

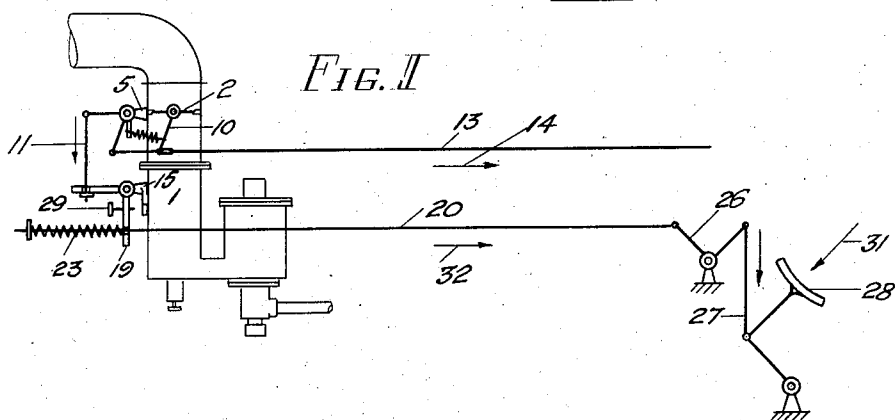
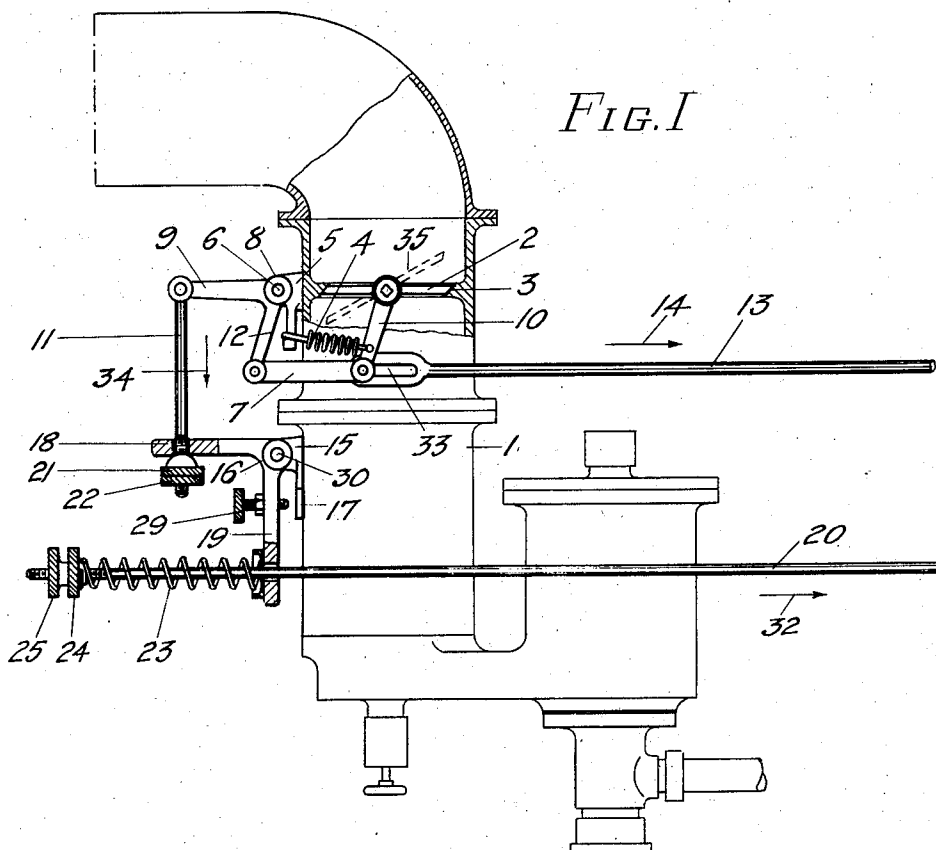
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H. A. LARDNER

AUTOMATIC THROTTLE VALVE CONTROL DEVICE FOR AUTOMOBILES

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AUTOMATIC THROTTLE-VALVE-CONTROL DEVICE FOR AUTOMOBILES.

