

No. 746,646.

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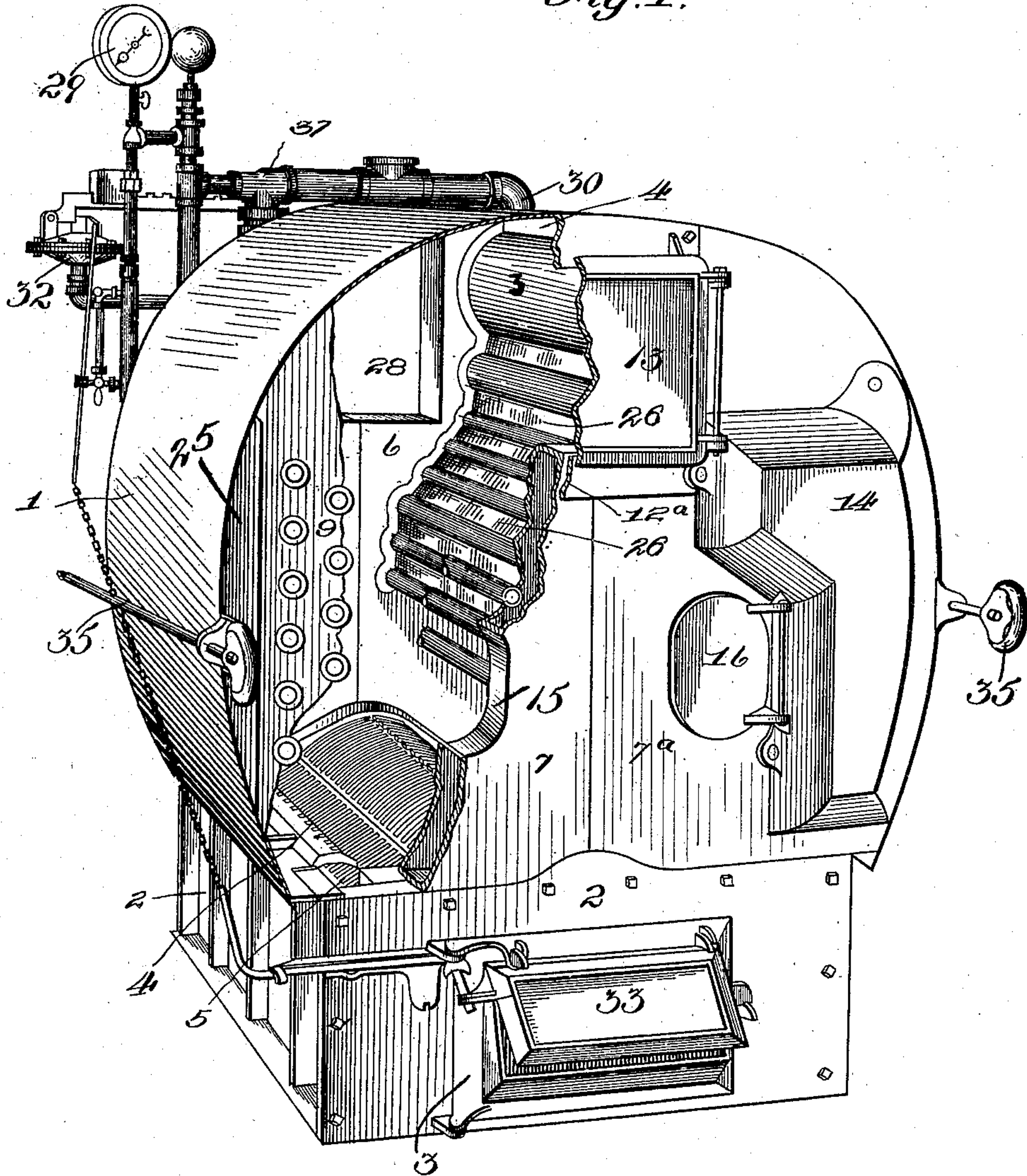
G. F. SPENCER.
STEAM BOILER.

