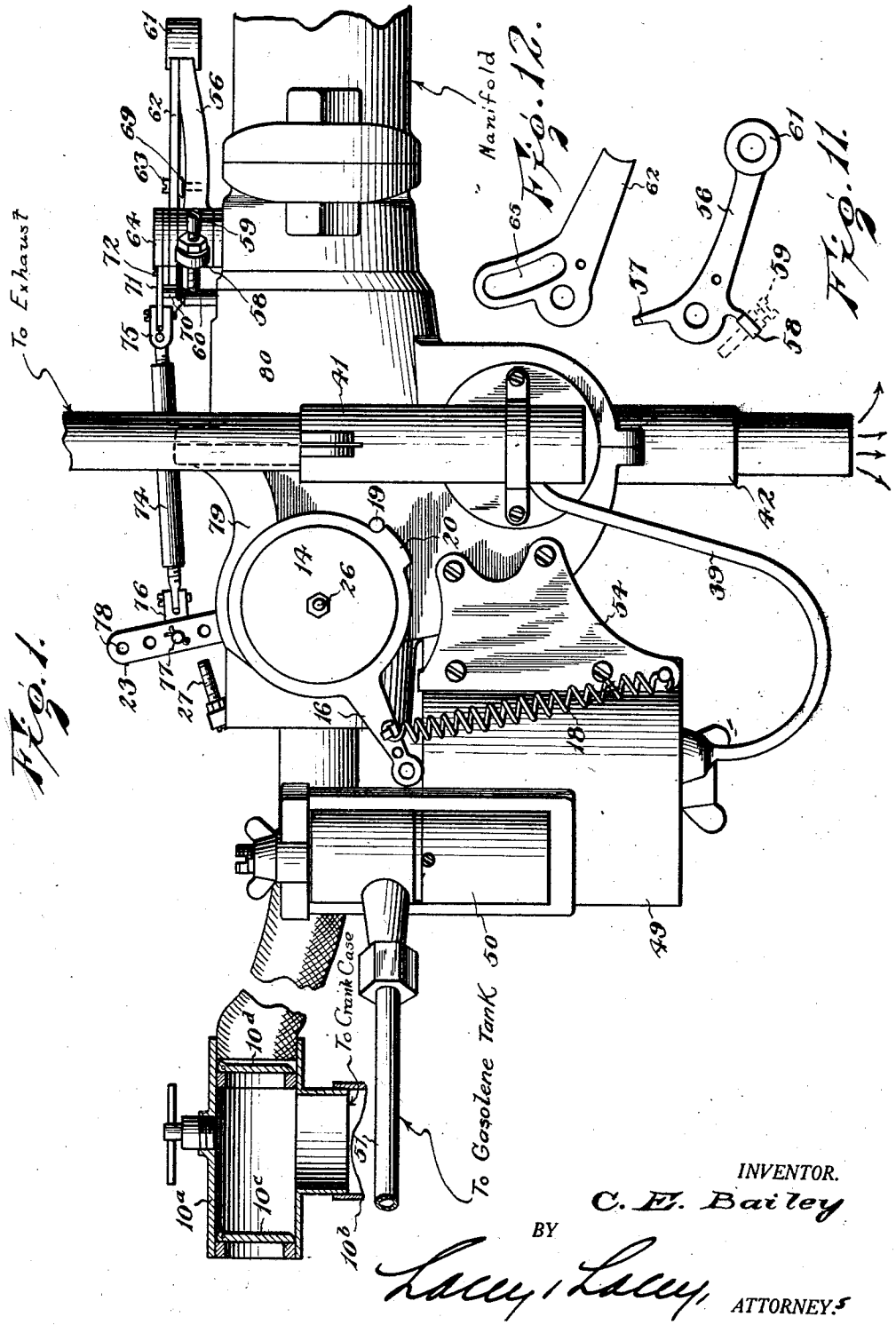
April 26, 1932. C. E. BAILEY 1,855,276

OIL VAPORIZING APPARATUS

Filed Nov. 2, 1928 4 Sheets-Sheet 1



