

May 12, 1959

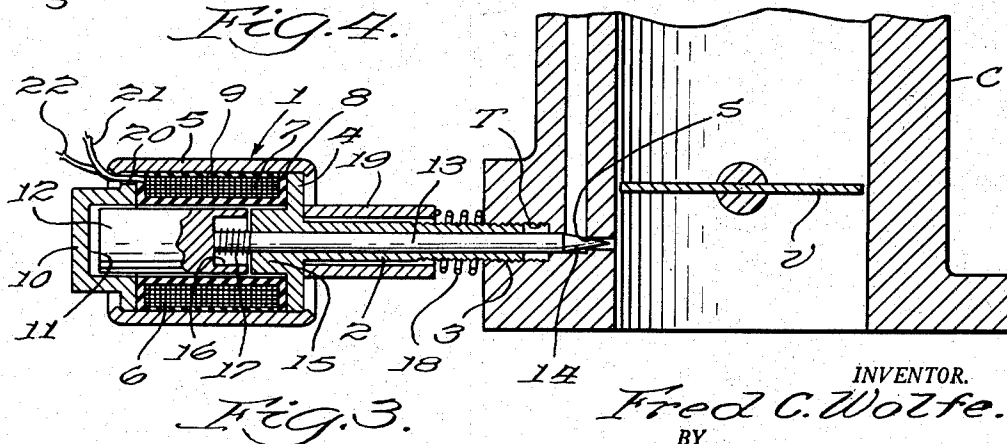
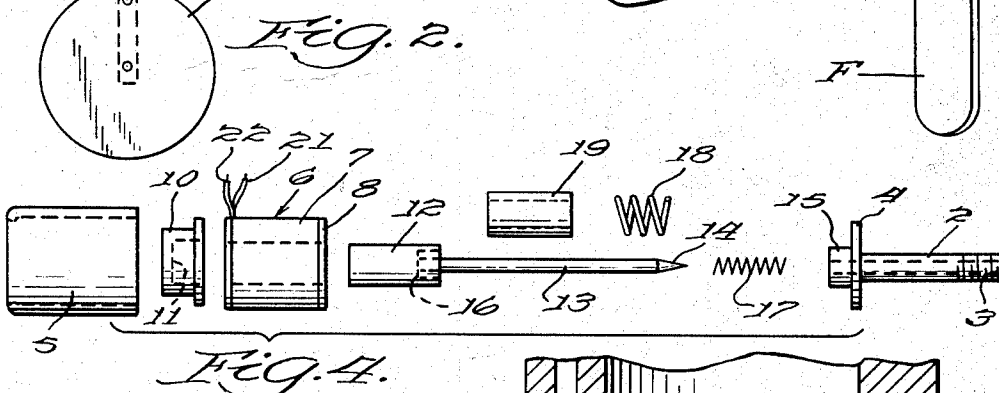
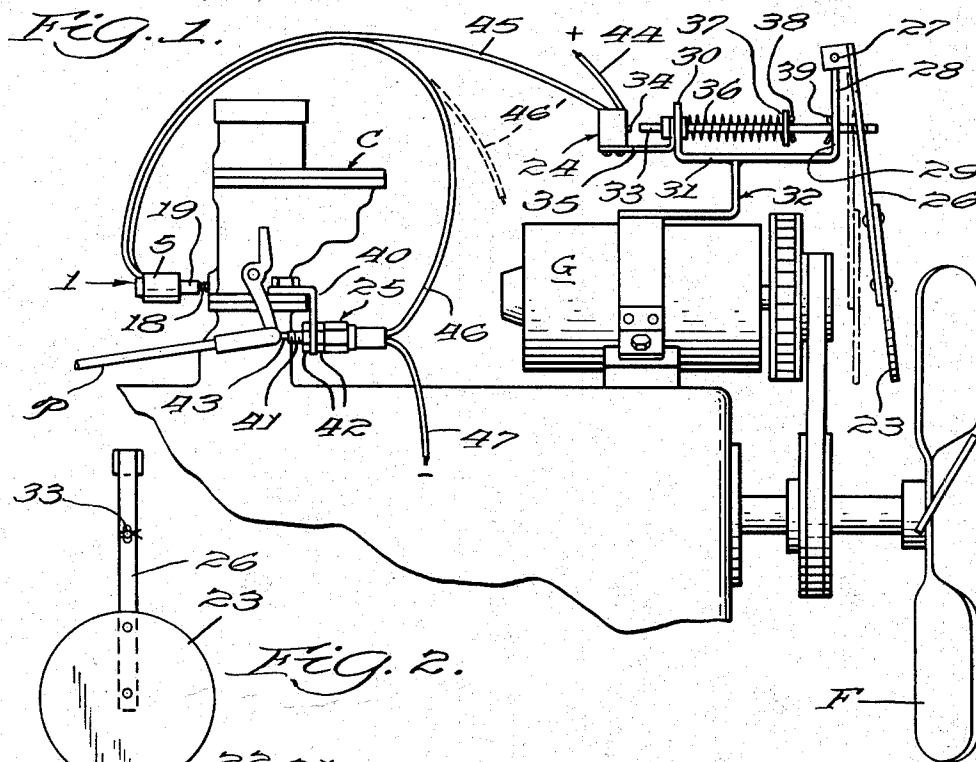
F. C. WOLFE

2,886,020

CARBURETOR IDLER JET CONTROL MEANS

Filed Oct. 14, 1955

3 Sheets-Sheet 1



INVENTOR.

INVENTOR.
Fred C. Wolfe.

BY

Harold J Le Vesconte
Att'y.

Atta

May 12, 1959

F. C. WOLFE

2,886,020

CARBURETOR IDLER JET CONTROL MEANS

Filed Oct. 14, 1955

3 Sheets-Sheet 2

FIG. 6.

