

No. 693,766.

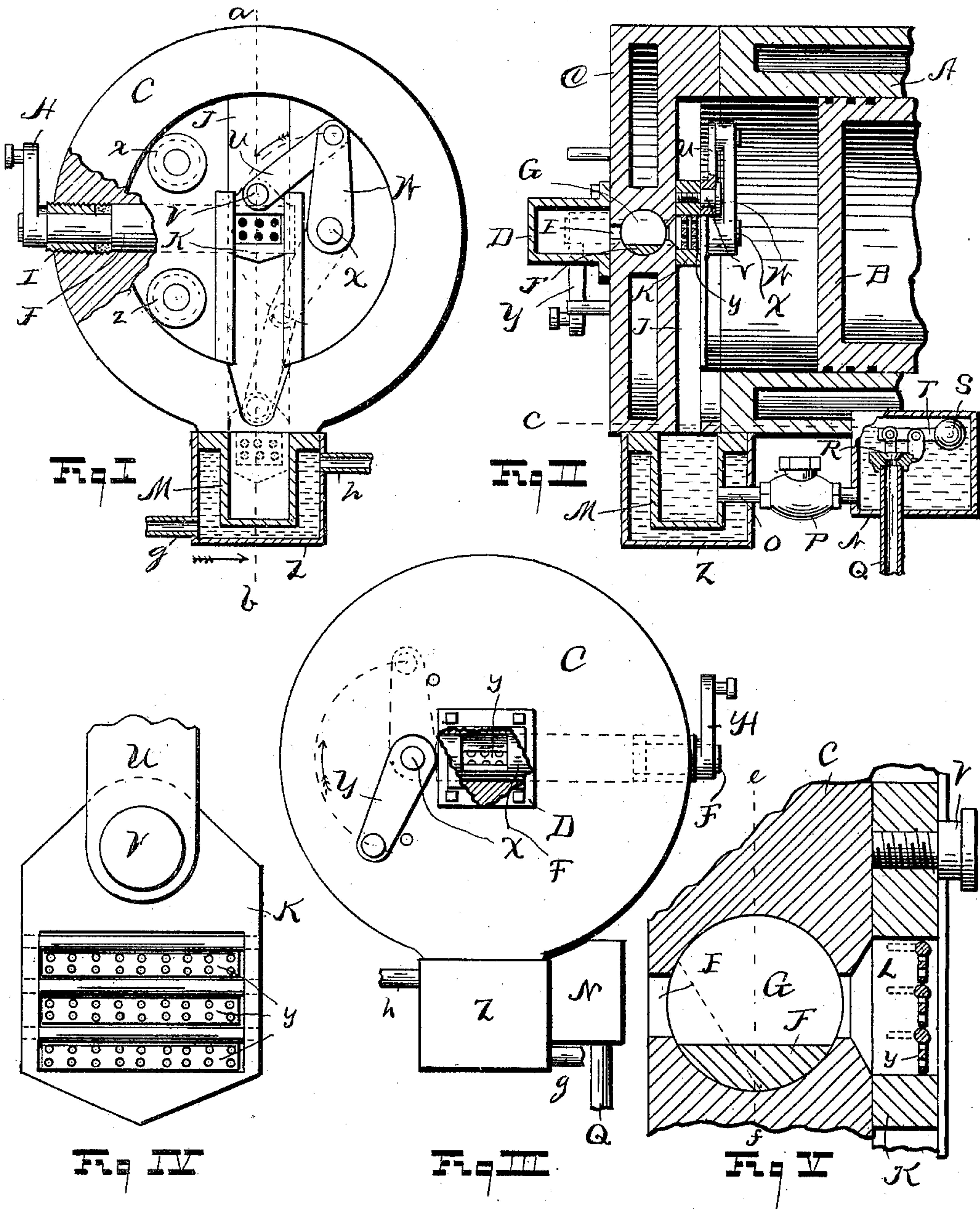
Patented Feb. 18, 1902.

G. J. WEBER.

APPARATUS FOR CONVERTING FUEL INTO POWER.

(Application filed Feb. 17, 1899.)

(No Model.)



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR CONVERTING FUEL INTO POWER.

SPECIFICATION forming part of Letters Patent No. 693,766, dated February 18, 1902.

Application filed February 17, 1899. Serial No. 705,769. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE J. WEBER, a citizen of the United States of America, residing in Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Apparatus for Converting Fuel into Power, of which the following is a specification, reference being had to the accompanying drawings.

