

J. B. BERNHARD.
DOUBLE SECTIONAL BOILER.
APPLICATION FILED DEC. 2, 1909.

979,738.

Patented Dec. 27, 1910.

4 SHEETS—SHEET 1.

Fig. 1.

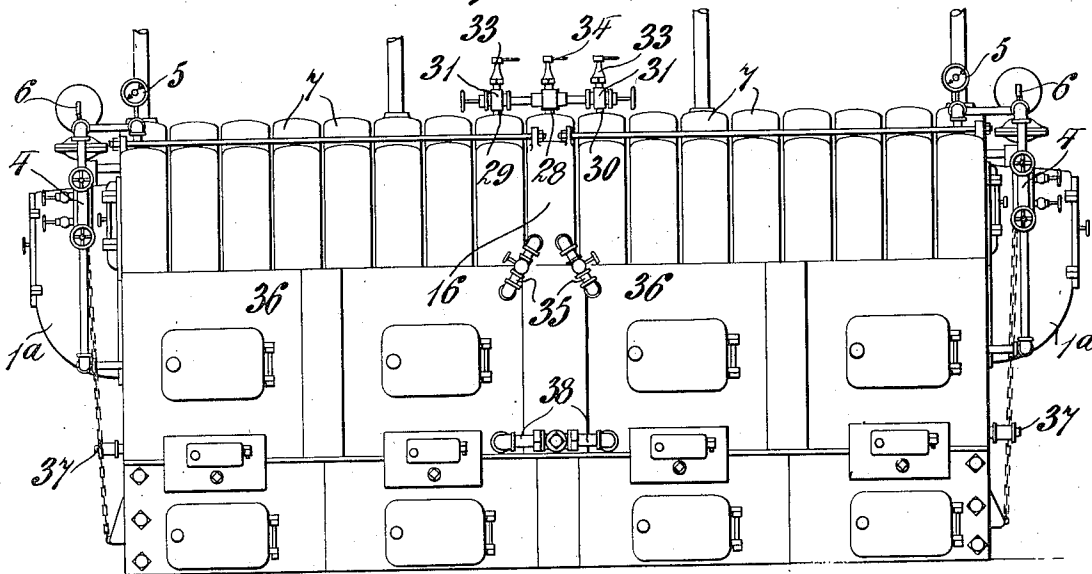
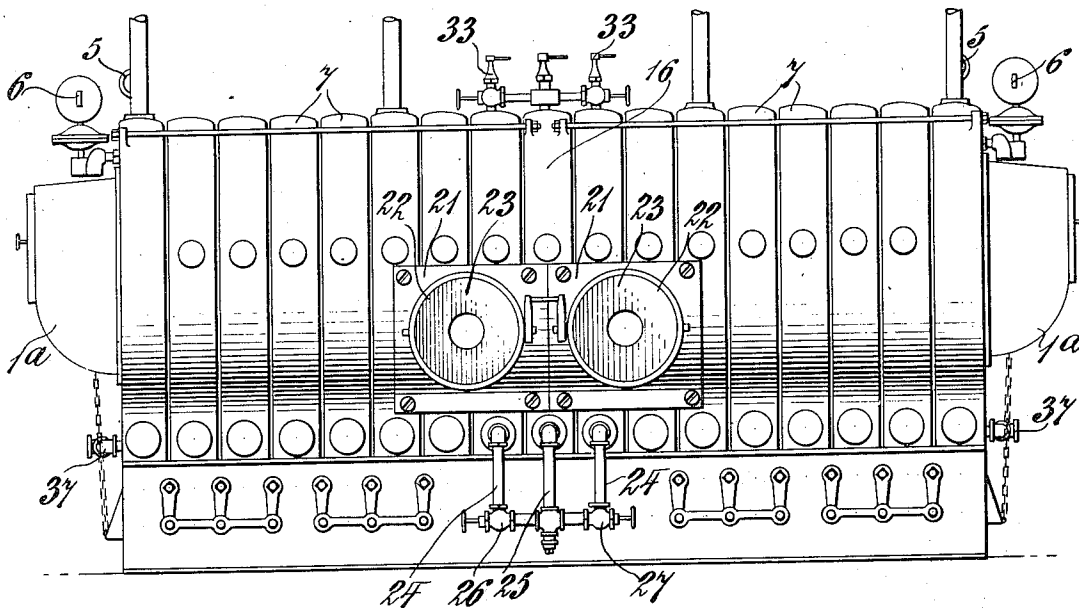


