

- [54] **ENGINE ANTI-DIESEL CONTROL**
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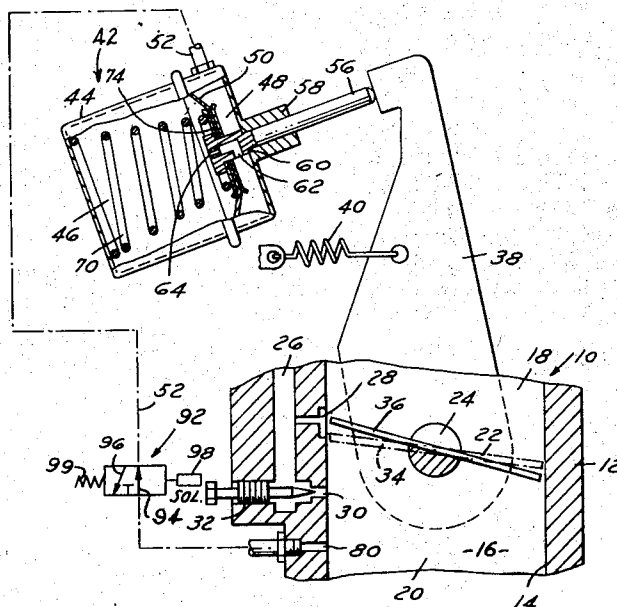
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[57] **ABSTRACT**

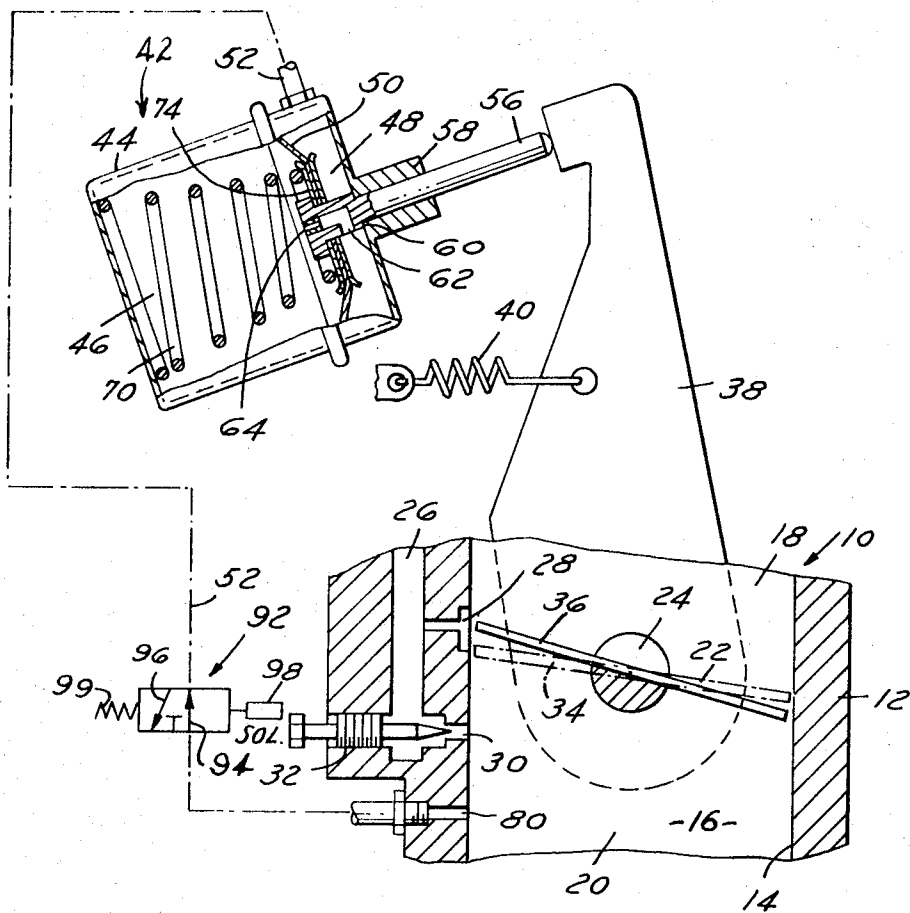
The throttle valve of a downdraft type carburetor is controlled in its movement by a servo in turn controlled by manifold vacuum changes; springs initially move the throttle valve to an idle speed setting for engine starting as well as engine idling; and, engine shutoff permits vacuum in a reservoir to temporarily move the throttle valve towards a closed position to prevent dieseling.

