

(No Model.)

2 Sheets—Sheet 1.

E. M. TYDEMAN.  
HYDROCARBON BURNER.

No. 539,781.

Patented May 21, 1895.

FIG 1

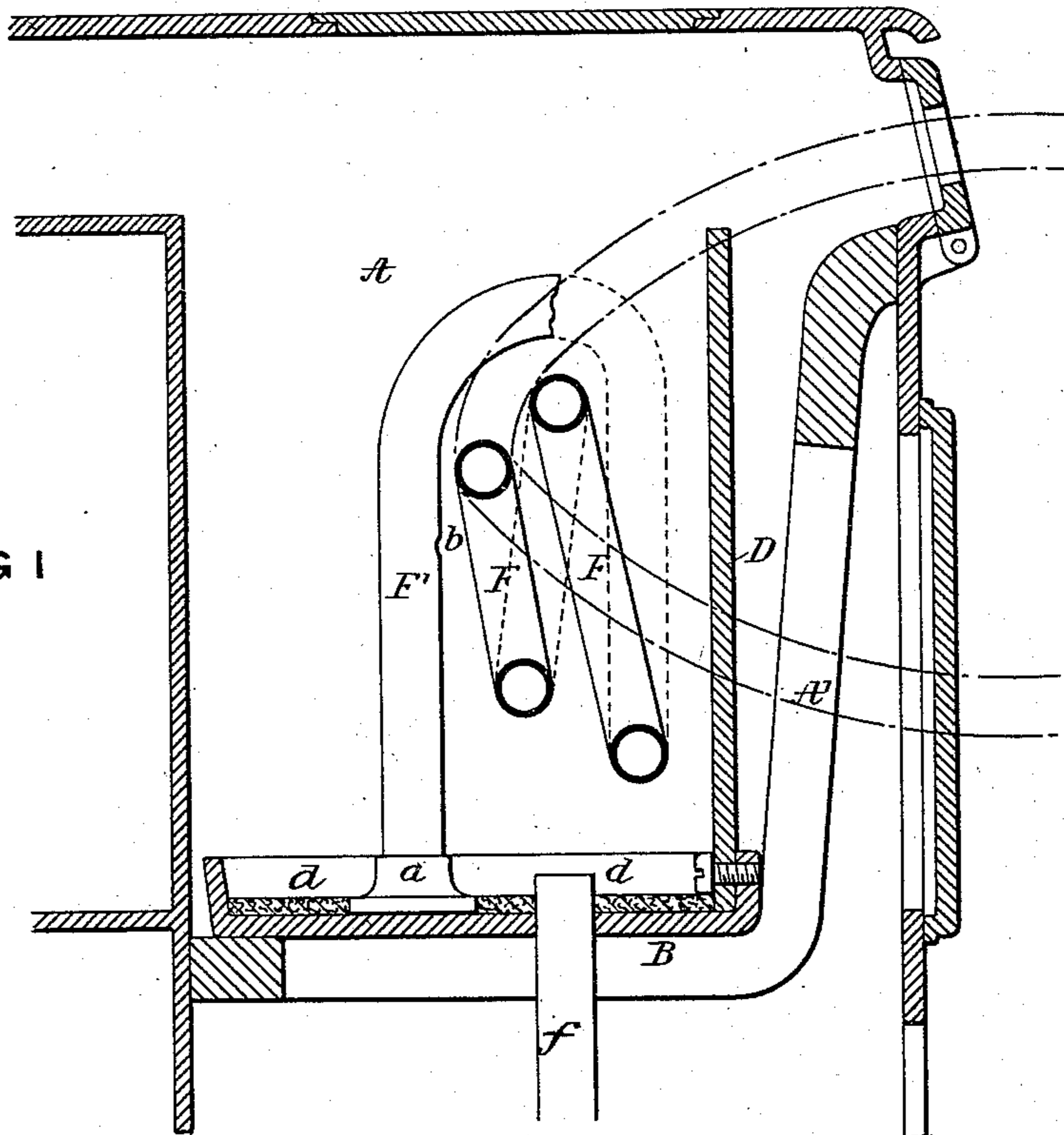
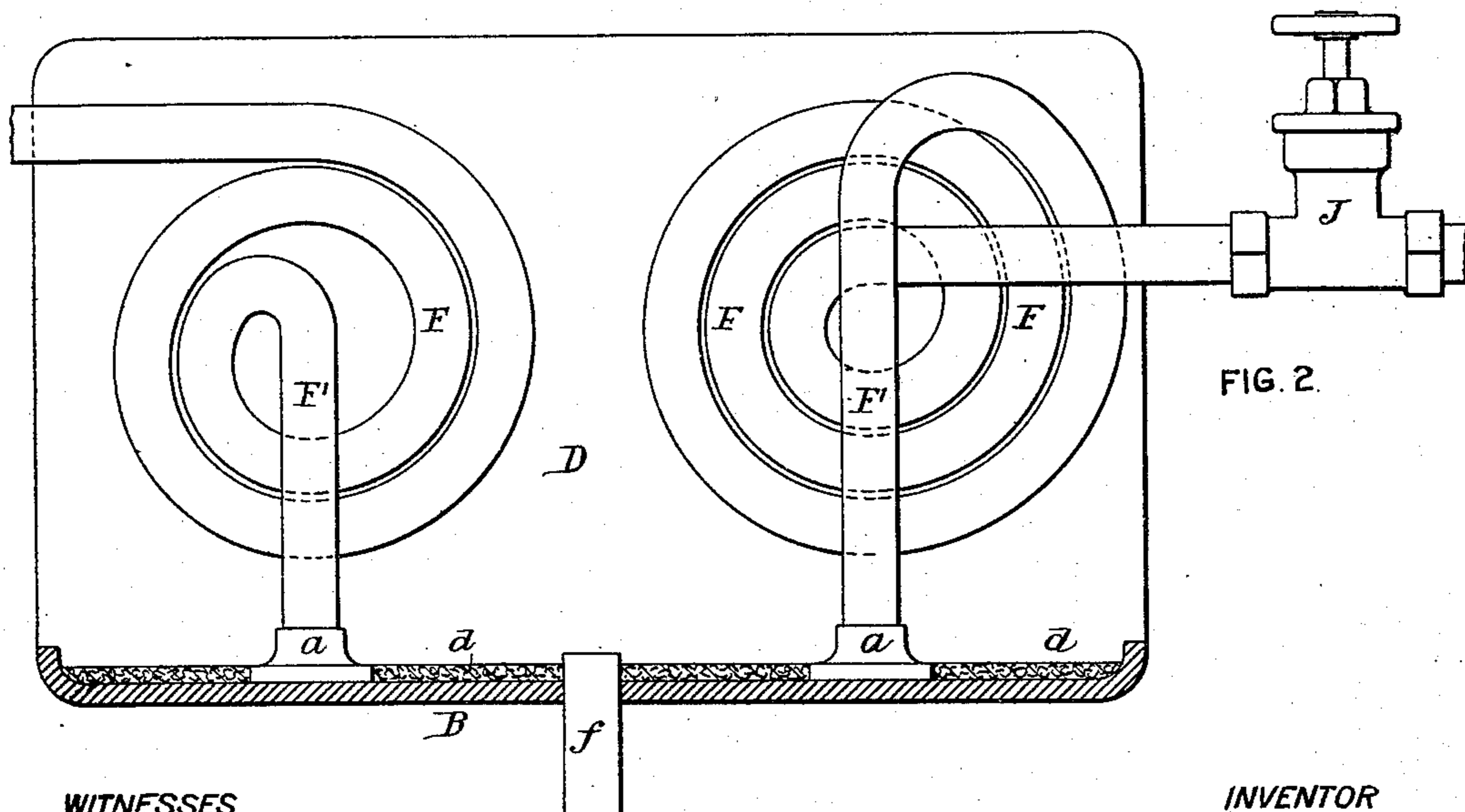