Fig. 2.



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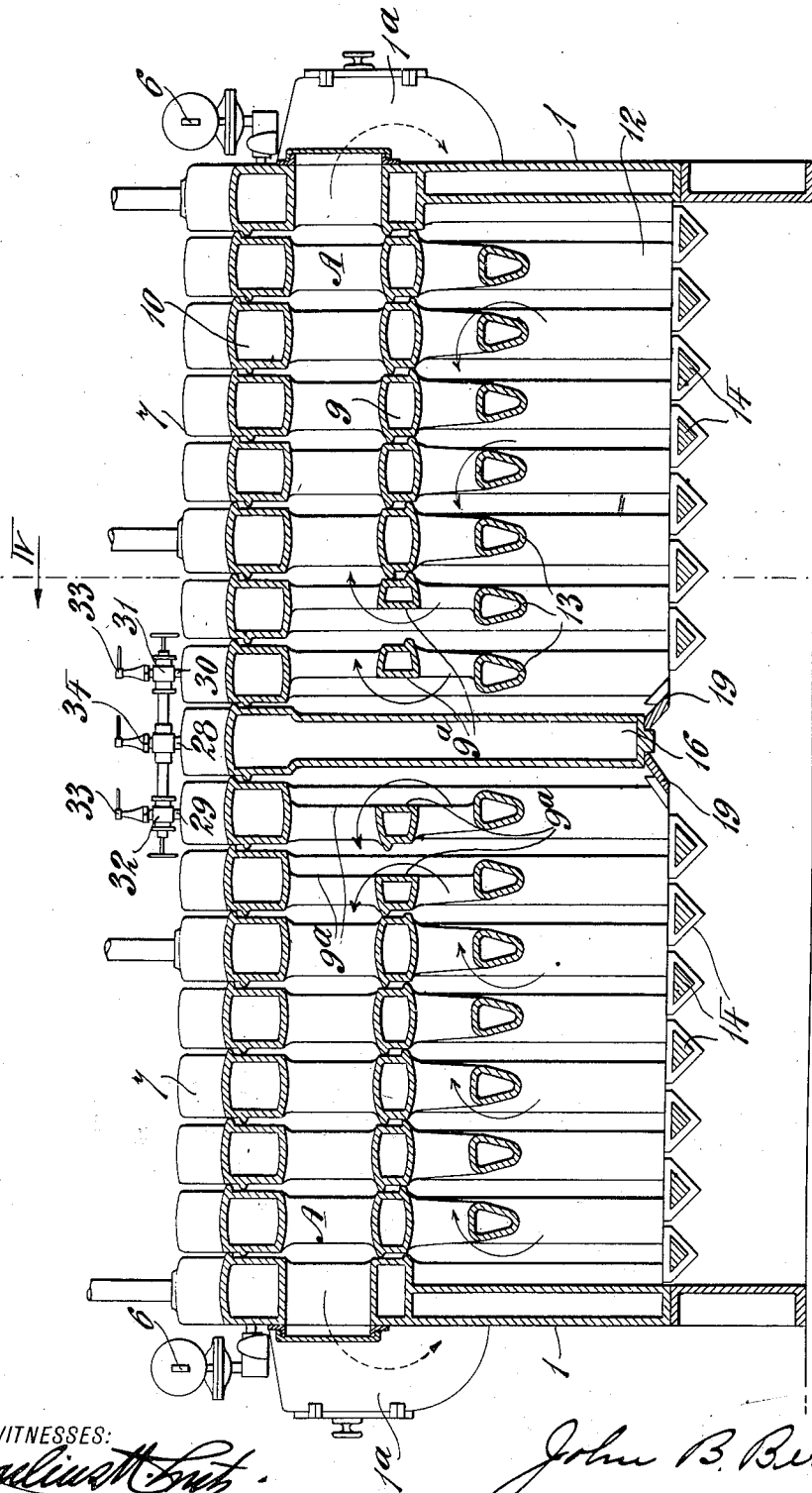