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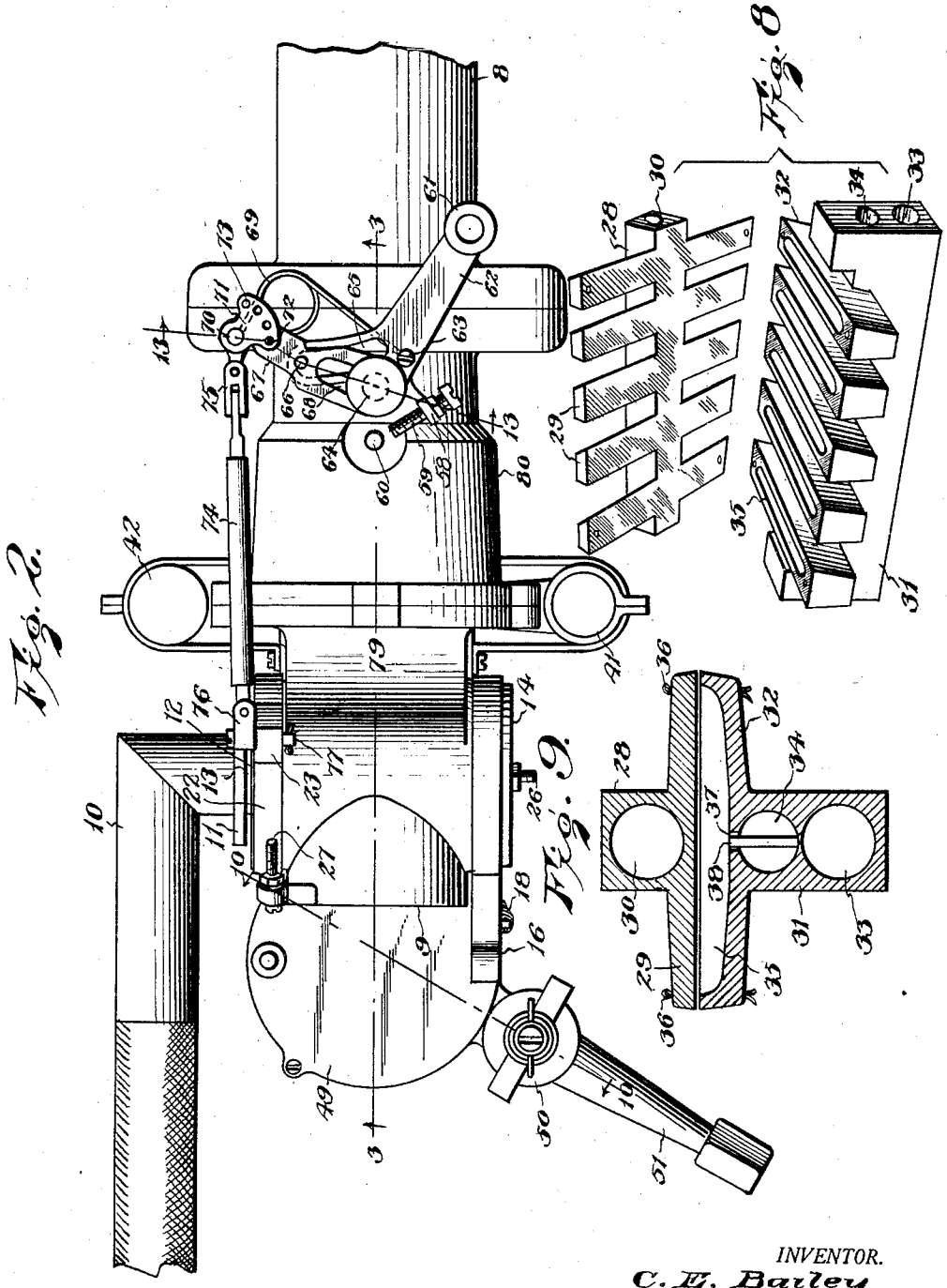

Fig. 2.

Fig. 8

Fig. 9.

