

(No Model.)

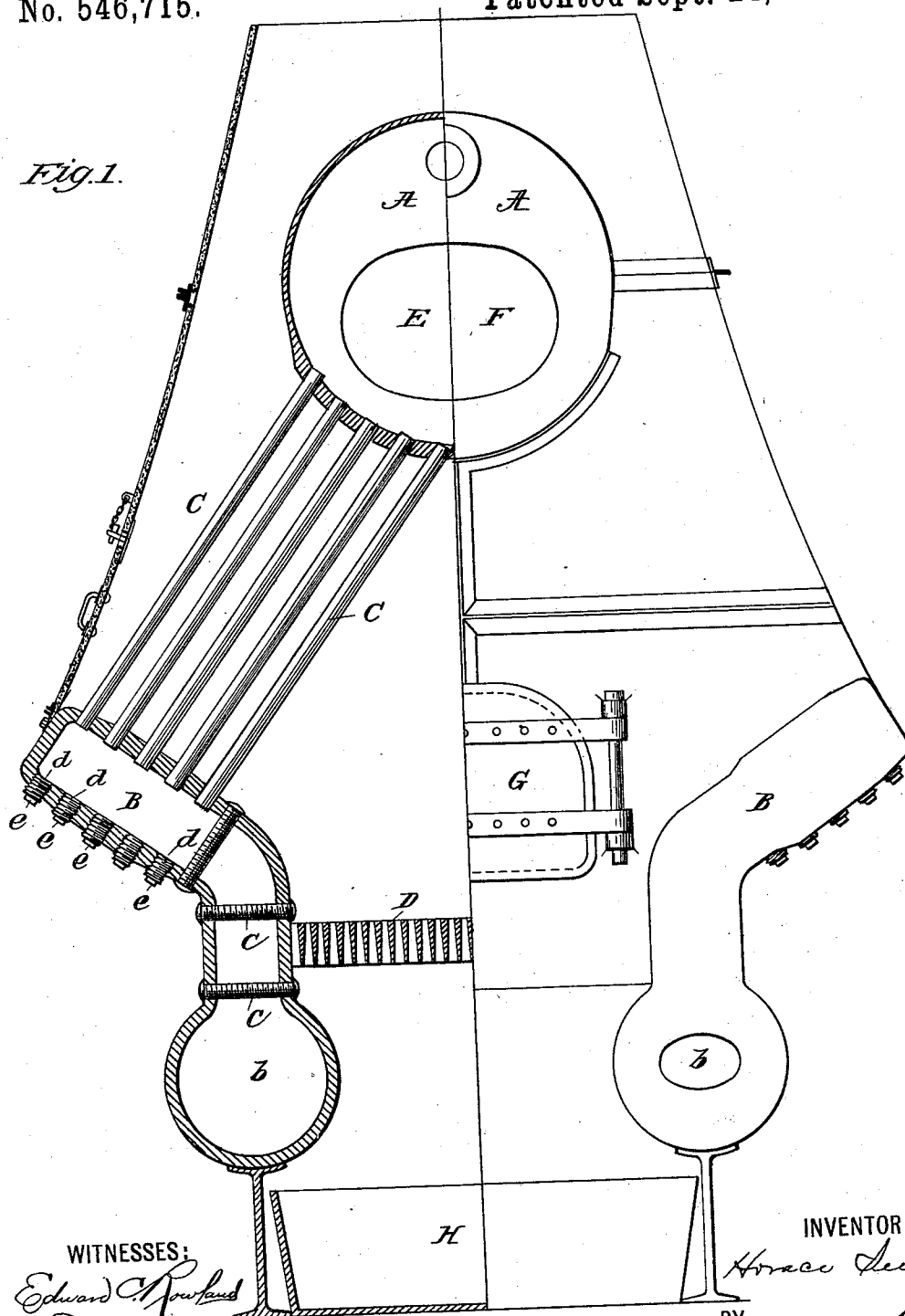
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H. SEE.
WATER TUBE BOILER.

No. 546,715.

Patented Sept. 24, 1895.

Fig. 1.



