(No Model.) 3 Sheets—Sheet 1.

A. SPENCE.

WATER HEATER.

No. 359,105. Patented Mar. 8, 1887.

Fig. 1.

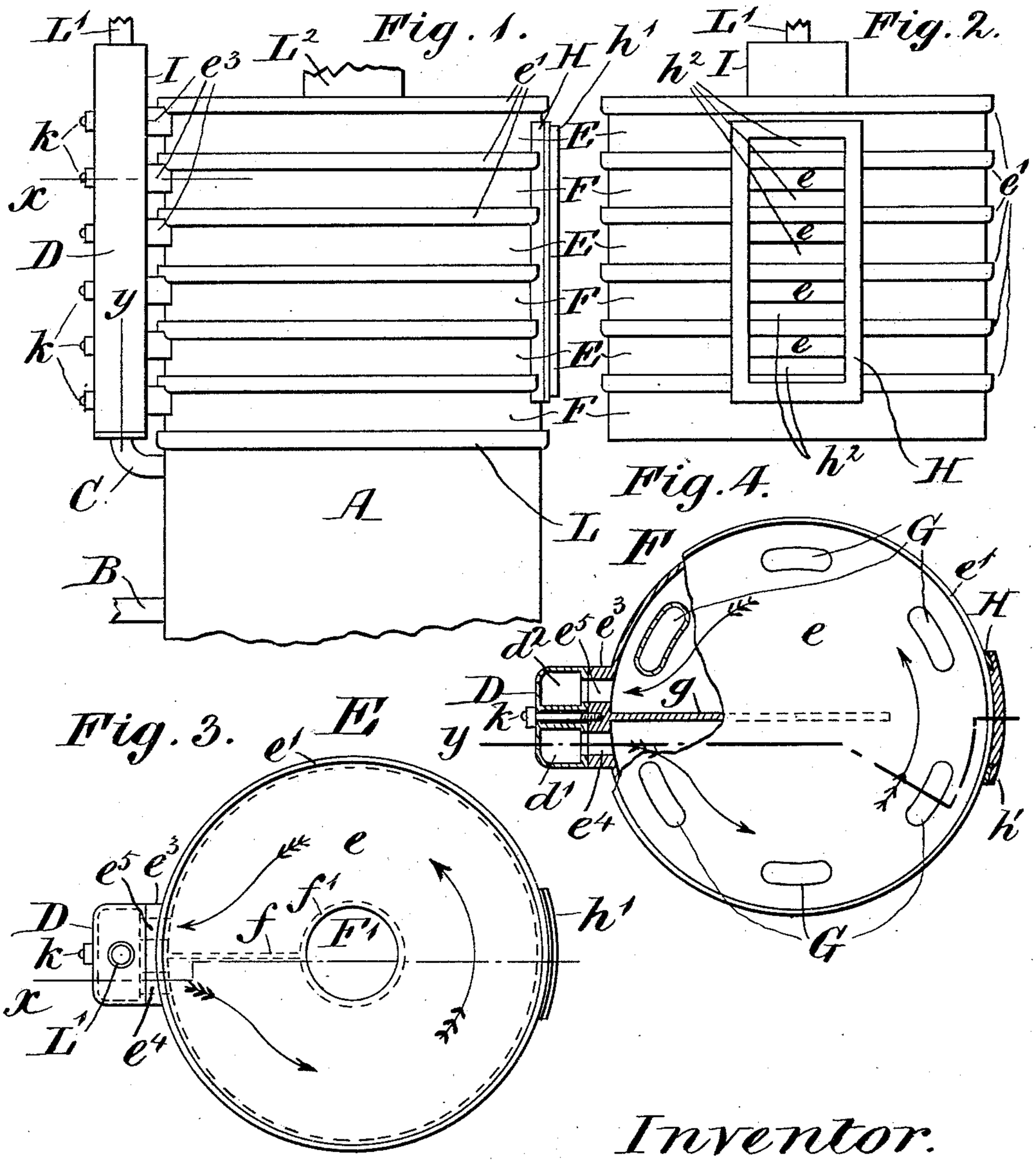

Fig. 2.

