Dec. 29, 1931. H. W. LINKERT 1,838,421

DOWN DRAFT CARBURETOR

Filed July 11, 1929 2 Sheets-Sheet 1

Fig. 4

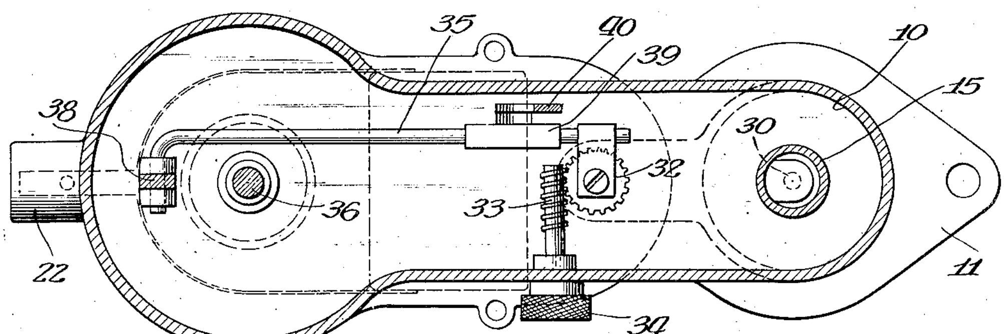


Fig. 3

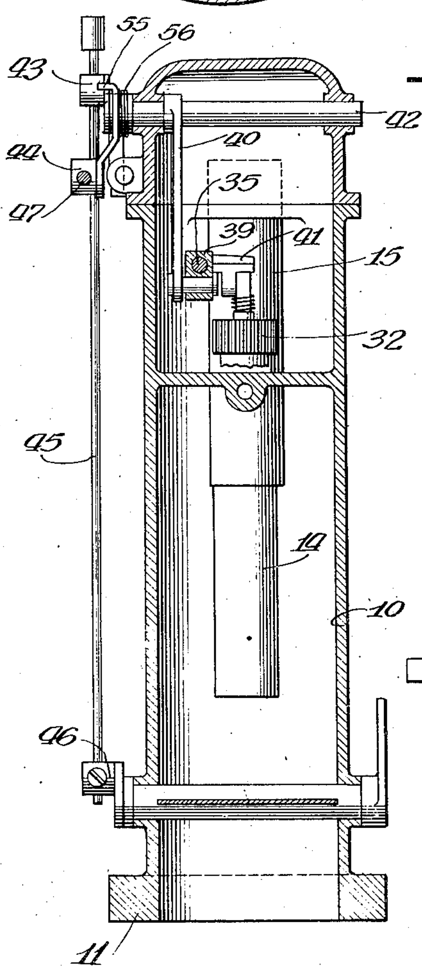
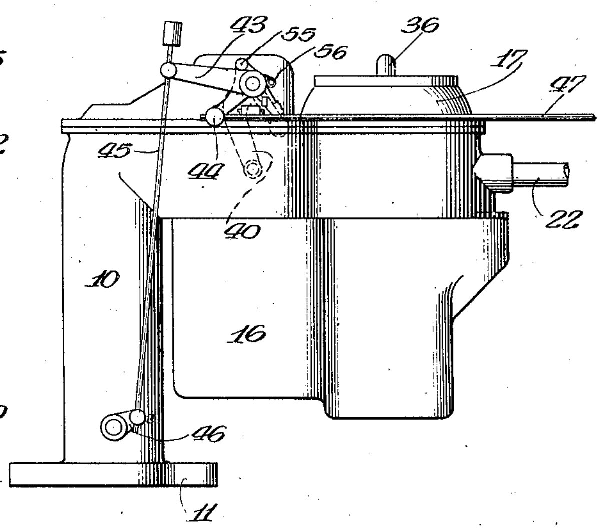


