

No. 737,250.

PATENTED AUG. 25, 1903.

A. W. LA FRANCE.
STEAM BOILER.

APPLICATION FILED NOV. 14, 1902.

2 SHEETS—SHEET 1.

NO MODEL.

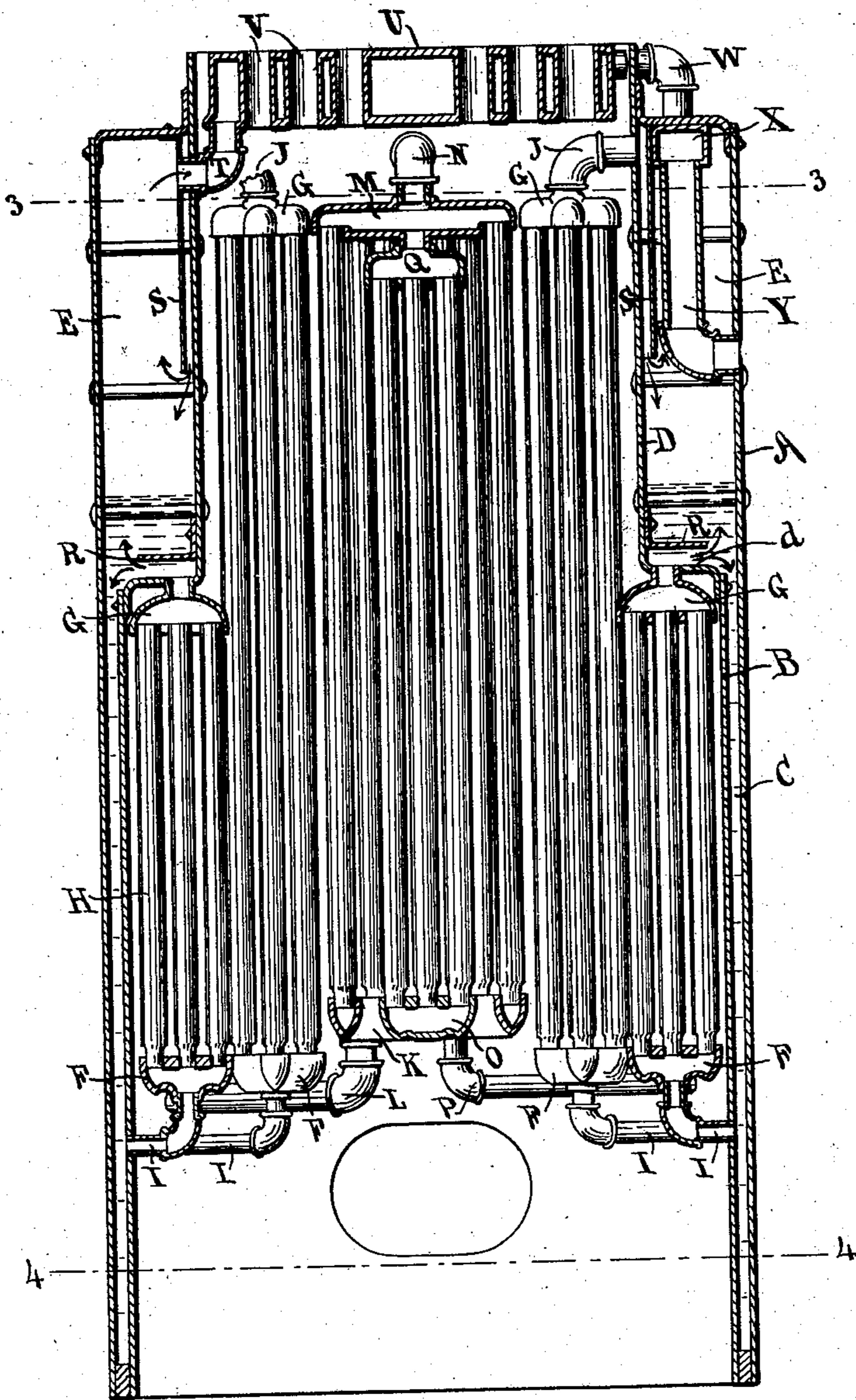


Fig. 1.

