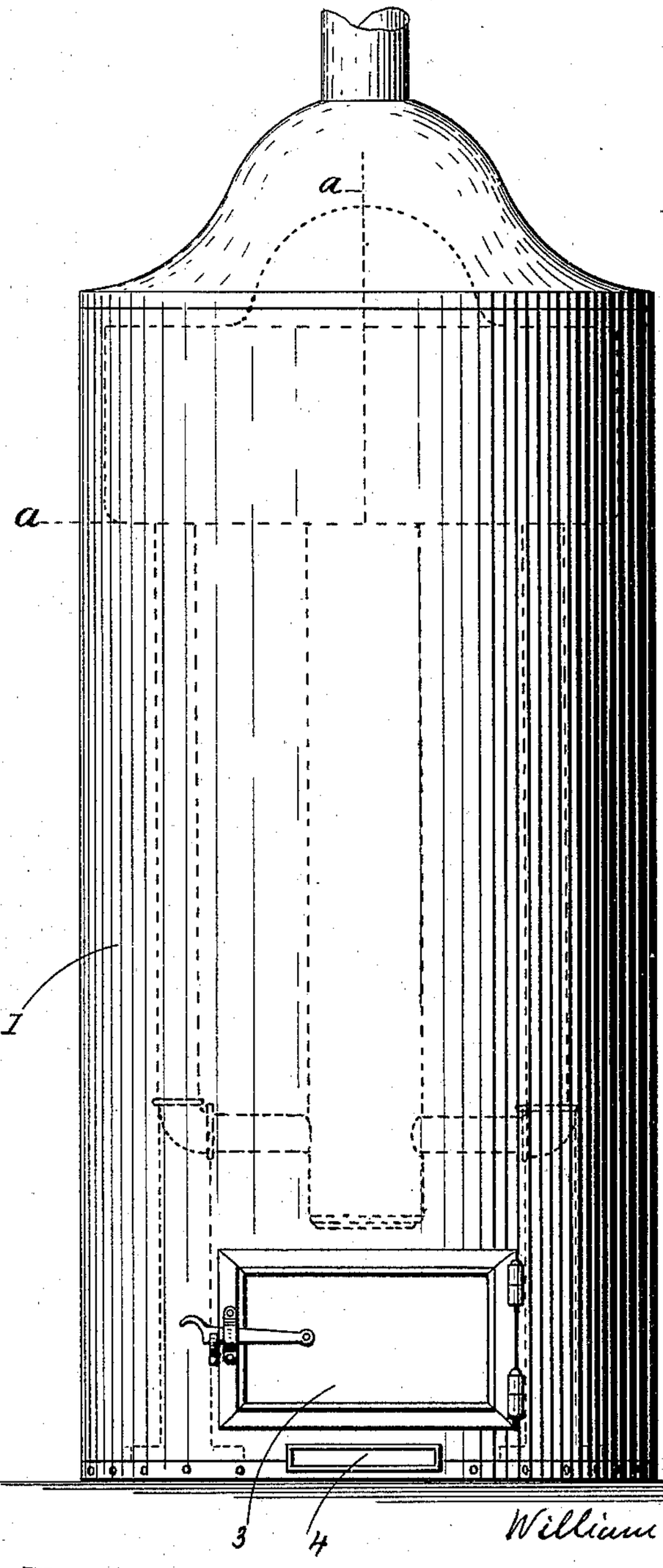
(No Model.) 2 Sheets—Sheet 1.

W. N. OLDMAN.

UPRIGHT MARINE BOILER.

No. 544,792. Patented Aug. 20, 1895.

Fig.1



Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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UPRIGHT MARINE BOILER.

No. 544,792. Patented Aug. 20, 1895.