Fig. 2.

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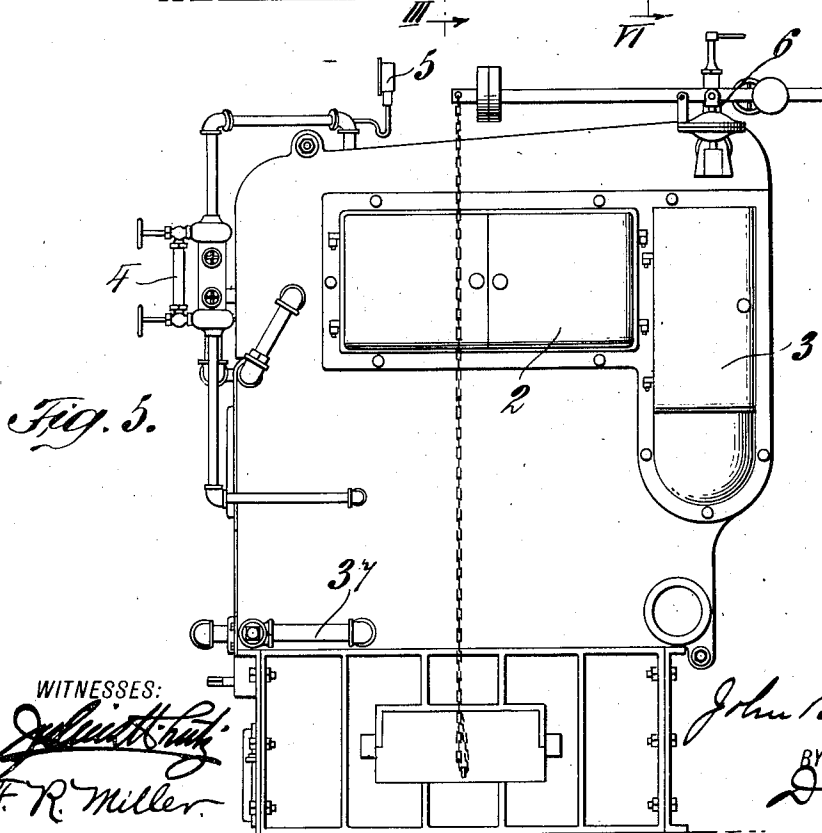
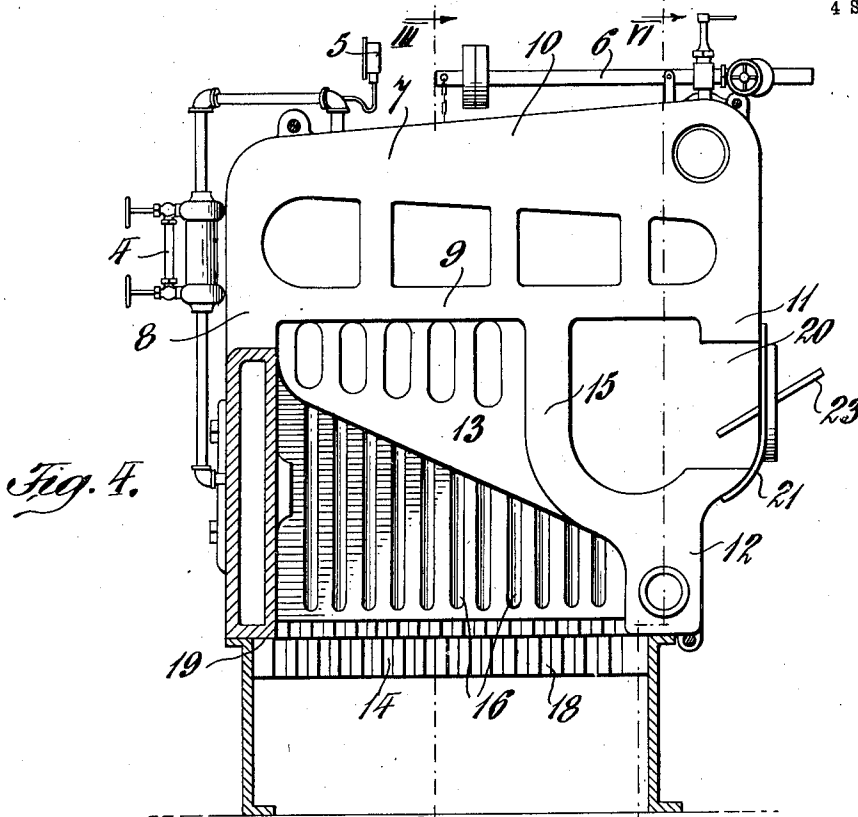
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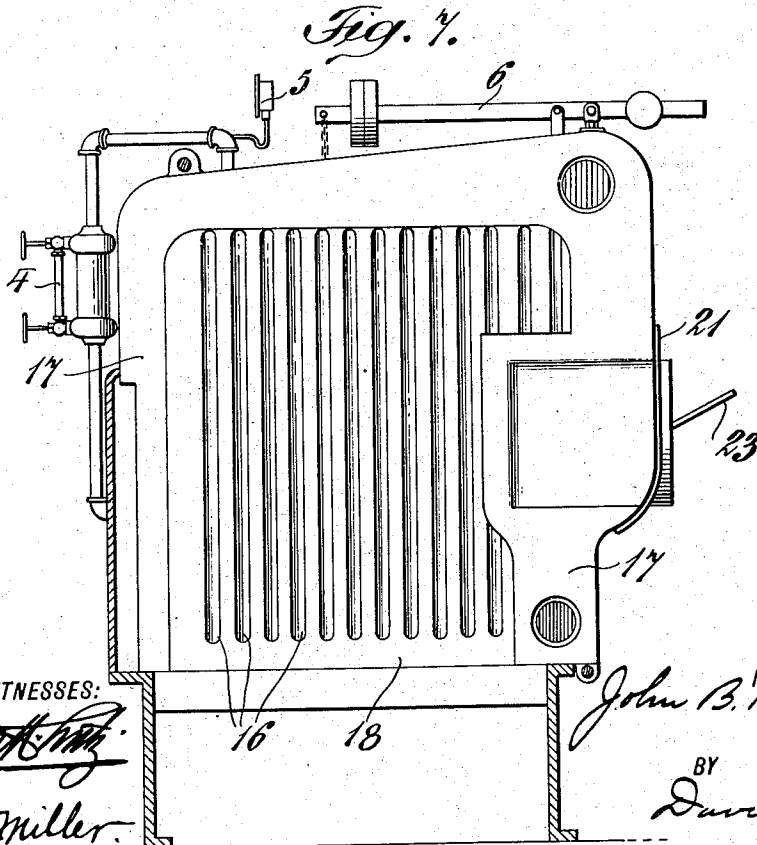
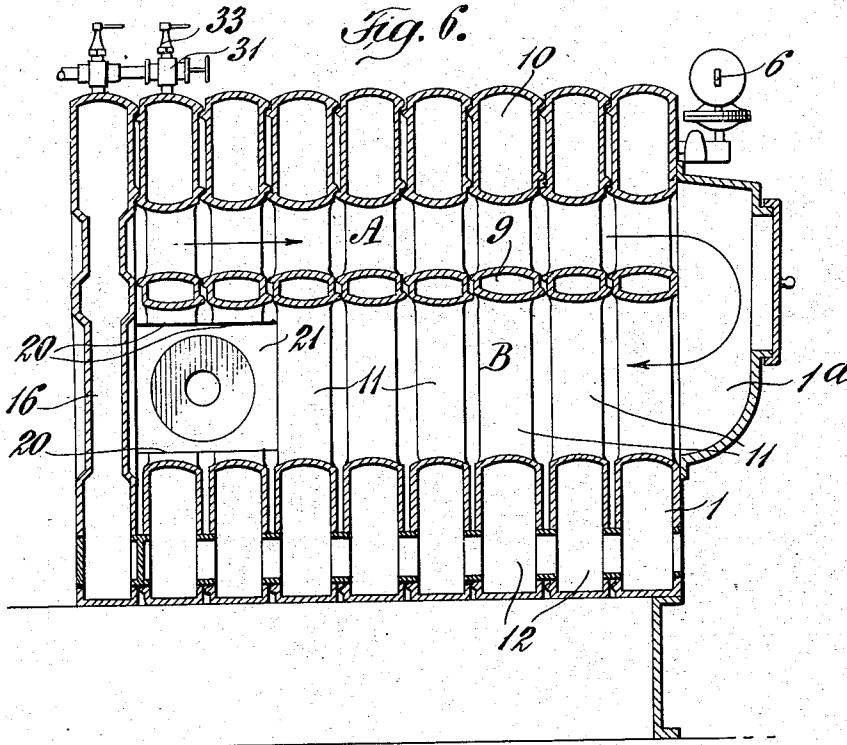
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4 SHEETS—SHEET 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN BLOOMFIELD BERNHARD, OF NEWARK, NEW JERSEY, ASSIGNOR TO UNION BOILER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

