

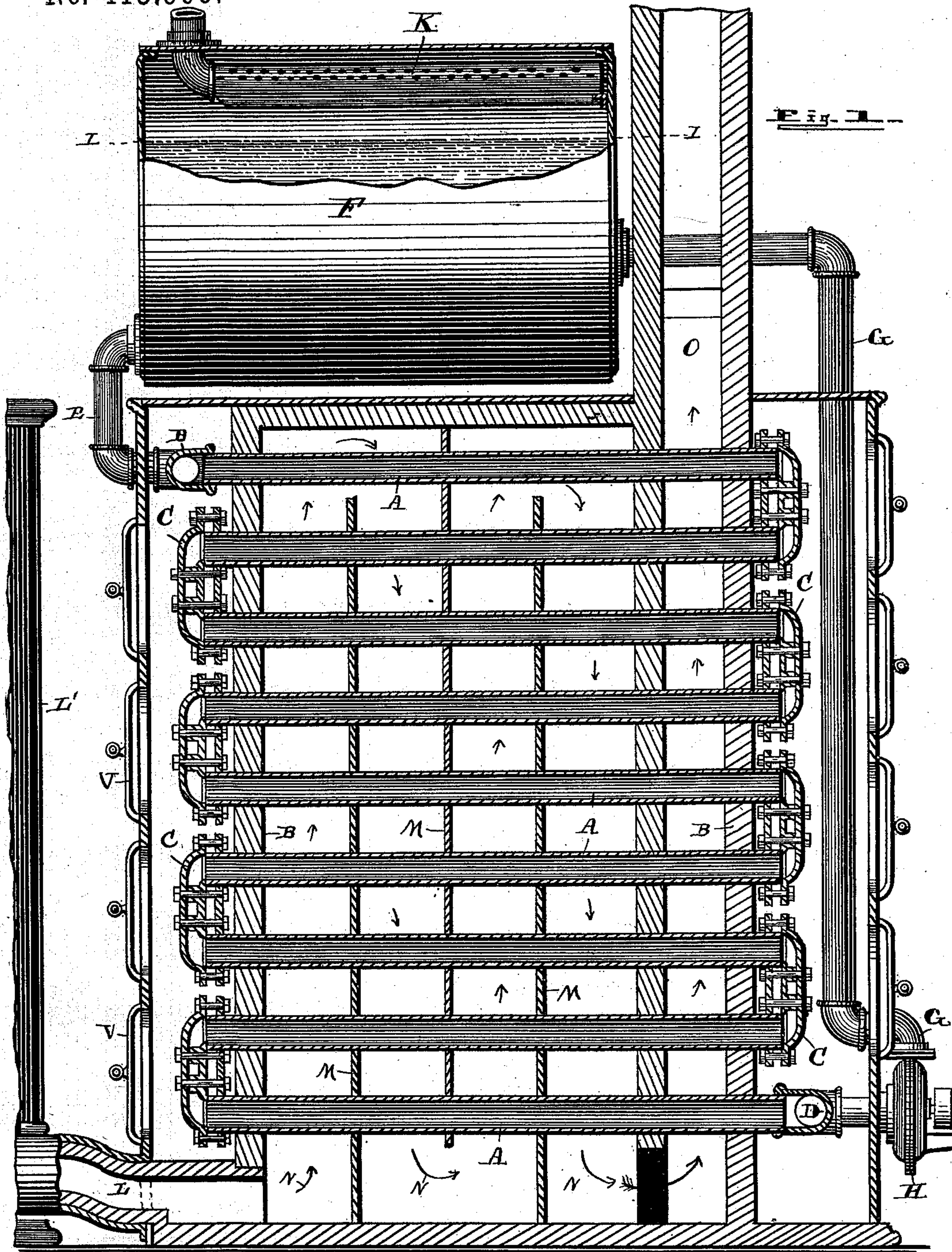
(No Model.)

3 Sheets—Sheet 1.

V. W. BLANCHARD,
STEAM BOILER.

No. 413,906.

Patented Oct. 29, 1889.



