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PATENTED DEC. 27, 1904.

G. LINDER & J. REICH.

STEAM BOILER.

APPLICATION FILED APR. 16, 1904.

2 SHEETS—SHEET 1.

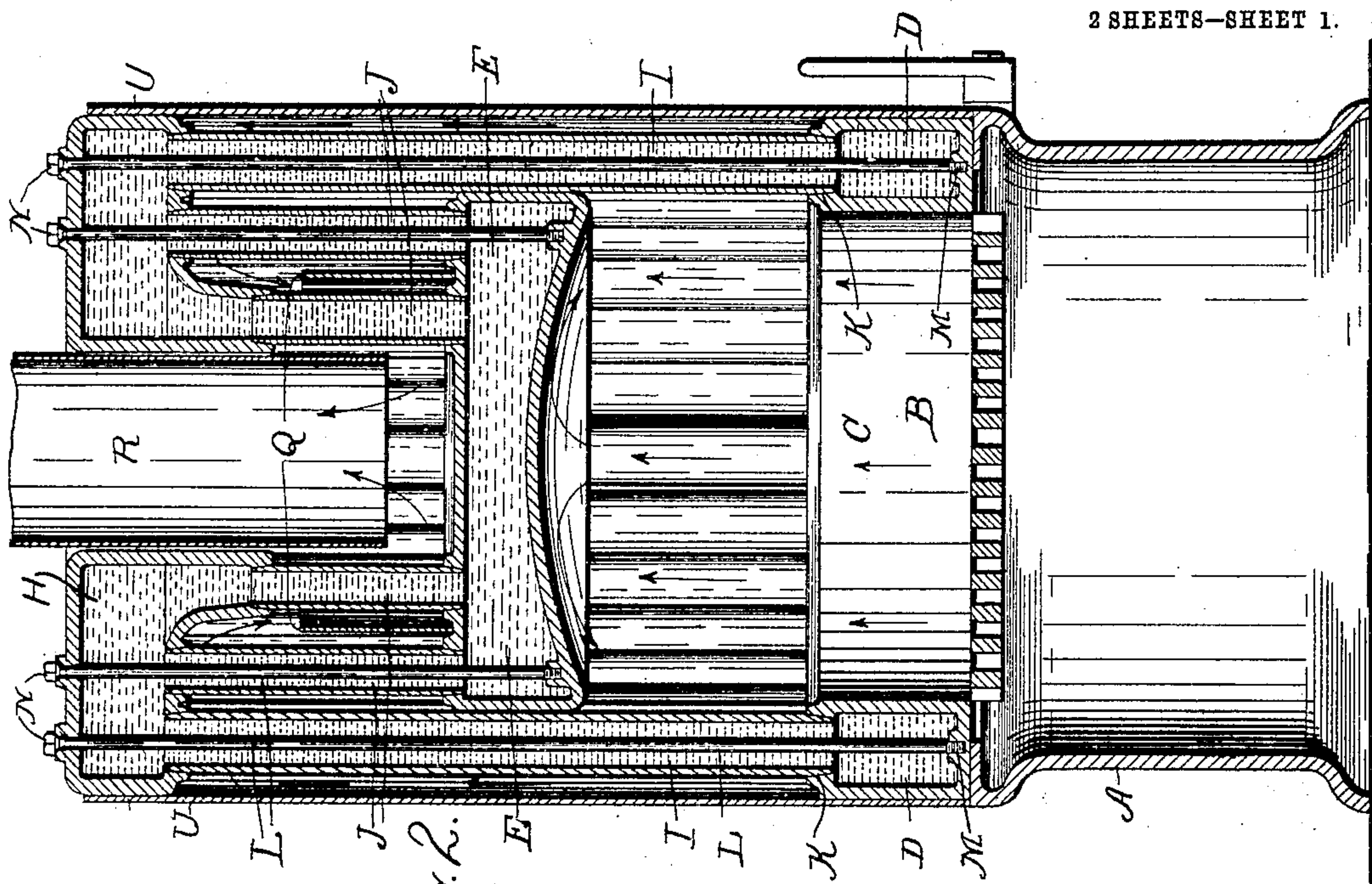


Fig. 2.

