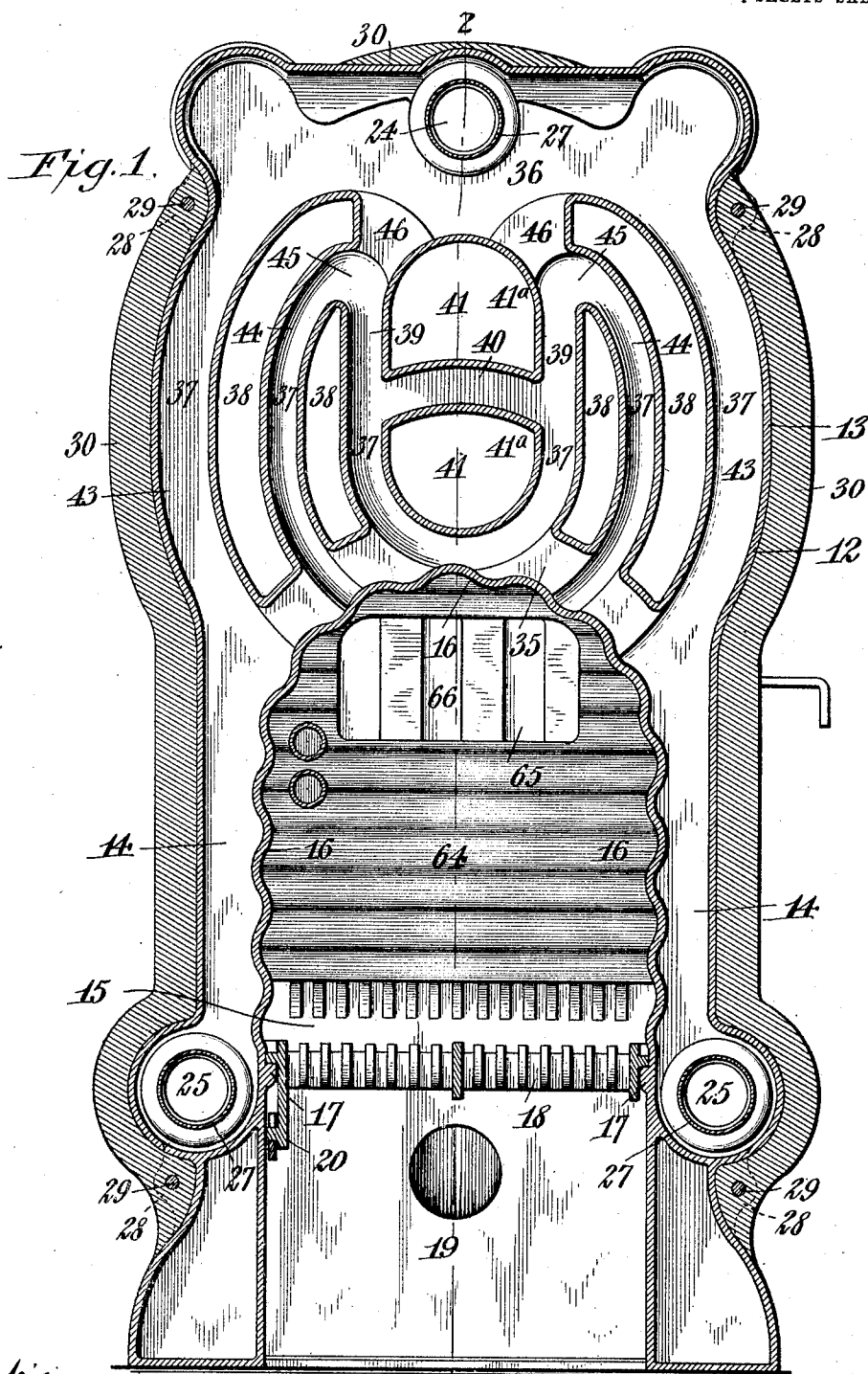


W. C. McKEOWN.
WATER HEATER OR BOILER.
APPLICATION FILED FEB. 21, 1908.

996,995.

Patented July 4, 1911.

4 SHEETS—SHEET 1.



Witnesses:
Christ Feinle, Jr.
Harry D. Rapp.

