Aug. 8, 1939. L. H. MESSINGER, JR 2,168,605

ATTACHMENT FOR INTERNAL COMBUSTION ENGINES

Filed Nov. 27, 1937 2 Sheets-Sheet 1

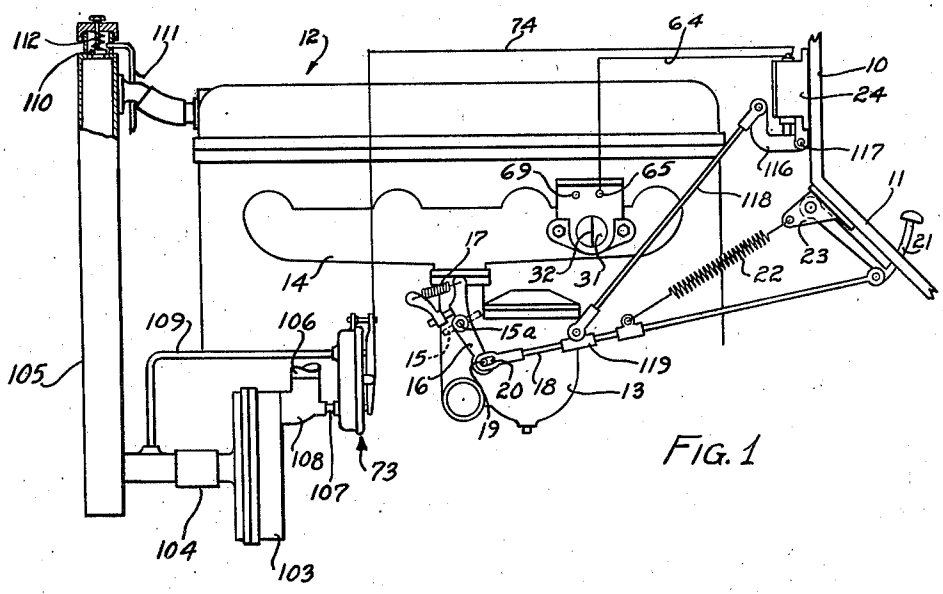


FIG. 1

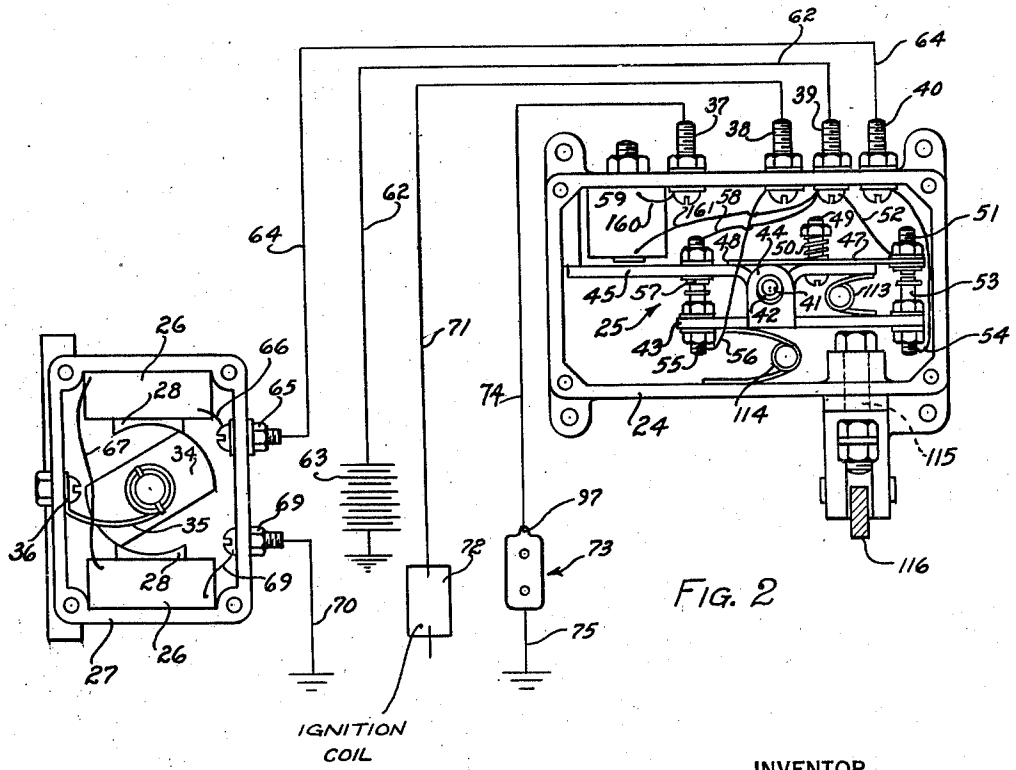


FIG. 2

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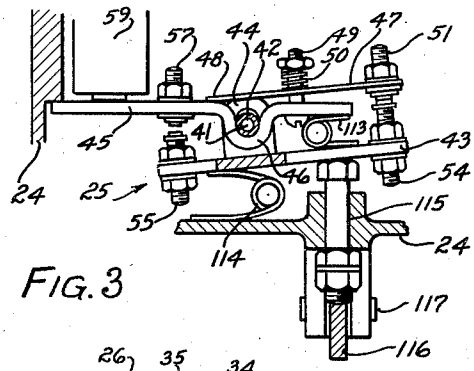


