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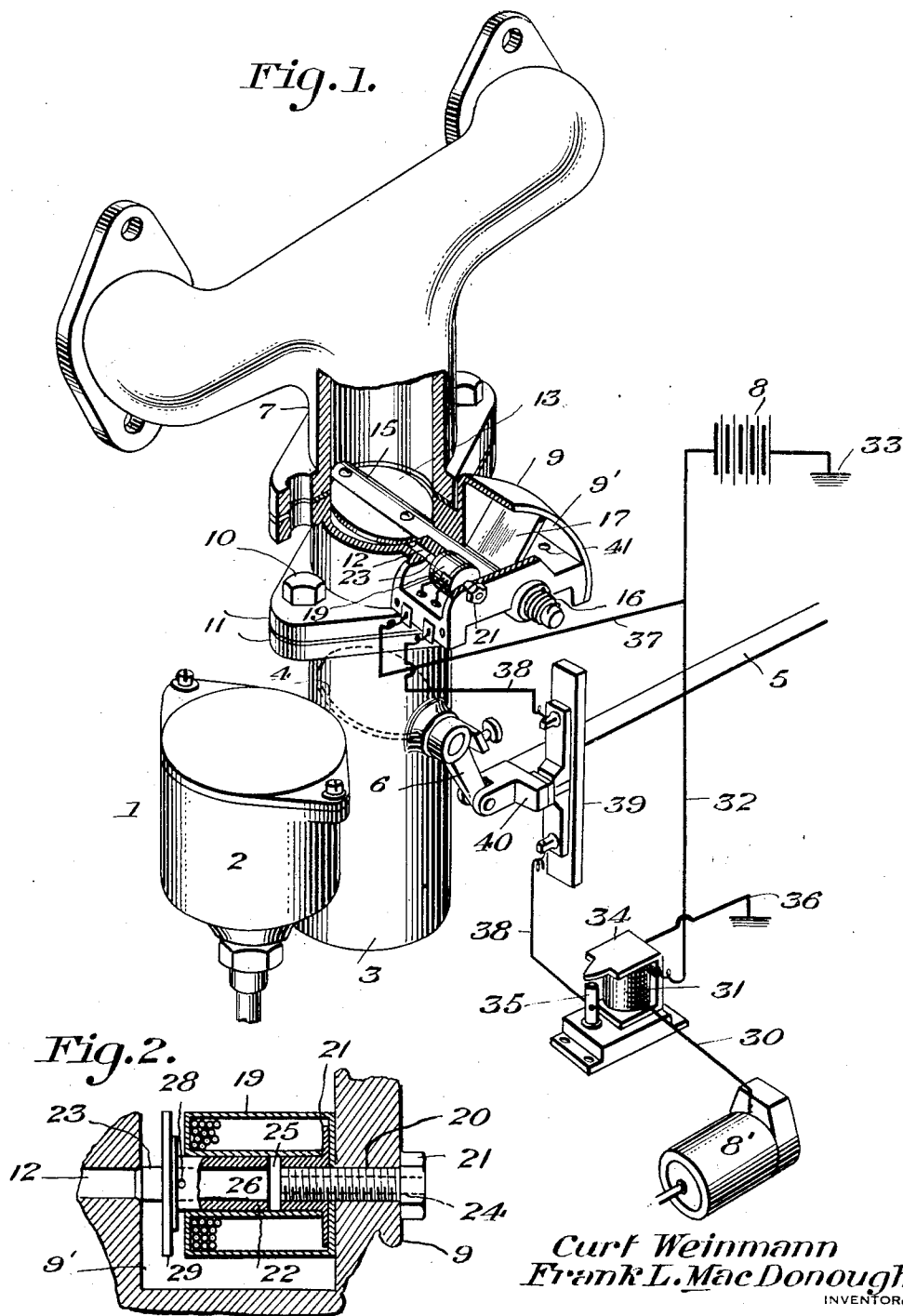
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AUXILIARY AIR INLET

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Fig. 1.



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AUXILIARY AIR INLET

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5 Claims. (Cl. 123—97)

Our invention relates to improvements in auxiliary fuel control apparatus for internal combustion engines of automobiles.

