

(No Model.)

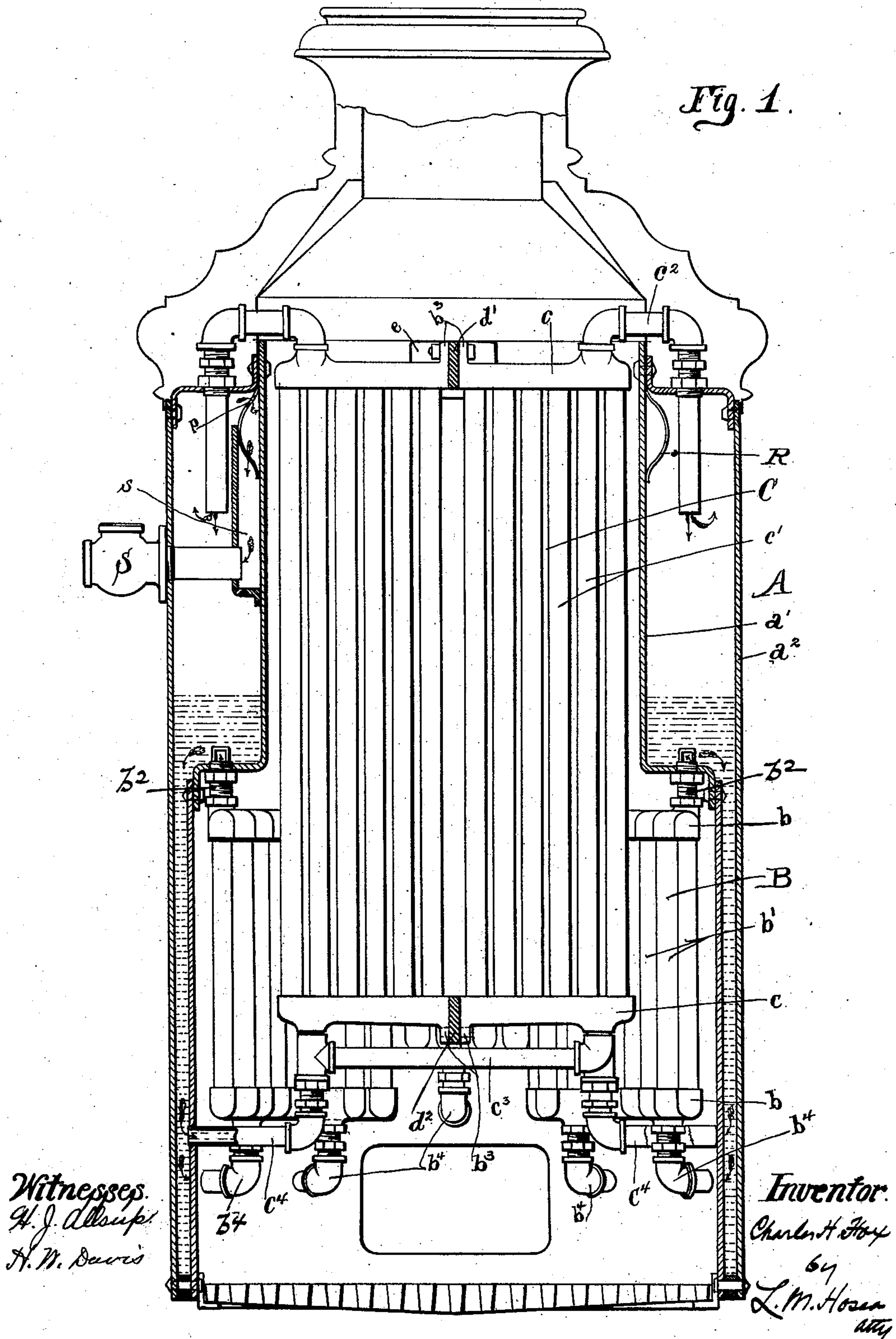
2 Sheets—Sheet 1.

C. H. FOX.
STEAM BOILER.

No. 603,482.

Patented May 3, 1898.

Fig. 1.



(No Model.)

