

(No Model.)

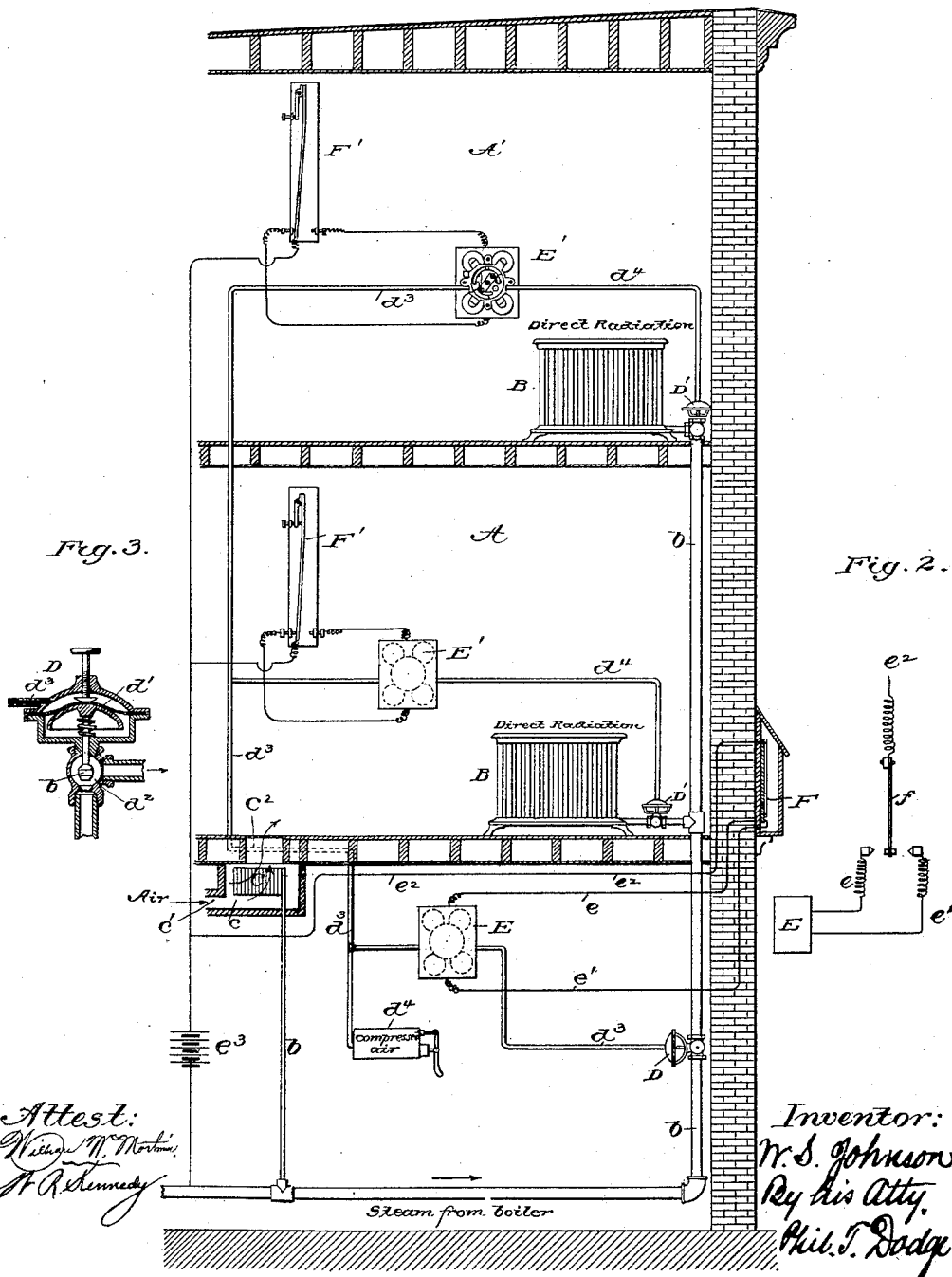
W. S. JOHNSON.

AUTOMATIC TEMPERATURE REGULATING SYSTEM.

No. 477,121.

Patented June 14, 1892.

Fig. 1.



UNITED STATES PATENT OFFICE.

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AUTOMATIC TEMPERATURE-REGULATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 477,121, dated June 14, 1892.

Application filed January 3, 1890. Serial No. 335,772. (No model.)

To all whom it may concern:

Be it known that I, WARREN S. JOHNSON, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain Improvements in Automatic Temperature-Regulating Systems, of which the following is a specification.

This invention has reference to heating systems in which the apartments are ordinarily heated by indirect radiation, but which also include means for heating by direct radiation to be used in the event of exceptionally cold weather.

The object of the invention is primarily to provide means for automatically controlling the apparatus for direct radiation, so that it can be brought into action only in the event of an abnormally low temperature outside of the building, and, secondly, to provide for controlling the temperature by regulating automatically both the direct and indirect heating systems.

I use the expressions "direct" and "indirect radiation" in the sense in which they are now known in the art—that is to say, the first as indicating a system in which steam or hot-water radiators are located in the apartment to be heated and the second as indicating a system in which the radiators are located at a point distant from the apartment and applied to heat a volume of air which is delivered through flues or suitable conductors to the apartment.

Referring to Figure 1 of the drawings, A and A' represent two apartments to be heated; B B, ordinary steam-radiators located in the respective apartments and connected by steam-pipes *b* with a steam-boiler or generator, by which they are supplied with steam for heating purposes in the ordinary manner.

