J. T. KETCHUM.

WATER BOILER.

APPLICATION FILED MAR. 8, 1910.

992,779.

Patented May 23, 1911.

3 SHEETS—SHEET 1.

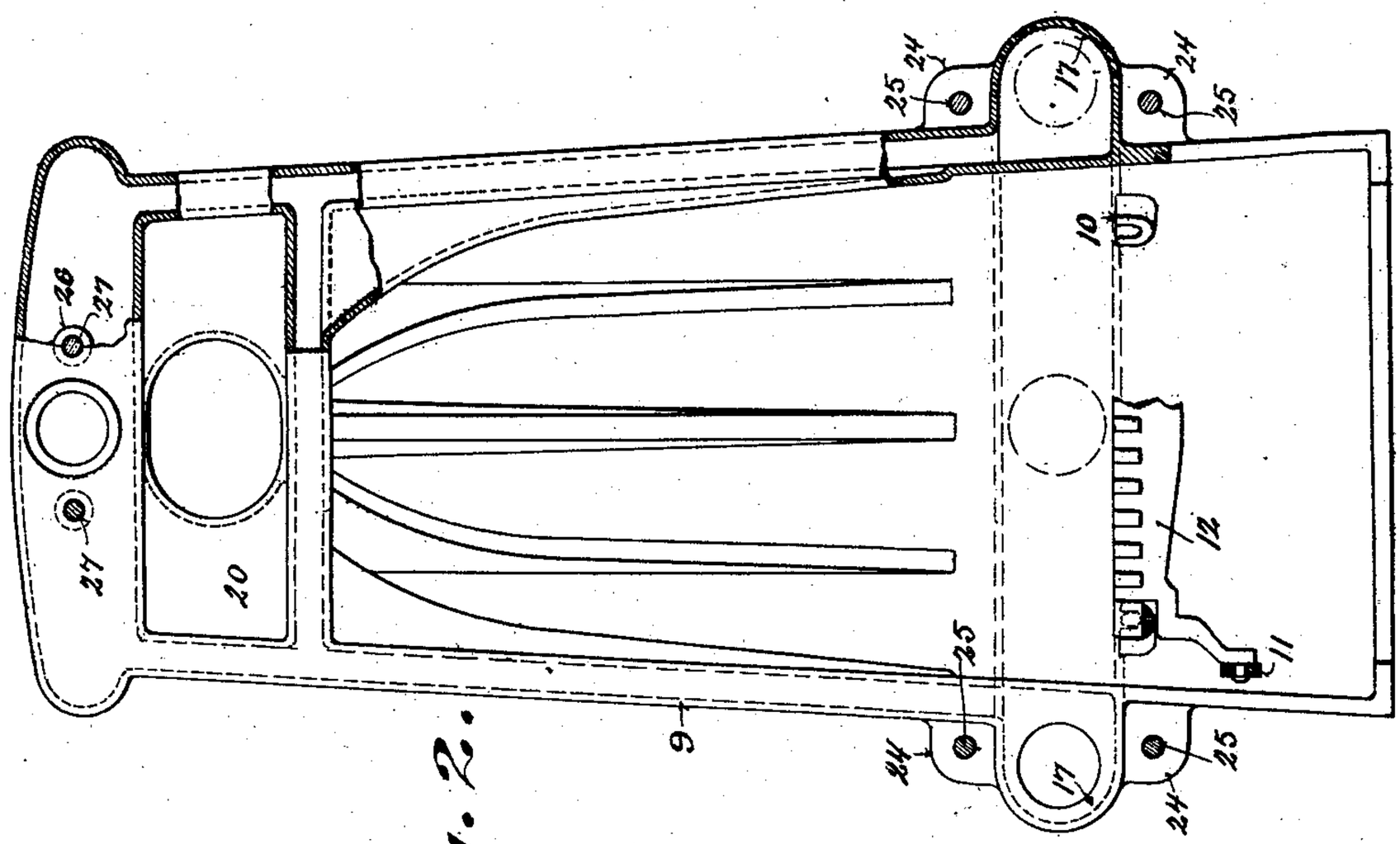


Fig. 2.

