

No. 619,098.

Patented Feb. 7, 1899.

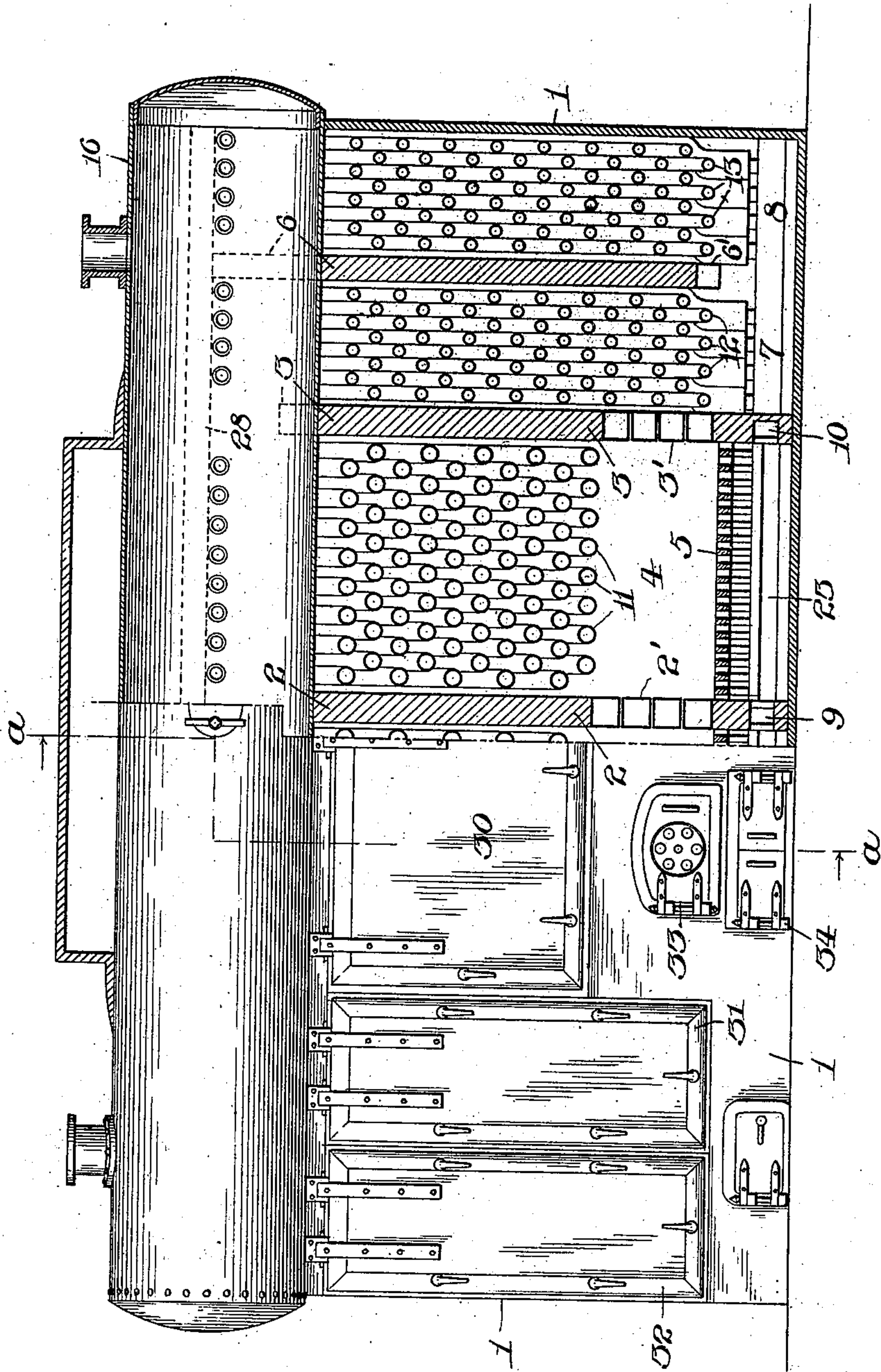
J. A. STEVENS.
STEAM BOILER.

(Application filed Nov. 26, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



WITNESSES:
Thomas A. Gale
O. H. Granger.

INVENTOR
John A. Stevens
BY
Charles A. Butler
ATTORNEY.