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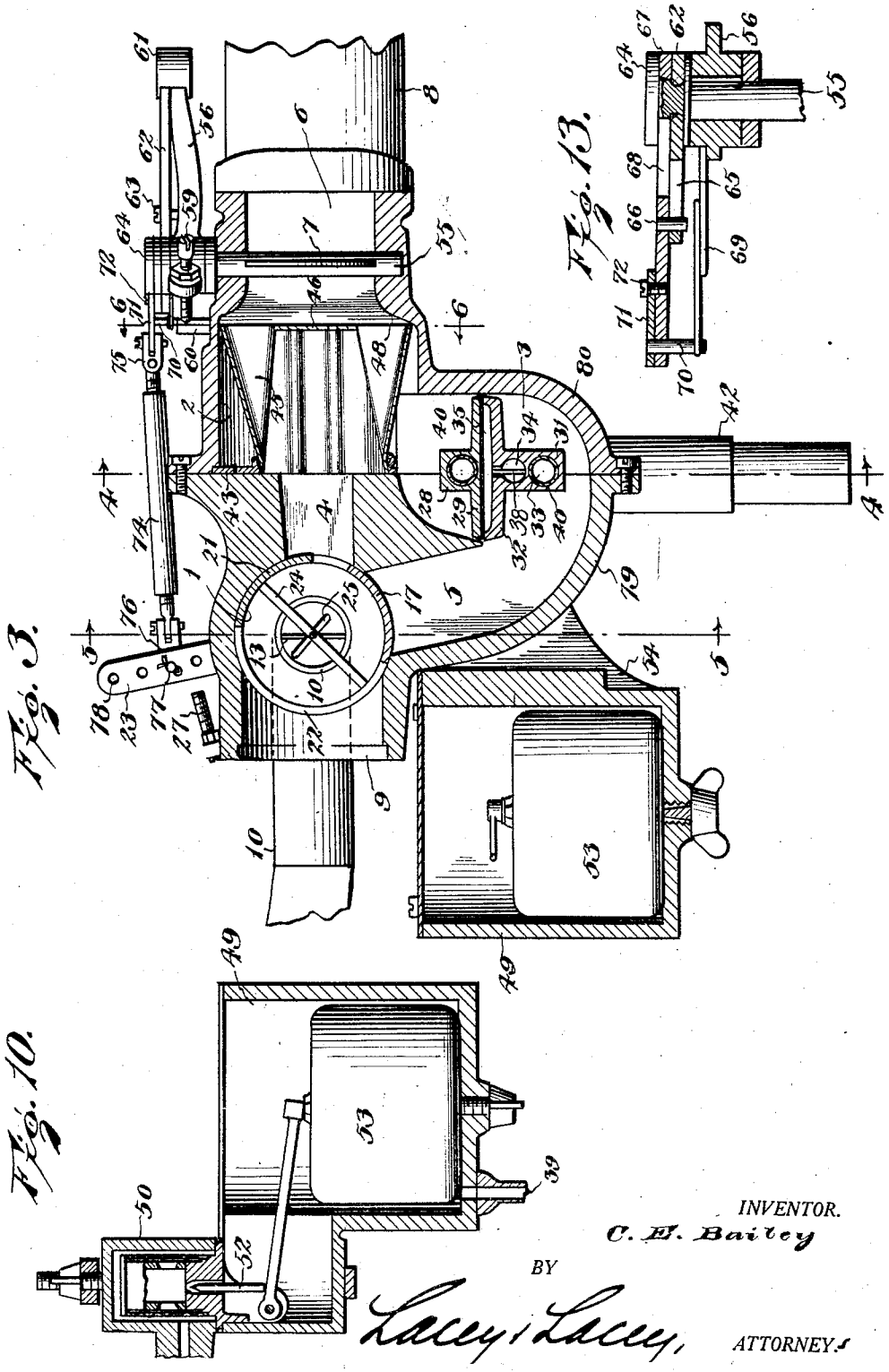

Fig. 3.

Fig. 13.

Fig. 10.

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OIL VAPORIZING APPARATUS

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Fig. 4.