DOUBLE SECTIONAL BOILER.

979,738.

Specification of Letters Patent. Patented Dec. 27, 1910.

Application filed December 2, 1909. Serial No. 530,920.

To all whom it may concern:

Be it known that I, JOHN BLOOMFIELD BERNHARD, a citizen of the United States, and resident of the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Double Sectional Boilers, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a front elevation of the boiler complete; Fig. 2 a rear elevation thereof; Fig. 3 a longitudinal vertical sectional view taken on the line III—III of Fig. 4; Fig. 4 a transverse sectional view taken on the line IV—IV of Fig. 3; Fig. 5 an end elevation; Fig. 6 a vertical longitudinal sectional view of one end of the boiler taken on the line VI—VI of Fig. 4; and Fig. 7 a transverse sectional view showing the middle or dividing water section in side elevation.

The main object of this invention is to provide a steam boiler formed of a plurality of water sections or legs, each of said sections extending from front to rear of the boiler and being provided with lateral openings therein, whereby the fire travel or path of the products of combustion will be laterally through the furnace, that is to say, from side to side, and to embody in such a furnace a dividing water section or leg to interrupt the fire travel at about the middle of the furnace, said dividing section extending to the grate level, whereby the furnace will be divided into two parts, each part having a separate and independent fire travel and an independent smoke outlet. By this means either end of the furnace may be used as desired without it being necessary to pass the products of combustion through the other end.

Another object of the invention is to connect together the water sections on each side of the dividing section with suitably valved pipes and to connect the dividing section to said pipes in such a manner that all of the sections will be simultaneously charged with water, and steam may flow from them. The water-charging pipes are connected to the lower ends of the sections, and the steam outlet pipes are connected to the tops of said sections. Suitable valves are provided so that communication between the two sets of water sections may be closed whenever

one section or part of the boiler is out of use.

