

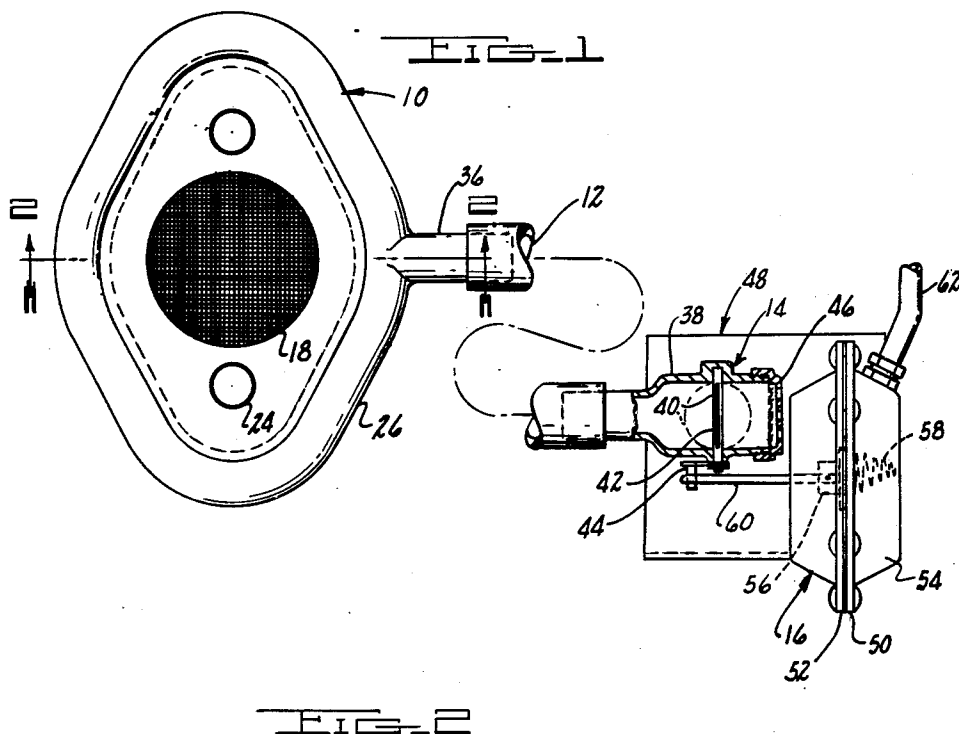
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VACUUM CONTROLLED GAS SAVER

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VACUUM CONTROLLED GAS SAVER

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Continuation of abandoned application Ser. No. 578,309,
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No. 84,457

1 Claim. (Cl. 123—124)

This is a continuation of my co-pending application S.N. 578,309, titled "Vacuum Controlled Gas Saver," and filed April 16, 1956, and now abandoned.

This invention relates to means for improving the gas mileage of an automotive vehicle, truck or other engine, without the sacrifice of design horsepower.

The carburation systems of most automotive vehicles is designed to supply more fuel to an engine operating at normal highway speeds than is actually consumed; that is a richer fuel-air mixture than is necessary under normal operating conditions. This is done in order to have additional fuel available for acceleration and other added power demands when and if required without complicated carburetor controls at the lower engine operating speeds. Obviously, this results in inefficiency and reduces gas mileage by sacrificing fuel that is seldom required. At the same time, it is appreciated that the availability of additional power is a requisite for highway safety.

Numerous gas saving devices have been previously suggested but these have either required some sacrifice of available horsepower, or have been too costly for the savings involved.

The automotive industry has found the problems of economy and horsepower incompatible within a simple carburation system and have been required to go to a dual carburation system for their more high powered vehicle engines. In such dual systems a second carburetor, in effect, is used under high power conditions. Obviously, such a carburetion system is most expensive and extremely complicated. This in turn requires the utmost care and maintenance to assure that additional fuel will be made available when additional power is required.

The gas saving device of my invention is exceptionally simple in construction and therefore both inexpensive to manufacture and to install. Most important, it is usable with a simple carburetion system to affect full economy without a sacrifice of power.

My invention relates to means of supplying supplementary air to the intake manifold of an internal combustion engine at operational conditions which will not adversely affect normal engine starting, idling or high power operation. This is accomplished by making use of a vacuum responsive control similar to the automatic spark advance timing control commonly used on automotive vehicles. This control enables the introduction of supplemental air into the intake manifold of an engine only during constant driving conditions and is adapted to automatically shut-off such additional air when lesser or greater power demands are imposed on the engine.

It will be appreciated that the spark-timing control referred to is connected to an engine carburetor on the atmospheric side of the throttle valve and that there is no appreciable vacuum on such side during engine starting and idling when the throttle valve is closed. However, during normal operation the throttle valve is opened more and the vacuum condition is increased relative to the engine speed. This is used to advance the spark timing at high engine speeds while assuring against spark advance at idling speeds which might cause the engine to stall.