C represents a steam-coil, also connected by a steam-supply pipe *b*, located in an air-chamber *c*, which is supplied with fresh air through a suitable inlet *c'* and connected with one or more of the apartments by a flue or passage *c''*, through which the heated air is delivered into the apartments. The parts constitute an ordinary indirect heating system and may under my invention be replaced by any equivalent form or arrangement of indirect heaters.

In order to control the direct heaters B, which are ordinarily out of action, I provide the steam-supply pipe *b* at a point between the boiler and the first heater with a stop-valve D, by means of which the steam may be shut off from the entire series of heaters B. This valve may be of any form adapted to be opened and closed by fluid-pressure; but I recommend a valve such as shown in Fig. 3, in which the valve-stem proper *b* is connected to and operated by a flexible diaphragm *d'*, applied to close one side of a rigid chamber *d''*, which receives compressed air or other fluid under pressure through a pipe *d'''* from a reservoir *d'''* or other source of fluid-pressure supply. This valve in itself is of a form well known in the art and is not claimed as a part of the present invention, being shown in Letters Patent issued to me on the 17th day of March, 1885, No. 314,027.

The delivery of the actuating-fluid to and from the stop-valve D is controlled by an electric three-way valve E, applied to the pipe *d'''*. This electric valve is preferably made in the form represented in Letters Patent No. 379,201, dated March 6, 1888; but it may be of any other form or construction adapted to be controlled electrically.

From the electric valve, ordinarily designated as the "secondary valve," I extend conductors *e* and *e'* to a thermostat F, located on the outside of the building or in any other suitable position in which it would be subjected to the influence of the external temperature. In the form shown the thermostat consists simply of an ordinary compound bar *f*, as shown in Fig. 2, fixed at one end and vibrating at the opposite end between the terminals of the wires *e e'*, so as to make a contact with one or the other, according as the temperature rises or falls. A third wire *e''* connects with the thermostatic bar and thence through a battery *e'''* with the ground. The valve is also grounded through the system of pipes or otherwise, as desired.

Under ordinary conditions the valve D is closed and the steam-supply shut off from the heaters B. When, however, the temperature falls below the predetermined limit, the thermostat closes the circuit on one side and opens the electric valve E, allowing the air to escape

from the expansion-chamber, thereby causing the valve D to open and admit steam through the main pipes leading to the direct radiators. When the external temperature again rises the thermostat changes the circuits, the valve E is opened, and the fluid permitted to close the valve D. The foregoing parts are a complete embodiment of the principal feature of the present invention and are in themselves sufficient to prevent the direct heaters from being left in action through the carelessness of attendants or otherwise during warm weather. In order, however, to control the temperature in the apartments individually when the direct heaters are in action, I provide adjacent to each of the heaters B a stop-valve D', controlling the delivery of steam thereto. These valves may be identical in construction with the valve D. They are each connected through a pipe d^4 with the source of fluid-pressure supply, and each of the pipes d^4 is controlled within the apartment by an electric three-way valve E', which is in turn controlled by a thermostat F', also within the apartment. By this arrangement the steam is shut off from the radiators individually whenever the temperature exceeds the predetermined limit within the apartment.

As regards the electric valves, the only requirement is that they shall be adapted to be electrically controlled and that they shall by their change of position permit the fluid for operating the main valves to flow to and from said valves.

While I prefer to operate the stop-valve D from the thermostat by means of fluid-pressure and the electric valve controlling said pressure, it is to be understood that any other known means may be employed for operating the valve D if thermostatically controlled—that is to say, the thermostat may be applied to operate the valve D either directly or through mechanical connections such as are now known in the art.

I do not claim as my invention simply the employment of a direct and an indirect heater in one apartment. The essence of my invention resides in the combination of the two

heaters acting conjointly or in combination to heat one apartment or inclosure, one of these heaters being automatically controlled independently of the other by a thermostatic device located externally to the building or apartment, so that the second heater is brought into action only under exceptional conditions and by influences outside of the apartment heated.

Having thus described my invention, what I claim is—

1. In an automatic temperature-controlling system, the combination, with an apartment to be heated, of an indirect-heating apparatus, a direct-heating apparatus, and a thermostat external to the apartment controlling the direct heater, whereby a second heater is brought into action to assist the first by an abnormal reduction of temperature occurring outside of the apartment.

2. In a heating system, the combination of two or more apartments, direct heaters therein, a supply-pipe leading to said heaters, a thermostat subject to the temperature outside of the building, a valve controlled by said thermostat and in turn controlling the steam-delivery, the series of heaters, local valves controlling the action of the respective heaters, and thermostats within the apartments controlling the local valves, whereby an abnormal reduction of temperature outside of the building brings into play supplemental heaters to co-operate with the main heater.

3. In a heat-regulating system and in combination with an apartment to be heated, an indirect heater C external to the apartment, a direct heater B within the apartment, a valve D, through which the direct heater is supplied, fluid-pressure devices for operating said valve D, an electric valve controlling the fluid-supply, and a thermostat external to the building controlling the electric valve.

In testimony whereof I hereunto set my hand, this 9th day of December, 1889, in the presence of two attesting witnesses.

WARREN S. JOHNSON.

Witnesses:

H. E. DICKSON,
L. F. FISH.