Aug. 1, 1944. H. W. SIMPSON 2,354,778

FUEL CONSERVING DEVICE FOR INTERNAL COMBUSTION MOTORS

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Fig. 1.

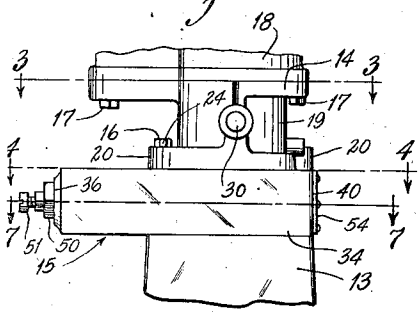



Fig. 2.

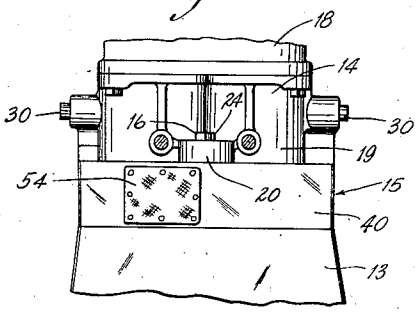



Fig. 3.

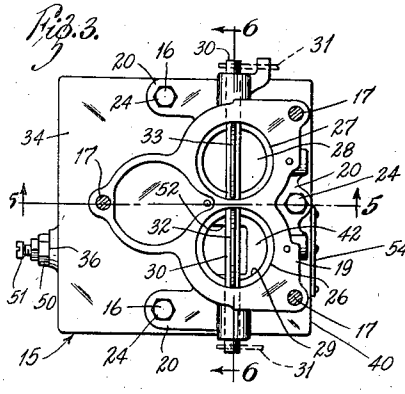



Fig. 5.

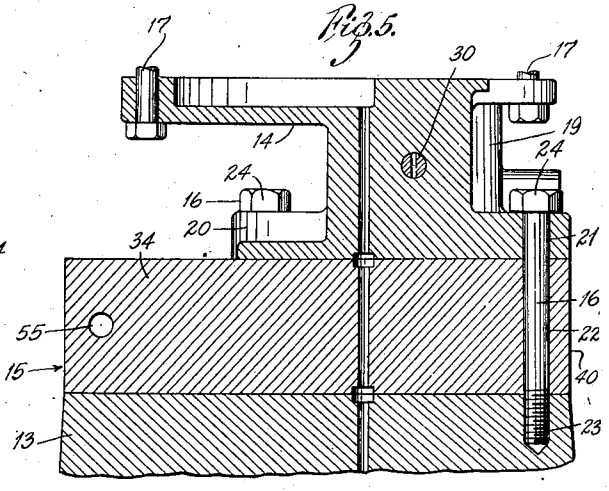



Fig. 4.

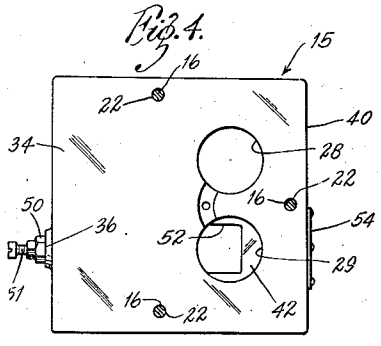



Fig. 6.

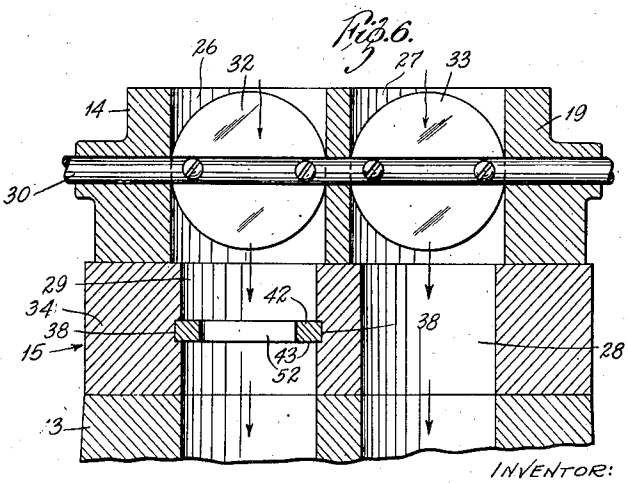
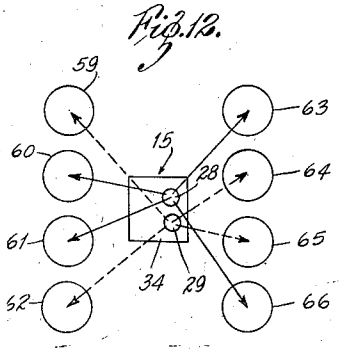



