No. 688,324. Patented Dec. 10, 1901.

W. S. McMULLAN.

SELF FEEDING SECTIONAL HEATER.

(Application filed May 16, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig-1-

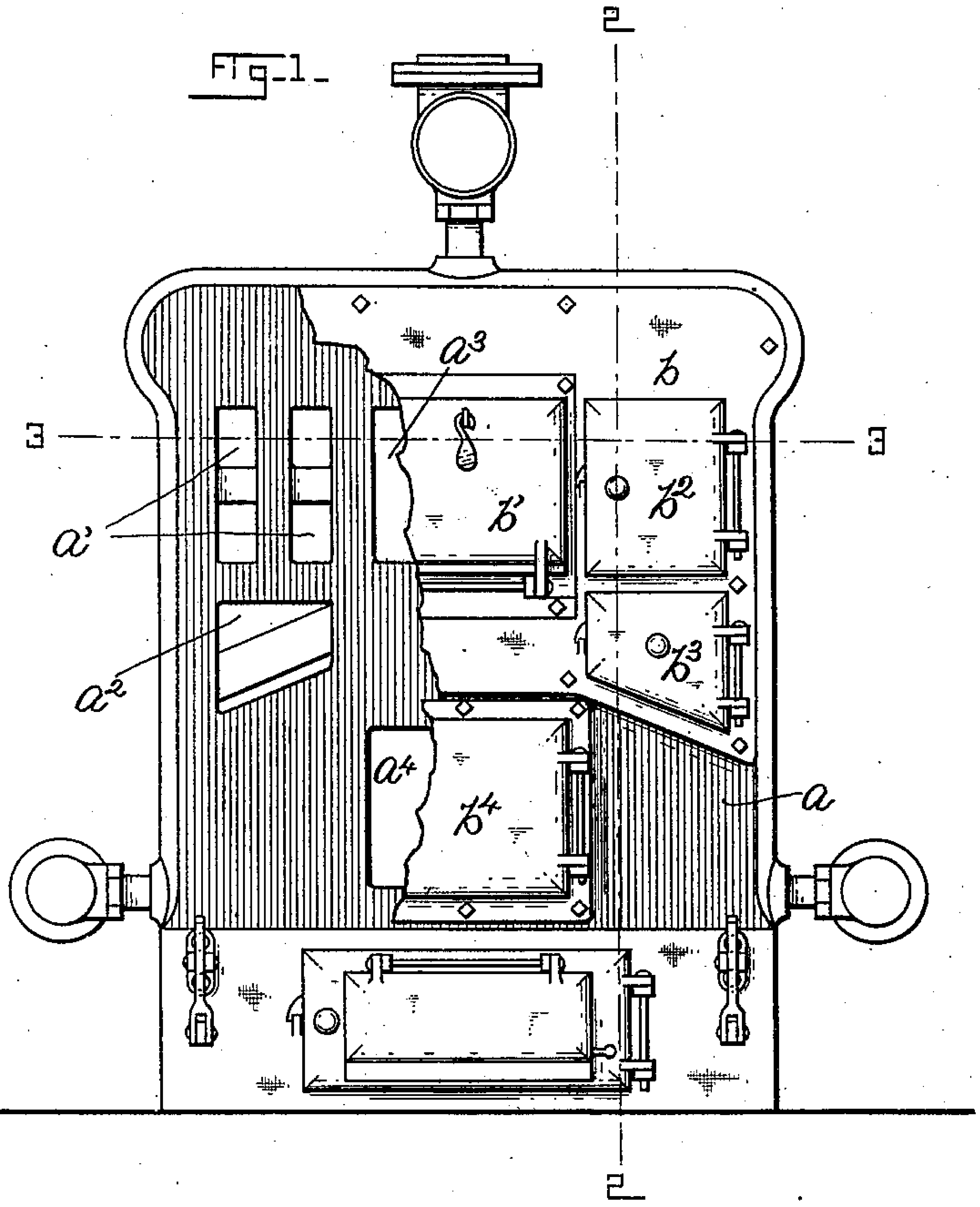
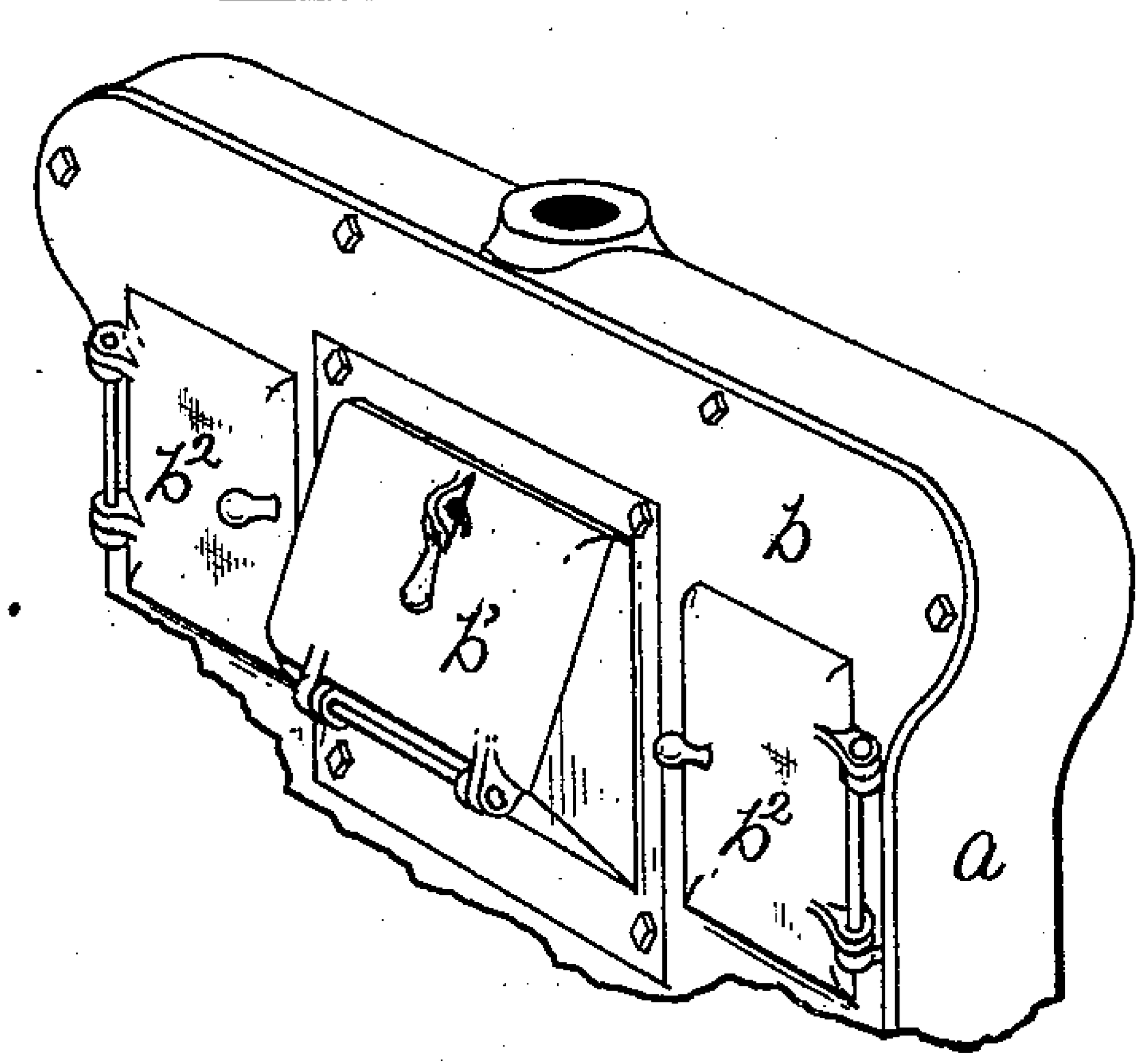