WITNESSES

P. L. Briggs.
A. E. Dorrill.

INVENTOR

Virgil W. Blanchard
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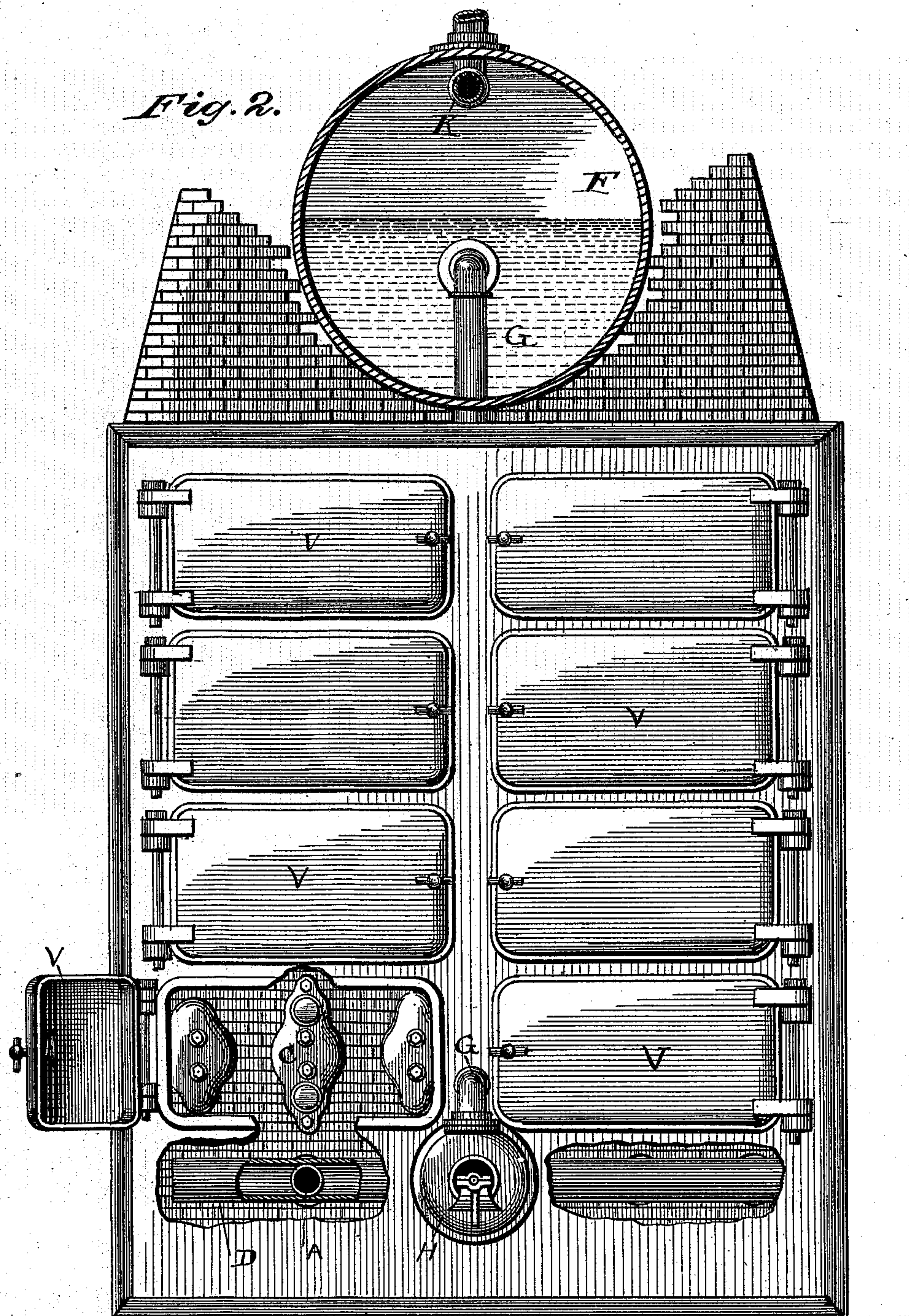
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3 Sheets—Sheet 2.

V. W. BLANCHARD.
STEAM BOILER.

No. 413,906.

