W. TUCKER.

Cylindrical Steam-Boiler.

No. 208,868. Patented Oct. 8, 1878.

FIG. 1.

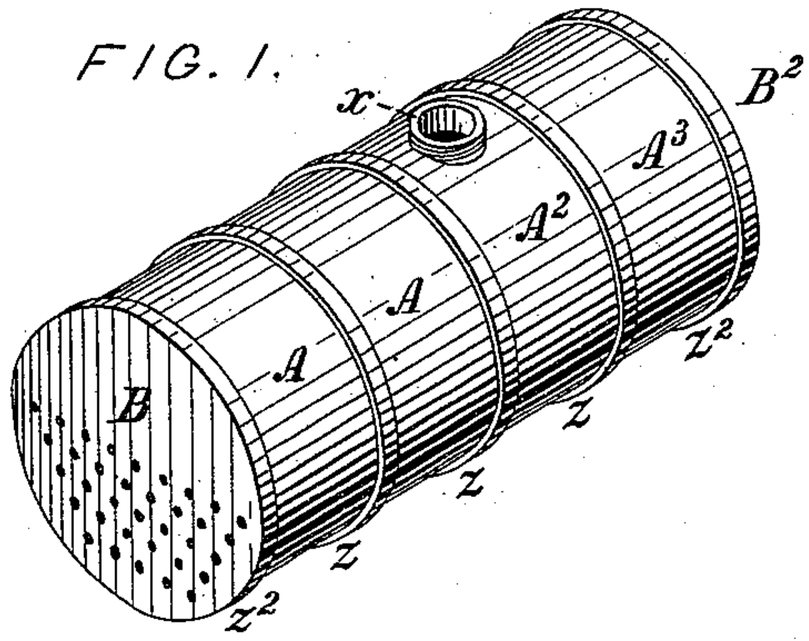


FIG. 2.