Fig.2

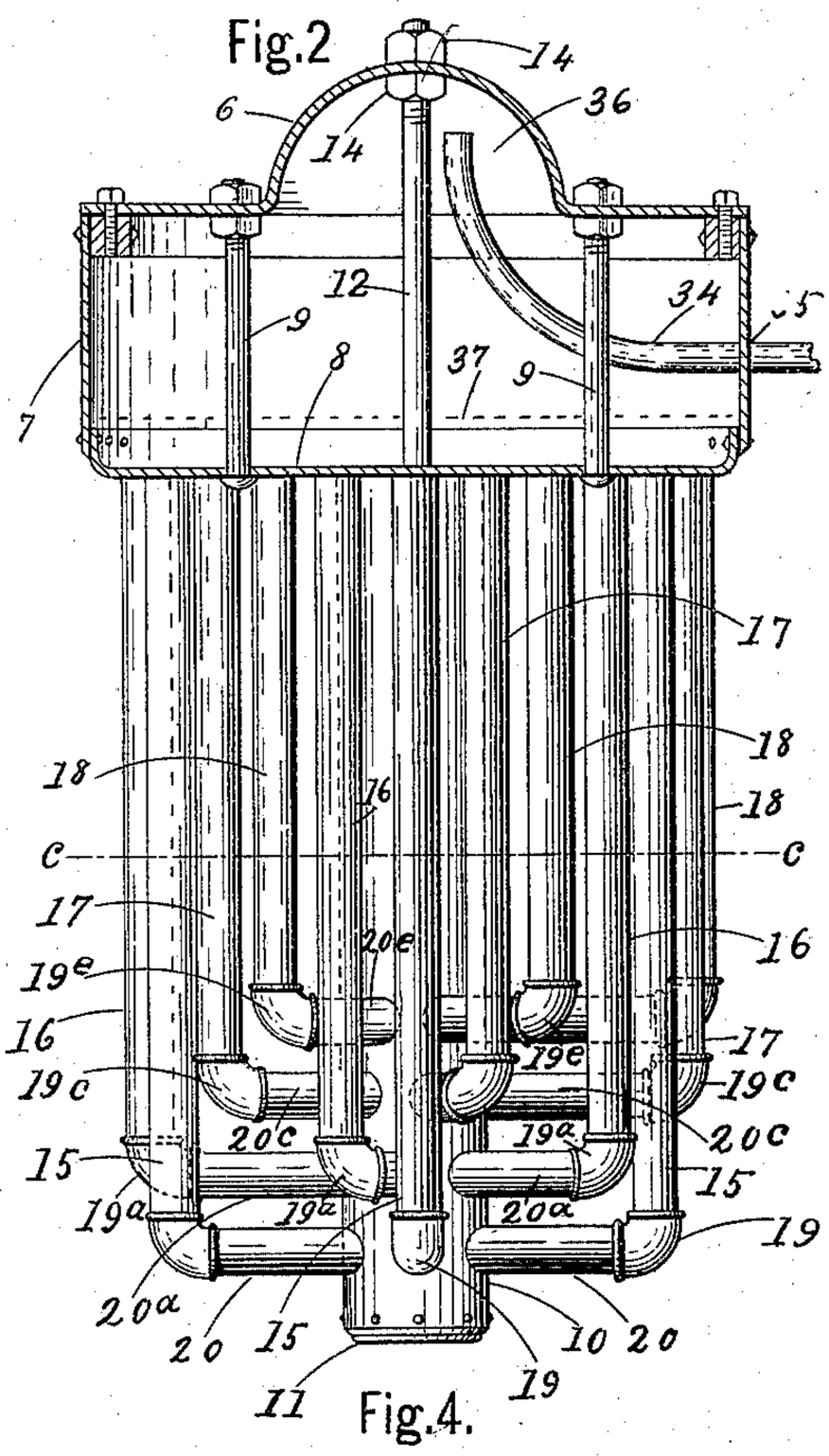


Fig.4.

