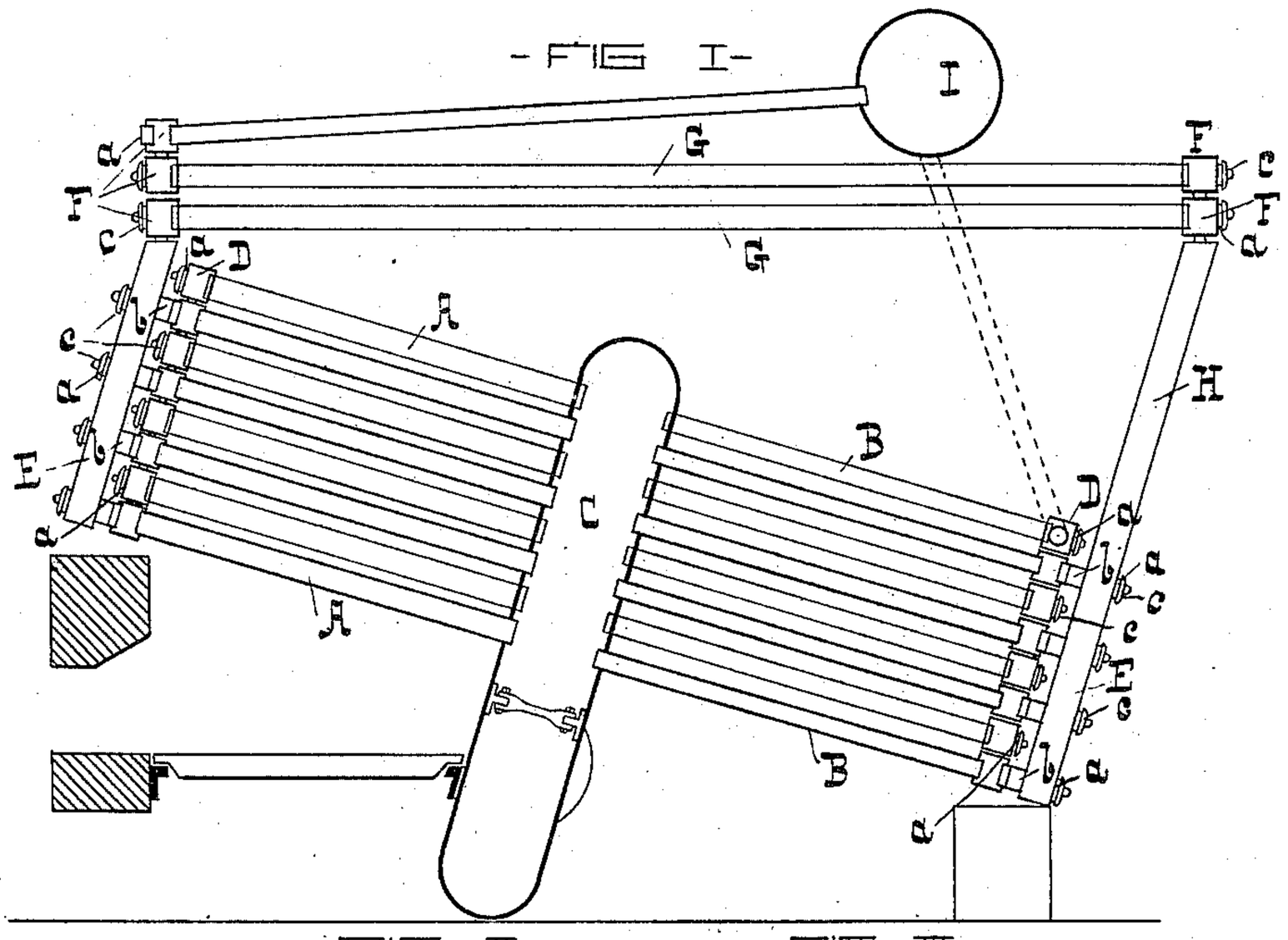
(No Model.) 2 Sheets—Sheet 1.