WITNESSES:

M. E. Verbeck.

M. L. Beck.

INVENTOR

Asa W. LaFrance

BY

Eugene Diven
ATTORNEY

No. 737,250.

PATENTED AUG. 25, 1903.

A. W. LA FRANCE.
STEAM BOILER.

APPLICATION FILED NOV. 14, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

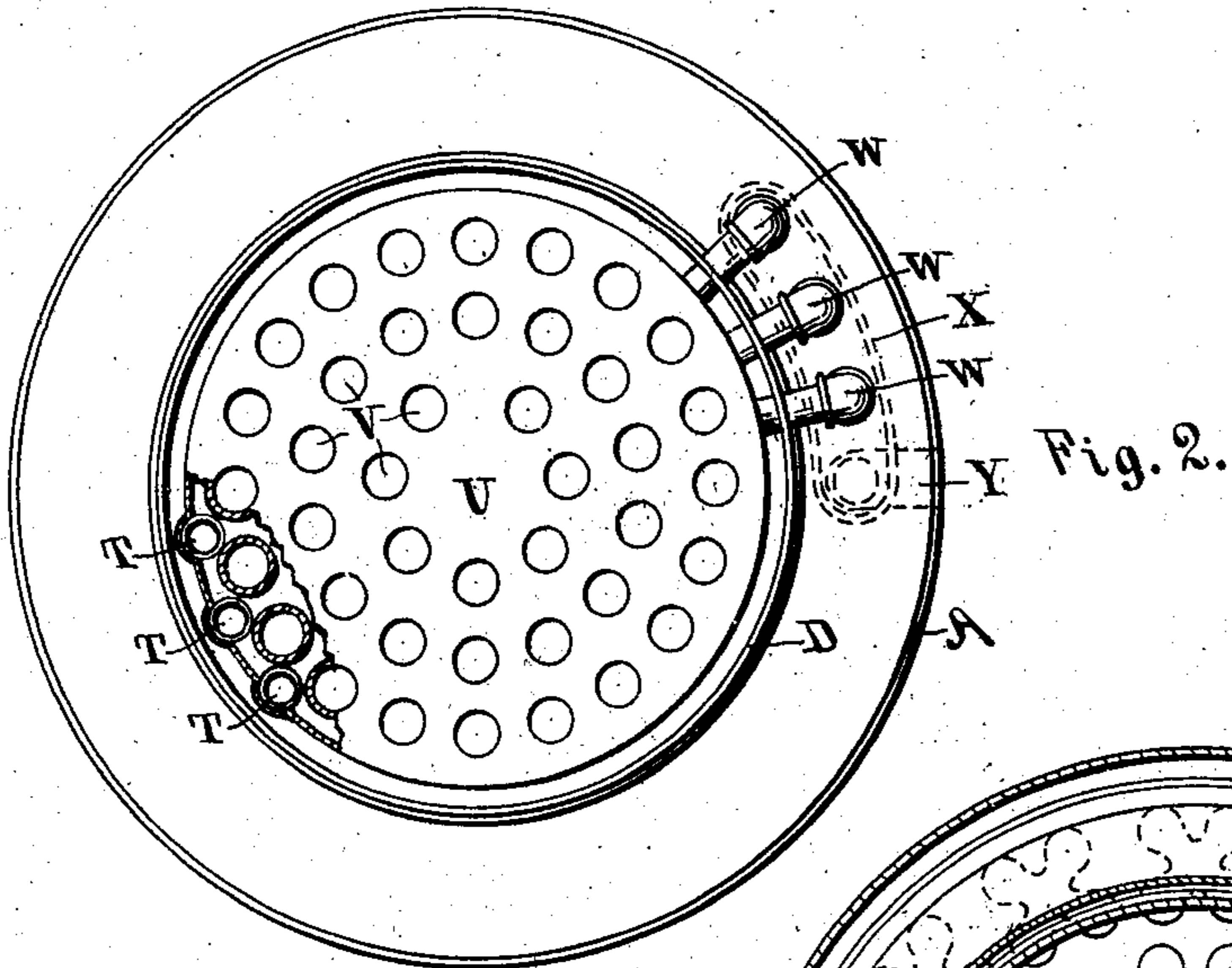


Fig. 2.

