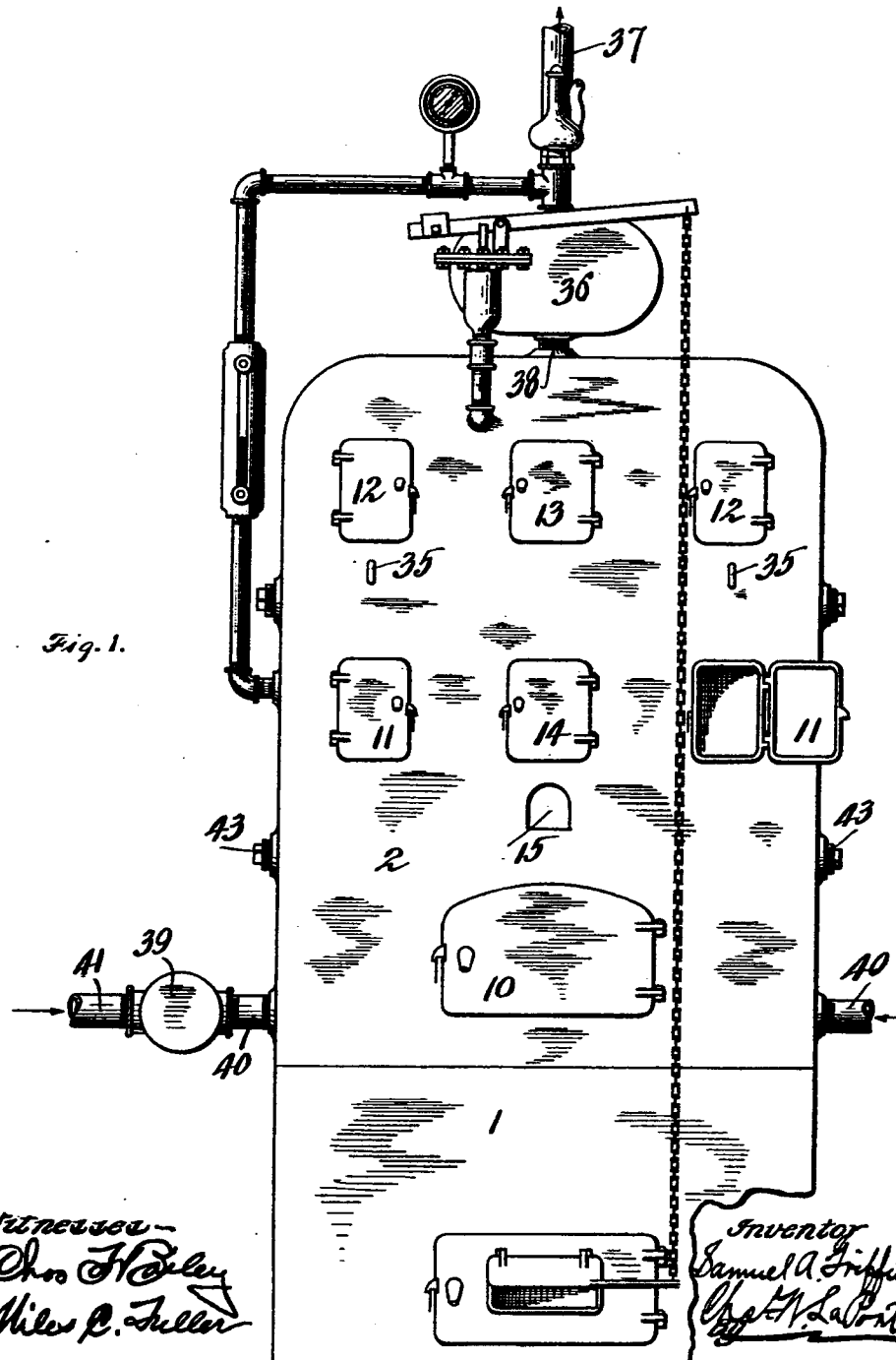


1,061,174.

S. A. GRIFFIS.
BOILER.
APPLICATION FILED JUNE 19, 1909.

Patented May 6, 1913.
6 SHEETS-SHEET 1.



