

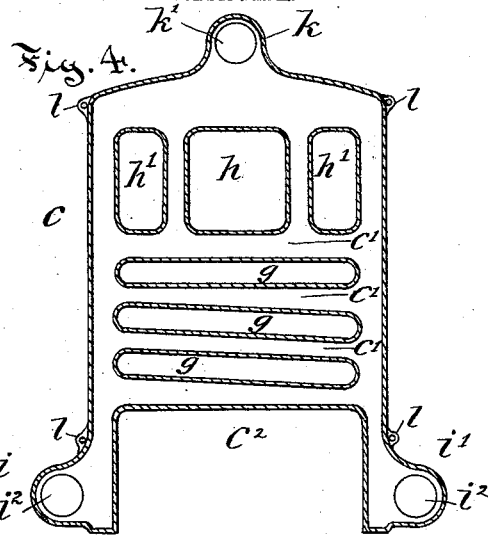
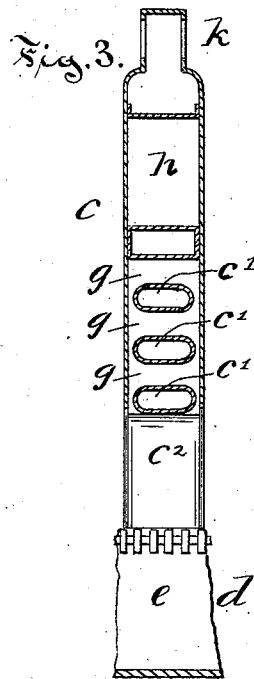
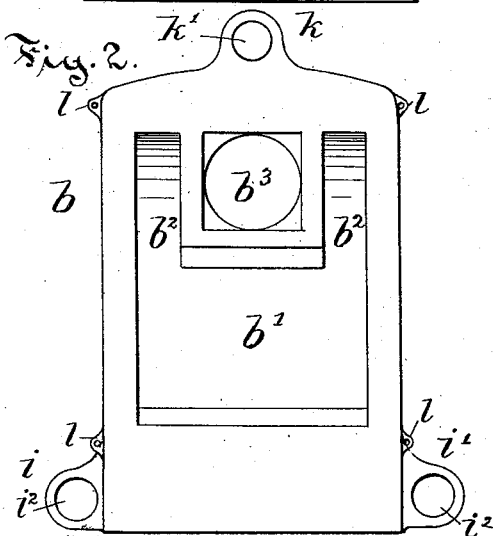
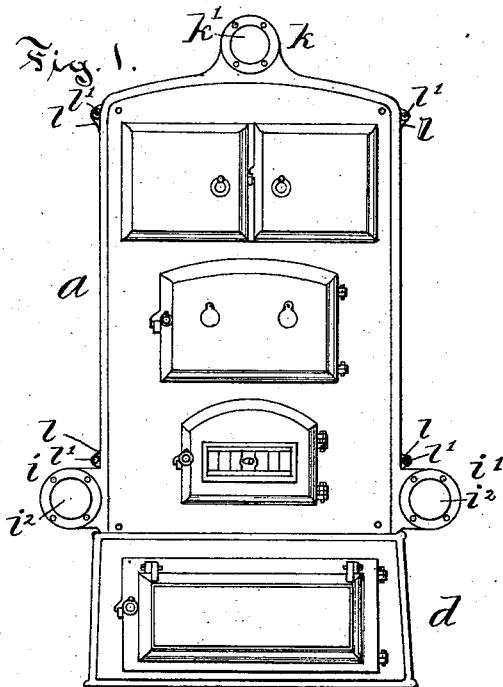
(No Model.)

3 Sheets—Sheet 1.

W. VANDERMAN.  
SECTIONAL BOILER.

No. 522,441.

Patented July 3, 1894.



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Fig. 5.

