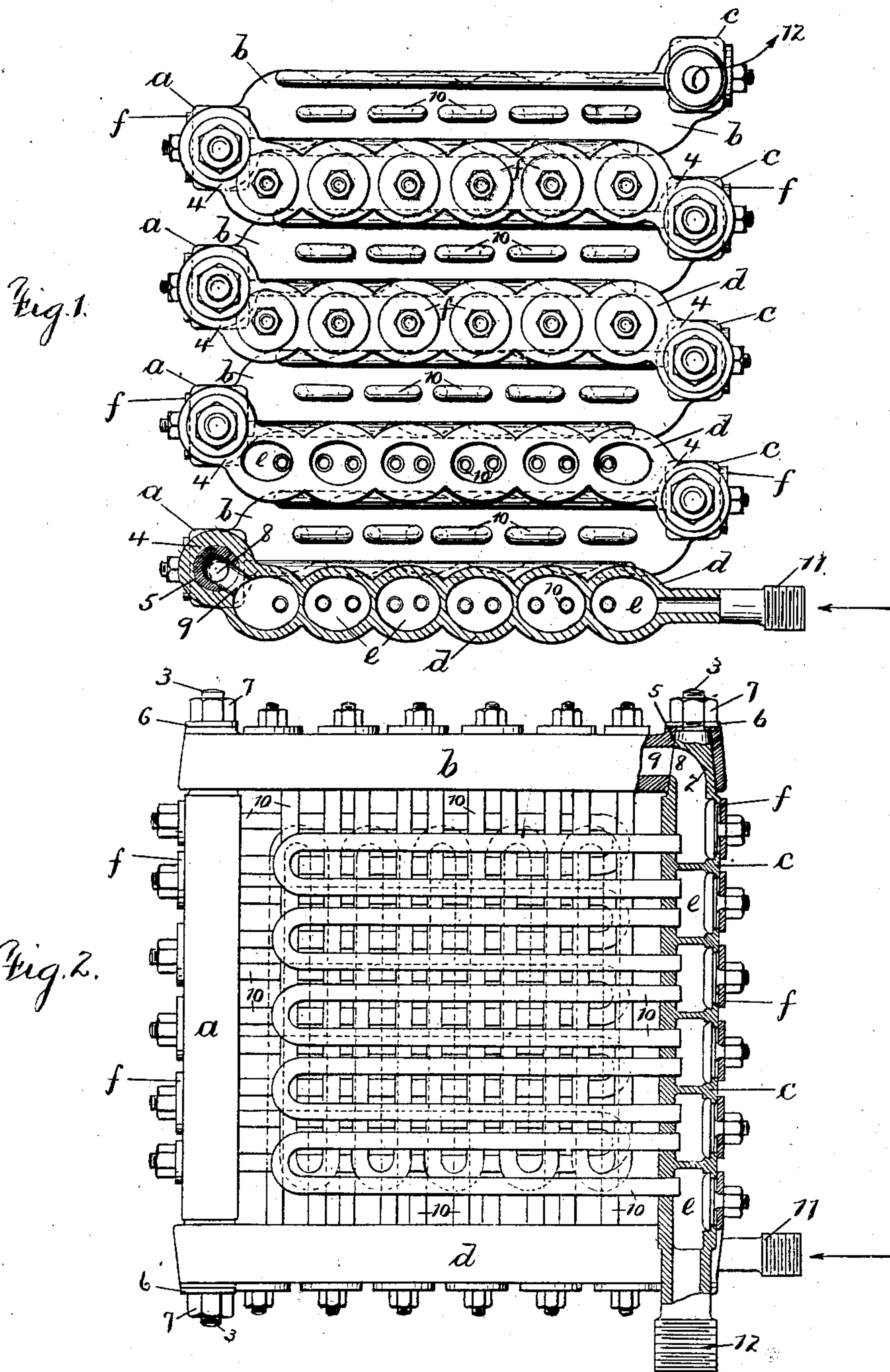


C. CAMPUS.  
STEAM BOILER.

APPLICATION FILED OCT. 11, 1902.

NO MODEL.



Witnesses  
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## UNITED STATES PATENT OFFICE.

CESARE CAMPUS, OF NAPLES, ITALY.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 736,068, dated August 11, 1903.

Application filed October 11, 1902. Serial No. 126,871. (No model.)

*To all whom it may concern:*

Be it known that I, CESARE CAMPUS, a subject of the King of Italy, residing at Naples, in the Province of Campania, Italy, have invented an Improvement in Steam-Boilers, of which the following is a specification.

My invention relates to steam-boilers of the water-tube type, and particularly to the water-tube sections thereof; and my invention is especially applicable for use in connection with automobiles employing steam as a motive power.

