

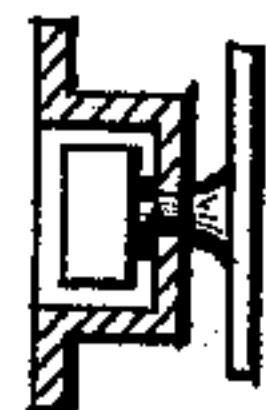
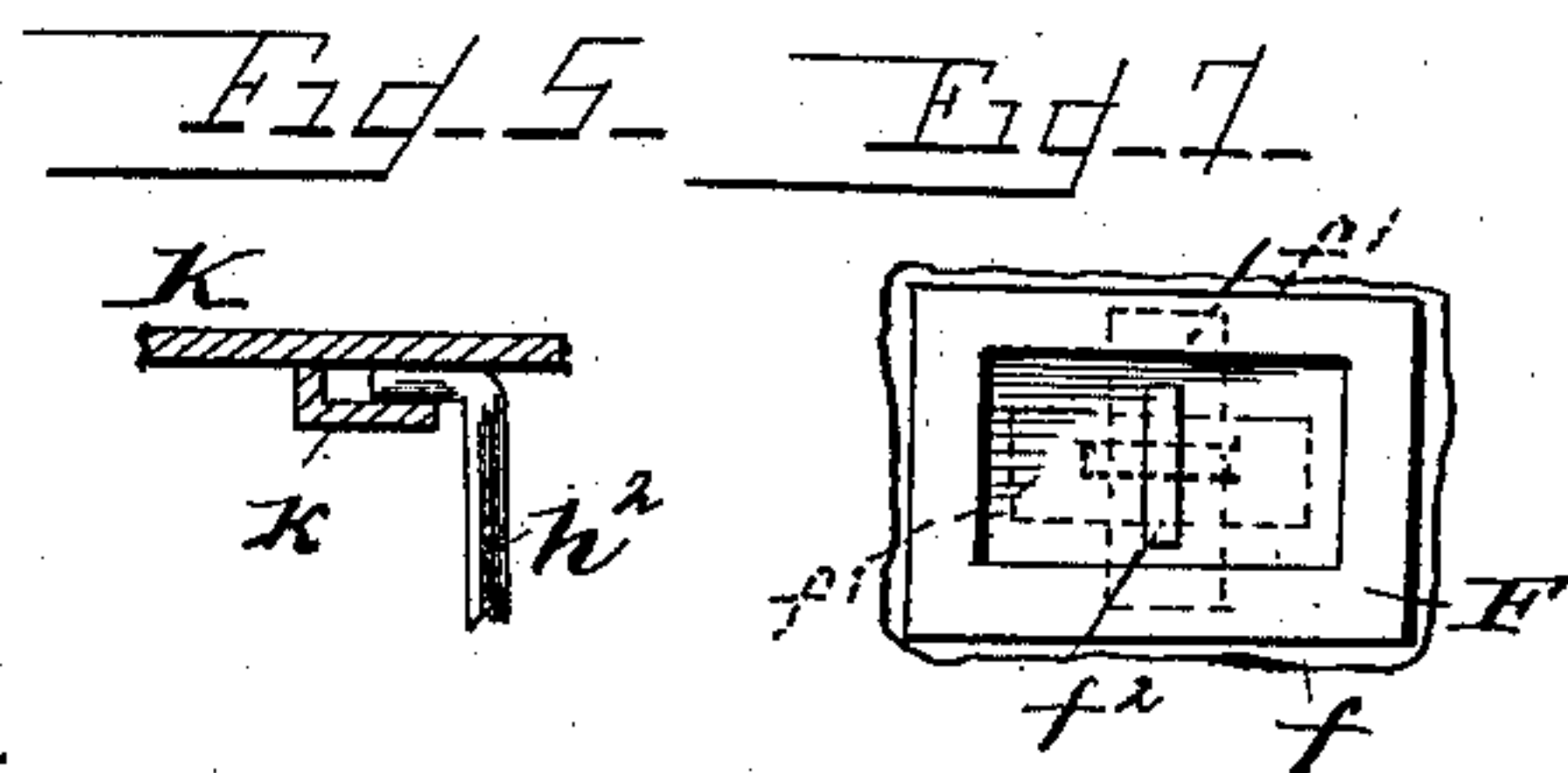
