No. 710,340. Patented Sept. 30, 1902.

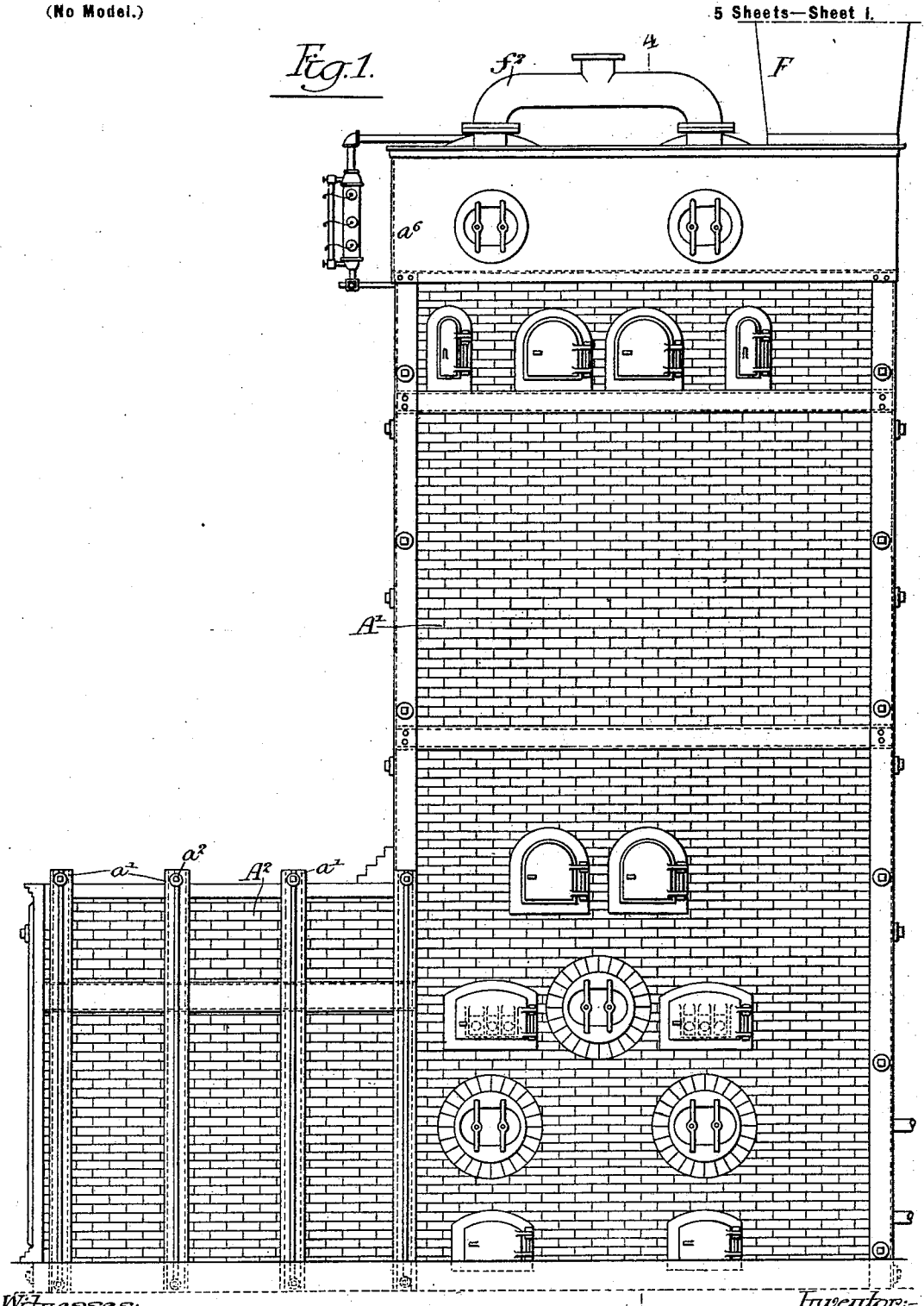
E. G. RUST.

WATER TUBE BOILER.

(Application filed May 29, 1902.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



Witnesses:-
A. D. Copper
Herman E. Mehius

Inventor:-
Edwin G. Rust,
by his Attorneys: Howson & Howson

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

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(No Model.) 5 Sheets—Sheet 2.

