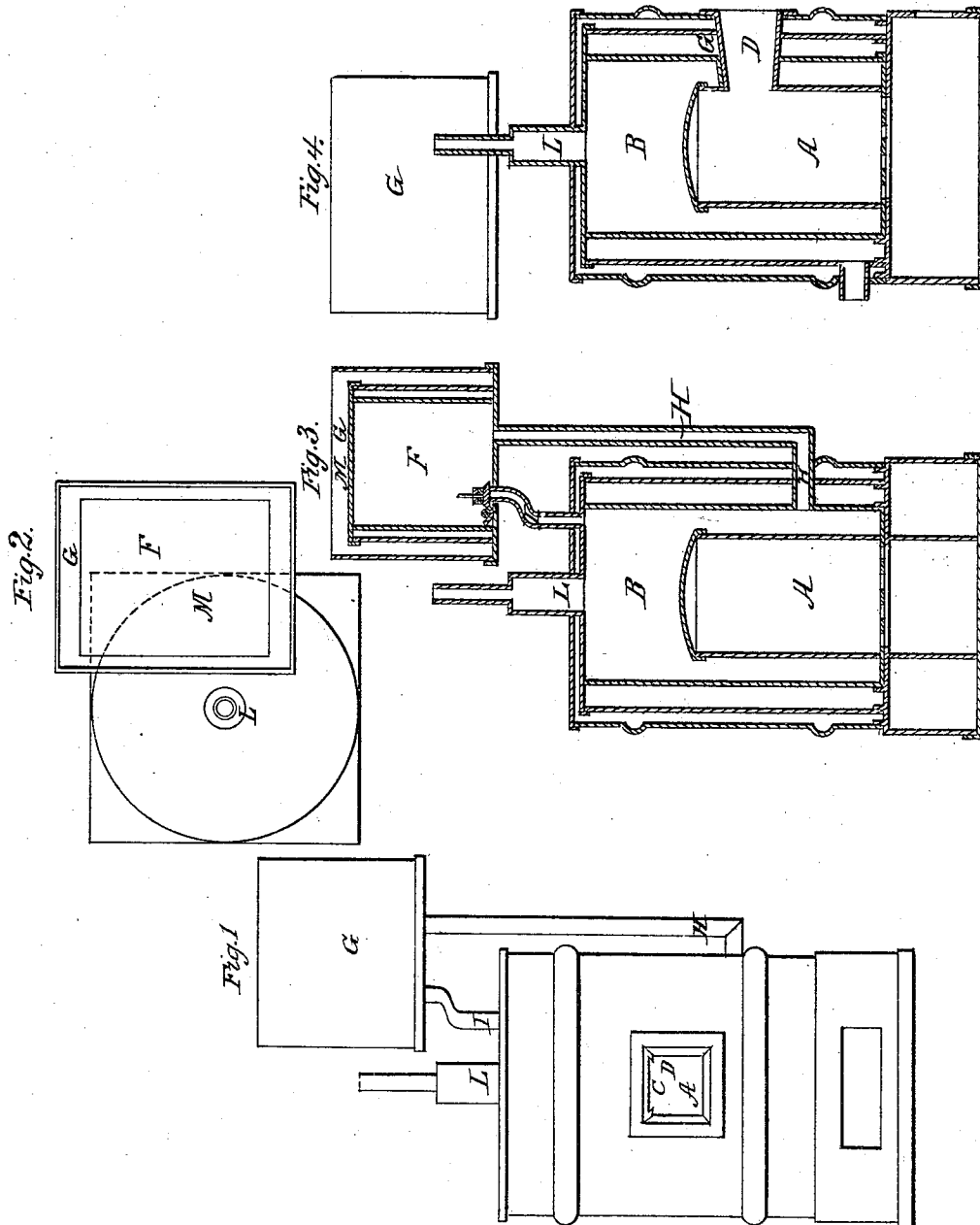


G. S. G. SPENCE.
Steam Heater.

No. 14,743.

Patented April 22, 1856.



UNITED STATES PATENT OFFICE.

GEORGE S. G. SPENCE, OF BOSTON, MASSACHUSETTS.

IMPROVED PRESSURE-REGULATING APPARATUS FOR STEAM-HEATING BOILERS.

Specification forming part of Letters Patent No. 14,743, dated April 22, 1856.

To all whom it may concern:

Be it known that I, GEORGE S. G. SPENCE, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Safety and Self-Regulating Apparatus to be Applied to Boilers Used for Heating Buildings by Steam; and I do hereby declare that the same is fully described and represented in the following specification and the accompanying drawings, of which—

Figure 1 denotes a front elevation of a steam-generator having my invention applied to it. Fig. 2 is a top view of it. Fig. 3 is a vertical and transverse section taken through its refrigerator, receiving-vessel or cistern, and stand-pipe, to be hereinafter described. Fig. 4 is a transverse section of the boiler and its furnace, the same being taken through the fuel-supply mouth or throat of the latter.

