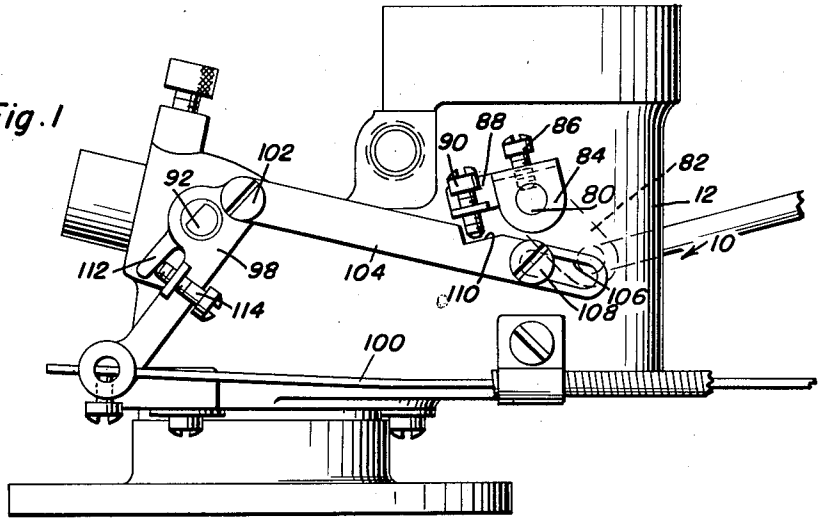
Sept. 11, 1956 O. R. CEDARHOLM 2,762,615

VACUUM CONTROL FOR INJECTION CARBURETORS

Filed June 21, 1954

Fig. 1



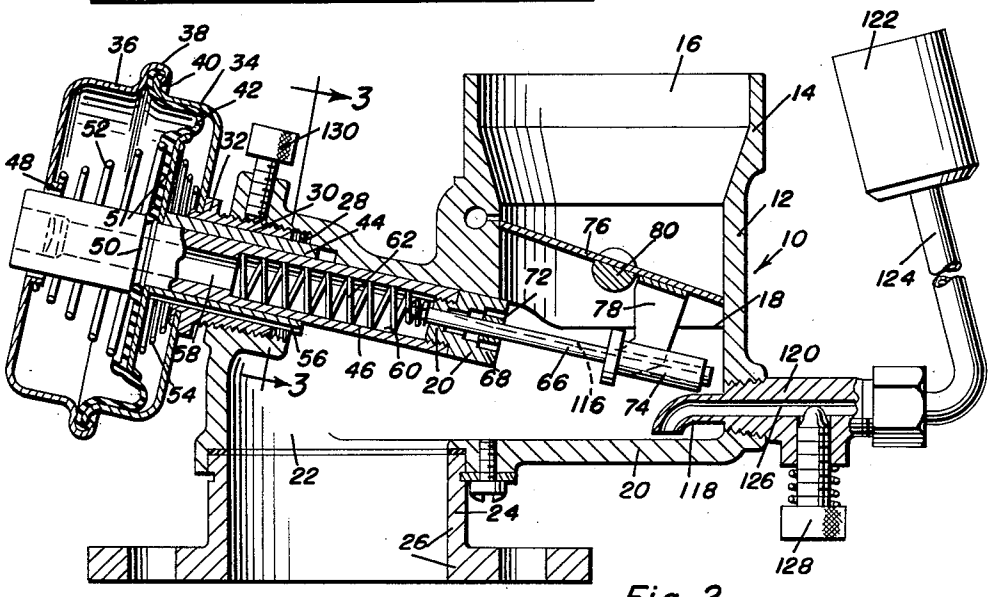
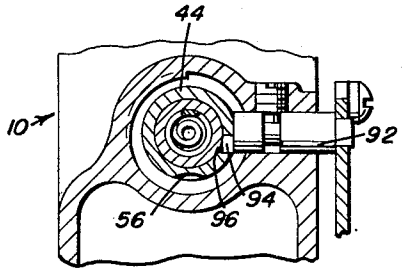


Fig. 2

Fig. 3



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VACUUM CONTROL FOR INJECTION CARBURETORS

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2 Claims. (Cl. 261—69)

This invention comprises novel and useful improvements in an automatic control for injection carburetors and relates to similar subject matter and constitutes an improvement over my prior Patent No. 2,653,804, issued September 29, 1953.

A primary object of this invention is to provide an improvement in the valve body shifting mechanism of my above identified patent whereby the air fuel ratio may be more accurately adjusted and controlled.

These, together with other objects and advantages which will become subsequently apparent, reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view of a carburetor constructed in accordance with this invention;

Figure 2 is a vertical section taken through the carburetor shown in Figure 1 showing the same in engine idling position; and

Figure 3 is a transverse vertical section taken substantially along the plane of section line 3—3 of Figure 2.

