

(No Model.)

E. T. CARR.
SECTIONAL BOILER.

No. 512,679.

Patented Jan. 16, 1894.

Fig. 1.

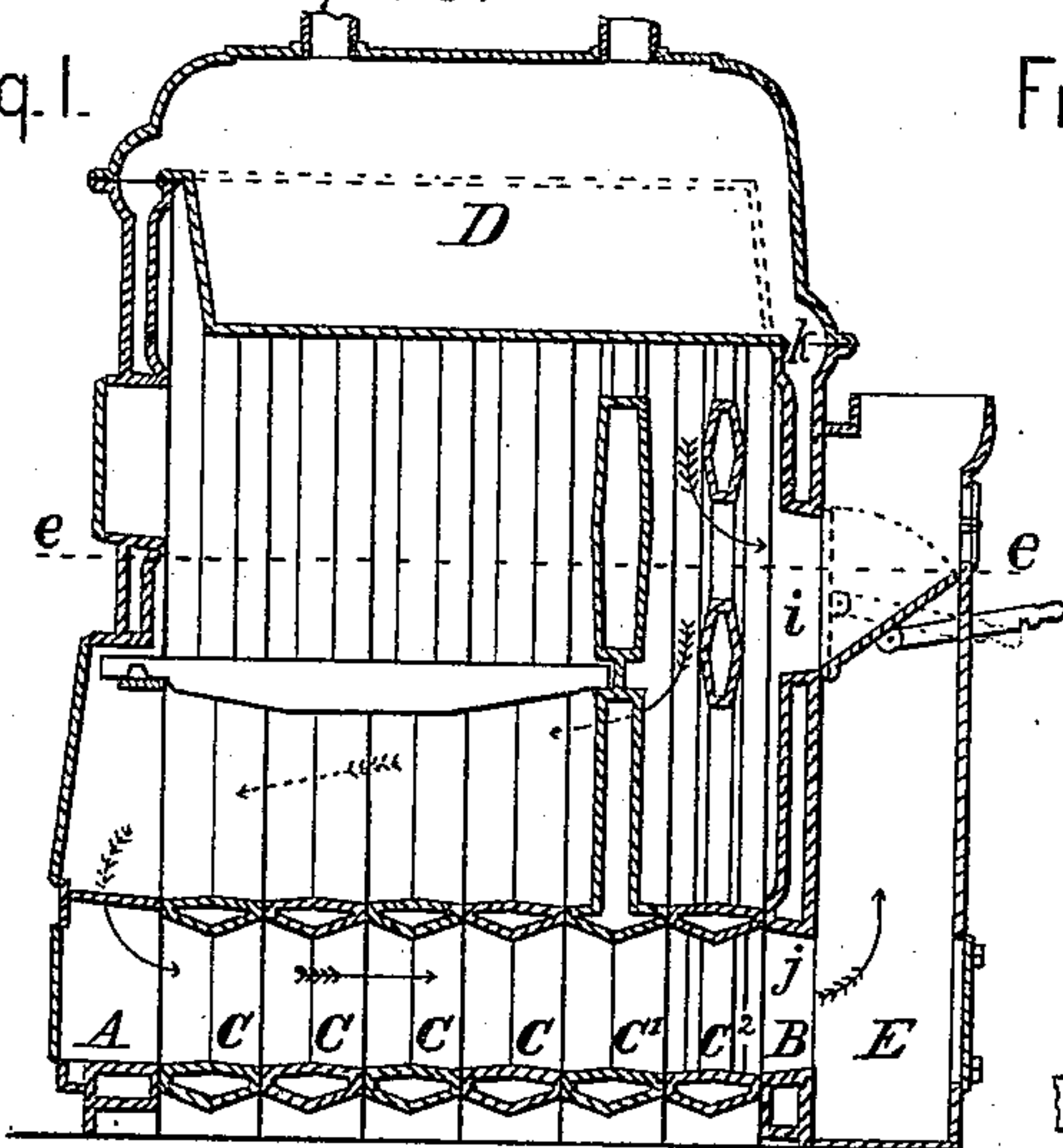


Fig. 2.

