Aug. 5, 1941. E. DÖRNER 2,251,516

CONTROL DEVICE FOR CARBURETORS ON MOTOR VEHICLES

Filed March 24, 1939

FIG. 1.

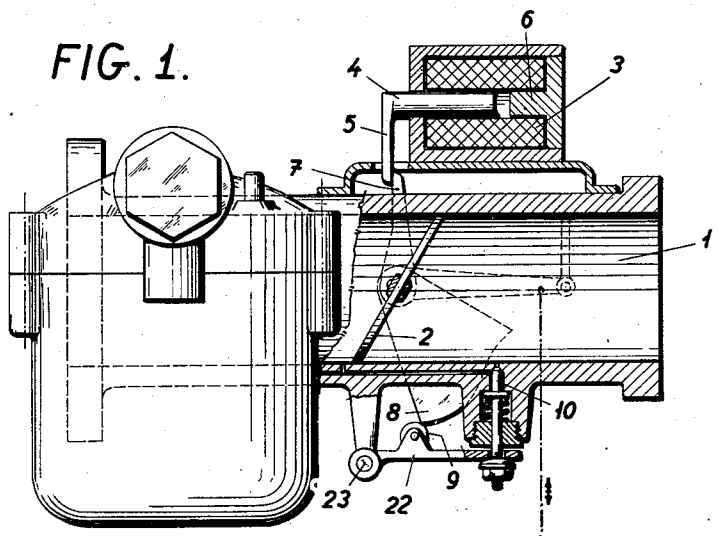


FIG. 3.

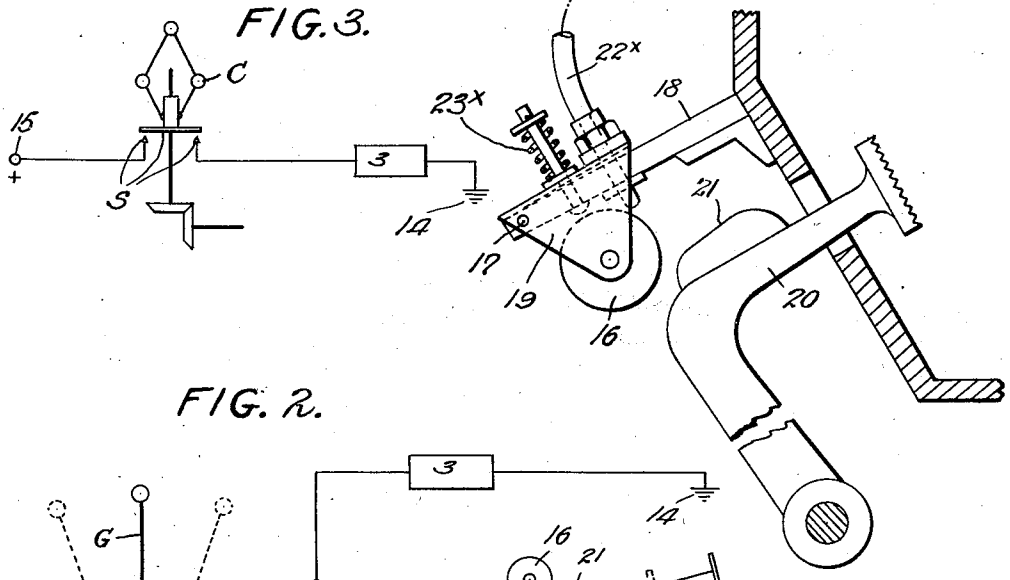
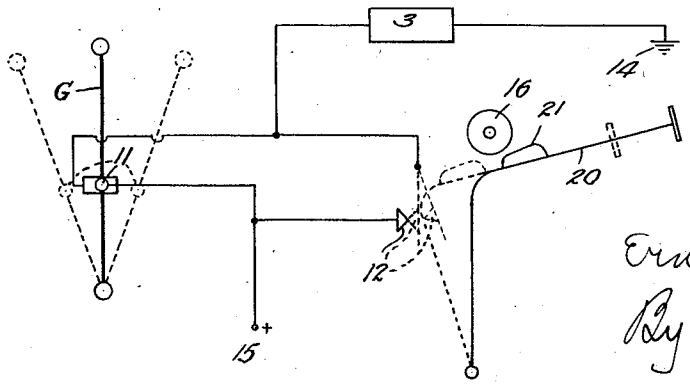


FIG. 2.



