

No. 772,297.

PATENTED OCT. 11, 1904.

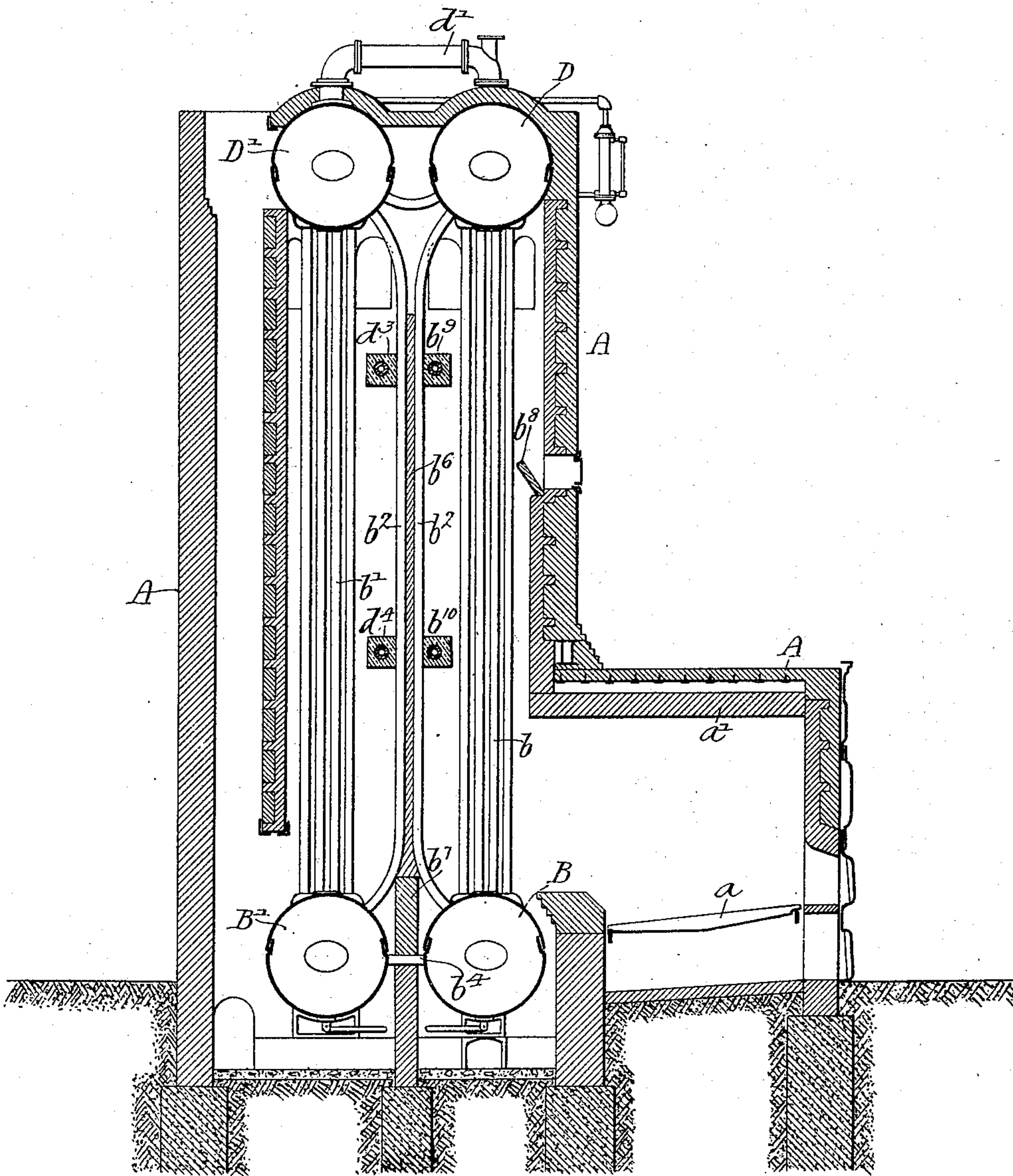
E. G. RUST.
BOILER.

APPLICATION FILED APR. 28, 1904.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:-
 Tetus H. Goss.
 Frank L. A. Graham.

