(No Model.) 2 Sheets—Sheet 1.

M. H. PLUNKETT.

STEAM BOILER.

No. 482,384. Patented Sept. 13, 1892.

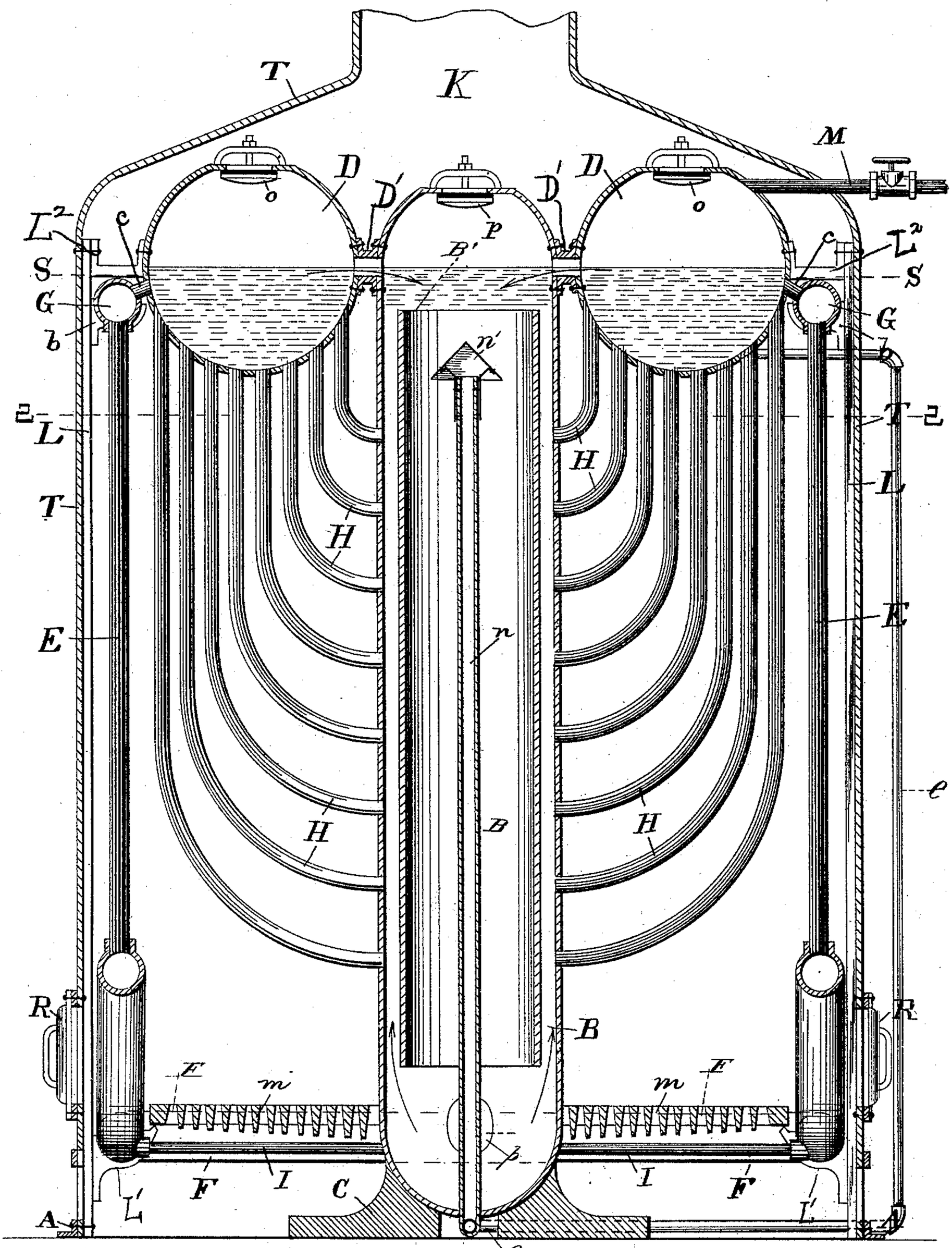

