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F. J. IRVING

2,102,271

AUTOMATIC THROTTLE

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FIG. 1.

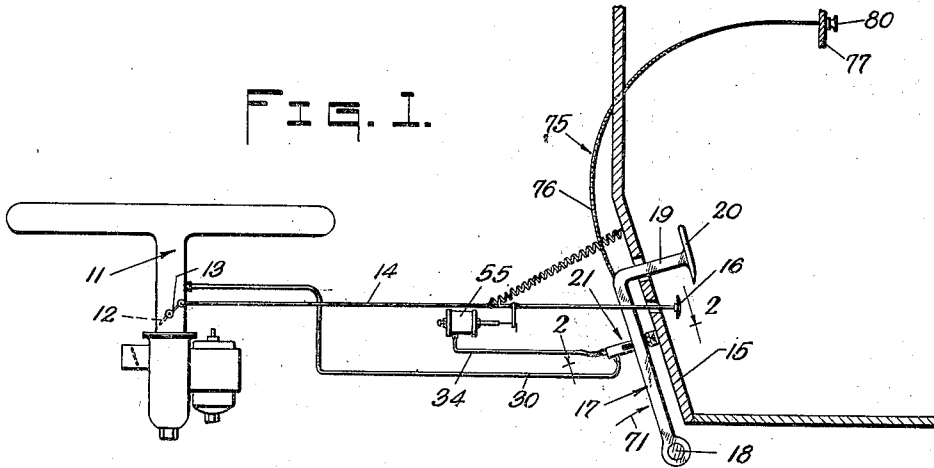


FIG. 2.

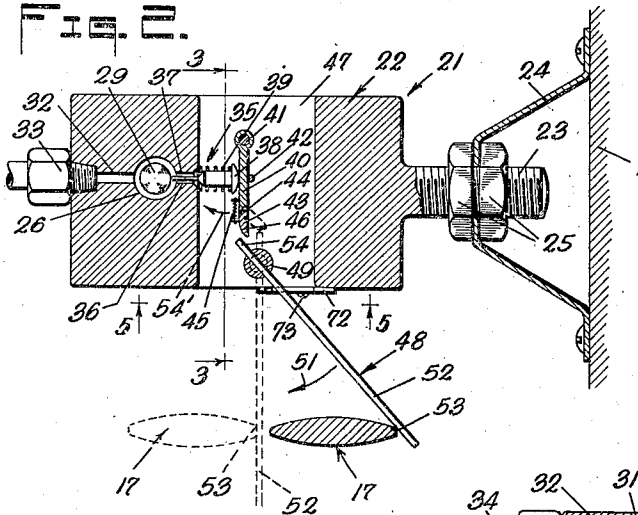


FIG. 3.

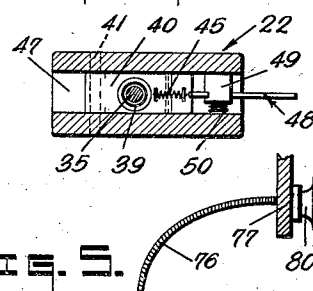


FIG. 4.

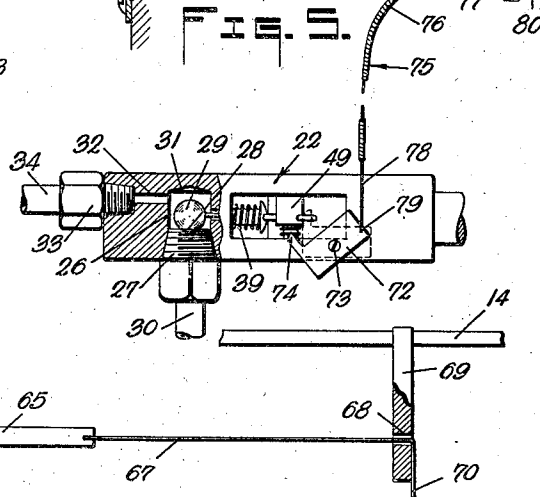
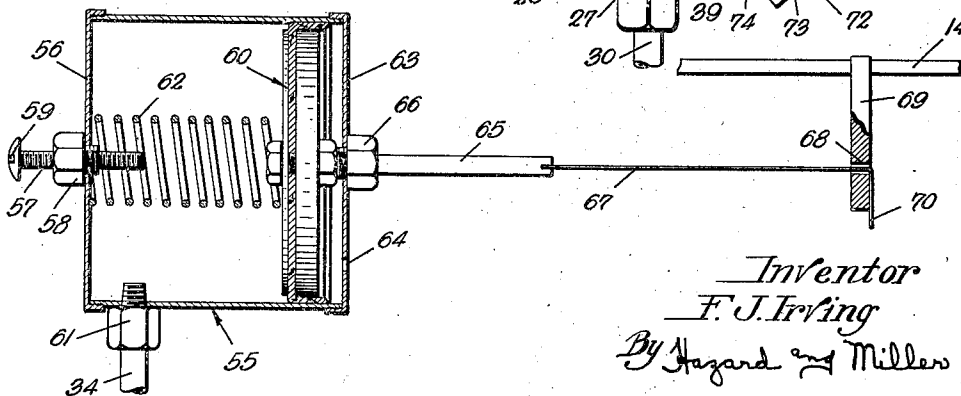