10 My invention relates to improvements in gas-engines of the class operated by the use of oil, gasolene, or carbon in comminuted form.

The object of my invention is to provide a gas-engine having a cylinder and means for 15 compressing air therein with a fuel-receptacle, means for conveying the fuel into the cylinder, a vaporizing-chamber normally disconnected with the cylinder, but adapted to be connected therewith, means by which the 20 compressed air in the cylinder forces the fuel into the vaporizing-chamber in a finely-divided state, and means for igniting the mixed air and fuel.

My invention provides, further, a gas-engine provided with a cylinder, means for 25 compressing air therein, a fuel-receptacle, a dipper which alternately enters the fuel-receptacle and the cylinder for conveying the fuel from the receptacle into the cylinder, a vaporizing-chamber, a passage connecting the 30 vaporizing-chamber with the cylinder, and means for opening and closing the said passage.

My invention consists, further, in providing 35 a gas-engine having the ordinary cylinder and piston with a fuel-receptacle adapted to receive a device therein which will take up some of the fuel contained in the receptacle and transfer it into the cylinder in which air has 40 been compressed, means being also provided by which the fuel is suddenly thrown into a finely-divided state in contact with the compressed air.

My invention provides, further, means by 45 which the air which has been compressed in the cylinder is permitted to suddenly expand in contact with fuel which has been introduced into the cylinder from a fuel-receptacle by means of a dipper which alternately 50 enters the cylinder and the fuel-receptacle.

My invention provides, still further, means by which the fuel in the receptacle therefor

is kept at a certain predetermined degree of heat. By thus regulating the temperature of the fuel it is prevented from becoming too 55 heated and "flashing" before the proper time. By having the fuel-dipper enter directly into the cylinder from the fuel-receptacle the oil or other fuel is subjected to a high degree of heat during and prior to the expulsion of the 60 fuel from the dipper. At the same time the dipper imparts heat by conduction to the fuel held in the receptacle, inasmuch as the dipper is highly heated by its entrance into the cylinder. 65

My invention provides, further, certain novel features of construction in gas-engines hereinafter fully described and claimed.

In the accompanying drawings, illustrative of my invention, Figure I represents an inner elevation view of the cylinder-head with the fuel receptacle or well shown in vertical section, a portion of the head being broken 70 away. In this view the dipper is shown in the elevated position in solid lines and in the lower position in dotted lines. Fig. II represents a vertical sectional view taken on the dotted line *a b* of Fig. I looking in the direction indicated by the arrow, the dipper being shown in the elevated position and a portion 80 of the fuel-regulating chamber being shown in section. Fig. III represents an end view of the cylinder-head, a portion of the same and the vaporizing-chamber being broken away in order to show a portion of the valve 85 which controls the passage leading from the cylinder to the vaporizing-chamber. Fig. IV represents a front elevation view of the dipper provided with swinging perforated vaporizing-plates. Fig. V represents a vertical 90 sectional view of a portion of the head containing the passage leading therethrough from the cylinder to the vaporizing-chamber. In this view the dipper is shown in position before the said passage, the valve controlling 95 the passage being shown in the open position, the oblique dotted line indicating the position of the valve when in the closed position. The dotted line *e f* of this figure indicates the line on which the portion shown in section in Fig. 100 III is taken.

Similar letters of reference indicate similar parts.

