

(No Model.)

3 Sheets—Sheet 1.

D. E. HOWATT.  
SECTIONAL WATER HEATER.

No. 431,355.

Patented July 1, 1890.

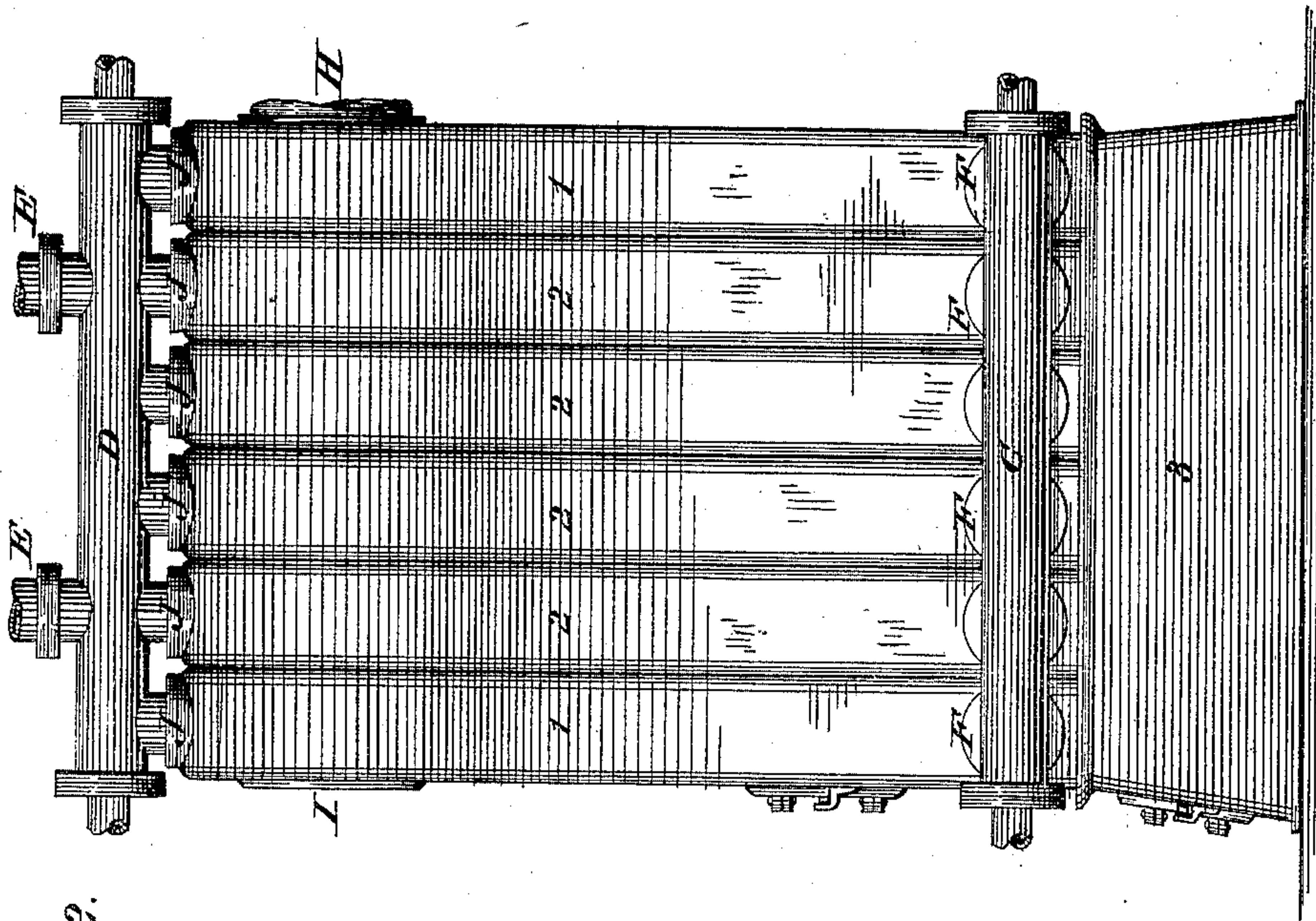
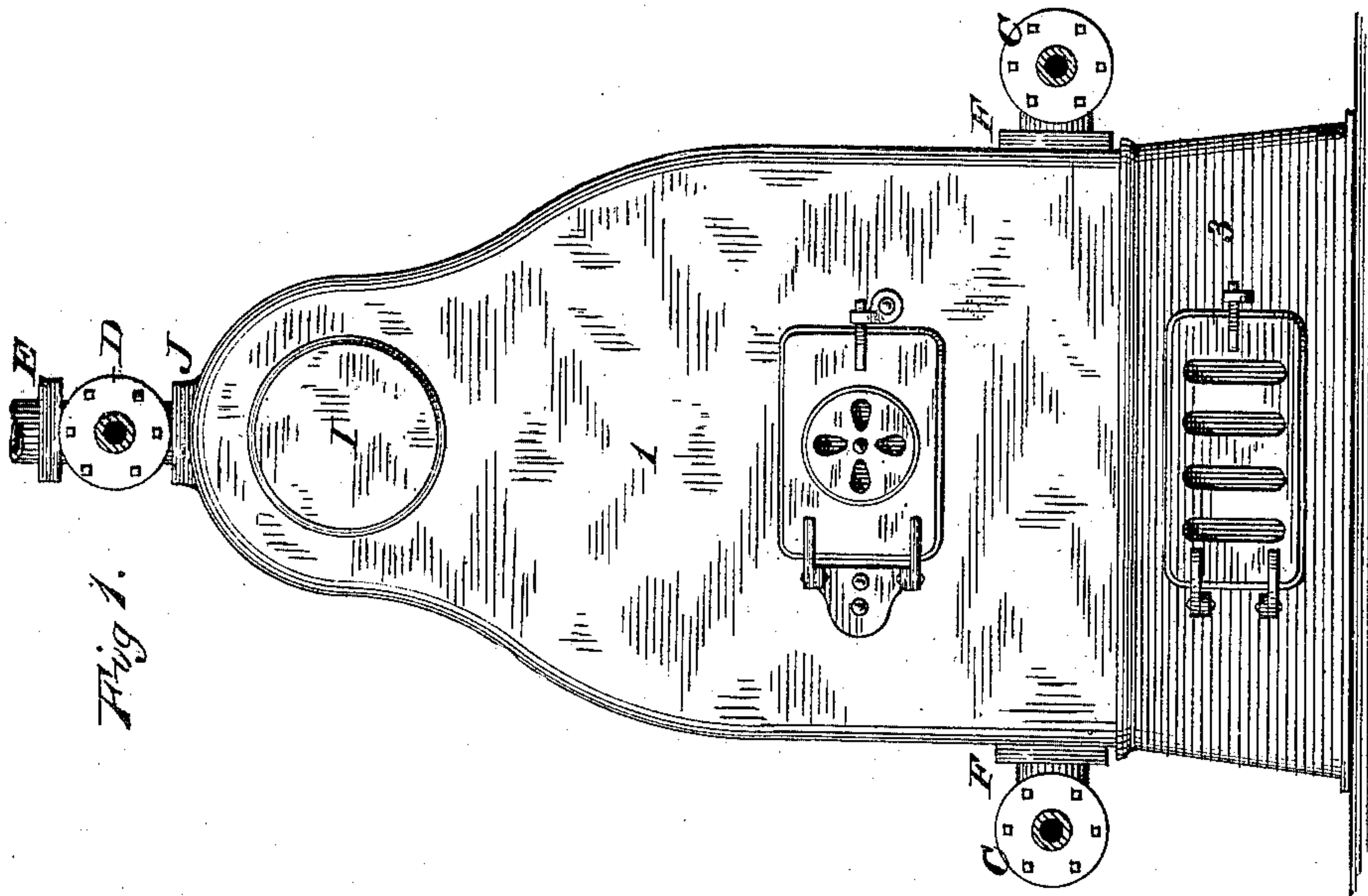


Fig 2.



Dir. H.