Referring now more particularly to the drawings, reference numeral **10** indicates the carburetor body generally which includes an upper portion **12** having an air horn **14** at its upper extremity, to which a conventional air cleaner is ordinarily attached, presenting an air intake opening **16** for the vertical air fuel passage **18**. At the bottom of this passage is a wall portion **20** which, as will be presently apparent, serves the purpose of a baffle to effect proper mixing of fuel with the incoming air. The lower extremity of the body portion **12** is offset with relation to the passage **18** and presents a discharge opening **22** entering into the lower body portion **24** removably secured to the upper portion and constituting therewith the complete carburetor body.

The lower body portion has an annular flange **26** for attachment to the intake manifold of an internal combustion engine, as will be readily apparent. It will be appreciated that the provision of two body portions is optional inasmuch as the carburetor could as well be formed of integral construction. In any case, it is desired to include the offset relationship between the intake and discharge openings **16** and **22** as well as the intermediate baffle wall **20**.

To one side of vertical passage **18** the body is provided with a threaded opening **28** within which an externally threaded bushing member **30** is received. The bushing is provided with a headed external end **32** suitably formed for manipulation with a wrench, and rigidly secured to this end of the bushing is a housing formed of the two sections **34** and **36** having frictionally engaged flanges **38** and **40** respectively holding a resilient diaphragm member **42** therebetween.

A stop sleeve **44**, more fully described hereinafter, is slidably received in bushing **30** and this sleeve, in turn, slidably receives the valve body **46** which terminates at

one end adjacent the passage **18** and at the other end externally of the housing section **36**, this section having an opening **48** therefor. The outer end of the valve body is grooved, as at **50**, into which the inner circumference of the diaphragm is snapped. An annular pressure plate **51** is rigid with valve body in underlying relation to the central portion of the diaphragm and provides a reaction member against which the two tapered coil springs **52** and **54** act. These two springs are normally balanced, in the absence of external forces, in a position in which the pressure plate **51** is disposed centrally between the opposite ends of the housing sections **34** and **36**. However, when the engine is idling, as illustrated in Figure 2, or at any time that the intake manifold vacuum is at its maximum, the diaphragm will be moved to the position shown in Figure 2 with the pressure plate **51** engaging against the stop sleeve **44**, the manifold pressure being communicated to the diaphragm through a longitudinal groove **56** in the sleeve **44**.

The valve body **46** is provided with a longitudinal bore **58** including the enlarged portion **60** within which the spring **62** is seated with its free end engaging against the upper end of valve core **66**. The inner end of the valve body receives the threaded plug **68** guiding the valve core through its opposite end walls **70** and **72** in the same manner as set forth in my previously mentioned prior patent. In this respect, it is to be noted that the valve core **66**, its associated collar **74**, the throttle valve **76**, the parallel arm **78** depending from the throttle valve, and the manner of interconnection between the arms and the collar are all identical to the construction employed in my prior patent.

The pivot shaft **80** for the throttle valve is provided at one end with an arm **82**, as indicated by dotted lines in Figure 1, which is connected by any suitable means to the accelerator pedal of the vehicle for actuation thereby. The opposite end of the throttle valve pivot shaft has a fast idle member **84** secured thereto as by setscrew **86**, and this member includes the radially projecting arm portion **88** provided with an adjusting screw **90**, the purpose of which will be presently apparent.

The fast idle assembly is interconnected for simultaneous actuation with an air fuel mixture enrichening assembly for starting the engine when cold. This assembly incorporates a horizontal shaft **92**, see Figure 3, journaled in the carburetor body having an eccentric projection **94** on its inner end received in a bore **96** in the stop sleeve **44**. The outer end of shaft **92** carries a lever member **98**, to one end of which a Bowden wire hand choke control **100** is connected. The opposite end of the lever is pivotally connected by member **102** to link **104** having an elongated slot **106** in its free end embracing the limit stop member **108** secured to the carburetor body. The upper edge of the link is notched, as at **110**, and in the normal position of the link the adjusting screw **90** is disposed therein.

An abutment projection **112** is formed on the body **10** and a lever adjusting screw **114** is engaged thereagainst to vary the normal positioning of sleeve **44**.

For the purpose of starting the engine, the throttle valve **76** is left in the closed position so that when the engine is cranked, a suction will be developed below the throttle valve which communicates through passage **56** with the suction side of diaphragm **42**, thus moving the diaphragm from its normal position substantially midway between the ends of the housing sections **34** and **36** to the position shown in Figure 2, in abutment with bushing **44**. This will of course move the valve body **46** a corresponding amount and at the same time the valve core will have moved into engagement with arms **78**. These arms are so positioned that movement of the valve core is arrested before the valve body reaches its limit of travel

or that point at which it engages the bushing 44, uncovering a portion of tapered slot 116 in the valve core to permit entry of fuel into the carburetor.

