

Dec. 8, 1936.

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2,063,794

THROTTLE CONTROL MECHANISM

Filed April 22, 1935

Fig. 1

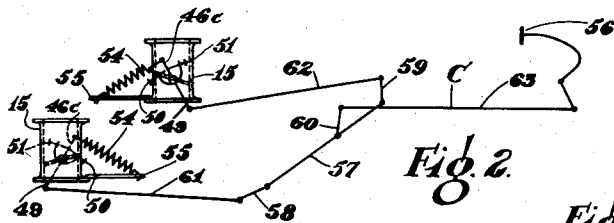
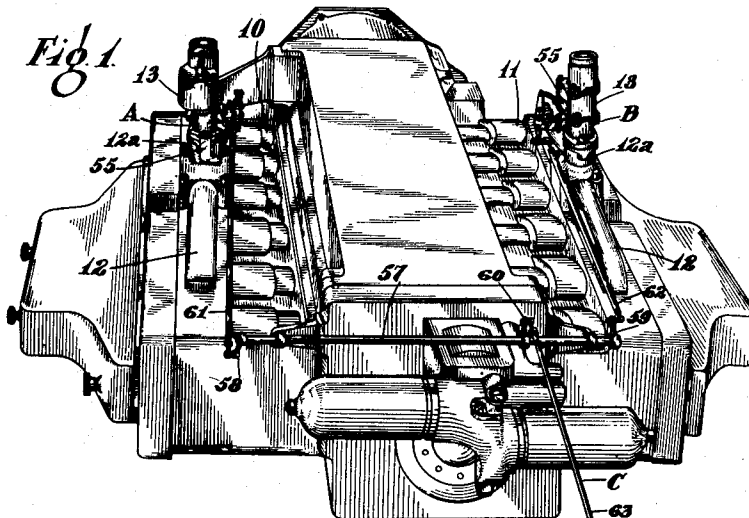


Fig. 2

Fig. 3

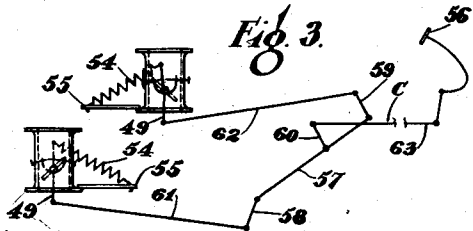


Fig. 4

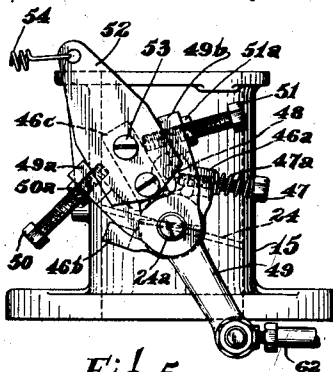
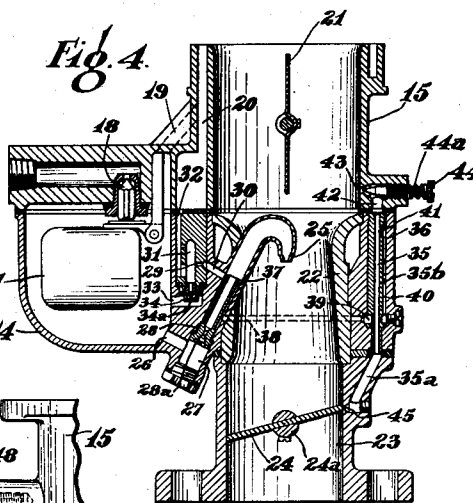


Fig. 5

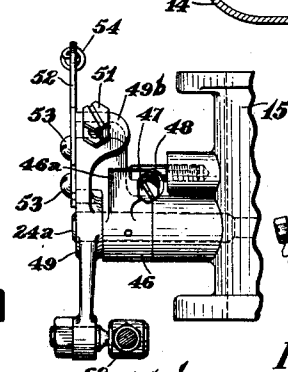


Fig. 6

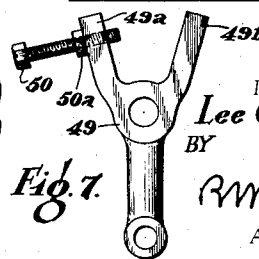


Fig. 7

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2,063,794

THROTTLE CONTROL MECHANISM

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Application April 22, 1935, Serial No. 17,567

6 Claims. (Cl. 261—23)

This invention relates to internal combustion engines, and more particularly to throttle control mechanism therefor.