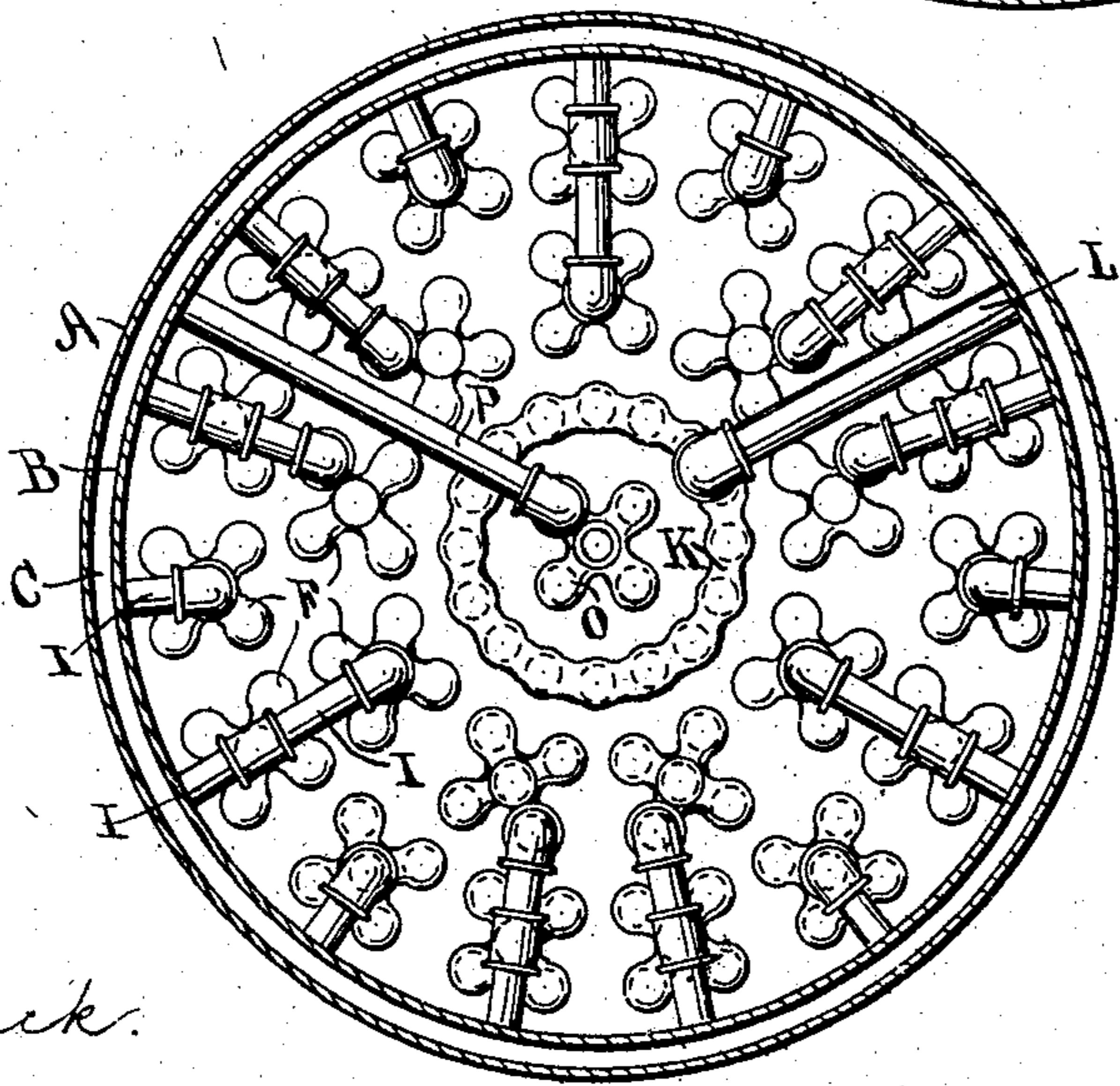