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To all whom it may concern:

Be it known that I, HENRY A. LARDNER, a citizen of the United States, and resident of Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Automatic Throttle-Valve-Control Devices for Automobiles, of which the following is a specification.

This invention has to do with the art of fuel saving devices for automobiles, and motor-vehicles generally.

In its preferred embodiment the invention is an attachment for carbureters for automobiles and comprises automatic closing and opening means for the carbureter throttle valve, cooperating with some essential members of the vehicle driving mechanism.

To fully explain the advantages of my invention I shall refer briefly to the prevailing method of fuel supply regulation for automobiles, provided with the conventional types of carbureters and throttle valves, and where the supply of the explosive mixture is controlled by suitable manipulation of the throttle valve by means of hand or foot levers. The predominating form of throttle valve in these cases is the so-called butterfly valve which is not even tightly fitted to its seat in most cases, which condition alone may result in fuel losses. Furthermore, for the purpose of idling the engine which from time to time becomes desirable and necessary during the normal driving of an automobile and which will require a small amount of fuel, it is essential that the throttle valve be held slightly open. However, the mechanism controlling the throttle valve has heretofore been adjusted in such a way as to hold the throttle valve open all the time and even when the vehicle is going down hill and when the brakes are being applied. Obviously, in these cases, although the engine is revolving, no fuel is required to maintain the movement of the motor. On the contrary, a prompt and complete cutoff of the fuel supply would have eliminated an unnecessary impelling force of the motor and would have improved the braking effect of the engine. The prevailing method of holding the throttle valve slightly open at all times even when coasting down hill results in a large amount

of gasoline being sucked into the engine and wasted, and this is especially true when the engine is connected to the car through any of the reducing gears, in order to produce a greater braking effect.

With the foregoing in view, this invention provides a means of realizing a considerable saving of fuel by keeping the carbureter throttle valve automatically closed at all times in a positive and reliable manner, and by permitting motor fuel to reach the motor only when the throttle valve is opened intentionally. The opening of the throttle valve may be effected either by means of the usual hand or foot throttle lever mechanism, or automatically in cooperation with the vehicle driving mechanism. In the latter case the throttle valve of this invention is automatically opened a predetermined amount to provide the exact quantity of fuel for the motor in order to enable the engine to idle when this is desirable.

These automatic throttle valve controlling means, furthermore, are susceptible of adjustment to admit of their application to varied types of carbureters and throttle valves, and to accord with desired settings for the valve opening.

In addition to fuel saving, said means for automatically cutting off the fuel supply, when coasting, will considerably assist the brakes of the vehicle and therefore increase their durability.

Supplementing the above advantages afforded by the automatic closing and opening means for the throttle valve are those derived from the circumstance whereby said means do not in any way interfere with the normal function or with air and fuel adjustments of the carbureter, and whereby back firing and untimely explosions may be prevented in many cases.

Other means have also been provided for making the manual operation of the throttle valve entirely independent of the automatic control and vice versa, which together with other instrumentalities of this invention will now be described in detail on reference to the accompanying drawing, in which:—

Figure I is a general view in side elevation and partial section of a conventional type of carbureter having the invention applied thereto.

Figure II is a diagrammatic view showing the throttle valve control mechanism in connection with the clutch pedal mechanism of the automobile.

General construction.

As shown in Figure I, the carbureter 1 of any conventional type contains a throttle valve which may be also of any desired type but is shown to comprise a butterfly valve 2 which is tightly held upon its seat 3 by means of the helical tension spring 4. To the carbureter 1 is either cast or suitably secured the lug or bracket 5 which serves as a fulcrum 6 for bell crank 8. One lever arm 13 of this bell crank engages the throttle valve lever 10 at its extremity by means of link 7 while the other lever arm 9 has pivotally connected therewith the operating rod 11 of the automatic valve control mechanism which will be described hereinafter.

