

No. 683,144.

Patented Sept. 24, 1901.

E. W. T. RICHMOND.

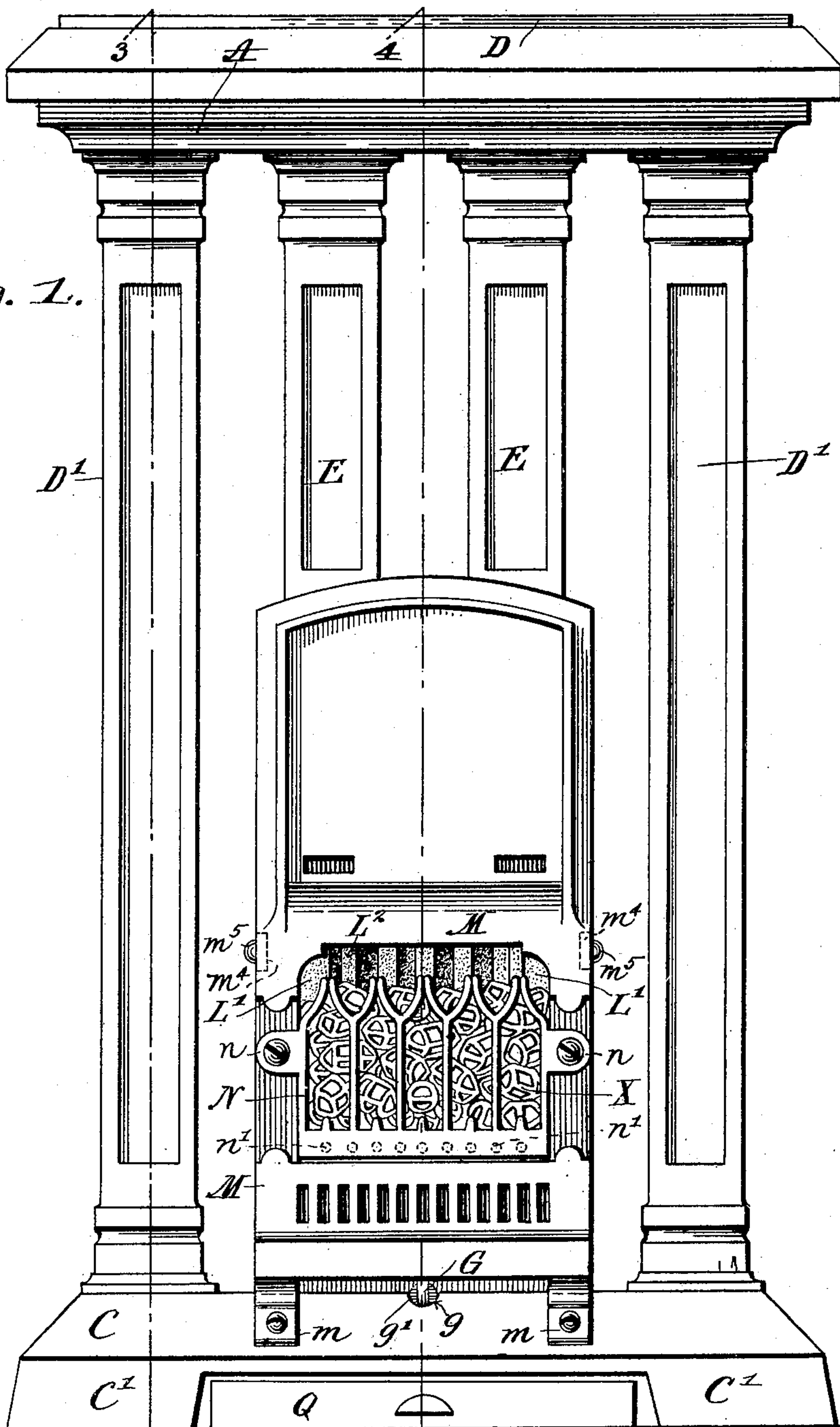
GAS HEATER.

(Application filed Dec. 17, 1900.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