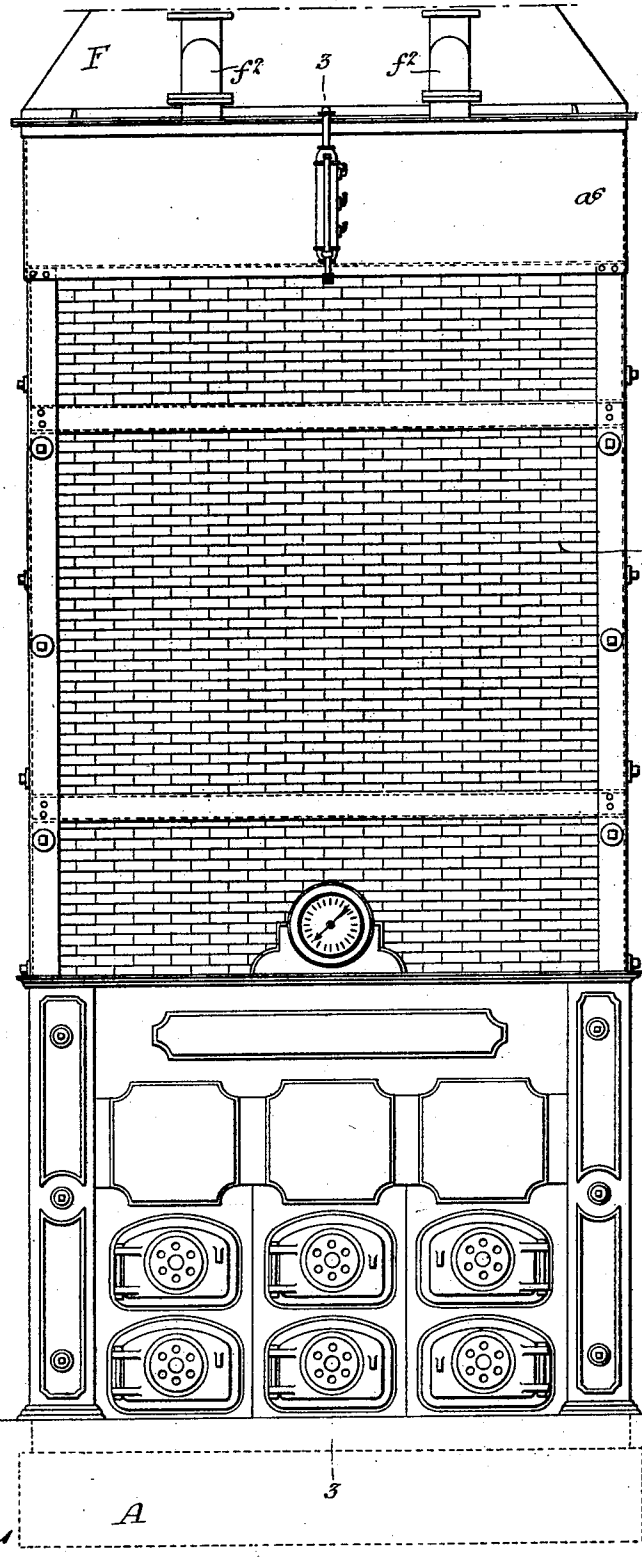


Fig. 2.