FIG. 5.



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UNITED STATES PATENT OFFICE

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AUTOMATIC THROTTLE

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11 Claims. (Cl. 192—31)

I designate my invention as an automatic throttle valve as the device automatically opens the throttle valve of an internal combustion engine when the clutch connecting the engine to the driven element is let in or closed. My invention is particularly adapted for automobiles in which an internal combustion engine is used controlled by a throttle and a clutch is also used to connect the engine to the transmission and driving wheels. A considerable amount of inconvenience arises in driving automobiles, for instance, from a stopped position with the engine running on an upgrade in which the vehicle is held stationary by the brakes using one foot on the brake pedal and the other foot is used to hold the clutch out while the vehicle is stationary and such clutch must be let in before the vehicle can start. As it is usual to manipulate the throttle by the foot used for the brakes it is necessary to remove the foot from the brake pedal before the foot throttle can be operated to open the throttle and speed up the engine on letting in of the clutch. This frequently causes the vehicle to roll rearwardly before the engine can be speeded up sufficiently to give a forward direction of movement. The same difficulty occurs to a lesser extent in starting a vehicle from rest on the level as from an idling speed with the throttle closed it is necessary to open the throttle by manipulating the foot throttle to obtain a sufficient engine speed to accelerate the vehicle.

Therefore, an object and feature of my invention is an automatic interconnection between the clutch and the throttle, preferably through the clutch operating lever so that in the action of letting in or closing the clutch from an open clutch position the throttle valve is actuated to increase the throttle opening and thus for a short period of time speeding up the engine. This interval of time is sufficient to permit removal of one foot from the brake pedal into engagement with the foot throttle, button, or other operating device.

A further object and feature of my invention is to make use of the vacuum developed in the intake manifold by the operation of the engine, preferably between the throttle valve and the engine to manipulate the foot throttle; and to so utilize this suction or vacuum that in the action of closing the clutch the suction or vacuum may operate or control a valve and this valve make a suction or vacuum connection to a power device and then this power device actuates the throttle for a short interval of time.

A further and more detailed object of my invention is utilizing a power cylinder having a vacuum connection at one end and an atmospheric air connection at the other end. This cylinder has a piston operating therein influenced by the vacuum so that on increase of the vacuum in one end of the cylinder the atmospheric air pressure causes the movement of the piston. The piston rod has a connection to the throttle valve and hence opens the throttle valve on the movement of the piston in one direction when subjected to suction.

Another object and feature of my invention is a vacuum control valve with a piping connection from the intake manifold to the power or operating cylinder. This valve is normally closed and maintained closed by the suction and hence the power cylinder is uninfluenced. However, I provide an operating connection between the control valve and the clutch pedal by which in the action of letting the clutch in or closing the clutch the vacuum valve is opened making a vacuum connection from the intake manifold to the power cylinder.

A further detailed object and feature of my invention as it relates to the vacuum valve is constructing this valve with a ball or the like forming a valve closure on a suitable valve seat and which ball may be unseated by a plunger and the plunger operated by a lever. This lever may be partly rotated in one direction to unseat the valve by a pivot arm. This arm is normally under a spring tension and urged into an operative position, but, in the normal running of the car with the clutch closed the arm is held in an inoperative position by the clutch pedal or lever. Then in the movement of the clutch pedal from a position of an open clutch to that of a closed clutch the arm rotates on a pivot and moves the valve lever to press the plunger inwardly and unseat the ball of the vacuum valve. In order that in the oscillating movement of the operating arm the valve lever may only move in one direction this valve lever is provided with a hinged or pivoted tip end which allows a free swinging of this end when the control arm is moved from its inoperative normal running position to its operative position when the clutch pedal is pressed forwardly to open the clutch.

Other detailed features of my invention comprise a latch which may be manually manipulated to retain the control arm locked in its inoperative position and, therefore, entirely dis-

connect the automatic throttle control from the clutch pedal.

