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CARBURETOR THROTTLE CONTROL

Original Filed June 27, 1961

2 Sheets-Sheet 1

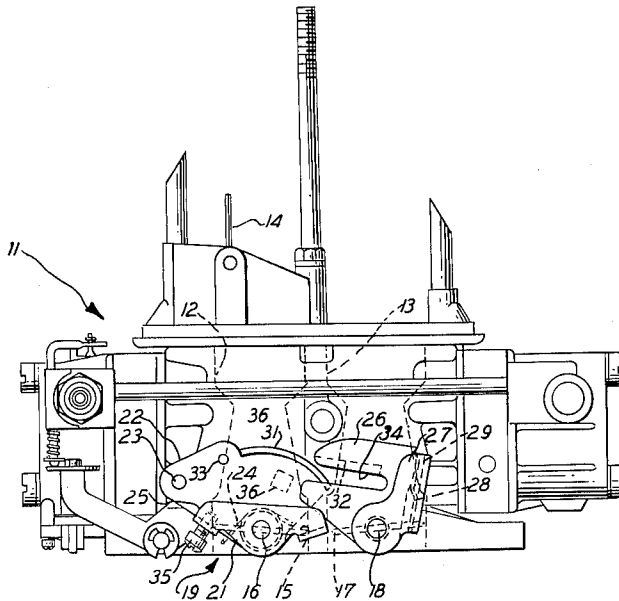


FIG. 1

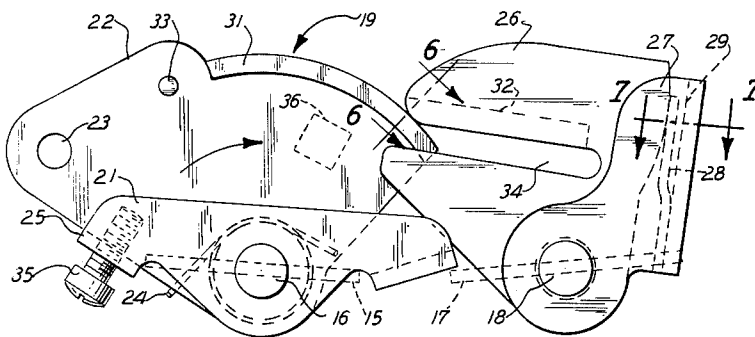


FIG. 2

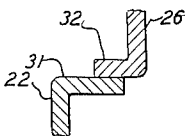


FIG. 6

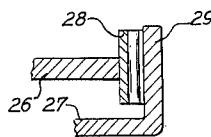


FIG. 7

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2 Sheets-Sheet 2

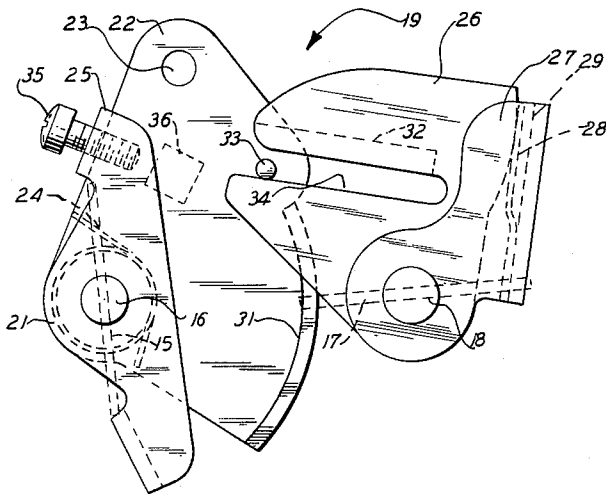


FIG. 3

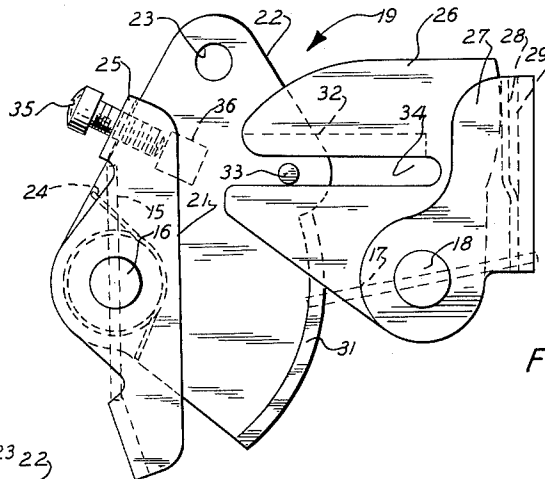


FIG. 4

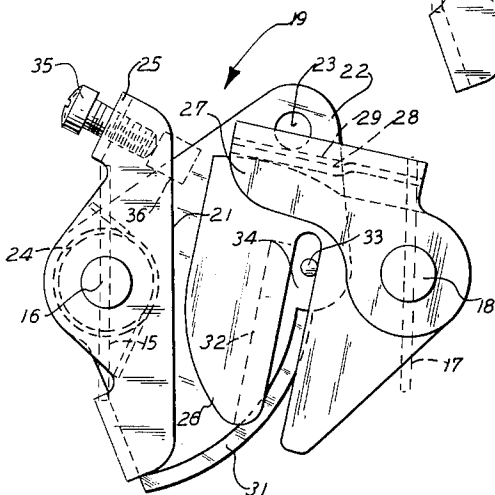


FIG. 5

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CARBURETOR THROTTLE CONTROL

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Continuation of application Ser. No. 119,934, June 27, 1961. This application Apr. 12, 1965, Ser. No. 449,375
2 Claims. (Cl. 261—23)

This application is a continuation of my copending application S.N. 119,934, filed June 27, 1961, now abandoned.