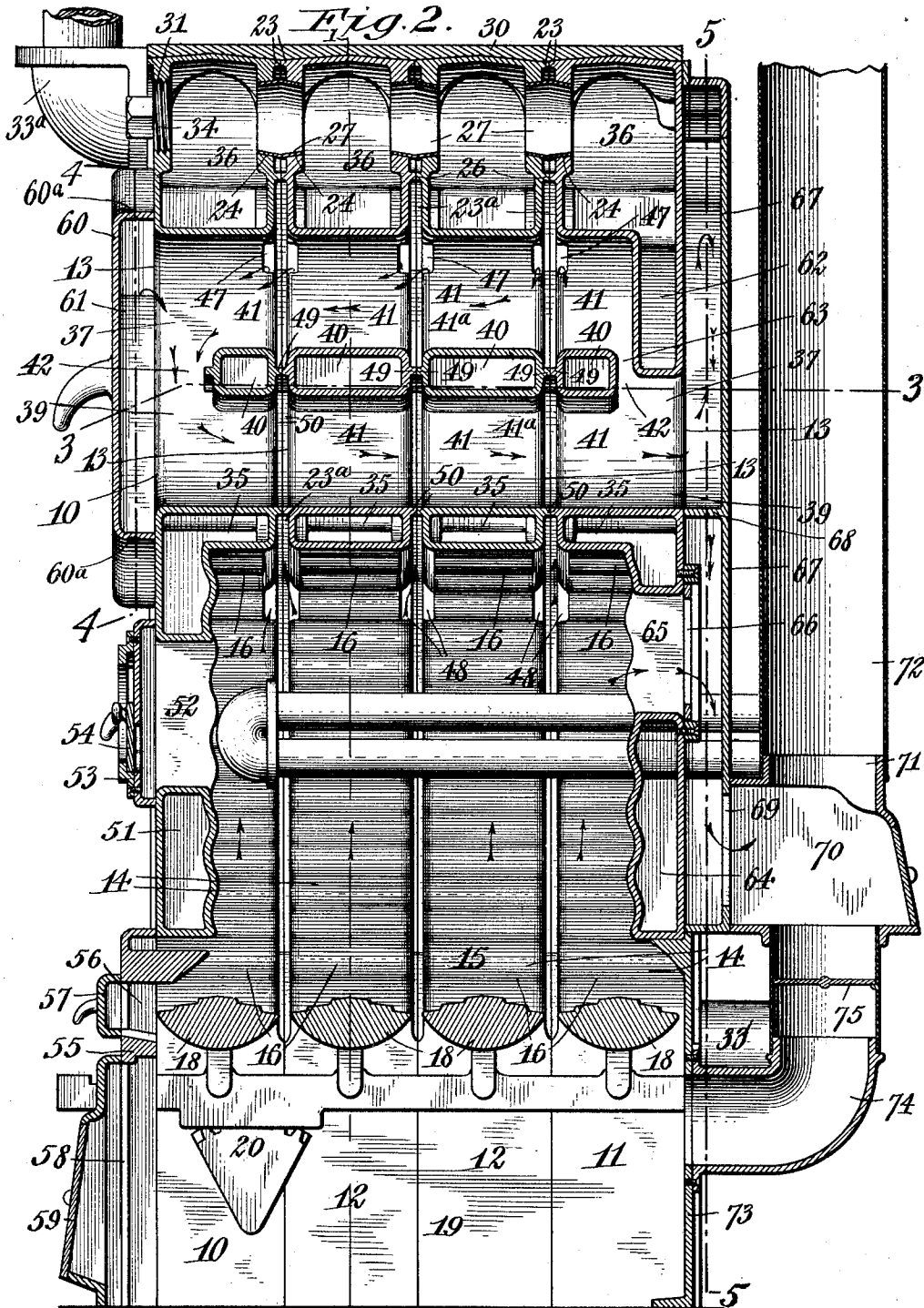
2 William C. McKeown, Inventor.
By Emil Neuhart,
Attorney.

