

April 28, 1942.

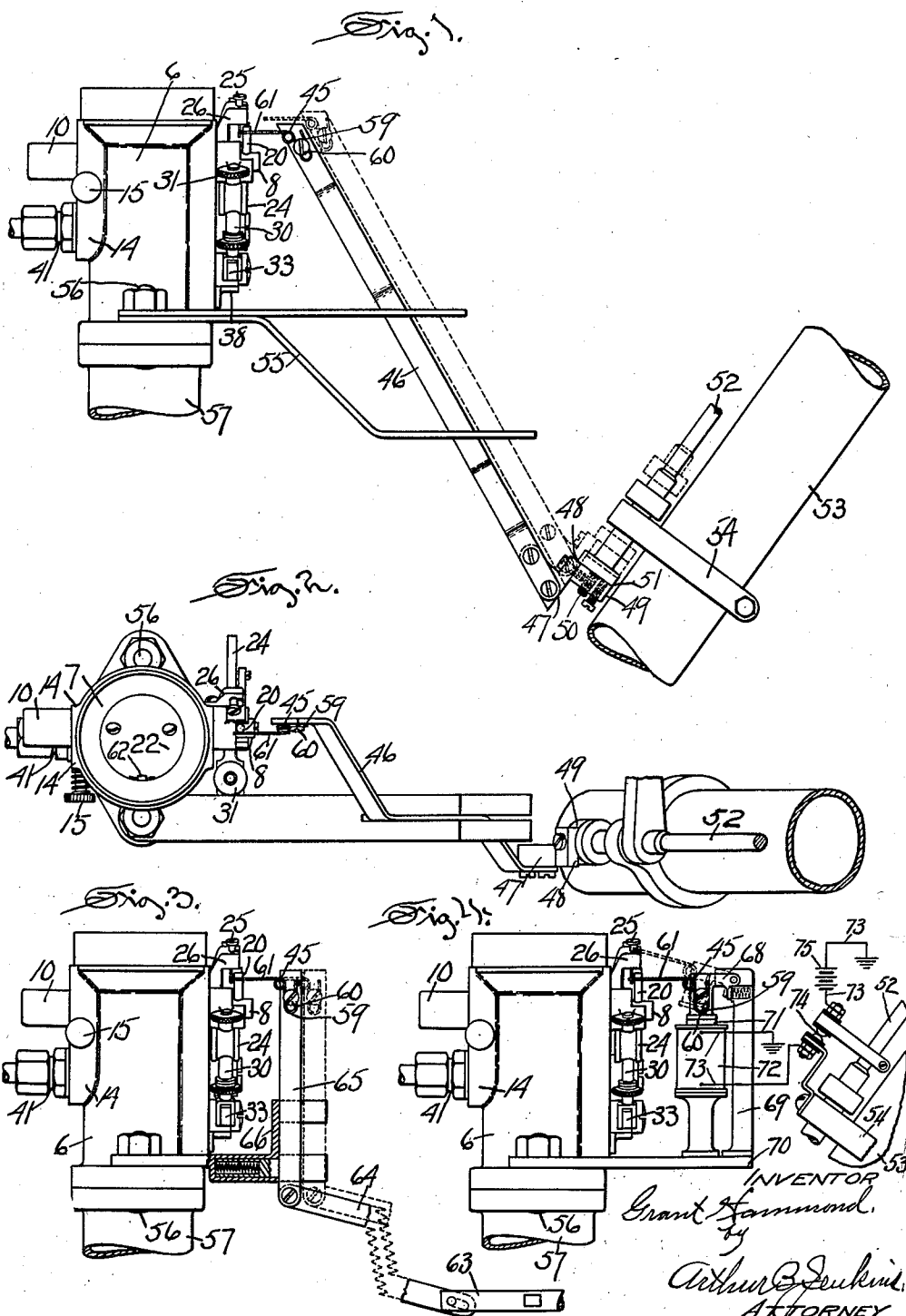
G. HAMMOND

2,281,285

CARBURETOR

Filed Feb. 12, 1940

2 Sheets-Sheet 1



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