Fig. 1



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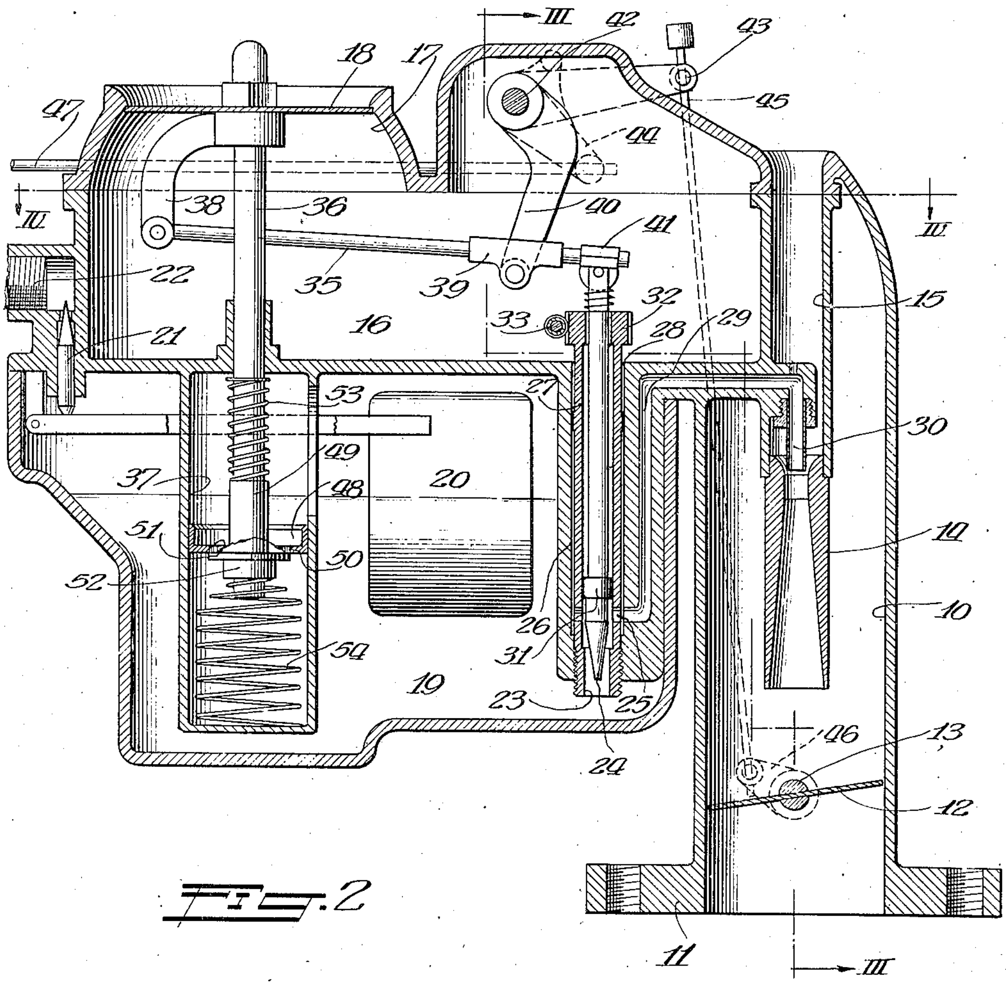

FIG. 2

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1,838,421

UNITED STATES PATENT OFFICE

HOWARD W. LINKERT, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE WHEELER-SCHEBLER CARBURETOR COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION OF INDIANA

DOWN DRAFT CARBURETOR

Application filed July 11, 1929. Serial No. 377,354.

This invention relates to down draft carburetors for internal combustion engines.

It is an object of this invention to provide a down draft carburetor of the air valve type that will provide a lean and economical mixture for a wide range of normal operating conditions, while having a richer mixture range for developing full power, together with means for enriching the mixture to assist in starting a cold engine. In order to provide a satisfactory lean and economical mixture for normal operating conditions, I provide a metered fuel supply to a downwardly opening nozzle together with an air bleed well into the fuel line between the metering orifice and the nozzle to assist in atomizing the fuel before it issues from the nozzle. The conventional up-draft carburetor and manifold allows fuel to collect on the riser and carburetor walls at low air velocities causing loading and lag upon acceleration. Thus, an up-draft carburetor is limited in size of air passages and riser diameter by the permissible value of the low air velocity. If too large a carburetor is used undue body loading results at low air velocities with consequent trouble in working out satisfactory accelerating properties. In a down-draft carburetor of the type of this invention no fuel can collect in disturbing quantities in the carburetor or the connecting tube to the manifold runners so that the carburetor and connecting tube will not load up, even with an enlarged carburetor. Thus, larger air passages and venturis may be used in the carburetor of this invention to increase the maximum speed and power output of the engine without decreasing the idling and accelerating performance thereof.

It is also an object of this invention to provide a simplified and improved down draft carburetor wherein an efficient automatic control of the fuel and air mixture ratio will be maintained under varying operating conditions.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a side elevation of a carburetor embodying the features of this invention.

Figure 2 is an enlarged longitudinal central section on a plane parallel to that of Figure 1.

Figure 3 is a vertical section on the line III—III of Figure 2.

Figure 4 is a horizontal section on the line IV—IV of Figure 2.

