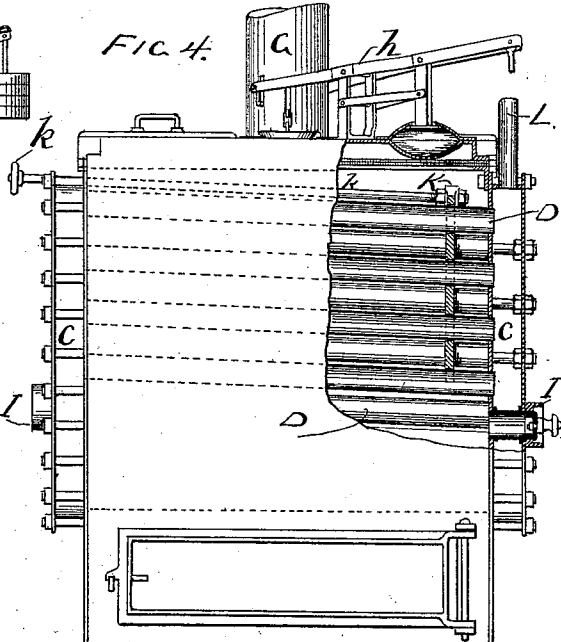
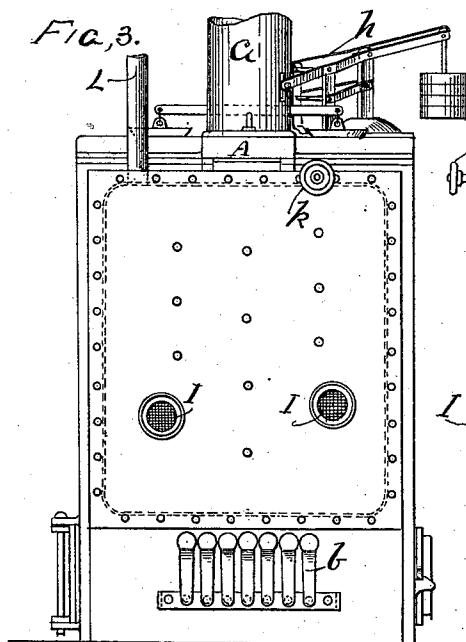
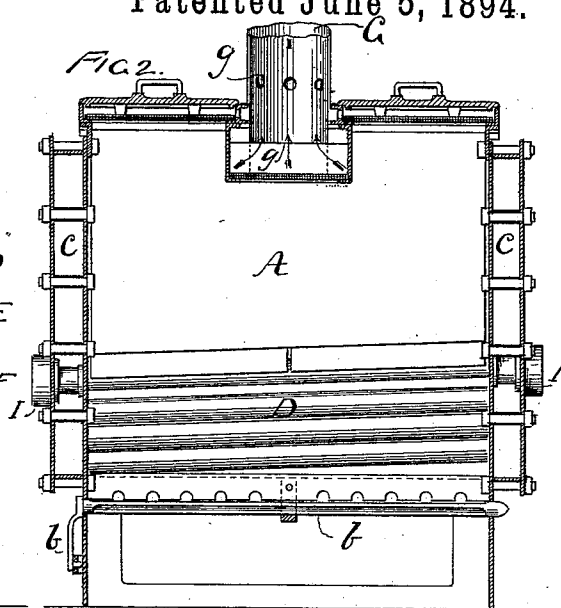
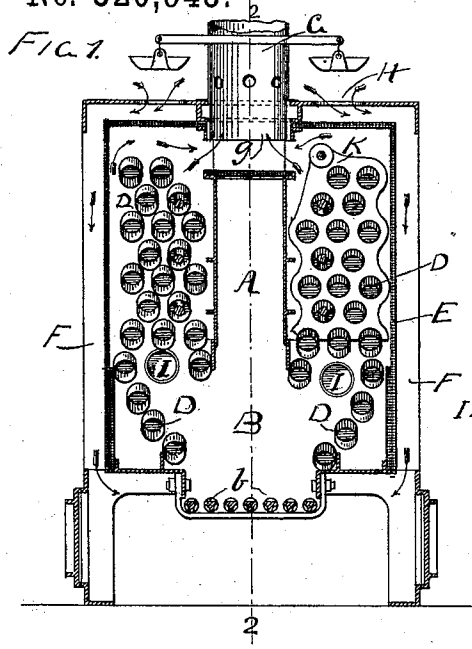


F. H. TREAT.  
STEAM BOILER.

No. 520,945.

