J. L. FITTS & J. E. G. MONTGOMERY.

AUTOMATIC VALVE FOR STEAM APPARATUS.

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1,002,252.

Patented Sept. 5, 1911.

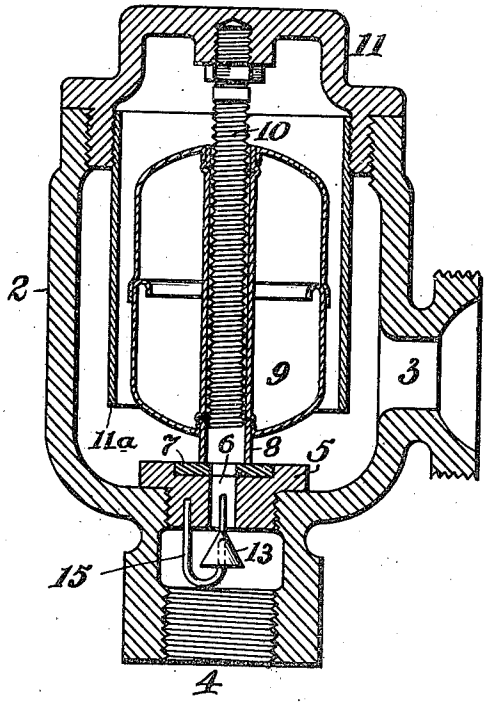

FIG. 1

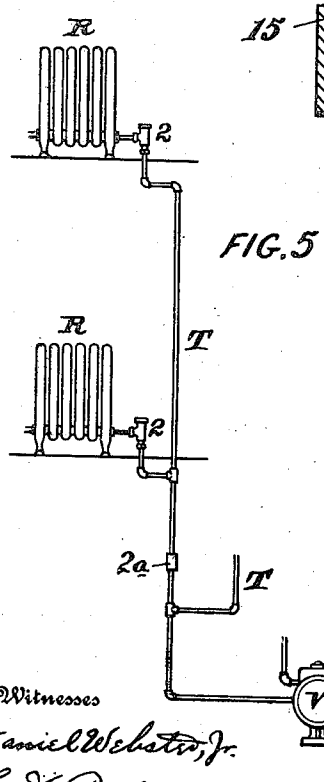

FIG. 5

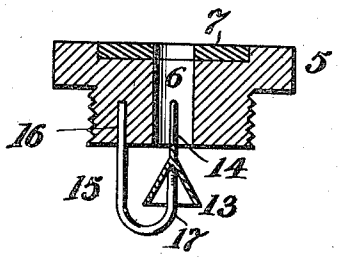

FIG. 2

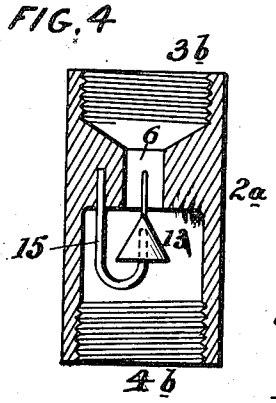

FIG. 4

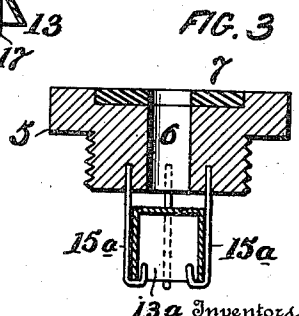

FIG. 3

Witnesses

Daniel Webster, Jr.

E. H. Barlow.

Inventors

James Logan Fitts and

John E. G. Montgomery

By

Attorney

UNITED STATES PATENT OFFICE.

JAMES LOGAN FITTS, OF MERCHANTVILLE, AND JOHN E. G. MONTGOMERY, OF CAMDEN, NEW JERSEY, ASSIGNORS TO WARREN WEBSTER & COMPANY, A CORPORATION OF NEW JERSEY.

AUTOMATIC VALVE FOR STEAM APPARATUS.

1,002,252. Specification of Letters Patent. Patented Sept. 5, 1911.

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To all whom it may concern:

Be it known that we, JAMES LOGAN FITTS, a citizen of the United States, and a resident of Merchantville, Pensauken township, county of Camden, State of New Jersey, and JOHN E. G. MONTGOMERY, a citizen of the United States, and a resident of Camden, county of Camden, State of New Jersey, have invented an Improvement in Automatic Valves for Steam Apparatus, of which the following is a specification.

Our invention has reference to automatic valves for steam apparatus and consists of certain improvements which are fully set out in the following specification and shown in the accompanying drawing which forms a part thereof.

The object of our invention is to provide an inexpensive and efficient check valve for use in steam heating and other steam circulating apparatus, for preventing a back flow of the water of condensation, vapor and air, if from any cause a reversal in the differential of pressure should occur in the apparatus.