Witnesses:-
N. B. Coppes
Herman E. Mehus

Inventors
Edwin G. Rust,
by his Attorneys
Howson & Howson

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

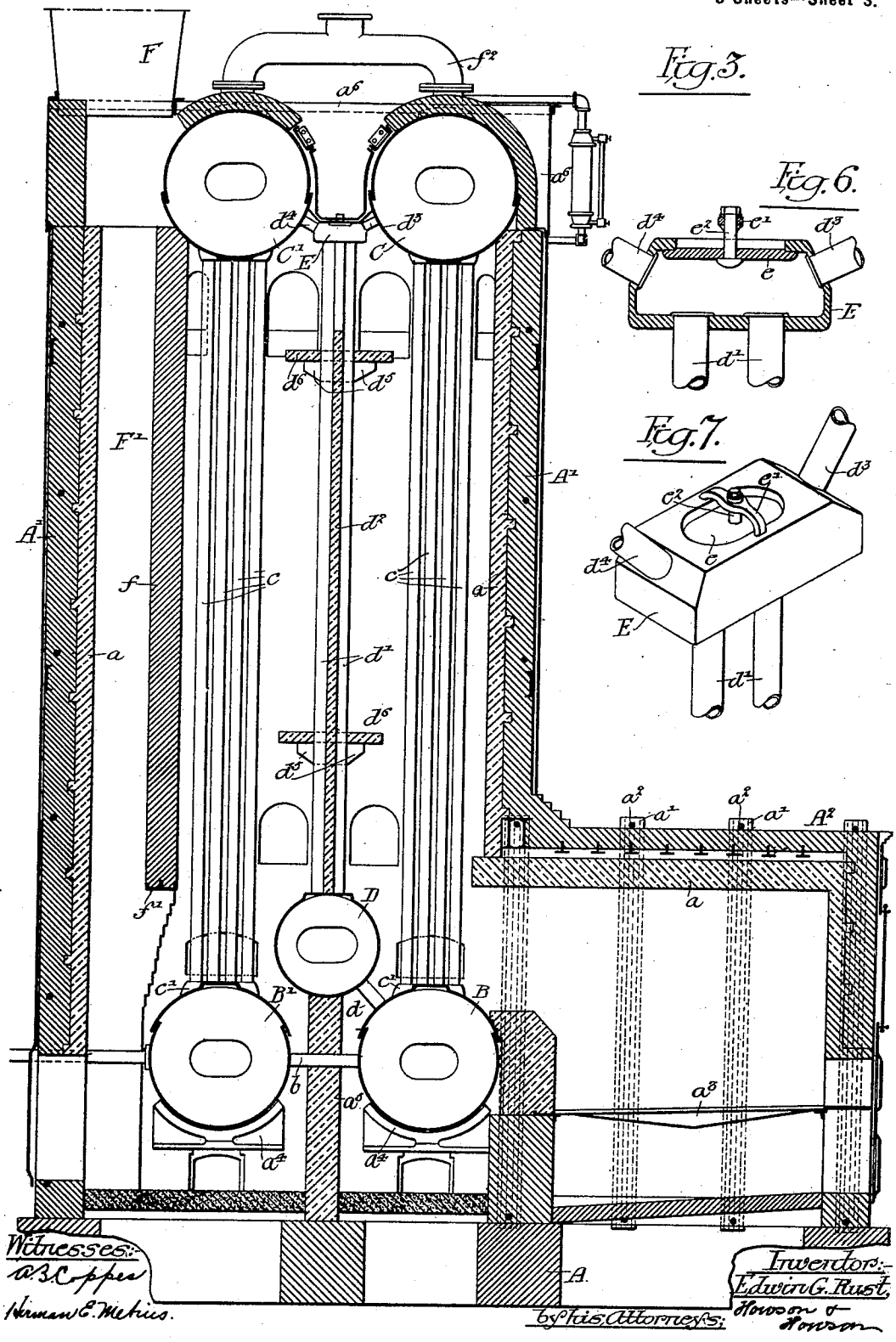
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E. G. RUST.

WATER TUBE BOILER.

(Application filed May 29, 1902.)

(No Model.) 5 Sheets—Sheet 3.



Witnesses:
A. B. Coppes
Herman C. Metcalf.

