July 11, 1944. V. L. STONE 2,353,524

FUEL SAVER FOR INTERNAL COMBUSTION ENGINES

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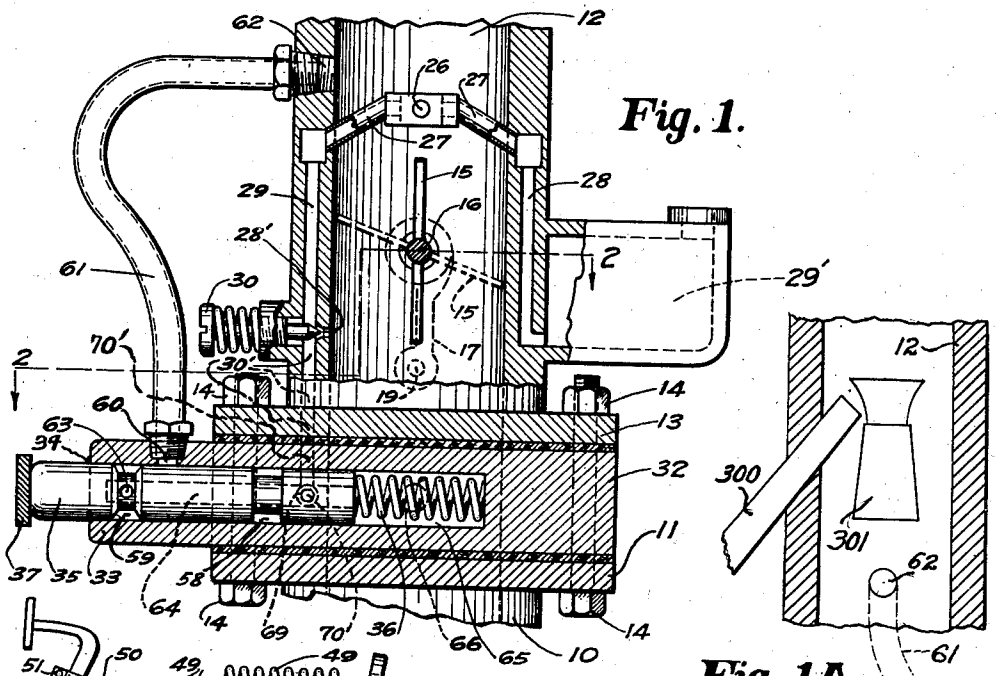

Fig. 1.

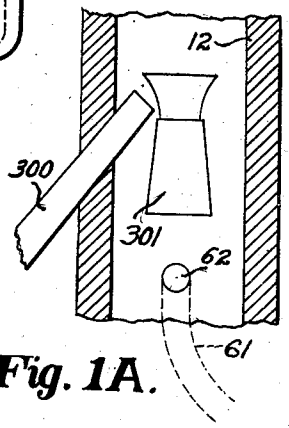

Fig. 1A.

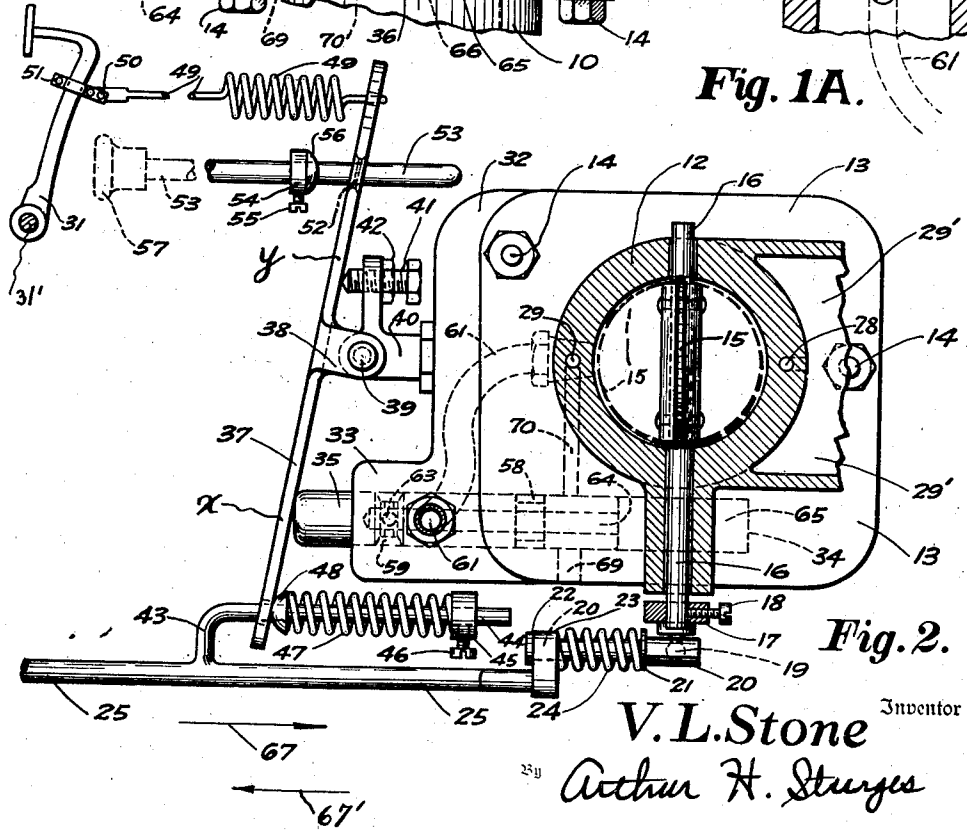

Fig. 2.