Fig-4-



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 2.

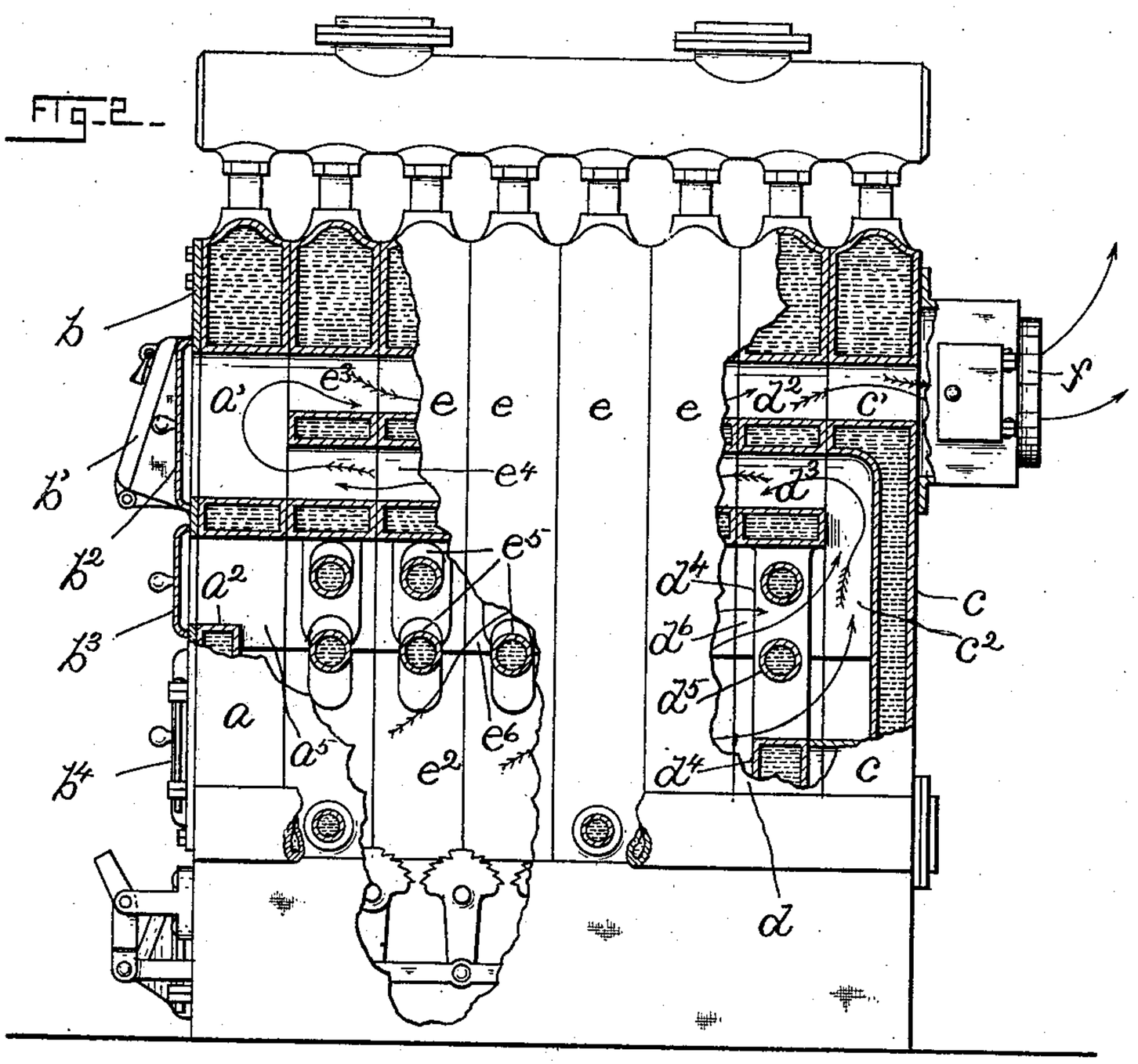
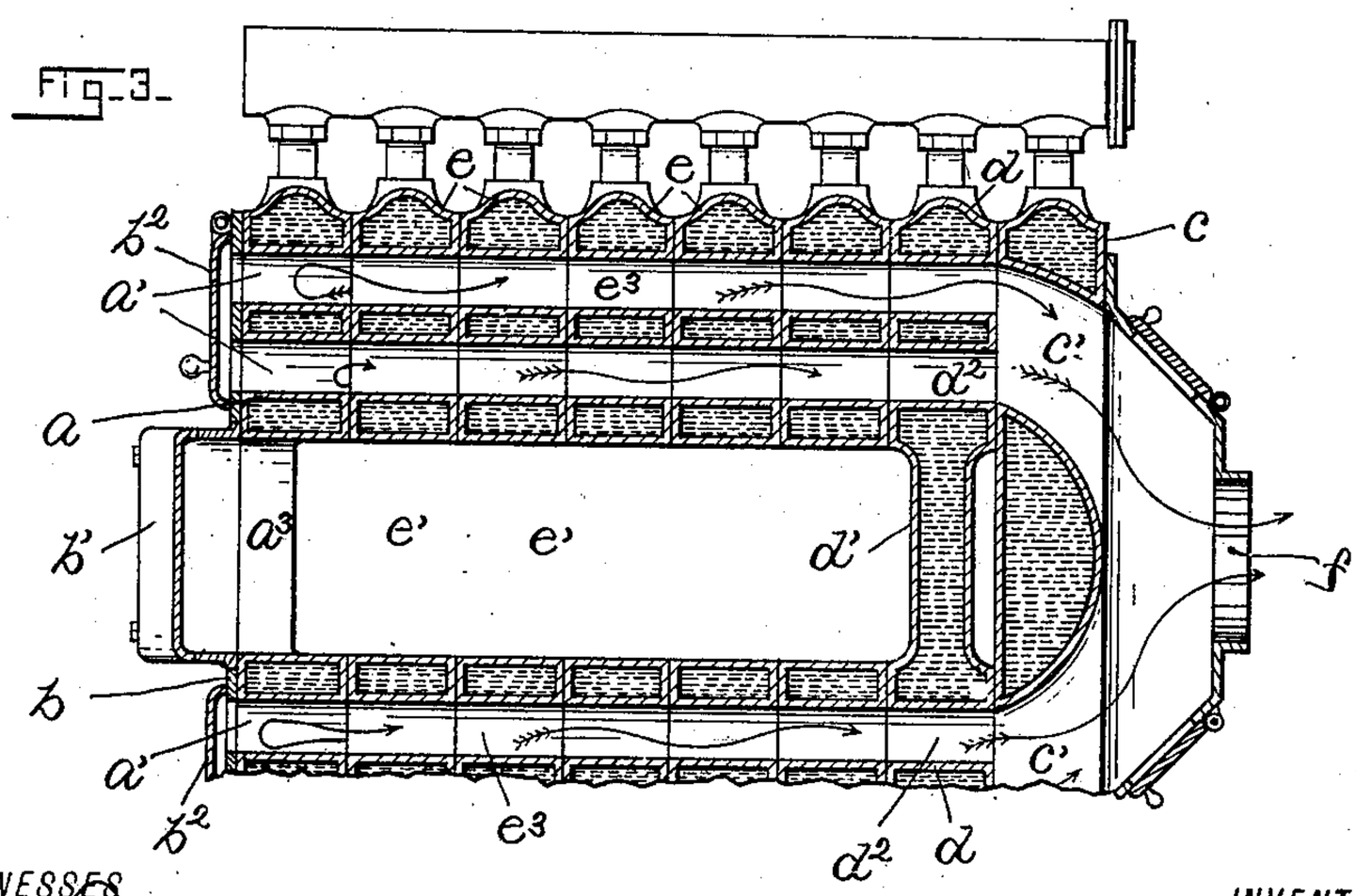


Fig. 3.



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(No Model.) 4 Sheets—Sheet 3.