In constructing my improved boiler I may employ any form of water section or leg, but I prefer to use the form of water leg shown in my Patent No. 794,773, dated July 18, 1905, which will permit of a lateral or side travel of the fire gases. I have shown this form of water section in the drawings, but deem it unnecessary to make a detail description of it, except as may be necessary to define the present invention.

Referring to the various parts by numerals, 1 designates the end sections, each of which is provided with clean-out doors 2 and 3. To each of these sections I also connect a water-level indicating glass 4; a steam gage 5, and a pressure-controlled damper-regulating device 6. The intermediate water sections or legs 7, as hereinbefore stated, are of the same shape and construction as those shown in my previously-mentioned patent, each being formed with the front portion 8 adapted to rest on the front wall of the furnace; a crown-sheet portion 9; a steam dome portion 10; a rear return water passage 11; a pedestal 12, and an upwardly and forwardly-extending thin overhanging portion 13 which overhangs the grate 14. Each water leg is also formed with a vertical chamber 15 which forms the rear wall of the fire box or combustion chamber and the forward wall of the return fire flue through which the products of combustion pass to the smoke outlet. These water sections or legs are arranged as described in said patent, so that the products of combustion pass three times through them before entering the smoke outlet.

Midway between the end sections is arranged a vertical dividing section 16, said section being of the same shape in exterior outline as the water sections. This section is formed with the front portion 17 and with the rear pedestal portion 17^a, which conforms in shape to the corresponding portions of the water sections and rests on the support which carries all the other boiler sections. This dividing section is hollow to contain water. It is blank, that is to say it is not provided with transverse openings, and, therefore, prevents the passage of the products of combustion in each end of the boiler beyond the dividing section. The

lower edge 18 of this dividing section is close to the upper surface of the grate, a short inclined section 19 of the grate being arranged between its lower edge and the adjoining grate surface. By this means fire and ashes will be prevented from passing from one section of the grate under the dividing water section, in either direction.

In my present arrangement of the water sections fire-travel is first from the outer sections inwardly toward the dividing section; thence upwardly into the flue above the crown sheet portions; thence outwardly to the end sections, through passages in the end sections and down into the large return flue; and thence inwardly through said flue to the dividing section; and thence outwardly to the rear of the boiler through the smoke outlet and into the stack.

To provide suitable passages through which the products of combustion may pass upwardly into the flue A above the crown sheet portions, said crown sheet portions of the two inner water legs, that is to say, the legs adjoining the dividing section, are cut away as at 9^a to provide two passages, as shown clearly in Fig. 3. The end sections are provided with suitable extensions 1^a to form flues which connect the flues A above the crown sheet portions with the return flues B.

To enable me to arrange the smoke outlets at the back of the furnace close to the dividing section, the rear water-return passages of the two inner flues are cut away, as shown at 20 to form an outlet from the fire-return flue. To the rear of the furnace are secured two plates 21 provided with openings 22 which register with the opening 20 between the inner water sections. Each smoke outlet is provided with a damper 23 so that said openings may be individually controlled.

The lower ends of the pedestals of the dividing section and the adjoining water legs are connected together by water inlet pipes 24 and 25, said pipes being provided with valves 26 and 27, so that water may be supplied to either end of the boiler, the dividing section being always supplied with water. The upper ends of the steam domes of the dividing section and the adjoining water sections are provided with steam outlet pipes 28, 29 and 30, these pipes being provided with valves 31 and 32 in order that the flow of steam from either end of the boiler may be shut off. Each end of the boiler is provided with a safety valve 33 and the dividing section is similarly provided with a safety valve 34.

The forward portion of the dividing section is connected by pipes 35 to the front wall portions 36 so that water may circulate from said front wall sections into the dividing section. The front wall sections are also in communication through pipes 37

with the end sections; and the boiler front sections are connected together by water pipe 38.

