No. 881,416. PATENTED MAR. 10, 1908.

C. KREBS.

CARBURETER.

APPLICATION FILED APR. 12, 1907. 5 SHEETS—SHEET 1.

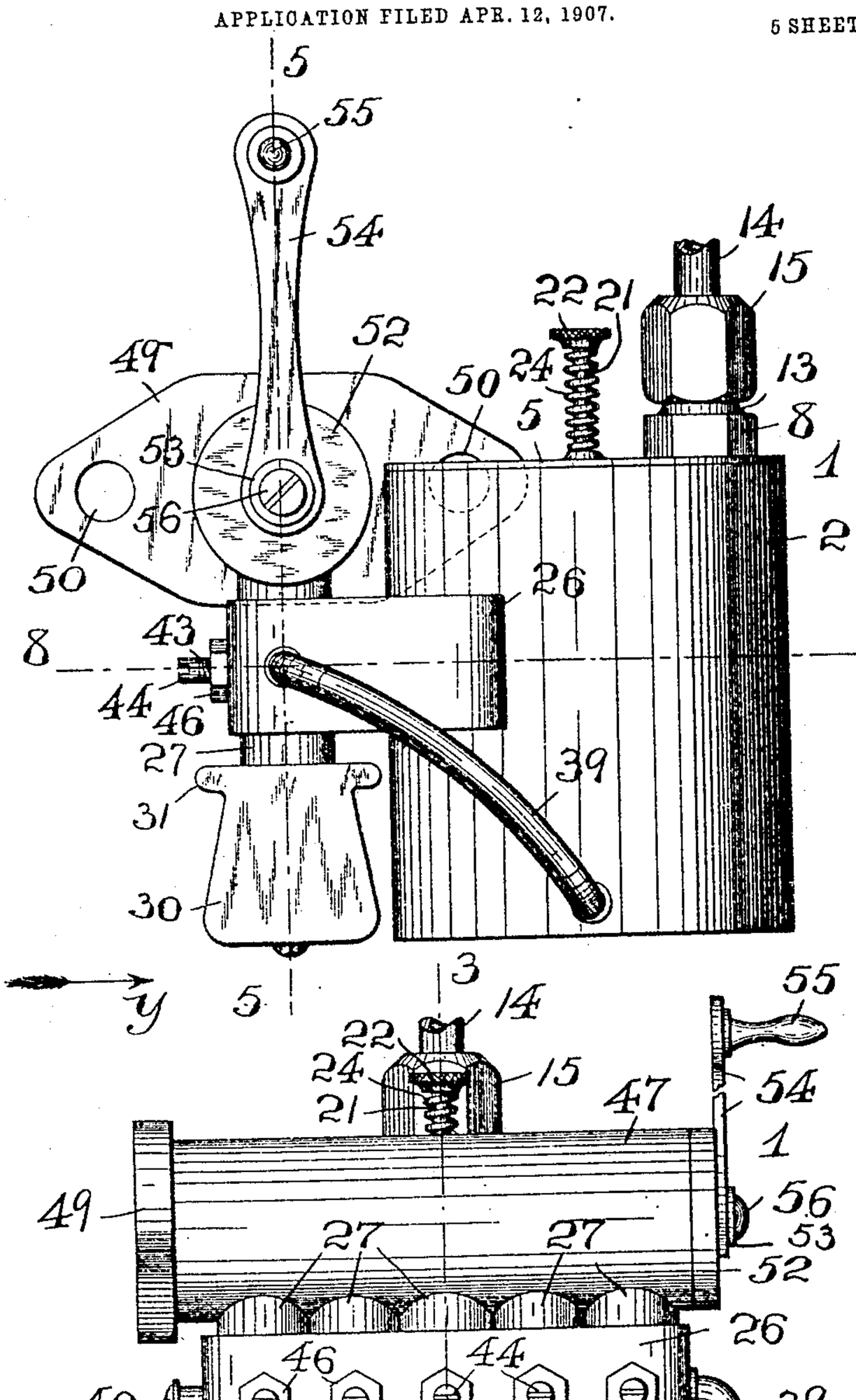

FIG 1

FIG 2

WITNESSES:

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Anna H. Carter

INVENTOR:

Charles Krebs,

BY

Fraentzel and Richards,

ATTORNEYS

261. GAS AND LIQUID CONTACT APPARATUS.

Draftsman.

No. 881,416. PATENTED MAR. 10, 1908.

C. KREBS.

CARBURETER.

APPLICATION FILED APR. 12, 1907. 5 SHEETS—SHEET 2.