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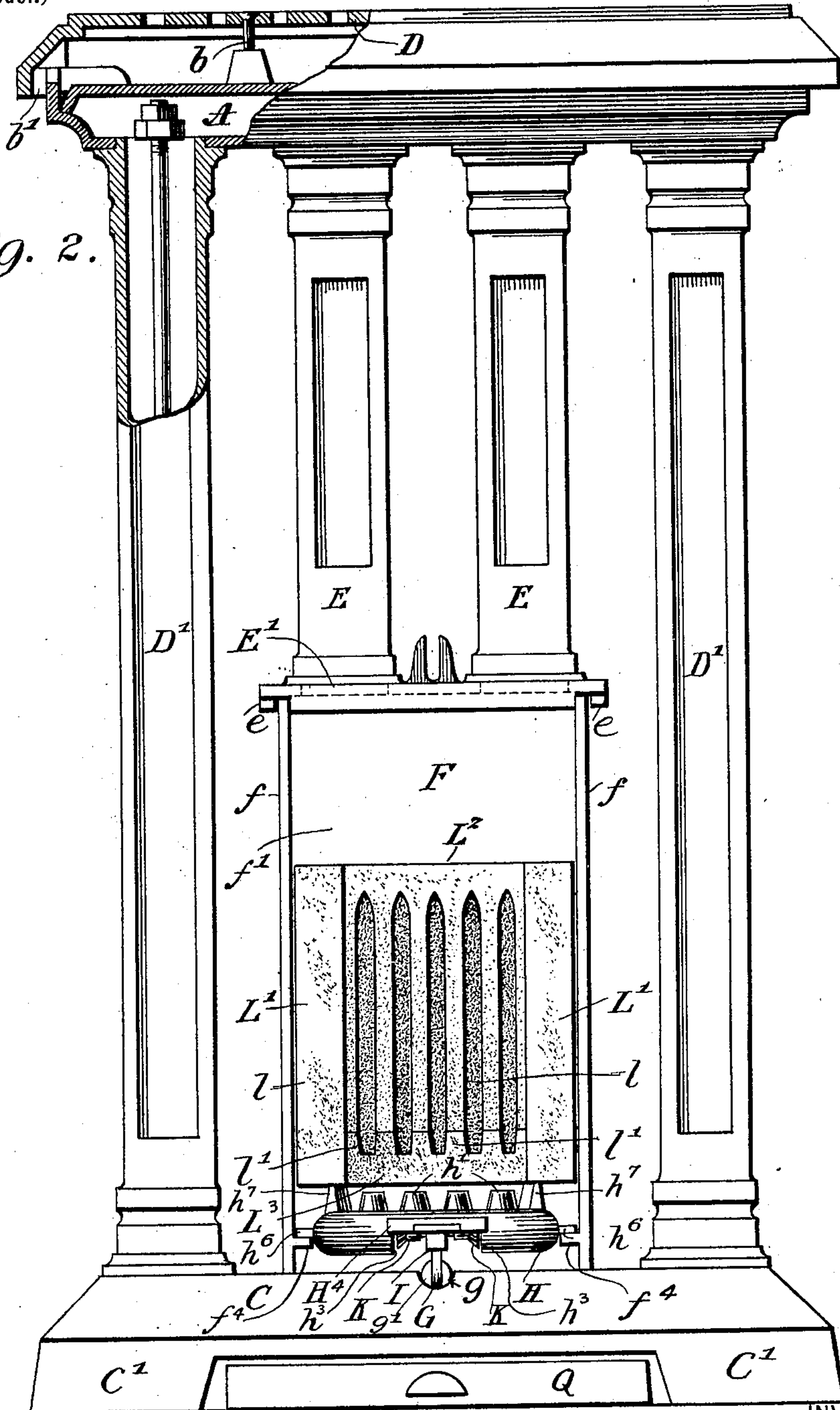
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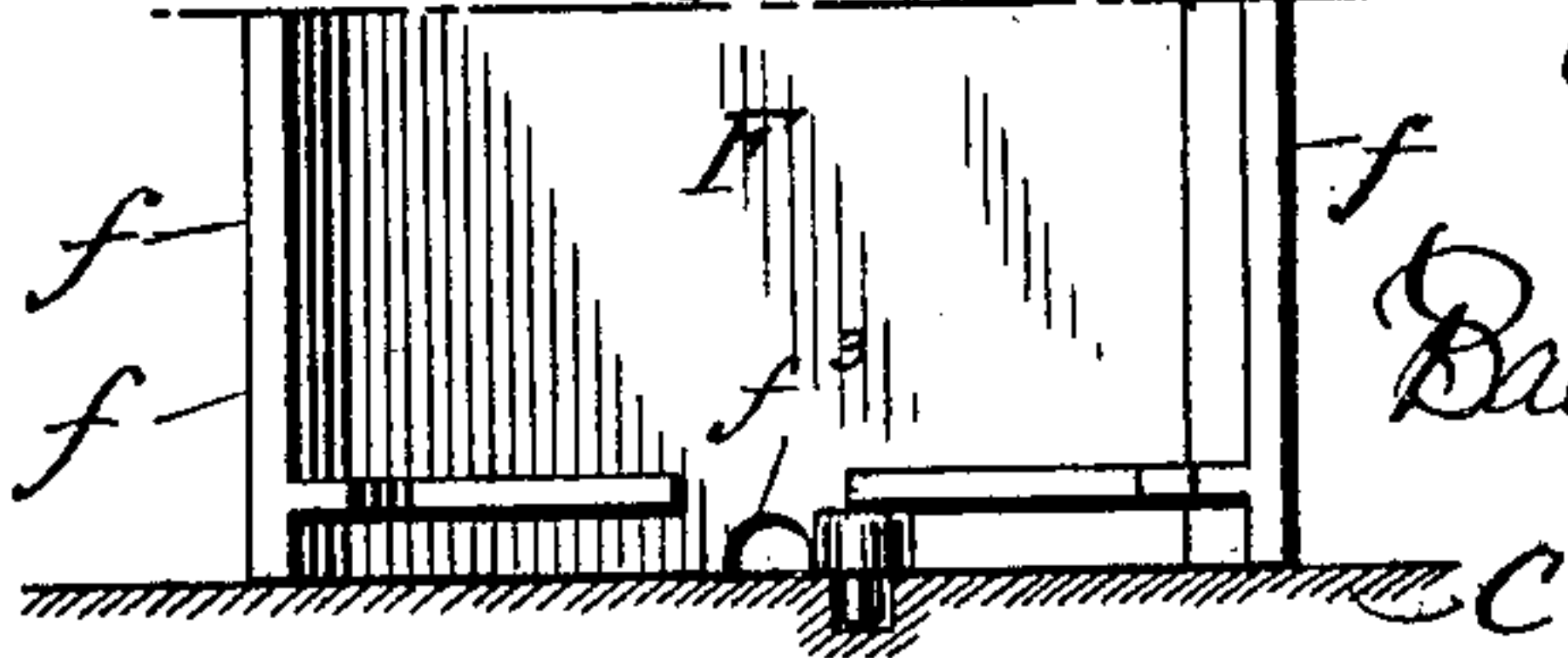
Fig. 2.



