

Nov. 1, 1938.

L. B. KIMBALL
 MEANS FOR CONTROLLING THE SUPPLY OF SUPPLEMENTARY
 LIQUIDS TO POWER GENERATING DEVICES
 Original Filed July 28, 1936 2 Sheets-Sheet 1

2,135,431

Fig. 1.

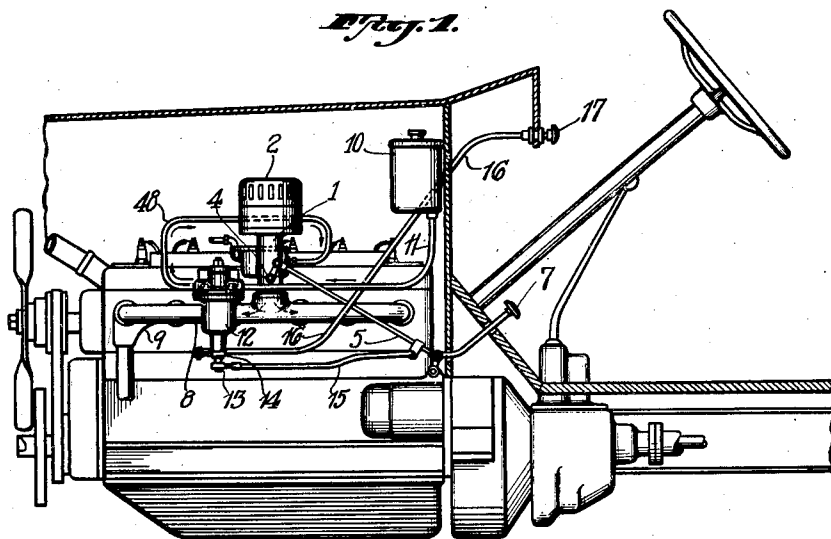


Fig. 2.

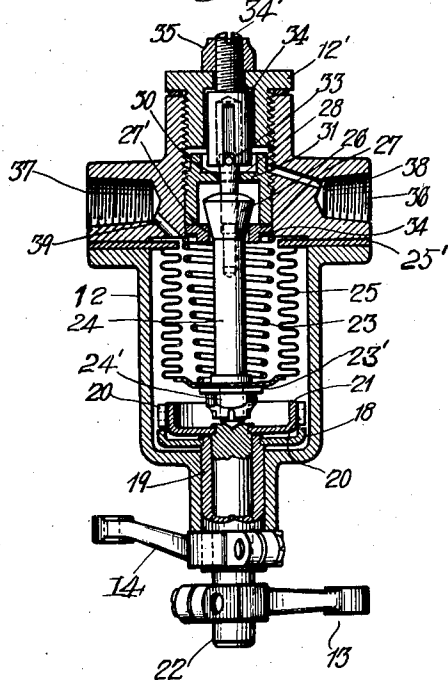
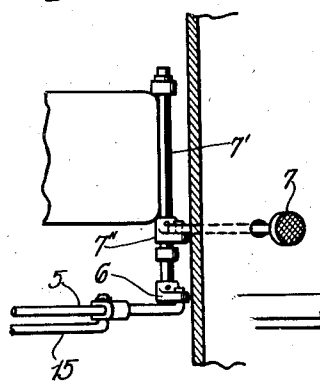


Fig. 3.



INVENTOR.
 LEO B. KIMBALL
 BY *Sheffield & Bett's*
 1938 ATTORNEYS.

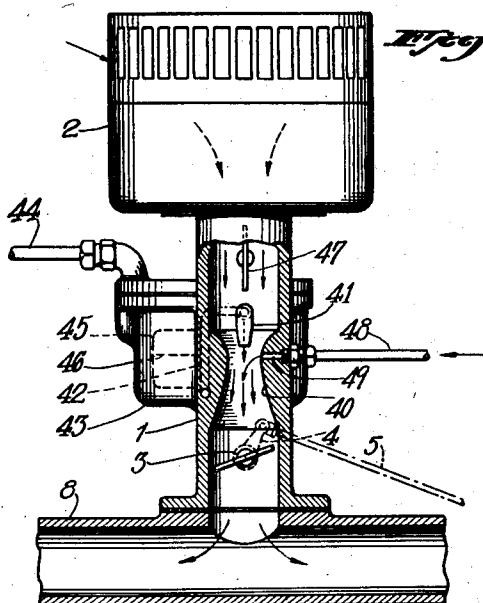
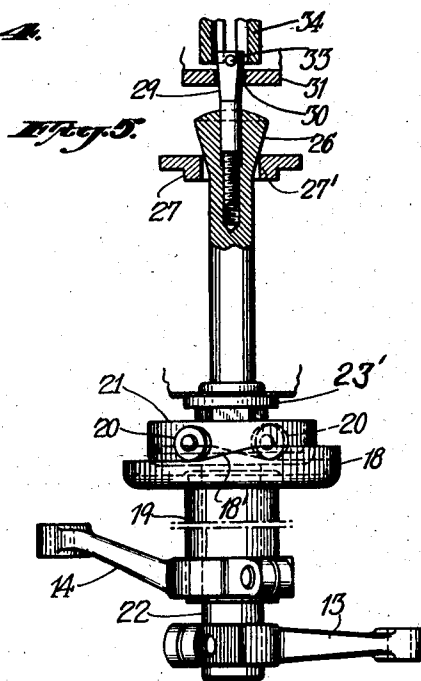
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MEANS FOR CONTROLLING THE SUPPLY OF SUPPLEMENTARY
LIQUIDS TO POWER GENERATING DEVICES