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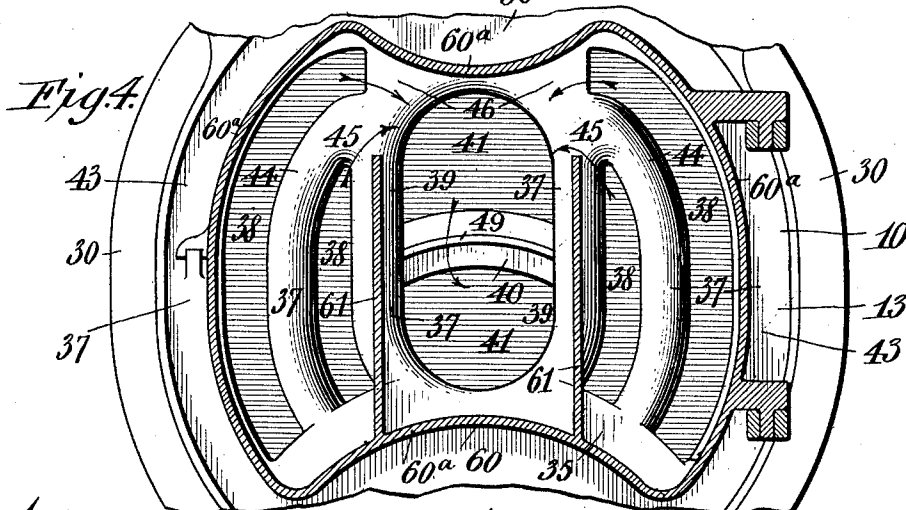
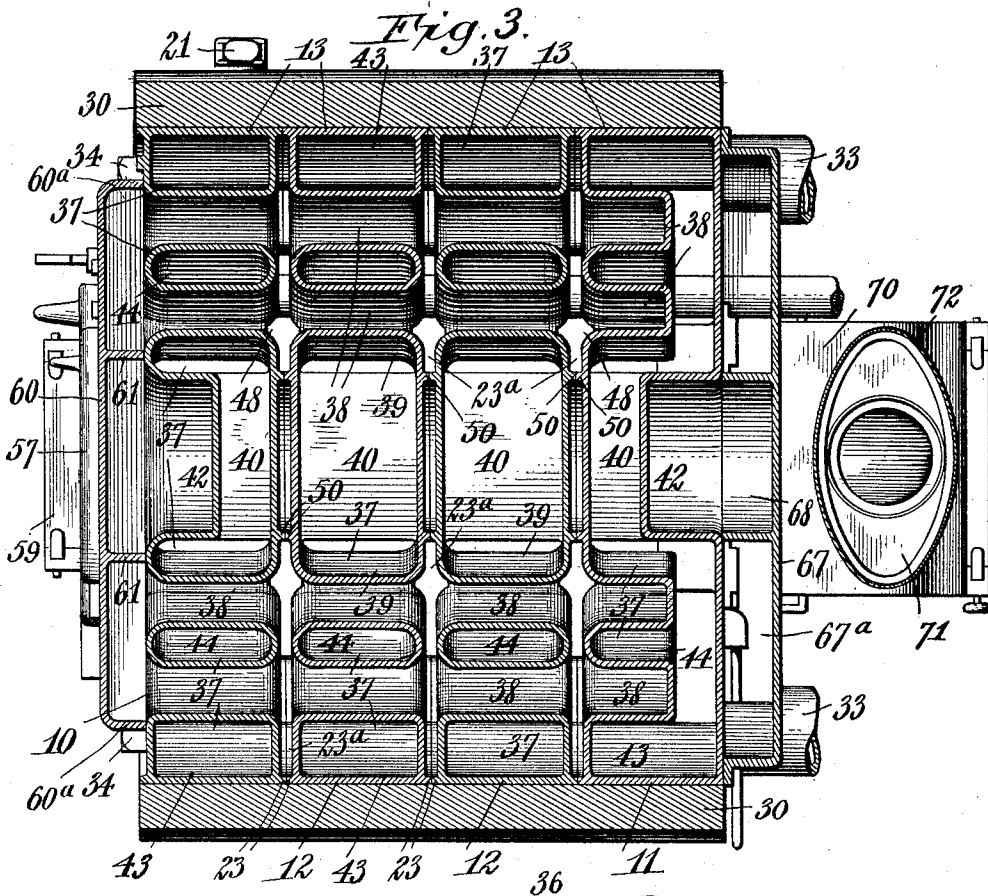