FIG 3

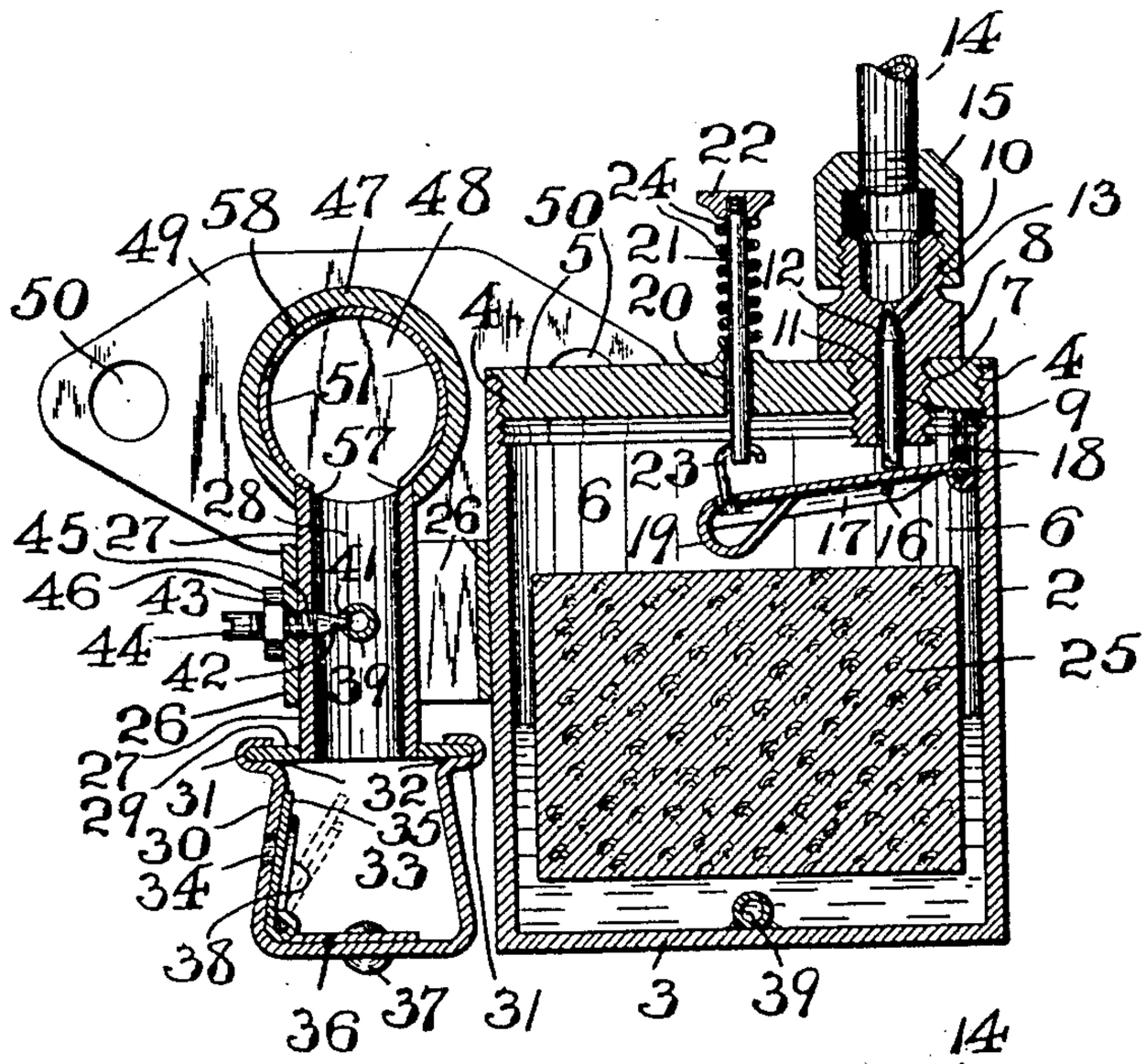
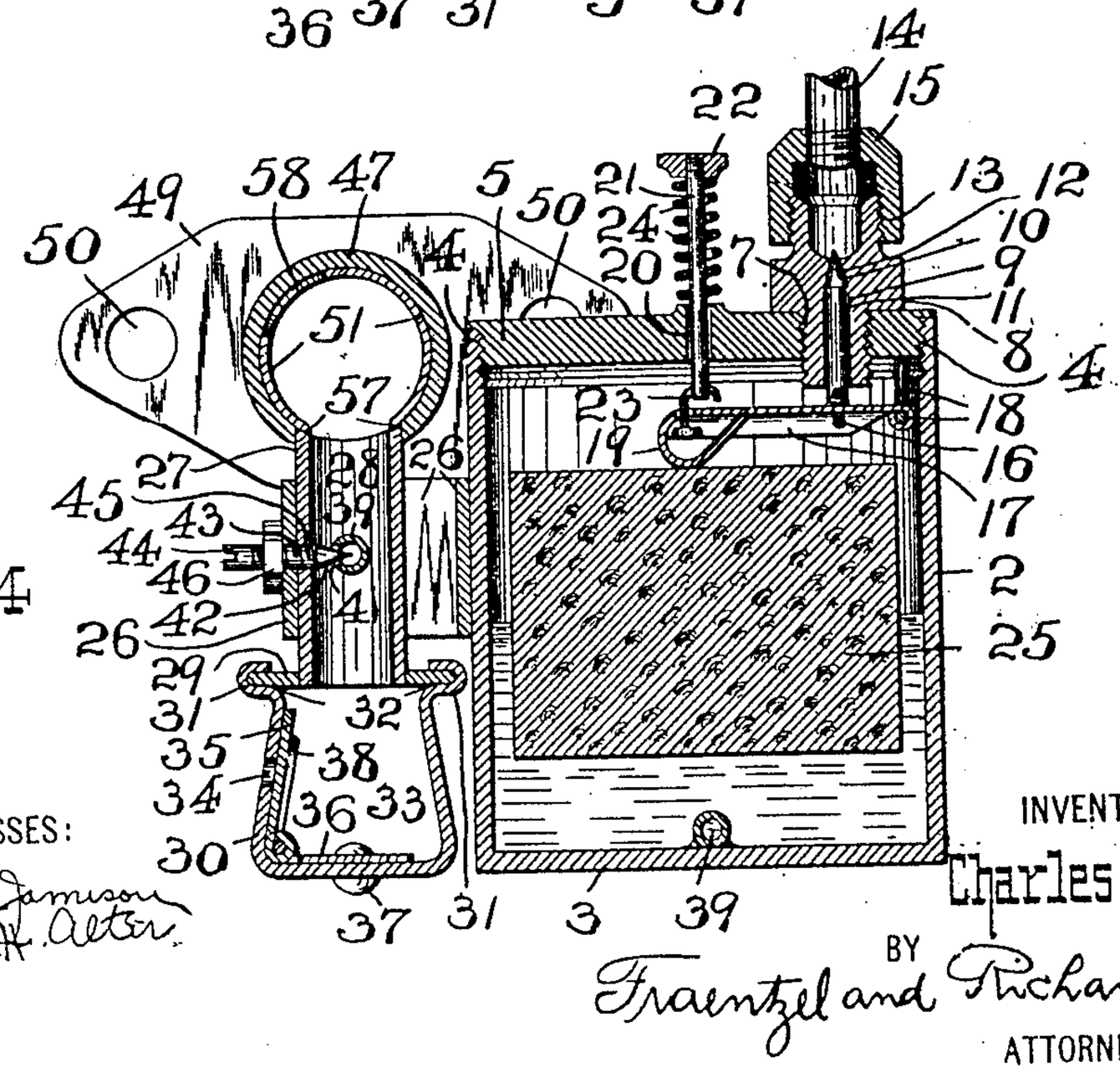


FIG 4



WITNESSES:

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Gl. GAS & [illegible] CONTACT APPARATUS.

Draftsman.

No. 881,416. PATENTED MAR. 10, 1908.

C. KREBS.

CARBURETER.

APPLICATION FILED APR. 12, 1907.