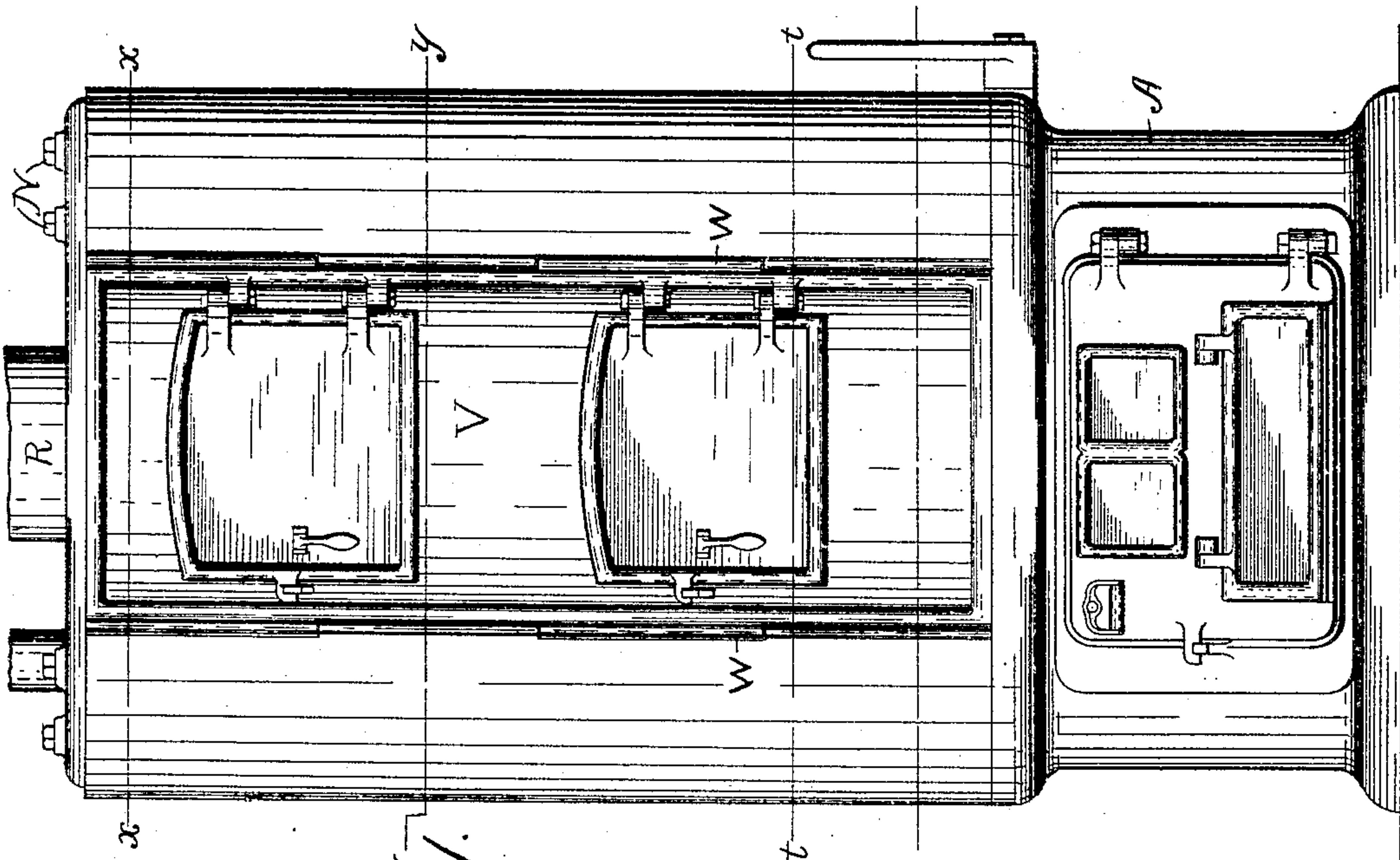


Fig. 1.