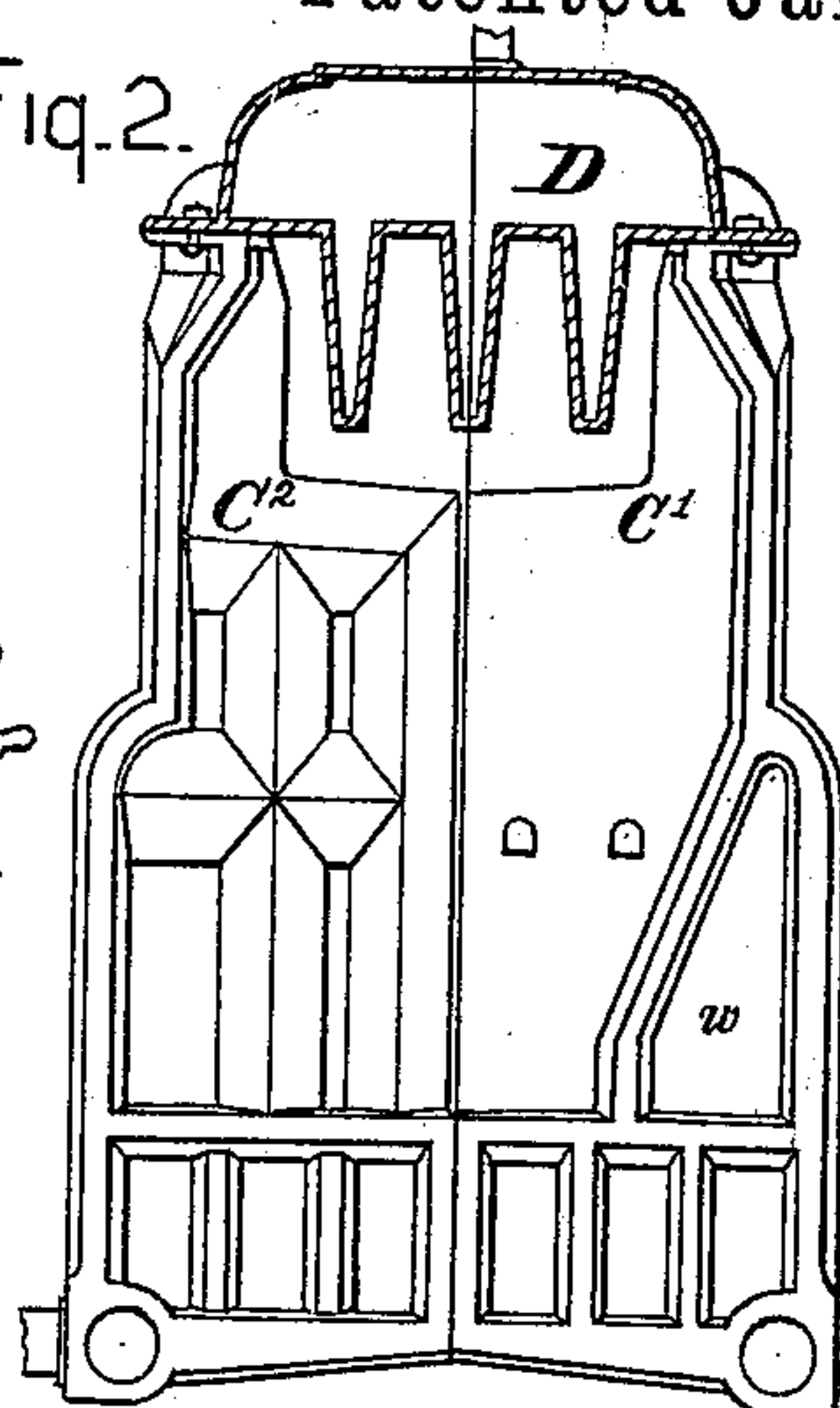


Fig. 9.