WITNESSES;

*Harry King*  
*C. W. H. Hines*

INVENTOR:

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David E. Hywatt  
By Irving Elting  
Attorney

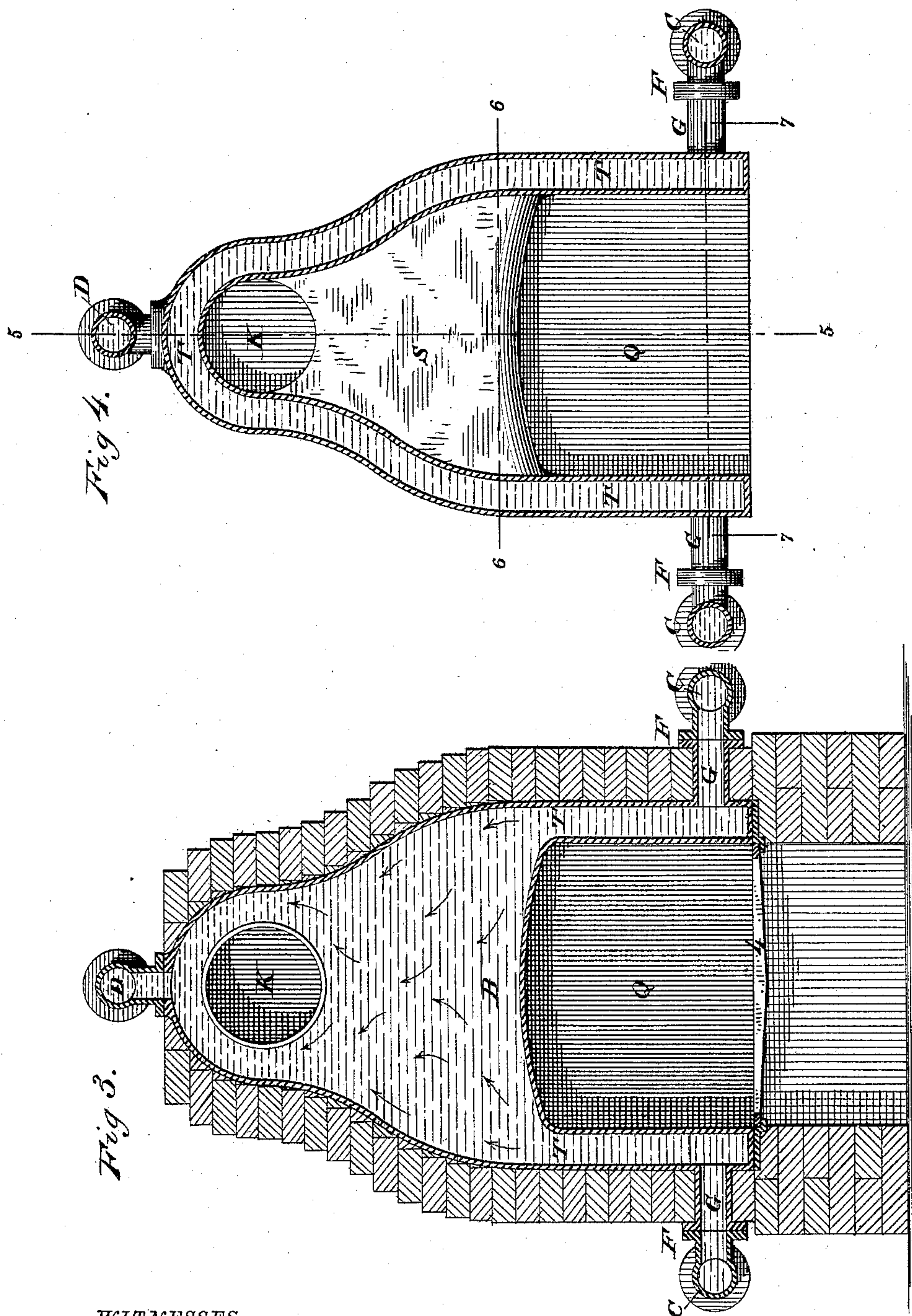
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Fig 6.