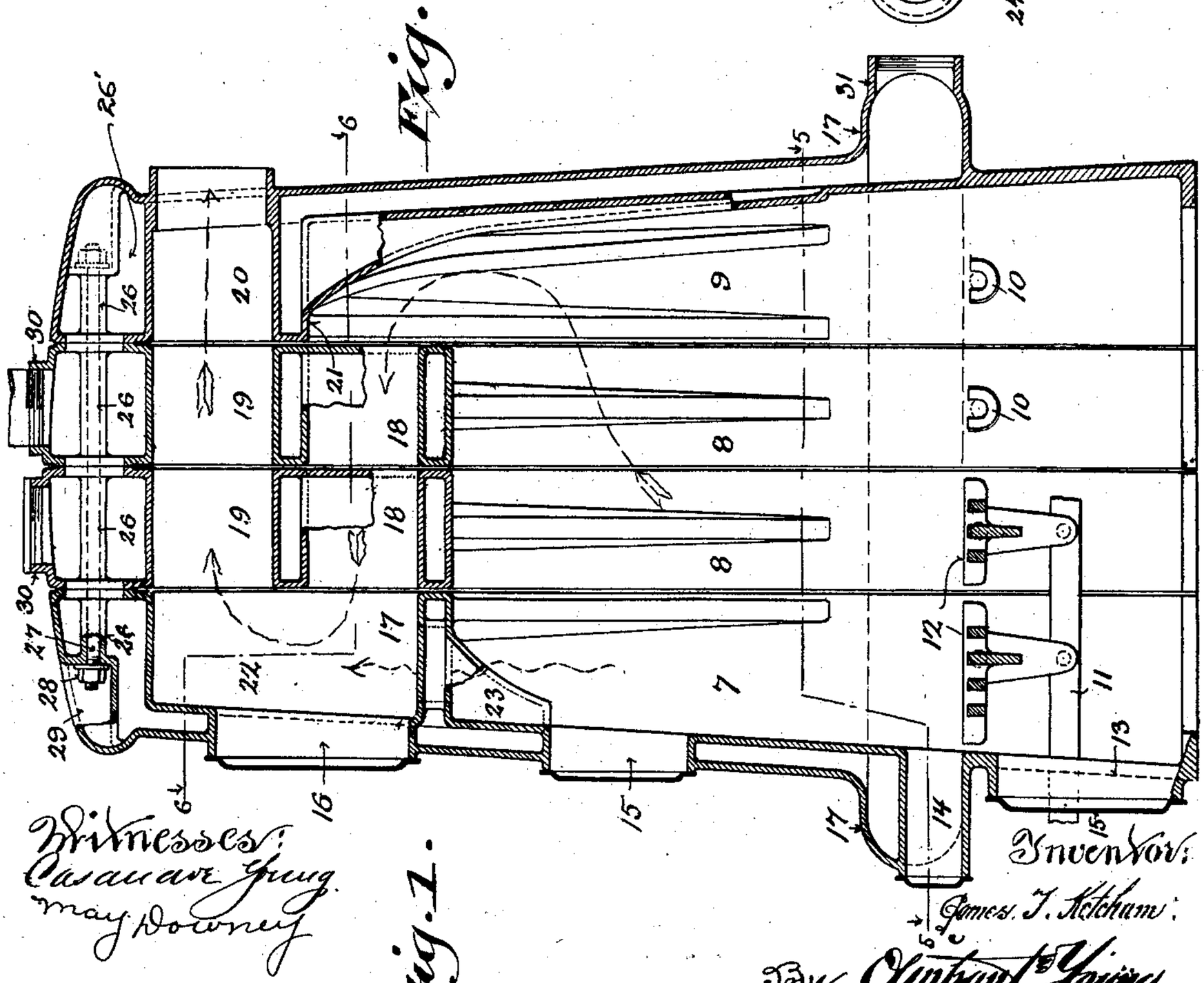


Fig. 1.

Witnesses:
Casaeare Young.
May Downey

Inventor:
James T. Ketchum;
By Olphant & Young
Attorneys.

J. T. KETCHUM.

WATER BOILER.

APPLICATION FILED MAR. 8, 1910.

992,779.

Patented May 23, 1911.