Patented June 5, 1894.



WITNESSES:

Ernest Sigart  
Gard Maynard

INVENTOR

Francis H. Treat  
By Banning Banning & Ryerson  
attys

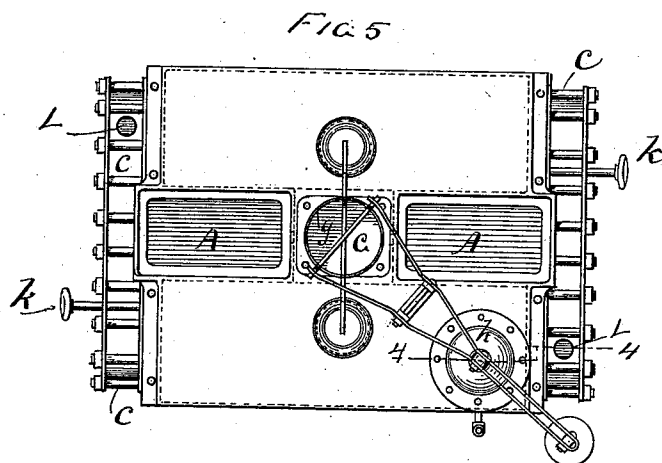
(No Model.)

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# UNITED STATES PATENT OFFICE.

FRANCIS H. TREAT, OF CHICAGO, ILLINOIS.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 520,945, dated June 5, 1894.

Application filed November 13, 1890. Serial No. 371,287. (No model.)

### *To all whom it may concern:*

Be it known that I, FRANCIS H. TREAT, of Chicago, Cook county, Illinois, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification.

My invention is particularly adapted to boilers used in houses, to heat water or generate steam for warming purposes; and the invention consists in the features and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a cross section of my improved boiler, particularly illustrating the general arrangement of parts; Fig. 2 a section taken in line 2 of Fig. 1; Fig. 3 an end elevation; Fig. 4 a side elevation, partly in section, taken in line 4 of Fig. 5; and Fig. 5 a plan view of the boiler.

A is the fuel magazine; B the fire box, and *b* the grate thereof; C water spaces; D water tubes connecting the water spaces; E the non-conducting cover of the boiler; F an air space around the boiler; G the chimney, and *g* draft dampers therein; H dampers for regulating the supply of air to the fire, and *h* a damper regulator; I openings through the water space; K a diaphragm scraper on the water tubes, and *k* a handle for operating the same; and L pipes connecting with the water spaces for the exit of steam.

In making my improved boiler, I provide for suitable water spaces, preferably one at each side of the boiler. As shown, these spaces are formed by two parallel plates having a rectangular frame or flat bar metal interposed between them, the plates being connected by bolts around the outside and stay bolts through the water spaces. The stay bolts of course prevent the plates from yielding or bulging.

To facilitate starting the fire, or cleaning the fire box, I provide openings, preferably two through each water space. These openings are preferably just above the top line of the fire, and adapted to be closed by means of a plug. The removal of this plug of course serves to open them whenever it is desired to start or examine the fire, to clean the fire box, or to look or work through them for any purpose.

The grate may be of any suitable construction, but I prefer to make it of triangular bars passing through holes in the plates to which

the water tubes are connected, each of these bars having a downwardly extending arm connected to a shaking bar by means of a small cylindrical lug fitting into a corresponding hole. In this way, all the arms are connected together and adapted to be rocked simultaneously, but still capable of being taken out separately. Whenever it is desired to take out any of the bars, to remove clinkers or for other purposes, it is only necessary to take hold of the downwardly projecting arm and pull its bar out. The grate bars are preferably supported in their central portion by a bar placed under and at right angles to them, but they may be supported in any convenient way.

I also provide two spaces for water tubes, one at each side of the fuel magazine and fire box. The water spaces are connected by tubes extending from one to the other, so that the water, passing from one space to another through these tubes, is kept in continuous circulation whenever the boiler is in operation. I prefer to have the tubes placed in a position slightly inclined vertically, the tubes on one side of the magazine and fire box being inclined in one direction and the tubes on the other side in the opposite direction. This brings the elevated ends of one series of tubes at the same side as the depressed ends of the other series, and thus causes the water to circulate in a continuous current around the magazine and fire box. On each set of water tubes is placed a diaphragm scraper adapted to slide loosely thereon. A handle rod, secured to this scraper, passes to the outside of the boiler, preferably above the water space, and by means of this handle the scraper may be moved backward and forward to clean the tubes of flue dust, soot, &c.