5 SHEETS—SHEET 3.

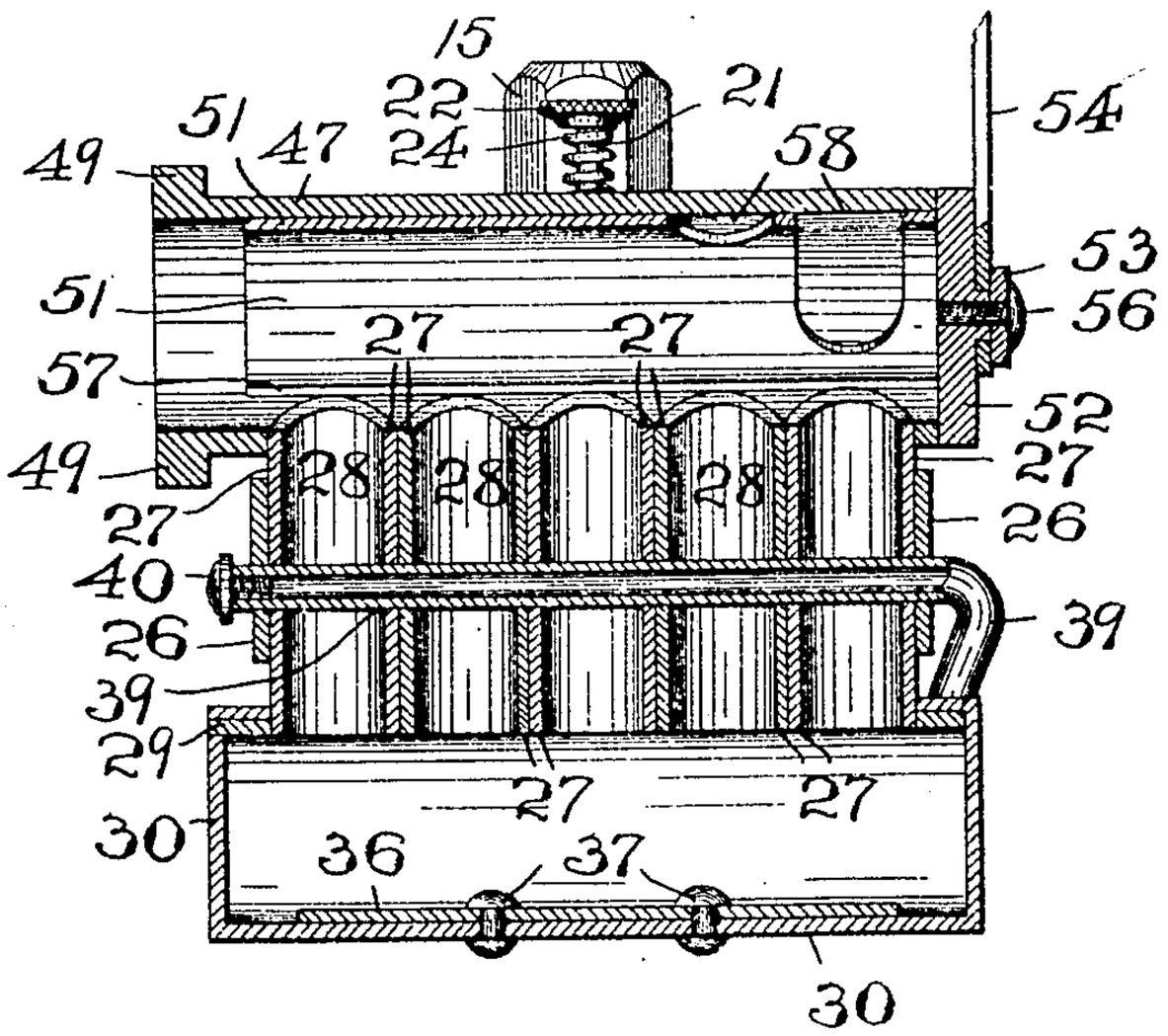

FIG 5

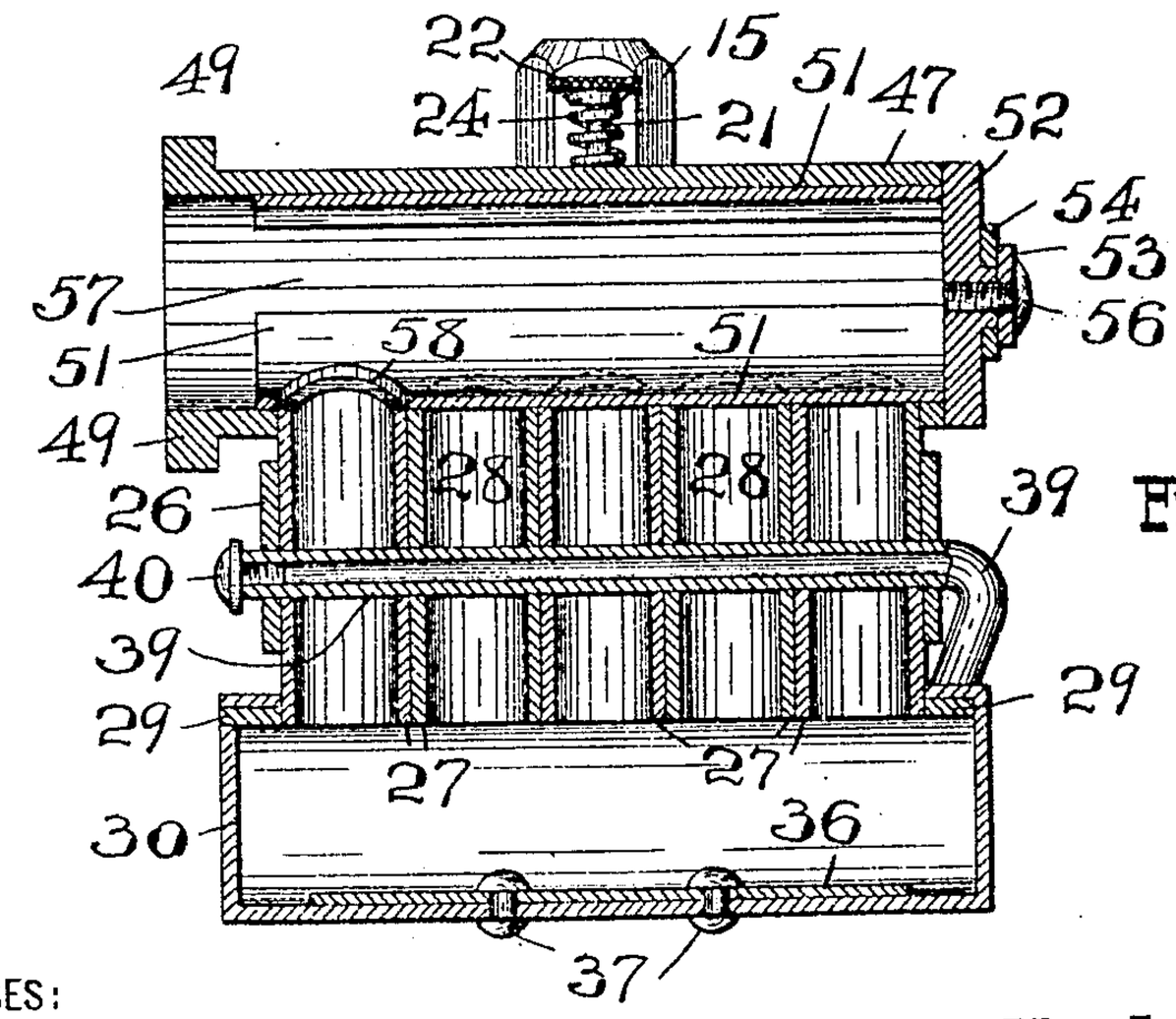

FIG 6

WITNESSES:

Frederick P. Johnson
Anna H. Salter

INVENTOR:

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261. GAS & LIQUID CONTACT APPARATUS.

Draftsman.

No. 881,416. PATENTED MAR. 10, 1908.

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APPLICATION FILED APR. 12, 1907. 5 SHEETS—SHEET 4.