S. A. GRIFFIS.

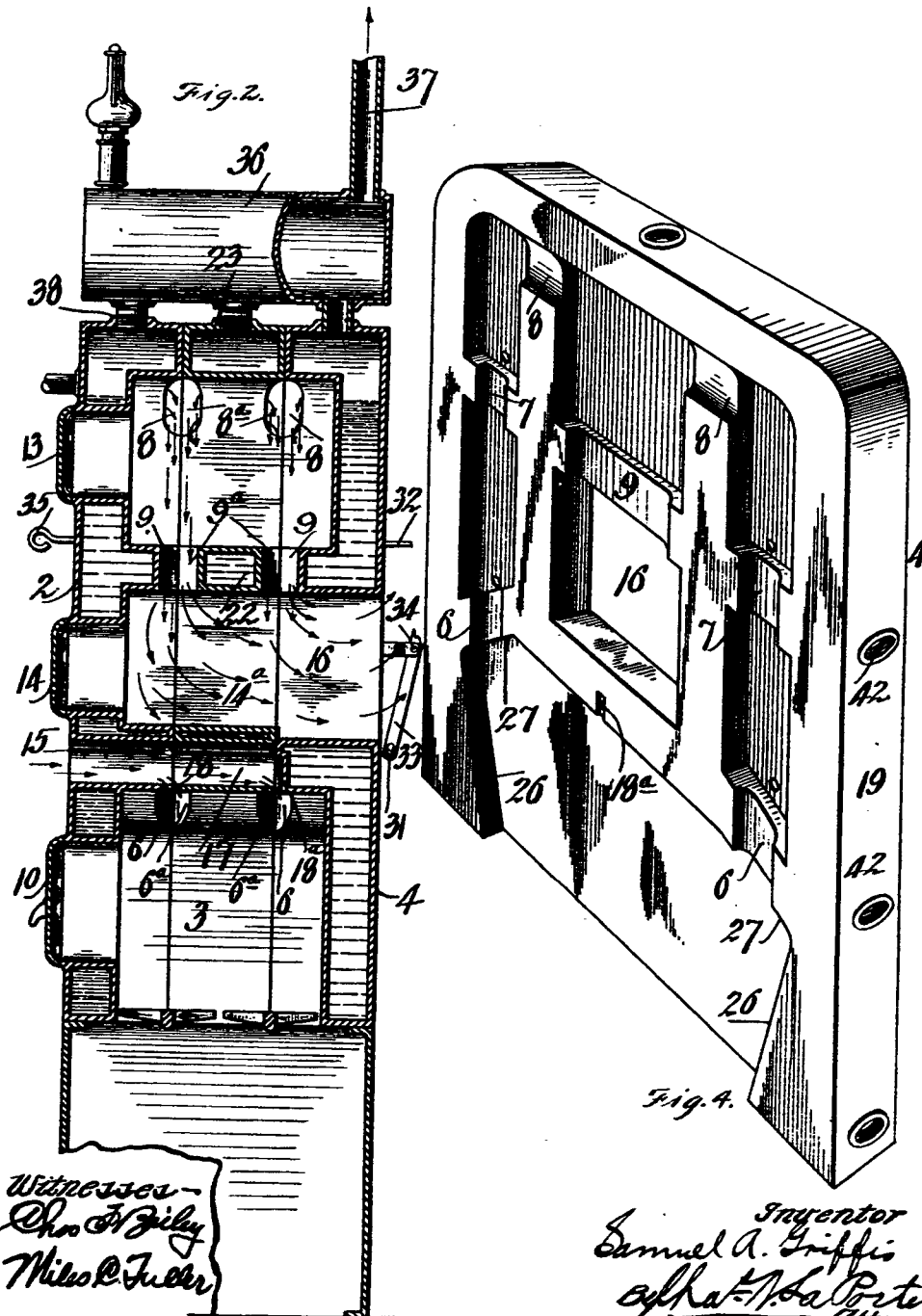
BOILER.

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1,061,174.

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6 SHEETS—SHEET 2.



