

J. N. LEACH.

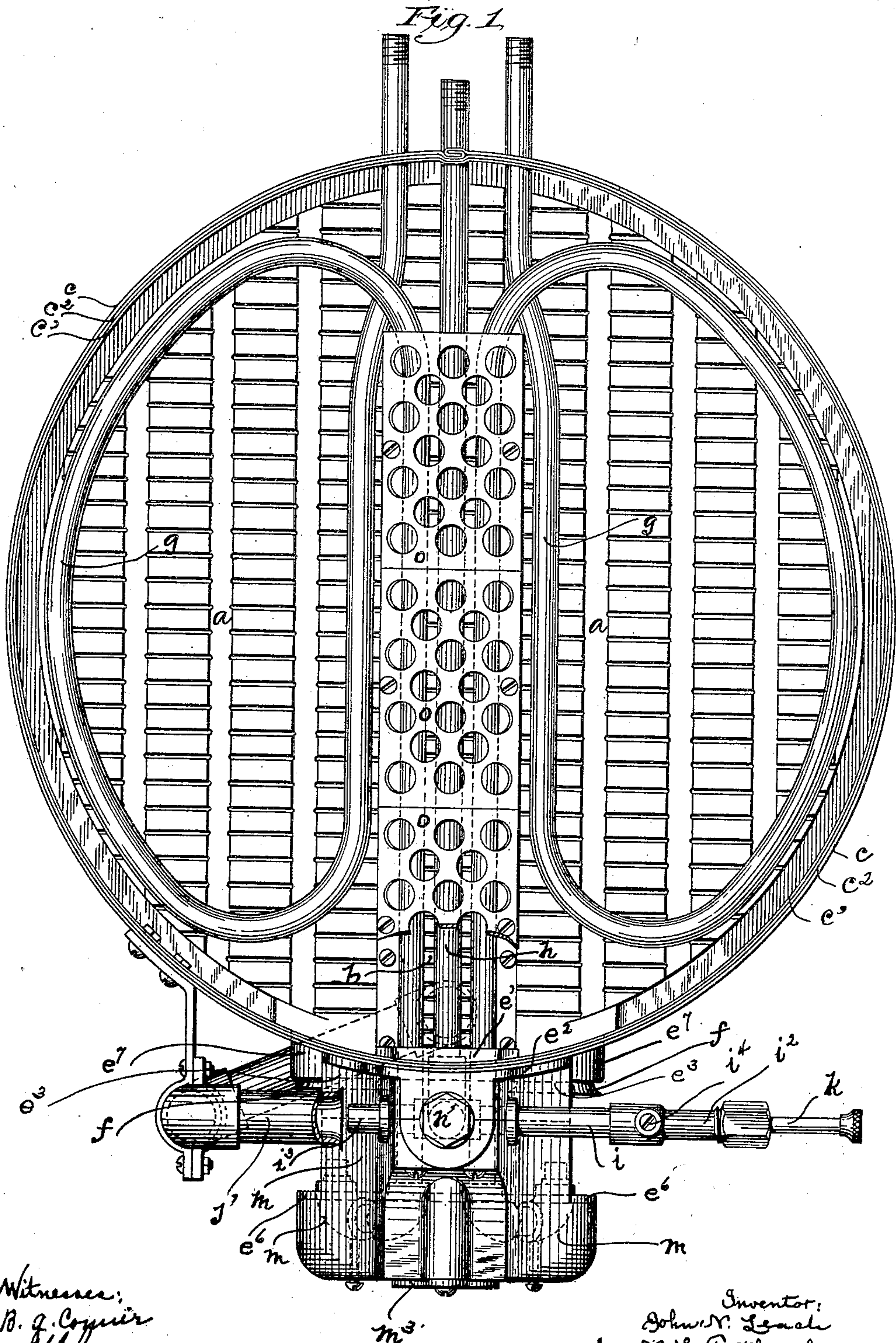
BURNER.

APPLICATION FILED DEC. 5, 1905.

921,850.

Patented May 18, 1909.

3 SHEETS—SHEET 1.



Witnesses:
B. G. Cooper
[Signature]

Inventor:
John N. Leach
by N. L. Frothingham,
his attorney.