In carrying out my invention I employ a series of collector-sections suitably secured together and preferably arranged in a quadrangular rising series, and each collector-section is divided into a number of separate and independent compartments. I also employ a number of water-tube sections which are preferably U-shaped and are connected with the said compartments and extend inwardly from the collector-sections, so that the feed-water circulates through the tube-section of one collector-section to and through the tube-section of the next adjacent collector-section, and so on through the entire tubular heating-sections. I also employ suitable means in connection with the collector-sections whereby the water-tube sections are readily accessible for the purpose of cleaning.

In the drawings, Figure 1 is an elevation and partial vertical section illustrating my invention, and Fig. 2 is a plan and partial horizontal section of the same.

*a b c d* represent collector-sections forming the respective sides of a hollow quadrangle which they form, rising in tiers one above the other, and each section is divided into a number of separate and independent compartments *e*. The opposite sections *a* and *c* are preferably straight and provided with tapering ends 2, fitted with stud-bolts 3, and the other opposite sides *b* and *d* have offset ends 4, one end being inclined upward and the other downward, both ends being provided with openings 5, adapted to receive the tapering ends 2 of the sections *a* and *b*, so that by means of plates 6 and bolts 7 the various collector-sections may be drawn tightly together and so held. The tapering end portions and the offset portions are provided with passages 8 and 9, respectively, so that

there is free communication between the end compartments of adjacent collector-sections.

Each collector-section is provided with a number of tube-sections 10, each of which latter is preferably U-shaped. The respective ends of the tube-sections are connected to and brought into communication with adjacent independent compartments of the collector-sections, the joint being made by reaming, calking, or other means by which a tight joint may be secured. The tube-sections 10 all extend inwardly from their respective collector-sections, forming a mass of overlapping and overlying tube-sections.

The independent compartments of the collector-sections are all provided with hand-holes and hand-hole cover *f*, which are readily removable and by means of which access to the interior of the tube-sections may be had for the purposes of cleaning the same.

One of the collector-sections is provided with an inlet 11 and an another with an outlet 12. Assuming the feed-water to be admitted at the inlet 11, the water passes to and through the compartments and tube-sections of the first collector-section *d*, then to and through the compartments and tube-sections of the collector-section *a*, then to the collector-sections *b* and *c*, and so on through to the outlet 12.

I claim as my invention—

1. In a water-tube boiler, a series of collector-sections arranged in a hollow quadrangle one above the other and each section having a number of separate and independent compartments, and water-tubes connected to and extending inwardly from said collector-sections, substantially as described.

2. In a water-tube boiler, a series of collector-sections arranged in a hollow quadrangle one above the other and each section having a number of separate and independent compartments, water-tubes connected to and extending inwardly from said collector-sections, and means for gaining access to said water-tubes for the purpose of cleaning, substantially as described.

3. In a water-tube boiler, a series of collector-sections arranged in pairs in a hollow quadrangle one above the other and each section having a number of separate and independent compartments, the ends of each sec-



tion of corresponding pairs being tapering and provided with stud-bolts, the ends of the other opposite pairs of sections being offset and provided with openings into which the aforesaid tapering ends are adapted to fit, and water-tubes connected to and extending inwardly from all of said collector-sections each of which tubes has its respective ends in communication with adjacent compartments in a collector-section, all of which sections are so connected, substantially as described.

4. In a water-tube boiler, a series of collector-sections arranged in pairs in a hollow quadrangle one above the other and each section having a number of separate and independent compartments, the ends of each section of corresponding pairs being tapering and provided with stud-bolts, the ends of the other opposite pairs of sections being offset and provided with openings into which the aforesaid tapering ends are adapted to fit, water-tubes connected to and extending inwardly from all of said collector-sections each of which tubes has its respective ends in communication with adjacent compartments in a collector-section, all of which sections are so connected, and means of access to the interior of the water-tubes for the purposes of cleaning, substantially as described.

5. In a water-tube boiler, a series of collector-sections arranged in pairs in a hollow quadrangle one above the other and each sec-

tion having a number of separate and independent compartments each having a hand-hole therein, the ends of each section of corresponding pairs being tapering and provided with stud-bolts, the ends of the other opposite pairs of sections being offset and provided with openings into which the aforesaid tapering ends are adapted to fit, water-tubes connected to and extending inwardly from all of said collector-sections each of which tubes has its respective ends in communication with adjacent compartments in a collector-section, all of which sections are so connected, and hand-hole covers for the said hand-holes by the removal of which access may be gained to the interior of the water-tubes, substantially as described.

6. In a water-tube boiler and in combination, parallel pairs of collector-sections arranged in a quadrangular rising continuous series in tiers, and a number of water-tube sections connected at right angles to each collector-section and extending inwardly therefrom so that the said water-tube sections are superimposed one above the other in parallel planes and are also at right angles to each other, substantially as described.

Signed by me this 1st day of October, 1902.  
CESR. CAMPUS.

Witnesses:

GEO. T. PINCKNEY,  
S. T. HAVILAND.