Inventor:
Edwin G. Rust,
by his Attorneys:
Howson & Howson

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

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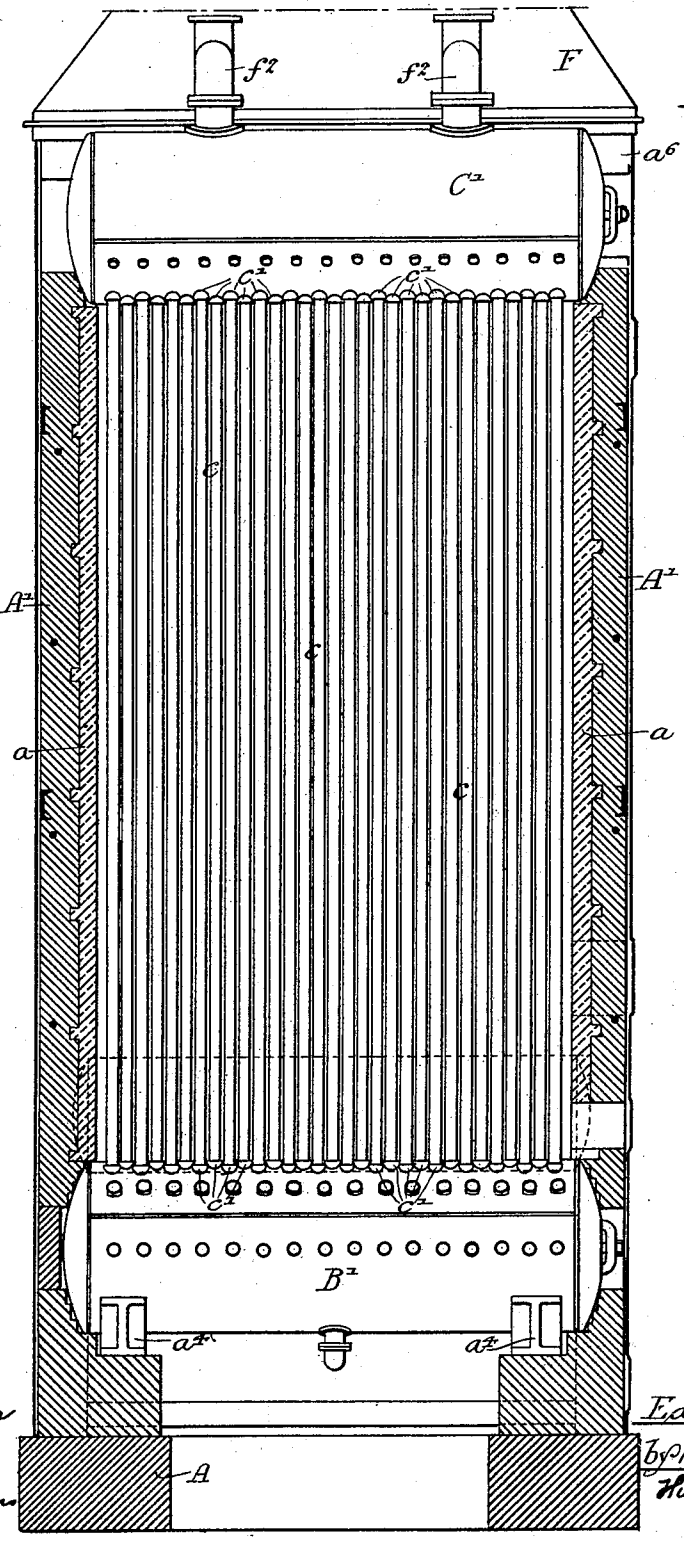
E. G. RUST.

WATER TUBE BOILER.

(Application filed May 29, 1902.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 4.



Witnesses:-
W. B. Coppes
Herman E. Mekin

Inventor
Edwin G. Rust,
by his Attorneys
Howson & Howson

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

No. 710,340. Patented Sept. 30, 1902.

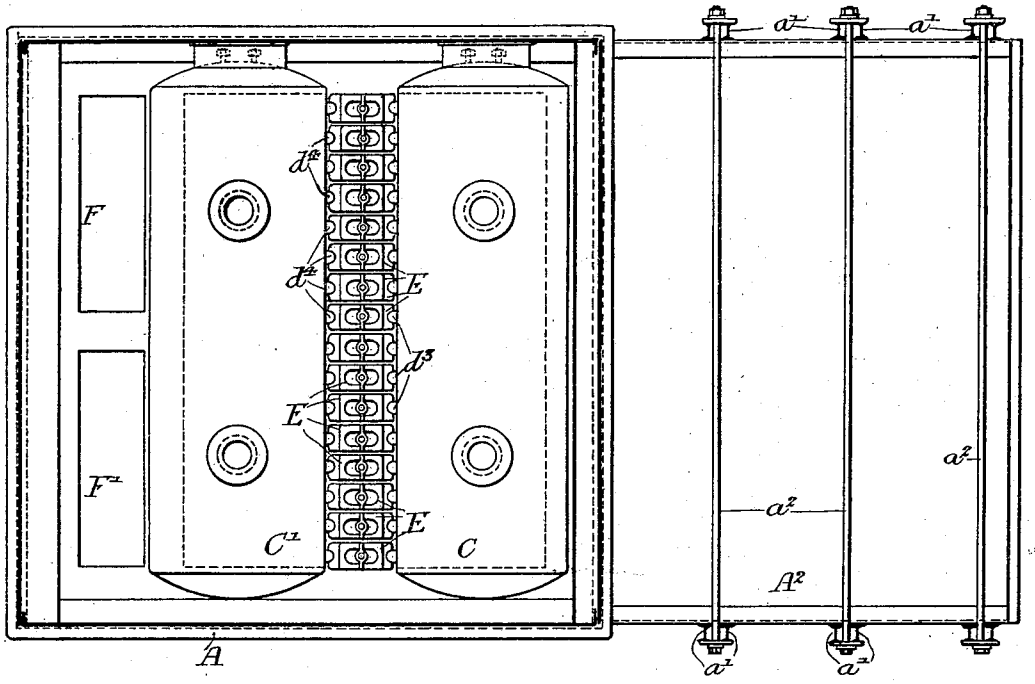
E. G. RUST.