Fig_5_

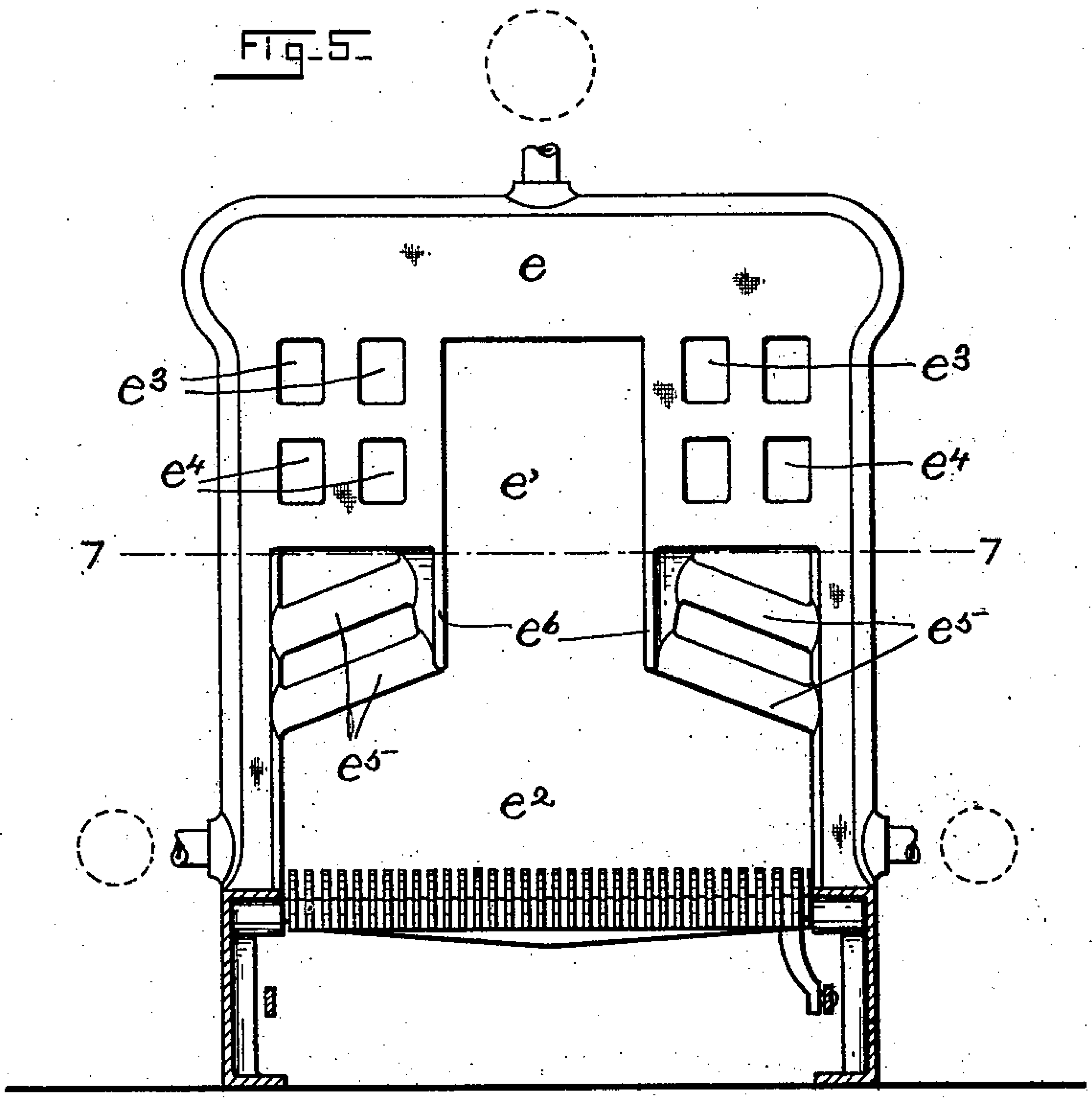

Fig_6_

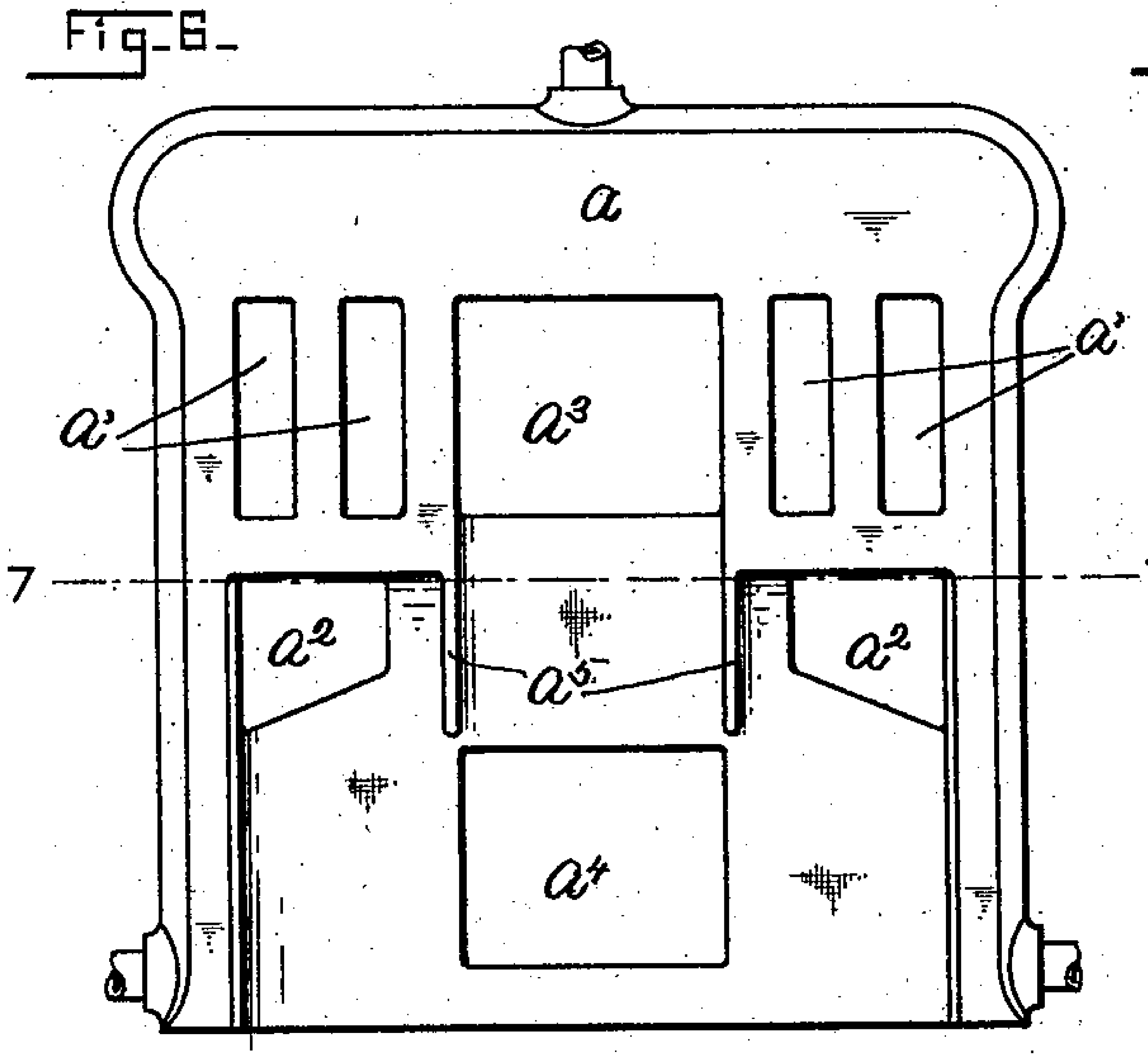

Fig_7_

