May 23, 1961 F. JACOBUS 2,985,524

CARBURETOR ATTACHMENT

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FIG_1

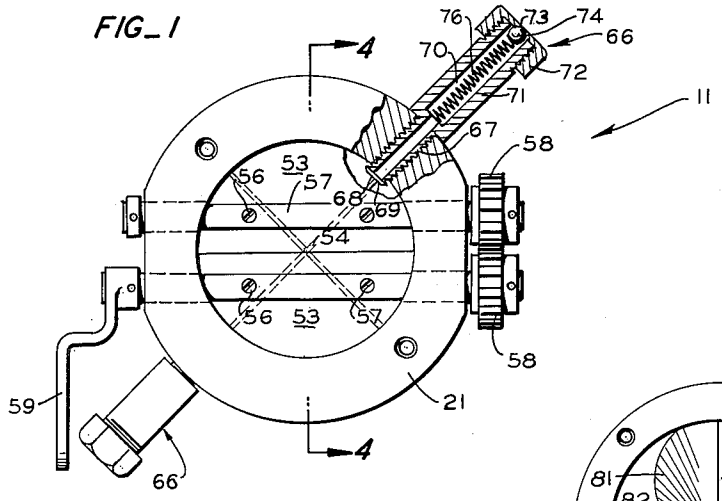

FIG_3

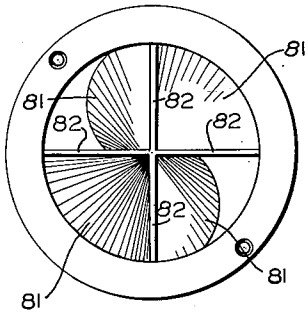

FIG_2

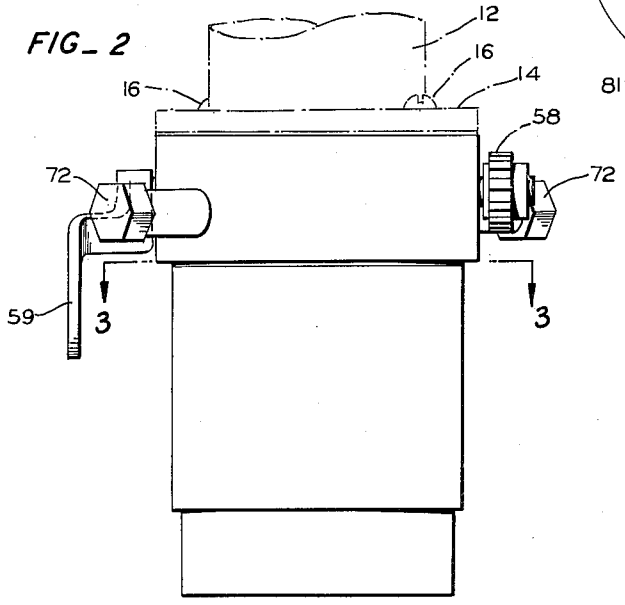

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FIG_ 4

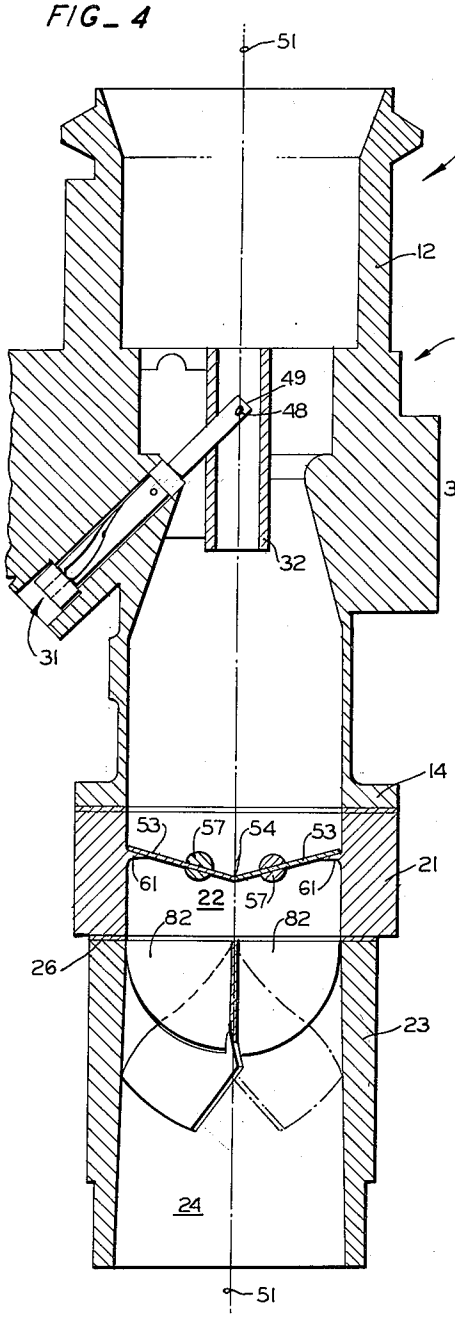
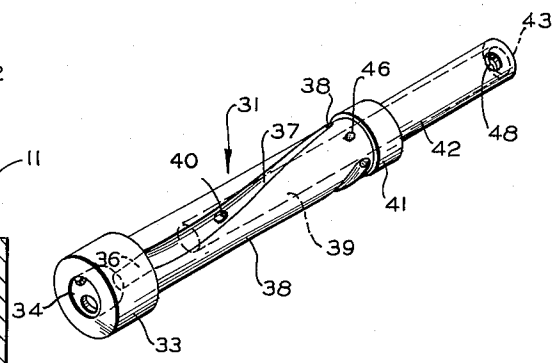