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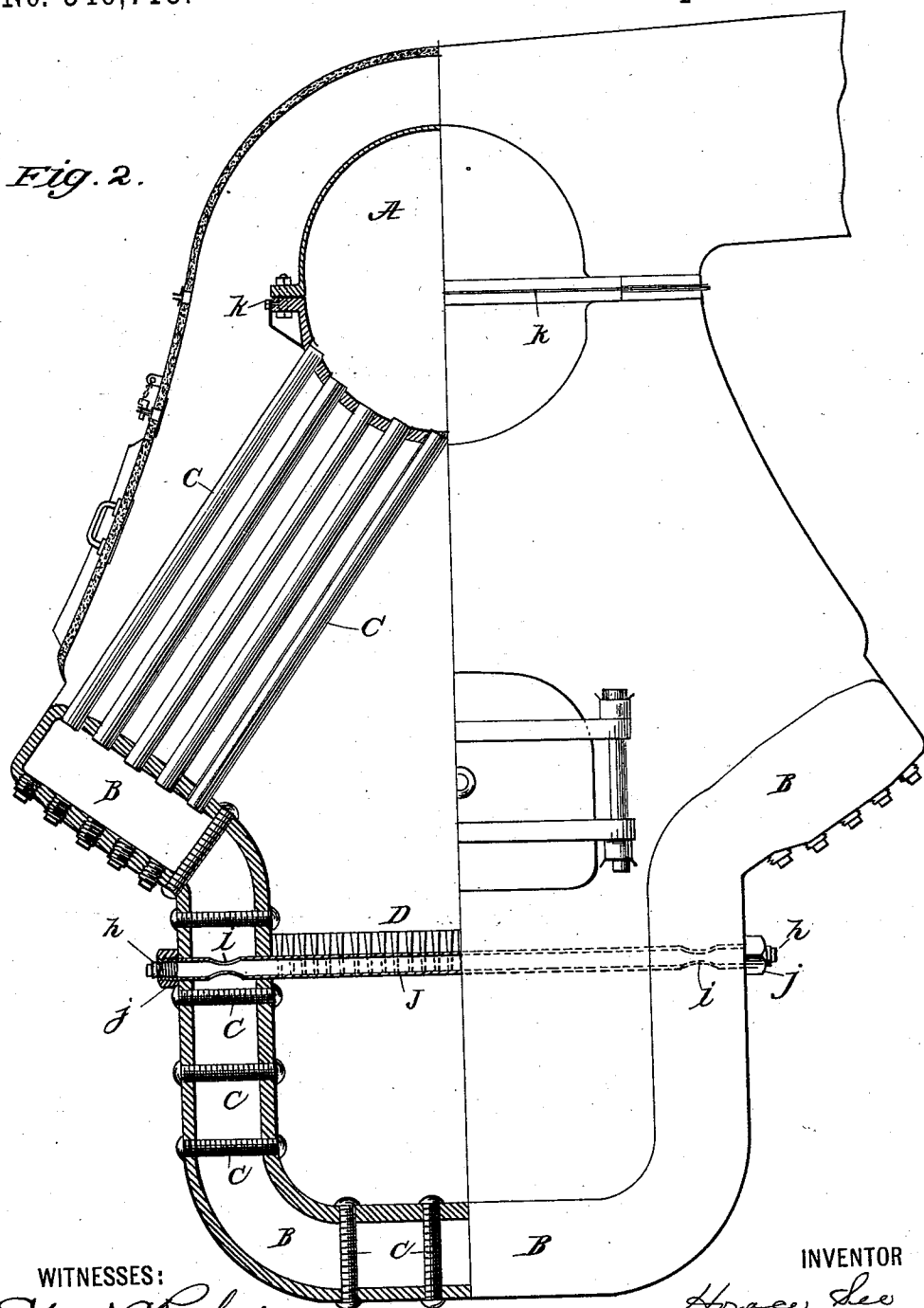
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WATER TUBE BOILER.

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Fig. 2.



