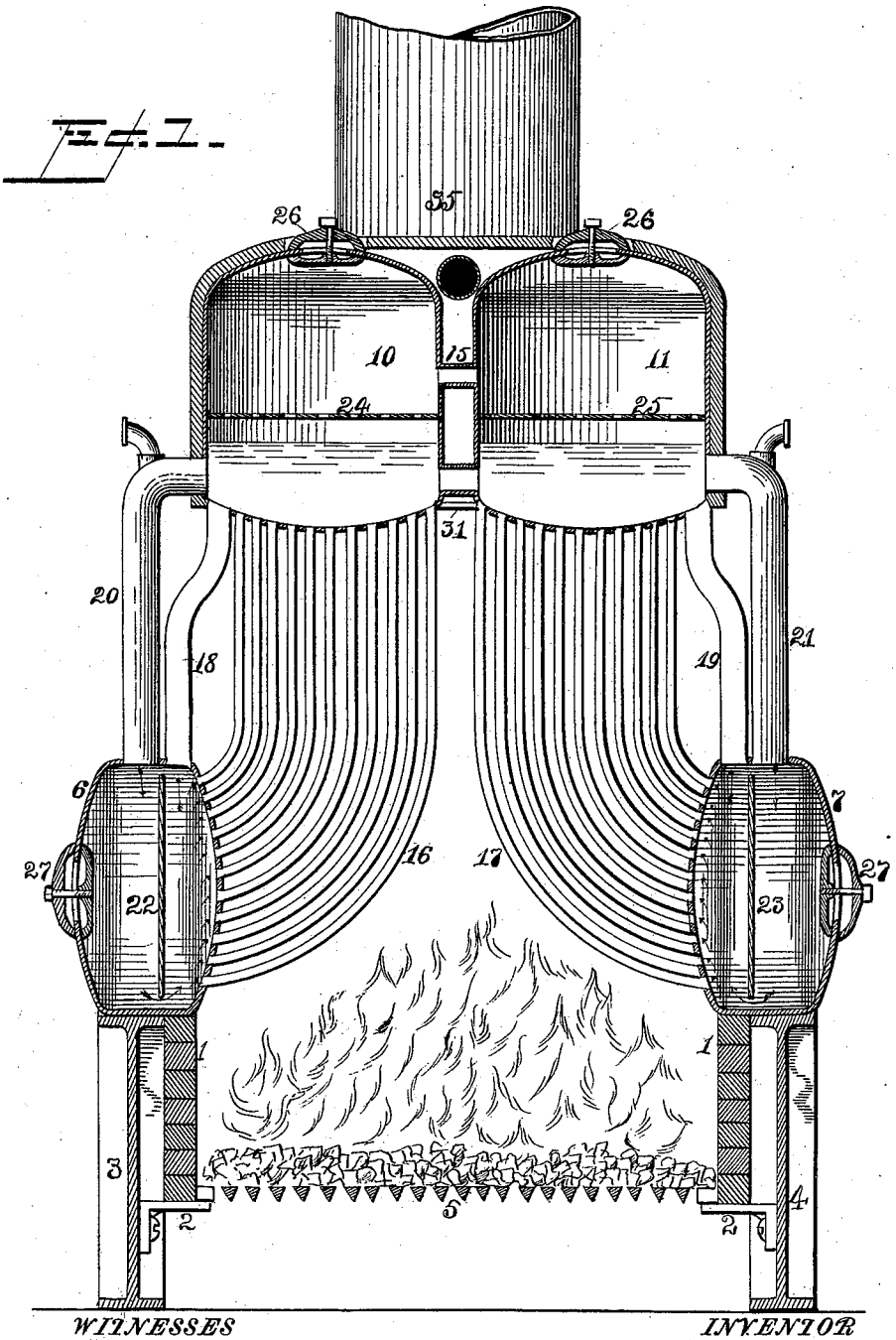
(No Model.) 2 Sheets—Sheet 1.