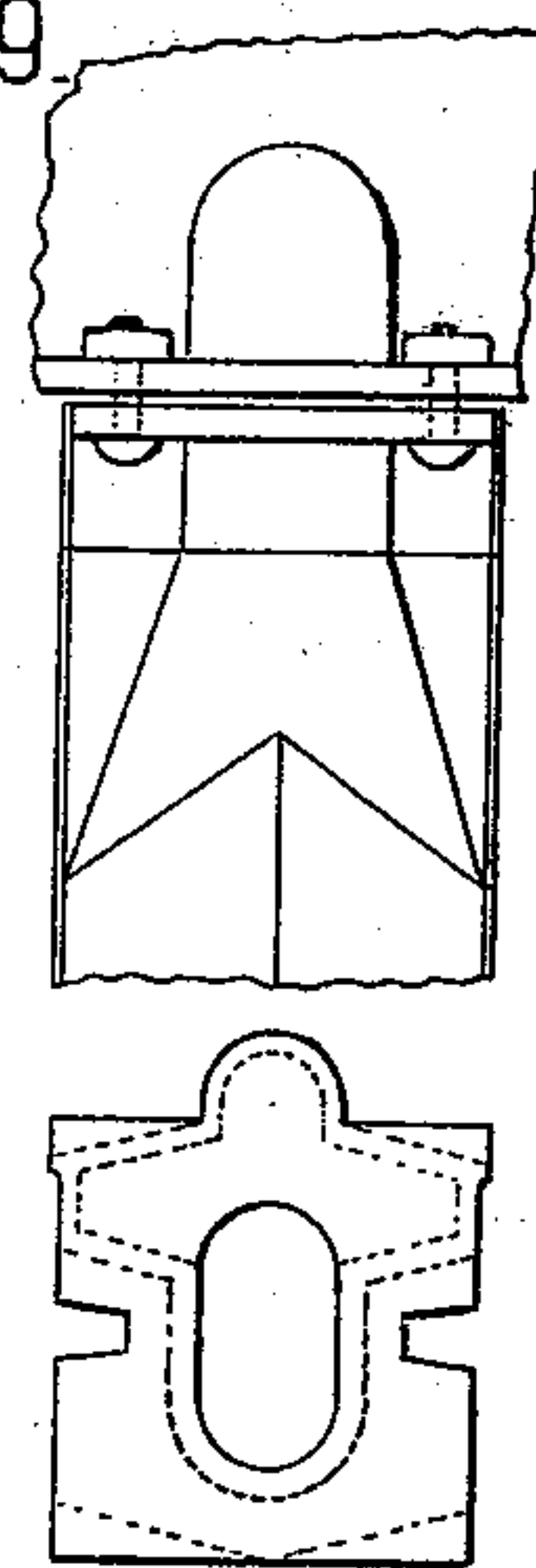


Fig. 3.