Fig. 3.

Fig. 4.

Witnesses.

H. Irwin

Nap. Lozeau.

Inventor.

Archibald Spence

By his Attorney

Charles G. Simpson

(No Model.) 3 Sheets—Sheet 2.

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WATER HEATER.

No. 359,105. Patented Mar. 8, 1887.

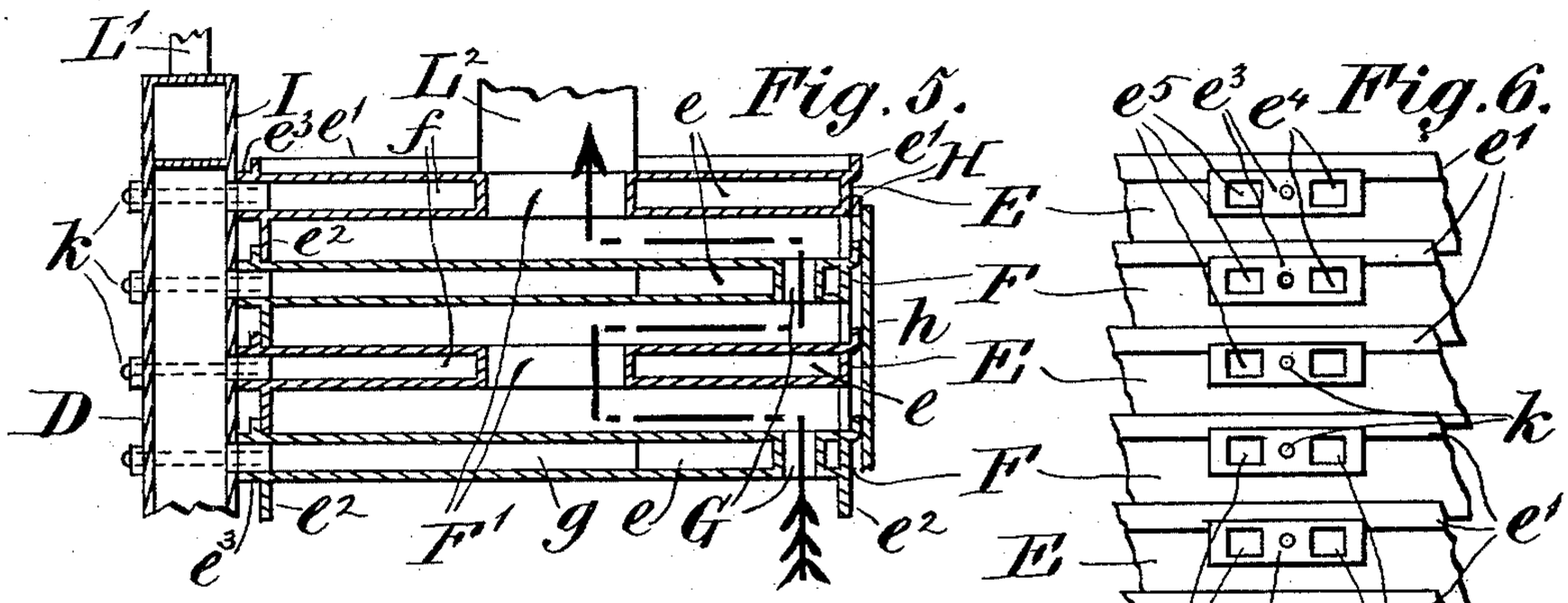
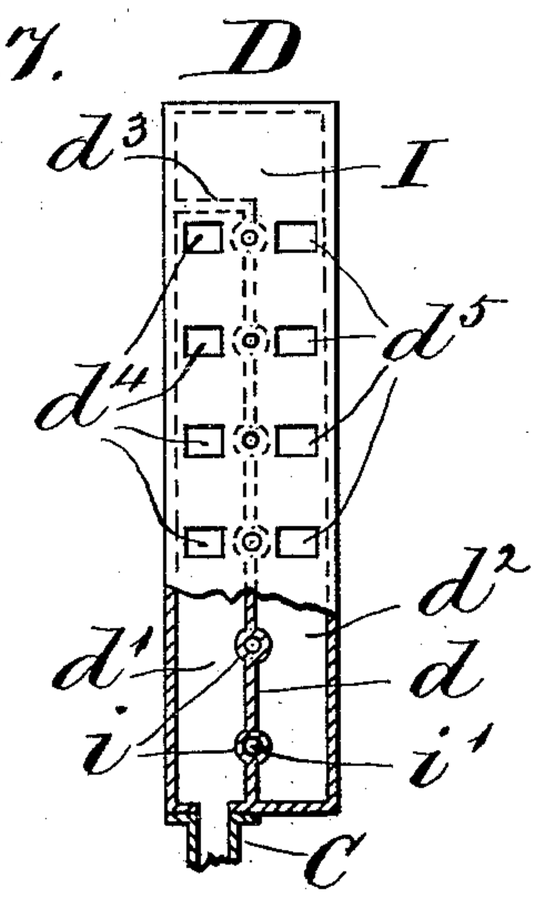