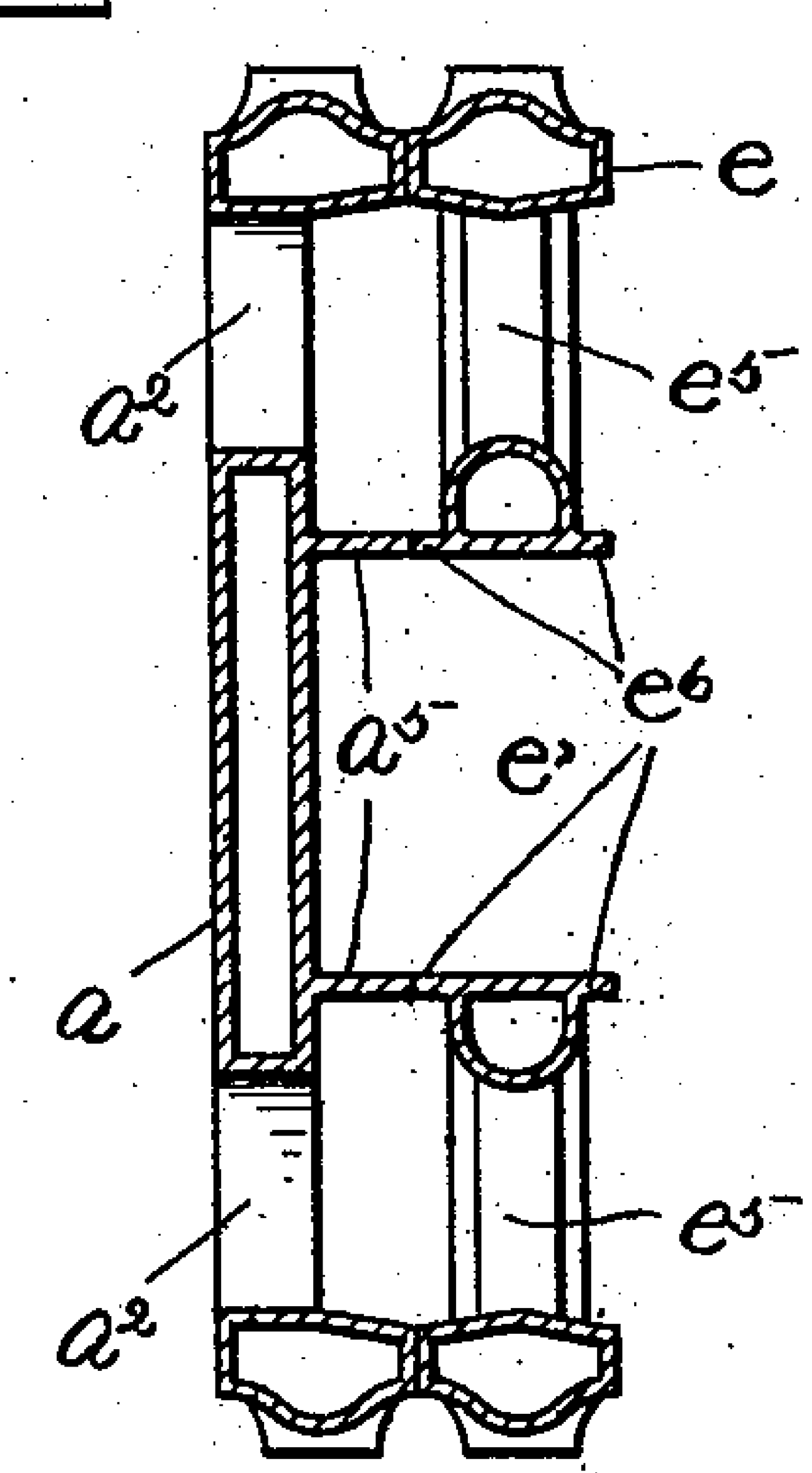

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Fig. 8.