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FUEL SAVER FOR INTERNAL COMBUSTION ENGINES

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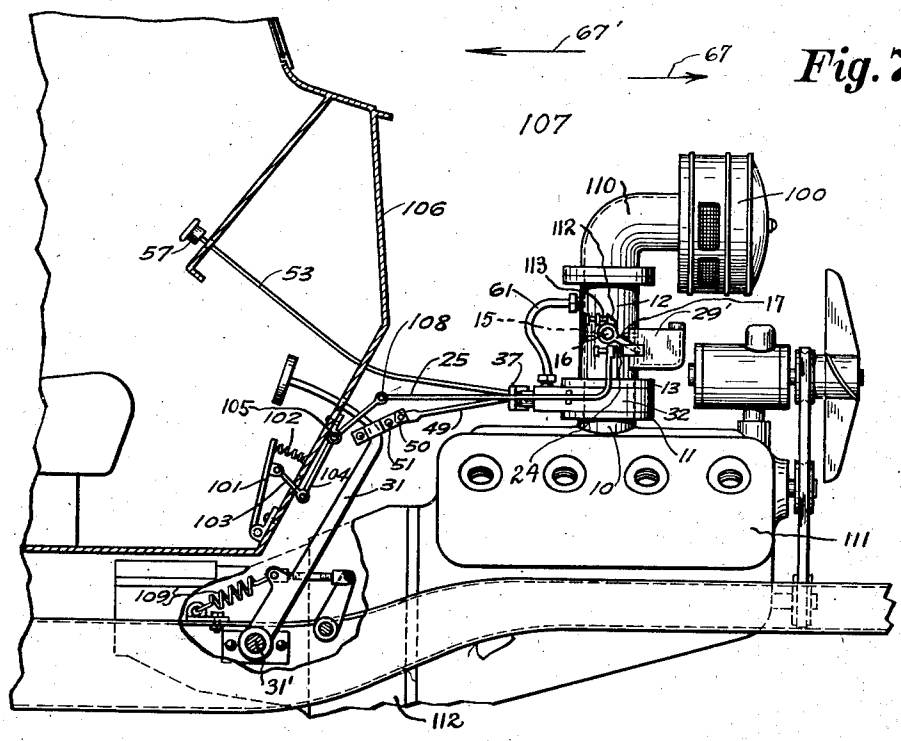

Fig. 7.

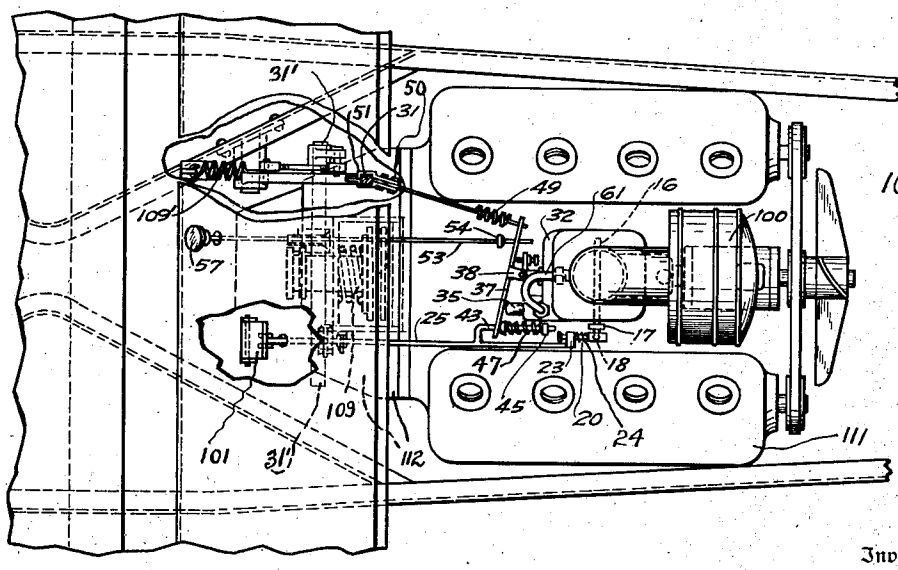

Fig. 8.

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FUEL SAVER FOR INTERNAL COMBUSTION ENGINES

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Fig. 3.

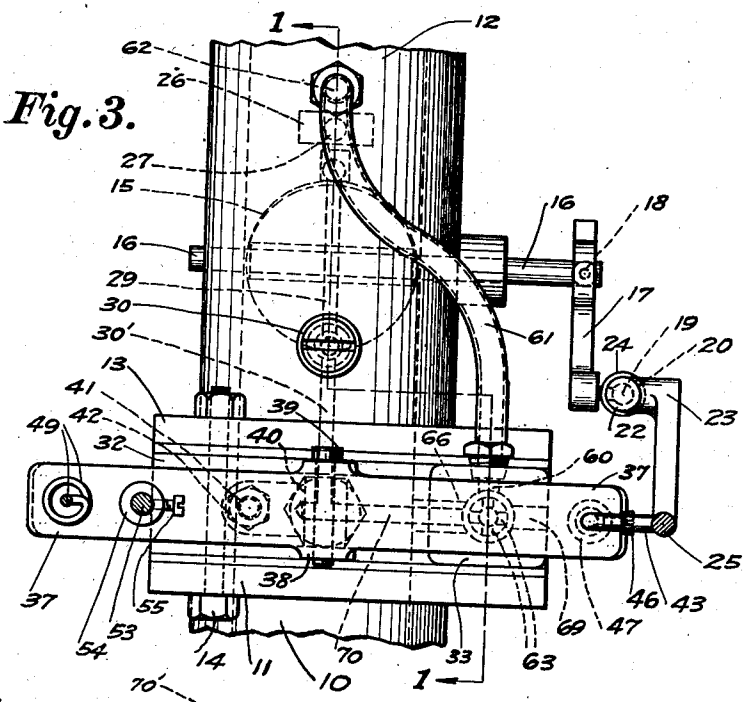


Fig. 4.

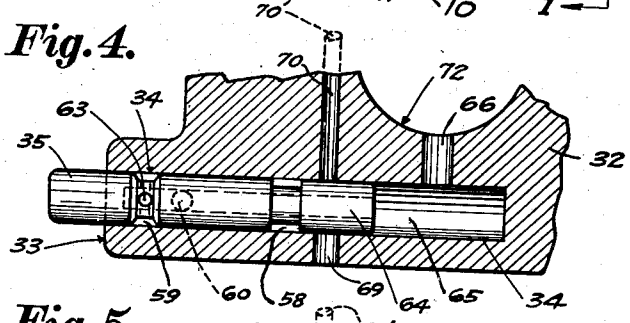


Fig. 5.