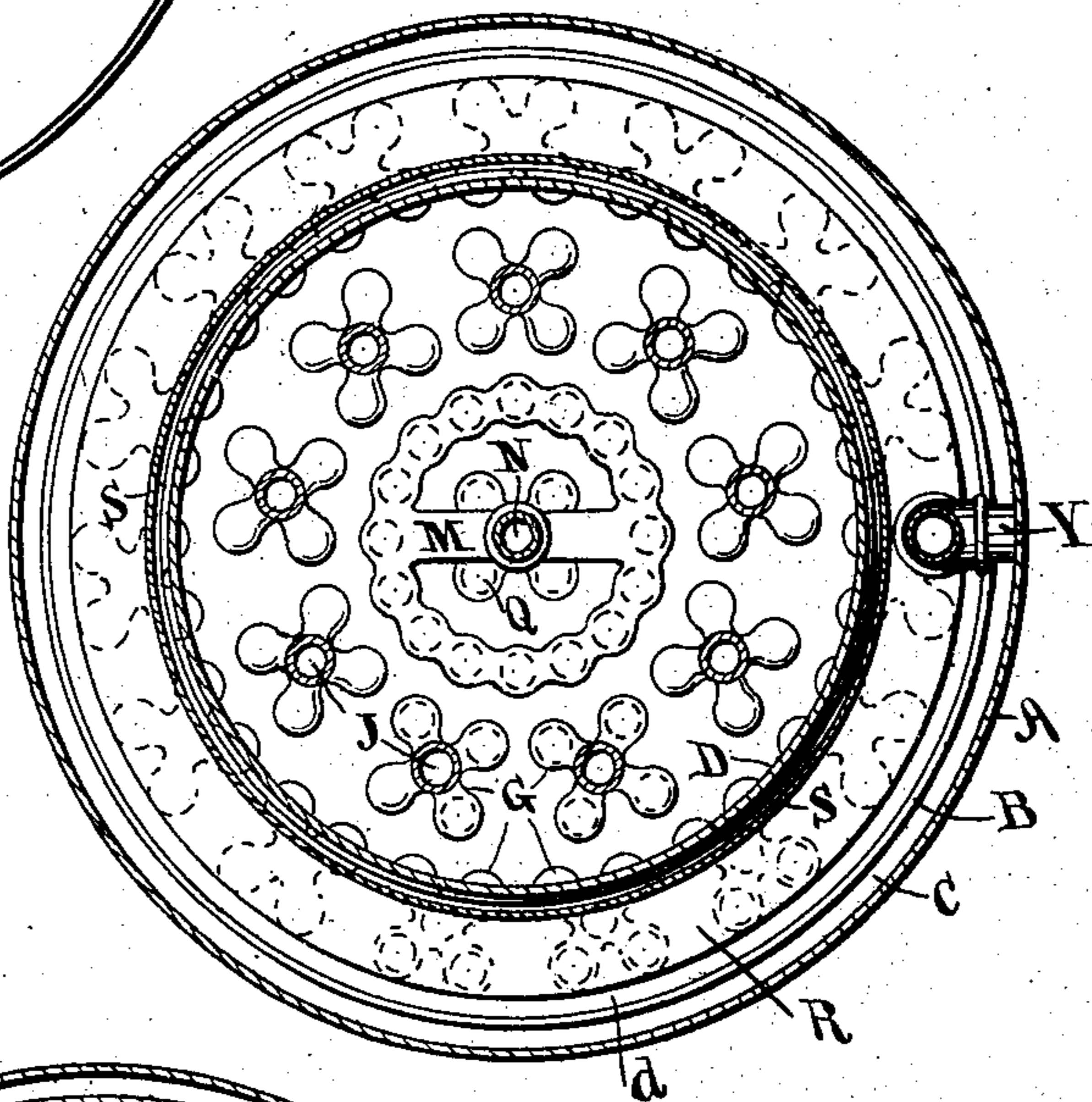