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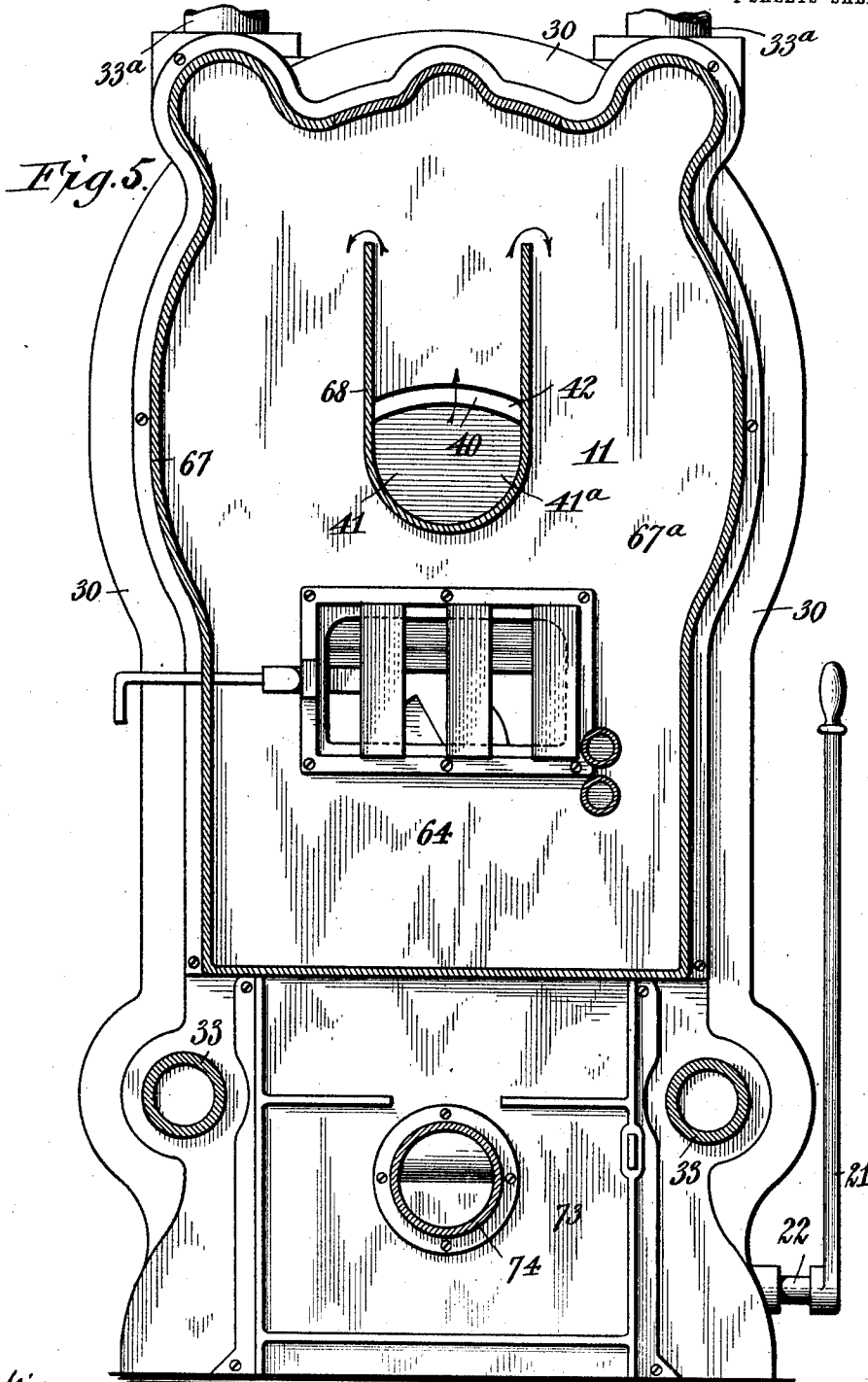
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

