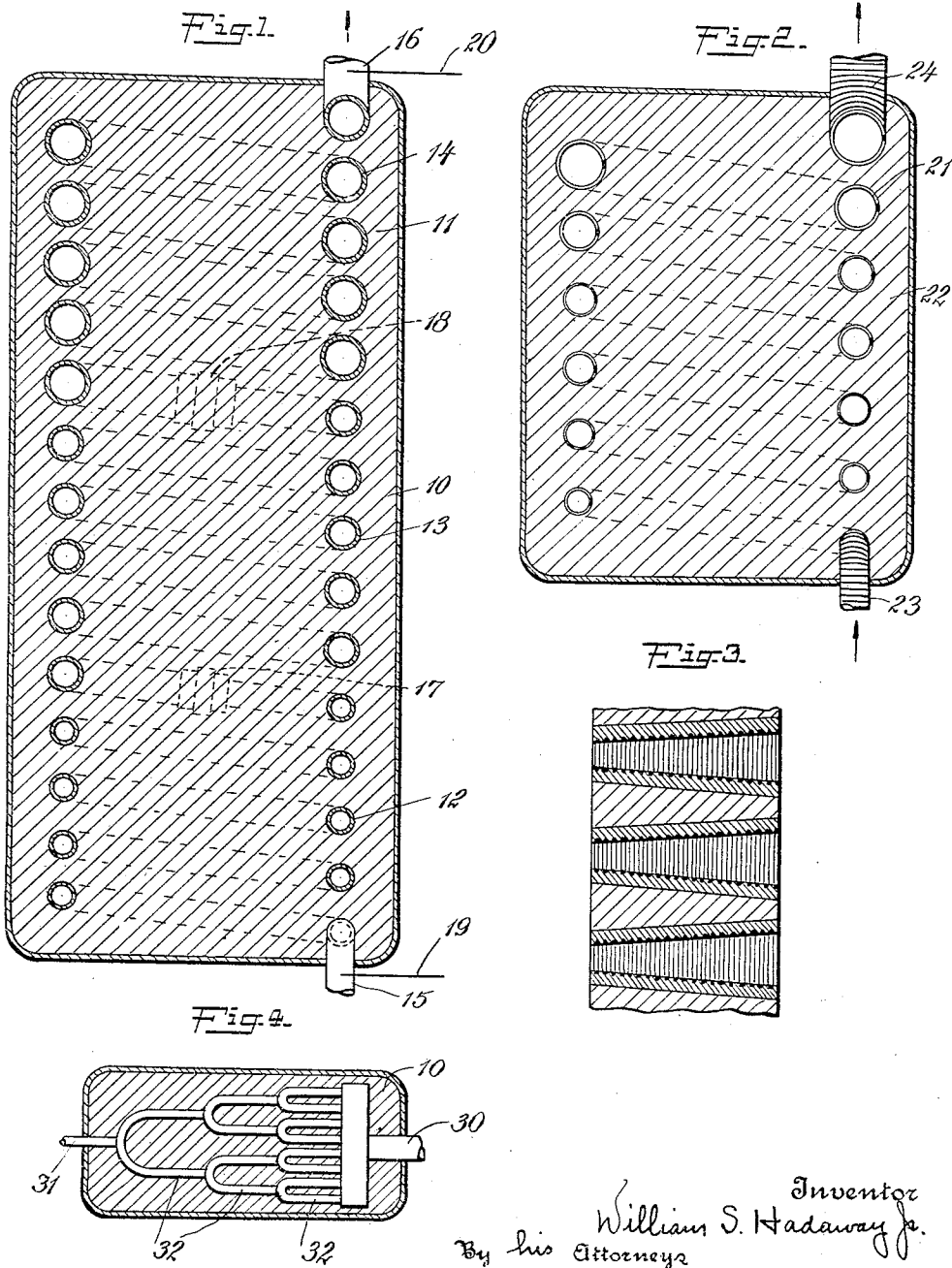


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VAPOR ELECTRIC HEATER.

APPLICATION FILED JULY 11, 1917. RENEWED AUG. 6, 1920.

1,373,809.

Patented Apr. 5, 1921.



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UNITED STATES PATENT OFFICE.

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VAPOR ELECTRIC HEATER.

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Specification of Letters Patent.

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Application filed July 11, 1917, Serial No. 179,838. Renewed August 6, 1920. Serial No. 401,823.

To all whom it may concern:

Be it known that I, WILLIAM S. HADAWAY, Jr., a citizen of the United States of America, and a resident of New Rochelle, Westchester county, and State of New York, have invented certain new and useful Improvements in Vapor Electric Heaters, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to vapor electric heaters and it has for one object to provide a compact structure having a vapor passage of varying size in cross-section, and electro-responsive means for imparting electrically generated heat to the vapor in the passage, whereby the hot vapor thus produced is available for various heating purposes.

Another object of my invention is to provide a device for increasing the temperature of steam that shall have a passage increasing in size toward the outlet end, to accommodate, to a greater or less degree, the increase in volume of the steam or other vapor which is to be heated by the device, and an electric heating element preferably constituting the walls of the passage, a mass of insulation being provided to constitute a support for the electric heater and to prevent loss of heat therefrom, thereby insuring that the electrically generated heat is transferred to the vapor within the passage.

