

No. 676,688.

Patented June 18, 1901.

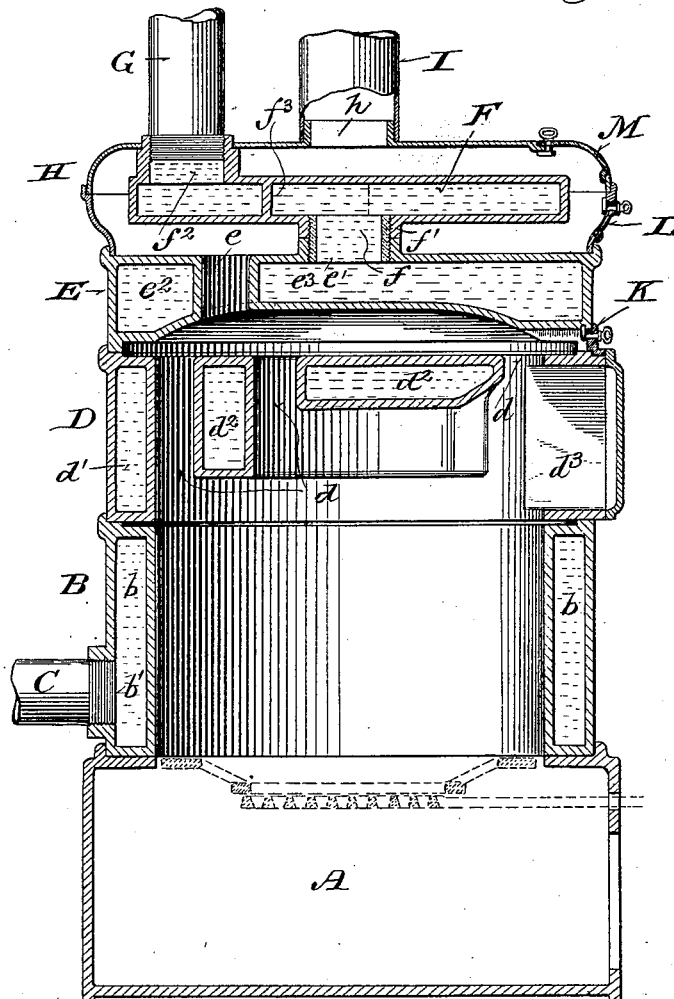
S. E. PORTER.
SECTIONAL HEATER.

(Application filed Mar. 19, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



Witnesses:

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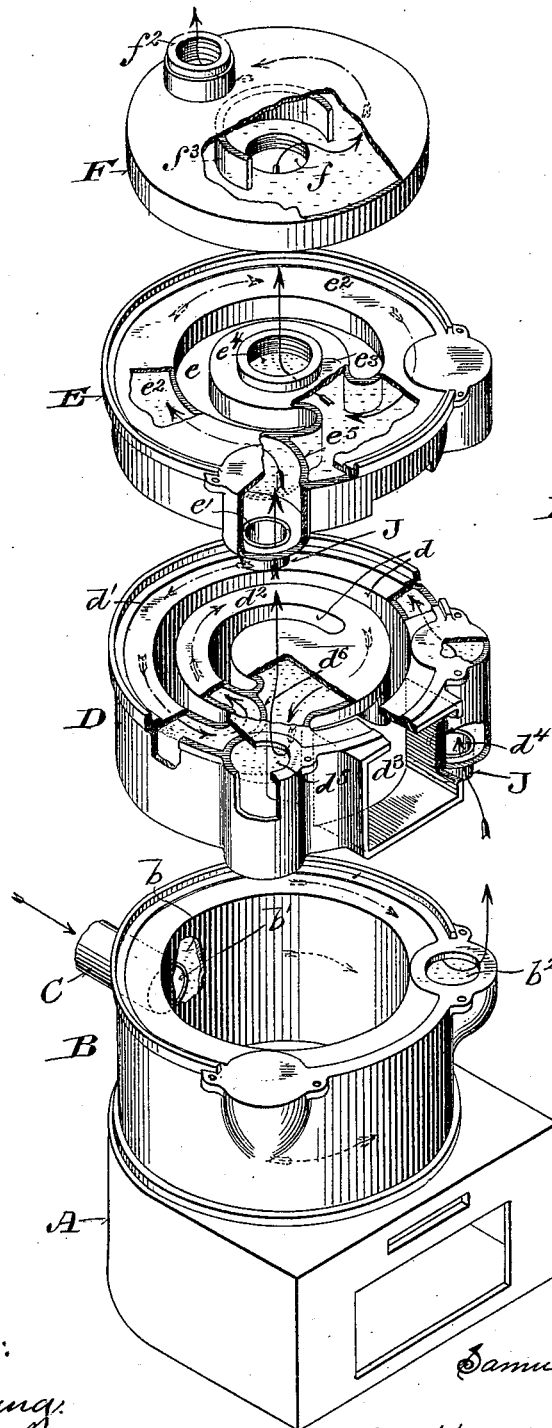


Fig. 2.