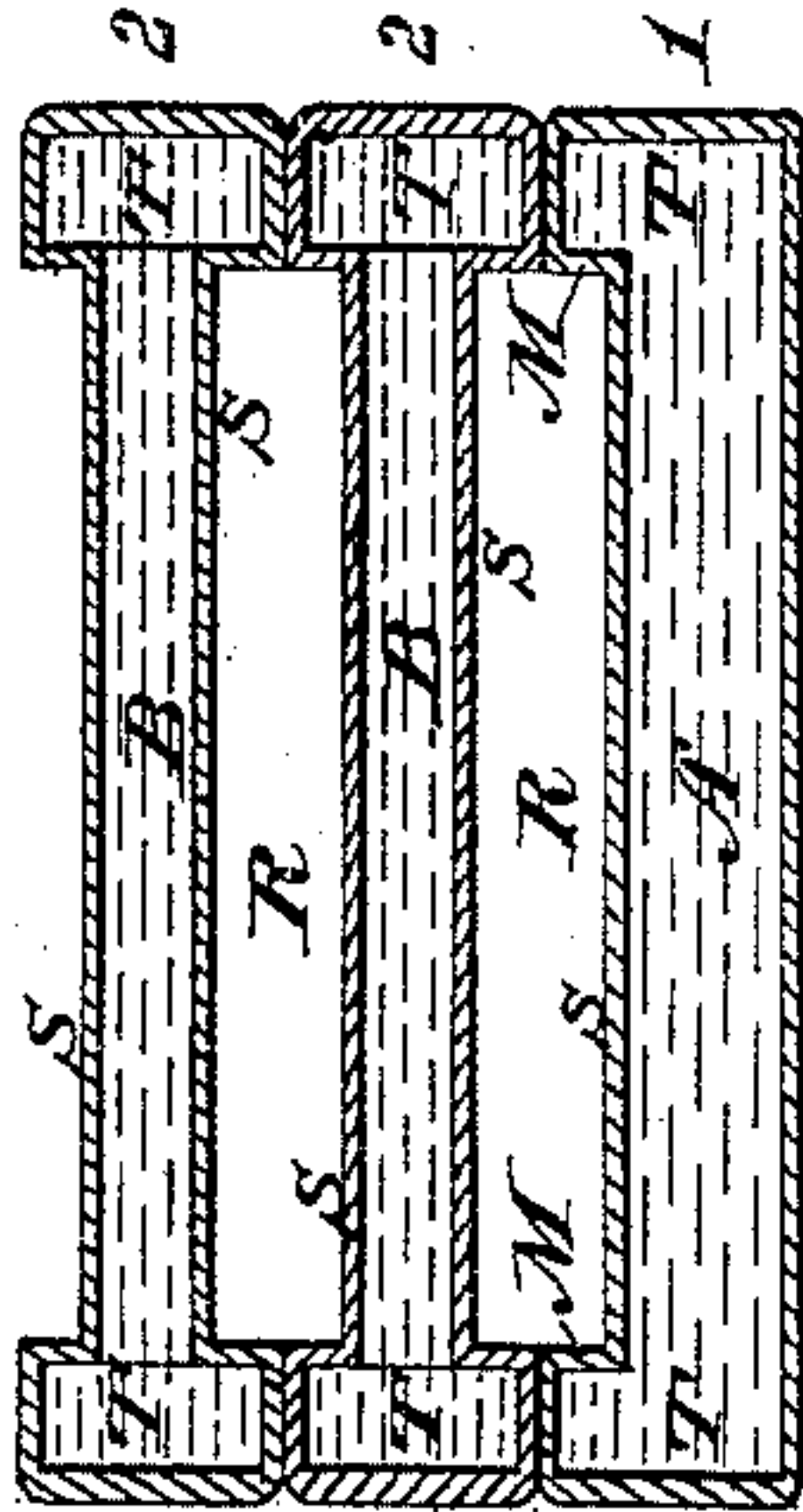


Fig 7.