FIG. 2.



WITNESSES

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By his Attorneys

*Hanson & Hanson*

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2 Sheets—Sheet 2.

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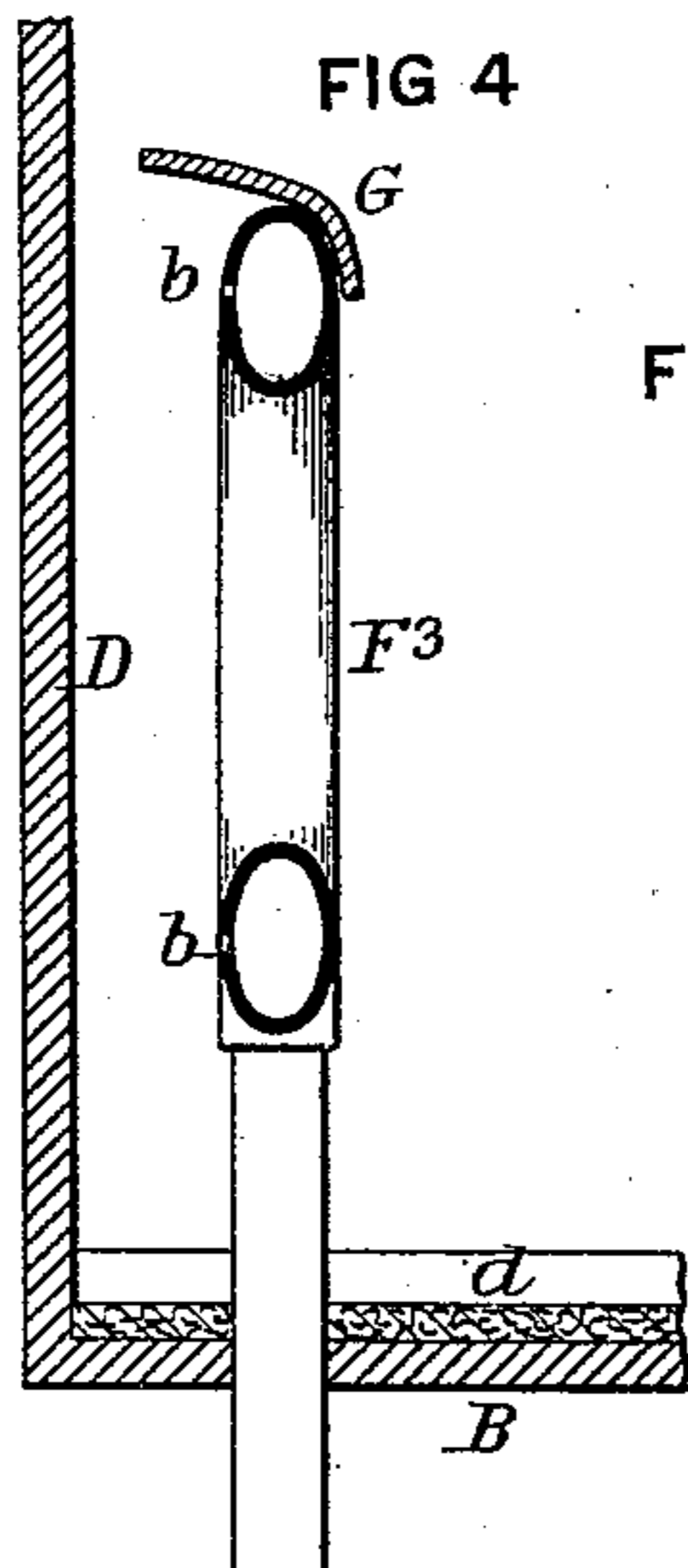
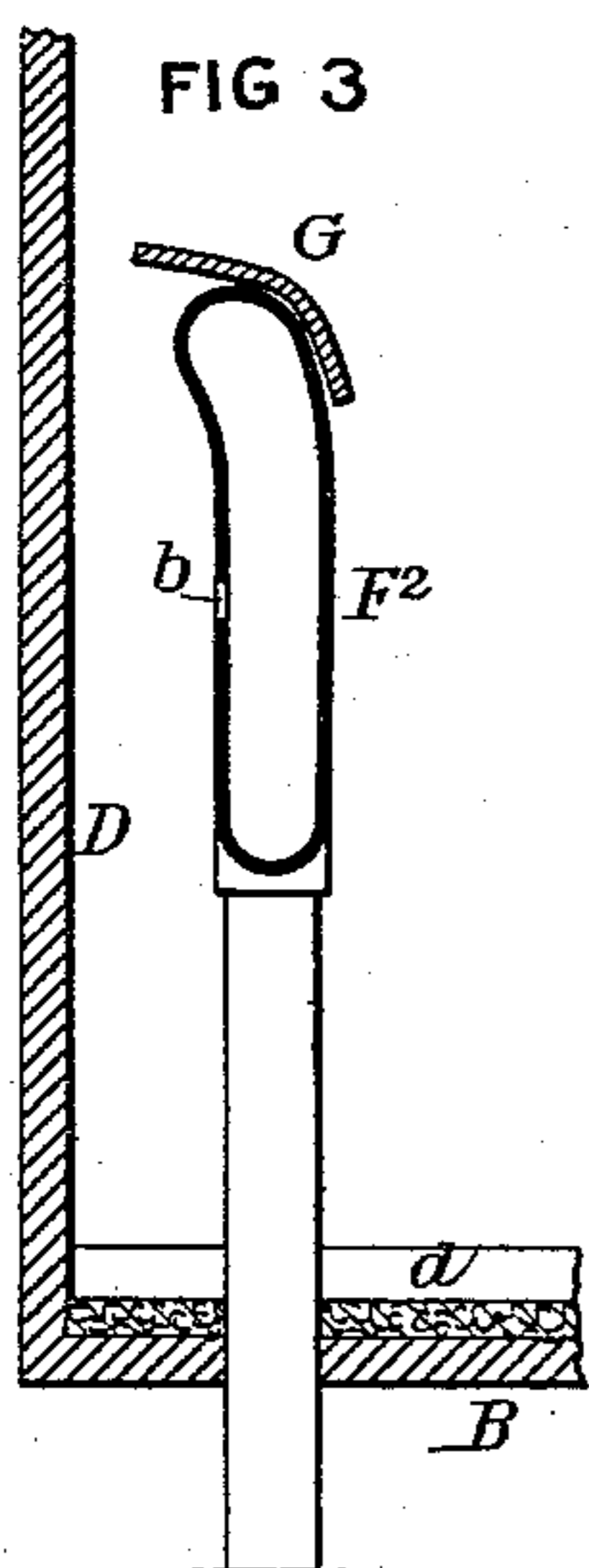