In order that my invention may be thoroughly understood, I will now proceed to describe the same in the following specification, and then point out the novel features thereof in appended claims.

Referring to the drawings:

Figure 1 is a sectional elevation of a vapor heater arranged and constructed in accordance with my invention, and constituting one embodiment thereof.

Another embodiment of my invention is shown in Fig. 2 which is also a sectional elevation.

Fig. 3 shows my invention as applied to an inner wall of an oven.

Fig. 4 is a sectional elevation showing still another modification of my invention, drawn to a relatively small scale.

Referring first to Fig. 1,—10 is a body of insulating material into which is molded or formed in any suitable manner a tubular electric heater 11 composed of sections 12,

13 and 14. 15 designates the vapor inlet and 16 the vapor outlet of the device. Each of the sections 12, 13 and 14 consists of a pipe coil. The coil 13 however is of a larger size pipe than the coil 12, and the pipe 14 is still larger. The sections 12 and 13 are joined by a connector 17 and the sections 13 and 14 by a connector 18.

Electric energy is supplied through circuit conductors 19 and 20 which are shown diagrammatically and are connected to the pipe coils at the inlet 15 and the outlet 16 respectively.

Assuming that the inlet 15 is connected to a low-pressure boiler or other suitable source of steam, and that the outlet 16 is connected to a working member or radiator where the heat is to be used, if electric energy is supplied to the circuit represented by the conductors 19—20, heat is electrically generated in the pipe coils and the heat is transferred to the vapor in the pipe, the losses being particularly small on account of the fact that the pipe is embedded in the large mass 10 of insulation.

The pipe may be composed of any desired number of sections, dependent upon the radiation and size required.

In Fig. 2 I have shown a modified arrangement in which the heater has the form of a helix of resistance wire or other suitable heating conductor. The helix varies gradually in size from one end to the other and is itself formed into a coil and embedded or formed into a mass 22 of heat insulation corresponding to the mass 10.

The mass 22 in this structure is formed of some hard substance such as porcelain, for example, and the helix 21 is formed into the walls of the passage. In this arrangement the small end 23 of the helix constitutes the vapor inlet and the large end 24 the vapor outlet, the size varying gradually from one end to the other.

In the structure of Figs. 1 and 2, the vapor passage is tortuous so that its length is considerable relative to the dimensions of the mass of insulation in which it is embedded, but this is not essential to my invention and as shown in Fig. 3 the passage may be straight and a number of such passages may be formed in one insulating block.

The structure of Fig. 3 is suitable for use as an inner partition wall of an oven as shown and described in my copending appli-

cation Serial No. 82,067 filed March 4, 1916, of which this application is a continuation in part.

In Fig. 4 the piping is all of one size with the exception of the outlet 30, but the sectional area of the path is increased in steps by connecting the pipes in multiple relation. The inlet pipe 31 is joined to two pipes 32 in multiple and each of these is joined to two more pipes in multiple, etc., the last group being connected to the outlet 30.

My invention may of course be embodied in structures of various kinds and adapted for various purposes and I intend that only such limitations be imposed as are indicated in the appended claims.

What I claim is:

1. A vapor heater comprising a body of heat insulation having a vapor passage therein of varying size in cross-section, and electrical means for imparting heat to the vapor in the passage.

2. A vapor heater comprising a body of heat insulation having a vapor passage therein of varying size in cross-section, and an electric heater formed into the walls of the passage.

3. A vapor heater comprising a body of heat insulation having a vapor passage therein of varying size in cross-section, and an electric heater composed of a helix of resistance conductor in the passage and varying in size to correspond thereto.

4. A vapor heater comprising a body of heat insulation having a vapor passage therein of varying size in cross-section, and a heating coil set into the walls of the vapor passage and varying in size to correspond thereto.

5. A vapor heater comprising a body of heat insulation having a tortuous vapor

passage therein of increasing size in cross-section from the inlet to the outlet end of the passage, and electrical means for imparting heat to the vapor in the passage.

6. A vapor heater comprising a body of heat insulation having a tortuous vapor passage therein of increasing size in cross-section from the inlet to the outlet end of the passage, and an electric heater composed of a helix of resistance conductor in the passage and varying in size to correspond thereto.

7. A vapor heater comprising a body of heat insulation having a tortuous vapor passage therein of increasing size in cross-section from the inlet to the outlet end of the passage, and a heating coil set into the walls of the vapor passage and varying in size to correspond thereto.

8. A vapor heater comprising means having a vapor passage therein of varying section, means for causing hot vapor to flow therein from the small to the large end of the passage, and means for imparting heat to the vapor in the passage.

9. A vapor heater having a vapor passage, means for supplying hot vapor to the passage at one end, and means for supplying heat to the vapor in the passage as it flows therein, said passage having a varyingly constricted opening from end to end.

10. A vapor heater having a vapor passage, means for supplying hot vapor to the passage at one end, and means for supplying heat to the vapor in the passage as it flows therein, said passage having a varyingly constricted opening increasing in size from the incoming to the outgoing end.

In witness whereof, I have hereunto set my hand this 6 day of July, 1917.

WILLIAM S. HADAWAY, JR.