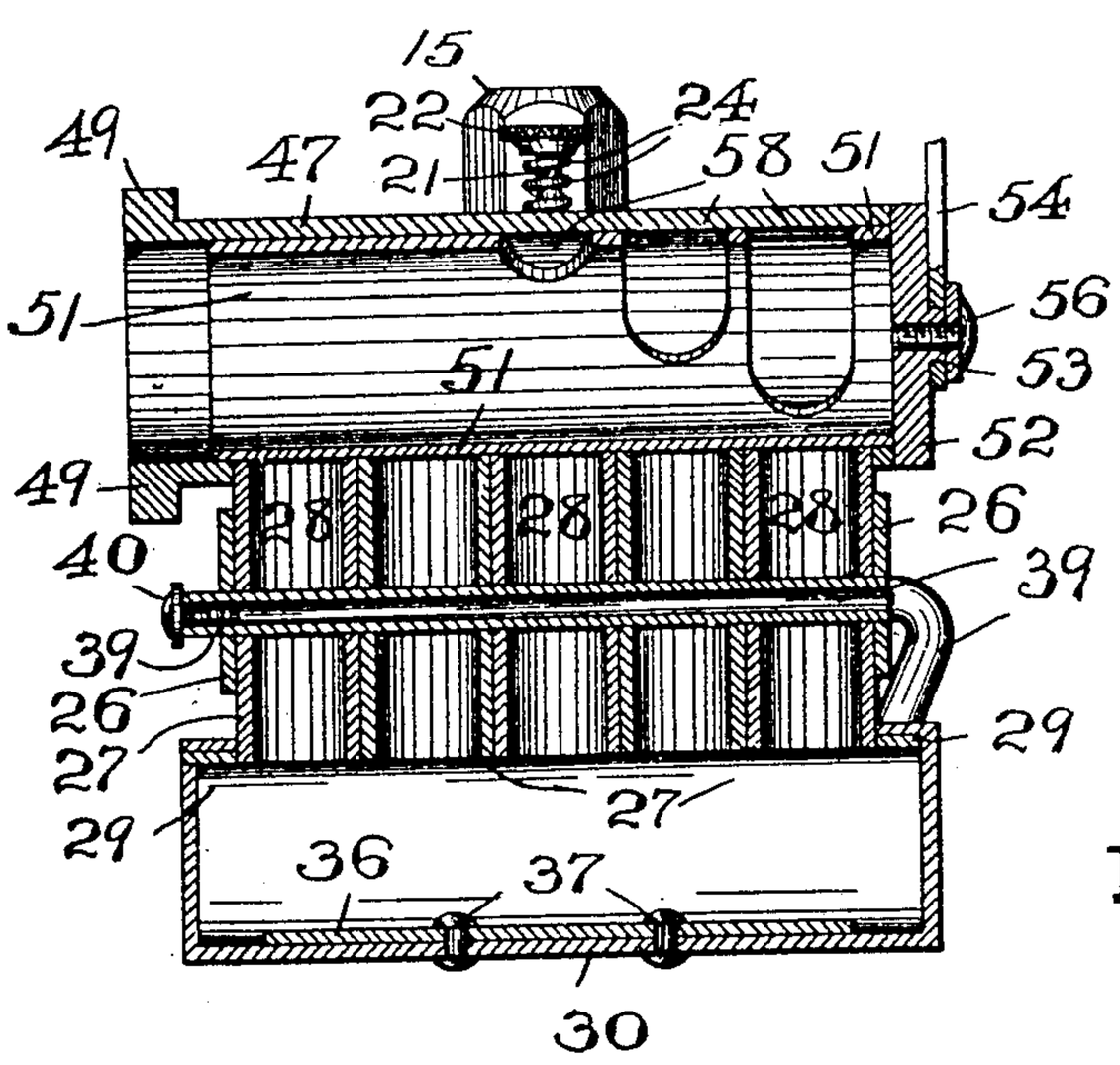

FIG 7

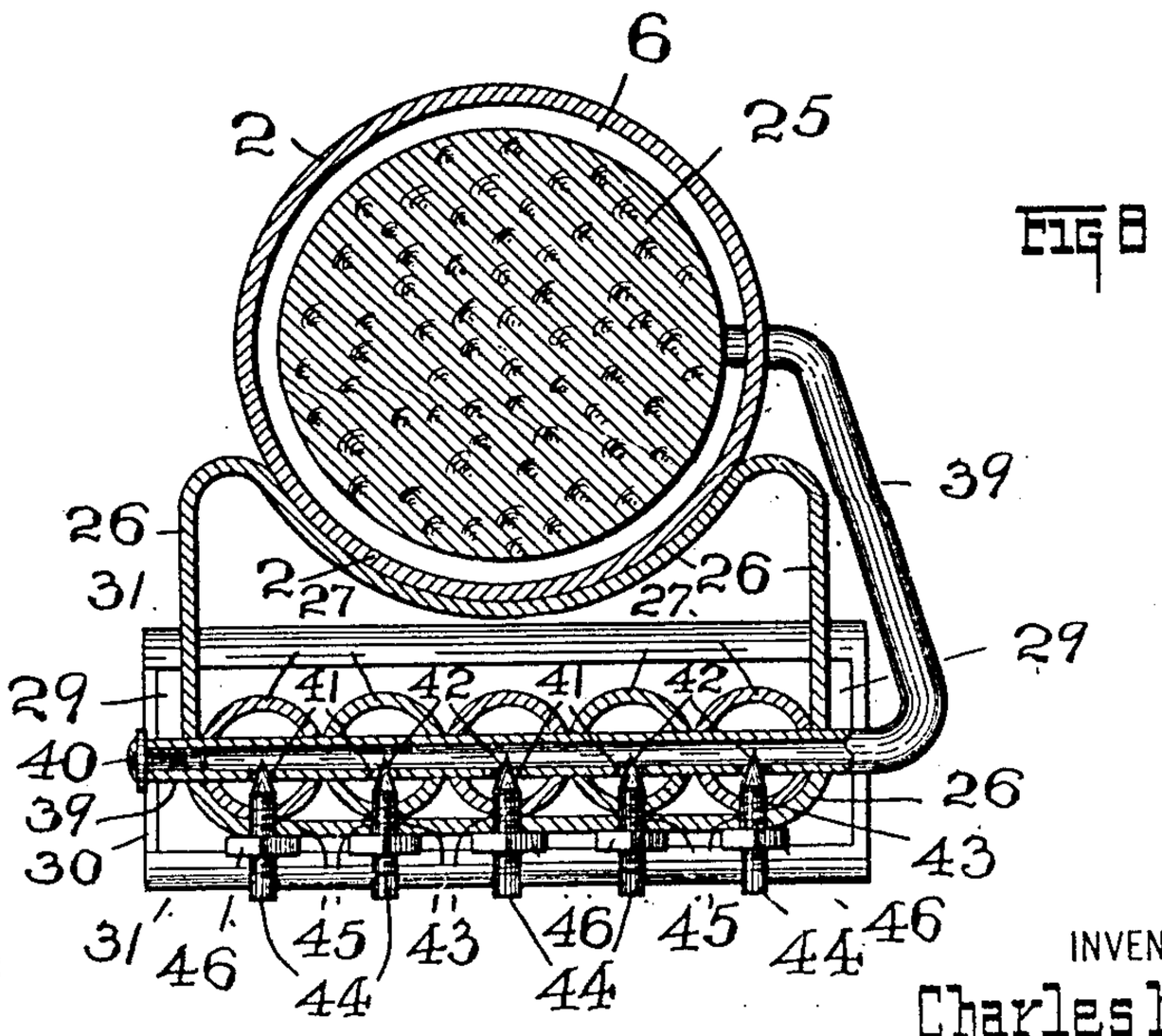

FIG 8

WITNESSES:

Frederick Jamison

Anna H. Alter

INVENTOR:

Charles Krebs

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Fraentzel and Richards.

