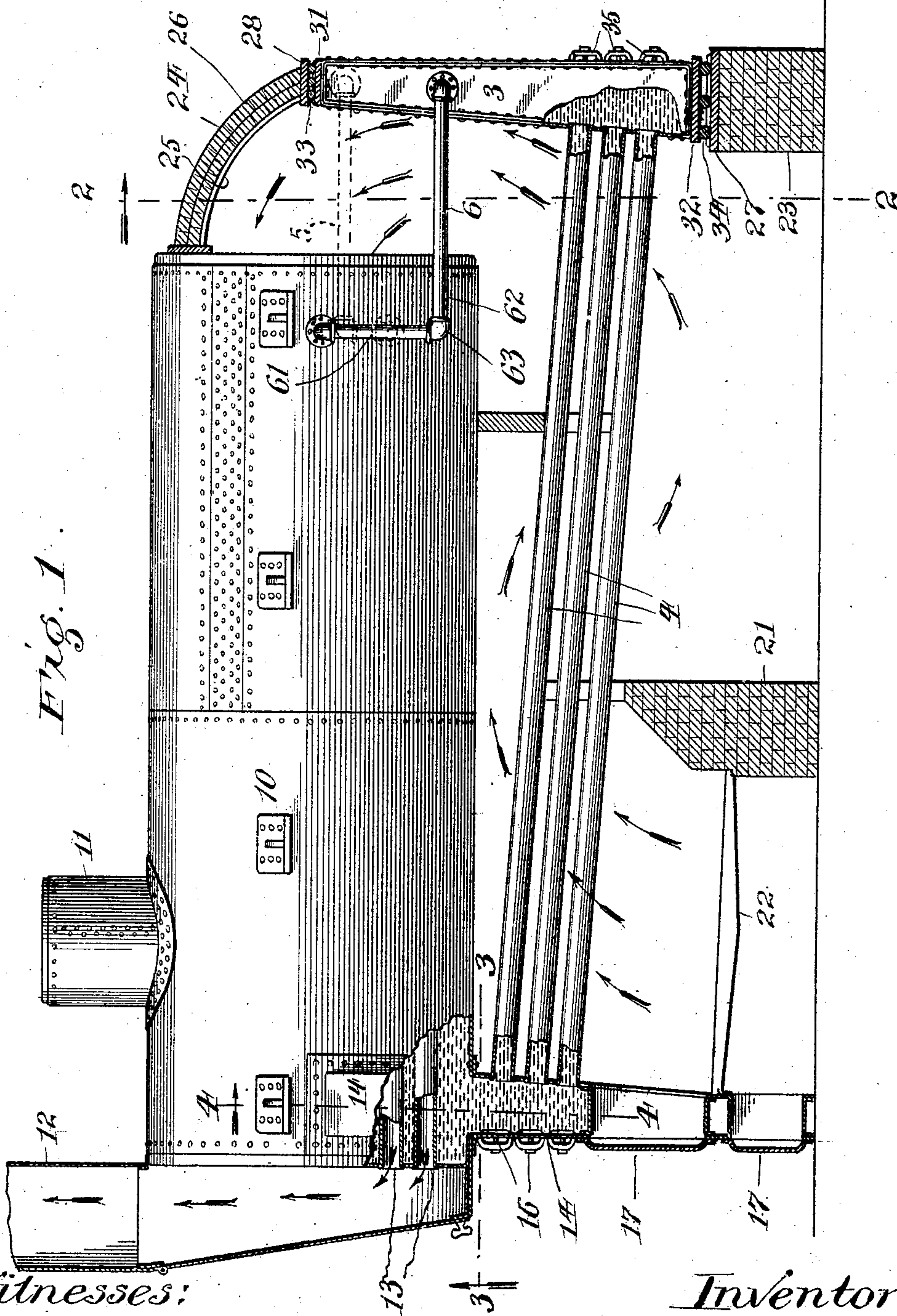


No. 845,386.

