

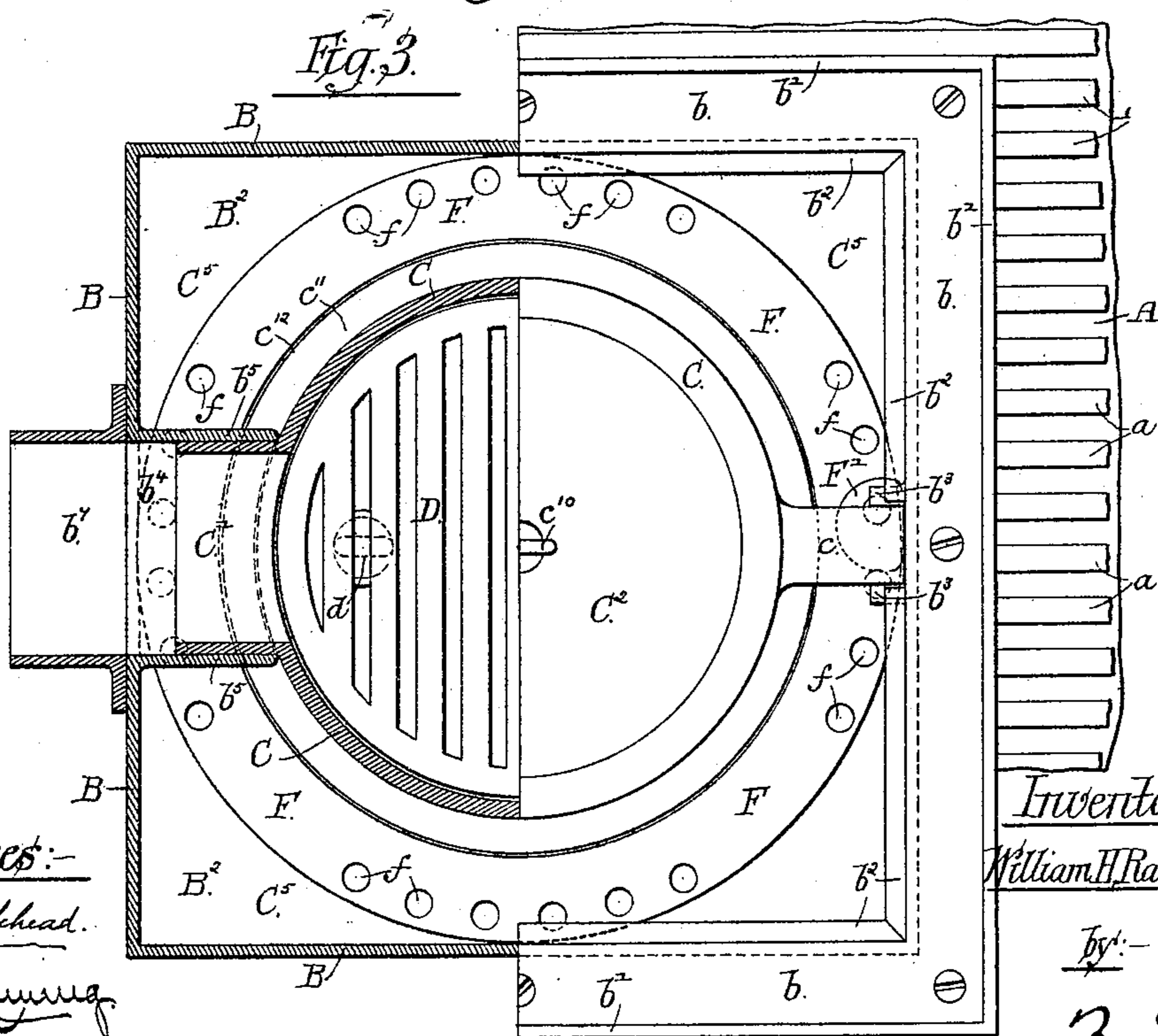
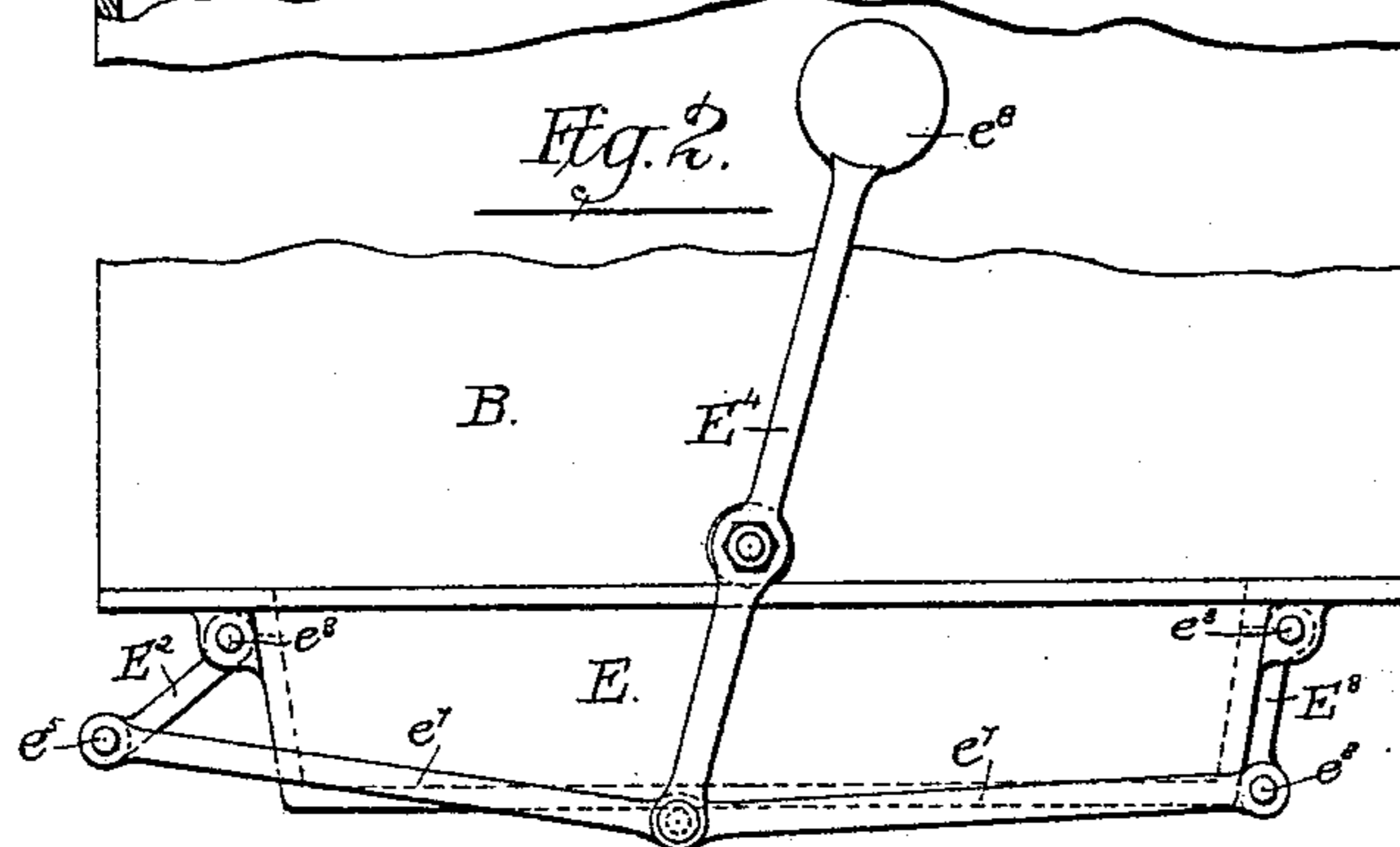