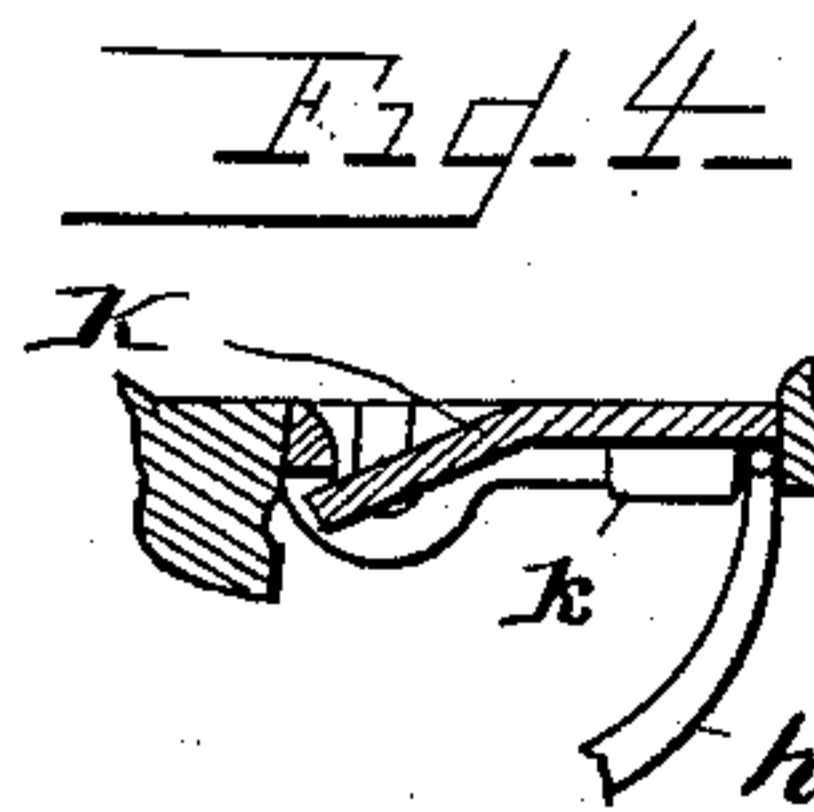
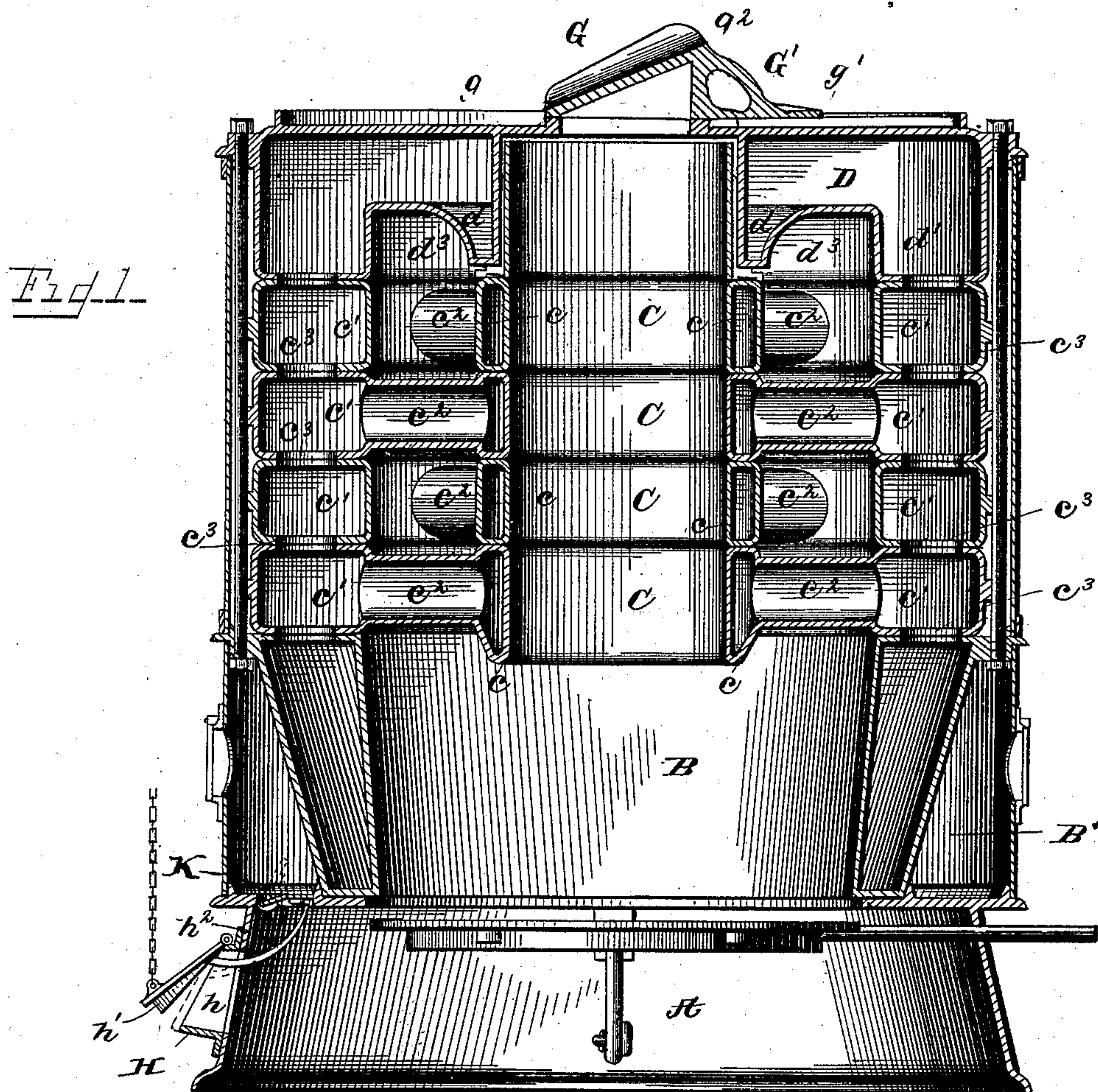
(No Model.)