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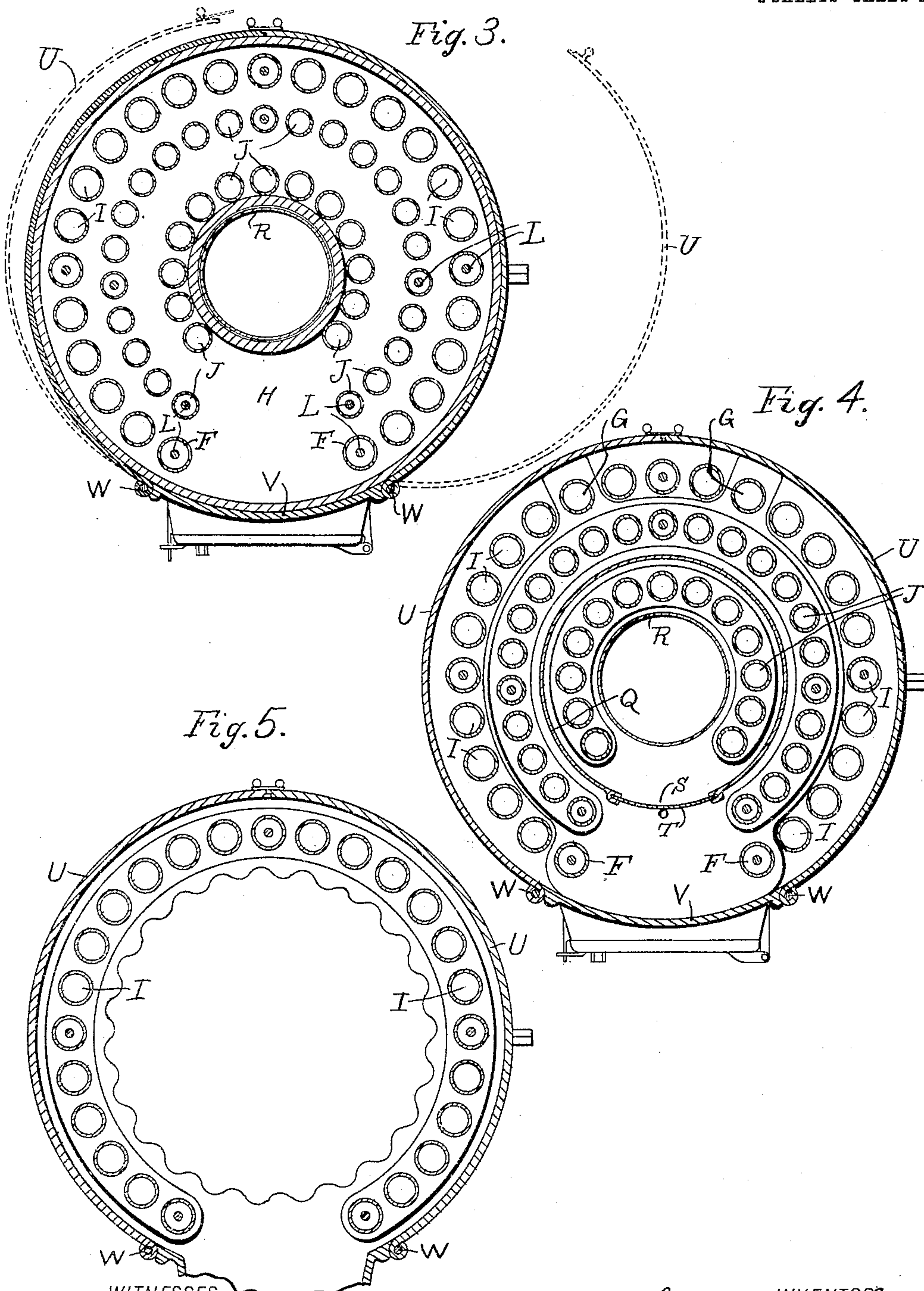
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UNITED STATES PATENT OFFICE.

GEORGE LINDER AND JOHN REICH, OF MILWAUKEE, WISCONSIN, AS-
SIGNORS OF ONE-THIRD TO HUBERT J. ROCK, OF MILWAUKEE,
WISCONSIN.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 778,828, dated December 27, 1904.

Application filed April 16, 1904. Serial No. 203,402.

To all whom it may concern:

Be it known that we, GEORGE LINDER and JOHN REICH, citizens of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Steam-Boilers or Water-Heaters, of which the following is a specification.

Our invention relates to improvements in steam-boilers; and it pertains to the peculiar construction and relative arrangement of the several water-chambers, the chamber-connecting pipes, the combustion-chamber, and draft-passages to each other, as well as to the means of forming the connecting-joints between the several water-chambers and the connecting water-pipes.