2 Sheets—Sheet 2.

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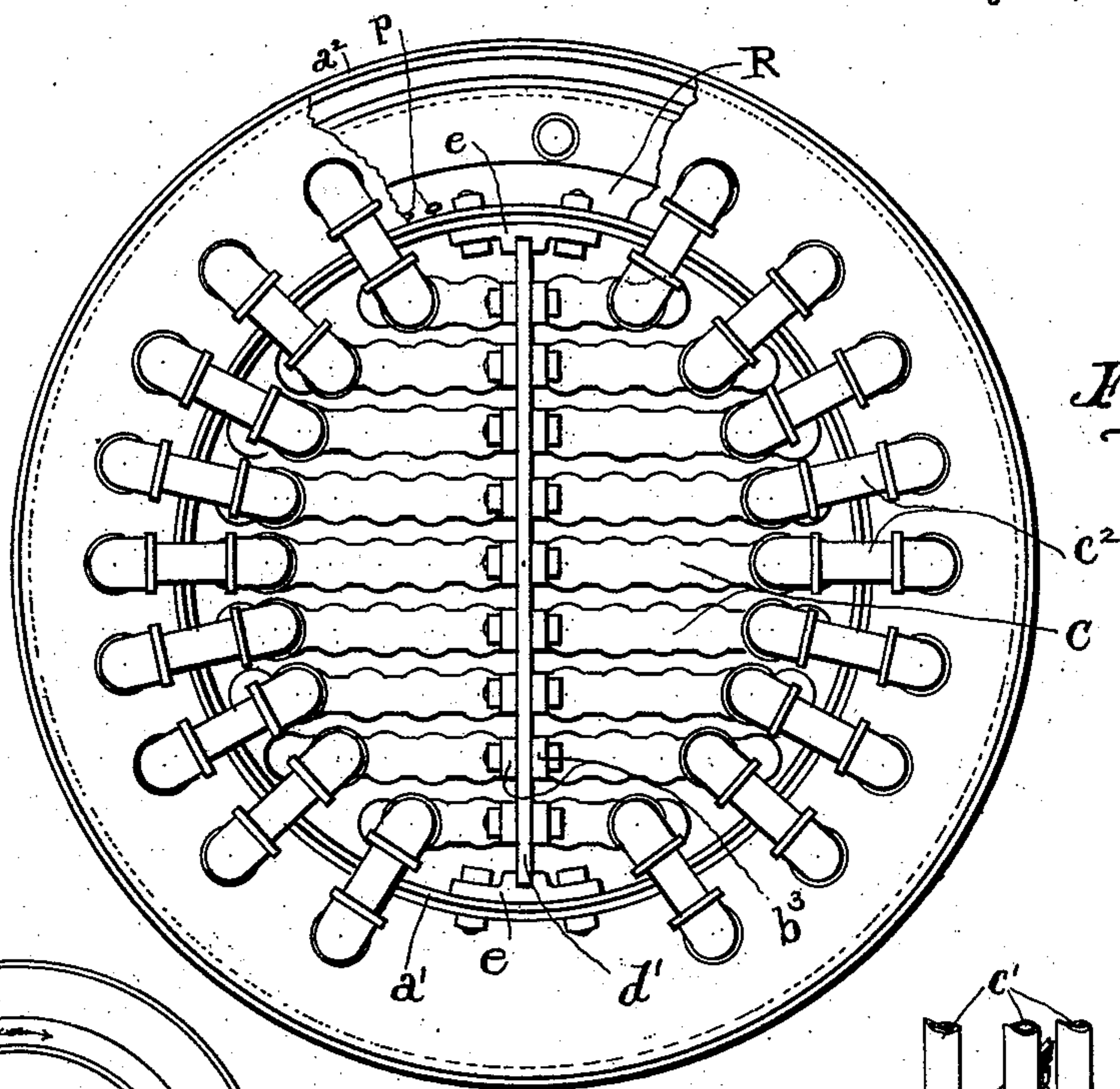


Fig. 2.