To the throttle valve lever 10 is connected the operating rod 13 which extends from the point of pivotal connection to the usual hand or foot throttle valve lever mechanism. Obviously, a movement of said rod 13 in the direction of arrow 14 will cause lever 10 to move in the same direction and open the butterfly valve 2 to any amount required for the normal operation of the engine, which conforms with the usual operation of the throttle valve. Since the latter valve closes automatically when the throttle valve lever is released, due to the action of spring 4, the operating rod 13 will evidently be subjected to tensional stress only and may therefore be reduced to a minimum size or diameter.

The automatic throttle valve controlling attachment embodying this invention includes a suitable bracket 15, cast or secured to the body of the carbureter 1. This bracket serves as a pivot for the bellcrank 16 and comprises also the stationary stop 17. The horizontal arm 18 and vertical arm 19 of the bellcrank 16 are apertured so as to receive therethrough sliding operating rods 11 and 20 respectively. As described before, the operating rod 11 at its upper end is pivotally connected to the leverarm 9 of the upper bellcrank 8 and registers through the lever arm 12, link 7 and lever 10 with the throttle valve 2, while the lower end of rod 11 extends loosely through an aperture in leverarm 18, and is adjustably connected to the latter by means of adjusting nut 21 and lock nut 22 in such a manner as to partake only of the downward movement of leverarm 18 and remain stationary when the latter moves upwards. The other operating rod 20 similarly engages the vertical leverarm 19 through helical compression spring 23, adjusting nut 24 and lock nut 25, and connects at the other end through bellcrank 26, rod 27 with the clutch pedal mechanism 28 as shown diagrammatically in Figure II.

By referring to Figure I, it will be seen that the vertical leverarm 19 also comprises an adjusting screw 29 which in cooperation with stationary stop 17 will limit the movement of bellcrank 16 revolving around pivot 30, and finally with it the opening of the butterfly valve 2.

As mentioned above in connection with rod 13, all other operating rods 11, 20 and 27 are subjected to tensional stresses only, which feature permits the best design.

Instead of the butterfly valve as shown in Figure I, any other type of throttle valve may be substituted, as for instance the conventional type of disc valve provided however that the valve is made to fit tightly and also kept in its closed position when not opened intentionally by means of the hand or foot throttle lever or automatically by the mechanism of this invention. Only slight modifications of some parts would be required to adapt this invention to other types of throttle valves.

General operation of the mechanism.

Bearing in mind that the throttle valve 2 of this invention is held completely closed due to the action of spring 4, the operation of the entire mechanism will be clearly understood on reference to the following description. In the usual course of driving the throttle valve 2 may be opened against spring 4 by means of the conventional hand or foot throttle lever connected to operating rod 13 and by moving the latter in direction of arrow 14. This operation will not in any way interfere with the automatic throttle valve control mechanism, since the rod 11 of the latter is free to slide downward through an aperture in lever arm 18 and will therefore not cause a movement of bellcrank 16.

When going down hill the manual or foot throttle lever is naturally released, and the throttle valve 2 will immediately return to its closed position. Obviously, during this operation the motor will not consume any fuel whatever and will therefore act more efficiently as a brake. Furthermore, with the throttle valve automatically closed, it will not be necessary to make any adjustments in the air or fuel supply for the carbureter as was sometimes formerly the case when the throttle valve was left slightly open during these same operations.

If now during the normal driving of the automobile it should become desirable or necessary to idle the motor, it is only necessary to disconnect the clutch in the usual manner by means of the clutch pedal 28. The downward movement of the latter as indicated by arrow 31 will automatically effect an opening of the throttle valve 2 and allow a predetermined amount of motor fuel to enter the motor for the purpose of keeping the engine revolving and prevent-

ing it from being stalled. Thus the throttle valve is automatically opened and maintained open to cause the engine to idle responsive to a disconnection of the driving means between the engine and the vehicle or upon the operator actuating means to control the operation of the vehicle. After the clutch is again connected, the throttle valve 2 will automatically return to its closed position and may be operated as described before.