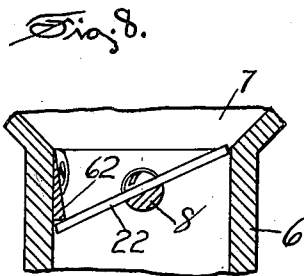
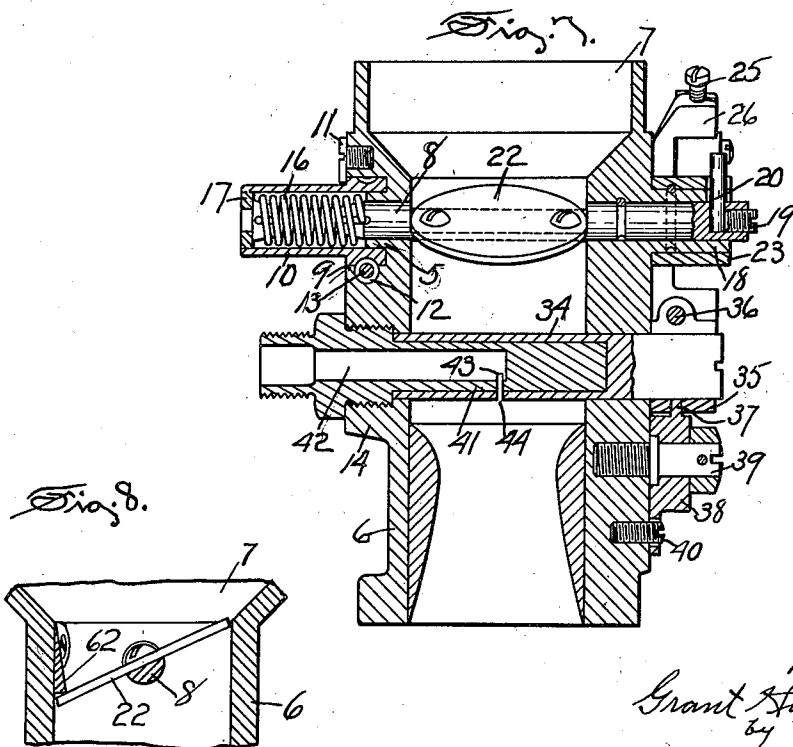
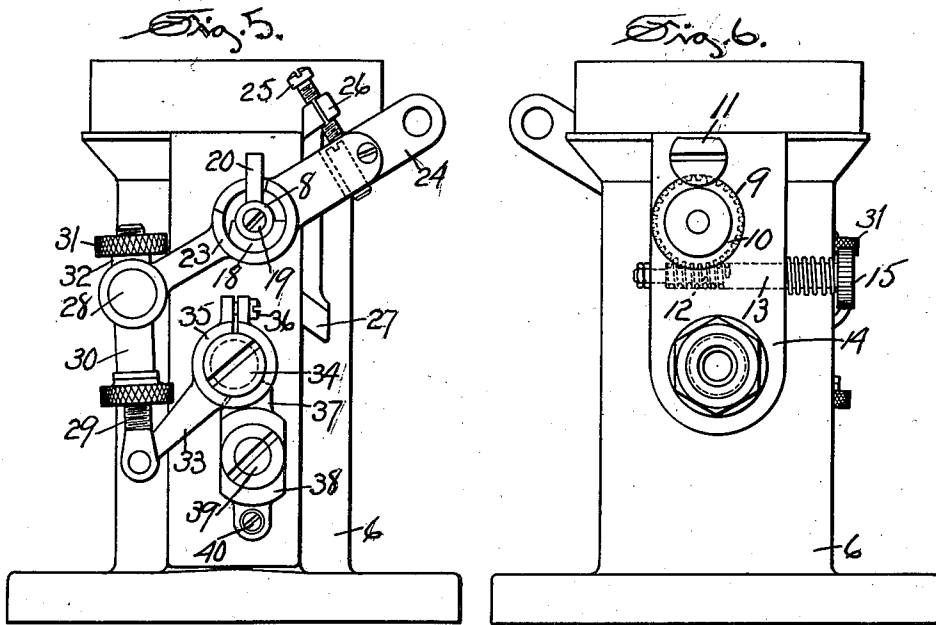
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,281,285