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Fig. 10.



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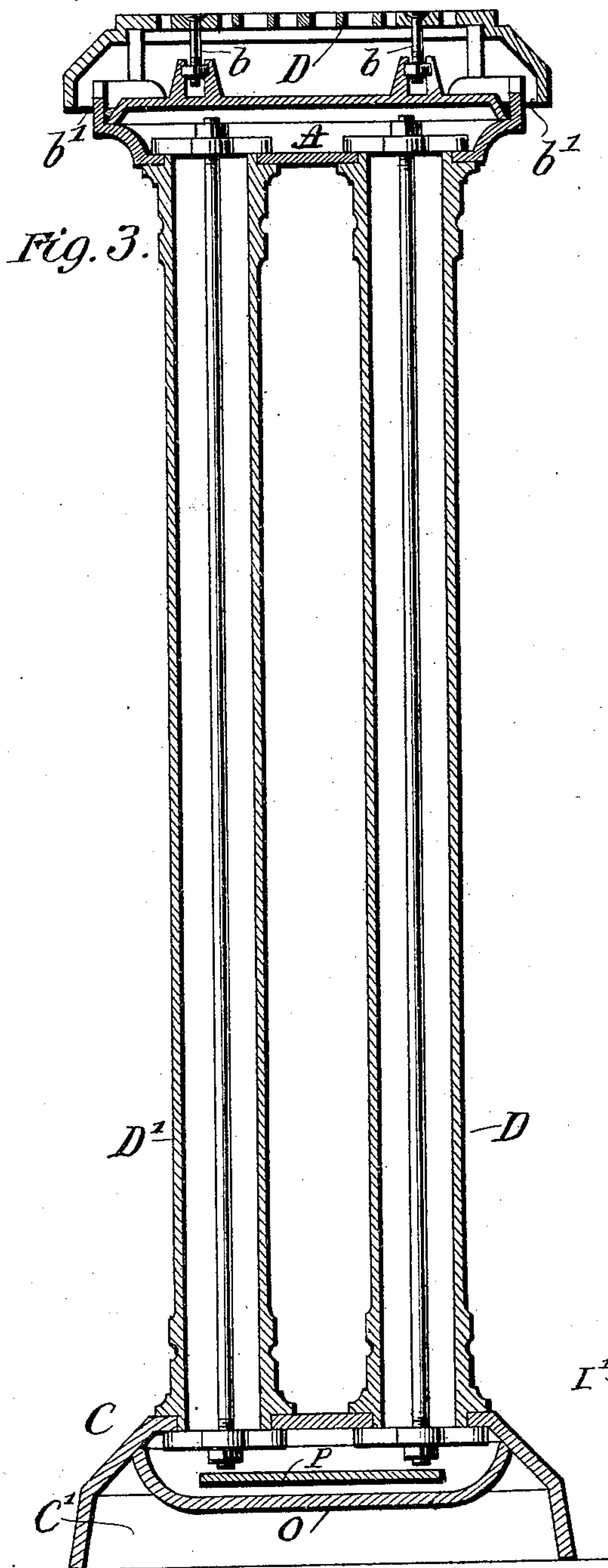


Fig. 3.