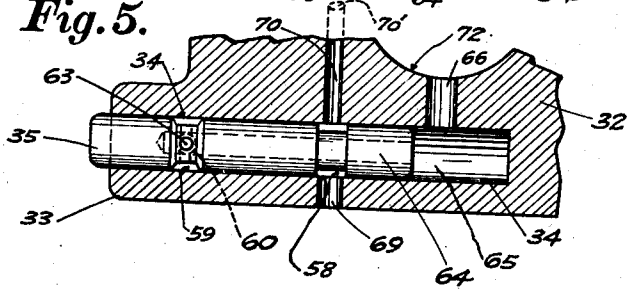
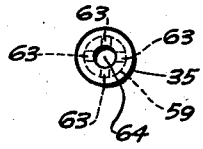


Fig. 6.



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UNITED STATES PATENT OFFICE

2,353,524

FUEL SAVER FOR INTERNAL-COMBUSTION ENGINES

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Application March 5, 1941, Serial No. 381,777

10 Claims. (Cl. 192—.01)

This invention relates to internal combustion engines and more particularly to automobiles.

It is an object of the invention to provide means for conserving fuel for decreasing the operating cost of automobiles, trucks and the like.

Another object of the invention is to provide a device for the above stated purpose which may be readily installed by an owner subsequent to manufacture of a vehicle or may be initially built into an engine at a factory, and which, in use, does not interfere with the normal operation or efficiency of said vehicle and engine.

A particular object of the invention is to provide a device for use in conjunction with carburetors provided with jets through which gasoline is sucked for providing a fuel mixture for automobile engines, said carburetors having at least one high speed jet and one idler speed jet, said device being so constructed and assembled in combination with an automobile that gasoline which has heretofore been wastefully sucked out of the high speed jets is during idling of engines employed for driving said engines at idling speeds in lieu of the gasoline which heretofore has passed through idler jets for said purpose, whereby an amount of gasoline approximately equal to the amount of gasoline heretofore used for idling said engines is saved particularly during road traveling movements of said automobiles.

A further object of the invention is to provide a means for use in conjunction with the new device and carburetors of the type herein described which will hold the throttle valves or plates of said carburetors closed momentarily and for a longer period of time than heretofore whereby a greater economy of fuel is obtained by said means and the use of the new device than would be obtained without said additional means.

Other and further objects and advantages of the invention will be understood from the following detailed description thereof.

In the drawings:

Figure 1 is a longitudinal section of the new device applied to and between a fragment of a carburetor and intake manifold, the view being taken approximately on the line 1—1 of Figure 3.

Figure 1A is a detail sectional view illustrating diagrammatically the arrangement of the high speed jet and the venturi associated therewith.

Figure 2 is a top plan view, partially in section, of the parts shown in Figure 1, the view being taken substantially on line 2—2 of Figure 1.

Figure 3 is a vertical elevation of the new device the parts thereof showing at a right angle with respect to the showing thereof in Figure 1.

Figure 4 is a view, in a closed or non-operative position, of a slide valve-shaft employed.

Figure 5 is a view showing said valve-shaft in an open or operative position.

Figure 6 is an end view of the said valve-shaft.

Figure 7 is a side elevation of a fragment of an automobile, certain parts thereof being in section and showing the preferred embodiment of the present invention in combination therewith.

Figure 8 is a top plan view of the combination shown in Figure 7.

It is well known that during operation of automobiles, particularly at times when a driver removes his foot from the accelerator pedal, that there is an appreciable period of time that expires between the time when the engine is operating at high speed and the time when the engine's speed becomes automatically retarded to an idling speed; that during said period of time, namely, the time required for the speed of the engine to be reduced to an idling speed, an unnecessary and heretofore wasted amount of fuel is sucked into the cylinders of the engine by the pistons resultant from forward traveling momentum of the automobile at times when the clutch of the automobile is engaged and the present invention aims to conserve a portion of the fuel delivered primarily to the engine's cylinders during said period of time.

Referring now to the drawings for a more particular description 10 indicates the intake manifold of an internal combustion engine provided with a flange 11. The air intake conduit 12 of the carburetor is similarly provided with a flange 13. An air straining and cleaning device 100 is in communication with the conduit 12 through a pipe or conduit 110. The manifold shown in the drawings is of down-draft type. The flanges 11 and 13 as usual being secured together by suitable keepers such as the bolts 14.

Within the conduit 12 a throttle-valve or plate 15 is disposed, being secured to its pivotally mounted shaft 16, the latter being journalled through the sides of the conduit 12, said shaft being provided with a lever-arm 17.

Referring to Figure 2 the valve plate 15 is shown by full lines in an open position with respect to the annular conduit 12 and the closed position of said plate is shown by dotted lines. There is a space between the perimeter of the valve-plate or throttle 15 and the interior annular side wall of the conduit 12 at times when the plate is swung to a closed position as illustrated in said figure, said plate not fitting snugly whereby some suction is applied to all of the jets of the

carburetor at times when said plate is in a closed position and the pistons of the engine are reciprocating.

As shown in Figure 2, the lever 17 is usually adjustably secured to the shaft 16 by means of a set screw 18. The lower end of the arm 17 is provided with a ball 19 which is received in a socket formed in a rod 20, said parts being conventional. In the practice of the present invention the rod 20 is provided with an annular flange 21 and a similar flange 22 at that end thereof which is oppositely disposed with respect to said socket. A yoke 23 of the new device is slidably disposed on the rod 20 between the flanges 21 and 22. Between one side of the yoke and the flange 21 a spring 24 is provided about the rod 20.

The yoke 23 is secured to a reach-rod 25, the latter extending to and being connected with the accelerator pedal 101, as later described.

As conventionally constructed the rod 25 and the rod 20 are integral and but one rod employed for controlling swinging movements of the throttle-valve 15 by the accelerator pedal 101. In the practice of the present invention said conventional one piece rod 25 is provided of two piece construction in order that the yoke 23 may be slidably disposed on the rod 20. The spring 24 operates to hold the valve 15 in a closed position momentarily at times when the rod 25 is moved in a direction to open the valve 15, as later more particularly described, for effecting a saving of fuel by means of the employment of the spring 24, said saving being in excess of the amount of fuel saved through the use of the new device without said spring and the adjunct parts 20, 21, 22 and 23.