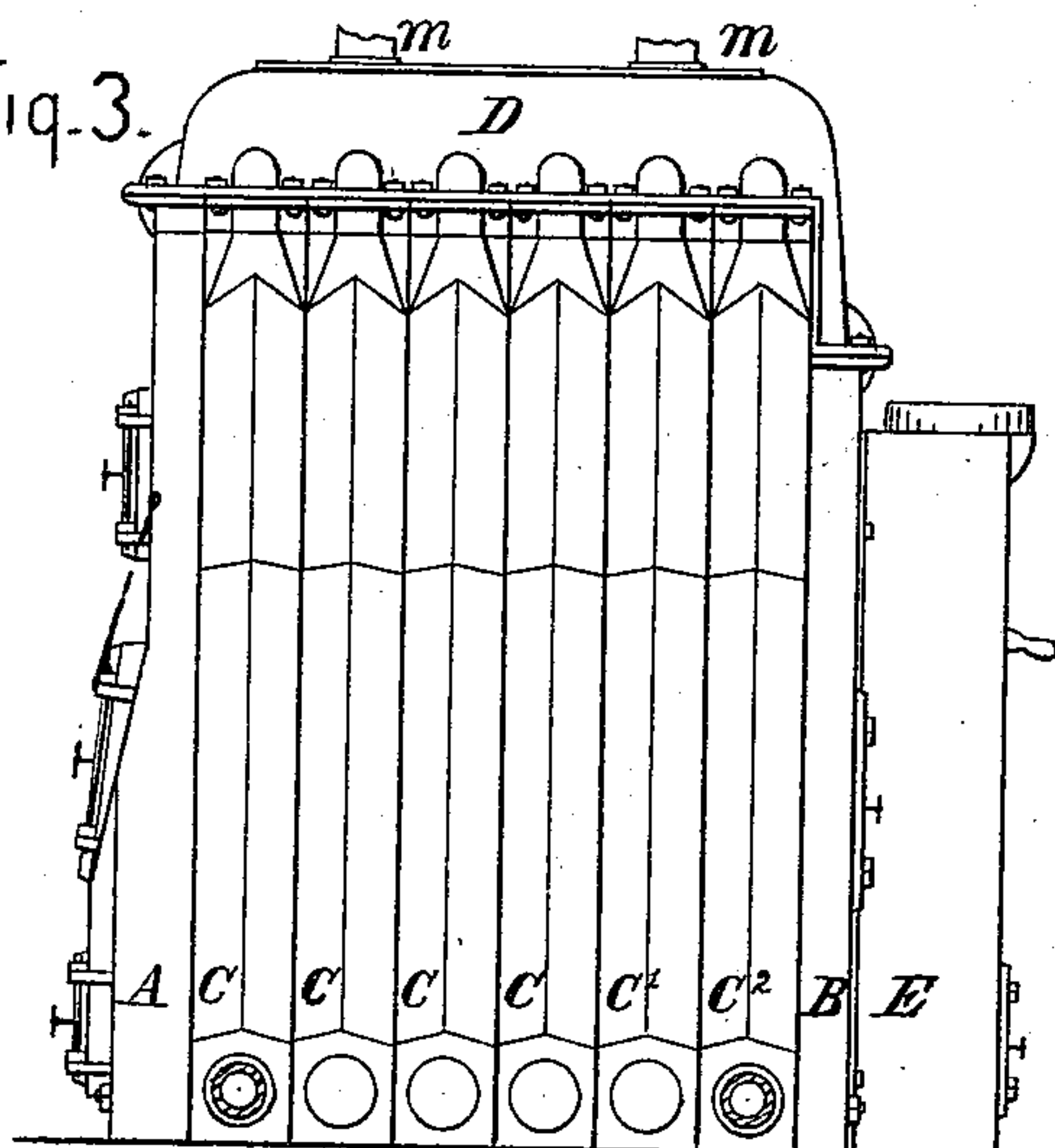


Fig. 4.

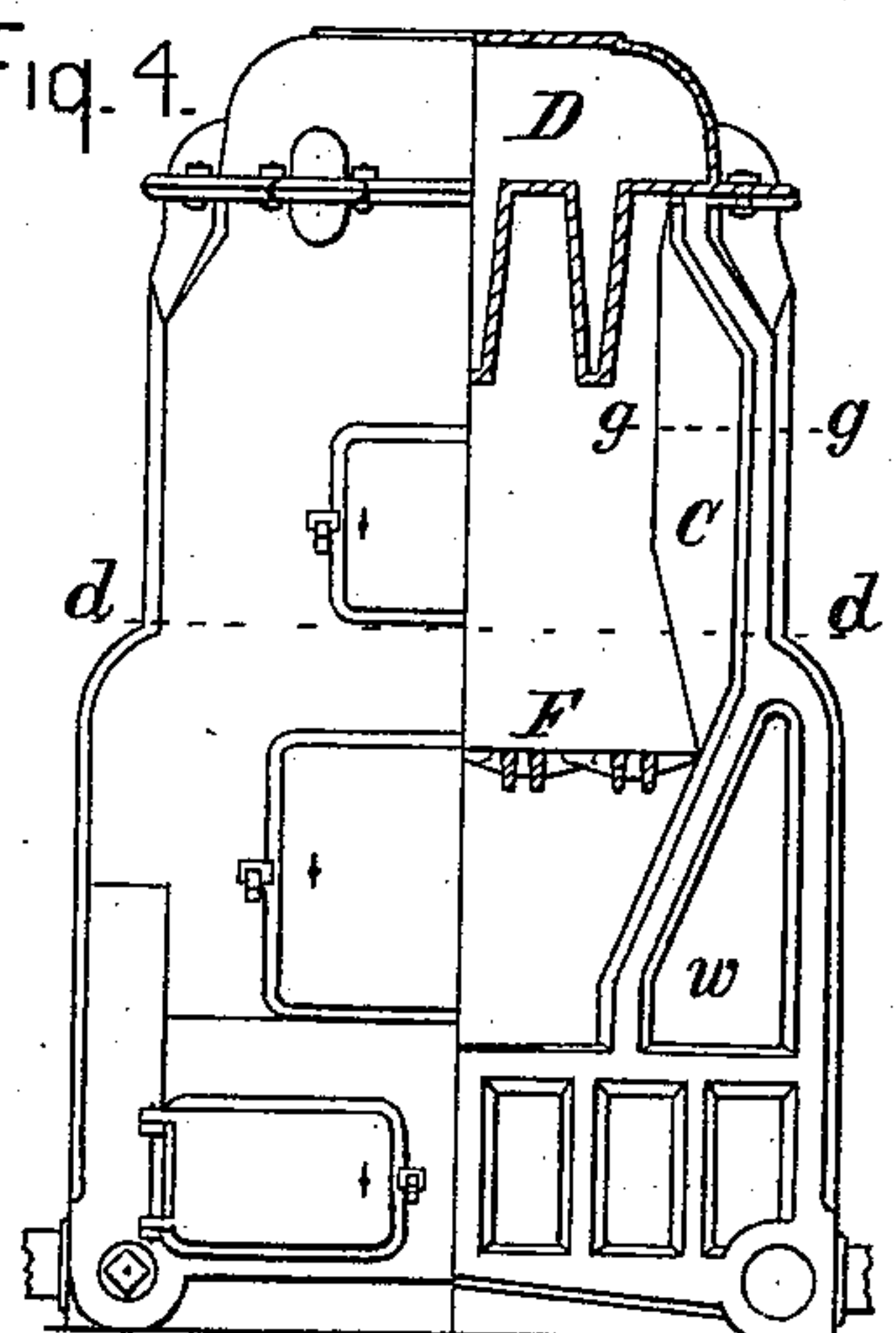


Fig. 8.