FIG. 3

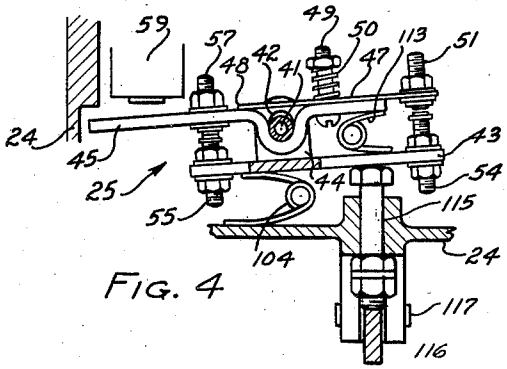


FIG. 4

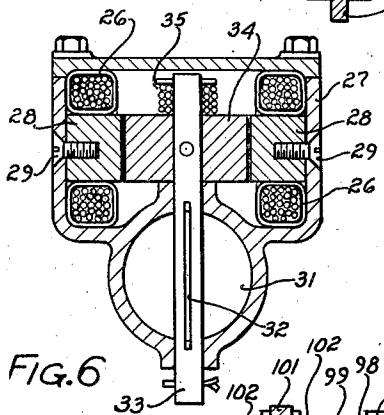


FIG. 6

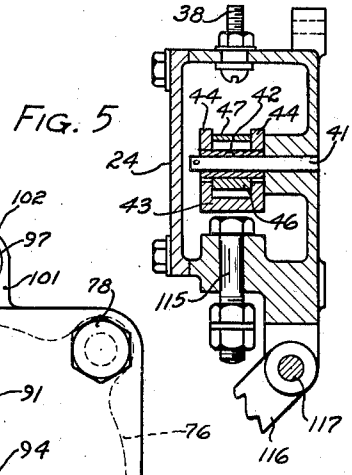


FIG. 5

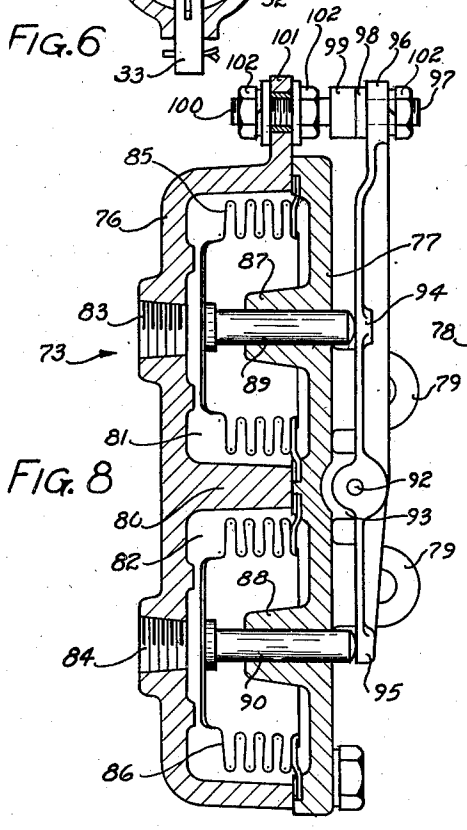


FIG. 8

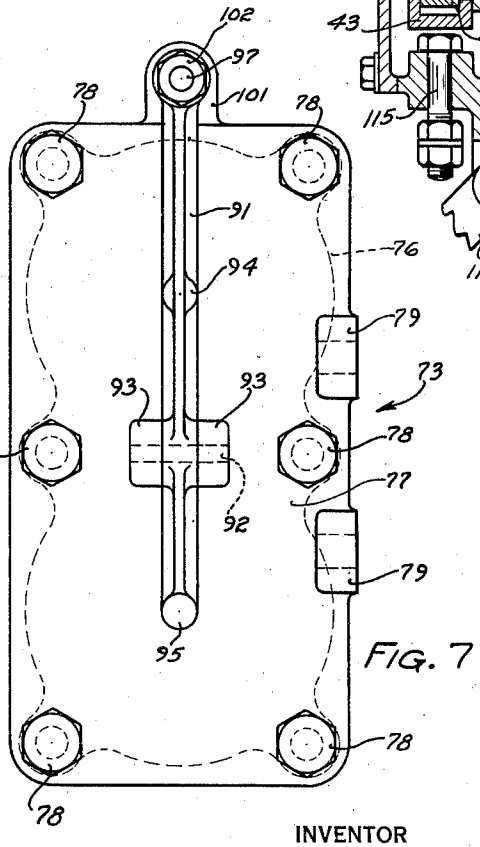


FIG. 7

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Patented Aug. 8, 1939

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UNITED STATES PATENT OFFICE

2,168,605

ATTACHMENT FOR INTERNAL COMBUSTION ENGINES

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Application November 27, 1937, Serial No. 176,844

21 Claims. (Cl. 123—103)

This invention relates to new and useful improvements in internal combustion engine driven vehicles and has particular relation to the engines of such vehicles.

The objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a side elevational view illustrating an embodiment of the invention as applied to the engine of an automobile;

Fig. 2 is a view showing certain parts uncovered and in their normal relative positions and the view also shows the wiring diagram;

Fig. 3 is a view of the main control switch of Fig. 2 in another position;

Fig. 4 is a view similar to Fig. 3 but showing the parts of the main control switch in yet another position;

Fig. 5 is a transverse sectional view through the main control switch as viewed in Fig. 2;

Fig. 6 is a sectional view through the valve operating means of the invention;

Fig. 7 is a plan view of a pressure operated switch means employed; and

Fig. 8 is a sectional view through such pressure operated switch means.

Referring in detail to the drawings, in Fig. 1 is shown a portion of an automobile including a dash 10 and the usual floor boards 11. In front of the dash there is shown a portion of a motor 12 to which fuel is fed as from a carburetor 13 through an intake manifold 14. The supply of fuel is controlled in the usual manner by a throttle valve 15 the stem of which is shown at 15a connected with an operating arm 16 extending to each side of the stem and at one end connected with a spring 17 the tendency of which is to return the throttle valve to closed position when moved therefrom.

Connected with the other end of the arm 16 is a rod 18 the connection being formed as by a pin 19 on the arm and an elongated slot 20 in the end of the rod. At its forward end this rod 18 is pivotally connected with an accelerator or throttle pedal 21 and a coil spring 22 is anchored at one end to the rod and at its other end to a stationary bracket 23 and serves to return the rod and accelerator pedal to their normal positions when moved therefrom.

The mechanism thus far described may be either in the form shown or may be of any other desired or conventional construction. It is simply illustrated as a conventional arrangement in order that the construction and operation of the means of the invention may be fully set forth. Bolted or otherwise secured in any desired position on the automobile as, for example, on the dash 10 is a housing 24 containing a main switching mechanism generally designated 25 and a detailed description of the construction and operation of which will later be given.

This switching mechanism amongst its other functions controls a circuit to coils 26 of a solenoid magnet mounted within a housing 27. The cores 28 of said coils are secured (see Fig. 6) to the walls of housing 27 by means of screws 29. Said coils may be held in place about the cores by any suitable means as, for example, by being driven thereon. It is to be understood that while the coils 26 are shown as connected in series they may be connected in parallel.

Housing 27 is connected with the intake manifold 14 of the engine and in its lower portion the housing includes a port 21 through which air may be admitted directly to the manifold instead of through the fuel supply means or carburetor 13. Arranged in the port or opening 31 is a valve 32 the stem 33 of which extends through the lower end of the housing (see Fig. 6) and the upper end portion of which extends into the space between the magnet coils 26.

To this upper portion of the stem 33 there is secured an armature 34 adapted to be attracted by the electro-magnets and when so attracted adapted to turn the valve stem 33 and consequently the valve 32 shifting the valve to open position whereupon air will be admitted through port 31 to the manifold 14 between the engine and the carburetor. A spring 35 above the armature 34 has one end anchored to the housing as at 36 and has its other end portion wrapped repeatedly around the upper end portion of the valve stem 33. This spring is purposely made of great length so as to exert a constant pressure and the spring tends to retain the valve in closed position and to return it to such position when moved therefrom.

Mounted on the housing 24 or otherwise suitably located are binding posts 37, 38, 39 and 40 respectively. These posts are insulated from the housing and from one another. Within the housing is a shaft 41 rotatably mounting a bushing 42

on which is pivotally mounted a plate-like member 43 having up-turned ears 44 pivotally connecting it with the bushing. Also within the housing and pivotally mounted on the bushing 42 is a second plate-like member or armature 45 bent or off-set intermediate its ends as at 46 (see Figs. 3 and 4) and this off-set intermediate portion embraces the bushing.

A member 47 has an end portion 48 extending between and guided by the upper portions of the ears 44 and extending over the off-set portion of the member 45 and beyond one end of said member. Passing through the member 47 and an end portion of the member 45 is a bolt 49 surrounded by a coil spring 50 constantly tending to keep the member 47 against the member 45 but permitting such members to be pressed apart as shown in Fig. 3.

The member 47 carries a contact element 51 connected with the binding post 39 as by a wire 52 and the plate-like member 43 carries a contact element 53 connected with the binding post 40 as by a wire 54. Further member 43 carries a contact member 55 connected with the binding post 38 as by a wire 56 and the armature member 45 carries a contact member 57 connected with the binding post 39 by a wire 58. Within one end portion of the housing 24 there is arranged an electro-magnet 59, the coil of which is connected with the binding posts 37 and 39 by wires 60 and 61.

A lead 62 connects the binding post 39 with the positive side of a battery 63, which may be the usual automobile battery, while a lead 64 connects binding post 40 with a binding post 65 on the housing 27. Binding post 65 is connected with one of the coils 26 by a wire 66, the coils being connected by a wire 67 while the lead from the coils is shown at 68 connected with a binding post 69 from which a lead 70 extends to a ground. From the binding post 38 a lead 71 extends to the ignition coil 72 of the automobile.

Binding post 37 is connected with a pressure operated switch 73 by a wire 74 and a ground connection for said switch is shown at 75. Switch 73 is shown in detail in Figs. 7 and 8 and the relation of the switch to the engine is shown more particularly in Fig. 1. This switch comprises an outer casing in the form of an elongated cast metal body 76 and a closure portion 77, the latter being removably secured to the former as by bolts 78 and carrying perforated lugs 79 by which the switch may be mounted.