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

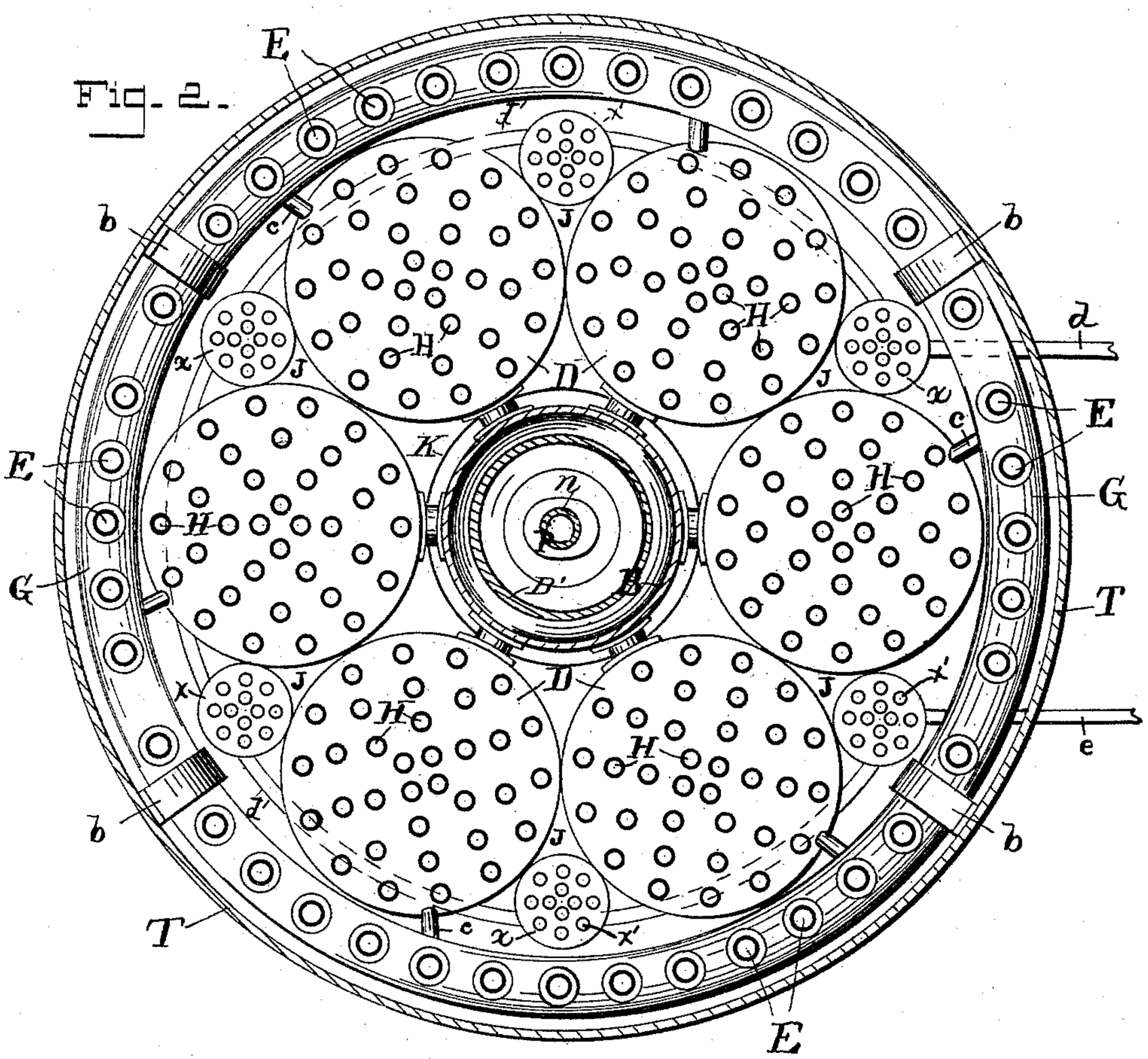
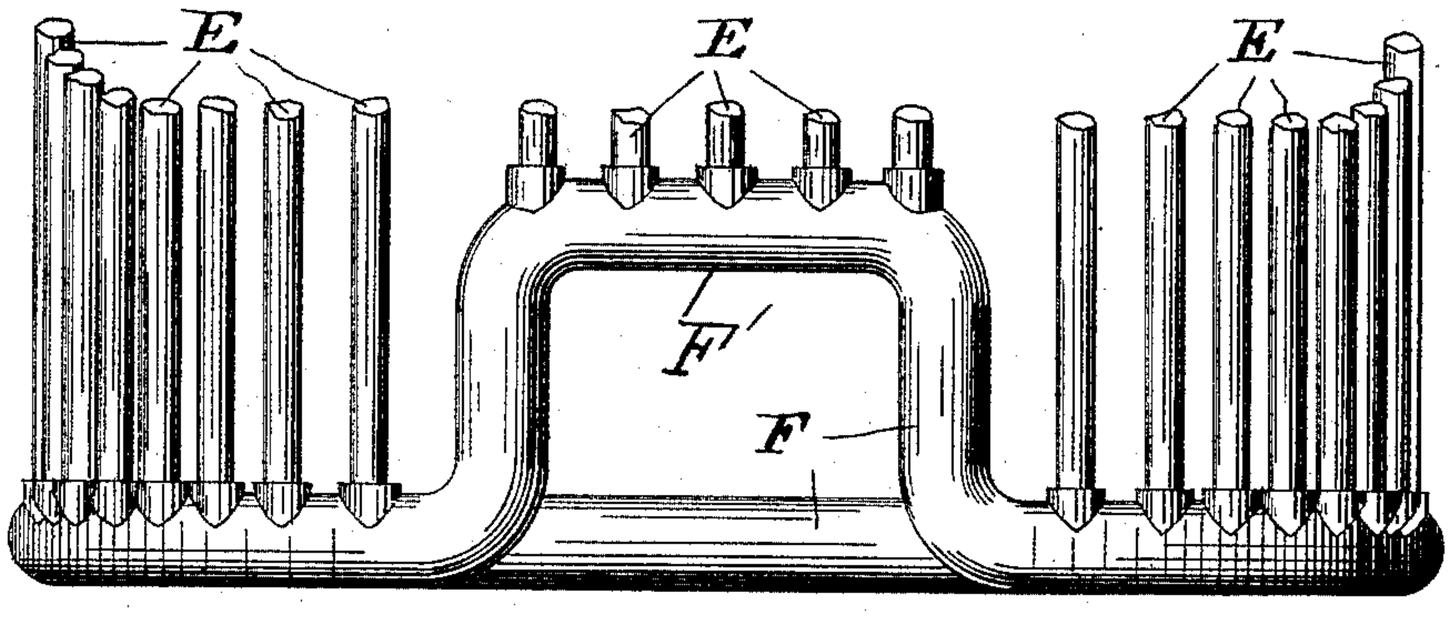