Fig.3

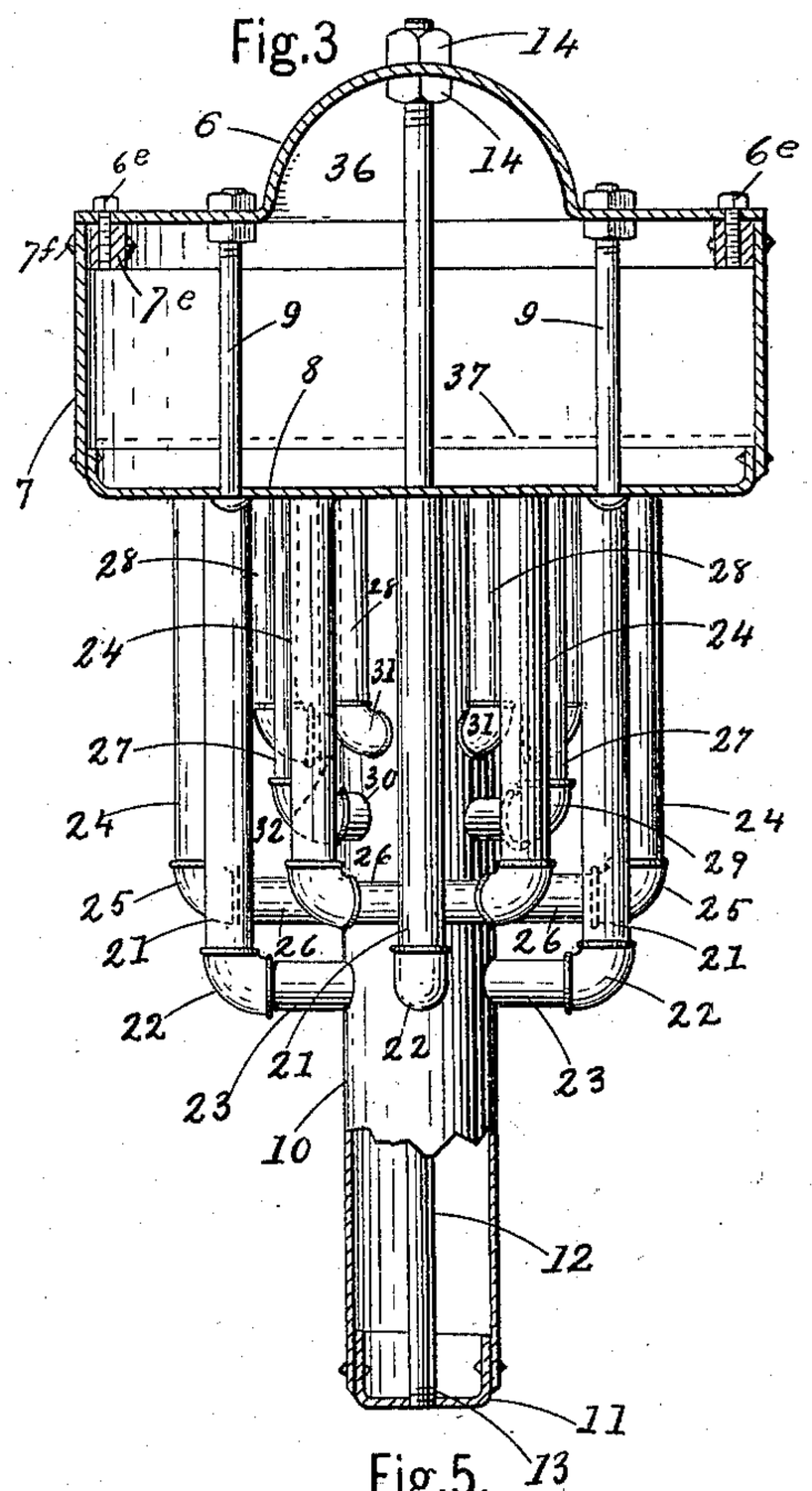
