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CARBURETOR CONTROL MECHANISM

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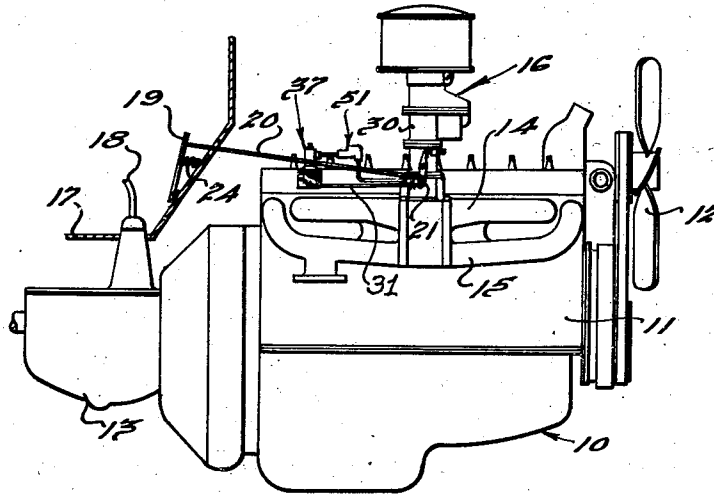


FIG. 1.

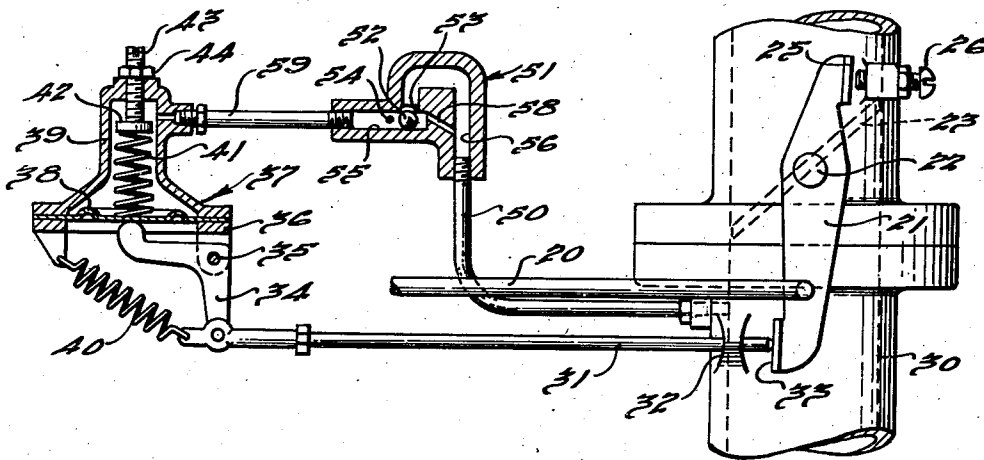


FIG. 2.

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UNITED STATES PATENT OFFICE

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CARBURETOR CONTROL MECHANISM

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8 Claims. (Cl. 123-103)

My present invention relates to the control and operation of internal combustion engines, particularly internal combustion engines of the type used in automotive vehicles, such as automobiles. The particular invention comprises an anti-stall device for the purpose of preventing stalling of an engine during periods of idling operation, such a device being especially useful in automotive vehicles provided with a fluid fly-wheel transmission which cannot be completely disengaged when the vehicle is at rest and the engine is idling.

The purpose of the present invention is to provide means responsive to the suction pressure in the intake manifold of the engine to open the throttle valve momentarily when the engine is in the initial stages of stalling, thus causing the engine to pick up speed and refrain from stalling.

A further object of the present invention is to provide means for returning the throttle valve to its idle setting after a short operation of the engine at higher speed to prevent stalling.

A further object of the present invention is to provide means to delay the return action of the throttle valve for a period of time after having been opened so that the engine may be permitted to operate at a high speed for a short period of time, thus insuring its continued operation at idling speed when the throttle valve is ultimately closed.

The objects and advantages of the present invention should be more readily apparent from a study of the following specification taken in connection with the accompanying drawing wherein like numerals refer to like parts throughout.

In the drawing, Fig. 1 is a partially diagrammatical view of an internal combustion engine mounted in an automotive vehicle and having the present invention applied thereto; and,

Fig. 2 is an enlarged view partially in section of the carburetor control device comprising the present invention.