A web 80 cooperating with a portion of the closure 77 partitions the interior of the body into a pair of separate chambers 81 and 82 with which communicate tapped inlet openings 83 and 84 respectively. Within the respective chambers 81 and 82 are bellows type diaphragms 85 and 86 secured in place by having their edges clamped between the body 76 and the closure 77. The closure carries bosses 87 and 88 projecting into the diaphragms 85 and 86 respectively and bearing against the inner ends of the respective diaphragms and slidable through the bosses are pins 89 and 90. Such pins as clearly shown in Fig. 8 pass entirely through the closure 77.

A switch bar 91 is pivotally mounted intermediate its end by means of a pin 92 passing through an intermediate portion of said bar and mounted by a pair of spaced lugs 93 carried on the outer side of the closure 77. Bar 91 includes portions 94 and 95 arranged opposite the projecting ends of the pins 89 and 90 respectively whereby at certain times as will later appear the pins acted on by the diaphragms may cause the bar to rock on its pivotal mounting.

An end portion 96 of bar 91 projects beyond an end of the closure 77 and carries a binding post 97 provided with a contact element 98. Such element is to cooperate with a similar element 99 carried by a binding post 100 mounted on an extension or lug 101 on the end of the body 76 of the pressure switch housing and secured as by clamping nuts 102. The lead wire 74 is connected with the binding post 97 while the ground wire 75 is connected with the binding post 100.

Switch 73 is connected (see Fig. 1) to be responsive to the pressure of water being circulated in the cooling system of engine 12. A water pump 103 is driven from the engine as through gears (not shown) and through a connection 104 draws water from the lower end of a radiator 105. Through a pipe line 106 the pump discharges into the water jacket of the engine. A nipple 107 connects an elbow 108 with the tapped opening 84 in the switch body 76. Therefore the pressure of the coolant being circulated by the pump is acting on the bellows or diaphragm 86 and owing to the particular hook-up shown the velocity pressure of the coolant is acting directly on diaphragm 86.

While the opening 84 is connected with the discharge side of pump 103 the opening 83 is connected with the intake line to the pump, such connection being as through a tube 109. When the pump is not operating or when it is being driven only at low speed as when the engine is idling the respective diaphragms acting through their pins 89 and 90 hold the bar 91 in such position that the contact 98 is spaced from the contact 99. Under such circumstances the switch 73 is said to be balanced as the action of one diaphragm on the bar 91 is balanced by the action of the other diaphragm thereon. Obviously the static pressure of the coolant is the same on each diaphragm.

However, when the engine is operating above idling speed the velocity pressure of the coolant at the discharge side of the pump 103 is sufficiently greater than the pressure at the intake side thereof whereby diaphragm 86 is compressed sufficiently to have its pin 90 acting on the end 95 of bar 91, rock such bar about its pivot 92 to bring contact 98 into engagement with contact 99. Should the engine slow to idling speed or be stopped the required pressure on diaphragm 86 will not be available or will not be enough greater than that on diaphragm 85 to hold the bar 91 in position with contact 98 in engagement with contact 99 and the circuit through such contacts will be broken as will later more fully appear.

The upper end of radiator 105 is closed or sealed as by a valve 110. Such valve cuts off communication between the interior of the radiator and the overflow pipe 111 and the valve is normally held on its seat as by a coil spring 112 disposed about the stem of the valve. Obviously with this arrangement when the pressure within the radiator reaches a predetermined pressure the valve 110 will be forced off its seat and the pressure relieved.

The purpose of valve 110 is to prevent loss of anti-freeze mixture from the radiator but generally the valve is set to open at a pressure of two or three pounds. Obviously such pressure will be present in all parts of the cooling system whereby diaphragm 85 is required to balance the action of diaphragm 86 in so far as the static pressure of the coolant is concerned

and diaphragm 86 when influenced by velocity pressure causes contact 98 to engage contact 99.

Owing to the presence of valve 110 a suction pressure may develop in the cooling system on a drop in temperature in the same. Such suction pressure will tend to expand the diaphragms 85 and 86 drawing their inner ends toward the ports 83 and 84. Should this happen the pins 89 and 90 will be free to move in or leave the arm 91 free to move contact 98 into engagement with contact 99.

To prevent such casual engagement of the contacts the diaphragms are installed in such condition that they are tensioned or expanded from their positions of rest whereby they will not be expanded by a suction pressure in the cooling system and will keep the pins 89 and 90 against the bar 91 so that the latter is never free and casual engagement of contact 98 and 99 can never take place.

In the switch 25 the plate-like members 43 and 45 are mounted for pivotal movement together and separately about the shaft 41, such members moving with the bushing 42 about the shaft. To one side of said shaft between the plate-like members there is arranged a spring 113 having one of its arms connected with each of said members. The normal tendency of this spring is to move said members apart and to keep the contacts 51 and 52 separated. A spring 114 is arranged between the other end portion of member 43 and the bottom wall of the housing 24 and serves to prevent the members 43 and 45 pivoting freely around the shaft 41 in a direction to bring the contact 51 into engagement with the upper wall of the housing and to prevent the contact 55 or an end portion of member 45 coming into engagement with the lower wall of the housing.