Fig. 12.




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Fig. 7.

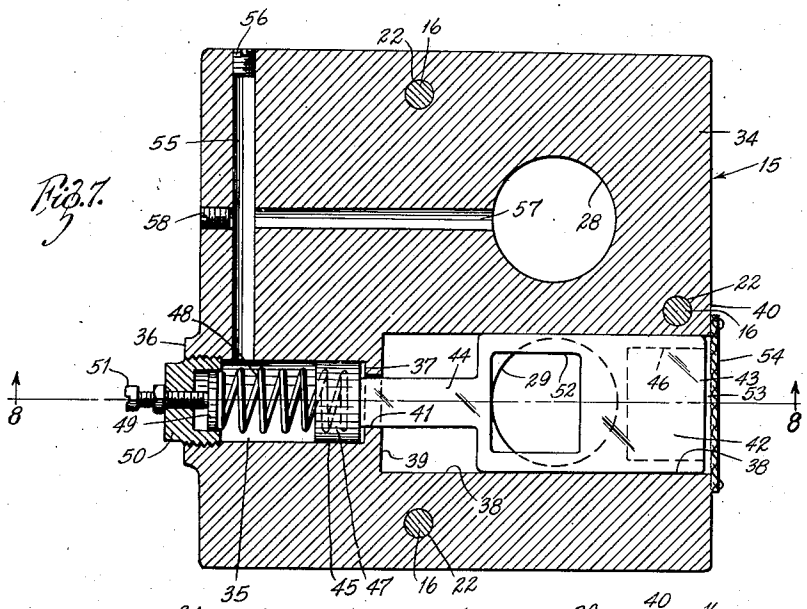



Fig. 8.

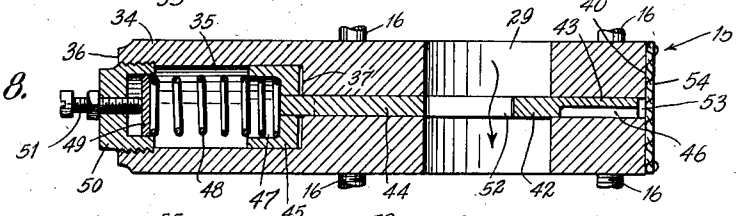



Fig. 9.

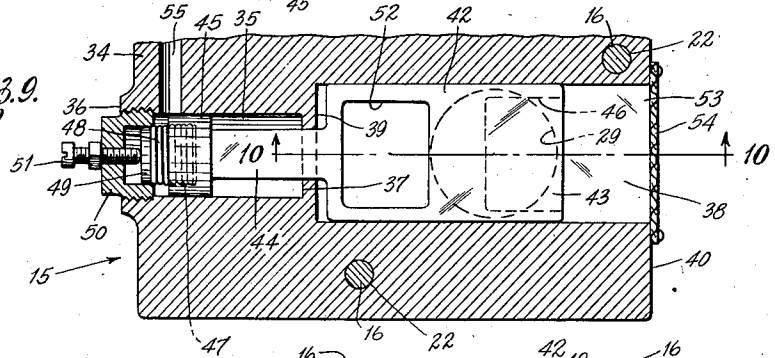



Fig. 10.