This invention relates to multistage carburetors and more particularly to a mechanism for controlling the operation of the secondary throttle valve of two stage carburetors.

In recent years, two stage carburetors have been widely used for automotive engines, particularly those having large cylinder displacements. In an automotive application at low loads the secondary system is inoperative and the primary stage of the carburetor furnishes the engine fuel air mixture requirements. As the load increases, the secondary stage of the carburetor becomes operative to furnish, in conjunction with the primary stage, the additional mixture requirements of the engine.

The interrelated operation of the primary and secondary stages is generally controlled by a complex linkage system. The linkage frequently includes an interlock which prevents the secondary system from functioning when the choke valve is closed during warm-up periods. The complex linkage conventionally employed requires detailed adjustment during initial setup and when engine tune ups are being performed.

The point at which the secondary stage of the carburetor comes into operation varies from carburetor to carburetor. Generally, however, the linkage permits the secondary system to become operative at a point considerably prior to wide open throttle of the primary system. The linkage then permits a secondary throttle valve to open at an accelerated rate so that the primary and secondary systems may reach full throttle condition simultaneously.

The construction in current production vehicles is such that the secondary throttle valve is permitted to open even though the accelerator pedal is only slightly depressed. The corresponding load at which the secondary stage becomes operative is frequently so low that, even under steady speed condition, all the throttle valves are at least partially opened under most conditions of operation. The entire carburetor's calibration, therefore, must be a compromise between low speed economy and maximum performance at full throttle resulting in a sacrifice of economy at normal operating speeds.

The poor part throttle fuel economy and complicated linkage of conventional four barrel carburetors has prevented extensive acceptance of these carburetors. In addition, many manufacturers who previously utilized two stage carburetors are returning to single stage carburetors either as original equipment or as a regular production option.

It is an object of this invention to provide a two stage carburetor that possesses good part throttle economy without sacrificing full throttle performance.

It is a still further object of this invention to provide a secondary stage control mechanism that requires a minimum number of parts and adjustments.

The carburetor throttle valve control mechanism of the present invention prevents opening of the secondary throttle valve until the primary throttle valve is at, or nearly at, full throttle. Continued movement of the primary throttle valve allows the secondary throttle valve to open at an accelerated rate. The construction permits

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the primary throttle valve to reach its full throttle position before the secondary throttle valve is fully opened. This permits the primary system to be designed and calibrated for economy because maximum performance requirements are met by the secondary system. The construction further eliminates the requirements of a choke operated throttle valve lock in the secondary system inasmuch as the secondary throttle valve cannot open until the primary throttle valve is at wide open throttle.

As a further economy feature of the present invention, the secondary throttle valve is actually opened in response to engine demand as expressed by manifold vacuum. The degree of opening of the secondary throttle valve is limited by the linkage of the present invention.

Further objects and advantages of this invention will become more apparent as this description proceeds particularly when considered in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevational view of a two stage carburetor incorporating the present invention.

FIGS. 2-5 show, in enlarged view, the linkage of the present invention in several stages of operation.

FIG. 6 is a cross sectional view taken along line 6-6 of FIG. 2.

FIG. 7 is a cross sectional view taken along line 7-7 of FIG. 2.

Referring now in detail to the drawings and in particular to FIG. 1, there is shown generally at 11 a two stage or four barrel carburetor. Carburetor 11 has the primary and secondary venturis 12 and 13 respectively. The detail of the internal construction of carburetor 11 is not shown since that construction is well known in the art and forms no part of the present invention. The primary system will be designed and calibrated primarily for economy while the secondary system is designed to satisfy the maximum performance requirements of the engine. As is conventional, choke valve 14 is positioned in primary venturi 12.

Fuel and air flowing through primary venturi 12 is regulated by the primary throttle valve 15 rotatably positioned therein on a shaft 16. A secondary throttle valve 17 is rotatably positioned on a shaft 18 in secondary venturi 13 to control the flow of mixture therethrough.

The linkage controlling the operation of primary and secondary throttle valves 15 and 17 is shown generally at 19 and in more detail in FIGS. 2-7. Linkage 19 includes a first link 21 which is suitably and rigidly secured to primary throttle valve shaft 16 for rotation therewith. A manually actuated cam link 22 rotatably supported on primary throttle valve shaft 16. It will be readily apparent that cam link 22 is actuated by the vehicular accelerator pedal in the known manner. The hole 23 is provided in cam link 22 to allow attachment of the accelerator linkage. A torsional mouse trap type spring 24 coacts with links 21 and 22 to urge the inturned tang 25 formed on link 21 into contact with cam link 22 (FIGS. 2 and 3). The action of spring 24 causes links 21 and 22 to rotate together as a unit until the primary throttle valve 15 reaches the wide open throttle position (FIG. 4). Primary throttle valve 15 may thereby be manually positioned by movement of the vehicular accelerator pedal.

