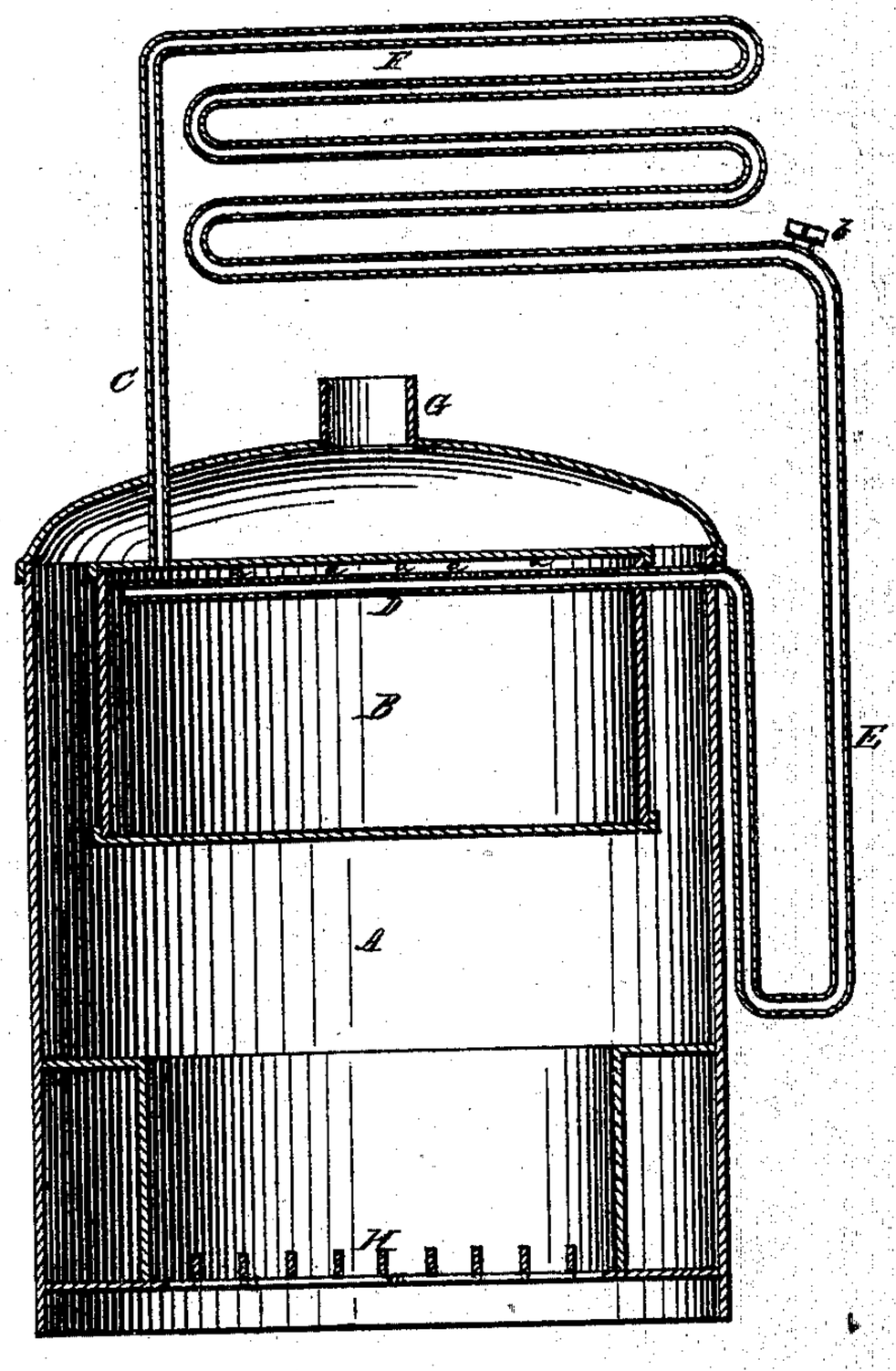
W. M. FULLER.

Steam-Heaters.

No. 144,527. Patented Nov. 11, 1873.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLARD M. FULLER, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-HEATERS.

Specification forming part of Letters Patent No. **144,527**, dated November 11, 1873; application filed May 3, 1873.

To all whom it may concern:

Be it known that I, WILLARD M. FULLER, of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam Heating Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, which form a part of this specification, in which the figure is a vertical section.