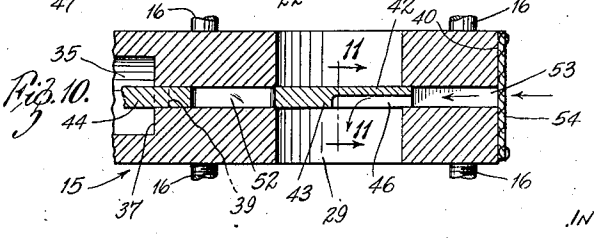
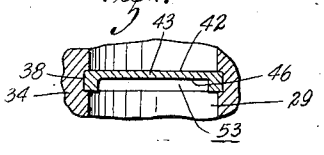



Fig. 11.




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# UNITED STATES PATENT OFFICE

2,354,778

## FUEL CONSERVING DEVICE FOR INTERNAL-COMBUSTION MOTORS

Harold Wilford Simpson, Collinsville, Ill., assignor of one-half to Harold Miles Seago, Collinsville, Ill.

Application November 19, 1942, Serial No. 466,168

1 Claim. (Cl. 137—153)

The object of my invention is to make a fuel conserving device for internal combustion motors, particularly those used to propel automobiles. By the use of my device, the gasoline consumption in the operation of an automobile may be reduced as much as fifty (50%) per cent. Where the gasoline consumption in the conventional automobile is 23 miles per gallon, tests have shown that with my device attached the mileage per gallon is increased to 37 miles per gallon over the same road under the same conditions of load, etcetera.

In the conventional automobile, when operating properly, all the cylinders are functioning whenever the motor runs, irrespective of the difference in power necessary, depending on the road traversed. All the cylinders are functioning when the car is moving up a steep hill, as well as when the car is moving on level ground, or down a steep hill. All the cylinders are functioning when the car is moving on smooth concrete or on thick, loose gravel. This means a fuel consumption in all the cylinders practically all the time when the motor is running, whether this is necessary for power purposes or smoothness in operation or not. At certain times, under favorable driving conditions, more power is developed than is necessary and than is used. This is the case when the car is moving on a smooth level pavement, when the car is travelling at the ordinary cruising speed. In starting the automobile, a maximum of power must be developed by the motor; when moving over a rough road or up a steep hill, or with a big load, the maximum power must also be developed.

A further object of my invention is to automatically cut cylinders in and out of operation and to reduce the force necessary to move the pistons in the inoperative cylinders to a minimum. That is to say that the inoperative cylinders as far as power production is concerned, will not act as a load on or back pressure against the power produced by the power operating cylinders, and that cutting out some cylinders from the power production will not appreciably disturb the smooth operation of the other cylinders or of the crank shaft, that is not disturb the smoothness of its torque, and that no fuel will be delivered to the non-power producing cylinders while they are acting as such.

More specifically my device is an attachment to the motor between the carburetor and the intage manifold. The device is operated by the vacuum produced by the cylinders in the intake manifold and finds particular application with eight, twelve or sixteen cylinder motors. The Ford V-8 is ideally suited for my device. The device is used with the dual down draft type carburetor. The device operates in such manner that when maximum power is required from the motor, the operation of the carburetor is unaffected, that is, it operates in the conventional manner. My device only affects the operation of the carburetor when power from only half of the cylinders is required. Each half of the dual down draft carburetor functions with half of the number of cylinders of the motor, and, the other half of the carburetor functions with the other half of the number of cylinders. In a V-8 engine, the cylinders functioning with each half of the carburetor are so arranged that the evenness of the torque on the crank shaft is not disturbed. When it is desired, by the use of my device, one-half of the carburetor is made non-functioning and thereby half of the number of cylinders are made non-functioning as far as the production of power by them is concerned. In a Ford V-8 when it is desired, four of the cylinders are made inoperative automatically by my device, when the load on the motor is decreased. Furthermore, when my device is in operation the pistons and spark plugs in the non-power producing cylinders will continue to move and function in the conventional manner, but only air will be delivered to the cylinders instead of an explosive mixture of air and gas. There will therefore be no explosions in the non-power producing cylinders while they are made inactive by my device.

My device is actuated by the pull of the vacuum produced by the movement of the pistons in the cylinders. My device does not operate until the vacuum in the intake manifold reaches about eight ounces. As the speed of the motor increases, or the load increases, or both, the manifold pressure builds up to about 22 ounces. My device is in operation therefore between eight and twenty-two ounces or more of pressure in the intake manifold and as previously stated, is inoperative below eight ounces. When my device is in operation, in order to prevent the non-firing cylinders from creating a back pressure against which the firing cylinders would be compelled to pump, air must be delivered to the non-nring cylinders. My device accomplishes this.

