R. ROUSE, JR.

STEAM AND HOT WATER BOILER.

APPLICATION FILED FEB. 2, 1910.

975,462.

Patented Nov. 15, 1910.

2 SHEETS—SHEET 1.

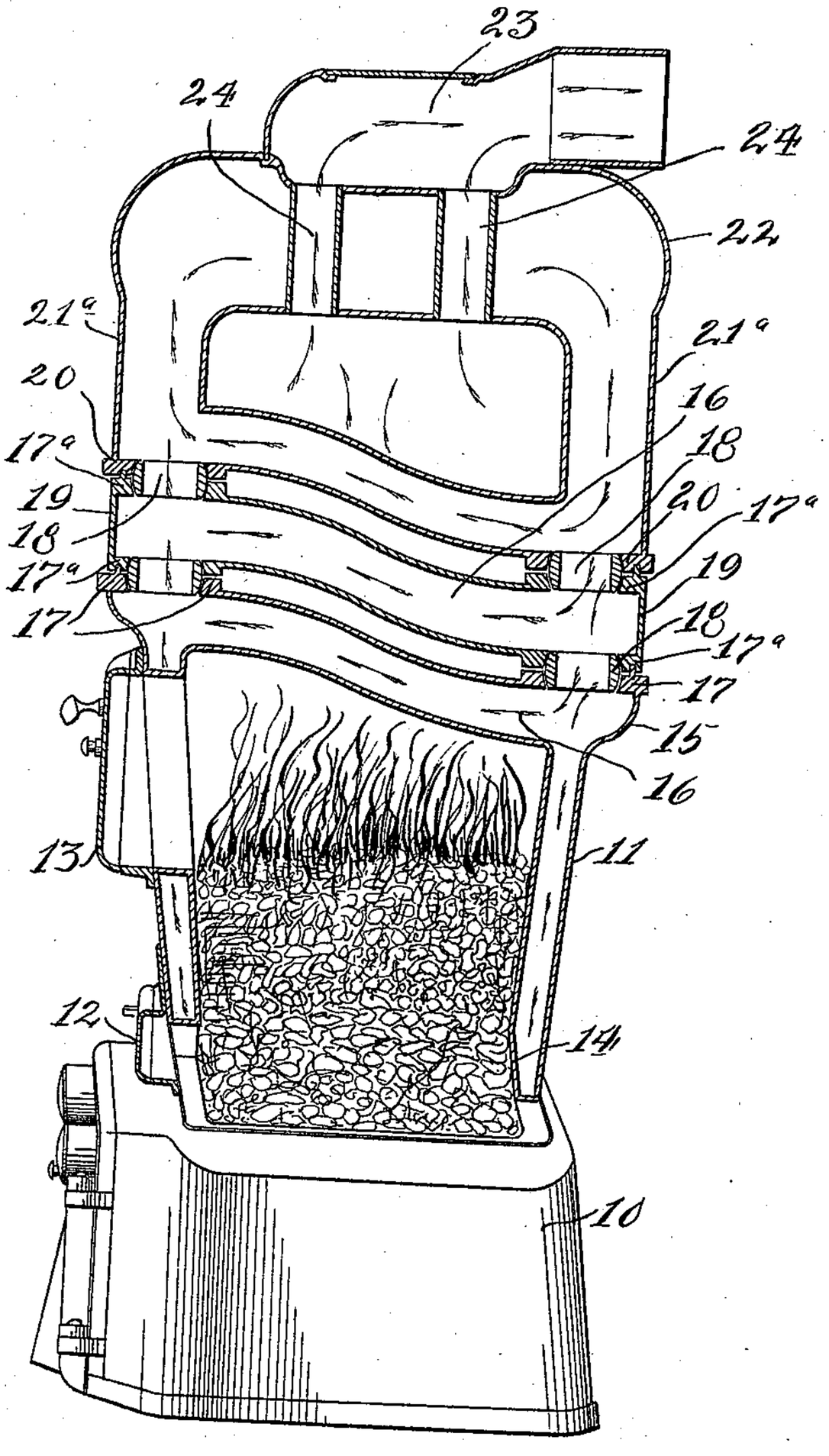

Fig 1

Witnesses:
Frank L. Stubbs.
Arthur B. Darnell,

Richard Rouse, Jr. Inventor.
By his Attorney
W. B. Hutchinson.