E. J. MOORE.

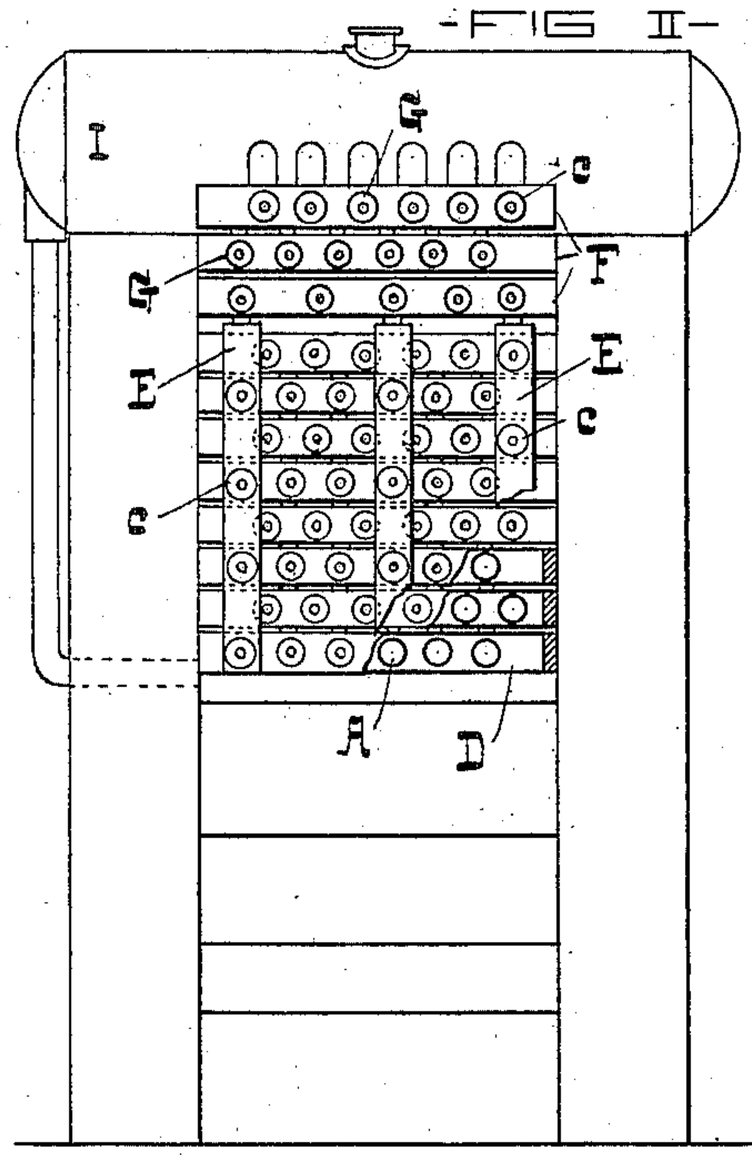
WATER TUBE BOILER.

No. 309,352. Patented Dec. 16, 1884.