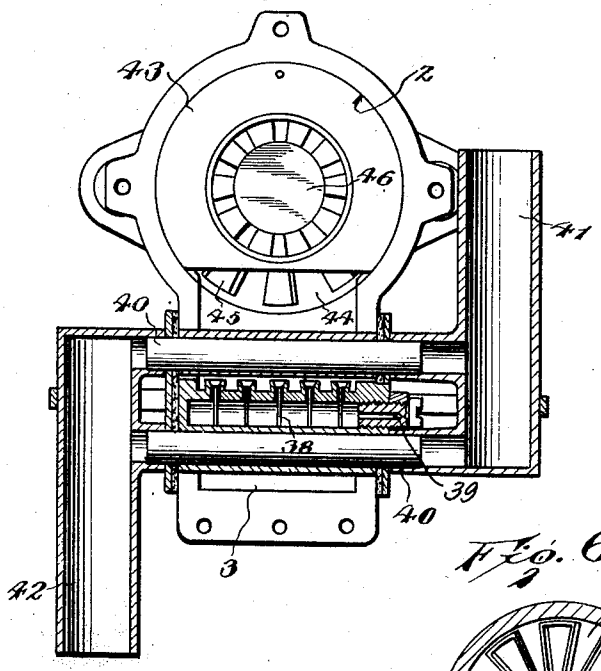


Fig. 6.

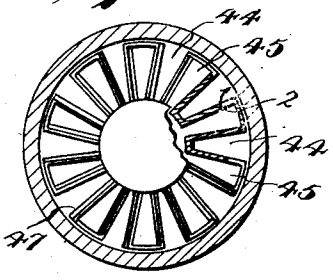
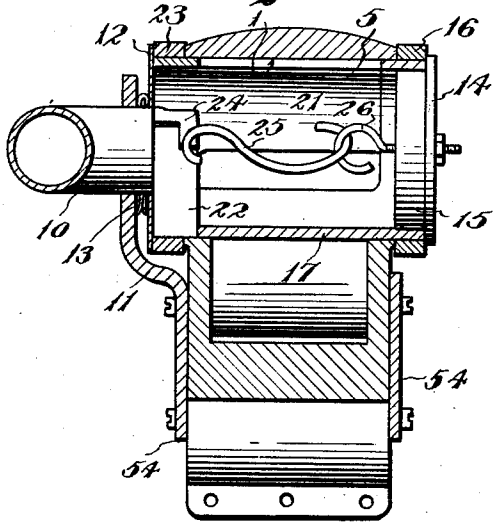


Fig. 5.



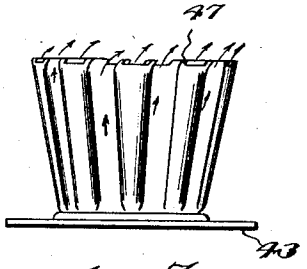


Fig. 7.

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Patented Apr. 26, 1932 1,855,276

UNITED STATES PATENT OFFICE

CHARLES E. BAILEY, OF MASCOUTAH, ILLINOIS

OIL VAPORIZING APPARATUS

Application filed November 2, 1928. Serial No 316,685.

The invention relates to devices for supplying vaporized fuel to the motors of the internal combustion type.

The invention provides an oil vaporizing apparatus which includes a vaporizer and mixer and independent valves for controlling and regulating the flow of air and mixture to meet varying conditions as the exigencies may require to obtain the best results.

While the drawings illustrate a preferred embodiment of the invention, it is to be understood that in adapting the means to meet specific needs and requirements, the design may be varied and changes in the minor details of construction may be resorted to within the scope of the invention as claimed, without departing from the spirit thereof.

For a full understanding of the invention and the merits thereof, reference is to be had to the following description and the drawings hereto attached, in which:—

Figure 1 is a side view of an apparatus embodying the invention.

Figure 2 is a top plan view of the device.

Figure 3 is a vertical, central, longitudinal sectional view on the line 3—3 of Figure 2 looking in the direction of the arrows, the levers associated with the journal being shown in full lines.