ATTORNEYS

[redacted] APPARATUS.

Draftsman.

No. 881,416. PATENTED MAR. 10, 1908.

C. KREBS.

CARBURETER.

APPLICATION FILED APR. 12, 1907. 5 SHEETS—SHEET 5

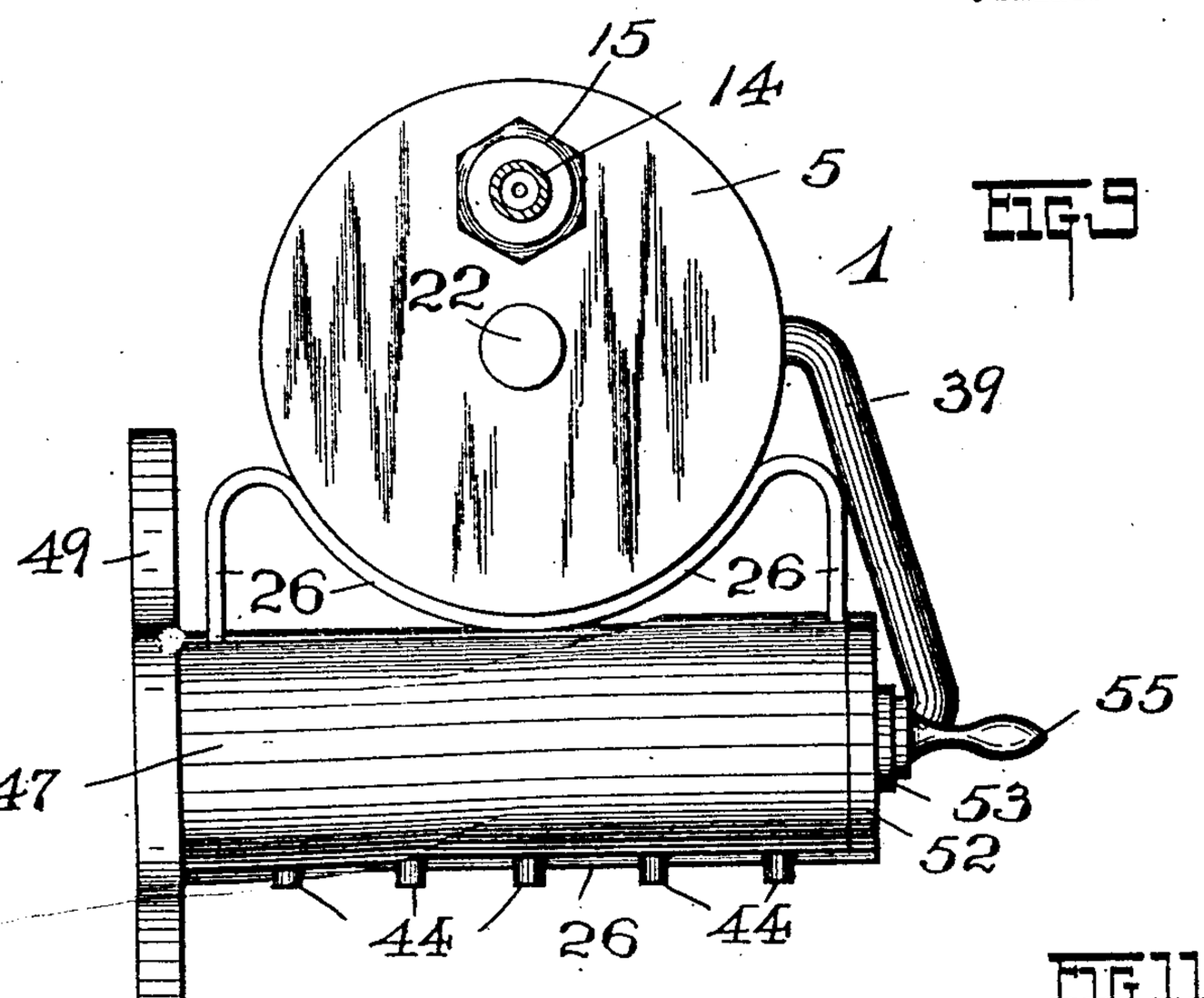


FIG 9

FIG 10

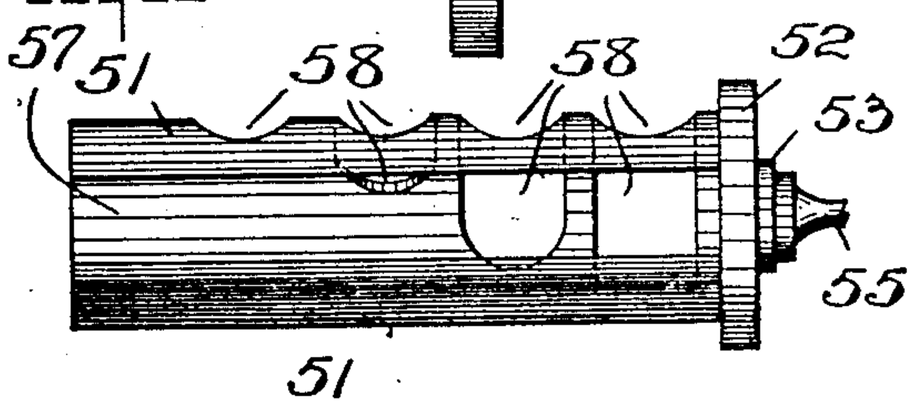
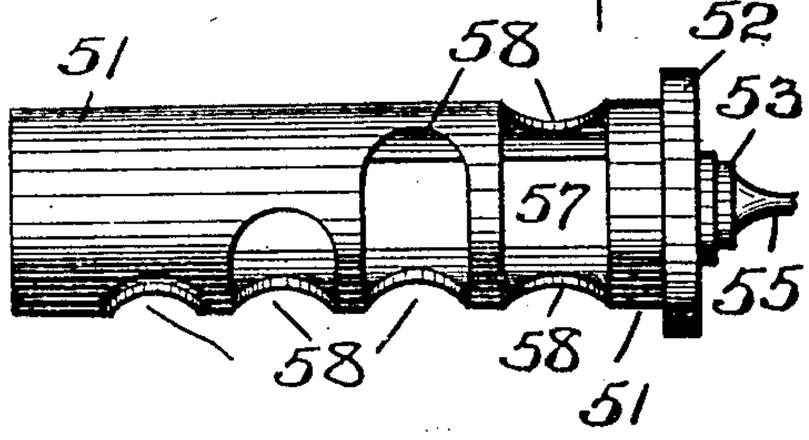