J. N. LEACH.

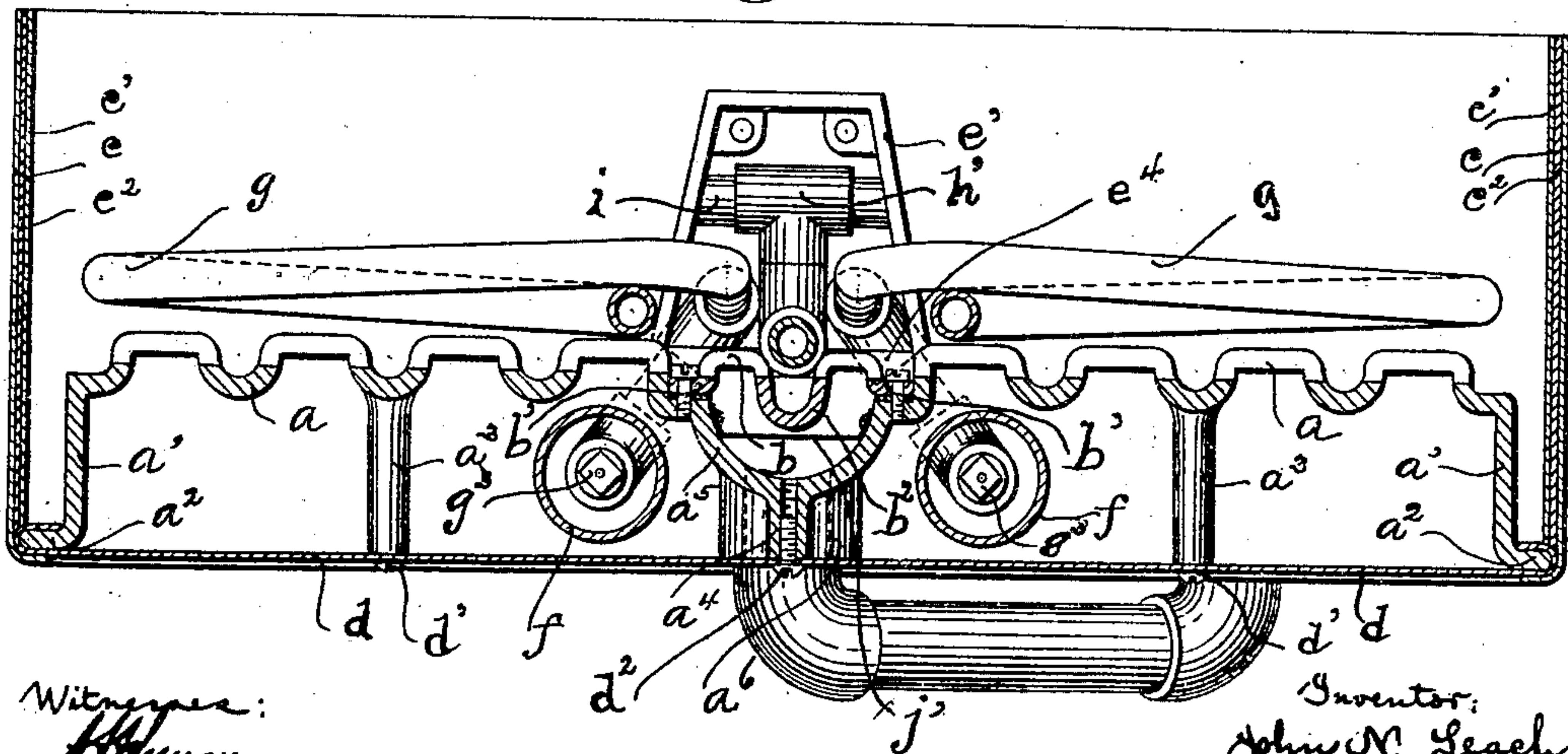
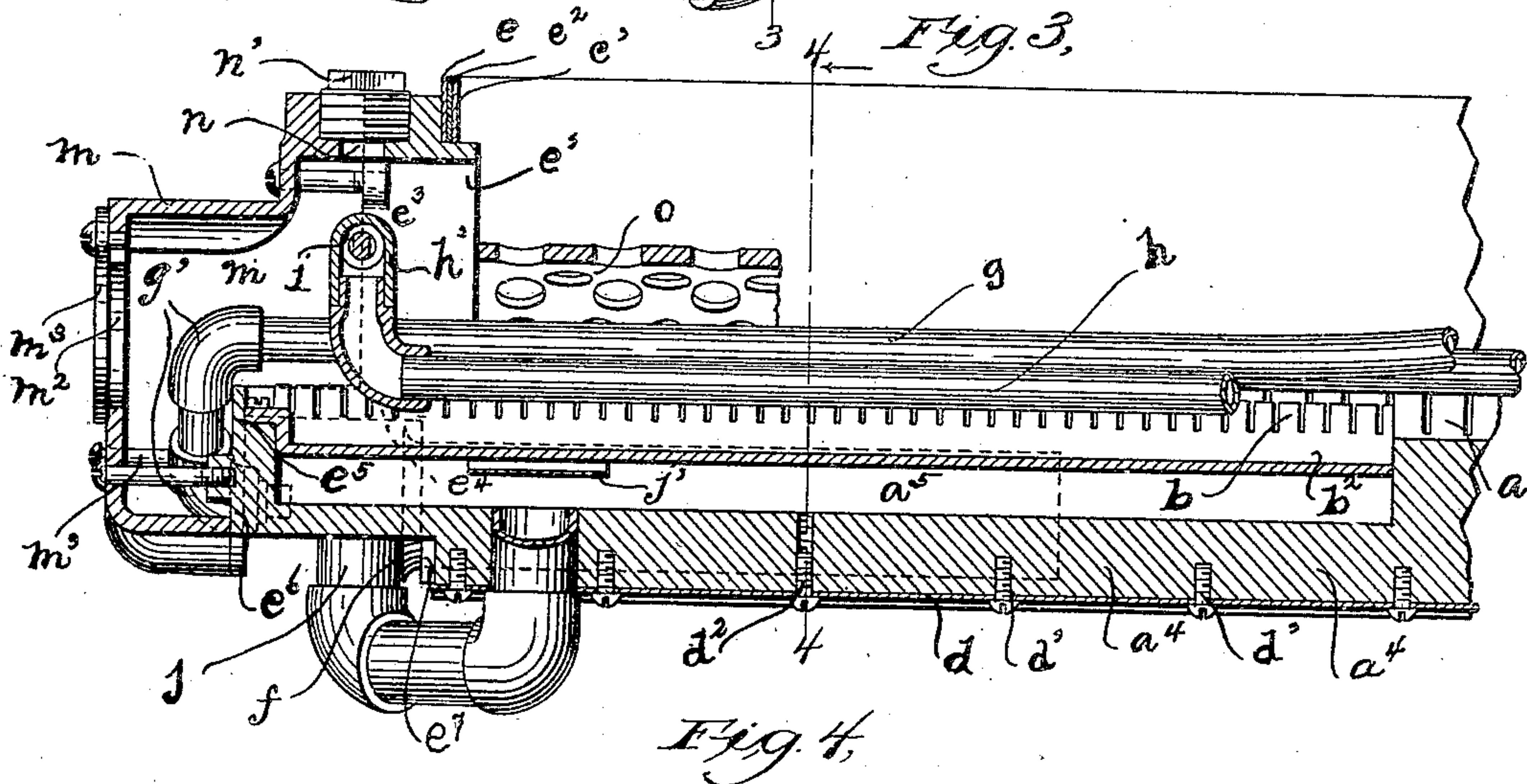