FIG. 6

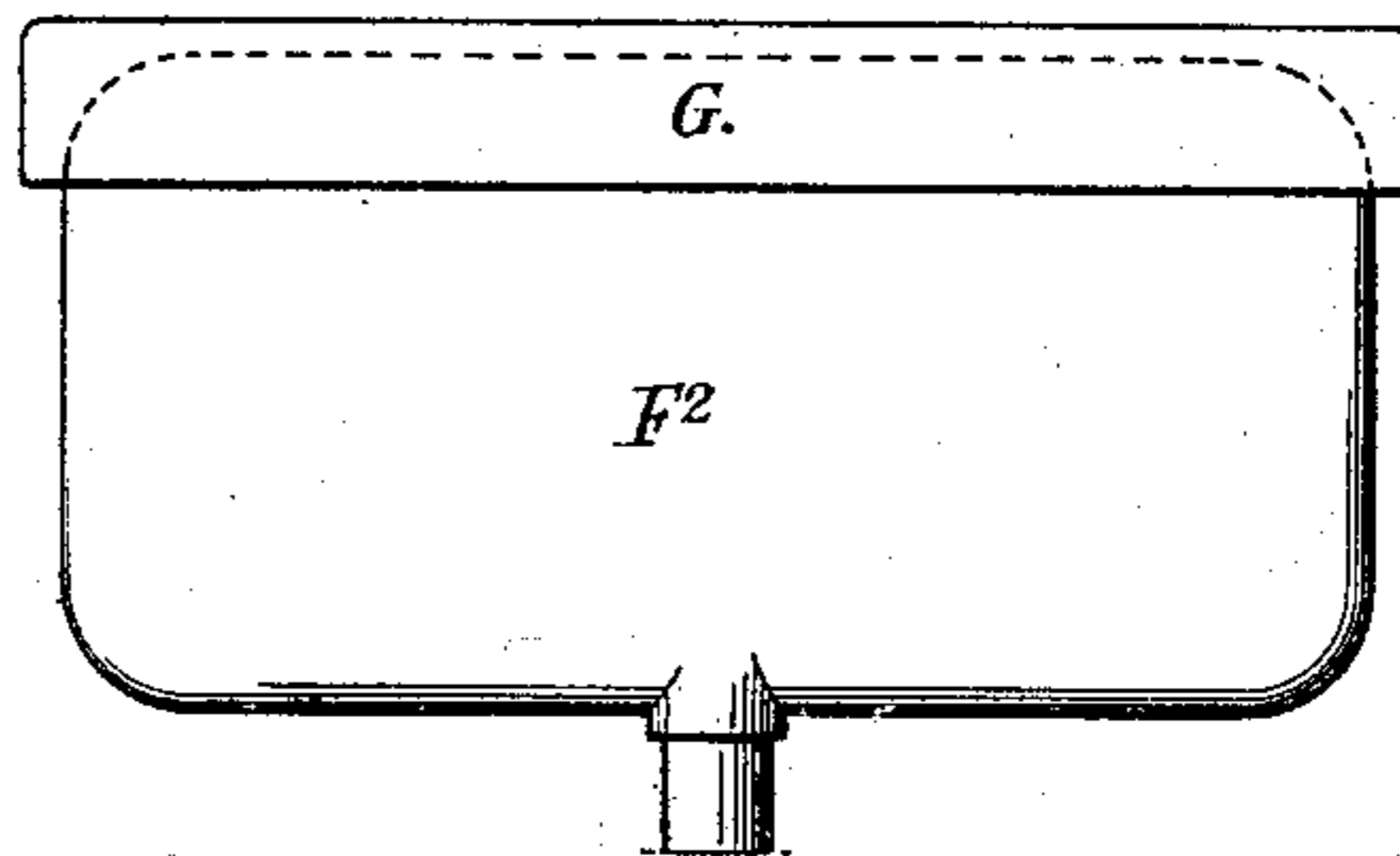


FIG 7

