(No Model.) 4 Sheets—Sheet 1.

A. H. FOWLER.

MAGAZINE BOILER.

No. 307,284. Patented Oct. 28, 1884.

Fig. 1.

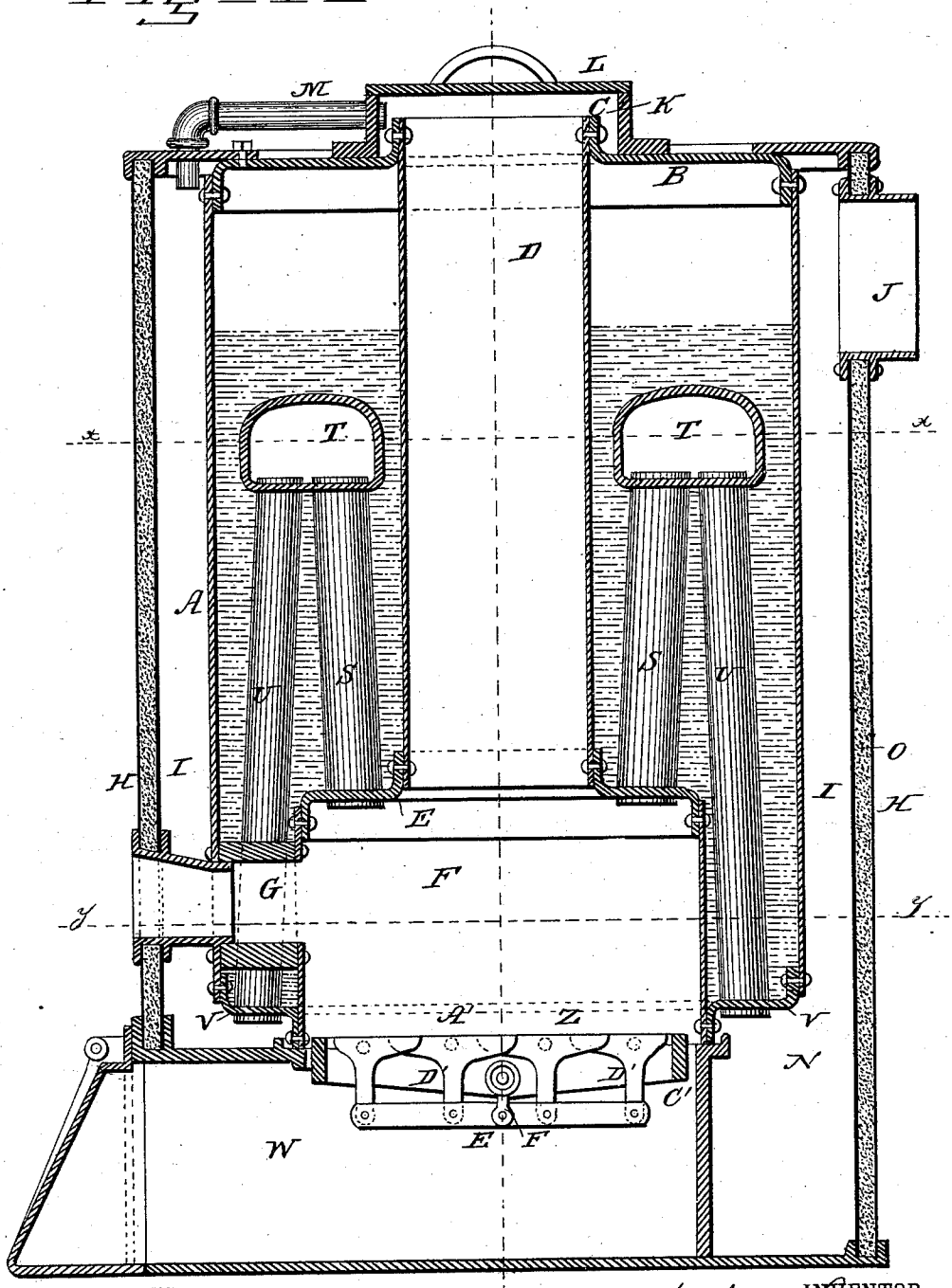

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Fig. 2.