Fig. 3.



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Inventor:
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UNITED STATES PATENT OFFICE.

MICHAEL H. PLUNKETT, OF BALTIMORE, MARYLAND, ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO WASHINGTON BOWIE AND ELIJAH J. BOND, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 482,384, dated September 13, 1892.

Application filed December 26, 1891. Serial No. 416,139. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL H. PLUNKETT, of Baltimore, in the State of Maryland, have invented a new and useful Improvement in Steam-Boilers, of which the following, taken in connection with the accompanying drawings, is a specification.

The invention hereinafter described relates to certain improvements in steam-boilers of the water-tube class, and especially to that class in which there is arranged a vertical central water column having a steam-space in the upper part thereof, and around the said upper part there is arranged a series of spheroids or globes which are connected to the lower part of the central column by water-tubes and to the upper part by flanged thimbles. The parts herein referred to are also connected to a suitable base water-ring, from which extend upwardly a number of water-tubes which form a water-jacket around the furnace, the said tubes being connected at their upper ends to a circular water-ring, which is in communication with the spheroids by means of connecting-nipples.

Other necessary parts and details are hereinafter particularly described.

The object of my invention is to produce a boiler capable of high pressure and to obviate the use of thick plates and pipe-coils for high pressure as is now the practice and to do away with all flat stayed surfaces.

A further object is to provide a boiler that will give the greatest strength with the least thickness of metal, large steam-room, occupying less space, and much lighter in weight than the ordinary type of boiler used for high-pressure, and so constructed and arranged as to give a large heating-surface exposed to the products of combustion, which circulate around and give up their heat to the water and steam spaces of the boiler, thereby generating steam and superheating it before escaping to the uptake, thus utilizing a large amount of heat usually lost in all vertical boilers.

A further object is to provide a perfect circulation, thereby avoiding deposits of sediment on the heating-surfaces and the consequent burning out of those parts.

These and other objects are carried out by a boiler arranged, constructed, and combined as hereinafter described.

The invention consists of certain novel features, arrangement, and combination of parts, as will appear from the annexed description and claims.

In the accompanying drawings, which form a part of the specification, Figure 1 represents a vertical central section of the boiler. Fig. 2 is an inverted plan view taken on the line 2 2, Fig. 1, looking upward. Fig. 3 is a side elevation of the horizontal circular base-ring, showing the tubes broken away.

Like letters of reference refer to like parts throughout the several views.

Within an outer casing T, resting upon a circular base A, there is arranged a vertical boiler having upon the base C a central steam and water chamber B, closed at both ends, and from the sides of said chamber extend outwardly and upwardly the water-tubes H, which are expanded in said chamber at their lower ends and at their upper ends are expanded in the spheroids or globes D, arranged around the upper portion of the chamber B and in communication therewith by means of flanged thimbles D′.

Within the vertical chamber B there is suitably supported an open-ended cylinder B′, as shown in Fig. 1, which extends from the grate-level to just below the water-level and insures a rapid circulation along the inner surface of the drum and sweeps off all particles of steam as soon as formed, thereby insuring a contact of the water with the sides of the drum.

Spheroids or globes are used for the reason that they are capable of standing great pressure and provide large steam-space.