CARBURETOR

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Application February 12, 1940, Serial No. 318,434

11 Claims. (Cl. 74-472)

My invention relates to the class of devices which are employed for regulating mixtures of air and a combustible fluid to produce an explosive charge for internal combustion engines, and an object of my invention, among others, is the production of a device of this class which is simple in construction and which shall improve the efficiency and general operation of such structures.

One form of a device embodying my invention and in the construction and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawings, in which—

Figure 1 is a view in side elevation of my improved carburetor illustrating means for effecting its operation.

Figure 2 is a top plan view.

Figure 3 is a view in side elevation illustrating a modification.

Figure 4 is a similar view illustrating another modification.

Figure 5 is a view on enlarged scale to clearly show the air valve structure together with means for momentarily retarding its opening movement, at certain times in its operation.

Figure 6 is a similar view of the opposite side of the carburetor.

Figure 7 is a view in axial section through the same.

On account of the small scale of Figures 1 to 4 all of the details of the carburetor structure are not shown therein, it being understood, however, that the carburetor shown in these figures is the same as that shown in Figures 5, 6, and 7, sufficient structure being shown in Figures 1 to 4, however, to enable a clear understanding of the structure embodying my invention and the operation thereof.

Figure 8 is a detail view of the stop for the air intake valve.

My improved carburetor is of that type known as "self-feeding" in that it automatically supplies itself with the necessary quantities of gas and air for use in an engine. The invention is particularly adapted to the carburetor shown and described in my application filed Sept. 14, 1939, of Serial Number 294,895, to which reference is hereby made for a more complete understanding as to details if such shall be desired. It will be understood, however, that the invention herein disclosed is equally applicable to other carburetors of this general type.

I have demonstrated the fact after several

years of experience with this self-feeding type of carburetors that they may be "tuned up" or adjusted for quick acceleration for either high or low gear, but not for both. If tuned for first or low gear for quick acceleration it is found that the carburetor will not function smoothly for quick acceleration in high gear as too much fuel is drawn into the system, causing the engine to choke. These carburetors may be likewise tuned to take high gear for quick acceleration, but in such case it is found that not enough fuel will be drawn into the system for the engine to function satisfactorily with power for quick acceleration for first or low gear. In short, if there is fuel intake enough for quick acceleration for first gear there is too much for quick acceleration for high gear and vice versa if there is the right quantity for high gear there will not be enough for low gear.

In the structure of my application hereinbefore referred to these imperfections in operation were materially remedied by placing a supplemental spring in the path of movement of a pin projecting from the air valve shaft to place an added resistance to opening movement of the valve to prevent quick action as a result of sudden depression of the accelerator. This spring being continuously in the path of movement of said pin was ready for action at all times when the engine was running in low or high gear and in the latter case such action was found to be detrimental to smooth running of the engine, in some exceptional cases. It was, therefore, to remove what might be termed this last vestige of hindrance to smooth running conditions at all times that the present invention has been developed. This consists, briefly speaking, in placing the supplemental spring hereinbefore mentioned on a movable support which is necessarily operated to place the transmission in low gear, and it therefore positions the spring in the path of movement of the valve stop pin whenever the transmission is in low gear, and removes said spring from this position and maintains it thus at all other times.