3 SHEETS—SHEET 2.

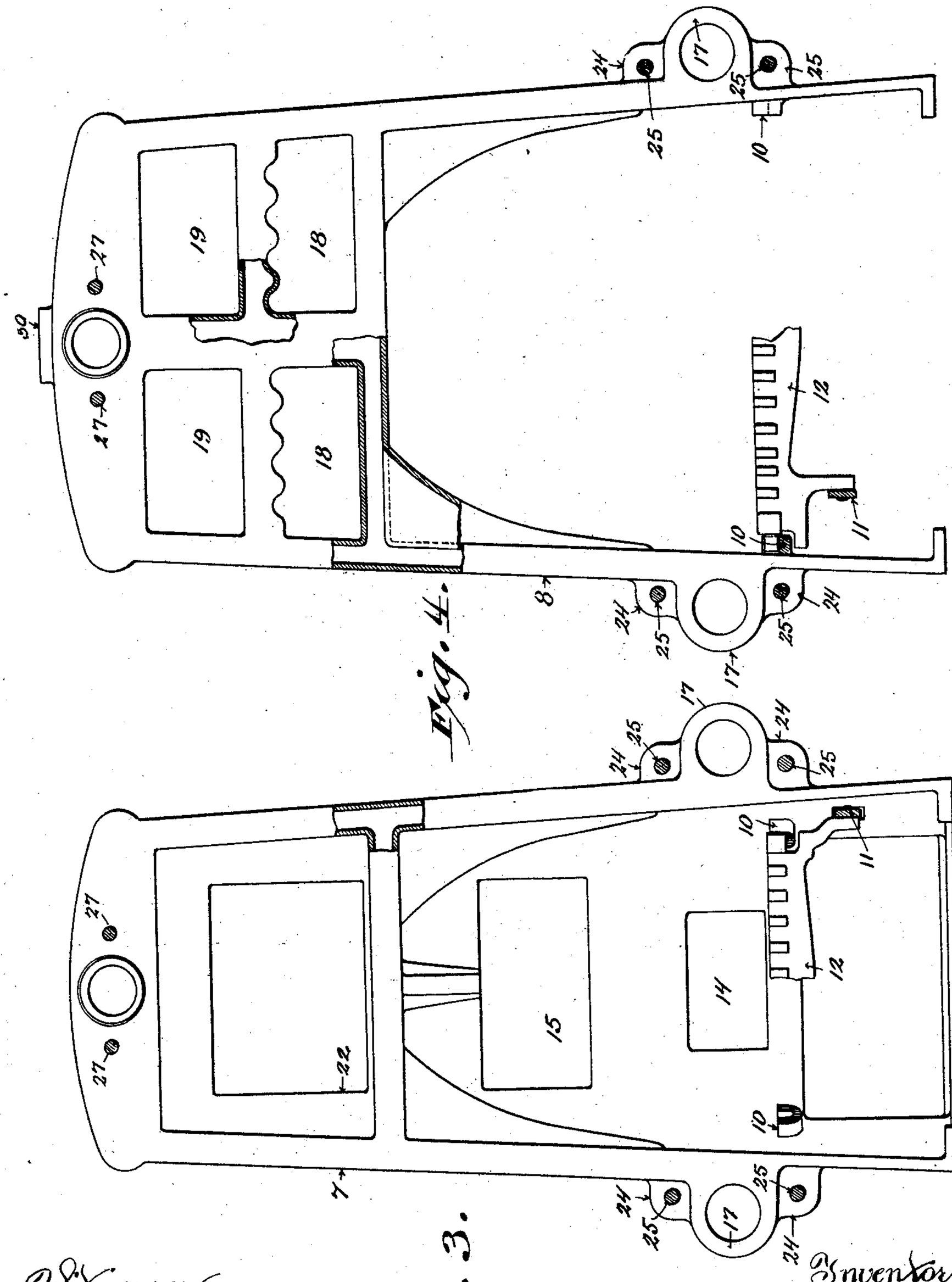


Fig. 4.

Fig. 3.

Witnesses
Casanave Young.
May Downey.

Inventor:
James T. Ketchum.
By Clephane & Young
Attorneys.

J. T. KETCHUM.

WATER BOILER.

APPLICATION FILED MAR. 8, 1910.

992,779.

Patented May 23, 1911.

3 SHEETS—SHEET 3.

Fig. 6.