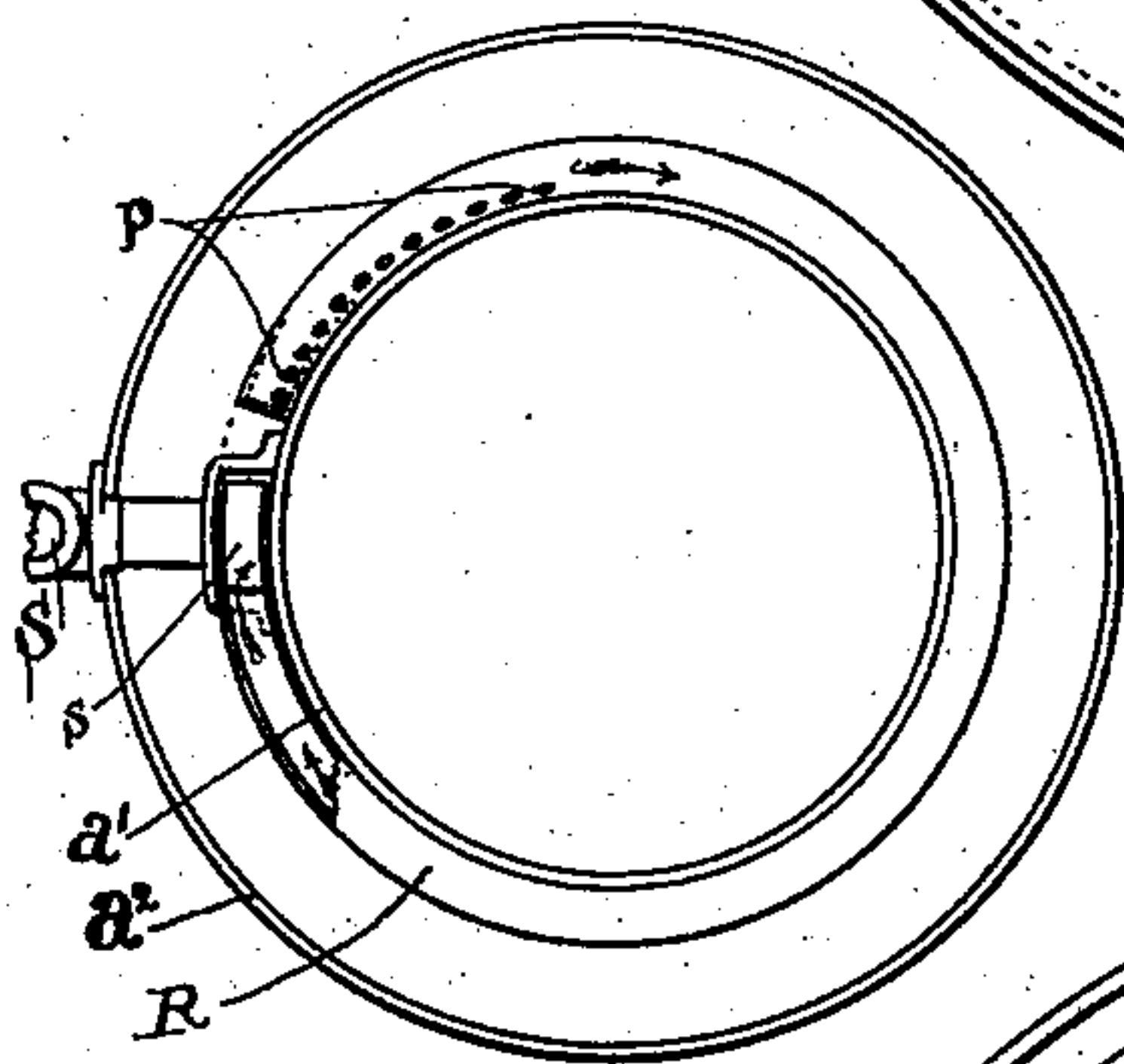


Fig. 4.