More specifically, our object is to employ the check valve device in the outlet-side of a return valve for the discharge side of the radiators, whereby the abnormal creation of a partial vacuum within the radiators will not be permitted to draw water, vapor and air from the return pipe into the radiators.

Our object is further, to employ the improvement in a return pipe or a steam main to normally permit free flow of the water, steam, air and vapor in said pipe or main in one direction, but prevent the flow in the other direction when a condition of partial vacuum or reduced pressure is set up in the pipe or main between the automatic device embodying our invention and the source of steam, air or water supply to said pipe or main.

Our invention consists of certain features of construction comprehending a contracted passage for the water, vapor and air in one direction, combined with a light sheet metal check valve below the contracted passage and adapted to seat upon it in an upward direction in the event of a reversal of the pressure upon opposite sides of the seat of said valve.

Our invention also embodies certain structures which are fully described hereinafter, and more specifically defined in the claims.

Referring to the drawings: Figure 1 is a sectional elevation of a return valve for a steam heating system embodying in its structure our improvements; Fig. 2 is a sectional elevation of the valve seat having our improvements applied thereto removed from the valve structure shown in Fig. 1; Fig. 3 is a sectional elevation corresponding to Fig. 2 showing a modified form of our invention; Fig. 4 is a sectional elevation of our invention for use as a coupling in a steam or return pipe; and Fig. 5 is a diagrammatic elevation showing a vacuum system of steam heating with our invention applied thereto.

R represents radiators, T the return pipes, and V the vacuum pump. Steam may be supplied to the radiators in any suitable way. The air and water of condensation are drawn out of the radiators into the return pipe T under the action of the vacuum pump V; and in the escape of said air and water of condensation from the radiators, they pass through automatic return valves 2 which, while permitting the free passage of water and air, restricts the escape of the steam. One form of these return valves is shown in Fig. 1 with our present invention applied thereto.

Referring to Fig. 1, the body 2 is provided with air inlet 3 and an outlet 4 and arranged above the outlet is a valve seat bushing 5 which is secured in place and provided with the escape orifice 6 having an annular seat 7 preferably of rubber composition. A bonnet 11 fits upon the top of the body 2 and is provided with a central screw threaded guide stem 10 and a concentric apron 11^a forming a float chamber. A float 9 is arranged within the float chamber and guided upon the screw-threaded guide stem 10. This float is provided on its lower end with a valve piece 8 seating upon the seat 7. This construction of automatic return valve is well known and in operation, normally keeps the valve seat closed below the water level, while permitting the air to be drawn into the return pipe by passing between the stem 10 and the guide surface of the float. Should steam attempt to pass, it will be condensed in the capillary space formed between the stem and float and seal the same.

Secured to the lower part of the valve seat bushing is a U-shaped wire 15, one leg of which extends up into a hole 16 bored in

the under part of the bushing and sweated therein or drawn in and held by friction and the other leg 17 of which is turned upward centrally with the orifice 6 in the bushing but terminating at some distance below the same. Loosely supported upon the upper end of this leg 17 is an inverted cone valve piece 13 formed of stamped sheet brass or copper and having an upwardly directed stem 14 extending into the orifice 6 in the bushing 5, so as to hold the said valve piece 13 in operative relation. The object is, to provide an extremely light weight check valve carried on and supported by the bushing of the automatic valve and which, while offering no obstruction to the free discharge of water, scale and dirt through the orifice, will rise to seat upon the said orifice and seal it to prevent any back flow of water, vapor and air from the return pipe into the valve body and thence to the radiator. We have shown the cone check valve piece in an upright position, but it will be understood that it may take any position so long as it is in condition to lift and automatically seal the orifice; in other words, the stem 14 may normally lean against the side wall of the orifice 6 and when the vacuum in the radiator takes place the valve piece 13 will in rising centralize itself. To make the device sensitive and responsive, it should be made very light in weight and very free to move. The construction above described fulfils these requirements and the device is very effective in use.

While it is desirable to employ the cone shaped check valve piece 13, we may employ a construction as shown in Fig. 3 in which the valve piece 13^a is made like an inverted cylindrical box with the lid removed and guided by three or more wires 15^a which extend down from the bottom of the seat bushing 5 and bend inward at their lower ends to limit the downward movement of the check valve piece 13^a. In both this construction and that shown in Fig. 2 the check valve piece is made of light inverted cup shaped form the upper part of which acts as a valve to seat on the lower edge of the orifice 6 in the bushing and in both the supports for the valve piece are wires secured in the lower face of the bushing to one side of its orifice and bent inwardly under the valve piece. It is evident that the inner ends of these guide wires 15^a may be extended up into the valve piece 13^a to a greater or less extent as desired. By the use of this simple means for holding the valve in place it is evident that the valve piece may be readily removed when necessary by simply bending the wire support to liberate the valve piece and when the trouble has been removed the valve piece may be replaced and the supporting and guide wire bent back into position. As these guide wires do not interfere with the seating of the valve piece upon the bushing it is evident that no great care is necessary in their adjustment, thereby securing economy in construction, freedom of action of the valve piece and capacity for easy repair.