No. 619,098.

Patented Feb. 7, 1899.

J. A. STEVENS.
STEAM BOILER.

(Application filed Nov. 26, 1898.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 2.

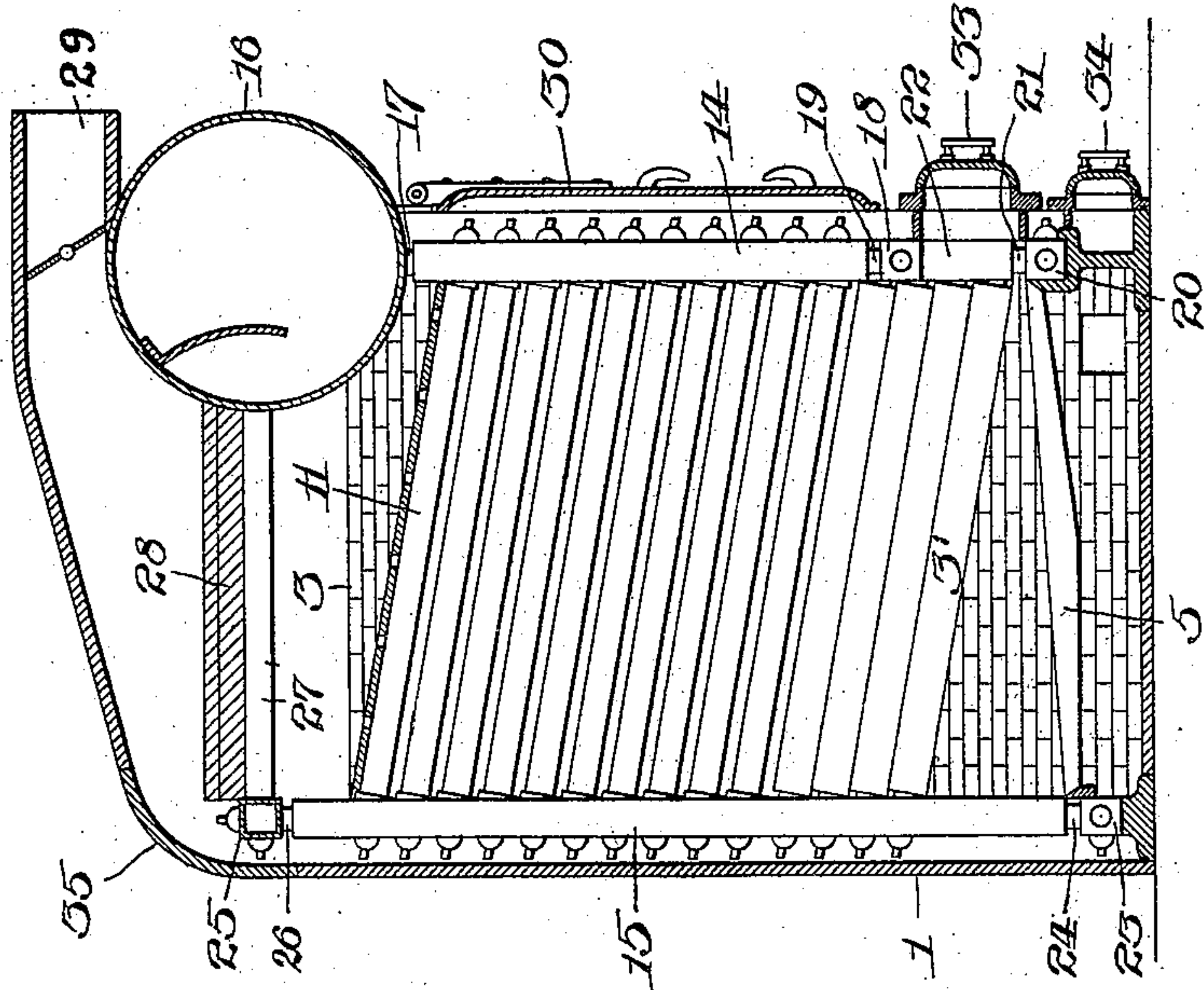
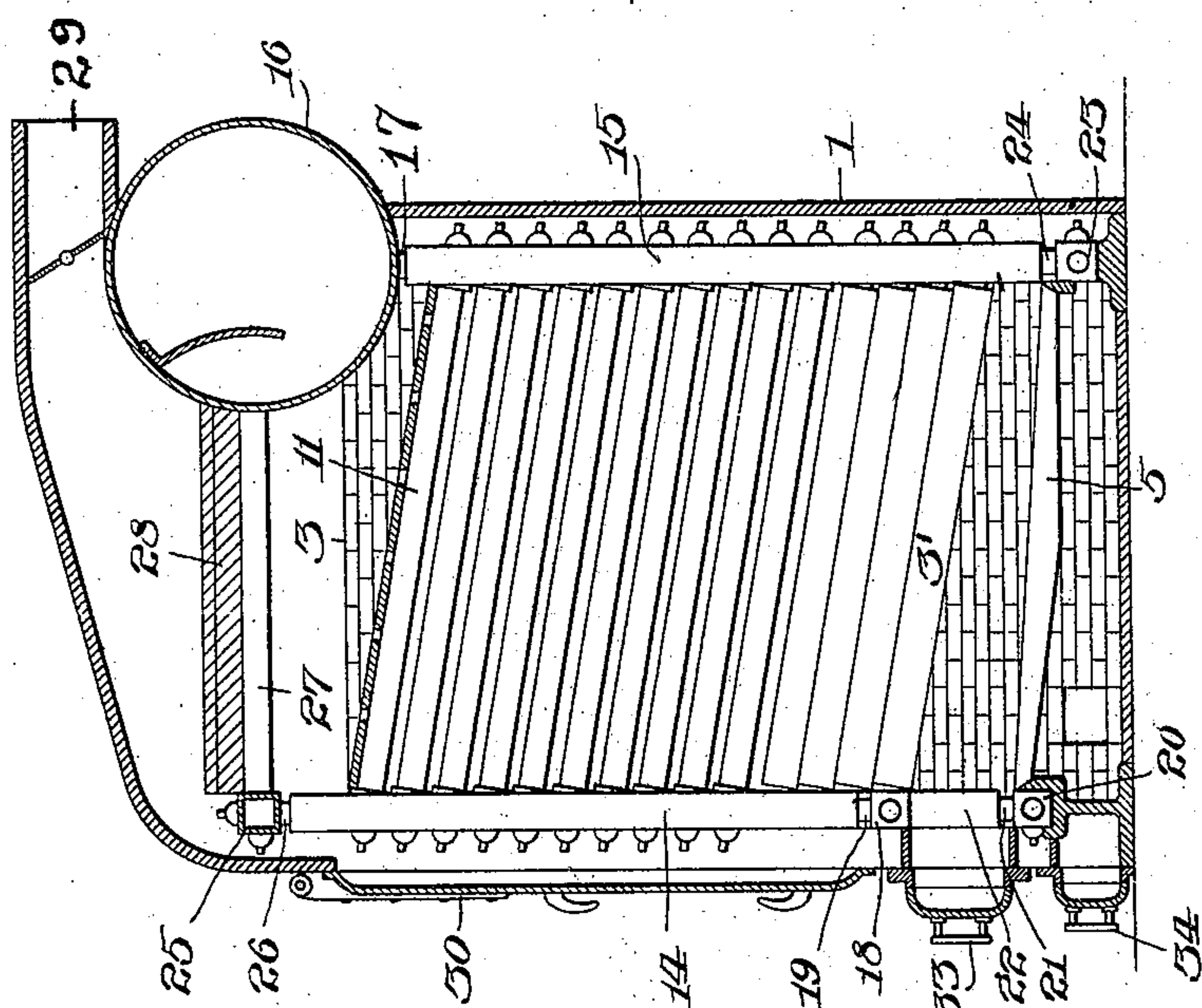