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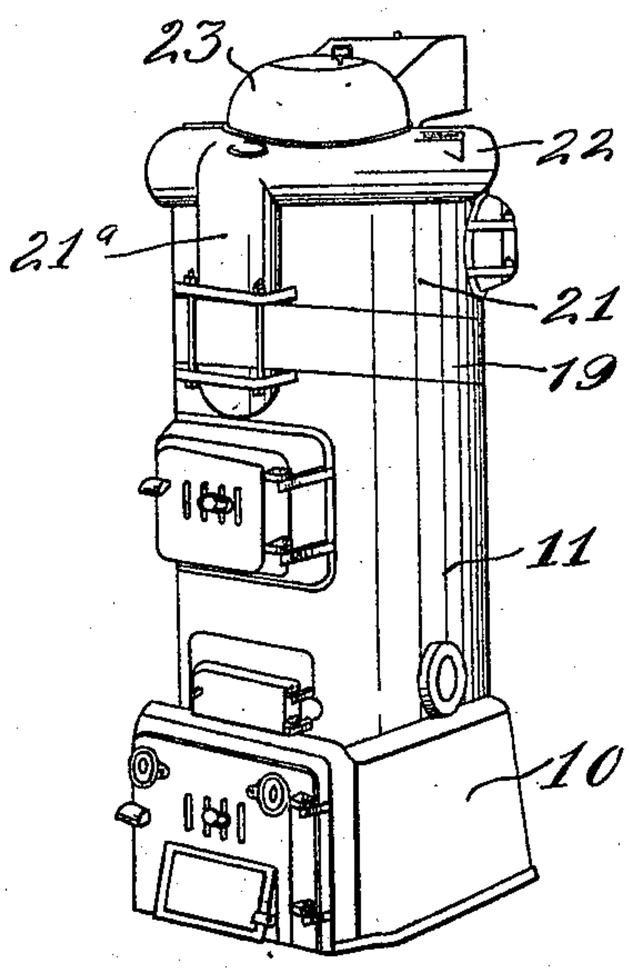

Fig. 2

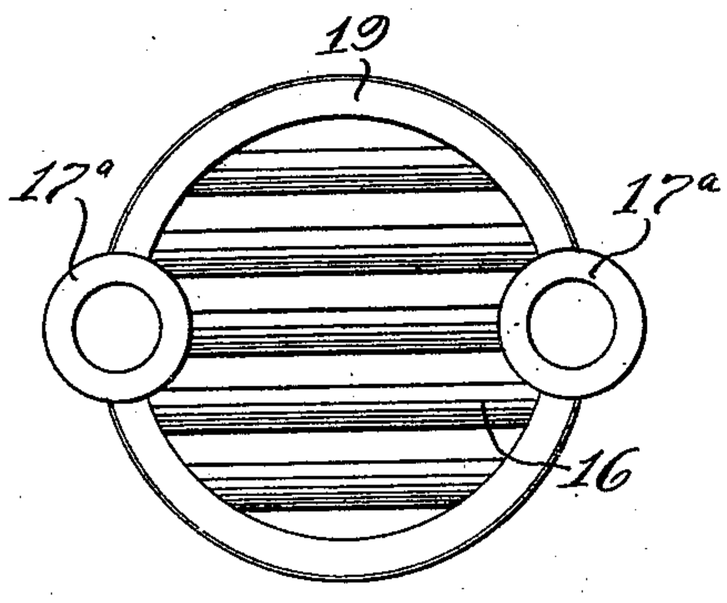

Fig. 3.

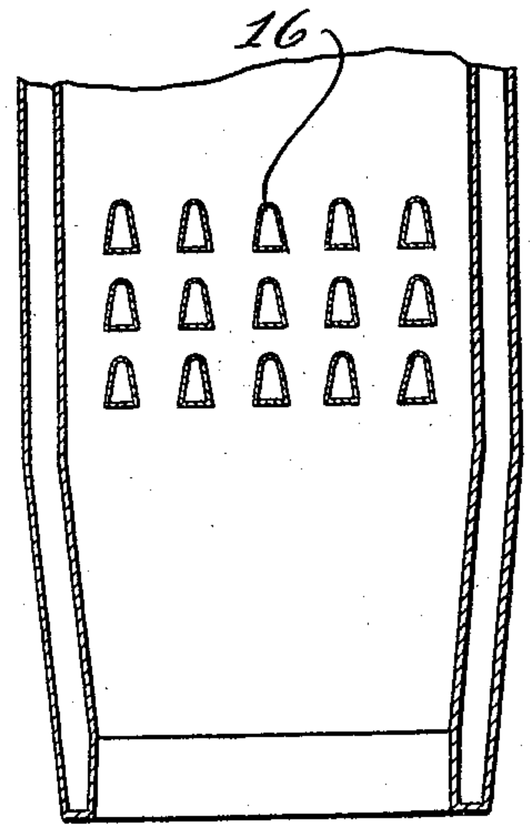

Fig. 4

Witnesses:
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UNITED STATES PATENT OFFICE.