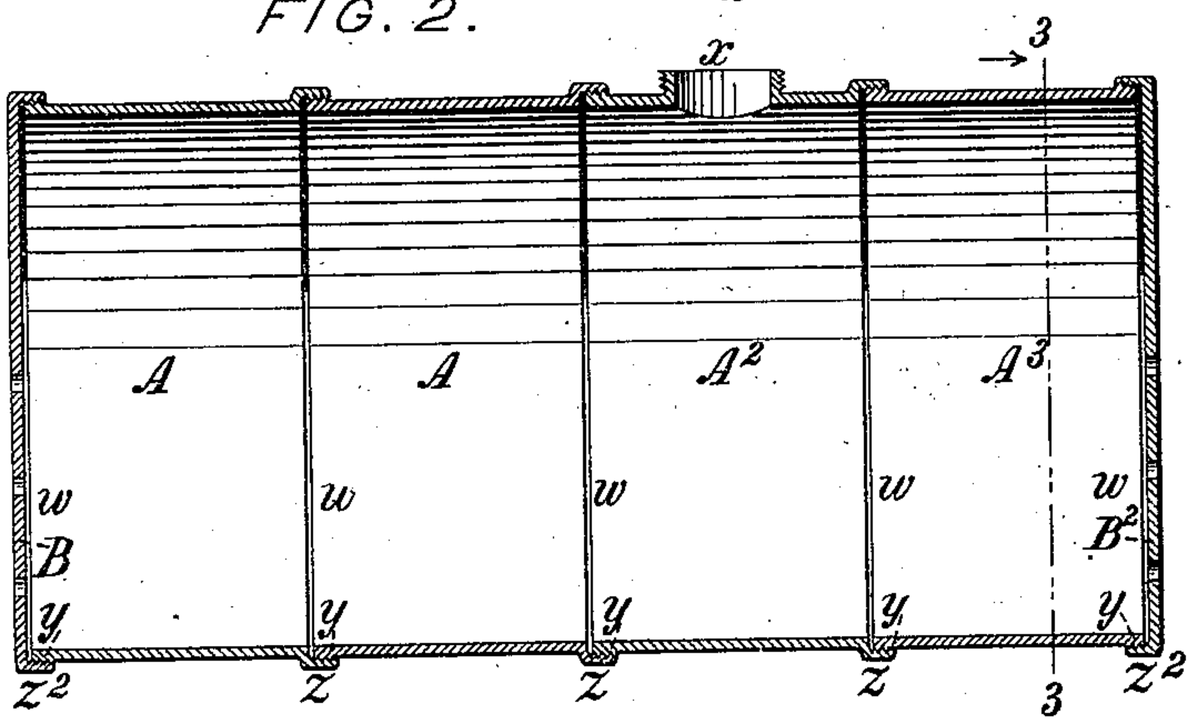


FIG. 3.

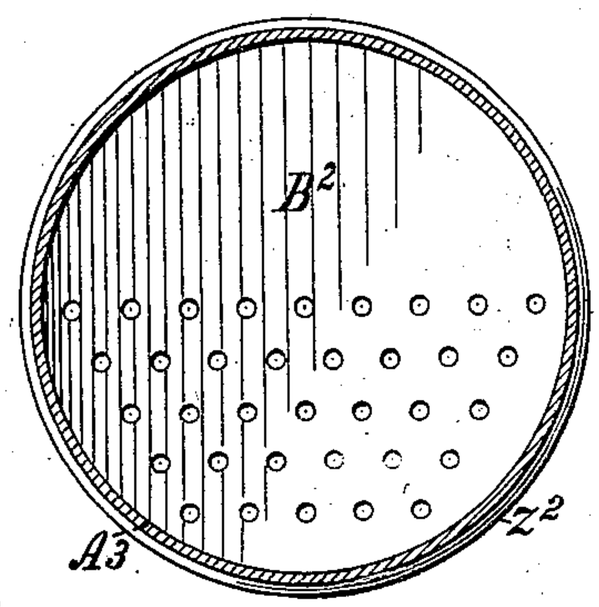


FIG. 4.

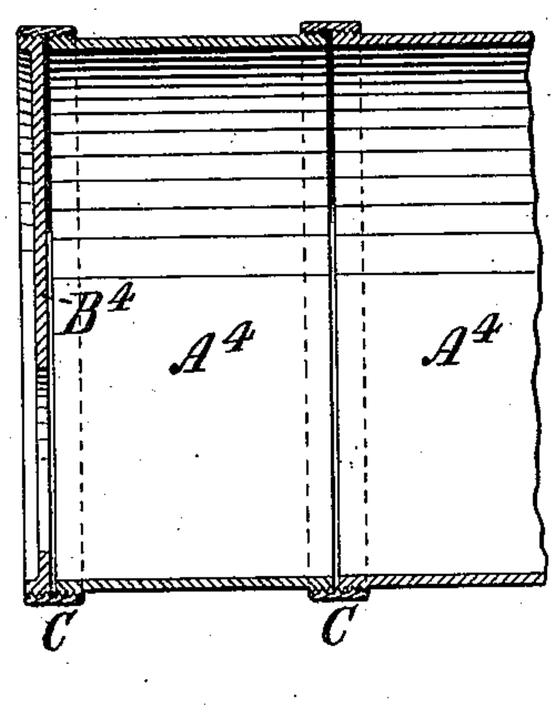
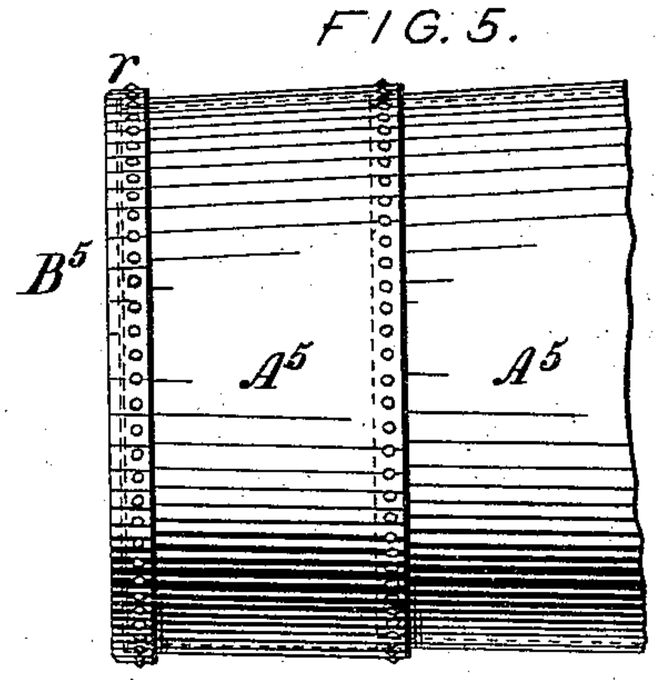