Inventor:
Edwin G. Rust.
by his Attorneys,
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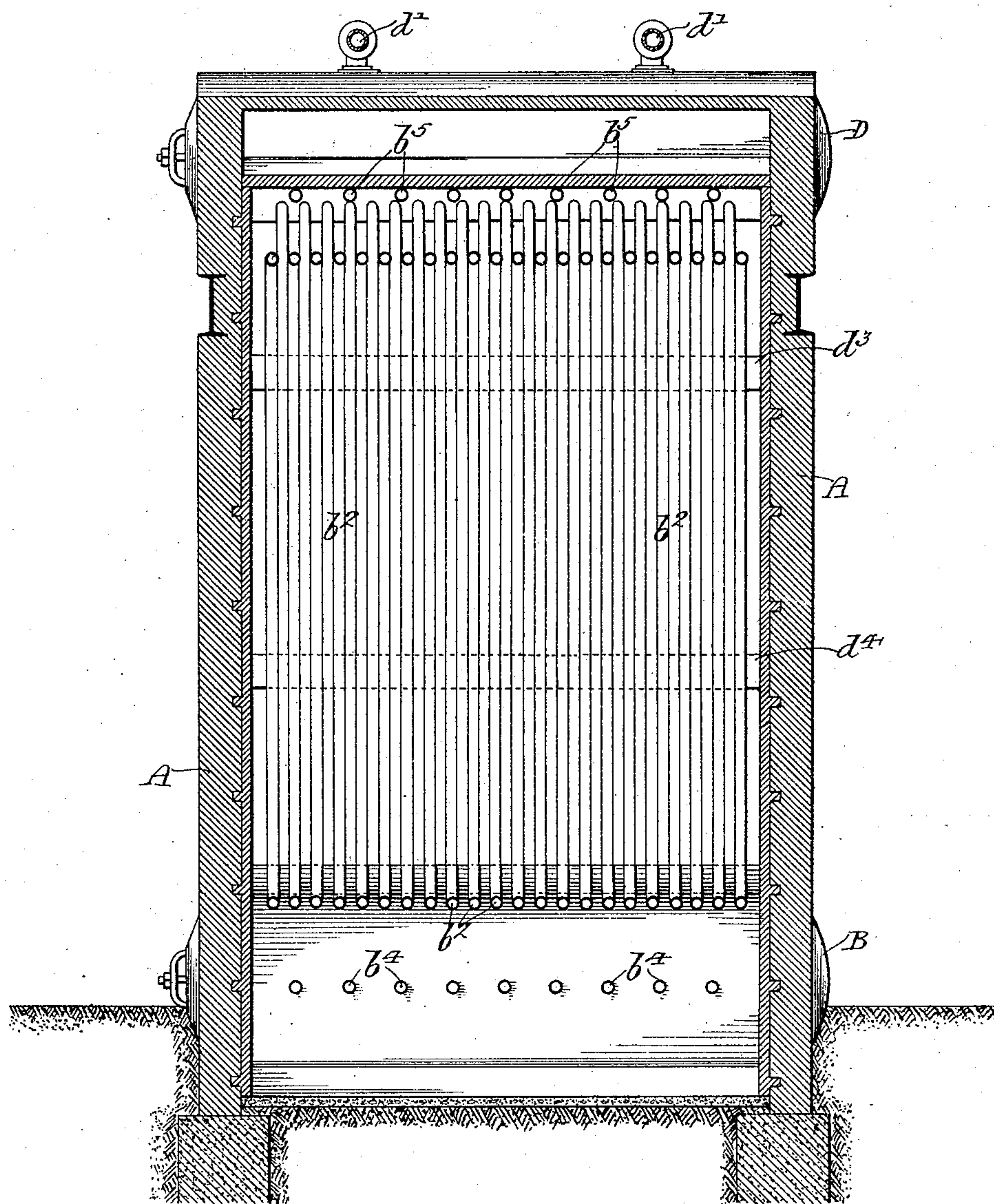
E. G. RUST.
BOILER.

APPLICATION FILED APR. 28, 1904.

NO MODEL.

3 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
Titus N. Irons.
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No. 772,297.