M. H. PLUNKETT.

WATER TUBE BOILER.

No. 522,272. Patented July 3, 1894.

Fig. 1.



WITNESSES

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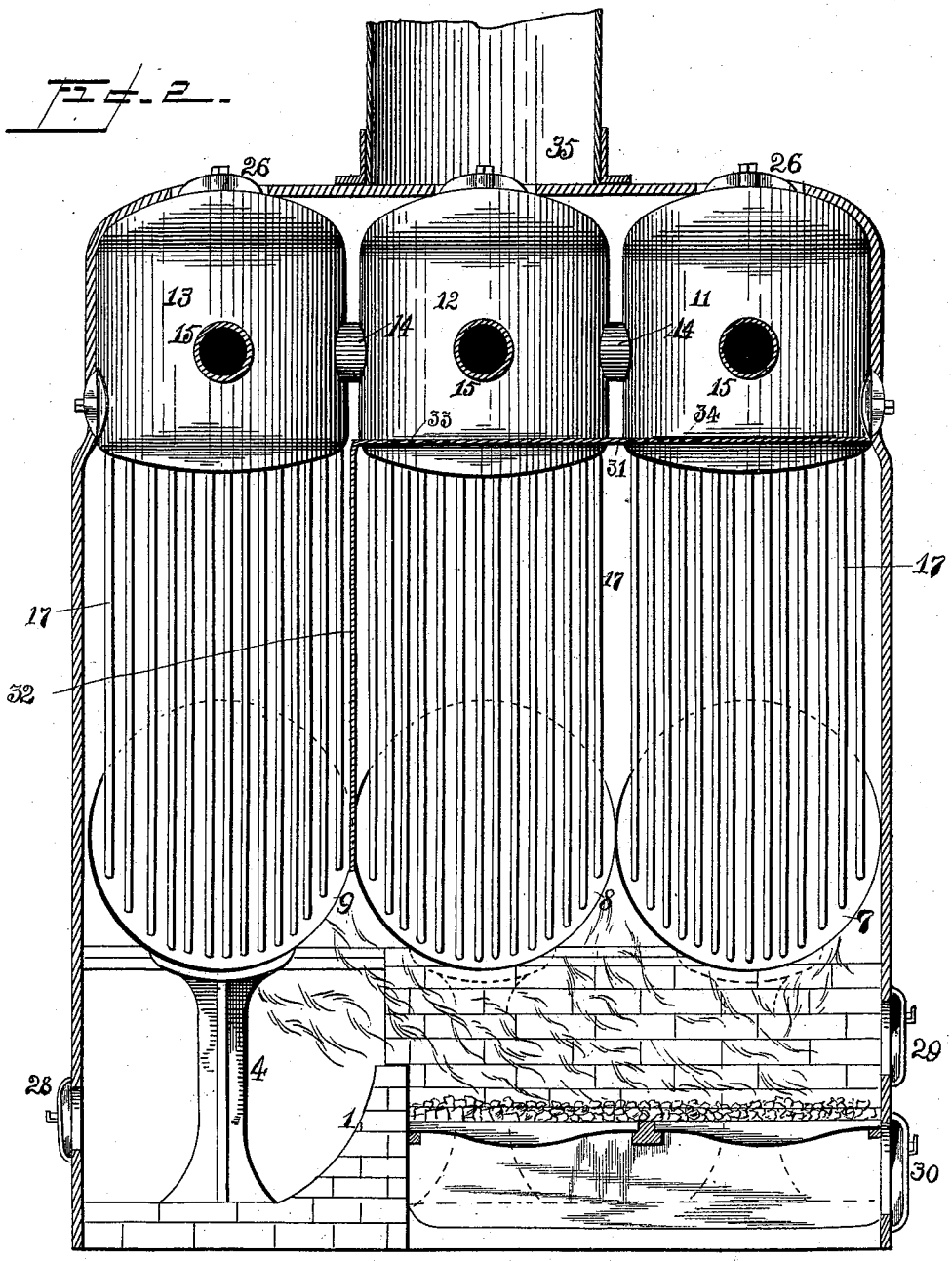
(No Model.) 2 Sheets—Sheet 2.