APPLICATION FILED MAY 13, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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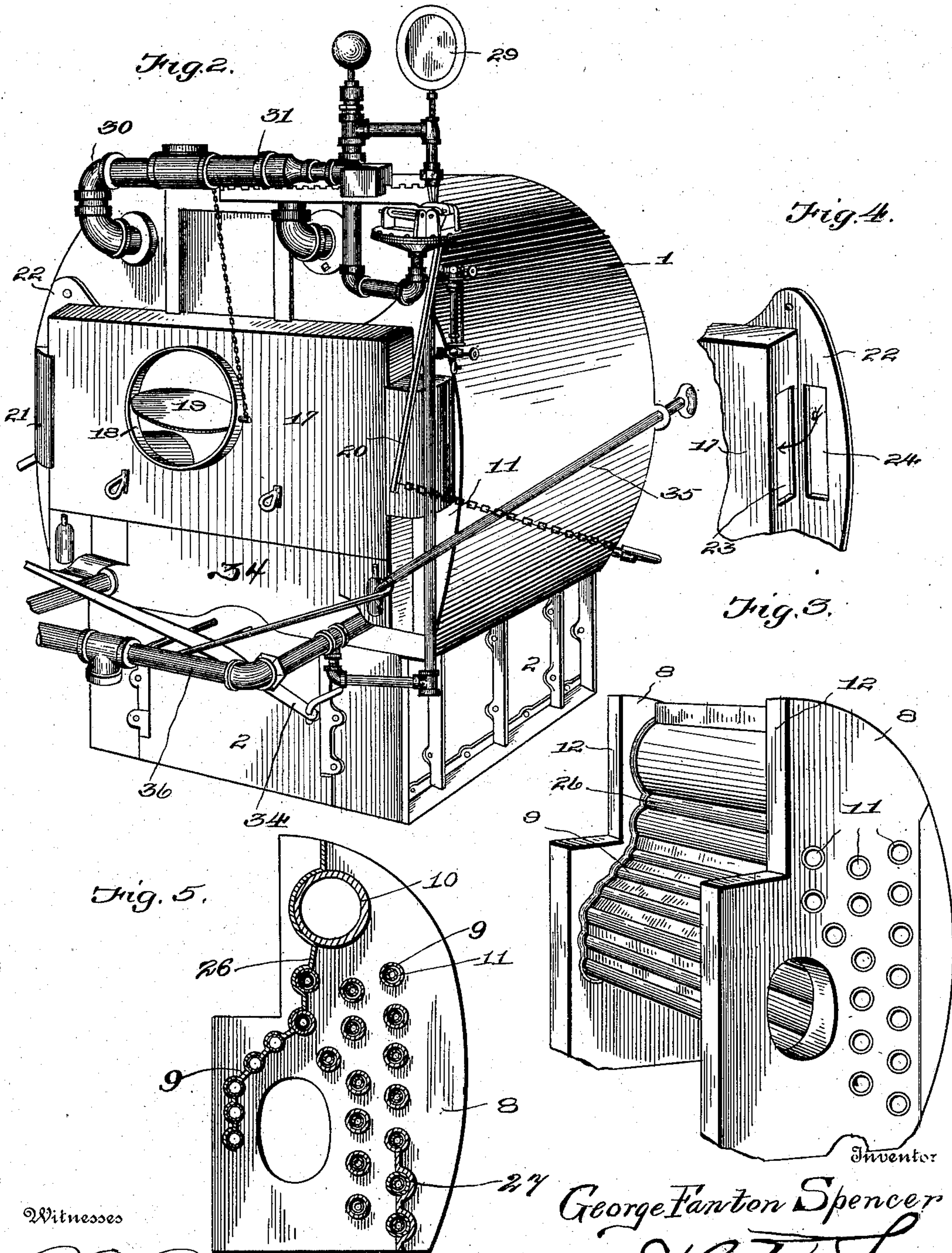
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UNITED STATES PATENT OFFICE.

GEORGE FANTON SPENCER, OF THOMPSON, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 746,646, dated December 8, 1903.

Application filed May 13, 1902. Serial No. 107,193. (No model.)

