H. C. MALLORY.

THERMOSTATICALLY CONTROLLED HEATING SYSTEM.

APPLICATION FILED JUNE 8, 1905.

988,725.

Patented Apr. 4, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

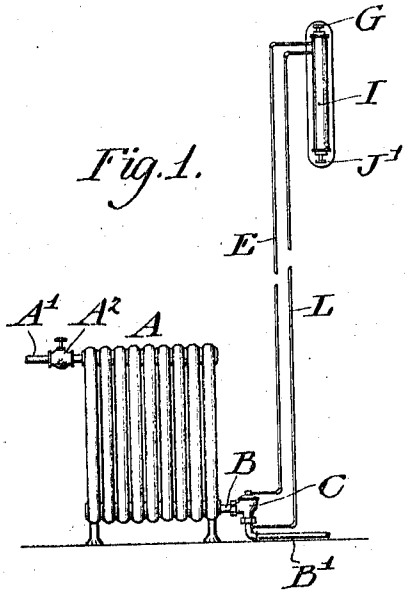
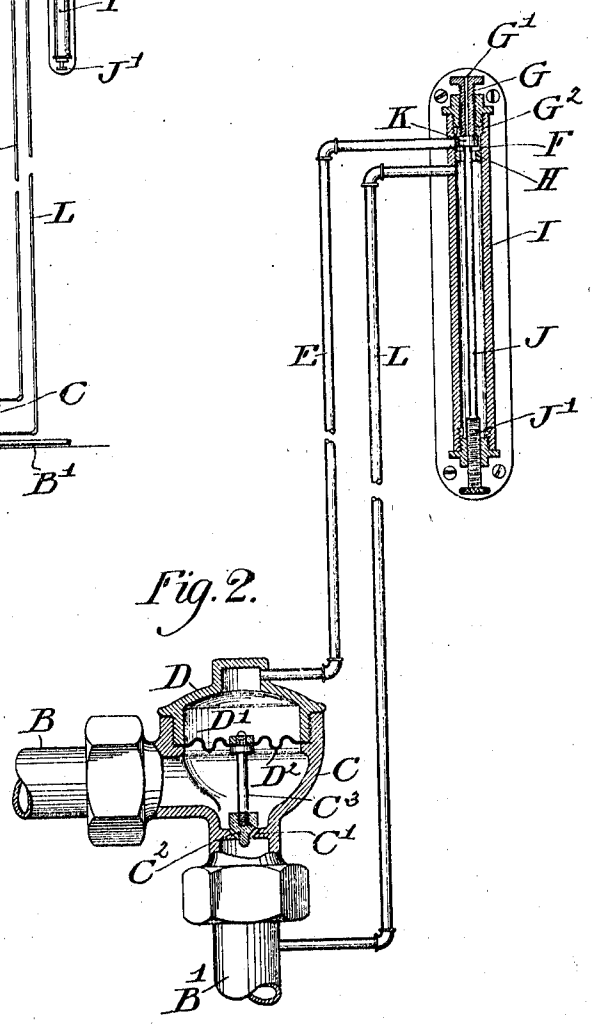


Fig. 2.



WITNESSES:

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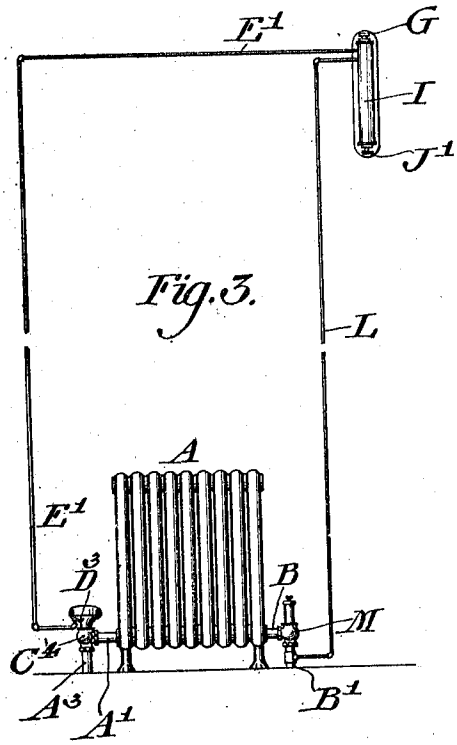

Fig. 3.

