(No Model.)

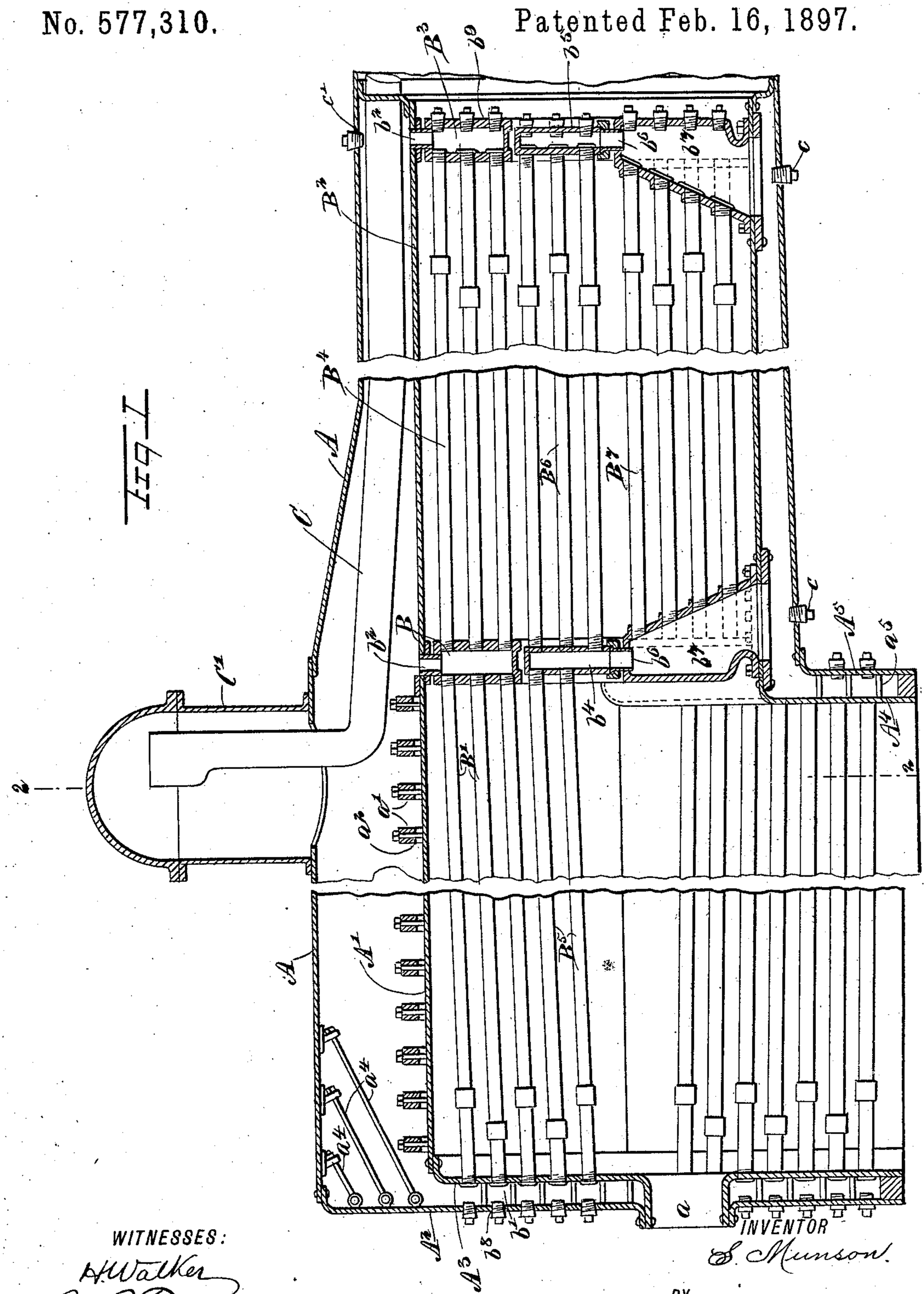
2 Sheets—Sheet 1.

S. MUNSON.

TUBULAR BOILER.

No. 577,310. Patented Feb. 16, 1897.