WILLIAM C. McKEOWN, OF BUFFALO, NEW YORK, ASSIGNOR TO BUFFALO RADIATOR COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

WATER-HEATER OR BOILER.

996,995.

Specification of Letters Patent.

Patented July 4, 1911.

Application filed February 21, 1908. Serial No. 416,971.

To all whom it may concern:

Be it known that I, WILLIAM C. McKEOWN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Sectional Water-Heaters or Boilers, of which the following is a specification.

My invention relates to sectional water-heaters or boilers of the type in which the sections are connected in any desired number; each boiler or heater comprising a front, a rear section, or a front, a rear and one or more intermediate sections, as may be desired.

The primary objects of my invention are the production of a heater or boiler comprising several upright connected sections capable of being assembled with great economy and facility; and in which the draft is directly upward through the fire-grate so that a live fire can be maintained at every point in the fire-box, enabling the grate-surface to be reduced to a minimum and assuring greater efficiency.

Other objects of my invention are to extend the combustion-chamber to the top of the heater or boiler; and to afford water passages of small cross-sectional area so that the walls thereof form an extensive heating-surface.

With these and other objects in view, the invention consists in the construction, arrangement and combination of parts to be hereinafter described and particularly pointed out in the subjoined claims.

In the drawings,—Figure 1 is a vertical transverse section of a boiler constructed according to my invention, taken on line 1—1, Fig. 2. Fig. 2 is a vertical longitudinal section taken on line 2—2, Fig. 1. Fig. 3 is a horizontal section taken on line 3—3, Fig. 2. Fig. 4 is a vertical section taken on line 4—4, Fig. 2. Fig. 5 is a transverse section taken on line 5—5, Fig. 2.

Referring now to the drawings in detail, like numerals of reference refer to like parts in the several figures.

My improved heater or boiler consists of a plurality of hollow sections connected together and in communication, there being preferably a front section 10, a rear section 11 and one or more intermediate sections 12. Each section comprises a body-portion 13

and water-legs 14 depending from the sides 55 of said body-portion and serving as standards for the sections. The bottoms of the body-portions serve as the top or crown-sheet of a fire-place 15 and said water-legs serve as the sides of the same. I preferably 60 corrugate the crown-sheet and sides of the fire-place, as shown at 16, so as to increase the heating-surface, and a short distance from the lower ends of said standards, on the inner walls thereof, supporting lugs 17 65 are cast which support rocking grate-bars 18 that separate the fire-place from the ash-pit 19 beneath said bars. The grate-bars are rocked by mechanism 20, actuated by a lever 21 held on a stub-shaft 22 extending 70 from a part of said mechanism through one of the standards of the front section 10.

In assembling the several sections they are placed together face to face, and with a view of obtaining maximum heating efficiency, the opposing faces of adjoining sections are provided with marginal ribs 23 which contact and form intervening heat-spaces 23^a between the several sections. In this manner, a combustion-chamber is provided which extends from the grate-bars to the tops of the sections. The latter are also provided centrally at their upper ends with registering openings 24 in their inner opposed faces, and the alined water-legs at 85 each side are also provided with registering openings 25 at points about in line with the fire-grate, and around said openings the opposing faces of the several sections are provided with annular ribs 26 of which the 90 marginal ribs form part. The contacting faces of the ribs 23 and 26 are preferably planed to assure a close fit between the several sections. The several sections are connected by means of oppositely tapered nipples 27 which are preferably driven into the registering openings 24 and 25 in opposing walls and assure a water-tight connection. However, as the frictional contact of such nipples cannot be relied upon to maintain 100 proper and secure connection between the several sections when setting the heater and subjecting it to side and twisting strains, I provide the sections on opposite sides with alined apertured lugs 28 through which tie-bolts 29 are passed to draw the sections 105 tightly together. As an additional guard against the escape of heat between the sec-

tions and to prevent radiation of the heat, I deem it advisable to face the sides and top of the heater with asbestos, as at 30.

Each of the body-portions 13 of the sections has a transverse upwardly curved water-tube 35 at its lower end which connects the water-legs 14 depending therefrom, a crown-chamber 36 at its upper end, and upright water-tubes 37 connecting said transverse water-tube with said crown-chamber and separated by intervening spaces 38. Said upright tubes are arranged at opposite sides of the vertical center and the space between the innermost tubes 39 is divided by a transverse water-tube 40 into two superposed heat-openings 41; the openings of all sections being alined to form superposed horizontal heat-flues 41^a connected at the front and rear, as at 42, by diminishing the depth of the transverse water-tubes 40 of the front and rear sections. The outer upright tubes 43 of each section form the sides of the body-portion and join the lower transverse water-tube 35 at the point where the latter merges into the water-legs. Although the several upright water-tubes of each section connect the lower transverse water-tube with the crown-chamber, the inner upright tubes 39 and the intermediate upright tubes 44 unite at 45 and are in communication with said crown-chamber through the medium of short tubes 46 of somewhat less depth than said inner and intermediate tubes so as to form heat-passages 47 connecting the spaces intervening between the intermediate tubes 44 and the outer-tubes 43 with the upper horizontal heat-flue. The spaces 38 intervening between the tubes on opposite sides of the superposed heat-flues 41^a are connected by the heat-spaces 23^a provided between the several sections, and at their lower ends they are in direct communication with the fire-place through the medium of heat-passages 48 formed by diminishing the depth of the lower transverse water-tubes 35 in line with said spaces.