WATER TUBE BOILER.

(Application filed May 29, 1902.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 5.



Witnesses:-
A. B. Coppes
Herman E. Metius.

Inventor
Edwin G. Rust,
by his Attorneys
Howson & Howson

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

UNITED STATES PATENT OFFICE.

EDWIN G. RUST, OF PUEBLO, COLORADO.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 710,340, dated September 30, 1902.

Application filed May 29, 1902. Serial No. 109,553. (No model.)

To all whom it may concern:

Be it known that I, EDWIN G. RUST, a citizen of the United States, residing at Pueblo, Colorado, have invented certain Improvements in Water-Tube Boilers, of which the following is a specification.

My invention consists of an improved form of water-tube boiler, the objects thereof being to produce an efficient and at the same time a comparatively inexpensive boiler which, while being of simple construction, may be easily and quickly examined and repaired.

A further object of the invention is to so construct the boiler that it shall occupy a minimum of floor-space for a given steaming capacity.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved boiler. Fig. 2 is a front elevation of the same. Figs. 3 and 4 are sectional elevations of the boiler, taken on the lines 3 3, Fig. 2, and 4 4, Fig. 1, respectively. Fig. 5 is a plan view of the boiler, the inclosing covering being removed to show the arrangement of the headers. Fig. 6 is a vertical sectional elevation of one of the small headers, showing the arrangement of the water-tubes entering the same; and Fig. 7 is a perspective view of one of the small headers.

In the above drawings, A represents the foundation upon which the boiler and its setting are supported, this being usually of masonry or concrete constructed in any of the well-known ways. The setting in the present instance consists of a brick casing A′, having a forwardly-projecting portion A^2, forming the furnace, the whole being provided with a suitable refractory lining *a* and being held together by a framework of binders and stays, as shown in Figs. 1 and 2. The furnace has pairs of "I-beams" *a′* placed vertically at its sides, these being tied together both above and below by means of bolts a^2, there being also fire and ash doors and a grate a^3 provided for said furnace. Within the casing and supported directly from the foundation A are cast-iron saddles a^4, (in the present instance two,) which carry, respectively, the lower drums B and B′, these in turn supporting the two upper drums C and C′ through the medium of the water-tubes *c*. All four of these drums are preferably provided with the improved form of tube-sheet described and claimed in United States Patent No. 700,091, granted to me May 13, 1902, the said sheet being made with pressed-out plane surfaces *c′*, which are so placed as to allow the water-tubes to enter perpendicular to their inside and outside surfaces without bending. Upon a wall a^5, extending upwardly from the foundation between the drums B and B′, is carried a third drum D, connected to either of the drums B or B′, or both, being shown in the present instance connected to the drum B by a series of tubes *d*, in addition to which there are a series of tubes *b* passing through said wall and connecting the said drums B and B′. The tube-sheet of this third drum is preferably made the same as are those of the other drums, and from it extend a number of series of water-tubes *d′*, supporting between them a partition or baffle-wall d^2, each series consisting in the boiler illustrated of two tubes entering a small header E, placed, preferably, somewhat below the plane of the centers of the upper drums C and C′. I do not limit myself to but two tubes in a series, since I may, if desired, use any convenient number of the same. The headers, while being independent of each other, are connected to the drums C and C′, respectively, by short nipples or tubes d^3 and d^4, it being noted that the baffle-wall d^2 does not extend quite to the bottom of the headers, but leaves unobstructed a sufficient opening below the headers E for the passage of the products of combustion on their way from the furnace to the stack. The headers E are preferably of the construction shown in Figs. 5 and 6, being made of such a shape that they offer plane surfaces both for the entrance of the tubes *d′* and also for the tubes d^3 and d^4, having also a plane upper surface in which is a hand-hole or opening normally closed by a cover-plate *e*. For convenience the surfaces of the headers for the reception of the tubes d^3 and d^4 are placed so as to be substantially parallel to the portion of the surfaces of the drums C and C′ adjacent to them. Pieces d^5, of refractory material, project

transversely from the baffle-wall d^2 and serve to carry substantially horizontal wings or deflecting-walls d^6.