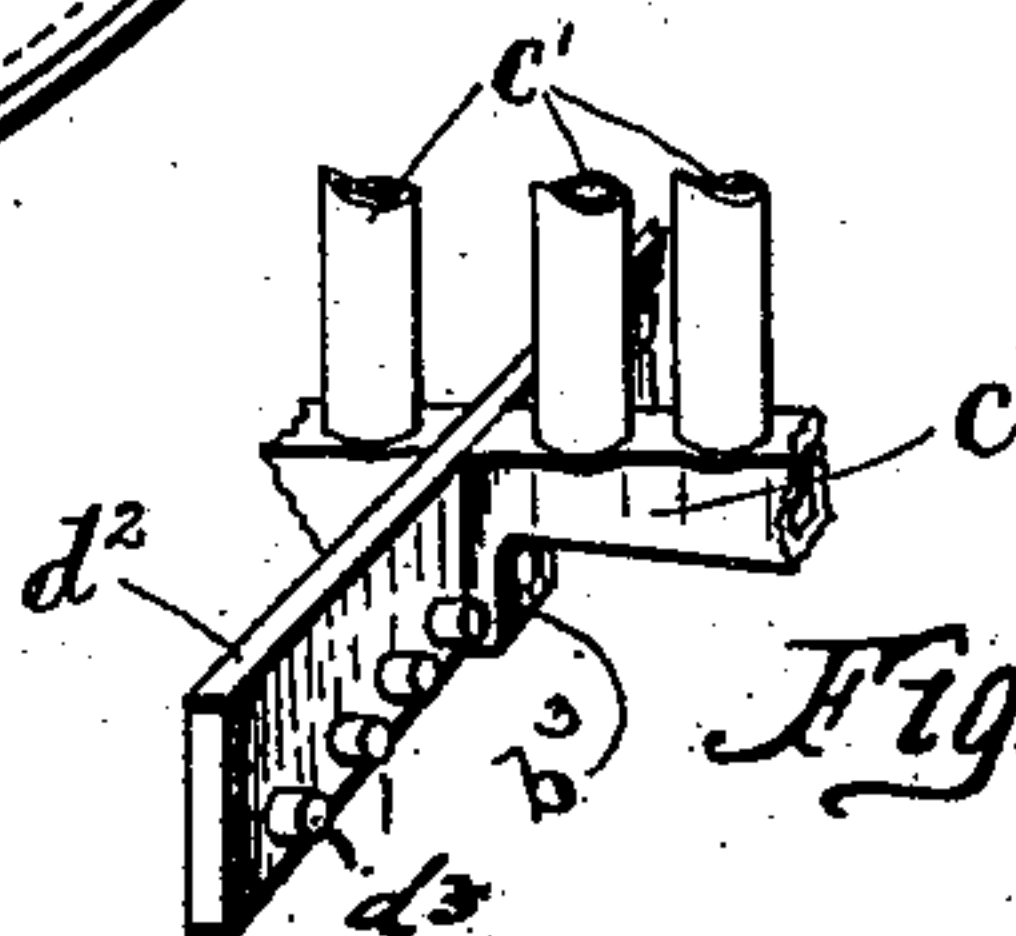


Fig. 5.