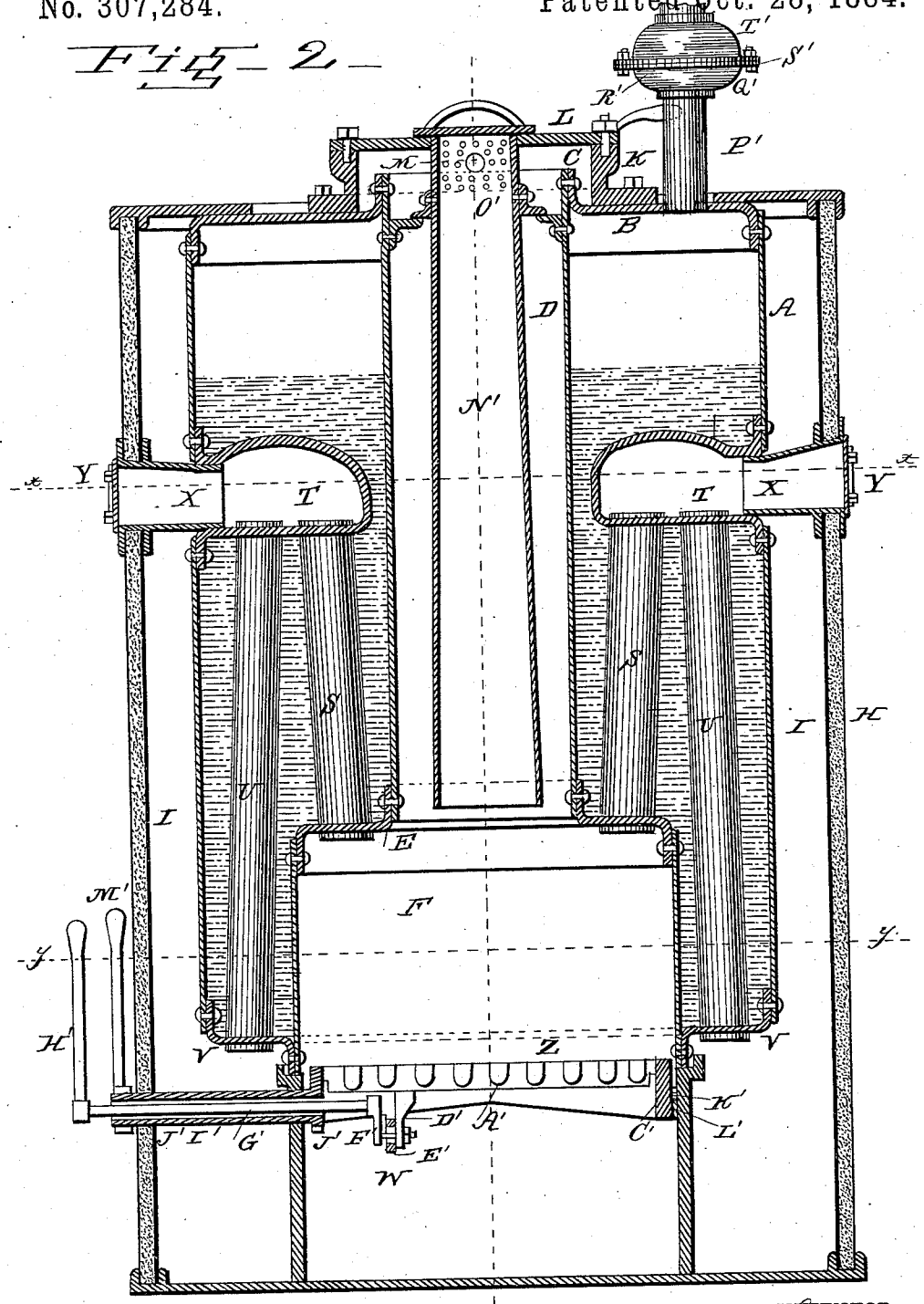

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Fig. 3.