RICHARD ROUSE, JR., OF ELIZABETH, NEW JERSEY, ASSIGNOR TO BOYNTON FURNACE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

STEAM AND HOT-WATER BOILER.

975,462. Specification of Letters Patent. **Patented Nov. 15, 1910.**

Application filed February 2, 1910. Serial No. 541,421.

To all whom it may concern:

Be it known that I, RICHARD ROUSE, JR., of the city of Elizabeth, county of Union, and State of New Jersey, have invented a new and useful Improvement in Steam and Hot-Water Boilers, of which the following is a full, clear, and exact description.

My invention relates to improvements in steam and hot water boilers such as are used for heating purposes as distinguished from power boilers.

My invention relates more especially to improvements in the so-called round boiler which is usually cast, and the object of my invention is to produce a simple, cheap, but very efficient type of boiler of this class, in which the several parts or sections are so arranged that they can be easily, accurately and tightly assembled, the water tubes are provided with an upward trend, and the whole water-containing part constructed and arranged so that there will be a continuous upward tendency of the heated water in the boiler, and therefore a very perfect circulation maintained. This upward tendency of the circulation is directed toward the front part of the boiler so that the hot water constantly flows to this upper part and then settles back to the lower part through the back portion of the boiler, and the circulation is therefore complete and rapid.

My invention also provides for having the cross water tubes of such a construction and shape that a comparatively thin water surface will be had in any tube so that quick heating results, the rising gases will be deflected from one series of tubes to the other and ignited, so that the best results are obtained from the fuel, and further the tubes are shaped in such a manner that they can be cast and will yet be able to stand the quickest and hottest fire without cracking either themselves or the boiler parts by sudden expansion.

In general, my invention is intended to produce a boiler all the essential parts of which can be cast and readily assembled, and which by reason of its perfect circulation and heating arrangements, is highly efficient.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a central vertical section of the boiler embodying my invention. Fig. 2 is a perspective outside view of the boiler, Fig. 3 is a plan of one of the removable rings, and Fig. 4 is a diagrammatic cross section showing the general arrangement of the water tubes.

The boiler comprises a suitable base 10 which can be of cast iron, and upon this rests the lower boiler section 11 which can likewise be a casting and which has double walls to provide for the water body, this section comprising also the fire pot as shown. The section has suitable openings for cleaning and for fuel, these having the usual doors as shown at 12 and 13, and the inner lower part of the fire pot section 11 is preferably beveled as shown at 14 so that the falling fuel and ashes will naturally follow the inner wall and leave a little clearance or air space around the lower edge of the fire pot so that the draft will be better. The fire pot section is preferably enlarged slightly at the top as shown at 15 to provide for more symmetrical shape and for a larger water holding body, and the section has extending across it parallel tubes 16 through which the water flows, these being arranged also in the sections or rings 19 which will be presently referred to.

The section 11 has at the top suitable connection rings 17 which abut with corresponding rings 17^a on the ring or section 19 forming a part of the boiler body, and suitable nipples 18 forming a ground joint connect the two rings 17 and 17^a at the front and rear sides of the boiler. The arrangement of these tubes 16 is clearly shown in Figs. 1, 3 and 4. If the tubes 16 extended horizontally across the boiler they would be liable to crack the latter if they were suddenly heated, as the quick expansion would bulge the boiler sides rapidly, but to obviate this difficulty I give each tube an upward and forward inclination and curve, as shown clearly in Fig. 1, and thus the horizontal expansion is taken care of in part by the tube itself and sufficient leeway is thereby allowed to prevent the cracking of the boiler. This idea I have thoroughly tested and I find that I can build the hottest and quickest fire beneath the tubes and no harmful result follows.