The spring 113 causes the off-set portion 46 of member 45 to press against the bushing 42 and forcing downwardly on the member 42 causes the upper ends of the openings 44a in the ears 44 of member 43 to bear downwardly on said bushing. Thus the spring causes the members 43 and 45 to lock themselves about the bushing 42. However, the bushing is free to turn about the shaft 41 so that at the proper times, as will later be described, the members 43 and 45 may rock together or relatively about the shaft without undue friction. If desired the openings 44a in the ears 44 may be elongated as and for the purpose set forth in my application Serial No. 13,019 filed March 26, 1935.

Extending through the wall of the housing 24 in alignment with one end portion of the member 43 is a push rod 115 shown as in the form of a bolt. This rod is slidable through the housing wall and normally is disposed with its inner end in spaced relation to the member 43. A bell-crank lever 116 is arranged at the outer side of the housing being pivoted at 117. Connected to one end of this bell-crank is a rod 118, the other end of which is connected with rod 18 at 119.

In operation the throttle lever 21 is depressed in the usual manner against the action of spring 22 to open the throttle valve 15 and the air inlet valve 32, in the air inlet port 31, remains closed. Therefore there is no change in the normal operation of the engine while it is under load or with open throttle. As long as the engine is being operated at a speed sufficient to cause pump 103 to maintain, at its discharge side, that degree of velocity pressure necessary to have diaphragm 86 overcome diaphragm 85 whereby contact 98 is in engagement with contact 99 the electro-magnet 59 is energized from battery 63 and is attracting the end portion of the plate-like member 45 so that the switch parts are held in the positions in which they are shown in Fig. 2 provided the engine is operating under load or with advanced throttle. The circuit of the magnet is from the battery 63 through line 62, binding post 39, wire 61, from the coil of the magnet through wire 60, binding post 37, wire 74 to binding post 97 of the switch 63 and the ground wire 75 of such switch.

It will be noted in Fig. 2 that the contacts 55 and 57 are in engagement and that the circuit between the ignition means 72 and the battery is closed. Further contacts 51 and 53 are separated so that the circuit to the coils 26 controlling the air inlet valve 32 is open and such valve is therefore closed. If the throttle mechanism is now released or retarded while the engine maintains the predetermined speed as, for example, if the automobile is coasting in gear and the engine is operating above a predetermined speed as when the vehicle wheels are driving the engine, the bell-crank 116 engages and pushes the rod 115 inwardly and it engages an end portion of plate-like member 43 and rocks said member about its pivot shaft 41 in opposition to spring 113.

Since the plate-like member 45 is being held against movement by the energized magnet 59 rocking of the member 43 will serve to separate the contacts 55 and 57 to open the ignition circuit and to bring the contacts 51 and 53 into engagement closing the circuit to the coils 26 with the result that the armature 34 is attracted and against the action of spring 35 the valve 32 is swung to open position. This admits air to the manifold between the engine and the carburetor and relieves any vacuum in the manifold. The air port 31 is large so as to admit sufficient air to supply the engine requirements and therefore fuel will not be drawn into the engine and there will be a free intake and exhaust of air by the engine.

No appreciable amount of vacuum is needed to take air into the engine through port 31 and the opening of valve 32 gives a "free wheeling" effect since the pistons of the engine do not have to work against vacuum. As air, substantially free of fuel is drawn into the engine when the valve 32 is open it will be clear that a considerable saving in fuel results. However, the most important consideration is that with the valve open and air being drawn into the engine through port 31 there is no discharge of partly burned gases by the engine as the latter decelerates.

Should the speed of the engine drop below that necessary to operate the pump in a manner to maintain the necessary velocity pressure at the discharge side of the pump then the diaphragm 86 will expand retracting its inner wall to permit pin 90 to move inwardly and as the pressure on the respective diaphragms becomes equal diaphragm 85 acting through its pin 89 will cause movement of bar 91 about its pivot 92 to carry contact 98 away from contact 99 opening the circuit to the magnet 59. Such magnet being de-energized the plate-like member 45 will be released and will rock about the pivot 41 in a direction to bring contact 57 into engagement with contact 55, thereby closing the engine ignition circuit, and carrying the contact 51 out of engagement with contact 53 opening the cir-

cuit to the coils 26 whereupon spring 35 will close valve 32.

While the parts are in the positions of Fig. 3, that is, with the ignition circuit open, the throttle mechanism retarded and the valve 32 open, should the throttle mechanism be advanced the bell-crank 116 will be carried away from the push rod 115 and the latter will move out of the housing 24 permitting the parts to return to the positions in which they are shown in Fig. 2. This return movement of the parts will be accomplished by the spring 114. It will be understood that when the throttle is advanced the engine will be speeded up so that the pump will be operating at an increased speed and the velocity pressure of the fluid at the discharge side of the pump will be raised whereby the diaphragm 86 will be acted on in a manner to cause its pin to rock bar 91 in a direction to bring contact 98 into engagement with contact 99, thus again closing the circuit to magnet 59. However as contact 53 will now be spaced from contact 51 valve 52 will be closed.