The opposed faces of the transverse water-tubes 40 are provided with contacting-ribs 49 and the inner upright water-tubes 37 which bound the heat-openings 41 are also provided on their opposed faces with contacting-ribs 50 which are curved inward at their lower ends to meet at the tops of the transverse water-tubes. The upper ends of the ribs 50 terminate at the heat-passages 47, so that the heat and gases can only enter the upper of the superposed heat-flues through said heat-passages, said heat-flues being otherwise disconnected from the fire-box by the ribs 50. The ribs 49 also disconnect the upper from the lower heat-flue at points between the several sections, so that the heat and gases must pass to the end of one flue before they can enter the other.

The opposing faces of all sections are similar so that the front and rear section may be connected together without an intermediate section, or one or more intermediate sections may be used in connection with the front and rear sections, as may be desirable. The number of sections used is, of course, governed by the heating-surface of the radiators used in the heating-system.

The front section is similar in essential features to the intermediate sections. The body-portion thereof, however, has a depending water-chamber 51 which terminates at its lower end a short distance above the fire-grate and is in communication with the water-legs of said section and the body-portions thereof. Said depending water-chamber is of less depth than the section of which it forms part, as clearly shown in Fig. 2, and forms the front wall of the fire-box. A fuel-opening 52 is formed in said depending water-chamber through which fuel is introduced into the fire-box and which is closed by a door 53 hinged to the outer face of said chamber and having the usual damper 54. The space between the lower end of said depending water-chamber and the floor is closed by a plate 55 screwed or otherwise secured to the front section and having a stoke-opening 56 therein by means of which access may be had to the fire for stoking or otherwise caring for the same. Said stoke-opening is closed by a door 57 hinged to said plate. Said plate also has an opening 58 through which access is had to the ash-pit and which is closed by a door 59 hinged to said plate.

The connected front ends of the superposed heat-flues 41^a and the spaces intervening between the upright water-tubes on opposite sides of said heat-flues are closed by a door 60 having inwardly directed marginal flanges 60^a which bear against the outer face of the front section. Said door has two upright walls or partitions 61 which bear against the inner upright water-tubes of the front section so that the heat and gases cannot pass from spaces on opposite sides of the superposed heat-flues to the lower of said flues. In order, however, that the heat and gases can pass from said spaces to the upper of said flues, the walls or partitions 61 terminate in a plane between the top and bottom of said upper flue. The rear section is also similar in essential features to the intermediate sections. It, however, has a hollow extension or chamber 62 depending from the crown-chamber with its lower end terminating in a plane beneath the bottom of the upper heat-flue 41^a, said depending-chamber being separated from the transverse water-tube 40 of said section by a narrow heat-passage 63. Said section also has a water-chamber 64 depending from its body-portion and occupying the space

between the water-legs with the lower end terminating a short distance above the fire-grate. Said last-mentioned depending chamber is in communication with the body-portion of said section and with the water-legs thereof and serves as the rear wall of the fire-box.

With the water-legs of the several sections acting as the sides of the fire-box and the water-chambers depending from the body-portions of the front and rear sections serving, respectively, as the front and rear walls of the said fire-box, the latter is entirely surrounded by water-chambers, which assures high heating efficiency.

The water-chamber 64 depending from the body-portion of the rear chamber is provided with a draft-opening 65 equipped with a damper 66 of any improved construction. Secured to the rear face of the rear section is a plate 67 having inwardly directed marginal flanges by means of which said plate is secured to said section and which serve to separate the plate from the latter by an intervening space forming a smoke-chamber 67^a. Extending inward from said plate is a U-shaped wall or partition 68 which bears against the rear face of the rear section and surrounds the open rear end of the lower-heat-flue 41^a. Said wall or partition acts as a deflector and the upper ends thereof terminate a distance above the open rear end of said flue. At its lower end, said chamber has an opening 69 which is covered by a smoke-box 70 having an opening 71 in its upper wall surrounded by a flange onto which is fitted the smoke-pipe or stack 72.