By pushing the clutch pedal 28 downward in direction of arrow 31 (see Figure II) operating rod 20 will be forced to follow the movements of bellcrank 26 and operating rod 27 and will therefore be pulled to move in direction of arrow 32. This movement of rod 20 causes a revolving of lever arm 19 around pivot 30 in the same direction and a corresponding lowering of lever arm 18 and rod 11, but comes to a rest when the adjusting screw 29 bumps against or impinges the stationary stop 17. The downward movement of rod 11 as indicated by arrow 34 will cause a revolving of bellcrank 8 around its pivot and a corresponding oscillation of cooperating lever arm 12 and lever 10, suitable to open the throttle valve 2, as indicated by the dotted position 35. It is evident that the opening of this valve is terminated exactly at the same moment when the adjusting screw 29 touches the stationary stop 17. Consequently the amount of valve opening can be easily and exactly adjusted and maintained by means of adjusting screw 29.

Furthermore, by referring to Figure I, it will be seen that this movement of the throttle valve control mechanism and particularly of rod 11, bellcrank 8 and throttle lever 10 is effected independently of and will not be interfered with in any way by the rod 13 of the manual or foot throttle lever mechanism due to the provision of slot 33 in said rod 13, which permits a free movement of valve lever 10 in direction of arrow 14.

The helical compression spring 23 positioned between adjusting nut 24 and lever arm 19 is provided for the purpose of compensating for the difference in the extent of movements of bellcranks 16 and 17. This permits of the connection 20 being further moved after it has been moved to open the throttle valve and without further opening the valve.

Other means may also be employed whereby the throttle valve may be opened to a limited extent only sufficient to cause the engine to idle, but the arrangement described wherein the throttle valve is opened to a limited extent just sufficient to cause the engine to idle upon operation of the clutch pedal, is preferred.

While I have described my improvements in great detail and with respect to a pre-

ferred form thereof, I do not desire to be limited to such details or form since many changes and modifications may be made and the invention embodied in widely different forms without departing from the spirit and scope thereof in its broader aspects. Other means used by the operator to control the operation of the vehicle in various respects may be utilized to automatically effect the opening of the throttle valve. Also various parts may be omitted altogether. Therefore I desire to cover all forms and modifications coming within the language or scope of any one or more of the appended claims.

Having thus described the invention, I claim:

1. The combination with a vehicle driven by an internal combustion engine, of a throttle valve for controlling the fuel supply to the engine, said throttle valve being normally closed substantially tight whereby when so closed substantially no fuel will be supplied to the engine, means for operating said throttle valve to vary the amount of fuel supplied to the engine and vary the amount of power developed by the engine during the running of the vehicle, and means for opening said throttle valve and means whereby the action of said last mentioned means is limited so that it opens the throttle valve to a limited extent only sufficient to cause the engine to idle without otherwise affecting the operativeness of said first mentioned means.

2. The combination with a vehicle driven by an internal combustion engine, of a throttle valve for controlling the fuel supply to the engine, said throttle valve being normally closed substantially tight whereby when so closed substantially no fuel will be supplied to the engine, manually controlled means for operating said throttle valve to vary the amount of fuel supplied to the engine and vary the amount of power developed by the engine during the running of the vehicle, and means controlled independently by the operator of the vehicle for maintaining said throttle valve open and means whereby said last mentioned means acts to open and maintain open said throttle valve only to an extent just sufficient to cause the engine to idle without otherwise affecting the operation of said first mentioned means.

3. The combination, with a vehicle driven by an internal combustion engine, of a normally closed throttle valve for controlling the fuel supply to the engine, means for operating said throttle valve to vary the amount of fuel supplied to the engine and vary the amount of power developed by the engine during the running of the vehicle, and means for independently opening said throttle valve to a limited extent to cause

the engine to idle, said last mentioned means being operated to so open the throttle valve responsive to a disconnection of the driving means between the engine and the vehicle.

4. The combination with a vehicle driven by an internal combustion engine, of a throttle valve for controlling the fuel supply to the engine, said throttle valve being normally closed substantially tight whereby when so closed substantially no fuel will be supplied to the engine, manually controlled means for operating said throttle valve to vary the amount of fuel supplied to the engine and vary the amount of power developed by the engine during the running of the vehicle, and means controlled independently by the operator of the vehicle for maintaining said throttle valve open to at least an extent to cause the engine to idle without otherwise affecting the operation of said first mentioned means, said last mentioned means being operated to so open the throttle valve, by a disconnection of the driving means between the engine and the vehicle.