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CONTROL DEVICE FOR CARBURETORS ON MOTOR VEHICLES

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Application March 24, 1939, Serial No. 264,044
In Czechoslovakia April 3, 1937

6 Claims. (Cl. 192—.01)

This application corresponds to the application of Ernst Dörner, Serial No. P. 2217-37, which was filed in Czechoslovakia on April 3, 1937.

The present invention relates to apparatus for automatically preventing undesired mixture formation by the idling jets in carburetors of motor vehicles.

It is generally known that the suction in the induction pipe by means of which the fuel is aspirated into the cylinder, is dependent upon three factors:

(1) Upon the temperature of the engine;

(2) Upon the speed of the engine;

(3) Upon the position of the throttle of the carburetor.

If the throttle valve is in the idling position, that is, almost closed, then the suction below atmospheric pressure in the induction pipe on starting amounts to about 1.4 to 2.1 lb./in.², it increases after starting to about 4.2 lb./in.², and with fully heated engine to about 8.5 lb./in.²; if however, the car drives the engine, either by the weight thereof in running downhill, or owing to inertia on a level road (that is, without gas), the suction immediately increases to many times the normal amount.

By means of this increased suction, a correspondingly large amount of fuel is aspirated from the idling jet which alone is in operation. This quantity of fuel is much greater than is generally assumed. Since the idling jet must be so dimensioned that even with the slight suction which is produced by the engine running on no-load gas, a quantity of fuel is supplied sufficient for idle running at all temperatures, the idling jet causes, during the over-run and at higher speeds, in particular when the engine is hot, a great waste of fuel and thus considerably reduces the economy of working of the vehicle. At the same time, many injurious influences are in this case produced, namely:

The fuel, in consequence of the marked throttling of the air, passes into the engine mainly in the liquid state or only inefficiently atomized, and there washes the film of oil from the cylinder walls, dilutes the oil in the crank-case in four-stroke-cycle engines and in two-stroke-cycle engines causes irregular and unpleasant explosions which produce the cracking of the two-stroke engine which is found so very troublesome.

The essence of the invention consists in the provision, for the idle running position of the throttle valve of the carburetor, of a stop which is actuated by means of an electromagnet, and for slow running, the mixture passage opening on the engine side in front of the throttle valve is fully opened by means of a valve and this only (according to a first embodiment), when the gear shift lever of the vehicle is in the neutral position or the engine clutch is disengaged or (according to a second embodiment) when the speed of the engine attains the value which corresponds to its idling speed.

In order to ensure a reliable acceleration at the moment when these conditions are fulfilled, the actuating mechanism of the clutch is so connected with the corresponding lever of the carburetor that on disengaging the clutch there is at the same time automatically given a little gas during a predetermined period of time, so that the engine continues to run properly. The necessary mechanical connection may for example be established by means of a Bowden wire.

The device for carrying out the process described consists of a mechanical stop for the idling position of the throttle valve, and also of a valve which opens or closes the idling mixture passage, the stop and also the valve being actuated by one or more electromagnetic relays and corresponding springs; the device further consists of a cam on the clutch pedal and a power transmission device which connects this cam with the regulating valve of the carburetor. Furthermore, the whole device includes a switch cooperatively connected with the clutch mechanism and a switch cooperatively connected with the gear shifting mechanism.

The invention will be more fully explained with reference to an example of execution shown on the annexed drawing.

Figure 1 is an elevation of the carburetor partially in section, provided with the device according to the invention.

Figure 2 is a circuit diagram of the separate switches, using two switches according to the first embodiment of the invention.

Figure 3 is a diagram of the connection of the centrifugal switch according to the second embodiment of the invention.