A indicates the cylinder, B the piston, and



C the cylinder-head, of a gas-engine of the four-cycle type—that is, of the type in which the mechanism is arranged so that during one instroke there is compression in the cylinder, the next stroke out being the power-stroke, the next stroke in the exhaust-stroke, and the next outstroke the one in which air is taken into the cylinder. Upon the outside of the cylinder-head, centrally located thereon, is a vaporizing or igniting chamber D of any convenient form, connected with the interior of the cylinder through the head by means of a passage E, which is opened or closed by means of a rotary or a rock valve F, disposed transversely in the cylinder-head and comprising, preferably, a cylindrical shaft provided with a notch G, adapted to aline with the passage E, and provided at its outer end with a crank-arm H, by means of which the valve-shaft F is rotated or rocked so as to open or close the passage E. The chamber D may have, as shown in the drawings, the form of a rectangular body with an open end adjacent to the head of the cylinder. Encircling the shaft G near its outer end is mounted a sleeve I, the periphery of which is provided with a screw-thread adapted to fit the screw-threaded inner periphery of the opening in the cylinder-head in which the shaft F is rotatably fitted. The sleeve I serves as a packing-sleeve, between the inner end of which and a shoulder on the shaft F is placed packing material serving to seal the bearing against gas leakage. Across the passage E in the head C is provided a vertical groove J, in which is reciprocally mounted a dipper K, provided, preferably, with a transverse opening therethrough (indicated by L) adapted when the dipper is at its upper position to be in alinement with the passage E below the cylinder A, and connected internally therewith is a fuel receptacle or well M, inclosed on all sides but the top, which is connected with the interior of the cylinder through the groove J. The fuel-well is adapted to contain any desirable form of fuel, such as oil, gasoline, or carbon in the form of an impalpable powder. When used to hold oil or gasoline, it is connected with a regulating-tank N by means of a pipe O, in which is provided any of the common forms of check-valves to prevent the backflow of the oil. This check-valve is indicated by P. The regulating-tank is fed through a pipe Q, the upper end of which is connected with a fuel-supply tank located above the tank N, so that the oil will flow through the pipe Q into the tank N by gravity. The pipe Q within the tank N is provided with a valve R, which opens or closes through the intermediacy of a float S, connected with the valve R by means of a lever T, pivotally supported within the tank N and preferably upon the pipe Q, as shown. The dipper K is reciprocated vertically in the groove J by means of a link U, one end of which is pivotally connected with the dipper through the intermediacy of a pin

or bolt V, secured to the body of the dipper, and the other end being pivotally secured to the outer end of a crank-arm W, secured to the inner end of a rock-shaft X, rotatably mounted in a bearing provided through the cylinder-head C. The rock-shaft X may be packed in its bearing in a manner similar to that shown with reference to the shaft F. The outer end of the shaft X is provided with a crank-arm Y, by means of which the shaft is rocked. Any desirable mechanism may be employed to rock the shafts F or X at the proper times. The dipper K in its downward stroke enters the fuel-receptacle M. The dipper is provided in the opening L with one or more plates *y*, preferably provided with perforations, recesses, or other interstices, in which fuel from the well or receptacle M is carried by adhesion. These plates *y* are preferably disposed perpendicularly to the axis of the opening L, so that air passing through will pass through the perforations in the said plates, and thus better absorb the oil carried therein. In Fig. V, I have shown the perforated plates *y* as hinged in the opening L. This construction permits the sudden passage into or out of the vaporizing-chamber D without too great resistance. Surrounding the fuel-well M is a jacket Z, between which and the outer wall of the receptacle M is a space adapted to contain water to regulate the temperature of the fuel. Water is circulated therein through the pipes *g* and *h*, connected to any suitable water-supply.

*x* and *z* indicate, respectively, the air-valve and the exhaust-valve, which may be located in any suitable position with respect to the cylinder. Suitable ports lead therefrom, and any of the well-known means of operating the said valves at the proper times may be employed.

The following is a description of the operation of the mechanism illustrated as a means of carrying my process into effect. When the piston B is on its outstroke, the air-valve *x* opens, permitting the cylinder to fill with air. At the end of the said stroke the valve *x* closes, and the air within the cylinder is compressed on the instroke. When the instroke has been about completed, the dipper K will be in the raised position, with its opening L in alinement with the passage E. At this time the crank-arm H is rocked, thus opening the valve F, controlling the passage E, when a portion of the compressed air in the cylinder suddenly rushes through the opening in the dipper K past the plates *y* into the vaporizing-chamber D. The dipper K, having previously been inserted into the fuel-receptacle M, is covered by adhesion with fuel therefrom. The sudden passage of a portion of the compressed air from the cylinder through the passage E causes it to impinge with great force against the fuel carried by the dipper, causing a disintegrating of the oil into a very finely-divided condition, in which form, mixed with the air, it passes into the vaporizing-