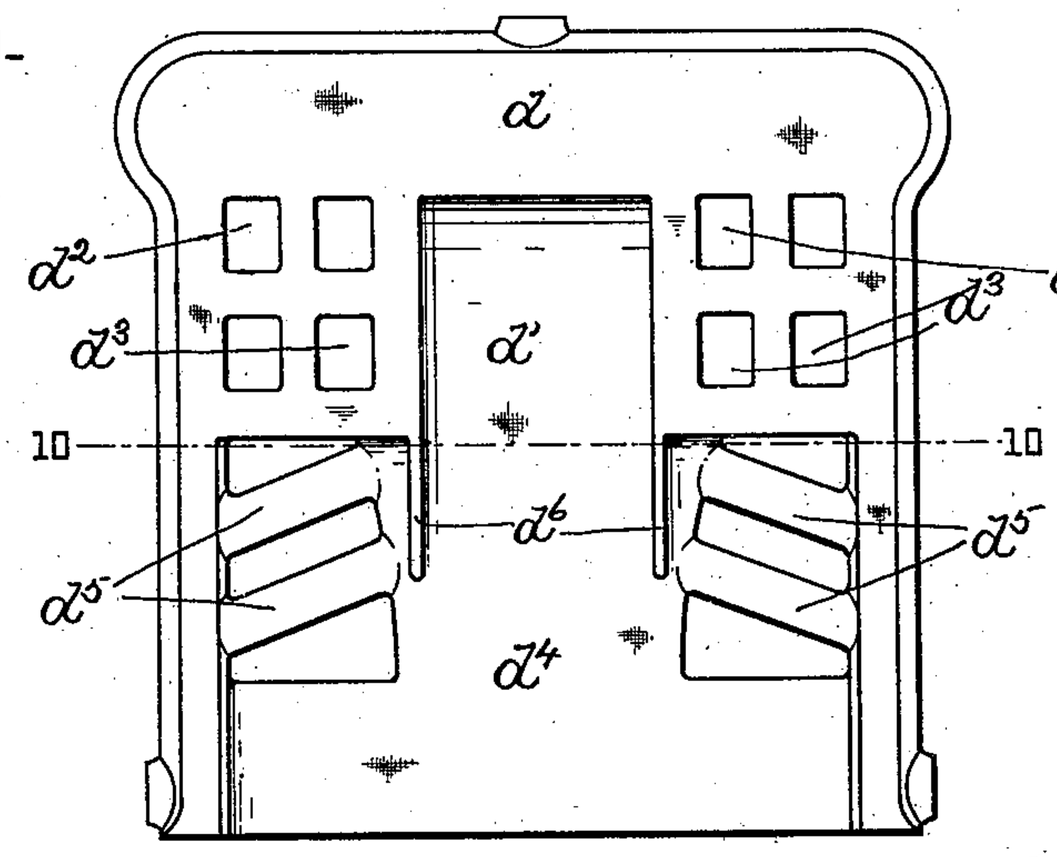


Fig. 9.

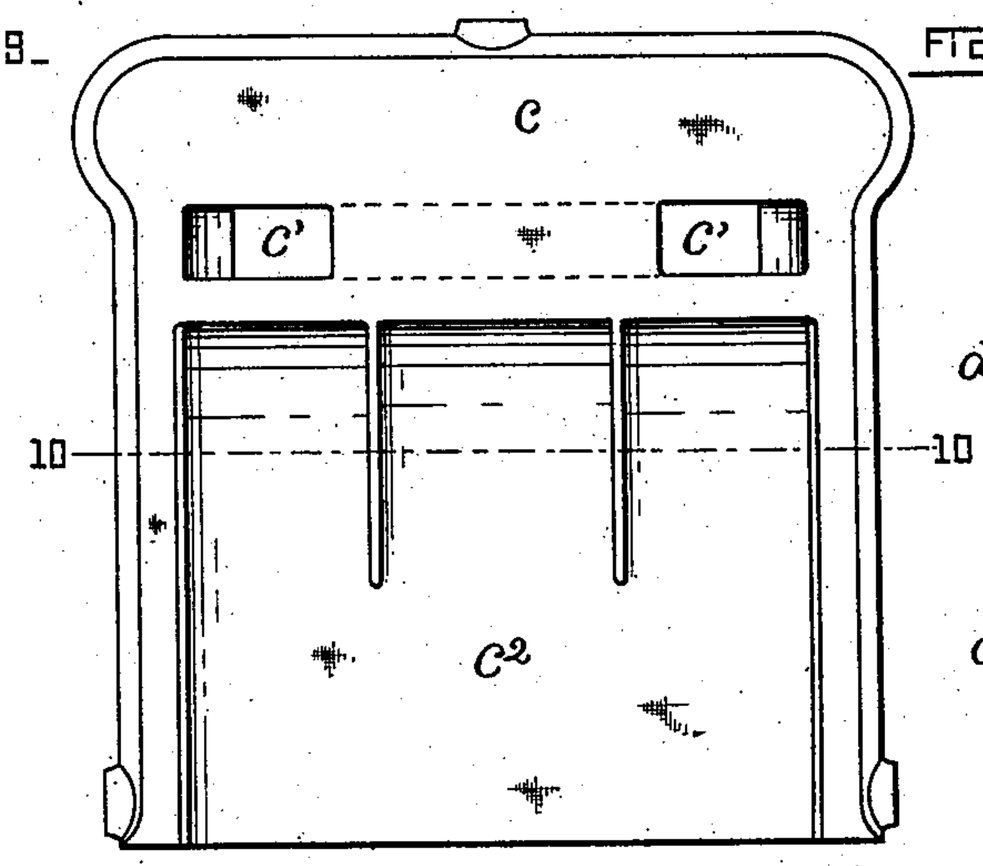


Fig. 10.