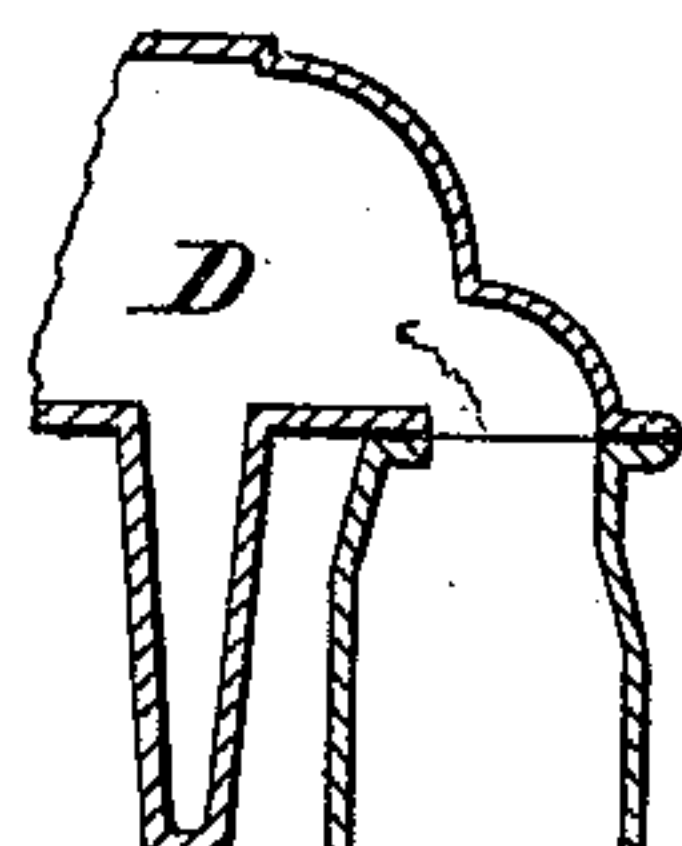


Fig. 5.