Above the ring 19 is a top section 21 of the boiler which has rings 20 abutting with the rings 17^a of the section 19, and the nip-

ples 18 are used here as in the joint below. Furthermore, the joints where the several sections unite are provided with the customary tongue and groove joint as shown clearly in Fig. 1. In Figs. 1 and 2 I have shown but one section or ring 19 interposed between the fire pot section 11 and the top section 21, but it will be obvious that any desired number of these rings can be superposed without in the least affecting the principle of the invention. The top section 21 is provided on its front and rear sides with integral water tubes 21ª forming a part of the casting 21 and alining with the rings 17 and 17ª, so as to provide for the free up and down flow of water, and the top section 21 merges into an enlargement 22 which forms a steam dome. If the boiler is used as a hot water boiler, to maintain a hot water circulation instead of steam, this dome need not be so large. The top section 21 is also provided with an outlet flue 23 which connects with the interior of the boiler by suitable flues 24, thus providing sufficient smoke exit.

It will be noticed by reference to Fig. 4 that the tubes 16 are of generally triangular shape and with the bases downward. In this figure I have not shown the separating rings, as it is merely diagrammatic to show the relation of the tubes to each other. By giving them this shape I make them strong, and they provide shallow water passages so that the thin streams of water are rapidly heated. It will be noticed in the drawings that these tubes are not staggered, but are placed in vertical alinement. This arrangement I find works better than the staggered tubes for the following reasons. First a better draft is maintained, and next as the gases rise from the fuel they rapidly expand and after the first series of tubes is passed, the expansion of gases will fill the space below and around the second series of tubes, and the gas at this point will be ignited from the flames below and will serve the double purpose of heating the water in the tubes and surrounding wall and of igniting the gases which are further expanded and burned around the next series of tubes above. This is contrary to the general practice, but I find that it works out in actual experience and that I get very efficient results. It will be further observed that as these cross tubes 16 are narrowest at the top and are rounded at this point, they will not serve as collectors for soot, thus clogging the boiler, an objection found in many cross tubes. Obviously the scheme can be carried out to the desired extent until the gases are practically consumed. This action is facilitated by having the flat sides of the tubes downward, as these flat surfaces serve to better deflect the gases.

From the foregoing description it will be seen that I have produced a boiler all the parts of which can be cast, that it can be assembled with the greatest ease, that there is no danger of breakage from heat expansion, and that a perfect circulation naturally follows, as the rising water will trend forward and upward through the hollow walls through the tubes 16, and the front nipples 18, upward through the tube 21ª. The downward flow is through the back tube 21ª and the nipples 18 on the back side of the boiler. This arrangement provides for such a perfect circulation that the steam rises very dry into the dome 22 ready for circulation in the ordinary circulation pipes, this being especially so because there is very little agitation of the water owing to the smooth circulation.

It will be observed that this boiler is substantially circular in cross section, thus rendering it strong and capable of withstanding the strain of internal pressure, and further that by having these generally circular sections built up to form a boiler, an easy water connection is made between the several sections at the highest and lowest points so that only two connections are necessary.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent:—

1. A boiler of the kind described, having its body portion made up of a series of generally circular cast sections superposed, each section being connected by cross curved water tubes, and water connections between adjacent sections at their highest and lowest points.

2. A cast metal boiler generally circular in cross section, comprising superposed water-carrying cast sections and curved cross tubes connecting opposite parts of each section, each tube being wider at the bottom than at the top.

3. A boiler of the kind described comprising a series of generally circular cast and inclined sections, cross tubes extending from the higher to the lower parts of each section and so arranged that the tubes of the several sections shall vertically aline, and water connections between the several sections at their highest and lowest points.

4. A boiler of the kind described, comprising a cast water-carrying bottom section containing a fire-pot, and superposed cast sections seated one above the other above the fire-pot section, cross tubes connecting the lower and higher parts of each section, said tubes being arranged so that the tubes of the several sections shall vertically aline, and water connections between the highest and lowest parts of the several sections and between the lower of the sections and the base section of the boiler.

5. A cast metal boiler comprising a base water-carrying section containing a fire-pot and provided with curved cross tubes extending from the highest to the lowest side

of the said base section, inclined superposed sections resting on the base section, water connections between the several sections and the base section at the highest and lowest points, cross tubes on the several sections, the tubes being in vertical alinement, and the top or dome section having cross tubes, and water connections between the top section and the lower and intervening sections.

RICHARD ROUSE, JR.

Witnesses:
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W. S. DICKINSON.