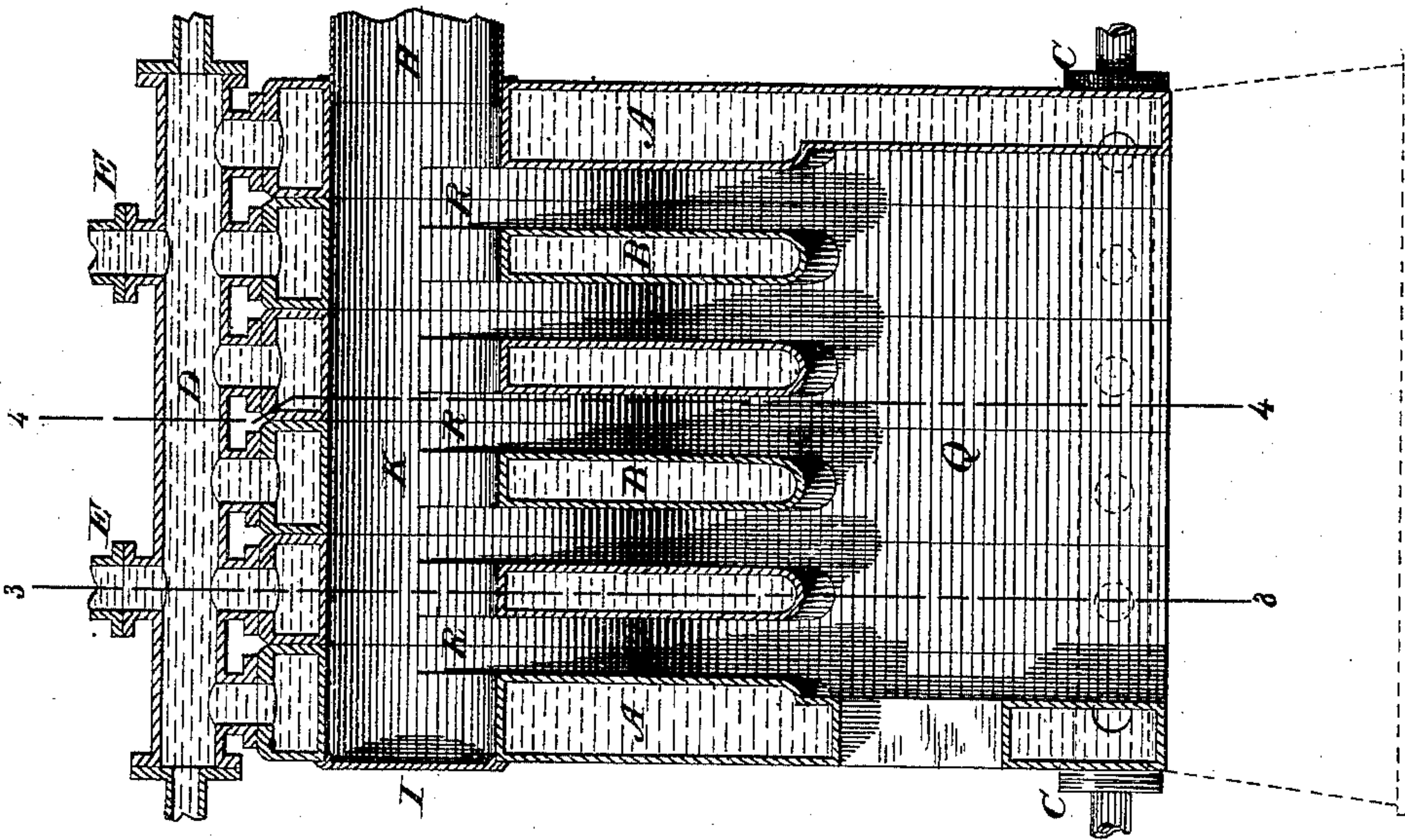