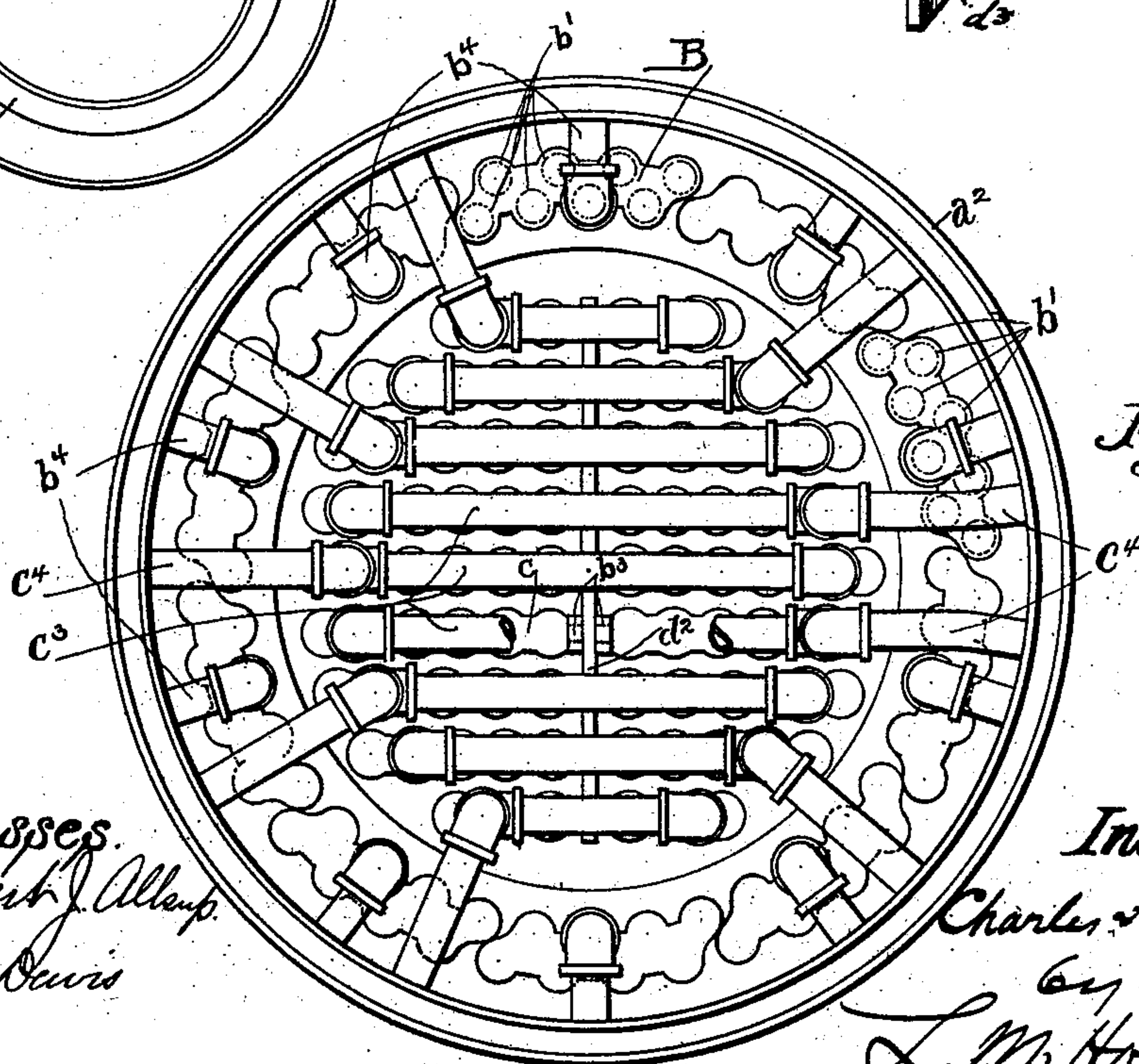


Fig. 3.

Witnesses.
Herbert J. Allsup.
H. W. Davis

Inventor.
Charles H. Fox
by
L. M. Hosen, atty.

UNITED STATES PATENT OFFICE.

CHARLES H. FOX, OF CINCINNATI, OHIO.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 603,482, dated May 3, 1898.

Application filed October 11, 1897. Serial No. 654,787. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. FOX, a citizen of the United States, residing at Cincinnati, Ohio, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to steam-boilers of the vertical type and to the class embodying a steam and water jacketed shell inclosing a system of internal circulating-tubes occupying the central draft-space above the fire-grate, its object being to produce a compact and easily-constructed boiler of high efficiency and convenient maintenance especially adapted to service where the boiler is subject to movement—as, for example, in vehicles, such as fire or traction engines, boats, &c.—and is in the nature of an improvement on that covered by my former application, Serial No. 613,910, now pending for issue.

To this end my invention consists in, first, a construction of the tube-manifolds and their arrangement and union into a rigid and perfectly-supported system, permitting the convenient detachment of any integral unit of the system without interfering with the use of the remainder; second, in the provision for the firm support of the tube-manifolds individually and as a system in relation to the boiler-shell, and, third, in the provision for securing dry steam for service.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical sectional elevation of my improved boiler complete. Figs. 2 and 3 are upper and under plan views, respectively, showing the relative arrangement of the tube-manifolds; Fig. 4, a plan section near the top of the boiler, exhibiting the “steam-take-off ring;” and Fig. 5, a detail showing the construction and manner of attaching the lower stay-bar to the central manifold system.

Referring now to the drawings, A designates a vertical cylindrical boiler having outer and inner shells a' a^2 , the inner shell being enlarged below to constitute a “fire-box,” surrounded by an annular “water-leg.” Beneath the offset thus formed is placed a succession of short manifolds B, in series, arranged as an annulus, surrounding the actual fire-space and connected above and below to the water-space of the boiler. These mani-

folds consist of corresponding top and bottom “headers” b , connected by vertical tubes b' , &c., placed in “staggered” relation in order to secure the largest amount of heating-surface and an increased number of tubes connecting headers of a given length. The top header of each of these manifolds is suspended by a pipe connection b^2 from the offset or shoulder of the inner shell, and the lower header is connected below radially outward with the annular water-leg by a pipe connection b^4 . In the central vertical space thus encircled and extending upward to the top of the boiler is placed a second system of manifolds C, independent of the first, constructed and arranged as follows: Each of these manifolds consists of a top and a corresponding bottom header c , proportioned in length to the space to be occupied in lateral series relation within the circular shell, connected by vertical parallel tubes c' . These manifolds are placed side by side in two independent series, with headers abutting end to end, as indicated in Figs. 2 and 3, separated above and below by cross-bars d' d^2 , respectively, with which the headers are connected, as presently described, each upper header having a pipe connection c^2 , extending radially outward over the top of the inner shell and thence downward through the top connecting-flange of the outer shell. Each lower header is connected across to its opposite by a pipe c^3 and thence by a common connection c^4 to the water-leg, so that while each manifold C has an independent connection to the steam-space of the boiler there is but one connection for two to the water-space.