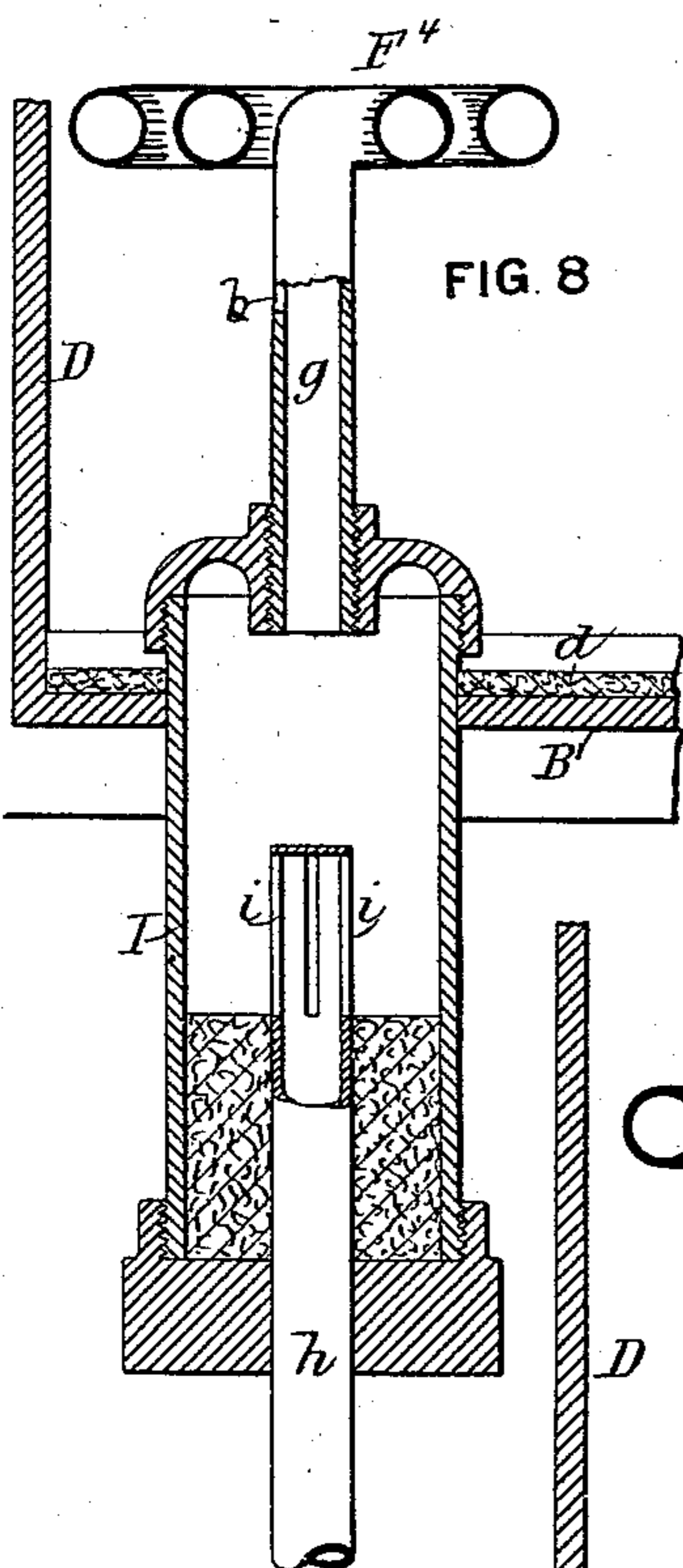
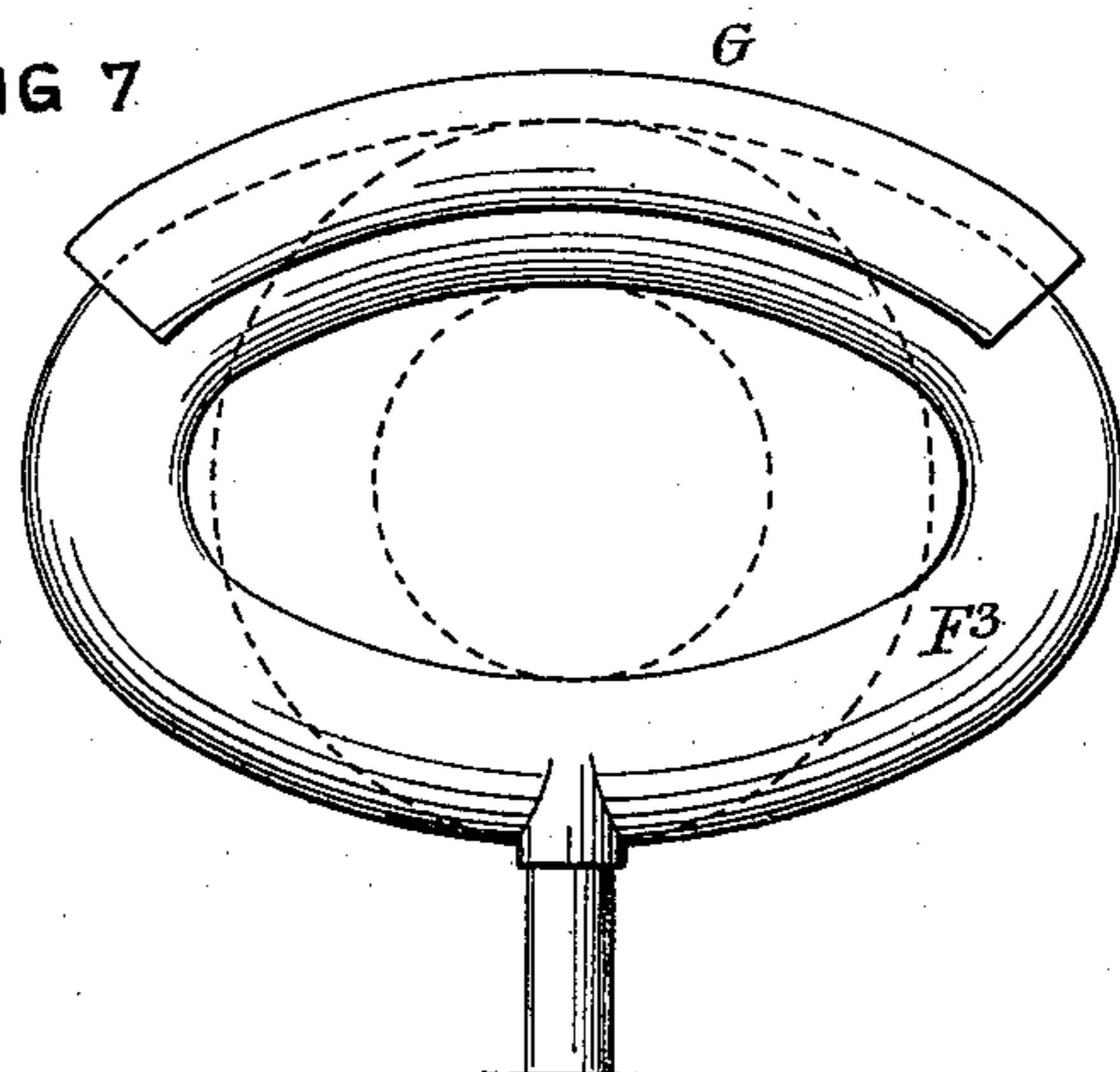