Fig. 1.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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Fig 2

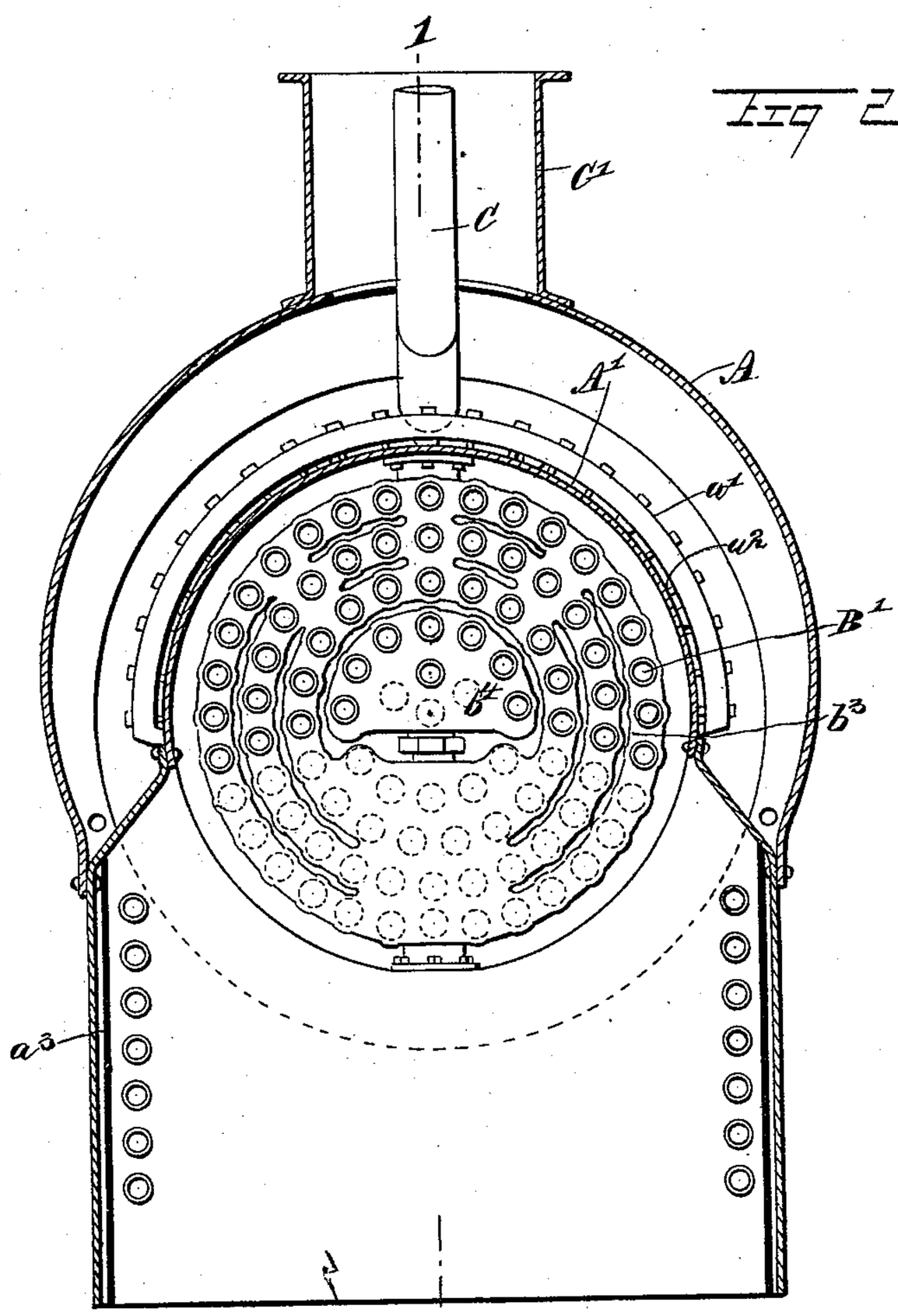
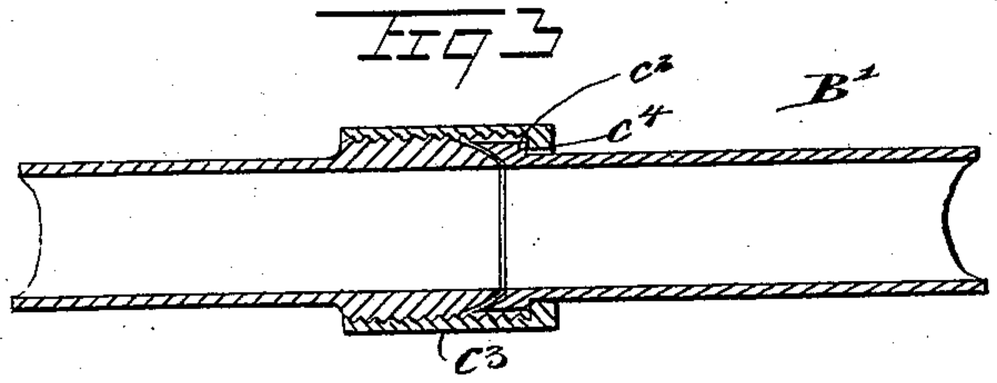