Patented Oct. 29, 1889.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 3.

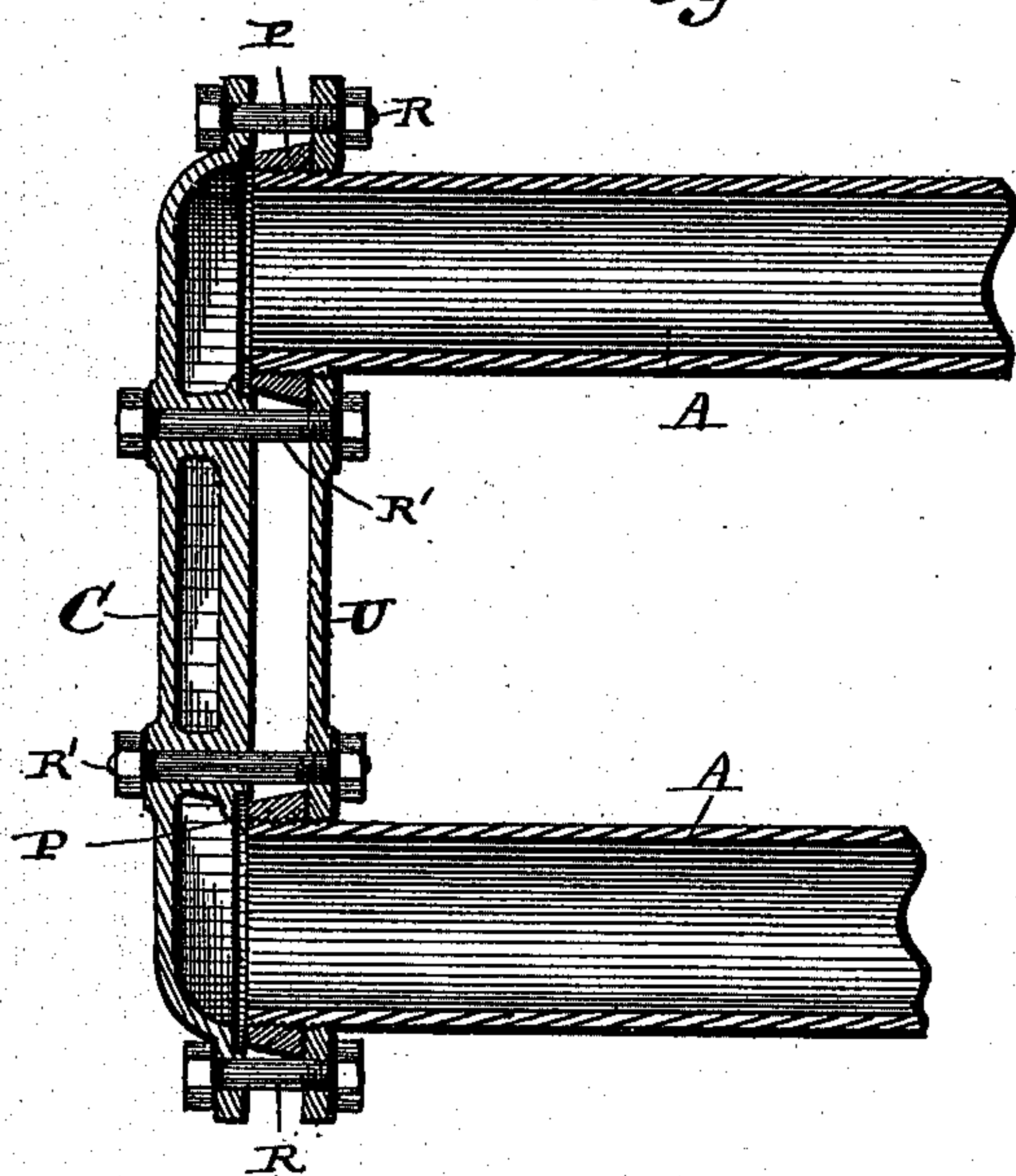


Fig. 4.