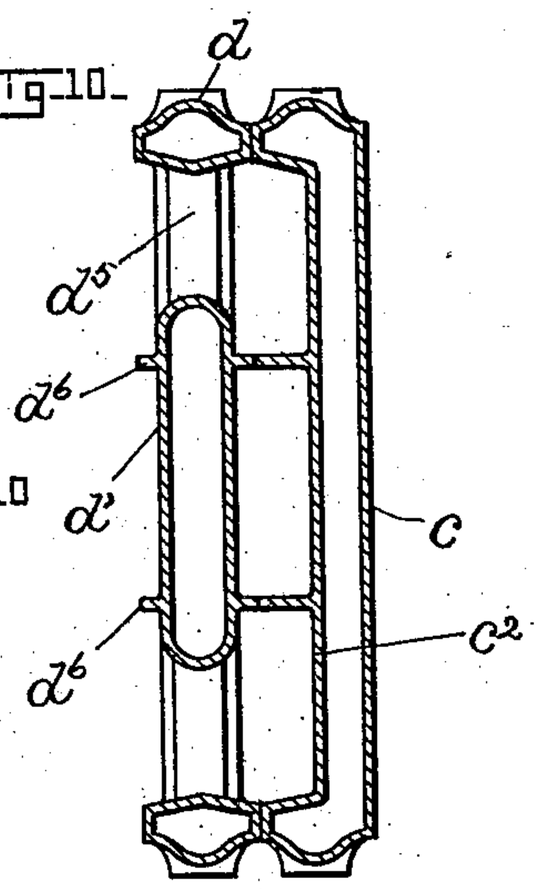
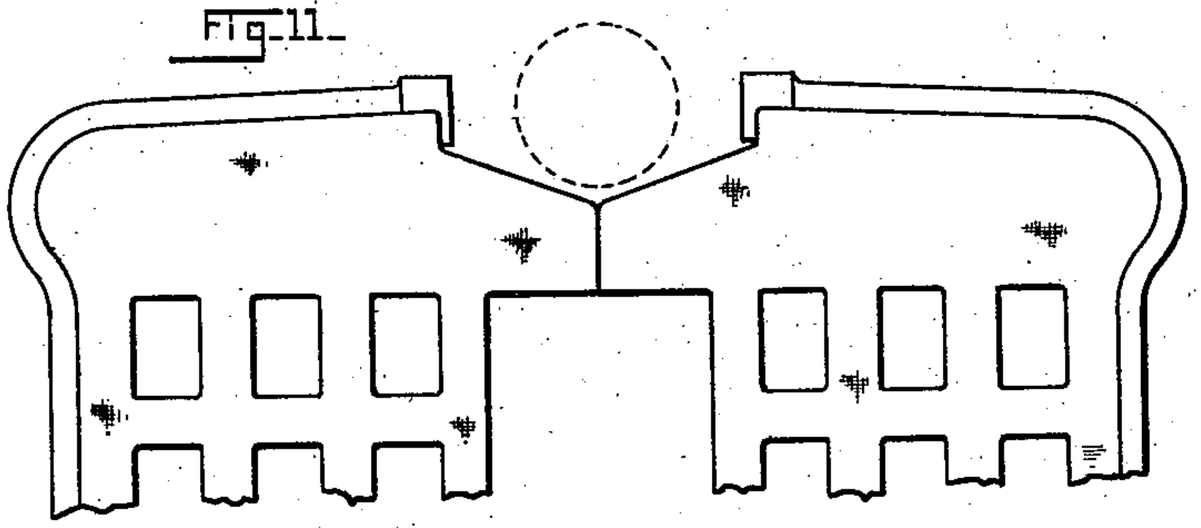


Fig. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM S. McMULLAN, OF NORWICH, CONNECTICUT.

SELF-FEEDING SECTIONAL HEATER.

SPECIFICATION forming part of Letters Patent No. 688,324, dated December 10, 1901.

Application filed May 16, 1901. Serial No. 60,585. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. McMULLAN, a citizen of the United States, residing at Norwich, county of New London, State of Connecticut, have invented certain new and useful Improvements in Self-Feeding Sectional Heaters, of which the following is a full, clear, and exact description.

The chief object of this invention is to provide in a simple and practical manner a steam-generator of the vertical sectional type having a suitable reservoir for coke or coal, particular attention being given to the form and arrangement of the fire-pot, as well as to the location of the fuel-reservoir with respect to the combustion-chamber and draft-flues.

My improvements are particularly desirable in that class of steam-generators and hot-water heaters in which coke is used as fuel, such generators and heaters being thus rendered self-feeding.

For the purpose of explaining the said invention with greater clearness the annexed sheets of drawings have been provided, in which—

Figure 1 is a front view of a steam-generator embodying this present invention, the said view being chiefly in elevation, but having the front broken away in part to disclose the interior construction of said generator. Fig. 2 is a vertical sectional view of said generator, taken on line 2 2 of said Fig. 1; and Fig. 3 is a horizontal sectional view of the same, showing the major portion of the generator, taken on line 3 3. Fig. 4 is a perspective view of the upper portion of the front section and of the front plate of said generator. Fig. 5 shows in vertical section the ash-pit with a single grate-bar mounted therein and also illustrates an intermediate boiler-section mounted upon the said ash-pit. Fig. 6 is a front side elevation of the front section; and Fig. 7 is a cross-sectional view of the combined intermediate and front sections, taken on lines 7 7 of Figs. 5 and 6. Fig. 8 is a front side elevation of the so-called "bridge-wall" section, and Fig. 9 is a similar view of the so-called "back" section of the generator. Fig. 10 is a cross-sectional view of the combined bridge-wall section and back section, taken on lines 10 10 of Figs. 8 and 9. In Fig. 11 is illustrated the upper portion of an intermediate section of greater size and weight, the said section being shown as if constructed in two companion half parts in order that it may be the more conveniently handled in the process of constructing and setting up the generator.

Generators of this class are built up ordinarily of a front section, a back section, a bridge-wall section, and a number of intermediate sections that are interposed between the said bridge-wall and front sections, the particular number of intermediate sections used being governed by the required size and steaming capacity of the complete generator. Each of the several sections is cast hollow, so as to provide water-legs that extend downward on opposite sides of the fire-pot and so as to form a water-chamber immediately over the fire-pot and combustion-chamber. The several sections are connected on opposite sides, by means of nipples, to manifold pipes, thus providing an unobstructed water connection between the said sections. Immediately over the generator and extending from front to rear of the same is a steam-dome that is connected with each and all of the several sections by nipples. The front section and the several intermediate sections are formed in their upper central portions with openings that register when the several sections are assembled, and thus provide a large chamber immediately over the combustion-chamber that may serve as a storage chamber or reservoir for coke or other fuel. Particular attention has been given to the location of this fuel-reservoir relatively to the fire-pot, combustion-chamber, and draft-flues in order that the best caloric results shall be obtained from the fuel consumed and also to insure the perfect and automatic distribution of said fuel throughout the fire-pot.

The front section is best illustrated in Fig. 6 of the drawings and is indicated as a whole by the letter a. It has draft-flues $a' a'$, openings $a^2 a^2$, through which the series of arms e^5 (which are a part of the intermediate sections located in the combustion-chamber) may be reached and cleaned of any accumulations of the products of combustion, also an opening a^3, through which fuel may be passed to the reservoir, and a lower opening a^4, leading into the fire-pot. It should be noted that the face of the front section a, which is illustrated in

said Fig. 6, is the inner or rear face of said section—that is to say, the face that confronts the fuel-reservoir when the several sections are assembled. The opposite or outer face of said section *a* is substantially flat and is best seen in Fig. 1.