To all whom it may concern:

Be it known that I, GEORGE FANTON SPENCER, a citizen of the United States, residing at Thompson, in the county of Susquehanna and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in steam-boilers; and the primary object of the same is to provide simple and effective means whereby the fuel-heat will be utilized to its maximum extent with a minimum consumption and a greater water-heating surface obtained by arranging the water-tubes directly over the fire-bed, said water-tubes communicating with the end walls or heads of the boiler-sections, the lower ends of which are arranged adjacent the ends of the fire-bed, whereby the water will be quickly heated without requiring the use of a greater amount of fuel for maintaining the water therein at the proper degree of temperature.

A further object of the invention is to provide a sectional boiler each section of which is provided with a drum in communication with the respective section-heads, thereby permitting an uninterrupted passage of the water into the water-tubes.

A further object of the invention is to provide simple and durable means for rendering the operation of the water-heating means more effective generally and facilitate the assemblage of the several parts, as well as to provide for easy access to the interior for the purpose of cleaning the fire-surfaces.

With these and other objects and advantages in view the invention consists in the construction and arrangement of the several parts, which will be more fully hereinafter described and claimed.

In the drawings, Figure 1 is a view in perspective of a steam-boiler embodying the features of the invention, parts being broken away. Fig. 2 is a view in perspective taken from the rear of the boiler. Fig. 3 is a perspective view of one of the boiler-sections, and Fig. 4 is a fragmentary view of one end

of the smoke-box. Fig. 5 is a central vertical cross-section of one of the boiler-sections.

In the drawings, 1 designates a surrounding jacket or casing of approximately circular contour in cross-section and which is preferably formed of metal. This jacket is supported upon a base 2, formed with a suitable ash-pit and provided in its forward end with an opening, said opening being normally closed by the door 3.

On the upper edge of each long side of the base 2 I provide a stationary plate or bar 4, having inwardly-projecting short fingers or bars.

5 designates the grate, which is composed of two sections slidably mounted in longitudinally-arranged guides for the purpose hereinafter referred to. The sections of the grate are inclined in opposite directions transversely of the fire-box and are arranged so as to have their longitudinal centers directly under the center of the longitudinal magazine or hopper 6 and their lower ends arranged beneath the said plates 4. This construction permits the fire to be maintained at a uniform depth throughout, thus causing an even draft and uniform and perfect combustion of fuel over the surface of the grate.

7 and 7^a designate the two boiler-sections. Each section comprises a pair of hollow heads 8, which are of approximate semicircular contour and connected by the respective water-tubes 9, which are arranged in alignment with each other, and the horizontal drums 10, the ends of which are secured in the inner walls of the said heads.

11 designates the fire-flues, which are arranged in the water-tubes and extend entirely through the heads 8, as clearly shown in Fig. 3 of the drawings.

From the foregoing description it will be apparent that the two boiler-sections can be readily placed side by side in the jacket 1. The cut-away portions 12 and 12^a form an opening through the medium of which the fuel is admitted into the magazine or hopper 6, the opening being normally closed by a door 13.

Detachably secured to the front heads of the respective boiler-sections are the casings 14, which inclose the exposed forward ends

of the said fire-tubes and permit the products of combustion to pass from the fire-box there-through.

15 and 16 designate the doors for the fire-box, one of which is secured to each boiler-section.

Secured on the outer face of the rear heads of the boiler-sections is the transversely-arranged smoke-box 17, which incloses the rear ends of the entire series of fire-tubes and communicates with the chimney (not shown) through the opening 18, provided with a suitable damper 19.

20 and 21 designate hollow casings secured on the end flanges 22 of the smoke-box 17 and provided with openings which communicate with openings 23 and 24 of the smoke-box and flanges thereof, respectively.

The openings 24 communicate with the passages 25, formed between the walls of the jacket 1 and the boiler-sections, and thereby providing an auxiliary or semistraight draft located outside of the fire-tubes.

The magazine or hopper 6 is formed by inserting baffle-plates 26 between the drums and the inner row of water-tubes, which arrangement forms an inclined wall on either side a suitable distance from the center of the boiler and a proper distance above the grates, thus providing a fuel-feeding means for the entire length of the fire-box. The spaces between the remaining tubes are left open to allow for the circulation of the products of combustion therebetween.

