

No. 614,704.

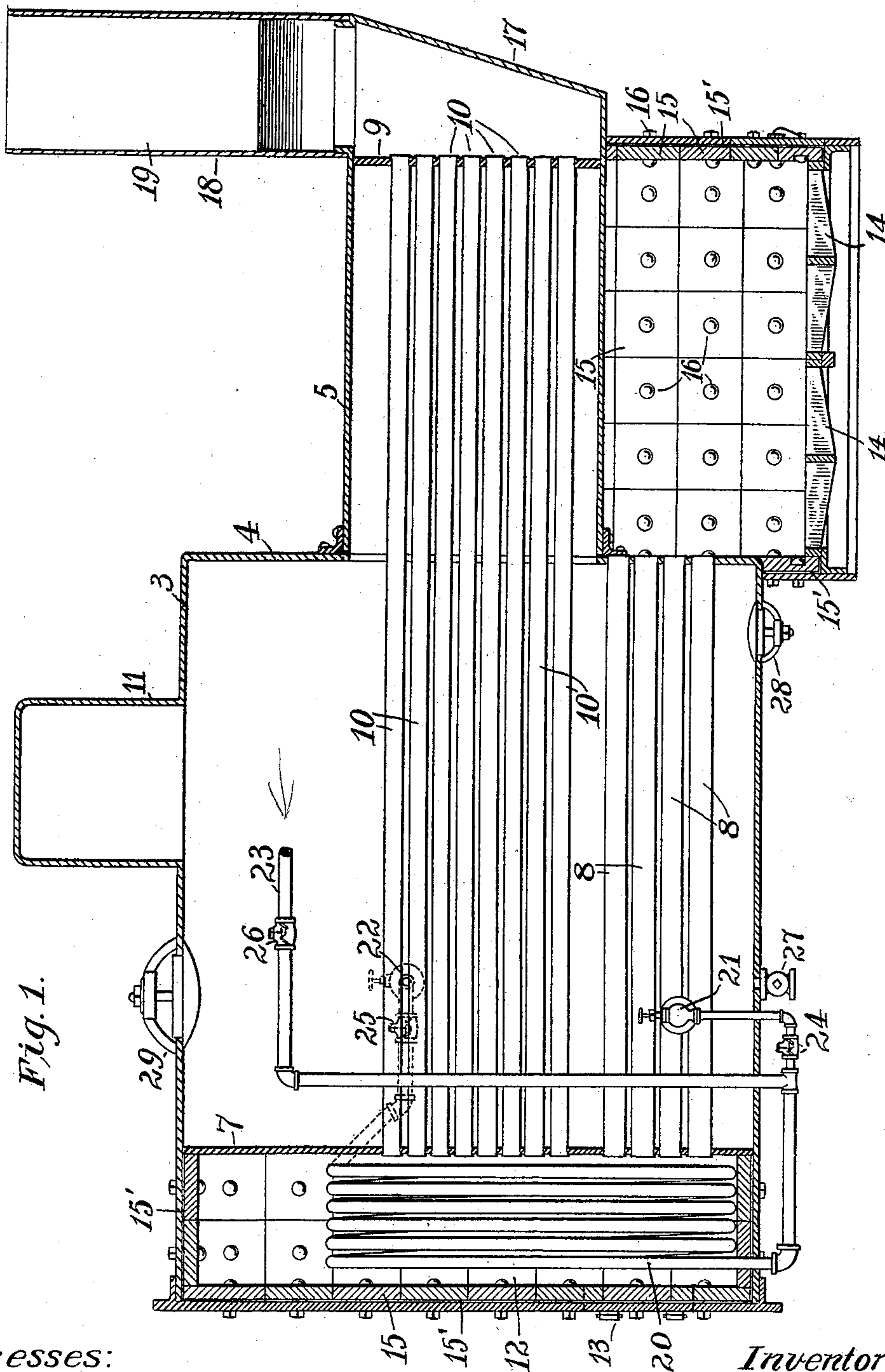
Patented Nov. 22, 1898.