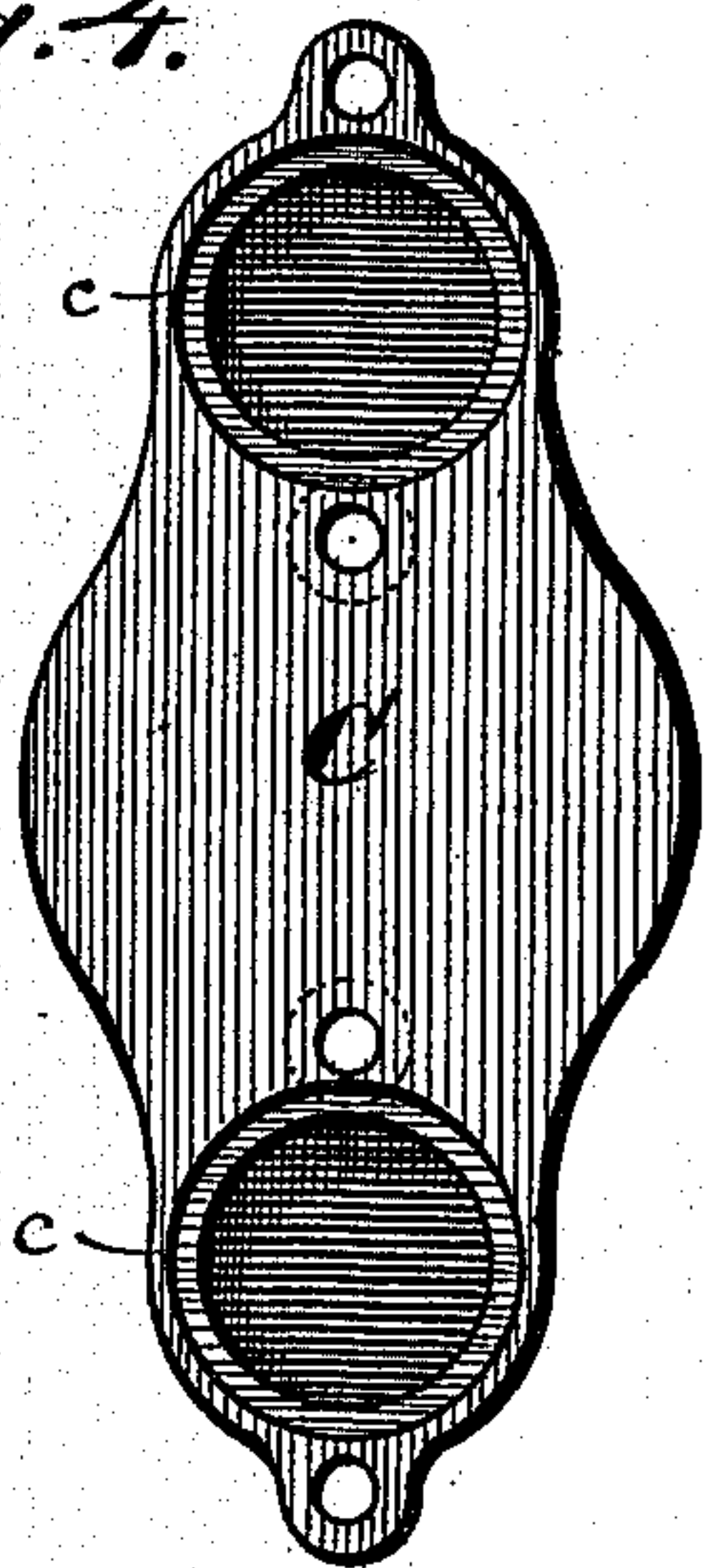
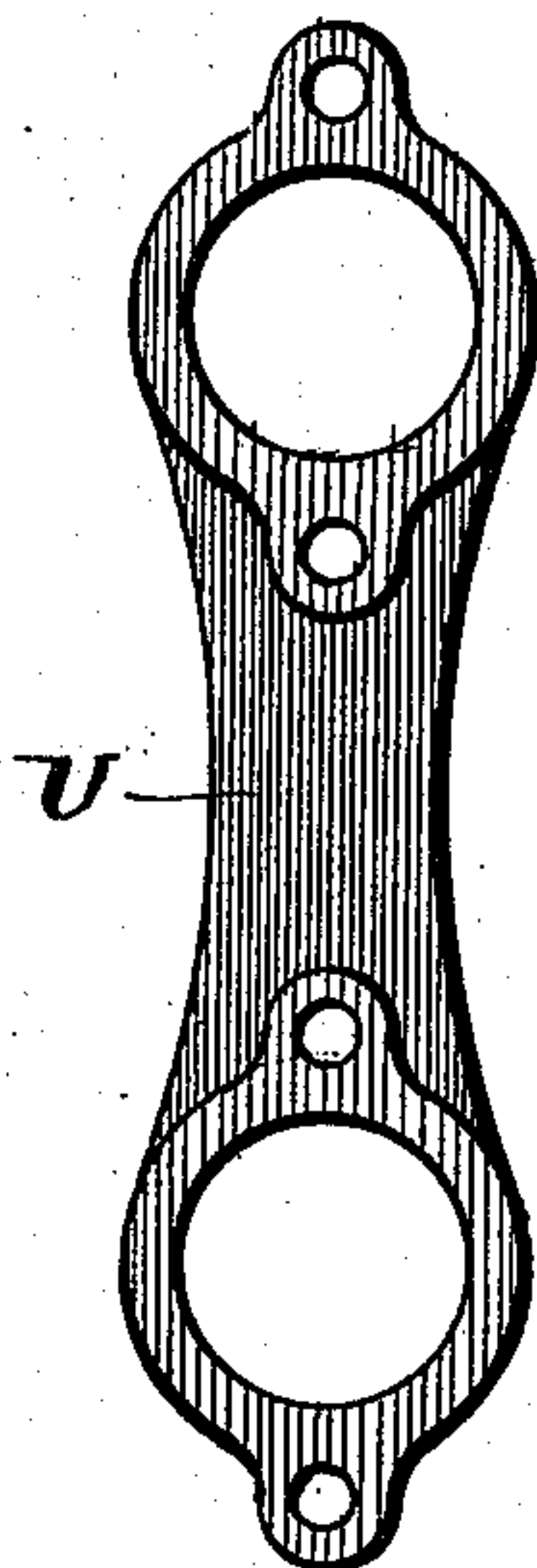