2 Claims, 1 Drawing Figure



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ENGINE ANTI-DIESEL CONTROL

This invention relates, in general, to a device for positioning the throttle valve of a carburetor to minimize the emission of undesirable elements into the atmosphere. More particularly, it relates to a vacuum controlled servo to control fuel and air flow through a carburetor after engine shutdown to prevent engine dieseling and the passage of unburned hydrocarbons into the atmosphere, while at the same time position the throttle valve for an engine idling speed and good starting conditions.

The problem of engine dieseling after the engine has been shut off is recognized. So long as the engine crankshaft continues to rotate, a vacuum signal will be present in the carburetor throttle bore below the throttle valve to pull idle system fuel and air into the hot combustion chamber, such that combustion is maintained for a few seconds or longer even though the engine ignition is shut off. This naturally is undesirable.

In the prior art devices, the minimum flow and engine idle speed positions of the throttle valve usually are the same. Therefore, when the engine is shut off, the above condition exists; that is, the vacuum signal still present for a few seconds draws a sufficient charge of fuel/air mixture into the combustion chamber to maintain the engine running.

The invention eliminates the above problem by providing a servo that automatically closes the throttle valve upon engine shutdown, thereby reducing the quantity of fuel/air mixture below a level needed to overcome the frictional resistance of the engine to sustain running. The servo subsequently repositions the throttle valve to the engine start position, which in this case also corresponds to the engine idle speed position.

It is one of the objects of the invention, therefore, to provide a carburetor with a throttle valve positioner that will automatically position the throttle valve for engine start and idle speed operations; and that will prevent engine dieseling upon engine shutdown to minimize the passage of unburned hydrocarbons into the exhaust system and atmosphere.

It is also an object of the invention to connect the throttle valve of a carburetor to a servo that is controlled by manifold vacuum that will close the throttle valve to reduce the flow of fuel and air to the engine cylinders upon engine shutdown; or, will normally position the throttle valve for engine start and idle speed running.

Other objects, features and advantages of the invention will become more apparent upon reference to the succeeding detailed description thereof, and to the drawing illustrating a preferred embodiment thereof, wherein the FIGURE illustrates schematically a cross-sectional view of a portion of a carburetor embodying the invention.

A portion 10 of a downdraft type carburetor is illustrated, although it will be clear as the description proceeds that the invention is equally applicable to other types of carburetors, such as updraft or sidedraft, for example. More particularly, the carburetor is provided with a main body portion 12 having a cylindrical bore 14 providing the conventional air/fuel induction passage 16. The latter is open at its upper end 18 to air at essentially atmospheric pressure passing through the conventional air cleaner, not shown. At its lower end 20, passage 16 is adapted to be connected to a conven-

tional intake manifold, from which the air and fuel mixture passes to the engine cylinders, not shown, in a known manner.

The flow of air and fuel through induction passage 16 is controlled in this instance by a conventional throttle valve 22. The latter is mounted on a shaft 24 rotatably mounted in the side walls of body 12, in a known manner. A main fuel system is not shown, since it can be any of many known types. Suffice it to say that the fuel would be inducted into passage 16 above the throttle valve in a known manner as a function of the rotation of the valve from its fully closed position 34 to a wide open nearly vertical position, by the change in vacuum signal.

The carburetor also contains a conventional idle system for supplying the necessary fuel and air to the engine cylinders around the throttle valve during engine idling speed operation. A bypass passage 26 contains the usual transfer port 28 and a discharge port 30 controlled by an adjustable needle valve 32.

The transfer port 28 is located so that its lower edge is aligned with the edge of the throttle valve plate in its closed dotted line position 34. Alternatively, if desired, the transfer port can be located vertically in other positions relative to the throttle plate edge when in the closed position. The full line position 36, on the other hand, indicates the idle speed position of the throttle valve.