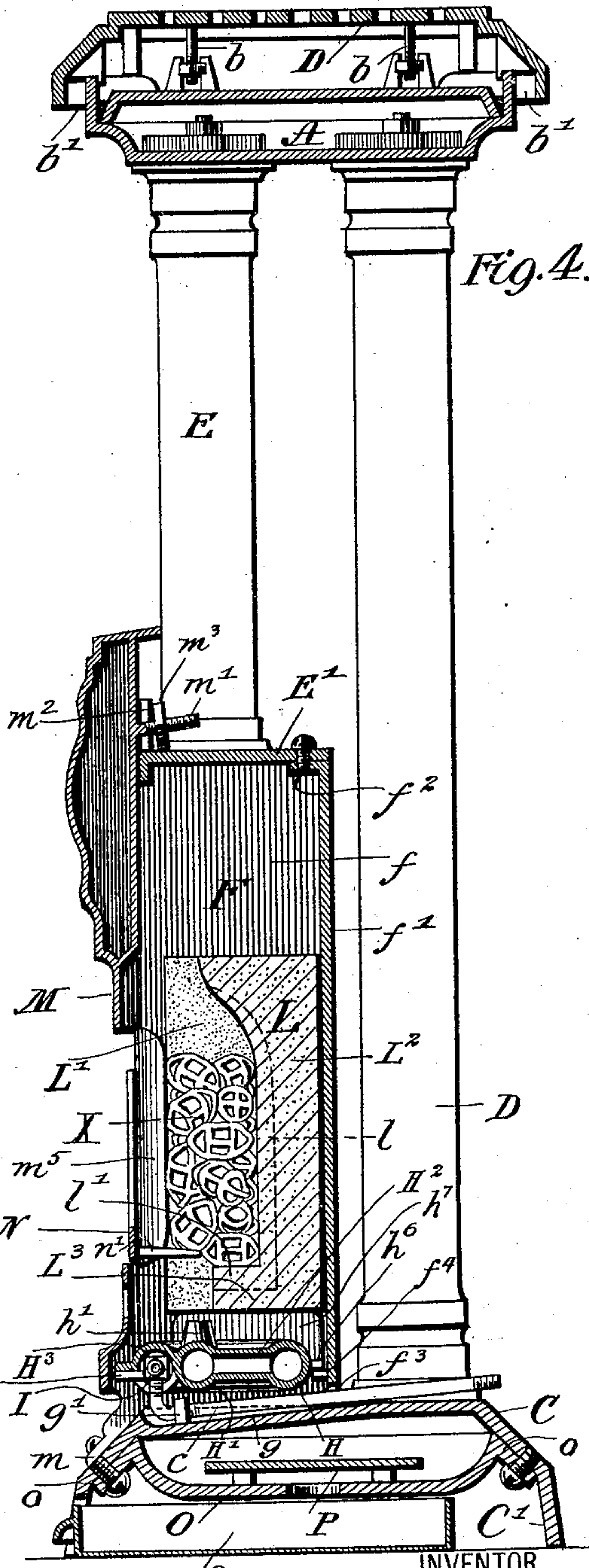


Fig. 4.