2 Sheets—Sheet 1.

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WATER HEATING APPARATUS.

No. 406,685.

Patented July 9, 1889.



Witnesses

G. A. Tauberschmidt,  
L. W. Philaker

Inventor  
Leonard M. Woodcock

By his Attorneys  
White & Pugh



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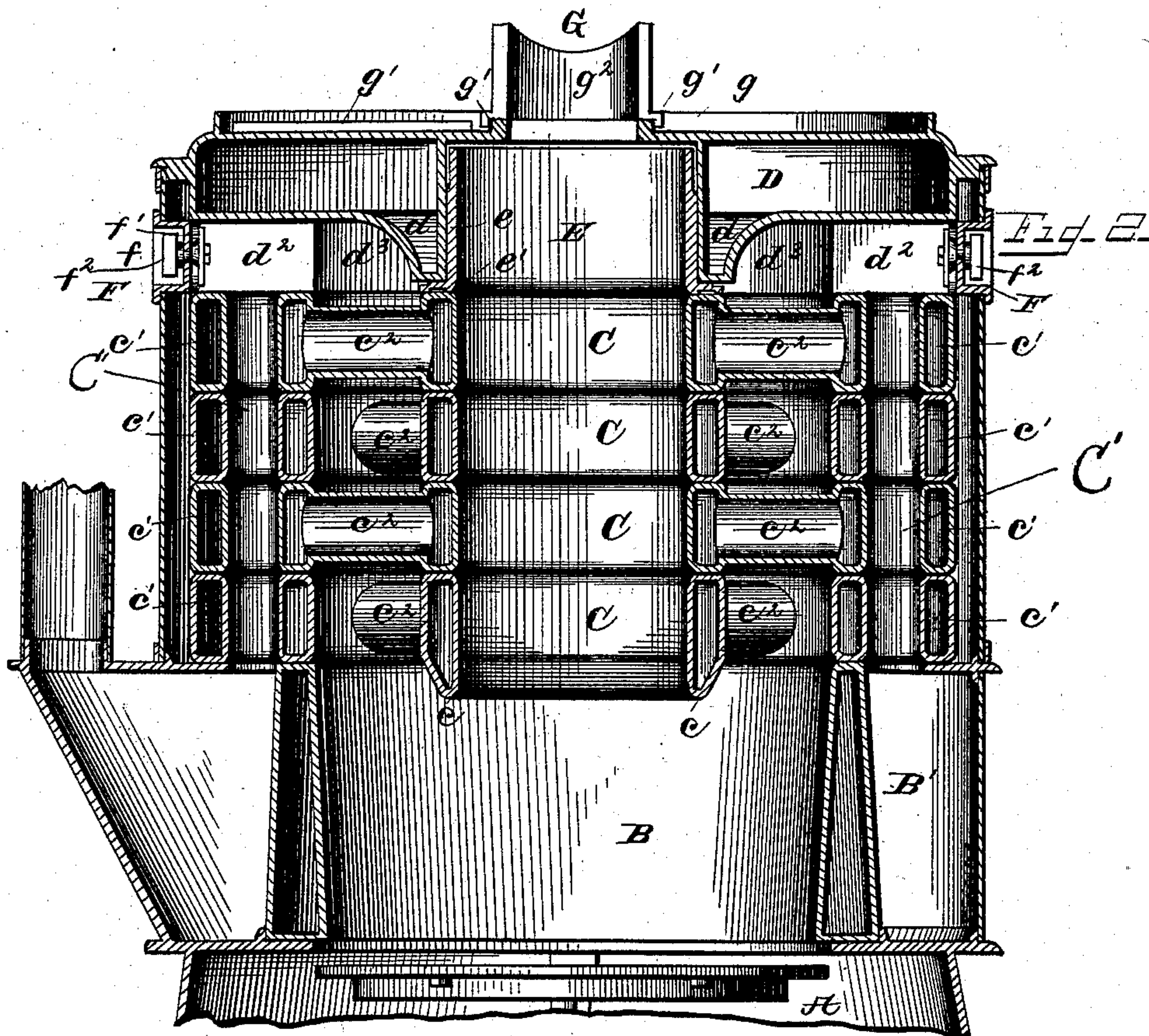
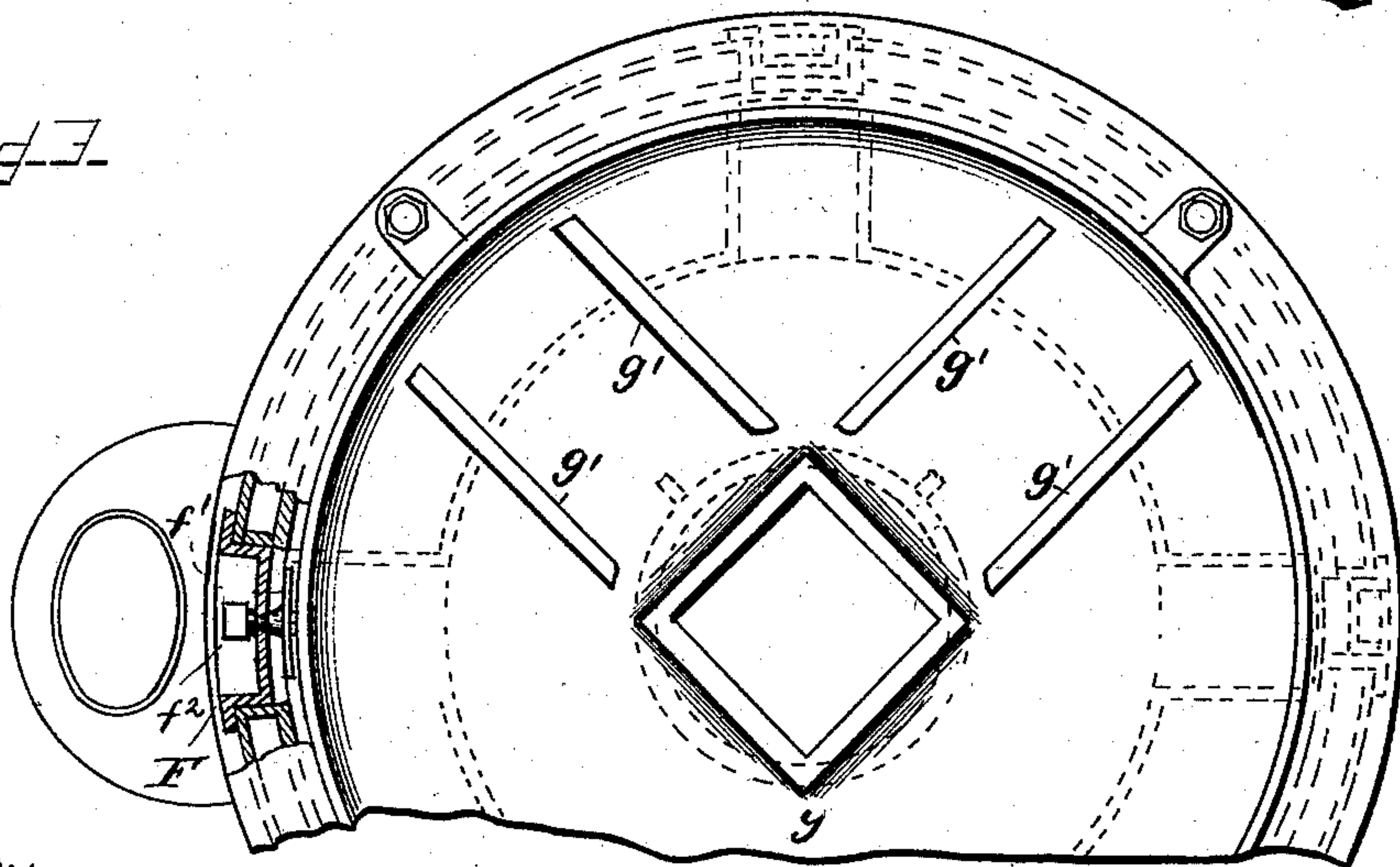