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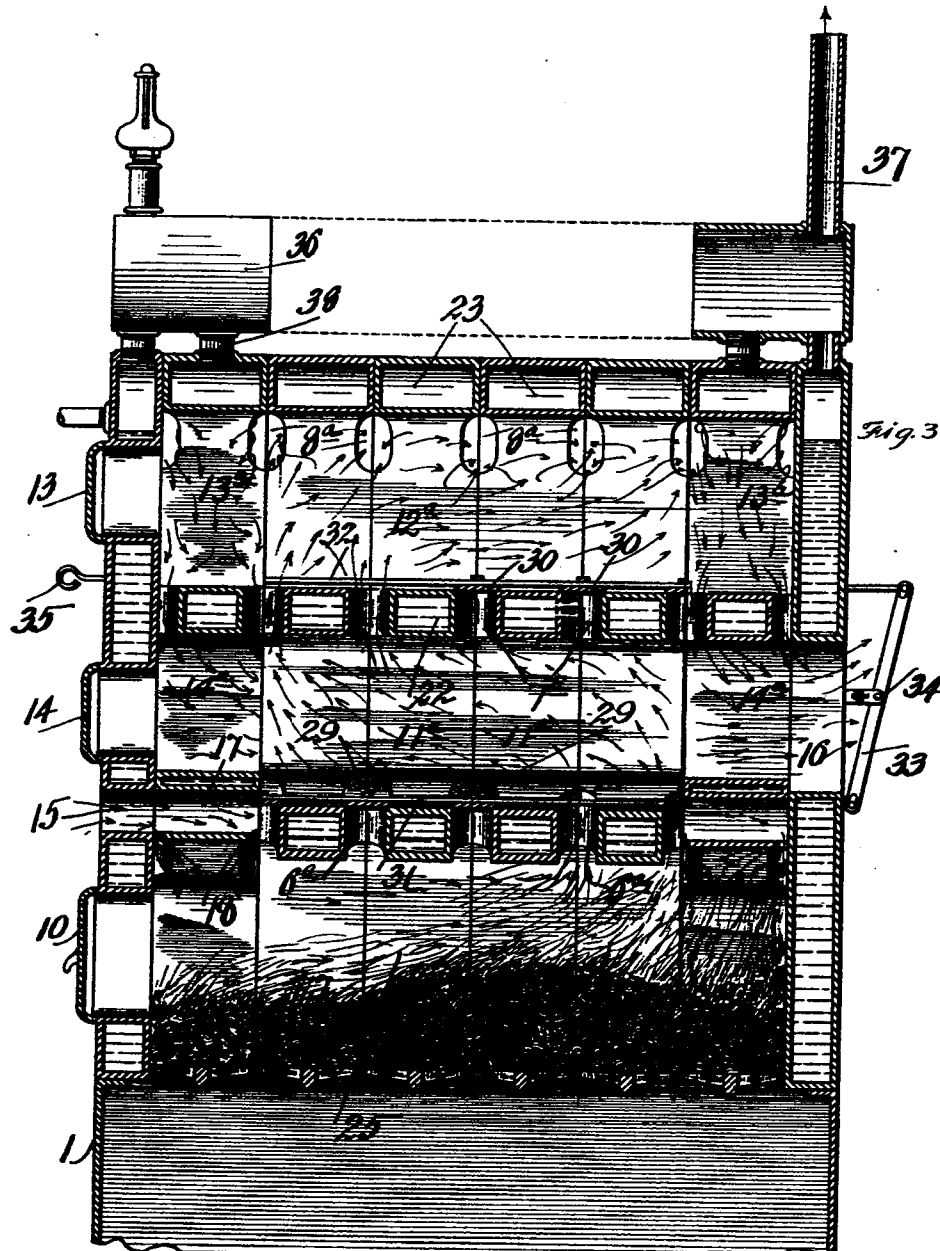
BOILER.

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6 SHEETS-SHEET 3.

1,061,174.



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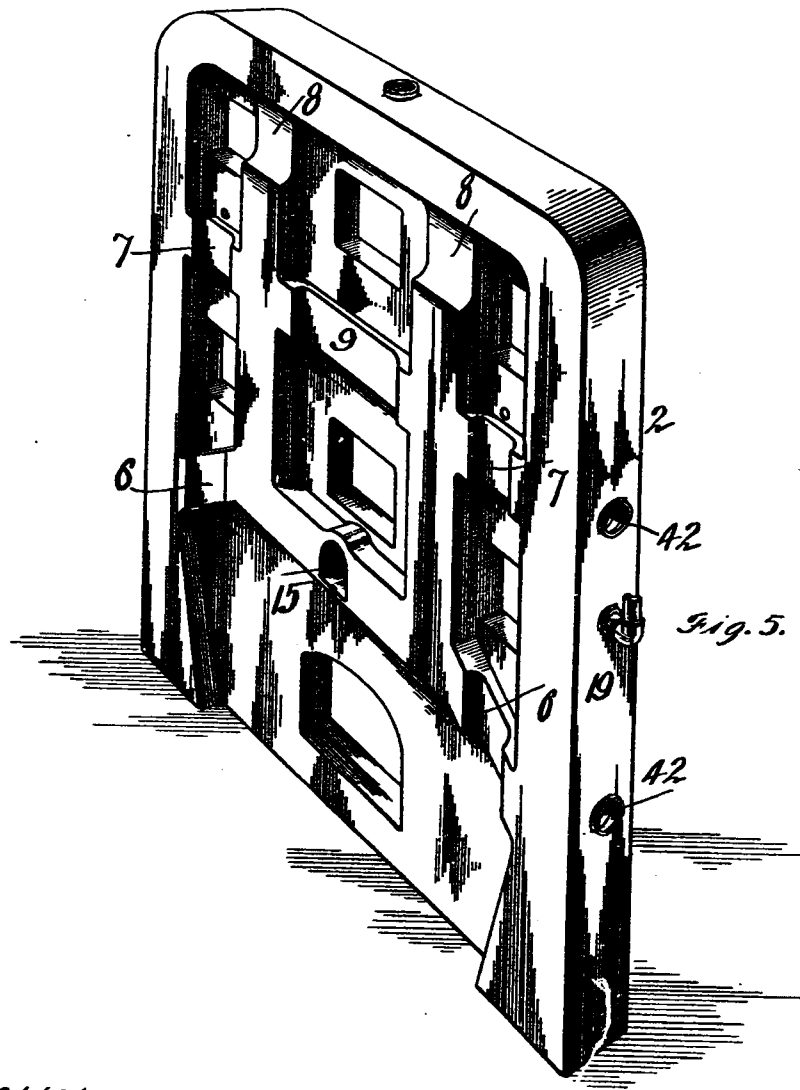
S. A. GRIFFIS.
BOILER.

