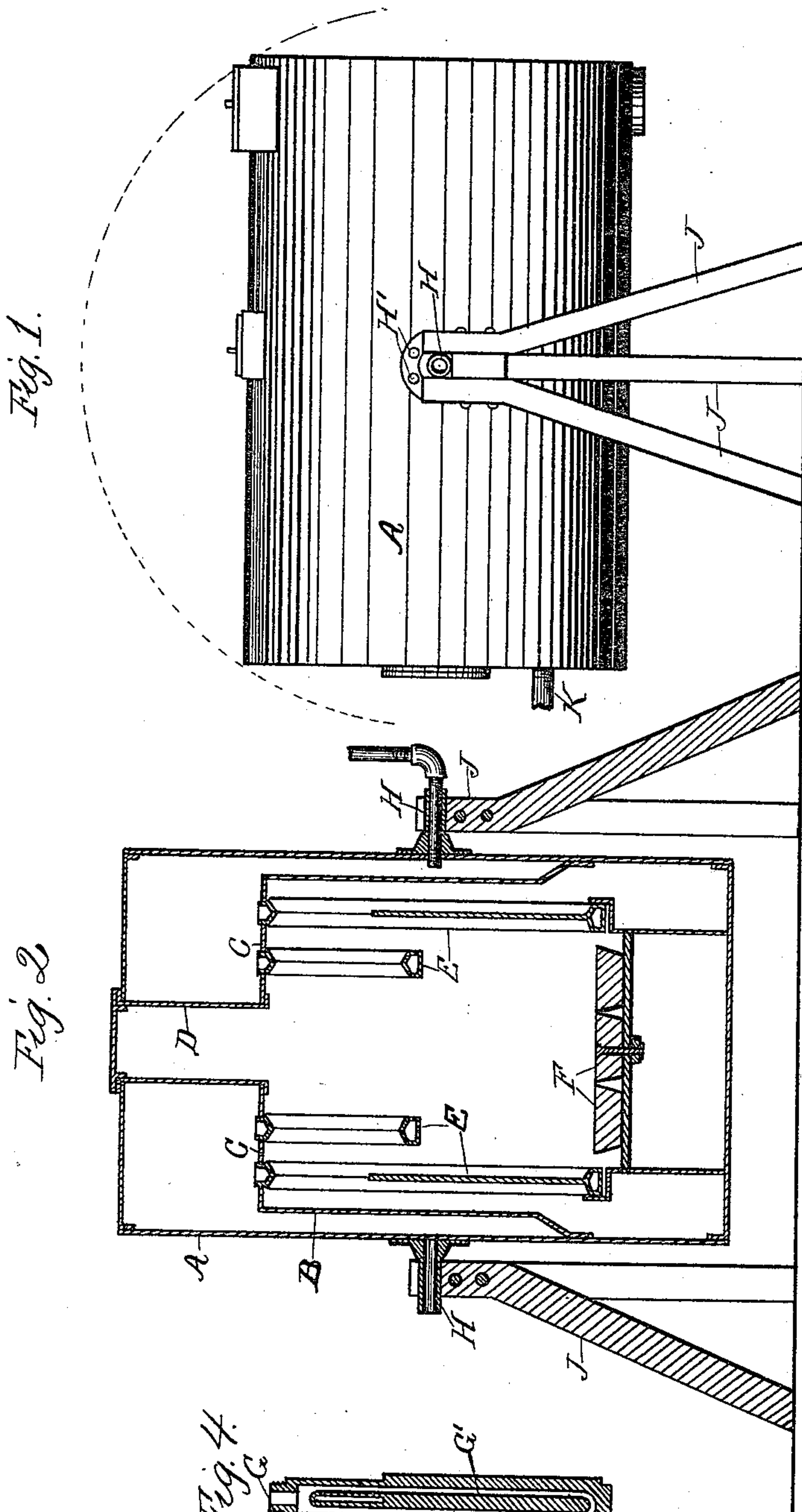


(No Model.)

T. E. BUTTON.  
STEAM BOILER.

No. 442,608.

Patented Dec. 16, 1890.



WITNESSES:  
Frank C. Curtis.  
John T. Booth.