The drawing discloses an internal combustion engine 10 of any conventional style, the engine comprising the usual engine block 11, cooling fan 12, transmission 13, intake manifold 14, exhaust manifold 15, and carburetor 16. The engine is shown in its relative position to the floor board 17 of the driver's compartment of an automotive vehicle through which projects the gear shift lever 18 and in which is provided the foot throttle 19 by means of which the operator controls the speed of the vehicle when in motion. The foot throttle 19 is connected to a throttle valve con-

trol link 20, the opposite end of which is connected to the lever 21 which is fixed to the pivot shaft 22 of the throttle valve 23 controlling the operation of the carburetor. When the engine is running at idle speed the link 20 is forced toward the left in Fig. 1 by a spring 24 compressed between the floor board 17 and the foot throttle 19, the spring being designed to pull the throttle valve 23 into idling position which is determined by the engagement of an abutment end 25 on throttle valve lever 21 with an adjustable screw 26 mounted upon the intake riser 30 joining the intake manifold 14 and the carburetor 16. When the abutment 25 is in engagement with the end of the adjustment screw 26, the carburetor is in idling position and the engine should operate at a low rate of speed.

It sometimes happens that the engine is not firing evenly, or it may be too cold to operate at idling speed, or, as in the case of the fluid fly-wheel transmission, there may be a slight drag on the engine, with the result that the engine tends to stop. As long as the engine runs evenly at idling speed the present invention will not come into use; but if the engine tends to stall, the present invention is designed to open the throttle valve and to hold it open for a short period of time in order that the engine will be more likely to continue operation when idling speed is resumed.

The invention comprises a rod 31 having one end slidably guided in a boss 32 on the surface of the riser 30. The end of the rod bears against an abutment face 33 on lever 21 adjacent the connection thereto of the throttle link 20. The opposite end of rod 31 is pivotally connected to one arm of a bell crank 34 which is pivotally mounted at 35 to a portion 36 of the housing of a vacuum responsive device 37. The opposite arm of the bell crank 34 is urged against the lower face of a diaphragm 38 mounted in the end of a dome-shaped cover 39 comprising a portion of the vacuum responsive device 37, and is maintained against the diaphragm by a spring 40 stretched between the end of rod 31 and the frame 36. The diaphragm is urged downwardly by a spring 41 mounted in the dome-shaped cover and having one end bearing against the diaphragm and its opposite end bearing against an abutment face 42 carried by an adjusting screw 43 which may be locked in position by a lock nut 44, the spring 41 being of greater strength than the combined thrust of springs 40 and 24 and tending to maintain the diaphragm 38 in depressed position.

The diaphragm 38 during normal operation of the engine at normal idling speed is maintained in an elevated position such as shown in Fig. 2 by the application of suction to the interior of the dome-shaped cover 39 through a connection with the interior of the intake riser 30 comprising a connecting tube 50, a valve device 51 and a tube 59, the pressure differential between the inside and the outside of the diaphragm 38 being sufficient to overcome the force differential between the springs so as to maintain the abutment face 25 against the screw 26 and causing the engine to run at idling speed. However, when the engine starts to stall there is a momentary decrease in suction through the riser 30 permitting the spring 41 to overcome springs 24 and 40, thus causing the diaphragm 38, bell crank 34, and rod 31 to open the throttle valve 23 in order that the engine speed may increase.

In order to maintain the engine speed at an increased rate for a sufficient period of time to insure further operation of the engine at idling speed, I have provided a dashpot delaying device in the form of a valve 51. As soon as the rod 31 has opened the throttle valve 23, the increased suction through the riser 30 tends to return the diaphragm 38 to its normal position. In order to prevent this from happening too soon for the anti-stalling device to be really effective, I have provided a ball valve 52 which is adapted to be raised against a valve seat 53 in the valve device 51 as soon as the increase in suction through the tube 50 is sufficient to raise the ball valve 52. The ball is maintained in proximity to the valve seat 53 by a pin 54 passing through the passage 55 communicating with the tube 59. The passage 56 communicating with the tube 50 and terminating in the valve seat 53 is formed in a U-shape so as to rise upwardly beyond the end of passage 55 and provide a downwardly facing seat 53. The valve device 51 is provided with a leak passage 58 connecting the passage 56 with the end of passage 55, thus by-passing the portion of the passage 56 containing the ball valve seat 53.