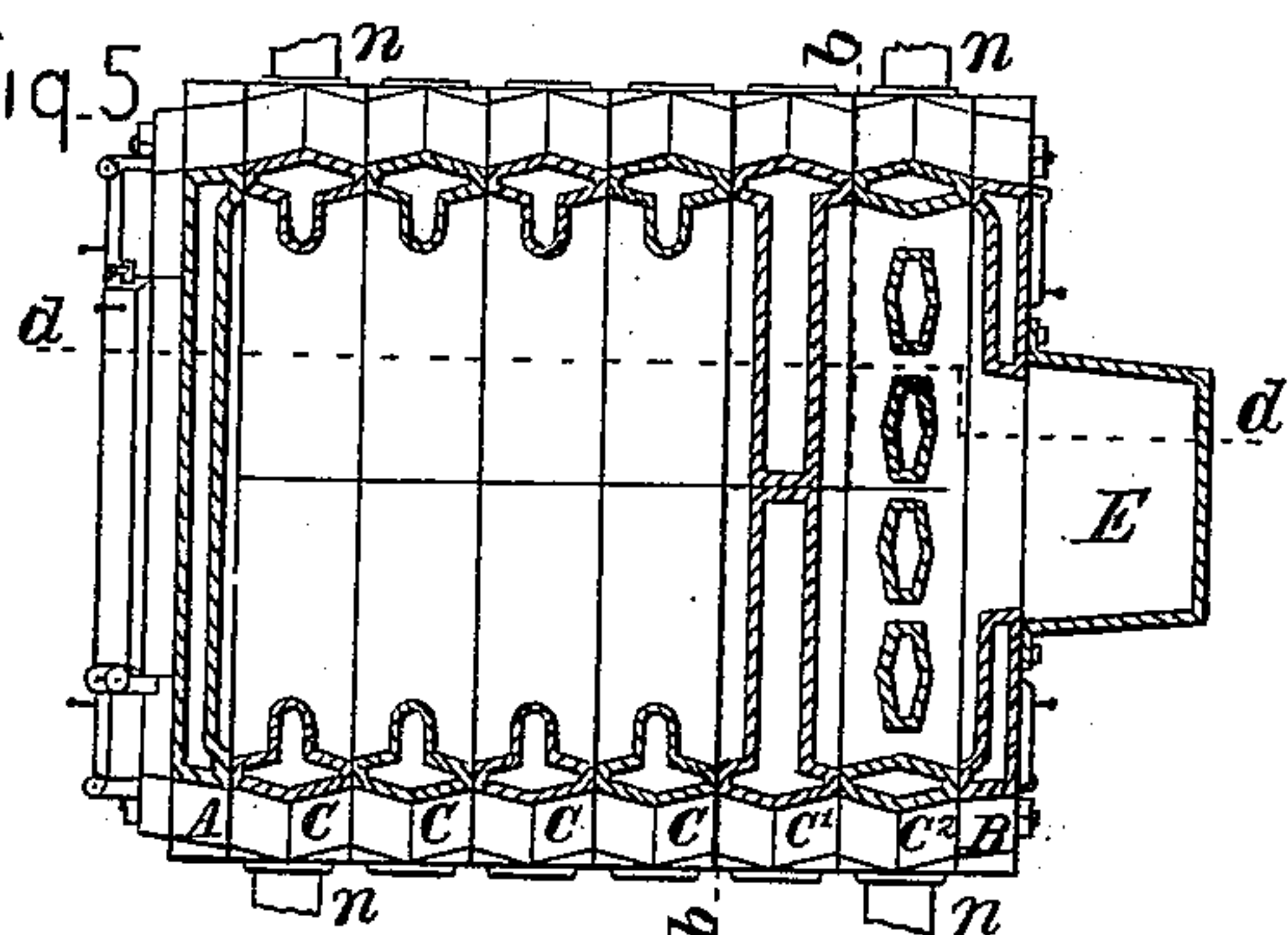


Fig. 6.

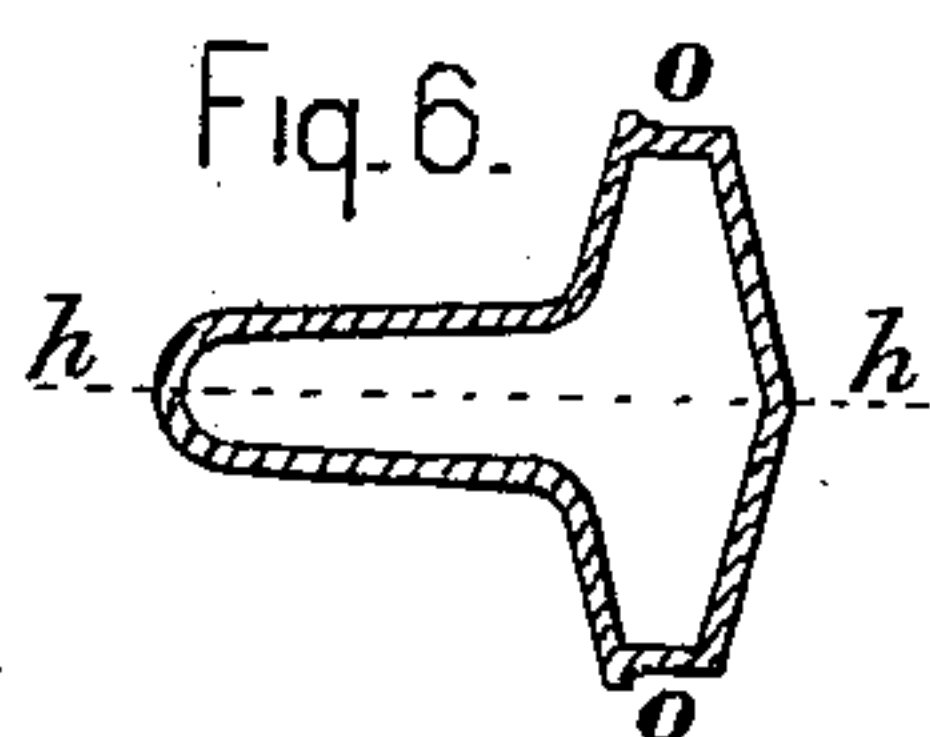
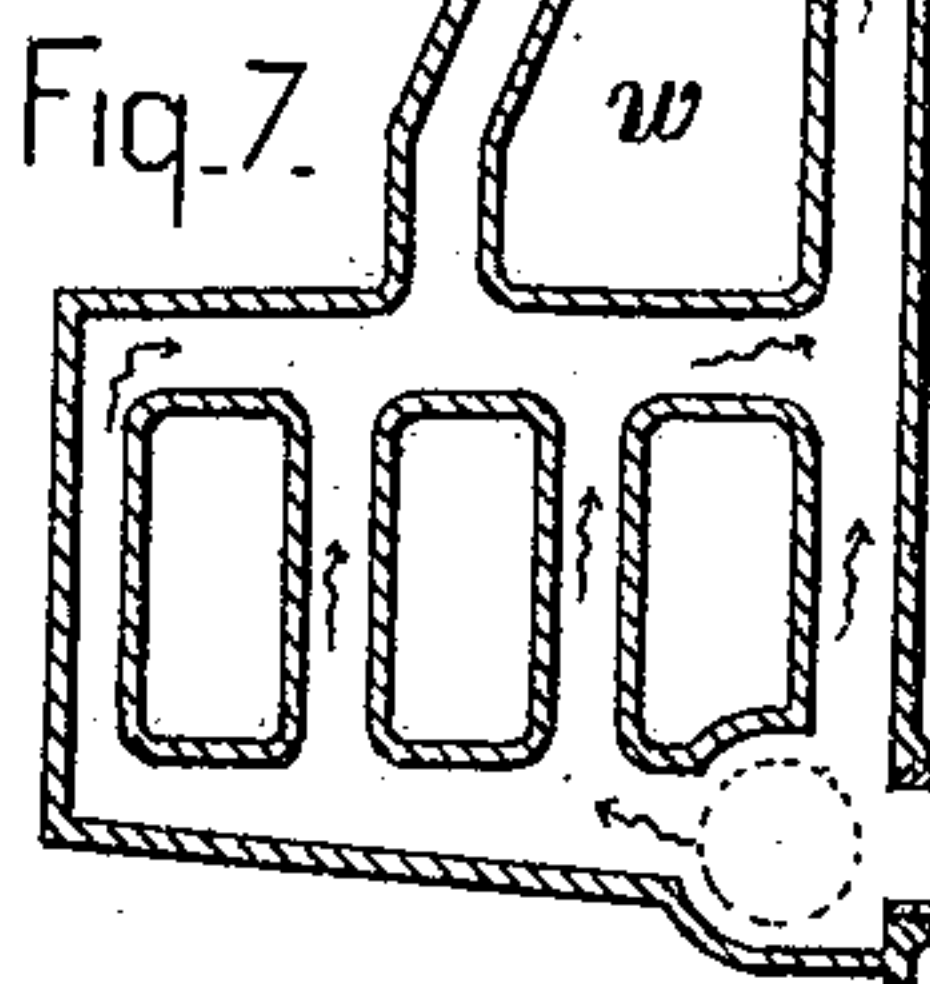