Figure 4 is a transverse sectional view on the line 4—4 of Figure 3 looking in the direction indicated by the arrows.

Figure 5 is a transverse sectional view on the line 5—5 of Figure 3 looking towards the right as designated by the arrows.

Figure 6 is an end view of the mixer and a sectional view of a portion of the casing on the line 6—6 of Figure 3.

Figure 7 is a top plan view of the mixer and the supporting ring.

Figure 8 is an enlarged detail view of the vaporizer, the parts being separated.

Figure 9 is an enlarged transverse sectional view of the vaporizer.

Figure 10 is a detail sectional view of the float chamber and valve mechanism on the line 10—10 of Figure 2.

Figure 11 is a plan view of one of the levers comprising the series of levers associated with the throttle.

Figure 12 is a similar view of the companion lever.

Figure 13 is a fragmentary sectional view of the series of levers on the line 13—13 of Figure 2.

Corresponding and like parts are referred to in the following description and designated in the several views of the drawings by like reference characters.

The casing for receiving the working parts is preferably of sectional formation as indicated most clearly in Figure 3 of the drawings. The sections are provided at their confronting edges with offstanding parts which are apertured to receive screws or other suitable fastenings. The body or casing includes chambers 1, 2 and 3 and passages connecting said chambers. The chambers 1 and 2 are connected by means of a passage 4. A passage 5 connects the chambers 1 and 3. The oil vaporizer is located in the chamber 3 and the mixer is located in the chamber 2. The chambers 2 and 3 are in direct communication. An outlet 6 leads from the chamber 2 and receives a butterfly valve 7 constituting the throttle for the engine, which is not shown inasmuch as, in itself, it forms no part of the invention. A pipe 8 connects with the outlet 6 to convey the gaseous mixture to the engine. The air inlet 9 is in direct communication with the chamber 1. A pipe 10 connects with one end of the chamber 1 and with a casing 10*a* coupled to the usual breather pipe 10*b* leading from the crank case of the engine. Valves 10*c* and 10*d* control the inlet and the outlet of the casing 10*a* and admit air into the engine crank case and the outflow of air and vapor therefrom to be drawn into the chamber 1 as will be understood. The pipe 10 obtains a snug fit in a bracket 11 applied to a side of the body. A plate 12 mounted upon the end of the pipe 10 closes the end of the chamber 1 and maintains a close joint between said chamber and the pipe 10. A cotter pin 13 is passed through the end of the pipe 10 and engages the inner side of the bracket 11 and retains said pipe in place. A plate 14 closes the opposite end of the chamber 1 and has an inner flange 15 which obtains a snug

bearing within the chamber 1 and to which is secured a lever 16. A valve 17, connected with or forming a part of the plate 14, normally closes the passage 5 and is movable across the inlet 9. A contractile spring 18 normally holds the lever 16 and valve 17 in predetermined position. A stop 19 projecting laterally from the body of the device coacts with a stop 20 of the lever 16 to limit the movement of the lever 16 and valve 17 in one direction against the tension of the spring 18. The lever 16 is adapted to be connected in any determinate way with a control element conveniently positioned within reach of the operator to admit of operating the valve 17 to regulate the flow from the chamber 1 into the passage 5.

A valve 21 within the chamber 1 controls the flow from said chamber to the chamber 2 and has a ring 22 at one end which obtains a snug fit within the chamber 1 and projects outwardly therefrom a short distance to receive a lever 23 which is fast thereto. A yoke 24 is connected to the ring 22 and a link 25 connects the yoke 24 with an eye 26 adjustably mounted in the plate 14. The levers 23 and 16 are formed at their inner ends with rings which are mounted upon the projecting ends of the parts 22 and 15 and engage the ends of the chamber 1 to preserve a close joint.

An adjustable stop 27 mounted upon the body or casing engages the lever 23 and determines the normal position of the valve 21.