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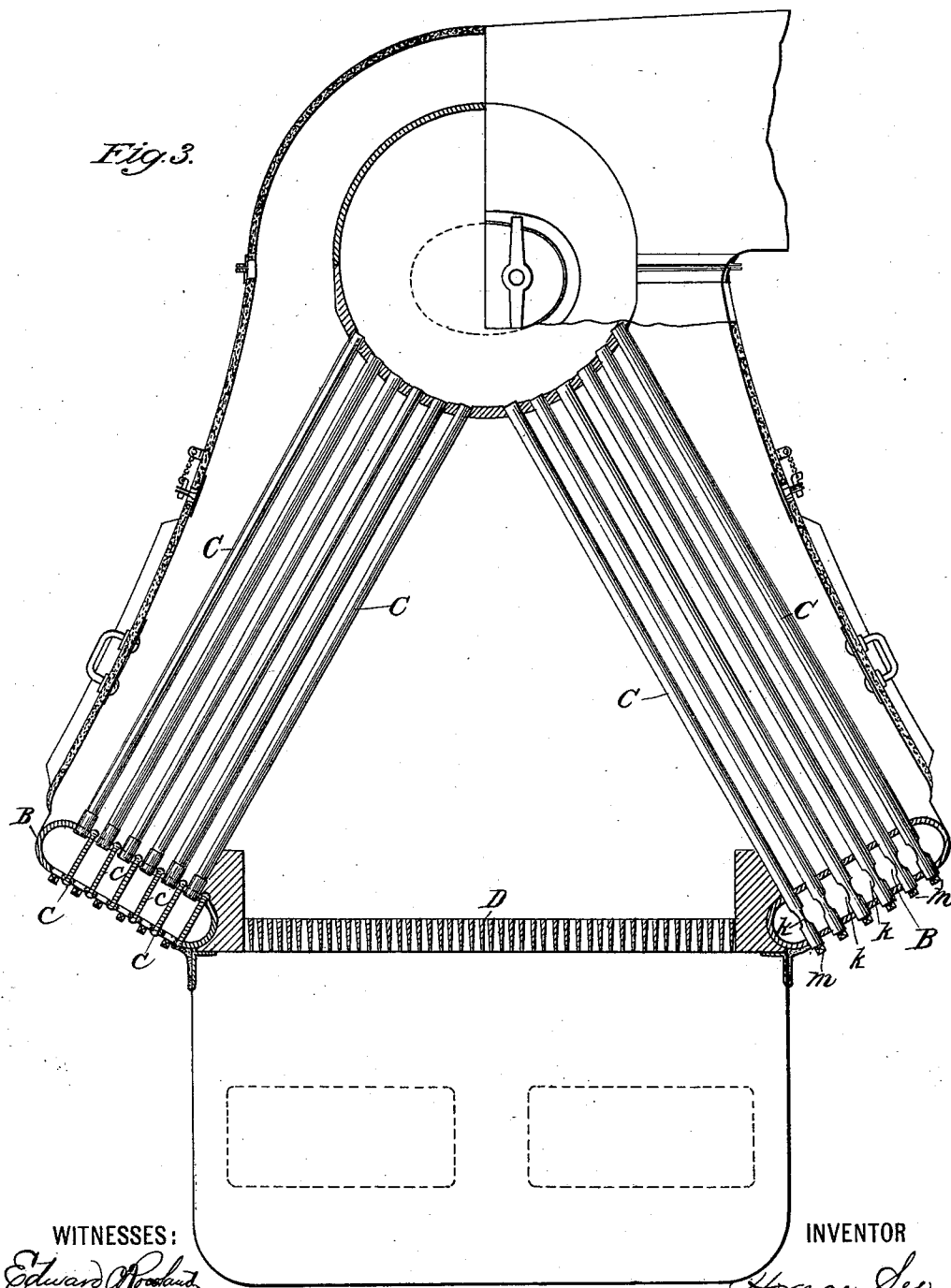
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H. SEE.
WATER TUBE BOILER.

No. 546,715.

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UNITED STATES PATENT OFFICE.

HORACE SEE, OF NEW YORK, N. Y.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 546,715, dated September 24, 1895.

Application filed June 7, 1894. Serial No. 513,741. (No model.)

To all whom it may concern:

Be it known that I, HORACE SEE, of the city of New York, in the county and State of New York, have invented a new and useful Improvement in Water-Tube Boilers, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to provide a water-tube boiler combining strength with lightness of weight with simple means for the removal or renewal of straight tubes, so that for such purpose only a manhole-plate and a screw-plug need be disturbed, or where the length of tube demands more room the steam chamber or drum may be made in two parts removably bolted together.

The invention will first be described in detail and then set forth in the claims.

In the accompanying drawings, Figure 1 shows in front sectional elevation one method of constructing my water-tube boiler. Fig. 2 shows in modified form a similar sectional elevation of the same. Fig. 3 shows still another modification in front sectional elevation, the tubes being differently secured to the water-bottom on opposite sides of the boiler for the sake of avoiding unnecessary numbers of figures.