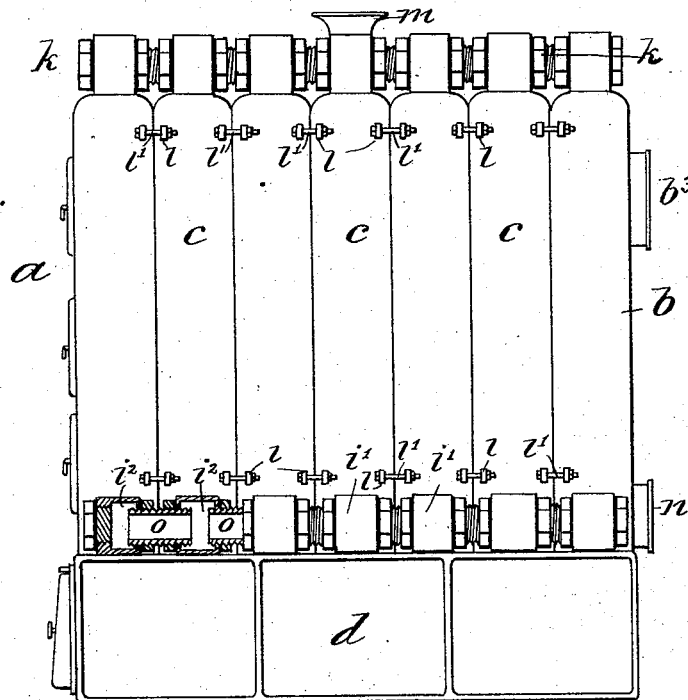
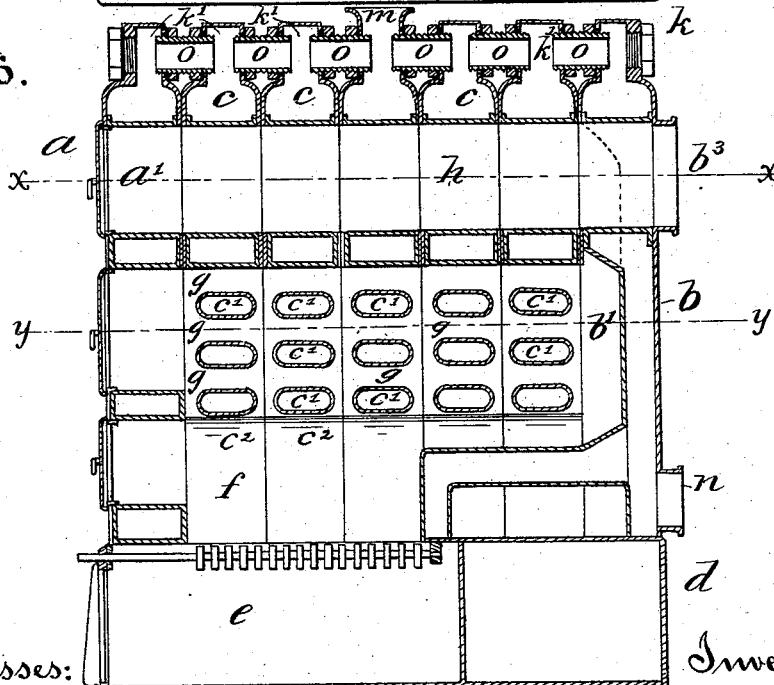


Fig. 6.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 7.

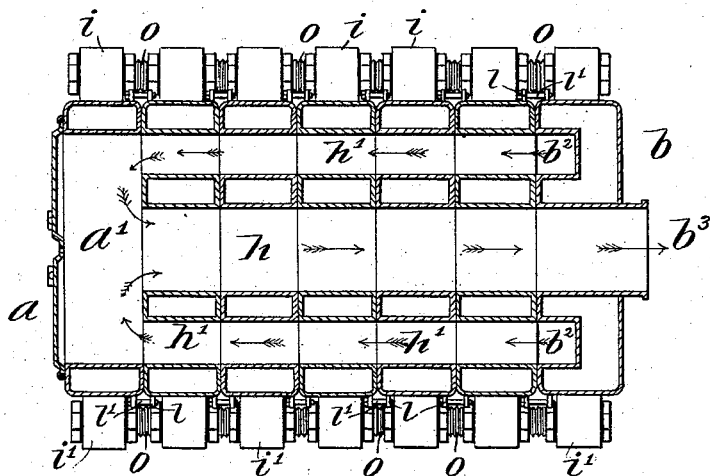
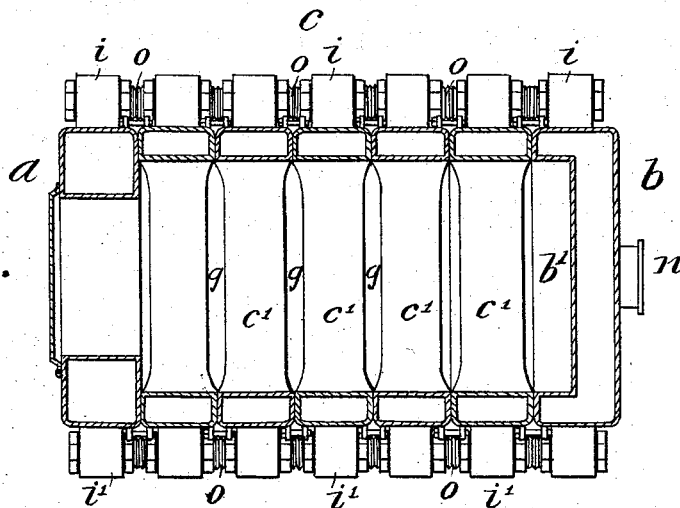


