No. 741,810. PATENTED OCT. 20, 1903.

C. M. MOHLER.

CONSTANT LEVEL LIQUID HYDROCARBON VAPORIZER FOR OIL ENGINES.

APPLICATION FILED NOV. 24, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

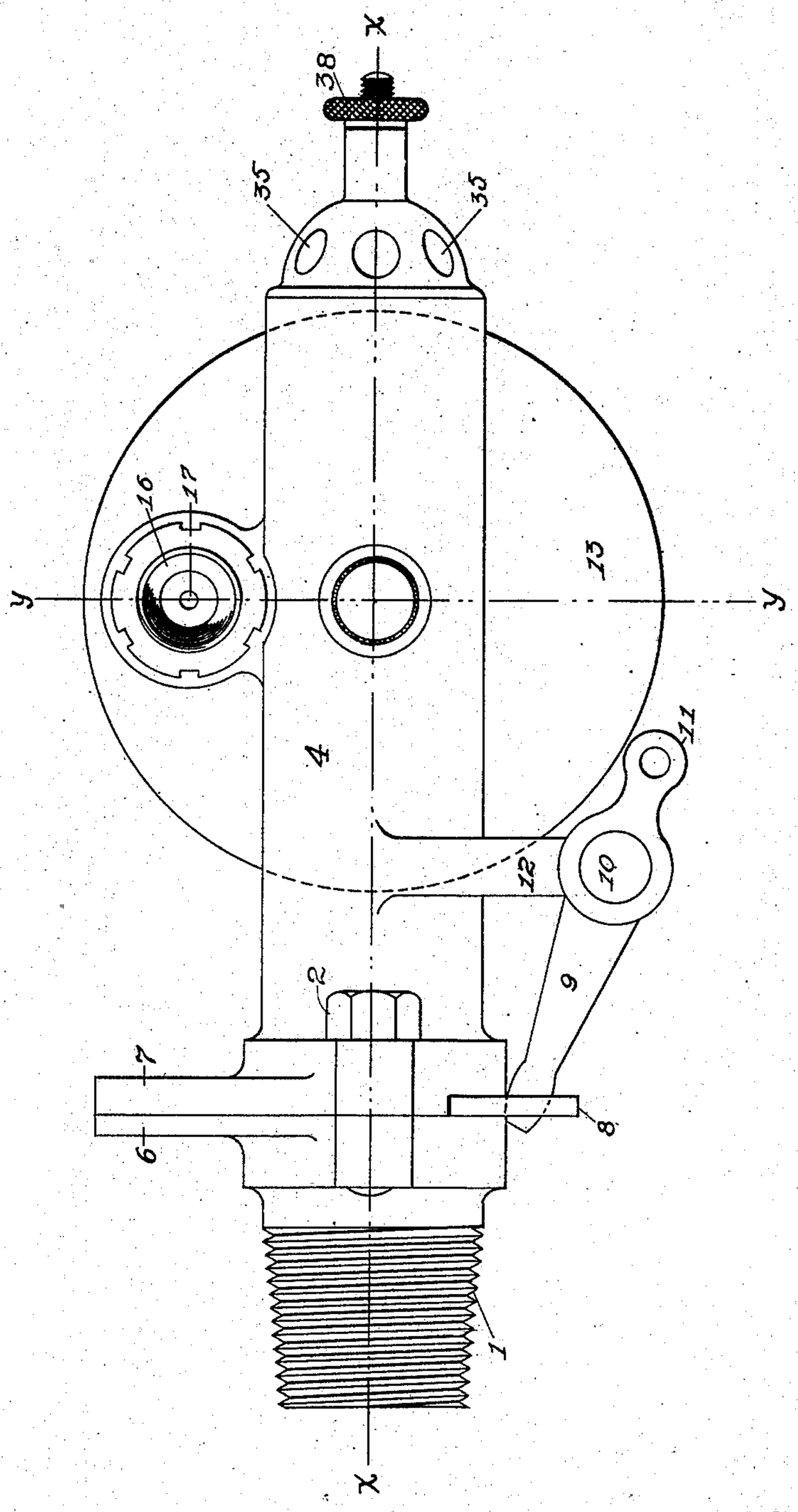

Fig. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

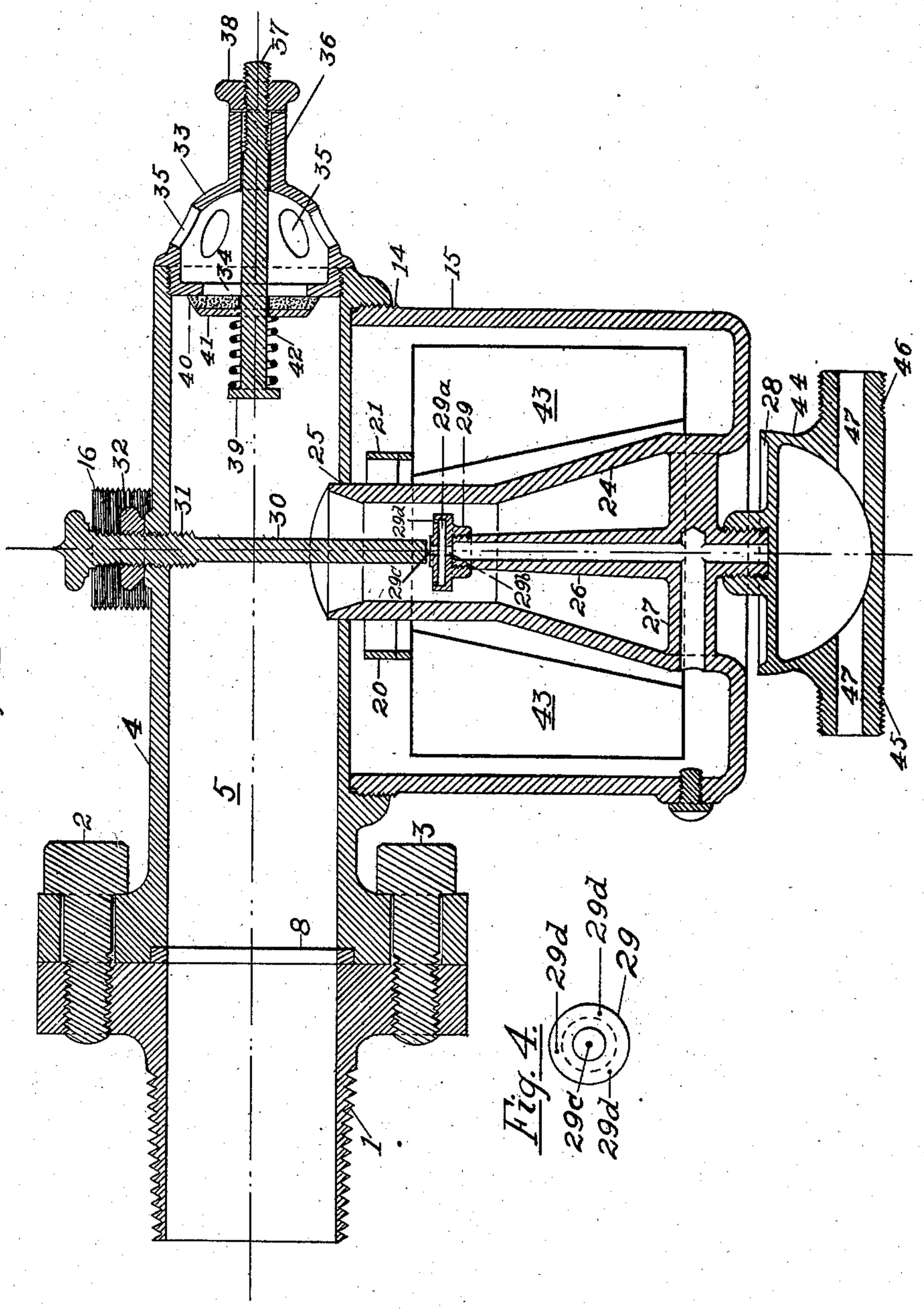

Fig. 4.