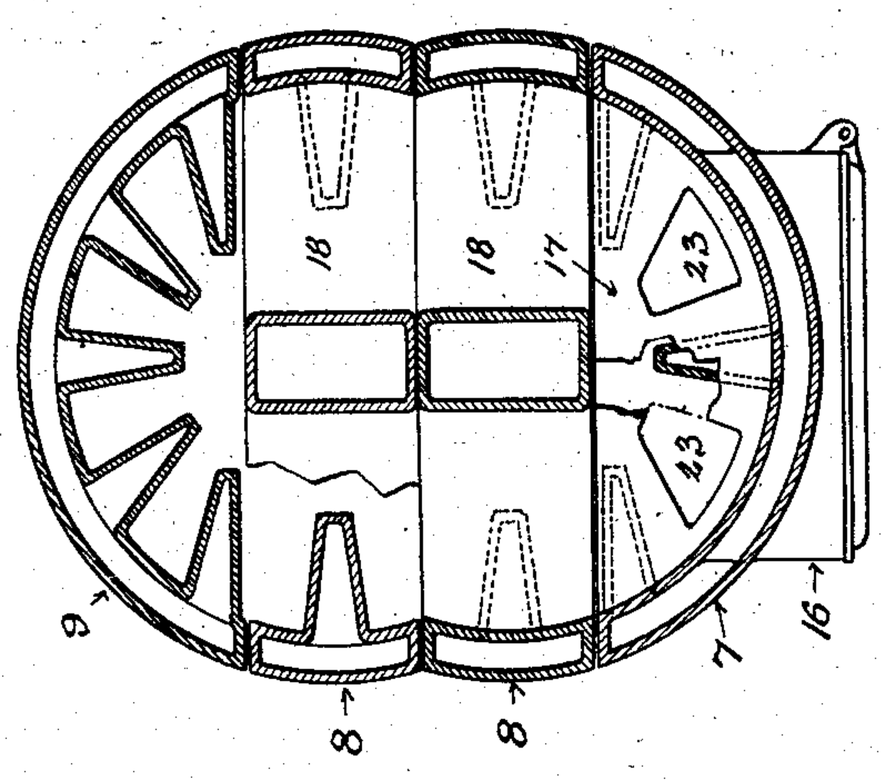
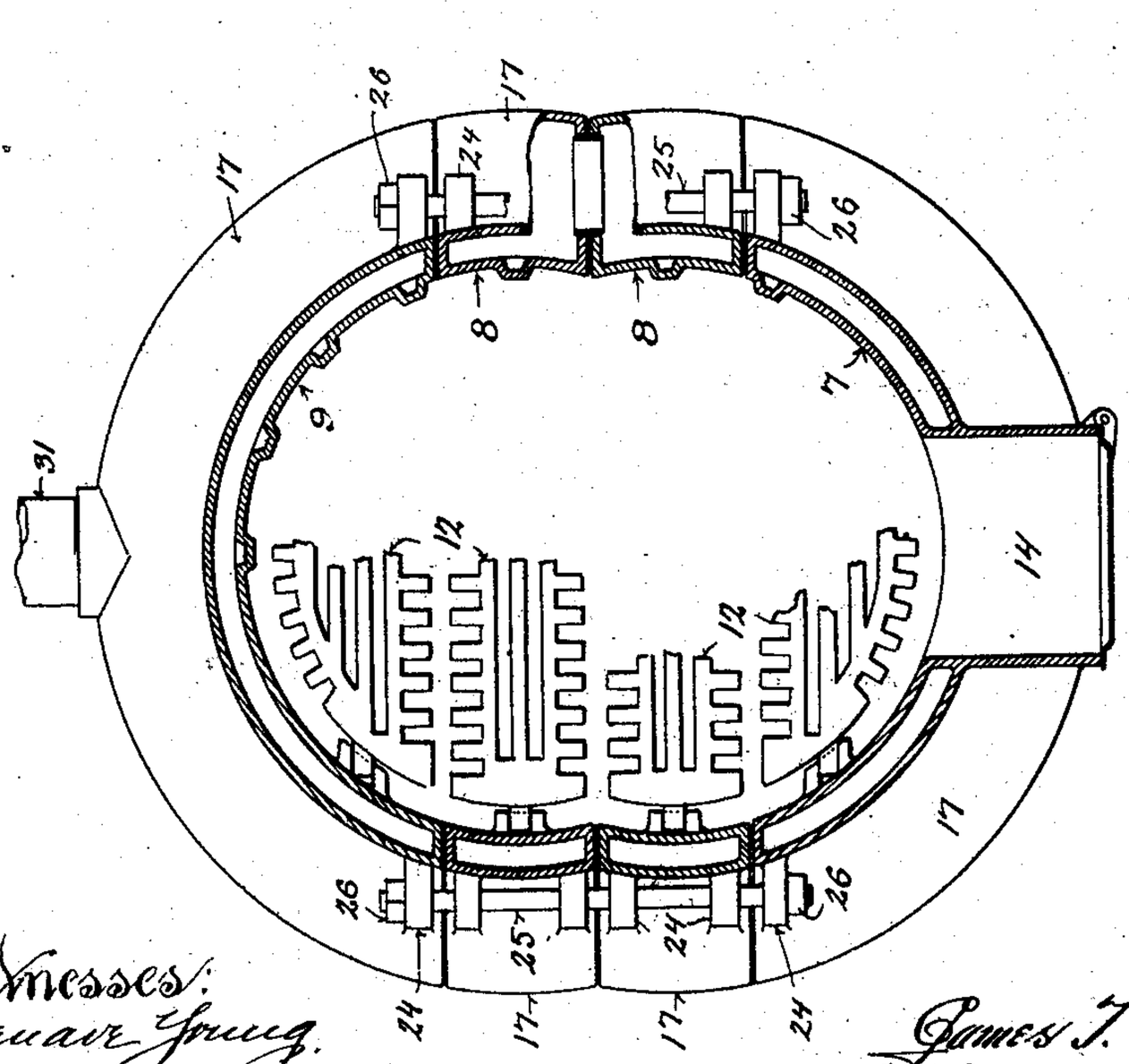