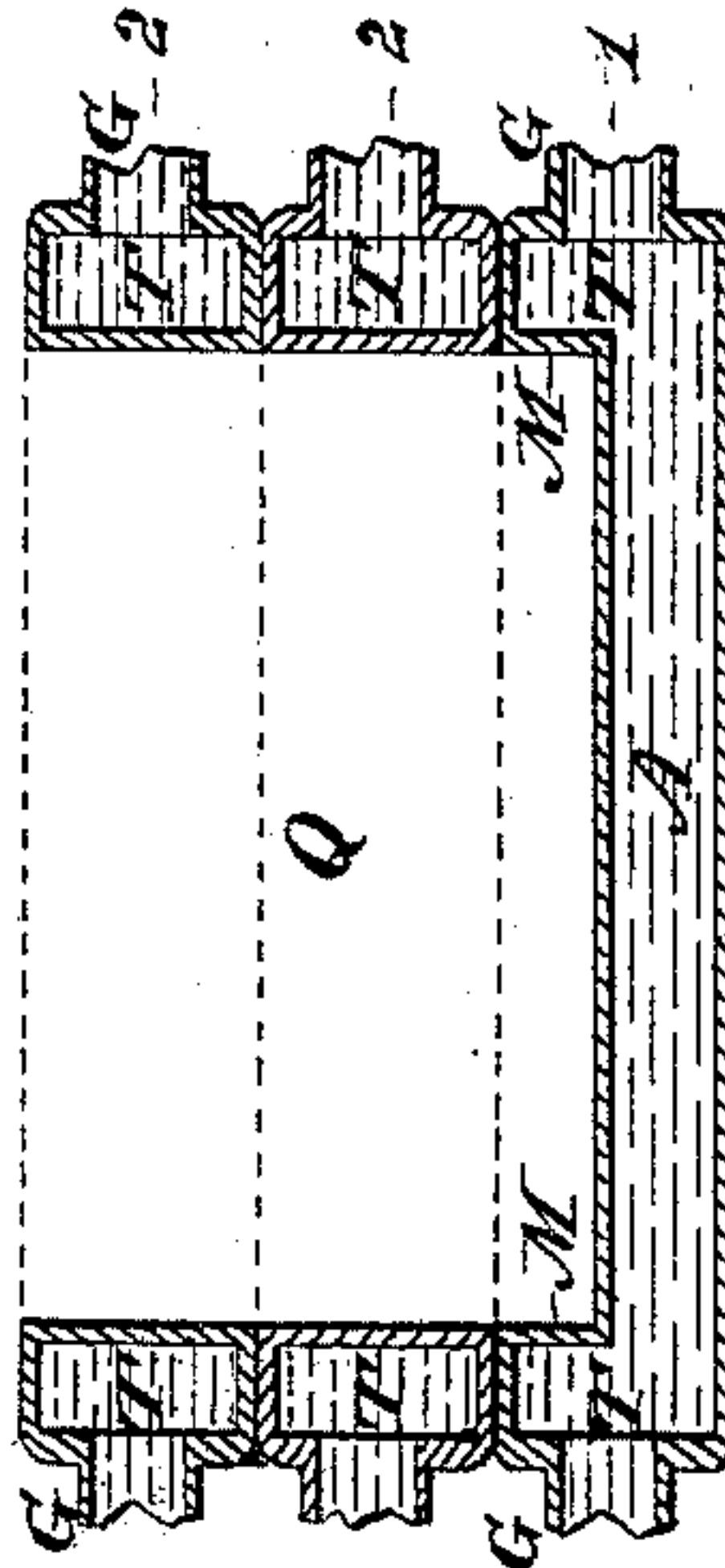