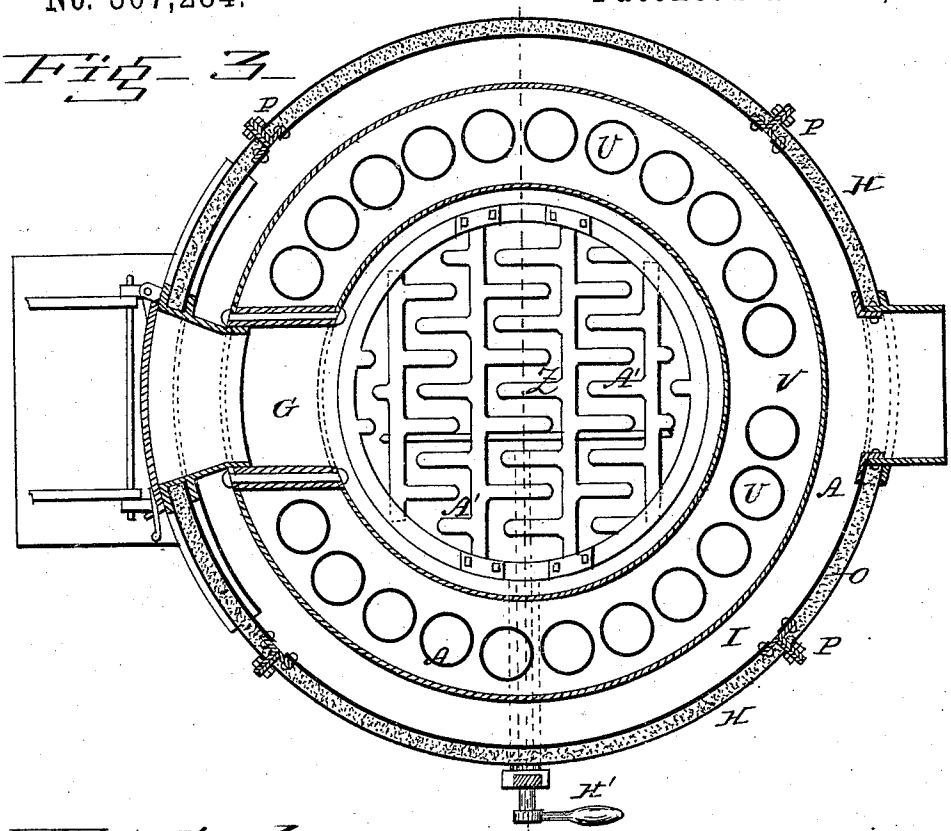

Fig. 4.