In the accompanying drawings in Figures 5, 6 and 7 I have shown just enough of the carburetor of my application hereinbefore referred to to enable a clear understanding of the present invention, the numeral 6 denoting the shell of the carburetor having a cylindrical opening from end to end with the exception of a large intake mouth 7. An air intake valve shaft 8 is rotatably mounted in openings through opposite sides of

the shell, the opposite ends of said shaft extending beyond the shell on opposite sides thereof. A recess 9 in one side of the shell houses one end of a valve spring adjuster 10 in the form of a hood that is rotatably mounted in said recess upon a hub 5 projecting thereinto, the end of the shaft 8 extending into said hood. An enlarged inner end of the hood 10 forms a shoulder to receive the head of a retaining screw 11, said enlarged end having an annular toothed groove in the form of a worm gear extending around it and engaged with a worm 12 on an adjusting spindle 13 extending through the side of a boss 14 formed on the side of the shell 6, as shown in Fig. 6, the end of the spindle being provided with a finger piece 15 as a means for turning it to adjust the tension of a spring 16 located in the hood 10, one end of the spring being engaged in a slot in the shaft 8 and resting against the end of the hub 5, and the other end of the spring being engaged in a slot in a hub projecting from the inner side of a cap 17 that closes the opening into the hood 10, as shown in Figure 7. The screw 11 also acts as a binding screw to prevent the adjuster from turning after it has been adjusted. The head of this screw is cut away on one side as shown in Figure 6 to release the shoulder on the adjuster hood and permit the latter to be removed. The spring 16 is tensioned by turning the finger piece until the proper tension is placed on the spindle, this being denoted by smooth running of the engine operated for this purpose.

The end of the valve shaft 8 extends into and through a hub 18 integrally formed with the shell 6 on one side thereof, as shown in Fig. 7. A threaded hole is formed in the end of the shaft for a set screw 19 that seats against the side of a stud 20 entered in a laterally formed hole in the shaft, as shown in Figure 7.

A sleeve 23 comprising the hub of a control lever 24 is rotatably mounted on the hub 18, said sleeve being cut away to permit movement of the stud 20 in a manner and for a purpose to be hereinafter described. The outer end of the lever 24 is provided with a hole or other suitable means for attachment of an accelerator connection of any usual construction in a manner that will be readily understood. A stop in the form of a screw 25 is inserted in a lug 26 formed on the side of the shell, said stop limiting the movement of the control lever 24 in one direction, as shown in Fig. 5, and a stop 27 is formed on the shell to limit movement of said lever in an opposite direction. The end of the control lever opposite the hole for the accelerator connection has a hole to receive a journal 28 rotatably mounted in said hole and provided with means for attachment of a connecting rod with a fuel valve actuating lever to be presently described. A connecting rod 29 is screw threadedly engaged with an adjusting sleeve 30 extending into a shouldered recess in the journal 28 and is seated against the shoulder in said recess. The rod 29 extends through the sleeve and journal and receives a locking nut 31 on its upper threaded end, said nut having a flange 32 extending into a shouldered recess in the opposite side of the journal 28 from that which receives the adjusting sleeve 30. When the lock nut is loosened the sleeve 30 may be rotated for lengthwise adjustment of the connection in a manner that will be readily seen. The end of the rod 29 is forked to receive the end of a fuel actuating lever 33 that is pivotally at-

tached to the rod, as shown in Fig. 5, the opposite end of said lever being secured to the end of a fuel valve 34 which extends into the shell 6 with a bearing therein on opposite sides of the opening therethrough. The hub 35 of the lever 33 is cut on one side and has ears to receive a screw 36 to bind the hub to the head of the valve as shown in Fig. 5. The valve 34 is retained in place by means of a lip 37 on a retainer 38 entering a slot in the hub 35, as shown in Fig. 7. The retainer is rotatably mounted on a screw stud 39 secured in the shell and held against rotation by a screw 40 extending through a lip on the retainer, removal of this screw permitting rotation of the retainer to release the fuel valve for removal in a manner that will be readily understood.

A fuel intake 41 extends into the shell 6 from one side thereof and into the valve 34, as shown in Figure 7. An intake passage 42 extending lengthwise within the intake has a port 43 at its inner end registering with a port 44 in the valve 34, as shown in Fig. 7.