As will be understood, when the accelerator of a car is released the throttle valve of the carburetor is left open to a sufficient degree to permit idling of the engine. During deceleration of the engine to its idling speed an unnecessary amount of fuel is fed thereto. The result is incomplete combustion, fouling of cylinder walls and spark plugs and a waste of fuel and unnecessary expense.

Having the foregoing in mind, the principal object of our invention is to provide an efficient apparatus for use in connection with the carburetor of an internal combustion engine under control of the usual accelerator mechanism and generator to shut off the feed of fuel from the carburetor when the accelerator is released and during the ensuing deceleration of the engine to its idling speed, and whereby the feed of the fuel is again permitted when the engine has reached its idling speed and automatically regulated to maintain the constant idling speed of the engine.

The invention will be fully and comprehensively understood from a consideration of the following detailed description when read in connection with the accompanying drawing which forms part of the application, with the understanding, however, that the improvement is capable of extended application and is not confined to the exact showing of the drawing nor to the precise construction described and, therefore, such changes and modifications may be made therein as do not affect the spirit of the invention nor exceed the scope thereof as expressed in the appended claims.

In the drawing:

Fig. 1 is a perspective view of an apparatus constructed in accordance with our invention, parts being broken away and shown in section; and

Fig. 2 is a transverse vertical section, drawn to an enlarged scale, of a control valve forming part of our apparatus.

Referring to the drawing, the numeral 1 designates a carburetor having the usual float valve chamber 2, mixing chamber 3 and throttle valve 4, the latter controlled by the usual accelerator mechanism including the pull rod connection 5 and crank 6. Numeral 7 designates the usual intake manifold for connection to an internal combustion engine in a manner which needs no description and therefore has not been illustrated.

The numeral 8 designates the battery, for instance, of an automobile, and 8' the generator charging the battery.

According to our invention a closed semi-circular casing 9 is arranged, as by bolts 10 and flanges 11, between the carburetor 1 and the intake manifold 7, at one side of the latter, said casing forming a chamber 9' communicating with the intake manifold 7 thru a port 12. An auxiliary valve 13, of the butterfly variety, is located in said manifold 7, below the port 12, said valve having a valve stem 15 projecting into the chamber 9' and rotatably mounted in any suitable manner. A coil spring 16 is suitably arranged on the valve stem 15 to yieldingly retain the valve 13 in open position. A radial blade or vane 17 is secured to the valve stem 15 within the chamber 9' for a purpose presently apparent.

A solenoid 19 is mounted in the chamber 9', at one side of the vane 17, by a hollow screw bolt 20 and nut 21, said bolt passing thru the wall of the casing 9 and being aligned with the core 22 of said solenoid. The latter is located so that the outer end of the core forms a valve 23 movable in opposite directions, respectively, to open and close the port 12. A bore 24 in the bolt 20 admits air to a passageway 25 in the solenoid. The inner end of the core 22 has a bore 26 communicating with the passageway 25 and terminating in a relief port 28 arranged to open into the chamber 9' when said valve 23 is moved in a direction to close the port 12, said relief port being closed when said valve is moved in the opposite direction. A disk 29 is fixed to valve 23.

The valve 23 is moved in a direction to open the port 12 under the conjoint control of the accelerator mechanism 5 and the generator 8' by the following means. A conductor 30 connects the generator 8' to one side of a solenoid coil 31, the other side of which is connected by a conductor 32 to one side of the battery 8, the other side of which is grounded as at 33. The solenoid 31 is designed to attract a resilient contact 34 into engagement with a contact 35, said contacts forming a circuit making and breaking device grounded as at 36. One side of the solenoid 31 is connected by a conductor 37 to the conductor 32. The other side of said solenoid 31 is connected by conductors 38 to the before-mentioned contact 35 and a circuit making and breaking device 39 is arranged in this line of connection 40 on the pull rod 5 when the accelerator mechanism is released and to be opened when said mechanism is operated to increase the speed of the engine.

