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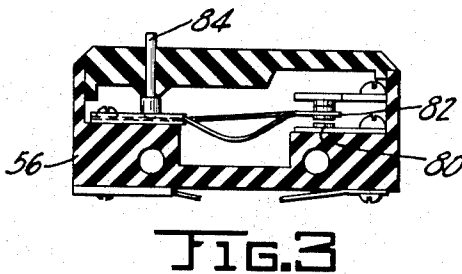
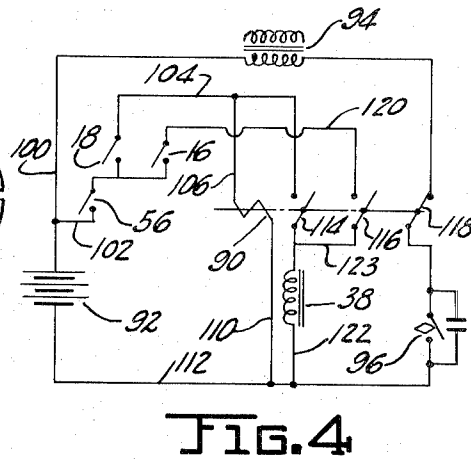
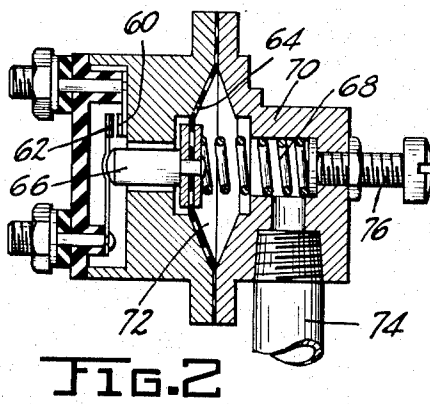
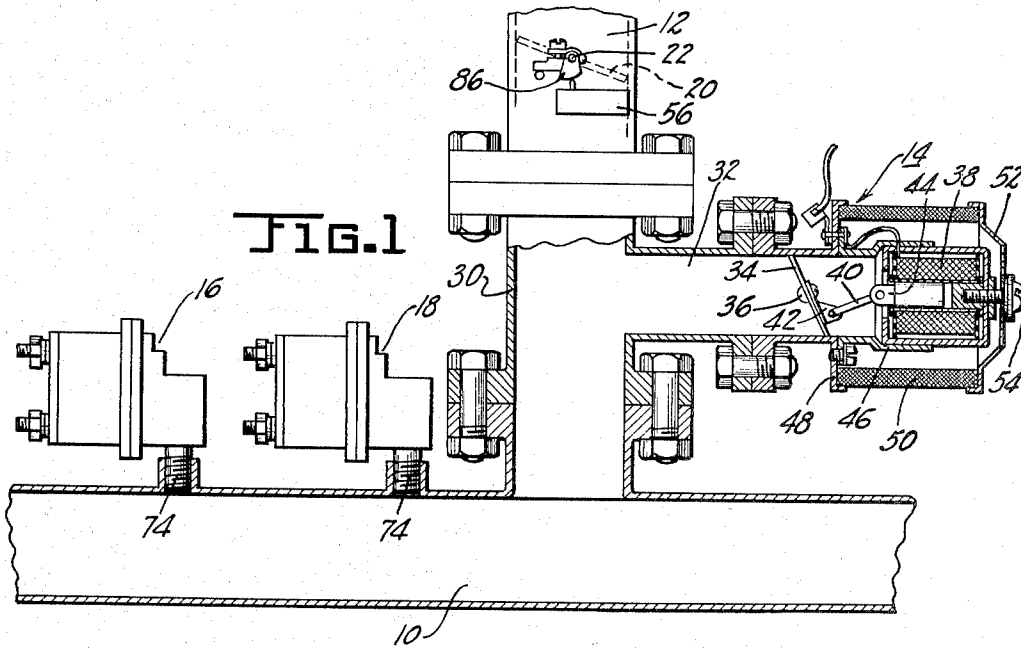
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2,724,375

