

No. 669,181.

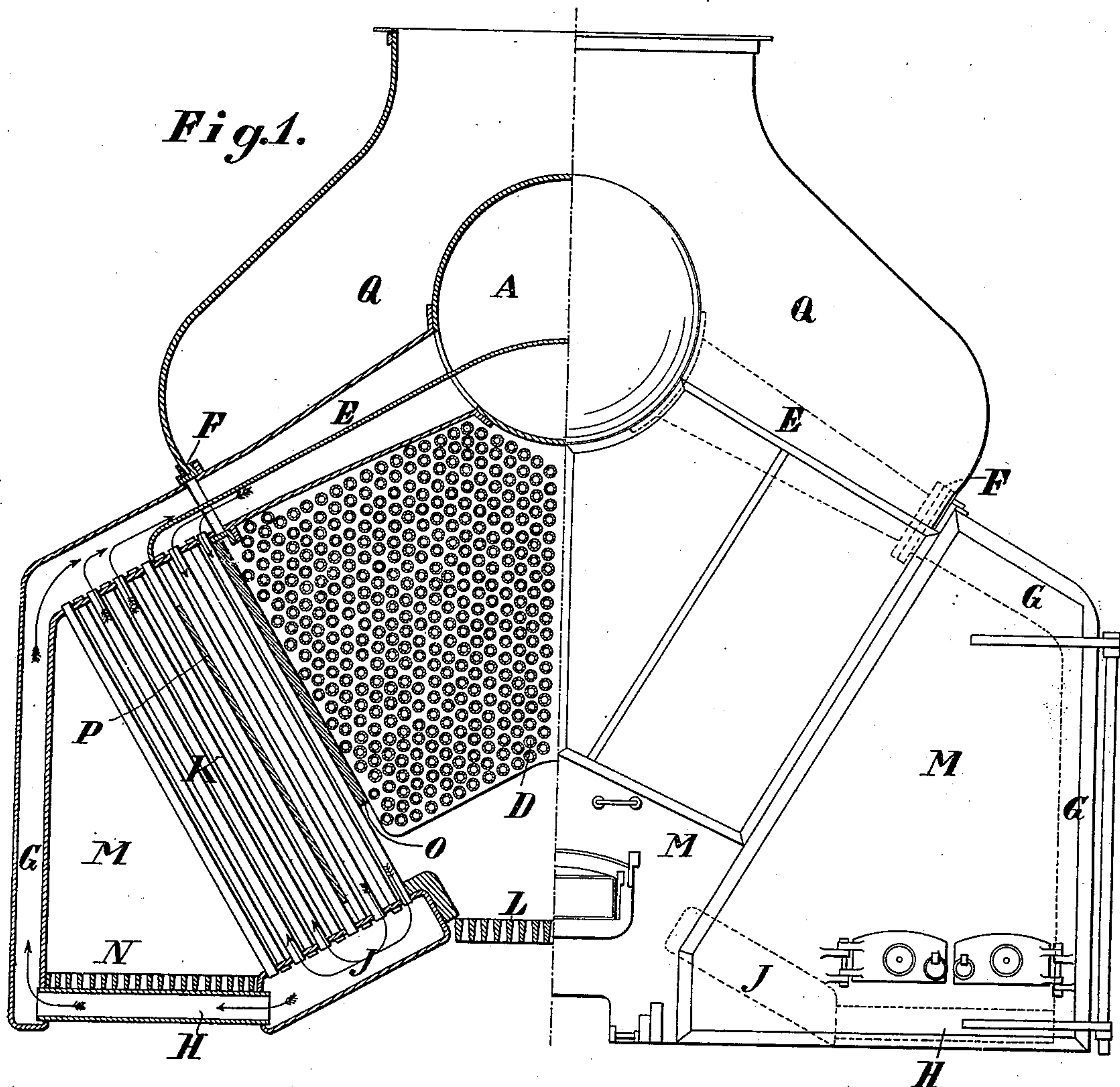
Patented Mar. 5, 1901.