It is often desirable in the construction of motor vehicles embodying a plurality of engines, and in the construction of motor vehicles embodying a single engine constructed with a plurality of fuel induction systems, to connect the throttles of the separate fuel induction systems for simultaneous operation. Difficulty has, however, been experienced in connecting the throttles in the manner specified when employing carburetors of modern construction equipped with idling jets, the difficulty encountered resulting from inaccuracies in construction of the carburetors which produce differences in the ranges of throttle movement between idling positions and the positions at which the main carburetor jets come into action.

It is the object of this invention to provide a throttle control mechanism of the type above set forth which can be readily adjusted to compensate for the inaccuracies in the construction of the carburetors.

It is a further object of this invention to provide a throttle mechanism for use with a plurality of carburetors which can be readily adjusted to compensate for inaccuracies in construction outside of the carburetors.

Other objects will appear in the following description of one practical embodiment of the invention illustrated in the accompanying drawing, in which:

Figure 1 is a perspective view of an engine constructed with two sets of opposed cylinders and with separate fuel intake systems for the two banks of cylinders, together with a control mechanism for the throttle valves of the intake systems.

Figure 2 is a diagrammatic view illustrating the various positions of the parts of the throttle control mechanism with the throttles in idling positions.

Figure 3 is a diagrammatic view illustrating the positions of the various parts of the throttle control mechanism with the throttles in partially opened positions.

Figure 4 is a sectional view of one of the carburetors shown in Figure 1.

Figure 5 is an elevational view of the lower portion of the carburetor illustrated in Figure 4, showing the mechanism carried by the operating shaft of the throttle valve.

Figure 6 is a similar view to Figure 5 taken at a right angle thereto and showing only a part of the lower portion of the carburetor, and

Figure 7 is a detail view of a modification of one of the levers employed in throttle control mechanism.

The engine illustrated in the drawing com-

prises two banks of cylinders 10 and 11 of like construction which are fed by two fuel induction systems A and B of like construction. The fuel induction systems A and B each comprise an inlet manifold 12, a short inlet pipe 12a, and a carburetor 13.

The carburetors 13 although oppositely disposed are exactly alike in construction, and a description of the one shown at the right in Figure 1 and illustrated in section in Figure 4 will serve the purpose of this disclosure. Such carburetor comprises a float chamber 14 and a tubular intake portion 15 which communicates with the intake manifold 12 through the pipe 12a. The float chamber 14 is provided with a fuel inlet 16, and with a float 17 and a needle valve 18 which cooperate to automatically control the level of the fuel in the float chamber. A vent for the float chamber is provided in the form of a duct 19 which forms a communicating passage between the upper part of such chamber and a passageway 20 leading to the outside atmosphere.

The upper end of the tubular portion 15 serves as an air intake and is controlled by a conventional choke valve 21. Located in the central part of the tubular portion 15, there is a venturi 22 which communicates at its lower end with a mixing chamber 23 at the lower end of the tubular portion. Mounted within the mixing chamber 23, there is a rotatable throttle valve 24 of the butterfly type, the shaft 24a of which extends through the wall of the tubular portion 15 for connection to the throttle operating mechanism.

