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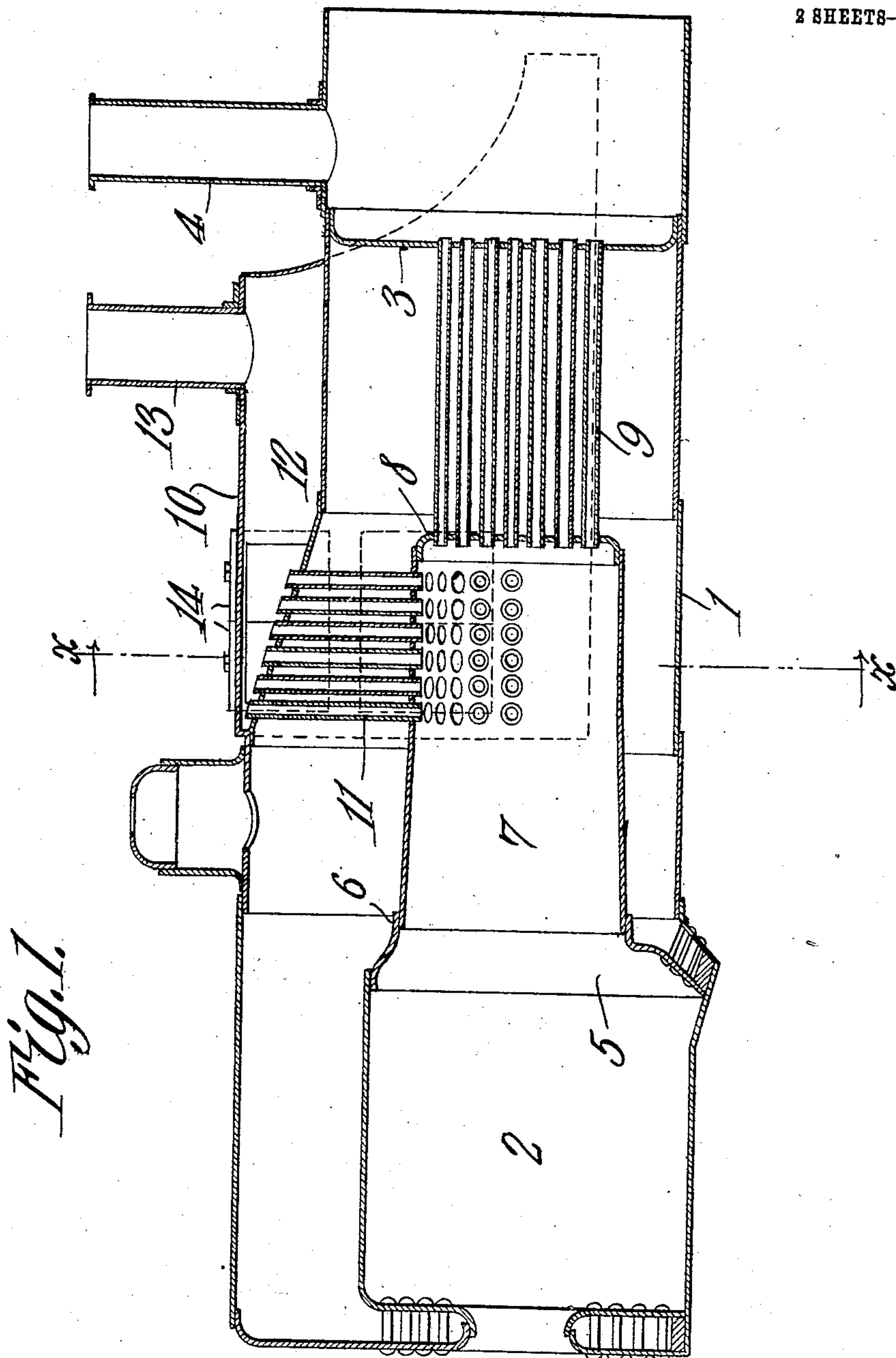
PATENTED AUG. 20, 1907.