The nature of my invention consists in regulating the pressure of steam by the quantity of water in the boiler, and in adjusting the boiler and pipes with the water, so that any desired pressure may be obtained, and a uniformity maintained by a measured quantity of water; and also in the combination hereinafter set forth and claimed as new.

In the drawing, A represents any suitable stove or furnace for surrounding or heating the boiler; B, boiler; C, steam-pipe; D, return-pipe; E, water-trap; F, any suitable radiator; G, smoke-flue; H, grate; *a a*, perforations through the top of that portion of the return-pipe which is within the boiler; and *b*, plug for admitting water. The boiler B is made of boiler-iron, and for one thousand feet of inch pipe I make it one foot in diameter and three inches deep, and I use about the same relative proportions in varying for a greater or less length of pipe, or in varying the diameter of the pipes, the object being to establish a certain degree of pressure when the water in the boiler is all converted into steam, which said pressure can be determined by the ordinary rules for computing the volume of steam from a given quantity of water at the desired pressure. I find, however, by actual experiment, that, owing to the large exposure of pipe and the retarding of the flow of the water of condensation by the back pressure, this apparatus falls about thirty-three per cent. below the tables given for the relative proportions of water and steam at a given pressure. With a boiler of the capacity named, and one thousand feet of inch pipe, one gallon of water will, when converted into steam, maintain a pressure of about ten pounds on the steam-gage. The addition of one pint of water will raise the pressure to about fifteen pounds, and, as the water in the boiler at the highest point required is all converted into steam, it is impossible to increase the pressure by the further application of heat to the boiler. The water of condensation returns by the pipe D, and flows out through the small openings or perforations *a a*, the inner end being closed, and as it trickles over the pipe, or comes in contact with the boiler, it is instantly converted again into steam, and the uniform pressure is thereby maintained. By locating the pipe D at the top of the boiler, there is always sufficient water at starting to fill the pipes with steam, as no portion of it which is below the top of the pipe can be driven back or into such return-pipe by the steam-pressure in the boiler. Outside of the stove or furnace I apply a trap, E, which is made in form of an inverted siphon, and remains filled with water up to the level of the perforations *a a*. This gives a proper direction to the steam in starting, and keeps the circulation uniform. The heater or radiator F may be made of any desired form, and the pipes C D may be connected with those now in common use, and by the use of suitable branch pipes any desired number of heaters or radiators may be attached; and when more than one is attached, each should be provided with valves to cut off and to retain the steam and water of condensation in the radiator; otherwise, if any considerable number were shut off, an undue proportion of water would flow to the boiler; but when cut off at both ends, the contained steam and water are kept out of the circulation, and when turned on the condensed water is readmitted, so that the pressure remains the same, whether there are few or many of the radiators in operation, and the boiler has been supplied for the largest number.

To fill the boiler, the plug *b* in pipe E is unscrewed, and a funnel inserted, when the desired quantity is poured in. To raise the temperature, all that is required is to turn in a little more water, and to diminish it, let a little out. By this mode of regulating the pressure and temperature, the apparatus can be adjusted to mild or cold weather without changing the furnace-flues, or increasing or diminishing the fire, and all danger from explosions is avoided.

The apparatus will work without the trap

in the return-pipe, or any obstruction in it, and a check-valve may be used in its place for starting the pressure and circulation; but I prefer the trap, as shown, as, by its use, I dispense with all valves, and produce an apparatus with confined water and steam continually circulating without break or check, which cannot be exploded, or cannot be overheated, so as to produce any injurious effects, and one which can be graduated by the quantity of water used, to produce and maintain a uniform pressure and temperature at any desired degree.

It will be obvious that, for the purpose of incasing and heating the boiler, a small stove or furnace, which may be placed in any of the lower rooms, can be used for heating an entire building, whether large or small, with the advantages in its use of a great saving of fuel and a saving in the cost of skilled labor, as any ordinary laborer or servant can keep it in operation with safety, from the fact that there are no injurious results in case the apparatus is allowed to become perfectly dry, and that water can only be put in when it is cold. A safety-valve, if desired, may be attached, so that, in case of starting with too much water, the excess will blow off.

What I claim as new, and desire to secure by Letters Patent, is—

1. The pipe D, located at or near the top of the generator B, allowing steam to be generated in an apparatus having free circulation without forcing the water into such pipe, substantially as set forth.

2. The trap E, in combination with the pipes C D and boiler B, substantially as and for the purposes specified.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

WILLARD M. FULLER.

Witnesses:

CHAS. R. WATSON,

EDWARD E. ELLIS.