Projecting into the venturi 22 from the wall of the tubular portion 15, there is a nozzle 25 the outlet end of which extends into the throat of the venturi 22. This nozzle constitutes the main jet of the carburetor, and is arranged and fed in such a manner that no fuel is drawn therefrom during idling of the engine. Such nozzle is fed directly from the float chamber through a duct 26, a well 27, and a tubular member 28 formed with a calibrated orifice 28a at its lower end. Such nozzle is further fed by way of two ducts 29 and 30 from a gravity well 31 which communicates with atmosphere through a duct 32 and the passageway 20 and receives its supply of fuel from the float chamber through a duct 33 and a member 34 formed with a calibrated orifice 34a.

In addition to the nozzle 25, the carburetor is constructed with means for supplying fuel to the engine during idling of the engine. Such means comprises a well 35 composed of a duct 35a formed in the wall of the tubular portion 15 and a tube 35b mounted in a bore 36 in the wall of the tubular portion. The well 35 is supplied with fuel from the gravity well 31 by way

of the ducts 29 and 30, a passage 37 existing between the tube 28 and the wall of the nozzle 25, a duct 38 leading around the periphery of the tubular portion 15, a passage 39 formed by cutting a notch in the circumference of the tube 35b, a second passageway 40 formed by cutting a longitudinally extending slot in the tube 35b, and an aperture 41 formed in the upper end of the tube 35b.

The upper end of the well 35 communicates through a duct 42 with a duct 43 leading into the interior of the tubular portion, and an adjustable needle valve 44 equipped with a retention spring 44a is provided to adjust the flow of air thereinto from the interior of the tubular portion. At its lower end, the well 35 communicates with the interior of the mixing chamber through a discharge orifice 45 constituting the idling jet.

When the engine is idling, fuel is supplied to the mixing chamber by the fuel system last described, the suction within the venturi 22 at such time being insufficient to draw fuel from the nozzle 25. As the throttle valve 24 is opened, a point is reached at which the suction created in the venturi is sufficient to draw fuel from the nozzle 25. At this time, the fuel supplied to the well 35 of the idling system is cut off due to all fuel from the well 31 being drawn into the nozzle 25, and from that time on fuel is supplied solely by the nozzle 25.

Fixed upon the shaft 24a of the throttle valve of each of the carburetors, there is a member 46 formed with two short arms 46a and 46b and with a long intermediate arm 46c. The arms 46a of the members 46 carry screws 47 equipped with retention springs 47a which are designed for engagement with members 48 protruding from the sides of the carburetors to limit closing movement of the throttle valves. The arms 46b of the members 46 are designed to engage with the members 48 to limit opening movement of the throttle valves, and the arms 46c to serve as throttle actuating levers in the manner hereafter described.

Rotatably mounted upon the shaft 24a of the throttle valve of each carburetor, there is a lever 49 formed at its upper end with an arm 49a located at the side of the arm 46c in which such lever moves in closing the throttle and with an arm 49b located on the opposite side of the arm 46c. Mounted in the arms 49a of the levers 49, there are adjustable screws 50 equipped with lock nuts 50a which are designed to engage with the arms 46c; and mounted in the arms 49b of the levers 49, there are adjustable screws 51 equipped with lock nuts 51a which are designed to engage with the opposite sides of the arms 46c from the screws 50.

The rotatably mounted levers 49 are held in place by plates 52 secured to the arms 46c of the members 46 by means of screws 53. Springs 54 connecting the upper ends of the members 52 of the mechanisms associated with the separate carburetors with brackets 55 on the carburetors act to urge the throttle valves 24 towards their idling positions. The levers 49 are connected with a pivotally mounted foot pedal 56 through a linkage mechanism C.

The linkage mechanism C comprises a cross shaft 57 rotatably mounted on the front of the engine and equipped with two oppositely disposed levers 58 and 59 at its ends and an intermediately mounted lever 60. The levers 58 and 59 are connected to the lower ends of the levers

49 by means of pull rods 61 and 62, and the lever 60 to the lower end of the foot pedal 56 by means of a pull rod 63. As will readily be seen, the organization of the linkage is such that depression of the foot pedal 56 causes forward movement of the pull rod 61 and rearward movement of the pull rod 62, and the release of the foot pedal 56 reverse movements of the pull rods 61 and 62.