PATENTED FEB. 26, 1907.

J. WILDMAN.
WATER TUBE BOILER.
APPLICATION FILED APP. 23, 1906.

2 SHEETS—SHEET 1.



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Wm. P. Bond

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2 SHEETS--SHEET 2.

Fig. 3.

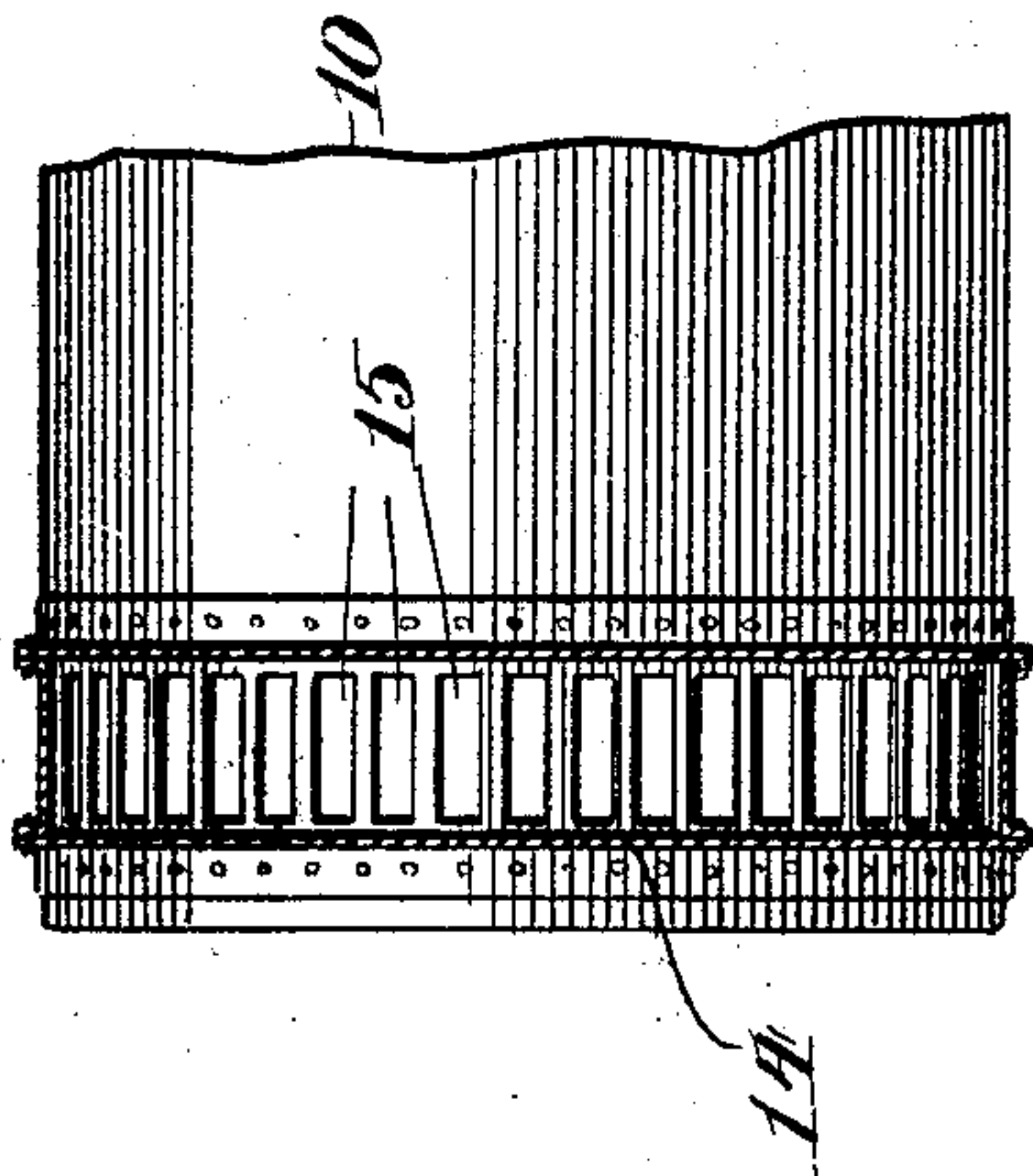


Fig. 4.