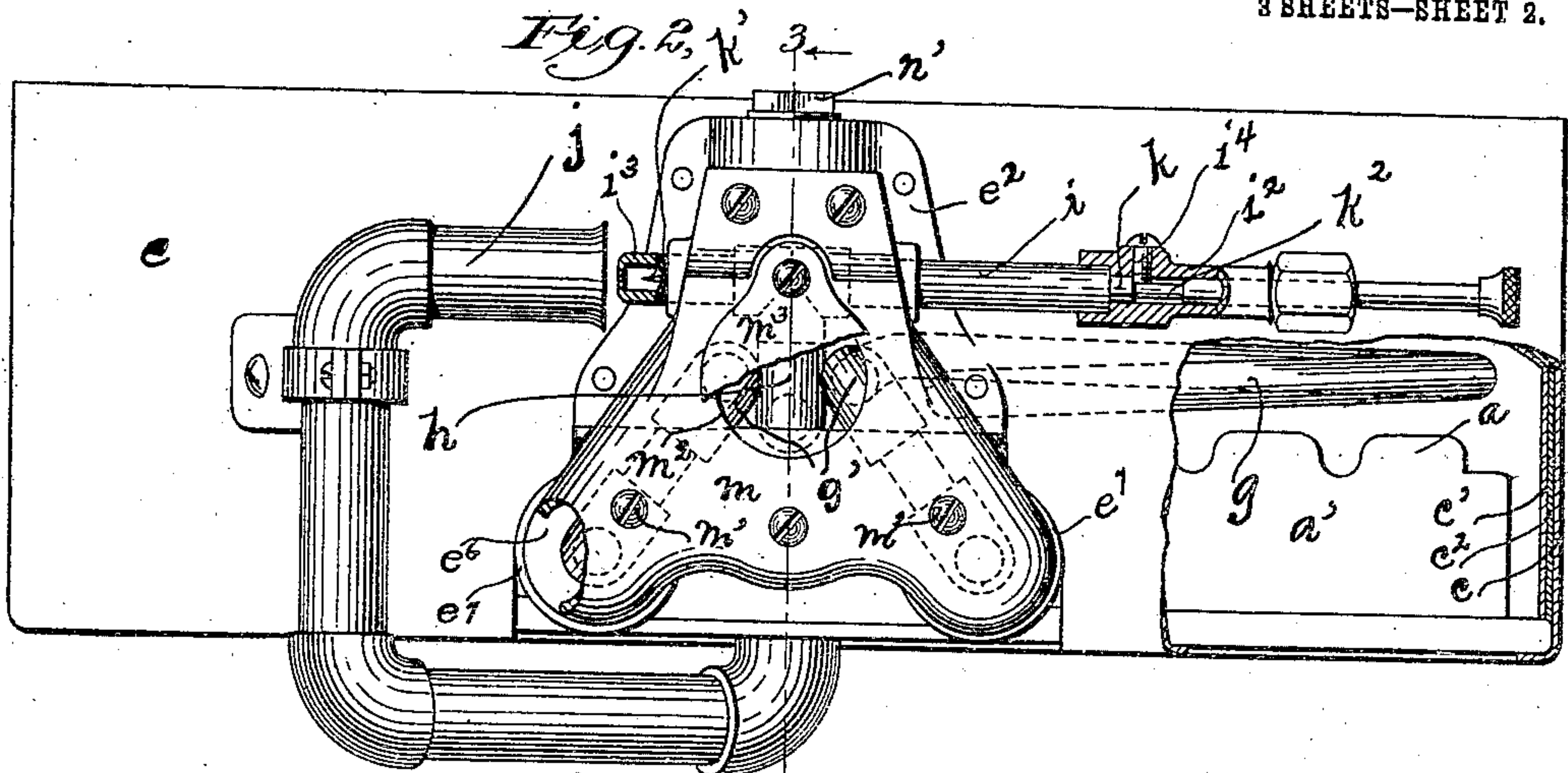
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3 SHEETS—SHEET 2.