The control of this invention is similarly responsive to vacuum conditions in the carburetor on the atmospheric side of the throttle valve to selectively introduce and cut-

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off the supply of supplemental air to an engine. As will be shown, such control assures against too lean a combustible mixture during engine starting and idling conditions when the throttle is closed, and similarly guarantees a cut-off of supplemental air when the throttle is partially closed and is required to be opened at high speeds to effect an acceleration of the engine in response to a higher power demand. In this manner, the design horsepower of an engine is always available when additional power is called for.

It is accordingly an object of this invention to provide a simple, inexpensive and operational mechanism for supplying and controlling the supply of supplemental air to the intake manifold of an internal combustion engine to assure greater fuel economy without a sacrifice of engine horsepower.

It is also an object of this invention to provide a control mechanism for introducing supplemental air to the carburetion system of an engine only at operational conditions of the engine which will not adversely affect engine starting or idling nor response to demands for more power at higher operating speeds.

A further object of this invention is to teach a method of controlling the supply of supplemental air to an internal combustion engine which has not been heretofore practiced and which produces most satisfactory results.

More specifically, it is an object of this invention to teach the method, and disclose a device suitable for practicing such method, wherein the vacuum condition within an engine carburetor immediately adjacent and on the atmospheric side of the throttle valve is used to open supplementary air supply means at a predetermined engine operating condition and is countermanded in the course of any demand upon the engine for additional power to shut off such supplemental air immediately and re-establish the fuel-air ratio originally intended for such engine.

Other objects of this invention will appear in the following description and appended claim, reference being made to the accompanying drawings forming a part of this specification and wherein like reference characters designate corresponding parts in the several views.

In the drawings:

FIG. 1 is an illustration of one embodiment of the gas saver of the present invention.

FIG. 2 is an illustration showing the supplementary air inlet ring of the gas saver of FIG. 1 in cross section as seen in the direction of the arrows 2—2 of FIG. 1 and installed in the intake port of the intake manifold of an internal combustion engine and illustrating the vacuum line connection thereto.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring to FIG. 1 the elements of the gas saver of the present invention comprise a supplementary air inlet ring 10, a conduit 12 connecting between said air inlet ring 10 and a valve 14 and a vacuum actuated control means 16 mounted for operation of said valve 14.

The supplementary air inlet ring 10 is provided with a central passage 18 which, as shown in FIG. 2, and is mounted in alignment with the intake port 20 of the intake manifold of an internal combustion engine (not shown) to allow passage of the air-fuel mixture from the carburetor into the intake manifold.

The supplementary air inlet ring 10 is preferably mounted directly on top of the intake port 20 underneath

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the carburetor. In FIG. 2, the lower portion of a conventional carburetor (not shown) is illustrated for convenience as a conduit 22. The supplementary air inlet ring is also provided with the two apertures 24 through which pass the bolts (not shown) that are used to mount the carburetor on the upper surface of the intake port 20 of the intake manifold.

The supplementary air inlet ring 10 comprises the peripheral chamber 26 and upper and lower transverse flanges 28 and 30 defining therebetween a passageway 32 between the peripheral chamber 26 and the central passage 18. A plurality of screens 34 are positioned in this passageway 32 and extend across the central passage 18. The screens 34 are so arranged that the wires in each are at angles to the wires in the others to provide a maximum atomization of the fuel-air mixture passing through the central passage 18. The screens also serve to assure a uniform distribution of the supplementary air introduced from the peripheral chamber 26 into the central passage 18.

An inlet 36 to the peripheral chamber 26 is provided. The conduit 12 connects between this inlet and the valve 14. The valve 14 comprises a casing 38, a disk 40 affixed to a shaft 42 and a crank arm 44 affixed to the outer end of shaft 42. The shaft 42 extends transversely through the casing 38 and is journaled therein for rotational movement. The valve 14 is thus balanced against the force of the vacuum in the conduit 12. That is, the force of this vacuum has no effect on the operation of the valve since its action on the top half of the disk 40 would tend to open the valve but at the same time its action on the bottom half of the disk 40 would equally tend to close the valve. One end of the casing 38 is open to allow passage of air through the valve 14 and via the conduit 12 to the gas saver ring 10. This opening in the casing 38 is provided with suitable filter means 46 which can be a fine screen or combination screen and cloth to filter the incoming supplementary air.

The valve 14 is mounted in the motor compartment (not shown) of an automobile in any desired manner. For example, the valve 14 may be mounted on a plate or bracket 48 which can be affixed to one of the sidewalls of the motor compartment or to the motor itself. Also mounted on the bracket 48 is the vacuum actuated control means 16, which opens and closes the valve 14.

