No. 658,615.

Patented Sept. 25, 1900.

A. BLECHYNDEN.

STEAM BOILER

(Application filed May 7, 1894.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.

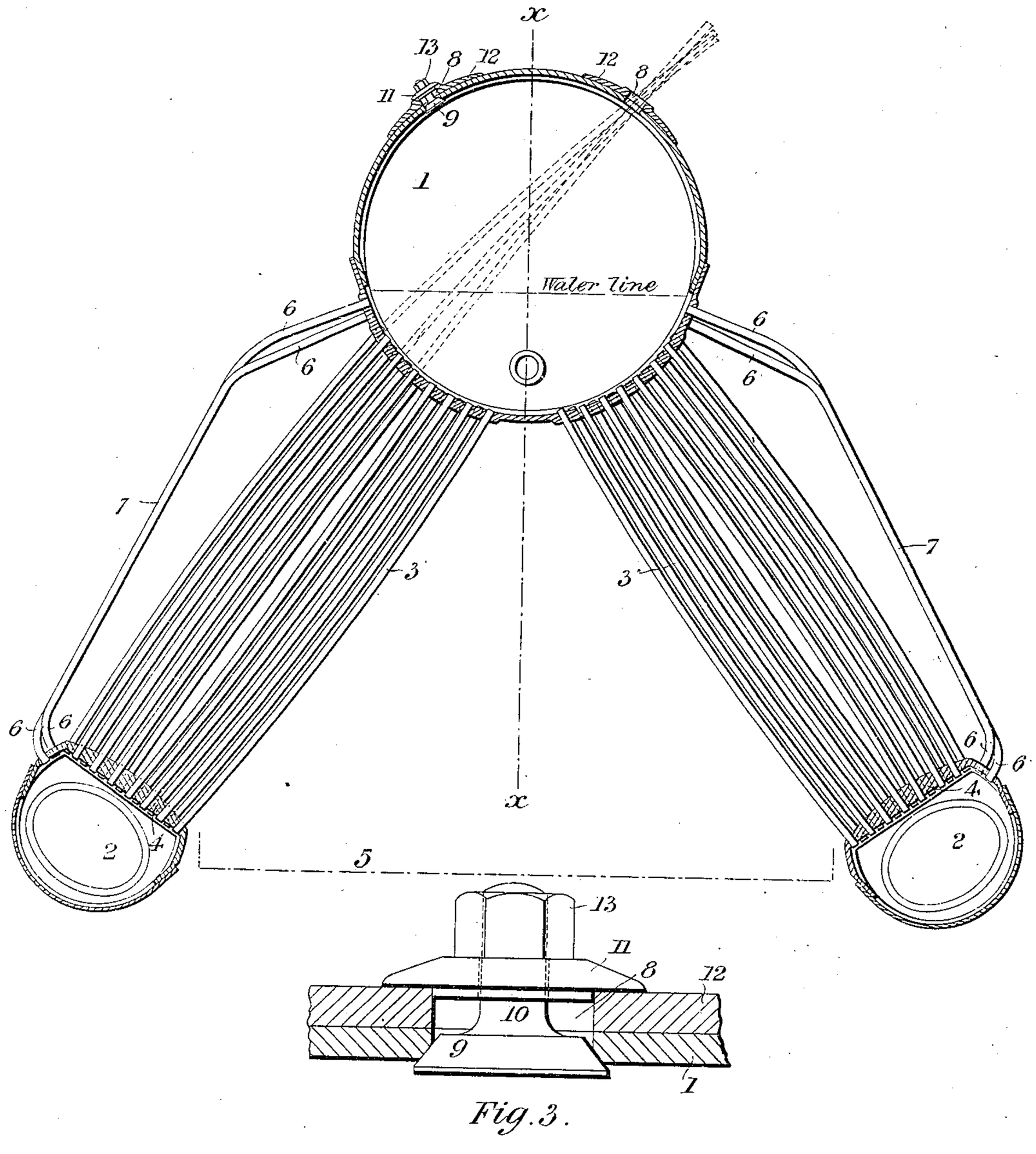

Fig. 3.

Witnesses.