The opening of the secondary throttle valve 17 is controlled by the follower link 26. If mechanical actuation of secondary throttle valve 17 is desired, follower link 26 may be directly secured for rotation with secondary throttle valve shaft 18. To provide increased economy, however, vacuum actuation of secondary throttle valve is desired. This insures that secondary throttle valve 17 will not open until engine demand so requires. For this purpose, secondary throttle valve 17 may be opened by any of the vacuum or air flow responsive devices known

in the art. It has been found most desirable to utilize an overcenter balance valve of the type well known in the art. A link 27 is rigidly secured for rotation with secondary throttle shaft 17 to limit the maximum opening permitted secondary throttle valve 17. A leaf spring 28 secured to the inturned tang 29 formed on link 27 contacts follower link 26 (FIG. 7). The position of follower link 26, therefore, positively limits the maximum opening of secondary throttle valve 17 and the flow of fuel air mixture through secondary venturi 13.

OPERATION

Cam link 22 and follower link 26 are constructed to provide three stages of operation for carburetor 11. During the initial stage of operation, movement of manually controlled cam link 22 is directly transmitted to movement of primary throttle valve 15 through torsional spring 24. In this stage of operation, the arcuate or first cam portion 31 formed on link 22 urges follower link 26 in a direction which prevents secondary throttle valve 17 from opening through contact with a part of the follower portion formed on follower link 26, that is the inturned tang 32 formed thereon (FIG. 2).

In the second stage of operation, cam portion 31 moves free of contact with tang 32 and a pin or second cam portion 33 secured to cam link 22 enters the slot 34 formed in follower link 26 (FIG. 3). This occurs when primary throttle valve 15 is at or nearly at its full throttle position. A point five degrees before wide open throttle of the primary system has proven desirable. Continued movement of cam link 22 and primary throttle valve 15 is accompanied by movement of the follower link 26 at an accelerated rate because of the action of pin 33 with another part of the follower portion on the follower link 26, that is one wall forming the edge of slot 34. This is the bottom edge of the slot 34 as viewed in FIGURES 3 and 4. This permits secondary throttle valve 17 to be opened in response to engine demand as expressed by manifold vacuum.

When primary throttle valve 15 is fully opened, it is prevented from further movement by the contact of the adjustable stop 35 threaded through an aperture formed in tang 25 with an abutment 36 formed on the carburetor body (FIG. 4). This occurs prior to the wide open throttle position of secondary valve 17. Continued movement of cam link 22 is permitted by the yielding of torsional spring 24. This permits follower link 26 to be positioned so that secondary throttle valve 17 may move in response to the proper engine vacuum to the wide open position. The actual position will, of course, be dependent upon the engine vacuum. FIGURE 5 illustrates the linkage and throttle valves in the fully open throttle position.

It is to be understood that this invention is not to be limited to the construction shown and described but that various changes and modifications may be made within

the scope of the invention as defined by the appended claims:

What is claimed is:

1. A multistage carburetor having primary and secondary mixture conduits, a primary throttle valve located upon a primary throttle valve shaft in said primary mixture conduit, a secondary throttle valve located upon a secondary throttle valve shaft in said secondary mixture conduit, a cam link supported on said primary throttle valve shaft for controlling the position of said primary throttle valve, and follower link supported on said secondary throttle valve shaft for controlling the position of said secondary throttle valve, a first cam portion formed on said cam link, a follower portion formed on said follower link, said first cam portion and said follower portion being formed to coact for precluding the opening of said secondary throttle control valve during a first portion of the movement of said primary throttle valve and said cam link, and a second cam portion formed on said cam link for coacting with the follower portion on said follower link for causing movement of said follower link to permit opening of said secondary throttle valve during a second portion of the movement of said cam link.

2. A multistage fuel induction device having primary and secondary mixture conduits, a primary throttle valve located upon a primary throttle valve shaft in said primary mixture conduit, a secondary throttle valve located on a secondary throttle valve shaft in said secondary mixture conduit, a first link fixed to said primary throttle valve shaft for controlling the position of said primary throttle valve, a cam link rotatably supported upon said primary throttle valve shaft, a follower link supported on said secondary throttle valve shaft for controlling the position of said secondary throttle valve, biasing means interposed between said first link and said cam link for simultaneous movement of said first link and said cam link, means for positioning said cam link, a first cam portion formed on said cam link, a follower portion formed on said follower link, said cam portion and said follower portion being formed to coact for precluding the movement of said follower link and opening of said secondary throttle valve during a first range of movement of said cam link, and a second cam portion formed on said cam link for cooperation with the follower portion of said follower link to cause movement of said follower link and permit opening of said secondary throttle valve during a second range of movement of said cam link.

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