

No. 660,751.

P. CUNNINGHAM.

Patented Oct. 30, 1900.

BOILER.

(Application filed May 28, 1900.)

(No Model.)

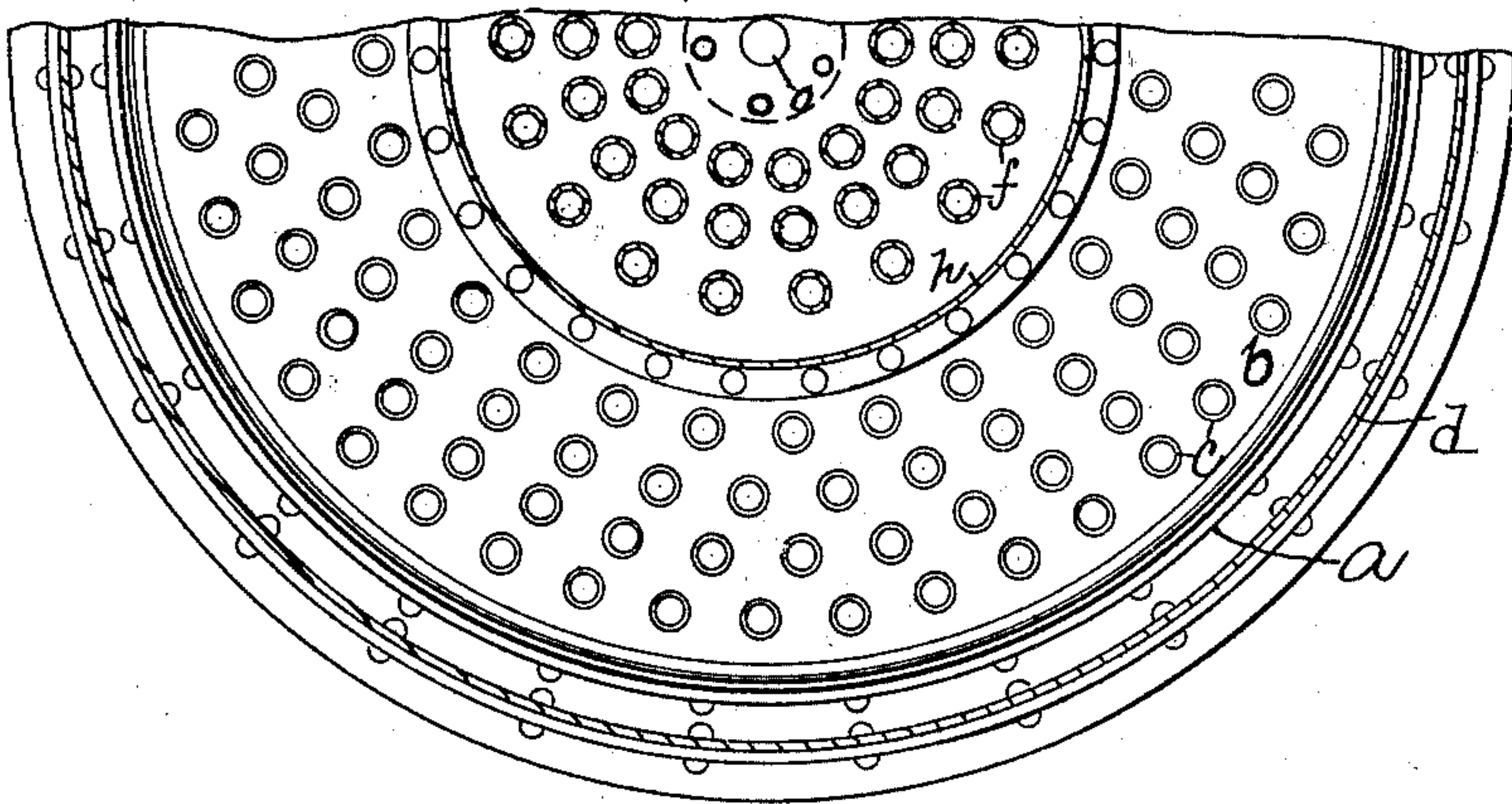


FIG. 2.