When the throttle is retarded the speed of the engine drops and should the engine drop to a predetermined low speed (either while idling or while operating slowly under load) the fluid coolant being circulated by pump 103 will exert the same pressure on each of the diaphragms 85 and 86, there being an absence of velocity pressure due to the low speed of the pump, and the switch 73 will be in a state of balance and contact 98 will be held spaced from contact 99 so that the circuit to magnet 59 will be open and the magnet will not be energized. Under such conditions retarding of the throttle lever will shift the push rod 115 inwardly and the entire switch mechanism 25 will rock about the shaft 41 into the position shown in Fig. 4. There it will be noted that contacts 55 and 57 are in engagement so that the engine ignition circuit is closed but the contacts 51 and 53 are spaced apart so that the circuit to the coils 26 of the magnet controlling the valve 32 is open. Therefore, the valve 32 will be closed and the engine idle in the usual manner.

Owing to the mounting of the contact carrying member 47 the push rod 115 may operate to rock the member 43 and bring the contact 53 into engagement with the contact 51 without applying sufficient pressure to the armature or member 45 to force said member away from the magnet 59. That is, when the contact 53 engages contact 51 it may push the same upward slightly tensioning the spring 50 which will yield as indicated in Fig. 3.

From the foregoing it will be understood that with the disclosed means the valve 32 will open whenever the throttle lever 21 is retarded and the engine is being driven at a speed sufficient to have the pump 103 force the pressure of the fluid it is circulating up so that there is a differential between the velocity pressure at the intake side of the pump and the velocity pressure at the discharge side thereof. Whenever this last is true the contact 98 is being held in engagement with the contact 99. Thus the valve may open while the automobile is coasting in gear or when the throttle lever is advanced and then suddenly released as when shifting gears.

Obviously binding post 100 may be adjusted to dispose the contact 99 closer to or further from the contact 98 in the normal position of the latter by loosening of the nuts 102 on such post, shifting the post to make the desired adjustment and then tightening said nuts. Depending on the adjustment made a greater or lesser movement of the bar 91 will be required to bring contact 98 into engagement with contact 99. It is preferred that the mentioned adjustment be such that the velocity pressure of the fluid at the discharge side of the pump will act on the diaphragm 86 to cause contact 98 to engage contact 99 whenever the engine is operating above idling speed and will be insufficient for the suggested purpose when the engine is idling.

The engine may idle in the usual manner since on the engine dropping below a predetermined speed contacts 98 and 99 separate and the valve 32 closes. Also such valve closes immediately the throttle is advanced as this permits the push rod 115 to move outward or drop downward away from the member 43. It will now be clear that the device is automatic in its operation and requires no special attention on the part of the operator and that the device will not cause stalling of the engine when the latter is operating at low speed.

While the present device provides for the saving of fuel as above noted attention is directed to the fact that with the throttle closed and the engine being driven by the vehicle at a speed or speeds above idling speed, should the valve 32 be closed or not provided fuel would be drawn into the engine and cracked on coming into contact with the hot parts thereof and then discharged in the form of obnoxious gases. With the present arrangement this is largely prevented. It is also noted that the coils 26 as well as the coil 59 operate off the battery and by a constant voltage so that said coils do not have to be built to withstand fluctuating voltages delivered from the automobile generator.

In connection with the operation of the device it will be noted in Fig. 3 that the magnet 59 is energized and that the contacts 54 and 57 are spaced so that the ignition circuit is open and that the contacts 51 and 53 are in engagement so that the circuit to the valve actuating coils 26 is closed. Now if pressure of the coolant at the discharge side of the pump 103 drops below a predetermined point the parts of switch 25 will move into the relative positions of Fig. 4 and the circuits will be reversed. That is, the ignition circuit will be closed and the circuit to the coils 26 will be opened so that the valve 32 will close and the engine will be idling.

When the parts are positioned as in Fig. 4 should the velocity pressure of the fluid at the discharge side of the pump 103 increase the circuits will again be reversed as the parts will be drawn into the relative positions in which they are shown in Fig. 3. While the parts are as shown in Fig. 4 should the engine be speeded up without depressing the throttle lever as when the automobile starts down a grade the ignition circuit would be opened and the circuit to the coils 26 closed so that the valve 32 would be opened. However, should the accelerator be advanced when the parts are positioned as shown in Fig. 4 the parts would shift into the positions in which they are shown in Fig. 2 and the valve 32 would be closed to have the engine operate in the usual manner.

While the control of the invention has been described in detail as applied to the controlling of valve 32 it will be apparent that it may have other applications and I do not therefore in all my claims limit the control to the specific application herein disclosed.

Having thus set forth the nature of my invention, what I claim is:

1. In combination with an internal combustion engine including a water cooling system, a pump operated in accordance with the speed of said engine and circulating the water in said system, a pressure responsive control means connected with the discharge side of said pump to be influenced by the pump generated and static pressures of the water in said system, other pressure responsive means connected elsewhere in said system to be influenced by the static pressure only of said system, and means whereby said second means balances out the effect of static pressure on the first means leaving the latter to be effected solely by changes in the pump generated pressure of the water in said system.