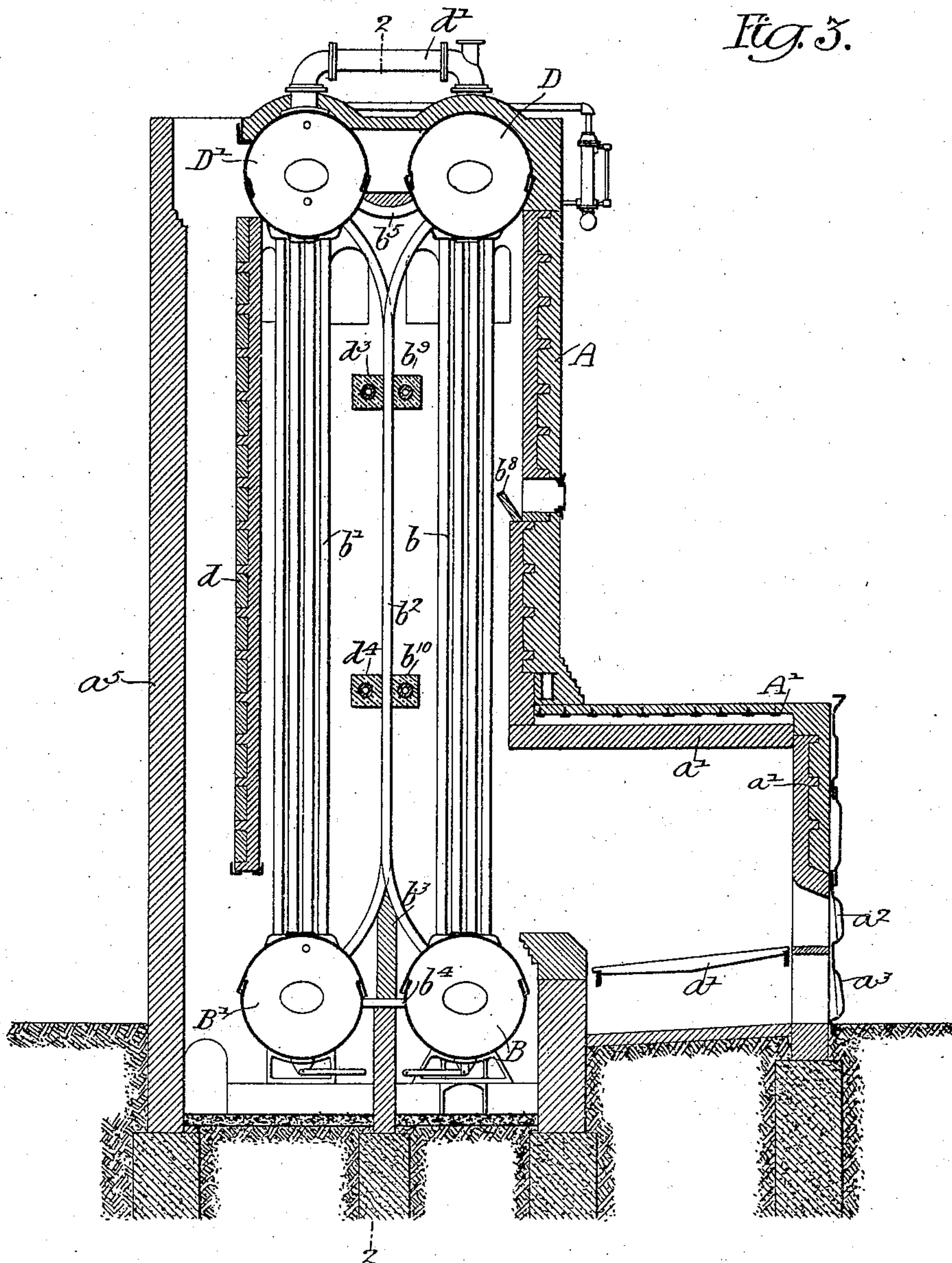
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BOILER.

APPLICATION FILED APR. 28, 1904.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses:
Jesse H. Jones.
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Inventor:
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UNITED STATES PATENT OFFICE.

EDWIN GRAY RUST, OF ELK RAPIDS, MICHIGAN.

BOILER.

SPECIFICATION forming part of Letters Patent No. 772,297, dated October 11, 1904.

Application filed April 28, 1904. Serial No. 205,329. (No model.)

To all whom it may concern:

Be it known that I, EDWIN GRAY RUST, a citizen of the United States, residing in Elk Rapids, Michigan, have invented certain Improvements in Boilers, of which the following is a specification.

My invention consists more particularly in certain improvements in the arrangement of the water-tubes extending between two pairs of drums relatively to the other parts of a boiler of the type described and claimed in Letters Patent of the United States No. 698,323, issued to me April 22, 1902, and more particularly contemplates such arrangement of the tubes as to form a convenient and reliable support to the baffle-wall.

The object of my invention is to provide a boiler of durable and compact construction, including two upper and two lower drums connected by rows of water-tubes and heated by products of combustion delivered from a furnace, and in the use of a novel form of baffle-wall to so deflect the products of combustion as to secure the best results with a minimum floor-space, material for construction, and such support for the baffle-wall as will avoid displacement of same. These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional elevation of a well-known type of boiler, showing my improved form of baffle-wall between the two main sets of vertically-extending water-tubes. Fig. 2 is a sectional elevation on the line 2 2, Fig. 1, further illustrating a modified arrangement of my improved boiler; and Fig. 3 is a sectional elevation of a special form of my invention, the tubes being so arranged as to eliminate the greater portion of the refractory baffle-wall and themselves perform the function of said wall.