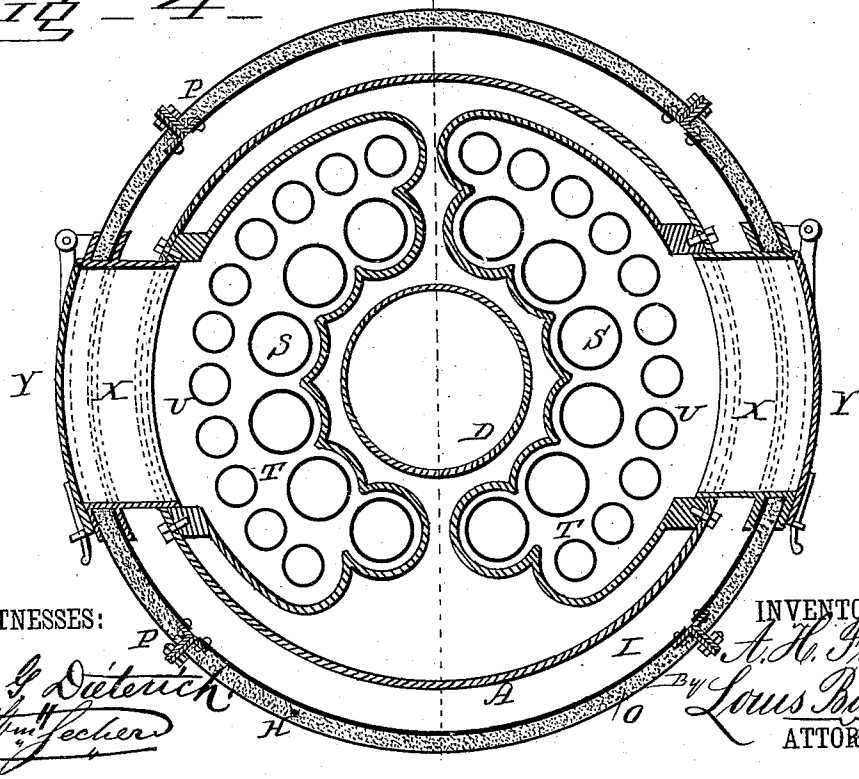

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Fig. 6.

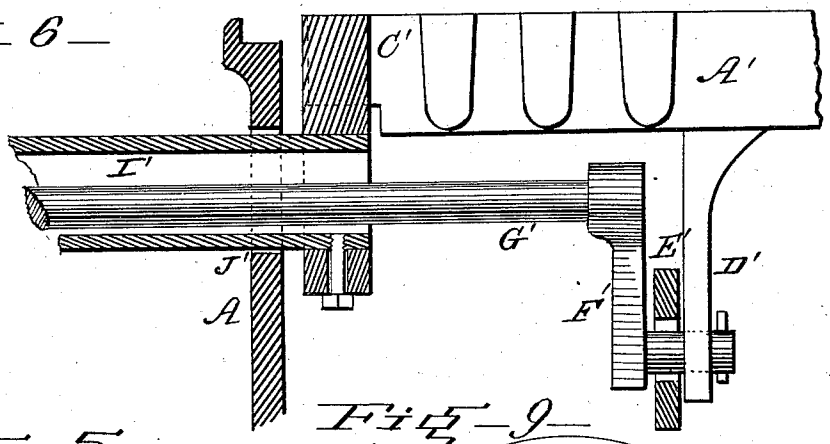


Fig. 5.

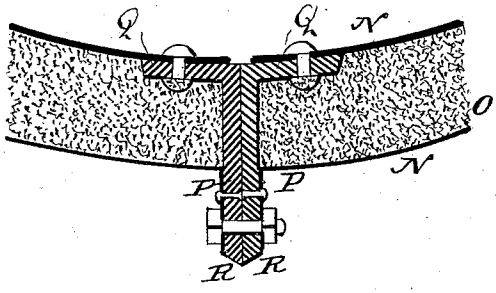


Fig. 9.

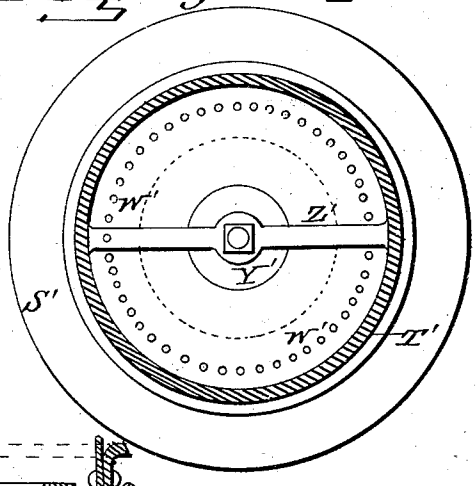


Fig. 7.

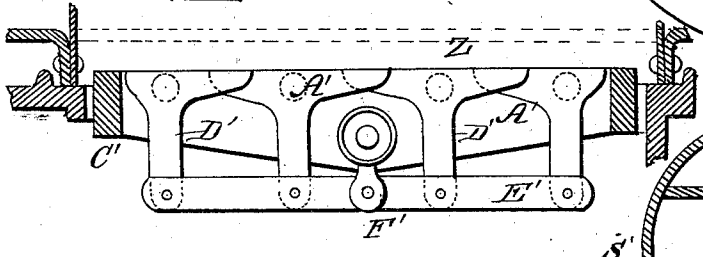
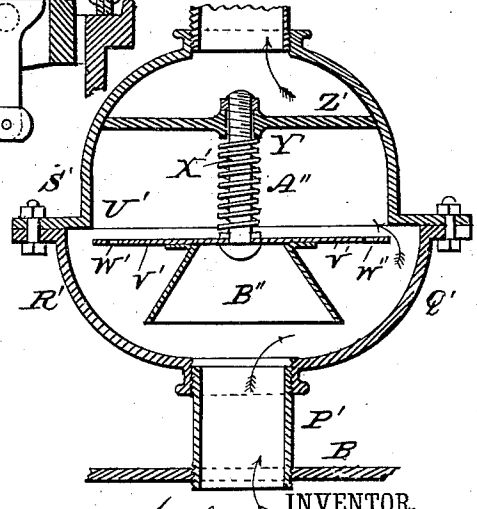


