E. L. MILLER.

Steam Heater.

No. 4,625. Patented July 7, 1846.

Fig. 2

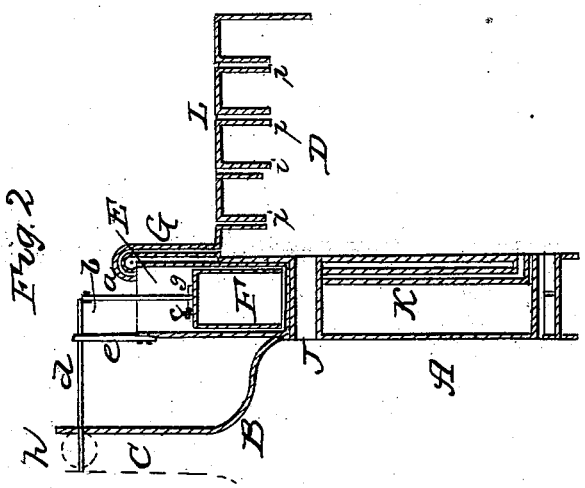
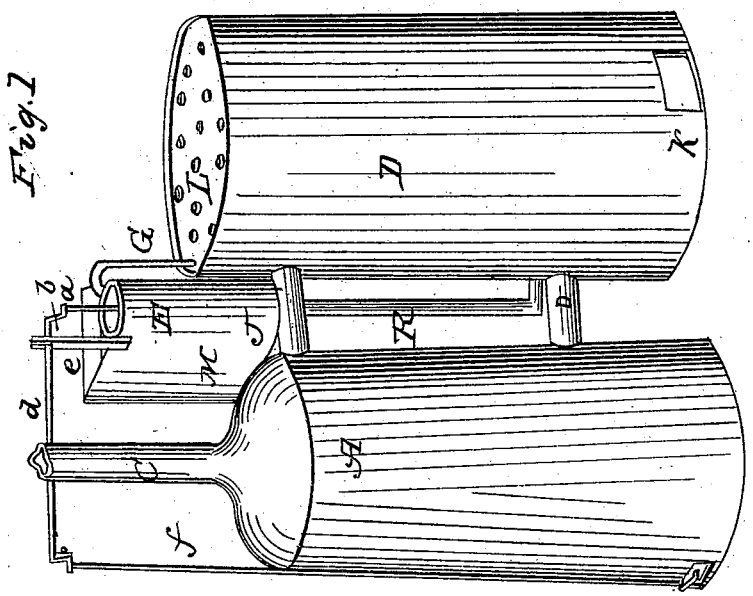


Fig. 1



UNITED STATES PATENT OFFICE.

EZRA L. MILLER, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN HOT-WATER APPARATUS FOR WARMING BUILDINGS.

Specification forming part of Letters Patent No. **4,625**, dated July 7, 1846.

To all whom it may concern:

Be it known that I, EZRA L. MILLER, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and improved mode of constructing and arranging a hot-water furnace for the purpose of warming buildings, and in connection with this have invented an improvement in the plan and mode of working a damper or dampers for controlling and regulating the heat.

The first of these, which I denominate a "condensing-radiator," consists in a new and improved arrangement, combination, and application of the different parts and surfaces of a hot-water apparatus or furnace for warming buildings, by which the circulation of the water in contact with the radiating-surfaces is much accelerated and the air for taking off the heat is in its circulation brought and kept more closely in contact with the water-heated surfaces than by any former method.

My other improvement, which I denominate a "hydro" pneumatic regulator, consists in the particular application of the expansibility of water and air combined to produce motion in a damper or dampers for the purpose of regulating the degree of combustion in a furnace; and I hereby declare that the following is a full and exact description of the construction and arrangement of these improvements, reference being had to the accompanying engravings, making a part of this specification, in which—

Figure 1 is a perspective view of the whole apparatus; and Fig. 2, a vertical section of the arrangements for working the dampers, &c.

I construct the condensing-radiator D of copper, iron, or other suitable metal, of a cylindrical or other convenient shape, and of such capacity as to contain a sufficient number of tubes of from one to two inches diameter to give the requisite heating-surface. These tubes (see *i i*) are open to the atmosphere at both ends, and are set in the heads of the condensing-radiator, as shown at L, in the manner of the tubes in the boiler of a locomotive steam-engine.

The condensing-radiator is set within a furnace-chamber in the cellar or lower part of the building to be warmed, and communicates, by the pipes I and J, at or near the top and bottom, with a boiler A for heating the water which circulates within the radiator D, between and around the small tubes with which it is filled. The external air for circulation is admitted at the lower ends of these small tubes under the bottom of the radiating-cylinder or through the opening *k*, and is heated for distribution in its passage through them, when it is conducted from the furnace-chamber to the apartments to be warmed in the usual way of hot-air furnaces.

I construct the hydro-pneumatic regulator for working the dampers, a section of which is shown at E and F, Fig. 2, of copper or any suitable metal, in the following manner: The vessel M, Fig. 1, is an expansion-cistern connected with the condensing-radiator by the vapor-pipe G, the circular front of which cistern (for convenience) forms one side of a cylinder or guide-tube E, which may be from four to six inches in diameter and ten or fifteen inches long, and is open at its lower end upon the inside to the water in the expansion-cistern half an inch or more.

Within this cylinder I make a float tube or cylinder F, of very light copper or other metal, open at bottom, but closed at top, and from eight to twelve inches long, so fitted as to leave no more space than will allow it to work easily up and down like a piston. In the head of this float-tube I insert an air cock or stopper *c*, and at or near the center of the head I attach a wrist *g*, to which the connecting-rod *a* is attached, which connects with and gives motion to the shaft *d* by the crank *b*. The shaft *d* is supported by the brace *e* and the smoke-pipe C, in the latter of which, upon the shaft *d*, is the damper *h*. At this end of the shaft *d* another arm or crank *b* unites the connecting-rod *f* with the wrist of a crank on a register in or near the ash-pit door of the boiler for the purpose of excluding or admitting air from or to the grate. The position of the shaft *d* and the length of the connecting-rod *a* should be such as to allow the float-tube F to descend to the bottom of the cistern M.

The pipe K connects the expansion-cistern with the lowest part of the condensing-radiator D; or it may connect with the lower pipe I, and serves the double purpose of expansion and feed pipe. The bottom of the expansion-cistern M is placed a little below the top of the radiator D, so that when the radiator is filled with water it will contain a few inches

of water, and is served by a ball-cock from a reservoir in any convenient situation. The float F may be adjusted to close the dampers at any desired temperature under the boiling-point by admitting more or less air by the cock *c* into the float F, any increase or decrease in the temperature of the water producing a corresponding expansion or contraction of both air and water, thereby causing a corresponding rise or fall in the float F, which communicates motion to the dampers by means of the connecting-rods, &c., as above described, thus regulating the degree of combustion with great precision.

I do not claim as my invention the simple use or application of a cylindrical or other shaped vessel filled with tubes for the purpose of radiating heat; but

What I do claim, and wish to secure by Letters Patent, is—

1. The combination of the condensing-radiator with the hydropneumatic regulator and a boiler or boilers within a hot-air or furnace chamber, as herein fully described and set forth, whether the condensing-radiator be cylindrical or other shaped, if so constructed and combined as to be similar in principle and effect.

2. The peculiar manner of applying the expansibility of water and air combined to the working of a damper or dampers for the regulation and control of the combustion of the fuel in a furnace, in combination with a condensing-radiator, as herein fully described and set forth.

E. L. MILLER.

Witnesses:
B. H. STRATTON,
CHS. WILLIAMS.