

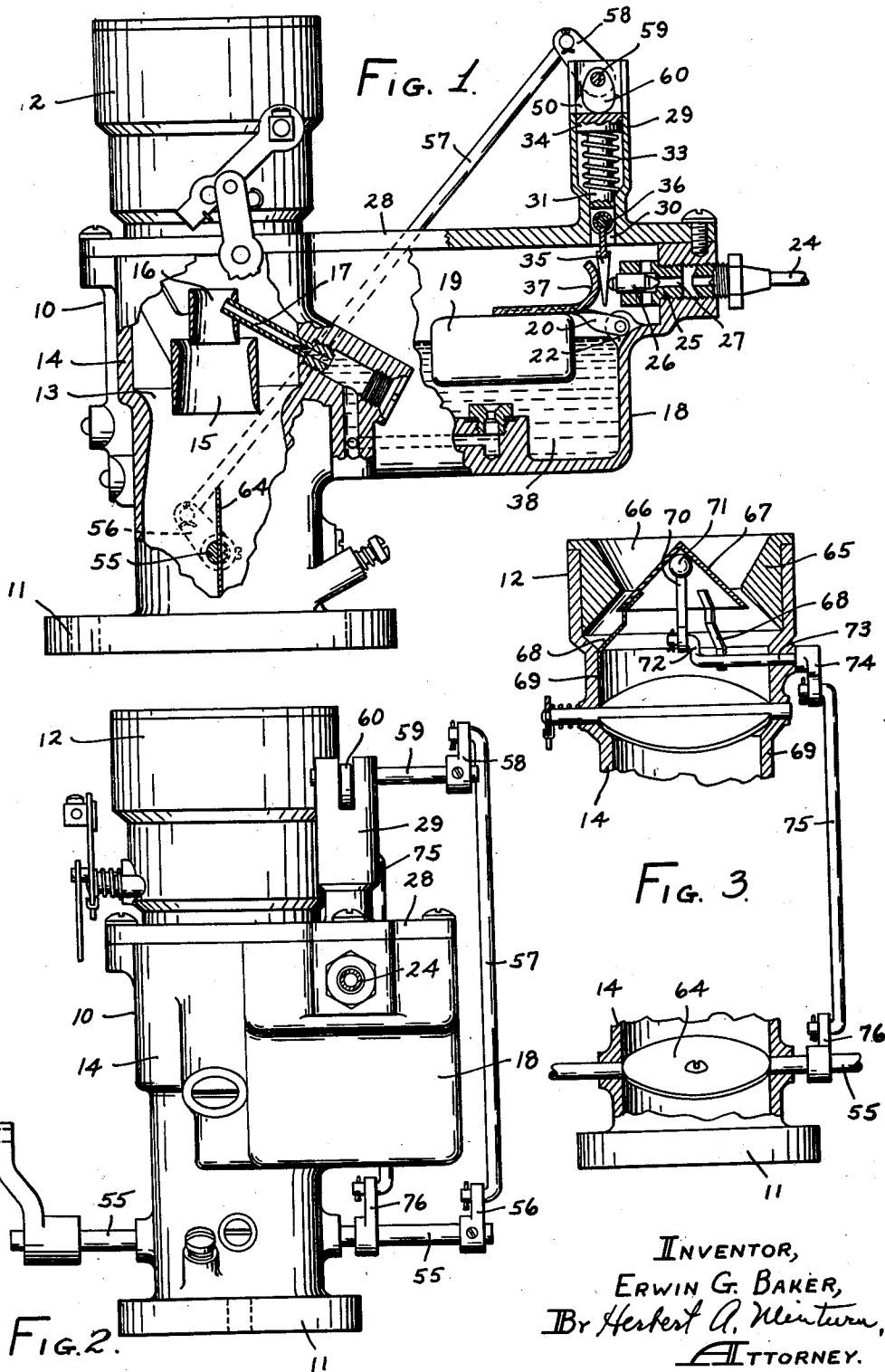
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AUTOMOTIVE CARBURETOR

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AUTOMOTIVE CARBURETOR

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This invention relates to a fuel carburetor of that type customarily employed upon automotive vehicles, and in particular automobiles and trucks.

A primary object of the invention is to increase greatly the mileage to be secured by the automobile on each gallon of fuel consumed. The invention is more particularly useful in the volatile type fuel such as the gasolines now being supplied to the trade.

A further important object of the invention is to provide an exceedingly simplified construction which will not interfere with the present installations of carburetors, and which may be applied to the carburetors without requiring any appreciable additional space under the hood, all without complicating controls or requiring any sensitive adjustments.