F. REUSING.
WATER TUBE BOILER.

(Application filed Mar. 8, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
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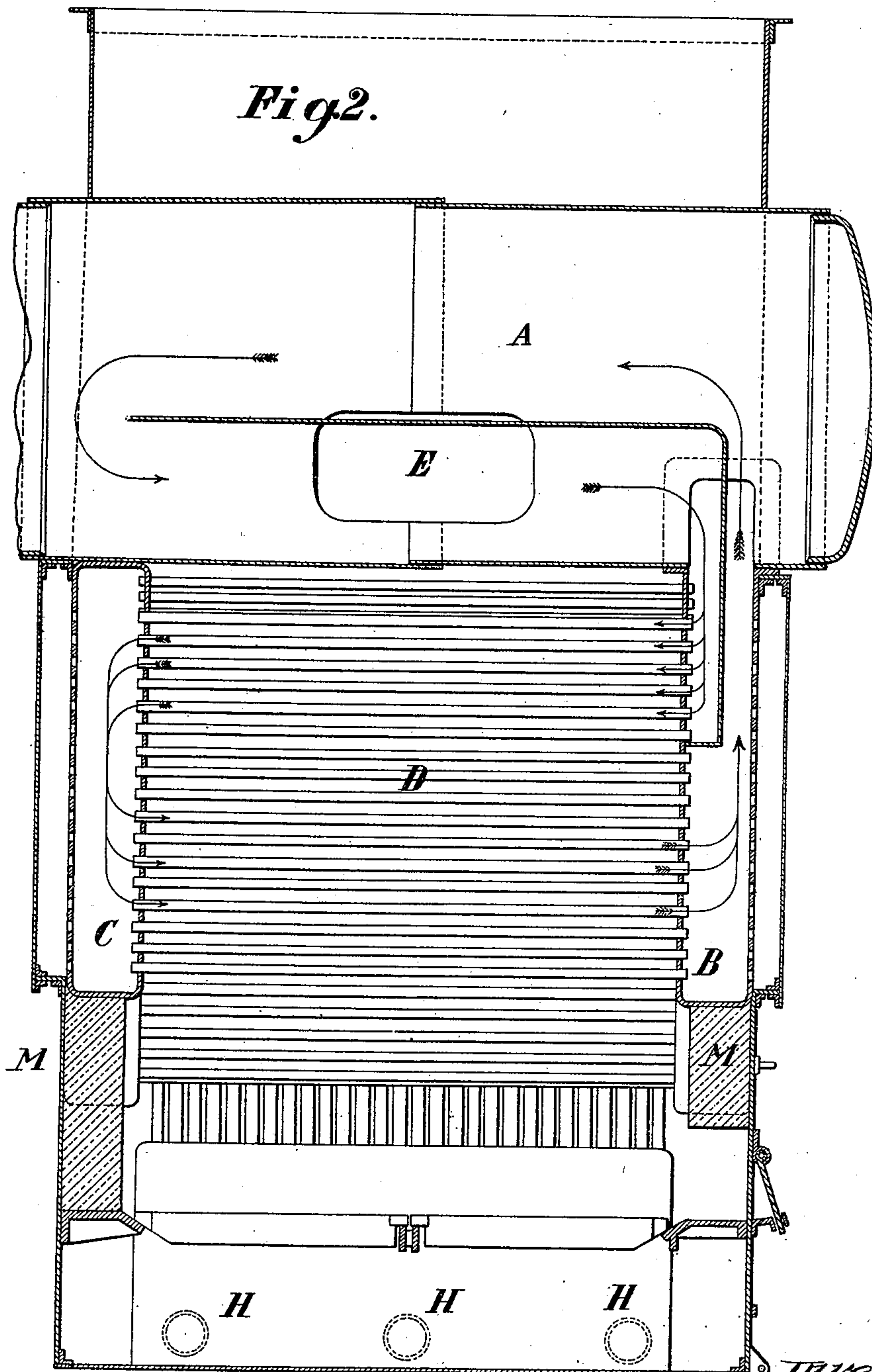
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3 Sheets—Sheet 3.