Witnesses:
A. H. H. H.
B. G. Conner

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J. N. LEACH.
BURNER.

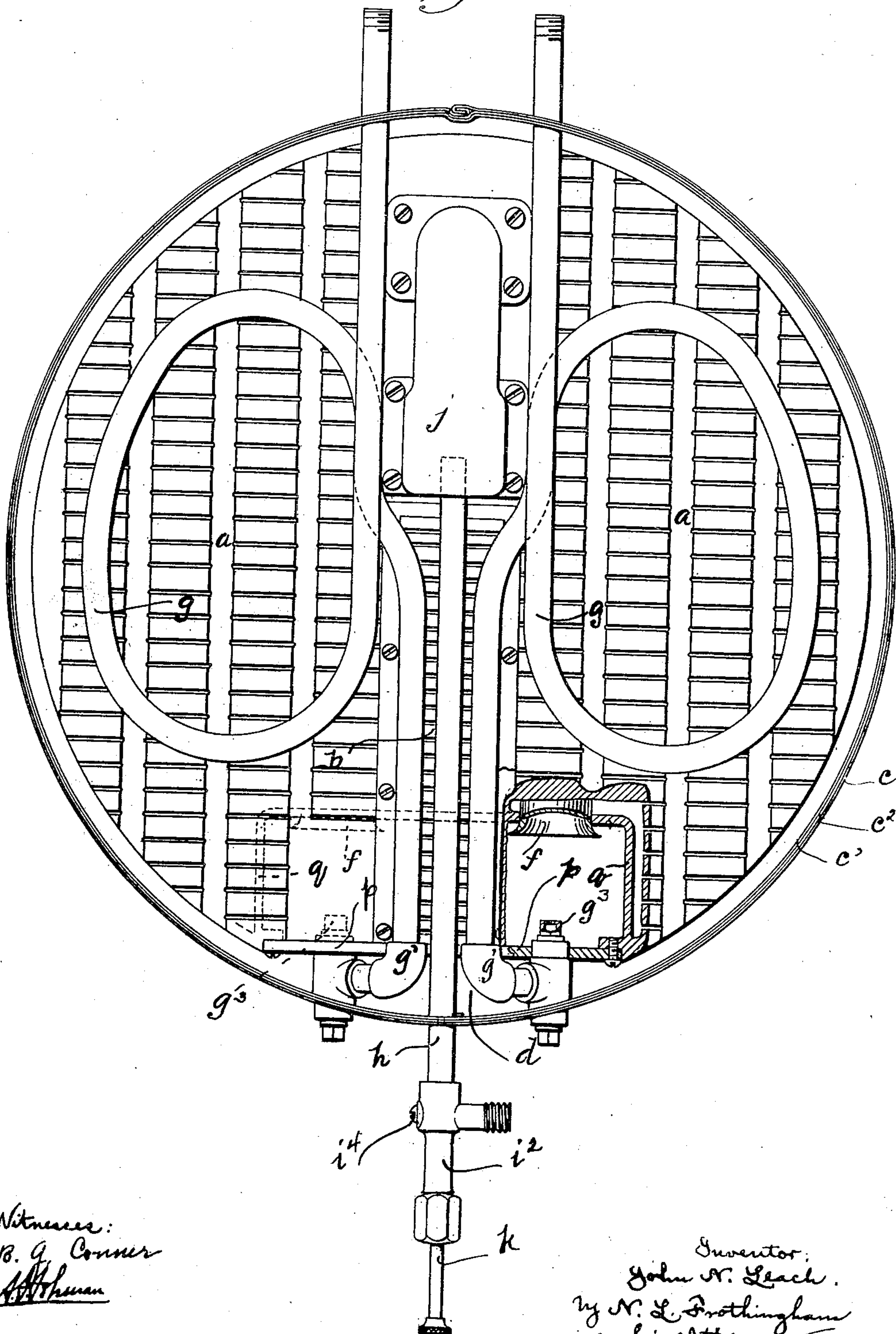
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3 SHEETS—SHEET 3.

Fig. 5.



Witnesses:
B. G. Conner
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UNITED STATES PATENT OFFICE.