The throttle control mechanism described in the foregoing provides for an adjustment whereby inaccuracies in carburetor construction resulting in different ranges of throttle movement between idling positions and the positions at which the main carburetor jets come into action can be compensated for. When not compensated for, such inaccuracies cause the throttle valve of one carburetor to reach a position at which the main jet comes into action in advance of the throttle valve of the other carburetor, and to thereafter maintain a lead over the valve of the other carburetor throughout the range of throttle openings for working conditions of the engine. This inconsistency in the operation of the two throttle valves causes the two banks of cylinders of the engine to be fed differently, and produces what is known as rough operation of the engine.

Under a preferred method of adjusting the throttle mechanism, the screws 50 and 51 of the carburetors are turned so as to provide a fairly large amount of play between their ends and the arms 46c of the members 46. The engine is then started and the screws 47 of the carburetors adjusted with the foot pedal 56 released in a manner such that the engine idles properly with no load, following which the screws 50 and 51 are turned inward to engage the arms 46c of the members 46 in a manner such as not to dislocate the throttle valves from their idle positions.

After turning the screws 50 and 51 into engagement with the arms 46c, the speed of the engine is increased by depressing the foot pedal 56 until the main jet of one of the carburetors is brought into action. The point at which this occurs is observed from the top of the carburetor by noting the position at which the face of the throttle valve 24 becomes wet. The screws 50 and 51 of the other carburetor are then adjusted in such a manner that the throttle valve occupies a position in its movement at which the main jet of the carburetor has just been brought into action.

Following the steps enumerated, the foot pedal 56 is released allowing the springs 54 to draw the throttle valves 24 towards their idling positions. In the absence of a very rare condition when certain inaccuracies in construction compensate for other inaccuracies, one of the throttle valves will reach its idling position before the other throttle valve, with the result that the latter mentioned throttle valve will be prevented from reaching its idling position. Should the condition mentioned exist, no further adjustment of the throttle operating mechanism is needed, otherwise the adjustment of the throttle mechanism is completed by turning the screw 51 which is preventing the throttle valve from reaching its idling position, away from the arm 46c of the associated member 46 a sufficient distance to allow the throttle valve to be moved to its idling position.

Under an adjustment of the throttle mechanism in which the last mentioned adjustment is

not needed, the throttle valves will move together during all phases of their movement, and due to having been properly adjusted for idling of the engine and in a manner such as to simultaneously reach the positions at which the main jets of the carburetors come into action, will coact to produce smooth operation of the engine.

Under an adjustment of the throttle mechanism in which it is necessary to make the last mentioned adjustment, the throttle valve of the carburetor in which the screws 50 and 51 are both in engagement with the arm 46c is first advanced towards an open position. Following a slight opening movement of such throttle valve, a corresponding movement of the other throttle valve is initiated by the screw 50 of the mechanism associated therewith. Thereafter, the throttle valves move together simultaneously reaching the positions at which the main jets of the carburetors are brought into action. When the foot pedal 56 is released, the throttle valves 24 are returned to their idling positions by the springs 54, the throttle valve of the carburetor in which the screws 50 and 51 are in engagement with the arm 46c reaching its idling position slightly in advance of the other throttle valve. As a result of the screws 47 having been properly adjusted the engine operates smoothly with the throttle valves in idling position, and due to the adjustment whereby the main jets are brought into action at the same time the engine also operates smoothly under working conditions with the cylinders being supplied with fuel by way of the main jets.

Figure 2 illustrates diagrammatically the relation of parts, with the foot pedal released, in a control mechanism which has been adjusted in accordance with the preceding method, and in which the inaccuracies of construction do not compensate one another, and Figure 3 the relation of parts with the foot pedal partially depressed.