Fig. 2.



Witnesses

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# UNITED STATES PATENT OFFICE.

LEONARD M. WOODCOCK, OF AUBURN, NEW YORK.

## WATER-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 406,685, dated July 9, 1889.

Application filed March 9, 1889. Serial No. 302,602. (No model.)

*To all whom it may concern:*

Be it known that I, LEONARD M. WOODCOCK, a citizen of the United States, residing at Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Water-Heating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to heating apparatus; and it consists in certain novel features of construction and combination, which will be hereinafter fully described.

I have illustrated said invention in the accompanying drawings, and it is fully disclosed in the following specification and claims.

Figure 1 represents a vertical section of a steam-boiler and furnace embodying my invention. Fig. 2 is a section similar to Fig. 1 through the smoke-flues and outlet-pipe. Fig. 3 is a partial view of the boiler; and Figs. 4, 5, 6, and 7 are detail views of parts detached.

In the drawings I have shown my invention embodied in a steam-boiler and furnace, which is constructed in any preferred or usual manner.

A represents the ash-pit; B, the fire-pot; C C C, a series of hollow rings or sections, which are superimposed upon each other and upon the fire-pot and form the water-jacket or boiler; and D is the steam-dome, located above said water-jacket.

The sections C C C are preferably constructed in the form of two hollow annular concentric tubes  $c c'$ , the one within the other, and connected therewith by radially-extending tubes  $c^2$ . These parts C C are provided at suitable intervals with openings  $c^3$  in their upper and lower faces, whereby they may be connected together, and they are also provided, preferably, between the apertures  $c^3$  with passages  $C'$ , which extend vertically entirely through said parts C C and form return-passages for the products of combustion. The parts C C are so placed that the openings  $c^3$  will coincide and the parts be connected in a suitable manner, and the passages  $C'$  must also register and form vertical passages, as before stated. The fire-pot B may also be pro-

vided with a water-jacket connected with the apertures  $c^3$  in the adjacent ring C. The ring  $c$  of the section adjacent to the fire-pot preferably extends downwardly into the same, as shown, in order to subject it to a greater degree of heat and give more room for combustion.