Secured to the front section *a* by bolts or otherwise is a plate *b*, on which is hinged a drop-door *b'*, that covers the entrance to the fuel-reservoir, also doors b^2 b^3, through which the arms e^5 and the draft-flues may be reached for the purpose of cleaning. A fire-pot door b^4 is also mounted on the front of section *a*.

The so-called "back" section of this new form of generator is illustrated in Fig. 9 and is indicated as a whole by the letter *c*. It has draft-flues *c'* and is preferably recessed to about one-half its thickness on its front face, as at c^2.

The bridge-wall section is illustrated in Fig. 8 and is indicated by the letter *d*. This section has a recess *d'*, that forms the rear portion of the fuel-reservoir, and upper and lower draft-flues d^2 d^3, which will be referred to more fully later on. The lower portion of section *d* is formed with a hollow web d^4, that is connected with the sides or legs of the section and serves as the bridge-wall at the rear of the fire-pot. The said web d^4 is connected with water-legs forming the opposite sides of the section by hollow arms or pipes d^5, that are cast integral with the section. The web d^4 is chambered through above and below the pipes d^5 in order that the products of combustion may readily pass rearward and upward from the combustion-chamber, as will be explained later.

In Fig. 5 is shown one of the intermediate sections, the same being denoted by the reference-letter *e*. This section is chambered completely through, as at *e'*, to provide a part of the fuel-reservoir, also as at e^2 to provide for the fire-pot. Draft-openings e^3 e^4, corresponding to those of the bridge-wall section, are provided in section *e*, and inclined hollow arms or pipes e^5 are also provided, like the described pipes d^5 of the said bridge-wall section.

The top of the combustion-chamber is marked by the lines 7 7 in Figs. 5 and 7 and by the line 10 10 in Fig. 8.

Particular notice is now directed to certain narrow webs or fin-like projections that form an important feature on each of the described sections. These projections are indicated on the front section by the letter a^5, on the intermediate section by e^6, and on the bridge-wall section by d^6. When the several sections are assembled, these projections register with each other and complete the side walls of the fuel-reservoir. This construction not only increases the capacity of the fuel-reservoir by adding to its depth, but it renders more important service by discharging the fuel well down in said combustion-chamber and preventing the fuel from completely filling and clogging said combustion-chamber. In other words, the downwardly-extending projections a^5 e^6 d^6 serve to prevent the fuel from rising too high at the sides of the fire-pot, thus leaving at all times considerable open space for combustion purposes between the said projections and the water-legs of the several sections—*i. e.*, the open space indicated by a^2 in Fig. 6.

The arrangement of draft-flues is best seen in Figs. 2 and 3 of the drawings. The smoke and other waste products pass from front to rear on both sides of the generator through the openings a^2 and between the arms d^5 e^5 until the rear section is reached, when said products are deflected upward (see Fig. 2) and pass thence to the front through the lower flues d^3 e^4, where they are again deflected upward and caused to return to the rear of the heater through the upper flues d^2 e^3, where they are discharged through an exit *f*. (See Figs. 2 and 3.) The area of the flues and the distance traveled by the products of combustion from the combustion-chamber to the exit are proportioned on scientific principles based upon the quantity and quality of fuel under combustion. The location of the fuel-reservoir is such that the fuel is highly heated before it is discharged into the fire-pot; but because of the fact that the fuel-chamber has no outlet (other than a slight seepage through which accumulated gases may escape into the draft-flues) excepting its lower discharge-opening into the fire-pot combustion, and consequent disintegration of the fuel, cannot take place within the fuel-reservoir.

In the operation of the described generator fire is first started on the grate through fire-door a^4, and after a sufficient body of fire is obtained the fuel-reservoir is then filled with coke or other suitable fuel through the door *b'*, the said reservoir being refilled daily. As the burning fuel becomes disintegrated and reduced to ashes a fresh supply moves downward from the reservoir by gravity and passes laterally beyond the lower edges of the side walls a^5 e^6 d^6 until the fresh coals or coke cover the entire body of fire from front to rear section, and this automatic feeding of the fuel is repeated as often as the consuming fuel needs to be replenished. The relation between the prime heating-surface and the fire is such that the best possible results are obtained from the fuel under combustion. Furthermore, the automatic feeding of the fuel which is provided for prevents any possibility of the combustion-chamber becoming filled or choked by the premature or excessive feeding of said fuel.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a steam-generator of the class referred to, a centrally-located fuel-reservoir extending the entire length of the generator, and having side walls that extend downwardly into the combustion-chamber to prevent the filling and clogging of said combustion-chamber.

2. A front and rear section and a multiple of intermediate sections, the intermediate sections having registering central openings that form a fuel-reservoir which extends the entire length of the generator, the side walls of said fuel-reservoir being extended downwardly, into the combustion-chamber as, and for the purpose, specified.

3. In a steam-generator, front and rear sections and a plurality of intermediate sections having alining apertures in their upper central portions, abutting flanges formed on their front and rear faces and extending down into the fire-box, to provide a fuel-receptacle and a duplex system of draft-flues arranged on either side of the central aperture in the intermediate sections.

4. In a steam-generator, the combination with front and back sections of intermediate sections, each consisting of a hollow body portion having a central aperture therein opening into the combustion-chamber duplex draft-openings at each side of the central aperture, water-legs depending from the sides of the body portion, hollow flanges extending downwardly into the fire-chamber and pipes connecting the flanges with the water-legs.

Signed at Norwich, Connecticut, this 4th day of May, 1901.

WILLIAM S. McMULLAN.

Witnesses:
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