As best shown in Figure 1 the plate or valve 15 is disposed in a conventional position between the intake manifold 10 and an air intake port 26 which is formed in a small conduit 27, the latter being transversely disposed across and within the large air intake conduit 12.

One end of the conduit 27 is in communication with a passageway 28, the latter being in communication with a well 29' which receives raw fuel or gasoline from a supply tank of said vehicle and prior to an admixture of said fuel with air for providing a burnable gas for the engine at idling speed. The other end of the small conduit 27 is in communication with a similar passageway 29 which, as best shown in Figure 1, extends from said other end of the conduit 27 to the outlet 28' thereof, said passageway 29 being conventionally known as an "idler passageway," being conventionally used to feed fuel to the engine at times when the latter is operating at an idling speed. A set screw 30 is so arranged and constructed with respect to the outlet 28' that the capacity thereof may be decreased at will for governing the amount of gas delivered by the passageway 29, air being sucked into the intake port 26 for admixture with fuel from the wall 29' for forming said gas.

As shown in the drawings the latter depict a late type of carburetor as used on late models of well-known automobiles and it will be understood that the herein described new device is operative in conjunction with carburetors having a plurality of jets through which fuel is sucked and delivered to intake manifolds. Such carburetor includes a removable Venturi sleeve near the throat of the primary venturi, at the point of greatest suction, so that the suction will be as great as possible for breaking the fuel into the smallest particles, giving better atomization; the high speed jet exerts its principal influence at the higher engine speeds; a calibration of a certain jet determines the rate of fuel discharge when progressing from an idling speed to higher engine speeds; air is admitted in a certain manner so that the effect of the motor suction will be reduced; with reference to the high speed jet and the idler jet the latter functions only at idling speeds below twenty-five miles per hour and at times when the throttle-valve 15 is almost closed and there is a very strong suction past the edge of the throttle-plate 15. Also it is well known that a swingable butterfly or throttle valve plate in a carburetor does not completely close the passageway across which it is disposed when swung to a closed position, whereby some suction is always applied to the fuel delivery jets of carburetors and fuel leaks outwardly therefrom at undesired times, and during reciprocation of an engine's pistons. In Figure 1A is illustrated diagrammatically the location of the high speed jet 300 and the venturi 301 with relation to conduit 61 and the inlet 62 in the wall of the air pipe 12.

In the practice of the present invention the said carburetor is altered by providing a bore 30' through the wall of the conduit 12 from the outer face of the flange 13 to and in communication with the passageway 29, as best shown by the dotted and full lines in Figure 1.

A self-propelled vehicle or automobile is generally indicated at 107, being provided with an engine 111. Air for the gas mixture fed into said engine being cleaned by the air straining device 100. The vehicle 107 is provided with a dashboard 106 upon which is pivotally mounted an accelerator pedal 101 as shown in Figure 7. The free end of the pedal 101 is normally urged away from the dashboard 106 by means of a spring 102. A link 103 is pivotally connected at its ends, respectively, to the pedal 101 and to a bell-crank-lever 104 at one end of the latter. The bell-crank is pivotally mounted on the dashboard 106 as at 105. The other end of the bell-crank is pivotally connected as at 108 to the reach rod 25, whereby at times when the accelerator pedal 101 is pressed towards the dashboard 106 by the operator's foot a corresponding movement is applied to the rod 25 for moving the latter in the direction of the arrow 67' for correspondingly moving the throttle valve 15.

The automobile further includes a clutch pedal lever 31 which is rigidly secured to a jack shaft 31', the latter being transversely disposed with respect to the housing 112 for the change speed gear and clutch of the vehicle. The clutch is normally held engaged by means of a clutch spring 109 in a well-known manner as indicated by the dotted lines in Figure 8, the arrangement being such that at times when the lever 31 is moved towards the engine that the shaft 31' is correspondingly moved for disengaging said clutch and against the urge of the spring 109. An auxiliary spring 109' is usually employed for taking up lost motion occasioned by wear for preventing vibration of said lever 31 and attendant noise, said spring having an end connected to the clutch lever 31 and an opposite end secured to the frame of the vehicle, as shown in Figure 7.

The new device including the spring 24, flanges 21 and 22 and yoke 23 at the end of the rod 25 is cooperatively combined with said conventional automobile parts and when constructed for installation subsequent to the delivery and manufacture of an automobile by a factory and as distinguished from building the new device into an

automobile at said factory includes a slab 32 which in plan is of substantially the same contour as the above mentioned flanges 11 and 13 being provided with an outstanding portion 33 having a bore 34 which extends through said portion and into sad slab.

Within the bore 34 a longitudinally slidable valve-shaft 35 is provided, being urged in one direction by means of a spring 36 which is disposed between the inner end of the member 35 and the inner end wall of the bore 34 and permitted to move in an opposite direction with respect to the urge of the spring 36 at times when an end portion X of a rock-lever 37 permits the same, said portion X being disposed against the outer or exposed end of the valve-shaft 35, as best shown in Figure 2.

Between the ends of the rock-lever 37, the latter is provided with a tang 38 which is pivotally connected as at 39 to an outstanding portion or ear 40 of the slab 32. The portion 40 provides a mounting for a set-screw detent 41, the latter being provided with a lock-nut 42 for securing the set-screw in a selected position with respect to its mounting for limiting a movement in one direction of the rock-lever 37.

As shown in Figure 2, the heretofore mentioned reach-rod 25 is provided with an arm 43 of the new device which in the practice of the invention may be welded or otherwise suitably secured to said rod, said arm 43 having an elongated portion 44 which is disposed in approximate parallelism with the rod 25. Adjacent the end of said portion 44 a collar 45 is provided which is adjustably secured to said portion by means of a set-screw 46. The elongated portion 44 of the arm 43 extends through one end of the rock-lever 37 and between said lever and the collar an expansion spring 47 is disposed, preferably coiled about said portion 44 whereby the tension and position of said spring may be regulated by means of the set-screw 46 in conjunction with the collar 45. Preferably an anti-noise washer 48 formed of fiber or the like is disposed between the rock-lever 37 and the spring 47.