The vacuum control means 16 comprises a casing 50 and a flexible diaphragm 52 disposed transversely through the middle of said casing 50 and defining in conjunction with the right half of said casing as viewed in FIG. 1, a chamber 54. Affixed to the center of this diaphragm is a collar 56 and disposed on the opposite side of the diaphragm between the diaphragm and the end wall of chamber 54 is a spring 58 operative in compression to urge the diaphragm toward the left as viewed in FIG. 1.

Extending between and affixed to the collar 56 and the crank arm 44 of the valve 14 is the linkage rod 60 which is journaled at either end for limited transverse movement.

A conduit 62 provides a connection between the chamber 54 and the carburetor of the engine. As shown in FIG. 2, the end of this conduit 62 is illustrated as connected directly to the carburetor on the atmospheric side of the throttle valve 63. In practice I find it most convenient to make this connection to the carburetor at the same place as the existing connection for the vacuum spark control. This is essentially the position indicated. I do this simply by substituting a T fitting to which I attach both the conduit 62 and the conduit to the vacuum spark control.

When the vacuum in the carburetor on the atmospheric side of the throttle valve increases, the vacuum in chamber 54 of vacuum actuated control means 16 is increased via the conduit 62. As illustrated in FIG. 1, valve 14 is in the closed position not allowing supplementary air to pass. However, when the vacuum increases in chamber

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54 to a certain extent the diaphragm 52 is urged to the right, as viewed in FIG. 1, against the resistance of spring 58. This movement of the diaphragm 52 opens valve 14 via linkage rod 60, crank arm 44 and shaft 42, by turning the disk into the position shown in dotted lines in FIG. 1. This allows supplementary air to pass through valve 14 and via conduit 12, inlet 36, peripheral chamber 26, passageway 32 and central passage 18 into the intake manifold.

The movement of diaphragm 52 in response to an increase in the vacuum in chamber 54 is a positive and decisive movement. That is, the diaphragm does not move until the vacuum has built up to a sufficient point to overcome the resistance of spring 58. The spring 58 is of the same type used in the spark-control device and is calibrated to resist minor fluctuations and yield only to a given vacuum condition. Subsequently, when the vacuum in chamber 54 decreases to a level slightly below the level which was required to overcome spring 58, the spring will return the diaphragm 52 to its original position thus closing valve 14 and shutting off the supplementary air supply to the intake manifold. Therefore, the vacuum control means provides a positive on-off and snap-action like control for the supplementary air introduced through the supplementary air inlet ring 10.

I have found that this positive on-off control allows the introduction of even larger amounts of supplementary air than would be expected. That is, conduit 12 can be of significantly greater diameter than the inlets of prior gas savers since the cut-off action is immediate and not a gradual minimization.

From the description it can be seen that I have provided a gas saver which introduces supplementary air to the intake manifold of an internal combustion engine only at times when the vacuum in the carburetor on the atmospheric side of the throttle valve has increased to a predetermined point.

The vacuum condition which first enables supplementary air to be introduced into the system is a vacuum condition existing at normal engine operating or cruising speeds. Upon a call for more power while operating in this range, as by depression of the accelerator and an opening of the throttle valve, there is a drop in the vacuum condition which causes the supplementary air to be shut off. As the engine speeds build up, the vacuum condition also begins to build up until it reaches a point where it is sufficient to again open the supplementary air supply.

By utilizing the vacuum in the carburetor on the atmospheric side of the throttle valve as the control, I assure that no supplementary air will be admitted when the engine is idling. This is particularly important. Many prior gas saver devices have utilized the vacuum in the manifold, that is downstream of the throttle valve, to open a supplementary air inlet port. However, since the manifold vacuum is high when the engine is idling, these prior devices have admitted supplementary air at such times making the engine run unevenly and also making it extremely difficult to start the engine.

Having thus described my invention I claim:

A device for a fuel conserving supply of supplementary air to an internal combustion engine without loss of design horsepower, and comprising: supplementary air inlet means for connection within the intake manifold system of an engine on the engine side of the throttle valve, a control mechanism including a balanced butterfly valve provided in said supplementary air inlet means for air flow control therein and actuator means operatively connected to said valve, said actuator means including a housing having a diaphragm member provided therein and dividing said housing into atmospheric and vacuum sides, an operative link interconnecting said butterfly valve and said diaphragm member through the atmospheric side of said housing, a vacuum pressure sensing conduit and means for connecting one end thereof within

the engine manifold system between the venturi throat of the engine carburetor and the throttle valve, means for connecting the other end of said conduit to the vacuum side of said actuator housing for vacuum pressure responsive actuation of said diaphragm member and opening of said butterfly valve, and spring means operatively connected to said diaphragm member within said actuator housing and on the vacuum side thereof for holding said valve closed in the absence of a countermanding vacuum pressure condition on the vacuum side of said diaphragm valve, said spring being calibrated to be overcome by

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the diaphragm member when the vacuum sensed is greater than that normally existing at engine idling speeds.

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