In operation the valve device functions as follows: the rapid increase in suction pressure occasioned by the opening of the throttle valve causes a pressure differential between the tubes 50 and 59 so rapidly that the ball 52 is lifted against the downwardly facing seat 53, thus preventing the application of suction to the upper side of diaphragm 38 and the return of throttle valve 23 to idling position. The leak passage 58, however, causes a slow balancing of the pressure between tubes 50 and 59 with the result that the diaphragm 38 slowly returns to normal position and the ball 52 drops to its inoperative position, whereupon suction is applied to the diaphragm 38 through the normal passage including the valve seat 53. This delayed action provided by the dashpot device 51 insures continued operation of the engine at higher speeds for a sufficient length of time to guarantee continued operation at idling speed after the throttle valve is returned to idling speed.

Having illustrated and described a preferred form of my invention, it should be apparent to those skilled in the art that the same may assume modifications in arrangement and details. All such as come within the scope of the following claims are considered a part of my invention.

I claim:

1. An anti-stall device for internal combustion engines having fuel intake means of the type

including a carburetor throttle valve for regulating the amount of combustible fuel mixture fed to the cylinders of the engine, said device comprising pressure differential operated means controlled by the difference in pressure between the interior and exterior of the fuel intake means for opening the throttle valve if the engine tends to stall while idling, said pressure differential operated means comprising mechanism for moving the throttle valve to open position, and intake suction responsive means for overcoming said mechanism, and a dashpot device for delaying the operation of said intake suction responsive means.

2. An anti-stall device for internal combustion engines having fuel intake means of the type including a carburetor throttle valve for regulating the amount of combustible fuel mixture fed to the cylinders of the engine, said device comprising pressure differential operated means controlled by the difference in pressure between the interior and exterior of the fuel intake means for opening the throttle valve if the engine tends to stall while idling, said pressure differential operated means comprising a spring tending to move the throttle valve to open position and intake suction responsive means for overcoming said spring, and a dashpot device for delaying the operation of said intake suction responsive means.

3. An anti-stall device for internal combustion engines having fuel intake means of the type including a carburetor throttle valve for regulating the amount of combustible fuel mixture fed to the cylinders of the engine, said device comprising pressure differential operated means controlled by the difference in pressure between the interior and exterior of the fuel intake means for opening the throttle valve if the engine tends to stall while idling, said throttle valve having spring means associated therewith tending to maintain the throttle valve in idling position unless manually overcome, said pressure differential operated means comprising a spring stronger than said spring means and so arranged as to overcome said spring means and to move the throttle valve to open position and intake suction responsive means so constructed and arranged as to counterbalance the excess force of said spring whereby to permit said spring means to hold the throttle valve in idling position when the engine is idling smoothly, and a dashpot device for delaying the operation of said intake suction responsive means after said throttle valve has been moved to open position by said spring.

4. An anti-stall device for internal combustion engines having fuel intake means of the type including a carburetor throttle valve for regulating the amount of combustible fuel mixture fed to the cylinders of the engine, said device comprising pressure differential operated means controlled by the difference in pressure between the interior and exterior of the fuel intake means for opening the throttle valve if the engine tends to stall while idling, said throttle valve having spring means associated therewith tending to maintain the throttle valve in idling position unless manually overcome, said pressure differential operated means comprising a spring stronger than said spring means and so arranged as to overcome said spring means and to move the throttle valve to open position and intake suction responsive means so constructed and arranged as to counterbalance the excess force of said spring whereby to permit said spring means to hold the throttle valve in idling position when the engine is idling

smoothly, and a dashpot device for delaying the operation of said intake suction responsive means after said throttle valve has been moved to open position by said spring, said dashpot device comprising a check valve located between the fuel intake means and the suction responsive means and a leak passage by-passing said check valve.

