C. DAVENPORT.

Steam Heater.

No. 13,639. Patented Oct. 9, 1855.

Fig. 2

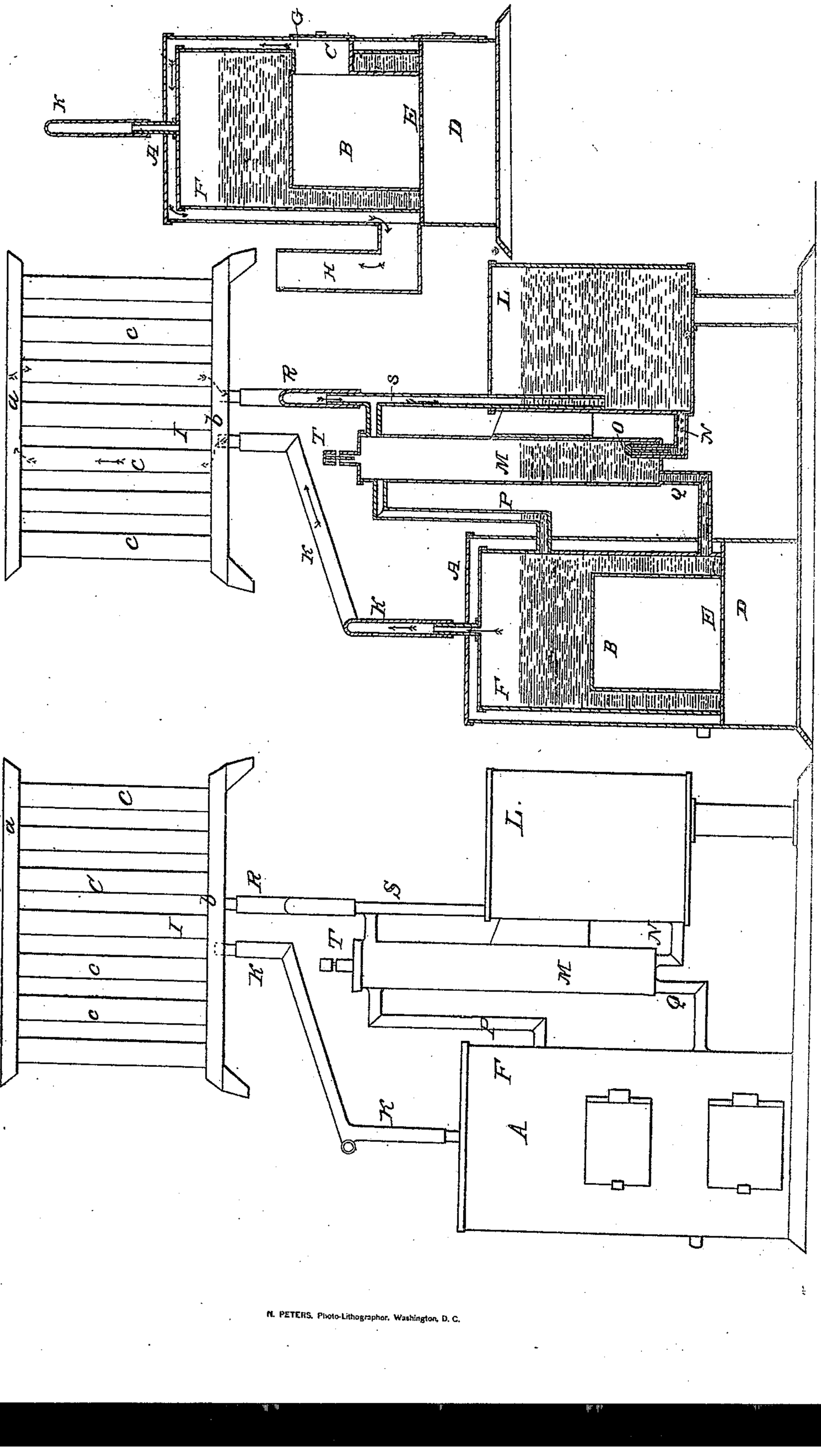

Fig. 1

UNITED STATES PATENT OFFICE.

CHARLES DAVENPORT, OF WATERTOWN, MASSACHUSETTS.

IMPROVED APPARATUS FOR HEATING BUILDINGS BY STEAM.

Specification forming part of Letters Patent No. **13,639**, dated October 9, 1855.

To all whom it may concern:

Be it known that I, CHARLES DAVENPORT, of Watertown, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Apparatus 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, letters, figures, and references thereof.

In the drawings, Figure 1 denotes a side elevation, while Fig. 2 is a vertical section of the steam-boiler, heat-radiator, and supply-cistern with my improvement applied to them. Fig. 3 is a transverse and vertical section of the boiler and its surrounding flues.

The purpose of my invention is not only to regulate the pressure of steam and indicate when it is too high, but also to enable the boiler to be supplied with water to the extent sufficient to compensate for leakage either from it, the radiator, or their connecting-pipes.