A. G. Ashton

George A. Kinson

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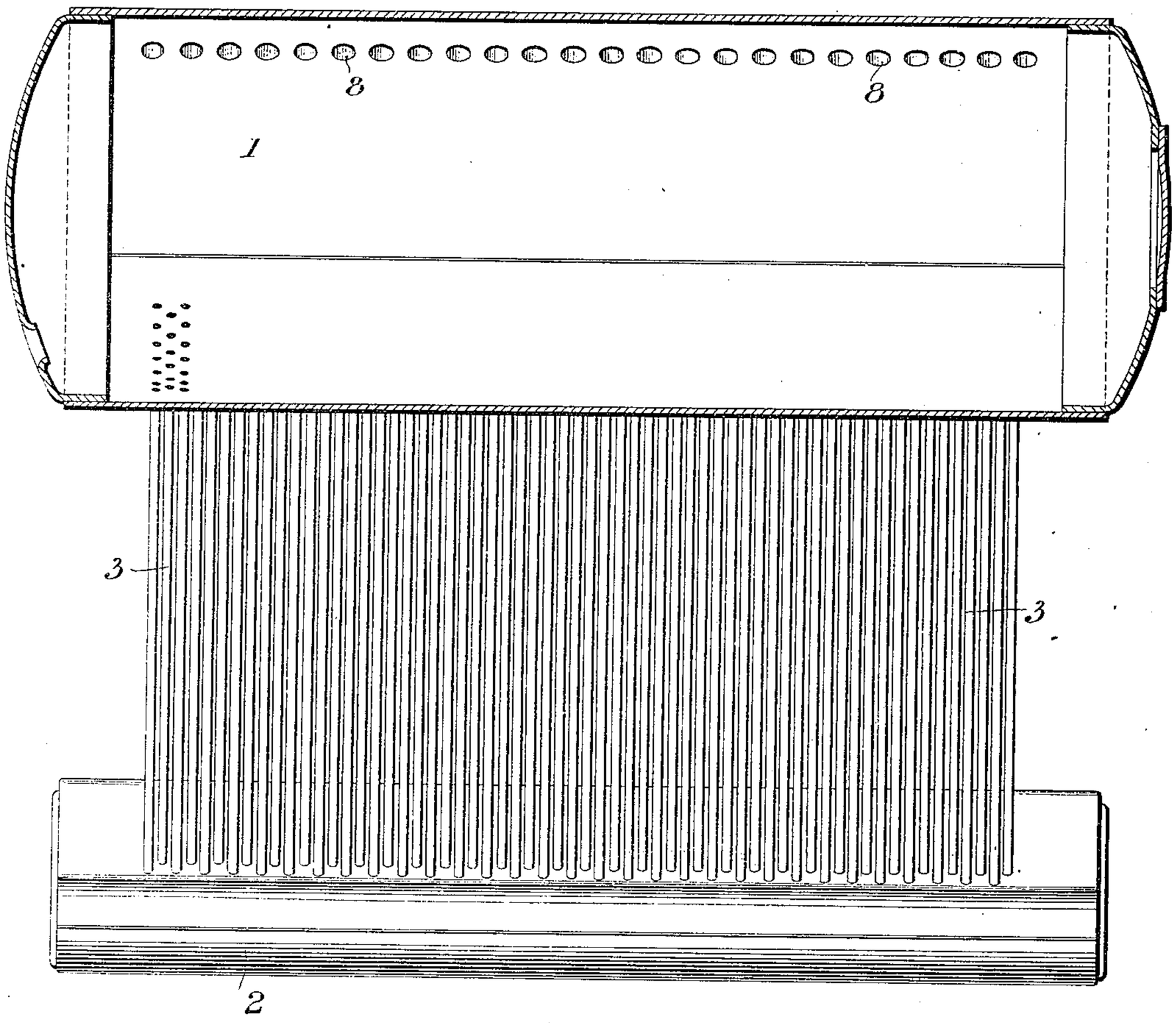
Fig. 2.