Fig. 3.



WITNESSES:

Thomas S. Gates
P. H. Granger.

INVENTOR

John A. Stevens

BY

Charles A. Butler

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN A. STEVENS, OF LOWELL, MASSACHUSETTS.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 619,098, dated February 7, 1899.

Application filed November 26, 1898. Serial No. 697,518. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. STEVENS, residing at Lowell, in the county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

This invention relates to water-tube boilers, and is an improvement on my former inventions, in which means are provided for directing the gaseous products of combustion transversely to the courses of the water-circulating system and into active contact therewith.

This improvement has for its object, primarily, the utilization of the principles of my former inventions in a boiler having such construction that material head-room is saved, the structure is strengthened, the various members of the system are rendered readily accessible and removable, free circulation is facilitated, and a large heating-surface for the generation of steam is provided within a relatively small space.

My invention is illustrated in the accompanying drawings, of which—

Figure 1 is a front elevation, partially in section. Fig. 2 is a vertical sectional view on the line *a a* of Fig. 1. Fig. 3 is a modification of the construction illustrated in Fig. 2.

As in my former invention, forming the subject-matter of my United States application, Serial No. 683,432, the space inclosed by the containing-walls 1 is separated into two distinct compartments by a division-wall 2. Each of these compartments is provided with a baffle-wall 3, extending upward and forming, with the division-wall 2, a primary pass or combustion-chamber 4, containing a grate 5, and with a baffle-wall 6, extending downward and forming, with the baffle 3 and the end wall 1, respectively, the secondary passes 7 and 8. The ducts 9 and 10 supply air to facilitate combustion. The division and baffle walls are preferably formed of a combination of refractory material with water-boxes 2', 3', and 6', the latter being placed in the lower parts of the passes where they can be removed readily.

The water-boxes 2', 3', and 6' and the banks of tubes 11, 12, and 13 in the respective passes 4, 7, and 8 are connected with front and rear headers or water-legs 14 and 15, which may

be of the box type, as shown in the pass 4, or of the sectional type, as shown in the passes 7 and 8.

In the form of the invention illustrated in Fig. 2 a steam-and-water drum 16 is placed above the front headers 14 and is connected therewith by the nipples 17. The front headers for the primary passes 4 are connected with a water-box 18 by nipples 19, and the front headers for the secondary passes 7 and 8 are connected with the water-box 20 by the nipples 21. An opening 22, between the walls 2 and 3 and the water-boxes 18 and 20, is thus provided, through which fuel is charged to the grate 5 in each primary pass. The tubes and the water-boxes extending between and connected with the front and rear headers rise from the front toward the rear headers. The bottoms of the rear headers are connected with a water-box 23 by the nipples 24, and the tops of the rear headers are connected with a water-box 25 by the nipples 26. The water-box 25 is connected with the drum 16 by the tubes 27, covered by a roof of insulating material 28. The breeching or escape 29 extends forward over the drum.

In the form of the invention illustrated in Fig. 3 the steam-and-water drum 16 is placed over and connected by the nipples 17 with the rear headers 15 and their water-box and connecting-nipples 23 and 24. The front headers for the primary passes 4 are connected with the water-box 18 by the nipples 19, and the front headers for the secondary passes 7 and 8 are connected with the water-box 20 by the nipples 21, as in Fig. 2. The tubes and the water-boxes extending between and connected with the front and rear headers fall from the front toward the rear headers, and the water-box 25 and its nipples 26 are placed above and connected with the front headers 14. The tubes 27 thus connect the front header with the drum, and the escape above the roof-baffle 28 extends rearwardly to the breeching above the drum.

The boiler is provided with the doors 30, 31, and 32 for access to the interior construction and with the usual fire-doors 33 and ash-doors 34. Passages, as 35, may be formed in the containing-walls for access to the various parts requiring inspection and repair.

In constructing the boiler the headers, which are shown in vertical positions, may be inclined when this is deemed expedient.

It will be observed that the position of the drum above the headers for the lower ends of the tubes results in a material saving of head-room and that this arrangement, with the employment of the horizontal water-boxes which connect the corresponding headers for the several passes, materially stiffens the water-circulating and steam-generating system, renders it more compact, more readily assembled and dismembered, and facilitates freedom of circulation. When the capacity required is small, the same general arrangement may be embodied in a construction employing a single primary pass or combustion-chamber and the corresponding secondary passes, omitting one-half of the double construction shown and described.