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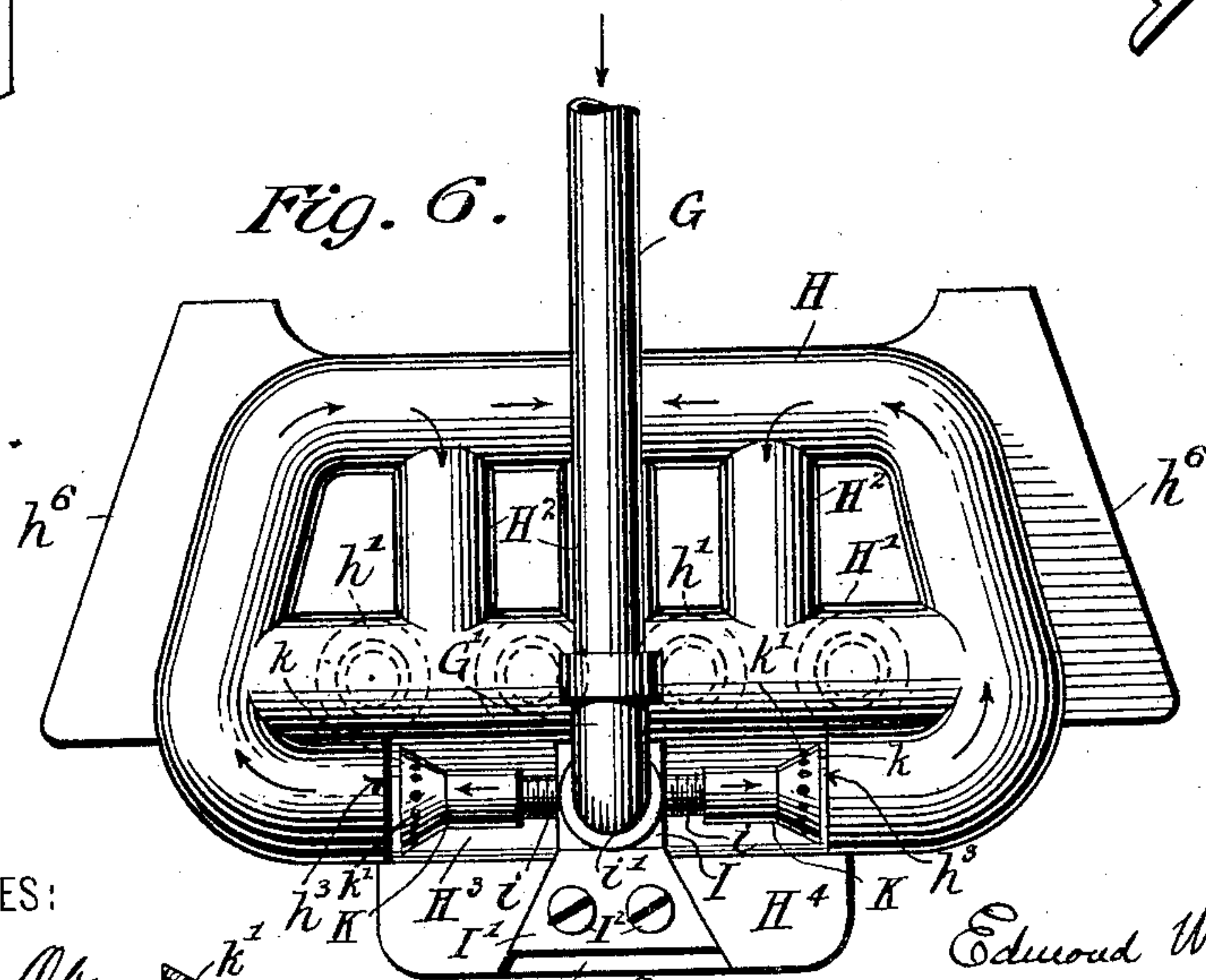
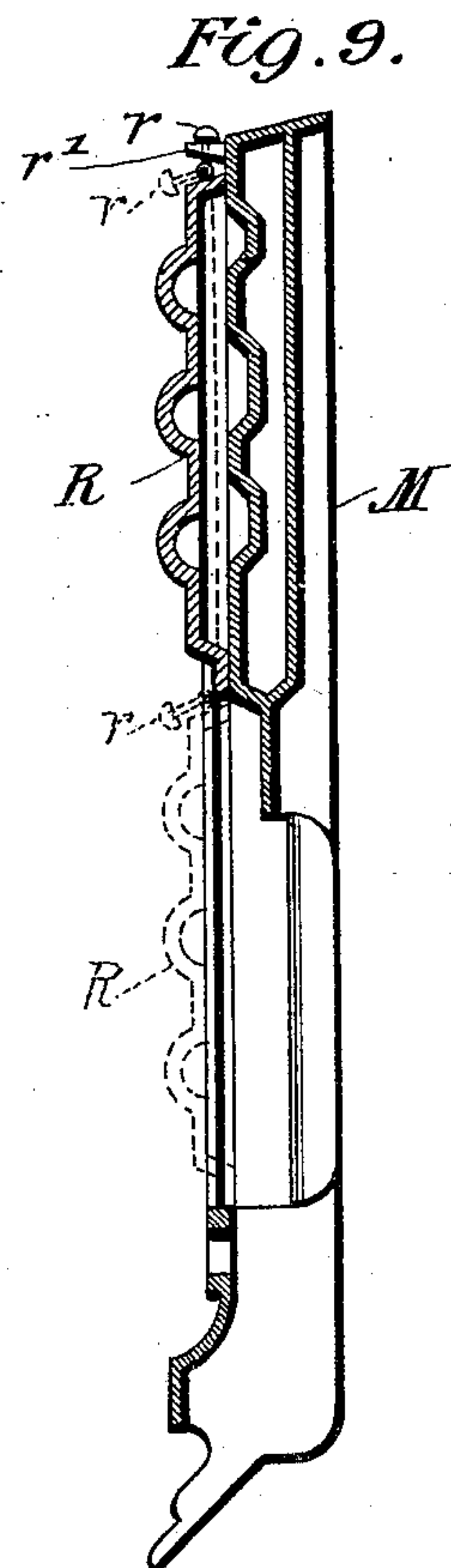
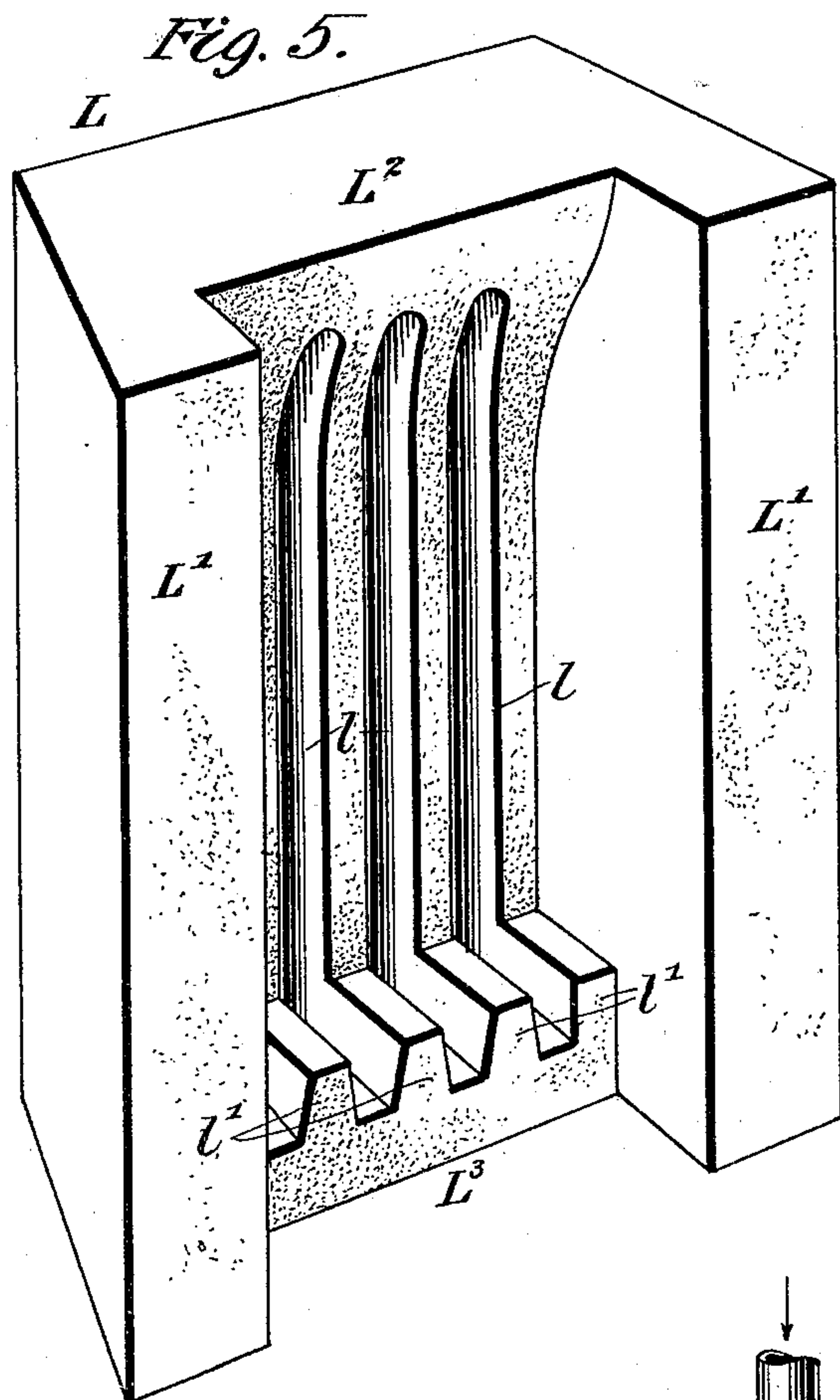
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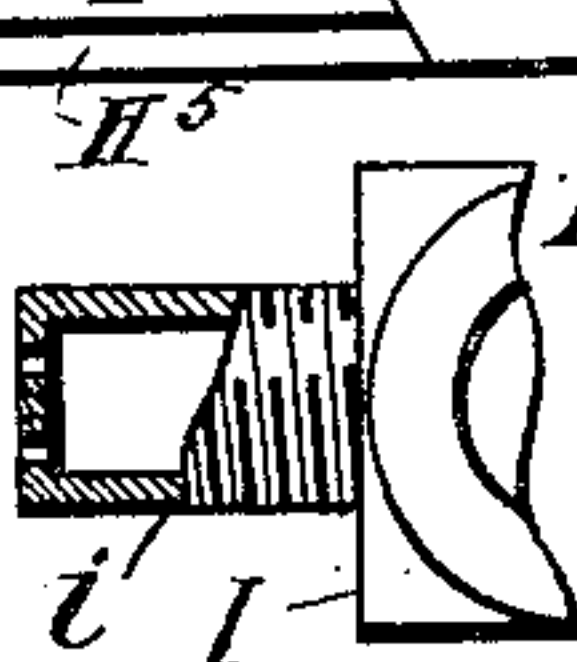
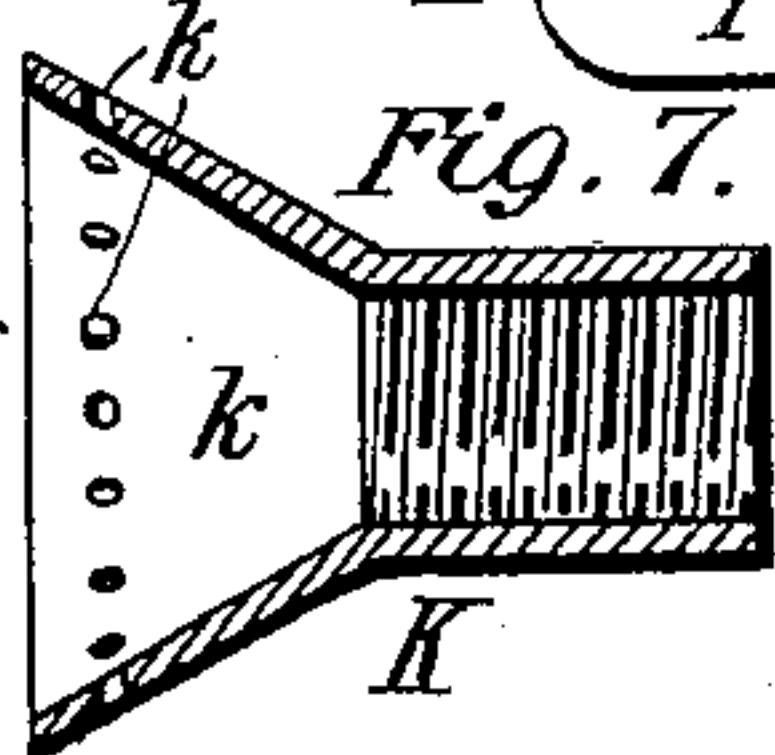
(No Model.)