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# UNITED STATES PATENT OFFICE.

THEODORE E. BUTTON, OF WATERFORD, NEW YORK.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 442,608, dated December 16, 1890.

Application filed February 26, 1890. Serial No. 341,815. (No model.)

*To all whom it may concern:*

Be it known that I, THEODORE E. BUTTON, a citizen of the United States, residing at Waterford, county of Saratoga, and State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described, and subsequently claimed.

Reference may be had to the accompanying drawings, and the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures therein.

The object of my invention is to provide a steam-boiler having depending water-tubes or loops permanently closed at their lower ends, with means for easily and quickly discharging the water from such tubes.

Figure 1 of the drawings is a view in side elevation of a trunnion-supported boiler tipped or turned from a vertical to a horizontal position. Fig. 2 is a central vertical section of the same in an upright position, taken through the trunnions and trunnion-supports showing some of the depending tubes. Figs. 3 and 4 are respectively views in side elevation and central vertical section of one of the depending tubes or loops detached.

In illustrating my improved device I have shown a part of one of that class of boilers with depending water-tubes shown and described in United States Letters Patent No. 387,393, issued to me August 7, 1888, for improvements in steam-boilers, to which patent reference may be had.

A and B are respectively the outer and inner shells of the boiler.

The crown-sheet C is provided with numerous threaded apertures adapted to receive the upper threaded ends of the water-tubes E, which depend from and are supported by the crown-sheet.

Coal is admitted through the supply-tube D to the fire-grate F, around and above which the tubes are arranged to receive heat therefrom, and from the products of combustion as they pass from the fire out through suitable flues and pipes. (Not shown.)

The tubes or loops are in the form of the "Bundy radiator-loop." These tubes have their inlet and outlet in one and the same end, as at G, Fig. 4. The lower end is closed, and the water circulates by passing down one channel G' and up the other G<sup>2</sup>. The water in the channel subjected to the greater degree of heat rises, while that in the cooler channel falls, thus establishing a current through the loop. To establish such circulation, it is necessary that the open end of the tube or loop should be the upper end, and the upper end is threaded and inserted in the crown-sheet to communicate with the water-space in the boiler. It is apparent, therefore, that the tubes will always be filled with water so long as there is water in the boiler above the level of the crown-sheet, also that the tubes cannot be emptied by drawing the water from the boiler, nor in any other convenient manner, except by inverting the tubes. In the cold season the water in the tubes would freeze and destroy them if for any reason the fire should be withdrawn and water left in the tubes. It is also of advantage to be able to empty the tubes or loops for cleaning or repairing.

By providing a boiler having depending water-tubes closed at the lower ends with central trunnions H, secured to the outer shell as by rivets H', and mounting such trunnions in bearings upon suitable supports J, I am able to empty all the tubes at once by turning the boiler from the vertical to a horizontal or partially-inverted position, first uncoupling the water or steam connections, (not shown in the drawings,) the movement of the boiler being indicated by dotted lines.

The steam-pipe K, leading from the top of the boiler, may be connected in any known manner with a steam-supply pipe, and the water-supply pipe may be coupled through one of the trunnions made hollow and connecting with the interior of the boiler, as shown in Fig. 2.

I am aware that boilers adapted to be revolved upon journals are not new, such construction being set forth in Patent No. 170,032, granted to Vail, November 16, 1875, and such matter is not of my invention. Neither do I claim the particular form of tube illustrated herein.



It is a characteristic of my improvement that the tubes can be entirely emptied by the rotation of the boiler—a result never before attained. In the revolving boiler above  
5 named there were no water-tubes and the intertubular water-space could not be wholly freed from water by rotating the boiler.

What I claim as new, and desire to secure by Letters Patent, is—

10 In a steam-boiler, the combination, with a series of depending water-circulating loops, having the legs of each loop connected at their

lower ends with each other and at their upper ends with the water-space, of boiler-supporting trunnions and trunnion-supporting bear- 15 ings, whereby the water-tubes can be entirely emptied, substantially as described.

In testimony whereof I have hereunto set my hand this 22d day of February, 1890.

THEODORE E. BUTTON.

Witnesses:

GEO. A. MOSHER,  
CHARLES T. FAULKNER.