JOHN N. LEACH, OF MELROSE, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
JUDSON L. THOMSON MANUFACTURING COMPANY, OF WALTHAM, MASSACHUSETTS, A
CORPORATION OF MAINE.

BURNER.

No. 921,850.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed December 5, 1905. Serial No. 290,424.

To all whom it may concern:

Be it known that I, JOHN N. LEACH, a citizen of the United States, residing at Melrose, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Burners, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to hydrocarbon burners, and more particularly to that type thereof especially adapted to consume vapors or gases generated from kerosene oil or other of the heavier hydrocarbons, and for use on automobiles.

The main object of the invention is to provide a burner wherein the vaporizer pipe or pipes will be so inclosed and maintained at a high temperature throughout, as to avoid the chilling of the vapors therein prior to the admixture thereof with the atmospheric air and the introduction of the mixture to the mixing chamber.

A further object is to provide a structure whereby the end or ends of the vaporizer or vaporizers may be projected beyond the burner plate to permit the distancing of the discharge nozzle or nozzles from the mixing tubes sufficiently to secure the proper mixture of the vapors therefrom and the atmospheric air, and yet be heated to a point adjacent to the nozzle or nozzles by a flame impinging thereon and beyond that point from the combustion chamber without contaminating the air prior to its mixture with the vapors discharged from said nozzle or nozzles.

A still further object is to provide a structure wherein the parts adjoining the discharge nozzle, or nozzles will be readily accessible to permit the cleaning of said nozzles, and the starting of the burner.

A still further object is to provide a burner comprising a primary burner plate or torch, and a secondary burner plate, or main burner, wherein the former plate will be formed so as to provide a central elongated trough to facilitate the initial generation of vapors in its individual vaporizer, which trough will be readily accessible from the exterior of the burner casing.

A still further object is to provide a burner wherein the mixing chamber of the primary burner will extend radially or longitudinally of the main burner plate to constitute a partition dividing the chamber formed beneath

said plate into a plurality of independent mixing chambers.

A still further object is to provide means whereby the closed bottom of the burner casing is so reinforced and secured in place as to prevent a rattling or whistling thereby when the burner is used on steam carriages.

A still further object is to provide simple means for draining the primary burner mixing chamber.

A still further object is to provide means for cleaning the discharge nozzle of the primary burner vaporizer which will avoid a torsion strain on the needle point of the cleaner rod. And a still further object is to provide a burner which will be simple in design and inexpensive to manufacture.

The invention consists in the novel features of construction and combination of parts hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

Referring to the drawings: Figure 1 is a plan view of a double mixing chamber burner embodying the preferred form of my invention; Fig. 2 is a front elevation thereof broken away to disclose the main burner plate casting and the manner of attaching the edge of the bottom, and the bottom of the outer casing thereto; Fig. 3 is a section on the line 3—3 of Fig. 2; Fig. 4 is a section on the line 4—4 of Fig. 3 and Fig. 5 is a plan view of a modified form of my invention, the main burner plate being broken away to disclose the arrangement of the parts adjacent to the mixing tubes therefor.

Like letters refer to like parts throughout the several views.

In the form of my invention shown in Figs. 1 to 4 inclusive, *a* indicates a corrugated burner plate which is preferably cast of iron with an outer wall *a'* having a bottom flange *a²*, a plurality of studs *a³* *a³* disposed at different points beneath said plate, and a diametrically extended partition *a⁴*, dividing the space within said plate casting into two independent mixing chambers, the forward upper part of said partition being forked as shown in Fig. 4 to form the walls of a mixing chamber *a⁵* having no communication with either of the main burner mixing chambers, for the primary burner plate *b*. A duct *a⁶* is cast integrally with said partition *a⁴* through which the mixture is discharged into said primary burner mixing chamber. The said

forked portion projects beyond the burner plate *a* and carries a frame adapted to project beyond the burner casing which frame with its hood forms an auxiliary inclosed chamber heated from or in communication with the combustion chamber of the burner, inclosing the ends of the vaporizer or vaporizers adjoining the discharge nozzle or nozzles thereof, and will be more particularly described hereinafter. A plurality of saw cuts form the burner openings in the plate *a* which plate constitutes the secondary or main burner plate. Closing the mixing chamber at *a*⁵ is a corrugated burner plate *b* constituting the primary burner plate or torch, having side flanges *b*¹ whereby it is secured by screws or otherwise to the casting *a*, and a central depressed portion *b*² forming a trough for alcohol or other agent for heating the vaporizer to produce the initial charge of vapor for the primary burner plate or torch *b*. Inclosing both plates *a* and *b* and extending thereabove to form a combustion chamber common thereto is an outer casing preferably comprising parallel sheet iron walls *c* *c*¹ and an intervening packing of asbestos or other material non-conductive of heat, *c*². A bottom *d* also of sheet iron, completely closes the bottom of the casting forming the plate *a* and the mixing chamber thereunder, excepting an opening provided for the duct *a*⁶. This bottom sheet is firmly secured with relation to the burner plate *a* by screws *d*¹ or other means in conjunction with the studs *a*³ and the flange *a*⁴, which screws being disposed at divergent points, serve to prevent or break up those vibrations which result in that roaring or whistling common to burners used on steam carriages. I utilize one of these screws, see *d*², as a means for draining the primary burner or torch mixing chamber *a*⁵ by merely extending the screw hole entirely through the partition *a*⁴ into said chamber, and using a screw of sufficient length to effectively plug this hole. The edges of the bottom *d* and the lower edge of the burner casing, are further secured to the said casting by being crimped about the flange *a*² thereof, as shown, such however, being a mere detail of construction and non essential to this invention.