As shown on the drawings:

The carburetor of this invention comprises a vertically disposed mixing chamber 10 having a flanged bottom outlet 11, for attachment to the intake manifold, and containing the usual throttle valve 12 on a throttle shaft 13, as well as a central primary venturi 14 having a separate primary air inlet passage 15 leading thereto. The mixing chamber 10 has an auxiliary air inlet passage 16 connected thereto and having a formed auxiliary air valve seat or port 17 against which a disc type of auxiliary air valve 18 seats at low suctions.

A float bowl 19 is positioned beneath the auxiliary air inlet passage 16 and is provided with the usual float and lever 20 controlling a valve 21 in a fuel inlet connection 22. From the float bowl fuel is drawn through the passageway 23 past a tapered needle or fuel valve 24, and is controlled at the circular orifice formed between the top of the passageway 23 and the valve 24. It then passes through a drilled hole 25 into an annular well 26 formed between a sleeve 27, forming the passageway 23, and a vertical aperture 28 in the body 10. This well opens at its top into the floor of the inlet passage 16, forming an air bleed into the well, the sleeve having a fluted band in the well 26 to center the same while admitting air therepast. From the well 26 a passage 29 leads to a downwardly opening nozzle 30 located centrally of the throat of the primary venturi 14. The fuel valve 24 has a short cylindrical section 31 by which it is guided in the orifice.

The sleeve 27 is threaded into its aperture

28 and at its upper end is provided with a worm gear 32 engaged by a worm 33 having an external milled head 34 to form the idling or low speed adjustment. Turning the head 34 will thus screw the sleeve 27 up or down in the aperture 28 thus raising or lowering the seat for the fuel valve 24 and making the initial adjustment, and to a small extent the range, leaner or richer, respectively.

As the rate of flow of air through the carburetor is changed, the air and fuel should be kept in the proper proportions. This is done by having the air valve 18 controlling the amount of air entering the carburetor, aside from the small primary air supply, the fuel valve 24 controlling the fuel, and a proportioning lever 35 transmitting to the fuel valve a definite portion of the motion of the air valve, so that as the air flow increases, the fuel flow also increases in the proper proportion. The air valve 18 is mounted on a rod 36 extending into a dash pot 37. An arm 38 is secured between the valve and the rod, which arm is pivoted to one end of the lever 35. The lever passes through a trunnion block 39 slidable on the lever and in turn pivotally mounted on the end of an adjustable fulcrum arm 40. On the other end of the lever 35 is another sliding block 41 pivotally attached to the top of the fuel valve 24. Thus, as the air valve 18 moves, the proportioning lever 35 turns about the pivot of the trunnion block 39 and gives to the fuel valve a motion that is in proportion to that of the air valve.

The taper of the fuel valve and the form of the air valve seat are so chosen as to provide a substantially uniform fuel and air ratio suitable for best economy under conditions of normal operation. However, for maximum power a richer mixture is desirable and, in order to obtain this richer mixture at any point in the range, the fulcrum arm 40 is made adjustable to vary the proportioning effect of the lever 35. The arm 40 is fastened to a shaft 42 passing through the body to the outside. An arm 43 is fastened to this shaft on its outer end, this arm having a lost motion engagement with a rod 45 connected to a lever 46 on the throttle shaft in such a manner that the throttle operates the lever only when nearing full open position, in order to enrichen the mixture for full power. An arm 44 is loosely pivoted on the shaft and is provided with a projecting lug 55 engaging the arm. A spring 56 is coiled about the shaft and acts to hold the arm 43 against the lug 55 except when the rod 45 pulls the arm down. A rod 47 is linked to the arm 44, forming a dash enrichening control similar in effect to a choke control. The arm 43 is so arranged as to be depressed when the throttle is wide open or the choke control is pulled to the right, and the trunnion block 39 is thereby moved towards the air valve and in consequence the fuel valve is given a greater lift for a given motion of the air valve so that the mixture is thereby made richer. Similarly, the dash control acts through the rod 47 to turn the fulcrum arm 40 to shift the trunnion block towards the air valve to increase the lift of the fuel valve, and to even cause a considerable lift of such fuel valve while the air valve is on its seat, thus materially enrichening the mixture for starting purposes with a cold engine.