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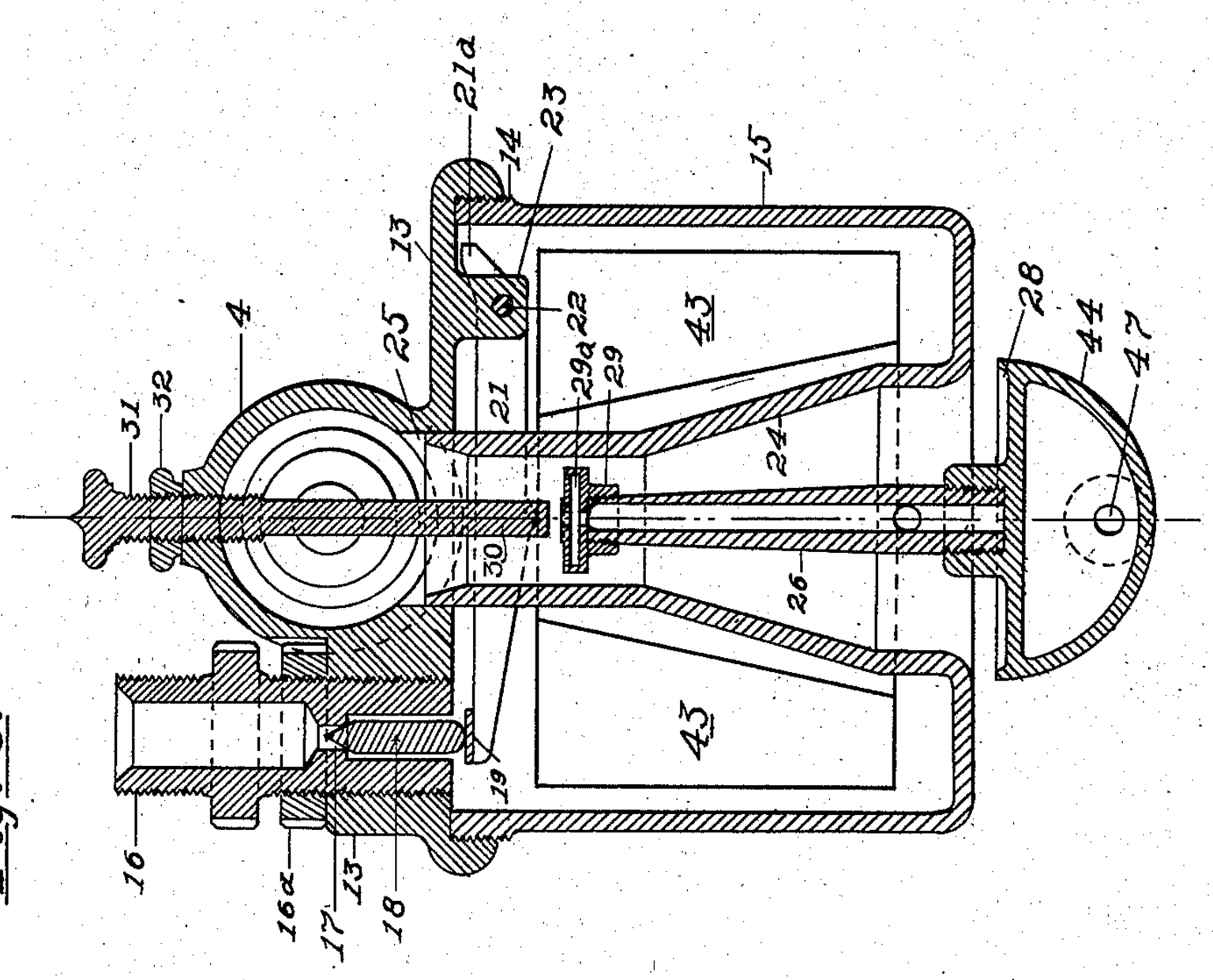
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.



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No. 741,810. Patented October 20, 1903.

UNITED STATES PATENT OFFICE.

CHARLES M. MOHLER, OF KENOSHA, WISCONSIN.

CONSTANT-LEVEL LIQUID-HYDROCARBON VAPORIZER FOR OIL-ENGINES.

SPECIFICATION forming part of Letters Patent No. 741,810, dated October 20, 1903.

Application filed November 24, 1902. Serial No. 132,633. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. MOHLER, a citizen of the United States, residing at Kenosha, in the county of Kenosha and State of Wisconsin, have invented certain new and useful Improvements in Constant-Level Liquid-Hydrocarbon Vaporizers for Oil-Engines, of which the following is a specification.

My invention relates to constant-level liquid-hydrocarbon vaporizers for oil-engines used with oil-engines and belonging to the class in which the principal mixing-chamber for air and sprayed liquid is supported directly above the reservoir and at right angles to the jet of liquid drawn in by the suction of the engine.

