

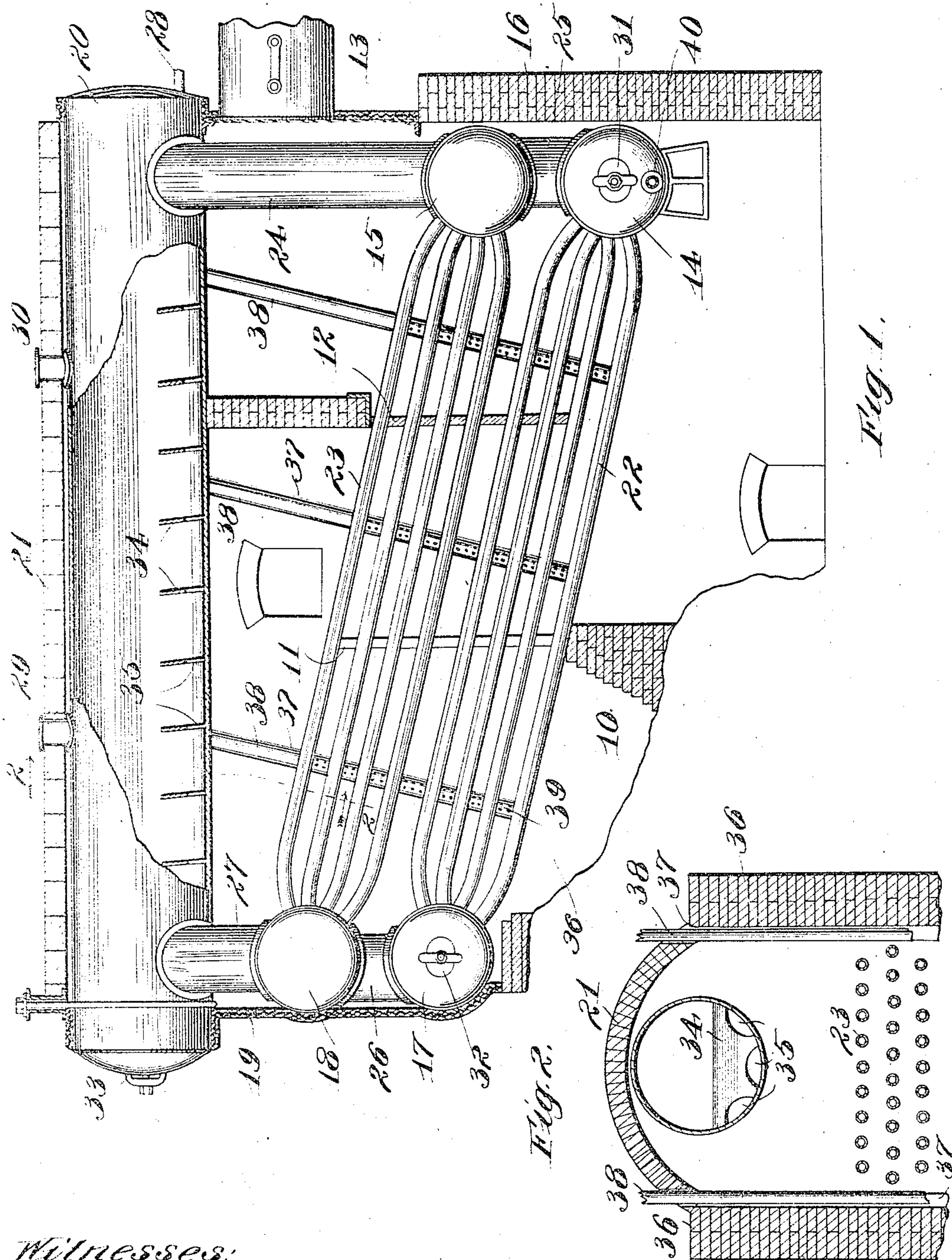
No. 855,934.

PATENTED JUNE 4, 1907.

E. E. CARR.
STEAM BOILER.

APPLICATION FILED SEPT. 10, 1906.

2 SHEETS—SHEET 1.



Witnesses:

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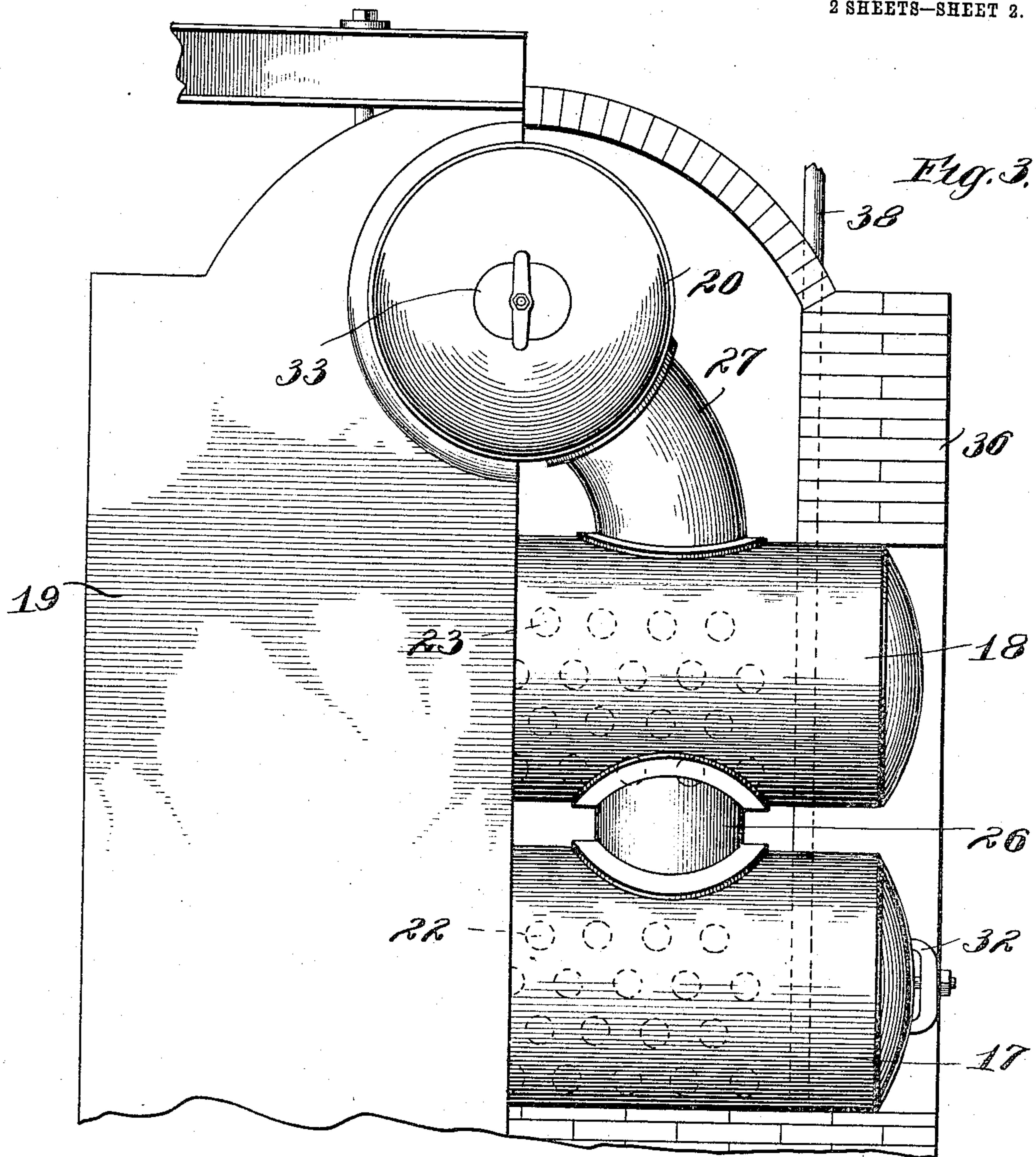
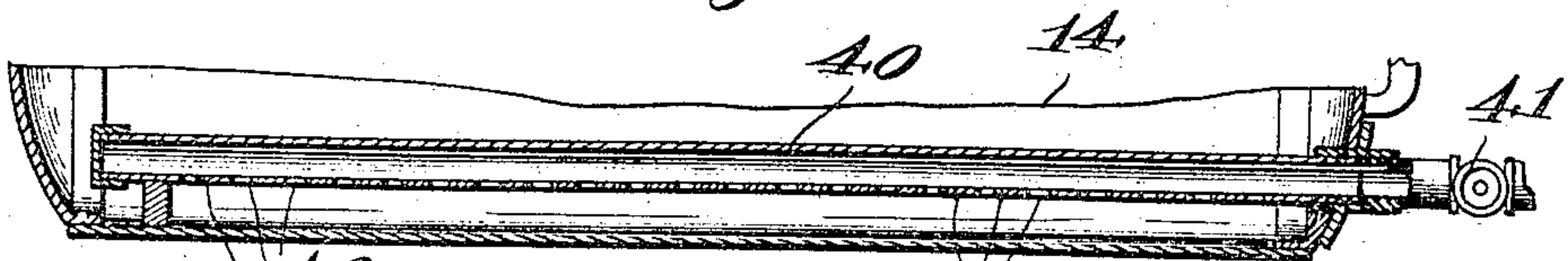


Fig. 4.



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UNITED STATES PATENT OFFICE.