Within the inner peripheries of the hollow rings C is formed a circular shaft, which serves as the fuel-magazine. Upon the uppermost ring C is placed a cylinder E, which is of the same diameter as the fuel-magazine, and is provided on its exterior at three or more points with a web or rib  $e$ , terminating at the lower edge of said cylinder in a foot-piece  $e'$ , projecting radially outward a short distance. The rib or web  $e$  may extend vertically the entire length of the cylinder E, or may terminate a short distance from the top, as desired. The steam-dome D is constructed with a central aperture, which fits over the ribs or webs  $e$  of the cylinder E, leaving a space between the two parts, and the cylinder does not extend quite to the top of the dome D.

The dome D is provided with an annular portion  $d$ , which surrounds the cylinder E, and its outer portion is provided with downwardly-extending portions  $d'$ , which connect with the apertures  $c^3$  in the upper section C, and between which are recesses  $d^2$ , communicating with the smoke-passages  $C'$  and a free annular space  $d^3$ , formed between the parts  $d$  and  $d'$  of the dome. It will be seen that there is a space between the cylinder E and the inner face of the dome D, which prevents the cold fuel from chilling the steam in the dome, and this space also communicates with the annular space  $d^3$ , so that all gas arising in the fuel-magazine will pass into the smoke-passage and will be conducted away with the products of combustion. The products of combustion will pass upwardly between the rings  $c c$  and around the pipes  $c^2$  and enter the annular passages  $d^3$ , from whence they pass through the recesses  $d^2$  into the return-flues  $C'$ , and are conducted into a compartment  $B'$ , surrounding the fire-pot and its water-jacket, which is connected with the smoke-outlet.

The outer wall of the furnace and the wall of recess  $d^2$  of the steam-dome are provided



with hand-holes  $f$ , having unequal diameters, which are adapted to be closed by covers  $F$ . (Best seen in Figs. 3, 6, and 7.) These covers  $F$  are of the same shape as the hand-holes and have unequal diameters. I prefer to construct them, as shown in Figs. 6 and 7, of oblong or oval form, and provide each cover with a securing-plate  $f'$ , having unequal diameters, its greater diameter being greater than the lesser diameter of said hand-holes. This plate is secured to a bolt or rivet passing through said cover  $F$ , and I may provide said bolt outside of said cover with a nut or other retaining device, or I may provide it with a winged head, by which the said bolt and the plate  $f'$  may be turned. When the cover is to be placed in position, the plate  $f'$  is passed within said hand-hole and turned until it engages the wall of the recess  $d^2$ . The nut or other retaining device, if one is employed, is then turned up and the cover secured. The nut is not necessary, however, and may be dispensed with, as before stated. When the bolt is provided with a winged head or other means for turning the plate  $f'$ , the cover will be placed in position and the bolt and plate turned by means of such winged head until the plate engages the inner wall of the hand-hole, when the cover will be secured in position. By removing these hand-holes access may be had to the smoke-flues for cleaning the same.

The top of the steam-dome  $D$  or top plate of the boiler is provided with a central aperture, preferably square, which is in line with the fuel-magazine, around the edges of which is a raised flange  $g$ . The top of the furnace is also provided with two or more sets of guides  $g' g'$ , for the sliding magazine-cover  $G$ , two sets being shown, each of said guides being located in line with a part of flange  $g$  forming one side of the central aperture, and said guides extending to different portions of the periphery of the dome. These guides and the flange are of the same height, and it will be readily seen that the cover  $G$  may be placed upon one set of guides and made to slide so as to cover the central aperture, or it may be drawn to the outer edge or periphery of the dome. It will also be seen that the cover  $G$  may be placed in position to engage one or the other of the sets of guides and the cover drawn to one or another portion of the periphery of the dome, as is found most convenient or desirable. This cover  $G$  is constructed with an inclined top  $g^2$ , which is concave or trough-like in cross-section, as shown in Figs. 1 and 2, and when drawn to the outer edge of the boiler this trough-like and inclined bottom portion will form a chute to conduct the fuel directly to the magazine, and the cover is preferably provided with a suitable handle  $G'$ .