Fig. 5.



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UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y., ASSIGNOR TO JOSEPH A. DAVIS, OF SAME PLACE.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 413,906, dated October 29, 1889.

Application filed April 9, 1889. Serial No. 306,535. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a section taken vertically and longitudinally through my improved tubular steam-boiler on one side of the center thereof, showing part of a furnace communicating with it. Fig. 2 is an elevation of one end of the boiler, parts of which are broken away. Figs. 3, 4, and 5 are enlarged views in detail of the devices for making connections between the ends of the heating-pipes.

This invention relates to tubular steam-boilers, and especially to improvements on the tubular boiler for which Letters Patent of the United States were granted to me on the 11th day of December, 1883, numbered 289,962.

My present invention is designed for simplifying and rendering more safe, practicable, and useful a tubular steam-boiler wherein there is a mechanical as well as a natural circulation of water through the numerous heating-pipes which compose the boiler, as will fully appear from the following description, when taken in connection with the annexed drawings.

The steam-boiler represented in said drawings consists of layers of horizontal pipes which are supported near their extremities by means of vertical walls B B, each pipe being connected exteriorly to said walls by one of its extremities to a neighbor above and by its other extremity to a neighbor below by means of short elastic or yielding couplings C, hereinafter described. The couplings or pipe-connections C have sufficient rigidity to form perfect joints with the pipes they connect in the presence of a high steam temperature, and at the same time, by reason of their elasticity, they afford sufficient play for the

unequal expansion and contraction resulting from the differential temperature to which they are necessarily exposed.

The upper and lower layers of the heating-pipes A A enter each a common horizontal transverse pipe D, and from the highest pipe D there is a single pipe-connection E with a steam-drum F.

G designates a circulating-pipe having a screw or other suitable propeller-wheel in its course running in a closed vessel or case H, which pipe connects the steam-drum F with the lowest horizontal pipe D.