Fig 3



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UNITED STATES PATENT OFFICE.

SWENEY MUNSON, OF SAYRE, PENNSYLVANIA.

TUBULAR BOILER.

SPECIFICATION forming part of Letters Patent No. 577,310, dated February 16, 1897.

Application filed May 28, 1896. Serial No. 593,433. (No model.)

To all whom it may concern:

Be it known that I, SWENEY MUNSON, of Sayre, in the county of Bradford and State of Pennsylvania, have invented new and useful Improvements in Tubular Boilers, of which the following is a full, clear, and exact description.

This invention relates particularly to locomotive or tubular boilers; and the object is to provide a boiler in which the number of stay-bolts employed is very much less than the number at present employed to reduce leaky flues to a minimum and in which there is a greatly-increased heating-surface, and, further, to so construct the boiler that every tube can be easily inspected and cleaned.

I will describe a boiler embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal section, on the line 1 1 of Fig. 2, of a boiler embodying my invention. Fig. 2 is a section on the line 2 2 of Fig. 1, and Fig. 3 is a sectional view showing a tube-joint employed.

Referring to the drawings, A designates the outer shell of the boiler, having in its forward portion a crown-sheet A′, forming a combustion-chamber which has the usual fire-door *a*. This crown-sheet A′ being transversely arched is substantially self-supporting, but it may be further strengthened or supported by means of arched beams *a*′, which extend around the outer side of the crown-sheet and are connected thereto by means of bolts a^2. The lower edges of the crown-sheet are bolted to the inwardly and upwardly extended ends of the wall of the combustion-chamber, the inner surface of said wall being here shown as provided with asbestos a^3, there being an air-space between the lining and wall.

The space between the front wall A^2 of the outer shell A and the front head A^3 of the crown-sheet and of the combustion-chamber forms a water-leg, and a water-leg is formed at the rear portion of the combustion-chamber by means of the end wall A^4 and the end wall A^5. Diagonal brace-rods a^4 are extended from the inner side of the head-plate A^2 to connections with perforated lugs secured to the inner side of the outer shell A, as plainly indicated in Fig. 1, and horizontal brace-rods a^5 extend from the head-plate A^2 through the head A^3 and through the wall A^4 to a connection with the wall A^5.

A manifold B is arranged rearward of the combustion-chamber, and a series of flues communicate at one end with the interior of this manifold by the flues B′ and at the other end with a water-leg *b*′. Extended rearward from the manifold B is an inner boiler-shell B^2, which connects at its rear end with a manifold B^3, and extended from the manifold B to the manifold B^3 are a series of water-tubes B^4. These manifolds B B^3 are made substantially ring shape and communicate at their lower portions with the water-space between the lower portion of the outer shell and the lower portion of the inner shell, and each has a steam-opening b^2, communicating with the space between the upper portion of the inner and outer shells.

Supported centrally within the manifold B is a water-box b^4, and supported centrally within the manifold B^3 is a water-box b^5. These water-boxes have communication b^6 with the material of their manifolds. Tubes B^5 provide communication between the water-leg *b*′ and the water-box b^4, and communication is provided between the water-boxes b^4 and b^5 by means of tubes B^6. The lower portions of the inner walls of the manifolds are inclined rearward, making large water-spaces b^7, as shown in Fig. 1, and communication is provided between these water-spaces by means of tubes B^7.