FIG_ 5



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United States Patent Office 2,985,524 Patented May 23, 1961

2,985,524

CARBURETOR ATTACHMENT

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Filed July 11, 1958, Ser. No. 747,949

1 Claim. (Cl. 48—180)

The invention relates to carburetors for internal combustion engines and, more particularly, to attachments for improving carburetor performance.

It is an object of the invention to provide a carburetor attachment which results in a saving of fuel.

It is another object of the invention to provide a carburetor attachment which effects a more complete and homogenous air-fuel mixture.

It is still another object of the invention to provide an attachment which is susceptible of use both with old and new carburetor installations.

It is yet another object of the invention to provide a carburetor attachment which is relatively economical and which has but few moving parts to get out of order, and which is therefore durable and long-lived.

It is another object of the invention to provide a generally improved carburetor attachment.

Other objects, together with the foregoing, are attained in the embodiment described in the following description and shown in the accompanying drawings in which:

Figure 1 is a plan view of the attachment, a portion of the device being shown in section to illustrate the structure of one of the auxiliary air valve members;

Figure 2 is an elevation, the lower portion of a carburetor barel being shown in outline;

Figure 3 is a section, the plane of section being indicated by the line 3—3 in Figure 2;

Figure 4 is a median vertical section of the attachment connected to the lower portion of a typical carburetor barrel, the throttle valve of the carburetor not being shown in order to simplify the figure; and

Figure 5 is a perspective of a fuel nozzle forming a part of the attachment of the invention.

While being susceptible of numerous physical embodiments depending on the environment and requirements of use, substantial numbers of the herein shown and described embodiment have been made and used and have performed in an eminently satisfactory manner.

The device of the invention, generally designated by the numeral 11, while susceptible of being formed integrally with the barrel 12 of a carburetor 13 of conventional make is, in the embodiment shown and described herein, appropriately secured to the flanges 14 on the lower end of the carburetor barrel, as by fastenings 16. In turn the attachment 11 is affixed, in any suitable manner, to the intake manifold (not shown).

The major components of the attachment include a collar 21 having a substantially uniform cylindrical interior bore 22 and a sleeve 23 having an interior bore 24 which diverges or expands in a downward direction. For convenience of manufacture the collar 21 and the sleeve 23 can be separately made, in which event a gasket 26 is interposed between the two members.

Cooperating functionally with the collar and sleeve and their attendant structure, although physically separated therefrom, is a nozzle 31 appropriately dimensioned

to replace the nozzle encountered in most carburetors of conventional make and which discharges into the customary vertical Venturi or comparable tube 32 centrally located in the carburetor barrel.

The nozzle 31 includes a base 33 having a close fit in the customary cylindrical nozzle bore in the carburetor casting. A recess 34 in the base receives fuel from the carburetor reservoir, the fuel passing forwardly and outwardly through a plurality of passageways 36 and discharging into a corresponding plurality of channels 37 helically formed on the exterior of a nozzle body 38. As the fuel proceeds along the helical channels 37, being substantially confined therein by the encompassing walls of the carburetor casting, the fuel mass acquires a transverse component of motion. Fuel which moves along in the channels 37 discharges inwardly through a plurality of ports 40 located in the channels and passes into an interior bore 39 in the nozzle, the bore continuing through and past an annular collar member 41 and through a stem portion 42 of reduced diameter, the bore 39 being open at the end 43. The encompassing wall of the carburetor casting is in snug fit not only with the base 33 but also with the collar portion 41. The encompassing casting wall is spaced from the exterior of the body 38, however, by a distance substantially equal to the thickness of the collar band 41. Consequently, a film or sheet of fuel moves forwardly over the outer surface of the body 38 and this quantity of fuel, which does not at this time acquire the helical motion of the fuel passing along in the channels 37, discharges through a plurality of ports 46 into the longitudinal bore 39 and moves along and mingles with the fuel from the channels 37 which has assumed a swirling motion. Both streams move toward the end 43 of the stem 42 and the combined flow is swirling or helical in pattern.