FIG 11



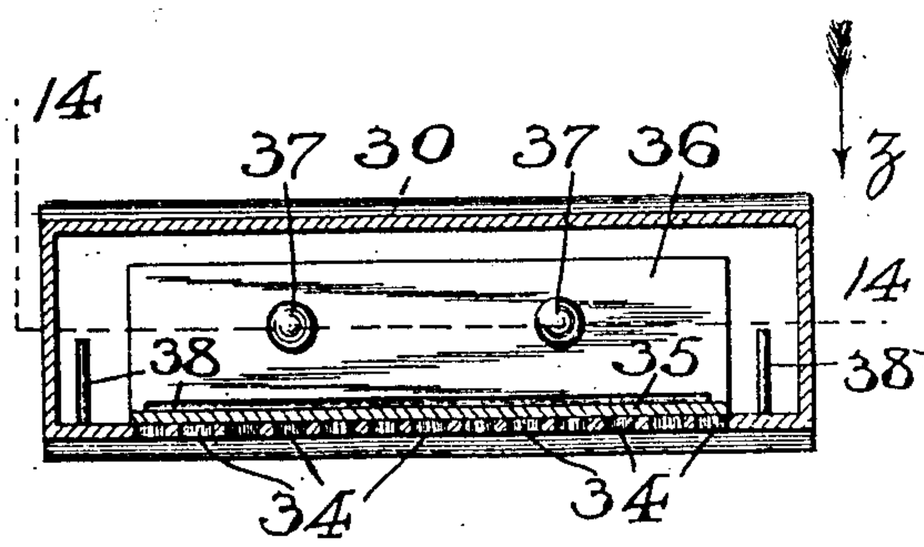


FIG 13

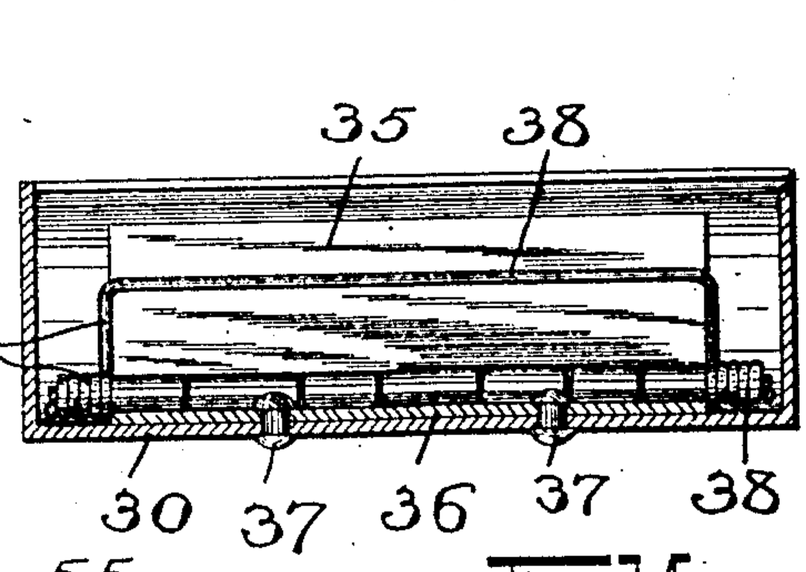


FIG 14

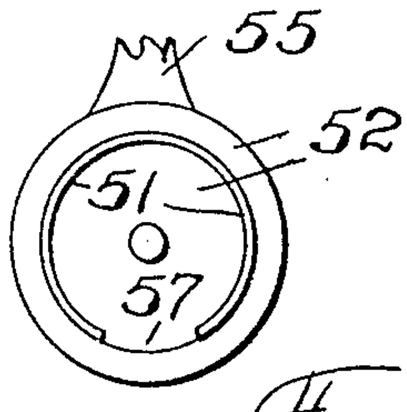


FIG 12

WITNESSES:

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Anna B. Acker

INVENTOR:

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BY

Fraentzel and Richards

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UNITED STATES PATENT OFFICE.

CHARLES KREBS, OF NEWARK, NEW JERSEY.

CARBURETER.

No. 881,416. Specification of Letters Patent. Patented March 10, 1908.

Application filed April 12, 1907. Serial No. 367,820.

To all whom it may concern:

Be it known that I, CHARLES KREBS, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Carbureters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention has reference, generally, to improvements in carbureters for gas-engines; and the present invention has for its principal objects to provide a novel and simply constructed apparatus or device in which a perfect admixture of the gasolene with air is caused to produce the explosive gas which is to be exploded in the cylinder of the gas engine.

The invention has for its further object to provide in addition to the carbureting chamber, a regulating-chamber provided with a novel means within said regulating chamber for controlling or regulating at will, the amount or quantity of the admixture of gasolene and air which is to be conducted to the explosion chamber or cylinder of the gas engine.

A further object of this invention is to provide a gasolene reservoir or chamber provided with an automatically operated means for controlling the supply of the gasolene within the said reservoir by opening and closing an inlet-valve as the level of the fluid within the reservoir becomes lowered or is raised.

Another object of the present invention is to provide a novel construction of carbureting chamber and air-intake connected therewith, as well as a novel construction of gasolene intake-valves, which are adapted to be regulated and set to permit a desired amount of gasolene to be drawn into said carbureting chamber in which it is mixed with the air to form a proper explosive gas which is to be conducted to and exploded in the cylinder or explosion chamber of the gas-engine.

Other objects of this invention not at this time more particularly mentioned will be clearly evident from the following detailed description of the same.

With the various objects of my present invention in view, the same consists in the novel carbureter for gas-engines hereinafter more fully set forth; and, furthermore, this invention consists in the general arrangements and combinations of the various devices and parts, as well as in the details of the construction of the same, all of which will be presently more fully described, and then finally embodied in the clauses of the claims which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is an end elevation of a carbureter embodying the principles of the present invention; and Fig. 2 is a side elevation of the same. Fig. 3 is a transverse vertical section of the same, taken on line 3—3 in the said Fig. 2 looking in the direction of the arrow *x;* and Fig. 4 is a similar view illustrating, more particularly, how the supply of gasolene flowing into the gasolene-reservoir or chamber is automatically shut-off and regulated. Fig. 5 is a longitudinal vertical section taken on line 5—5 in the said Fig. 1, looking in the direction of the arrow *y*, said view illustrating more particularly the position of the regulator when wide open to admit of the maximum quantity of the explosive mixture to the engine; Fig. 6 is a similar section of the same parts, showing the regulator in its relative position when only a minimum quantity of the gaseous mixture is to be admitted into the gas-engine; and Fig. 7 is a similar sectional representation of the same parts, showing the position of the regulator when in its entirely closed position, so that none of the mixed gases are admitted to the engine. Fig. 8 is a horizontal section of the carbureter, said section being taken on line 8—8 in the said Fig. 1, and looking in a downward direction. Fig. 9 is a top or plan view of the carbureter embodying the principles of this invention. Figs. 10 and 11 are two side elevations, and Fig. 12 is an end view of the regulating means by which the supply of gas entering the regulating-chamber from the carbureting chamber is controlled or regulated. Fig. 13 is a horizontal section of the air-intake of the carbureting chamber, said section being taken on line 13—13 in said Fig. 2, looking in a downward direction; and Fig. 14 is a vertical section of the same, said section being taken on line 14—14 in said Fig. 13, looking in the direction of arrow *z*.

Similar characters of reference are employed in all of the above described views to indicate corresponding parts.