FIG. 8

FIG 5

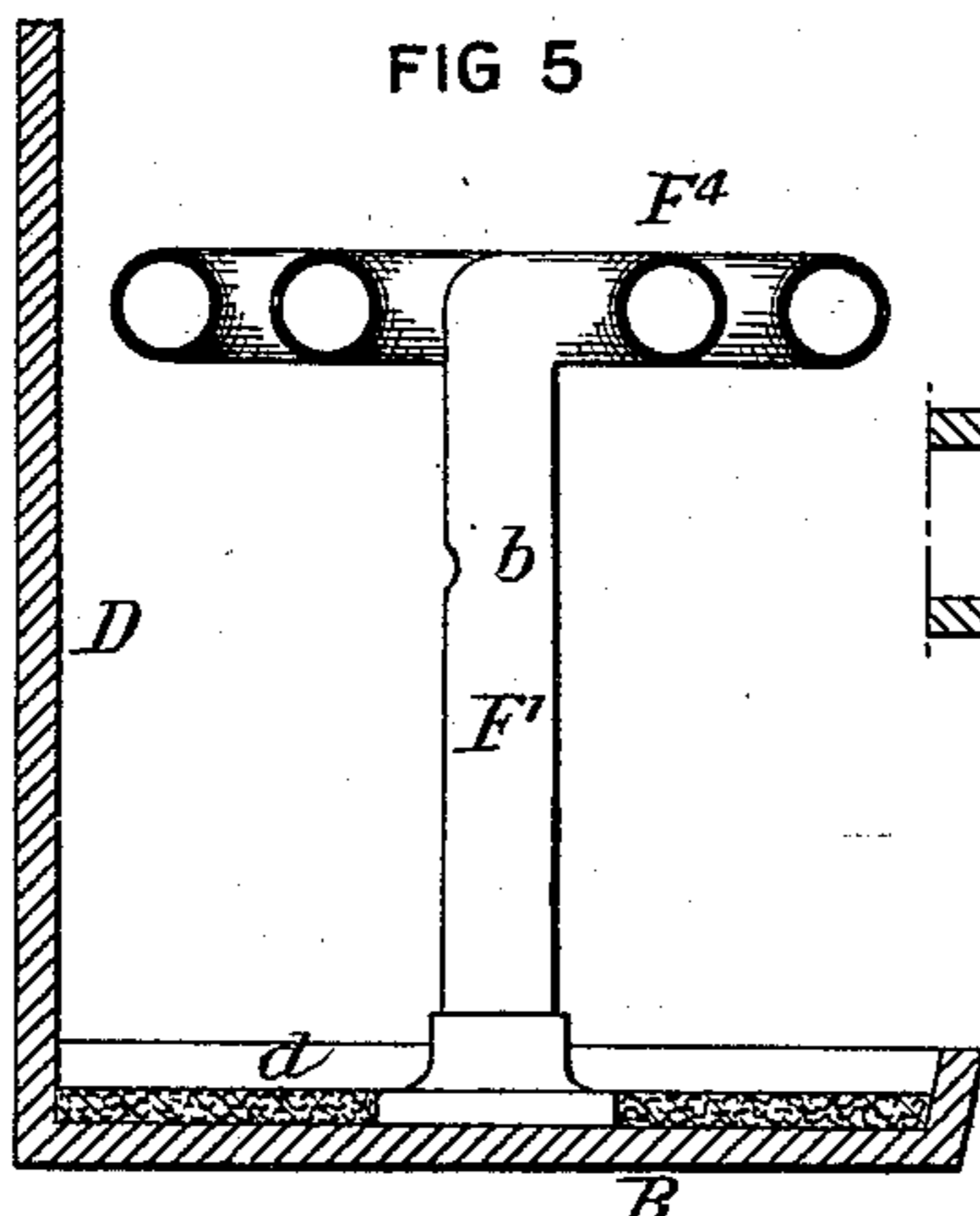
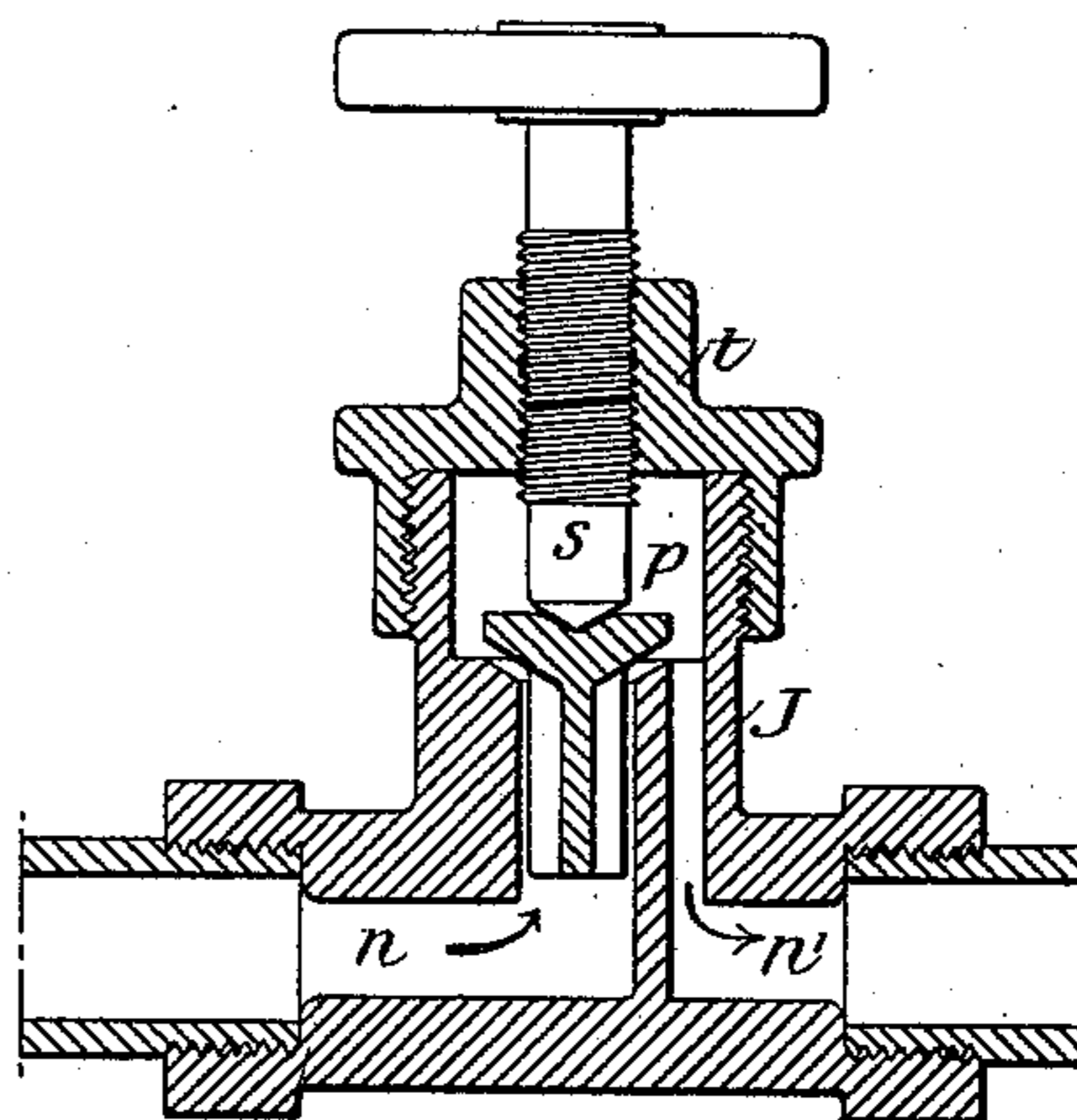