Fig 5.

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# UNITED STATES PATENT OFFICE.

DAVID E. HOWATT, OF HYDE PARK, NEW YORK.

## SECTIONAL WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 431,355, dated July 1, 1890.

Application filed April 14, 1890. Serial No. 347,857. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID E. HOWATT, a citizen of the United States, residing at Hyde Park, in the county of Dutchess and State of New York, have invented certain new and useful Improvements in Sectional Water-Heaters; 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 sectional water-heaters in which the sections, when placed together side by side, as hereinafter more particularly described, constitute a complete heater consisting of water-legs, outer and inner shells, smoke-flues, dome, and fire-box, without other joints than those formed by the union of the sections themselves, this union of sections being in the fire-spaces and not in the water-cells; and the objects of my improvements are to provide a sectional heater which has, first, an uninterrupted upward flow of water from the bottom to the top; second, great direct heating-surface and even distribution of water over the whole of it; third, freedom from all water-joints within the heater proper, which is conducive to safety and to cheapness of repairs in case of accident; fourth, adaptability to all classes of work; fifth, ease in handling, and, sixth, strength and cheapness in construction. I attain these objects by the device illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of my heater. Fig. 2 is a side elevation of the same, showing six sections united by outside pipe-connections. Fig. 3 is a vertical cross-section cut on line 3 3 of Fig. 5, showing the relative position of fire-box, water-space, and smoke-flue, and showing the heater set in brick. Fig. 4 is a vertical cross-section cut on line 4 4 of Fig. 5, showing the relative positions of fire-box, fire-space, smoke-flue, and uniform outside water-leg. Fig. 5 is a vertical section cut through center of heater from front to back, or on line 5 5 of Fig. 4, showing the relative positions of outside water-leg, interior water-cells, fire-box, upper fire-spaces, and smoke-flue. Fig. 6 is a longitudinal view of an outer and two inner sections of my heater, cut at line 6 6 of Fig. 4;

and Fig. 7 is a longitudinal view of an outer and two inner sections of the same, cut at line 7 7 of Fig. 4, and showing water-legs outside the fire-box.

Similar letters and figures refer to similar parts throughout the views.

The front and back sections of my heater (represented by 1 1) are practically the same in construction. Both are cast with a collar H to receive on the front section a cover I to the smoke-flue K, to facilitate cleaning the heater, and to receive on the back section a pipe leading to the chimney; and it may be convenient, especially for heaters having a large number of sections, to have a fire-door in the back section as well as in front, though it is not shown in the drawings. All the intermediate sections 2 2 are duplicates in every particular, and are cast in a single piece with a core which has its only openings at the top to make the manifold connections with the outlet-pipe D, and at either side at the bottom for connections with the return and inlet pipes C C, the connections being made at the top by the flanges E and at the bottom by flanges F.

The precise character of the heater may be best indicated in connection with the above preliminary general description by noting the details of a single section 2, as shown in Figs. 3, 4, and 5. In Fig. 3 we have a view cut vertically through the center of one of these sections, showing the fire-box space Q and the smoke-flue K surrounded by the inner water-space B, having its inlets G G and its outlet into D. The inlet-hubs G G are shown long to admit of a brick setting, if desired.

In Fig. 4 we see in effect a plan view of a side of one of the intermediate sections 2, except that the casting is cut away by the draftsman to show the uniform water-space T, surrounding the fire-box Q and the smoke-flue K. Imagine this not to have been cut away on this view and we have a plan view of a complete section of my heater, showing the outside of the metal casting surrounding water-space T of one of the inner sections, the outside water-leg of the outer sections being represented by A. In it are the openings Q for the fire-box and K for the smoke-flue.



S represents a depressed portion of the casting, the same on either side of each section, and this depression S of the casting, when placed next a similar depression in the next section of the heater, forms the heat-flues R, extending from the fire-box Q to the smoke-flue K and surrounding the interior water-spaces represented by B in Fig. 5. These interior water-spaces, which are directly over the fire-box in the center of each section, are within the contracted portions of the casting represented by S; but they are also a part of the same water-space which in its outer portion is designated by T. This complete union of the water-spaces (represented in the drawings by B and T) is shown in Figs. 3 and 6. The result of this novel arrangement of the hollow water-space in each casting is to bring every particle of water into closest possible contact with the fire-box and heat-flues and to permit a steady and uninterrupted flow of heated water from bottom to top. To further facilitate the rapid outward flow of the heated water, the outlet-pipes which connect each heater-section with D may be made oblong from side to side, instead of being round, as shown in the drawings. It may be as well also to have the inlet-openings G at the bottom of each section oblong in a vertical direction, where they make the manifold pipe-connections with C, as this form of opening not only gives greater entrance-room for the water, but also affords better facilities for securing perfect castings. The outside sections 1 1 may be cast with a depression on the outer side corresponding with S on the inner side, which will make the water-space A no wider than that at B between the sections, and will thus tend to make the circulation of heated water entirely uniform in every part. In Fig. 5 the outside sections do not show this depression, and thus the space A is wider than B. At the lower part of the water-legs of the outside sections this uniformity in the width of the water-space is produced by narrowing the interior portion of the casting opposite the fire-box, as shown in Fig. 5, and as indicated in Fig. 7 by dotted line M M.