In Figure 1 there is provided in the delivery conduit or outlet duct 1 of the carburetor the throttle valve 2 for regulating the quantity of gas and on the outside of the conduit tube, the electromagetic stop device having a coil 3. When current flows through the coil 3, the movable iron core 4 which is provided at its end with the stop 5, is drawn into the solenoid coil. The fixed iron core 6 limits this movement. The said

movement is transmitted through the lever 7 to the valve 2 and through the cam 8, roller 9 and the lever 22 rotatable about the pivot 23, to the idling fuel valve 10 which controls the idling fuel passage.

The valve 10 is opened as soon as valve 2 begins to open for the minimum delivery of gas and is then so controlled in the course of the further movement of the throttle valve 2, by means of the roller 9 and the lever 22, by the cam 8 that it opens or closes more or less corresponding to the composition of the mixture required at the position of the valve at the moment, exactly as is necessary for attaining a constant mixture.

The control of the device can take place by the arrangement of the gear shift lever G of the transmission gear to operate an electric switch 11 which is switched in when the gear shift lever is brought into the neutral position, and by furthermore an electric switch 12 being operated by the clutch pedal (or rod system) so that it is switched in when the clutch pedal is depressed.

As shown by Figure 2, the two switches are connected on one side to the positive pole 15 of the electric wiring system of the motor vehicle and, on the other side, to the coil 3 which is again connected with the mass of the engine and thus with the negative pole or ground 14.

Figure 1 shows an example of execution of the device which on sudden declutching permits an immediate supply of mixture to the previously completely starved engine, thus preventing stopping of the latter. This device having for its object to mechanically connect the manipulating mechanism of the clutch with that of the carburetor, consists of a roller 16 which is arranged in a carrier 19 rotatable about the pivot 17 carried by the arm 18 and rolls over an actuating cam 21 fixed on the clutch pedal 20, whereby it actuates either directly or indirectly the throttle valve of the carburetor, through the Bowden wire 22^x. By the particular design of the cam 21, the point of time of the fueling can be regulated. The return pressure spring 23^x brings the roller support with the roller automatically back into the original position.

In the modification shown in Figure 3, a centrifugal governor C operates the switching device S to open the circuit when a predetermined speed has been reached.

The method of operation of the device is as follows:

When the car is running with clutch engaged and a speed selected and without opening of the throttle being required, the valve 2 and also the valve 10 closes completely. The engine neither aspirates fuel nor air, gives very little compression work and develops a hardly noticeable braking action.

On the sudden disengagement of the clutch, the cam 8 will carry the carburetor lever along a little way, but it moves back again directly. In the meantime, the switch 12 has already closed, the gas lever slides back until the lever 7 rests on the stop 5. The position of this stop has, however, been previously altered by current flowing through the coil 3 at the moment of the disengagement, to such an extent that the throttle valve 2 is now held in the position for normal running of the engine at idling sped and at which the valve 10 is opened as far as is necessary.

The advantages of the invention lie in a considerable increase in the economy of the vehicle without reducing the power, and furthermore in the thorough obviation of all the injurious influences mentioned at the outset of the description and the reduced stressing of the engine due thereto.

I claim:

1. In apparatus of the class described for motor vehicles, a carburetor having an outlet duct, a throttle valve controlled passage through said duct and an idling fuel passage having an outlet into said duct at the outlet side of said throttle valve, an idling fuel valve for said idling fuel passage, means continuously tending to close said idling fuel valve, means cooperating with said throttle valve for opening said idling mixture valve as said throttle valve begins to open to idling position, manually operated means for the normal control of the throttle valve for effecting the different running speeds of the engine by which also the throttle valve may be completely closed, an electromagnetic stop device cooperatively connected with said throttle valve for moving the closed throttle valve to an idling position, and means cooperative with the clutch pedal for first mechanically moving said throttle valve to idling position and then effecting electrical energization of said electromagnetic means as the clutch pedal is moved to disconnect the clutch.

2. In apparatus of the class described for motor vehicles, a carburetor having an outlet duct, a throttle valve controlled passage through said duct and an idling fuel passage having an outlet into said duct at the outlet side of said throttle valve, an idling fuel valve for said idling fuel passage, means continuously tending to close said idling fuel valve, means cooperating with said throttle valve for opening said idling mixture valve as said throttle valve begins to open to idling position, manually operated means for the normal control of the throttle valve for effecting the different running speeds of the engine by which also the throttle valve may be completely closed, an electromagnetic stop device cooperatively connected with said throttle valve for moving the closed throttle valve to an idling position, and means operable by a gear shift lever of the vehicle for effecting energization of said electromagnetic means only when the gear shift lever is in neutral position.