J. J. MORGAN & W. M. HASTINGS.

STEAM BOILER.

APPLICATION FILED APR. 23, 1907.

2 SHEETS—SHEET 1.



WITNESSES:

E. J. [Signature]
Herbert D. Lawson

Joseph J. Morgan
Willard M. Hastings INVENTORS

By *C. A. Snow & Co.*
ATTORNEYS

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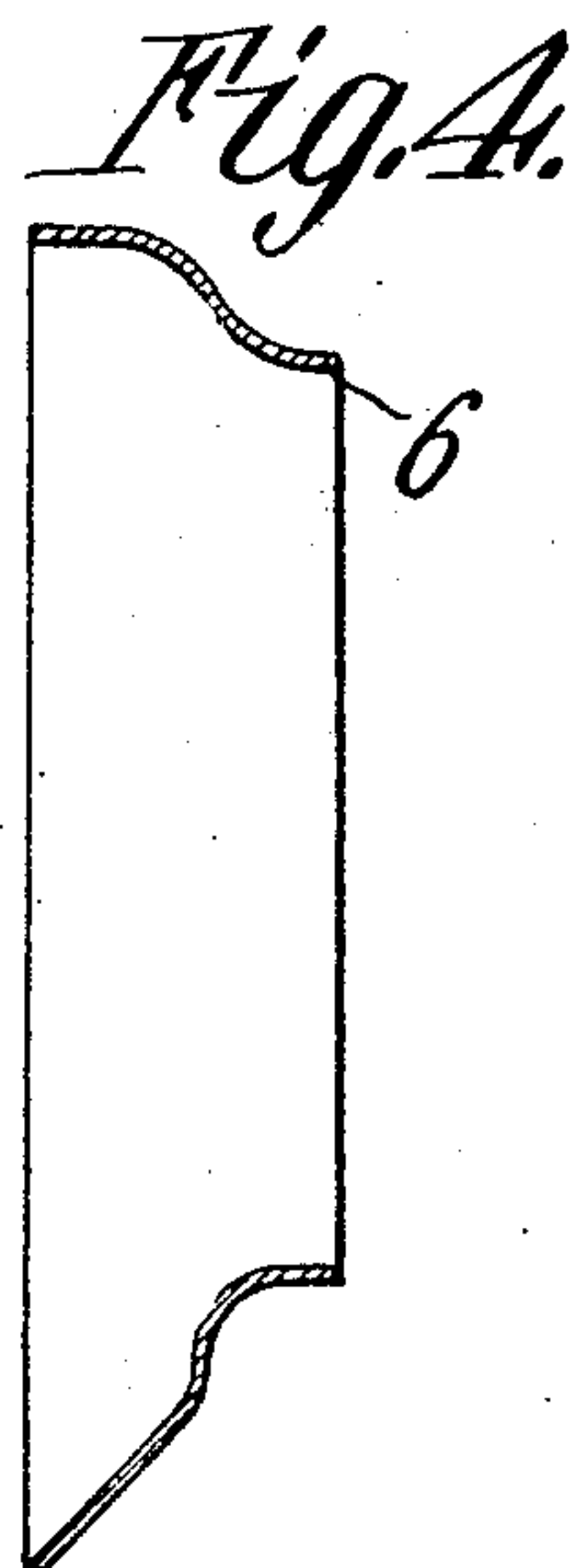