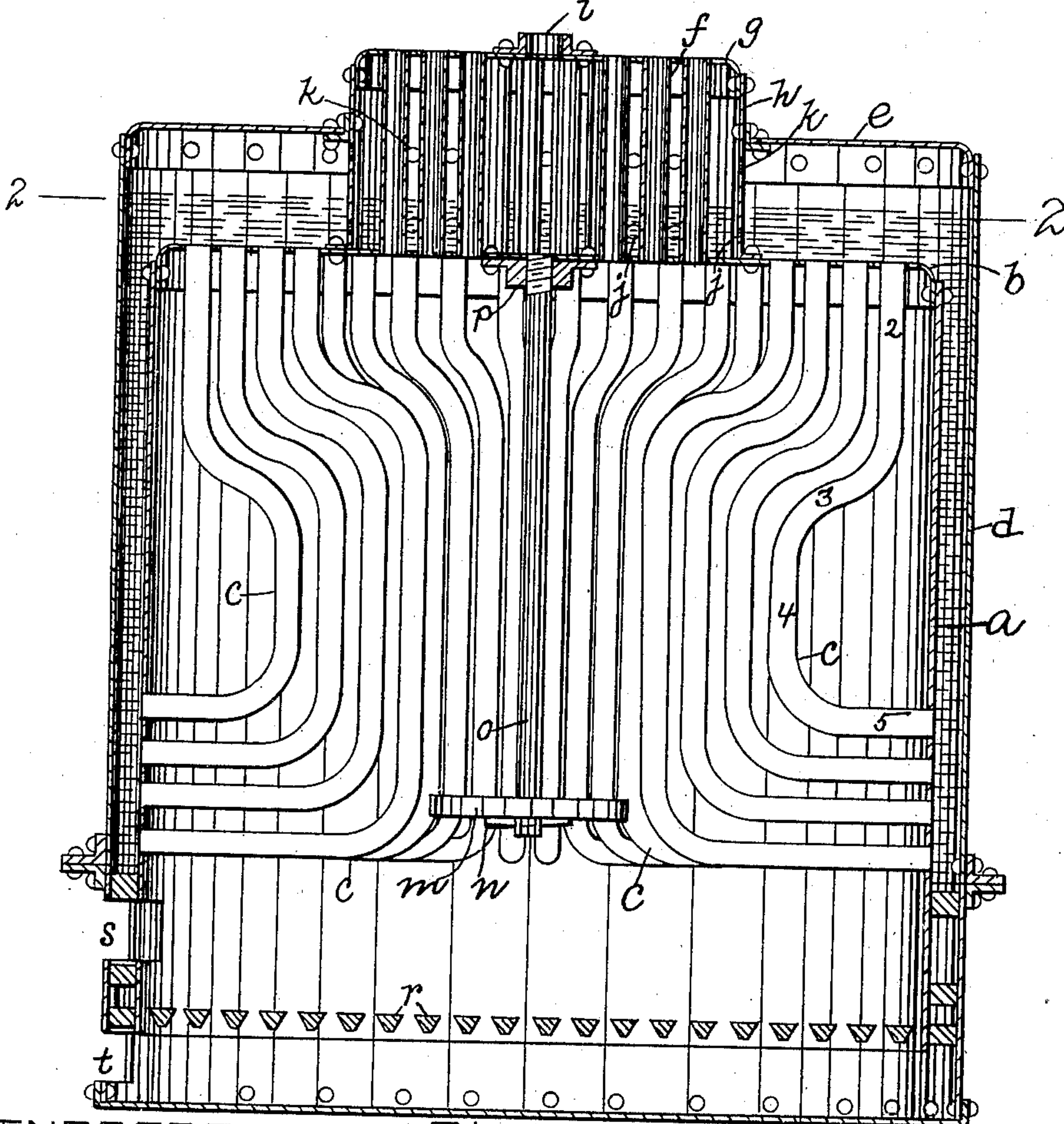


FIG. 1.

WITNESSES.

C. H. Gannett
J. Murphy

INVENTOR.

Patrick Cunningham
by Jas. H. Churchill
att'y.

UNITED STATES PATENT OFFICE.

PATRICK CUNNINGHAM, OF NEW BEDFORD, MASSACHUSETTS, ASSIGNOR
TO THE CUNNINGHAM ENGINEERING COMPANY, OF BOSTON, MASSACHUSETTS.

BOILER.

SPECIFICATION forming part of Letters Patent No. 660,751, dated October 30, 1900.

Application filed May 28, 1900. Serial No. 18,211. (No model.)

To all whom it may concern:

Be it known that I, PATRICK CUNNINGHAM, a citizen of the United States, residing in New Bedford, county of Bristol, and State of Massachusetts, have invented an Improvement in Boilers, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

10 This invention relates to a steam-boiler, and has for its object to provide a highly-efficient, powerful, and economical boiler particularly well adapted, among other uses, to be employed on automobile vehicles using steam as
15 the motive power. For this purpose I employ a system or series of vertically-arranged water-circulating tubes or pipes connected to the upper end and sides of an inner shell and a system or series of vertically-arranged
20 fire-tubes communicating with the combustion-chamber of the boiler and extended through a steam chamber or dome attached to the outer shell, which forms, with the inner shell, a water-space communicating with
25 the water-circulating tubes. Within the inner shell is located a baffling-plate or spreader, which is situated near the lower portion of the water-circulating tubes and which causes the products of combustion to pass through
30 and around said water-tubes on their way to the fire-tubes, which carry the products of combustion through the steam-dome, and thereby highly heat and dry the steam.