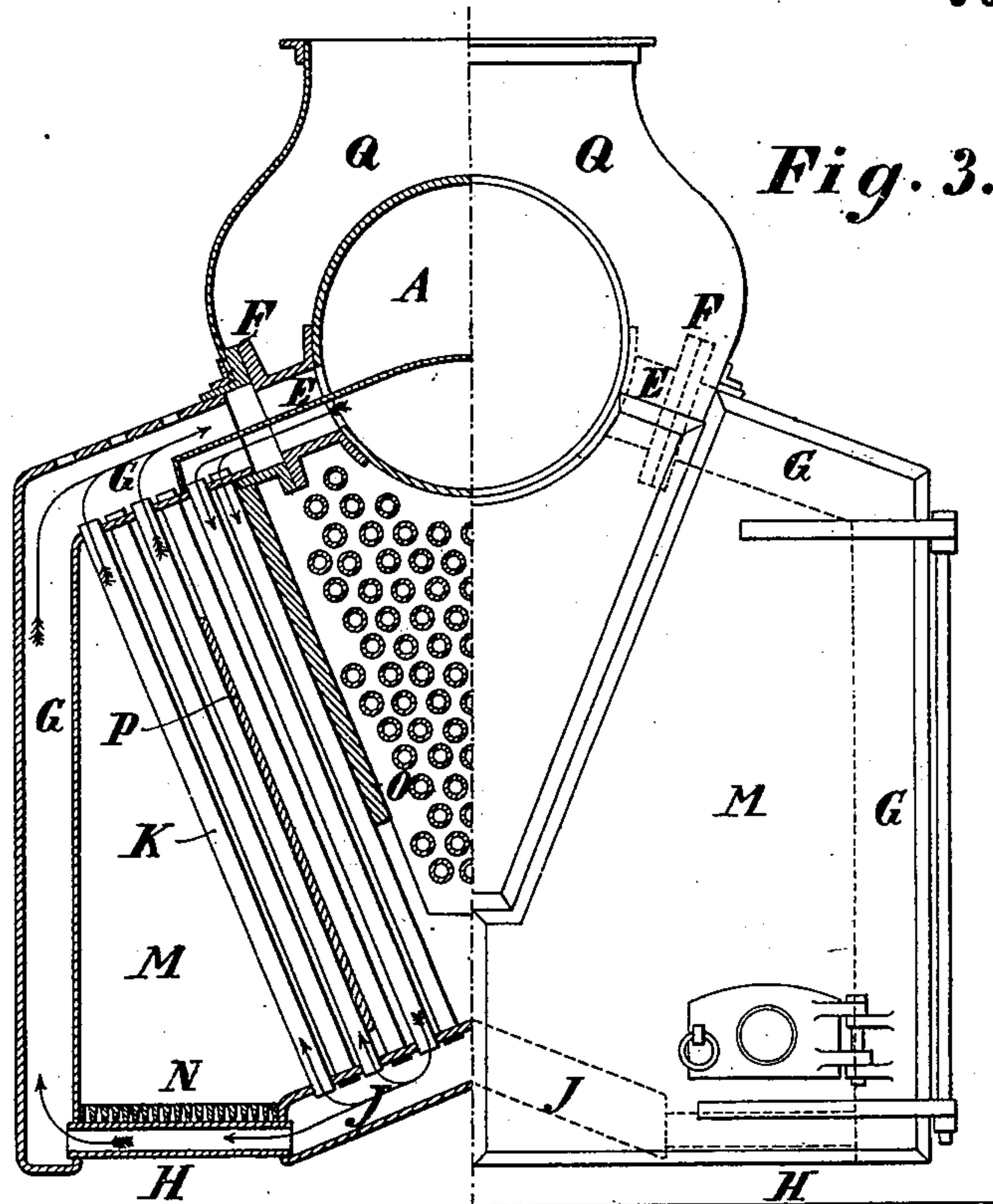


Fig. 3.