With the steam-drum F filled with water to the line I, by forcibly actuating the propeller-wheel in the vessel H a current of water will be forced into the lower horizontal pipe D, and thence equally through the layers of jointed pipes A A upward and into the upper common horizontal pipe D, and from this pipe into the steam-dome F, and on in a continuous uninterrupted journey. By this means the heat which is latent in the wall of the pipes A A is transmitted as rapidly as it is absorbed to the rapidly-moving water-current within them and conveyed to the steam-drum F for storage and utilization.

It is obvious that by means of the rapid mechanical circulation of water, as above described, the various parts of the boiler are kept at a comparatively uniform temperature; also, that no scale or earthy or mineral incrustation can find lodgment on the interior surfaces of the heating-tubes or their end couplings, and also that the boiler is absolutely free from all danger of explosion resulting from negligence or carelessness on the part of the engineer.

K designates a perforated steam-exit pipe leading from the upper part of the steam-drum F, and not herein claimed.

L designates a flue passing from the furnace L' and entering the draft-space inclosed by the walls B. The arrows N indicate the direction of the heated currents through said space, which is deflected in an up-and-down zigzag course by means of the partition-plates M. (Shown in Fig. 1.)

O represents the chimney, which may con-

tain air-heaters, if desired, (not shown herein,) for economizing the heat escaping there-through.

One of the elastic or yielding couplings is clearly shown in Fig. 3. In this figure annular bevel-faced ferrules P P are screwed on the ends of adjoining pipes A A, a clamping-strap or eye-piece U being first slipped on said pipes and yoking them together. C C designate flattened tubular connections having dressed openings c c at their ends in one face, in which openings are received the ferrules P P. The connections C are united to the strap U by means of bolts R R R' R', as shown, which firmly clamp the connections C to the pipes and bind the ferrules P P between the connections and strap U, making a water-tight joint, as is evident from the drawings. The pipes secured to connections C can be sprung toward or from each other slightly, the connections, owing to their peculiar construction, bending or yielding sufficiently to permit this without weakening the joints. The extremities of pipes A A are thus united by a secure and sufficiently yielding or flexible connection to compensate for any undue expansion that may result from a differential temperature in the aforesaid pipes, for it is known that a flattened tube, as designated by the letter C, having thin walls, possesses considerable natural flexibility in the direction of its shortest diameter, much more in proportion to its area than a cylindrical tube has.

In Fig. 2 I show doors V in the outer casing of the boiler, through which easy access may be had to the jointed extremities of the heating-pipes A A outside the walls B B. By this means any leakage of the joints by which pipes A A are connected may be repaired without removing them from their position.

Having described my invention, I claim—

1. In a tubular steam-boiler, the combina-

tion of a series of water-pipes with the flattened tubular connections C and the clamping-straps U, substantially as and for the purpose specified.

2. The combination of the connected series of water-pipes, the steam-dome, and the pipe connecting the upper series of water-pipes to said dome, with a propeller and casing, a pipe connecting the steam-dome and propeller-casing, and the pipe-connections between said casing and the lowermost series of water-pipes, all substantially as and for the purpose specified.

3. The combination of the supporting-walls and chimney and partitions arranged to form a zigzag flue between said walls, with a series of water-pipes extending through said walls and partitions, and the flattened tubular connections C for the extremities of said pipes, substantially as specified.

4. The combination of the water-pipes having ferruled ends, the clamping-straps U, the tubular flattened connections C, and the uniting-bolts, all substantially as described.

5. The herein-described tubular boiler, consisting of a series of water-pipes, supporting-walls therefor, partitions between said walls, the tubular flattened connections C for the water-pipes outside the walls, the steam-dome, the pipe-connections between the upper series of water-pipes and the dome, the pipes connecting said dome with the lowest series of water-pipes, and the inclosing-casing provided with a series of doors opposite the ends of the water-pipes, substantially as and for the purpose set forth.

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

VIRGIL W. BLANCHARD.

Witnesses:

W. R. KEYWORTH,
F. O. MCCLEARY.