2. In combination with an internal combustion engine including a water cooling system, a pump operated in accordance with the speed of said engine and circulating the water in said system, a pressure responsive control means connected with said system to be influenced by the pump generated and static pressures of the water in said system, and other means balancing out the effect of static pressure on said first means leaving the latter to be effected solely by changes in the pump generated pressure of the water in said system.

3. In combination with an internal combustion engine including a water cooling system, a pump operated in accordance with the speed of said engine and circulating the water in said system, a pressure responsive control means connected with said system in such manner that static pressure of the system thereon is balanced out whereby said means is actuated solely due to changes in the pump generated pressure of the water in the system.

4. The combination in an internal combustion engine including a water cooling system, a pump operated in accordance with the engine speed and circulating the water in said system, said system including a pressure relief valve whereby a static pressure may be built up in the system, means including an electrically operated valve for stopping the flow of fuel to the engine, switch means controlling a circuit to said valve, means causing closing of said switch means on a change in the pump generated pressure of the water being circulated by said pump, and other means preventing closing of said switch means on a change in the static pressure only of the water being circulated.

5. The combination in an internal combustion engine including a water cooling system, a pump operated in accordance with the engine speed and circulating the water in said system, said system including a pressure relief valve whereby a static pressure may be built up in the system, means including an electrically operated valve for admitting air to the engine substantially to the exclusion of fuel, switch means controlling a circuit to said valve, means causing closing of said switch means on a change in the pump generated pressure of the water being circulated by said pump, and other means preventing closing of said switch means on a change in the static pressure only of the water being circulated.

6. The combination, in an internal combustion engine including a water cooling system, a pump operated in accordance with the engine speed and circulating the water in said system, said system including a pressure relief valve whereby a static pressure may be built up in the system, means including an electrically operated valve for stopping the flow of fuel to the engine, switch means controlling a circuit to said valve, a pair of diaphragms controlling closing of said switch means, means connecting one of said diaphragms with said system at the intake side of said pump whereby said diaphragm is influenced only by the static pressure of the water in said system, and means connecting the other diaphragm with said system at the discharge side of the pump whereby while the static pressure of the water in the system on said other diaphragm is balanced by the static pressure on the first diaphragm the pump generated pressure of the water acts on said other diaphragm to cause closing of said switch.

7. The combination in an internal combustion engine including a water cooling system, a pump operated in accordance with the engine speed and circulating the water in said system, said system including a pressure relief valve whereby a static pressure may be built up in the system, means including an electrically operated valve for admitting air to the engine substantially to the exclusion of fuel, switch means controlling a circuit to said valve, a pair of diaphragms controlling closing of said switch means, means connecting one of said diaphragms with said system at the intake side of said pump whereby said diaphragm is influenced only by the static pressure of the water in said system, and means connecting the other diaphragm with said system at the discharge side of the pump whereby while the static pressure of the water in the system on said other diaphragm is balanced by the static pressure on the first diaphragm the pump generated pressure of the water acts on said other diaphragm to cause closing of said switch.

8. The combination in an internal combustion engine, a throttle lever, a fluid circulating pump actuated by the engine, means including an electrically operated valve for stopping the flow of fuel to the engine, a constant voltage circuit to operate said valve, switching means controlled by the position of said throttle lever and controlling said circuit, other means adapted to render said switching means operative and inoperative, said other means including a pair of diaphragms each arranged to be influenced by the static pressure of the fluid being circulated by said pump and to balance one another and maintain said other means in position rendering said switch means inoperative, and one of said diaphragms also arranged to be influenced by the pump generated pressure of the fluid being circulated by said pump whereby on a change in such pump generated pressure one of said diaphragms overbalances the other to render said switching means operative.

9. The combination in an internal combustion engine including a throttle lever, a fluid circulating pump actuated by the engine, means including an electrically operated valve for admitting air to the engine substantially to the exclusion of fuel, a constant voltage circuit to operate said valve, switching means controlled by the position of said throttle lever and controlling said circuit, other means adapted to render said switching means operative and inoperative, said other means including a pair of diaphragms each arranged to be influenced by the static pressure of the fluid being circulated by the pump and to balance one another and

maintain said other means in position rendering said switching means inoperative, and one of said diaphragms also arranged to be influenced by the pump generated pressure of the fluid being circulated by the pump whereby on a change in such pump generated pressure one of said diaphragms overballances the other to render said switching means operative.

10. In a motor vehicle comprising an internal combustion engine including a water cooling system, a pump actuated by the engine and circulating the water in said system, means for stopping the flow of fuel to the engine, means influenced by the pump generated pressure of the water in said system and operative to render said first means operative when said pump generated pressure varies from a predetermined point, and other means preventing operation of said second means on a variation in the static pressure only of the water being circulated by the pump.

11. In a motor vehicle including an internal combustion engine, a water circulating pump actuated by the engine, means for admitting air to the engine substantially to the exclusion of fuel, means influenced by the pump generated pressure of the water in said system and operative to render said first means operative when said pump generated pressure varies from a predetermined point, and other means preventing operation of said second means on a change in the static pressure only of the water being circulated by the pump.