Any desired number of outlet-hubs with flanges E may be used to carry the heated water to radiators in different parts of the building. Any ordinary base 3 and grate 4 may be used with this heater, the grates and bases being made of different sizes corresponding with the different numbers of sections which it is desired to use with them.

It will readily be seen that it is possible to place one of my heaters of any size in a building by taking it in conveniently in sections, and yet not be obliged to encounter the difficulty and danger of fitting any water-tight joints within the heater itself in order to put it in running condition. All the joints between the sections are fire-box joints, which may be filled with asbestos, as in Fig. 2, or bricked over, as shown in Fig. 3. The safety

and economy of this feature of my heater can hardly be overestimated.

Another novel and valuable feature of my invention consists in my arrangement for manifold outside pipe-connections for water-inlet and outflow, by means of which it is possible to cut off or add one or more sections, and thus decrease or increase the capacity of the boiler to any extent or for any purpose whatever. If, for instance, a break occurs in any casting or section of the heater, the inlets and the outlet to that section may be cut off from the rest of the heater by simply unscrewing its flange-connections at F and J, inserting pieces of sheet-iron and screwing up again. The heater may then be run as before without the slightest interference to the free circulation of the water and the perfect action of the heater in every respect; or, if it were necessary to remove a section for the purpose of repairs, it could readily be done by severing the pipe-connections of that section, and the plugging of two openings in C C and one in D would suffice to put the heater in running order, notwithstanding the temporary loss of the section needing repairs. This independent operation of all the sections may be utilized whenever it is desired to decrease the heating capacity of the boiler, as is often convenient upon the approach of the warm season. The back portion of the fire-box may then be temporarily bricked up to any extent, and the heat-flues R R between a corresponding number of sections may be cut off from the smoke-flue K by inserting sheet-iron circular pieces in the bottom of smoke-flue K to shut off the draft, while the remaining sections do their work as perfectly as before and with economy of fuel proportionate to the amount of hot water required. Finally, if after my heater has been set in place with a sufficient number of sections to do the required work it becomes necessary to increase the heating capacity of the boiler for additional work, a new heater is not required. One end section may be disconnected, the grate, base, and the pipes C and D extended, any number of new sections inserted between the old sections and the advanced end section, and a heater of a third or half greater heating capacity is quickly and cheaply obtained.

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

1. A sectional water-heater in which each section consists of a continuous water-space surrounding fire-box and smoke-flue openings and somewhat depressed in the center over the fire-box to form, when placed adjacent to another section, a heat-flue conducting the products of combustion from fire-box to smoke-flue by direct draft and requiring no outer casing, as and for the purpose described.

2. A water-heater composed of sections containing continuous water-spaces depressed in the center to form heat-flues conducting the products of combustion by direct draft to the



smoke-flue, the said heat-flues alternating with the water-cells, as described, the several sections having no water-joints except at the inlet and outlet openings and being united only by outside manifold pipe-connections, as set forth.

3. A water-heater composed of two outer and one or more inner sections constructed with continuous jointless water-spaces connected over the fire-box to form heat-flues between the sections, leading by direct draft from fire-box to smoke-flue for the purpose of distributing the heat evenly along the water-cell surfaces, all the sections being united by outside manifold pipe-connections and placed above an ordinary ash pit and grate, substantially as described.

4. In a sectional water-heater, the combination of the sections 1 2 1, constructed with inside continuous water-spaces surrounding fire-box and smoke-flue, as described, and having between the sections heat-flues R, connecting the fire-box Q by direct draft with smoke-flue K, the base 3, and grate 4, and the outside inlet and outlet pipes C C D for uniting the water-spaces of all the sections at the openings G and J, as and for the purpose described.

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

DAVID E. HOWATT.

Witnesses:

IRVING ELTING,  
WM. R. WOODIN.