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UNITED STATES PATENT OFFICE.

SAMUEL E. PORTER, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO THE FULLER-WARREN COMPANY, OF SAME PLACE.

SECTIONAL HEATER.

SPECIFICATION forming part of Letters Patent No. 676,688, dated June 18, 1901.

Application filed March 19, 1900. Serial No. 9,301. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL E. PORTER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Sectional Heaters, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

10 The main object of my invention is to produce a sectional water-heater that shall be simple in construction, efficient and economical in operation, easily assembled and set up, and that shall occupy a small floor-space.

15 It consists in a novel construction and arrangement of parts, as hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in both figures.

20 Figure 1 is a vertical medial section of a heater embodying my invention; and Fig. 2 is a perspective view of the same, the sections being separated above the fire-pot and parts being broken away and shown in section.

25 The heater is of a generally cylindrical form and composed of approximately circular sections arranged one above another.

30 A is the ash-pit, which is preferably made of semicylindrical form at the back and square or straight in front, where the ash-pit opening and door are located.

35 B is the fire-pot section, which is formed with an annular water space or passage *b*, extending clear around the fire-pot. In the back and near the bottom of said section is an inlet-opening *b'*, with which the feed-water supply or return pipe C is connected, and in the top at the front and to one side of the center is an outlet-opening *b''*. The outer wall of the section is bulged outwardly next to this opening to admit of a larger opening without unnecessarily increasing the size of the section. Equidistant from the center on the opposite side the outer wall is bulged outwardly in like manner, so that another outlet-opening from the water-space *b* may be made when the heater is to be used for generating steam.

45 The heater, as shown in the drawings, is specially designed for hot-water heating; but by a few simple changes, which will be here-

inafter explained, it may be readily adapted for steam-heating.

D is a section fitted at the bottom to and mounted upon the fire-pot section B. It may be for convenience of description designated 55 the "feed-door" section. It is formed with two segmental or horizontally-curved flue-openings *d*, extending upwardly through it and dividing the water-space into an outer channel or passage *d'* and an inner passage 60 *d''*. It is also formed in the front side with a feed-door opening *d'''* and at the top, on opposite sides of said door-opening, with inlet and outlet openings *d''''* and *d'''''*, respectively. The outer wall of the section is bulged or curved 65 outwardly next to the inlet and outlet openings to correspond with the bulges on the fire-pot section, and when the heater is to be used for steam-heating an extra inlet-opening may be made in the bottom below the out- 70 let-opening *d''''*. The outer water channel or passage *d'* communicates at one end with the inlet-opening *d'''* and at the opposite end with one end of the inner passage or channel *d''*, the other end of the inner channel being ex- 75 panded horizontally and rearwardly over the central portion of the fire-pot and communicating with the outlet-opening *d'''''*, which when the heater is used for hot-water heating is separated from direct communication with the 80 outer passage *d'* by a partition *d''''''*; but when the heater is used for steam-heating this partition is preferably omitted. The outer passage *d'* corresponds in width with the water-space *b* in the fire-pot section and extends 85 from top to bottom of the feed-door section. The inner passage *d''* at the back is made of less depth and opposite the feed-door opening is recessed or cut away on the under side to afford a clear space for the supply of fuel to 90 the fire-pot and at the same time to bring an extended area of water-heating surfaces in said feed-door section directly over and close to the fire.

E is a section which may be called the 95 "crown-section," fitted at the bottom and mounted upon the top of the feed-door section and formed with a segmental or horizontally-curved flue-opening *e*, which when the sections of the heater are assembled is above 100

and opposite the curved water-passage d^2 of the fire-pot section, so that the fire and heated products of combustion passing upwardly through the flue-openings in the feed-door section will impinge against and be deflected by heat-absorbing and water-heating surfaces of said crown-section, which is recessed on the under side, as shown in Fig. 1, to afford free communication between the flue-openings d d in the feed-door section and the flue-opening e in the crown-section. The crown-section is formed in the bottom with an inlet-opening e' , which registers with the outlet-opening d^5 in the section below it and is bulged outwardly around said opening to correspond with the bulge on section D. The flue-opening e divides the water-space of section E into an outer circular passage e^2 and an inner circular chamber e^3 , which has a central outlet-opening e^4 in the top. The passage e^2 communicates at one end with the inlet-opening e' and at the opposite end with the chamber e^3 , direct communication between the inlet e' and the outlet e^4 being cut off by a partition e^5 . To provide for an additional inlet-opening or an outlet-opening, although either is unnecessary and undesirable for steam or hot-water heating, and for the sake of symmetry in the design of the heater, the section E may be formed with an outward bulge directly over and corresponding with the bulge on section D around its inlet-opening d^4 .