Fig. 8.



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# UNITED STATES PATENT OFFICE.

WILLIAM VANDERMAN, OF WILLIMANTIC, CONNECTICUT.

## SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 522,441, dated July 3, 1894.

Application filed November 6, 1893. Serial No. 490,109. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM VANDERMAN, of Willimantic, in the county of Windham and State of Connecticut, have invented certain new and useful Improvements in Heating-Furnaces, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My invention relates more particularly to the class of apparatus which are used for generating steam or for heating water for the purpose of heating buildings, although the use of the apparatus is not limited entirely to such purpose.

The object of my invention is to provide a sectional heater of this general class which shall be simple and comparatively cheap in construction and easily assembled and repaired.

To this end my invention consists in the details of the several parts making up the sectional heater and in the combination of such parts as more particularly hereinafter described and pointed out in the claims.

Referring to the drawings: Figure 1 is a detail view in front elevation of the furnace. Fig. 2 is a detail view in front elevation of the rear section. Fig. 3 is a detail view in transverse vertical section of an intermediate section. Fig. 4 is a view in vertical transverse section widthwise of an intermediate section of the furnace. Fig. 5 is a detail view in side elevation of the furnace as set up. Fig. 6 is a detail view in vertical lengthwise section through the furnace. Fig. 7 is a view in horizontal section of the furnace on the plane denoted by line  $x-x$  of Fig. 6. Fig. 8 is a like view on the line  $y-y$ .

In the accompanying drawings the letter  $a$  denotes the front section,  $b$  the rear section and  $c$  the intermediate sections of the boiler or furnace, the several sections being adapted to fit upon a base  $d$ , the front part of which forms the ash pit  $e$ .

The front section  $a$  is a hollow casting preferably of iron with walls as thin as practicable, and through this section are the several openings giving access to the fire box  $f$ , the combustion chamber flues  $g$  and smoke flue  $h$ , the front of these openings being closed by suitable doors. The interior of the hollow casting forms a water chamber, projections  $i$ ,

$i'$  at the sides of the base and  $k$  at the top of the section being perforated so as to form a part of a continuous water-way when the several sections are secured together. All of the sections are provided on adjacent sides with projections or ears  $l$  through which bolts  $l'$  are passed for securing the sections together.

The front and rear sections are simply chambered forming essentially water fronts and water backs, while the intermediate sections  $c$  form a series of transverse water ways  $c'$  and also openings or flues  $g$ ,  $h$  and  $h'$  for the passage of the heated products of combustion. Each of the intermediate sections has a recessed bottom  $c^2$  forming part of the combustion chamber, the flames rising in the chamber and passing around the oval shells of the water-ways  $c'$  in the vertical spaces between such water-ways and also in the horizontal spaces  $g$ . The hot products of combustion passing to the rear strike the chamber  $b'$ , rise at the sides through the narrower chambers  $b^2$  which connect with the flues  $h'$ , pass to the front into the chamber  $a'$  and then to the rear through the flue  $h'$ , out of the opening  $b^3$ , into the smoke stack. This arrangement of flues provides for a return or indirect draft and compels the complete circulation of the heated products of combustion carrying them into contact with a large heating surface and insuring the thorough absorption of all of the heat in the process of heating the water within the sections and the boiler as a whole. One or more of the sections is provided at the top with an outlet  $m$  for the passage of heated fluids from the boiler and an inlet or return connection  $n$  for the inflow of the colder fluids. The crosswise flues  $c'$  are inclined from a horizontal line and for that reason aid the circulation of water from side to side of the boiler so that when it is used as a hot water heater a good circulation of the water is insured.