I provide the outer wall of the ash-pit  $A$  with a damper aperture or seat  $h$ , which is provided with a damper  $H$ , hinged, preferably at its upper edge, to the seat  $h$ . This damper

is provided with a flange  $h'$  to engage its aperture or seat. The upper plate of the ash-pit is also provided with an aperture adjacent to the damper  $H$ . This aperture is fitted with a check-draft damper  $K$ , which is provided with trunnions engaging suitable bearings in the plate. The damper  $H$  is provided with an arm  $h^2$ , which engages the check-draft damper  $K$ , and is adapted to operate the same. To this end the check-draft damper  $K$  may be provided on the under side of the same with an annular guide  $k$ , and the end of the arm  $h^2$  is bent or curved to form a projection for engaging said guide, and this construction forms a movable or sliding connection between the arm  $h^2$  and check-draft damper  $K$ . The arm  $h^2$  is of such length that when the damper  $H$  is open the check-draft damper will be closed. When the damper  $H$  is moved in a direction to close the same, as soon as the flange  $h'$  engages the upper portion of the seat  $h$  the arm  $h^2$  will begin to move the check-draft damper in a direction to open the same. When the flange  $h'$  has completely entered the seat  $h$  and is stopped by the projecting edge of the damper, and the damper  $H$  is closed, the damper  $K$  will have been thrown open to its fullest extent. When the damper  $H$  is operated in a direction to open the same, the damper  $K$  will be closed, the foregoing operation being reversed. The damper  $H$  may be connected to any form of regulator whereby the draft of the fire may be automatically governed.

Having now particularly described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with a series of horizontal sections having central apertures forming the fuel-magazine, and provided with draft-flues, of a cylinder forming a continuation of said fuel-magazine, provided with radial webs or ribs terminating at the lower edge of the cylinder in radial feet, and a steam-dome surrounding said cylinder and supported upon said sections and said radial feet, substantially as described.

2. The combination, with the fuel-magazine, of a sliding cover for the same, said cover having an inclined top adapted when the cover is disengaged from the magazine to guide the fuel into the magazine, substantially as described.

3. The combination, with the fuel-magazine, of a sliding cover for the same, having an inclined top concave or trough-shaped in cross-section, adapted when said cover is disengaged from the magazine to guide the fuel into said magazine, substantially as described.

4. The combination, with the fuel-magazine, of a sliding cover for the magazine and one or more sets of guides for said cover, whereby said cover may be made to engage either set of guides, substantially as described.



5 5. The combination, with the fire-pot having an ash-pit beneath the same, of a damper in a wall of said ash-pit and a check-draft damper between the ash-pit and the smoke-flue, substantially as described.

10 6. The combination, with the fire-pot having an ash-pit beneath the same, of a damper in a wall of said ash-pit, a check-draft damper between the ash-pit and smoke-flue, and an operative connection between the damper and the check-draft damper, substantially as described.

15 7. The combination, with the fire-pot having an ash-pit beneath the same, of a chamber surrounding the fire-pot and connected with the smoke-outlet, a damper in the wall of said ash-pit, and a check-draft damper between the ash-pit and the said chamber, substantially as described.

20 8. The combination, with the fire-pot having an ash-pit beneath the same, of a chamber connected with the smoke-outlet, a damper for controlling the draft, a check-draft damper between the ash-pit and said chamber, and an arm on said damper engaging the check-draft damper, substantially as described.

9. The combination, with the fire pot, of sections forming the boiler, the section adjacent to said fire-pot having a hollow annular portion around the center of the same depending within the fire-pot and extending below the horizontal plane of the bottom of said section, substantially as described. 30

10. The combination, with a furnace having a hand-hole in its walls communicating with the smoke-flues and having unequal diameters, of a cover having unequal diameters engaging said hand-hole, a bolt passing through said cover and provided at one end with a securing-plate rigidly secured thereto and at the other end with a head, whereby said bolt may be turned and the plate made to engage the walls of said hand-hole for securing said cover in place, substantially as described. 35 40

In testimony whereof I affix my signature in presence of two witnesses. 45

LEONARD M. WOODCOCK.

Witnesses:

W. F. WAIT,

WM. F. GIBBS, Jr.