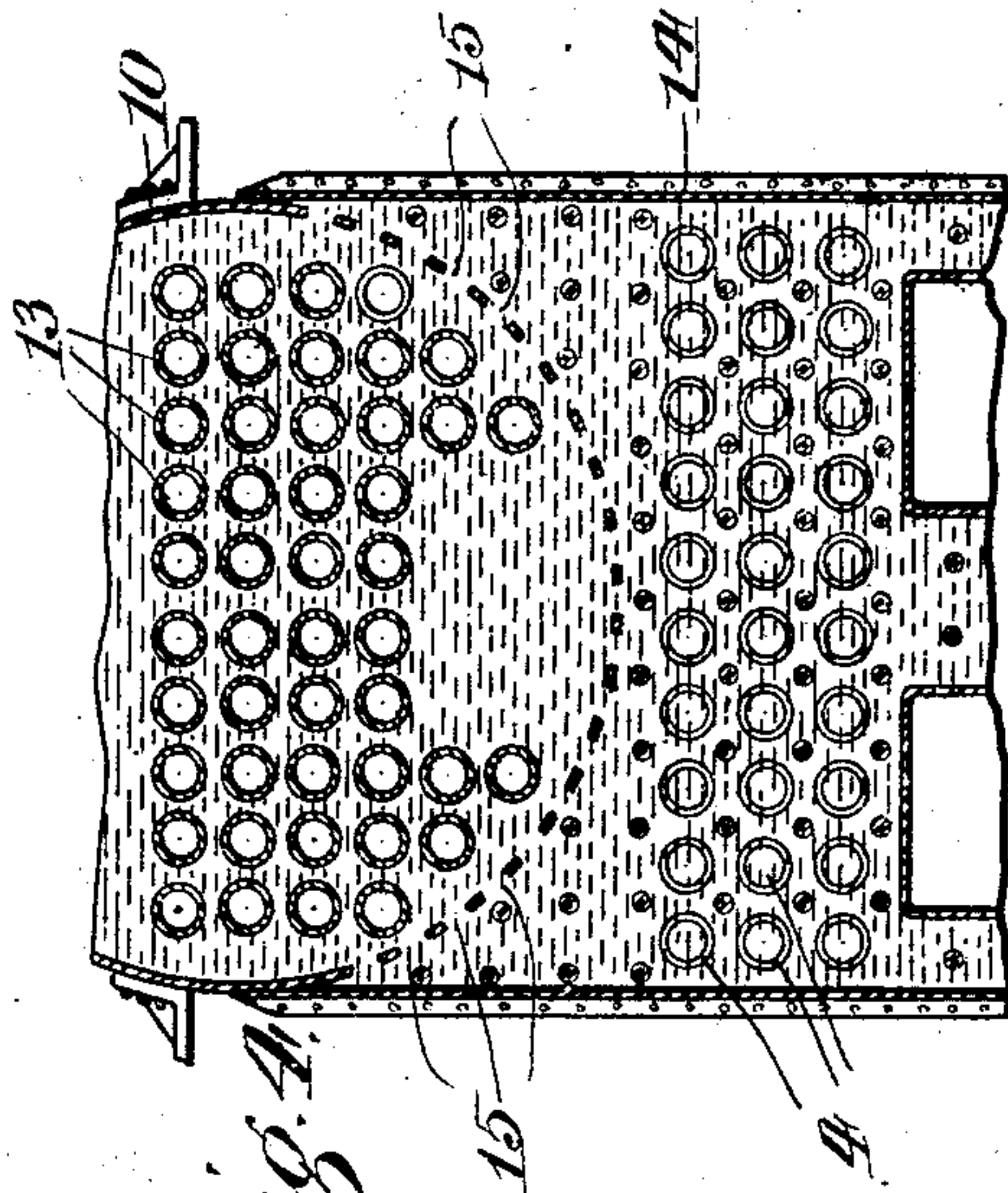