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INVENTOR.
LEO B. KIMBALL
BY *Sheffield & Butts*
HIS ATTORNEYS.

UNITED STATES PATENT OFFICE

2,135,431

MEANS FOR CONTROLLING THE SUPPLY OF
SUPPLEMENTARY LIQUIDS TO POWER
GENERATING DEVICESLeo B. Kimball, New Haven, Conn., assignor to
Fuel Development Corporation, a corporation
of DelawareApplication July 28, 1936, Serial No. 92,980
Renewed September 27, 1938

1 Claim. (Cl. 261—18)

This invention relates to the manipulation of valves that are useful for various purposes where it is necessary to supply some fractional part of a supplementary ingredient or liquid to a stream or current of some fluid or combustible mixture that may be used for any desired purpose, such as with liquid fuels supplied to internal combustion engines, as through the use of the well-known carburetor.

This invention is particularly applicable to the supply of liquids to the intake conduits or apparatus and to the control of the quantity and condition of fuels for driving internal combustion automobile engines or engines of similar nature.

The present invention is a development of the prior methods and apparatus for the fractional supply of fluids comprised in my prior United States Patent No. 1,974,071, granted September 18, 1934, and No. 1,974,072 of same date.

The present invention also may be used for the purpose of adding any suitable liquid to the intake passages of internal combustion engines such as automobile engines where it may be desired to add such liquids in certain proportions or at certain times during the operation of the engines, particularly under various atmospheric conditions and various degrees of power output.

For a detailed description of one form of the apparatus which has heretofore been found to be useful, reference may be had to the following specification and to the accompanying drawings forming a part thereof in which—

Fig. 1 is a schematic view in elevation of my improved apparatus showing how it is connected with an automobile engine for supplying liquid to the intake thereof;

Fig. 2 is a vertical sectional view of the valve used as a part of said apparatus and indicating the internal arrangement thereof;

Fig. 3 is a plan view of the means for connecting the accelerator button with the throttle valve;

Fig. 4 is a vertical sectional view of the carburetor of a modern automobile engine indicating how the tube for supplying liquid thereto is attached to the carburetor which includes a Venturi tube; and

Fig. 5 is a detailed view, in elevation, of the cam arrangement of Fig. 2.

Referring to Fig. 1 of the drawings, the numeral 1 indicates the carburetor for the automobile engine. This is indicated as being the modern so-called "down draft" carburetor which

is usually provided with a cylindrical portion 2 as an air cleaner. That contains finely divided or fibrous non-combustible material for filtering the air and extracting particles of dust and foreign matter therefrom. The numeral 3 indicates the outer end of the shaft of the throttle valve to which is attached a lever or crank arm 4 on the free end of which is pivoted one end of a rod 5 extending to the accelerator control arm 6 connected with the foot lever or accelerator button 7. 7' indicates a transverse shaft on one end of which the arm 6 is fixed (Fig. 3) and to which the button 7 is connected by the arm 7".

The numeral 8 indicates the intake manifold of the automobile engine and 9 the exhaust manifold thereof. The numeral 10 indicates a tank or reservoir adapted to contain the fluid being supplied to the engine and is provided with a pipe 11 leading to the control valve 12. Said control valve carries at its lower end as will hereinafter be described two arms or levers 13 and 14. The arm 13 is pivotally connected with the rod 15, the right-hand end of which is also connected with the rod 5 operated by the accelerator pedal or button 7. The arm 14 is connected with the wire or flexible shaft 16 which runs to the dash of the automobile as indicated in Fig. 1, and terminates in a control button or knob 17 which may be manipulated by the operator of the car or engine to change the position of the arm 14 and the cam member 18 within the valve casing 12 (Fig. 2).