Witnesses.
A. H. Ashton
Geo. A. Kinson

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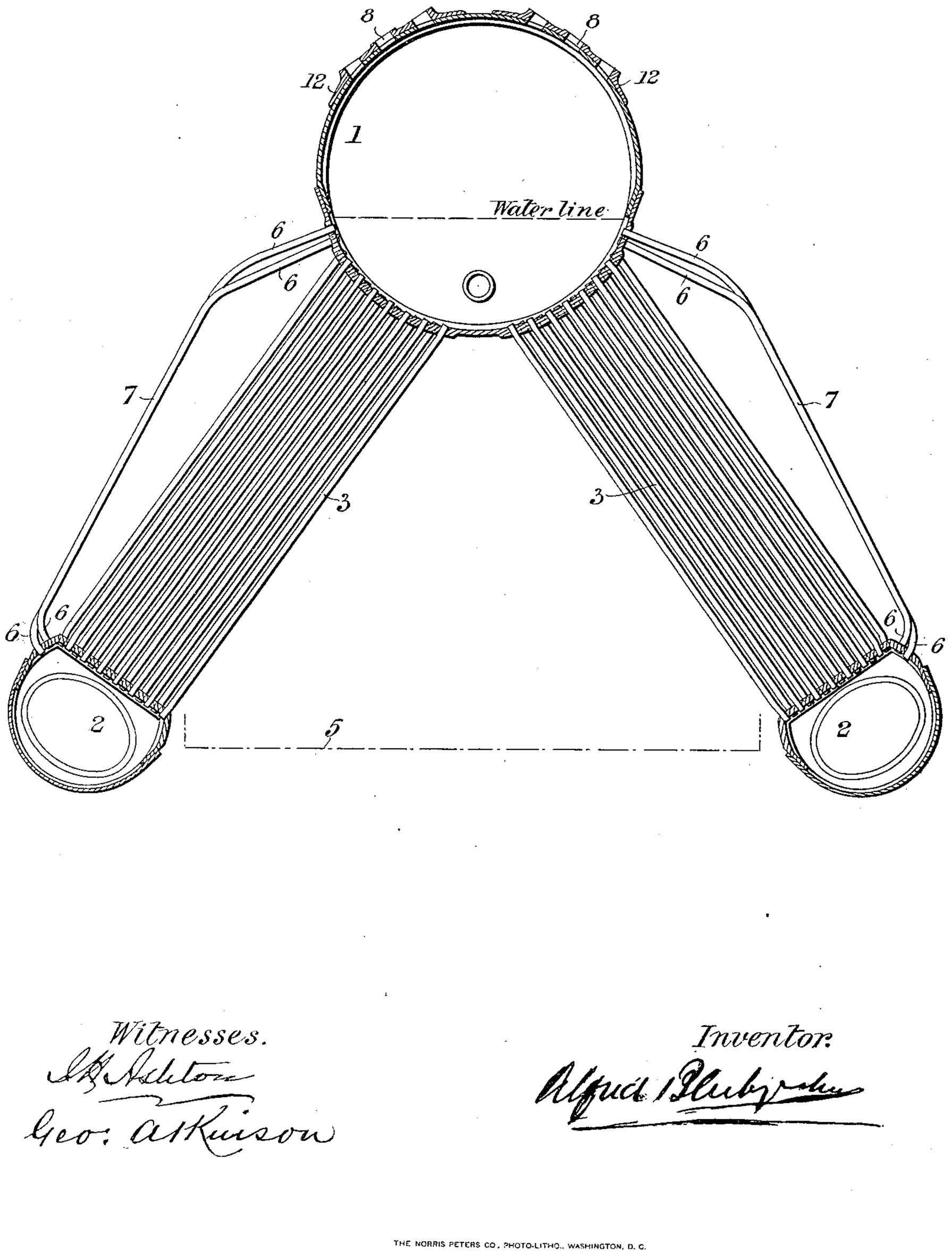
(No Model.) 4 Sheets—Sheet 3.

Fig. 4.