The dash pot 37 serves to keep the air valve from fluttering. The dash pot lies below the fuel level in the float chamber and is thus always full of fuel. A dash pot piston 48 is mounted on a sleeve 49 and is provided with passages 50 therethrough which are closed by a disc 51 on a shouldered nut 52 which engages the rod 36 but allows the disc to drop away slightly from the piston. The sleeve 49 is slidable on the air valve rod 36, but is normally held in fixed position against the nut by a spring 53 above the sleeve. The fluctuations in the suction of the engine tending to cause the air valve to flutter, are small in magnitude and the spring 53 is strong enough to resist them completely and force the piston to remain firmly in place and act as a solidly mounted piston. When the throttle is opened after coasting a very high manifold suction is suddenly imposed on the air valve, causing a very strong opening pull which is sufficient to overcome the initial load on the spring 53, thus compressing it and allowing the piston and sleeve to slide on the rod 36, allowing the air valve to drop as though the dash pot were omitted. A spring 54, beneath the piston, acts against the nut and rod 36 to return the air valve to its closed position upon closing of the throttle.

In the operation of this down draft carburetor the engine suction draws a primary air supply through the passage 15 and venturi 14 where the air picks up fuel from the nozzle 30. When the auxiliary air valve is closed the fuel passage at the valve 24 is greatly restricted so that the suction at the venturi draws both air and fuel from the well 26, whereas, when the air valve opens the fuel valve opens correspondingly so that sufficient fuel is supplied under all conditions while the air bleed limits the suction on the fuel metering valve thus permitting the use of an open nozzle of relatively large size. As previously described, the sleeve 27 is vertically adjustable to form the idling adjustment, while the leverage or fulcrum point is shiftable to vary the ratio between the fuel and air supply as the auxiliary air valve opens. The initial or base ratio of fuel to air is determined by the profile of the formed air valve seat 17 which is initially determined by a series of experiments to give proportions of fuel and air suitable for a given type and de-

sign of engine, as it has been found desirable to fit the carburetor to individual designs of engines to obtain the maximum possible performance throughout the operating range.

It will thus be seen that I have provided an improved down draft carburetor embodying a wide range of capacity with an independent control of the mixture ratio at different speeds and loads with a simple single fuel passage or nozzle.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore, do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. A down draft carburetor comprising a downwardly discharging throttle controlled mixture outlet passage, an inverted primary venturi positioned therein and having its own primary air supply passage, a fuel nozzle discharging into said venturi, a fuel metering valve supplying fuel to said nozzle, an air bleed fuel well interposed between said metering valve and said nozzle, an auxiliary air valve for admitting additional air to said mixture outlet passage, and means interconnecting said auxiliary air valve and said fuel metering valve to increase the delivery of the latter valve as the air valve opens.

2. A down draft carburetor comprising a downwardly discharging throttle controlled mixture outlet passage, an inverted primary venturi positioned therein and having its own primary air supply passage, a fuel nozzle discharging into said venturi, a fuel metering valve supplying fuel to said nozzle, an auxiliary air valve for admitting additional air to said mixture outlet passage, a proportioning mechanism interconnecting said fuel and air valves to vary the delivery of the fuel valve, means for varying the proportioning effect of said mechanism, and an air bleed fuel well interposed between said metering valve and said nozzle.

3. A down draft carburetor comprising a downwardly discharging throttle controlled mixture outlet passage, an inverted primary venturi positioned therein and having its own primary air supply passage, a fuel nozzle discharging into said venturi, a fuel metering valve supplying fuel to said nozzle, an auxiliary air valve for admitting additional air to said mixture outlet passage, a proportioning mechanism interconnecting said fuel and air valves to vary the delivery of the fuel valve, means interconnected to the throttle for varying the proportioning effect of said mechanism, and an air bleed fuel well interposed between said metering valve and said nozzle.

4. A down draft carburetor comprising an inverted primary venturi having a fuel nozzle therein, a valve for supplying fuel to said nozzle comprising an adjustable sleeve and a valve movable in said sleeve, said sleeve being so mounted as to form an open annular fuel well between said valve and said nozzle, an auxiliary air valve, and mechanism connecting said air valve to said fuel valve to proportionally vary the opening of said valves.

5. A down draft carburetor comprising an inverted primary venturi having a fuel nozzle therein, a valve for supplying fuel to said nozzle comprising an adjustable sleeve and a valve movable in said sleeve, said sleeve being so mounted as to form an open annular fuel well between said valve and said nozzle, an auxiliary air valve, mechanism connecting said air valve to said fuel valve to proportionally vary the opening of said valves, and means for varying the proportioning effect of said mechanism.

In testimony whereof I have hereunto subscribed my name at Indianapolis, Marion County, Indiana.

HOWARD W. LINKERT.