A slide in my device is so positioned that it may be slid over the flue on one side of the carburetor. Either flue of the carburetor may be employed. By means of a coil spring, the slide is held in its normal position, that is in the position in which it does not cover a flue of the carburetor. The slide is moved over the carburetor flue against the resistance of the spring, by means of the changing vacuum in the intake manifold. The vacuum pull varies with the distance about sea level. The eight and twenty-two ounces critical pressures indicated are those at St. Louis, Missouri. These vacuum intensities would be different in Denver, Colorado, or Miami, Florida. These variations are compensated for by the strength and compression of the coil spring which maintains the slide of my device in the normal open position. By means of a set

screw in contact with said coil spring, to be herein described, the location of the motor in one locality or another may be compensated for. My device may be cheaply made of few and simple parts that lend themselves readily to multiple production. It can be made of such size that it may be attached to the automobile motor between the intake manifold and the bottom of the carburetor in a few minutes by removing several bolts and replacing them with a like number of others when my device has been placed in position.

With these and other objects in view, my invention has relation to certain novel features of construction and arrangement of parts that will be hereinafter more fully described, pointed out in the claim and illustrated in the drawings, in which:

Fig. 1 is a side elevation of the upper end of the intake manifold of an internal combustion motor, together with the lower portion of a dual down draft carburetor with my device secured between them.

Fig. 2 is an end elevation of Fig. 1.

Fig. 3 is a sectional plan view on the line 3—3 of Fig. 1.

Fig. 4 is a plan view of my device on the line 4—4 of Fig. 1.

Fig. 5 is a fragmental sectional elevation on the line 5—5 of Fig. 3.

Fig. 6 is an enlarged fragmental sectional elevation on the line 6—6 of Fig. 3.

Fig. 7 is an enlarged sectional plan view of my device taken on the line 7—7 of Fig. 1, showing the carburetor port unobstructed or open.

Fig. 8 is a vertical sectional elevation on the line 8—8 of Fig. 7.

Fig. 9 is a view similar to Fig. 7 showing the carburetor port obstructed or closed.

Fig. 10 is a fragmental sectional elevation on the line 10—10 of Fig. 9, showing the slide used in my device in the closed position obstructing the carburetor flue and showing the structure that permits the passage of air alone to the cylinders that are not firing when the motor is in operation.

Fig. 11 is a transverse sectional elevation on the line 11—11 of Fig. 1, showing the cross-sectional shape of a portion of the slide used in my device.

Fig. 12 is a schematic plan of eight cylinders of an internal combustion motor, together with the carburetor of my device shown positioned between them in operative position. The solid lines with arrows attached show the connection of one flue of the carburetor with four firing cylinders, and the dash lines with arrows attached show the connection of the other flue to the remaining four non-firing cylinders, when my device is in operation.

Numeral 13 designates the upper end of the intake manifold of an internal combustion motor; numeral 14 designates the lower portion of a dual down draft carburetor forming a part of the same internal combustion motor. These two elements are of conventional size, structure and material. Numeral 15 designates my structure generally. By means of bolts or lag screws 16, my device 15 is secured to both the upper end of the intake manifold 13 and the lower portion 14 of a dual down draft carburetor. Numerals 17 designate bolts or lag screws that secure the lower portion of the carburetor to the upper portion 18. Only a fragment of the upper portion of the carburetor is shown as it is of conventional structure. The lower portion of the carburetor 14 comprises a frame 19 having projections 20, in which are formed holes 21 through which the bolts 16 pass. The bolts 16 also pass through holes 22 in my device 15 and are in threaded engagement at their lower ends in tapped holes 23 formed in the frame of the upper end of the intake manifold. The bolts 16 are of such length that when they are screwed down tight, their heads 24 will engage the projections 20 thereby holding the carburetor frame 19, my device 15, and the upper end 13 of the intake manifold securely together in operative position.