Our invention is explained by reference to the accompanying drawings, in which—

Figure 1 represents a front view. Fig. 2 represents a vertical section. Fig. 3 is a transverse section drawn on line *xx* of Fig. 1. Fig. 4 is a transverse section drawn on line *yy* of Fig. 1, and Fig. 5 is a transverse section drawn on line *tt* of Fig. 1.

Like parts are identified by the same reference-letters throughout the several views.

A represents the supporting-base of the boiler; B, the fire-grate; C, the combustion-chamber. The combustion-chamber C is surrounded on all sides by an annular water-chamber D.

Supported above the combustion-chamber C is a central water-chamber E, which is connected at its front and rear sides with the chamber D by the water-pipes F F and G G. Located at the extreme upper end of the boiler is a second annular chamber H, which is supported near its outer edge from the lower annular chamber D by the annular series of pipes I I, while it is connected centrally with the central chamber E by the two annular series of pipes J J. Heretofore it has been common to connect the ends of the pipes with the water-chambers of boilers by screw-threaded joints or by riveting or upsetting the ends of the pipes. By our improvement the pipe-receiving apertures K of the several chambers D, E, and H are slightly tapered to fit

the tapers of said pipes, whereby when said pipes are in place in the several chambers and said chambers are drawn together they form closely-fitting joints, which prevent the escape of steam or water. When constructing our boiler, the several pipes connected with the lower chamber D are first put in place, when the chamber E is placed thereon. This being done, the second series of pipes above are inserted in the several apertures formed in the upper wall of the chamber E, when the upper chamber H is placed upon the upper ends of the second and upper series of pipes, whereby the several chambers are connected together, as indicated in Fig. 2. This being done, the several chambers are secured firmly in place upon the connecting-pipes by the several connecting-rods L. The rods L have screw-threaded bearings M in the lower inner walls of the chambers D and E and extend from thence upwardly through the pipes I and J across the chamber H and protrude through the upper wall of said chamber H, at which point they are provided with fastening-nuts N, whereby when said rods K are in place and said nuts N are turned down on their protruding ends said chambers H and E and D are drawn toward each other and secured firmly in place upon the ends of the connecting-pipes. To prevent the escape of steam or water from around the protruding ends of the rods L, the lower sides of the nuts N taper inwardly and downwardly toward the connecting-rods, while the opposing surfaces of the water-chambers against which they bear are tapered to conform to the taper of said nuts and the contiguous bearings of such parts are so ground as to form steam-tight bearings. Attention is called to the fact that by the construction described we are enabled to entirely dispense with the packing between the joints of the contiguous parts, thus avoiding the defects incident to the use of packing as heretofore employed in the construction of this class of boilers.

To prevent the smoke and products of combustion from escaping too rapidly from the combustion-chamber that the fuel may be used with the greatest possible economy, we have

interposed a cylindrical deflecting-shell Q between the water-chambers E and H, and we also extend the smoke-flue R down into the furnace past the water-chamber H to within
 5 a short distance of the upper surface of the water-chamber E, whereby the smoke and products of combustion as they escape from the combustion-chamber are first brought in
 10 contact with the lower surface of the water-chamber E, as indicated by the arrows, when they are deflected downwardly and pass out between the several water-tubes of the series
 15 II, as indicated by the arrows, and from thence upwardly past the upper edge of the deflecting-shell Q until they are brought in contact with the lower wall of the upper chamber H,
 20 when they are deflected downwardly and passed over the upper edge of the deflecting-shell Q until they are brought in contact with the upper surface of the water-chamber E,
 25 when they pass up from beneath the lower end of the smoke-flue R and from thence to the atmosphere in the usual way, as indicated by the arrows. It will be obvious that by
 30 this arrangement we have provided for the free circulation of the smoke and products of combustion past the several water-chambers and connecting-pipes, while by the arrange-
 35 ment of the water pipes and chambers we have provided for the free circulation of the water through them and for the steam to pass from both the lower and central chamber to the
 40 upper chamber without liability of becoming trapped or otherwise retarded in its movement.

The deflecting-shell Q is provided with an aperture S, which is closed with a door T, whereby access to the inner series of tubes J
 45 may be had for the purpose of cleaning the same.