J. DICKSON.
STEAM BOILER.

(Application filed Mar. 30, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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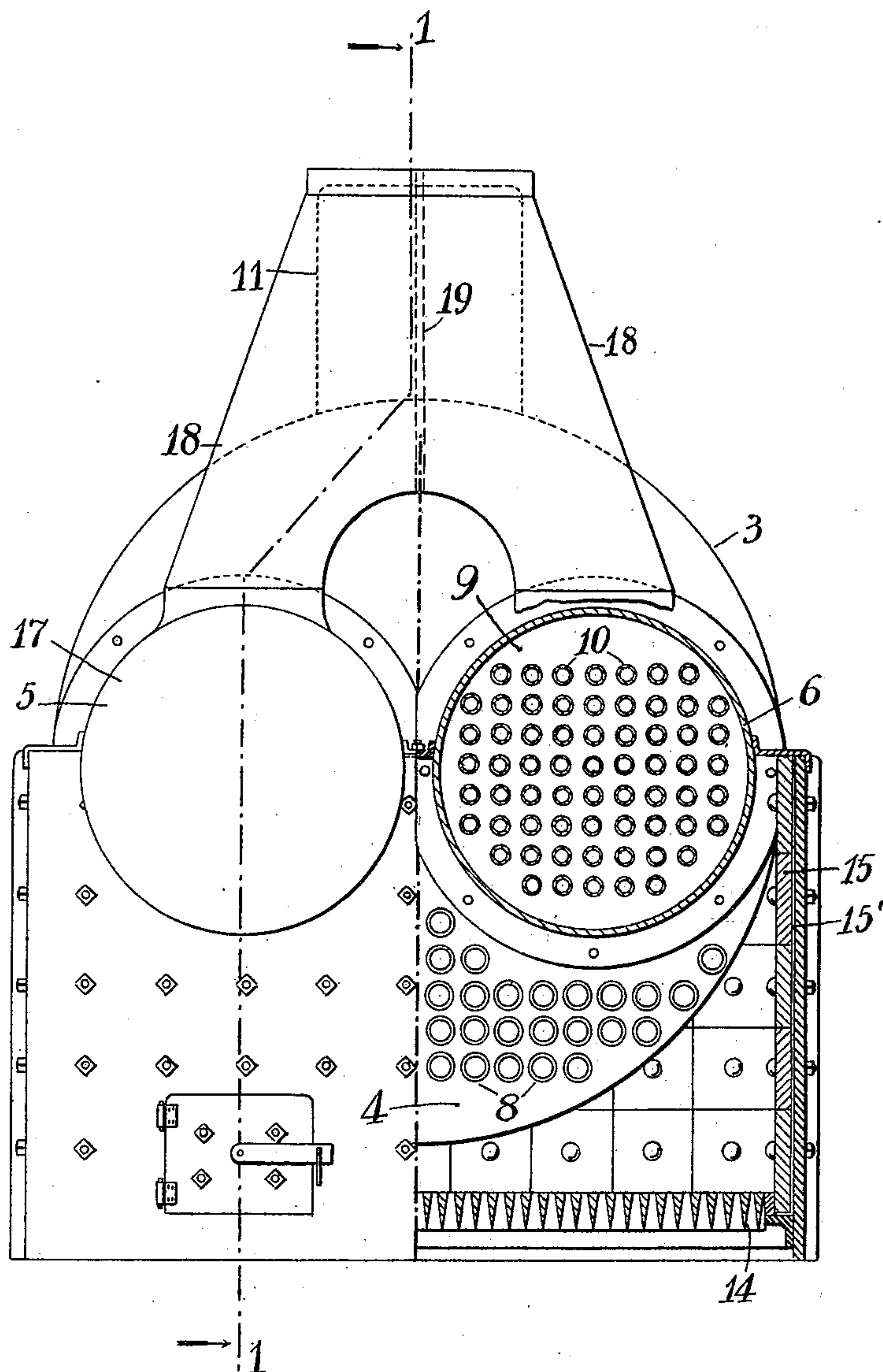
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Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN DICKSON, OF NEW YORK, N. Y.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 614,704, dated November 22, 1898.