From the foregoing it will be seen that by my arrangement of water sections and the dividing section I provide an apparatus which may be used as one boiler, but which, if desired, may be separated into two parts so that one part only may be used as a boiler having the capacity of one-half of the complete apparatus. The effect is to provide two boilers which may be used together or separately while at the same time saving materially in floor space necessary for two boilers and materially reducing the cost of the two boilers. By dividing the fire box into two portions it is clear that even when the apparatus is used as a single boiler the fires may be independently controlled and a low fire maintained under one portion of the boiler, while an intense fire may be made under the other portion thereof. It is manifest that there are many other advantages in this form of boiler and that its capacity is practically unlimited. It is also manifest that a plurality of dividing sections may be used if desired.

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

1. A sectional boiler comprising two end sections, a water dividing section and extending downwardly to the grate level and being without lateral passages and serving to interrupt the fire travel and divide the fire box into two portions, intermediate water legs or sections arranged between the end sections and the dividing section, each of said intermediate water sections being formed with a steam dome portion, a crown sheet portion, flue openings between the steam dome portions and the crown sheet portion, an upwardly and forwardly extending portion over-hanging the fire box, a rear return water portion and an upwardly extending portion forming the rear wall of the fire box, the crown sheet portions of the water sections adjoining the dividing section being reduced in width to form passages connecting the fire box with the flues formed by the flue openings above the crown sheet portions, means to connect the outer ends of the upper flues with the outer ends of the lower return flues, and means forming two independent smoke outlets from the respective return flues at the rear of the boiler and adjoining the dividing section.

2. A sectional boiler formed of two end water sections, a dividing water section midway between said end sections, a plurality of water legs or sections between the end sections and the dividing section, each of said water legs being formed with registering apertures forming lateral flues for the fire gases, means whereby the gases from

one flue may pass to the other flue at one end of the boiler section and means whereby the fire gases may escape from said flue into the smoke outlet at one end of said lateral flue, 5
valved pipe connections to supply water to the lower ends of the water sections and the dividing section.

3. A sectional boiler formed of two end sections, a dividing water section without 10
lateral passageways for the fire gases, the lower edge of said dividing section extending near to the grate and thereby dividing the fire box into two unconnected sections, intermediate water legs or sections provided 15
with registering passages forming laterally extending flues for the travel of the fire gases, the water legs adjoining the dividing section having the faces which face the dividing section set back or cut away to form 20
flues at right angles to the lateral passages, said water legs being cut away at their rear portions to form smoke outlets at the rear of the furnace near the dividing section, one of 25
said outlets being on each side of said dividing section, and means for independently controlling said smoke outlets.

4. A boiler comprising a fire box forming a combustion chamber, a central water section dividing the fire box and combustion 30
chamber into two separate parts, a grate for each of the parts of the fire box, a boiler abutting said central section at each side thereof so that said central dividing section forms a common wall between the boilers, 35
external water supplying pipes connected to

both boilers and the dividing section, pipes connecting together the steam spaces of the two boilers and the dividing section, and valves in the aforesaid pipes whereby the two boilers may be connected up to the dividing section to permit the whole to be used 40
as a single boiler or either boiler may be cut off from the other boiler and the dividing section.

5. A sectional boiler comprising two end 45
sections, a dividing water section, intermediate water legs or sections arranged between the end sections and the dividing section, each of said intermediate water sections being formed with a steam dome portion, a crown 50
sheet portion, an upwardly and forwardly extending portion over-hanging the fire box, a rear return water portion and an upwardly extending portion forming the rear wall of the fire box, the crown sheet portions of the 55
water sections adjoining the dividing section being reduced in width to form passages connecting the fire box with the flues above the crown sheet portions, and intermediate sections adjoining the dividing section hav- 60
ing their rear return water portions cut away to form two independent smoke outlets from the inner ends of the return flues.

In testimony whereof I hereunto affix my signature in the presence of two witnesses 65
this 16th day of November 1909.

JOHN BLOOMFIELD BERNHARD.

Witnesses:

J. M. TAYLOR,

P. B. RICHARDSON.