A further detailed feature of my invention embodies a slip connection between the piston rod of the piston in the power cylinder and the throttle operating rod to permit any desired use of the throttle rod either through the foot operative button or by hand without moving the piston and also so that the piston of the power cylinder may move the throttle rod to open the throttle independent of any manual manipulation of this rod.

My invention is illustrated in connection with the accompanying drawing in which:

Fig. 1 is a diagrammatic elevation, partly in section showing the manner of installing my invention in relation to the throttle, the throttle control, the clutch pedal and the instrument panel of an automobile.

Fig. 2 is a longitudinal section on the line 2—2 of Fig. 1 in the direction of the arrows illustrating the vacuum valve and actuating elements thereof.

Fig. 3 is a transverse section on the line 3—3 of Fig. 2 in the direction of the arrows.

Fig. 4 is a longitudinal section through the power operating cylinder for actuating the throttle.

Fig. 5 is a vertical section on the line 5—5 of Fig. 2 in the direction of the arrows, parts being broken away to illustrate the locking out latch for the automatic control.

In the drawing, referring first to Fig. 1, the intake manifold for an internal combustion engine is indicated at 11, a throttle valve 12, generally designated as the throttle, has a throttle arm 13 connected thereto, the arm and the valve being rotated by a throttle rod 14 which extends through an opening in the floor board 15 and has a button 16 for operating the foot throttle, a spring 16' normally returns the throttle to its closed position and from said position, when the button is pressed towards the floor board, the throttle is opened. The clutch pedal is designated by the assembly numeral 17 and is pivoted at 18 and having a bent end 19 with a head 20 to be engaged by the foot. In the usual construction the pedal is pressed forwardly bringing the head 20 towards the floor board to open or throw the clutch out and on the return movement to the position illustrated in full lines in Fig. 1 the clutch is closed or let in.

In my invention I employ a suction or vacuum valve assembly designated by the numeral 21. This has a rectangular body structure 22 with a threaded bolt like end 23 which may be attached to a bracket 24, this bracket being secured to the floor board 15. The bolt 23 is adjusted on the bracket by means of the nuts 25. The valve housing has a bore 26 extending upwardly which is closed by a plug 27, this plug having a valve seat 28 on which is seated a closure ball 29. A pipe 30 is attached to the plug and extends to the intake manifold between the throttle valve and the engine as illustrated in Fig. 1. This gives a suction on the valve and in the normal running of the engine tends to hold the ball 29 seated. The space for movement of the ball is limited by the end 31 of the bore 26. A duct 32 leads from the bore 26 to a connector 33 and from this connector there is a suction pipe 34.

The device for controlling and actuating the ball valve to release the same comprises a slidable plunger 35 which has a stem 36, slidable in a small bore 37 in the valve housing. The

plunger has a head 38 and it is normally pressed outwardly by a coil spring 39 coiled around the plunger. The head of the plunger is engaged by a lever 40 pivoted at 41 and engaged by the stop pin 42 to limit the outward movement of the plunger. The tip end 43 of the valve lever is hinged as indicated at 44 so that it may swing in the direction of the dotted lines in Fig. 2, that is, in a counter-clockwise direction. A retraction spring 45 is secured to the main portion of the lever and the tip end and returns this tip end into alignment with the main lever portion. An inter-acting shoulder between the tip end and the main portion of the lever prevents the tip end from hinging in both directions. This hinged end preferably has a beveled or cam shaped surface 46.

The main portion of the plunger, the control lever and the operating mechanism, therefore, are preferably mounted in a transverse opening 47. The pivot 41 extends through this open space. The operating arm 48 to actuate the valve lever is mounted on a pintle 49 which extends across the opening 47 between the top and the bottom and the coil spring 50 tend to rotate the lever in the clockwise direction, that is, they give an urge to rotate this arm in the direction of the arrow 51. The arm has an outer end portion 52 which is engaged by the rearward edge 53 of the clutch pedal lever 17. The inner end 54 of the arm is positioned to engage and contact with the tip end 43 of the valve lever 40.

The operation of the vacuum valve so far described is as follows:

When the clutch is in the driving position, Fig. 1, the valve arm 48 is held in its retracted or inoperative position by the interengagement of the clutch lever and the arm 48. When the clutch pedal is depressed and moved to the dotted line position of Fig. 2 in the operation of releasing or opening the clutch the spring 50 urges the arm 48 in the direction of the arrow 51. In this movement the end 54 of the arm 48 engaged the tip end 43 of the lever 40 and rotates this on its hinge 44. This action does not or cannot move the lever 40 because this lever engages the stop pin 42. When the arm 48 moves to the dotted line position of Fig. 2 the tip end returns to the full line position.