The end of the casting forming the mixing chamber *a*⁵ and the burner plate *b* protruding beyond the inclosing casing, are entirely housed in by a frame *e* and a (preferably removable) hood. The said frame has a portion *e*¹ projecting through an opening in the casing *c* and opening into the combustion chamber, and a portion projecting outwardly beyond said casing, the upper portion of the walls of which are provided with a flange *e*² by means of which the frame is riveted or otherwise secured firmly in place relatively to the casing *c*. The lower portion of said frame beyond said casing is flared outwardly

and downwardly as at *e*³, and the bottom of the auxiliary chamber so formed is closed by a bottom plate, as *e*⁴ extending from each said flared portion to, and forwardly thereof to a point conterminous with the projecting end of the walls of the primary burner or torch mixing chamber. The extremity of the walls of the mixing chamber *a*⁵ carries or has cast integrally therewith, a distance plate *e*⁵ extending entirely across and slightly above the plate *b*, and having divergent arms *e*⁶ dropped considerably below the level of said plate, and having an opening therein respectively, through which the discharge nozzle of the main burner plate vaporizer is adapted to pass. Said frame also carries or has cast integrally therewith, downwardly projected divergent arms carrying a boss as *e*⁷ fitted to the casing *c* and adapted respectively to support the mixing tube as *f* passing therethrough and through said casing into the mixing chamber, and opening outwardly toward said distance plate, and establishing communication between its mixing chamber and the space between said distance plate, the bottom plate *e*⁴ and the said arms.

Each of the mixing chambers for the main burner plate *a* is supplied with its charge of gas for maintaining the flame therein, by a vaporizer pipe subjected successively to the flames from the plates *a* and *b*, which, as to the portion thereof within the burner, is entirely independent of the other. The construction, arrangement and function of each vaporizer being identical with the other, a description of but one of them will be entered into. It comprises a continuous pipe *g* leading from a source of oil supply and having a valve mechanism for controlling the feed of oil therethrough in the usual and well known manner formed in a coil above the plate *a* in a manner to permit and cause the flames therefrom to pass about and impinge upon it; and then passed above the plate *b* along substantially the full length of said plate. Said pipe has its end passed through the frame *e*, still above the plate *b*, and is fitted with suitable elbow joints *g*¹ and short pipe section, to give it direction paralleling the arm *e*⁶ and permit the projection of the removable discharge tip or nozzle *g*² through the opening in said arm *e*⁶, and in alinement with substantially the center of the mixing tube *f*. This arrangement of the arm *e*⁶ gives the proper distance of the said nozzle and the said tube *f* to insure the proper amount of air being drawn with the vapor jet into the said tube and its mixing chamber.

The primary burner or torch vaporizer comprises a straight way pipe *h*, or tube, passing diametrically across the plate *b*, a portion thereof being incidentally subjected to the flame from a small portion of the plate *a* and its end passing through the frame *e* and en-

tering a T-joint h' carrying and in communication with an elongated discharge fitting i , the nozzle of which is adapted to discharge into a mixing tube j supported in relation to the casing c in any desired manner, and extended so as to be fitted to the duct a^6 in a manner to discharge the mixture passing therethrough directly into the mixing chamber a^5 , a deflector plate j' being placed above the discharge end thereof to distribute the mixture. The oil fed to said vaporizer h may be drawn from any desired source of supply and means independent of those controlling the supply to the vaporizers g for controlling same (not shown) are provided.

The fitting i comprises a straight tubular portion i' supported by the frame c and its hood, and having suitable end fittings i^2 closing same at one end. The other end has a tip i^3 having a small discharge opening therein. This opening is liable to become clogged by scales from within the vaporizer h , and it is necessary to provide means whereby it may be readily cleaned. Owing to the normally heated condition of these fittings, and the weakness of the needle point generally used for this purpose, it is found that the twisting of this cleaner frequently results in the breaking of this needle and the permanent clogging of the nozzle. To obviate this difficulty, I provide the stem k , having a needle point k' and a channel k^2 therein, seated within the fitting i and supported in the proper alinement by the fittings i^2 . The tube i' or end fittings i^2 carry a stud i^4 entering the channel k^2 and while permitting a direct reciprocation of the stem k prevents any twisting thereof.