Fig. 7.



WITNESSES:

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SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 512,679, dated January 16, 1894.

Application filed August 30, 1893. Serial No. 484,351. (No model.)

To all whom it may concern:

Be it known that I, ERASMUS T. CARR, a citizen of the United States, residing at Miles City, in the county of Custer and State of Montana, have invented a new and useful Improvement in Heating-Furnaces; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

The said furnace is of the vertical sectional type, composed of intermediate half sections placed together in pairs, each pair forming a full section, (or in full sections as may be determined in their construction,) with full front and rear sections forming the front and rear of the completed furnace; the whole being surmounted by a horizontal section forming the crown sheet and distributing chamber, which I designate the dome, and which is designed to serve as a distributing chamber when used for water circulation, or a steam chamber when used as a steam generator, all as shown by the accompanying drawings which form a part of this specification.

It is my object in this invention to produce a heating furnace that shall be equally well adapted to steam or water heating; to so construct it as to give to it the largest amount of heating surface in direct contact with the fire, consistent with good combustion; to so arrange the circulation of water into and through the furnace, and of the products of combustion from the furnace, that the water of a lower temperature shall first come in contact with the cooler products of combustion at or near the bottom of the furnace, thence rising and meeting the more intensely heated surfaces until it reaches the dome, where the different currents unite and receive from the crown sheet a uniform temperature, and the highest degree possible to give to it.

In all vertical sectional furnaces for water circulation, the water in the different sections, or water legs, comes in contact with surfaces subjected to widely different degrees of heat, and in consequence is delivered at the top of the furnace, and in most of them to the rooms to be heated, at correspondingly different degrees of temperature, making them defective as water circulators, and worthless as steam generators. To overcome these defects I pro-

pose the shorter vertical sections, and the dome before referred to, which renders the furnace equally well adapted to steam or water circulation.

In the management of the so called drop return flue furnaces much vexation is caused by having to deal with sluggish or weak draft chimneys, and especially is that the case in high altitudes. To obviate it I place the flues W at the sides of the fire chamber and its ash pit, with but one set of flues below the ash pit, thus having less of the upward tendency of the gases from combustion to overcome.

Referring to the drawings, Figure 1. represents a longitudinal section on the vertical plane *a. a.* of Fig. 5. Fig. 2. is a transverse vertical section on *b. b.* of Fig. 5. showing elevation of bridge-wall section C', elevation of combustion chamber section C², also a section of the crown sheet and dome D. Fig. 3. is a side elevation of the furnace. Fig. 4. is an elevation of fire chamber section showing the arrangement of smoke flues and location of grate F. and also an elevation of one half of the completed furnace. Fig. 5. is a plan of the base with horizontal section on *d. d.* of Fig. 4. and of *e. e.* of Fig. 1. Fig. 6. is a cross section on enlarged scale of fire chamber section C at *g. g.* Fig. 7. is an enlarged vertical section of C on plane *h. h.* of Fig. 6, showing water way and connection with dome. Fig. 8. is a plan of the top flange of all sections, the dotted lines showing the section immediately below the flange. Fig. 9. is an elevation of the upper portion of sections, showing the manner of securing to dome, space for packing, &c.