4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

EDMOND W. T. RICHMOND, OF ROMFORD, ENGLAND.

GAS-HEATER.

SPECIFICATION forming part of Letters Patent No. 683,144, dated September 24, 1901.

Application filed December 17, 1900. Serial No. 40,138. (No model.)

To all whom it may concern:

Be it known that I, EDMOND W. T. RICHMOND, a subject of the Queen of Great Britain, residing at Summercourt, Romford, Essex county, England, have invented certain new and useful Improvements in Gas-Heaters, of which the following is a specification.

My invention relates to a type of gas-heaters in which vertical tubes extending between a hollow cap and base are employed in conjunction with an open-grate fire containing refractory material to be heated to incandescence by a flame from a gas-burner placed below it.

The invention comprises certain improvements in the gas-burner, the associated parts comprising a grate or rather a fuel-holder and other details, all as hereinafter described.

In the accompanying drawings, Figure 1 is a front elevation. Fig. 2 is a similar view with the front plate of the fire box or grate removed. Fig. 3 is a section of the line 3 3 of Fig. 1. Fig. 4 is a section of the line 4 4 of Fig. 1. Fig. 5 is a detailed view of the fire-brick fuel-holder. Fig. 6 is a bottom plan view of the burner. Figs. 7 and 8 are detailed views showing the feature of adjustability of the burner to adapt it to gases of varying character—as, for instance, ordinary illuminating-gas or water or producer gas. Fig. 9 is a detailed view of the front plate or frame covering the fire-box, and Fig. 10 is a detailed view of the lower part of the cast-iron box in which the fire-brick fuel-holder is placed.

A is a hollow cap, upon which the skeleton or open-work ornamental cover D is attached by screws *b*. There is a space *b'* between the downwardly-extending edges of the cover and the walls of the cap to permit of free circulation of air.