That end of the rock-lever 37 which is opposite with respect to the spring 47 is attached to one end of a coiled spring 49; the other end of the latter, as best shown in Figures 2 and 7, being pivotally secured as at 50 to a clamp 51, the latter being secured to and about the clutch pedal lever 31, since it is desired that the new device shall be operative only at times when the clutch lever 31 is in a normal position and the clutch is engaged for coupling the crank-shaft of the engine 111 to the propeller shaft of the vehicle 107 as during forward traveling movements of said vehicle.

The spring 49 being connected to the clutch operating mechanism at one of its ends and the other end of said spring being connected to the rock-lever 37, as shown in Figure 2, said spring causes that end of the rock-lever which is opposite to said spring 49 to abut against the valve shaft 35 for moving said valve, at times, as later explained.

The valve-shaft 35 is provided with an annularly disposed channel 58, which at times when the spring 36 is compacted sufficiently to permit the same, becomes disposed in communication with the heretofore mentioned idler passageway 29, through a later described bore 70, at which time a similar channel 59 of said shaft becomes disposed in communication with the outlet end 60 of a conduit 61 of the new device, the other end or intake end 62 of said conduit 61 being disposed above and at the other side of the throttle-valve 15 and it will be understood that the conduit 61, as shown in the drawings, is depicted of pipe type for convenience of illustration and explanation, and that in actual practice said conduit may, if desired, be provided by extending a suitable bore through the wall of the conduit 12 of the carburetor similar to the idler passageway 29, the desirable arrangement of the parts being that the intake end 62 is disposed at an opposite side of the throttle-valve 15 with respect to the outlet end 60 of said conduit 61. As shown in Figure 1, said outlet end 60 is in communication with the bore 34 of the slab 32. Also for many installations the intake end 62 of the conduit may be in direct communication with the air washing device 100 of the vehicle, if desired.

As best shown in Figure 1, the annular channel 59 of the valve-shaft 35 is provided with a transversely disposed bore 63, the latter being in communication with a longitudinally disposed bore 64 which, as best shown in Figure 6 and also as shown by the dotted lines in Figure 4, extends from the transversely disposed bore 63 to and through the end wall of the valve-shaft 35 at that end of the latter against which the spring 36 is abutted at all times, whereby a passageway is provided from the channel 59 through the bores 63 and 64 of the valve shaft 35 to a chamber 65 within which the spring 36 is disposed.

As best shown in Figure 4, a bore or passageway 66 extends from the chamber 65 to the large bore 72 of the slab 32, said bore 72 being in alignment and in communication with the intake manifold 10 of the engine 111.

At times when the valve-shaft 35 is sufficiently moved towards and against the urge of the spring 36 the annular channel 58 becomes disposed in alignment with the idler passageway 29 and in communication with the latter through the bore 70 and its upturned end 70', said end, as shown by the dotted lines in Figures 4 and 1, being in communication with the bore 30' and the passageway 29. Simultaneously with an alignment of the channel 58 and the passageway 29 the channel 59 becomes disposed in alignment and communication with the outlet end 60 of the air by-pass conduit 61 whereby, at times when the pistons of the engine are reciprocating cleaned air from the air straining device 100 is sucked and by-passed around the throttle valve 15 through the conduit 61, channel 59, bores 63 and 64, chamber 65, bore 66 and from the latter is admitted into the large bore 72 of the slab 32 for purposes later described.

The push of the spring 36 against the valve-shaft 35 is overcome at times when the spring 49 becomes stretched and attenuated whereby the spring 49 is taut and said condition of the spring 49 is occasioned at all times when the clutch pedal 31 is in a raised normal position as shown in Figure 2 and is maintained in said position by means of either one or both of the springs 109 and 109' as shown in Figure 8.

As best shown by the full lines in Figures 4 and 5 and by the dotted lines in Figure 2, the new device further includes a port 69 provided in the slab 32. The port 69 is in communication with the atmosphere and the bore 34, the idler passageway 29 through the bore 70 and the upturned end 70' of the latter at times when the position of the channel 58 of the valve-shaft 35 permits the same, as shown in Figure 5, being cut off from said communication at times when the member 35 is in the position shown in Figures 2 and 4.

The new device becomes operative for saving

fuel during road traveling movement of the vehicle generally indicated at 107 at the time the operator moves his foot off of the accelerator pedal 101 and the latter is returned to a normal position by the spring 102 under said pedal, said spring 102 moving the link 103, bell-crank 104 and rod 25 correspondingly, the latter thereby becoming moved in the direction of the arrow 67 for swinging the throttle-valve 15 from an open position to a closed position.

The operation of the carburetor shown in the drawings and without the new device being attached to or built into said carburetor is well known and, therefore, the operation of said carburetor during use of the high speed jet or jets thereof is not described herein, it being understood that the new device saves fuel only at the time when the lowest or idling speed jet of said carburetor is in use.

The new device is not of particular advantage when used in conjunction with vehicles provided with said "free wheeling" mechanism except at times when said mechanism is not engaged by means of the lever which governs the use of said "free wheeling" mechanism.

At idling speed of the engine and without an employment of the new device, the passageway 29 then feeds fuel to the engine, the reciprocating pistons sucking raw gasoline from the well 29' into the passageway 27 for admixture with air sucked into the passageway 27 through the intake port 26 for said passageway since at said time the throttle-valve 15 is closed, said fuel mixture being delivered from the passageway 29 through the outlet port 28' and to the engine for compression and operating the engine at low or idling engine speed. At this time the high speed jet, not shown, of the carburetor is not in use, however, as is well known some fuel leaks outwardly of said high speed jet at all times and especially shortly subsequent to a closure of the throttle-valve 15, at which time the pistons of said engine are applying stronger suction than at the time the engine speed becomes reduced to an idling speed.