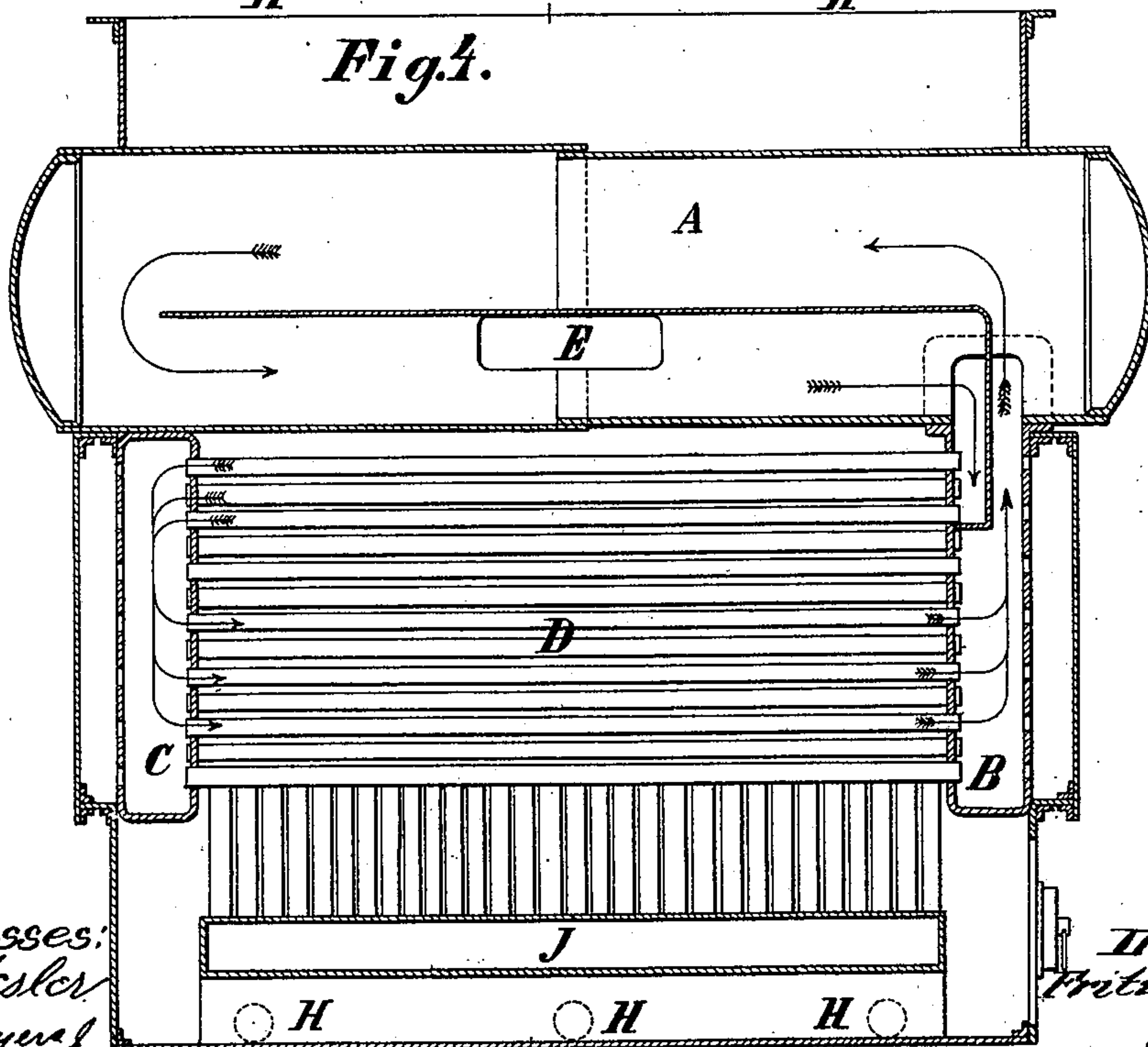


Fig. 4.

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UNITED STATES PATENT OFFICE.

FRITZ REUSING, OF MULHEIM, GERMANY.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 669,181, dated March 5, 1901.

Application filed March 8, 1900. Serial No. 7,873. (No model.)

To all whom it may concern:

Be it known that I, FRITZ REUSING, a subject of the King of Prussia, German Emperor, and a resident of Mulheim, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Water-Tube Boilers, (for which I have applied for a patent in Germany, dated July 20, 1899, and in England, dated January 29, 1900,) of which the following is a specification.

My invention relates to an improved **U S** construction of water-tube boilers in which groups of horizontal water-tubes are combined with groups of vertical or inclined water-tubes, each of which is connected separately to an upper steam-chamber common to all of them, the furnace chamber or chambers being formed either by the groups of tubes, water-chambers, and front walls or doors of the casing or only by the tube groups and the said front walls or doors of the casing. Thus as the boiler is composed of separate conveniently-handled parts it can readily be erected or taken to pieces and cleaned.

I will describe my said invention with reference to the accompanying drawings, in which—

Figure 1 shows a part front elevation and part cross-section, and Fig. 2 a longitudinal section; of a water-tube boiler with a central furnace-grate, while Figs. 3 and 4 show similar views of a modified construction with only two lateral furnace-grates.