Heretofore it has been common to inclose the furnace with a single continuous shell extending entirely around the same from one
 50 side of the door to the other. By our improvement, however, we form the inclosing shell in two separate parts U, which are connected with the frame V of the front doors by
 55 hinges W, whereby when desirous to clean the furnace we are enabled to swing the respective shells U U toward the right and left to readily reach all the pipes and water-chambers for such purpose. This being done, said
 60 inclosing shells U are swung back in place and secured together.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a steam-boiler the combination of a lower annular water-chamber the central aperture of which forms a combustion-chamber;
 65 an upper annular water-chamber the central aperture of which forms a smoke-passage; a central water-chamber forming a deflecting-partition between said lower and upper
 70 chambers; a plurality of water-pipes commu-

nicating between the respective chambers and an exterior wall inclosing said chambers and pipes.

2. In a steam-boiler the combination of a lower annular water-chamber the central aperture of which forms a combustion-chamber;
 75 an upper annular water-chamber the central aperture of which forms a smoke-passage; a central water-chamber forming a partition between said upper and lower chambers; a
 80 plurality of water-pipes communicating from said lower annular chamber to said central chamber; a plurality of water-pipes communicating from said central chamber to said
 85 upper chamber; a plurality of water-pipes communicating from said lower chamber directly to said upper chamber past said central chamber; an exterior wall inclosing said
 90 chambers and pipes.

3. In a steam-boiler a supporting-base forming an ash-receptacle; a lower annular water-chamber supported on said base, the central
 95 aperture of which forms a combustion-chamber; a fuel-supporting grate located at the bottom of said combustion-chamber; an upper
 100 annular water-chamber, the central aperture of which forms a smoke-passage; a central chamber forming a partition between said upper and lower chambers; water-pipes commu-
 105 nicating from said lower annular chamber to said central chamber; water-pipes communicating from said central chamber to said upper chamber; water-pipes communicating
 110 from said lower chamber to said upper chamber directly past said central chamber and an exterior wall inclosing said chamber and pipes.

4. In a steam-boiler, the combination of a lower annular water-chamber the central aperture of which forms a combustion-chamber;
 115 an upper annular water-chamber, the central aperture of which forms a smoke-passage; a central water-chamber forming a deflecting-partition between said lower and upper chambers, said chambers being provided with a
 120 plurality of tapered apertures for the reception of the ends of the connecting water-pipes; a plurality of water-pipes tapered at their ends to conform to the apertures formed therefor
 125 in said water-chambers and means for binding and connecting said chambers together.

5. In a steam-boiler, the combination of a lower annular water-chamber the central aperture of which forms a combustion-chamber;
 130 an upper annular water-chamber the central aperture of which forms a smoke-passage; a central water-chamber forming a partition between said upper and lower chambers; a plurality of water-pipes communicating from
 135 said lower annular chamber to said central chamber; a plurality of water-pipes communicating from said central chamber to said upper chamber; a plurality of water-pipes communicating from said lower chamber directly to said upper chamber past said central
 140 chamber; an exterior wall inclosing said chambers and pipes.

bers and pipes; an annular vertical smoke-deflecting partition supported from said central water-chamber between the exterior and interior series of water-pipes, substantially as set forth.

5 6. In a steam-boiler, the combination of a lower annular water-chamber the central aperture of which forms a combustion-chamber; an upper annular water-chamber the central
10 aperture of which forms a smoke-passage; a central water-chamber forming a partition between said upper and lower chambers; a plurality of water-pipes communicating from said lower annular chamber to said central
15 chamber; a plurality of water-pipes communicating from said central chamber to said upper chamber; a plurality of water-pipes communicating from said lower chamber directly to said upper chamber past said central

chamber; an exterior wall inclosing said chambers and pipes; an annular vertical smoke-deflecting partition supported from said central water-chamber between the exterior and interior series of water-pipes; a central annular vertical partition suspended from said upper
20 water-chamber terminating at its lower end near said central water-chamber and adapted to serve as a deflector for retarding the escape of heat and products of combustion from the boiler, substantially as set forth. 25 30

In testimony whereof we affix our signatures in the presence of two witnesses.

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JOHN REICH.

Witnesses:

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