One feature of my improvement resides in the location and arrangement of the connecting tubes  $o$  which enable the sections to be set up and united without any preliminary facing off of contact surfaces or planing of joints. Connection between the several sections is provided by short lengths or joints of pipe threaded on the outer surface and inserted in the openings  $i^2$ ,  $k'$ , which all regis-

ter with each other when the sections are set up in proper alignment. Each of the short tubes *o* is long enough to extend within any two of the adjacent projections and each supports two jam nuts which are turned in opposite directions until they bear against the faces of the opposite projections, an annular packing of suitable material being inserted between the under surface of the nut and the face of the projection. These connecting tubes *o* may be readily put in place or removed without taking the several sections apart.

After the furnace has been set up one of the sections can be slipped in through the opening until it is in the desired position, the nuts then screwed on the tube, packings introduced and the joint held firmly in place and sections on either side may be then connected in a similar manner. It is, of course, preferred to insert the several short tubular connections as each section of the boiler is set in place, but it is not necessary that it should be done at such time.

An important feature of my invention resides in the fact that the sections cast as described are ready for setting up as soon as they come from the mold without any preparatory cutting, trimming, or finishing of either faces or joints, or cutting of thread for connections between sections.

It is obvious that this improved heater may be used either as a steam boiler or hot water heater, but is particularly adapted and intended for use as a heating apparatus of the latter type for warming buildings.

I claim as my invention—

1. In combination in a sectional boiler, the several hollow sections with registering openings into the water-ways in the several sections, fastening means for securing the several sections together and means for connecting the sections comprising pipes fitting the unthreaded openings, and the jam nuts fitting the threaded surface of the pipe connection, all substantially as described.

2. In combination in a sectional boiler, the several hollow boiler-sections having flue openings, fastening means for securing the several sections together and the connecting means which comprise short pieces of pipe fitting unthreaded sockets in openings in the several sections which register with those of the adjacent section, jam nuts borne on said pipe and packings interposed between the face of the section and each nut, all substantially as described.

3. In combination in a sectional boiler, the hollow boiler-sections having flue openings, lateral projections on the several sections with openings on the sides toward the adjacent sections, means for securing the several boiler sections together and the removable joints comprising short pieces of threaded

pipe smaller in diameter than the said registering openings and with jam nuts fitted thereon, all substantially as described.

4. In combination in a sectional boiler, the hollow sections having crosswise water-ways and lengthwise flue openings, projections on the several sections having openings on the sides toward the adjacent sections which openings substantially register with each other, means for securing the several boiler sections together, and the removable joints comprising the threaded pipes smaller in diameter than said openings and with jam nuts thereon, all substantially as described.

5. In combination in a sectional boiler the chambered front and rear sections, intermediate hollow sections having crosswise water-ways and lengthwise flues, the open projections from the several sections arranged to register with each other, means for securing the several boiler sections together, the short removable threaded pipes smaller in diameter than the opening and each bearing two or more jam nuts and the packing located beneath the jam nuts, all substantially as described.

6. In combination in a sectional boiler, the cast metal hollow sections means for securing said sections together, a front section having doors covering openings for access to the several chambers and smoke flues, a hollow rear section having a chamber *b'* with narrow chambers *b<sup>2</sup>* communicating with return flues *l*, the intermediate section having return flues *h* and *h'* each section having lateral open projections arranged in line with each other, the tubular joint smaller in diameter than the opening in the projecting part of the section, adapted to connect two adjacent sections, the jam nuts and packing for the joints and the water inlet and outlet through the shell of the boiler, all substantially as described.

7. In combination in a sectional boiler, a hollow front section, a hollow rear section, intermediate hollow sections with the inclined crosswise water-ways and the lengthwise flue openings, the branched chamber in the inner surface of the rear section, the lengthwise flues extending from the branches of said chamber through the intermediate sections and the smoke flue communicating with the central opening through the intermediate sections, the fastening bolts securing the several sections together, and the tubular removable joints smaller in diameter than the opening into which the joint projects and extending between the projections on the several sections jam nuts on said joints and the water inlet and outlet of the boiler, all substantially as described.

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