F is the cap or top section, which is formed in the bottom with a central inlet-opening f and is connected with and supported a short distance above section E by a nipple or short pipe-section f' , which is inserted in the externally-flanged openings e^4 and f of said sections. The section F is formed at the rear on top with an externally-flanged outlet-opening f^2 , with which the service-pipe G is connected. Between the inlet and outlet openings f and f^2 this section is formed with a semicircular baffle-plate or deflecting-partition f^3 , which is open on the front side.

H is a smoke-box which incloses a space around the top section F. It is formed on top with a central flanged opening h , with which the smoke-pipe I is connected. The section F is preferably made somewhat smaller in diameter than the section E, so as to allow a passage for the smoke and products of combustion all around it without extending the smoke-box H much, if any, beyond the outer walls of the heater-sections below it.

The registering openings in the sections B, D, and E are preferably provided with plain slip-nipples J to allow for unequal expansion and contraction of the parts and to avoid leakage; but other coupling devices, such as screw-threaded nipples or pipe-sections, may be used.

The fire-pot B of my heater, as herein shown and described, does not have a feed-door, with which the corresponding sections of heaters of this class are usually provided; but the feed-door opening is made in the sec-

tion above it. In this way a deep fire-pot is afforded and provision is made for a comparatively large body of fuel, by which economy and efficiency in the operation of the heater are secured. It will also be observed that the feed-door section of the heater has a large area of heat-absorbing and water-heating surface directly over and in close proximity with the fire and directly exposed to the heated products of combustion as they escape through the flue-openings in said section and that the water in its passage from the inlet to the outlet of the heater has to travel a long distance, as indicated by the arrows on Fig. 2, in contact with highly-heated surfaces. The products of combustion have also to travel in a sinuous course to reach the exit-flue I and in so doing part with all their available heat to the heat-absorbing and water-containing walls with which they come in contact.

The flue-spaces between the sections D, E, and F and above the section F are reached and cleaned out by doors K, L, and M. (Shown in Fig. 1.)

For steam-heating in addition to the changes hereinbefore noted the top or cap section F is made deeper and provided with a water-gage, so as to afford means for maintaining a steam-space above the water-level in said section. The depth of the smoke-box H is correspondingly increased, and the partition or baffle-plate f^3 may be omitted. In other respects the heater may be made for this purpose as shown in the drawings.

As constructed for hot-water heating the cool feed-water entering through pipe C passes in both directions through the annular water-space b to the outlet-opening b^2 in section B, in which it is partially heated. From this section it passes through the outlet-opening b^2 into the section D, in which it passes back and forth in a circuitous path through the passages d' and d^2 to the outlet-opening d^5 , whence it escapes into section E, traversing the circular passage e^2 of this section and escaping therefrom through its outlet-opening e^4 into the top section F. From the inlet-opening in this section it flows in both directions around the ends of the partition or baffle-plate f^3 through the outlet-opening f^2 into the service-pipe G. As constructed for steam-heating the circulation is substantially the same, except that the water and the steam liberated therefrom in section D may flow directly from both the passages d' and d^2 through the outlet-opening d^5 into the section E next above it, and the water is not allowed to rise above a certain level in the top section F.

Various modifications in the details of construction may be made without material effect upon the operation of the heater and without departing from the spirit and intended scope of my invention. For instance, the number and arrangement of the sections may be varied. The top section F may be omitted in some cases, the service or flow

pipe G being connected directly with the outlet e^4 of section E and the smoke-box H and the location of the smoke-flue connection h being modified accordingly in such cases, or the heater may have one or more additional sections like or similar to and mounted upon section D, each additional section having no door-opening, but a water space or passage extending entirely around it.

10 I claim—

1. In a sectional heater the combination with the fire-pot section of sections mounted one above another thereon and having horizontally-curved segmental flue-openings and water-passages, the flue-openings of one section being arranged opposite the water-passages of the adjacent section, substantially as and for the purposes set forth.

2. In a sectional heater the combination with the fire-pot section of sections mounted one above another thereon and having segmental flue-openings and water-passages, the flue-openings in one section being arranged opposite the water-passages of the adjacent section, a water-passage of each section communicating with a water-passage of an adjoining section, and the water-passages and their connections being so arranged that the water will be caused to flow back and forth in the sections around the segmental flue-openings therein from the inlet in one section to the inlet in another section, substantially as and for the purposes set forth.