These and many other objects and advantages of the invention will become apparent to those skilled in the art in the following description of the invention as illustrated in the accompanying drawings, in which

Fig. 1 is a view in side elevation and partial section of a carburetor structure embodying the invention;

Fig. 2 is a view in end elevation; and

Fig. 3 is a diagrammatic view in vertical section of the control of the total air intake of the carburetor.

Referring to the drawings, the carburetor generally designated by the numeral 10 is herein shown as being of the down draft type wherein there is a bottom mounting flange 11 and a top air horn 12. In this form shown, there is employed the triple venturi within the carburetor 10, herein shown as the major Venturi throat 13 formed in the body 14, a Venturi tube 15 centrally entering that throat 13, and a smaller diameter Venturi tube 16 centered and entering the upper end of the tube 15.

The primary fuel jet 17 is herein shown as entering the upper tube 16 at the point of maximum vacuum, insofar as may be practical.

Then to the right of the body 14, is the usual fuel float chamber 18 wherein there is placed a float 19 rockably mounted through an arm 20 on an ear 22 carried by the chamber 18.

A fuel supply line 24 leads to discharge into the carburetor float chamber 18. It is to be understood of course that interposed in this line 24 is the usual fuel pump, not herein shown since it does not form a part of the invention per se. At one side of the float chamber 18 where the supply line 24 enters, there is provided a valve seat member 25 into which is guided a needle 26 from the inside of the chamber 18 as a means for opening and closing the passageway 27 through which the fuel must flow from the tube 24 into the chamber 18.

Mounted on the top cover 28 of the chamber 18

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is a vertically disposed chamber 29 having a cylindrical bore 30 at its lower end particularly wherein there is freely guided a rod 31. Normally this rod 31 is urged into an uppermost position.

There is suspended from the lower end of the rod 31 a wedge 35 which is free to rock toward and away from the inner end of the needle 26. This wedge 35 is rockably attached to the rod 31 by means of a pin 36.

The float 19 is provided with an upturned ear 37, Fig. 1, which is formed and shaped to present a cylindrical face against the wedge member 35 as the fuel 38 in the bowl 18 rises to near its normal level. When the fuel 38 reaches the predetermined level, this ear 37 will have pushed against the wedge member 35 to, in turn, push that member 35 against the end of the needle 26, so as to move the needle 26 into the closing off position to prevent further entrance of fuel into the chamber 18. By raising and lowering the wedge member 35 between the ear 37 and the needle 26, the level of the fuel 38 in the chamber 18 may be correspondingly controlled to vary within predetermined limits, depending upon the thickness of the wedge 35 and the angularity of its faces. In the position shown in Fig. 1, the wedge member 35 is in its upper most position, and correspondingly, the level of the fuel 38 is at its maximum possible level. As is the case in carburetor practice, the fuel level in the chamber 18 is transmitted to the same level within the jet 17.

It has been discovered by me that by varying this level in the jet 17, so that this level will be lowered with increasing engine speed, a very large saving in fuel is to be had.

A direct mechanical control of the float level is had from the carburetor throttle shaft 55 by means of a lever 56 fixed thereon, a connecting rod 57 leading from that lever 56 to an uppermost lever 58 which in turn is fixed to a rock shaft 59 which is secured diametrically across the upper end of the cylinder or chamber 29. On this rock shaft, there is mounted in a fixed manner a cam 60 so that by rocking the shaft 59, this cam 60 will bear against the head 34 of the rod 31 and push the rod 31 down as the cam 60 revolves thereagainst, and will also permit the rod 31 to lift by reason of the spring 33 pushing normally upwardly against the under side of the head 34. In operating the structure, when the throttle shaft 55 is turned to the open throttle position, then the cam 60 is in its lowermost position as is indicated in Fig. 1, that position being the lowermost position for the float 19.

Now in addition to controlling the level of the fuel within the float chamber 18, I also control the air entering the carburetor 10 through an air horn 12. Referring to Fig. 3, there is inserted in the upper end of the air horn a

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ring 65 which reduces the cross-sectional area in the zone 66 of the possible air flow through the air horn into the body 14. In other words the ring 65 produces a Venturi effect in regard to the flow of air therethrough. In order to vary in effect the opening through the ring 65 at the restricted zone 66, I mount a conical member 67 in any suitable manner so as to be reciprocable in that zone in vertical directions. In the present form, the cone 67 is guided by means of a number of legs 68 which drop down against the wall 69 of the carburetor body 14 to be freely slidable therealong.

The cone 67 is supported on the upper end of a post 70, herein shown as having a ball end 71 bearing in the apex of the cone 67, and connected rockably by its lower end to the crank arm 72 on the transverse shaft 73 which is rockably carried through the wall 69.