The only purpose of the screws 51 is to insure engine operation in case one of the springs 54 should break or otherwise fail to perform its function. As will readily be seen, the failure of one of the springs 54 in cases in which the last mentioned adjustment is not needed would have no effect on the operation of the throttle valves except to weaken the spring force acting to return the throttle valves to their idling positions. In instances where it is necessary to make the last mentioned adjustment, failure of the spring 54 associated with the carburetor in which the screws 50 and 51 are both in engagement with the arm 46c would have the same effect as above mentioned in that it would not alter the operation of the throttle valves except to weaken the spring force operating to return such parts. Failure of the spring 54 associated with the other carburetor in such instances would allow the throttle valve to flutter back and forth between the limits of movement produced by the last mentioned adjustment, but would permit continued engine operation although such operation would be rough.

If it is desired to take the risk of interrupted engine operation as a result of failure of one of the springs 54, the screws 51 can be eliminated. See the modification of the lever 49 illustrated in Figure 7. In such case the throttle mechanism is adjusted by first turning the screws 50 outward so as to provide a large amount of play between their ends and the arms 49b. The engine is then started and the screws 47 of the car-

buretors adjusted with the foot pedal 56 released in such a manner that the engine idles properly with no load, following which the screws 50 are turned inward to engage the arms 46c of the members 46 in a manner such as not to dislocate the throttle valves from their idling positions.

After turning in the screws 50 as described, the speed of the engine is increased by depressing the foot lever 56 until the main jet of one of the carburetors is brought into action, the point at which this occurs being observed in the manner previously described. The screw 50 of the other carburetor is then adjusted in such a manner that the throttle valve occupies a position in its movement at which the main jet of the carburetor has just been brought into action.

Following the last mentioned step, the foot pedal 56 is released allowing the springs 54 to draw the throttle valves 24 towards their idling positions. In case the inaccuracies in construction compensate one another, the throttle valves will reach their idling position at the same time, otherwise one throttle valve will reach its idling position before the other. The return of the other throttle valve to idling position is permitted in consequence of the adjustments having been made in such a manner that the gaps between the end of the screws 50 and the arms 49b are substantially greater than the width of the arms 46c. As a result, when one throttle valve has been returned to its idling position by the associated spring 54, the other spring 54 will continue to act returning the other throttle valve to its idling position and rotating the lever 49 on the other side of the engine to a position in which the screw 50 is out of contact with the arm 46c of the associated member 46.

If one of the springs 54 should fail in a modification of the throttle operating mechanism with the screws 51 eliminated, the associated throttle valve would be permitted a large range of movement with respect to the parts associated therewith for any position of the foot pedal, and would flutter back and forth in a manner such as to prevent successful engine operation.

Although the foregoing description is necessarily of a detailed character in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of the parts and modifications in structural details may be resorted to without departing from the scope or spirit of the invention as claimed.

What I claim is:

1. The combination with a plurality of engine fuel supply systems each comprising a carburetor constructed with a throttle valve, an idling jet, and a main jet which is rendered active by the creation of a predetermined depression at its outlet, of means for limiting the closing movements of the throttle valves of the carburetors of said supply systems, spring means arranged to urge said throttle valves towards closed positions, a throttle control lever, and linkage connecting the throttle valves of said carburetors with said throttle control lever, said linkage comprising adjustable lost motion connections through which said linkage can be adjusted in a manner to provide for complete closing movement of all of said throttle valves and in a manner to provide for simultaneous actuation of the main jets of said carburetors

during the opening of said throttle valves by said throttle control lever.

2. The combination with a plurality of engine fuel supply systems each comprising a carburetor or constructed with a throttle valve, an idling jet, and a main jet which is rendered active by the creation of a predetermined depression at its outlet, of members operatively connected to the throttle valves of the carburetors of said supply systems, means for limiting the closing movements of said throttle valves, spring means arranged to urge said throttle valves towards closed positions, a throttle control lever, and linkage mechanism connecting said members with said throttle control lever including relatively movable parts associated with said members, and adjustable means carried by said parts and arranged for engagement with the opposite sides of said members from the direction in which said members are moved in opening the throttle valves, the arrangement being such that said adjustable means can be adjusted in a manner to provide for complete closing movement of all of said throttle valves and in a manner to provide for simultaneous actuation of the main jets of said carburetors during opening of said throttle valves by said throttle control lever.