FIG. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM TUCKER, OF EAST BROOKFIELD, MASSACHUSETTS.

IMPROVEMENT IN CYLINDRICAL STEAM-BOILERS.

Specification forming part of Letters Patent No. **208,868,** dated October 8, 1878; application filed May 1, 1878.

To all whom it may concern:

Be it known that I, WILLIAM TUCKER, of East Brookfield, in the county of Worcester, Massachusetts, have invented a new and useful Improvement in the Construction of Cylindrical Steam-Boilers, of which the following is a full, clear, and exact specification.

My present invention relates exclusively to the construction of the shells of cylindrical (fire-flue) boilers, the prime object being to give such shells the maximum of strength with reduced cost.

My said invention consists, first, in constructing the sides of such boiler-shells of iron or steel rolled endlessly into rings or seamless bands of the required diameter, and of about the thickness of ordinary boiler-iron for a given shell. The ends or edges of said rings being adapted to form the circumferential seams of the shell, with or without the aid of rivets at said circumferential seams, I thus avoid the weak longitudinal joints of ordinary boiler-shells, and utilize the full strength of the metal to resist the severe transverse or radial strain in high-pressure boilers.

My said invention consists, secondly, in a rivetless shell for cylindrical boilers, composed of one or more endless bands or rings of rolled iron or steel and a pair of flue-sheets, united by means of screw-joints of one or more circumferential threads each, so as to do away with the noisy, tedious, and more expensive work of riveting, as hereinafter more fully set forth.

Figure 1 of the accompanying drawing is a perspective view of the shell of a cylindrical multi-flue boiler, illustrating this invention. Fig. 2 is a vertical longitudinal section of the same on a larger scale. Fig. 3 is a transverse section on the line 3 3, Fig. 2. Fig. 4 is a vertical longitudinal section of one end of another boiler-shell; and Fig. 5 is an elevation of one end of another, illustrating certain modifications.

Like letters of reference indicate corresponding parts in the several figures.

The improved shell for cylindrical boilers shown in Figs. 1, 2, 3 is made without the usual noisy and tedious work of riveting, and is greatly superior to riveted shells as regards cheapness and strength.

A sufficient number of endless bands or rings, A A^2 A^3, united end to end, constitute the cylindrical sides of the shell, and a pair of flue-sheets, B B^2, constitute the ends or heads.

The endless bands or rings A A^2 A^3, which may be of different widths, are preferably cast in smaller and thicker rings of steel and rolled endlessly until they come to the required thickness and diameter. They may also be welded of iron or steel and rolled in the same way.

In the illustration three varieties of the endless bands, as regards detail, are represented. Two bands, A, are perfectly plain, except an enlargement, *z*, rolled at one edge of each, and screw-threaded internally, and a matching external thread, *y*, at the opposite edge of each. The second pattern, A^2, is like the first as regards its edges or ends, and has a vertical neck, *x*, to receive a steam-dome. This neck may be formed in one part with the band, after the rolling of the latter is finished, by perforating and striking up the band at this point beneath a steam-hammer; or the steam-dome may be otherwise attached. It would only be required, of course, in horizontal boilers. The smaller attachments may be tapped in as usual, and the man-hole and other similar openings may be formed in any approved manner. The third pattern of band, A^3, is externally threaded at both ends or edges, being the terminal band.