5. An anti-stall device for internal combustion engines having fuel intake means of the type including a carburetor throttle valve for regulating the amount of combustible fuel mixture fed to the cylinders of the engine, said device comprising pressure differential operated means controlled by the difference in pressure between the interior and the exterior of the fuel intake means for opening the throttle valve if the engine tends to stall while idling, said throttle valve having spring means associated therewith tending to maintain the throttle valve in idling position unless manually overcome, said pressure differential operated means comprising a suction chamber, a passage connecting the interiors of said suction chamber and said fuel intake means, a diaphragm closing one end of said suction chamber, a spring in said suction chamber thrusting against said diaphragm, and means movable by said diaphragm to open said throttle valve against the force of said spring means, said spring being stronger than said spring means in order to open said throttle valve when the suction in said fuel intake means is reduced if the engine tends to stall while idling, and a dashpot device for delaying the return of said throttle valve to idling position after the throttle valve has been moved to open position in response to a reduction in suction through the fuel intake means.

6. An anti-stall device for internal combustion engines having fuel intake means of the type including a carburetor throttle valve for regulating the amount of combustible fuel mixture fed to the cylinders of the engine, said device comprising pressure differential operated means controlled by the difference in pressure between the interior and the exterior of the fuel intake means for opening the throttle valve if the engine tends to stall while idling, said throttle valve having spring means associated therewith tending to maintain the throttle valve in idling position unless manually overcome, said pressure differential operated means comprising a suction chamber, a passage connecting the interiors of said suction chamber and said fuel intake means, a diaphragm closing one end of said suction chamber, a spring in said suction chamber thrusting against said diaphragm, and means movable by said diaphragm to open said throttle valve against the force of said spring means, said spring being stronger than said spring means in order to open said throttle valve when the suction in said fuel intake means is reduced if the engine tends to stall while idling, and a check valve located in the passage between the fuel intake means and the suction chamber and operable by a sudden increase in suction through said fuel intake means to prevent immediate closing of said throttle valve to idling position after said throttle valve has been moved to open position by said spring.

7. An anti-stall device for internal combustion engines having fuel intake means of the type including a carburetor throttle valve for regulating the amount of combustible fuel mixture fed

to the cylinders of the engine, said device comprising pressure differential operated means controlled by the difference in pressure between the interior and the exterior of the fuel intake means for opening the throttle valve if the engine tends to stall while idling, said throttle valve having spring means associated therewith tending to maintain the throttle valve in idling position unless manually overcome, said pressure differential operated means comprising a suction chamber, a passage connecting the interiors of said suction chamber and said fuel intake means, a diaphragm closing one end of said suction chamber, a spring in said suction chamber thrusting against said diaphragm, and means movable by said diaphragm to open said throttle valve against the force of said spring means, said spring being stronger than said spring means in order to open said throttle valve when the suction in said fuel intake means is reduced if the engine tends to stall while idling, and a check valve located in the passage between the fuel intake means and the suction chamber and operable by a sudden increase in suction through said fuel intake means to prevent immediate closing of said throttle valve to idling position after said throttle valve has been moved to open position by said spring, said check valve being provided with a leak passage permitting gradual application of suction to the interior of said suction chamber whereby to permit delayed overcoming of said spring.

8. An anti-stall device for internal combustion engines having fuel intake means of the type including a carburetor throttle valve for regulating the amount of combustible fuel mixture fed to the cylinders of the engine, said device comprising pressure differential operated means controlled by the difference in pressure between the interior and the exterior of the fuel intake means for opening the throttle valve if the engine tends to stall while idling, said throttle valve having spring means associated therewith tending to maintain the throttle valve in idling position unless manually overcome, said pressure differential operated means comprising a suction chamber, a passage connecting the interiors of said suction chamber and said fuel intake means, a diaphragm closing one end of said suction chamber, a spring in said suction chamber thrusting against said diaphragm, and means movable by said diaphragm to open said throttle valve against the force of said spring means, said spring being stronger than said spring means in order to open said throttle valve when the suction in said fuel intake means is reduced if the engine tends to stall while idling, and a check valve located in the passage between the fuel intake means and the suction chamber and operable by a sudden increase in suction through said fuel intake means to prevent immediate closing of said throttle valve to idling position after said throttle valve has been moved to open position by said spring, said check valve being provided with a leak passage permitting gradual application of suction to the interior of said suction chamber whereby to permit delayed overcoming of said spring and said check valve comprising a ball and an overhead valve seat whereby said check valve automatically opens upon balancing of pressure through said leak passage.

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