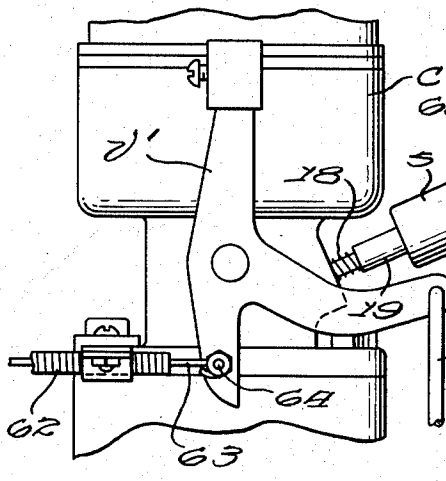


FIG. 7.

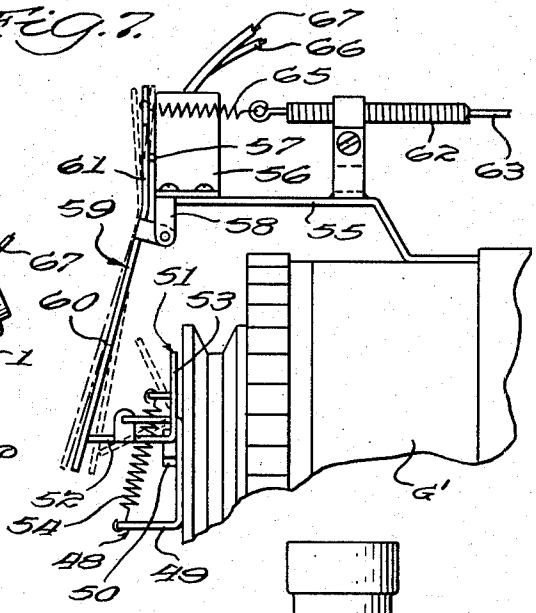
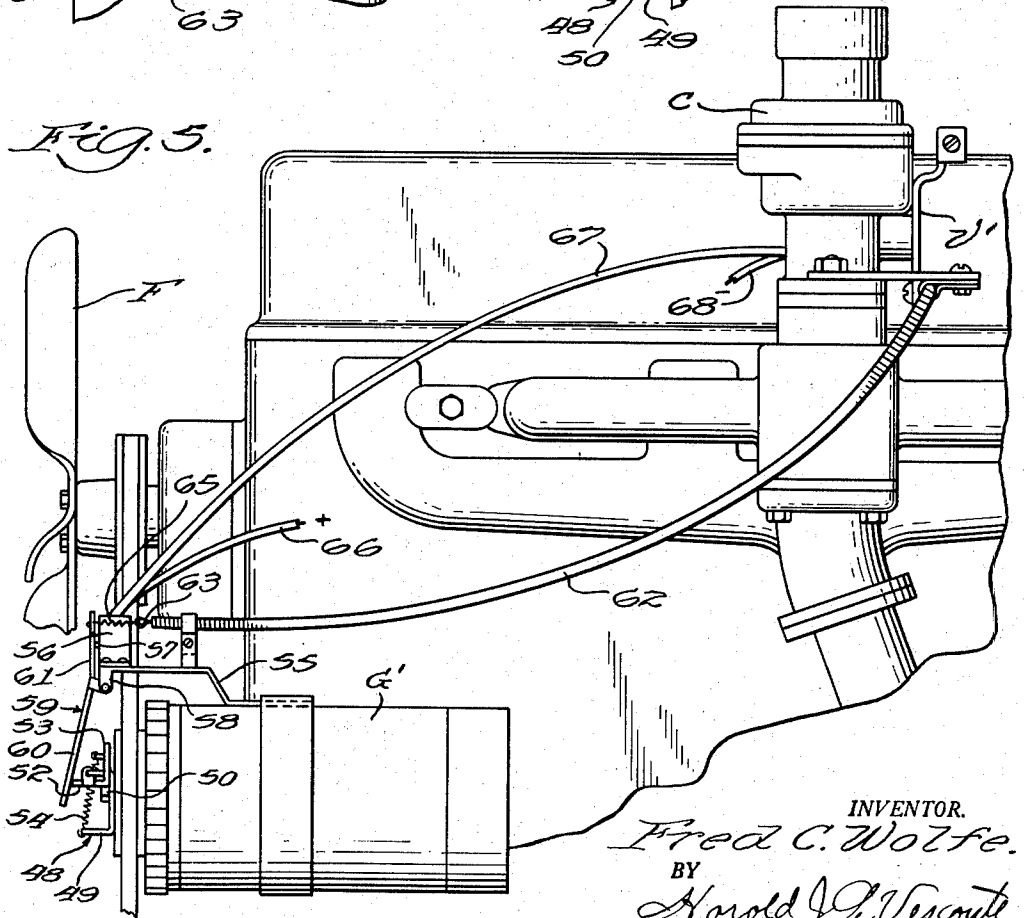


FIG. 5.



INVENTOR.
Fred C. Wolfe.
BY
Harold J. Versoute
Att'y.