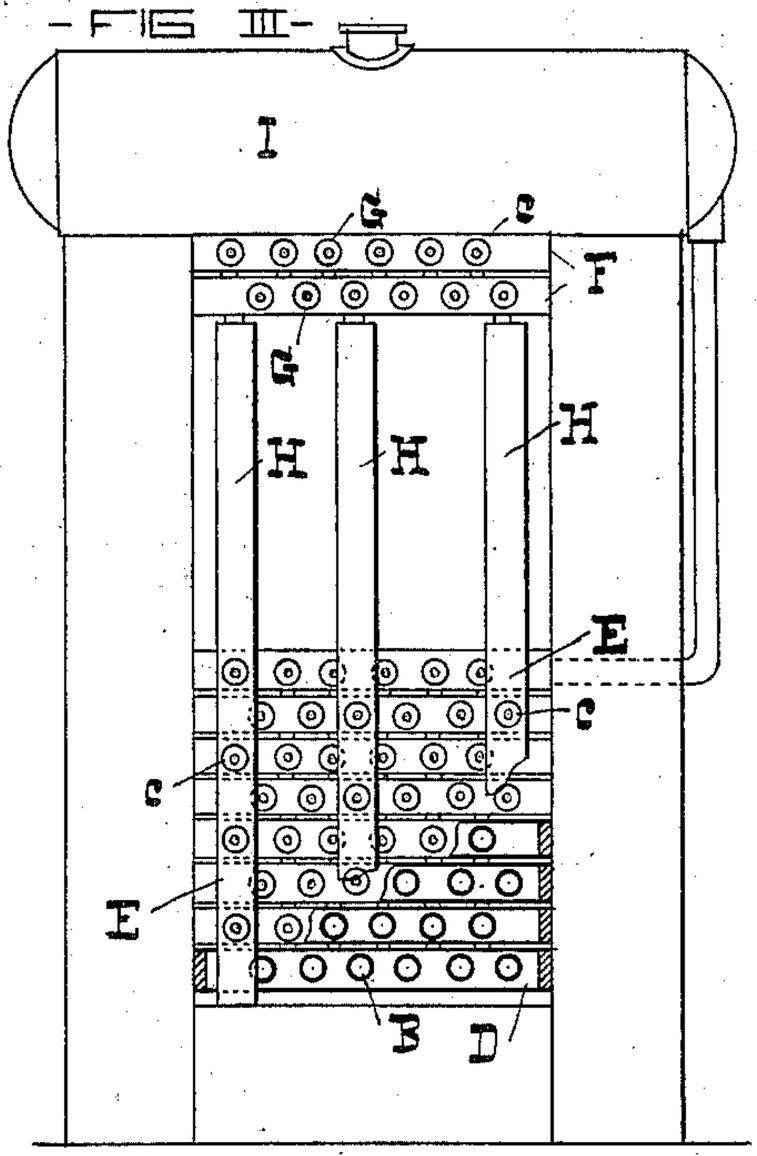
-FIG I-



-FIG II-



-FIG III-



-WITNESSES-

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(No Model.)