The object of my invention is the construction of a vaporizer of the character and form stated which shall consist of a minimum number of individual parts, and the object of the invention further comprehends a particular arrangement of those parts, as hereinbelow set forth.

It is also an object of my invention to produce a vaporizer automatic in action and when properly adjusted giving a uniform explosive mixture irrespective of the speed of the engine and through a wide range of speed—as, for example, in engines for motor-carriages.

I attain the object desired by employing and associating the several elements illustrated in the accompanying drawings, whereof—

Figure 1 represents a top plan view; Fig. 2, a vertical longitudinal section on line $x\,x$ of the first figure, and Fig. 3 a cross-section on line $y\,y$ of the first figure. Fig. 4 is a top plan view of the perforated head or nozzle for spraying the oil.

Like numbers of reference designate like parts throughout.

Considering the drawings, numeral 1 marks the coupling or connection to be screwed into a casting of an engine, and bolts 2 and 3 secure the coupling to the hollow tubular casting 4, of which the interior 5 constitutes the mixing-chamber for oil and air. At the junction of the coupling 1 and tube 4 two laterally-extended portions (designated by numbers 6 and 7) of the coupling and end of the tube meet and form a guide and pocket, into which slides a gate 8, engaging and operated by the movement of the end of a lever 9, pivoted on the same short shaft 10 with crank 11, the shaft being journaled in the bracket 12, cast integrally with tube 4. A reciprocating rod from the engine is to be connected with crank 11, and gate 8 is caused to alternately open and close the path by which the explosive mixture passes from mixing-chamber 5 to the engine.

In Fig. 1 is shown the top of the circular screw-cap 13, which is, in fact, a part of the tubular casting 4. Cap 13 engages exterior threads 14 at the mouth of a reservoir or bowl 15. Fluid enters the reservoir by way of connection 16 and through a constricted passage 17, the lower mouth of the passage forming a seat for the pointed end of a cylindrical body 18, constituting a valve. Connection 16 is threaded and capable of being adjusted up and down through cap or cover 13, which raises and lowers the constricted portion or valve-seat 17 and calls for a higher or lower level of fluid and float to close the oil-entrance. An external nut 16^a fixes the connection in any adjusted position. Against the other end of valve-body 18, usually rounded, as shown, rests the bridge-piece 19, which joins the corresponding ends of the twin levers 20 and 21, that operate as one and have the same fulcrum 22, supported by the lug 23, projecting downwardly from the interior of cap 13. Beyond lug 23 to the right of the fulcrum a short upwardly directed rear part of each lever is extended, as shown in Fig. 3, for lever 21 and marked 21^a. As that end of lever 21 to which bridge-piece 19 is attached falls with the liquid-level and float rear part 21^a rises against cap 13 and limits the lever's movement. This limitation is necessary to prevent the free valve-body 18 from dropping out of the chamber containing it, particularly when no oil is in the bowl and the float unsupported. Rising between the levers is the combining-tube 24, a hollow funnel-shaped formation, integral with the bottom of bowl 15, open to air at its lower end and fitting at the top into a suitable aperture 25 in the tubular casting 4, already described. Thus way is provided from the outer air directly into the mixing-chamber 5 and at right angles thereto. Usually

the tube 24 is located centrally in the bowl, and at the axis of the tube the oil-supply pipe 26 stands. Pipe 26 is upheld by a cross connecting-block 27, and both pipe and block are of the same piece with the tube 24 and bowl 15. By boring the block 27 and pipe 26 axially passages at right angles to each other are formed. At its lower end below the block an extension of the pipe is exteriorly threaded and engages a centrally-raised portion of the pan 28, which will be further described. By reason of this connection with pan 28 the bore of pipe 26 is permanently closed at the bottom. At the top the pipe 26 is provided with a spray head or nozzle 29, having the circular interior 29^a, the centrally-located opening 29^b, connecting with the bore of pipe 26, the central perforation 29^c through the top of the head, and outlying perforations 29^d, all of which operate to spray the fluid into the upper part of combining-tube 24. It will be noted here that as both air and oil are drawn in through the combining-tube 24 the upper part of the tube is in a degree a mixing-chamber. Rod-valve 30 is adjustable toward or from nozzle 29 by means of a threaded portion 31, and its adjustment is fixed by nut 32 on the outside of tubular casting 4. The central perforation 29^c of head 29 may be entirely closed by rod-valve 30 and the amount of entering fluid cut down by that much, if desired.