May 12, 1959

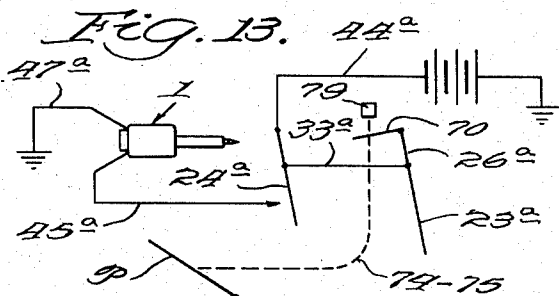
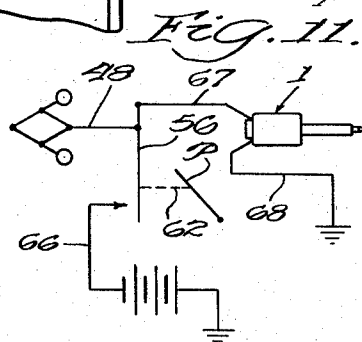
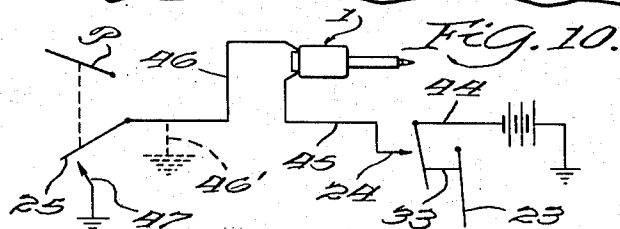
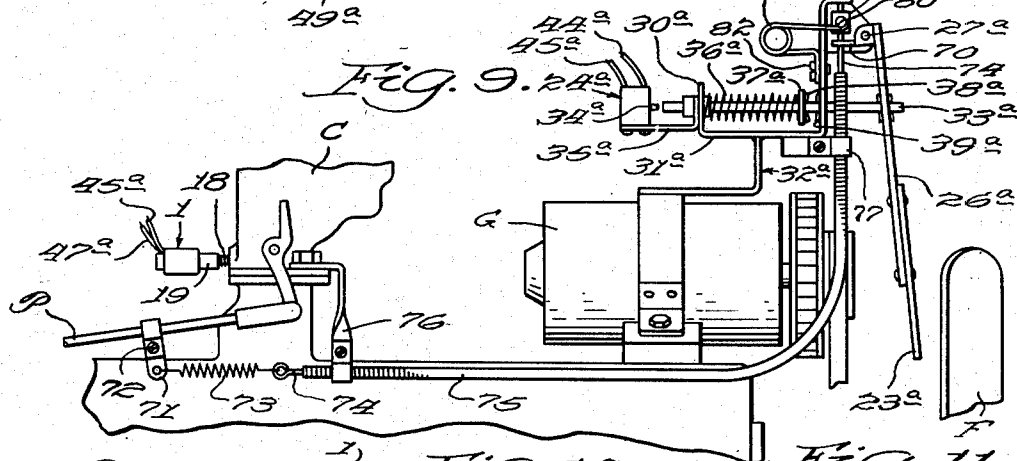
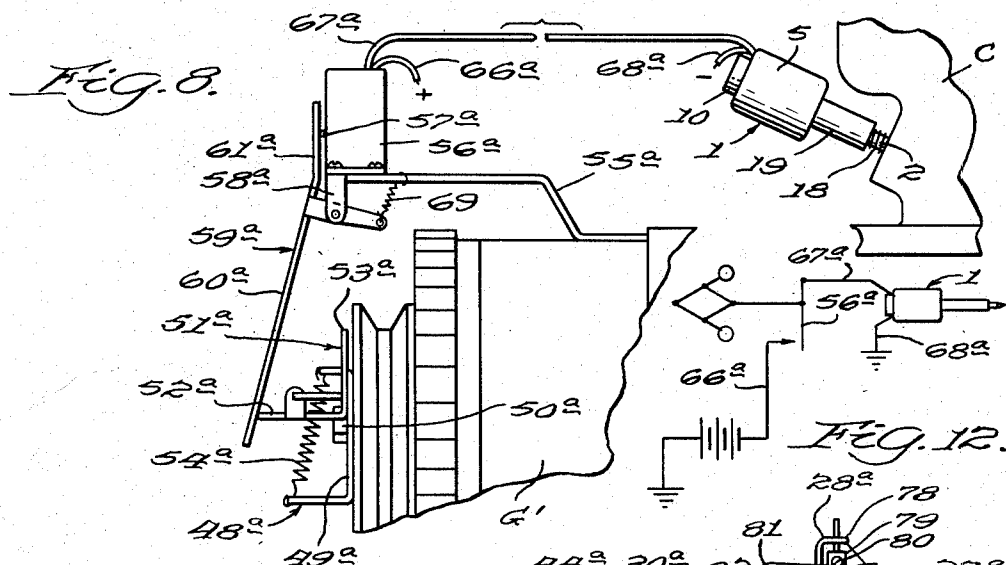
F. C. WOLFE

2,886,020

CARBURETOR IDLER JET CONTROL MEANS

Filed Oct. 14, 1955

3 Sheets-Sheet 3



INVENTOR.

INVENTOR.
Fred C. Wolffe.

BY

BY
Harold J. LeVesconte
Avery

1

2,886,020

CARBURETOR IDLER JET CONTROL MEANS

Fred C. Wolfe, Burbank, Calif.

Application October 14, 1955, Serial No. 540,372

19 Claims. (Cl. 123—124)

This invention relates to carburetion control devices and more particularly to an improved and novel form thereof effective to reduce the amount of fuel supplied to the engines of automotive vehicles during the deceleration cycle with resultant elimination of the discharge of unburned fuel and consequent reduction of smog producing pollutants to the atmosphere and at the same time, realising the attendant saving of fuel.

It is now well settled that the chief pollutants of the atmosphere which produce the condition known as smog are the vaporized constituents of unburned gasoline which is discharged into the atmosphere. It is equally well settled that except for improperly adjusted carburetors, the chief source of these pollutants derives from motor vehicles when they are coasting at speeds above, say, fifteen miles per hour with the throttle closed. These situations prevail at at least two principal times, viz., when the vehicle is rolling up to a stop, and when coasting down an incline. With the throttle closed, the manifold suction draws raw gasoline into the engine through the idler jet or jets of the carburetor which are located in close proximity to the throttle valve on the downstream side thereof.

These idler jets are adjusted by needle valve type screws and an object of the present invention is to provide an electrically operated valve means which is adapted to be mounted on a carburetor as a replacement for each of the idler jet adjusting screws together with switch means responsive to throttle position and engine speed effective to cause the said electrically operated valve means to close the idler jets under conditions of a closed, or nearly closed throttle and an engine speed somewhat above the normal idling speed.

Another object of the invention is to provide a solenoid operated valve construction which can serve as a replacement for the idler jet adjusting needle valve.

A further object of the invention is to provide an operating control for a solenoid operated idler jet valve including means actuated by the air pressure derived from the engine cooling fan of a motor vehicle.