M. H. PLUNKETT.

WATER TUBE BOILER.

No. 522,272. Patented July 3, 1894.

Fig. 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

MICHAEL H. PLUNKETT, OF BALTIMORE, MARYLAND.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 522,272, dated July 3, 1894.

Application filed September 23, 1893. Serial No. 486,320. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL H. PLUNKETT, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Water-Tube 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.

My invention relates to water tube boilers and has for its object to furnish a greatly improved boiler of this class.

With this object in view my invention consists in the construction, arrangement and combination of parts hereinafter fully described and afterward specifically pointed out in the appended claims.

In the drawings Figure 1 is a transverse vertical section through a boiler made in accordance with my invention, and Fig. 2 is a central longitudinal vertical section through the same.

Like numerals of reference mark the same parts in both the figures.

Referring to the drawings by numerals, 1 is the usual brick foundation supported in any usual manner, and forming the walls of the fire box. In this instance I show the brick work partially supported upon brackets 2, attached to or projecting from cast iron stools 3, 4.

5 are the grate bars of any usual or preferred construction.

In my improved boiler I provide two series of horizontally placed, cylindrical, water or tube chambers, one series on each side of the boiler. The body of the boiler is rectangular, and the horizontal cylindrical chambers of each series are placed one behind the other, each series extending from front to rear, along one side of the structure. In Fig. 1, I show—in section—one chamber of each of the series, being the front one of each series, such chambers being marked 6 and 7, and being shown supported partly on the stools or frames 3 and 4 and partly on the brick walls of the fire box. In Fig. 2, I show, in elevation, the whole of the right hand series of these chambers and designate them 7, 8, 9. It will of course, be understood, that while only one—the front one—of the left hand series is shown, that each series is similar in number, construction and relative position.

Above each series of water or tube chambers I provide a series of steam chambers each of which is a vertically placed cylinder, and these series of steam chambers correspond, in number and position, with the lower series of water chambers. The front one of each of these series of water chambers is shown, in section, in Fig. 1 and are marked respectively 10 and 11, while in Fig. 2 I show one full series, in elevation, being marked 11, 12 and 13. Each of the steam chambers of these two series is connected to the adjajacent chamber of its own series by pipes 14 and to the corresponding chamber of the opposite series, by pipes 15 so that a free circulation and even pressure are kept up in all of them.

The inner face of each of the series of water chambers is connected to the lower or bottom face of the corresponding steam chamber in the series above it, by means of water tubes marked respectively 16, 17, which drop vertically from the bottoms of the steam chambers and are curved outwardly, near their lower ends to enter into the inner faces of the water chambers. The ends of the tubes are secured by spreading or rolling so as to dispense with screw joints.

18, 19 are larger tubes which extend from the top of the horizontal water chambers to the bottom of the steam chambers and 20, 21 are return pipes extending from the outer sides of the steam chambers to the top of the water chambers.

20, 21 are injection or inlet pipes or feed pipes which discharge feed water into the return pipes which thence passes into the water chambers, going in direction to the down current.

22, 23 are circulation plates or diaphragms placed and properly secured in vertical positions in the steam chambers between the line of the entry of the return and feed pipes and that of the steam tubes, to insure a proper circulation of the feed and return water in the water chambers.

24, 25 are perforated horizontal diaphragms in the steam chambers to prevent the rise of water therein and insure dryness in the steam.

Each of the chambers is properly provided with manholes to permit of easy access to the interior for the various operations to be performed therein, such man holes being marked 26 for the steam chambers and 27 for the water chambers. A man hole 28 is also provided in the rear wall, and a suitable furnace door 29 and ash pit door 30 in the front of the boiler.