Fig. 5.

Fig. 6.

Fig. 7.



Witnesses.
H. Irwin
Nap. Lozeau.

Inventor.
Archibald Spence
By his Attorney
Charles G. Simpson

(No Model.) 3 Sheets—Sheet 3.

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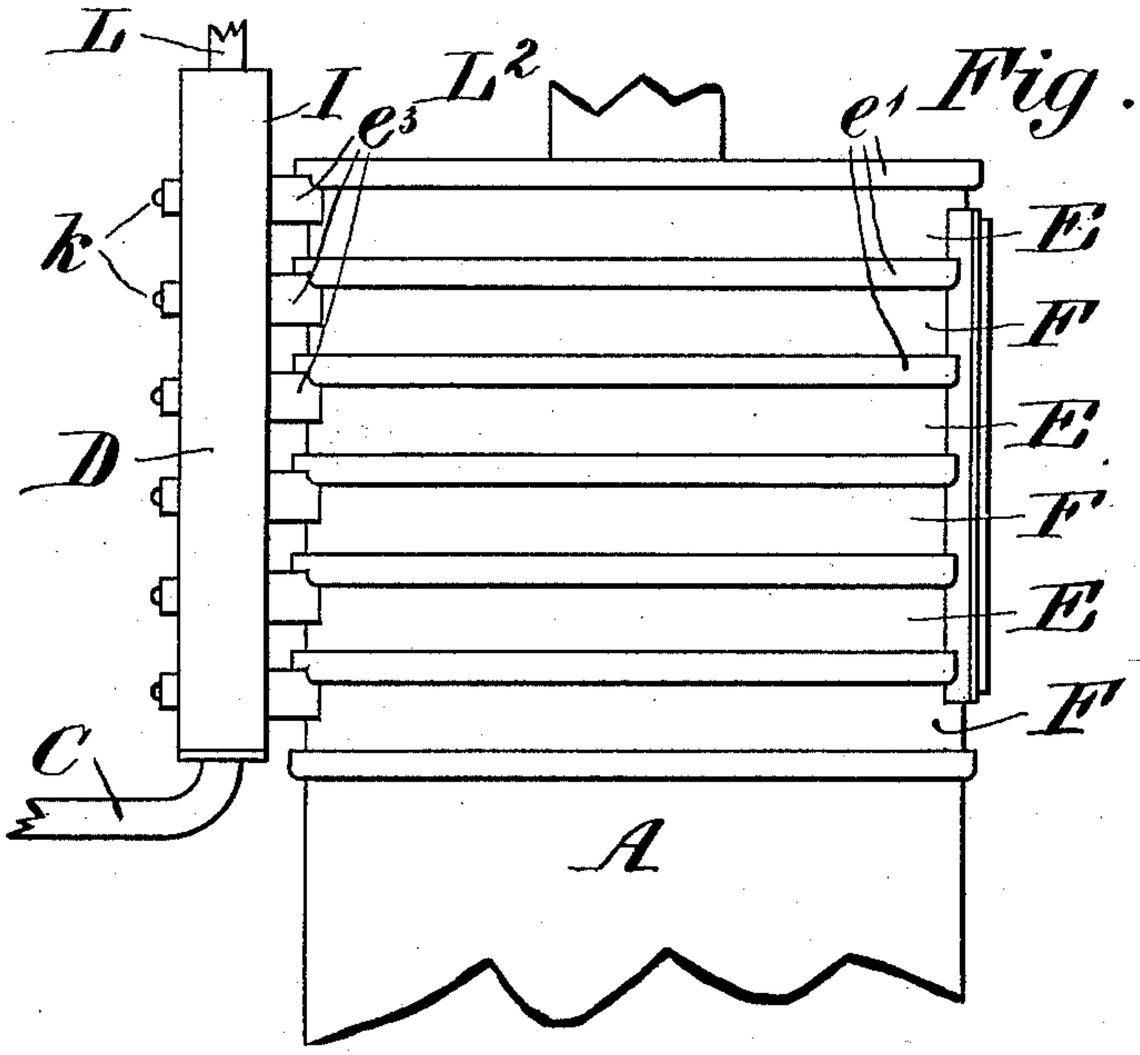