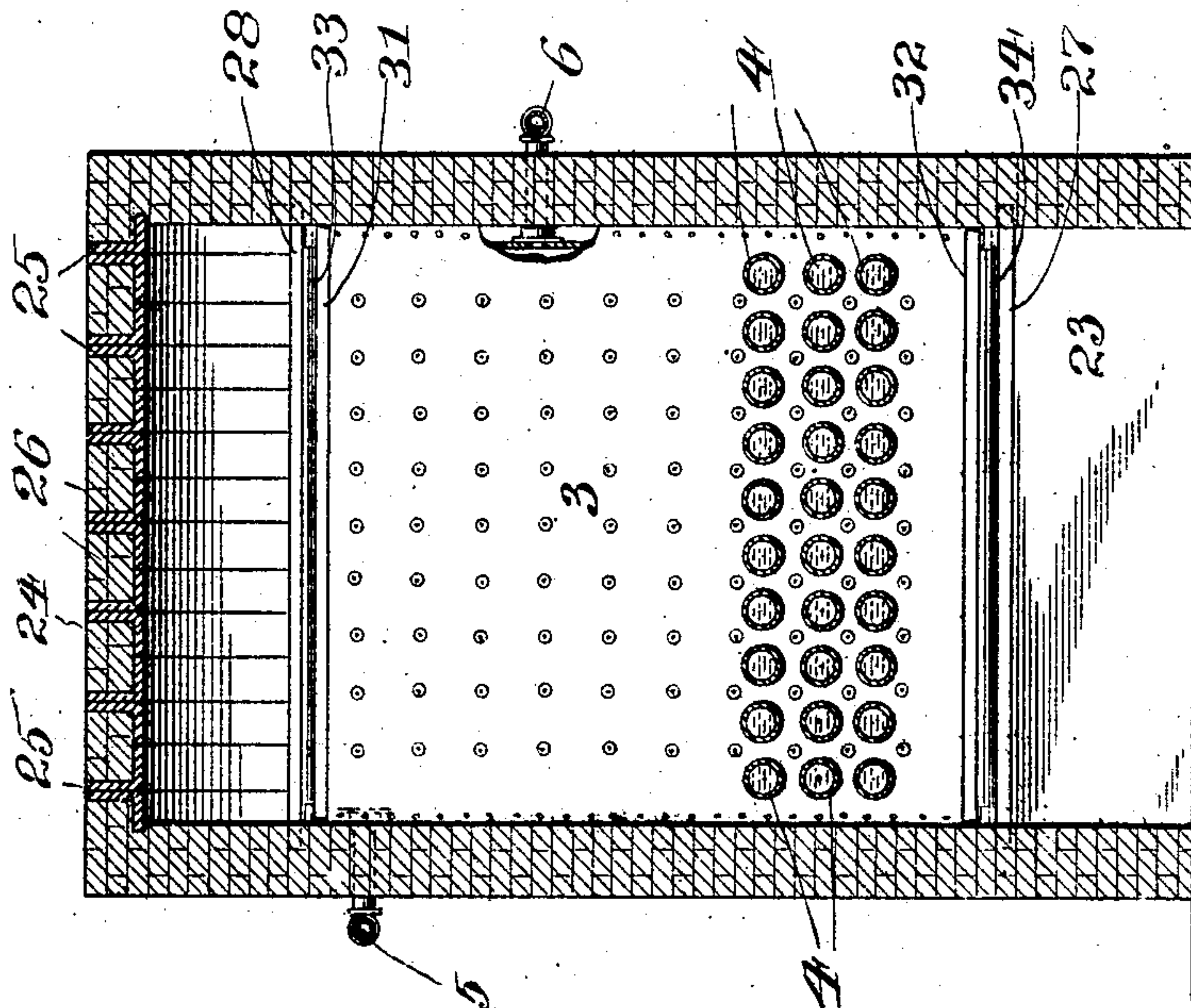