On the outer end of this shaft 73 there is fixed a lever 74, to which is rockably attached a connecting rod 75 leading downwardly to a lever 76 in turn fixed on the throttle valve shaft 55. Levers 74 and 76 are so mounted angularly around their respective shafts 73 and 55 that upon closing of the throttle valve 64, the cone 67 will be lifted toward the closing off position in the ring zone 66, although there must be left a space between that cone and the ring 65 for entrance of the minimum amount of air desired in the initial or "choking" operation.

In other words, the air flow through the ring 65 is directly affected by operation of the throttle valve 64. Not only is the air thus "metered" through the ring 65 by reason of its internal diameter in the restricted zone 66, but it is also further controlled in a variable manner by the lifting and dropping of the cone 67 in response to the demand for air as reflected by the position of the control throttle 64. Furthermore, this Venturi effect of air flow through the ring 65 sets a turbulence on down through the interior of the carburetor to greatly increase the picking up ability of that air flow of the gasoline or other fuel which is drawn outwardly from the jet 17 in the tube 16.

It is to be kept in mind, that at idling speeds with the throttle practically closed, the feeding of the fuel under the throttle is achieved primarily by a high degree of vacuum in the intake manifold to induce a fuel intake through a low speed jet. To the contrary, at higher speeds, at open throttle conditions, the fuel is not fed from below the throttle, but through the power jet spaced above the throttle, and the power jet discharge orifice is not affected by the presence or absence of vacuum in the intake manifold, but is affected by the rate of flow of air through the air horn to the intake manifold in order that the mixture of the air and fuel fill the cylinders. The faster the engine operates on an open throttle, of course the faster the air flows through the air horn, and consequently normally there is a greater amount of fuel taken from the power jet.

While it has been common practice to squirt an additional amount of gasoline into the carburetor air horn upon jamming the foot throttle pedal downwardly, by means of an auxiliary pump (not shown) or under the assumption of heavy loads on the engine, this practice being performed to prevent detonation, is not advised where it can be avoided. That practice is a great waster of fuel. It is now being avoided

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by many other different means not forming a part of this invention per se.

The throttle valve 64 is operated in the usual manner by rotating the shaft 55 from a normally closed position or engine idling condition as is indicated in Fig. 3, to the full open position as is indicated in Fig. 1. In rocking from the closed to the open positions, the shaft 55 also rocks the lever 56 secured thereon to shift the connecting rod 57, to, in turn, rock the lever 58 which is fixed on the shaft 59, thereby rotating the shaft 59 accordingly. The cam 60 which is fixed on the shaft 59, during that rotation of the shaft 59, progressively pushes down on the head 34 of the rod 31 against the resistance of the spring 33 to lower the wedge 35. In so doing, the thicker part of the wedge 35 to an increasing degree becomes interposed between the valve needle 26 and the float ear 37 so that, in downward travel of the wedge, the float 19 is increasingly lowered in seating the needle 26 on the valve seat member 25. The end result is that upon open throttle conditions, the float 19 is set lower in the chamber 18 than in closed throttle conditions to vary the fuel permissible heights in the chamber 18 accordingly.

Thus, the fuel height in the chamber 18 is progressively lowered as the throttle valve 26 is progressively opened.

This means, in operation of an automobile, that upon starting the engine, idling it, and driving the automobile at slow speeds, the fuel is largely fed through the low speed jet of the carburetor all in the usual and normal manner, this fuel feeding being under the influence of a relatively high intake manifold vacuum. Then as the throttle 26 is opened for increased engine speed, the air flow velocity through the horn 12 increases to cause the fuel to be injected from the nozzle 17 into the venturi 16.

At higher speeds, the rate of fuel injection from the jet 17 increases with the increased rate of air intake flow. But with my invention, the normal overfeed of fuel under this increasing injection is avoided. Thus the degree of vacuum set up in the discharge orifice of the jet 17 increases (pressure reduces) under the effect of the greater air velocity thereacross, and the float 19 becomes lowered to lower the level of the fuel in the jet 17 by farther throttle opening.

This action automatically compensates for change in speed of the automobile under driving conditions with the throttle 26 held constant after the automobile is brought up to that normal, level road driving speed desired. One of the essential features which I emphasized to secure the greatest possible fuel economy is that the operator's foot be kept steady on the throttle. For example, in approaching a hill, the foot throttle will not be pressed down any farther than it was in going on the horizontal road. If the car be traveling forty miles an hour when the foot of the incline is reached, the same foot pressure is maintained as the incline is ascended. Of course some speed will be lost, and possibly on steep grades the car will only be moving at possibly twenty miles per hour when the crest is reached, but on most of the hills encountered, that makes a tremendous difference in the amount of fuel not used. It is the sudden pushing down of the foot throttle which causes an oversupply of fuel, all of which is mostly wasted without any particular purpose.