Referring now to the several figures of the drawings, the reference-character 1 indicates a complete carbureter, showing one embodiment of the present invention, the same consisting, essentially, of a main shell or body 2, preferably of cylindrical configuration, said shell or body is provided with a closed bottom 3 and is made with an open top, having a screw-thread 4 upon its inner surface, into which screws a cover or member 5, substantially as illustrated, and the whole being adapted to provide a gasolene-reservoir or holder 6. The said cover or member 5 may be provided with a screw-threaded opening 7, situated near the outer circumferential edge of said cover or member, said opening 7 having screwed therein, a tubular valve-seat member or element 8. The stem 9 and cone 10 of a needle-valve is adapted to be slidably arranged in the vertical opening or duct 11 in said valve-seat member and the cone 10 furthermore is adapted to engage, at proper times, with the cone-seat 12 located at the upper end of said opening or duct 11. Said valve-seat member or element 8 is furthermore provided with an upwardly extending screw-threaded portion 13, to which is secured the end of a supply pipe 14 for conducting gasolene through said member or element 8 to the main holder 6. The end-portion of the pipe 14 is suitably secured to said valve-seat member 8 by means of the union-coupling 15. Connected by means of a link 16 attached to the lower end of the valve-stem 9, which projects downwardly into the gasolene reservoir or chamber 6, or in any other suitable manner, is a lever or arm 17, pivotally secured at one end to a V-shaped pintle or fulcrum 18 which is secured to the cover or member 5, substantially as shown. The free end of said lever or arm extends inwardly toward the center of the gasolene-reservoir or holder 6, and it is provided with a bent or turned-over portion, the same forming a contact-piece 19.

Slidably arranged in a centrally disposed opening or hole 20, in the cover or member 5, is a rod 21 which is provided with a head 22, the said rod 21 being adapted to extend into the reservoir or holder 6, and having its lower end connected by means of a link 23, or other suitable means of connection with the free-end of said lever or arm 17. A coiled spring 24 is arranged upon said rod 21, between the head 22 and the cover or member 5, to prevent the rod 21 from dropping on said lever or arm 17, and the tension of the spring being such, that under normal conditions it will not interfere with the movements of the valve-stem 9, nor will it cause the cone 10 of the valve-stem 9 to become seated upon the valve-seat 12, when the parts are in the positions indicated in Fig. 3 of the drawings, and thereby unnecessarily shut off the supply of the gasolene. A float 25 of cork, or any other suitable material, is arranged within the said reservoir or holder 6, the same being designed to ride or float upon the surface of the liquid contained therein.

It will be clearly evident from an inspection of Figs. 3 and 4 of the drawings, that, when a sufficient amount of liquid gasolene has entered the gasolene reservoir or holder 6, through the valve-mechanism just described, the float 25 rising with the level of said liquid will engage with the contact piece 19 of the lever or arm 17, thereby causing said lever or arm to be pushed in an upward direction and consequently forcing the valve-stem 9 and its cone 10 also in an upward direction within the valve-seat member or element 8, until the cone 10 engages with the cone-seat 12, and closes the needle-valve. The inflow of gasolene, is thus prevented and arrested, until the level in the reservoir or holder 6 again falls, whereby the float 25 and the lever or arm 17 again drops down, and the movement of the parts above described being reversed, the cone 10 moves away from the cone-seat 12, thereby opening the valve and permitting the gasolene again to freely flow into the reservoir or holder 6. It will be clearly evident, that these operations are purely automatic.

If at any time an increased quantity of gasolene is desired in the reservoir or holder 6, after the needle-valve has been closed, a slight downward pressure upon the knob 22 of the rod 21 will bring the lower end of the latter in contact with the lever or arm 17, thereby forcing said lever or arm, with the float down, and in the same manner opening the needle-valve, to permit the inflow of the extra quantity of gasolene.

A supporting bracket 26 is secured to the side of the shell or body 2, in any suitable manner, and suitably secured to and carried by said bracket are a plurality of tubular air-conveying and gasolene-receiving members 27, which are open at the top and bottom, and each one of which produces or forms a carbureting or mixing chamber 28. The bottoms or lower end-portions of said tubular members 27 each extend into suitable openings in a base-plate 29, and are secured therein in any desired manner.

Slidably arranged upon the longitudinal marginal edges of said base-plate 29, so as to be brought underneath said tubular-members 27, is a shell or box-like member 30, provided upon its upper longitudinal side-edges with turned-over portions 31, providing grooves 32 which embrace and are slidably arranged upon the said longitudinal marginal edges of the said base-plate 29.

This shell or box-like member 30 forms an air-intake chamber 33, and is provided upon one side with a plurality of holes or perforations 34, through which the air may be drawn. The said holes or perforations 34 are normally closed by means of the gate 35, pivotally connected to a hinge-plate 36, which is secured to the said shell or box-like member 30 by means of rivets 37, or in any other suitable manner. The said gate 35 is normally kept in its closed relation, so as to exclude the unnecessary entrance of dirt, dust and the like, into said chamber 33 by means of a spring 38, but the same is easily opened by the suction of the gas-engine when it is desired to draw the air into the carbureter.

The gasolene is conducted from the gasolene reservoir or holder 6, into the several carbureting or mixing chambers 28, by means of a feed-tube 39 which is connected in any suitable manner with the bottom of said reservoir or holder, and enters through the sides so to pass laterally through and diametrically across each tubular member 27, substantially in the manner illustrated in the several figures of the drawings. Said feed-tube 39 is furthermore closed at its free-end in any suitable manner, by means of a plug or cap 40. The said feed-tube 39, where it passes through the interior of each tubular-member 27, which form the carbureting or mixing chambers 28, as has been stated, is provided with a hole or perforation 41, through which the gasolene may pass into each chamber 28 to be mixed therein with the air. To regulate the proper spraying and the uniform flow of said gasolene through the said holes or perforations 41, there is provided opposite each of said holes or perforations, a cone or needle-point 42 which is formed with a screw-threaded shank 43 and a slotted head 44. The screw-threaded shanks 43 are screwed into screw-threaded openings 45 in the said tubular member 27 and the said bracket 26, whereby the slight turning of the said shank 43 therein, will insert or withdraw the cone or needle-point 42 in its relation with the holes or perforations 41 of the feed-tube 39, thus affording an easy means of adjustment. To lock the shanks 43 and the cones or needle-points 42, against any accidental disarrangement, after the same have been properly adjusted, suitable lock or jam-nuts 46 are provided, which are screwed upon the shanks 43 and against the bracket 26, to prevent the shanks 43 against turning in the screw-threaded openings 45, as will be clearly understood.