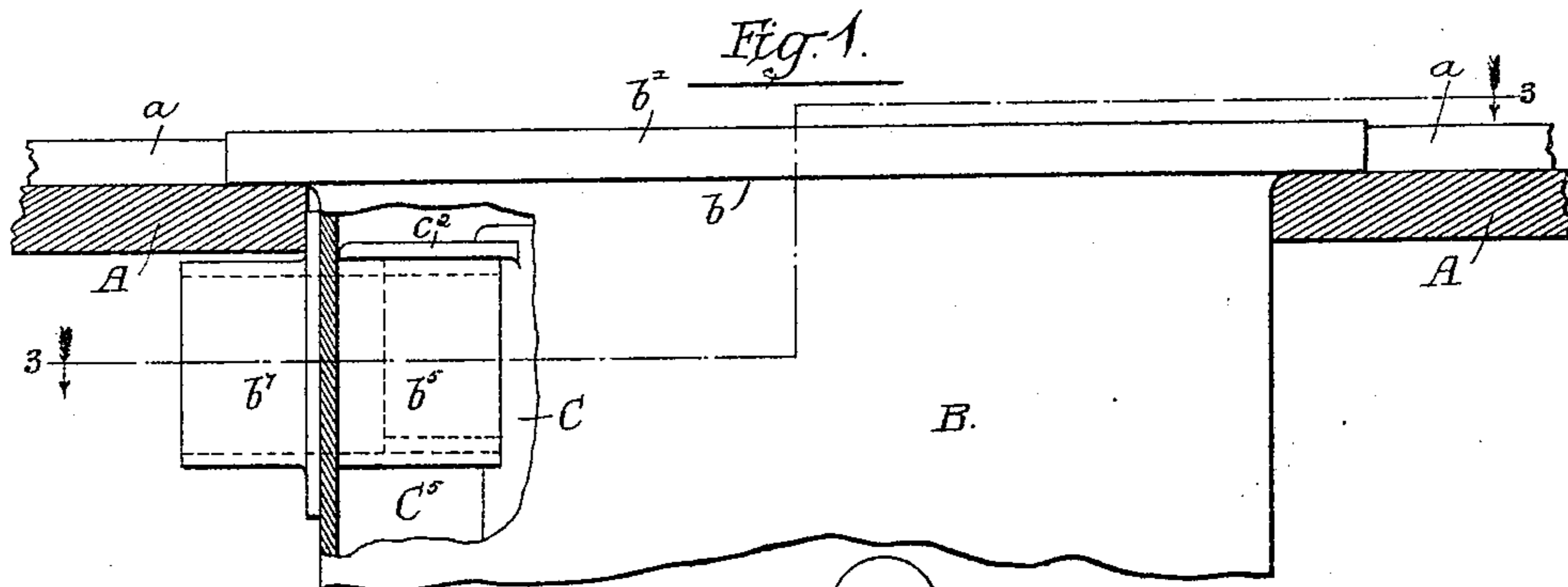
(No Model.)