3. The combination with a plurality of engine fuel supply systems each comprising a carburetor constructed with a throttle valve of the butterfly type, an idling jet, and a main jet which is rendered active by the creation of a predetermined depression at its outlet, of operating levers fixed on the shafts of the throttle valves of the carburetors of said supply systems, means for limiting the closing movements of said throttle valves including adjustable means for varying the positions attained by said throttle valves at the ends of their closing movements, springs connected at one end to said operating levers and arranged to urge said throttle valves towards closed positions, a throttle control lever, and linkage mechanism connecting said operating levers with said throttle control lever including levers rotatably mounted on the shafts of the throttle valves of said carburetors, and adjustable parts carried by said rotatably mounted levers and arranged for engagement with the opposite sides of said operating levers from the direction in which said operating levers move in opening the throttle valves, the arrangement being such that said adjustable parts can be adjusted in a manner to provide for complete closing movement of all of said throttle valves and in a manner to provide for simultaneous actuation of the main jets of said carburetors during opening of said throttle valves by said throttle control lever.

4. The combination with a pair of engine fuel supply systems each comprising a carburetor constructed with a throttle valve, an idling jet, and a main jet which is rendered active by the creation of a predetermined depression at its outlet, of members operatively connected to the throttle valves of the carburetors of said supply systems, means for limiting the closing movements of said throttle valves including adjustable means for varying the positions attained by said throttle valves at the ends of their closing movements, spring means arranged to urge said throttle valves towards closed positions, a throttle control lever, and linkage mechanism connecting said members with said throttle control

lever including relatively movable parts associated with said members, and adjustable means carried by said parts and arranged for engagement with the opposite sides of said members from the direction in which said members are moved in opening the throttle valves, the arrangement being such that said last named adjustable means can be adjusted to cause the main jets of said carburetors to be simultaneously brought into action despite an initial opening of one of said throttle valves in advance of the other of said throttle valves.

5. The combination with a pair of engine fuel supply systems each comprising a carburetor constructed with a throttle valve, an idling jet, and a main jet which is rendered active by the creation of a predetermined depression at its outlet, of members operatively connected to the throttle valves of the carburetors of said supply systems, means for limiting the closing movements of said throttle valves, spring means arranged to urge said throttle valves towards closed positions, a throttle control lever, and linkage mechanism connecting said members with said throttle control lever including relatively movable parts associated with said members, adjustable means carried by said parts arranged for engagement with the opposite sides of said members from the direction in which said members are moved in opening the throttle valves, and adjustable means carried by said members arranged for engagement with the opposite sides of said members from the said first named means, the arrangement being such that the said third and fourth named means can be adjusted to cause the main jets of the carburetors to be simultaneously brought into action despite an initial opening of one of said throttle valves in advance of the other of said throttle valves.

6. The combination with a pair of engine fuel supply systems each comprising a carburetor constructed with a throttle valve of the butterfly type, an idling jet, and a main jet which is rendered active by the creation of a predetermined depression at its outlet, operating levers fixed on the shafts of the throttle valves of said carburetors, means for limiting the closing movements of said throttle valves including adjustable means for varying the positions attained by said throttle valves at the ends of their closing movements, springs arranged to urge said throttle valves towards closed positions, a throttle control lever, linkage connecting said operating levers with said throttle control lever including levers rotatably mounted on the shafts of the throttle valves of said carburetors, adjustable parts carried by said rotatably mounted levers designed for engagement with the opposite sides of said operating levers from the direction in which said operating levers move in opening said throttle valves, and adjustable parts carried by said rotatably mounted levers designed for engagement with the opposite sides of said operating levers from said first named adjustable parts, the arrangement being such that the aforesaid first and second named parts can be adjusted to cause the main jets of the carburetors to be simultaneously brought into action despite an initial opening of one of said throttle valves in advance of the other of said throttle valves.

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