31 is a deflector plate running horizontally between the front steam chambers of the two series, and vertically downward at 32 the line of separation of the second and third steam chambers of both series. It is provided with perforations at 33 and 34, for the purposes hereinafter explained. A suitable smoke stack 35 rises from the top of the boiler.

The operation of my improved boiler may be described as follows: Fire having been started in the furnace the natural tendency of the smoke and flame will be to take as direct a path as possible to the smoke stack. This is prevented by the horizontally and vertically placed deflectors 31 and 32 and the perforations 33 and 34 therein provide means whereby the proper draft is allowed at these several positions. To reach the smoke stack the products of combustion are therefore compelled to take such direction as will thoroughly and quickly heat the tubes 16 and 17. This being done, a circulation is quickly started through the return pipes 20 and 21. The feed water passing down through these pipes 20 and 21 is compelled, by the deflecting or circulation plates 22 and 23 to pass down in the outer half of the water chamber and passing under these plates is again heated and passed through the water tubes 16 and 17. A continual circulation is thus kept up and a large steam capacity assured. The various chambers being small, the thickness of plate necessary to withstand any particular pressure, is much less than would be required in larger chambers.

The advantages of my improved boiler are many and valuable. The weight and space necessary to high pressures, are very greatly reduced. All central water chambers are dispensed with leaving a clear unobstructed furnace that can be easily fired from one fire door in the front end of the boiler. There are no flat surfaces to be braced or stayed, the tube sheets being crowning in shape. The arrangement is such that both ends of the tubes can be reached for repair or replacement, without going into the boiler and all the parts are easy of access. The whole construction can be taken apart so that it may be lowered through the fire room hatch without cutting the decks and can be removed the same way. There is a very large surface exposed to the fire and there are no screw joints exposed to the heat. The structure is such that the motion of a vessel will not materially affect the water level so as to expose surfaces to the fire which should be covered.

Having thus fully described the construction, operation, and advantages of my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a steam generator, in combination a cylindrical chamber arranged horizontally, along the side of a furnace, a cylindrical steam chamber arranged vertically above the furnace, bent or curved pipes passing through the furnace and connecting the inner end of the water chamber with the bottom end of the steam chamber, and return tubes located outside the furnace and connecting the steam and water chambers, substantially as set forth.

2. In a steam generator a series of horizontally placed cylindrical water chambers in combination with a series of vertically placed, cylindrical steam chambers, series of water tubes connecting the bottoms of the vertical steam chambers with the ends of the water chambers and return tubes located outside the furnace and connecting the steam and water chambers, substantially as set forth.

3. In a steam generator horizontal cylindrical water chambers arranged in a series in line of their diameters in combination with a series of vertical, cylindrical steam chambers arranged in line of their diameters, series of water tubes connecting the water chambers and bottoms of the steam chambers and return tubes located outside the furnace and connecting the steam and water chambers, substantially as set forth.

4. In a steam generator, in combination, horizontally placed cylindrical water chambers arranged in two series in lines with their diameters forming the sides of the fire box, vertically placed cylindrical steam chambers arranged in two similar rows, placed above the water chambers and forming the top of the fire box, an open space being left between the rows of steam and water chambers for furnace room, and curved pipes connecting the inner ends of the several steam and water chambers, substantially as set forth.

5. In a steam generator, in combination, horizontally placed cylindrical water chambers arranged in two series in lines with their diameters forming the sides of the fire box, vertically placed cylindrical steam chambers arranged in two similar rows placed above the water chambers and forming the top of the fire box, an open space being left between the rows of steam and water chambers for furnace room, and curved pipes connecting the inner ends of the several steam and water chambers, and return tubes located outside the fire box and connecting the steam and water chambers, as and for the purpose set forth.

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

MICHAEL H. PLUNKETT.

Witnesses:
S. BRASHEARS,
A. O. BABENDREIER.