Fig. 4.

WITNESSES:

M. E. Verbeck,

M. L. Beck.

INVENTOR

Asa W. LaFrance

BY

Eugene Diven
ATTORNEY

UNITED STATES PATENT OFFICE.

ASA W. LA FRANCE, OF ELMIRA, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 737,250, dated August 25, 1903.

Application filed November 14, 1902. Serial No. 131,419. (No model.)

To all whom it may concern:

Be it known that I, ASA W. LA FRANCE, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to improvements in vertical steam-boilers of the water-tube type, adapted more particularly for the quick and rapid generation of steam; and my object is to provide certain improvements in the manner of connecting the water-tube manifolds or headers with the steam and water spaces of the boiler whereby more perfect separation of the steam and water will be attained, and, further, to provide such a boiler with an improved form of superheater, through which the steam is passed before it enters the steam pipe or outlet.

I attain my object by means of the construction and arrangement of the boiler and its parts, as illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical section of my improved boiler; Fig. 2, a top or plan view of the same; Fig. 3, a transverse section on the line 3 3 in Fig. 1, looking downward; and Fig. 4, a section on the line 4 4 in Fig. 1, looking upward.

Like letters of reference designate like parts in the several views.

A represents the outside shell of the boiler, and B and D the inside shells of different diameters, which are united by an annular crown-sheet *d*, these two inner shells forming, with the outside shell, the water-leg C and the broader steam and water space E.

Within the combustion-chamber over the fire-box of the boiler are arranged a number of water-tube nests composed of manifolds or headers F and G, united by tubes H. In the boiler illustrated there are two annular series of these nests with a large compound nest filling the central space, this latter nest being composed of the annular lower manifold or header K, coupled to the leg of the boiler by the connection L, and a similar manifold M at the top, having a diametrically-arranged cross-channel united by connection N with the steam-space E at the top of the boiler. Q

is the header of a smaller nest coupled into the header M, the bottom of this latter nest being formed by the header O, having a separate connection P with the leg of the boiler. By these two connections L and P the central nest is given an ample supply from the water-leg, which is essential, as it receives the strongest heat in the combustion-chamber. The outside row of nests are short and set in close to the shell B of the boiler, their upper headers being connected directly with the water-space above the annular crown-sheet *d* and their lower headers being in communication with the leg of the boiler through connections I. Just above the outlets from the upper headers of this outer row of nests I place in the boiler an annular baffle-plate R, the outer rim of which approaches the outer shell A of the boiler, leaving an annular space between. The intermediate annular series of nests, together with the central compound nest, are coupled to the top of the boiler by the connections J and N, as indicated, and from the head of the boiler I drop a cylindrical baffle-plate or shell S to a point approaching the water-line of the boiler, this shell forming an annular space at the top of the boiler around the inner shell D, into which the steam and water from the central nests are delivered and given a downward direction before issuing into the water-space E. By this arrangement the outer series of nests may have their headers coupled directly to the crown-sheet by open nipples, and the water or heavily-saturated steam, which would otherwise be thrown directly up into the steam-space of the boiler from these nests, is intercepted by the baffle-plate R and given a lateral flow toward the outer shell of the boiler, the steam separating from the water and rising into the steam-space and the water being caught by the strong downward current at this point and returned to the leg of the boiler, as indicated by the arrows. In the same way the water or saturated steam issuing from the longer central nests passes first into the annular space formed by the baffle-plate or shell S and is given a downward flow in contact with the inner shell D of the boiler, receiving a degree of heat during this downward passage in con-