It will be observed that the various vaporizer ends projecting through the frame c into the auxiliary chamber formed thereby require to be inclosed or housed in to protect same, and avoid direct communication between the combustion chamber and the outside of the casing c . This I accomplish by means of a hood m corresponding in contour with the said frame and the arms e^6 of the distance plate, which hood entirely closes said frame and abuts against the said distance plate, forming there with a normally closed auxiliary chamber for the vaporizer ends. This hood is preferably secured to the frame by means of screws as shown to permit its removal for purposes of inspection and repair. It has suitable recesses for aiding in the support of the fitting i ; carries steady-ing pins or screws m' for the ends of the vaporizers g respectively, and an opening m^2 having a pivotal cap m^3 whereby access may be conveniently had to the trough b^2 for starting the primary burner or torch b . The auxiliary chamber so formed has a top opening at n closed by a screw plug n' . Within the combustion chamber, the plate b and the various vaporizers above same, are pro-

tected by an arched top-plate or hood o preferably made of cast iron and in sections, as shown, which serves to protect the flame from said plate b from back drafts from the main burner plate a and to confine the said flames about the said vaporizers.

In the modification shown in Fig. 5, my invention is embodied in a different type of burner, the general features of which do not require description. In this form of the invention the auxiliary chamber heretofore described, is formed by cutting away a portion or sector of the plate a and providing a distance plate p below said cut away portion, leaving a chamber between the casing and said plate. The bottom d is under cut adjacent to said distance plate p , and the respective mixing chambers are closed by walls q preferably cast integrally with the plate a . The mixing tubes f are carried by the said walls q , and distanced away from the plate p . The ends of the vaporizers g h pass over said plate and the nozzles thereof project through openings therein so as to discharge beneath the plate a into said tubes f , and draw air with the vapors therefrom in such quantities as to produce a proper charge for said mixing chambers. I preferably employ a plurality of mixing chambers for the main burner, and individual vaporizers therefor, in order to increase the capacity of the burner, it being impracticable to increase the effective supply of vapors in proportion to the demands of burners of large capacity, by a corresponding increase in the size and capacity of the said vaporizer, or increase of the volume of oil fed therethrough.

The arrangement of the vaporizers within the combustion chamber, forming no part of this invention and being an arrangement now in extensive use, will not be herein described in detail. It has been found by me, however, that with the ends of the vaporizer or vaporizers projecting without the main casing, a small portion of the vaporizer, at that point where condensation interferes most with the proper admixture of air with the vapors, is removed from the heated portions of the burner and subjected to the colder temperature prevailing outside of the burner. It is largely to obviate this difficulty that I employ the herein described construction of burner, the operation of which, except as to the vaporizers is as follows: In starting the primary burner or torch b , the cap m^3 is swung on its pivot, and alcohol, gasolene, or other highly combustible agent is introduced into the trough b^2 and ignited. The flame therefrom soon brings the portion of the vaporizers g h within the top plate o to a dull red heat, whereupon oil is admitted by degrees to the vaporizer h where it is converted into a vapor which is conveyed to the fitting i and discharged in a jet into the tube j , and thence to the mixing chamber a^5 from

which it passes through the burner openings in the plate *b* and is at once ignited from the flame of said agent. It is apparent that upon entering the tube *j* it draws with it air in quantities sufficient to give a mixture which will be highly combustible. Thereafter all that portion of the vaporizers *g h* above the plate *b*, are constantly subjected to the flame from said burner plate, which aids in the further generation of vapors for both the primary burner and torch *b* and the main burner *a*. That portion of each vaporizer *g* adjacent to the discharge nozzle, however, while extended beyond the main burner plate, is still directly above the primary burner plate, or torch *b*, even though necessarily so extended as to give the proper distance of the discharge nozzle from the mixing tube *f*; and the portion thereof necessarily dropped to aline the discharge nozzle with said tube, is subjected to the heat from the combustion chamber to the very nozzle itself. The elongation of the primary burner plate or torch *b* also gives increased capacity to said plate when running alone, or when acting as a superheating flame in conjunction with the main burner. The under cut space between the discharge nozzle and the tube *f* breaks up direct air currents, yet allows a sufficient quantity of air to be drawn into the tube *f* with the vapor jet. This space permits access to the tip of the vaporizer nozzles to remove or clean same.

It will be observed that the employment of an inclosure forming the auxiliary chamber, entirely incloses and maintains a high temperature of, the vaporizers throughout, to a point so close to the discharge point as to avoid all possibility of said vaporizers becoming cooled or chilled; and that furthermore this temperature will be maintained so long as either the main or secondary burner, or the primary burner or torch is alight. This inclosure also prevents all external conditions or disturbances interfering with this result. It will also be observed that the distance plate, insures the proper positioning of the discharge nozzles relative to the mixing tubes, and that the slight heat radiation thereabout will heat the air sufficiently prior to its mixture with the vapors, to increase the effectiveness of the charge. The steadying pins *m'* hold the discharge ends of the vaporizers against the distance plate *e'* thus preventing displacement thereof. The mixing tube *j* being exposed does not result in any material condensation, as such does not occur after the mixture of the vapors and the air, when the parts are once well heated. In case, however, of an accumulation of oil in the chamber *a'*, said chamber may be readily drained by merely removing the screw plug *d'*.