3. In a sectional heater composed of approximately circular horizontal sections, the combination with a fire-pot section surrounded by a water space or passage having an inlet connection on one side and an outlet at the top on the opposite side, of a section mounted thereon having a feed-door opening and a water-space with an inlet-opening at the bottom and an outlet-opening at the top on opposite sides of said door-opening, said inlet-opening registering with the outlet-opening in the fire-pot section, and segmental flue-openings forming sinuous water-passages, the outer water-passage communicating at one end with the inlet-opening and at its opposite end with one end of the inner passage, the opposite end of which communicates with the outlet-opening, substantially as and for the purposes set forth.

4. In a sectional heater the combination of an approximately circular fire-pot section having a water-space around the fire-pot and inlet and outlet openings, and a section mounted thereon and having a feed-door opening, and segmental flue-openings dividing the water-space into curved passages which communicate with each other at one end and with inlet and outlet openings respectively at their opposite ends, said inlet-opening registering with the outlet-opening in the fire-pot section and the inner water-passage being cut away on the under side next to the feed-door opening and extended

horizontally rearward over the fire-pot, substantially as and for the purposes set forth.

5. In a sectional heater the combination of a fire-pot section having a water-space surrounding the fire-pot and inlet and outlet openings, and a section mounted thereon and having a water-space, a feed-door opening through one side, and one or more flue-openings leading upwardly from the fire-pot through the water-space, the under side of said section being recessed over the fire-pot next to the feed-door opening, whereby a deep fire-pot is afforded and the water-heating surface of the fire-door section is brought close to the fire, substantially as and for the purposes set forth.

6. In a sectional heater the combination of a fire-pot section having a water-space around the fire-pot, a feed-door section mounted thereon and having a feed-door opening in one side and segmental flue-openings forming sinuous water-passages, and a crown-section mounted upon the feed-door section and having a segmental flue-opening opposite a water-passage between flue-openings in said feed-door section, the water-space of each section communicating with the water-space of the adjoining section or sections and the top section having an outlet connection, substantially as and for the purposes set forth.

7. In a sectional heater the combination of a fire-pot section having a water-space around the fire-pot and an inlet connection, a feed-door section mounted upon the fire-pot section and having flue-openings dividing the water-space above the fire-pot into sinuous passages, a crown-section mounted upon the feed-door section and having a flue-opening and water-passage alternating with the flue-openings and water-passages of said feed-door section, and a top section mounted upon the crown-section and having an outlet connection and a water-space extending over the flue-opening therein, the water-space of each section communicating with that of the adjoining section or sections, substantially as and for the purposes set forth.

8. In a sectional heater the combination of a fire-pot section having a water-space around the fire-pot and an inlet connection, sections mounted one above another upon said fire-pot section and having alternating flue-openings and water-spaces, a top section having an outlet connection, and a smoke-box inclosing a space around and above said top section and having an outlet-flue connection at the top over said top section, substantially as and for the purposes set forth.

9. In a sectional heater the combination of a fire-pot section having a water-space around the fire-pot and an inlet connection with said space, a feed-door section mounted thereon and having horizontally-curved flue-openings and water-passages which communicate with each other and with inlet and outlet openings at the top and bottom on opposite sides of

the door-opening, a crown-section mounted upon the feed-door section and having a curved flue-opening and water-passages opposite the flue-openings in the feed-door section with a bottom inlet-opening registering with the outlet-opening of said feed-door section, and a central top outlet-opening, a top section having a water-space with a central bottom inlet-opening communicating with the outlet-opening of the crown-section, a top outlet-opening at one side of the center and an interposed baffle-plate, and a smoke-box inclosing the top section and provided at the top with an exit-flue connection, substantially as and for the purposes set forth.

10. In a sectional heater the combination of a number of approximately circular sections mounted one above another, the lower section having a water-space around the fire-pot with an inlet connection on one side and

an outlet-opening at the top, the top section having a central inlet-opening in the bottom, an eccentric outlet connection at the top and an intervening curved baffle-plate, and the intervening sections being recessed on the under side and having alternating curved flue-openings and water-passages which communicate with each other and with the water-space in the fire-pot section and top section, and a smoke-box inclosing the top section in communication with the flue-opening through the section below it and having an exit-flue connection, substantially as and for the purposes set forth.

In witness whereof I hereto affix my signature in presence of two witnesses.

SAMUEL E. PORTER.

Witnesses:

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JOHN H. HURLEY.