In the operation of the new device at times when a later described manually actuated rod 53 is in a neutral position and the clutch lever 31 in an up or normal position the throttle valve 15 being in an open position for causing the automobile to travel along a road the relative position of the parts are then as shown in Figure 2, at which time the high speed jets of the carburetor are being employed, the clutch being engaged by the clutch spring 109 whereby there is a connection between the propeller shaft of the automobile and the crank shaft of the engine for said travel of the vehicle and at this time the accelerator pedal 101 is then being depressed by the operator for holding the throttle-valve 15 open for said traveling movement. The throttle-valve having been opened by the rod 25, the latter having been moved in the direction of the arrow 67' for causing the yoke 23 to engage against the flange 22 of the rod 20 for said travel and for holding the throttle-valve open, the then position of the rod 25 causes the spring 47 to be compacted and shortened for moving the rock-lever 37 for overcoming the urge of the then attenuated spring 49, it being understood that the spring 47 is stronger than the spring 49, the rock lever 37 becoming abutted against the detent-set-screw 41, as shown in Figure 2, the valve shaft 35 thereby becoming urged to an inoperative or neutral position by the spring 36 within the chamber 65.

During said traveling movement of the vehicle and assuming that the latter approaches a curve in the road, a road-crossing or for any reason the operator desires to decrease the speed of the vehicle by decreasing the speed of the engine he then removes his foot from the accelerator pedal 101 in a well known manner which permits the spring 102 under said pedal to move the rod 25 in the direction of the arrow 67 for causing the throttle-valve to be swung to a closed position at which time the relative position of the parts is as shown in Figure 7.

When the rod 25 is moved in the direction of the arrow 67 for slowing the speed of the vehicle said movement of the rod also moves the arm 43 and the spring 47 in the direction of the arrow 67 whereby the spring 47 becomes elongated and the urge thereof becomes correspondingly decreased for permitting that spring of lesser strength 49 to move the portion Y of the rock-lever 37 away from the detent screw 41 which causes the end X of the rock-lever to push the valve shaft 35 in the direction of the arrow 67 for causing the channels 58 and 59 of the valve shaft to respectively align with the port 69 and the end 60 of the duct 61, said movement of the rod 25 swinging the throttle-valve 15 from an open to a closed position (as shown by the dotted line closed position of said valve in Figures 2 and 7) prior to the alignment of the channels 58 and 59 of the valve-shaft 35 respectively with the port 69 and the outlet end 60 of the duct 61, whereby at the time of said alignment the new device then becomes operative for saving fuel by utilizing the fuel which is leaking out of the high speed jets of the carburetor, said leaking fuel becoming admixed with air by-passed around the throttle-valve 15 through the conduit 61.

At the time the spring 47 becomes elongated as stated in the last above paragraph the yoke 23 contacts with and starts to compact the spring 24 on the rod 20 which swings the throttle-valve to a closed position before the spring 24 is fully compacted and before the channel 58 aligns with the port 69. Further movement of the yoke 23 further compacts the spring 24 and during the time when the throttle-valve 15 is fully closed also said further movement permits the spring 47 to become further elongated which permits the spring 49 to overcome the urge of the spring 36 and the channel 58 to eventually align with the port 69 for admitting some air through the port 69, the channel 59, conduit 70 and bore 30' whereby the suction applied to the idler passageway 29 by the reciprocation of the pistons becomes nullified and no gasoline is sucked through the conduit 27 from the source of supply of said gasoline. At this time the fuel for driving the engine at idling speed is that fuel which leaks out of the high speed jets and is saved instead of wasted as heretofore, said saving being augmented since but little or practically no fuel is sucked through the conduit 27 at this time.

The said compacting of the spring 24 described in the last above paragraph is possible since the conventional device provided on the carburetor for limiting the swing of the throttle-valve 15 is employed, said conventional device as shown in Figure 7, includes an outstanding lug 112 provided on the lever 17 which is attached to the shaft 16 of the throttle-valve 15,

said lug at times when said throttle-valve is fully closed being then abutted against a conventional set-screw detent 113, the latter being carried by a boss outstanding from the exterior wall of the conduit 12 of the carburetor. When contact is established between the lug 112 and the adjacent end of the detent screw 113 further movement of the rod 25 in the direction of the arrow 67 is permitted by the spring 24. The throttle-valve 15 is in a closed position for permitting said further elongation of the spring 47 for the overall purpose of permitting said eventual alignment of the channel 58 of the valve-shaft 35 with the port 69 for saving fuel. The communication between the outlet port 28' of the idler passageway 29 with the exterior atmosphere prevents gasoline from being sucked through said port 28'. The throttle-valve is closed and the fuel which leaks from the high speed jets of the carburetor is utilized. Said leaking is occasioned by the momentum of the forward travel of the automobile, even at times when the throttle valve is closed. Said forward travel causing the engine's pistons to reciprocate and, as explained, the clutch connects said pistons with the rear wheels of the automobile through the propeller shaft of the vehicle which applies suction to said high speed jets it being understood that the throttle-valve 15 in all engines is loosely fitted within the conduit 12 of the carburetor.

As thus described it will be noted that, in substance, the new device operates to substitute and utilize the fuel which heretofore has leaked from the high speed jets for the fuel or gasoline which heretofore has been sucked through the outlet 28' of the idler passageway 29.

The fuel saved which heretofore has leaked from the high speed jets and during the time the operator reduces the engine's speed by removing his foot from the accelerator pedal 101 is sufficient in quantity to drive the pistons of the engine and in the event that the operator for any reason disconnects the clutch said saved fuel prevents the engine from becoming "killed."

