steam-pipe and the valve-body. In the form shown in Fig. 1 a diaphragm, *e*, is arranged across the body, and over this the cover *f* is secured with a vent, *f'*. At the center of the cover an adjustable tube, *g*, closed at the top by a slotted head, extends through the cover and diaphragm in a threaded socket, so that by raising or lowering it the play of the hollow valve within the valve-body may be controlled. An opening, *g'*, is made in the side of this tube as an outlet for the escaping air.

The parts being in the position shown by full lines in Fig. 3, when steam is turned into the radiator to which my device is attached, its operation is as follows: The air is forced out of the pipes, as indicated by the arrows, and passes into the valve-body, around the valve, through the tube to the outer air. A little of the steam escapes in the same path; but its heat soon expands the valve and causes it to close the lower end of the tube, preventing any further escape. When considerable pressure is used in the pipes, the walls of the hollow valve are made quite thick, and it is partly filled with a suitable liquid, as water, or in some instances with a non-freezing liquid, and hermetically sealed. The liquid within the ball serves as a weight to prevent the ball from rising against and closing the outlet of the valve too quickly. It also serves to keep the temperature of the air within the ball at a lower point than if air alone filled the ball, thus preventing the closing of the outlet by the too quick expansion of the ball. It also serves to keep moist, and therefore preserve for a greater length of time, the substance of the ball.

To adapt my device to low pressures, I use a valve-body corrugated on the inner side, as seen in Fig. 5, while the hollow valve is made with thin walls. As shown in this figure, (5,) the stem may have a central division, thus providing for the backflow of water from the valve-body by the lower channel, while the air or steam passes along the upper. The diaphragm is not used in this form, and the push-

pintle *h*, held up by the spiral spring, is used to push the valve away from the lower end of the tube *i*, when it is desired to allow more steam to escape after the valve has automatically closed. The valve fits quite closely within the body, and the air escapes past it in the corrugations.

As already described, my device also acts so as to prevent the escape of water as well as air from the pipes by way of the air-valve; and this is due to the fact that the india-rubber valve floats on the water as it rises, and thus closes the outlet from the valve-body. When the water falls, the valve drops from the outlet, which is then reopened for the escape of air.

In order to render the device more certainly operative as a water-valve, I use in the valve-body a check-valve arranged above the rubber valve and consisting of a diaphragm or disk of metal with a rubber packing. This check-valve operates in the usual manner to check the flow of water in case the rubber valve should fail in its office from long wear or after lengthy disuse.

I do not restrict myself to a spheroidal, oval or cylindrical with rounded ends, or other special form of valve-body, the main feature of my invention being as hereinbefore recited, and various modifications of my invention in the matter of the shape of the hollow valve will suggest themselves to one skilled in the art.

I claim as my invention—

1. In an automatic air-valve, in combination with a valve-body, *a*, a hollow valve, *d*, of india-rubber, wholly inclosed within the valve-body, cover *f*, having outlet *f'*, adjustable tube *g*, having opening *g'*, and diaphragm *e*, all substantially as described.

2. In combination, a valve-body, *a*, having hollow stem *b*, with openings *c' c²* within the radiator-tube *c*, diaphragm *e*, cover *f*, with outlet *f'*, adjustable tube *g*, having outlet *g'*, and an independent and hollow valve, *d*, of india-rubber, hermetically sealed and partly filled with liquid, all substantially as described.

3. In combination, a valve-body, *a*, having inlet and outlet openings, and inclosed independent hollow valve, *d*, of india-rubber, and a check-valve arranged in a chamber above the main valve-chamber, all substantially as described.

4. In combination, the valve-body corrugated on the inner side, and the inclosed hollow expansible valve of india-rubber hermetically sealed, all substantially as described.

WILLIAM VANDERMAN.

Witnesses:
CHAS. L. BURDETT,
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