Fig. 2.



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UNITED STATES PATENT OFFICE.

JAMES WILDMAN, OF CHICAGO, ILLINOIS.

WATER-TUBE BOILER.

No. 845,386.

Specification of Letters Patent.

Patented Feb. 26, 1907.

Application filed April 23, 1906; Serial No. 313,120.

To all whom it may concern:

Be it known that I, JAMES WILDMAN, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Combined Fire-Tube and Water-Tube Boiler, of which the following is a full, clear, and exact description.

My invention relates to certain new and useful improvements in combined fire-tube and water-tube boilers; and its object is to provide means for increasing the heating surface presented to the fire without endangering a boiler of this particular type to injury.

Another object is to provide means for compensating the unequal expansion of the various parts of the boiler and utilizing such means to further increase the heating-surface.

Another object is to afford rapid circulation between the fire-tube portion of the boiler and the water-tube portion.

Another object is to increase its efficiency and to construct and arrange the parts so as to avoid the possibility of the tearing out of the water-tubes from the parts to which they are connected.

To such end the invention consists in certain novel features of construction and arrangement, a description of which will be found in the following specification with the essential features thereof more definitely pointed out in the claims appended thereto.

The invention is clearly illustrated in the drawings presented herewith, in which—

Figure 1 is a view, partly in side elevation and partly in vertical longitudinal section, illustrating a boiler embodying my invention. Fig. 2 is a vertical cross-section taken in the line 2 2 of Fig. 1. Fig. 3 is a horizontal section taken in the line 3 3 of Fig. 1 and looking upward, and Fig. 4 is a vertical cross-section taken in the line 4 4 of Fig. 1.

In these views 10 is a fire-tube boiler of ordinary construction, which may be provided with the ordinary steam-dome 11, if desired, and is provided at its forward end with a smoke-stack 12. Within the boiler are the fire-tubes 13, which are secured in the heads of the boiler in the usual manner. The boiler is provided at its forward end with a water-front 14, which extends downward therefrom and communicates therewith through a series of perforations 15, formed in the wall of the boiler. I prefer to perforate the boiler at this point instead of making a large single opening, so as to avoid weaken-

ing the boiler at this point, which is obviously an important feature in devices of this kind. This water-front is provided with the usual doors 17, and back of the same is a bridge-wall 21. Between them are supported the grate-bars 22. The rear wall of the device is made up of two stationary portions 23 24 and a movable portion 3. The portion 23 is preferably constructed of bricks and the portion 24 preferably made up of curved angle-irons 25, secured to the rear head of the boiler 10, having supported thereupon bricks 26. The remainder of the rear wall is in the form of a water-back for the boiler, and this water-back is provided upon its upper and lower ends with bearing-plates 31 32 and is slidably mounted between the upper and lower portions 23 24 of the wall. Bearing-plates 27 28 are provided upon the upper face of the portion 23 and upon the lower face of the portion 24 of the rear wall, and between the plates 27 and 32 and the plates 28 and 31 are interposed rollers 33 34 to facilitate the movement of the water-back. The water-back is practically made high enough to reach the water-line of the fire-tube boiler.

The water-front 14 and water-back 3 are connected by water-tubes 4, which are located in the direct path of the flame, and to provide rapid circulation the main boiler 10 and water-back 3 are connected by circulating-pipes 5 and 6. Each of the two circulating-pipes consists of two segments or members 61 and 62, extending at an angle to each other and connected by elbows 63, so as to permit of a limited amount of play between their ends which enter the boiler and water-back, respectively. The usual hand-holes 16 and 35 are provided and the parts are braced and stayed in the manner well known to those skilled in the art of boiler-making.