The flue-sheets B B^2 will be made of the same metal as the endless bands, and may be rolled or hammered, being preferably made seamless, with internally-threaded flanges z^2, corresponding with the internally-threaded ends *z* of the endless bands.

The screw-threaded ends will be cut in a suitable lathe, and be made slightly tapering, and the parts will be screwed together by means of hydraulic jacks, the said taper insuring the formation of steam-tight joints before the ends of the sections come together, so as to leave internal spaces *w* in the joints.

The entire absence of longitudinal joints is the feature of prime importance in this invention. A single riveted boiler, owing to the punching out of so large a percentage of the plate for rivet-holes, has only fifty per centum of the strength of the plate at its joints, and the best double-riveted seams are allowed but seventy per cent. of the strength of the plate.

This strength is sufficient for the circumferential joints, as the strain on these joints—that is, the longitudinal strain on the shell—is to the transverse or radial strain, which tends to make the "longitudinal tear," as 1 is to 2. Consequently, by the absence of longitudinal joints in the improved shell, it is insured one hundred per centum of the full strength of whole stock, as compared to seventy per cent. in the best double-riveted boilers of ordinary make, and one hundred per cent. as compared to fifty per cent. in the common single-riveted boilers, while the improved boiler-shell can be built at a lower cost.

In said Figs. 1, 2, 3 the flue-sheets B B^2 are shown perforated to receive small flue-tubes.

The modifications illustrated in Fig. 4 consist, first, in the piercing of the flue-sheets for one or more large flues; and, secondly, in the employment of independent steel coupling-rings C, with right and left internal screw-threads, in combination with endless bands A^4 and flue-sheets B^4, screw-threaded externally to receive said coupling-rings. The adoption of this form of joint would facilitate rolling the metal, and would facilitate the expansion of the socket parts by heat preliminary to making the joints should this be desirable.

Fig. 5 illustrates the employment of rivets *r* in lieu of screw-couplings for uniting endless bands or rings A^5 and heads B^5. The endless bands in this modification are made very slightly conical, so as to be joined end to end by entering one a little into another. Perfectly cylindrical bands of different diamters may be employed, if preferred, and, although single-riveting is considered sufficient for uniting the endless bands, two rows of rivets at each joint may, of course, be employed, if preferred. The rivet-holes in the endless bands or rings and in the flanges of the heads may be made by drilling or punching the same indexically in a dial-machine, as gears are cut, and can thus readily be made to agree mathematically, as the shape of the stock is not subsequently changed.

For some uses the improved boiler-shell may consist of a single endless band or ring united to a pair of flue-sheets or their equivalent by either screw-joints or rivets.

This invention is not confined to horizontal boilers, nor to any particular system of flues, but may be embodied in any cylindrical (fire-flue) boiler, the flue-sheets and the terminations of the shell to be modified as circumstances may demand.

I am aware that it is common to construct tubulous boilers wholly of drawn tubes, with plugs or caps. In this case there is no shell, properly speaking, and the application of this mode of building to the shells of cylindrical boilers has never been proposed, I think, and would be utterly impracticable.

I am also aware that it has been proposed to strengthen shells of ordinary boiler-iron by means of welded rings secured between the successive lengths, and do not wish to be understood as claiming any such arrangement.

The following is what I claim as new and of my own invention, and desire to secure by Letters Patent, namely:

1. A cylindrical boiler-shell composed of endless bands or rings of iron or steel, rolled endlessly, and adapted at their ends or edges to form the circumferential seams of the boiler-shell, as herein specified, for the purpose of utilizing the full strength of the metal in resistance to radial strain.

2. A rivetless shell for cylindrical (fire-flue) boilers composed of one or more endless bands or rings of rolled iron or steel and a pair of flue-sheets, united by means of screw-joints of one or more circumferential threads each, substantially as herein shown and described, for the purposes set forth.

WILLIAM TUCKER.

Witnesses:

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