The oil vaporizer is located within the chamber 3 and is of sectional formation, the sections being of similar form and readily separable. The top section of the vaporizer comprises a bar 28 and fingers 29 projecting laterally from the bar. The sides of the fingers 29 are oppositely inclined or beveled with the result that the spaces formed between adjacent fingers flare upwardly. An opening 30 extends throughout the length of the bar 28. The bottom section of the vaporizer includes a bar 31 and laterally extending fingers 32. The sides of the fingers 32 are oppositely beveled or inclined to form downwardly flaring spaces between adjacent fingers. The fingers 29 and 32 are of corresponding number and arrangement so that they register and the bars 28 and 31 are alined vertically when the upper section is imposed on the lower section. Longitudinal openings 33 and 34 are formed in the bar 31. The opening 33 extends entirely through the bar 31, whereas the opening 34 terminates short of one end of the bar and in its open end receives a bored plug, as shown in Fig. 4, so as to confine the liquid fuel. The fingers 32 are recessed in their top sides as indicated at 35. The fingers 29 extend over the recesses 35 and cover the same. When the sections of the vaporizer are assembled an exceedingly small space exists between their meeting faces whereby to provide an escape for the oil vapor. This is effected by rubbing a file over the faces of the fingers 29 and 32 to produce a roughened surface forming numerous striations or fine grooves for the escape of the vapor as indicated most clearly in Figure 8 of the drawings. Openings are formed in the terminal portions of the end fingers and receive cotter keys 36 which secure the sections when the vaporizer is assembled. An opening 37 is formed in the top portion of the bar 31 to establish communication between the opening 34 and the recess 35 of each of the fingers 32. A metal pin 38 extends across the opening 34 and rests upon the lower side of said opening. The pin 38 extends through the opening 37 and is of a less diameter to provide a space for the flow of the hydrocarbon from the opening 34 through the opening 37 into the recess 35. The pins 38 constrict the passage between the opening 34 and the recesses 35 and increase the surface from which heat may pass to the oil to effect vaporization. The pipe 39 connects with the opening 34 and supplies the volatile hydrocarbon thereto through the plug shown in Fig. 4 in the operation of the apparatus. A pipe 40 as clearly shown in Fig. 4 is fitted within each of the openings 30 and 33 and projects beyond opposite ends of the vaporizer and sides of the body or casing of the apparatus. A pipe 41 is coupled to the projecting ends of the pipes 40 as clearly shown in Fig. 4 and is adapted to conduct exhaust from the engine, as will be understood. A pipe 42 connects with the opposite ends of the pipes 40 to carry off the exhaust and discharge the same at any determinate point. The heat flowing through the pipes 40 raises the temperature of the vaporizer body sections and the parts thereof so that the fuel oil is readily and steadily vaporized.

The pipes for supplying the exhaust for heating the vaporizer are of a capacity to insure a comparatively free flow of the exhaust to heat the vaporizer to readily convert the hydrocarbon into vapor to mix readily with the air.

The mixer consists of a hollow body or shell of conical formation and of a length approximating the axial dimension of the chamber 2. The mixer is supported centrally within the chamber 2 by means of a plate 43 which is clamped between the sections of the vaporizer body or casing. The larger end of the mixer faces the outlet 6 and the smaller end faces the passage 4 to receive the inflowing air therefrom. In the illustrated construction, the body or shell of the mixer is of thin metal which is longitudinally fluted or crimped to provide passages 44 and 45 which taper throughout their length, the smaller ends being adjacent the smaller end of the body and the larger ends coinciding

with the larger end of the said body or shell. The passages 44 open outwardly whereas the passages 45 open inwardly. A baffle 46 is located at the larger end of the mixer and serves to arrest the inflow of the air entering the mixer by way of the passage 4 and deflect the same outwardly into the air passages 45. The space surrounding the mixer and formed between it and the outer wall of the chamber 2 is in communication with each of the passages 44 and with the chamber 3 to receive the gaseous mixture from the vaporizer. The passages 44 and 45 alternate and open into the rear end of the mixing chamber 2. The terminal portions of the walls separating the passages 44 and 45 are deflected laterally, as indicated at 47 in Figure 7 to deflect the outflowing air and mixture laterally to impart a swirling movement thereto to effect a thorough mixing so that a homogeneous gas results to be supplied to the engine to obtain an explosion of maximum force. The rear wall of the chamber 2 is constricted on a curved line, as indicated at 48 in Figure 3, thus gradually forcing the gaseous mixture inward across the paths of the outflowing currents of air from the passages 45. This results in a thorough mixing of the air with the mixture discharging from the passages 44.