chamber, the walls of which are heated to the igniting temperature of the mixture or the interior of which is provided with an igniting device, such as are commonly used for such purposes, as an electric spark or an igniting-tube. The ignition of the portion of air expelled from the cylinder mixed with the fuel taken up from the dipper causes an explosion in the vaporizing-chamber and a discharge back therefrom of the gas through the passage E and the opening L of the dipper into the cylinder, igniting all the mixed fuel and air contained in the cylinder, and thus producing the power-stroke by forcing the piston outward. When the portion of the compressed air that passes into the vaporizer passes the dipper K, it takes up more fuel than needed for an explosive mixture. This excess of fuel on reëntering the cylinder combines with the remaining portion of the compressed air and being in a finely-divided condition and at a high temperature perfect combustion takes place, resulting in great efficiency in the engine. The fuel in the well M is heated to a point just below the flashing or vaporizing point through the intervention of the entrance therein of the heated dipper to the direct action of the heat from the combustion in the cylinder and to the heat communicated through the cylinder-wall to the fuel-receptacle wall. By regulating the flow of water around the fuel-well M the temperature may be regulated in the fuel at the proper point. The height of the fuel in the well M is kept at a given point by means of the check-valve P and the valve R. When the oil falls in the fuel-well M, oil will pass the check P through the pipe O into the fuel-well until it rises to a height level with the oil in the tank N. When the oil falls in the tank N, the float S will also fall, thus opening the valve R through the intermediacy of the lever T, and oil will flow through the pipe Q into the tank N until the float S rises, so as to close the valve R. The regulating of the height of the fuel in the receptacle M permits the immersion of the dipper K an equal amount each time it descends, thus regulating the amount of fuel taken up each time. While I have illustrated a system of valves, a float, and piping for regulating the height of fuel in the fuel-receptacle, it is obvious that other means may be employed for maintaining such regulation that would be included in my invention. In the use of the term "dipper" as applied to the member K and as employed in the claims I take it in its generic sense and do not restrict that portion of my invention to any particular contrivance, but intend to include any device such as will pick up fuel by insertion therein. The employment in dippers of the kind illustrated of perforated plates or similar devices is of minor importance and may be entirely dispensed with, their use being to facilitate the dispersion of the fuel upon subjecting it to the sudden air-blast, but not be-

ing essential to the successful operation of the dipper.

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

1. In a gas-engine, the combination with the cylinder, of a fuel-receptacle, means for heating the said receptacle, a cooling-jacket around the said receptacle, and a dipper adapted to alternately enter the fuel-receptacle and the cylinder, substantially as described.

2. In a gas-engine, the combination with the cylinder, of means for compressing air therein, a liquid-fuel receptacle, means for conveying the liquid fuel therefrom into the cylinder in a liquid form, a vaporizing-chamber normally disconnected but adapted to be connected with the cylinder, means by which the compressed air in the cylinder forces the liquid fuel into the vaporizing-chamber in a finely-divided state and means for igniting the mixed air and fuel, substantially as described.

3. In a gas-engine, the combination with the cylinder, of means for compressing air therein, a liquid-fuel receptacle, a dipper which alternately enters the fuel-receptacle and the cylinder for conveying the fuel from the receptacle into the cylinder in the liquid form, a vaporizing-chamber, a passage connecting the cylinder with the vaporizing-chamber across the path of the dipper, and means for opening and closing the said passage, substantially as described.

4. In a gas-engine, the combination with the cylinder, of means for compressing air therein, a liquid-fuel receptacle, means for conveying the fuel therefrom into the cylinder, a vaporizing-chamber, a passage connecting the cylinder with the vaporizing-chamber, a valve controlling the said passage, and means for igniting the mixed air and fuel, substantially as described.

5. In a gas-engine, the combination with the cylinder, of means for compressing air therein, a liquid-fuel receptacle, a dipper adapted to convey fuel from the receptacle into the cylinder, a vaporizing-chamber, a passage connecting the cylinder with the vaporizing-chamber, a valve controlling the said passage, and means for igniting the mixed air and fuel, substantially as described.

6. In a gas-engine, the combination with the cylinder, of means for compressing air therein, a vaporizing-chamber, a passage connecting the vaporizing-chamber with the cylinder, a fuel-receptacle, a dipper, means for reciprocating the dipper from the fuel-receptacle across the said passage, and a valve controlling the opening and closing of said passage, substantially as described.

7. In a gas-engine, the combination with the cylinder provided with suitable inlet and exhaust ports, of the piston, a fuel-receptacle, a dipper, means for moving the dipper alternately into the fuel-receptacle and the cylin-



der, a vaporizing-chamber adjacent to the cylinder, and means by which the vaporizing-chamber is connected with the cylinder when the dipper has reached the proper position  
5 in the cylinder, substantially as described.