ELMER E. CARR, OF CHICAGO, ILLINOIS.

STEAM-BOILER.

No. 855,934.

Specification of Letters Patent.

Patented June 4, 1907.

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To all whom it may concern:

Be it known that I, ELMER E. CARR, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

10 This invention relates to what are known as water-tube boilers, in which the furnace heat is directed primarily upon a series of tubes connecting headers and through which the water is circulated.

15 The objects of the invention are to simplify the construction of the boiler and to increase its efficiency by making its interior conveniently accessible for cleaning; by providing for a freer circulation of water; by
20 providing for the agitation of the water in the upper or steam drum, whereby the liberation of the steam is facilitated; and by providing for the better heating of the steam drum than has heretofore been practical.

25 The invention is exemplified by the structure hereinafter described, and which is illustrated in the accompanying drawings, in which—

30 Figure 1 is a sectional detail of the boiler and its settings; Fig. 2 is a detail section on the line 2—2 of Fig. 1; Fig. 3 is an enlarged detail showing the front of the boiler, partly in section and partly in elevation; and Fig. 4 is a sectional detail of the mud or sediment
35 drum.

40 As the form of fire-box and grate used in connection with the boiler is entirely immaterial, this detail is not shown in the drawings except that at 10 is represented a furnace bridge wall, the line of draft being controlled by baffle plates 11 and 12, and a smoke flue being shown at 13.

45 The boiler consists of a plurality of drums, preferably cylindrical in form, there being shown two, designated 14 and 15, at the rear and adjacent to and just inside of the back wall 16 of the furnace; two, designated 17, 18, of the same form, located at the front of the furnace and adjacent to and inside of its
50 front wall 19, and being at somewhat greater elevation than the rear drums; and an upper drum 20 arranged longitudinally of the furnace and located adjacent to but inside of its dome 21. Each of the rear drums 14, 15, is
55 connected with one of the forward drums 17, 18, by a plurality of tubes, as shown at 22,

23, which are, of course, inclined upwardly from rear to front.

A water leg 24 leads down from each side of the drum 20, and adjacent its bottom, to the drum 15. A hollow saddle 25 affords communication between the drums 14 and 15, and a similar saddle 26 connects the drums 17 and 18. The parts 24, 25 and 26 are preferably each provided in duplicate, only
65 one of each of these parts being shown in the drawings. A water leg 27 (only one of which is shown) leads from the drum 18 to each side of the drum 20, entering it near its bottom. Water is admitted to the boiler through a
70 connection 28, and steam is delivered from the boiler through the connections 29 and 30 leading out of the top of the drum 20.

Each of the lower drums 14, 17, is provided with a manhole, suitably covered, as shown
75 at 31, 32, in one or both of its ends, of such size that a man may enter the drum, and the saddles 25, 26, are of such size that a man may pass from the lower drum of each pair into the upper one. By this arrangement
80 the necessity for locating hand holes in the drum opposite the end of each of the water tubes 22, 23, is entirely obviated; the drums are rendered much stronger by this freedom from perforations, and the cleaning operation
85 is greatly simplified and can be performed in much less time than when it is necessary to remove and replace numerous hand holes covers. Furthermore, the hollow saddles 25, 26, provide for a much freer circulation of
90 water than has heretofore been obtained in boilers of this type, as their cross-sectional area is ample to permit the passage of water as may be conveyed through the tubes 22.

The water legs 24, 27, are also made large
95 enough to convey as much water as will the two sets of tubes 22, 23. It is not necessary to provide as large a cross-sectional area in the vertical tubes as in the inclined tubes 22, 23, for the reason that the water will pass much
100 more readily and with less friction through the large vertical pipes than through the small and approximately horizontal tubes, this feature of the invention involving the use of tubes and water passages so proportioned that, in view of their position, they
105 will have substantially equal conveying capacity.

The upper drum 20 is provided with a suitably-closed man-hole 33 in one or both of its
110 ends. A series of baffle plates 34 is located transversely across the interior of the drum

20, rising from its bottom, these plates being inclined backwardly with reference to the direction of circulation of the water and being apertured adjacent their lower edges, as shown at 35.

The direction of circulation is upwardly from the drums 14, 15, through the tubes 22, 23, the drum 17, the saddle 26, the drum 18, and the water legs 27; it is thence backwardly through the drum 20, and downwardly through the water legs 24 to the drums 15, saddle 25 and drum 14. As the water moves backwardly through the drum 20 it is agitated by its contact with the baffle plates 34, and these plates serve the further purpose of directing it down to the bottom of this drum and hence bringing it into contact with the greatest available heat. This agitation of the water facilitates the separation of the steam globules. The pitch of the baffle plates may be determined by the builder in view of the general situation of the boiler.