FIG. 9



WITNESSES

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# UNITED STATES PATENT OFFICE.

EDMUND M. TYDEMAN, OF RICHMOND, VIRGINIA, ASSIGNOR OF ONE-HALF  
TO WILLIAM H. HETZEL, OF PHILADELPHIA, PENNSYLVANIA.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 539,781, dated May 21, 1895.

Application filed July 11, 1894. Serial No. 517,263. (No model.)

*To all whom it may concern:*

Be it known that I, EDMUND M. TYDEMAN, a subject of the Queen of Great Britain and Ireland, and a resident of Richmond, Virginia, have invented certain Improvements in Hydrocarbon-Burners, of which the following is a specification.

The object of my invention is to provide a simple, cheap and effective form of hydrocarbon burners especially adapted for use in connection with cooking stoves or ranges, although available for use also in connection with heating or other furnaces, the special features constituting my invention being fully set forth and specifically claimed hereinafter.

In the accompanying drawings, Figure 1 is a longitudinal section of sufficient of an ordinary cooking stove or range to illustrate my invention. Fig. 2 is a front view, partly in section, of my improved burner, showing the two different forms of coil-retorts. Figs. 3, 4, and 5 are sectional views of modified forms of burners. Fig. 6 is a face view of the burner shown in Fig. 3. Fig. 7 is a similar view of the burner shown in Fig. 4. Fig. 8 is a sectional view illustrating a primary generator to be used in connection with the burner, and Fig. 9 is a sectional view of a combined stop and check valve also used in connection with the burner.

In Fig. 1, A represents the fire place of an ordinary form of cooking stove or range having a grate A' upon which is mounted my improved hydrocarbon burner, the latter consisting of a tray B having at the front a vertical plate D, which may be integral with the tray or may consist of a separate piece or pieces, as desired.

The burner consists of a coil F which, as shown in Fig. 1, is in the form of a cone having a horizontal axis, this coil terminating in a vertical leg F' having at the bottom a foot  $\alpha$  suitably mounted on the tray or solid or imperforate plate B. In the vertical leg F' some distance from the bottom of the same, and preferably in line with the axis of the coil F is an exit opening  $b$  facing the vertical plate D at the front of the burner so that a jet of vapor issuing from said opening  $b$  will

be forcibly projected against the plate D and will be broken up thereby and thrown backward so as to completely envelop the coil F and practically fill the fire place A. Hydrocarbon entering the inner convolution of the coil either in liquid or vapor form is, in its passage through the coil F, vaporized, or further vaporized, so that by the time it reaches the discharge opening  $b$  it is under such pressure and so attenuated as to issue from said opening in the form of a forcible jet of gas, which will ignite immediately upon issuing from the opening, thus forming a flame which when it strikes the plate D is spread and thrown backward into the fire place and around the coil F, the latter being consequently intensely heated in order to enable it to act as a retort for the vaporization or conversion into gas of the incoming volumes of fresh hydrocarbon. Any solid impurities held in mechanical suspension by the gas or vapor will be carried downward into the leg F' below the opening  $b$  and hence will not clog or obstruct free flow of gas through said opening.

The tray B is preferably provided with a lining  $d$  of asbestos fiber or like absorbent and refractory material so as to receive and retain any liquid hydrocarbon which may find its way into the tray, and to prevent the accumulation in this tray of such liquid hydrocarbon in excess, said tray is provided with an overflow pipe  $f$  which may lead into a receptacle conveniently located.

The plate, B, which, as before indicated, is imperforate except as to the overflow opening or the opening for the inlet pipe, prevents the air from passing upward to interfere with the flame as it is thrown backward over the retort.