Witnesses.
Henri B. Dorval
A. Irwin.

Inventor:
Archibald Spence
By his Attorney
Charles G. Simpson

UNITED STATES PATENT OFFICE.

ARCHIBALD SPENCE, OF MONTREAL, QUEBEC, CANADA, ASSIGNOR TO WARDEN KING, OF SAME PLACE.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 359,105, dated March 8, 1887.

Application filed December 28, 1886. Serial No. 222,773. (No model.) Patented in Canada May 17, 1886, No. 24,079.

To all whom it may concern:

Be it known that I, ARCHIBALD SPENCE, of the city of Montreal, in the District of Montreal, and Province of Quebec, Canada, have invented new and useful Improvements in Water-Heaters; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention has reference to an improved construction of sectional boilers or water-heaters of the class used in connection with a system or systems of circulating-pipes, by means of which the heat of the water or steam is circulated and distributed as desired, to reduce the cost and labor of such heaters in their construction, and give a very effective heater.

The features or combination of parts which form the present invention will be hereinafter set forth and claimed.

In the drawings hereunto annexed similar letters of reference indicate like parts; and Figure 1 is a side elevation of a sectional boiler or water-heater embodying my invention. Fig. 2 is a front elevation of the sections of the boiler or water-heater shown in Fig. 1. Fig. 3 is a plan of the boiler or water-heater shown in Fig. 1. Fig. 4 is a plan of the sections F of the boiler or water-heater. The sectional part of this figure is taken on line *x*, Fig. 1. Fig. 5 is a section at line *x*, Fig. 3, of the casing D and of the sections E, while the section of the sections F is shown as taken on line *y*, Fig. 4. Fig. 6 is an elevation of the faces of the projections e^3. Fig. 7 is an elevation in part of the casing D and in part a section taken at line *y*, Fig. 1. Fig. 8 is a side elevation of a modification.

Letter A is an ordinary furnace, the outline of which only is shown. It is preferably a "water-cased" furnace, but not necessarily so. If a water-cased furnace, B, is the water-inlet pipe to it and C is the water-outlet pipe from the water-casing to a casing, D, which connects with all the sections E and F, used in forming the sectional portion of the boiler or water-heater. The sections E and F are to some extent of two different forms or constructions, and are set together or built alternately—at the top a section, E, next a section, F, again a section, E, under it a section, F, and so on for whatever number of sections may be employed. This alternation is shown in the drawings.

The sections E and F may be made of any desired shape in plan. As shown, they are circular. The sections E consist of a water or double casing, *e*, provided with an enlarged upper circumferential flange, e', a lower flange, e^2, of proper size to fit within the flange e', a projection, e^3, having ports e^4 and e^5. These sections E are also provided with a central opening, F′, and a diaphragm, *f*, uniting with the projection e^3, and extending to and uniting with the wall f' of the opening F′. The sections F are the same as the sections E, above described, in so far as being formed of the casing *e*, with enlarged flanges e', flange e^2, and projections e^3, and these parts are the same sizes as in the sections E; but the sections F are provided with a number of openings, G, situated near the outer edge of the sections, and in this case the diaphragms *g* are carried a greater distance part way across the sections, as shown in Fig. 4.