In further explaining my invention, A represents the front and B the rear sections which are to form the front and rear of the furnace, and are to be supplied with the usual feed and ashpit doors, clean out doors, smoke exits, dampers, &c. The smoke flue E is to be bolted to B and so as to receive the smoke from the exits *i* and *j*. Except where necessary in providing doors and smoke exits A and B will be made hollow and used as water circulating space, as shown by Fig. 1, suitable connection for that purpose to be made with the dome. For the purpose of drawing the water from the dome it will be connected to

B at the lowest point, as shown at *k*. Fig. 1. C represents the fire chamber sections, C' the bridge-wall sections and C² the combustion chamber sections: all in pairs or halves. In the arrangement of the smoke flues through the sections I do not confine myself strictly to the arrangement here shown for them. The flues W may be extended higher along the fire chamber, be made wider, or divided as circumstances may require.

It is well known that the mass of fuel in contact with the walls of a fire chamber containing water is inclined to pack against such walls and impair its freedom of combustion. To overcome this I have designed the corrugations of the fire chamber sections, and also the bridge-wall sections so that as the fuel is consumed and settles, portions will recede from the walls, admitting air currents and thereby causing freer combustion. The sections are to be set up as shown by Fig. 1, provided with suitable packing between each at the hub at bottom, and be held in place by bolts extending through the hub of each from front to rear, packed at the ends, each section to be secured to the dome as shown by Fig. 9. When the whole is finally bolted together it is to be suitably calked with fire-proof cement, provision for which is made in each section. See O. O. Fig. 6. There is to be free circulation of water or steam through the hubs of the several sections, and vertically through the sections to the dome, from which the flow will be out through the pipes *m*, returning through the pipes *n*, and of which pipes there may be more or less as required.

For different requirements the same width of furnace may be diminished or increased by using less or more sections in the fire chamber, or more sections in the combustion chamber, provision being made to shorten or extend the dome in the same proportion.

The top section or dome D is to be in one piece substantially as shown by the different drawings. That portion forming the crown sheet of the furnace may be plain or corrugated. The drawings show it to be corrugated, and in the nature of drop tubes in some other furnaces, with provision for draining through the connections with the rear section before referred to. It is proposed to make the corrugations longitudinal only, or both longitudinal and transverse as experience may determine.

I am aware that furnaces have been constructed with vertical sections, and also with vertical half sections, but I am not aware that furnaces have been constructed with short vertical sections, connected to a crown sheet

and dome where the contents of the several sections are united and together brought in contact with the most intensely heated portions of the furnace before leaving it as in my invention.

I am aware also that furnaces for hot air, hot water and steam have long been constructed with drop return flues, in which the grate is located high up in the furnace, or so that the heat generated is exposed first to the upper portions, thence to the rear and deflected downward and below the fire chamber and ash pit, to the front, again deflected downward and discharged in the rear at the bottom of the furnace, but I am not aware that any have been constructed with the fire chamber so placed as to expend its energy, first, upon a crown sheet, either plain or corrugated, extending to the rear of the furnace, thence returning by flues along each side of the fire chamber and its ash pit, to the front, where it is deflected downward and through flues to the rear, where it is discharged into a smoke flue or chimney as in my invention.

What I claim, and desire to secure by Letters Patent, is—

1. A water or steam heating furnace consisting of vertical hollow sections surmounted by a horizontal hollow section to which the vertical sections are attached; the whole being so united as to allow of free circulation of water or steam from vertical section to vertical section, and from each vertical section to the horizontal section, with a fire chamber in the upper portion of such vertical sections and immediately below the horizontal section, with provision for the products of combustion to pass to the rear beneath said horizontal section, or between the corrugations thereof to a direct exit, or by damper to be deflected and return to the front by means of flues along each side of said fire chamber and its ash pit, to flues beneath these and the ash pit to the outlet at bottom and rear of the furnace, substantially as and for the purposes described.

2. In a sectional boiler, the combination with the dome, of a series of vertical side sections comprising central portions projecting inwardly into the fuel in an inclined direction, whereby air passages are formed as the fuel is consumed, grooves in their adjoining sides forming packing channels and slotted or perforated flanges at their tops for attachment to said dome.

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Witnesses:

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