Application filed March 30, 1898. Serial No. 675,750. (No model.)

To all whom it may concern:

Be it known that I, JOHN DICKSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to steam-boilers, and particularly to those designed for high pressures.

The objects of the invention are to construct a boiler of this class in a manner such that very little bracing will be necessary; also, to provide a large grate-surface and so locate the fire-box that the maximum effect of the heat therein may be available, and withal to produce a boiler that shall be easily constructed, which shall have a high factor of safety, and a high degree of durability.

With these objects in view the invention consists in the construction, combination, and arrangement of parts hereinafter fully described, and set forth in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 represents the improved boiler in longitudinal vertical section, said section being taken in the plane indicated by the line 1 1, Fig. 2. Fig. 2 represents a partially-sectionized end elevation of the boiler.

The main portion of the boiler consists of the cylindrical section 3, to the head 4 of which are connected side by side two smaller sections 5 and 6, said head being provided with apertures corresponding to the internal diameters of said smaller sections. The lower portion of the head 4 is connected to the head 7 by means of the tubes 8, which are expanded at their ends into each of said heads in the usual manner. The heads 9 of the sections 5 and 6 are connected to the head 7 of the section 3 by means of the tubes 10, which are likewise expanded into said heads in the usual manner. The only portions of the boiler-heads unsupported by the tubes are the upper portions of the heads 4 and 7, which are above the levels of the sections 5 and 6. These portions of said heads may be stayed

in the usual manner, as by bolts 11. The shell of section 3 is preferably extended beyond the head 7 to form the back connection-chamber 12, which serves as an uptake for the products of combustion passing from tubes 8 into tubes 10. This chamber may for the purpose of cleaning be provided with a suitable door, as indicated at 13 by dotted lines.

The fire-box, as shown, is located under the sections 5 and 6 and is flanged thereto and to section 3, the grates of said box being indicated at 14. This box is lined with tile or fire-brick on all surfaces save that under the grates and those presented by the head of sections 3 and the under side of sections 5 and 6. These tiles are indicated at 15 and are preferably secured in place by bolts 16, which pass through them and the walls of the fire-box. The back connection-chamber 12 is lined in a similar manner on all of its inner surface excepting that formed by the head of section 3. Before putting these tiles in place a layer of asbestos 15', preferably in the form of sheets, is placed against the surfaces to be covered by the tiles. This not only acts as a non-conductor but provides for more securely holding the tiles in place and for preventing access of the fire or products of combustion to the metal of the fire-box between the tiles.

To the front end or heads 9 of the sections 5 and 6 are secured the lower portions of the smoke pipe or stack, as indicated at 17. These portions of the stack are continued into the Y-shaped connecting-section 18, from the upper portion of which the stack proper continues.

To insure equal draft for each side of the boiler, a partition, as indicated at 19, is inserted vertically through the middle of said connection.

The capacity and efficiency of this boiler is materially increased by locating in the chamber 12 a coil of pipe, as 20, which shall serve for heating the feed-water. This coil may also serve as a means of maintaining circulation in the boiler and for that purpose is connected at one end to the lower portion of section 3, as indicated at 21, and at the other end to said section at a higher elevation, as indicated at 22. By this connection also cir-

5 culation may be maintained in the feed-water coil at times when no feed-water is flowing through it. The pipe for supplying water to said coil is indicated at 23 and is connected to the coil 20 at the lowest portion thereof. Check-valves, as 24 and 25, may be located in the extremities of the coil 20 to regulate the flow of water through the coil.

10 In the ordinary operation of the boiler the feed-water will enter the coil through pipe 23 and be prevented from going directly into the boiler by the check-valve 24. It will, however, be admitted to the boiler after circulating through the coil 20 by passing the check-valve 25. A check-valve, as 26, may also be located in the pipe leading from the feed-pump, so that should the pressure in the coil 20 exceed that of the pump the hot water may not be forced back into the pump. Should at any time the supply of feed-water to the coil cease and the pressure in the coil exceed that in the boiler, relief will be given to the coil through the check-valve 25, and the water from the lower portion of the boiler may flow into the coil through the check-valve 24.