The clutch pedal must be held down by the foot, usually the left foot. When the clutch is let in or closed by pulling the foot back and permitting the clutch pedal to move from the dotted to the full line position of Fig. 2 the end 54 of the arm 48 engages the tip end 43 of the lever 40 and rotates this lever in the direction of the arrow 54', that is, in a clockwise rotation. This action depresses the plunger 35 and the plunger stem 36 to a sufficient extent to unseat the ball 29 of the ball valve. This then allows a suction or vacuum connection through the pipe 34, the duct 32, the valve having the bore 26, the pipe 30 to the intake manifold.

The power device for actuating the throttle valve utilizes a power cylinder designated by the numeral 55. This cylinder is suitably supported. It has a closed head 56 at one end through which extends an adjusting stop screw 57. The screw is illustrated as extending through an interiorly threaded nut 58 which nut is secured to the head 56. A kerf 59 on the screw head allows adjusting of this. The adjusting screw is to limit the movement of the piston 60 under the action of vacuum as the vacuum pipe 34 enters the cylinder through the connector 61. A compression spring

62 which bears on the cylinder and the head 56 tends to force the piston towards the cylinder head 63 which head has openings 64 to the atmosphere. The piston rod 65 operates through a plug 66 secured to the head 63 and this rod has a tension wire 67 thereon. The wire passes through a perforation 68 in an arm 69 secured to the throttle rod 14. The rod 67 is illustrated as having a bent end 70.

The operation of the power cylinder is as follows:

As the clutch is being let in by a movement of the clutch pedal in the direction of the arrow 71 (Fig. 1) or from the dotted to the full line position of Fig. 2 the ball 29 of the vacuum valve is unseated in the manner above described. This gives a vacuum connection from the intake manifold through the vacuum valve to the cylinder 55 and the piston is moved from the right hand towards the left hand in this cylinder, having reference to Fig. 4, the limit of movement being by the stop screw 57. This action of exerting tension on the wire 67 pulls on the arm 69 and moves the throttle rod 14 into position to open the throttle, thus increasing the fuel to the engine and speeding up the engine as the clutch is let in. This gives sufficient time for the driver of the vehicle to release the foot brakes and to engage the foot throttle with his right foot, presuming the clutch pedal is being operated by the left foot. As soon as the plunger operating lever 40 is released from the inner end of the arm 48 the spring 39 forces the plunger outwardly and the ball of the vacuum valve again becomes seated, thus breaking the vacuum connection to the power cylinder through passage 37. The spring 62 then returns the piston to its original position and when the wire 67 is in its inoperative position the foot throttle and also the hand throttle may be freely manipulated.

The latching out device for locking the automatic throttle inoperative is as follows, having reference particularly to Figs. 1, 2 and 5:

A latch plate 72 is pivoted at 73 on one side of the valve housing 22 and this has a hook or finger 74 which in the operative position engages the arm 48 when the outer portion 52 is shifted to its inoperative position as shown by the full lines in Fig. 2. A Bowden wire construction 75 employs a flexible tube 76 secured to the instrument panel 77 and in this there is an operating wire 78 which connects at 79 to the latch plate 72. This wire has a finger pull button 80. Therefore, on pulling on this button the latch plate is rotated to its inoperative position as shown dotted in Fig. 5 and releases the arm 48 for free movement on the movement of the clutch pedal and on the reverse action, that is, thrusting inwardly on the button, the latch plate assumes its operative position as shown in full lines in Fig. 5. It will thus be seen that at the will of the driver he may use the automatic throttle if he wishes or he can lock this out of operation.

With the device above described and illustrated operated with the latching-out device having the latch plate 72 inoperative and by a careful manipulation of the clutch pedal, the movement of the operating arm 48 from its dotted line position of Fig. 2 towards its full line position permits holding the lever 40 away from the stop pin 42, thus holding the plunger 35 depressed and unseating the ball 29 thereby opening the vacuum control valve. In other words, by a careful actuation of the clutch pedal in the movement required to close or partially close or let the clutch

in, the vacuum control valve may be opened and maintained open for any desired length of time. This causes the creation of a vacuum in the power device having the power cylinder 55, which in turn causes a movement of the piston 60 towards the adjusting stop screw 57 which action operates the throttle rod 14 and hence opens the throttle, and as the vacuum control valve may be maintained open, the piston 60 may move until it is stopped by the adjusting stop screw 57 and thereby open the throttle valve to substantially any extent desired, and thus give a control of the engine speed by the manipulation of the clutch pedal. Manifestly the adjusting screw 57 may be regulated to obtain any desired degree of throttle opening and hence of engine speed.