Numeral 26 designates one flue formed in the carburetor frame 19 and numeral 27 designates a second similar flue formed therein. The flues 26 and 27 pass entirely through the carburetor frame vertically from its lower to its upper face. Numerals 28 and 29 designate two vertical flues passing through my device 15 from its upper to its lower face. The flue 29 of my device 15 is in registration with the flue 26 in the lower portion 14 of the carburetor. The flue 28 of my device is in registration with the flue 27 in the lower portion 14 of the carburetor.

Numeral 30 designates a shaft extending through the flues 26 and beyond the carburetor frame 19. To the free ends of the shaft 30 are secured the arms 31. By a movement of the arms 31 rotatively, the shaft 30 may be rotated. Numeral 32 designates a butterfly valve secured to the shaft 30 diametrically in the flue 26. Numeral 33 designates a butterfly valve secured to the shaft 30 in the flue 27. By a rotation of the arms 31, therefore, the butterfly valves 32 and 33 may be rotated.

The vacuum line extends from the cylinders (not shown) to and through the intake manifold, to its upper end 13, through the flues 28 and 29 of my device 15, through the flues 26 and 27 in the lower portion of the carburetor 14, to the upper portion of the carburetor. The vacuum line may be established or broken by opening or closing the butterfly valves 32 and 33, by rotation of arms 31 on the shaft 30. This movement is imparted by the accelerator in an automobile. The accelerator provides means for opening the butterfly valves 32 and 33 from an open to a closed or any intermediate position. The speed of the car is controlled by the butterfly valves 32 and 33 in the conventional manner. A selective separate control of each butterfly valve independently of the other is not possible by the structure thus far described. My device in no way changes the structure or operation of the devices thus far described. It does provide means for automatically blocking or opening one of the flues 26 or 27 responsive to the vacuum that is produced by the motor cylinders (not shown) in the intake manifold.

My device 15 may be made of wood or metal or other similar material.

It consists of a rectangular block in which is formed a hollow cylinder 35, circular section which extends to the face 36 to the end 37. Numeral 38 designates a slot or slide extending from the face 39 to the face of the block 40. The hollow cylinder 35 is connected to the slot 38 by means of the slot 41. The slot 38 passes through one of the flues 28 or 29 of my device. Either one of the flues 28 or 29, but not both, will suffice. Numeral 42 designates a slide having the rectangular portion 43 formed on one end and the smaller rectangular portion 44 formed interval therewith at the other end. Numeral 45