If the engine is warm, the above operation will be sufficient to start the engine. However, if the engine is cold, it will be necessary to manipulate the cable 100 and thus shift the bushing 44 to the right in Figure 2, which will permit further than normal travel of the diaphragm and the valve body, which will effect a correspondingly greater uncovering of the tapered slot 116, with a resultant richer mixture within the carburetor.

It will be noted that the effect of the throttle valve on the fuel air mixture on the one hand, and the effect of the valve body on the other hand tend to counterbalance each other to produce a uniform fuel air ratio over the normal operating range of the engine. That is, assuming a vehicle proceeding along a level stretch of roadway at a constant speed, opening movement of the throttle valve will shift the valve core to the left (Figure 2), while at the same time the momentary decrease in manifold vacuum (until the speed of the vehicle increases to that corresponding to the new throttle setting) will shift the valve body to the left also, so that as a practical matter there is no relative movement between the valve core and the valve body, thus maintaining a predetermined and constant air fuel ratio in the carburetor. Of course, under some conditions of operation, it is possible to obtain a richer than normal mixture. For example, under full load, full throttle conditions, the diaphragm and valve body will be positioned such that the springs 52 and 54 are in equilibrium inasmuch as no vacuum will exist in the manifold. At the same time, the full opening position of the throttle valve 76 will have shifted the valve core its full extent to the left in Figure 2 and will have passed that point which would result in the normal fuel air ratio and will thus produce a richer than normal mixture.

During normal idling, the parts are in the position as illustrated in Figure 2 with a portion of slot 116 uncovered. At this time, the throttle valve is closed and air is supplied to the engine through the nozzle 118 which is formed as an extension of plug 120 adjacent the bottom wall or baffle 20. In the absence of other preheater means, an air cleaner 122 is positioned adjacent the exhaust manifold and a line 124 leading therefrom connects to the body 120 to supply heated air to the carburetor. The bore 126 in the plug is intersected by a threaded aperture receiving an adjusting screw 128 for varying the amount of air entering the carburetor during idling.

It is to be noted that the nozzle 118 is directed onto the baffle wall 20 whereby the incoming air will scour this baffle and pick up liquid fuel deposited thereon. At any time the engine is running, the baffle will of course operate to thoroughly mix the fuel and air.

The bushing 30 is adjusted initially to obtain the proper air fuel mixture throughout the operating range of the carburetor and is held in the desired position by a setscrew 130. In conjunction with the positioning of the bushing 30, the sleeve 44 is likewise properly positioned by manipulation of the adjusting screw 114. When these two adjustments are properly set, the desired air fuel mixture will be obtained throughout the operating range of the engine.

It is to be noted that since the diaphragm 42 is not rigidly secured to the valve body but is merely received in groove 50, the housing sections 34 and 36 may be rotated without imparting rotation to the valve body, that is, rotated in conjunction with the nut member 30 to effect the initial positioning of the bushing 44. This is important inasmuch as the valve body will be connected to the fuel line and it is not desirable to rotate the valve body as the adjustment on the casings 34 and 36 is obtained to effect the positioning of the bushing 44. Therefore, as the casing sections 34 and 36 and the screw member 30 are rotated, the diaphragm 42 merely slides around the valve body since its beaded inner edge merely slides within the groove 50 previously mentioned.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A suction operated control mechanism adapted for use in controlling the inlet of fuel inwardly of a butterfly valve in a carburetor having a body adapted to be mounted on the intake manifold of an internal combustion engine in response to variations in pressure in the intake manifold, said mechanism comprising a housing adapted to be supported on the carburetor, a valve body movably mounted on said housing and having a stem adapted to extend into the interior of the carburetor body, a diaphragm mounted in said housing and connected to said valve body for movement thereof, a sleeve encircling said stem and slidably supporting the same, said sleeve adapted to be movably supported in the wall of the carburetor body and extend into the interior thereof, said sleeve having one end extending into the housing and forming a limiting abutment for said diaphragm thereby limiting the movement of the valve stem, said sleeve having a longitudinal passage therein adapted to communicate the interior of the carburetor body with the housing for movement of the valve stem in response to variations in pressure in the intake manifold and adjacent portion of the carburetor body, means adapted to be mounted on the carburetor body for adjusting the longitudinal position of the sleeve thereby adjusting the scope of movement of the valve stem, said valve body being hollow and forming a fuel inlet passageway, and a metering valve core associated with the inner end of the passageway for controlling the flow of fuel into the carburetor body upon relative movement between the valve body and the metering valve core.

2. The combination of claim 1, said means for adjusting the sleeve comprising a pivotal member adapted to be supported on the carburetor body adjacent the sleeve, an eccentric lug projecting from said pivotal member, said sleeve having an opening receiving said lug for moving said sleeve longitudinally upon pivotal movement of the pivotal member, said pivotal member being manually controlled.

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