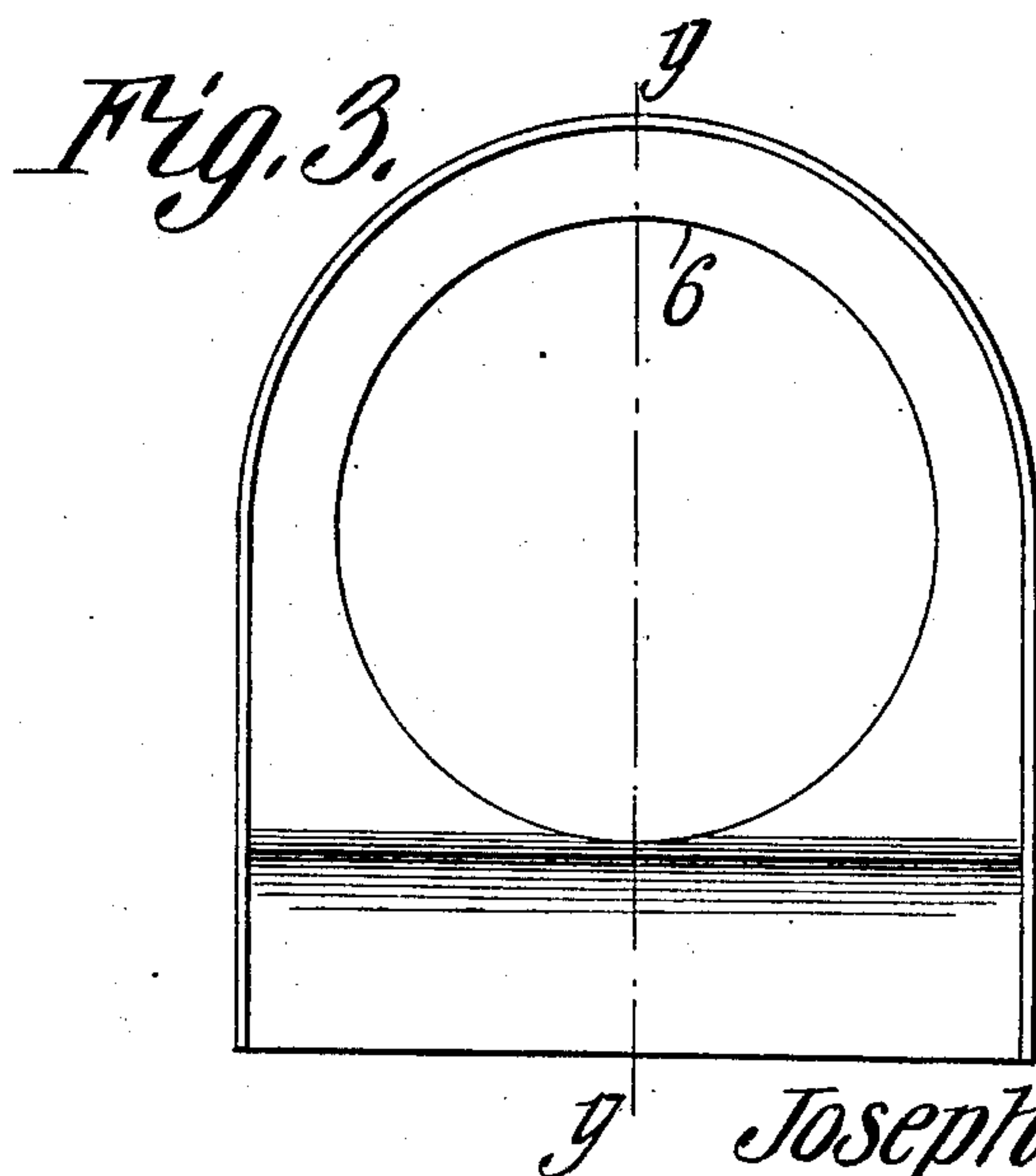
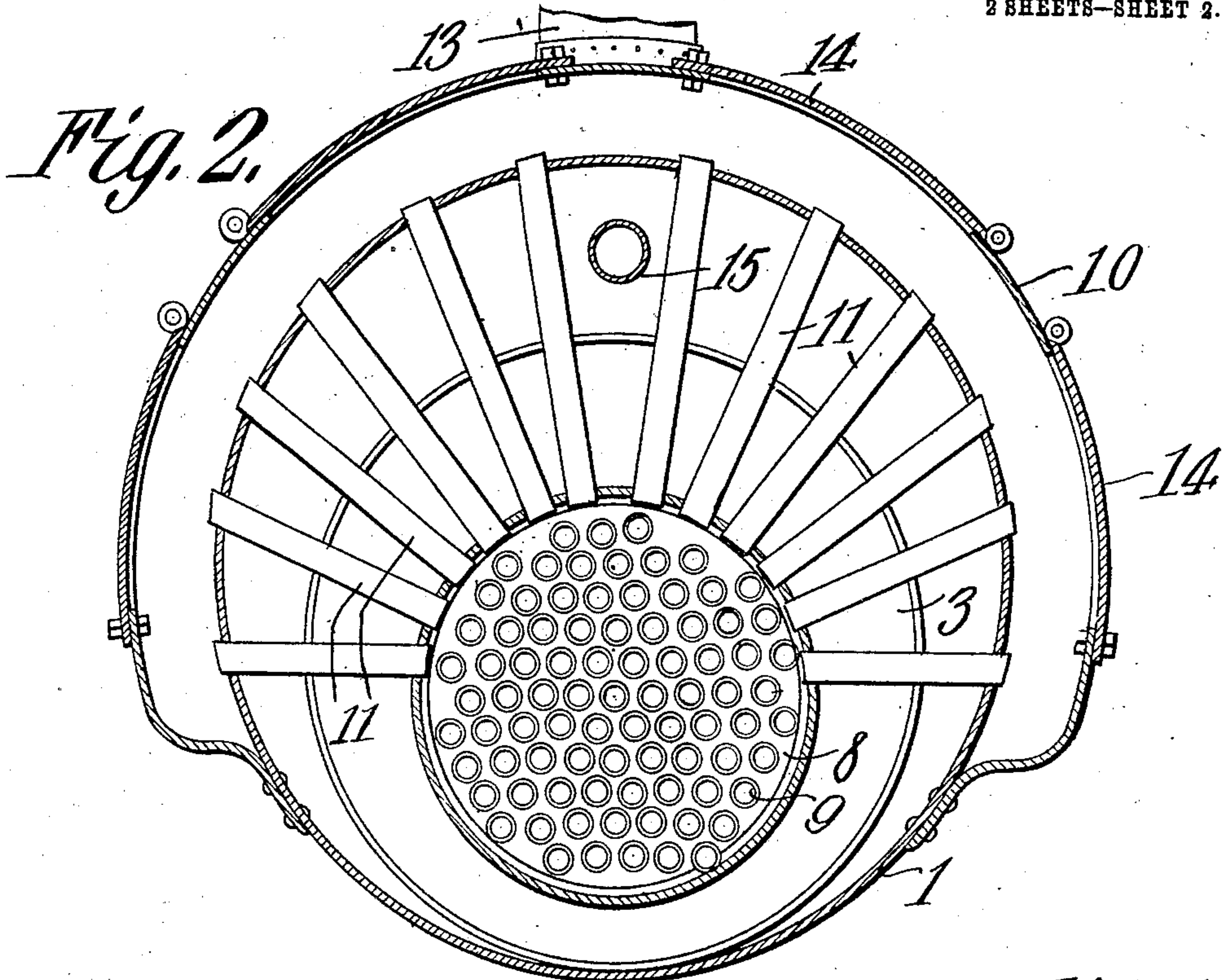
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UNITED STATES PATENT OFFICE.