It will be clear that in the closed position 34, the idle passage area exposed to the vacuum existing below the throttle valve is reduced from that when the throttle valve is in position 36. Therefore, a lower quantity of fuel and air will flow at this time as the part of the transfer port 28 above the throttle valve edge subjects passage 26 to an ambient or atmospheric pressure bleed. The quantity flowable past the needle valve at this time therefore is determined to be insufficient to provide the torque necessary to overcome the engine friction.

It will also be seen that when the throttle valve is positioned in its idle speed position 36, the transfer port area subjected to the vacuum signal below the throttle valve is increased so as to increase the amount of fuel and air to pass through the idle system to the amount needed to maintain the engine at idling speed.

To accomplish the above, a lever or link 38 is fixed on or formed integral with the throttle valve shaft 24 for rotation with it, a tension spring 40 biasing lever 38 in a counterclockwise direction at all times to bias the throttle valve towards its closed position 34.

The lever 38 is adapted to be moved clockwise to the right, as seen in the FIGURE, by a servo 42 to rotate throttle valve 22 clockwise to its engine idle speed position 36. The servo includes a shell type housing 44 divided into two vacuum chambers 46 and 48 by an annular flexible diaphragm 50. A vacuum line 52 is connected to chamber 48. A stem type actuator or plunger 56 is secured to one side of diaphragm 50, and slidably and sealingly projects through a boss 58 on shell 44. The base of plunger 56 is stepped as at 60 to form a stop to limit rightward movement of the plunger. The base of plunger 56 extends through the diaphragm 50, and contains a passage 62 to provide communication between the chambers 46 and 48. An orifice or flow restriction 64 is inserted in passage 62. The orifice delays decay of vacuum from chamber 46 at times, and, therefore, constitutes chamber 46 as a reservoir, as will be explained more fully later.

A compression spring 70 is seated between one end of the shell or can 44 and a diaphragm retainer 74. It normally biases plunger 56 to the right to the position shown. The force of spring 70 is chosen to be greater than that of return spring 40 so that in the absence of vacuum, or a balancing of vacuum, in chambers 46 and 48, spring 70 can move plunger 56 to rotate the throttle valve to the idle speed position 36 shown. Vacuum in the reservoir chamber 46 alone, on the other hand, will retract plunger 56 sufficiently to allow spring 40 to rotate the throttle valve 22 to its closed position 34.

The vacuum to line 52 emanates from an intake manifold vacuum port 80 shown opening into the carburetor body portion 12 below the throttle valve. It could equally be tapped directly into the intake manifold below. The vacuum is sensed to line 52 through a spring vented, electrically connected valve 92 of the on-off type. More specifically, the valve body is illustrated schematically as provided with a straight through passage 94 and a vent or atmospheric passage 96. A solenoid 98 when energized normally positions the valve as shown to connect port 80 to passage 52 to allow vacuum to be applied to servo chamber 48. A spring 99 moves valve 92 to vent passage 54 when the solenoid is deenergized.

Valve 92 preferably forms part of the conventional engine ignition circuit. Details of the construction and operation of the same are not given since they are known and believed unnecessary for an understanding of the invention. Suffice it to say, however, that the latter would include an ignition key operated switch bridging or breaking the circuit from a battery to the coil of solenoid 98. When the coil is energized, when the engine is running, valve 92 will be forced leftwardly against the force of a spring 99 to the position shown.

The operation of the system is as follows. Prior to engine startup, servo chambers 46 and 48 are at atmospheric pressure, permitting the stronger spring 70 to locate the plunger 56 against the boss 58 and the end of lever 38 and against the force of return spring 40. This positions lever 38 to open the throttle valve to its idle speed or start position 36.

As soon as the engine is cranked and started, the turning of the ignition key energizes solenoid 98 to move valve 92 to the position shown. Manifold vacuum admitted to chamber 48 will slowly bleed through the orifice 64 into chamber 46 until the vacuum level in chamber 46 builds up to that in chamber 48. The throttle valve, however, and plunger 56 remain in the positions shown, with normal engine idling fuel and air supply being inducted into passage 16 through the orificed discharge port 30.