Instead of discharging through the end opening 43, however, the fuel passes downwardly through a pair of ports 48 formed in the hollow stem wall. Preferably the ports 48 are not diametrically disposed but are each displaced downwardly toward the bottom of the stem. Thus, as the air, which is moving rapidly downwardly through the tube 32, blows through the end opening 43, the air being scooped in, as it were, by the projecting lip 49 of the stem end, the air forces the fuel downwardly through the ports 48 and into the air stream. Since the fuel is previously in a swirling condition, the sudden blast of air forcing the fuel to change direction and to discharge from the ports 48 results in a highly effective dispersion or "atomization" of the fuel.

The dispersed fuel then moves downwardly in a pattern substantially concentric with the vertical axis 51 of the carburetor, the collar and the sleeve.

Helping generally to center the air-fuel mixture flow but serving to disperse it somewhat in a lateral direction is a pair of shutters 53, each being substantially semicircular in outline and in touching relation, in closed position, along a common or inner edge 54, or margin. Each of the shutters is mounted, as by fastenings 56, to a shaft 57 suitably journalled in the walls of the collar 21. The shafts 57 are in parallel relation and at one end are provided with a pair of meshing gears 58. Consequently, as one of the shafts is rotated in a predetermined direction and amount, as by a lever 59 suitably linked to the conventional throttle lever (not shown) of the carburetor, the other shaft rotates through the same arc in the opposite direction.

A pair of projecting lips 61 limit and support the outer margins of the shutters in closed position of the shutters and serve, as well, to deflect inwardly any fuel-air mixture impinging on the lips in open position of the shutters.

Mechanism is also provided for adding air to the mixture passing the shutters when the shutters are in their open or partially open attitude, as is customary in normal driving, and when the pressure within the attachment falls below a predetermined value. Diamertically disposed on opposite sides of the collar is a pair of auxiliary air valves **66** including a hollow threaded stem **67** projecting interiorly somewhat into the collar bore and forming an annular lip **68** which preferably is fish-tailed to some extent as by a horizontal diametral cut **69** in the lip **68** at right angles to the stem axis. The horizontal cut **69** in the stem lips permits the air emerging from each of the stems to spread in a lateral or fan-shaped manner. Air enters the stem through a central passageway **70** in a valve body **71** having mounted thereon a cap **72** with a central opening **73** covered in closed positions by a ball **74** urged against its seat by a spring **76**. When the outside air pressure exceeds the inside air pressure by a predetermined amount the ball unseats, the air bleeds in and disperses in a fan-shaped pattern from the valve stem lips **68**.

The air-fuel mixture passing down through the shutters is thoroughly intermixed with the entering auxiliary or mixture-leaning air owing to the provision of a plurality of swirl vanes **81**, the vanes originating at their upper ends in a plurality of vertical walls **82** and progressing downwardly in a substantially helical manner, forcing the air and the now well-dispersed fuel into a rather violent swirling flow. The lips **68** of the stem are preferably located so that as the auxiliary air streams fan out they are substantially symmetrically located on each side of and above any two of the vane walls **82**; thus, approximately equal portions of the auxiliary air issuing from each of the stems **67** flow into each of the underlying vane channels.

Upon emerging from the bottom of the vanes, the swirling mixture of fuel particles and air are even more thoroughly intermingled since the diverging bore **24** permits the mixture to expand. Additional fuel evaporation and more complete surrounding of fuel by air molecules is thereby effected. Consequently, when the mixture emerges from the bottom of the sleeve **23** and enters the intake manifold a highly homogeneous and thoroughly intermingled and dispersed fuel air mixture is obtained. The result is more efficient combustion which, when taken in conjunction with the somewhat leaner mixture provided during certain "normal" operating conditions, leads to substantially increased fuel mileage and smoother engine performance.

What is claimed is:

A carburetor attachment comprising: a substantially cylindrical collar mounted below a carburetor barrel, said collar defining a central vertical chamber adapted to receive and conduct downwardly the fuel and air mixture from said carburetor; a plurality of fixed swirl vanes mounted within and extending across said chamber, said vanes including a pair of vertical diametrical members each disposed at right angles to the other so as to form an X-shape in horizontal section, the bottoms of said swirl vanes being curved into a substantially helical configuration and extending downwardly below the bottom of said collar; a pair of spring-urged air inlet ball check valves extending from the atmosphere on the outside of said collar inwardly to said chamber, said check valves being formed on opposite sides of said collar and aligned on a diameter of said collar substantially coincident with the alignment of one of said pair of swirl vanes whereby the air entering said chamber from each of said valves is disposed immediately above the adjacent peripheral portion of one of said swirl vanes and whereby the air is thereby substantially equally divided between the channels defined by said swirl vanes; and a sleeve mounted below said collar, said sleeve having an interior vertical and downwardly diverging bore, said sleeve bore encompassing said helically configured portion of said swirl vanes whereby the air-fuel mixture emerging from said vanes is expanded as said air-fuel mixture passes through said sleeve.

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