In Figs. 2 and 3, A denotes an upright cylindrical boiler provided with a fire-place B, which is arranged within it and furnished with a fuel-supply throat or passage C. Below the said boiler is the ash-pit D, between which and the fire-place there is a grate E. The boiler so arranged is surrounded by a smoke space or flue F, which extends entirely around it about its sides and over its top and receives smoke from the fire-place through an opening G, made in the upper part of the supply-throat C. The smoke, after coursing around the whole external surface of the boiler, is suffered to escape through a flue or chimney H, leading out of the back part of the smoke-space F, as seen in Fig. 3. Connected with the boiler by a pipe K, and arranged within any room or apartment to be heated, is a steam-radiator I, made in any proper manner. In constructing such a radiator I prefer to make it of two horizontal shallow chambers or boxes *a b* and a series of vertical pipes *c c c*, connecting one of said chambers with the other, such radiator being made of cast-iron or other suitable material. The pipe K leads out of the top of the boiler and should pass a short distance into the box *b* or rise above its bottom, as represented by dotted lines in Fig. 1.

L is a supply-cistern, which is arranged on or about on a level with the boiler, and is connected with a pressure-regulator M by means of a pipe N, which passes out of the lower part of the cistern L, and has a valve O arranged upon that end of it which enters the vessel M, the said valve being made to open upward. The vessel M is a tall closed chamber, not only arranged so as to extend above the cistern and boiler, as seen in the drawings, but connected with the latter by pipes P Q, respectively, leading out of the upper and lower parts of the said vessel M and into the upper and lower parts of the boiler A, as seen in Fig. 2. The vessel M is also connected with the condensing-radiator I by means of a pipe R, which opens out of the bottom of the chamber *b* and into the top of the vessel M, and communicates with the cistern L by means of a branch pipe S. A steam alarm-whistle T is arranged on top of the vessel M, it being made to communicate with the interior of said vessel. The pipe P should enter the boiler H at a level below which the water in said boiler should not be allowed to fall with safety while the apparatus is in use.

In the operation of the said apparatus the steam from the boiler will flow into the pipe K, and from thence into the radiator I, where its heat will be abstracted by the metallic surfaces thereof and thrown therefrom into the surrounding atmosphere, the condensed steam of the radiator flowing down the pipe R and into the vessel M. As the boiler, by means of the pipe Q, communicates directly with the vessel M, water will stand at the same level in the boiler and said vessel, as well as in the cistern L, provided the boiler is not making steam; but while steam is being formed therein its pressure on the surface of the water in the boiler will have a tendency to force water into the vessel M, and thereby raise the water thereof above such level. While the water in the vessel M is above such level the valve O of the pipe N will remain closed in consequence of the extra pressure upon it; but whenever water falls below the level of the water in the cistern such valve will be forced open and water will flow from the cistern into the vessel M, and from thence through the pipe Q into the boiler. While the column of water in the vessel M remains above the level of the water in the boiler it serves to force the steam through the pipe K and to maintain or promote its circulation through the

radiator, the vessel M serving in such manner to regulate or promote the circulation of the steam and at the same time close the valve O. Now should the water in the boiler fall below the top of the mouth of the pipe P steam will rush through said pipe and into the vessel M and be discharged through the whistle T, thus giving notice that the fire in the furnace is too brisk and that means must be taken to partially arrest the process of combustion of the coal. If the discharge-flue H be provided with a damper, such may be turned so as to diminish the draft, and thereby reduce the production of steam.

My invention as applied to a boiler and radiator for heating buildings is not only a safety apparatus to prevent the boiler from bursting by reason of the water thereof getting too low therein, but it is a water-supply apparatus for the boiler and a regulator or promotor of the circulation of steam through the pipes and the radiator. Without the vessel M the circulation of steam often becomes sluggish unless its pressure is high, and great care is required to keep the water in the boiler at its proper level; but with said vessel applied to the supply-cistern, the boiler, and the radiator, essentially as specified, little attention is necessary to the apparatus, and it can operate with steam at very low pressure, say from one-quarter of a pound to two pounds to the inch, there being under such circumstances little or no danger of bursting either the boiler or any of the pipes.

Were I to dispense with the vessel M and not only connect the lower part of the cistern with that of the boiler by a pipe, but join the pipe P to the pipe K, water from the boiler would so communicate with that of the cistern as to heat it to so great an extent as to cause it to evolve steam. Such an evolution of steam would be productive of waste of fuel and be objectionable in other respects. With the vessel M applied as described the cistern is made to receive only cold water until the vessel M is full.

I do not claim a boiler, radiator, and supply-cistern so connected by pipes that the steam from the boiler may be made to circulate through the radiator and from thence pass in a condensed state back to the boiler; but

What I claim as my invention is—

The arrangement of the vessel M and its connecting-pipes Q N P and valve O, the supply-cistern L, the boiler A, the radiator I, and the leading steam and return-pipes K and R of the said boiler and radiator, the whole being made to operate together substantially in manner and for the purpose as specified.

In testimony whereof I have hereunto set my signature this 10th day of August, A. D. 1855.

CHARLES DAVENPORT.

Witnesses:
R. H. EASLY,
W. F. RICE.