Fig. 5.



Witnesses:
Casaaar Young.
May Downey.

Inventor
James T. Ketchum
By Clapp and Young
Attorneys.

UNITED STATES PATENT OFFICE.

JAMES T. KETCHUM, OF FOND DU LAC, WISCONSIN.

WATER-BOILER.

992,779. Specification of Letters Patent. Patented May 23, 1911.

Application filed March 8, 1910. Serial No. 548,033.

To all whom it may concern:

Be it known that I, JAMES T. KETCHUM, a citizen of the United States, and resident of Fond du Lac, in the county of Fond du Lac and State of Wisconsin, have invented certain new and useful Improvements in Water-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention consists in what is herein particularly set forth with reference to the accompanying drawings and pointed out in the claims of this specification, its object being to provide simple, economical, easily assembled and efficient sectional water boilers for hot-water or low-pressure steam heating apparatus, each boiler comprising a front, rear and one or more intermediate sections in all of which provision is preferably had for ash-pit space and fire-grate sections, as well as for water reservoir space adjacent to the grate-line; and the relative construction of the boiler-sections is such as to provide for thorough combustion of the fuel gases in the furnace portion of each boiler that is devoid of any baffle-plate or deflector, each boiler-section being a single casting.

Figure 1 of the drawings represents a vertical section view of a boiler in accordance with my invention having parts therein broken away, the major portion of the view being on the plane indicated by line 1—1 in Fig. 5, duplicate intermediate sections of the boiler being shown; Fig. 2, a front elevation of the rear section; Fig. 3, a rear elevation of the front section; Fig. 4, an elevation of an intermediate section of the boiler, parts in the same being broken away, and Figs. 5 and 6, horizontal sections respectively indicated by lines 5—5 and 6—6 in Fig. 1.

Referring by numerals to the drawings, 7 indicates the front section, 8 each of plural intermediate sections and 9 the rear section of a hot-water or low-pressure steam boiler of my improved construction. A front, rear and intermediate section is requisite in each boiler but the intermediate section may be multiplied indefinitely, two of the same being herein shown. Each section is a single casting preferably extended below the grate line to provide for ash-pit space. Within ash-pit space, the boiler sections are provided with bearing lugs 10 and 11 for the trunnions and shaker-arm pivots of grate-sections 12 made to conform with the inner contour of the respective boiler sections. Each of the front and rear sections of the boiler are herein shown provided with a single grate-section, but for larger diameters of boilers two or more grate-sections may be necessary in each of said boiler sections that are hollow above the grate-line.

The general contour of the front and rear sections of the boilers is horizontally curvilinear and the ends of each intermediate section are preferably likewise, the general contour of the boiler, as a whole, being elliptical in horizontal section. Vertically, the boiler-sections are preferably tapered the convergence of each being upward to the dome swell of each.