DEGASSER

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

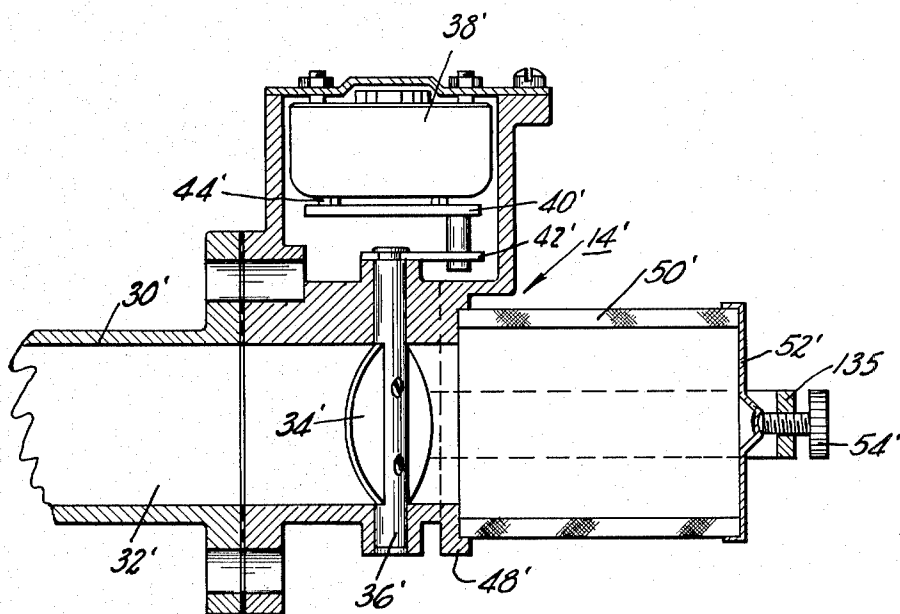


FIG. 5

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The present invention relates to an induction system for internal combustion engines and more particularly to a device for obtaining more economical use of fuel and the elimination of noxious exhaust fumes during deceleration.

The present invention is primarily concerned with a device for admitting air into the induction passage of an internal combustion engine on the manifold side of the throttle while the engine is being driven by the vehicle wheels, as during deceleration of the vehicle so that the normal rise of manifold vacuum under such conditions is reduced with a corresponding reduction in fuel flow. The principal object of this invention is to provide a simple, dependable control system for the aforesaid device, which together with the device can readily be installed on an engine and thereafter easily serviced. Further objects and advantages of the present invention will become apparent from the following description with reference to the accompanying drawings, wherein:

Figure 1 is a view of my device and a section of an engine intake manifold shown in cross section;

Figures 2 and 3 are cross-sectional views of elements of my control system; and

Figure 4 is an electrical circuit wiring diagram for my control system; and

Figure 5 is a view showing an alternate arrangement of my control device.

Referring more specifically to the drawing and to Figure 1 in particular, numeral 10 indicates an intake manifold for a conventional internal combustion engine (not shown), 12 a carburetor, 14 my air inlet control device mounted between the carburetor and manifold as a separate unit, and 16 and 18 vacuum responsive switches mounted on the intake manifold. For the purpose of the present description, carburetor 12 may be considered a conventional downdraft float-type unit having a throttle 20 therein mounted on a shaft 22 and controlled by the operator through a linkage (not shown) connected to one end of the throttle shaft 22.

The air inlet control device 14 supplies air to the engine intake manifold when the engine is being driven by the wheels of the vehicle and includes a body 30 having an auxiliary air inlet passage 32 controlled by a butterfly valve 34 mounted in said passage on a shaft 36. The body is shown as a sandwich type mounted between the carburetor and manifold; however, the body can be dispensed with and the auxiliary passage formed as an integral part of the manifold or of the carburetor on the engine side of the throttle valve. Valve 34 is controlled by a solenoid 38 at the air inlet end of passage 32 and is connected thereto by a rod 40 pivotally secured at one end to valve 34 by bracket 42 and at the other end to a reciprocable core of the solenoid by an extension 44 on the end of the core. The solenoid is spaced from the end of passage 32 and is held firmly in place by a plurality of arms 46 connected to a flange 48 around the inlet end of the passage. The air entering passage 32 can readily pass between the solenoid and flange 48 without any substantial interference

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from arms 46. The air entering passage 32 is preferably filtered, and, in the embodiment shown in the drawing, an air filter unit 50 is mounted on flange 48 and is provided with a cover 52 which, together with screw 54 threadedly received in the outer end of the solenoid, secures the filter unit in place on flange 48. The filter unit can readily be cleaned and serviced by merely removing screw 54.

The solenoid is controlled by three switches, the two vacuum switches 16 and 18 and a switch 56 actuated by movement of the throttle. Switches 16 and 18 are substantially the same in construction and operation and include a stationary contact 60, a movable contact 62 of the leaf spring type and a vacuum responsive diaphragm 64 connected to the movable contact 62 by a plunger 66 and urged in the direction to open the switches by a coil spring 68. The diaphragm is enclosed in a housing 70 and forms one wall of a vacuum chamber 72 therein, said chamber being connected to the intake manifold by a tube 74 which in addition to transmitting the manifold pressure to chamber 72 supports the housing of the switch. Spring 68 determines the degree of manifold vacuum required to open contacts 60 and 62 and is adjusted to the desired degree of vacuum by screw 76 which varies the tension of said spring. When the manifold vacuum increases sufficiently to overcome the force of spring 68 it moves diaphragm 64 to the right, as shown in Figure 2, and permits spring actuated contact 62 to engage contact 60. One of the vacuum responsive switches, for instance switch 16, is adjusted to close when a vacuum of about five inches of mercury is reached, whereas the other switch is adjusted to close only after a vacuum of about 22 inches is reached.

In order to prevent air valve 34 from opening while the throttle is open, switch 56 actuated by the throttle is included in the control circuit for solenoid 38. A switch suitable for the throttle controlled switch is shown in Figure 3 wherein numeral 80 indicates a stationary contact, 82 a movable contact of the leaf spring type and 84 an actuating stem which is moved downwardly by a lever 86 on throttle shaft 22 to close the switch when the throttle reaches fully closed position.

