J. C. WIGHTMAN & J. H. MILLS.

Apparatus for Automatic Control of Combustion in Hot Water and Hot Air Heating Apparatus.

No. 138,547. Patented May 6, 1873.

Fig. 1.

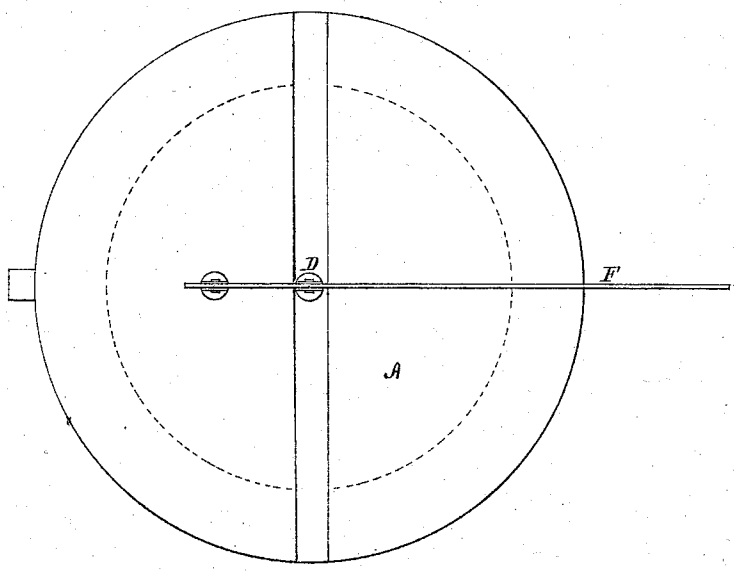
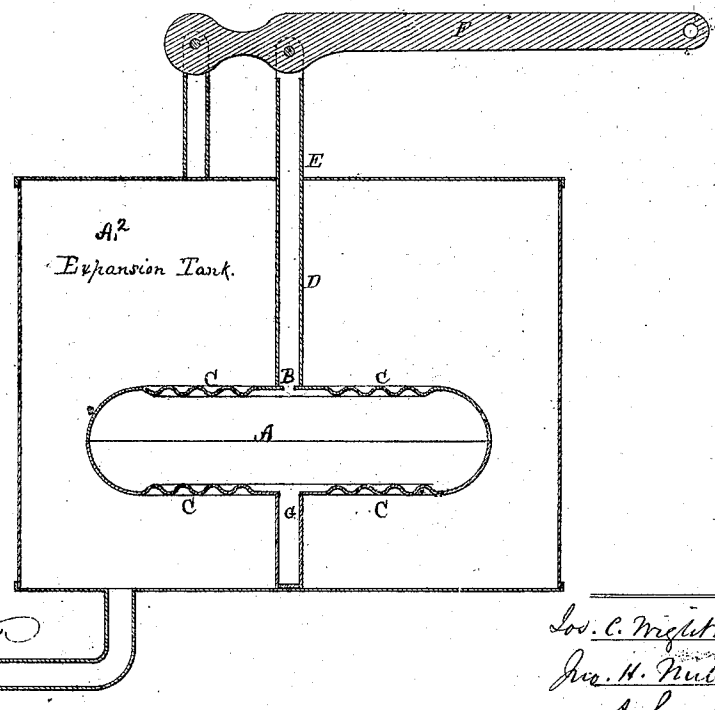


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

JOSEPH C. WIGHTMAN, OF NEWTON, AND JOHN H. MILLS, OF BOSTON, MASSACHUSETTS; SAID WIGHTMAN ASSIGNOR, BY MESNE ASSIGNMENT, TO SAID MILLS.

IMPROVEMENT IN APPARATUS FOR AUTOMATIC CONTROL OF COMBUSTION IN HOT-WATER AND HOT-AIR HEATING APPARATUS.

Specification forming part of Letters Patent No. **138,547**, dated May 6, 1873; application filed February 27, 1872.

To all whom it may concern:

Be it known that we, JOSEPH C. WIGHTMAN, of Newton, in the county of Middlesex, and JOHN H. MILLS, of Boston, in the county of Suffolk, all of the Commonwealth of Massachusetts, have made an invention of certain new and useful Improvements in Automatic Regulation of Combustion in Hot-Water and Hot-Air Heating Apparatus; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being to the accompanying drawing making part of this specification, and in which—

Figure 1 is a plan, and Fig. 2 a vertical section, of our invention.

This invention relates to hot-water and hot-air heating apparatus; and its object is to obtain, from the low degree of heat usually maintained in such apparatus, perfect regulation of the furnace-damper for the purpose of automatically controlling the combustion therein.