tact with said shell, whereby the steam becomes less heavily saturated. The water which is carried over with the steam from these central nests drops to the water-space of the boiler after passing from said shell S and returns thence down the leg of the boiler for recirculation, and the steam passes from around the lower edge of the said shell S and rises into the steam-space E. A thorough separation of the steam from the water thrown out by the nests in the rapid circulation incident to this type of boiler is thus accomplished, and the steam in a dry state will rise to the top of the boiler, while the water is rapidly returned to the leg of the boiler to keep up the supply demanded by the rapid circulation generated in the nests. To further dry and superheat this steam, I provide a hollow disk-shaped superheater U at the top of the inner shell D over the central nests, this superheater being provided with a number of flues V, by which smoke and gases pass to the stack of the boiler, imparting in this passage heat to the inner spaces of the superheater. At one side of the boiler connections T run from the steam-space outside of the shell S to this superheater U, and diametrically opposite a like number of connections W pass out and downward into the steam-box X, located, preferably, in the boiler, as illustrated, just below the head of the boiler in the steam-space E, the outlet or steam-pipe Y leading therefrom to the cylinder connections. By this arrangement all the steam from the steam-space E must pass into the superheater at one side thereof and entirely across the superheater to the outlets W, thereby coming in contact with all the heating-surface of the superheater during this transverse passage. Thence the steam in a thoroughly-superheated state is carried into the steam-box X, which being located in the top of the steam-space is kept in a heated condition, so that there can be no condensation before the steam passes into the cylinder connections.

Heretofore one of the principal and most serious objections found in water-tube boilers of this type has been the failure to provide for the effective separation and superheating of the steam, so as to furnish a large supply of steam in a thoroughly dry condition to the cylinders, as is essential, especially in fire-engine practice, as without this separation and superheating the steam will be sluggish and injurious to the valve-seats and cylinders.

Free egress of the smoke and gases from the combustion-chamber of the boiler past the superheater is provided by the annular space which I allow between the outer periphery of the superheater and the shell D of the boiler and the numerous flues V, passing through the body of the superheater. This superheater may be either cast in one piece or formed of riveted plates and rolled tubes.

Having thus described my improvements and pointed out the features which I deem are particularly novel, what I claim as my invention, and desire to secure by Letters Patent, is—

1. In an upright boiler comprising inner and outer shells, forming annular water and steam spaces, and a system of circulating tubes or nests of tubes communicating with the steam and water spaces at top and bottom, the combination therewith of a superheater comprising a disk-shaped chamber perforated by smoke-flues set into the upper end of the inner shell and having communication at one side with the steam-space of the boiler and at the opposite side with the steam pipe or outlet.

2. In an upright boiler comprising inner and outer shells, forming annular water and steam spaces, and a system of circulating tubes, or nests of tubes communicating with the steam and water spaces at top and bottom, the combination therewith of a superheater comprising a disk-shaped chamber perforated by smoke-flues positioned at the top of the inner shell, said chamber having a plurality of connections at one side with the steam-space of the boiler, and at the opposite side a plurality of connections with a steam-box positioned in the steam-space at the top of the boiler, and a steam pipe or outlet leading away from said box.

3. In an upright boiler comprising inner and outer shells, forming annular water and steam spaces, and a system of circulating tubes, or nests of tubes communicating with the steam-space at the top and the water-space at the bottom, the combination therewith of a cylindrical baffle-plate, or shell depending from the boiler-head around said upper connections, and a superheating-chamber positioned at the top of the inner shell receiving steam from the steam-space outside said baffle-plate and delivering it at the opposite side to the steam pipe or outlet.

4. In an upright boiler comprising an inner shell of two diameters and an outer shell forming therewith annular water and steam spaces of different diameters with an annular crown-sheet between, the combination therewith of an annular series of circulating tubes or nests of tubes in the space of larger diameter below the normal water-level having direct communication through said crown-sheet with the space above it and at the bottom having connection with the lower water space or leg of the boiler, and a shallow circulating-chamber immediately above the crown-sheet formed by an annular baffle-plate fitted around the inner shell adjacent to the crown-sheet, said chamber being in direct communication with the leg of the boiler and with the steam-space above by way of narrow annular passages adjacent the outer shell of the boiler.

5. In a nest-tube boiler, a compound nest

comprising annular headers united by a plurality of tubes, the top header having a diametrical cross-channel connected with the upper portion of the boiler, and the lower header
5 having connection with the lower portion, or leg of the boiler, and a central system within the first having its upper header connected with said cross-channel and its lower header

provided with a separate connection with the leg of the boiler.

In testimony whereof I have affixed my signature in presence of two witnesses.

ASA W. LA FRANCE.

Witnesses:

MARY L. BECK,
M. E. VERBECK.