While we have so far described our invention as incorporated with the return valve on the radiator, we also employ it in the return piping as indicated at 2^a in Fig. 5 and in Fig. 4. In this case we form the coupling 2^a with the inlet 3^b and outlet 4^b and an intermediate partition having an orifice 6 through which the water, air and vapor pass, the said partition corresponding to the bushing 5 of Fig. 1. The check valve piece 13 and its supporting wire 15 is the same as in Fig. 2 or may be made as in Fig. 3. The operation of our invention prevents back flow in the pipe in this case just as it prevents back flow in the return valve from the pipe in Fig. 1.

While we have shown the bushing 5 as made separate from the body it is evident that the thoroughfare or orifice 6 may be in the body itself as indicated in Fig. 4 and hence, while the bushing being removable, is a convenient way of removing the seat and check valve, it is when in use a portion of the body of the fitting and holds the wire support 15 as firmly to the body as if directly secured to the outer body 2 itself.

While we have shown our invention as applied to a vacuum system of steam heating, it is not restricted to such use, but may be employed in any pipe or valve in which a reversal of the differential in pressure is liable to occur with resulting reversal in direction of flow of the contents.

The particular shape employed enables us to make the check valve piece of exceedingly light material while maintaining the required strength and also permits the device to be stamped or drawn from sheet metal and very accurately at a nominal cost.

While we have shown our invention in the forms which we have found suitable for the particular uses above stated, we do not restrict ourselves to the minor details as these may be modified without departing from the spirit of the invention.

Having now described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a steam fitting, the combination of a body having inlet and outlet ports separated by a transverse partition provided with a central orifice through it, a check valve adapted to seat upon the discharge side of the orifice and consisting of a cup shaped piece of very light weight having its closed end presented to the orifice, and a support for the cup-shaped check valve piece consisting of a wire fastened into the transverse partition to one side of its orifice

and bent inward over the open end of the valve piece to limit its movement away from the orifice.

2. In a steam fitting, the combination of a body having inlet and outlet ports separated by a transverse partition provided with an orifice through it, a check valve arranged in the outlet port and adapted to seat upon the under or discharge side of the orifice and consisting of a cup shaped piece of very light weight and of much less diameter than the diameter of the outlet port having its closed end presented to the orifice, a support for the cup-shaped check valve piece consisting of a wire fastened into the transverse partition to one side of its orifice and valve and bent inward over the open end of the valve piece and under the same to limit its movement by gravity away from the orifice.

3. In a steam fitting, the combination of a body having inlet and outlet ports and a thoroughfare through it, a conical inverted cup shaped check valve piece of very light weight arranged to close the thoroughfare from below, and a bent wire support for the check valve secured to the fitting to one side of the thoroughfare and bent inwardly under and then upward into the opening in the under part of the conical check valve to support it in operative position relative to the thoroughfare.

4. In a steam fitting, the combination of a body having inlet and outlet ports and a thoroughfare through it, a conical check valve piece arranged to close the thoroughfare from below and having a conical recess in its bottom, and a bent wire support for the check valve secured to the fitting to one side of the thoroughfare and bent inwardly under and then upward into the conical opening in the under part of the conical check valve to support it in position the construction being such that when the check valve is raised to close the thoroughfare it is out of contact with wire support.

5. In a steam fitting, the combination of a body having inlet and outlet ports and a thoroughfare through it, a conical check valve piece arranged to close the thoroughfare from below and having an upwardly extending stem very loosely fitting into the thoroughfare and a recessed under part, and a bent wire support for the check valve secured to the fitting to one side of the thoroughfare and bent inwardly under and then upward into the recess in the under part of the conical check valve to support it in position.

6. In a steam fitting, the combination of a bushing having a central orifice, with an inverted cup-shaped sheet metal check valve arranged below the orifice, and a wire secured to the bushing to one side of the orifice and check valve and bent downward and under the sheet metal check valve to loosely guide it and support it in position below the bushing.

7. In a steam fitting, a body having a thoroughfare, combined with a conical check valve seating upon the lower part of the thoroughfare to close it having an upwardly extending stem loosely guided in the thoroughfare and a conically recessed bottom, and a support for the valve consisting of a wire secured to the fitting to one side of the thoroughfare and extending down and under the valve and having its free end turned upward into the recessed under portion of the valve to support it at a definite position below and centrally of the thoroughfare valve but permit it to freely adjust itself to seat in the thoroughfare when required.

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

JAMES LOGAN FITTS.
JOHN E. G. MONTGOMERY.

Witnesses:
PHILIP Y. QUINN,
WM. H. SNYDER.