H is a frame, to which is attached a sweep-hole door, h'. With the exception of the lowest section of whatever number may be used, the flange e^2 does not extend completely around the sections; but where the opening of the frame H occurs the portion of the flange e^2 is omittted, as shown in Figs. 2 and 5, thus leaving openings h^2, to reach in and clean out any soot or ashes which may collect upon the upper inner surfaces of the sections.

The casing D consists of a closed tube having a length somewhat greater than that of the height of the sections E and F when built together, as shown. It is provided with an inner diaphragm, *d*, dividing, with the diaphragm d^3, the space into two parts, d' and d^2, as shown in Fig. 7.

In the face I of the casing D ports d^4 are formed, agreeing with the ports e^4 of the sections E and F, and ports d^5, agreeing with the ports e^5 in the said sections.

The diaphragms *d* and d^3 are integral with the casing D, and in the diaphragms *d* are formed enlargements *i*, having openings i' for bolts *k* to pass through and screw into the center of the projections e^3, screwed holes being formed in the projections for this purpose.

The manner of fitting up the sections and

casing is to lay or build together the sections E and F (whatever number may be required) in proper order, with the projections e^3 agreeing as nearly as can be. When so built, they are firmly clamped or bound together and put on a planing-machine, and all the faces of the projections e^3 dressed off to a true surface in one and the same plane. The face I of the casing D is also planed off true and laid upon faces of the projections e^3 and adjusted so that the ports e^4, e^5, d^4, and d^5 agree. The bolts *k* are then put in and the casing and sections united together, after which the clamps, &c., by which the sections have been held together during the said operation of planing, are cast off and the sections are ready to be united with the furnace A, which will be provided with a flange, L, or other ordinary means for forming a proper joint with the bottom flange, e^2, of the lowest section.

If the furnace A is not a water-cased one, the pipe C will not connect, as shown in Fig. 1, but will unite with the "return" of any ordinary system or systems of heater-pipes usually connected with heaters of this class, as shown in Fig. 8.

L′ is a pipe, one or more of which may be attached to the upper part of the casing D, to connect any desired number of systems of heater-pipes therewith.

L^2 is any suitable flue or chimney by which the products of combustion are carried off. These, arising from the furnace A, are compelled by the situation of the openings F′ and G to travel by the circuitous route indicated by the arrow in Fig. 5, thus causing a large amount of very effective heating-surface.

The water entering the casing D by the pipe C in the part d' passes through the ports d^4 and e^4 into the sections E and F and circulates through them, as indicated by the arrows shown in Figs. 3 and 4, the heat of the water being raised while so doing, and by the ports e^5 it passes into the part d^2 of the casing D to the pipe L′ for circulation.

It will be observed that by this arrangement of the sections E and F they form a casing which incloses the smoke and products of combustion.

What I claim, and wish to secure by Letters Patent, is as follows:

1. The combination, with a furnace, of the sections E, having flanges e' and e^2, openings F′, diaphragms *f*, projections e^3, and ports e^4 and e^5, sections F, having flanges e' and e^2, openings G, diaphragms *g*, projections e^3, and ports e^4 and e^5, and with casing D, provided with ports d^4 and d^5, and diaphragms d d^3, also provided with inlet and outlet pipes, as described, the whole united and operating substantially as described.

2. The combination, with a furnace, of the sections E, having openings F′, projections e^3, having ports e^4 and e^5, and diaphragms *f*, sections F, having openings G, projections e^3, having ports e^4 and e^5, and diaphragms *g*, with a casing, D, connecting the ports in the manner described, and provided with inlet and outlet pipes, as described, the whole substantially as set forth.

ARCHIBALD SPENCE.

Witnesses:
CHARLES G. C. SIMPSON,
NAP. LOZEAU.