In the drawings, A is a furnace surrounded by a water-space or boiler, B, the smoke from said furnace being caused to pass through an opening, C, in the top of the throat D, and from thence to circulate around the external surface of the boiler and escape through a discharge-pipe arranged, as seen in Fig. 4. Above the top of the said boiler a receiving-cistern, F, is disposed as seen in Fig. 2, the said cistern being surrounded by or placed within another cistern or refrigerator, G, the top of the latter cistern being raised somewhat above that of the former, as shown in said figure.

Out of the lower part of the boiler a stand-pipe, H, is carried and made to open into the lower part of the receiver F. Another or secondary pipe, I, leads out of the top of the boiler, opens through the bottom of the said cistern F, and has a safety-valve, K, applied to its mouth of discharge. Besides these pipes there is another—viz., L—leading out of the top of the boiler, and for the purpose of conducting steam into one or more radiators or coils of pipe that may be used to absorb and distribute heat from the steam, the condensed water of such radiators being suffered to flow therefrom and be conducted into the boiler by any suitable means.

In arranging the receiver F with respect to the boiler it is disposed above the same, so that the usual working-pressure of the steam in the boiler shall be just sufficient to maintain the water in the stand-pipe H to a level

with the bottom of the receiver F. The receiving-cistern has an inverted cover, M, placed over it and extending down into the refrigerating-vessel, as seen in Figs. 2 and 3, it being made to encompass the sides and top of the receiving-vessel. By extending the cover into the water of the refrigerator any steam which may flow into the receiver will be prevented from escaping therefrom otherwise than through the pipes leading out of the bottom thereof.

In using the apparatus the refrigerating-vessel or space surrounding the vessel F should contain cold water. Whenever the steam in the boiler exceeds the working-pressure, which for all useful purposes, so far as heating buildings is concerned, may be at two pounds per square inch, the water in the stand-pipe H will be driven up said pipe into the receiving-cistern F, and will there be cooled, and in consequence of the tendency of cold water to pass downward through warm water it will flow back into the stand-pipe, descend through the same, and pass into the boiler, so as to lower the temperature of the water therein, and thereby reduce the production of steam and its consequent pressure. The purpose, therefore, of the refrigerator, receiving-cistern, and stand-pipe is to reduce the pressure of steam when it may exceed a given amount or that adopted as the working-pressure of the apparatus. The purpose of the safety-valve and its pipe or communicating passage when applied to the boiler and receiving-cistern is to enable the steam when at too high a pressure to escape from the boiler and be condensed, the water of condensation flowing down the pipe H and back into the boiler.

The sides of the refrigerator are made to extend above the receiving-cistern, and the water in the refrigerator G is to stand on a level with the top of the receiving-cistern F when the cover of the latter is on. The result of this arrangement will be that when steam from any cause may be freely discharged through the safety-valve into the receiving-cistern F, and the water resulting from its condensation may flow down the sides of the cover, it will all flow over the top of the receiving-cistern F and then be returned through the stand-pipe H into the boiler again. In this way any waste of water

by discharge of steam through the safety-valve is prevented.

In my apparatus self-regulation and safety are secured, first, by the steam being balanced by the water in the stand-pipe; second, by the water discharged from the boiler into the receiver again returning through the stand-pipe, whereby not only is the steam suffered to expand, but its pressure, temperature, and quantity are subsequently reduced; third, by the escape of steam through the safety-valve and into the receiver.

I am aware that it is not new to apply to the boiler and the cylinder or valve-chest of a steam-engine a refrigerating apparatus or condenser for the purpose of condensing the waste steam, the water of its condensation being subsequently returned to the boiler. I am also aware that a safety-valve is no new contrivance as applied to a steam-boiler. Therefore I do not claim such separately considered. My invention has reference particularly to an apparatus for heating buildings by the condensation of steam through pipes, radiating-vessels, or chamber so connected with a boiler or steam-generator that the steam after having imparted heat to and been condensed in said radiators shall be returned to the boiler in the form of water. To such an apparatus or to its boiler I apply my improvement, and it should be borne in mind that the water condensed in the radiators does not return through my apparatus to the boiler.

It is only the steam which may be condensed in the receiving-chamber F of the safety apparatus that returns to the boiler through the stand-pipe H. While the stand-pipe H and the chamber or vessel F in connection with the safety-valve serve to regulate the pressure, the chamber F, its cover M, and the refrigerating-cistern G perform, beside other important functions, that of receiving any amount of steam which may be suddenly blown through the pipe I and condensing it so that it may be returned into the boiler by means of the pipe H. Thus, while we insure safety to the boiler and heating apparatus and regulate the pressure of the steam we prevent the steam from being wasted, and condense and return it to the boiler.

What, therefore, I claim as my invention or improvement is—

The above-described peculiar arrangement of the steam-generator or boiler B, the stand-pipe H, the condensing apparatus, (composed of the receiver F, the cover M, and the refrigerating-vessel G,) the safety-valve, and its pipe I, the whole operating together, substantially in manner as specified.

In testimony whereof I have hereunto set my signature this 21st day of November, A. D. 1855.

GEO. S. G. SPENCE.

Witnesses:

R. H. EDDY,

F. P. HALE, Jr.