Still another object of the invention is to provide an operating control for a solenoid operated idler jet control valve including an engine speed responsive device and throttle operated means for rendering said speed responsive device effective to operate a switch for energizing and de-energizing said solenoid operated idler jet control valve.

A still further object of the invention is to provide a solenoid operated idler jet control valve usable as a replacement for the needle valve screw of a carburetor which is adjustable as a unit to limit the maximum extent of idler jet opening.

Still another object of the invention is to provide an idler jet control means for the carburetors of motor vehicle engines in which the foregoing objectives are realized in practice; which is readily installed on existing vehicles; which is simple in construction and economical to manufacture; and which is reliable in operation.

2

With the foregoing objects in view, together with such additional object and advantages as may subsequently appear, the invention resides in the parts, and in the construction, combination and arrangement of parts, described, by way of example, in the following specification of certain presently preferred modes of execution of the invention; reference being had to the accompanying drawings which form a part of said specification and in which drawings:

Fig. 1 is a side elevation of a portion of the engine of a motor vehicle showing one embodiment of the invention applied thereto comprising a switch means operated by the throttle means and a second switch operated by a vane disposed in the cooling fan air stream and additionally showing in broken lines a modification of that embodiment,

Fig. 2 is a front elevation of the vane shown in Fig. 1,

Fig. 3 is an exploded view of the component parts of the idler jet control valve means employed in the present invention as a replacement for the idler jet needle valve screw,

Fig. 4 is an enlarged medial sectional view of a manifold attached end of a carburetor and idler jet and showing also in medial section the solenoid operated valve for the idler jet applied thereto,

Fig. 5 is a fragmentary side elevation of the engine of another motor vehicle in which the vane control means can not be conveniently applied and in which the idler jet control valve is operated by a single switch through the combined action of a centrifugal force responsive means rotating with the engine and other means attached to the throttle,

Fig. 6 is an enlarged scale fragmentary elevation of the throttle carrying portion of the carburetor as viewed from the right hand side of Fig. 5,

Fig. 7 is an enlarged side elevation of the centrifugal force responsive device and the parts of the control cooperating therewith,

Fig. 8 is an embodiment of the invention employing the centrifugal force device but with the modification thereof by the throttle eliminated,

Fig. 9 shows an embodiment of the form of the invention shown in Fig. 1 but with the throttle controlled switch replaced by means for rendering the vane operated switch operative or inoperative at will,

Fig. 10 is a circuit diagram of the form of the invention shown in Fig. 1 and showing a modification thereof in broken lines, and

Figs. 11, 12 and 13 are circuit diagrams showing the circuits of the embodiments of the invention disclosed in Figs. 5, 8 and 9, respectively.

Referring first to Figs. 3 and 4 of the drawings, there is shown in detail the solenoid operated valve means of the invention, which valve means replaces the needle point screw commonly used to effect adjustment of the carburetor idler jet or jets. It will be understood that in each installation of a device embodying the invention there will be one of these solenoid operated valve devices for each idler jet in the carburetor and that where a plurality of idler jets is involved such solenoids may be connected either in series or in series parallel relation as best suits the convenience of the installer. The solenoid operated valve means 1 comprises a tubular valve guide member 2 which is provided with external threads 3 at one end thereof for engagement with the threads T in the body of a carburetor C in which the adjusting screw for the idler jet I is received; the threads 3 being of sufficient length to permit adjustment of the device in the threads T incident to providing the proper operating clearance for the valve element presently to be described. At its other end the valve guide member is provided with a thin annular head portion 4 which is en-

3

gaged by one end of the solenoid coil housing sleeve 5; said end being spun inwardly over the head 4 as best shown in Fig. 3. The sleeve 5 contains and houses a solenoid coil 6 comprising a winding 7 carried by a spool 8 and exteriorly surrounded by a covering sleeve 9; said spool and covering sleeve being formed of suitable non-conductive material. The other end of the sleeve 5 is spun over a cover element 10 which secures the coil against endwise movement and which has an axially disposed clearance recess forming portion 11 for the end of the reciprocable armature 12. The armature 12 at the end thereof extending toward the valve guide 2 carries a valve member comprising a rod 13 slidable in and extending beyond the threaded end of the valve guide 2 and terminating in a needle point 14 adapted to engage the idler jet valve seat S. The valve guide member 2 beyond the head portion 4 includes an axially disposed boss 15 which extends into the interior of the spool 8 and serves as an abutment limiting travel of the armature 12 in a direction to cause the valve member to close the idler jet. The adjacent end of the armature 12 is provided with an annular groove 16 and a light compression spring 17 surrounding the rod 13 and reacting between the end of the boss 15 and the bottom of the groove 16 tends constantly to move the armature and valve member to the left as viewed in Fig. 3 with resultant opening of the idler jet. The device is screwed into the carburetor body as a replacement for the idler jet adjusting screw and is secured in place by use of the compression spring 18 which is removed from the adjusting screw and a sleeve 19 loosely fitting over the valve guide member 2 and which provides an abutment for the spring at the point at which it was engaged by the head of the replaced adjusting screw. The device is screwed into the carburetor body until the valve member, when withdrawn by the spring 17, effects the desired restriction of the jet orifice and the force exerted by the spring 18 serves thereafter to maintain it in adjusted position. Also as shown in Fig. 3 the cover element 10 in the rim thereof is provided with a notch 20 through which the leads 21 and 22 of the coil 7 extend for connection to the controlling switch means. As before stated, this valve means is actuated to close the idler jets under certain conditions of vehicle operation and the closure is effected against the force exerted by the spring 17 by energization of the coil 7.