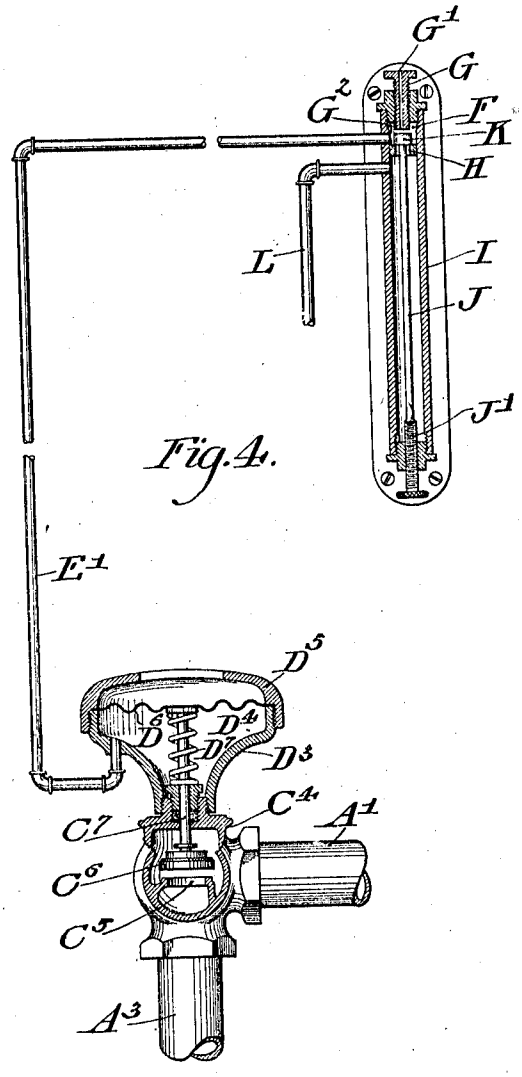

Fig. 4.

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HARRY C. MALLORY, OF NEW YORK, N. Y.

THERMOSTATICALLY-CONTROLLED HEATING SYSTEM.

988,725. Specification of Letters Patent. Patented Apr. 4, 1911.

Application filed June 8, 1905. Serial No. 264,204.

To all whom it may concern:

Be it known that I, HARRY C. MALLORY, a citizen of the United States of America, residing in the city and county of New York, in the State of New York, have invented a certain new and useful Improvement in Thermostatically-Controlled Heating Systems, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to heating systems in which the admission of steam to the radiator through a supply pipe is directly or indirectly automatically controlled by thermostatic mechanism and generally speaking my improved system is particularly applicable to those systems in which a pump or exhauster is used to remove the air or air and water from the radiator through a return pipe and produce a partial vacuum therein so that the pressure in said pipe will be less than that in the steam supply pipe.

In carrying out my invention I provide a conduit leading to or from the radiator with a controlling valve and a fluid pressure motor for actuating said valve, the motor chamber being provided with ports by which it communicates both with the air and with the low reduced pressure return pipe and I provide a thermostatically actuated valve mechanism controlling said ports to cause a variation of pressure in the motor chamber and a consequent action of the motor to open or close the controlling valve.

One of the objects of my present invention is to provide such systems as above described with simultaneously actuated valves which in the act of opening one of the ports leading to the motor chamber will close the other port, thus avoiding any permanent leak to or from the motor chamber and insuring a prompt and efficient action of the motor.

The nature of my invention will be best understood as described in connection with the drawings in which it is illustrated and in which—

Figure 1, is an elevation of one style of radiator system equipped with my improvement. Fig. 2, being a sectional elevation showing the controlling valve motor and thermostatic valve actuating apparatus, as indicated in Fig. 1. Fig. 3, is an elevation showing the application of my improvement to another style of heating apparatus, and Fig. 4, is a sectional elevation of the controlling valve motor and thermostatically actuated valve system as shown in Fig. 3.