Fig. 8.



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UNITED STATES PATENT OFFICE

ARTHUR H. FOWLER, OF NEWARK, OHIO.

MAGAZINE-BOILER.

SPECIFICATION forming part of Letters Patent No. 307,284, dated October 28, 1884.

Application filed February 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR H. FOWLER, a citizen of the United States, and a resident of Newark, in the county of Licking and State of Ohio, have invented certain new and useful Improvements in Magazine-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a vertical sectional view of my improved magazine-boiler. Fig. 2 is a similar view of the same, taken at right angles to Fig. 1, and showing a slight modification of the same. Figs. 3 and 4 are horizontal sections on lines *x x* and *y y*, Fig. 1. Fig. 5 is a detail view of one of the joints of the outer jacket or casing. Figs. 6 and 7 are detail views of the mechanism for shaking and dumping the grate, and Figs. 8 and 9 are a vertical and a horizontal sectional view, respectively, of the steam-trap.

Similar letters of reference indicate corresponding parts in all the figures.

My invention has relation to magazine-boilers or generators; and it consists in the improved construction and combination of parts of the same, as hereinafter more fully described and claimed.

In the accompanying drawings, the letter A indicates the shell of the boiler, the upper head, B, of which forms a flanged aperture, C, to which the upper end of the outer magazine, D, is secured. The lower end of the magazine is secured to the central flanged aperture, E, of the top of the furnace F, which has a laterally-extending opening, G, provided with a door through which the fire may be observed.

H is an outer shell or jacket, which surrounds the boiler, leaving a space, I, between it and the boiler, into which the chimney or smoke-stack J opens near its upper end, and the upper head of this jacket forms a central flanged aperture, K, which is provided with a lid or cover, L, which may be removed for the purpose of filling the magazine. The upper end of the magazine has a laterally-extending tube, M, through which all gas created in the magazine may be conveyed into the smoke-chamber or space between the boiler and the outer jacket. The outer jacket consists of two shells, N N, with an interposed layer, O, of a non-conducting material, and the joints or connecting-seams for the edges of the sheets forming the shells is shown in Fig. 5, and consists of two angle-irons, P, each riveted with its base-flange Q to the edges of the inner sheets, having the edges of the outer sheets bolted or riveted to the outer portions of their outwardly-projecting flanges, R, which flanges are bolted together.

S indicates the updraft-flues, which are secured with their lower ends in the top or crown sheet of the furnace, while their upper ends open in the floor or bottom of two smoke-chambers, T, which each extends nearly halfway around inside the boiler-shell, and the downdraft-tubes U extend from the floors of these chambers to the lower annular head, V, of the boiler, which extends around the lower end of the furnace at the upper end of the ash-pit W, the downdraft-flues opening in the lower end of the smoke-chamber surrounding the boiler. The inner walls of the upper smoke-chambers are curved to conform to the circumferences of the updraft-flues, thus allowing free upward passage for the steam formed below them, and the chambers are each provided with an outwardly-extending casing, X, which extends out through the outer jacket, and is provided with a door, Y, providing access to the draft-flues for the purpose of cleaning them, or for other similar purposes.