3. In apparatus of the class described for motor vehicles, a carburetor having an outlet duct, a throttle valve controlled passage through said duct and an idling fuel passage having an outlet into said duct at the outlet side of said throttle valve, an idling fuel valve for said idling fuel passage, means continuously tending to close said idling fuel valve, means cooperating with said throttle valve for opening said idling mixture valve as said throttle valve begins to open to idling position, manually operated means for the normal control of the throttle valve for effecting the different running speeds of the engine by which also the throttle valve may be completely closed, an electromagnetic stop device cooperatively connected with said throttle valve for moving the closed throttle valve to an idling position, and means controlled by the speed of the engine of the vehicle and effective only when that speed reaches idling speed for energizing said electromagnetic means.

4. In apparatus of the class described for motor vehicles, a carburetor having an outlet duct, a throttle valve controlled passage through said duct and an idling fuel passage having an outlet into said duct at the outlet side of said throttle

valve, an idling fuel valve for said idling fuel passage, means continuously tending to close said idling fuel valve, means cooperating with said throttle valve for opening said idling mixture valve as said throttle valve begins to open to idling position, manually operated means for the normal control of the throttle valve for effecting the different running speeds of the engine by which also the throttle valve may be completely closed, an electromagnetic stop device cooperatively connected with said throttle valve for moving the closed throttle valve to an idling position, and means cooperative with the clutch pedal for first mechanically moving said throttle valve to idling position and then effecting electrical energization of said electromagnetic means as the clutch pedal is moved to disconnect the clutch, said electromagnetic means comprising a solenoid mounted on said outlet duct, a core for the solenoid, which core has a stop finger, and a lever connected to the throttle valve and engaged by said stop.

5. In apparatus of the class described for motor vehicles, a carburetor having an outlet duct, a throttle valve controlled passage through said duct and an idling fuel passage having an outlet into said duct at the outlet side of said throttle valve, an idling fuel valve for said idling fuel passage, means continuously tending to close said idling fuel valve, means cooperating with said throttle valve for opening said idling mixture valve as said throttle valve begins to open to idling position, manually operated means for the normal control of the throttle valve for effecting the different running speeds of the engine by which also the throttle valve may be completely closed, an electromagnetic stop device cooperatively connected with said throttle valve for moving the closed throttle valve to an idling position, means cooperative with the clutch pedal for first mechanically moving said throttle valve to idling position and then effecting electrical energization of said electromagnetic means as the clutch pedal is moved to disconnect the clutch, said mechanically moving means comprising a lever connected to said throttle valve, a member movably mounted adjacent the clutch pedal of the vehicle, a Bowden wire connecting said movably mounted member with said last named lever and a cam on the clutch pedal for actuating said movably mounted member while de-clutching so as to open said throttle valve to idling position, and means continuously tending to return said movably mounted member to a normal inactive position.

6. In apparatus of the class described for motor vehicles, a carburetor having an outlet duct, a throttle valve controlled passage through said duct and an idling fuel passage having an outlet into said duct at the outlet side of said throttle valve, an idling fuel valve for said idling fuel passage, means continuously tending to close said idling fuel valve, means cooperating with said throttle valve for opening said idling mixture valve as said throttle valve begins to open to idling position, manually operated means for the normal control of the throttle valve for effecting the different running speeds of the engine by which also the throttle valve may be completely closed, an electromagnetic stop device cooperatively connected with said throttle valve for moving the closed throttle valve to an idling position, means operable by a gear shift lever of the vehicle for effecting energization of said electromagnetic means only when the gear shift lever is in neutral position, said manually operated means comprising a lever connected to said throttle valve, a member movably mounted adjacent the clutch pedal of the vehicle, a Bowden wire connecting said movably mounted member with said last named lever and a cam on the clutch pedal for actuating said movably mounted member while de-clutching so as to open said throttle valve to idling position, and means continuously tending to return said movably mounted member to a normal active position.

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