The upper ends of the tubular-members 27 open into, and are secured in suitably disposed openings or holes in a cylindrical shell, body or element 47, the same providing what may be termed a regulating chamber 48. Said cylindrical shell is provided at one end with a flange 49, formed with holes or openings 50 through which may be passed bolts, for the purpose of securing the said carbureter in its operative position upon the end of a gas-inlet pipe, leading to the cylinder or explosion-chamber of the gas-engine. Arranged in an oscillatory manner within said cylindrical shell 47, so as to turn therein, is a regulator, the same comprising a tubular-portion or member 51. The inserted end of said member 51 is open, and the opposite end is closed and is preferably provided with an annular shoulder 52, which rides against the outer edge of the said cylindrical-shell 47. Secured to the closed end of said tubular-portion 51, upon a boss or enlargement is an actuating lever or arm 54 which is provided with a handle or finger-piece 55. The lever or arm 54 is securely held in its operative relation by means of the screw 56 and washer 53, or it may be otherwise connected with the closed end of the regulator 51, as will be evident. By means of this lever or arm the tubular-portion 51 can be turned or revolved within the said cylindrical shell 47, and set in any one of its regulating positions, for the purposes subsequently to be described. The said tubular portion or element 51 is provided with an elongated and longitudinally extending opening or slot 57, which may be moved over and above all of the open ends of the tubular-members 27, forming the carbureting or mixing chambers 28, so as to register with said open ends to permit the flow of the gaseous mixture into the regulating-chamber 48 from all of said tubular-members, at one and the same time, as will be clearly seen from an inspection of Fig. 7 of the drawings. The said tubular-portion or element 51 is furthermore provided with a plurality of holes or openings 58 which are preferably of the configurations shown more particularly in Figs. 5, 7, 10 and 11 of the drawings, the hole or opening at the left end of the tubular portion or element 51 usually being a circular hole, while the remaining holes are of an elongated shape, extending laterally upon the cylindrical surface of the element 51, and the lengths of said holes increasing from left to right of the element, in a manner clearly shown in Figs. 10 and 11. The purposes of the holes, varying in their lengths, is clearly evident, for it is owing to this arrangement of the holes that an open communication may be maintained between a single, or two, or three, or four of the carbureting or mixing chamber 48, to conduct a minimum or maximum, or an intermediate degree of the gaseous mixture to the explosion or combustion chamber of the gas-engine, as will be clearly understood.

From the foregoing description, it will readily be seen, that the present invention provides a carbureter, in which the carbureting or mixing chamber is divided into a plurality of small chambers, whereby a bet-

ter and quicker mixture of air and gas is obtained; furthermore, by providing the regulating chamber above the carbureting chambers, as above described, it is possible to control and regulate the amount of gas to be conducted to the explosion chamber or cylinder of the gas-engine, by simply closing, by means of the tubular-portion or element, 51, one or more of the tubular members 27 against the passage of the gas therefrom, the result being that the gas may thus be taken from one or more of the said tubular-members 27, at will, and thereby using, at all times, the proper quantity or quantities of the gaseous mixture, the same being under the proper control of the operator.

I claim:—

1. In a carbureter for gas-engines, the combination with a gasolene-holder, of a series of mixing tubes, each tube forming a mixing chamber, a feed-tube connected with said gasolene-holder, said tube extending into and diametrically across each mixing tube, said tube being provided with a series of outlets, each outlet establishing a communication with each mixing chamber of the respective mixing tubes, and means connected with each mixing tube having a portion in engagement with the outlets in said feeding tube for regulating the spraying of the gasolene from said outlets, substantially as and for the purposes set forth.

2. In a carbureter for gas-engines, the combination with a gasolene-holder, of a series of mixing tubes, each tube forming a mixing chamber, a feed-tube connected with said gasolene-holder, said tube extending into and diametrically across each mixing tube, said tube being provided with a series of outlets, each outlet establishing a communication with each mixing chamber of the respective mixing tubes, and means connected with each mixing tube having a portion in engagement with the outlets in said feeding tube for regulating the spraying of the gasolene from said outlets, a regulating chamber in communication with all of said mixing tubes, and means in said regulating chamber for establishing communication with one or more or all of said mixing tubes, substantially as and for the purposes set forth.

3. In a carbureter for gas-engines, the combination with a gasolene-holder, of a series of mixing tubes, each tube forming a mixing chamber, a feed-tube connected with said gasolene-holder, said tube extending into and diametrically across each mixing tube, said tube being provided with a series of outlets, each outlet establishing a communication with each mixing chamber of the respective mixing tubes, and means connected with each mixing tube having a portion in engagement with the outlets in said feeding tube for regulating the spraying of the gasolene from said outlets, a regulating chamber in communication with all of said mixing tubes, and means in said regulating chamber for establishing communication with one or more or all of said mixing tubes, comprising a tubular regulator arranged in said regulating chamber, said regulator having an oscillatory motion, said regulator being provided with variously disposed openings of different conformations, all arranged for establishing communication with one or more or all of said mixing tubes.

4. In a carbureter for gas-engines, the combination with a gasolene-holder, of a series of mixing tubes, each tube forming a mixing chamber, a feed-tube connected with said gasolene-holder, said tube extending into and diametrically across each mixing tube, said tube being provided with a series of outlets, each outlet establishing a communication with each mixing chamber of the respective mixing tubes, and means connected with each mixing tube having a portion in engagement with the outlets in said feeding tube for regulating the spraying of the gasolene from said outlets, a regulating chamber in communication with all of said mixing tubes, and means in said regulating chamber for establishing communication with one or more or all of said mixing tubes, comprising a tubular regulator arranged in said regulating chamber, said regulator having an oscillatory motion, said regulator being provided with variously disposed openings of different conformations, all arranged for establishing communication with one or more or all of said mixing tubes, and an actuating lever connected with one end of said regulator, substantially as and for the purposes set forth.

5. In a carbureter for gas-engines, the combination with a gasolene holder, of a series of mixing tubes, each tube forming a mixing chamber, a regulating chamber in communication with all of said mixing tubes, and means in said regulating chamber for establishing communication with one or more or all of said mixing tubes, all combined with an air-receiving shell forming an air-intake, said shell being in communication with said mixing tubes and being provided in one of its sides with air-receiving holes, and a spring-controlled gate movably arranged over said holes, substantially as and for the purposes set forth.

6. In a carbureter for gas-engines, the combination with a gasolene holder, of a series of mixing tubes, each tube forming a mixing chamber, a regulating chamber in communication with all of said mixing tubes, and means in said regulating chamber for establishing communication with one or more or all of said mixing tubes, comprising a tubular regulator arranged in said regulating chamber, said regulator having an oscillatory motion, said regulator being provided with

variously disposed openings of different conformations, all arranged for establishing communication with one or more or all of said mixing tubes, all combined with an air-receiving shell forming an air-intake, said shell being in communication with said mixing tubes and being provided in one of its sides with air-receiving holes, and a spring-controlled gate movably arranged over said holes, substantially as and for the purposes set forth.

7. In a carbureter for gas-engines, the combination with a gasolene holder, of a series of mixing tubes, each tube forming a mixing chamber, a regulating chamber in communication with all of said mixing tubes, and means in said regulating chamber for establishing communication with one or more or all of said mixing tubes, comprising a tubular regulator arranged in said regulating chamber, said regulator having an oscillatory motion, said regulator being provided with variously disposed openings of different conformations, all arranged for establishing communication with one or more or all of said mixing tubes, and an actuating lever connected with one end of said regulator, all combined with an air-receiving shell forming an air-intake, said shell being in communication with said mixing tubes and being provided in one of its sides with air-receiving holes, and a spring-controlled gate movably arranged over said holes, substantially as and for the purposes set forth.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 10th day of April, 1907.

CHARLES KREBS.

Witnesses:
FREDK. C. FRAENTZEL,
FREDERICK JAMISON.