The advantages of a combined fire-tube and water-tube boiler are well known; but great difficulty has been encountered on account of the unequal expansion of the fire-tubes and water-tubes. The water-tubes, lying immediately above the fire, are subjected to the hottest part of the flames and contain a very small body of water, while the fire-tubes are farther removed from the fire and are surrounded by a great body of water. It is for this reason that the water-tubes when connected to heads or other water-legs outside of and rigidly secured to the main

boiler are apt to bend out of shape or tear loose from their supports. In fact, it frequently happens that the tubes themselves are split open, and the fireman is apt to be severely injured from the escaping steam. To avoid these difficulties, I have dispensed with the usual water-leg on the rear end of the boiler and provided a suitably-supported and longitudinally-movable water-back with which the water-tubes are connected, which water-back is extended up to form practically the entire rear wall of the device. The water-back being unprovided with any rigid connections with the boiler other than the water-tubes is free to move longitudinally whenever any such movement is necessitated through the expansion and contraction of the water-tubes, whereas if it were rigidly connected to the boiler or to any other stationary part it would be compelled to rock upon such stationary part, and the same danger to the joints would again be present. It will be obvious that the flames passing between the water-tubes strike the bottom of the main boiler and are then deflected by the baffle, so as to again pass between the water-tubes and up along the rear wall or water-back and then out through the fire-tubes of the main boiler and up the smoke-stack. In this way practically all of the heat units are utilized to advantage. Where the ordinary brick wall is used at the rear of the furnace, much of the heat from the flame is absorbed in the wall and lost, whereas with my improved device all these heat units are made use of. Were this water-back rigid, however, the water-tubes would be in danger of buckling or tearing loose, whereas inasmuch as it is movable the expansion and contraction of the water-tubes is made possible without any danger whatever.

I realize that various alterations and modifications of this construction are possible, and I do not, therefore, intend to limit myself to the specific construction shown and described.

I claim as new and desire to secure by Letters Patent—

1. The combination with a fire-tube boiler having at its front end a dependent water-front, of a water-back at some distance in the rear of the rear end of the boiler and mounted

in the rear setting wall to slide between rollers above and below, water-tubes connecting said water-front to the lower part of said water-back, and tubes forming a horizontally-yielding connection between the upper portion of the water-back and the boiler.

2. The combination with a fire-tube boiler having a dependent water-front, of a wall at some distance in the rear of the rear end of the boiler, extending forward to meet the boiler above the fire-tubes therein and provided with a way for a water-back, a water-back mounted in said way to move in a front to rear direction upon rollers in said way, water-tubes connecting said water-front with the lower part of said water-back, and tubes connecting the upper part of the water-back with the boiler and arranged to readily permit horizontal movements of the water-back.

3. The combination with a fire-tube boiler having at its front end a stack and a dependent water-front forming the front wall of a combustion-chamber, a detached water-back at some distance in the rear of the rear end of the boiler, mounted to slide back and forth in a front to rear direction and forming a deflector for the products of combustion, water-tubes connecting the water-front and water-back, and pipes forming a horizontally-yielding connection between the water-back and the boiler.

4. The combination with a boiler having at its front end a stack and a dependent water-front, of a detached vertical water-back mounted in a wall at some distance in the rear of the boiler to slide freely toward and from the latter, downwardly-inclined water-tubes connecting the water-front to the lower part of the water-back, deflecting-walls between the planes of the water-front and water-back to throw the products of combustion alternately upward and downward past the water-tubes, and tubes connecting the upper portion of the water-back to the boiler and arranged to permit free horizontal movement of the water-back, substantially as set forth.

JAMES WILDMAN.

Witnesses:

STEPHEN H. JONES,
THEODORE DILKS.