Witnesses.
A. J. Ashton
Geo. Atkinson

Inventor:
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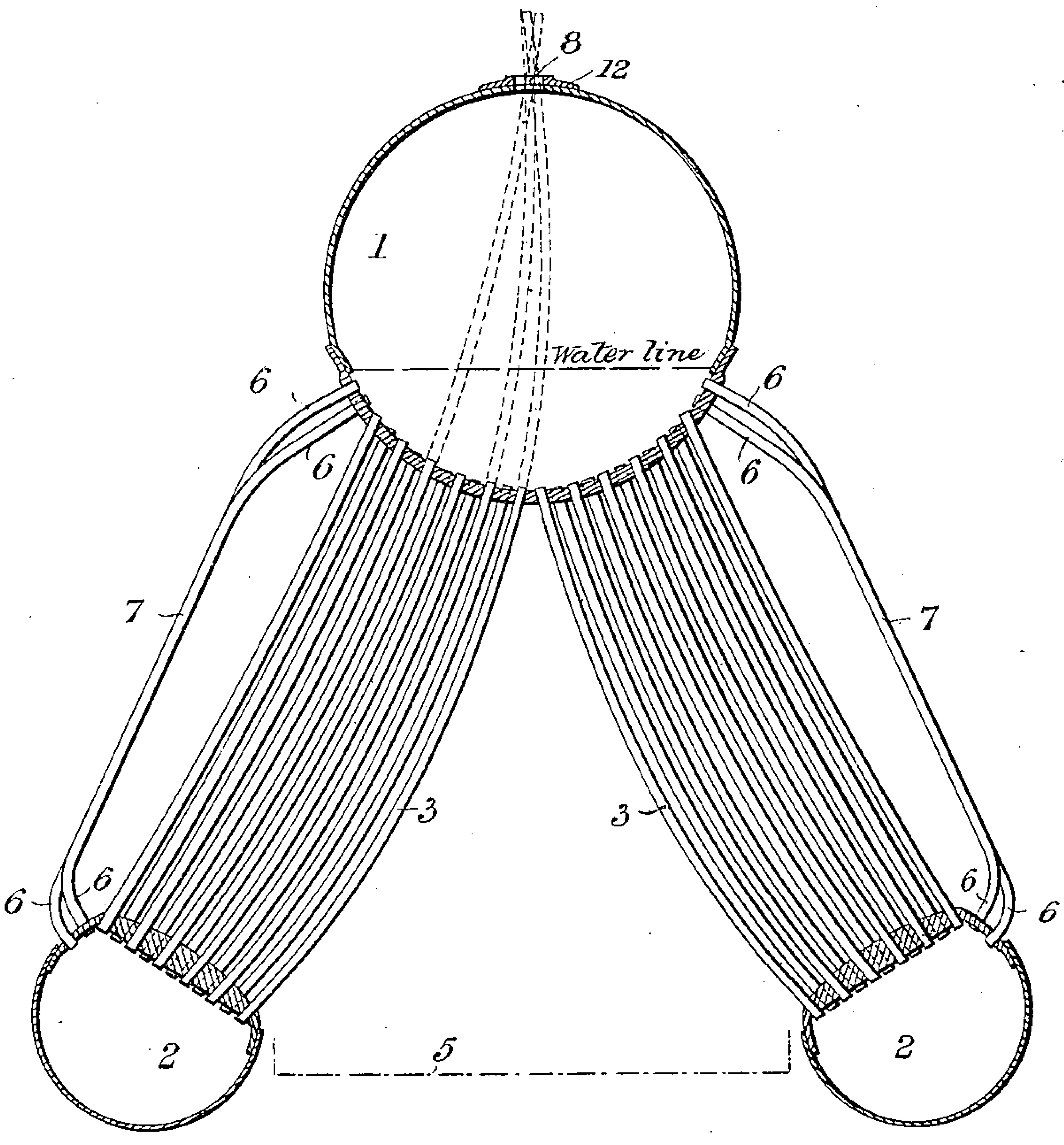
4 Sheets—Sheet 4.

Fig. 5.



Witnesses.

S. H. Atkinson

Geo: Atkinson

Inventor.

Alfred Blechynden

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ALFRED BLECHYNDEN, OF BARROW-IN-FURNESS, ENGLAND; ALFRED E. T. HANSMANN, ADMINISTRATOR OF SAID BLECHYNDEN, DECEASED, ASSIGNOR TO CHARLES D. MOSHER, OF NEW YORK, N. Y.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 658,615, dated September 25, 1900.

Application filed May 7, 1894. Serial No. 510,356. (No model.)