Referring to Figs. 1 and 2 there is shown an embodiment of the invention in which both a spring biased vane 23 and a switch 24 operated thereby and a second switch 25 operated by the throttle comprising the control for the solenoid operated valve are employed. In this embodiment of the invention, the vane 23 is located directly in rear of the cooling fan F and is supported by one end of an arm 26 the other end of which is pivotally mounted on a pin 27 carried by a bracket arm 28 for movement toward and away from the fan. The bracket arm 28 comprises an extension one of a pair of arms 29 and 30 rising from a horizontal member 31 which is carried by a bracket and clamp 32 attached to the generator G of the vehicle. Slidably mounted in the arms 29 and 30 is a rod 33 which projects at one end beyond the arm 29 and is connected to the vane carrying arm 26. The opposite end of the rod 33 projects beyond the arm 30 and is disposed in the axial line of an operating plunger 34 of the normally open, snap action switch 24 carried by a bracket arm 35 extending laterally from the rear face of the rod supporting arm 30. A compression spring 36 surrounds the rod 33 between the arms 29 and 30 and reacts between the forward face of the arm 30 and a washer 37 secured on the rod 33 by a cotter pin 38 tending to move the rod 33 to the right as viewed in Fig. 1 to the extent permitted by the stop comprising the cotter pin 39 extending through the rod 33 between the cotter pin 38 and the rear face of the arm 29 and allowing the vane to occupy the position shown in full

4

lines in Fig. 1 unless moved against the bias of the spring 36 by the airstream generated by the fan F. One of the mounting bolts for the carburetor C additionally secures a laterally and thence downwardly extending bracket 40 in the free end of which the normally open switch 25 is mounted; said switch comprising an externally threaded shank 41 extending through the bracket and being secured therein by lock nuts 42 at each side of the bracket affording means for adjustment of the switch in the bracket. The switch is disposed in the line of the throttle rod end which is attached to the operating arm for the carburetor throttle valve V and includes a spring biased plunger 43 extending from the shank 41 which upon being contacted as the throttle valve reaches closed position is depressed into the shank with resultant closing of the contact means within the switch body. This switch is one obtainable on the open market and further description is not deemed necessary. A lead 44 extends from a source of electrical energy to one side of the switch 24, a second lead 45 connects the opposite side of the switch 24 with one side of the solenoid valve 1, a third lead 46 extends from the solenoid to the switch 25, and a fourth lead 47 extends from the opposite side of the switch 25 to the ground. In practice one side of the switch is grounded, but a separate ground is shown for clearness of illustration. It is not essential that the leads be thus arranged, the only requirement being that the two switches and the solenoid be connected in series relation. Also, if more than one solenoid is employed they can be connected in series with each other and with the switches or in parallel as a group with the group being connected in series with the switches. The circuit of the above-described embodiment is shown in Fig. 10 in which the throttle control and foot pedal are designated P.

Referring first to Fig. 1, the device is shown under operating conditions in which the engine is idling. The throttle is closed closing the switch 25, but the air-stream from the engine fan is insufficient to displace the vane 23 from the position imposed by the spring 36 and consequently, the switch 24 is open and the solenoid valve is not energized and the idler jet is open. When the throttle is opened by pressure on the throttle pedal, the switch 25 is opened and upon the engine reaching a speed which would be equivalent to motion of the vehicle at, say, 15 to 17 m.p.h., the airstream produced by the fan and imposed on the vane 23 is sufficient to overcome the bias of the spring 36 and cause the movement of the vane to the dotted line position with resultant closing of the switch 24. However, the switch 25 having been opened by the opening of the throttle, the circuit remains open and the idler jet remains open. When, however, the vehicle is moving at a rate sufficient to cause the fan to hold the vane 23 in position closing the switch 24 and the throttle is closed with resultant closing of the switch 25 as in coasting down a grade or coasting to a stop, the circuit is closed, energizing the solenoid and closing the idler jet or jets. This prevents the drawing of excess fuel into the engine cylinders and the consequent expulsion of unburned fuel through the exhaust. This unburned fuel has been shown by repeated experiments to be the most important component of the various elements of smog which have a deleterious effect on health and on plant life.

It is to be noted that the invention does not affect the ordinary operation of the carburetor and that it comes into action only at those times in which the presence of the generally necessary idler jets results in adverse effects as well as causing waste of fuel.

Also in Figs. 1 and 10 there is shown in broken lines the use of the device with the elimination of the throttle operated switch. This is achieved by connecting the lead 46 directly to ground as indicated in the said broken lines designated 46'. Under these conditions the idler jets are maintained closed by the solenoid valve or valves

5

at all times when the engine speed is above the pre-determined point at which the vane closes the switch 24. This arrangement is as satisfactory as the two switch arrangement but since the solenoid coil is subjected to substantially continuous duty, it must be designed for such duty. Also in some cars, the throttle switch is difficult to install.

Figs. 5, 6 and 7 show an embodiment of the invention for vehicles in which there is not sufficient room for the fan operated vane or in which the mounting of the vane is difficult and in which there is room for flyball type of speed responsive instrumentality as, for example on the end of a pump or generator shaft.

In the illustrated embodiment of the invention, the drive pulley end of the shaft of the generator G' carries a flyball type of device generally indicated as 48 and including a base element 49 secured to the end of the shaft by a screw 50; said base element hingedly supporting an L-shaped member 51 including a normally horizontally disposed leg 52 and a vertical leg 53. A tension spring 54 normally holds the L-shaped member with the legs thereof disposed at an angle to the said vertical and horizontal positions as indicated in dotted lines in Fig. 7. Under the influence of rotation centrifugal force will bring the L-shaped member to the full line position shown in Fig. 7; the weight of the part and the strength of the spring being such as to cause this movement when the rotation of the generator shaft is such as occurs when the engine is rotating at a speed sufficient to move the vehicle at about 15-17 m.p.h. The free end of the leg 52 terminates in a point disposed in the axial line of the rotation of the device when it is moved to its maximum position by centrifugal force.