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1,061,174.

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6 SHEETS—SHEET 4.



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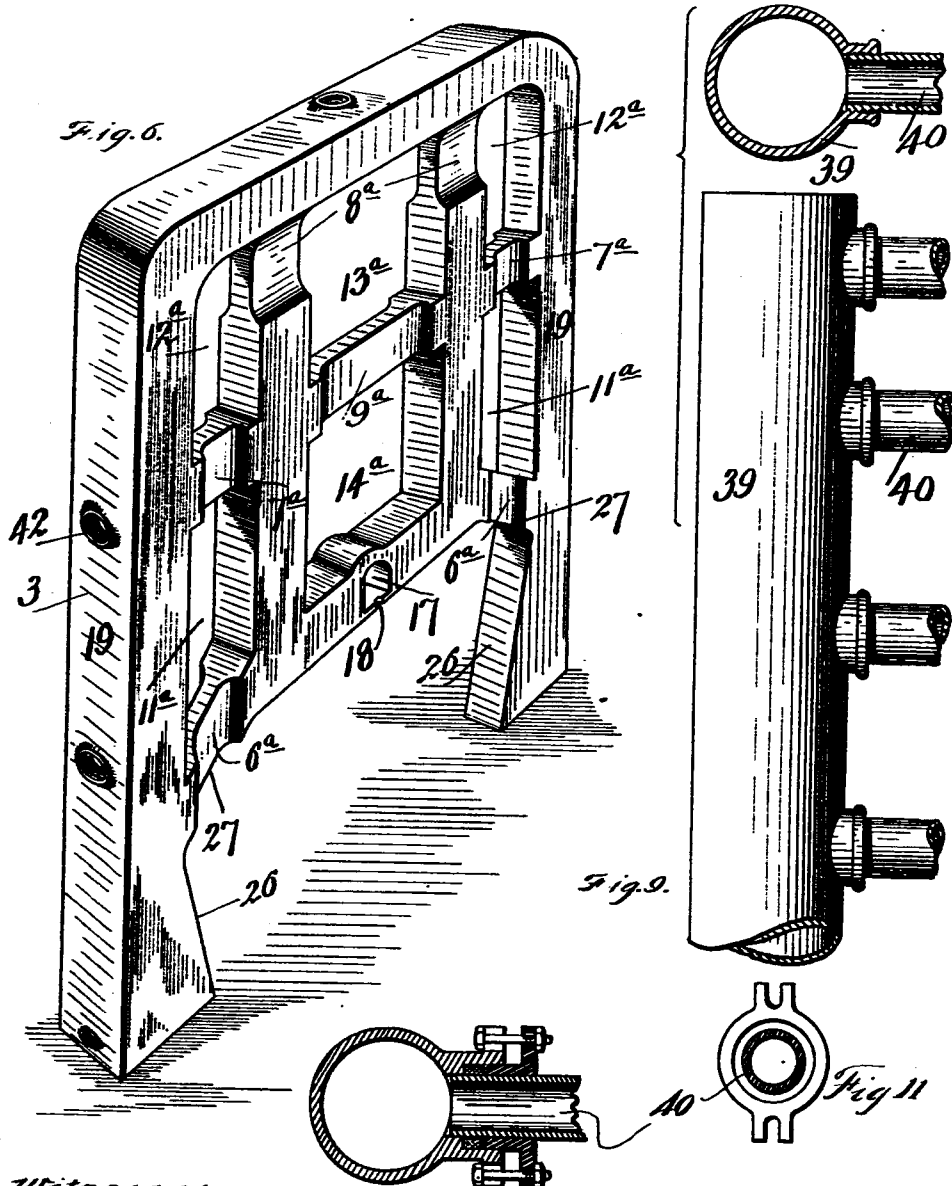
S. A. GRIFFIS.
BOILER.

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6 SHEETS—SHEET 5.