25 It will be noticed that tubes 8 are larger than tubes 10, and said tubes 8 may be made still larger. Indeed, it is contemplated substituting flues therefor in adapting the boiler to low-pressure service or for burning soft coal. In either case it is necessary only that the carrying capacity of the tubes or flues in the lower portion of section 3 be properly proportioned to that of tubes 10, carrying the products of combustion from chamber 12 to the smoke-stack.

35 By the construction of boiler shown and described it will be observed that a large amount of surface of the boiler-sections themselves is presented to the direct heat of the fire and that the products of combustion by having it pass through only comparatively short tubes in the lower portion of the boiler still possess a high degree of heat as they enter the longer tubes on their way to the smoke-stack. Then, too, by locating the feed-water heater as described the feed-water may be raised nearly to the steam-point before it enters the boiler, and because of this advantage the size of the boiler may be materially decreased.

50 The tiling and asbestos lining of the fire-box and the uptake-chamber also conserves heat energy to a large degree and provides for a higher efficiency in producing steam.

55 The usual appurtenances of the boiler are employed in this as in other boilers—such, for instance, as the blow-off 27, the hand-hole 28, and the manhole 29.

60 Many changes may be made in the form and construction of parts herein shown and described without departing from the invention, one such change residing simply in the multiplication of the number of small sections to be attached to the large section. Another change in the construction shown may be

made by substituting water-legs of the usual construction and in the usual way for the brick-lined walls of the fire-box and the back connection.

No claim is herein made to the feed-water heater, as it will be made the subject-matter for a divisional application.

The invention claimed is—

1. In a boiler, the combination with one section, of a series of smaller sections placed side by side to lie within the cross-sectional limits of said first-named section and connected to the head of the larger section, the interior of said sections communicating with one another.

2. In a boiler, the combination with one section, of a series of smaller sections placed side by side to lie within the cross-sectional limits of said first-named section and connected to the head of the larger section, and a fire-box built under the smaller sections and against the head of the larger section.

3. In a boiler, the combination with one section, of a series of smaller sections placed side by side to lie within the cross-sectional limits of said first-named section and connected to the head of the larger section, tubes extending continuously through the smaller sections and the larger section, and other tubes extending through the larger section below the junction of the said smaller sections.

4. In a steam-boiler, the combination with a section as 3, of a series of smaller sections 5 and 6, secured to section 3, over openings in the head thereof, flues extending through the larger and the smaller sections, and other tubes extending through the larger section only, the back connection-chamber 12, and the fire-box built under the smaller sections and against the head of the larger section, substantially as set forth.

5. In a steam-boiler having comparatively short tubes or flues leading from the fire-box and long tubes or flues leading to the smoke-stack, a back connection-chamber for the passage of the products of combustion on their way from the shorter to the longer tubes, and a lining of asbestos and fire-brick secured to the outer walls of said chamber said asbestos lining extending continuously of the chamber and across the joints between said fire-brick.

6. The combination with the large section 3, and the smaller sections 5 and 6, secured to the head thereof, of the fire-box under the smaller sections and attached thereto and to the end of the larger section, of a lining of fire-brick and asbestos bolted to the outside walls of the fire-box, the asbestos lining arranged between the fire-brick and the chamber's walls and extending continuously across the joints between the fire-brick as and for the purpose set forth.

7. The combination with a boiler having sections as 5 and 6, located side by side, of a

smoke-head for each, a Y connection into which said heads discharge, and a vertical partition in said connection, substantially as and for the purpose set forth.

- 5 8. In a steam-boiler, the combination with a metallic fire-box, of a lining of fire-brick and asbestos bolted to the outside walls of the fire-box, the asbestos lining being arranged
10 and extending continuously across the joints

between the fire-brick, as and for the purpose set forth.

Signed at New York, in the county of New York and State of New York, this 25th day of March, A. D. 1898.

JOHN DICKSON.

Witnesses:

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