2 Sheets—Sheet 1.

W. H. RANDALL.
HEATER.

No. 460,659.

Patented Oct. 6, 1891.



Witnesses:-
Louis M. Whitehead.
Wm. J. Hemmings.

Inventor:-
William H. Randall.
By:-
Dayton, Pole & Brown.
Attorneys:-

UNITED STATES PATENT OFFICE.

WILLIAM H. RANDALL, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE RANDALL CAR HEATER COMPANY, OF SAME PLACE.

HEATER.

SPECIFICATION forming part of Letters Patent No. 460,659, dated October 6, 1891.

Application filed October 29, 1889. Renewed March 9, 1891. Serial No. 384,197. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. RANDALL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Heaters; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of heaters employed upon street-railway cars wherein the heater is suspended from the floor of the car and arranged to deliver the heated air to the interior thereof, but is not restricted to such use, as these heaters may be employed upon milk-wagons and other forms of vehicles.

The invention consists in the novel features of construction herein shown, described, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is an end view of the upper portion of my improved heater suspended from the floor of a car, said view being partly in section to more clearly show the interior construction. Fig. 2 is a side view of the lower portion of my improved heater, the line of vision being at right angles to that of Fig. 1. Fig. 3 is a plan view of the heater, one-half being in horizontal section on the line 3 3 of Fig. 1. Fig. 4 is a central vertical sectional view of the heater. Fig. 5 is a horizontal sectional view of the heater, taken on two different planes, as shown by the line 5 5 of Fig. 4. Fig. 6 is a detail sectional view taken on the line 6 6 of Fig. 4.

In the drawings, A is a floor of the car upon which the mat *a* is placed.