2 Sheets—Sheet 2.

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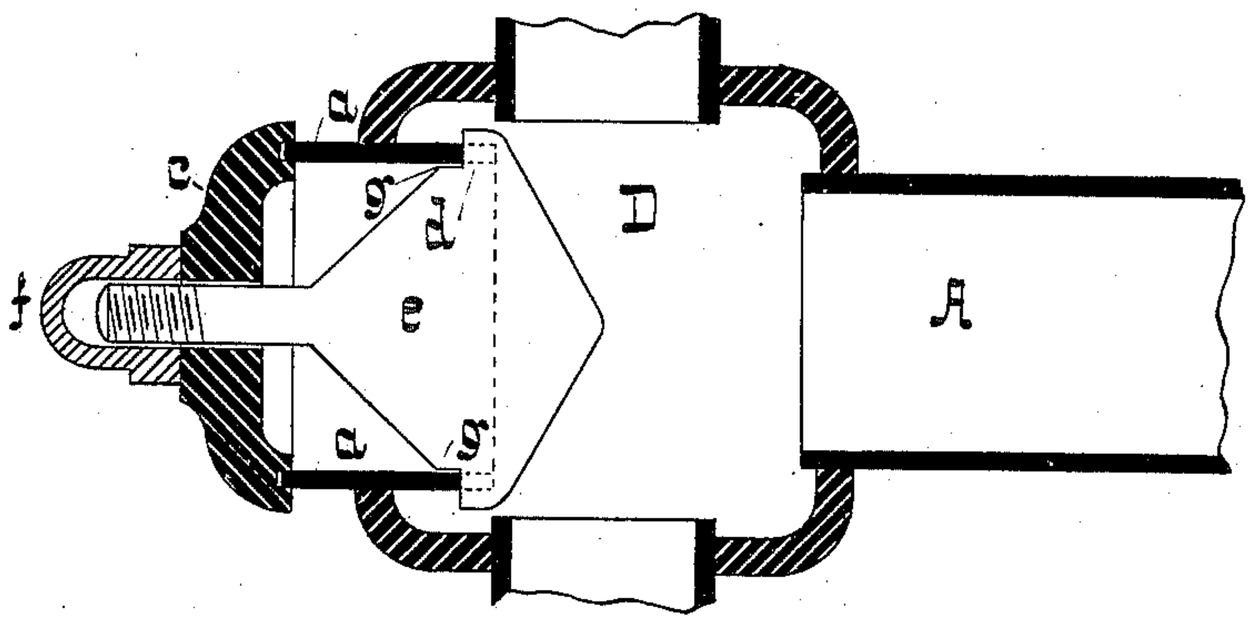
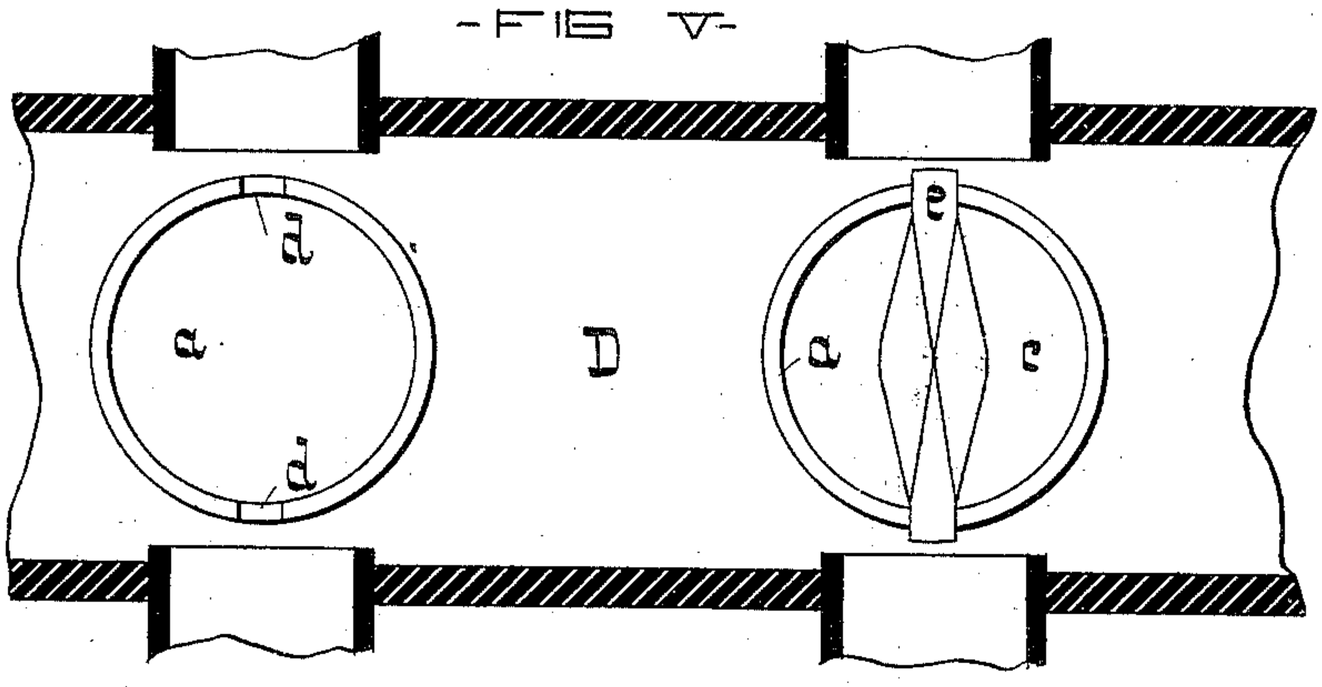
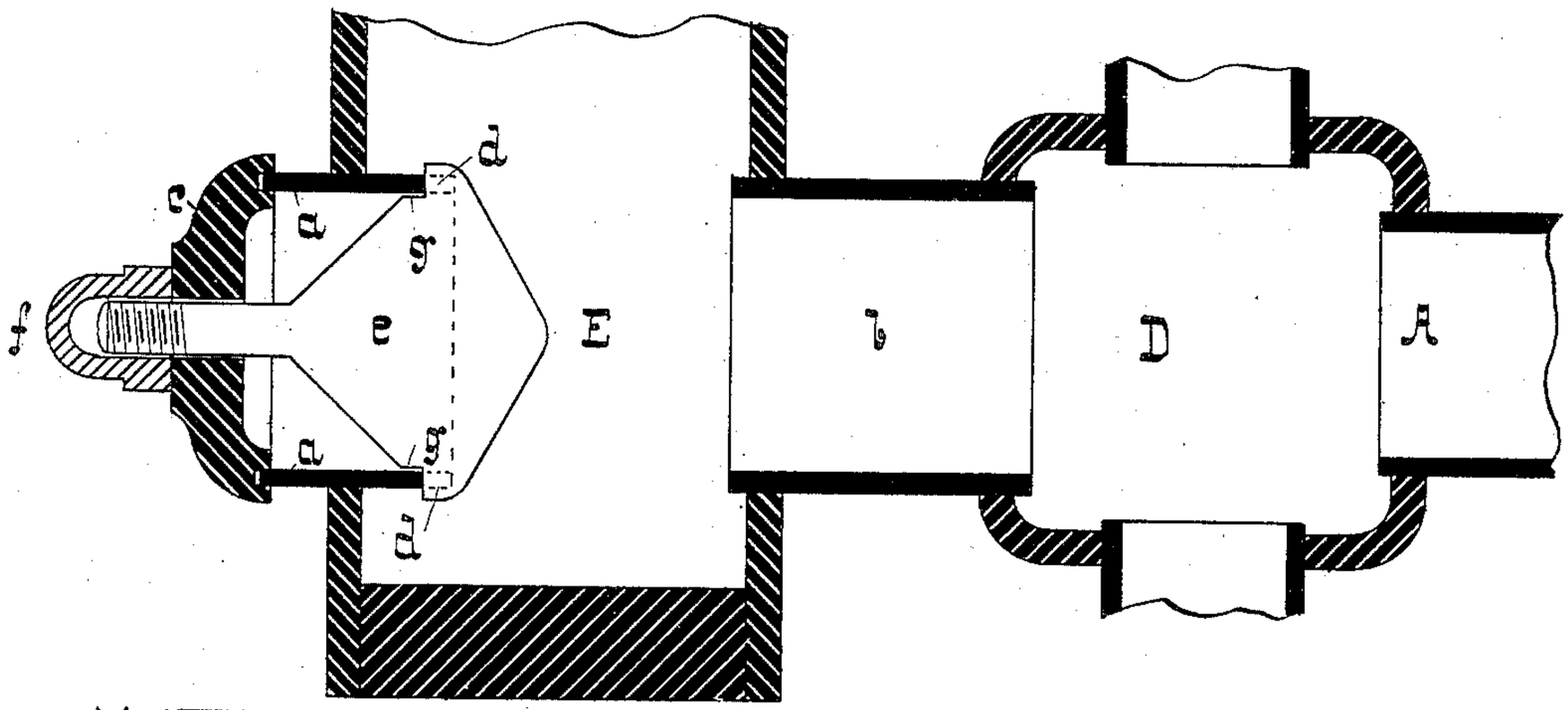
-FIG IV-