The numeral 49 designates a float chamber with which the pipe 39 connects to convey the liquid hydrocarbon to the opening 34 of the vaporizer. The numeral 50 denotes a chamber which receives hydrocarbon from a suitable source of supply by means of a pipe 51. A needle valve 52 controls the flow from the chamber 50 into the chamber 49, said needle valve being controlled by means of a float 53 in the chamber 49 in a manner well understood in the art. These parts 49 and 50 may be of any determinate construction and are connected to the body or casing of the device by means of plates 54 one of which is extended to form the bracket 11, as indicated most clearly in Figure 5 of the drawings.

The stem 55 of the throttle valve 7 projects beyond the side of the outlet 6 and receives a lever 56 which is fast thereto. Two extensions 57 and 58 project from opposite sides of the pivotal end of the lever 56. A screw 59 is threaded through the extension 58 and constitutes an adjustable stop, whereas the extension 57 constitutes a non-adjustable stop. A pin 60 projecting from the body coacts with the stops 57 and 59 to limit the movements of the lever 56 and the throttle 7. A boss 61 at the outer end of the lever 56 is adapted to receive a suitable connection provided between said lever and conveniently positioned for ready access. A lever 62 is placed upon the lever 56 and is connected thereto by means of a screw 63. The outer end of the lever 62 is notched to obtain a snug fit against the boss 61 thereby preventing any movement of the lever 62 independently of the lever 56. The lever 62 is of elbow formation and has a curved slot 65 formed in an end portion to receive a stud 66 of a lever 67 supported upon the lever 62. The inner end of the lever 67 is formed with a slot 68 which slidingly engages the stud 64 of the lever 62. The stud 64 is in line with the stem 55 and pivotal movement of the lever 56 causes a corresponding movement of the lever 62 but the slotted end of the lever 62 coacting with the stud 66 of the lever 67 imparts a combined longitudinal and pivotal movement to said lever 67. A coiled spring 69 is connected at one end to the screw 63 and at its opposite end to a pin 70 at the outer end of the lever 67. The spring 69 serves to normally hold the lever 67 at the limit of its outward movement and incidentally reacts on the levers 56 and 62. A plate 71 is pivotally mounted upon the lever 67 through the instrumentality of the pin 70 and is adjustable angularly by means of a screw 72 threaded into the lever 67 and engageable with one of a series of openings 73 formed in the plate 71 concentric with the pin 70. The numeral 74 designates a turn buckle connection which is interposed between the plate 71 and the lever 23. A link 75 forms a universal joint between the turn buckle connection 74 and the plate 71. A link 76 provides a universal joint between the turn buckle connection 74 and the lever 23 and is attachable on said lever as indicated most clearly in Figures 1 and 3 of the drawings. A pin 77 engages the link 76 and is insertable in one of a series of openings 78 formed in the length of the lever 23.

In operation, the screw 59 is adjusted to prevent a complete closing of the valve 7 whereby to permit idling when required. When starting the engine, the valve 17 is partly open and the valve 21 is closed. After th engine has started, valve 17 is opened to admit the proper mixture into the engine. After the engine has warmed up sufficiently to run free, the valve 21 is opened to admit of a proper mixture being supplied to the engine. The throttle may be opened to a certain extent without moving the valve 21, and beyond the given point the valves 7 and 21 move together. This results from the system of levers and the turn buckle connection between the valves 7 and 21 referred to in detail hereinbefore. The body or casing comprises the sections 79 and 80 which are preferably cast and are secured when assembled by screws or like fastenings passing through off standing parts such as ears and flanges. The inlet 9, outlet 6, chambers 1 and 2 and the passage 4 are in line, as shown most clearly in Figure 3 of the drawings. The chamber 3 and passage 5 are located below the chambers 1 and 2, thereby admitting of the vaporizer and the float chamber occupying a

position below a straight line connecting the inlet 9 and outlet 6.