Assume now that the engine is shut off by turning the ignition key. This opens the ignition switch and deenergizes solenoid 98. This moves valve 92 to immediately bleed line 52 and chamber 48 to atmospheric pressure. As soon as the engine is shut down, the intake manifold vacuum in port 80 decays almost immediately to an atmospheric pressure level. The bleed valve 92 is used, however, as a compensator in the event of a delay in the decay of manifold vacuum at engine shutdown, for any reasons.

Because of the orifice or flow restrictor 64, the vacuum in reservoir 46, however, will be only slowly bled to atmospheric pressure. This delay of say five seconds, for example, is sufficient to permit the vacuum in the servo chamber 46 to retract diaphragm 50 and plunger

56 to the left until the throttle valve is permitted (by spring 40) to move to the closed position 34. This reduces the fuel and air flow to the engine cylinders from the idle system below the level necessary to sustain running of the engine.

It will be noted that once the vacuum in reservoir 46 does decay to near atmospheric pressure, than the force of spring 70 will be sufficient to return the throttle valve to the right to its engine idle or engine start position 36 shown.

Therefore, it will be seen that the invention provides a throttle valve positioner that prevents engine dieseling after the engine is shut off for a period of time sufficient to permit the engine to come to rest; and, repositions the throttle valve to an attitude providing engine starting and idling.

While the invention has been showed in its preferred embodiment in the drawing, it will be clear to those skilled in the arts to which it pertains that many changes and modifications may be made thereto without departing from the scope of the invention.

We claim:

1. An engine anti-dieseling carburetor throttle valve positioner comprising, in combination, an engine carburetor having an induction passage open to essentially atmospheric pressure at one end and adapted to be connected to an engine intake manifold at the opposite end so as to be subject to varying engine vacuum, a throttle valve rotatably mounted across the passage and movable from an essentially closed first position to a second engine idle speed position and beyond to a wide open throttle position, and return, for controlling flow through said passage, and control means to move the throttle valve to the first and second positions, the control means including first means operatively biasing the throttle valve to the first closed throttle anti-diesel position, second means biasing the throttle valve towards the second position, and engine manifold vacuum sensitive means operable upon engine shutdown to initially move the throttle valve to the closed throttle first position to prevent engine dieseling and subsequently permit return movement of the throttle valve to the second open idle speed position by the second spring means to condition the engine for starting, the vacuum sensitive means including a vacuum servo having a movable diaphragm dividing the servo into first and second vacuum chambers, means connecting the first chamber to manifold vacuum at a point in the carburetor induction passage below the throttle valve, plunger means connected to the diaphragm operably engagable with the throttle valve, and flow restricting means interconnecting the first and second chambers for the slow bleed of vacuum into and out of the second chamber whereby upon engine shutdown, the immediate decay of engine manifold vacuum in the first chamber permits vacuum in the second chamber to effect movement of the throttle valve to the first closed throttle anti-diesel position, the subsequent decay of the vacuum in the second chamber through the flow restricting means permitting return movement of the throttle valve to the open throttle second position by the second spring means.

2. An engine anti-dieseling carburetor throttle valve positioner comprising, in combination, an engine carburetor having an induction passage open to essentially atmospheric pressure at one end and adapted to be connected to an engine intake manifold at the opposite end so as to be subject to varying engine vacuum, a

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throttle valve rotatably mounted across the passage and movable from an essentially closed first position to a second engine idle speed position and beyond to a wide open throttle position, and return, for controlling flow through said passage, and control means to move the throttle valve to the first and second positions, the control means comprising a vacuum servo having a flexible movable diaphragm dividing the servo into first and second vacuum chambers, plunger means connected to the diaphragm and projecting outwardly of the servo for operative engagement with the throttle valve, first spring means in the first chamber biasing the diaphragm and plunger to a first throttle valve open position, second spring means of lesser force than the first spring means operatively biasing the throttle valve to-

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wards a second closed position, means connecting the second chamber to engine intake manifold vacuum, and orifice means connecting the vacuum from the second chamber to the first chamber during engine operation to constitute the first chamber as a vacuum reservoir, whereby upon engine shutdown essentially immediately decaying manifold vacuum in the second chamber, the vacuum in the first chamber is effective to effect a movement of the throttle valve to the closed anti-diesel second position until such time as sufficient vacuum in the first chamber is bled through the orifice to permit return movement of the throttle valve to the open throttle first position by the first spring means.

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