During the above described forward travel of the automobile vehicle 107 and after the vehicle has traversed the above mentioned curve in the road and the operator then desires to speed up the engine for increasing the momentum of the vehicle said operator then depresses the accelerator pedal 101, thereby causing the rod 25 to move in the direction of the arrow 67' which causes the rod 25 and more particularly the yoke 23 to move in the direction of the arrow 67' thereby starting a release of the tension of the spring 24 between said yoke and the flange 22 of the rod 20. During said movement of the yoke 23 towards the flange 22 the then expanding spring 24 holds the throttle-valve 15 closed as above described, until the spring 24 becomes fully elongated and expanded, said throttle-valve 15 remaining closed until the yoke 23 abuts the flange 22 whereby a further movement of the yoke in the direction of the arrow 67' swings the throttle valve 15 to an open position and as thus described it will be noted that the throttle-valve 15 is held closed by the spring 24 during an expansion of the latter and for a short instant of time which permits the throttle-valve to be held closed during a part of the movement of the rod 25 in the direction of the arrow 67' for augmenting a saving of fuel and until the yoke 23 firmly engages the flange 22 for then moving the rod 20 in the direction of the arrow 67' which then swings the throttle-valve open. During the expansion of the spring 24 the spring 47 carried by the arm 43 attached to the rod 25 becomes compressed and shortened for increasing its urge to a sufficient extent to move the portion Y of the rock-lever 37 against the detent 41 whereby the urge of the spring 49 is overcome, the latter becoming stretched and attenuated to the normal condition thereof as shown in Figure 2. The urge of the spring 49 then being removed from the end X of the rock-lever 37 permits the spring 36 within the chamber 65 to urge the valve shaft 35 in the direction of the arrow 67' for moving the channel 58 out of alignment with the port 69; whereupon the operation of the engine and automobile is then the same as it would be in the event that the new device were not employed.

As herein described it will be noted that the spring 24 together with its adjunct mechanism provides a means whereby the channel 58 cannot align with the port 69 until the throttle-valve 15 is fully closed.

As thus described it will be noted that the throttle-valve 15 is completely closed for an instant of time preceding an alignment of the channel 58 and port 69.

When the accelerator pedal 101 is fully depressed and the rod 25 reaches the end of its movement in the direction of the arrow 67' the engine 111 then becomes accelerated and operating at high speed again at which time the normal position of the new device is as shown in Figure 2, the throttle-valve 15 being open.

At times when the accelerator pedal 101 is in an up position and the throttle-valve 15 in a closed position, the new device then being in operation for saving fuel, at which time the portion Y of the rock-lever 37 is swung away from the detent screw 41 by the urge of the spring 49 and in the event that for any reason the operator depresses the clutch pedal 31 the spring 49 then contracts since the distance between the upper end of the lever 31 and the end Y of the rock-lever 37 becomes correspondingly lessened whereby the urge of the spring 49 is removed from the end X of the rock-lever 37 which permits the spring 36 to move the valve shaft 35 in the direction of the arrow 67' for rendering the new device inoperative at times when the clutch lever 31 is depressed and moved sufficiently towards the engine 111 for preventing the engine from "racing" such as is occasioned at times when the clutch is disengaged by the lever 31 and the connection between the crank shaft of the engine and the propeller shaft of the vehicle removed.

As thus described it will be noted that the new device provides a means for saving fuel at desired times and also provides means for automatically rendering said device inoperative at times when the clutch lever 31 becomes moved toward the engine 111.

Further means are provided for rendering the new device inoperative at desired times such as when the vehicle is being parked towards or away from curbstones during which time the engine is running very slowly and it is not desirable to admit auxiliary air into the carburetor through the conduit 61 of the new device since at said times said admission would be apt to "kill" the engine. Said means for rendering the new device entirely inoperative also being useful at times during an initial starting of the engine, particularly during cold weather. Said further means

includes an aperture 52 disposed through the rock-lever 37 for receiving therethrough a push-rod 53. The rod 53 is provided with a collar 54 thereon and preferably adjustably secured by a set screw 55 and an anti-noise washer 56 is disposed between the rock-lever 37 and the collar 54. As shown in Figure 7 the rod 53 extends to the dashboard or other convenient part of the vehicle, being provided with a control button 57. At times when said button is moved sufficiently in the direction of the arrow 67 the collar 54 applied a corresponding movement to the portion Y of the rock-lever 37 for moving the latter for permitting the spring 39 to urge the valve shaft 35 outwardly in the direction of the arrow 67' for rendering the new device inoperative. The neutral position of the rod 53 and collar 54 thereof is as shown in Figure 2.

The new device has been installed on automobiles, and during an actual use thereof it has been noted that an appreciable saving of gasoline per mile of travel was consumated during road traveling movement of the vehicle resultant from the operator intermittently depressing and releasing the accelerator pedal 101 for traveling up and down hills, following curves of the road, and the like which require numerous changes in the quantity of fuel admitted to the engine. It was also noted that some saving in gasoline was effected during travel through crowded traffic.

Heretofore numerous devices have been constructed for saving fuel, and said devices provide for an admission of auxiliary air at the time an engine is operating at high speed, said old devices being so arranged that auxiliary air is sucked into the cylinders and mixed with the gas only at high engine speed and at the time when the throttle-valve of the carburetor is in an open position, reverse to the operating principle of the present invention, the latter effecting a saving of fuel at and during the time the throttle-valve is closed.

The heretofore wasted gasoline, which the new device utilizes, has heretofore leaked past the piston rings of the engine and into the crank case of the latter thereby diluting and lessening the lubricating efficiency of the oil in said crank case. At times when said piston rings are tight, gasoline is often expelled into the exhaust manifold and wasted. Also it has often happened that gasoline expelled into the exhaust manifold concentrates in the muffler of the vehicle and explodes, breaking said muffler and also causing fires. The prevention of dilution of crank case oil is a desirable resultant of an employment of the new device among other advantages thereof.

Among advantages of the invention other than heretofore described it will be noted that air admixed with the otherwise wasted gasoline or fuel is derived through the air cleaning and straining device 100 of the automobile whereby grit and the like injurious debris is prevented from entering the cylinders of the engine 111.

From the foregoing description it is thought to be obvious that a fuel saver for internal combustion engines constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish it to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as claimed.

I claim:

1. In a fuel saver for an automobile engine provided with a carburetor having a throttle-valve, an idler and a high speed jet for delivering gasoline to said carburetor; a conduit for admitting air into said carburetor posterior to the throttle-valve at times when the latter is closed; a valve for said conduit arranged to close the latter at times when said throttle-valve is open; and means responsive to a closure of said throttle-valve for moving said conduit-valve to stop flow of fuel from the idler jet and to permit air from said conduit to become admixed in said carburetor with gasoline from said high speed jet.