The stop 27 may be adjusted to properly limit the throw of the lever 23 and prevent its overthrow, when the throttle 7 is operated by a quick movement or jerk of the throttle lever, through wear and looseness of turnbuckle joints and lever connections, and which would result in opening valve 21 too far.

Throttle valve 7 and valve 21 are adjusted so that throttle valve 7, with screw 59 against stop 60, is slightly open for idle running. Valve 21 then laps over port or passage 4. A further movement of throttle valve 7 of $\frac{1}{16}$ of an inch, then valve 21 commences to open, but at a greater rate of speed than throttle valve 7. When the throttle valve 7 has uncovered one-half of the bore of the outlet 6, valve 21, is wide open and lever 23 is against stop 27 or valve 21 is wide open when throttle valve 7 is half open.

Through the levers 62, 67, the throttle valve 7 can be opened from half to full opening without any further movement of valve 21. Once this adjustment is made between throttle valve 7 and valve 21, it is fixed.

Having thus described the invention, I claim:

1. An oil vaporizing apparatus comprising a body having a vaporizing chamber therein, a vaporizing body in said chamber, a series of upper and lower fingers projecting laterally from the vaporizing body, the lower fingers having oil receiving and holding recesses in their upper sides and the sides of all the fingers being beveled to define upwardly and downwardly flaring passages between adjacent fingers in the respective series, the upper fingers covering the respective lower fingers, and means for heating the vaporizer body.

2. An oil vaporizing apparatus comprising a body having a vaporizing chamber, a vaporizing body in said chamber, spaced fingers projecting laterally from the body and having oil holding recesses in their upper sides, and heating means disposed about and over the fingers and providing an outlet from the recesses for the escape of vapor, said vaporizing body having an oil passage which is disposed below and in communication with the recesses in the several fingers.

3. An oil vaporizing apparatus comprising a vaporizing body, spaced fingers projecting laterally from the body and having oil holding recesses in their upper sides, a heating member extending over the fingers and arranged to provide an outlet for the escape of vapor from the oil in the recesses, said body having a passage which is below and in communication with the recesses in the several fingers, and metal pins rising from the bottom of and extending across said passage and into the recesses of the respective fingers to convey fuel to the recesses.

4. An oil vaporizing apparatus comprising a vaporizing body having vertically spaced heat passages therethrough and an intermediate elongated oil chamber parallel with the heat passages, upper and lower series of spaced fingers projecting laterally from opposite sides of the body, the lower fingers being covered by the upper fingers and having oil holding recesses in their upper sides in communication with the oil chamber, there being an outlet for the escape of vapor between the upper and lower fingers, and metal pins extending across the oil passages and through the recesses of the fingers.

5. An oil vaporizing apparatus comprising a body having an air chamber open at one end to the outer air, a mixing chamber in direct communication with the air chamber at one side and having an outlet at the opposite side, a vaporizing chamber disposed at one side of the air and mixing chambers and in direct communication at its respective ends with said chambers, rocking cut-off valves in the air chamber having a common axis at an angle to the mixing and vaporizing chambers, one of said valves controlling flow to the mixing chamber and the other valve controlling flow to the vaporizing chamber, means for setting said valves, a vaporizer in the vaporizing chamber, means for heating the vaporizer, and means for supplying oil to the vaporizer.

6. An oil vaporizing apparatus comprising a vaporizing body consisting of upper and lower bars each having a heat passage extending longitudinally therethrough, the lower bar having an oil receiving passage above the heat passage therein and extending parallel with the heat passage, and series of laterally projecting fingers on opposite sides of both bars, the fingers on the upper bar covering the fingers on the lower bar and the fingers on the lower bar having oil holding recesses in their upper sides in communication with the oil passage in the bar, the oil passage being closed at its ends and the closure at one end being formed to admit oil to the passage.

In testimony whereof I affix my signature.

CHARLES E. BAILEY. [L. S.]