Automatic regulation of the damper of some classes of furnaces has been heretofore attained by the employment of metal, or of water, or of a mercury float, but these devices can only be used when a high degree of heat is imparted, and are not practicable in an apparatus such as above referred to, in which the heating medium does not rise to boiling-point, and usually ranges between 100° and 200°. It is well known that water is not converted into steam until it has attained a temperature of 212° Fahrenheit, and this degree of heat must be increased until sufficient pressure is obtained to distend the diaphraghm and overcome the resistance of its connections. In a heating apparatus in which water is the medium for receiving and distributing the heat it is very desirable that the temperature of the water should not be raised to the boiling-point because of loss by overflow resulting from undue expansion, and because a degree of heat below the boiling-point is sufficient in the coldest weather; while, in many instances, 125 to 150° Fahrenheit will be found amply sufficient to effect the desired temperature. In order to obtain the beneficial results of a low temperature, as above premised, and at the same time obtain the desired power or pressure wherewith to actuate the diaphragm, we employ a substance more volatile than water, and we dispose this substance in a suitable air-tight vessel, distinct from and independent of the main heating apparatus, excepting to receive the heat therefrom to operate the elastic diaphragm, which is part of this auxiliary vessel, it being connected with and actuating the damper of the primary heating apparatus.

In putting our invention into practice we provide a suitable closed vessel, shown at A in Figs. 1 and 2 of the drawing; this vessel being composed preferably of brass, and of such thickness as to obtain the necessary strength and rigidity, and being provided with a suitable orifice, B, through which a fluid may be supplied, and which may be tightly closed in order to hermetically seal the vessel. The vessel A is constructed in any suitable manner, with flexible diaphragms C, these diaphragms being composed of a suitable metal for the reason that the fluids we employ within the vessel are rapid solvents of India rubber or other ordinary flexible materials. The mechanism by which the pulsations of the diaphragms C are imparted to the damper of the heating apparatus may be of any suitable character, that shown herein being a rod, D, passing through a passage, E, in the vessel A^2, said vessel A^2 representing an expansion-tank to a hot-water heating apparatus, and said rod D impinging against a lever, F, which lever in turn is connected with the damper by a suitable rod in such wise that a distension of the diaphragms from undue heating of the contents of said vessel A shall effect a corresponding closing of the damper, and vice versa. As the vessel A is hermetically sealed no loss of its contents ensue, and we employ, as a medium whereby to obtain the necessary expansion and pressure, sulphide of carbon, naphtha, or other volatile fluid, which is to be supplied to the vessel A in proper quantity.

In order to heat the contents of the vessel A we provide the latter with a contracted extension, G, which extension is to be acted upon by the contents of the primary heating apparatus imparted to the expansion-tank A^2, and we prefer that such vessel A should be disposed in such a locality that it shall be protected from currents of air, or from external atmospheric changes, in order that its contents shall remain inactive, as far as possible, except as acted upon by the heat of the primary apparatus. In order to obtain a considerable degree of distension of the diaphragms C they should be corrugated or undulating, as shown in the drawing, and it may be double, as shown in Fig. 2, or otherwise constructed. The form of the vessel A and the adaptation of the diaphragms C are not arbitrary, as both may be varied considerably.

The operation of our invention is not dependent upon a diaphragm, as a cylinder and piston may be employed with substantially like results, but we decidedly prefer the former. It will be seen that our invention is operative without regard to conditions of construction or use of the primary heating apparatus, and that it will perform its functions to as good advantage when connected with an open vessel of water or hot-air chamber.

In conclusion we would state that we do not claim, broadly, the employment of a sensitive fluid, vaporizable at a low temperature, for the purpose of opening and closing air-passages. We are aware that air-cocks for steam-radiators have been so made for the purpose of permitting the escape of air from the radiating drum, and then closing tightly against the escape of steam. We are also aware that hot-air registers have been operated by means of a tank of sensitive fluid placed in the room into which the register opens, so as to be effected by the temperature of said room.

Our invention is directed to an entirely different end; and has for its object the automatic control of draft in furnaces of the class hereinbefore specified, in which the water or heating medium is maintained within the low range of temperature above stated, and it is only in the manner described that we have found the combustion can be thus regulated economically and effectively.

What we claim, therefore, and desire to secure by Letters Patent, is—

The automatic control of combustion in hot-water and hot-air heating apparatus by the employment of two fluids, as specified, the one to serve as a medium to receive and absorb heat from the furnace and impart it to the other, and the other more volatile and vaporizable at a low temperature, to operate at temperatures under 212° Fahrenheit, the draft regulation or damper of the furnace, through the medium of a flexible diaphragm, or its equivalent, and mechanism intermediate between and connecting said diaphragm, or its equivalent, and damper, each fluid being contained within a distinct vessel, and operating substantially as and for the purposes herein shown and set forth.

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