I have found that by the use of a horizontal jet striking a vertical deflecting plate I am enabled to obtain much better results than if the jet discharges vertically either upward or downward and I have devised several forms of burner in which this principle of operation is embodied. For instance, in Fig. 2 I have shown two forms of coils constituting cones with horizontal axes, the coil at the right hand side being that which is represented in sec-

tion in Fig. 1, and having the primary convolution at the inside of the coil, the leg  $F'$  constituting the extension of the outer convolution, while in the coil shown at the left hand side of Fig. 2, the reverse construction is adopted—that is to say, the inlet communicates with the outer convolution of the coil and the leg  $F'$  forms a continuation of the inner convolution. In many cases the latter is the preferable construction.

The dotted lines in Fig. 1 show how the inlet pipe of the coil may if desired be carried through openings usually formed in the front of the stove or range, instead of through the side, ranges being sometimes so set in brick-work that the latter construction is impracticable.

In Fig. 3, I have shown a form of burner in which the retort  $F^2$  is in the form of an oblong hollow box or casing receiving its supply of hydrocarbon from below and having an opening  $b$  facing the deflecting plate  $D$  of the burner, while the burner shown in Fig. 4, is in the form of a flattened ring  $F^3$  which may have one or more discharge openings on its inner side, or this burner may constitute a true ring, as shown for instance by dotted lines in Fig. 7.

In the burner shown in Fig. 5, the retort consists of a flat horizontal coil  $F^4$ , terminating in a vertical leg  $F'$  with discharge opening  $b$ .

When the burners of the form shown in Figs. 3 and 4 are used it is advisable to mount on the top of the burner a guard plate or shield  $G$  in order to prevent flickering or extinguishment of the flame by sudden down draft from above, such guards however, not being necessary in the case of a coil burner, as shown in Figs. 1, 2 and 5.

The various forms of retort shown may be in one or more pieces as desired, and may be composed of metal, or of refractory or fire proof material, such as fire clay or plumbago, or when composed of metal they may be coated or lined with refractory or fire proof material to prevent their destruction by the heat to which they are subjected.

It is advisable in many cases to provide the burner with a primary generator for effecting a preliminary vaporization of the oil before it enters the burner retort. Such a primary generator is shown in Fig. 8, and consists of a casing  $I$  having at the top the supply pipe  $g$  for the burner retort and at the bottom a supply pipe  $h$  which communicates with the reservoir of hydrocarbon.

The pipe  $h$  extends some distance above the bottom of the casing  $I$  and may be open or closed at the top, lateral slots  $i$  being formed in the sides of the pipe below the top so that the liquid hydrocarbon issues from the slots and comes into contact with the sides of the casing  $I$ , which, after the burner has been in operation for a short time, become sufficiently heated to effect the vaporization of

the oil, either this casing  $I$  or the retort of the burner being externally heated in the first instance in order to start the burner into action.

The casing  $I$ , below the level of the slotted upper end of the pipe  $h$ , is filled with asbestos or other absorbent refractory material which becomes saturated with the hydrocarbon and prevents fluctuation in the flame of the burner due to irregularity in supply at the pipe  $h$ , the mass  $m$  of absorbent material retaining a sufficient supply of hydrocarbon to properly keep up the flow of vapor to the burner even if the flow through the pipe  $h$  is temporarily obstructed or cut off. I also find it advisable to use in connection with the burner a check valve to prevent back flow of gas or vapor through the supply pipe in the event of any sudden increase of pressure at the burner, and in order that the check valve may at the same time serve the purpose of a stop valve, I construct it as shown in Fig. 9, in which  $J$  represents a chest or casing having inlet passage  $n$  and discharge passage  $n'$ , the flow from one to the other being regulated by a valve  $p$  adapted to a seat at the top of the inlet passage  $n$ .

A screw stem  $s$  is adapted to a threaded opening in the cap  $t$  of the valve chest and when this screw stem is turned to the full extent in one direction it forces the valve  $p$  against its seat and thus cuts off the flow of oil or vapor through the valve, but by backing off the screw stem to the extent of one or more turns any desired amount of lift of the valve  $p$  will be permitted and the flow thus regulated, while the valve will instantly close against its seat when any back pressure is exerted upon it so that back flow through the valve chest is effectually prevented.

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

1. A hydrocarbon burner consisting of a retort mounted upon an imperforate base plate,  $B$  and having an orifice from which the gas or vapor jet issues in a substantially horizontal course, and a substantially vertical deflecting wall or plate against which said jet impinges and by which it is broken up and thrown backward around the retort, substantially as specified.

2. A hydrocarbon burner consisting of a coil forming a retort and terminating in a vertical leg having in one side an opening for the discharge of a substantially horizontal jet of gas or vapor, an imperforate base plate, and a substantially vertical deflecting plate supported by said base plate against which said jet impinges and by which the flame is thrown backward around the retort, substantially as specified.

3. A hydrocarbon burner consisting of an imperforate base plate  $B$  having a vertical deflecting plate extending therefrom, with a retort having an opening for projecting a jet of

gas or vapor in a substantially horizontal course against said vertical deflecting plate, substantially as specified.

- 5 4. In a hydrocarbon burner, the combination with a primary generator consisting of a box or casing and the feed pipe provided with lateral discharge slots or openings in its inner end, discharging against the sides of the casing, of an imperforate base plate, B, having  
10 a vertical deflecting plate extending therefrom, with a retort having an opening for pro-

jecting a jet of gas or vapor in a substantially horizontal direction against the vertical deflecting plate, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDMUND M. TYDEMAN.

Witnesses:

G. H. A. BALL,

FRED C. BRAUER, Jr.