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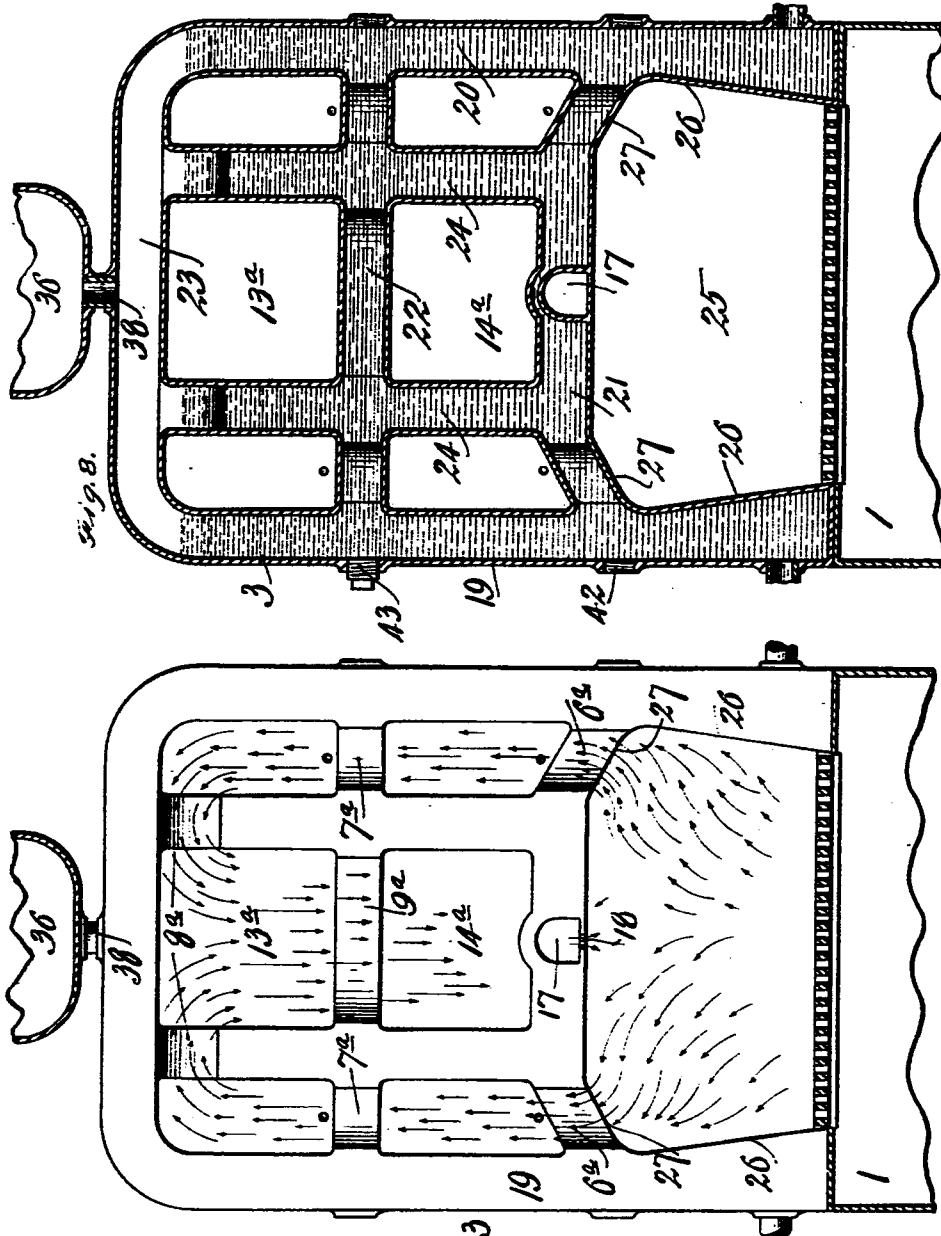
S. A. GRIFFIS.
BOILER.

APPLICATION FILED JUNE 19, 1909.

Patented May 6, 1913.

6 SHEETS-SHEET 6.

1,061,174.



Witnesses
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Fig. 7

Inventor
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Att'y

UNITED STATES PATENT OFFICE.

SAMUEL A. GRIFFIS, OF PEORIA, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
JOHN V. BROKAW, OF CANTON, ILLINOIS.

BOILER.

1,061,174.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed June 19, 1909. Serial No. 503,181.

To all whom it may concern:

Be it known that I, SAMUEL A. GRIFFIS, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has reference to certain new and useful improvements in sectional boilers or generators and has for its object a boiler which may be used either as hot-water heater or steam boiler; and it consists, substantially, in the construction and combinations of parts hereinafter particularly described, and pointed out in the claims.