To all whom it may concern:

Be it known that I, ALFRED BLECHYNDEN, a subject of Her Majesty the Queen of Great Britain, residing at Barrow-in-Furness, in the county of Lancaster, England, have invented a certain new and useful Improvement in Tubulous Steam-Boilers, of which the following is a specification.

My invention relates to an improvement in tubulous steam-boilers, it being particularly adapted to boilers of the class in which an upper steam and water chamber and two lower chambers are situated, respectively, at the apex and lower extremities of a triangle formed by two groups of inclined tubes connecting the upper and lower chambers, the fire-grate forming the base, though the invention is equally applicable to any form of tubulous boilers having one or more groups of tubes connecting two chambers, the object of my invention being to provide means for readily withdrawing a damaged tube and inserting a new one.

In the accompanying drawings it will be seen that my invention is illustrated as applied to the three-chambered type of boiler above described and by reference to which—

Figure 1 is a cross-section of such a boiler. Fig. 2 is a longitudinal section on line *x x*, Fig. 1. Fig. 3 is a detail showing one form of plug. Fig. 4 is a cross-section illustrating a modification of my invention, and Fig. 5 is a similar view illustrating a further modification.

The upper steam and water chamber is connected to a pair of lower water-chambers 2 by tubes 3, which may be curved as shown. The chambers 2 may be of D-section, the flattened portion 4 forming the tube-plate, as shown. These tube-plates are in some cases preferably thickened to compensate for the weakening of them by the number of tubes inserted therein. The outer casing and mounting of the boiler is not shown, as it may be of any suitable form.

The grate is represented by the line 5, and 6 6 are tubes which start from different levels in the upper and lower chamber, but are bent so as to run side by side at 7 and form a wall to prevent the escape of heat.

For the purpose of withdrawing and inserting the tubes 3 I form in the upper chamber plug-holes 8, which may be closed by plugs 9, as shown in Figs. 1 and 3, the holes 8 being of considerably larger diameter than the tubes 3. In the form shown the plug 9 has a short bolt 10 attached to it, which passes through a washer 11, which bears on a reinforcing-plate 12, the bolt 10 being provided with a nut 13. Screw-plugs or plugs of other suitable forms may, however, be employed. It will be seen that when the boiler is emptied and the plug 9 removed the tubes 3 of the group after being loosened from the bottom chamber 2 may be withdrawn through the plug-holes 8 opposite to same, as shown by the dotted lines in Fig. 1, the curve of the tubes facilitating the operation. Each plug-hole 8 will serve for the withdrawal of a number of tubes. This method of withdrawing the tubes is of service where the boilers are arranged in small vessels, such as torpedo-boats, where the space is limited, as the tubes may be withdrawn under the deck. The tubes 6 are withdrawn in the ordinary way.

In Fig. 4 the tubes 3 are straight. In order to remove them, it is necessary to provide a greater number of holes than would be necessary with curved tubes. In Fig. 4 three rows of holes are shown opposite each group of tubes.

In Fig. 5 I employ only one row of plug-holes 8 and use curved tubes 3, all the tubes of each group being curved in one direction only, as shown, so that the tubes of each group may be drawn out through the one row of holes, as illustrated.

It will be evident that in the case of Fig. 1 a few of the center tubes of each group may be straight and that in Fig. 5 a few of the outside tubes of each group may be straight, or that each group may be made up of straight and curved tubes in any proportion, so long as all of them may be withdrawn through the plug-holes.

It will further be apparent that when the boilers are arranged in small vessels or other confined situations when the space above them is not sufficient to withdraw the tubes entirely through the holes in the upper cham-

ber they may be withdrawn until the end of the tube is clear of the tube-plate. Then by slanting the tube it may be drawn within the upper chamber and removed through the manhole at the end.

What I claim is—

1. In combination an upper and lower chamber, a group of curved tubes connecting them, plug-holes in the upper chamber through which the tubes are adapted to pass, and plugs for closing the holes, substantially as described.

2. In combination an upper chamber, a pair of lower chambers, groups of curved tubes connecting the upper with the lower chambers, a row of plug-holes in the upper chamber through which the tubes are adapted to pass, and plugs for closing the holes, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALFRED BLECHYNDEN.

Witnesses:

I. H. ASHTON,

GEO. H. KUISON.