As hereinbefore mentioned the main feature of this invention resides in adding restraining action to opening movement of the air valve 22 at a particular period during the control of running operation of the engine, in the structure herein shown this being at the beginning of starting of such operation. To this end a supplemental spring 45 is secured to and projects from the outer end of a spring supporting arm 46 secured at its inner or lower end to a supporting foot 47 projecting from a base block 48 secured to the flattened side of a supporting collar 49 supported on a threaded stud 50 projecting from the end disk 51 of a vacuum shift mechanism of well known construction, as the Chevrolet automobile, and which includes a vacuum shift rod 52 supported by the steering post 53 of the steering mechanism. This rod is movable lengthwise on the post in the operation of shifting the change speed gears and is supported at its lower end as in a strap 54, as shown in Fig. 1 of the drawings. The arm 46 extends at an angle to the shift rod 52 and may be supported for guiding movement in a bracket 55 secured by a nut on one of the studs 56 which fastens the carburetor shell in place on the intake manifold 57, as shown in Figure 1.

An air intake valve 22 of the butter-fly type is secured to the shaft 8 that extends across the valve slightly at one side of its diametrical center so that the force of the air currents entering the mouth 7 of the shell will be greater on one side than on the other, causing the valve to readily open under such force.

The supplemental spring 45 hereinbefore referred to to place an added resistance to opening movement of the air valve, particularly during operation in low gear, is preferably a coiled spring and it has a U-shaped bend 59 to receive a screw 60 by means of which the spring is secured to the upper end of the arm 46. This spring includes a spring finger 61 projecting into the path of movement of the stud 20 projecting from the valve shaft 8, as shown in Figs. 1 and 2 of the drawings. The upper end of the arm 46 to which the spring 45 is secured is located slightly above and opposite the end of the air intake valve shaft. This locates the finger 61 of the supplemental spring in front of and a slight distance from the stud 20, when the air intake valve is in its idling position. When the vacuum shift rod 52 is moved down to that position shown in full lines in Fig. 1 to start the automobile in

low gear the finger 61 will be in the path of movement of the stud 20 when the air intake valve shaft is turned in its bearings by the opening of the air intake valve during engine operation. If now the accelerator be suddenly pushed down to increase the speed the tendency of the air valve to suddenly open under the conditions thus imposed will be resisted by the supplemental spring 45 by reason of contact of the stud 20 on the air valve shaft with the finger 61. The opening of the air valve being thus momentarily delayed at this time sufficient vacuum is maintained in the system to draw in sufficient fuel for power to operate at this time, and the engine will promptly pick up its speed to the extent imposed by the conditions without unevenness or fault in such action. If this checking of the opening movement of the air valve did not take place and it was otherwise permitted to open, the vacuum in the system would be instantly destroyed and the engine would not function with sufficient power for sudden acceleration.

When the shift rod 52 is moved upwardly into intermediate or high gear position, as shown in dotted lines in Fig. 1, the finger 61 will be moved out of the path of the stud 20 and the air valve will be permitted to operate in a normal manner. It is found that the engine will operate satisfactorily in intermediate gear under the conditions herein set out.

The air valve 22 is made from steel spring tempered to instantly regain its form if distorted for any cause. A valve stop 62 is secured inside of the shell 6 to limit the movement of the valve in its closed position, the edge of the valve in this position being slightly spaced from the wall of the shell, as shown in Fig. 8, thereby to prevent sticking. Therefore if this valve be forcibly closed as by back firing, any distortion thereof caused by such action will be promptly removed and the original form will be regained, thereby preventing any faulty action due to misshape which often takes place in the use of valves composed of metal not having this quality.