For a further and full description of the invention herein and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result, reference is had to the following description and drawings hereto attached.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation of the boiler; Fig. 2 is a vertical longitudinal section through the center of the boiler with double water front and back; Fig. 3 is a vertical longitudinal section which is taken partly through the center of the boiler and partly through the side flues for the purpose of more clearly showing the internal construction thereof the two front and rear members being shown on a central vertical section and the intermediate members on a section through the center of the side flues; the water front and back being single and the boiler shown consisting of a larger number of intermediate sections than are shown in Fig. 2; Fig. 4 is a perspective view of a double water-back; Fig. 5 is a perspective view of a double-water-front; Fig. 6 is a perspective view of one of the intermediate sections; Fig. 7 is an elevation of one of the intermediate sections and parts of adjoining portions of the boiler, with arrows indicating, generally, the path of the products of combustion; Fig. 8 is a view similar to

Fig. 7 with the exception that the intermediate section is shown in vertical cross-section to show the water compartments, and the arrows are omitted, and Fig. 9 illustrates by a plan and a cross-section the general construction of the headers with which the return pipes may be connected. Fig. 10 is a detail cross-sectional view of a modified form of connection between header and nipples, while Fig. 11 is an end view, the nipple being in section, of one of the packed joints with the gland removed.

Like numerals of reference indicate corresponding parts throughout the figures.

The construction of the boiler being such that it may be used as a water-heater or a steam boiler I have caused to be illustrated in Fig. 1 suitable auxiliary connections such as are customary and in common use on steam boilers and in Fig. 8 the height of the water therein shown in said section, shows the water line if the boiler is used as a steam-boiler, the remaining views showing the boiler as it may be used, either as a water-heater or steam boiler. The several sections constituting the complete boiler, such as the water-front, water-back and intermediate sections are placed in juxtaposition and are so organized as to form a fire-chamber extending substantially from front to rear of the structure, the said sections each provided with communicating flues and having water compartments in communication with a header or steam dome common to all of the sections and the water front is provided with doors opening into the fire-chamber, the flues and the ash pit in the base of the boiler which supports the several sections. Each section, with the exception of the water-back, in addition to having the flues and water compartments, is provided with a central longitudinal air duct or passage, which, when the sections are united, communicate to form a continuous flue from the water front to the water-back; air passing in and through the water front is adapted to enter the fire-chamber through feed-openings leading from each section which lead the air directly to all parts of the fire box and not only does it produce a more intimate admixture of the smoke and gases arising therein but separates the same and causes it to be uniformly directed to the opposite sides of the chamber where it enters the flues, through

which, in a manner to be described, it passes to the stack.

The boiler, as illustrated, comprises the base portion 1 which serves as the ash-pit and supported on said base are the several sections 2, 3 and 4. The reference numeral 2 indicating what is known as the water-front; 4 indicating what is known as the water-back and 3 the intermediate sections. any number of which may be employed, depending largely on what capacity boiler is desired.

The water-front 2 as well as the water-back 4, referring particularly to Figs. 1, 2, 4 and 5 are in most respects similar: that is to say, they are each double, and as distinguished from a single water front and back, as shown in Fig. 3, are provided on their inner faces with half-flue or conduit portions 6, 7, 8 and 9 which coincide with similar half flue or conduit portions 6^a, 7^a, 8^a and 9^a in the matching faces of the adjoining sections 3, whereas in Fig. 3 the water front and back do not have such half-flue or conduit portions, and the other noticeable differences between the front 2 and back 4 is, that the front has the fuel-door 10, the flue-doors 11, 12, 13 and 14 and the central air-duct or passage 15 extending therethrough.

The flue-doors 11, 12, 13 and 14 in the front 2 close over flue openings, which, when all the sections are united coincide and communicate with openings 11^a, 12^a, 13^a and 14^a in the sections 3 which form continuous flues extending the length of the structure and which are closed at their rear ends by a solid wall in the water-back 4, except the flue 14^a which communicates with an opening 16 in the wall of the water back 4, through which the products of combustion finds its way to the stack, not shown, and said flues 11^a, 12^a, 13^a and 14^a communicate with the united half-flues or conduits 6^a, 7^a, 8^a and 9^a of the adjoining intermediate sections and corresponding half-flues or conduits of the sections 2 and 4 and adjoining intermediate sections. This is also true of the air-duct 15 in the water-front 2 which, when the sections are all united communicates with similar air-ducts 17 in the intermediate sections 3 forming a continuous air-duct above the fire-chamber from and through the water-front to the water-back 4 and the faces of each of said sections 2 and 3 having the air-ducts 15 and 17 are provided with the semi-circular openings 18 opening into the fire-chamber and when the sections have their adjoining flues in juxtaposition, the semi-circular openings 18 are united to form egress openings for the air passing into the air-duct 15 in the water-front into the fire-chamber. The face of the water back 4 which forms the end wall for the air-duct through the water-front and

intermediate sections has a depression 18^a similar to the semi-circular openings 18 in the adjoining section, so that when the sections are united the semi-circular opening 18 in the last intermediate section together with the depression 18^a in the water-back will provide for the passage of air entering the air duct through the sections, to the fire chamber.