28 designates an opening in the rear ends of the heads 8 of the boiler-sections which communicates with the chimney, (not shown,) thereby affording a direct draft for the fire.

29 designates the steam-gage; 30 and 31, the steam-pipes communicating with the drums 10; 32, the automatic steam-regulator, which is operatively connected to the damper 19 and the draft-door 33.

The reciprocating grate-sections may be operated by any desired mechanism, and I have shown in the drawings a simple means which comprises levers 34, fulcrumed to the boiler and having their outer ends pivotally connected to operating-rods 35, which are arranged longitudinally of the boiler, as clearly shown in the drawings.

Water is supplied directly to the rear heads 8 through the medium of the pipes 36, and it will be apparent that the water will readily circulate through the tubes 9 to the forward heads of the boiler-sections and then into the horizontally-disposed drums 10. These drums preferably receive but a small quantity of water, thereby providing in their upper portions space for the generated steam. A baffle-plate 27 is inserted between the lower outer rows of tubes of each boiler-section and the next tubes thereabove for the purpose of directing the heat as much as possible toward the water-tubes.

From the foregoing description it will be obvious that the products of combustion will

readily pass upward through the casings 14 into the forward ends of the fire-flues and then through the smoke-box 17 to the chimney. This casing is preferably made double, having a dead-air space between them to prevent radiation, or it may be brick incased, as desired.

The preferred form and arrangement of the present invention has been shown and described; but it is obviously apparent that changes in the form, size, proportions, and minor details may be resorted to without departing from the spirit of the invention.

Having thus fully described my invention, what I claim as new is—

1. The combination of the approximately circular casing and the two boiler-sections arranged therein, said sections being provided at each end with an approximately semicircular head, said heads forming the front end of said casing, substantially as and for the purpose specified.

2. The combination of the hollow casing, and a pair of boiler-sections arranged in the said casing side by side, said sections having their interior constructed so as to form a hopper, substantially as described.

3. The combination of a casing, a boiler arranged in the said casing, water-tubes, and a fuel-hopper, said tubes forming the side walls of the hopper.

4. The combination of a casing having its front and rear ends open, a boiler formed of two sections arranged in the said casing, and a fuel-hopper.

5. In combination with a base, of a casing, a sectional boiler arranged in said casing, comprising a pair of heads, water-tubes connecting the said heads, fire-tubes arranged in the said water-tubes and terminating at the outer walls of the respective heads, a smoke-box inclosing the rear ends of the said fire-tubes, casings inclosing the forward ends of the said fire-tubes, and a fuel-hopper mounted between the said water-tubes.

6. In combination with a base, the fire-grate, and the casing secured to the said base, a boiler composed of two sections arranged in the said casing, said sections each comprising a pair of hollow heads having their inner upper ends cut away, a series of water-tubes communicating with each pair of heads, fire-tubes arranged in the said water-tubes and extending through the said heads, a smoke-box inclosing the rear ends of the said fire-tubes, a fuel-hopper mounted between the said sections, and doors provided in the forward heads of the said sections, substantially as described.

7. The combination of the hollow casing, a pair of boiler-sections arranged in said casing side by side, a hopper and baffle-plates arranged between the pipes of the said sections, said baffle-plates and pipes of the boiler-sections forming the side walls and bottom of the hopper.

8. In combination with a base, and the fire-

grate, a casing secured on the base, a two-section boiler mounted in said casing, a series of water-tubes carried by each section and arranged directly over said grate, and a
5 fuel-hopper formed by the tubes of the said sections.

9. In combination with a base, and the fire-grate, of a casing secured to the base, a sectional boiler mounted in said casing, said
10 boiler-sections each comprising hollow heads, connected by drums and water-tubes which

communicate therewith, flues extending through said heads, and baffle-plates arranged between the water-tubes arranged adjacent the meeting edges of the sections.

In testimony whereof I affix my signature
in presence of two witnesses.

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GEORGE FANTON SPENCER.

Witnesses:

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