Upon the brackets L′, secured to the vertical plates L near the bottom, there is supported a horizontal circular base-ring F, which is arched over the door or doors, as at F′, (see Fig. 3,) and is connected to the bottom of the chamber B by the water-tubes I, as shown in Fig. 1. From the base-ring F extend upwardly water-tubes E and at their upper ends are connected to the circular water-ring G, supported by the brackets *b*, secured to the plates L, said ring being in communi-

cation with the spheroids or globes D by means of nipples *c*. The plates L are two inches in width and are secured to the outer casing T. A circular grate *m* surrounds the chamber B near its lower end, as shown.

Between the globes D and the water-ring G a number of feed-water heaters *x*, having the usual fire-tubes *x'*, are arranged and connected together by pipes *d'*, whereby the water entering through pipe *d* to the heaters and from said heaters out through pipe *e* to the water-chamber B through the pipe *n*, having a hood *n'*, so that by the time the feed-water reaches the central chamber it is of a temperature approximating closely to that of the boiler-water, thus utilizing a great quantity of heat which would otherwise be lost.

The usual fire-doors R and the manholes *o* and *p* for the globes D and chamber B are provided.

The steam-pipe M, which conducts the steam away from the boiler, is provided with the usual hand or other valve for controlling the flow of the steam.

K represents the uptake through which the products of combustion escape.

The water-line is indicated by line S S. The brackets L^2 are secured to the plates L and globes D and assist in supporting the latter. The water in the chamber B is drawn upwardly through the tubes H, owing to the heat of the furnace being imparted thereto, and passes into the spheroids D, where it is converted into steam. The water not so converted enters the upper portion of the chamber B through the thimbles D' and passes downwardly through the cylinder B' and upwardly between the cylinder B' and the inner surface of the chamber B to the tubes H. The water which passes into the spheroids D has also another passage into the water-ring G and downwardly into the base-ring F through the tubes E, and from said base-ring the water enters the bottom of the chamber B through the pipes I, where it mixes with the water in the chamber B and passes upwardly between the cylinder B' and the inner surface of the chamber B to the tubes H, and the operation continues, the steam being conveyed away by the pipe M. Owing to rapid and perfect circulation all deposits of sediments on parts of the boiler and the consequent burning out of those parts are avoided.

The boiler is constructed of wrought-iron or steel, and no cast-iron parts are used where they would be exposed to the heat of the furnace.

By "spheroids" I mean any body whose periphery is composed of spherical surfaces, which includes bodies whose cross-section may be circular, elliptical, oval, &c. The form of the chamber D, however, will generally be that of a globe, as shown, and is covered, as above stated, under the word "spheroid."

Having thus ascertained the nature and set forth the construction of my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination, in a steam-boiler, of a central steam and water chamber with two or more spheroids arranged around the upper end thereof and forming steam and water chambers and connected to said central chamber by steam and water passages, substantially as set forth.

2. The combination, in a steam-boiler, of a central steam and water chamber with two or more spheroids arranged around the upper end thereof and forming steam and water chambers and connected to said central chamber by steam and water passages and water connections between the said spheroids and the lower end of the said central chamber, substantially as set forth.

3. The combination, in a steam-boiler, of a central steam and water chamber, two or more spheroids connected thereto, a circular water-ring arranged around and outside said spheroids, with a base water-ring and pipes connecting the said water-rings and forming thereby a water-jacket for the furnace, substantially as set forth.

4. The combination, in a steam-boiler, of a central steam and water chamber, two or more spheroids connected thereto, a circular water-ring arranged around and outside said spheroids, a base water-ring arranged around the grate, pipes connecting said water-rings and forming thereby a water-jacket around the furnace, with pipes connecting said base water-ring and the lower end of the central chamber, substantially as set forth.

5. The combination, in a steam-boiler, of a central steam and water chamber with two or more spheroids arranged around the upper end thereof and connected to said central chamber and an open-ended cylinder arranged within the said central chamber for promoting the circulation, substantially as set forth.

6. The combination, in a steam-boiler, of a central steam and water chamber, two or more spheroids arranged around the upper end thereof and connected to said central chamber, with a feed-water heater arranged between the spheroids and pipes conveying the water from the feed-water heater to the central chamber, substantially as set forth.

7. The combination, in a steam-boiler, of a central steam and water chamber, two or more spheroids arranged around the upper end thereof and connected to said central chamber, with a series of feed-water heaters arranged within the furnace between the spheroids and having fire-tubes therethrough and pipes connecting said feed-water heaters with the said central chamber, substantially as set forth.

8. A steam-boiler having a vertical central steam and water chamber, a series of spheroids arranged around the upper end thereof and connected to said central chamber, in

combination with a water-jacket around the furnace, consisting of vertical water-tubes connected to upper and lower water-rings, said rings being respectively in communication with the spheroids and the lower end of the said central chamber, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 24th day of December, A. D. 1891.

MICHAEL H. PLUNKETT.

Witnesses:
HUMPHREY F. MORGAN,
WM. H. JONES.