It is not my intention to limit the invention to the precise details of construction

herein shown and described, as such may be departed from without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent is:

1. The combination, in an apparatus for generating and burning gas from hydrocarbons, of a burner having a mixing chamber and a combustion chamber, a mixing tube adapted to discharge into said combustion chamber, a vaporizer located within said combustion chamber having its discharge end projecting beyond said burner and having a nozzle provided with an outlet orifice adapted to discharge into said mixing tube, an inclosure for said projecting end and nozzle, said inclosure opening into said combustion chamber, a distance plate supporting said nozzle, a hood closing said inclosure and abutting against said distance plate, said hood having an opening therein, and a movable cap for said opening.

2. The combination, in an apparatus for generating and burning gas from hydrocarbons, of a primary burner having a primary mixing chamber, a primary mixing tube adapted to discharge into said mixing chamber, a plurality of secondary burners having secondary mixing chambers, respectively, a plurality of secondary mixing tubes adapted to discharge into said secondary mixing chambers, respectively, a casing forming a combustion chamber common to both of said burners, a primary vaporizer located in said combustion chamber and having a nozzle adapted to discharge into said primary mixing tube, a plurality of secondary vaporizers located in said combustion chamber and having nozzles provided with orifices, respectively, adapted to discharge into said secondary mixing tubes, said secondary vaporizers having their discharge ends projecting beyond said burners, and an inclosure for said projecting ends and secondary nozzles, said inclosure forming an exteriorly closed chamber communicating with said combustion chamber, said inclosure inclosing said projecting ends and secondary nozzles to a point adjacent to the outlet orifices thereof.

3. The combination, in an apparatus for generating and burning gas from hydrocarbons, of a primary burner having a primary mixing chamber, a primary mixing tube adapted to discharge into said mixing chamber, a plurality of secondary burners having secondary mixing chambers, respectively, a plurality of secondary mixing tubes adapted to discharge into said secondary mixing chambers, respectively, a casing forming a combustion chamber common to both of said burners, a primary vaporizer located in said combustion chamber and having a nozzle adapted to discharge into said primary mixing tube, a plurality of secondary vaporizers

located in said combustion chamber and having nozzles provided with orifices, respectively, adapted to discharge into said secondary mixing tubes, said secondary vaporizers having their discharge ends projecting beyond said burners, and an inclosure for said projecting ends, said inclosure comprising a hollow frame supported by said casing, a distance plate having downwardly projecting diverging arms supporting said secondary nozzles and a hood closing said frame and abutting against said distance plate, whereby said secondary vaporizers are entirely inclosed and heated from said combustion chamber.

4. The combination, in an apparatus for generating and burning gas from hydrocarbons, of a primary burner having a primary mixing chamber, a primary mixing tube adapted to discharge into said mixing chamber, a plurality of secondary burners having secondary mixing chambers, respectively, a plurality of secondary mixing tubes adapted to discharge into said secondary mixing chambers, respectively, a casing forming a combustion chamber common to both of said burners, a primary vaporizer located in said combustion chamber and having a nozzle adapted to discharge into said primary mixing tube, a plurality of secondary vaporizers located in said combustion chamber and having nozzles provided with orifices, respectively, adapted to discharge into said secondary mixing tubes, said secondary vaporizers having their discharge ends projecting beyond said burners, and an inclosure for said projecting ends, said inclosure comprising a hollow frame supported by said casing, a distance plate having downwardly projecting diverging arms supporting said secondary

nozzles and a hood and steadying pins carried by said hood and engaging said vaporizer ends and preventing displacement thereof.

5. The combination, in an apparatus for generating and burning gas from hydrocarbons, of a casing entirely closed at the bottom and sides thereof, a main burner, a main vaporizer, a main mixing tube and nozzle, a supplementary burner provided with a supplementary mixing chamber and burner outlets, a supplementary vaporizer and nozzle all arranged within said casing, and a mixing tube extending from said supplementary mixing chamber to a point outside said casing.

6. The combination, in a gas burner apparatus, of a casing entirely closed at the bottom and sides thereof, a main mixing tube and nozzle, means forming a supplementary mixing chamber and having burner outlets and a supplementary nozzle all arranged within said casing, and a mixing tube extending from said supplementary mixing chamber to a point outside said casing.

7. The combination, in a gas burner apparatus, of a casing entirely closed at the bottom and sides thereof, a main burner provided with a mixing chamber and having a nozzle, and a supplementary burner provided with a mixing chamber and having a nozzle all arranged wholly within said casing.

In witness whereof, I have hereunto affixed my signature, this 13th day of November, 1905 in the presence of two witnesses.

JOHN N. LEACH.

Witnesses:

N. L. FROTHINGHAM,
A. A. ASHMAN.