The fuel magazine is preferably rectangular in shape, and extends entirely across from the water space on one side to the water space on the other side. The tube sheets or plates of the water spaces form the end walls of the fire chamber and magazine, the side walls thereof being preferably formed of flat metal plates arranged in the space between the two sets of water tubes and extending downward from the top of the boiler to a tube at the lower edge of the magazine. This tube is set closer to the magazine than others in

the line above it, and small false plates may be used to connect it to the downwardly extending plate above described. Openings are provided in the top of the magazine for the introduction of fuel, preferably one at each side of the chimney. Immediately under the chimney, and connecting therewith, is a short horizontal flue extending across the magazine, for causing a draft and furnishing an outlet for waste gases and products of combustion. Fitting loosely inside the chimney is a short pipe adapted to move up and down, telescopically, to regulate the draft. When a strong draft is desired this pipe is raised, and the gases or products of combustion allowed to pass in under its lower edge and up and out through it and the chimney. When it is desired to reduce the draft, this pipe is lowered, contracting the space between its lower edge and the bottom of the horizontal flue; and when it is desired to shut off the draft entirely, the pipe is allowed to come down and rest on such bottom. In order that this inside pipe may be raised and lowered automatically, I provide for connecting it by lever mechanism to the draft regulating diaphragm operated by the pressure of steam in the boiler as next hereinafter described.

The air required to support combustion is supplied to the fire through air spaces around the boiler, as indicated by arrows. Saucer dampers may be used to close or partially close the circular openings for the admission of air, so as to regulate the draft as desired. These dampers are preferably suspended from a horizontal bar extending through a slot in the chimney and adapted to move up and down with its inside movable pipe. In this way the saucer dampers are caused to move up and down automatically by the pressure of steam inside the boiler, so as to regulate the supply of air to the fire in unison with the regulation of the draft in the chimney.

To prevent the escape of gas into the room, when the regulator in the chimney is entirely closed, I provide openings in the movable pipe in the chimney. These openings are so arranged that when the sliding pipe is down, they come into position opposite the air space on the top of the boiler, thus forming a communication between the air space and chimney, whereby gases that leak into the space are allowed to escape through the chimney. One or more of these openings may be used as desired.

Although I have thus described the various parts of my invention, still it will be under-

stood that I do not intend to limit myself to minor features or details of construction. On the contrary, I intend to omit immaterial parts, to vary the form and construction of other parts, and to use equivalent forms or members as circumstances may suggest or render expedient.

I claim—

1. In a combined steam and hot-water boiler, the combination, with an internal vertical heating-chamber, a magazine located centrally therein, and external water chambers, of a series of horizontal tubes passing through said heating chamber at each side of the magazine and opening at their ends in said water-chambers, substantially as described.

2. In combination with the water spaces of a boiler, two sets of water tubes arranged in parallel series, one at each side of the fuel magazine, each set being slightly inclined vertically, one set in one direction and the other set in the opposite direction, substantially as described.

3. In combination with the water spaces of a boiler, an internal vertical heating chamber, a fuel magazine in the heating chamber, and two sets of water tubes arranged in parallel series, one at each side of the fuel magazine and fire space, and communicating with the water chambers whereby the water tubes are brought into contact with the fire and made to form sides of the fire box, substantially as described.

4. In combination with the water spaces of a boiler, two sets of water tubes, arranged in parallel series, one at each side of the fuel magazine, the lowest inner tube of each set being placed somewhat closer to the magazine than others in line above it, substantially as described.

5. In a boiler, a fuel magazine having two of its sides formed by water spaces of the boiler and two by flat metal plates extending down from the top of the boiler, substantially as described.

6. In a boiler, the combination of a fuel magazine extending across the boiler and dividing it into separate chambers for water tubes, a chimney, and a horizontal flue under the chimney and communicating therewith and with each of the water tube chambers, substantially as described.

FRANCIS H. TREAT.

Witnesses:

EPHRAIM BANNING,  
SAMUEL E. HIBBEN.