I preferably inclose or surround the two upper drums C and C′ by a sheet-iron casing a^6, which not only assists in binding together the upper parts of the setting and serves as a support for the stack F, but also gives a finished and ornamental appearance to the same.

While I have illustrated my invention as applied to a boiler whose casing communicates directly with the stack F, it will be understood by those skilled in the art that, if desired, there may be an underground flue connection without departure from my invention. As illustrated, there is a baffle-wall f, supported by a beam or channel f' and extending back of the tubes c, connecting the rear pair of drums B′ and C′, whereby the products of combustion are made to pass downwardly between the tubes d' and the said connecting-tubes c of the rear drums and thence into the flue F′. Main steam-pipes f^2 connect the upper portions of the drums B′ and C′, and there are the usual fittings and cleaning-openings commonly found in boilers of the type to which my invention belongs. By the use of a plurality of the relatively small headers E it will be seen that I can very easily and conveniently construct this portion of my improved form of boiler, for any of the various sets of water-tubes d', d^3, and d^4 can be inserted and expanded or removed and replaced with the minimum disturbance of the adjacent tubes and other parts of the boiler.

I claim as my invention—

1. The combination in a water-tube boiler, of a plurality of main drums having water-tubes extending between them, an auxiliary drum, a plurality of relatively small headers connected thereto by comparatively long substantially perpendicular tubes and to certain of the main drums by comparatively short and inclined tubes, and water-tubes connecting said auxiliary drum to the main drum or drums, substantially as described.

2. The combination in a water-tube boiler, of a plurality of main drums having water-tubes extending between them, an auxiliary drum adjacent to certain of said drums, a plurality of relatively small headers adjacent to others of the drums, water-tubes connecting said headers with the adjacent main drum or drums, and tubes connecting the auxiliary drum with its adjacent main drums, substantially as described.

3. In a water-tube boiler, the combination of a plurality of pairs of main drums having water-tubes extending between them an auxiliary drum adjacent to and between two of the main drums substantially parallel to the same, a series of relatively small headers adjacent to others of the main drums, tubes connecting the auxiliary drum and the headers, and other tubes connecting the headers and the auxiliary drum with their adjacent main drums respectively, substantially as described.

4. In a water-tube boiler, the combination of a plurality of main drums having water-tubes connecting them, an auxiliary drum having series of water-tubes, headers connected to said tubes, a baffle-wall extending between said series of tubes, brackets supported by said wall and projecting therefrom between certain of the tubes and deflecting-walls carried by said brackets, substantially as described.

5. In a water-tube boiler, the combination of a plurality of main drums having water-tubes connecting them in pairs, an auxiliary drum between two of the main drums and parallel to the same, headers having series of water-tubes connecting them to the said auxiliary drum, a baffle-wall between the said series of tubes, brackets projecting substantially at right angles to the wall and supported thereby, and deflecting-walls carried by said brackets, substantially as described.

6. In a water-tube boiler, having upper and lower main drums connected by water-tubes, an auxiliary drum parallel to and above the lower drums, a series of headers adjacent to the upper drums and each connected to the auxiliary drum by a tube or tubes, with tubes connecting the said auxiliary drum and the headers to their respective adjacent main drums, substantially as described.

7. A plurality of upper and lower main drums, an auxiliary drum adjacent and connected to certain of the same, a series of independent headers adjacent to others of said drums, a tube or tubes connecting each header with the auxiliary drum and other tubes connecting each header with the adjacent main drums, substantially as described.

8. In a water-tube boiler, the combination with substantially cylindrical main drums of a series of independent headers of relatively small capacity placed adjacent to certain of said drums and having a surface or surfaces substantially parallel to the surface of the main drums, an auxiliary drum having its long axis substantially parallel to certain of the axes of the main drums, tubes connecting said auxiliary drum with the main drum, other tubes connecting it with the headers and tubes extending between the adjacent surfaces of the drums and headers, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN G. RUST.

Witnesses:

WILLIAM E. BRADLEY,

JOS. H. KLEIN.