Referring to the operation of our invention, under normal operating conditions the throttle valve 4 is in open position and the contact 40 is held away from the circuit breaker 39 by the accelerator draw rod 5, and the current from the generator 8' has energized the solenoid 31 to attract the contact 34 into engagement with the contact 35. The auxiliary valve 13 is held open by the spring 16 and the suction from the intake manifold 7 pulls the valve 23 into position to close the port 12. When the accelerator draw rod 5 is released to partially close the throttle valve 4, as will be understood, the circuit making and breaking device 39 is closed by the contact 40. A circuit is thus closed from the battery 8 thru conductors 32 and 37 to one side of the solenoid 19 and from the other side of said solenoid thru conductor 38, circuit breaker 39 and contacts 35 and 34 to ground 36. The solenoid 19 is thus energized to attract the core 22 thereof and move the valve 23 in a direction to open the port 12 and close the relief port 28, whereupon the suction in the manifold 7 creates a vacuum in the chamber 9' sufficient to cause the blade 17 and valve stem 15 to rotate against the tension of the spring 16 and rock said valve 13 to closing position. At this point the feed of fuel is completely cut off while the engine is decelerating to idle speed. Obviously when the engine has reached its idle speed the current from the generator becomes weaker. The solenoid 31 is so designed that when the engine has reached its idle speed it is inoperative to attract the contact 34 under the charge of the generator 8', so that the circuit is broken when the engine has decelerated to its idle speed, as will be clear. Obviously, if the operator accelerates the engine thru the accelerator rod 5, the circuit will be broken by the circuit breaker 39. As soon as the circuit is broken at either point the suction in the intake manifold 7 again operates to close the port 12 in a manner before described. The vacuum in the chamber 9' being broken thru the relief port 28, port 26, passage 25 and port 24, whereupon the valve stem 15 and blade 17 are returned by the spring 16 to open the auxiliary valve 13.

If desired a relief port 41 may be suitably located in the casing 9 to relieve back pressure against return of the blade 17.

What is claimed as new is:

1. In fuel control apparatus for internal combustion engines, the combination with a carburetor having a throttle valve, an accelerator mechanism for controlling the throttle valve, and an intake manifold, of a casing secured to the manifold and forming a chamber in which a vacuum is created by suction in said manifold, an auxiliary valve in said manifold operative by the vacuum in said chamber, and a valve in said chamber for breaking the vacuum therein and

under the control of the accelerator mechanism.

2. In a fuel control mechanism for internal combustion engines, the combination with a carburetor having a throttle valve, accelerator mechanism for controlling said valve, an intake manifold, a battery, and a generator in circuit with the battery, and an auxiliary valve in said manifold, means for operating said valve by suction in said manifold, an electrically operative valve for controlling said means, and means for connecting said valve in circuit with said battery and generator and including circuit makers and breakers operative by said accelerator mechanism and fluctuations in the current generated by said generator, respectively.

3. In a fuel control apparatus for internal combustion engines, the combination with a carburetor having a throttle valve, an accelerator mechanism for controlling said valve, and an intake manifold, of a casing secured to the manifold and forming a chamber in which a vacuum is created by the suction in the manifold, an auxiliary valve in said manifold having a stem projecting into said chamber, for rotation therein, a vane on said stem whereby the vane is rotated by the vacuum in the chamber, a valve in said chamber for breaking the vacuum therein, and electrical means for operating said valve under control of the accelerator mechanism.

4. In a fuel control apparatus for internal combustion engines, the combination with a carburetor having a throttle valve, an accelerator mechanism for controlling said valve, an intake manifold, and a generator, of an auxiliary valve in said manifold, means for operating said valve by suction in said manifold and including, a control valve movable in opposite directions to determine whether or not said suction shall be effective or ineffective, respectively, and operative in one direction by said suction, and electrical means for moving said control valve in the opposite direction under control of said accelerator mechanism, and generator.

5. In a fuel control apparatus for internal combustion engines, the combination with a carburetor having a throttle valve, an accelerator mechanism for controlling said valve, an intake manifold, and a generator, of an auxiliary valve in said manifold, means for operating said valve by suction in said manifold and including, a control valve movable in opposite directions to determine whether or not said suction shall be effective or ineffective, respectively, and operative in one direction by said suction, electrical means for moving said control valve in the opposite direction under control of said accelerator mechanism, and means for rendering said electrical means alternately effective and ineffective and under control of said generator.

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