Each section 2, 3 and 4 has what may be termed the legs 19, with water compartments 20 which communicate with the lower, intermediate and upper transverse water compartments 21, 22 and 23 and they in turn communicate with the intermediate and spaced vertical water compartments 24, the whole series of compartments being formed by the peculiar construction of the sections to produce the united vertical and longitudinal flues aforesaid, for the travel of the products of combustion from the fire chamber to the stack. The fire chamber is indicated at 25 and has for its side walls the inclined walls 26 of the legs of the sections and its upper wall the lower walls of the water compartments 21 which at their opposite ends merge into the legs by being inclined downwardly as at 27 which places the flues, formed by the half flues 6 and 6^a also on an incline and greatly facilitates in the products of combustion entering said flues.

For controlling the flow of the products of combustion and regulating the boiler, I provide a plurality of damper-plates 29 and 30 which are adapted to cover the united half-flues 6, 6^a and 7 and 7^a of the front and adjoining sections and united half-flues 6^a and 7^a of the adjoining intermediate sections, and as many or as few may be used as desired. These damper-plates are connected with slidable bars 31 and 32, each of which extend out through the water back 4 and pivotally connected to levers 33 which are fulcrumed at 34 to a support on the water back. The bars 32 extend out through the water front 2 and are provided with a handle portion 35 by means of which an operator may operate the bars 32 for opening or closing the respective damper-plates 29 and 30, as may be desired.

In Fig. 3 which shows the front and back and next adjoining intermediate sections in vertical cross-section central thereof and the remaining intermediate sections in vertical cross-section through the flues 11^a and 12^a on the right hand side of the boiler looking at Fig. 1, arrows indicate air passing in and through the longitudinal air-duct through the boiler immediately above the fire-chamber and into said chamber through the openings 18 leading from said duct, and by reason of the use of damper plate 29 which closes all the lower flues 6^a with the exception of the last two, which are shown

open, the products of combustion will travel toward the back end of the boiler and be caused to travel up through the open ducts 6^a and then by reason of the use of damper-plate 30 which closes all the upper flues 7^a with the exception of the first two, which are shown open, said products of combustion, will travel to the front end of the boiler through the flues 11^a when they will pass upward through the flues 7^a into the flues 12^a when they will find their way into the flues 13^a through the flues 8^a and from the flue 13^a to the flue 14^a through the flues 9^a, from which they will pass out of the rear end of the boiler through the opening 16 in the water back 4 to the stack. It will thus be seen that in the manner in which the damper-plates are disposed so will the draft through the boiler be regulated and that if they are regulated so that lower and upper flues 6^a and 7^a are opened simultaneously there will be a straight draft to the upper flues 8^a from whence the products of combustion will pass in manner described, to the stack.

In Fig. 7 is illustrated, how the air passing from the air duct extending longitudinally through the boiler, acts to produce a more intimate admixture of the smoke and gases arising in the fire-chamber and separating it causes it to pass uniformly up through the flues 6^a. Connecting the water front, water back and the intermediate sections is a dome 36 from which leads an outlet pipe 37, and said dome communicates with said sections by means of vertical supporting-nipples 38. While at the outer lower sides of the said sections are supported headers 39 which communicate with said sections by means of horizontal supporting nipples 40 and connected with each of said headers are return pipes 41. In addition to the flue-doors 11, 12, 13 and 14 by means of which access may be had to the flues 11^a, 12^a, 13^a and 14^a for the purpose of cleaning said flues or for other reasons, I have also provided means whereby access may be had to the water compartments within the several sections for the purpose of cleaning the walls of said compartments or for other reasons. Said means consisting of a plurality of openings 42 in the outer wall of the legs of the said sections, preferably at such points on the said legs so as to be convenient to the water compartments 21 and 22, as seen in Fig. 8, and said openings are adapted to be closed by the plugs 43, which may be easily removed whenever it is desirable.

Having thus fully described my invention what I claim and desire to secure by Letters Patent of the United States, is:—

1. A boiler, comprising a plurality of separable sections, each of said sections having the intercommunicating vertical and

spaced water compartments 20 and 24, and the horizontal and spaced water compartments 21, 22 and 23, and with half flue portions in the outside walls of the compartments 21, 22 and 24 and with an air duct extending through the compartment 21.

2. A section for a sectional boiler, comprising vertical leg portions with water compartments and intermediate spaced vertical water compartments communicating with the leg portions and the overlying horizontal water compartments, the lower horizontal water compartment being inclined at its opposite ends where it merges into the legs, and an air duct extending transversely through said lower horizontal water compartment.