8. In a gas-engine, the combination with the cylinder, of the piston, a vaporizing-chamber normally disconnected from the cylinder, means for connecting the cylinder with the  
10 vaporizing-chamber, for the passage of compressed air from one to the other, a dipper, means for placing the dipper in contact with the compressed air during such passage, a fuel-receptacle adapted to contain a fuel-  
15 supply and to receive the dipper therein, and means for maintaining the fuel-supply at a given level, substantially as described.

9. In a gas-engine, a fuel-dipper comprising a body provided with an opening there-  
20 through, and one or more swinging plates located in the said opening, substantially as described.

10. In a gas-engine, a fuel-dipper comprising a body provided with an opening there-  
25 through, and one or more hinged plates provided with interstices, substantially as described.

11. In a gas-engine, the combination with the cylinder, of a fuel-receptacle, a dipper re-  
30 ciprocally mounted in the cylinder and adapted to enter the fuel-receptacle, a rock-shaft provided with a crank-arm, a link connecting the dipper with the crank-arm, and means for rocking the shaft, substantially as  
35 described.

12. In a gas-engine, the combination with the cylinder, of a dipper reciprocally  
40 mounted in the cylinder, a rock-shaft, means for reciprocating the dipper when the shaft is rocked, substantially as described.

13. In a gas-engine, the combination with the cylinder-head provided on its inner face  
45 with ways, of a dipper reciprocally mounted in said ways, a vaporizing-chamber upon the outside of the head, a passage from the vaporizing-chamber to the path of the dip-  
50 per, a valve controlling said passage, a rock-shaft extending through the head and provided with an inner and an outer crank-arm, and a link connecting the dipper with the in-  
ner crank-arm, substantially as described.

14. In a gas-engine, the combination with the cylinder, of means for compressing air  
55 therein, means for bringing fuel into the cylinder, a vaporizing or igniting chamber located outside the cylinder, a passage connecting the cylinder and said vaporizing-chamber, and means by which a portion of the compressed  
60 air is allowed to escape from the cylinder through the said passage into the vaporizing-chamber, substantially as described.

15. In a gas-engine the combination with the cylinder, of means for compressing air  
65 therein, a vaporizing-chamber, a passage connecting the vaporizing-chamber with the cyl-

inder, means for opening and closing the said passage, a fuel-dipper provided with an opening therethrough for receiving the fuel, and means for moving the dipper in the cylinder  
70 so that the opening in the dipper may be brought in register with the said passage, substantially as described.

16. In a gas-engine, the combination with the cylinder, of means for compressing air  
75 therein, a vaporizing-chamber, a passage connecting the vaporizing-chamber with the cylinder, means for opening and closing the said passage, a fuel-dipper comprising a body pro-  
80 vided with an opening therethrough, one or more plates provided with interstices mounted in the said opening, and means for so moving the dipper as to bring the said opening in the  
dipper in register with the said passage, sub-  
stantially as described.

17. In a gas-engine, the combination with  
85 the cylinder, of means for compressing air therein, a vaporizing-chamber, a passage connecting the vaporizing-chamber with the cylinder, means for opening and closing the said  
90 passage, a fuel-dipper comprising a body provided with an opening therethrough, one or more swinging plates mounted in the said opening, and means for so moving the dipper  
as to bring the said opening in the dipper in  
register with the said passage, substantially  
95 as described.

18. In a gas-engine, the combination with the cylinder, of means for compressing air  
100 therein, a vaporizing-chamber, a passage connecting the said chamber with the cylinder, means for opening and closing the said pas-  
105 sage, a fuel-receptacle, a fuel-dipper comprising a body with an opening therethrough, a swinging plate mounted in the said opening, and means for so moving the dipper from the  
fuel-receptacle into the cylinder as to bring the said opening therein in register with the  
said passage, substantially as described.

19. In a gas-engine, the combination with the cylinder, of means for compressing air  
110 therein, a vaporizing-chamber, a passage connecting the said chamber with the cylinder, a valve controlling the said passage, a fuel-re-  
115 ceptacle, a fuel-dipper reciprocally mounted in the cylinder and adapted to enter the fuel-receptacle, the dipper being provided with an opening therethrough adapted to be  
brought into register with the said passage, and a perforated swinging plate mounted in  
120 the said opening and resting normally at right angles to the said opening, substantially as described.

In testimony whereof I have hereunto af-  
fixed my signature in presence of two wit-  
nesses.

GEORGE J. WEBER.

Witnesses:

WARREN D. HOUSE,  
JULIUS J. KARGES.