Therefore, by the operation of the clutch pedal alone, together with the adjustment of the stop device which limits the movement of the piston 60, the throttle opening and engine speed may be maintained under a control by the use of one foot.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In a device as described the combination of an engine provided with an intake manifold having a throttle valve and developing a suction in the manifold and a clutch controlled by a movable clutch lever, a suction operated power device, an interconnection between said power device and throttle, a suction operated valve and a suction air connection between the intake manifold and the intake manifold and the valve, and between the valve and the power device, the said valve having a valve closure normally seated when subjected to suction, and an operative means interconnecting between the valve and the clutch lever to open the valve on closing of the clutch thereby giving a suction connection between the intake manifold and the power device.

2. In a device as claimed in claim 1, and a latching out device operatively connected to the valve and manually operated to latch the said interconnecting means between the valve and the clutch lever to render the valve inoperative to open.

3. In a device as claimed in claim 1, the said interconnecting means between the valve and the clutch lever comprising a pivotally mounted arm, the said valve having a plunger, a closure element for the valve adapted to be unseated by the plunger and an interconnecting means between the said arm and said plunger to operate the plunger to open the valve in one direction of movement of the said arm.

4. In a device as described, the combination of an engine provided with an intake manifold, a throttle valve operated by a throttle rod and developing a suction in the intake manifold and a clutch actuated by a pivoted clutch lever, a power device having a cylinder with a piston therein, and a piston rod operatively connected to the throttle rod, a valve, a suction connection between the valve and the intake manifold and the valve and the cylinder, said valve having a closure means operated by suction, an unseating means in the valve to unseat the said closure means and an operative connection between the clutch lever and the said unseating means to open the valve on movement of the clutch lever to close the clutch and thereby form a suction con-

nection between the intake manifold and the cylinder.

5. In a device as described in claim 4, the said operative connection including a pivotally mounted arm, a movable latch and a manually operative means to actuate said latch to render the said arm inoperative whereby the said clutch lever may be actuated and the said arm remain stationary.

6. In a device as described, the combination of an engine provided with an intake manifold, a throttle valve operated by a throttle rod and developing a suction in the intake manifold, a clutch actuated by a pivoted clutch lever, a power device having a cylinder with a piston therein, a piston rod, a connection between the piston rod and the throttle rod to move the throttle rod in one direction only on movement of the piston, a valve housing for a valve seat with a valve closure therein, a suction connection between the intake manifold and the valve seat to hold the closure member seated, a second suction connection between the valve and one end of the cylinder, a plunger in the valve to unseat the valve closure, a pivotally mounted lever arm engaging the plunger, a pivotally mounted operating arm, a spring means urging said arm in one direction of rotation and the free end of the arm engaging the clutch lever whereby on closing the clutch the opposite end of the arm engages the said lever and depresses the plunger to unseat the valve closure and provide a suction connection from the intake manifold to the cylinder.

7. In a device as described in claim 6, the said lever having a pivoted tip end, the said arm engaging said end and swinging said end on its pivot without moving the lever in a plunger depressing action.

8. In a device as described in claim 6, a cutting out latch plate pivotally connected to the valve housing and having a finger to engage the said arm, means to rotate said plate whereby the said finger retains the arm in an inoperative position when the clutch lever is in the closed clutch position.

9. A device as described, the combination of an engine provided with a throttle valve and a clutch actuated by a movable clutch lever, an air power device, an operative connection between said device and the throttle valve to open said valve in one direction of movement of the said device, an air controlled valve with an operative air connection to said power device and to means forming a source of air power, an interconnecting actuating device between the valve and the clutch lever to actuate said valve on movement of the lever from an open to a closed clutch position to thereby energize the said air power device.

10. In a device as described, the combination of an engine having a suction means, a throttle valve and a clutch, the clutch being actuated by a movable clutch actuating means, a power device, an interconnection between said power device and the throttle, a control valve, an interconnection between the control valve, the engine suction means and the power device, the said valve being interconnected with the movable clutch actuating means, means to open the interconnection between the valve and the movable clutch actuating means to render the said valve and power device inoperative.

11. In a device as described, the combination of an engine having an intake manifold with a throttle valve and developing a suction in the manifold, a clutch with a movable clutch actuating means, a suction operated power device interconnected with the throttle, a vacuum valve, a vacuum connection between the intake manifold, the valve and the valve to the power device, means operated by the movable clutch actuating means in closing the clutch to open the said vacuum valve and form a vacuum connection to the said power device, a latching out device operatively connected to the valve and movable to render the valve inoperative to open the means operated by the suction being constructed and operated to maintain the valve closed.

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