Figure 1 is a vertical section of a boiler embodying this invention; and Fig. 2, a sectional view of a portion of the boiler, the section being taken on the line 2 2, Fig. 1.

Referring to Fig. 1, *a* represents the inner shell, provided with the top or crown sheet *b*,
40 in which are expanded or otherwise secured a series of vertically-arranged water-circulating tubes *c*, preferably made as herein shown and comprising a substantially straight upper portion 2, a curved portion 3, a substantially straight portion 4, and a substantially
45 horizontal portion 5, which latter is connected to the side of the inner shell *a*, so as to communicate with a water-space between the shell *a* and an outer shell *d*, extended above
50 the inner shell and provided with a crown

sheet or top *e*. The water-tubes *c* are arranged within the combustion-chamber so as to leave a substantially circular central space, with which communicates a series of vertically-arranged fire-tubes *f*, which, as shown, are fastened to the crown-sheet *b* and are extended
55 up through the top *g* of a steam-dome *h*, which is fastened at its lower end to the crown-sheet *b* and has its upper end extended above the top *e* of the outer shell, which is fastened to
60 said steam-dome. The top plate of the steam-dome is provided with a steam-outlet *i*. The portion of the steam-dome within the outer shell is provided with ports or openings *j*, located near the crown-sheet of the inner shell
65 to afford a passage for water into the steam-dome, and near the crown-sheet of the outer shell said dome is provided with additional ports *k* for the passage of steam from the space between the tops of the inner and outer
70 shells into the steam-dome.

Within the combustion-chamber of the boiler and between the water-circulating tubes, near the lower end of the same, is a flame-spreader *m*, which may be composed of
75 any suitable material and which is herein shown as a plate which rests on a key *n*, inserted through a hole in a rod *o*, depending from the crown-sheet of the inner shell, the said rod being shown as screw-threaded at its
80 upper end to engage a threaded boss *p*, riveted to said crown-sheet.

The boiler is provided with the usual grate-surface *r* and openings *s t* for the fire-box and ash-pit.

From the above description it will be seen that a large number of water-circulating tubes *c* are exposed to the direct action of the products of combustion, which are caused to circulate in among and around them by the
90 flame-spreader *m*, thus insuring a rapid circulation of water through the tubes *c*, and consequently generating steam quickly, which passes into the steam-dome and is there subjected to the heat of the fire-tubes, which has
95 the effect of superheating the steam, so that practically dry steam is supplied to the engine.

By reference to Fig. 2 it will be seen that the upper ends of the water-circulating tubes 100

are arranged in circular rows near the outer portion or edge of the crown-sheet of the inner shell, leaving a substantially large central space for connection of a substantially large number of fire-tubes. The spreader *m* causes the products of combustion to pass out toward the sides of the inner shell, then up among the water-circulating tubes, and back toward the central portion of the combustion-chamber and out through the fire-tubes.

I claim—

1. In a boiler, the combination with an outer shell provided with a crown-sheet, an inner shell of smaller diameter provided with a crown-sheet and forming with the outer shell a water-space, a steam-dome extended through the crown-sheet of the outer shell and secured to the crown-sheet of the inner shell, of a series of substantially vertical water-circulating tubes within the inner shell and having their opposite ends connected with the crown-sheet and sides of the inner shell, and a series of substantially vertical fire-tubes located within the said steam-dome and secured to the crown-sheet of the inner shell and to the top of the steam-dome, the said steam-dome communicating with the said water-space, substantially as described.

2. In a boiler, the combination with an outer shell, an inner shell forming therewith a water space or chamber, of a series of substantially vertical water-circulating tubes having their upper ends communicating with the water-space between the tops of said shells and their lower ends communicating

with the water-space between the said walls of said shells and arranged to leave a substantially central space within the inner shell, and a series of substantially vertical fire-tubes communicating with said central space and extended through the top of the outer shell, and a spreader within said inner shell near the lower end of the water-circulating tubes, substantially as described.

3. In a boiler, the combination with an outer shell, an inner shell forming therewith a water space or chamber, a steam-dome extended through the outer shell and fastened to the inner shell, of a series of substantially vertical water-circulating tubes within the inner shell and composed of the substantially straight upper portion 2 connected with the top of the inner shell, the curved portion 3, the substantially straight portion 4 and the substantially horizontal portion 5 connected with the side of the inner shell, a series of substantially vertical fire-tubes extended through the steam-dome and communicating with the inner shell within the space formed by the water-circulating tubes, and a flame-spreader located between the water-circulating tubes near their lower ends, substantially as described.

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

PATRICK CUNNINGHAM.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.