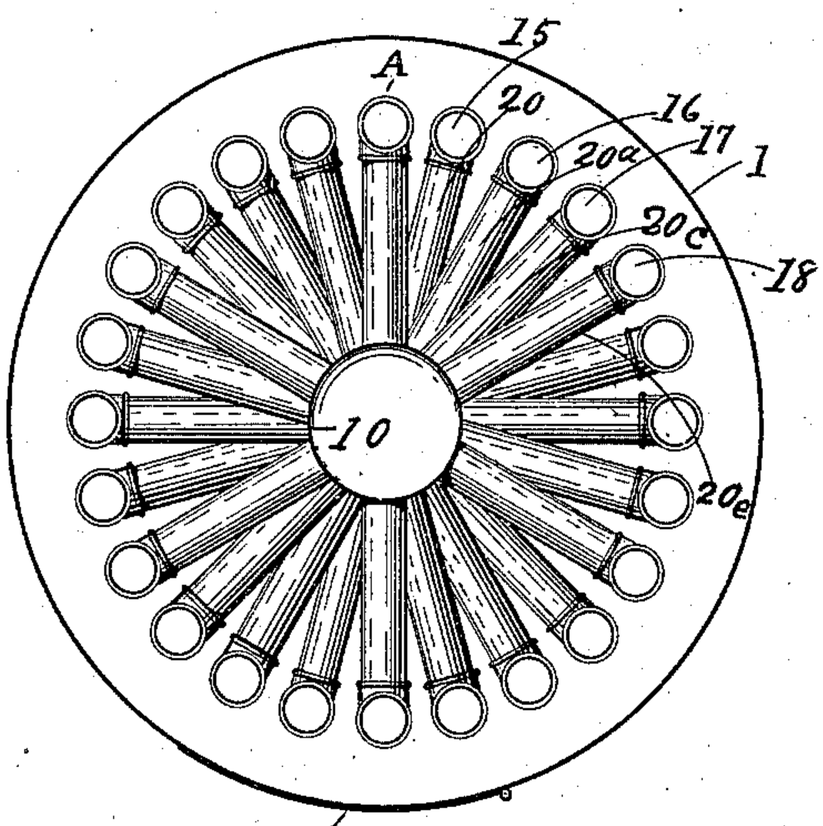
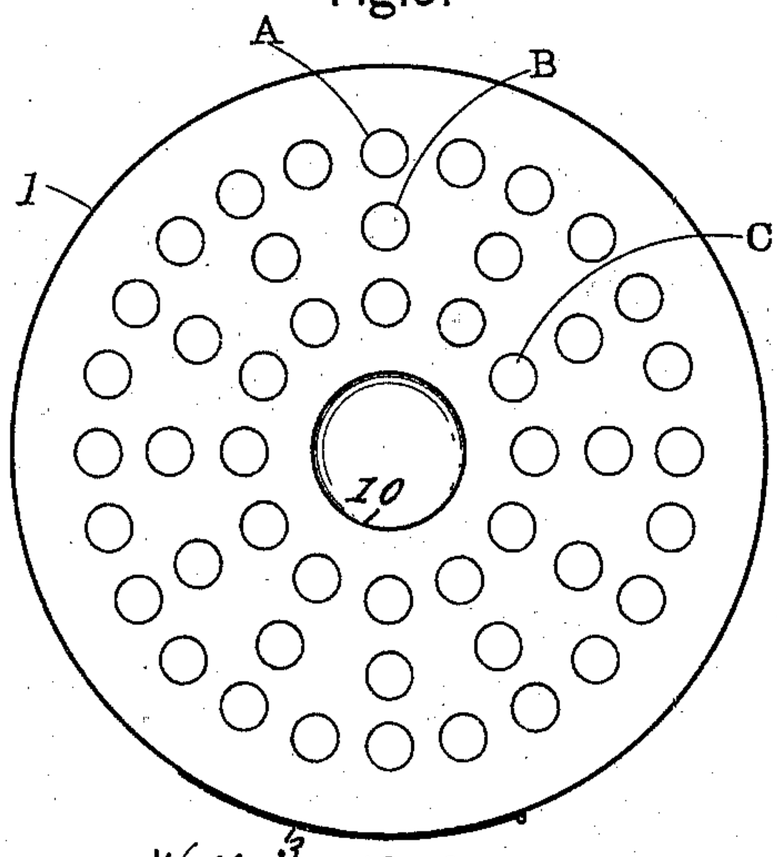