In the above drawings, A represents a casing or setting, which in the present instance is provided with a forwardly-extending portion A', serving as a furnace, which is provided with a grate a and a fire-brick lining a' , having in addition fire and ash-pit doors a^2 and a^3 . The rear of said furnace opens directly into the main chamber of the boiler,

within which are a pair of lower drums B and B' and a pair of upper drums D and D', the drums B and D and B' and D' being respectively connected by vertically-extending tubes b and b' . In addition there are in each of the four drums series of openings, to which are connected two series of tubes b^2 , which are curved at their upper and lower ends so as to enter their respective drums perpendicularly to the curved surfaces thereof. The main portions of these tubes are straight and extend in two substantially parallel planes midway between the two sets of straight tubes b' and b . Between these two sets of tubes b^2 I place a baffle-wall b^6 , of refractory material, carrying this upon a supporting-wall b^7 and extending it to a height practically the same as that of the straight portions of said tubes. By this construction I provide a substantially gas-tight wall between the tubes b and b' , so that the products of combustion coming from the furnace pass upwardly and around the tubes b and also heat the front series of tubes b^2 . Passing between the curved upper ends of this same series of tubes b^2 the products of combustion pass downwardly around the tubes b' and also heat the second or rear series of the tubes b^2 , between whose upper ends the hot gases pass. At a point adjacent to the lower drum B' all of the gases pass between the tubes b' and flow around the lower edge of a baffle-wall d , between which and the rear portion a^5 of the boiler-setting is left a space connected to a suitable stack.

In addition to the tubes above noted the drums B and B' have extending between their adjacent surfaces a series of tubes b^4 , while the drums D and D' are also connected by an additional series of tubes b^5 , there being also steam-pipes b' connected to the upper portions of said drums in the well-known manner. If desired, the tubes b^2 instead of having their straight portions lying in two planes may be so placed, as shown in Fig. 3, as to have said portions lying in one plane. With such an arrangement of parts the baffle-wall of refractory material may be omitted and the tubes b^2 made to serve as the substantially gas-tight baffle-wall.

Owing to the fact that the tubes connecting the drums D and B alternate with those connecting the drums D' and B', there are left between the curved upper ends of the two series of tubes b^2 spaces through which the products of combustion are permitted to pass in their flow from the portion of the boiler containing the tubes b to the part containing the tubes b' .

In order that the products of combustion may not be short-circuited by the openings between the curved lower ends of the tubes b^2 , I provide a wall b^3 of refractory material, which effectually closes such otherwise open spaces between said tubes. In order to more efficiently direct the products of combustion, I provide a number of baffles b^8 , b^9 , and b^{10} for directing the hot gases as they rise around tubes b , and also other baffles, d^3 and d^4 , to further direct said gases in their descent around the tubes d' .

I claim as my invention—

1. The combination in a boiler of a furnace, pairs of drums of which each pair has a series of tubes respectively connecting its members, auxiliary series of tubes respectively extending between and entering the drums of each pair, the tubes of said auxiliary series extending adjacent to each other, with means for directing the products of combustion from the furnace into contact with the auxiliary series of tubes, substantially as described.

2. The combination in a boiler of two series of main tubes, an upper and a lower drum for each series of tubes and auxiliary series of tubes extending between each pair of drums, said auxiliary series of tubes extending adjacent to each other and forming a substantially gas-tight partition between said two main series of tubes, substantially as described.

3. The combination in a boiler of two lower drums and two upper drums respectively above said lower drums, a series of tubes extending between each pair of upper and lower drums, an auxiliary series of tubes extending from each upper drum to its respective lower drum, said series of auxiliary tubes being adjacent to each other and forming for the greater part of their length a substantially gas-tight partition between the main series

of tubes connecting the drums, substantially as described.

4. The combination in a boiler of two upper and two lower drums, a series of tubes extending from each upper drum to one of the lower drums, a series of auxiliary tubes extending between each upper drum and one of the lower drums, said auxiliary tubes being relatively distant from the straight tubes and being curved at each end so as to enter the curved surface of the drums substantially perpendicular thereto, a furnace, with means for directing hot gases from said furnace upwardly around one set of straight tubes, across the space including the upper ends of the auxiliary tubes and downwardly around the second series of straight tubes, substantially as described.

5. The combination of two lower and two upper drums, two series of tubes respectively connecting the upper with the lower drums, a series of tubes connecting the two lower drums and a second series of tubes connecting the two upper drums, with auxiliary series of tubes connecting respectively each of the upper drums with one of the lower drums and extending in the space between the straight series of tubes, a furnace and means for directing gas from the furnace in contact with the tubes connecting the upper and lower drums, substantially as described.

6. The combination in a boiler of two lower drums, and two upper drums respectively above said lower drums, a series of tubes extending between each pair of upper and lower drums, auxiliary series of tubes extending from the upper drums to their respective lower drums, one of said series of auxiliary tubes projecting toward the opposite series of auxiliary tubes, with a baffle-wall of refractory material supported between said two series of auxiliary tubes for deflecting the products of combustion, substantially as described.

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

EDWIN GRAY RUST.

Witnesses:

FREDERICK ELLIS,
RICHARD W. BAGOT.