C is the base, which is supported upon the flange extensions *C'*. Between the base and cap extend hollow tubes, the whole structure being appropriately secured by bolts, as shown. In the particular construction shown there are four tubes *D* at the rear and two tubes *D'* *D'* at the front, all of which tubes extend from the cap to the base and are in open communication with both of these parts. The two front middle tubes *E E* are approximately about one-half the length of the oth-

ers and at their lower ends are affixed to the plate *E'*, having lugs *e* at its sides, which fit over the upper edges of the sides *f* of the vertical iron box *F*, the back plate *f'* of which has a forwardly-projecting flange and is bolted to the rear part of the plate *E'*, as at *f*². The lower edges of the side and rear walls rest upon the top surfaces of the base *C*, which is indicated by the dotted line *c* in Fig. 4. The back plate *f'* of the box is notched or perforated, as at *f*³, to receive the gas-supply by pipe *G* entering from the rear and lying in an inclined groove *g*, formed in the top face of the base, where it is connected at *g'* by a coupling with the pipe projecting from the burner. The burner is shown in Figs. 6, 2, and 4. It consists of a casting having side wings *h*⁶ *h*⁶, resting upon ribs or flanges *f*⁴, projecting from the sides and rear wall of the box *F*, these members of the box being all preferably cast in one piece. The burner consists of a cored casting of skeleton structure, such as is shown in Fig. 6, having a hollow part *H* of substantially rectangular contour, the sides of which are connected by a hollow portion *H'*, on the upper face of which the burner-nipples *h'* are formed or mounted. The rear portion of the hollow part *H* of the burner is connected by cross connections with the part *H'*, there being three such cross connections *H*². In the lower face of the burner and on the under side, as seen in Fig. 6, there is a break or gap in the continuity of the part *H*, connected by a semicircular open trough *H*³, also forming part of the casting, leaving two opposite entrances *h*³ *h*³ to the passage *H*. From the trough *H*³ there projects a horizontal flange *H*⁴, having centrally in it a dovetailed recess *H*⁵. The part of the burner regulating the supply of gas and air consists of a hollow portion *I*, having cylindrical ends *i*, an internally-threaded opening *i'* in its under face to receive the threaded end of the gas-pipe *G'*, which is connected by a coupling *g'* with the gas-supply pipe *G*, a dovetailed flange *I'*, projecting horizontally from the hollow part *I*, fitting in the dovetailed recess *H*⁵ of the flange *H*⁴ and secured therein by screws *I*². The cylindrical ends *i* stand opposite and concentric with the openings *h*³ *h*³ in the part *H* of the burner and are closed at their ends except for the multiple perforations therein.

On the cylindrical threaded ends i are secured sleeves K , having at their outer ends forwardly-flaring flanges k , with multiple perforations k' therein. By screwing these sleeves toward or from the openings h^3 the space between the periphery of the flanges and the edges of the opening h^3 may be enlarged or diminished and the quantity of air so admitted to the part H of the burner regulated.

The apertures in the flange also permit of the influx of a certain quantity of air to the opening h^3 , and the flanges also act as shields to prevent "firing back." A gas-jet of this character permits of a ready adjustment of its parts to adapt it most favorably to the kind of gas which is admitted through it to the burner H . The fire-brick fuel-holder L may be and preferably is formed in one piece. It has side wings L' L' and a grooved back L^2 , that at the top curves forwardly, and a bottom portion L^3 , that projects between the wings L' , but does not extend out flush with their front faces. The grooves l in the back plate are continued across the face of the bottom L^3 , thus forming raised ribs l' thereon. This fire-brick box, in which the fuel (indicated by X in Fig. 4) is placed and which may be of any suitable refractory material, is of the horizontal cross-section shown in Fig. 5, which corresponds with the horizontal cross-section of the cast-iron box F , in which it closely fits, resting at the bottom upon the upper faces of the projections h^7 , cast with or attached to the part H of the burner. To the front of the box F is applied an open rectangular frame M , having at the bottom feet m , bolted to the base C , as shown in Fig. 1, and near the top a rearwardly-extending threaded bolt m' , that lies in the space between the two vertical lugs m^2 on the top of the plate E' , between the columns $E E$, and has applied to it a nut m^3 , bearing against the rear face of the lugs. Above the fireplace-opening the upper part of the frame M is closed or solid and is suitably ornamented, as may be desired and as is indicated in Figs. 1 and 4—that is to say, it may be cast with an appropriate raised or ornamental pattern. At the sides of the frame M are rearwardly-extending projecting arms or lugs m^4 , which embrace the side walls of the box F and are attached to them by screw-bolts m^5 , as seen in Fig. 1. At the opening in the frame opposite the fireplace there are inwardly-extending flanges m^6 , that are in contact with or in close juxtaposition to the front face of the wings L' of the fire-brick fuel-holder. In the special construction shown the fuel is held in place by an open-work skeleton frame N , which may be of cast-iron and is provided with side lugs n , which are bolted to the front of the side bars of the frame. The bottom bar of the skeleton frame N has a series of inwardly-projecting pins or fingers n' . The fuel partly rests upon these fingers and upon the bottom L^3 of the fire-brick holder. The fingers n' are preferably somewhat above the level of the top

face of the bottom L^3 of the fire-brick holder, and there is an interval of space between their rear ends and the bottom portion L^3 of the fire-brick. The burner-nipples h' are located in a plane below the lower face of the bottom L^3 of the fire-brick, but somewhat in front of it, so that the jets of flame rising from the nipples will pass between the fingers and into contact with the artificial fuel. The base C is closed at the bottom by the plate O , having flanges o , fitting against the interior inclined walls of the base and secured to it by screw-bolts, as shown in Fig. 4. This plate O has a central aperture, above which is supported a baffle-plate P , and beneath the aperture in the plate O is located a removable water-pan Q , which may be slipped into position through the opening in the front wall of the base. An opening, however, may be provided at the rear of the base or at either end for the insertion or removal of this pan.