Fig.5.





Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM N. OLDMAN, OF BUFFALO, NEW YORK.

UPRIGHT MARINE BOILER.

SPECIFICATION forming part of Letters Patent No. 544,792, dated August 20, 1895.

Application filed March 23, 1895. Serial No. 542,889. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM N. OLDMAN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Upright Marine Boilers, of which the following is a specification.

My invention relates to steam-boilers, adapted for the use of coal or liquid fuel, but more especially liquid fuel, and will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation showing a front view of the jacket in which the boiler is inclosed. Fig. 2 represents a sectional elevation cutting vertically and horizontally through the top of the boiler on or about line *a a*, Fig. 1, showing also a side elevation of the first or outer circular series of tubes, the boiler-jacket being omitted. Fig. 3 represents a similar section cutting vertically and horizontally through the upper portion of the boiler and showing below it the construction and arrangement of the second and third circular series of tubes, a portion of the central vertical tube being removed to show the interior, the jacket also being omitted in this view. Fig. 4 represents a horizontal section on or about line *c c*, Fig. 2, showing the first circular series of boiler-tubes and their connection with the larger central vertical tube. Fig. 5 represents a horizontal section cutting through the boiler-jacket and the several circular series of tubes, all parts below the section being omitted.

Referring to the drawings in detail, 1 represents the boiler-jacket. It is made of sheet-iron, secured together in the usual way, and when used for coal is provided with a door 3 and damper 4. The boiler is secured in any well-known way within the jacket by braces bolted or otherwise fastened thereto. The upper part of the boiler (see Figs. 2 and 3) consists of the top dome-shaped portion 6 and surrounding side portion 7. The top 6 is strongly, but removably, secured to the top of the side portion 7 by means of an inner rim or ring 7^e, rigidly secured to the inner upper part of the side portion 7 by rivets 7^f and a series of bolts 6^e, which screw into the rim 7^e, and also by the stay-bolts 9 and strengthening central bolt 12. The rim 7^e also strengthens and stiffens the top of the side portion 7. One of the objects in making the top 6 of the boiler removable is to provide a convenient means for getting at the interior of the boiler for cleaning or repairs when required. To the bottom of the portion 7 is secured by rivets, in the usual way, a horizontal tube-sheet 8. The tube-sheet 8 is larger than the largest circular space occupied by the outer circular series of tubes, so as to project beyond them on all sides, thereby leaving room enough in which to insert the tubes, as will more clearly hereinafter appear. A series of stay-bolts 9 are used to secure and brace the top and tube-sheets. In the center, or substantially so, of the tube-sheet is a large tube or pipe 10, made preferably of heavy iron or steel. It is secured in the ordinary way to the tube-sheet, so as to be steam-tight, and is provided with a cap 11, riveted thereto at the bottom. Within this tube or pipe 10 is secured a strengthening bolt or rod 12 by a screw portion 13 at the bottom and by screw-nuts 14 at the top. In this instance the boiler is made up of three circular series of tubes, a horizontal section being shown through each circular series in Fig. 5, and there designated as A, B, and C, A representing the outer circle of tubes, B the second circle, and C the third circle of tubes.

The first circular series A (see Fig. 5) or outer row of tubes are designated by the numerals 15, 16, 17, and 18, (see Figs. 2 and 3,) and, as shown in this instance, consist of twenty-four tubes, but there may be more or less of these tubes, if desired. These tubes are arranged in four sub-series of tubes, six in a series, each tube of its own sub-series being designated by the same numeral.