In said figures the several parts are indicated by reference-letters, like letters indicating similar parts in the several figures, as follows:

The letter A indicates a cylindrical water and steam chamber or drum. A water chamber or bottom B, Fig. 1, on each side of the furnace and extending below the same, is connected to the drum A by straight tubes C. Said tubes may be expanded at their ends into holes in the metal of the respective chambers or otherwise secured thereto, as may be desired. The water-chamber B is extended in rectangular form downward from the inner row or line of tubes on each side of the furnace and terminates in cylindrical form at *b* below the line of grate-bars D, the rectangular part between the tubes C and the cylindrical part *b* being suitably stayed by stay-bolts *e*. For obtaining access to the interior of the tubes C, or for their removal and renewal, holes *d*, somewhat larger in diameter than the external diameters of the tubes, are made in

the bottom of the water-chamber opposite the ends of each tube. Said holes are closed by removable screw-plugs *e*. Access to the top of the tubes is obtained through a manhole E, closed by a plate F, in the end or head of the drum A. The furnace proper, between the two sets of tubes C; which tubes are inclined crosswise of the same, is provided with a door G, and a suitable ash-pan or ash-pit H is provided below the grate-bars D.

In the modification shown in Fig. 2 the ash-pit is entirely inclosed within the water-chamber B, the rectangular form of which is extended to meet below the ash-pit, which extension is suitably stayed by stay-bolts *e*, as in Fig. 1. A tube I, expanded into both sheets of the water-chamber B and cut out, as at *i*, in the water-space between said sheets, serves both as a hollow water-circulating bearing-bar for the grate-bars D as well as a brace for the two sides of the water-chamber. Each end of the tube I is provided with a screw-nut *j*, which makes the tube a stay-tube, and with a removable screw-plug *h*, which closes the tube. Instead of relying upon a manhole in the drum A for access to the interior of the upper ends of the tubes in particular, if there be not room below the bottom of the tubes for their removal and replacement, the drum A in Fig. 2 is made in two semicylindrical parts separably bolted together, as at *k*, so that the top section may be removed and the tubes withdrawn or inserted from the top instead of from the bottom.

Fig. 3 shows a modified form of construction, in which the water bottom or chamber B, on one side of the furnace, is stayed between the tubes by stay-bolts *e*, preferably screw stay-bolts, and said chamber on the other side of the furnace is stayed or braced by the tubes C themselves. Said tubes pass through and are expanded in both sheets of the water-chamber, being cut out, as at *k*, in the water-space between said sheets for the circulation of the water. The ends of the tubes are closed by removable screw-plugs *m*, in order that the tubes may be cleaned when required, or by their removal to facilitate the removal of the tubes.

The course of circulation of the water in this boiler is up the inner rows of tubes nearest the grate-bars into the drum A and then

down the outer row or rows of tubes into the water-chamber below. A vigorous and uninterrupted circulation is thus maintained as long as fuel is supplied to the boiler.

- 5 For some boilers for some purposes the water-chamber under the tubes may be shortened, as shown in Fig. 3, dispensing with weight of both shell and stay-bolts; but in either event the water-bottom on each side of the grate-bars may be connected either, as shown in Figs. 1 and 2 or otherwise, by pipes or water-ways without departing from my invention.

Having thus fully described my said invention, I claim—

- 15 1. In a water-tube-boiler, the combination of the following named elements; a cylindrical steam-and-water-drum within the furnace; a rectangular water-bottom, located outside of the grate-bars; straight water-tubes, inclined crosswise of the furnace, secured at top to said drum and at bottom to said water-bottom; means substantially as described for bracing said water-bottom; and screw-plugs for obtaining access to the bottom of the tubes, as described.

2. In a water-tube boiler, the combination of the following named elements; a steam-

and-water-drum above the furnace; a water-bottom located outside of the grate-bars and provided with a downward extension at the side of the ash-pit; and straight water-tubes inclined crosswise of the furnace and secured at top to said drum and at bottom to said water-bottom.

3. In a water-tube boiler, the combination of the following named elements; a steam-and-water-drum above the furnace; a water-bottom located outside of the grate-bars and extending beneath the ash-pit; and straight water-tubes inclined crosswise of the furnace and secured at top to said drum and at bottom to said water-bottom.

4. In a water-tube boiler, the combination of the following named elements; a steam-and-water-drum above the furnace; a water-bottom located outside the grate-bars and extending beneath the ash-pit; a water-tube-brace connecting the two sides of said water-bottom below the grate-bars; and straight water-tubes inclined crosswise of the furnace and secured to said drum and water-bottom.

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Witnesses:

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