In Fig. 9 I have shown a somewhat-modified construction of the frame M . It is in part constructed substantially as already described, except that a supplemental plate R , having an ornamental face, is provided. When the heater is in use, this plate is raised, so as to cover or lie over the upper solid part of the frame already described; but when the apparatus is not in use the plate R , which is held in its elevated position by a pivoted headed bolt r , entering in a projection r' at the top of the frame, may be lowered into the position shown in dotted lines in Fig. 9, so as to cover the opening of the fireplace. In this movement the side lugs of the plate R travel in ways formed in the sides of the frame M . The products of combustion and air rising in the fire-box pass by the tubes $E E$ into the hollow cap and there divide among the four rear tubes D and the front side tubes D' , down which they pass into the hollow base. The superficial area of the pipes $D D'$, the hollow cap, and the hollow base is relatively large and is such as to take up the heat from the air and the products of combustion, radiating it into the room, and the products of combustion and air being correspondingly cooled are condensed, and such watery vapor as is present is reduced to liquid form and discharges through the aperture in the base into the pan Q . A considerable part of such non-combustible gases that would tend to vitiate the atmosphere of the room is absorbed and retained by the water, while the residue, mainly carbonic acid, is discharged adjacent to the floor of the apartment and being for the most part heavier than the atmosphere does not rise. In addition to the heat radiated from the metal parts of the apparatus there is a direct heat thrown out from the incandescent artificial fuel which also affords a bright and attractive open fire. A feature of the invention is that the cooling and condensing surface shall be of sufficient area to cool and correspondingly condense not only the products of combustion and air entering at the bottom

of the fire-brick below the fingers *n'*, but also the relatively large volume of air which is drawn in through the open front of the fire and effect the condensation of the water-vapor present. Furthermore, the cooling effect and the corresponding condensation are such as to induce a proper and suitable draft up through the fire-box and tubes E E and down the other tubes into the hollow base. These features are material to produce the most satisfactory and most efficient operation of a heater of this kind, which is distinguished from those radiator-like heaters wherein a mere gas jet or burner is provided at the base of one of the tubes. A number of forms of apparatus of that class have been proposed, but they all have objections which have prohibited their use except to a very limited extent. A further advantage of the construction that has been described is that the fire-brick fuel-holder is arranged vertically opposite the fireplace-opening and has its rear wall inclined forwardly at the top, thus efficiently radiating into the room a large portion of the heat absorbed by it.

I claim as my invention—

1. The combination of a hollow cap and base, tubes connecting them, an open-faced fire-box mounted on the base and communicating at the top with a short tube or tubes connected with the cap, flanges projecting from the wall of the box near its lower end, a burner removably mounted thereon, a gas connection to the burner extending from the rear of the apparatus across the top face of the base, a fire-brick fuel-holder fitting within the box above the burner and having a bottom portion upon which the fuel partly rests, and a fuel-guard applied at the front of the fireplace and having inwardly-projecting fingers upon which also the artificial fuel partly rests.

2. The combination of a hollow cap and base, tubes connecting them, one or more short tubes depending from the cap and secured at their lower ends in a plate, a fire-box having rear and side walls resting upon the base and its top formed by said plate, a burner located at the bottom of said box, a pipe for conveying gas to the burner entering the rear of the fire-box, a fire-brick fuel-holder located above the burner and having side wings, a rear wall and a relatively narrow bottom portion, a fuel-guard applied at the front of the fire-box and having inwardly-projecting fingers partly supporting the artificial fuel and located in a plane above the upper surface of the bottom portion of the fire-brick.

3. The combination of a hollow cap, a hollow base having an opening in the bottom thereof, tubes connecting the hollow cap and base, a fire-box adjacent to the base, a burner located at the bottom of the fire-box, a fuel-holder located above the burner, one or more

tubes connecting the top of the fire-box and the hollow cap, a baffle-plate supported within the base opposite the opening in the bottom thereof, and a water-pan located under the opening.

4. The combination of a hollow cap, a hollow base having an opening in the bottom thereof tubes connecting the hollow cap and base, a fire-box mounted on the base, a burner at the bottom of the fire-box, a fire-brick fuel-holder for artificial fuel located above the burner, tubes connecting the top of the fire-box and the hollow cap and a water-pan located under the base opposite the opening therein.

5. The combination of a hollow cap and base, tubes connecting them, a fire-box mounted on the base and having inwardly-projecting flanges near its bottom, a burner removably seated on said flanges, a jet for supplying the gas to the burner attached to the front portion thereof, a pipe for supplying gas to the jet entering the rear of the apparatus and connected at its front end with the jet, a fire-brick fuel-holder located above the burner, tubes connecting the top of the fire-box and the hollow-cap, and a fuel-guard applied at the front of the fire-box and having inwardly-projecting fingers serving to partly support the artificial fuel.

6. The combination of a hollow cap, a hollow base, tubes connecting them one or more tubes depending from the hollow cap, a plate in which their lower ends are secured, an open-face box interposed between the base and said plate which forms the top thereof, a fire-brick fuel-holder located in the box, a burner located in the bottom of the box, and a fuel-guard applied across the open face of the box.

7. The combination of a hollow cap, a hollow base, tubes connecting them one or more tubes depending from the cap, a plate in which their lower ends are secured, an open-face box mounted on the base and of which said plate is the top, a burner located in the bottom of the box and having projections *h'*, and a fire-brick fuel-holder located within the box and resting upon said projections.

8. The combination of a hollow cap, a hollow base, tubes connecting them one or more tubes depending from the cap, a plate in which their lower ends are secured, an open-face box interposed between the plate and base and of which the plate forms the top, a burner located at the bottom of the box, and a fire-brick fuel-holder located in the box and adapted to hold artificial fuel to be heated by the flame from the burner.

In testimony whereof I have hereunto subscribed my name.

EDMOND W. T. RICHMOND.

Witnesses:

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