-FIG V-



-FIG VI-



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UNITED STATES PATENT OFFICE.

EDWARD J. MOORE, OF BALTIMORE, MARYLAND.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 309,352, dated December 16, 1884.

Application filed February 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. MOORE, of the city of Baltimore and State of Maryland, have invented certain Improvements in Water-Tube Boilers, of which the following is a specification.

This invention consists, first, in constructing what are generally termed the "legs" or "headers" of a boiler wholly or in part of polygonal tubes placed side by side, and united at several points throughout their length by means of thimbles which are secured in the adjoining faces or sides of the tubes.

The said invention consists, secondly, in uniting the front and rear legs or headers, constructed in the manner above described, by means of a system of tubes divided into two lengths or sections of different diameters, united by a central leg, into which the ends of the tubes are expanded.

The said invention consists, thirdly, in combining with the front leg or header, constructed as described, a series of vertical tubes of polygonal shape, located exteriorly of the leg, into which steam as formed in the heating-tubes and the legs is delivered and carried to the drum.

The said invention consists, fourthly, in combining with the exterior vertical polygonal tubes aforesaid a gang of pipes, which forms the means of communication between the said tubes and the steam-drum, the said gang being in contact with the fire in such manner as to admit of the steam therein being superheated, and also provided with a system of circulating-pipes to conduct water carried forward and upward with the steam to the rear or back leg.