At the right the mixing-chamber 5 is closed by the hollow screw-plug 33. Through the base of the plug is an opening 34, and through its outer wall are a series of openings 35. A tubular extension 36 of the plug surrounds a puppet-valve rod 37, its outer and threaded end engaging the adjusting thumb-nut 38 and its inner end terminating in a head 39. Around rod 37 is a leather or fiber washer 40, backed by a metal plate 41 and arranged to close the opening 34 in the base of the plug, and a coil-spring 42 encircles the rod and is compressed between the rod-head 39 and metal valve-plate 41. By means of the thumb-nut the compression of the spring is regulated, and the amount of air admitted in response to the suction of the engine may be controlled in that way.

Number 43 marks the annular float placed within the bowl around the centrally-located combining-tube 24, and it is my custom to construct the float with an upwardly-expanding interior to add to its buoyancy and promptness of action as the level of fluid rises. By Figs. 2 and 3 it may be discerned that an upward movement of the float raises the levers and closes valve 18 wholly or partly, thus maintaining a constant level of fluid in the bowl in the ordinary way.

In Figs. 2 and 3 the element of my invention is shown which I have called herein the "pan" 28. It is supported, as stated, by its screw-threaded engagement with the lower end of the oil-pipe 26, and it closes the lower end of the pipe and partly closes the opening of injector-tube 24 through the bottom of the bowl. Through the annular opening between the edge of pan 28 and the bottom of the bowl an amount of air may be drawn by a certain degree of suction, and a certain amount of oil is by the same suction sprayed at the nozzle 29. Combined air and oil in definite proportions enter the combining-tube and mixing-chamber. When it is desired to run an engine at its maximum speed and power, adequate charges of the explosive mixture of air and gasolene are demanded in rapid succession. Certain definite amounts of air and gasolene must be combined to produce the most powerful result. Ordinarily vaporizers are constructed to serve at average speed this definite mixture, which utilizes all the gasolene, and is therefore most economical. In my invention the combining-tube 24, partly closed by pan 28, and head 29 are thus proportioned and deliver the proper mixture at slow speed; but as the speed increases more gasolene will be sucked through the head than the amount of entering air will satisfy, and the mixture becomes too rich in gasolene, limiting its explosive power. More air must be provided, and the puppet-valve effects this automatically. At slow speeds the puppet-valve remains seated; but as the speed increases the valve begins to open and admit outside air. The greater the speed and the more rapidly the mixture is called for the greater the opening of the valve and volume of entering air to be combined with the excess of gasolene. Thus the explosive quality of the mixture is maintained at the point of greatest economy and power whatever the speed. Attention is here called to the fact that the amount of air passing through combining-tube 24 may be limited by the diameter of spray-head 29. Where the head is given a certain size, it acts precisely as the pan 28 does, permitting the passage of just the proper amount of air at slow speed, and the pan might be omitted. Any number of perforations can be given head 29.

Pan 28 forms the top of a hollow hemispherical casting 44, and on each side are threaded projections 45 and 46, with a passage 47 extending through both and into the hollow casting 44. This hollow hemisphere is, in fact, an air-heater, and it is my custom to direct, by suitable piping, a portion of the exhaust from the engine through passage 47 in order to heat the air drawn into tube 24, the heated air assisting materially in vaporizing the oil.

I am aware that constant-level vaporizers, including float-controlled oil-valves, have been constructed, and I do not claim those features.

Having thus described the construction and operation of my invention, what I claim is—

1. In a constant-level vaporizer, the combination of a mixing-chamber, a puppet-valve adapted to admit air to said chamber, a spring yieldingly holding said valve to its seat and

means for adjusting the spring, a bowl adjacent to said chamber, a valve admitting oil to the bowl, an annular float within the bowl, mechanism constructed to transmit the movement of the float to the said oil-valve, a combining-tube opening through the bottom of said bowl and leading through the float into the said mixing-chamber, devices connected with the bowl and adapted to spray the oil by way of the said combining-tube into the mixing-chamber, and an air-heater partly closing the exterior mouth of the combining-tube, substantially as described.