In the construction of Figs. 1 and 2, A, is the radiator supplied with steam at or near the top through a pipe A′, in which I have shown a cut-off valve A^2. B, is the outlet or return pipe leading from the bottom of the radiator and connecting through a valve casing C, with the low pressure pipe B′, C′, being a valve port through which the valve chamber connects with the return pipe B′. C^2, is the controlling valve attached to and actuated through a stem C^3, which is attached at its top to the flexible diaphragm D^2, of a fluid pressure motor of which the screw cap D, forms the motor chamber, indicated at D′. E, is a conduit leading from the motor chamber to the valve chamber F, which is formed in the top of the tubular member I, of the thermostatic device to be described. G, is an adjustable threaded plug screwing into the head of the tubular member I, and formed with a longitudinal perforation or port G′, the end G^2, of the plug forming a valve seat. H, is a ported partition separating the chamber F, from the lower part of the tube I, the upper surface of which forms a valve seat. J, is a rod having a threaded bottom portion J′, which screws into the plug at the bottom of the tube I; the upper end of the rod extends into the valve chamber F, and has attached to it the valve disk K, the upper surface of which constitutes the valve which operates in connection with the port G′, and the lower surface of which constitutes the valve which operates in connection with the ported partition H. L, is a conduit connecting with the lower part of the tube I, and with the low pressure pipe B′, as shown.

In the system indicated, control of temperature is effected by the regulation of the accumulation of water in the radiator A, in accordance with Patent 802,766, granted October 24th, 1905, on an application filed September 20, 1902, the opening of the control valve permitting the escape of the accumulated water in the radiator while the closing of the control valve causes a gradual rise in the level of the condensed water and consequent diminution of the steam space in the radiator.

The tube I, and rod J, made up of course of materials having different thermal coefficients of expansion constitute the ther-

mostatic mechanism by means of which the valve K, on an increase of temperature is drawn down to close the ported partition H, and on a diminution of temperature thrust up to close the air port G^2. An increase of temperature sufficient to close the ported partition H, cuts off the communication between the low pressure pipe and the motor chamber, and by opening the air port G^2, permits the inflow of air at atmospheric pressure into the motor chamber with the result of pressing down the diaphragm D^2, and the controlling valve C^2, so as to close the connection between the radiator and the low pressure pipe. On the other hand a fall of temperature below a determined point causes the upward motion of the valve K, opening the connection with the low pressure pipe and closing the air port G^2, as a result of which the air is exhausted from the motor chamber and the flexible diaphragm and controlling valve moved up permitting an outflow of the water in the radiator to the return pipe.

In the construction of Figs. 3 and 4, the radiator A, has a steam supply pipe A′, situated at its bottom and connected through the valve chamber C^4, with the steam pipe A^3. The outlet pipe B, communicates through a valve chamber M, with the low pressure pipe B′. In this construction C^5 indicates the valve port in the chamber C^4, and C^6, the controlling valve attached to a valve stem C^7, which passes through a stuffing-box in the top of the valve chamber into the motor chamber D^4, of a fluid pressure motor indicated at D^3, the valve stem engaging a flexible diaphragm D^6, forming the top of the motor chamber and held in place by the flanged clamping cap D^5, D^7, being a spring which normally holds the diaphragm up and the valve C^6, away from its seat. In this construction the motor chamber is connected by a pipe E′, with a valve chamber of a thermostatic device practically identical with that shown and described in connection with Fig. 2. In this construction the top of the diaphragm is always exposed to atmospheric pressure while the motor chamber is alternately connected with the atmosphere and with a low pressure return pipe to the valve chamber K, the controller valve remaining lifted from its seat so long as atmospheric pressure is admitted to the motor chamber and being forced down to its seat when the pipe E′, is connected with the reduced pressure return pipe.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is,

In a two pipe low pressure heating system, the combination with a radiator and the steam supply pipe and the separate low pressure return pipe connected to the radiator, a valve controlling the flow of heating fluid through the radiator, a fluid pressure motor operating said valve, said motor having connections to the motor chamber thereof, including a port through which the chamber may be operated to the atmosphere and a second port through which the port may be connected to said low pressure pipe, and a thermostatic valve mechanism controlling said ports and adapted to open either of said ports, while, at substantially the same time to close the other of said ports.

HARRY C. MALLORY.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."