If the automobile loses speed in climbing the

hill, the fuel use lowers, due to decreased air intake speed. Of course the size of the jet is predetermined for the desired average operating performance. It is well known that an automobile engine will continue to operate under heavy load at low speeds, with wide open throttle. An accelerating device such as a pump as above indicated is used when the throttle is suddenly opened.

The primary purpose of my invention is to decrease the heretofore normal increase of fuel flow from the high speed jet under increasing speed conditions. It is to be understood that there will be an increase, of course, in fuel flowing from the jet with increase in engine speed, but the rate of this increase will be reduced by dropping the float bowl fuel level with engine speed increase.

While I have herein shown and described my invention in the best form as now known to me, it is obvious that structural changes may be employed without departing from the spirit of the invention, and I therefore do not desire to be limited to the precise forms herein shown and described beyond those limitations which may be imposed by the following claims.

I claim:

1. In a carburetor having an air intake horn, a fuel float chamber, a float in the chamber, a valve needle operated by change in float level, and a throttle valve, the combination therewith of a member carried by the float normally bearing against said needle to hold it in closed off position at a predetermined fuel level; a cam entered between said needle and said float member; a reciprocable member carrying said cam; and connecting means between said throttle and said reciprocable member to shift said cam by throttle opening and closing; said cam being carried to be advanced between said float member and said needle from a thin section relative to the spacing between said float member and said needle to a relatively thicker section by opening of the throttle, to lower the float progressively upon progressive opening of said throttle.

2. In a carburetor having an air intake horn, a fuel float chamber, a float in the chamber, a valve needle operated by change in float level, and a throttle valve, a combination therewith of a member carried by the float normally bearing against said needle to hold it in closed valve position at a predetermined level; a wedge entered between said needle and said float member; a reciprocable member carrying said wedge spring means normally urging said reciprocable member in a direction tending to withdraw said wedge from between said needle and said float member; a link interconnecting with said reciprocable member and said throttle shiftable by opening and closing of the throttle; said wedge being presented by said reciprocable member to have the wedge progressively travel from a thin section to a thicker section between said needle and said float member upon opening of said throttle.

3. In a carburetor having a throttle valve, a float chamber, a fuel feed shut-off valve, a float operating to close the fuel feed valve at an upper limit of travel of the float to effect a predetermined level of the fuel in the chamber, the combination therewith of fuel economizing means comprising cam means interposed between said feed valve and said float setting the upper limit of travel of said float in respect to the closed

position of said feed valve, and a connecting means between said cam means and said throttle valve varying said float upper travel limit to have said limit at a lower level for open throttle valve than for closed throttle valve conditions.

4. In a carburetor having an air intake horn, a fuel float chamber, a float in the chamber, a valve needle operated by change in float level, and a throttle valve, the combination therewith of a member carried by the float normally bearing against said needle to hold it in closed off position at a predetermined fuel level; a cam entered between said needle and said float member; a reciprocable member carrying said cam; and connecting means between said throttle and said reciprocable member to shift said cam by throttle opening and closing; said cam being carried to be advanced between said float member and said needle from a thin section relative to the spacing between said float member and said needle to a relatively thicker section by opening of the throttle, to lower the float progressively upon progressive opening of said throttle; and means in said intake horn interconnecting with and operable by movement of said throttle controlling air flow therethrough in direct relation to raising and lowering of said float providing increasing air flow upon progressive lowering of said float.

5. In a carburetor having an air horn; a fuel injecting venturi; a throttle valve on one side of the venturi; a float chamber, a fuel feed shut-off valve; a float in said chamber operating upon rise of fuel therein to rise and close said valve at a predetermined fuel level; the combination therewith of a fuel economizing means comprising cam means interposed between said fuel valve and said float for variable positioning of the float in respect to a closed fuel valve condition thereby variably fixing the upper level limits of fuel in said chamber; connecting means between said cam means and said throttle valve to shift said cam means between the fuel valve and the float upon travel of the throttle valve, said cam means having a form to depress the float in respect to the closed fuel valve condition upon travel of the throttle valve toward its open position; an air control valve in said air horn on the side of said venturi removed from said throttle; and means operatively interconnecting the air valve with said throttle valve to have opening throttle valve travel produce opening air valve travel as said float is lowered.

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