Mounted on the generator and overhanging the drive end is a bracket arm 55 carrying a normally open switch 56 including an operating plunger 57 at the free end thereof. The bracket arm 55 further included a pair of depending arms 58 at the said free end which arms pivotally support a contact operating member 59; said member including a depending portion 60 extending into the path of operation of the leg 52 of the flyball device and a portion 61 extending upwardly across the path of movement of the switch operating plunger 57. The plunger 57 is spring biased outwardly and by engagement with the portion 61 of the contact operating member it causes the member to follow the inward and outward components of the movement of the leg 52 of the flyball device. When the engine is operating in lower ranges of speed, the flyball device allows the plunger 57 to move outwardly to the dotted line position of the member 59 which causes the switch to open and break the solenoid operating circuit. As the speed increases, the plunger 57 is forced inwardly closing the switch.

Means for disabling the device when the throttle is opened is also provided; said means comprising a reciprocable cable means including a flexible sheath 62 and a wire 63 slidable therein. One end of the wire 63 is attached to the valve operating lever arm V' by a screw 64 and the opposite end of the wire 63 is connected to the free end of the portion 61 of the contact operating member through an interposed spring 65. When the throttle is opened, the wire 63 will be caused to move the contact member portion 61 toward the switch beyond the contact making position with resultant movement of the end portion 60 thereof to the position shown in dot and dash lines out of the range of movement of the flyball device; the spring 65 allowing the movement of the throttle beyond the initial opening position and consequent disabling of the switch operating means. When the throttle is closed, the engine speed will control the opening and closing of the switch. A lead 66 connects the switch with the battery or other source of energy, a second lead 67 connects the switch with one lead of the solenoid valve 1 and a third lead 68 connects the opposite lead of the solenoid with the ground. Thus when the

6

switch is closed, the solenoid valve means will close the idler jets and allow them to be open when the engine speed drops below a pre-determined minimum. The throttle operated disabling means may be omitted, if desired as shown in Fig. 8 in which the same general organization of elements is shown with the exception of the addition of the biasing spring 69 to insure that the contact operating means will follow the flyball device. Other than this addition, the parts have been given the same numbers as in Figs. 5, 6 and 7 with the addition of the exponent *a*.

Referring finally to Fig. 9 there is disclosed an embodiment of the device which in general resembles the first disclosed form except for the omission of the throttle operated switch and the inclusion of a throttle operated vane disabling means as a substitute for the throttle switch. In view of the fact that many identical parts are employed, such parts have been given the same identifying numerals as in Fig. 1 with the addition of the exponent *a* and will not be further described except as necessary to the description of the other parts.

In this embodiment of the invention the vane carrying arm 26*a* is provided with a laterally extending arm 70 at the opposite side of the pivot pin 27*a*. The throttle operating rod P carries a depending arm 71 clamped thereto by a screw 72 and the free end of the arm is connected by an interposed tension spring 73 to one end of a flexible, reciprocable member 74 contained in and guided by a flexible, sheath element 75 having one end secured in a bracket 76 secured by one of the carburetor connecting bolts and having its other end secured in a clamp member 77 extending laterally from the under side of the horizontal bracket member 31*a*. The clamp member 77 is positioned to locate the end of the reciprocable member 74 for movement vertically and the member 74 extends through an opening in the arm 70 and thence through a guiding opening in the bracket portion 78 formed in an upward extension of the bracket arm 28*a*. The flexible member 74 carries a stop collar 79 fixed thereto by a set screw 80 and disposed between the arm 70 and the guide in the bracket portion 78. Additionally, the bracket arm 28*a* carries a torsion spring 81 having one end thereof secured thereto by a screw 82 and having its other end extending beneath the set screw 80; said torsion spring being constantly operative to urge movement of the adjacent end of the flexible member 74 upwardly in opposition to the pull thereon by the opening of the throttle. The circuit connections are the same as in Fig. 10 except that the lead 46 is dispensed with and the lead 47*a* extends from the solenoid valve to ground.

As shown, the throttle is closed and the spring 81 is holding the collar 79 clear of the arm 70, wherefore, the vane 23*a* is free to respond to the action of the fan F to open or close the switch 24*a*. When the throttle is opened, the spring 73 overcomes the spring 81 and pulls the flexible member until the collar 79 contacts the arm 70 and moves the vane outwardly to the extent permitted by the cotter pin 39*a*. This takes place during the first portion of throttle opening movement and further opening of the throttle serves merely to extend the spring 73. In closing the throttle the spring 73 gradually relaxes and when relaxed sufficiently, the spring 81 which has been under load, moves the flexible member and the collar upwardly with incident release of the vane to its controlling function as in said first described form of the invention.

This embodiment of the invention is equally efficient as the said first described form and is intended for use where the installation of a throttle operated switch is inconvenient. Since only a single switch is employed, the wiring is simplified and the possibility of trouble developing in the circuit is reduced. The first form of the invention is cheaper to manufacture and where it can be used, it is more readily installed. The fact that each embodiment has some advantages and some disadvantages not possessed by other embodiments, and the wide variety

of engine constructions encountered makes it necessary to provide an equivalent variety of operating means for the solenoid operated idler jet control valve.

Finally, attention is especially directed to the fact that snap switches are employed to control the circuit. Ordinary make and break contact switches may be used, but such switches operate at the identical position of the operating member. They can be used in the present invention, but important operating characteristics will be lost by so doing. The operating member of a snap switch is moved to one position storing power in a spring to move the switch contacts to one position and must be moved or allowed to move to another position before the switch contacts move to the other position. One desirable feature of a snap action switch is the fact that the possibility of chattering contact is eliminated, but the above described movement of the operating member has a more important and less obvious advantage in connection with the invention which will now be described.

It will be noted that the invention makes use of normally open snap switches. Due to this choice of switches, the closing of the switch will occur at a somewhat higher rate of engine speed as represented by the operation of the fly ball device or airstream produced by the fan than will exist at the opening of the switch. Specifically, using Fig. 1 as an example, the switch operating member 34 is shown in switch opening position. The switch will not be closed until the plunger is depressed substantially to the face of the switch and it will remain closed until the plunger has returned to about the position shown. The result is that while the switch will be closed with resultant closing of the idler jets upon reaching the desired conditions of speed and throttle position, the idler jets will not be re-opened by opening of the switch until a somewhat lower speed is reached than that which caused the opening of the idler jets. Thus, under conditions of coasting down a grade or rolling up to a stop in which the engine is serving as a retarding means, the idler jets are not opened to discharge excess fuel into and through the engine as soon as would be the case were simple contact switches to be employed.