B is a rectangular metal housing or air-chamber provided at its upper end with a horizontally-projecting flange *b*, extending upon each of its four sides. This flange *b*, which is provided upon its outer margins with an upturned rim *b'*, forms a shoulder by which the heater is supported from said floor of the car when said heater is placed in and through the opening cut therein.

Resting upon the upper surface of the flange *b* is a wire screen *A'*, which latter is of such

thickness that its upper surface will lie flush with the upper edge of the rim *b'* and the face of the mat *a*. At a short distance below the upper surface of the flange *b* a second flange or shoulder *b²* is formed upon the inner face of each of the four walls of the housing B. Upon this shoulder *b²* rests the usual perforated metal plate or register *B'*, the upper surface of which is flush with or slightly below the upper surface of the flange *b*. Another shoulder or flange *b³* is provided upon the inner face of one wall only of the housing B, the upper surface of which shoulder *b³* is slightly below the flange or shoulder *b²*. In the wall opposite that upon which the shoulder *b³* is formed I provide a hole or opening *b⁴*. Upon the inside of said wall at a slight distance from the marginal edge of the opening *b⁴*, I provide an inwardly-projecting flange *b⁵*, which flange surrounds the said opening except on its upper side—that is to say, it extends around three sides only of said opening. The said flange *b⁵* extends outwardly a considerable distance and is provided on its upper side with a cross-piece or supplemental flange *b⁶*, located next to the wall of the housing B and extending but a little distance outwardly therefrom. Bolted or otherwise secured to the outside of the housing B and surrounding the said opening *b⁴* is the thimble or collar *b⁷*, to which thimble a smoke-pipe or chimney (not shown in the drawings) may be secured in the usual manner and may be disposed in any direction desired.

C is a circular metal fire-chamber provided at its upper end with an outwardly-projecting flange *c*, adapted to rest upon the upturned flange or shoulder *b³*. Diametrically opposite the flange *c* is the right-angular projecting flue *C'*, made or preferably formed integrally with the fire-chamber C and adapted to enter and rest within the inturned flange *b⁵* of the housing B, as shown clearly in Figs. 1, 3, and 4.

C⁴ is a guard or fender comprising a plate formed with fingers, said fingers overhanging the flue *C'* to prevent the pieces of fuel entering the same. The height and length of the flue *C'* is so arranged that when it enters said flange *b⁵* its upper side will meet the end

of the cross-piece or auxiliary flange b^6 at the same time that the end of the flange b^5 meets the wall of the fire-chamber C. The upper side of said flue is, moreover, provided with
 5 outwardly-projecting side flanges c^2 c^2 and an end flange c^3 . The said side and end flanges c^2 , c^2 , and c^3 have their under faces located a slight distance above the under face of the upper side of said flue C', said distance cor-
 10 responding to the thickness of said upper side, so that said flanges c^2 c^2 are adapted to rest upon the upper edges of the flange b^5 , while the flange c^3 is adapted to overlap and rest upon the upper face of the cross-piece or
 15 auxiliary flange b^6 .

It is obvious from the construction thus described that a tight and close joint is provided between the fire-chamber and chimney—such a joint as will effectually prevent the
 20 smoke or products of combustion from passing into the air-chamber in its passage through the same. It will be readily understood that the fire-chamber C will be suspended within the housing B and supported therein from
 25 the lug b^3 and the flange b^5 , it being manifest that the construction of the said flange b^5 and the flue C' permits the vertical removal of the said fire-chamber C from the housing B.

The fire-chamber C is provided with a cir-
 30 cular opening in its top, said opening having a downwardly and inwardly inclined wall, as indicated by c^4 . An annular flange c^5 is formed upon the said fire-chamber, and projects inwardly a slight distance beyond the
 35 wall c^4 of the opening therein and located immediately below said opening. The said annular flange c^5 is provided in its edge with notches or open slots c^6 c^6 c^6 , preferably three
 40 in number, and equally arranged upon the periphery of said opening.