designates a plunger detachably secured to the smaller rectangular portion 44. The outer end of the rectangular portion 43 has the channel 46 formed in its lower face. The plunger 45 is countersunk on its outer end to form the cup 47. The rectangular portion 43 is in sliding engagement in the slot 38. The plunger 45 is in sliding engagement in the hollow cylinder 35. By a longitudinal sliding of the plunger 45 in the hollow cylinder 35 the rectangular portion 43 is slid in the slot 38. The rectangular portion 43 is practically the same width as the diameter of the flue 29. Numeral 48 designates a coiled spring positioned in the cup 47 in the hollow cylinder 35. Numeral 49 designates a circular disk of the same diameter as the coiled spring 48. Numeral 50 designates a countersunk plug in threaded engagement in the rectangular block 34 at the open end of the hollow cylinder 35. Numeral 51 designates a set screw in threaded engagement in the countersunk plug 50. The countersunk portion of the countersunk plug 50 is slightly larger in diameter than the diameter of the circular disk 49. The circular disk 49 is positioned in the countersunk portion of the plug 50 in contact with the outer or free end of the coiled spring 48 and in contact with the inner end of the set screw 51. In operation, when the slide 42 is moved to the left, the coiled spring 48 is compressed as shown in Fig. 9. When the moving force of the slide 42 to the left is withdrawn, the compressed coiled spring pushes the plunger 45 and the slide 42 to the right to the position shown in Fig. 8. In the slide 42 is formed a hole 52 of substantially the same size as the cross-sectional area of the flue 29. When the slide 42 is in the extreme position to the right, as shown in Fig. 8, the hole 52 is in registration with the flue 29 so that fluid communication is established through the flue 26. In this position, the coiled spring is extended. In this position, the channel 46 is inoperative as seen in Fig. 8. When the slide 42 is moved to the position shown in Fig. 9, the hole 52 becomes inoperative and the passage through the flue 29 is blocked. Numeral 53 designates a passage through the wall of the block 34 leading from atmosphere to the flue 29 in the path of the movement of the slide 42. The slide 42 is shown in this passage in Fig. 8 and moved substantially out of it, in Fig. 10. In the position shown in Fig. 8, the passage of air from atmosphere to the flue 29 is prevented. In the position shown in Fig. 10, the passage of air from atmosphere through the passage 53 and the channel 46 is permitted through the flue 29 beneath the slide 42. Numeral 54 designates a gauze plate secured to the block 34 over the outer end of the passage 53. The purpose of this plate is to silence the chatter of the moving slide 42. Numeral 55 designates a passage in the block 34 connecting the hollow cylinder 35 to the side of the block 34. Numeral 56 designates a threaded plug positioned in the outer end of the passage 55. Numeral 57 designates a passage connecting the flue 28 to the outside of the block 34 at right angles to the passage 55 and in fluid communication therewith. Numeral 58 designates a plug selectively secured in the open end of the passage 57. By these means fluid communication is established between the hollow cylinder 35 and the flue 29. Let the eight cylinders be designated on Fig. 12 as follows: 59 to 66 both inclusive. There are two rows of four cylinders each. Cylinders 60 to 66, both inclusive, are affected by my device and cylinders 59 to 65, both inclusive, are affected by my device. In each row, therefore, there are two cylinders that are affected and two cylinders that are not affected. The cylinders and their firing order are so arranged as to give the greatest possible unity of torque during the operation of the motor. My device does not disturb this unity of torque because two of the cylinders affected by my device are in each row of cylinders and because when not firing the pistons and valves go through all the operations that they ever do, except firing. This is made possible by the admission of air into the non-exploding cylinders by my device. The operation of my device is as follows. When the motor is not running, the slide 42 will be in the position shown in Figs. 7 and 8. When the motor is starting and runs for a short time, a vacuum will be built up in the flues 28 and 29. This vacuum will build up a vacuum in the hollow cylinder 35. When this vacuum becomes sufficient the plunger 45 will be pulled to the left from the position shown in Figs. 7 and 8 to that shown in Fig. 9, against the compression of the coiled spring 48. By this procedure the flue 29 will be blocked as far as passage of an explosive mixture is concerned from the carburetor to the cylinders, that is, four cylinders will not consume any fuel and not produce any power. Atmospheric air will be provided to these four non-power producing cylinders through the passage 53 and the channel 46. The vacuum required to actuate the slide 42 depends on the power of the coiled spring and the degree that it is compressed when in the positions shown in Figs. 7 and 8. The latter is regulated by the adjustment of the set screw 51. The same four cylinders will also be affected by my device and the same flue of the carburetor will always be affected by my device.

Simply stated, when the automobile is started, all eight cylinders will operate; as the manifold pressure decreases four cylinders will be cut off, but when the motor begins to labor heavily and the pressure increases, all eight cylinders will function again until the load is removed from the engine. This load will be varied depending upon the grade and composition of the load.

What I claim and mean to secure by Letters Patent is:

A valve device comprising a block having a cylindrical bore therein, a slot in said block in communication with the exterior thereof, a passage through the block transverse of the slot, a conduit in the block communicating with one end of the cylindrical bore, a plate valve slidingly mounted in the slot and having a port therethrough for controlling flow through said passage and having a channel in one end thereof for controlling flow between the block passage and the exterior of said block, a fluid pressure actuated plunger slidingly mounted in the cylindrical bore and operatively connected to said plate valve, a spring having one end secured in said plunger and its other end engaged by a movable disc, a countersunk plug closing the said one end of the cylindrical bore for receiving said disc, a set screw extending through said plug and engaging said disc, the port in said plate valve registering with said transverse passage and closing said valve plate channel when the spring is in its normal expanded position and said plate valve closing said block passage and opening said plate channel when the spring is in its compressed position.

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