The said invention consists, fifthly, in providing the cleaning-apertures opposite the various tubes with thimbles having slotted inner ends, and the said thimbles with exterior caps and anchor-bolts, the enlarged ends of which rest in the slots in the thimbles aforesaid.

The said invention consists, sixthly, in certain details of construction of various parts of the boiler, as will hereinafter fully appear.

In the further description of the said invention which follows, reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure I is a longitudinal section of the improved boiler. Fig. II is a partly-sectional front view of the boiler. Fig. III is a partly-sectional rear view of the invention. Figs. IV, V, and VI are views of parts of the invention on an enlarged scale.

A and B are respectively the front and rear water-heating tubes, connected by the leg C, into which they are expanded. The leg C is wide enough to admit of the entrance thereto of a person to clean the tubes, or to expand them in the building or repairs of the boiler. The said leg is suitably braced to give it strength; but only one of the braces is shown in the drawings, and that is in Fig. I. The tubes A have an internal diameter greater than the external diameter of the ones B. Consequently the tubes B may be inserted through the ones A in the construction or repair of the boiler.

D D are polygonal tubes, preferably with a practically square cross-section, as shown, in which the heating-tubes A and B are inserted and expanded. The polygonal tubes may be made of either cast, malleable, or wrought iron or steel, and if of either wrought-iron or steel they can be first made of a circular shape, and then heated and rolled into the polygonal form. The object of this polygonal form is to obtain a flat surface into which the heating-tubes are inserted and expanded, and also to admit of the insertion and expansion of thimbles opposite to the tubes, which thimbles are provided with caps, and bolts to hold the caps in place, as hereinafter fully described. The said thimbles, which are denoted by *a* and *b*, are of two kinds, the ones *a* (see particularly Figs. IV and V) having caps *c*, and the others, *b*, (see Fig. VI,) being used to connect the polygonal tubes D with the vertical exterior tubes, E, which have a polygonal cross-section corresponding to that of the ones D. The thimbles *a* have notches *d* at their inner ends, into which the anchor-bolts *e* are inserted. These notches prevent the anchor-bolts turning in screwing up the nuts *f*, and the said bolts having a shoulder, *g*, slightly less in diameter than the interior of the thimble, they are invariably drawn into

a central position. The caps *c* may be of any suitable description; but they are preferably grooved, and the grooves filled with metallic packing, which is forced closely in contact with the ends of the thimbles *a*.

F F are polygonal tubes located above and secured in any suitable manner to the tubes E E, and the front and rear ones are connected by pipes G, which extend longitudinally of the boiler in the form of a gang, and the rear end of the gang is united to the rear exterior vertical tubes, E, by pipes H, through which water carried with the steam toward the drum I is returned to the boiler proper. It will be seen that the central leg, C, is used as a flame-deflecting plate and a bridge-wall, and its lower end is employed as a mud-drum.

I claim as my invention—

1. In a water-tube boiler, the legs or headers thereof, constructed wholly or in part of polygonal tubes placed side by side, and united at several points throughout their length by means of thimbles which are secured in the adjoining faces or sides of the said tubes, substantially as specified.

2. In a sectional water-tube boiler, the front and rear legs thereof, constructed wholly or in part of polygonal tubes placed side by side, and united at several points throughout their length by means of thimbles secured in the adjoining faces or sides of the said tubes, combined with a system of inclined heating-tubes in two lengths or sections of different diameters, which are connected by a central leg, substantially as specified.

3. In a water-tube boiler, the legs or headers thereof, which consist wholly or in part of pologyonal tubes placed side by side, and united at several points throughout their length by means of thimbles which are secured into adjoining faces or sides of the said tubes, combined with a series of exterior vertical polygonal tubes to conduct steam from the various rows of heating-tubes toward the drum, substantially as specified.

4. In a water-tube boiler, the legs thereof opposite the water-tubes provided with thimbles having slotted inner ends, exterior caps, and anchor-bolts adapted to rest in the said slots, substantially as and for the purpose specified.

5. In a sectional water-tube boiler, the heating-tubes thereof in two lengths or sections of different diameters connected by a central leg, which extends to a point below the grate-bars to form a bridge-wall, substantially as specified.

EDWARD J. MOORE.

Witnesses:
WM. T. HOWARD,
CHAS. B. CASSADY.