In operation the gaseous products of combustion pass from the primary combustion-chambers 4 through the apertures between the bridge walls or baffles 3 and the roof-baffle 28, thence downward through the passes 7 and beneath the baffle-walls 6, thence upward through the passes 8 and above the roof-baffle 28 to the breeching 29. In the water-circulating and steam-generating system the course is downward from the drum through the headers and water-boxes connected beneath the same, thence upward through the water tubes and boxes connecting the two headers, and from the second headers and its water-box back to the drum through the tubes 27.

Having thus described my invention, I claim—

1. In the combination of a boiler and furnace, a primary pass, a secondary pass and an escape therefrom, a baffle-wall between said passes, a bank of inclined tubes in each of said passes, having their vertical planes substantially parallel with said baffle-wall, headers for the respective ends of said tubes, a drum above the headers for the lower ends of said tubes and connected therewith, and passages connecting the headers for the upper ends of said tubes with said drum, substantially as specified.

2. In the combination of a boiler and furnace, one or more banks of inclined tubes, headers for the respective ends of said tubes, a steam-drum above the headers for the lower ends of said tubes and connected therewith, a water-box above the headers for the upper ends of said tubes and connected therewith, and tubes connecting said water-box with said drum, substantially as specified.

3. In the combination of a boiler and furnace, one or more banks of inclined tubes, headers for the respective ends of said tubes, a steam-drum above the headers for the lower ends of said tubes and connected therewith, a water-box below the headers for the lower ends of said tubes and connected therewith, a water-box above the headers for the upper

ends of said tubes and connected therewith, and tubes connecting the last-named water-box with said drum, substantially as specified.

4. In the combination of a boiler and furnace, one or more banks of inclined tubes, headers for the respective ends of said tubes, a steam-drum above the headers for the lower ends of said tubes and connected therewith, a water-box below the headers for the lower ends of said tubes and connected therewith, a water-box above the headers for the upper ends of said tubes and connected therewith, tubes connecting the last-named water-box with said drum, and one or more water-boxes beneath the lower ends of the headers for the upper ends of said tubes and connected therewith, substantially as specified.

5. In the combination of a boiler and furnace, a primary pass, a secondary pass and an escape therefrom, a baffle-wall between said passes, a bank of inclined tubes in each of said passes, having their vertical planes substantially parallel with said baffle-wall, headers for the respective ends of said tubes, a drum above the headers for the lower ends of said tubes and connected therewith, a water-box above the headers for the upper ends of said tubes and connected therewith, and tubes connecting said water-box with said drum, substantially as specified.

6. In the combination of a boiler and furnace, a primary pass, a secondary pass and an escape therefrom, a baffle-wall between said passes, a bank of inclined tubes in each of said passes, having their vertical planes substantially parallel with said baffle-wall, headers for the respective ends of said tubes, a drum above the headers for the lower ends of said tubes and connected therewith, a water-box below the headers for the lower ends of said tubes and connected therewith, a water-box above the headers for the upper ends of said tubes and connected therewith, and tubes connecting the last-named water-box with said drum.

7. In the combination of a boiler and furnace, a pair of primary passes separated by a division-wall, a secondary pass and an escape therefrom communicating with each of said primary passes, baffle-walls separating the respective primary and secondary passes, a bank of inclined tubes in each of said passes, headers for the respective ends of said tubes, a drum above the headers for the lower ends of said tubes and connected therewith, passages connecting the headers for the upper ends of said tubes with said drum and a roof-baffle for said passages, substantially as specified.

8. In the combination of a boiler and furnace, a pair of primary passes, a division-wall composed of a lower section of tubes or water-boxes and an upper section of refractory material for separating said primary passes, secondary passes and escapes therefrom communicating with the respective primary passes,

baffle-walls composed of lower sections of
tubes or water-boxes and upper sections of re-
fractory material separating the respective
primary and secondary passes, banks of in-
5 clined tubes in said passes, headers for the
respective ends of said tubes, a drum above
the headers for the lower ends of said tubes
and connected therewith, a water-box above
the headers for the upper ends of said tubes
10 and connected therewith, tubes connecting
the last-named water-box with said drum, and

a roof-baffle for said tubes, substantially as
specified.

In testimony whereof I have hereunto at-
tached my name, in the presence of the sub- 15
scribing witnesses, this 23d day of November,
A. D. 1898.

JNO. A. STEVENS.

Witnesses:

LUTHER HOLLAND,
PHILIP R. COATS.