JOSEPH J. MORGAN AND WILLARD M. HASTINGS, OF PORTSMOUTH, OHIO.

STEAM-BOILER.

No. 863,931.

Specification of Letters Patent.

Patented Aug. 20, 1907.

Application filed April 23, 1907. Serial No. 369,812.

To all whom it may concern:

Be it known that we, JOSEPH J. MORGAN and WILLARD M. HASTINGS, citizens of the United States, residing at Portsmouth, in the county of Scioto and State of Ohio, have invented a new and useful Steam-Boiler, of which the following is a specification.

This invention relates to steam boilers and more particularly to boilers for use upon locomotives.

The object of the invention is to provide simple and efficient means whereby combustion may be more perfectly effected and a larger percentage of heat utilized than with boilers of the usual construction.

A still further object is to provide means of this character which can be installed within an ordinary locomotive boiler or the like without interfering with the braces or the stays ordinarily used.

With these and other objects in view the invention consists of certain novel features of construction and combinations of parts which will be hereinafter more fully described and pointed out in the claims.

In the accompanying drawings is shown the preferred form of the invention.

In said drawings: Figure 1 is a longitudinal section through a locomotive boiler constructed in accordance with the present invention; Fig. 2 is an enlarged section on line $x-x$, Fig. 1; Fig. 3 is an enlarged elevation of the connecting plate or nozzle of the combustion chamber; and Fig. 4 is a section on line $y-y$, Fig. 3.

Referring to the figures by characters of reference, 1 designates the casing of the boiler, the same being of the usual construction and having a fire box 2 in one end thereof and a front flue sheet 3 adjacent its other end, there being the usual stack 4 through which the products of combustion pass after leaving the flues. Instead of using the back flue sheet and extending horizontal flues from one flue sheet to the other, said rear flue sheet is dispensed with and a connecting plate or nozzle 5 is substituted therefor. This plate is suitably secured to the forward end of the fire box and, as shown particularly in Figs. 1 and 4, is substantially funnel-shaped and has an opening surrounded by a flange 6. This flange fits tightly around and is secured to the open end of a cylindrical combustion chamber 7, the forward end of which is closed by a flue sheet 8. Flues 9 connect the two flue sheets 8 and 3.

A jacket 10 partly surrounds a portion of the casing 1 and opening thereinto are flues 11 which radiate from the compartment 7 at the sides and top thereof. Jacket 10 forms a receiving compartment 12 into which a portion of the product of combustion discharges and a stack 13 extends from this jacket and constitutes an outlet for said products. Doors 14 are arranged upon the jacket so that access may be conveniently had to the tubes 11. As shown in Fig. 2

these radiating flues may be positioned so that any pipes ordinarily employed within a boiler need not be displaced. One of these pipes has been shown at 15.

The combustion chamber is preferably slightly smaller in diameter at its front end than at its rear end so that the same can be readily placed in proper position when remodeling boilers. Moreover, it has been found in practice that the best results are obtained when this combustion chamber and the fire box are constructed in a predetermined proportion to each other. Said chamber should preferably not be over four inches shorter than first fire box in order to obtain the best results. A peculiar arrangement and disposition of the parts permits a boiler of the ordinary type to be readily remodeled to embody the present improvements.

When the products of combustion leave the fire box 2 they are deflected by the plate or nozzle 5 into the combustion chamber 7 which obviously presents a broad surface to the water contained within the boiler. The gaseous products then pass through the flues 11 and 9 to the respective stacks 13 and 4. A portion of the casing 1 is thus heated by those products within compartment 12 and inasmuch as the heat is more thoroughly distributed by the horizontal and radiating flues it is obvious that steam may be more quickly generated. By providing the large combustion chamber 7 the unconsumed products of combustion are given more time to burn and therefore a larger percentage of the fuel is utilized than where the products pass directly from the fire box into the flues.

What is claimed is:

1. The combination with a boiler having a fire box therein; of a combustion compartment extending from the fire box and into the boiler, and flues radiating from said compartment and within the boiler.
2. The combination with a boiler having a fire box therein; of a combustion compartment extending from the fire box and into the boiler, a jacket upon the boiler, and flues connecting said compartment and the interior of the jacket.
3. The combination with a boiler having a fire box therein; of a combustion compartment extending from the fire box and into the boiler, a jacket upon the boiler, and radiating flues extending from said compartment and opening into the jacket.
4. The combination with a boiler having a fire box therein; of a connecting plate or nozzle extending from one wall of the fire box, a combustion compartment extending therefrom and into the boiler, an outlet, a jacket, and flues extending from the compartment to the outlet and from said compartment to the jacket respectively.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

JOSEPH J. MORGAN.
WILLARD M. HASTINGS.

Witnesses:

FLOYD L. SMITH,
LEGRAND B. SMITH.