The front boiler section herein shown is provided with a forward ash-pit opening 13, clinker-opening 14, fuel-opening 15 and clean-out opening 16; each having a door or other suitable closure. Immediately above its fire-grate line, each boiler-section is provided with an outwardly extending reservoir enlargement 17 of its water-space, these enlargements of meeting sections of the boiler being nipple-joined, as is shown in one instance in Fig. 5, to provide an endless horizontal water-chamber that obviates the necessity of employing equalizing pipes or submerged returns for supplying water for steam making with thin sheets of said water in the boiler-sections, and at the same time fluctuation of the water line in the usual water-gage connected to said boiler is avoided. Hence the boiler herein shown and described is complete in itself for steam-making.

The several boiler-sections are provided with inner upwardly converging water-ribs as is usual in the art and each intermediate section of the boiler is provided with parallel horizontal flues 18, 19, in the upper portion of same, the flue 19 being alined with a similar flue 20 in the rear boiler section and which constitutes a smoke outlet.

The crown-sheet 21 of the rear section of the boiler is elevated to the top of the lower flue 18 in the adjacent intermediate boiler-section to provide for more than ordinary combustion area, and the front boiler-section is provided with an upper combustion-chamber 22 in communication with the flues aforesaid and with vertical flues 23 from the fire-box of the boiler, these flues 23 being through the hollow bottom portion 17′ of said combustion-chamber and thus wholly within said front boiler-section.

The several sections of the boiler are provided with lower outer ears 24 through which to pass coupling-rods 25 engaged by nuts 26, and it is preferable with boiler-sections having reservoir-enlargements 17 to provide the coupling ears immediately above and below said enlargements, as herein shown. Sleeves 26′ are provided in the dome of each section of the boiler for the engagement of coupling-rods 27 having nuts 28 run thereon in recesses 29 provided in the front and rear sections of said boiler. Each intermediate section of the boiler is provided with a water or steam outlet nozzle 30, and the rear section of said boiler is provided with a return nozzle 31 the same being part of its reservoir enlargement 17 when the latter occurs.

In practice there is horizontal fire travel of gaseous products of combustion in the boiler from rear to front and reverse through the parallel flues 18 and 19, the turn being made in the chamber 22 where they are met by other gaseous products of combustion that ascend through the flues 23, said chamber being unobstructed and of as great an area as the proportions of the front section of the boiler will permit. This chamber in the flue-communication with the forward portion of the fire-box of the boiler permits of a reassembling of the gaseous products of combustion on their way to the smoke outlet, no baffle-plate or deflector being necessary to retard or change the direction of travel of products. In case of extinguishment of the gaseous products of combustion in the horizontal flue 18, a reignition of said products takes place in the chamber 22 with which the fire-box of the boiler has direct communication through the vertical flues 23 aforesaid, this being an important feature of the boiler, that is simple in its construction, easily assembled, indefinitely variable as to capacity by multiplication of its intermediate section unit and which is extremely efficient for the purpose specified, its fire-box being unobstructed immediately over the grate-line and preferably curvilinear in contour to avoid corners which would cause clogging of fuel and ashes therein.

I claim:

1. In a boiler for the purpose specified, a hollow front section having an upper combustion chamber, the otherwise hollow bottom of which chamber is provided with vertical flue-passages from the fire-box area of said section to said combustion-chamber; at least one hollow intermediate section provided with parallel uninterrupted horizontal upper flues both open to said combustion-chamber of the front section, and a hollow rear section having an upper horizontal smoke outlet alined with the upper horizontal flue of the adjacent intermediate section, the crown sheet of said rear section being elevated to the top of the lowermost flue of said intermediate section.

2. In a boiler for the purpose specified, a hollow front section provided with a lower outwardly extending reservoir enlargement of the water-space therein, an upper combustion-chamber having a vertical flue-space through the bottom of the same, whereby, this flue-space is wholly within said section and serves to establish communication between the fire-box area of same and said combustion-chamber; a hollow rear section provided with a lower outwardly extending reservoir enlargement of the water-space therein, this reservoir enlargement being provided with a return nozzle at the back of same; and at least one intermediate section provided with lower outwardly extending reservoir enlargements of the water-space therein nipple-joined to those of the other sections, and also provided with parallel horizontal upper flues in communication with the aforesaid combustion-chamber and an upper horizontal smoke-outlet flue in the rear section, the crown-sheet of this rear section being elevated to the top of the lowermost flue of said intermediate section.

In testimony that I claim the foregoing I have hereunto set my hand at Fond du Lac in the county of Fond du Lac and State of Wisconsin in the presence of two witnesses.

JAMES T. KETCHUM.

Witnesses:

FRANK J. WOLFF,

ALICE M. VINTON.