To all whom it may concern:

Be it known that I, JAMES H. DAVIS, of Chicago, county of Cook, and State of Illinois, have invented an Improvement in Automatic Controlling Devices for Steam-Heating Systems, of which the following is a specification.

My invention relates to automatic controlling devices for steam-heating systems; and it consists of certain improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

In steam-heating systems of that class in which a pump or exhausting device is employed for the purpose of drawing out the air and water of condensation from the radiator, coils, or heaters by a partial vacuum or lower pressure created in the return mains, much difficulty has been experienced in regulating the discharge from the radiators, &c., to obtain a satisfactory operation throughout the system and to avoid waste of steam. Without careful regulation or adjustment of the discharge from the radiators there is liability of an excess of steam being drawn through some lines with a deficiency through others, resulting not only in waste of steam but very defective circulation. Not only is it difficult to adjust the outlet-valves by hand, but owing to the constant changes in the conditions under which such systems are operating frequent changes of adjustment are necessary.

It is the object of my invention to enable this necessary regulation to be accomplished automatically by a valve of improved construction adapted to open automatically for the discharge of water of condensation, but to close to prevent the escape of steam, while at the same time enabling the discharge of the air under the suction or lower pressure maintained in the return-lines while the large thoroughfare for the escape of water is closed. Such results have been obtained heretofore by the employment of thermostatic valves, in which the valve-outlet is controlled by an expanding-piece, which opens the valve to the discharge of air and water and closes it to the escape of steam; but my invention is designed to enable similar results to be obtained without the use of thermostatic expanding devices.

In carrying out my invention I employ a valve-body having a main thoroughfare controlled by a float device which operates automatically by the action of the accumulating water of condensation to open the main thoroughfare and enable the water to be discharged, and in addition to this main thoroughfare I employ an auxiliary air passage-way of constricted size, through which the air may be drawn out while the main thoroughfare is closed. The air passage-way is made so small that, while effective for the discharge of the air, it will not permit sufficient volumes of steam to escape to be wasteful or affect successful circulation.

It will be observed that my valve device is not adjusted by hand, as has been customary with other non-thermostatic valves designed for this purpose, and, although not employing any thermostatic expanding parts, it is entirely automatic in its action.

In the drawings, Figure 1 is a vertical sectional view of a valve embodying my invention. Fig. 2 is a transverse sectional view of the line x x of Fig. 1. Fig. 3 is a vertical sectional view of part of the valve, illustrating a modification; and Fig. 4 is an illustrative view showing the application of the valve device to a steam-heating apparatus.

A is the valve-body, having an inlet a and an outlet b, communicating through a passage-way c in the partition C, which is controlled by the float-valve B E.

F is the usual valve bonnet or cap. In the construction shown the passage-way c is formed with one or more ports or apertures d, controlled by a movable gate B, carried by a float E and provided with one or more small apertures e, so located as to be normally open through the passage-way c. The ports or apertures d are formed in a tube D, fitted in the passage-way c, and the gate B is a sleeve carried by the float E and fitting either outside of the tube D, as in Fig. 1, or inside thereof, as in Fig. 3, with the small aperture or apertures e formed therein. In either case while the float is down this gate B acts as a cover or obstruction to close the port or ports d, but leaves a more or less minute or constricted passage-way open through the aperture or apertures e.

This particular construction is not, however, essential to the invention, and the main thor-
oughfare c, which in this case consists of the ports d in the tube D, may be otherwise formed, as may also the float-controlled gate or wall which controls the main thoroughfare. So also, it is not necessary that the auxiliary constricted air passage-way e should be formed on the wall, gate, or float-controlled device B, which controls the main thoroughfare, provided it be so constructed as to remain open and permit the discharge of air while the main water-thoroughfare is closed.

Many modifications will be evident to those skilled in the art, and my invention includes any such construction in which the valve device is provided with a main, float-controlled water-thoroughfare and an auxiliary constricted air passage-way, so arranged that the main passage-way will be opened automatically by the action of the water of condensation, while the constricted air passage-way will remain open for the discharge of air while the main water passage-way is closed.

G is a screen interposed in the inlet a to prevent dirt, &c., passing into the valve, and H is a by-pass controlled by a valve I between the inlet a and outlet b, through which direct communication may be effected when desired. The valve is interposed in the return from the radiator or coil. As shown in Fig. 4, the inlet a is connected with outlet b through the radiator or coil J and the outlet b with the return K, which lead to a pump or exhausting device L. The radiators or coils are shown connected with a steam-main M in the usual manner.

The operation of the valve device is as follows: Supposing the by-pass, if used, to be closed; Supposing the float E down, as shown in Figs. 1 and 3, with the main thoroughfare formed by the port or ports d closed, the small or constricted passage-way formed by the small aperture or apertures e is open, and the suction or lower pressure in the return or outlet side of the valve, produced by the pump or exhausting device L, will draw the air out of the radiator or coil through the openings e and fill the radiator or coil with steam. As condensation takes place the water will flow into the valve and lift the float E, opening the ports d and permitting the accumulating water to be drawn off by the suction in the return. As the water of condensation is drawn off the float E will fall, closing the ports d, and thus preventing the waste of steam. Such volumes of steam as are drawn through the constricted air passage-way are too small to be objectionable or wasteful.

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

1. An automatic valve for steam-heating systems, consisting of a valve-body provided with a thoroughfare between the inlet and outlet for the passage of water of condensation, a movable gate or wall controlling said thoroughfare, and provided with a constricted opening for the discharge of air while said water-thoroughfare is closed, and a float controlling said movable gate or wall.

2. An automatic valve for steam-heating systems, consisting of a valve-body provided with a thoroughfare between the inlet and outlet, and a movable float-controlled gate or wall for automatically opening or closing said thoroughfare and provided with a constricted air passage-way for the escape of air while said gate is closed.

3. An automatic valve for steam-heating systems, consisting of a valve-body provided with a thoroughfare, a float within said valve-body, a gate or wall carried by said float and controlling said thoroughfare under the action of the float, and provided with a relatively small passage-way for the escape of air.

4. An automatic valve for steam-heating systems, consisting of a valve-body provided with a main thoroughfare between the inlet and outlet and with a by-pass outside of said main thoroughfare, a valve to control said by-pass, and a movable float-controlled gate or wall for automatically opening or closing said main thoroughfare under the action of the water in said valve-body, and provided with a constricted air passage-way for the escape of air while said gate is closed.

5. In a steam-heating system, the combination with the radiator, of a discharge-pipe, an exhausting device for maintaining a suction or lower pressure in said discharge-pipe, a valve between said radiator and discharge-pipe, having a main passage-way for the escape of water of condensation, a movable gate or wall for controlling said main passage-way provided with a constricted passage-way for the passage of air, and a float controlling said movable gate or wall, whereby said main passage-way is opened or closed automatically by the action of the water in said valve.

In testimony of which invention I haveunto set my hand.

JAMES H. DAVIS.

Witnesses:

A. J. SIMMONS,
C. H. ATKINS.