The upper cross-bar d' is upheld by socket-cleats e at each end, riveted to the boiler-sheets, and is removable upward. It passes between the contiguous ends of the upper headers, which are bolted to the same through lugs b^3 , formed at the ends of the manifolds, a single bolt passed through the lugs of opposite manifolds and the intervening bar d' securing the same, as indicated in Fig. 1.

The lower bar d^2 is formed with lateral projections d^3 , spaced to engage in the perforated lugs b^3 , as indicated in Figs. 1 and 5, the lower manifolds being clamped to the bar by the tying action of the pipe c^3 , which, being op-

positely threaded at the ends and set to place, draws the opposite headers tight against the bar d^2 . The latter by means of its lateral projections is itself supported by the headers and also serves to space and retain the same at proper distances apart in their series relation. The connections c^3 c^4 extend in opposite directions and at various radial angles in laterally-adjacent manifolds, thus giving freer access to the parts from beneath and giving a rigid connection of the entire system to the boiler-shell.

To provide for a steam-delivery to the supply-pipe S, I provide a "take-off ring" R of the following construction: It consists of a strip of sheet metal formed to a circle and with an approximately semicircular longitudinal concavity at one side, as indicated in Fig. 1. The strip or ring is secured against the inner sheet a' of the jacket near the top, as shown in Figs. 1 and 4, to form, with the sheet, a conduit closed at the receiving end, except for a row of perforations p at the top side, and terminating at its discharge end in the outward steam-discharge conduit S^s . The steam passing through the receiving-perforations p is already freed from entrained water to a great extent, and is dried by passing through the conduit or "ring" R, exposed to heat at the inner side in contact with the sheet a' , before reaching the ultimate outward conduit S^s . This construction serves, practically, to separate the steam from the water and to prevent the passage of water into the steam-pipe S when the boiler is in transportation over uneven ground, &c.

The mode of operation of the boiler will be sufficiently obvious so far as the circulation of water and production of steam is concerned. It will be seen that any one of the manifolds can be completely removed in case repairs (for example) are necessary and the shell connections plugged and the boiler still used, if required, and also that this may be done without removing the boiler from its setting or disturbing any of its other connections.

The operation of the steam-ring in aiding the separation of the entrained water from the steam and in supplying and drying the steam during its passage to the outlet S^s will also be obvious from the description and drawings.

I claim as my invention and desire to secure by Letters Patent of the United States—

1. In a steam-boiler of the character indicated in combination with the steam and water jacketed shell a system of vertical detachable manifolds with headers arranged within the shell, consisting of two independent sets or series each manifold having connection to the steam-space of the shell at the

top, and a connection below to the water-space of the boiler, substantially as set forth.

2. In a steam-boiler of the character indicated, two series of manifolds with headers arranged end to end, in combination with the fixed top supporting-bar to space and support the system and the independent steam connections extending outward in opposite directions radially as ties to hold the system rigid in relation to the shell, substantially as set forth.

3. In a steam-boiler of the character indicated two series of manifolds with headers arranged end to end, and supported by a top brace, in combination with a spacing-bar interposed between the series at the lower end, and water connections arranged to tie each two opposite manifolds to the spacing-bar and a single extension to the water-leg as a tie-brace for both and a common connection to the water-space of the boiler-shell, said extensions being carried to opposite sides of the water-leg, alternately in series, substantially as set forth.

4. In a steam-boiler of the character indicated two series of manifolds with headers arranged end to end and supported by a top brace, in combination with a spacing-bar interposed between the series at the lower end, and water connections arranged to tie each two opposite manifolds to the spacing-bar and a single extension to the water-leg as a tie-brace for both and a common communication to the water-space of the boiler-shell, substantially as set forth.

5. In a steam-boiler, in combination with a central and supported system of manifolds of the character indicated, the combination of a spacing-bar provided with projections engaging perforated lugs of the lower headers, tie connections, c^3 , extending across to secure opposite manifolds to the spacing-bar, and connections, c^4 , extending in various radii to opposite sides of the water-leg, to secure the system to the shell against displacement in any direction, substantially as set forth.

6. In a steam-boiler of the character indicated, a concaved strip of metal arranged as shown at the top of the inner shell forming a conduit adjacent to the shell, said conduit being provided with a number of relatively minute receiving-orifices at the otherwise closed receiving end, and terminating at the discharge end in the steam-supply exit, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES H. FOX.

Witnesses:

L. M. HOSEA,
HERBERT J. ALLSUP.