3. A section for a sectional boiler, consisting of vertical leg portions having water compartments which communicate through upper and lower horizontal water compartments, intermediate spaced vertical water compartments communicating with the upper and lower horizontal water compartments, and with the water compartments of the legs through a water compartment disposed intermediate said upper and lower water compartments, an air duct through the lower water compartment, clean out openings in the outside walls of said legs, and plugs for closing said openings.

4. A sectional boiler, comprising a hollow water front and back, hollow separable intermediate sections, the lower portions of the sections forming a fire chamber, said intermediate sections provided with a plurality of over-lying transverse openings, which, when the sections are united, form longitudinal flues through the boiler, and said sections provided in their opposite faces with matching half flue portions for forming a plurality of series of vertical and transverse flues between the said sections, air ducts in each of the water front and said intermediate sections immediately above the fire chamber for forming a continuous air duct from and through the water front to the water back, and air exit openings in said sections communicating with the air duct and said fire chamber.

5. A sectional boiler, comprising a hollow water front and back, hollow separable intermediate sections, each of said sections provided with coinciding transverse openings forming longitudinal flues in the boiler and with half flue portions in their matching faces forming together a plurality of series of vertical and transverse flues between said sections, the lower portions of the sections forming a fire-chamber which communicates with the flues between the said sections, coinciding air ducts in each of said water front and intermediate sections for forming a continuous air duct from and through the water front to the water back,

and air exits communicating with said air ducts and said fire-chamber for causing a separation of the products of combustion in the fire-chamber, whereby they are directed
5 to the flues between said sections upon the opposite sides of said ducts.

6. A sectional boiler, comprising a hollow water front and back and intermediate separable hollow sections, each of said intermediate sections provided with a plurality of
10 over-lying transverse openings forming flues, which extend the full length of said boiler and having in the matching outside faces of said sections, half flue portions,
15 which, together form a plurality of series of vertical and transverse flues between the said sections in said boiler, the said water front provided with flue doors communicating with the longitudinal flues through the
20 sections, and the water back having a central opening adapted to communicate with one of the flues extending through the sections and with a stack, air ducts formed in the water front and in each of said intermediate sections for producing a continuous
25 air duct from and through the water front to the water back air exit openings in each section from said air duct to the fire chamber, clean-out openings in the outside walls
30 of each of said water front, water back and intermediate sections, plugs for closing said clean-out openings, a dome centrally of said sections above the same and communicating vertical nipples supporting the same upon
35 the sections, a header extending along side of each of the lower sides of said sections and connected with said sections by horizontal nipples which support the same.

7. A sectional boiler, comprising a hollow
40 water front and back, hollow separable intermediate sections, the lower portions of the sections forming a fire chamber, said intermediate sections provided with a plurality of over-lying transverse openings,
45 which, when the sections are united, form longitudinal flues through the boiler, and said sections provided in their opposite faces with matching half flue portions for forming a plurality of series of vertical and
50 transverse flues between the said sections, air ducts in each of the water front and said intermediate sections immediately above the fire chamber for forming a continuous air duct from and through the water front to
55 the water back, and air exit openings in said sections communicating with the air duct and said fire chamber, and dampers capable of being operated to close the said vertical flues between the sections.

8. A sectional boiler, comprising a hollow
60 water front and back, hollow separable intermediate sections, the lower portions of the sections forming a fire chamber, said intermediate sections provided with a plurality of over-lying transverse openings,
65 which, when the sections are united, form longitudinal flues through the boiler, and said sections provided in their opposite faces with matching half flue portions for forming a plurality of series of vertical and
70 transverse flues between the said sections, air ducts in each of the water front and said intermediate sections immediately above the fire chamber for forming a continuous air duct from and through the water front to
75 the water back, and air exit openings in said sections communicating with the air duct and said fire chamber and a plurality of dampers adapted to be operated to close certain of said vertical flues simultaneously.
80

9. A sectional boiler, comprising a hollow water front and back, hollow separable intermediate sections, the lower portions of the sections forming a fire chamber, said intermediate sections provided with a plu-
85 rality of overlying transverse openings, which, when the sections are united form longitudinal flues through the boiler and said sections provided in their opposite faces with a plurality of matching half portions
90 for forming transverse flues and also an upper and a lower series of vertical flues between the said sections, dampers for closing certain of each of said vertical flues in each series.
95

10. A sectional boiler, comprising a hollow water front and back, hollow separable intermediate sections, the lower portions of the sections forming a fire chamber, said intermediate sections provided with a plu-
100 rality of overlying transverse openings, which, when the sections are united form longitudinal flues through the boiler and said sections provided in their opposite faces with a plurality of matching half portions
105 for forming transverse flues and also an upper and a lower series of vertical flues between the said sections, dampers for closing a plurality of the forward flues of the lower vertical series and dampers for closing a
110 plurality of the rear flues of the upper vertical series.

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

SAMUEL A. GRIFFIS.

Witnesses:

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