2. In a constant-level vaporizer, the combination of a mixing-chamber, a puppet-valve at one end of said chamber adapted to admit air to said chamber, a spring yieldingly holding said valve to its seat and means for adjusting the spring, a bowl arranged beneath the said mixing-chamber, a valve admitting oil to the bowl, an annular float within the bowl, mechanism constructed to transmit the movement of the float to the said oil-valve, an adjustable oil-valve seat whereby the closing position of the oil-valve may be raised or lowered causing a higher or lower level of oil in said bowl and corresponding elevation of the float, a combining-tube opening centrally through the bottom of the bowl and opening at the top into the said mixing-chamber, devices connected with the bowl and located in the combining-tube constructed to spray oil into said tube and chamber, and an air-heater partly closing the exterior mouth of the said combining-tube, substantially as described.

3. In a constant-level vaporizer, the combination of a mixing-chamber, a bowl adjacent to the chamber, a valve admitting oil to the bowl, a float within the bowl, mechanism constructed to transmit the movement of the float to the said oil-valve, a combining-tube leading from the exterior into said mixing-chamber, devices connected with the bowl and adapted to spray oil into said tube and mixing-chamber, and an air-heater having a hollow interior and adapted to be coupled to the exhaust-pipe of the engine, the top of said heater having the form of a pan and being arranged to partly close the exterior mouth of said combining-tube, substantially as described.

4. In a constant-level vaporizer, the combination of a mixing-chamber, a bowl adjacent to the chamber, devices connected with the bowl and adapted to admit air and to spray oil into the chamber, a screw-threaded connection adjustable up or down through the top of said bowl, the said connection having a constricted portion and a valve-seat, an independent valve-body engaging the said seat, levers supporting the said valve-body, a float within the bowl and normally in contact with the said levers, and means for limiting the fall of the ends of the levers supporting said valve-body, the adjustment of said screw-threaded connection allowing a higher or lower position of the said float and corresponding liquid-level in said bowl, substantially as described.

5. In a constant-level vaporizer, the combination of a mixing-chamber, an air-valve opening into said chamber, a bowl adjacent to the chamber, a combining-tube rising centrally from the bottom of the bowl at right angles to the said chamber and opening into it, an oil-pipe and spray-head located axially in said tube and connected with the bowl, a threaded valve-rod passing through the chamber and adjustable to or from said spray-head, the said combining-tube spreading downwardly, an annular float in the bowl encircling said tube, the inner wall of the float spreading downwardly, pivoted levers resting normally on said float, an independent valve-body supported at one end of said levers, a screw-threaded connection adjustable up or down through the top of the bowl and having a constricted portion and a valve-seat engaging said valve-body, the adjustment of said connection allowing a higher or lower position of said float and corresponding liquid-level in said bowl, and a pan attached to the said oil-pipe partly closing the exterior mouth of said combining-tube, substantially as described.

6. In a constant-level vaporizer, the combination of a mixing-chamber having an inlet air-valve, a bowl adjacent to the said chamber, float-operated devices constructed and arranged to maintain a constant liquid-level in the bowl, a combining-tube entering the mixing-chamber and open to air, an oil-supply pipe axially disposed in the combining-tube, a spray-head secured to the end of said oil-pipe within the combining-tube, and an air-heater partially closing the exterior mouth of the said combining-tube, substantially as described.

7. In a constant-level vaporizer, the combination of a mixing-chamber, an adjustable spring-held puppet air-valve connected with the chamber, a bowl adjacent to the chamber, an oil-valve admitting oil to the bowl, an adjustable oil-valve seat whereby the closing position of the oil-valve may be raised and lowered thus enabling the constant level of oil in the bowl to be fixed at different heights, float-operated devices constructed and arranged to actuate the said oil-valve, a combining-tube entering the mixing-chamber and open to air, an oil-supply pipe axially disposed in the combining-tube, a spray-head secured to the end of said oil-pipe within the combining-tube, and an air-heater partially closing the exterior mouth of the said combining-tube, substantially as described.

8. In a vaporizer, the combination of a mixing-chamber, an adjustable air-valve at one end of the said mixing-chamber, a combining-tube opening into the mixing-chamber at one end and into the atmosphere at the other end, oil-spraying devices located in the said combining-tube, means for serving the oil and

for regulating the oil served to the said oil-spraying devices, and an air-heater arranged to partly close the end of the said combining-tube which opens to the atmosphere whereby air drawn into the said combining-tube is heated and the said opening restricted to a certain predetermined area.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES M. MOHLER.

Witnesses:
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