The boiler shown at Figs. 1 and 2 consists of a water and steam chamber A with two lateral compartments B and C, of which B, Fig. 2, is fixed rigidly to the chamber A, while C is not so fixed, but can move freely in following the expansion and contraction of the horizontal tube group D. From each side of the chamber A larger tubes E E branch off, to which are connected at F the water-chambers G G. These chambers G G, which constitute the side walls of the boiler, are connected by the tubes H, on which are laid the lateral grate-bars N with the chambers J J. These water-chambers J and the **U S** water-chambers G are also connected together by means of approximately vertical tubes K K in such manner that between the tube group K and the water-chamber G is formed the one lateral furnace-chamber. Between the

chambers J and about the same height as the lower ends of the tube groups K is arranged the third fire-grate L. The furnace-chambers are inclosed at front and back by the doors M, lined with refractory material. The combustion-gases rising from the furnace-grates N pass in contact with the tube groups K, arranged in inclined positions, and are led by the partition-walls O and P in such manner that they are made to combine with the gases rising from the furnace-grate L and pass, together with these, in contact with the water-tube group D. From these the gases rise on either side of the upper water and steam chamber A and eventually escape into the smoke-box Q and uptake. On disconnecting the flanged joints F F, which are arranged either just within the walls of the smoke-box Q or outside these, the chamber A, together with the horizontal water-tubes, can be removed, so that by this means the boiler can be readily taken to pieces, cleaned, and, if necessary, repaired and reerected. In the smoke-boxes Q may be arranged a superheater, if required.

The modified construction shown at Figs. 3 and 4 is generally similar to the above described, with the exception that the middle fire-grate is omitted, so that the bottom water-chambers J J meet. In this case the combustion-gases from the furnace-grates N first pass in contact with the inclined tube groups K and then with the horizontal tube group D, from which they pass in contact with the chamber A, and thence into the smoke-box Q and uptake. The other parts of the boiler are designated by the same letters of reference as the corresponding parts of the first construction and need not be further referred to.

The arrows indicate the direction of the circulation of the water and steam in both constructions.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a tubular boiler, the combination of a steam-chamber, lateral compartments connected with said chamber, a series of horizontally-arranged tubes disposed between said compartments and opening thereinto, water-

jackets adapted to form the side walls of the boiler, pipes connecting said jackets with said steam-chamber, water-chambers disposed at the bottom of said boiler, tubes connecting
 5 said chambers with said jackets, a grate disposed over said tubes and a series of approximately vertical tubes connecting the water-chamber at the bottom of the boiler with the water-jacket at the top and forming a furnace-chamber.
 10

2. In a tubular boiler, the combination of a steam-chamber, groups of horizontally-disposed tubes connected with said chamber, groups of vertically-inclined tubes also connected with said chamber, water-jackets surrounding said boiler, and furnace-chambers
 15 formed between said jackets and tubes.

3. In a tubular boiler, the combination of a steam-chamber, a central group of horizontal
 20 tubes connected therewith, inclined tube groups disposed on opposite sides of said central group also connected with said chamber, and furnace-chambers disposed adjacent to said groups of tubes.

4. In a tubular boiler, the combination of a steam-chamber, a central horizontal tube group connected therewith, inclined tube groups also connected with said steam-chamber, water-jackets connected with said steam-
 25 chamber and furnace-chambers disposed between said water-jackets and said inclined tube groups.
 30

5. In a tubular boiler, the combination of a steam-chamber, a central horizontal tube

group connected therewith, inclined tube groups also connected with said steam-chamber, water-jackets connected with said steam-chamber and furnace-chambers disposed between said water-jackets and said inclined tube groups, and a middle furnace-chamber
 35 40 45 50 55 60
 formed by said inclined tube groups and the doors of the boiler.

6. In a tubular boiler the combination of a steam-chamber, a smoke-box surrounding said chamber, tubes leading from said chamber, water-jackets detachably connected with said tubes, a central horizontal tube group disposed below said steam-chamber and connected therewith, inclined tube groups also connected with said chamber, a water-chamber disposed below said inclined tube groups, a detachable pipe connecting said water-chamber with said water-jackets, and a grate disposed over said pipe.

7. In a tubular boiler, the combination of a horizontal tube group, a steam-chamber disposed above said tube group and provided with a freely-movable compartment, and a compartment rigidly fixed to said chamber, said tube group being disposed between said
 55 60
 compartments and opening thereinto.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

FRITZ REUSING.

Witnesses:

F. E. MALLETT,
 KARL SCHMITT.