The head or wall A^2 is provided with plug-closed openings b^8, arranged opposite the ends of the several tubes, and the outer wall of the manifold B^3 is provided with similar plug-closed openings b^9, and the outer wall of the water-box b^5 is provided with similar plug-closed openings. Obviously, by removing the plugs, access may be readily had to the several tubes.

A dry-steam pipe C extends from the upper portion of the steam-dome C′ out through the boiler in the usual manner. The lower portion of the outer shell A is inclined slightly downward and forward, and this lower portion of said outer shell directly opposite the

water-chambers b^7 is provided with wash-out openings having screw-plugs c, and above the steam-outlet b' is provided a plug-closed opening c', and by removing the plug c water may be readily forced through the water-tubes, the manifolds, and other water-spaces to thoroughly clean the same.

For convenience in inserting the several tubes I form them each with a long section and a short section united by a suitable coupling. As here shown, the inner ends of the long sections are screwed into the walls of a manifold. Then the short sections are screwed into the boiler-head or end wall and the ends upset or riveted. The free end of the long section is provided with an annular shoulder c^2 and the adjacent end of the short section is provided with an enlarged annular portion threaded on its outer side. A coupling-sleeve c^3 has an inwardly-extending annular flange c^4 at one end to engage against the shoulder c^2, and it has an interior screw-thread to engage the screw-thread on the short section. After the parts are inserted this coupling-sleeve is screwed into place; but it will be observed that there is a slight space between the ends of the sections, which will allow of the expansion and contraction of the tubes without bulging the boiler-head or the manifold-wall.

It will be seen that in a boiler constructed as shown and described the crown-sheet may be readily inspected and cleaned at any time by simply removing the dome-cap, and this can be the more readily performed, as there are no stay-bolts between the crown-sheet and the outside shell to interfere with the inspection. Further, the cost to manufacture this boiler will be somewhat reduced in comparison to other boilers, inasmuch as there is very little stay-bolt tapping and drilling to do, and, further, this system of tubing may be inserted in any locomotive now in use by simply removing the flue sheets or walls and fire-pots.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A locomotive or tubular boiler, comprising an outer shell, a crown-sheet arranged therein and forming a combustion-chamber, a water-leg forward of the crown-sheet, a manifold at the rear end of the crown-sheet, water-tubes providing communication between the water-leg and the manifold, an inner shell extended from said manifold to a connection with the manifold at the rear end of the boiler, and water-tubes connecting said two manifolds, the lower portion of the inner walls of said manifolds being inclined to provide enlarged water-spaces, substantially as specified.

2. A boiler, comprising an outer shell, an inner shell, a manifold at each end of said inner shell, water-flue connections between said two manifolds within the inner shell, a crown-sheet forward of the inner shell and having a water-leg between its end and the end of the outer shell, circulating-tubes extended through said crown-sheet, and a series of arched braces having connection with said crown-sheet, substantially as specified.

3. A locomotive or tubular boiler, comprising an outer shell, an inner shell, water-tubes connecting manifolds in said inner shell, a crown-sheet forward of the inner shell, circulating-tubes extending through said crown-sheet, and communicating with the tubes of the inner shell, and brace-rods extending from the body of the outer shell to the end wall of said outer shell, substantially as specified.

4. A locomotive or tubular boiler, comprising an outer shell having a plug-closed opening at its top and plug-closed wash-out openings through its bottom, an inner shell, manifolds at the ends of the inner shell, the said manifolds having enlarged water-spaces at their lower sides and communicating with the water-space between the inner and outer shells, a crown-plate forming the upper portion of the combustion-chamber forward of said inner shell, longitudinal brace-rods extending through the lower portion of said combustion-chamber, and diagonally-disposed brace-rods extended from the body of the outer shell to a connection with the end wall thereof, substantially as specified.

5. A locomotive or tubular boiler, comprising ring-shaped manifolds, water-flue connections between said manifolds, water-boxes located centrally within said manifold and having communication therewith, and tubes connecting said water-boxes, substantially as specified.

SWENEY MUNSON.

Witnesses:
F. J. KROM,
JOHN P. KEECHER.