The wiring diagram for the control circuit is shown in Figure 4 and includes a relay 90, a battery 92, ignition coil 94 and a distributor 96, together with the elements of the circuit previously referred to herein.

In the operation of the air valve device and the control system therefor, when the engine is driving the vehicle in a part throttle operation there normally will be sufficient manifold vacuum to close switch 16 but not sufficient to close switch 18. The throttle switch 56 will be open. In this condition the circuit for energizing solenoid 38 will not be closed. If the operator decelerates the vehicle or descends a hill such that the vehicle wheels drive the engine the manifold vacuum will rise to approximately 22 to 24 inches of mercury closing switch 18. Assuming that the throttle is closed, switches 16, 18 and 56 will all be closed, thus completing the circuit from battery 92 through leads 100 and 102, switches 56, 16 and 18, leads 104 and 106, relay 90 and leads 110 and 112 and energizing said relay, which in turn closes switches 114 and 116 and opens switch 118 of the relay. This completes the circuit through leads 100 and 102, switches 56, 16 and 18, and leads 104 and 120, switches 114 and 116, lead 123, solenoid 38 and leads 122 and 112, energizing said solenoid and thereby opening air valve 34. With valve 34 open, no fuel is supplied by the carburetor to the engine and hence no noxious fumes are formed and no popping in the exhaust occurs. The opening of switch 118 by relay 90 opens the ignition circuit from the battery to the distributor, thus preventing chance explosions in the firing chamber and eliminating chain reactions or "popping" therefrom throughout the exhaust systems.

As the vehicle decelerates, the manifold vacuum drops below that required to hold switch 18 closed; however, the circuit through switch 16, lead 120, switch 116, lead 123, switch 114 and leads 104 and 106 keeps relay 90 energized and switch 114 closed, thus keeping solenoid 38 energized and air valve 34 open. Thereafter if the manifold vacuum drops below that required to hold switch 16 closed, the circuits to both solenoid 38 and relay 90 are interrupted permitting air valve 34 to close and return the engine to normal operation. Throttle actuated switch 56 overrides switches 16 and 18 and causes valve 34 to close whenever the throttle is opened.

Various changes may be made in the construction of the elements comprising the control system and air valve device and in the arrangement of elements forming the system without departing from the scope of the present invention. An alternate arrangement is shown in Figure 5 wherein numeral 14' designates an air inlet control device having a body 30' with an auxiliary air inlet passage 32' controlled by a butterfly valve 34' mounted in said passage on a shaft 36'. Valve 34' is controlled by a solenoid 38' and is connected thereto by a bell crank 40' pivotally secured at one end to lever 42' mounted on shaft 36' and at the other end to a rotatable core of the solenoid by an extension 44' on the end of the core. The air entering passage 32' passes through an air filter unit 50' mounted on a flange 48' and is provided with a cover 52' which, together with screw 54' threadedly received in the U-shaped bracket 135, secures the filter unit in place on flange 48'. The control of the solenoid remains the same as discussed with respect to the embodiment shown in Figure 1.

I claim:

1. In an internal combustion engine having an induction passage with a throttle therein: an air inlet in said passage, a valve in said inlet, a solenoid for actuating said valve, a circuit for said solenoid, a switch in said circuit responsive to a predetermined high engine vacuum for energizing said solenoid to open said valve, a second switch in said circuit responsive to a predetermined low engine vacuum for deenergizing said solenoid to close said valve, and a throttle actuated switch in said circuit for overriding said vacuum switches.

2. In an internal combustion engine having an ignition system and an induction passage with a throttle therein: an auxiliary air inlet passage communicating with said induction passage, a valve in said auxiliary passage, an electrical control for said valve, a circuit for said control,

a switch in said circuit responsive to engine vacuum for energizing said control, a second switch in said circuit responsive to engine vacuum for deenergizing said control, means adapted to be actuated by said first vacuum switch for deenergizing said ignition system, and a throttle actuated switch for overriding said vacuum switches.

3. A control mechanism for an internal combustion engine having an induction passage with a throttle valve therein, comprising a means responsive to a predetermined high engine vacuum for energizing said control, a means responsive to a predetermined low engine vacuum for deenergizing said control, a means actuated by said first mentioned means for maintaining said control energized until a predetermined low engine vacuum is reached, and a throttle actuated means for overriding said vacuum responsive means.

4. An electrical control mechanism for an internal combustion engine comprising a circuit for said control, a switch in said circuit responsive to a predetermined high engine vacuum for energizing said control, a switch in said circuit responsive to a predetermined low engine vacuum for deenergizing said control, and a means actuable by said first mentioned switch for maintaining said control energized until a predetermined low engine vacuum is reached.

5. An electrical control mechanism for an internal combustion engine having an ignition system comprising a circuit for said control, a switch in said circuit responsive to a predetermined high engine vacuum for energizing said control, a switch in said circuit responsive to a predetermined low engine vacuum for deenergizing said control, means actuable by said first mentioned switch for maintaining said control energized until a predetermined low engine vacuum is reached, and means operatively connected with said first mentioned means for rendering said ignition system inoperative when said control is energized.

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