C^4 is a lid for closing the opening in the fire-chamber. Said lid C^2 is circular in contour and adapted to fit within the said opening, and is provided with a downwardly and
 45 inwardly inclined periphery or edge, as at c^7 , the incline of which corresponds to that of the wall c^4 of the said opening. Upon the under face of the lid are secured three right-angular lugs C^3 C^3 C^3 . The lugs C^3 are each
 50 formed with a vertical portion c^8 and an outwardly-extending horizontal portion c^9 . The said lugs C^3 are located upon the lid, so that the vertical portions c^8 will stand inwardly from the inner edge of the flange c^5 , while the
 55 horizontal portions c^9 are adapted to pass through the slots c^6 in said lid. The lid C^2 can be placed in position by holding the same above the opening, so that the lugs C^3 register with the slots c^6 , lowering said lid until
 60 the same is within the opening in the fire-chamber and the lugs have passed through the slots. Then by giving the said lid a slight turn the horizontal portions of the lugs will be brought beneath the flange, and thus serve
 65 to hold the lid in place.

c^{10} is a handle attached to the lid C^2 and by

means of which the latter may be removed and by which the entire fire-chamber may be
 70 bodily lifted out of the housing or air-chamber B.

The bottom B^2 of the housing B is provided with a central opening for the passage of
 75 ashes from the grate above and for the passage of air from the space below, which opening is surrounded by a vertical or upturned projection or flange b^8 .

The fire-chamber C is provided upon its lower end with an annular horizontal projection c^{11} , having upon its outer edge a down-
 80 turned rim c^{12} . A space c^{13} is formed between said downturned rim c^{12} and the bottom of the fire-chamber for the reception of the annular flange or rim b^8 . When the fire-chamber C is hung in the housing B from the
 85 flanges b^3 and b^5 , said flange b^8 will project into the space c^{13} , and thus secure said fire-chamber C from movement at its lower end. The space c^{13} is made somewhat larger than
 90 is necessary, simply to accommodate the flange or rim b^8 , in order to allow for the proper expansion of the metal when the fire-chamber C is heated by the fire therein.

Within the chamber C and resting upon the inturned flange or bottom c^{14} thereof is a
 95 grate D, provided with a downwardly-projecting headed pin or bolt d and adapted to be engaged by the forked end of a shaking-rod. Ashes on the grate D may be removed by re-
 100 volving the said grate in a familiar manner by means of the pin d , the grate rotating upon the flange c^{14} .

Secured to and below the bottom B^2 of the housing B, by bolts or otherwise, is an ash-
 105 box E.

E' is a door of ordinary construction hinged
 110 at e' to one side of the ash-box, so as to open downwardly when the thumb-latch e^2 is turned or opened.

Upon two ends of the ash-box E and opposite to each other are the hinged dampers E^2
 115 E^3 , said dampers being hinged or pivoted at their upper margins at e^3 e^3 and adapted to swing outwardly and upwardly upon said
 120 pivots, so as to alternately open and close spaces e^4 e^4 in the adjacent sides of said ash-box. The dampers are each provided on one
 125 side of their lower edges with pins or studs e^5 e^6 , which project outwardly to a point slightly beyond the side of the housing B.

E^4 indicates an operating-lever pivoted, as
 130 shown, to the side of the housing adjacent to the pins e^5 e^6 . Said lever extends downwardly below its pivotal point to the bottom of the ash-box and is pivoted at its lower end
 135 to the inner ends of two links e^7 e^7 , said links being pivoted at their outer ends to the pins e^5 e^6 on the dampers. The said lever E^4 is provided with a weighted upper end, as at e^8 . The links e^7 are made of such a length as to
 140 partially open each of said dampers when the lever E^4 stands in a vertical position, so that when thrown to one side one of said dampers

will be closed and the other opened to its full extent.

The damper for controlling the admission of air to the air-chamber within the housing is constructed as follows: $b^9 b^9$ indicate a plurality of perforations or openings, preferably circular, formed in the bottom B^2 of the housing. Said perforations are arranged in the form of a circle around the fire-chamber, and only on four opposite sides corresponding with sides of the housing, otherwise the corner perforations would open into the ash-box. F is a flat ring having an external diameter equal to the distance between the sides of the housing, said ring being held in position by the walls of the housing. The ring F is provided with a plurality of perforations $f f$, of the same size and shape as the holes b^9 in the bottom of the housing, and said ring is located so that the perforations therein are in the same vertical plane with the holes in the bottom of the housing. The distance between the said perforations $b^9 b^9$ and $f f$ in each case is greater than the diameters thereof. Thus it is evident that when the perforations register with each other air is free to pass into the air-chamber; but when the ring is turned to bring the perforations f over the spaces between the perforations b^9 said openings will be closed and prevent the admission of air. F' is an operating-lever for giving rotary motion to the ring F , said lever being pivoted to the inside of the housing and having a downwardly-projecting forked arm f' , adapted to embrace a lug f^2 on the said ring. The upper end of said lever F' is weighted, as shown, to aid in holding the same in its adjusted position. The said lever F' can be operated by removing the grating and reaching down between the fire-chamber and the housing, and is so arranged relatively to the ring that when it stands in a vertical position the holes will be half closed, so that by swinging the said lever to either side the openings will be opened or closed.