The series of six tubes 15 are the lowest sub-series and are all in the same horizontal plane. They are secured by elbows 19 to horizontal pipes 20, which pass to and are screwed at equal distances apart into the central tube 10, or otherwise rigidly secured to it. The next sub-series of six outer tubes 16 are secured in the same way by elbows 19^a to short pipes 20^a, which are secured in a similar manner to the central tube 10, but at a suitable point consistent with the strength of the material above the pipe 20 and in a horizontal plane around the tube 10. The next, a

third sub-series of six tubes 17, are arranged and connected in exactly the same way to the vertical tube 10 by means of elbows 19^c and short pipes 20^c, all being secured to the tube 10 in a horizontal plane above the tubes 16. The fourth sub-series, consisting of the tubes 18, are connected to the vertical tube 10 by means of the elbows 19^e and short pipe 20^e, all these outer tubes being arranged in the same circle A, substantially as shown in Figs. 4 and 5.

Within the first or outer circular series of tubes A, above described, I have shown another, a second circular series B, (see Fig. 5,) containing twelve tubes, also divided into several sub-series of six each. (See Fig. 3, where these tubes are shown.)

The first series of six inner tubes above the tubes 20^c are designated by the numeral 21. These are connected at their lower ends by elbows 22 and short tubes 23 with the vertical tube 10. The second sub-series 24 of six tubes belonging to the second circular series B (shown in Fig. 5) are also connected at the lower ends by elbows 25, secured by short pipes 26 to the vertical tube 10. This completes the second circular series of tubes B.

There is another circular series C within the series B, (see Fig. 5,) also divided into several sub-series of six tubes each, the tubes in one series being designated by the numerals 27 and the tubes in the other series by the numerals 28. The six tubes 27 are secured to the vertical tube 10 by means of elbows 29 and short tubes 30, and the six tubes 28 by means of the elbows 31 and short tubes 32, arranged in a horizontal plane around the tube 10 at equal distances apart above the six short tubes 30.

The several circular series of vertical tubes are passed down to the holes in the tube-sheet 8, and then screwed into the elbows, which have been previously rigidly secured to the vertical tube 10. The upper ends of said vertical tubes are then rigidly fastened to the tube-sheet by expanding in the well-known way.

The advantage of the above construction is that a large circular series of tubes can be connected to a comparatively small vertical central tube without weakening the several parts.

It will be readily seen that if a large circular series of such tubes—twenty-four, for instance—were all secured at the same level to a central tube 10, such as above described, it would have to be of much larger diameter than the one shown, because a series of twenty-four holes cut around the tube 10 in the same horizontal plane of the proportionate size required would cut such a tube entirely in two, hence the necessity of securing a sub-series of six tubes, more or less, in different horizontal planes, one above the other, substantially as above set forth.

In Fig. 2, 34 represents the steam-pipe. It is secured to the boiler at or about the point 35 and extends upward into the steam-chamber 36.

The dotted lines 37 in Figs. 2 and 3 represent the water-level, or thereabout.

I claim as my invention—

1. In a steam boiler, the combination of a substantially vertical central flue tube extending up nearly to the steam chamber and secured to the tube sheet, and extending downward to the fire chamber, a strengthening bolt extending from the top of the boiler down through the central tube to the bottom of the same, means for rigidly securing it to the top of the boiler and bottom of said tube, several circular series of vertical tubes having their upper ends connected to the tube sheet, each circular series being divided into several sub-series, each sub-series of tubes being connected at their lower ends to the vertical central tube by means of elbows and horizontal tubes in the same horizontal plane around said central tube, each complete sub-series being thus connected in its own horizontal plane one sub-series above the other, and a series of stay bolts connecting the top of the boiler with the tube sheet, substantially as and for the purposes described.

2. A steam boiler, provided with a strengthening rim near its top, a removable top secured thereto, a tube sheet forming the lower horizontal portion of the steam and water chamber, several series of water tubes having their upper ends connected to the tube sheet and extending downward, in combination with a vertical central tube to which the lower ends of the water tubes are connected by elbows extending thereto, stay bolts connecting the upper part of the boiler with the tube sheet, and a substantially central strengthening bolt secured at the top of the boiler and extending down through and connected to the bottom of the central tube, substantially as described.

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Witnesses:
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U. E. NIMBS.