(No Model.)

C. T. WILEY.

HOT WATER HEATER.

No. 512,138. Patented Jan. 2, 1894.

Fig. 1.

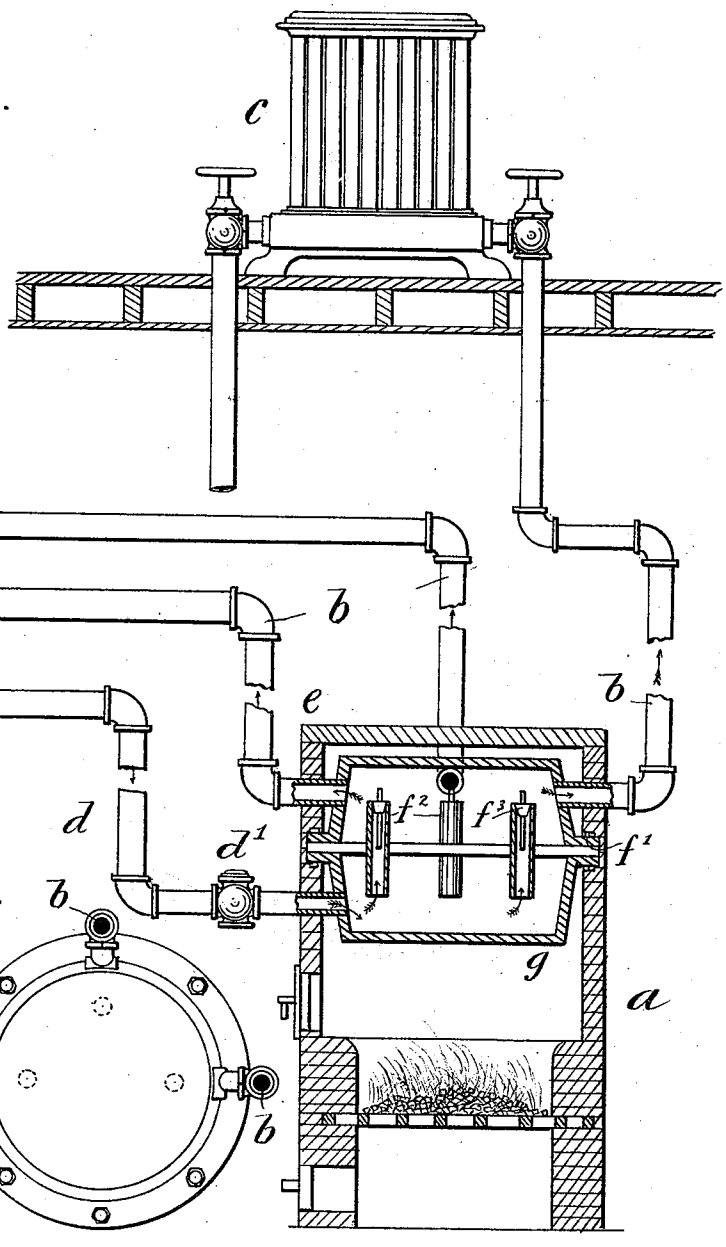

Fig. 2.

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CHARLES T. WILEY, OF GREENFIELD, MASSACHUSETTS, ASSIGNOR TO FREDERICK K. CASWELL, OF HARTFORD, CONNECTICUT.

HOT-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 512,138, dated January 2, 1894.

Application filed January 28, 1893. Serial No. 459,995. (No model.)

To all whom it may concern:

Be it known that I, CHARLES T. WILEY, of Greenfield, in the county of Franklin and State of Massachusetts, have invented certain new and useful Improvements in Hot-Water Heaters, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My invention relates to the class of apparatus that is used for the purpose of heating buildings by the circulation through pipes and heating coils of a volume of hot water and the object of my invention is to provide such an apparatus with means whereby a proper circulation of this heated fluid medium may be obtained.

To this end my invention consists in the details of the several parts making up the device as a whole and in the combination of the several parts as more particularly hereinafter described and pointed out in the claims.

Referring to the drawings: Figure 1 is a detail view in vertical section of a furnace embodying my invention and also showing a radiator and the pipes of the circulation. Fig. 2 is a detail plan view of the circulator removed from the furnace.

The ordinary form of apparatus for heating buildings for the circulation of hot water comprises a boiler and one or more heating coils or radiators connected by risers and returns, the circulation of the water through the system being brought about by the tendency of heated water to rise and of the colder water to return, but the force due to this inequality of temperature is so slight that the flow is sluggish at the best and but slight obstructions are sufficient to check any flow with a resulting dissatisfaction with the system as a whole. In prior devices a system of circulation has been devised in which the flow of water through the pipes of the circulation is aided by causing a vacuum to be formed in the circulator and my purpose is to provide an improved apparatus relating to this latter class. My within described improvement obviates the difficulty of the circulation and the result is obtained by the use of an apparatus as shown in the accompanying drawings, where the letter *a* denotes a furnace, *b* a riser, *c* a radiator or coil and *d* a return pipe. Within the furnace is supported a circulator *g* having a diaphragm *f'* arranged horizontally across it and through this diaphragm are openings in which are preferably arranged short tubes f^2, the upper ends of which are provided with puppet or check valves f^3 adapted to open upward and to close against any return movement of the water into the lower part of the circulator. One or more of the risers *b* extend from the upper part of the circulator to the coils or radiators *c* that are connected to the common return *d*, the lower end of which is provided with a check valve *d'*. In place of the puppet or check valves being located in the pipes f^2 a check valve may be located in each of the risers *b*, the pipes f^2 projecting above the diaphragm preventing the water from returning from the upper chamber to to the lower, but the form above described is preferred on account of the better results gained from the use thereof.

The operation of the apparatus when heat is applied to the circulator is as follows: The system being filled with water in the usual manner and heat being applied to the circulator the generation of steam is caused therein, which by pressure against the under side of the diaphragm and on the upper side of the water contained in the circulator below the diaphragm forces the water into the upper part of the circulator and into the risers, the outflow of the water under pressure in this manner causing a return flow of colder water through the return pipe d^2, and this inflow of colder water by condensing the steam in the lower part of the circulator produces a partial vacuum which causes a stronger and continued flow of the colder water from the return into the circulator chamber, this return flow of water promoting the circulation of heated water through the pipes and coils of the system connected to this circulator. This operation of the circulator in forcing the flow of hot water out of it into the pipes of the circulation is intermittent and depends upon the generation of steam within the circulator and, of course, on the degree of heat applied thereto.

This apparatus is automatic in its operation and my invention is comprised in any hot water heating apparatus in which there is embodied the circulator with a diaphragm and openings communicating between the upper and lower chambers with means for permitting a flow outward from and backward into the lower chamber within which is formed a partial vacuum caused by the return flow of cold water, this vacuum operating as a factor in aiding the forced circulation.

I claim as my invention—

1. In a hot water apparatus for heating buildings, a circulator provided with a diaphragm separating the vessel into two chambers located one above the other, a tubular passage between the two chambers, a riser extending from the upper chamber, means for preventing the flow of water from the riser into the lower chamber of the circulator, and a return pipe entering the lower chamber and having a return check valve, all substantially as described.

2. In a hot water apparatus for heating buildings a circulator provided with a diaphragm separating the vessel into two chambers located one above the other, a tubular passage between the two chambers, a check valve arranged in the communicating passage and opening upward, a riser extending from the upper chamber and a return pipe entering the lower chamber and having a return check valve, all substantially as described.

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