Referring now to the valve parts, the cam member 18 (Fig. 5) is carried on the end of a tubular member 19 to which the arm 14 is attached. An oscillation of the arm 14 will obviously change the position of the cam member 18 relative to the cam members or followers 20 projecting from the yoke or similar support 21. The latter support 21 is carried on one end of the central shaft 22 to the outer end of which the arm 13 is attached. Resulting from this latter connection a movement of the rod 15 to oscillate the arm 13 will move the yoke or support 21 and rotate the cam members or followers 20. The latter are located on the yoke or support 21 at diametrically opposite points so as to contact with two inclined portions 18' on the cam member 18, one of which is illustrated in Fig. 5. Bearing upon the washer 23', held in position by the nut 24' on the valve stem 24, is a helical compression spring 23 which is seated at its upper end on the casing. This spring is surrounded by a bellows 25, the lower

end of which also rests upon the washer 23' and the upper end is sealed to the bellows plate 25' which is adjacent the end of the spring 23. The valve stem 24 carries a tapering valve member 26 which is positioned to open or close an opening 27' in the member 27. The extending stud 28 which has screw-threaded connection with the valve member 26 is slightly tapering as at 29 and is adapted to oscillate within an opening 30 in the member 31 to cause a variable metering of the liquid passing through said opening 30.

The stud 28 extends upward and is provided with a rotating device which comprises a pin 33 and a slotted tube 34, the pin 33 being adapted to engage said slots in said tube 34. Said tube 34 has a screw-threaded projection 34' and is held in position by a nut or similar device 35 which allows the rotation of said tube but enables it to be fixed in position when the nut 35 is screwed up tightly on to the end portion 12' of the casing 12. That adjusting device is similar to the one described in my prior patents above noted.

The casing 12 is provided with an inlet (or outlet) passage 36 and an outlet (or inlet) passage 37. The passage 36 is connected with the space above the member 31 by a small drilled hole 38 and the outlet passage 37 is connected with the space below the member 27 by a small drilled hole 39.

Referring now to Fig. 4 which illustrates conventionally a form of carburetor for automobile engines, it will be noted that the outlet of the air cleaner 2 is connected with the main portion of the down draft carburetor. This carburetor is provided with the venturi or restricted portion 40 and with the gasoline injector tube 41 which leads through the passage 42 connected with the interior of the carburetor float valve chamber 43. This chamber has an inlet pipe 44 running from the gasoline pump or other supply device and the admission into the float valve chamber 43 is controlled in the usual way, by the position of the float 45 so that the level of the gasoline remains substantially constant at 46. The numeral 47 indicates the choke valve which is normally connected with a knob (not shown) on the dash so that the choke valve may be used in starting the engine. The numeral 3 above referred to, indicates the throttle valve which, as above stated, is connected with a crank arm 4 and a rod 5 which is connected with the accelerator or throttle valve control 7. The numeral 48 indicates a pipe running from the outlet of the control valve 12 as above referred to.

Referring now to the operation of this device, it will be seen that the Venturi tube portion 40 of the carburetor 1 produces the usual action in such tubes and causes a reduced lateral pressure or suction at the point where the pipe and connecting passage enters the same as at 49. The tube 41 supplies the necessary fuel for the combustible mixture which is produced within the carburetor above the throttle valve 3. The mix-

ture then flows to the intake manifold 8. When the throttle valve 3 is open to any considerable extent, the flow of the combustible mixture through the carburetor will be correspondingly rapid and according to hydraulic principles the reduced pressure or suction produced at the point 49 at the end of the passage or pipe 48 will vary in direct proportion thereto. This has the effect of drawing through the tube 48 from the valve 12 the anti-knock or other liquid that may be controlled by the operation of said valve. However, the exact amount of flow through said pipe 48 depends also upon the amount that the liquid is allowed to flow through the valve 12 by reason of the portion 26 and the metering portion 30 thereof. Since the said valves are controlled in two ways, that is, by the operation of the accelerator pedal or button 7 which moves the arm 13 and the cam member 18 and also by operation of the manually controlled button 17 at the dash which produces movements of the wire 16 and the arm 14 connected with the cam followers 20 on the support 21, the amount of liquid introduced into the Venturi portion of the carburetor at 49 depends not only upon the power output being developed by the engine, but also upon the conditions existing in the engine and upon the grade of fuel being used. Those factors may be compensated for by a movement of the button 17 which determines the range of power output over which the liquid is supplied in addition to the supply and metering of the liquid as controlled by the operation of the button 7.

It will be appreciated by one skilled in the art that other changes may be made in the apparatus without departing from the spirit and scope of my invention as defined by the appended claim.

What I claim and desire to protect by Letters Patent is:

Apparatus for controlling the supply of varying amounts of a supplementary liquid to the main stream of fuel-air mixtures flowing to a power generating device, such as an internal combustion engine, comprising a casing, valve members therein for respectively opening and closing, and also varying the amount of opening of, passages between the intake and outlet of said casing, said varying valve member being adjustable relative to said closing valve member, a flexible bellows-like separator within said casing, a spring within said separator for maintaining said valve members in inactive positions, and cam members, one of which consists of a cam having an inclined portion, and the other of which consists of a follower therefor, one of said members being adapted to be connected with a manually operated throttle control device, and the other member being adapted to be connected with an independent manually operated control member that determines the amounts of the supplementary liquid to be added to the fuel-air mixture passing to the power device.

LEO B. KIMBALL.