While in the foregoing specification there have been disclosed certain presently preferred embodiments of the invention, it is not to be inferred therefrom that the invention is limited to the exact form thereof so disclosed, and it will be understood that the invention includes all such changes and modifications in the parts and in the construction, combination and arrangement of parts as shall come within the purview of the appended claims.

I claim:

1. In an engine speed responsive control for vehicle engine carburetors, a normally open, electrically closed solenoid operated valve means mounted in the carburetor as a replacement for the idler jet adjusting screw, means electrically connecting the solenoid of said valve means with an electrical system including a switch and means responsive to the speed of the engine effective to close said switch during all times when the engine is operating above a predetermined speed with resultant energization of said solenoid and closure of the idler jet by said valve means during said times, said switch and engine speed responsive means being effective to maintain said idler jet valve means closed until and unless the engine speed decreases to a predetermined extent below the speed at which said switch was closed.

2. In an engine speed responsive control for vehicle engine carburetors, a solenoid operated valve means operable upon energization of the solenoid component thereof to close the idler jet of the carburetor, means electrically connecting said solenoid component with an electrical system including a normally open switch, and devices for closing said switch with resultant energization of said solenoid component; said devices comprising a vane disposed closely adjacent to the downstream side of the engine cooling fan and having a face exposed to

the air stream delivered by the fan, means for supporting said vane including resilient means urging said vane in opposition to the air stream, and means connecting said vane with said switch; said resilient means being proportioned to allow the air stream to move said vane when the speed of the engine and consequent speed of the fan exceeds a predetermined value and said movement of said vane being effective to close said switch and energize said solenoid.

3. A control device for the idler jet of a carburetor comprising a solenoid operated valve means attachable to the carburetor as a replacement for the idler jet adjusting screw; said valve means comprising an elongated, hollow valve guide having exterior threads at one end thereof engageable with the threads for the idler jet adjusting screw of the carburetor and having a valve guiding bore extending longitudinally thereof, a solenoid coil carried by the opposite end of said valve guide and disposed in axial alignment with said bore, a valve member freely slidable in said bore and having a conical end extending beyond said threaded end of said valve guide and adapted to engage the upstream side of the idler jet, an armature attached to the opposite end of said valve member and disposed within said solenoid coil, spring means normally operative to move said armature and valve member out of contact with the idler jet, and means for limiting the extent of axial movement of said armature and valve member away from the upstream side of the idler jet.

4. In an engine speed responsive control for the idler jet of a vehicle engine carburetor, a solenoid operated valve means mounted in the carburetor as a replacement for the idler jet adjusting screw, means electrically connecting the solenoid component of said valve means with a source of energy including a first normally open switch disposed in proximity to the carburetor throttle operating means, devices operated by the throttle operating means effective to close said first switch when the throttle approaches closed position, a second normally open switch and operating devices therefor responsive to the air stream delivered by the engine cooling fan effective to close said second switch during all times when the engine speed and resultant force of the air stream delivered by the fan exceeds a predetermined value.

5. In an engine speed responsive control for vehicle engine carburetors, a solenoid operated valve means operable upon energization of the solenoid component thereof to close the idler jet of the carburetor, means electrically connecting said solenoid component with an electrical system including a normally open switch, and devices for closing said switch with resultant energization of said solenoid component; said devices comprising a vane disposed closely adjacent to the downstream side of the engine cooling fan and having a face exposed to the airstream delivered by the fan, means for supporting said vane including resilient means urging said vane in opposition to the air stream, means connecting said vane with said switch; said resilient means being proportioned to allow the air stream to move said vane when the speed of the engine and consequent speed of the fan exceeds a predetermined value and said movement of said vane being effective to close said switch and energize said solenoid, and other devices connected to the throttle operating means effective upon opening of the throttle beyond a predetermined extent to disable said vane from responding to the airstream of the fan.

6. In an engine speed responsive control for vehicle engine carburetors, a solenoid operated valve means operable upon energization of the solenoid component thereof to close the idler jet of the carburetor, means electrically connecting said solenoid component with an electrical system including a normally open switch, and devices for closing said switch with resultant energization of said solenoid component; said devices comprising a means responsive to centrifugal force fixed to and rotatable with a

rotatable component of the engine connected to and operated by rotation of the engine crankshaft and including a spring, an element movable against the bias of said spring in response to centrifugal force derived from rotation of said component above a predetermined rate from a position nearer to said component to a position further from said component, a follower yieldingly engaging said element and movable therewith, and means connecting said follower with said switch effective upon movement of said follower derived from rotation of said component above said predetermined rate to close said switch with resultant energization of said solenoid and closure of the idler jet.

7. In an engine speed responsive control for vehicle engine carburetors, a solenoid operated valve means operable upon energization of the solenoid component thereof to close the idler jet of the carburetor, means electrically connecting said solenoid component with an electrical system including a normally open switch, and devices for closing said switch with resultant energization of said solenoid component; said devices comprising a means responsive to centrifugal force fixed to and rotatable with a rotatable component of the engine connected to and operated by rotation of the engine crankshaft and including a spring, an element movable against the bias of said spring in response to centrifugal force derived from rotation of said component above a predetermined rate from a position nearer to said component to a position further from said component, a follower yieldingly engaging said element and movable therewith, means connecting said follower with said switch effective upon movement of said follower derived from rotation of said component above said predetermined rate to close said switch with resultant energization of said solenoid and closure of the idler jet, and means connected to throttle actuating means and operative upon opening of the throttle beyond a predetermined extent to disable said follower element.