The operation of my invention is as follows: A fire is built upon the grate D within the fire-chamber C . The smoke will pass out through the flue C' to the open air. If the car or other vehicle to which the heater is attached is going in one direction, the damper E^3 is closed while the damper E^2 is open. Air is thus delivered through the opening e^4 into the ash-box E , and thence upwardly through the grate D and the fire. At the same time pure air is also delivered to the interior of the housing B through the openings b^9 therein, which are opened. The air in the space C^5 between the fire-chamber C and said housing becomes heated and passes upwardly through the grating B' and through the screen A' to the interior of the car. When the direction of motion of the car is reversed, the damper E^2 is closed over the space e^4 and the damper E^3 is open. It will thus be seen that fresh air is fed to the combustion-cham-

ber and is also supplied to the heating-chamber when the car is going in either direction.

It will be observed that my improved heater is very simple in its construction, cheap in its manufacture, therefore, and possesses no complicated parts, which render it difficult to operate. The removable fire-chamber C permits the operator to build a fire therein when the latter is disconnected from the housing B , a feature of utility which will be readily recognized by street-car men who have heretofore suffered from the dangers of leaving fires over night in cars in a barn, and from the smoke in the barn in the morning when the fires are started. In using my invention on street-railway cars it will be found convenient to remove all the fire-chambers C to a suitable room having a plurality of chimney-flues, building the fires in the said chambers C when the latter are in said room, and, after the several fires have ceased to throw off the gases and heavy smoke usual when first built, to severally replace the chambers C in the housing B as each car starts out of the barn on its first trip.

It will be observed from the construction above described that dust from the ashes in the fire-box or from the burning fire in the combustion chamber C is not permitted to mingle with the heated air in the space C^5 and thereby be delivered to the interior of the car, which evil is a serious objection existing in all heaters now in use. It is one of the main objects of my invention to cure this defect. The construction of the smoke-connection between the fire-chamber and the outside form a perfectly air-tight joint, so as to effectually prevent any dust or products of combustion from passing into the air-chamber.

I claim as my invention—

1. In a heater, the combination, with a housing secured to and suspended from the bottom of a vehicle, an opening in said housing, an inwardly-projecting flange, as b^5 , surrounding said opening at its bottom and sides, and a cross-piece, as b^6 , at the top of said opening, of a fire-chamber removably suspended within said housing, a flue, as C' , on said fire-chamber, and flanges $c^2 c^2 c^3$ on said flue, said flue being adapted to rest upon the flange b^5 , the flanges $c^2 c^2$ to rest upon the upper edges of said flange b^5 , and the flange c^3 to rest upon the cross-piece b^6 , substantially as described.

2. In a heater, the combination, with a housing secured to and suspended from the bottom of a vehicle, of a fire-chamber removably suspended within said housing, said fire-chamber being smaller than said housing and thereby forming an air-heating chamber C^3 , which communicates with the interior of the vehicle, the bottom of said housing outside of said fire-pot being formed with a plurality of openings or perforations communicating with the atmosphere and arranged in the form of a circle, a rotatable flat ring located over said openings or perforations and provided with

a plurality of openings adapted to register with the openings in the housing, and a lever pivoted to the housing and having one arm connected with said ring, whereby the latter
5 can be rotated to open or close said openings, substantially as described.

In testimony that I claim the foregoing as

my invention I affix my signature in presence of two witnesses.

WILLIAM H. RANDALL.

Witnesses:

HARRY COBB KENNEDY,
C. CLARENCE POOLE.