5. The combination with a vehicle driven by an internal combustion engine, of a throttle valve for controlling the fuel supply to the engine, said throttle valve being normally closed substantially tight whereby when so closed substantially no fuel will be supplied to the engine, means for operating said throttle valve to vary the amount of fuel supplied to the engine and vary the amount of power developed by the engine during the running of the vehicle, and means for opening said throttle valve to a limited extent to cause the engine to idle without otherwise affecting the operativeness of said first mentioned means, said last mentioned means being operated to so open the throttle valve, by a disconnection of the driving means between the engine and the vehicle, and means whereby the amount said last mentioned means opens the throttle valve, may be adjusted.

6. The combination, with a vehicle driven by an internal combustion engine, of a throttle valve for controlling the fuel supply to the engine, manually controlled means for operating said throttle valve to vary the amount of fuel supplied to the engine and vary the amount of power developed by the engine during the running of the vehicle, and means controlled and independently by the operator of the vehicle for maintaining said throttle valve open to a limited extent to cause the engine to idle, said last mentioned means being operated to so open the throttle valve by movement of the clutch lever of the vehicle to disconnect the driving means between the engine and the vehicle.

7. The combination, with a vehicle driven by an internal combustion engine, of a throt-

tle valve for controlling the fuel supply to the engine, a spring for holding said valve closed tightly whereby when so closed substantially no fuel will be supplied to the engine, a connection by means of which the operator of the vehicle may open said valve to various extents to vary the amount of fuel supplied to the engine in the operation of the vehicle, a second connection operation of which acts to open and maintain open the valve and means whereby the action of said second connection is limited so that it opens the throttle valve to a limited extent only sufficient to cause the engine to idle, and means whereby operation of said second connection does not affect said first connection.

8. The combination, with a vehicle driven by an internal combustion engine, of a throttle valve for controlling the fuel supply to the engine, a spring for holding said valve closed tightly whereby when so closed substantially no fuel will be supplied to the engine, a connection by means of which the operator of the vehicle may open said valve to various extents to vary the amount of fuel supplied to the engine in the operation of the vehicle, means including a lever for opening said valve and maintaining the valve open to a limited extent sufficient to cause the engine to idle and independently of said first connection, and a connection from said lever whereby the operator may move the lever to so open the valve, said last mentioned connection and lever having cooperating parts permitting the last mentioned connection to be further moved after it has been moved to so open the valve and without further opening the valve.

9. The combination, with a vehicle driven by an internal combustion engine, of a throttle valve for controlling the fuel supply to the engine, manually controlled means for operating said throttle valve to vary the amount of fuel supplied to the engine and vary the amount of power developed by the engine during the running of the vehicle, and means controlled independently by the operator of the vehicle for maintaining said throttle valve open to a limited extent to cause the engine to idle, said last mentioned means being actuated by operation of certain means controlling the operation of the vehicle under the control of the operator.

10. The combination with a vehicle driven by an internal combustion engine, of a throttle valve for controlling the fuel supply to the engine, said throttle valve being normally closed substantially tight whereby when so closed substantially no fuel will be supplied to the engine, manually controlled means for operating said throttle valve to vary the amount of fuel supplied to the engine and vary the amount of power developed by the engine during the running of

the vehicle, and means controlled independently by the operator of the vehicle for maintaining said throttle valve open to at least an extent to cause the engine to idle
5 without otherwise affecting the operation of said first mentioned means, said last mentioned means being automatically operated to so open the valve upon the operator actuating other means to control the operation
10 of the vehicle.

11. In combination with a carbureter for

motor-vehicles, comprising a tight fitting throttle valve, automatic closing means for said valve, means actuated by the clutch pedal mechanism of said vehicle, whereby in
15 the disengaged position of said clutch said valve is opened automatically a predetermined amount.

Signed at New York, in the county of New York and State of New York, this 20th day
20 of November A. D. 1923.

HENRY A. LARDNER.