8. In an engine speed responsive control for vehicle engine carburetors, a normally open solenoid valve means mounted in the carburetor as a replacement for the idler jet adjusting screw and including mounting means having capacity for adjustment relative to the idler jet orifice to determine the extent of open position; said valve means including a valve element movable into and out of engagement with the upstream side of the idler jet orifice as it is moved into closed and open positions, respectively, a solenoid coil, and a reciprocable, para-magnetic armature attached to said valve element and mounted for reciprocable movement within said solenoid coil and so positioned therein as to be caused to move said valve element into jet closing position upon energization of said solenoid coil, an electrical circuit connecting said coil with an electrical system, and control means for said circuit comprising a normally open switch and devices responsive to engine speed above a predetermined rate to close said switch with resultant completion of said circuit and consequent energization of said coil and closure of the idler jet by said valve means.

9. A control means as claimed in claim 8 in which said switch closing devices include a yieldingly mounted vane disposed at the downstream side of the engine cooling fan effective to be moved to close said switch by the air flow from the fan when the engine speed reaches a predetermined rate.

10. A control means as claimed in claim 8 in which said switch closing means includes a device responsive to centrifugal force mounted on a rotatable component of the engine driven by the engine crankshaft and including a spring and an element movable against the bias of said spring in response to increasing centrifugal force, a follower contacting said element and devices connecting said follower with said switch effective to close said switch when the speed of the engine reaches a predetermined rate.

11. A control means as claimed in claim 8 which includes disabling means for said switch operating devices comprising a reciprocable element having one end connected to the throttle operating means of the vehicle and the other end connected to said switch operating devices and effective upon opening of the throttle beyond a predetermined extent to render said switch operating devices inoperable to close said switch.

12. A control means as claimed in claim 11 in which said reciprocable element at its said other end is connected to said vane and is effective to hold said vane moved out of switch operating position.

13. A control means as claimed in claim 9 which includes a reciprocable element having one end thereof connected to the throttle operating means of the vehicle and the other end thereof attached to said vane and effective to hold said vane moved out of switch closing position at all times when the throttle is moved beyond a predetermined extent of open position.

14. A control means as claimed in claim 10 which includes a reciprocable element having one end connected to the throttle operating means of the vehicle and the other end thereof attached to said follower and effective to hold said follower out of engagement with said centrifugal force responsive element and in switch closing position during all times when the throttle is opened beyond a predetermined extent.

15. In an engine speed responsive device for controlling the idler jet of the engine carburetor, a solenoid operated valve means employing the upstream side of the idler jet as a valve seat, means electrically connecting said valve means with an electrical system including a switch, devices responsive to the engine speed effective to cause said switch to effect energization of said valve means with resultant closure of the idler jet when the engine reaches a predetermined speed; said switch thereafter remaining closed until and unless the engine speed decreases to a predetermined extent below the speed at which said switch was closed, and other devices connected to the vehicle throttle effective to disable said speed responsive devices at all times when the throttle is opened beyond a predetermined extent.

16. In an engine speed responsive means for controlling the idler jet of the engine carburetor, a solenoid operative valve means mounted in the carburetor as a replacement for the idler jet adjusting screw, means electrically connecting the solenoid of said valve means with an electrical system including a snap switch having a reciprocable operating member movable to effect opening and closing of the switch contacts at different points, respectively, in its path of travel, and engine speed responsive devices engaging said operating member to effect closing of said idler jet by said valve means when the engine speed reaches and exceeds a predetermined value and thereafter to maintain the idler jet closed until the engine speed drops to a predetermined speed lower than the speed at which the idler jet was closed by said valve means.

17. In an engine speed responsive means for controlling the idler jet of the engine carburetor, a solenoid operated valve means mounted in the carburetor as a replacement for the idler jet adjusting screw, means electrically connecting the solenoid of said valve means with an electrical system including a normally open snap switch having a reciprocable operating member movable to cause opening and closing of the switch contacts at different points, respectively, in its path of travel, and engine speed responsive devices engaging said operating member operative to effect closing of said switch and consequent closing of the idler jet by said valve means when the engine speed reaches a predetermined rate and to maintain said switch closed until the engine speed drops to a predetermined speed lower than the speed at which it was closed by said speed responsive devices.

18. The combination with a carburetor for internal

11

combustion engines of speed responsive devices for controlling fuel flow through the idler jet of the carburetor; said devices comprising an electrically operated valve means disposed in the path of fuel flow through the carburetor idler jet, and devices for actuating said valve means including a snap switch having a reciprocable operating member movable to cause opening and closing of the switch contacts at different points, respectively, in its path of travel, and engine speed responsive devices engaging said operating member to effect opening of the idler jet by said valve means when the engine speed reaches a predetermined value and thereafter to maintain the idler jet closed until the engine speed drops to a predetermined speed which is lower than the speed at which the idler jet was closed by said valve means.

19. The combination with a carburetor for internal combustion engines of speed responsive devices for controlling fuel flow through the carburetor idler jet; said devices comprising an electrically operated valve means disposed in the path of fuel flow through the carburetor idler jet, and devices for actuating said valve means including a normally open snap switch having a recip-

12

rocable operating member movable to cause opening and closing of the switch contacts at different points, respectively, in its path of travel, and engine speed responsive devices engaging said operating member operative to effect closing of said switch and consequent closing of the idler jet by said valve means when the engine speed reaches a predetermined rate, and to maintain said switch closed until the engine speed drops to a predetermined rate which is lower than the speed at which it was closed by said speed responsive devices.

References Cited in the file of this patent

UNITED STATES PATENTS

15	1,650,482	Barden	Nov. 22, 1927
	1,711,767	Barden	May 7, 1929
	2,415,336	Carlson	Feb. 4, 1947
	2,466,090	Fageol	Apr. 5, 1949
20	2,506,511	Mallory	May 2, 1950

FOREIGN PATENTS

261,022	Great Britain	Oct. 13, 1927
---------	---------------	---------------