The location of the steam drum within and beneath the dome 21 of the furnace provides for the circulation of the hot vapors entirely around it, and secures a drier steam than when the steam chamber is located practically outside of the furnace chamber.

Channels are formed on the inner surfaces of the side walls 36 of the boiler, as shown at 37, leading downwardly from its dome 21 to permit of the insertion of steam pipes 38 having lateral perforations, as shown at 39, so arranged as to discharge jets of steam upon the exteriors of the tubes 22, 23, for the purpose of blowing off the dust which may accumulate upon them. The channels 37 are inclined in order that the steam pipe may be substantially perpendicular to the tubes 22, 23, thereby providing for the more efficient sweeping of the tubes 22, 23, by the steam jets. The pipes 38 may be withdrawn from the channels 37 when not in use, and in order that they may be turned to direct steam upon different portions of the boiler tubes they will preferably have a flexible connection (not shown) with the steam supply.

The drum 14 being the lowest section of the boiler, will receive the accumulation of sediment. A blow-off pipe 40 is located within this drum and extends longitudinally thereof for substantially its entire length. As shown, it projects through the wall of the drum at one of its ends, and is there provided with a valve-controlled nipple 41. This pipe is freely perforated throughout that portion of its length which lies within the drum, as shown at 42, these perforations being preferably confined to its lower side. When the nipple 41 is open the internal pressure of the boiler will force the mud or the sediment into the pipe 40 and thence deliver it from the boiler. This arrangement of the blow-off or sediment pipe insures the removal of the

sediment from the entire floor of the mud-drum, a common fault with devices heretofore used for this purpose being that the sediment is removed only from that portion of the drum adjacent the discharge nipple.

The boiler thus described provides a further advantage in that its front wall 19 may be freed from perforations, except to accommodate the end of the steam drum 20, provision being made for access to the interior of the boiler for cleaning purposes at the sides. This arrangement permits of the use of a boiler front built of wire cloth, or similar material, and asbestos, as represented in Fig. 1.

I claim as my invention—

1. In combination, two pairs of drums, the members of each pair being vertically alined, water tubes connecting the pairs of drums, one of said drums having a man hole and its companion being joined to it by a hollow saddle adapted to afford access for cleaning purposes from one drum to the other.

2. In combination, in a steam boiler, drums united by inclined water tubes, a steam drum, water legs connecting the steam drum with the first-named drums, and baffle plates crossing the lower portion of the steam drum between the water legs.

3. In combination, in a steam boiler, drums united by inclined water tubes, a steam drum, water legs connecting the steam drum with the first-named drums, baffle plates crossing the lower portion of the steam drum between the water legs and being inclined backwardly with reference to the direction of flow of water.

4. In combination, in a steam boiler, drums united by inclined water tubes, a steam drum, water legs connecting the steam drum with the first-named drums, and apertured baffle plates crossing the lower portion of the steam drum between the water legs and being inclined backwardly with reference to the direction of flow of water.

5. In a steam boiler, in combination, a setting having a discharge flue and containing a fire box, flue passages, and a dome in the form of a self-supporting arch, its chamber being above but open to the main chamber of the setting and being independent of the flue passages and discharge flue; and a steam drum located within the dome and spaced apart from the walls thereof, whereby a dead-vapor space is provided around the drum.

6. In a steam boiler, in combination, two sets of drums spaced apart horizontally and vertically, the drums of each set being vertically alined connection between the drums of each set, tubes connecting the sets of drums, a steam drum, and a water leg connecting each of the first-named sets of drums with the steam drum.

7. In a steam boiler, in combination, two sets of drums spaced apart horizontally and vertically, the drums of each set being vertically alined connection between the drums of each set, tubes connecting the sets of drums, a steam drum, and a water leg connecting each of the first-named sets of drums with the steam drum, the water legs having substantially the same carrying capacity as the inclined tubes.

8. In a steam boiler, in combination, a cylindrical steam drum, a plurality of cylindrical water drums below the steam drum, the water drums being spaced apart horizontally and vertically and each having its axis extending transverse to the axis of the steam drum, tubes connecting the water drums, and water legs connecting the water drums with the steam drum.

9. In a steam boiler, in combination, a cylindrical steam drum, two sets of vertically-

alined cylindrical water drums arranged below the steam drum, each of such drums having its axis extending transverse to the axis of the steam drum and the two sets of drums being spaced apart horizontally and vertically, tubes connecting the sets of water drums, a hollow saddle connecting the water drums of each set, and a water leg connecting the uppermost drum of each set with the steam drum.

10. In a steam boiler, in combination, two sets of drums spaced apart horizontally and vertically, connection between the drums of each set, tubes connecting the sets of drums, a steam drum, and a water leg connecting each of the first-named sets of drums with the steam drum.

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