The grate Z is composed of so-called "herring-bone" grate-bars A′, the ends of which are pivoted in bearings in a rim, C′, of the grate, and are provided upon their lower sides with downwardly-projecting arms or lugs D′, which are hinged to a transverse bar, E′, to the middle of which is hinged the lower end of a crank, F′, upon the inner end of a shaft, G′, having a lever or handle, H′, and rocking in a tube, I′, which rocks in bearings J′, in the outer jacket and in the side of the ash-pit, and the inner end of which is secured to the rim of the grate, which has a diametri-

cally-opposite trunnion, K′, rocking in a bearing, L′, in the side of the ash-pit, the grate thus turning upon this trunnion and upon the tube, which is provided with a handle or lever, M′, upon its outer end. An inner magazine, N′, having a number of perforations, O′, at its upper end, may be secured inside the outer magazine, forming an annular space between the walls of the two magazines, for the purpose of feeding two different kinds of coal, as shown in Fig. 2. The steam-pipe P′ opens in the head of the boiler, and for the purpose of preventing water from rushing up in the pipe by high steam-pressure, or by lively boiling, I provide a steam-trap, Q′, consisting of a lower cup-shaped casing, R′, having a flange upon its upper edge, to which the flange S′, of an upper cup-shaped casing, T′, is secured, the mouth of which upper casing is smaller than the mouth of the lower casing, forming a shoulder, U′, against which the rim of a valve or disk, V′, bears, which valve is provided with a row of perforations, W′, near its outer edge. The upper side of the valve has a central upwardly-projecting rod, X′, which slides in a bearing, Y′, in a transverse bar, Z′, in the upper casing, and is provided with a spiral spring, A″, which is wrapped around the rod or stem, bearing against the upper side of the valve and against the bearing in the transverse bar. The under side of the valve is provided with a conical inverted cup, B″, which projects downward to near the opening of the steam-pipe, flaring beyond the said opening, and it will be seen that when water rushes up in the pipe it will be collected in the cup, and force by its greater resistance the valve upward, closing the space between the rim of the valve and the shoulder or seat, which the spring under normal circumstances will keep open, the water being deflected by the cup, while the steam will pass through the apertures in the valve, whereupon, when the water has ceased to pass up in the pipe, the spring will again force the valve downward, allowing the steam to pass around the edges of the valve, as well as through the perforations.

It will be seen that as coal is filled into the magazine and fire built in the furnace, the smoke and other products of combustion will pass up through the updraft-flues into the upper smoke-chambers, from which it will pass downward through the downdraft-flues into the lower portion of the outer smoke-chamber, in which it passes upward and out through the smoke-stack, the heat thus boiling the water around the flues and the chambers, and thereupon giving off heat to the outer shell of the boiler, thus heating the water and superheating the steam in the steam-chamber above the water.

It will be seen that the grate may be shaken by means of the handle or lever upon the crank-shaft, and that the entire grate may be tilted, dumping the ashes and cinders thereupon by tilting the lever upon the tube.

When the inner magazine is used hard coal is filled in the annular space between the inner magazine and the outer magazine, and soft coal is filled in the inner magazine, which will cause the soft coal to feed into the fire in the center, while the hard-coal fire will surround it, the smoke and soot created by the soft coal being carried through the hard-coal fire, and thus being consumed, which will do away with the drawback connected with the use of soft coal—viz., the soot and smoke—and giving the advantage of the lower price and greater heating properties, as well as the lasting capacity, of the soft coal.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The upper smoke-chambers in a magazine steam-boiler of the described construction, having its inner walls curved to conform to the circumferences of the draft-flues, as and for the purpose shown and set forth.

2. The joint for a hollow non-conducting shell for boilers or similar objects, consisting of two flanged angle-irons, having the edges of the inner shell bolted to their base-flanges, and having the edges of the outer shell riveted to the outwardly-projecting flanges, and having the outwardly-projecting flanges secured together by means of bolts, as and for the purpose shown and set forth.

3. The combination of the boiler, having the central magazine, the up and down draft flues, and the smoke-chambers, having the flues opening into them at a distance from their inner sides, and having the said inner sides curved to conform to the inner curves of the draft-tubes, as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

ARTHUR H. FOWLER.

Witnesses:
ORLANDO BOURNER,
W. D. CHERINGTON.