2. In a fuel saver for an automobile engine provided with a carburetor having a throttle-valve, an idler and a high speed jet for delivering gasoline to said carburetor; a conduit for by-passing air entering said carburetor past said throttle-valve at times when the latter is closed; a valve for said conduit arranged to close the latter at times when said throttle-valve is open; means responsive to a closure of said throttle-valve for moving said conduit-valve to open said conduit; and means to stop flow of fuel from the idler jet and for delivering air from said conduit to said carburetor for admixture in the latter with gasoline from said high speed jet.

3. In a fuel saver for an automobile engine provided with a carburetor having a throttle-valve, an idler and a high speed jet for delivering gasoline to said carburetor; a conduit for by-passing air entering said carburetor past said throttle-valve at times when the latter is closed; a port for admitting air into said idler jet; a slide-valve arranged to close said conduit and port at times when said throttle-valve is open; means responsive to a closure of said throttle-valve for moving said slide-valve to open said port and conduit; and means for delivering air from said conduit into said carburetor for admixture in the latter with gasoline from said high speed jet.

4. In a fuel saver for an automobile provided with an engine, a carburetor throttle-valve for said engine, idler and high speed jets in said carburetor a slab disposed at the outlet end of said carburetor, said slab having a bore aligned with said outlet end; a port provided in said slab for admitting air into said idler jet; a conduit having a terminal end in said slab; a valve carried by said slab for normally sealing said port and said end of said conduit; means responsive to a closure of said throttle-valve for causing said port and conduit end to become unsealed for admitting air through said port into said idler jet; and means for delivering air from said conduit into said bore of said slab for admixture with gasoline from said high speed jet.

5. In a fuel saver for an automobile engine provided with a carburetor having a throttle-valve, an idler and a high speed jet for delivering gasoline to said carburetor; a conduit for admitting air into said carburetor posterior to the throttle-valve at times when the latter is closed; a port for admitting air into said idler jet; a slide-valve; means for causing said slide-valve to normally seal said conduit and port at times when said throttle-valve is open; means responsive to a closure of said throttle-valve for moving said slide-valve to permit air from said conduit to become admixed in said carburetor with gasoline from said high speed jet and for

causing air to enter said idler speed jet through said port; and means including a spring for holding said throttle-valve closed until said slide-valve returns to its normal sealing position of said port and conduit for augmenting the saving of said fuel.

6. In a fuel saver for an automobile engine provided with a carburetor having a throttle valve, a control rod for said throttle valve, an idler and a high speed jet for delivering gasoline to said carburetor, a conduit for admitting air to said carburetor posterior to the throttle valve when the throttle valve is closed, a valve for said conduit disposed to close the conduit when the throttle valve is open, and means operatively connecting the control rod of the throttle valve to the conduit valve to move the conduit valve to a position to stop the flow of gasoline from the idler jet and to permit air from said conduit to become admixed in said carburetor with gasoline from said high speed jet.

7. In a fuel saver for an automobile engine provided with a carburetor having a throttle valve, a control rod for said throttle valve, an idler and a high speed jet for delivering gasoline to said carburetor, a conduit for admitting air to said carburetor posterior to the throttle valve when the throttle valve is closed, a valve for said conduit disposed to close the conduit when the throttle valve is open, and means operatively connecting the control rod of the throttle valve to the conduit valve to move the conduit valve to a position to stop the flow of gasoline from the idler jet and to permit air from said conduit to become admixed in said carburetor with gasoline from said high speed jet, and resilient means normally urging the conduit valve to its inoperative position.

8. The combination with an automobile engine having a clutch mechanism operatively associated therewith and having an operating lever resiliently urged to its clutching position, said engine being provided with a carburetor having a throttle valve, a control rod for said throttle valve, an idler and a high speed jet for delivering gasoline to said carburetor; of a conduit for admitting air to said carburetor posterior to the throttle valve when the throttle valve is closed, a valve for said conduit disposed to close the conduit when the throttle valve is open, a valve control lever engaging said conduit valve, resilient means operatively connected to said throttle valve control rod and urging the conduit valve control lever to its inoperative position both when the throttle valve is in its inoperative position and when the throttle valve is in its open position, and resilient means operatively connecting the valve control lever to the clutch lever and normally urging the valve control lever to its operative position in opposition to said first resilient means, said last named resilient means being rendered inoperative to overcome said first resilient means when the clutch operating lever is moved to its de-clutching position.

9. The combination with an automobile engine having a clutch mechanism operatively associated therewith and having an operating lever resiliently urged to its clutching position, said engine being provided with a carburetor having a throttle valve, a control rod for said throttle valve, an idler and a high speed jet for delivering gasoline to said carburetor; of a conduit for admitting air to said carburetor posterior to the throttle valve when the throttle valve is closed, a valve for said conduit disposed to close the conduit when the throttle valve is open, a valve control lever engaging said conduit valve, resilient means operatively connected to said throttle valve control rod and urging the conduit valve control lever to its inoperative position when the throttle valve is in its open position, and resilient means operatively connecting the valve control lever to the clutch lever and normally urging the valve control lever to its operative position, said last named resilient means being rendered inoperative when the clutch operating lever is moved to its de-clutching position, and manually actuated means to lock the conduit valve control lever in its inoperative position.

10. The combination with an automobile engine having a clutch mechanism operatively associated therewith and having an operating lever resiliently urged to its clutching position, said engine being provided with a carburetor having a throttle valve, a control rod for said throttle valve, an idler and a high speed jet for delivering gasoline to said carburetor; of a conduit for admitting air to said carburetor posterior to the throttle valve when the throttle valve is closed, a valve for said conduit disposed to close the conduit when the throttle valve is open, a valve control lever engaging said conduit valve, resilient means operatively connected to said throttle valve control rod and urging the conduit valve control lever to its inoperative position when the throttle valve is in its open position, resilient means operatively connecting the valve control lever to the clutch lever and normally urging the valve control lever to its operative position, said last named resilient means being rendered inoperative when the clutch operating lever is moved to its de-clutching position, said resilient clutch connecting means normally acting to move the conduit valve control lever to its operative position when the throttle valve is closed, in which position the conduit valve is moved to stop flow of fuel from the idler jet and to permit passage of air from the conduit to become admixed in said carburetor with gasoline from said high speed jet.

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