The space between the lower end of the depending water-chamber 64 of the rear section and the floor is closed by a plate 73 which has an opening for the escape of ash-dust from the ash-pit and which opening is connected with the smoke-box 69 by a flue 74 in which a damper 75 is located.

When starting a fire in a heater, the draft-opening 65 may be opened to bring the smoke-stack in direct communication with the fire-box. When the damper to said opening is opened, the smoke passes through the latter, down the smoke-chamber 67, through the smoke-box 69 and out the smoke-stack. After the fire is started, the damper 66 will be closed, so that the heat travels up between the connected sections and through the heat-passages 48 and follows the course indicated by the arrows.

Although the space intervening between the upright water-tubes at opposite sides of the horizontal centrally-located superposed heat-flues 41^a are in horizontal alinement, the course of the heat and gases through the same is upward, so that they may well be termed vertical heat-flues which connect the fire-box with the upper of the horizontal heat-flues.

Having thus described my invention, what I claim is,—

1. A water-heater or boiler comprising a front section, a rear section, and one or more intermediate sections, all in communication, said sections having body-portions forming the top of a fire-box and depending side water-legs forming the sides of the fire-box, said body-portions having central heat-openings separated by transverse water-tubes which lie in contact to form superposed longitudinal heat-flues, the transverse water-tubes of the front and rear sections being of less depth than said sections to provide connections between the ends of said heat-flues, each section having a transverse water-tube at its lower end connecting said water-legs, a crown-chamber at its upper end, and substantially vertical water-tubes separated by heat-flues which open at their upper ends into the upper longitudinal heat-flue and at their lower ends into the top of the fire-box, said vertical water-tubes connecting the transverse water-tubes at the lower ends of the body-portions with the crown-chambers, and said rear section having a water-chamber depending from its crown-chamber and terminating centrally of the transverse water-tube separating its central heat-openings and being separated from said transverse water-tube by a narrow passage.

2. A water-heater or boiler comprising a front section, a rear section, and an intermediate section, all in communication, said sections having superposed central longitudinal heat-flues surrounded by water-tubes and substantially vertical heat-flues on opposite sides of said longitudinal heat-flues and separated by water-tubes, a fire-place in communication with said heat-flues, a smoke-chamber, and a chamber in front of the front section and divided into three compartments by partitions lying against the water-tubes of the front section at the sides of the longitudinal heat-flues.

3. A water-heater or boiler comprising a front section, a rear section, and one or more intermediate sections, said sections having superposed longitudinal heat-flues surrounded by water-tubes and additional heat-flues on opposite sides of said superposed heat-flues, said superposed heat-flues being connected at their front and rear ends and said additional heat-flues being in communication with the upper of said superposed heat-flues, and a smoke-chamber in rear of said rear section and having a U-shaped partition bearing against said section around the rear end of the lower of said superposed heat-flues.

4. A heater-section comprising a body-portion and depending side water-legs, said body-portion having superposed central heat-openings, a transverse water-tube beneath the lower of said openings and connecting said water-legs, a crown-chamber at

the upper end of said section, and a plurality of upright water-tubes on opposite sides of said superposed openings separated by heat-openings and opening at their lower ends 5 into said transverse water-tube, at least two of said upright water-tubes at each side converging at their upper ends into a common passage in communication with said crown-chamber and the remaining upright water- 10 tubes opening into said crown-chamber.

5. A water-heater or boiler comprising a plurality of hollow connected sections, each having a body-portion and depending water-legs at the sides of said body-portion forming a fire-box, said body-portions having 15 superposed central longitudinal heat-flues separated by transverse water-tubes, upright water-tubes at each side of said heat-flues and separated by intervening spaces, transverse water-tubes at the lower ends of said 20

body-portions connecting the water-legs thereof and being in communication with said upright water-tubes, said last-mentioned transverse water-tubes being diminished in depth in line with the spaces between said upright water-tubes, and crown-chambers at the upper ends of said body-portions into which the upper ends of said upright water tubes open, said sections being diminished in depth between the upper of 30 said superposed heat-flues and the upper ends of the spaces between the upright water-tubes.

In testimony whereof, I have affixed my signature in the presence of two subscribing 35 witnesses.

WILLIAM C. McKEOWN.

Witnesses:

ELLA C. PLUECKHAHN,
MAY F. SEWERT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."