12. The combination with an internal combustion engine including a fuel supply means and an ignition circuit, an air port to admit air to the engine independent of the fuel supply means, an electrically operated valve normally closing said air port and adapted on being energized to open the port, a water circulating pump actuated by the engine, means adapted to cause energizing of said valve and disruption of said ignition circuit, means influenced by the pump generated pressure of the water circulated by said pump and operative to render said second means operative on a change in said pump generated pressure, and other means preventing operation of the third means on a change in the static pressure only of the water being circulated by the pump.

13. The combination with an internal combustion engine including a fuel supply means and an ignition circuit, an electrically operated valve adapted when energized to cause stopping of the flow of fuel to the engine, a water circulating pump actuated by the engine, means adapted to cause energizing of said valve and disruption of said ignition circuit, means influenced by the pump generated pressure of the water being circulated by the pump and operative to render said second means operative when said pump generated pressure varies from a predetermined point, and other means preventing operation of said third means on a change in the static pressure only of the water being circulated by the pump.

14. The combination with an internal combustion engine including a water cooling system, a pump actuated by the engine and circulating the water in said system, a carburetor to supply fuel to the engine, means controllable by the pump generated pressure of the water being circulated by the pump to eliminate suction pressure in said carburetor only when the engine is operating under forced momentum instead of under load and said pump generated pressure of the water varies in one direction from a predetermined amount and to restore said suction pressure in the carburetor when the pump generated pressure of said water returns to or varies in the opposite direction from said predetermined amount, and other means preventing operation of said first means on a change in the static pressure only of the water in said system.

15. The combination with a motor, a fluid circulating pump actuated by the motor, a fuel supply means and an intake member between the fuel supply and the motor, the intake member having an air port, means closing the air port when the motor is acting under load, means to operate said means to open the air port only when the motor is operating under forced momentum and the pump generated pressure of the fluid being circulated varies from a predetermined amount, and other means preventing operation of said last means on a change in the static pressure only of the fluid being circulated by the pump.

16. The combination in an internal combustion engine including a water cooling system, a pump operated in accordance with the engine speed and circulating water in said system, said system including a pressure relief valve whereby a static pressure may be built up in the system, means for stopping the flow of fuel to the engine, a control shiftable between a position causing operation of said first means and a position preventing such operation of the first means, means for causing shifting of said control to cause operation of the first means on a change in the pump generated pressure of the water in said system, and other means preventing such shifting of said control on a change in the static pressure only of the water being circulated.

17. The combination in an internal combustion engine including a water cooling system, a pump operated in accordance with the engine speed and circulating water in said system, said system including a pressure relief valve whereby a static pressure may be built up in the system, means for admitting air to the engine substantially to the exclusion of fuel, a control shiftable between a position causing operation of said first means and a position preventing such operation of the first means, means for causing shifting of said control to cause operation of the first means on a change in the pump generated pressure of the water in said system, and other means preventing such shifting of said control on a change in the static pressure only of the water being circulated.

18. In combination with an internal combustion engine including a fuel supply and an ignition circuit, a fluid circulating pump actuated by said engine, means for stopping the flow of fuel to said engine and disrupting said ignition circuit, means influenced by the pump generated pressure of the fluid being circulated and operative to render said first means operative when such pressure varies from a predetermined point, and other means preventing operation of said second means on a change in the static pressure only of the fluid being circulated by said pump.

19. In combination with an internal combustion engine including a fluid circulating system, a pump circulating the fluid in said system, a pressure responsive control means connected with said system to be influenced by the pump generated and static pressures of the fluid in said system, and other means balancing out the effect of static pressure on said first means leaving the

same to be effected solely by changes in the pump generated pressure of the fluid in said system.

20. The combination in an internal combustion engine including a water cooling system, a pump operated in accordance with the engine speed and circulating the water in said system, said system including a pressure relief valve whereby a static pressure may be built up in the system, means including an electrically operated valve for stopping the flow of fuel to the engine, switch means controlling a circuit to said valve, a pair of diaphragms controlling closing of said switch means, means connecting one of said diaphragms with said system at the intake side of said pump whereby said diaphragm is influenced only by the static pressure of the water in said system, means connecting the other diaphragm with said system at the discharged side of the pump whereby while the static pressure of the water in the system on said other diaphragm is balanced by the static pressure on the first diaphragm the pump generated pressure of the water acts on said other diaphragm to cause closing of said switch, said switch means including a lever pivoted intermediate its ends, pins carried by said diaphragms and engaging said lever at opposite sides of its pivotal mounting, and said diaphragms tensioned whereby to exert through their respective pins pressure on said lever at the respective sides of its pivotal mounting irrespective of the pressure exerted on the diaphragms by the water in said system.

21. In combination with an internal combustion engine including a water cooling system, a pump operated in accordance with the speed of said engine and circulating the water in said system, a pressure responsive switch means connected with said system, said means including a pair of diaphragms, a pivoted switch lever, said diaphragms exerting pressure against said lever at opposite sides of its pivot, means connecting the first of said diaphragms to be influenced by the pump generated and static pressures of water in said system, and means connecting the second of said diaphragms in said system to be influenced by the static pressure only of the water in the system whereby said second diaphragm acting against said lever balances out the effect of the static pressure on the first diaphragm whereby said switch lever is rocked on its pivot solely due to changes in the pump generated pressure of the water in said system.

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