In Figure 3 I have shown the invention as applied to a shift gear of somewhat older construction than the vacuum shift gear just described, this older construction, however, being in common use at the present time and familiar to most drivers now operating motor vehicles. It embodies a shift lever located beside the driver and projecting downward through and swivelly supported underneath the floor of the car. The lower extremity of the lever constitutes a finger located between two gear shift bars and engageable with and disengageable from notches therein to produce the required speed in accordance with the manner of operation of said shift lever. In view of what may be said to be almost universal knowledge of this operating mechanism, this description and a showing of an end of one of the gear shift bars will be sufficient for a clear understanding of the application of my invention thereto. This gear shift bar 63 has a connecting rod 64 rigidly attached thereto, said rod being pivotally secured to a spring supporting arm 65 slidably mounted in a bracket 66 secured on the stud 56 used to secure the carburetor to the manifold, as in the mechanism hereinbefore described. The supplemental spring 45 is secured to the upper end of the arm 65 and operates in the same manner to produce the same results as hereinbefore described with reference to the structure shown in Figs. 1 and 2, it being sufficient to state that when the gear shift lever is moved

into position for operation of the vehicle in low gear the arm 65 is moved into the position shown in full lines in Fig. 3 with the finger 61 in the path of the stud 20, and when said gear shift lever is moved into position for operation in intermediate or high gear the finger 61 will be moved out of the path of the stud 20, the position of the arm 65 for high gear being shown in dotted line in Fig. 3.

The arrangement shown in Figure 4 is applicable to an electrically operated spring shifting mechanism. In this structure the spring 45 is secured to a support 68 pivotally mounted on an arm 69 secured to and rising from a bracket 70 held by the stud 56 for securing the carburetor shell to the manifold, as hereinbefore set forth. The spring support 68 is rigidly attached to the armature 71 of an electromagnet 72 which is connected in a circuit 73, as shown in Fig. 4. In this arrangement when the shift into low gear is made a switch member carried by a movable member of the gear shifting mechanism will close the circuit and the magnet 72 will be energized, drawing the armature 71 against the magnet, thereby placing the finger 61 of the supplemental spring 45 in the path of the stud 20, as shown in full lines in Fig. 4. When the shifting mechanism is changed for intermediate or high gear the switch will be opened, the magnet will be deenergized, and the finger 61 will be moved out of the path of the stud 20 to the position shown in dotted lines in Fig. 4. Both of the supplemental spring supports 65 and 46 are spring pressed to remove the finger 61 from the path of the stud 20. Either the vacuum gear shift or the conventional hand operated shift may be employed with the structure of Figure 4, use with the vacuum gear shift being illustrated in said figure.

In operation of the device shown in Fig. 4 in connection with the vacuum gear shift when the gears are shifted into low the movement closes a switch 74 connecting the wires 73 which energizes the electro-magnet causing the spring to move forward into the path of the stop pin 20 of the air valve in which position it will remain until the gears are changed and the electro-magnet deenergized, at which time the arm of the spring is forced upwardly above the top of the stop pin. A wire may lead from a battery 75 to the contact switch 74 or from any other electrical source of power desirable, the vacuum shift rod 52 operating the contact switch 74 to which a wire leading from the electro-magnet is attached. The movement of the gear shift into low gear now makes an electrical contact which causes the electric current to energize the electro-magnet as soon as the engine is functioning in low gear or until the gears are shifted out of low gear position.

In accordance with the provisions of the patent statutes I have described the principles of operation of my invention, together with the device which I now consider to represent the best embodiment thereof; but I desire to have it understood that the device shown is only illustrative and that the invention may be carried out by other means and applied to uses other than those above set out.

I claim:

1. A carburetor including a shell having an air inlet opening to an air passage therein, an air valve positioned across said passage and unimpededly movable under the influence of air currents in said passage, a movably mounted spring support, a spring mounted on said support, a change

speed gear shifting member, and a connection between said gear shifting member and said spring support to move the latter to locate said spring in position to retard opening movement of said valve when said gear shifting member is operated to effect a predetermined rate of speed.

2. A carburetor including a shell having an air inlet opening to an air passage therein, an air valve positioned across said passage and unimpededly movable under the influence of air currents in said passage, a movably mounted spring support, a spring mounted on said support, a change speed gear shifting member, and a connection between said gear shifting member and said spring support to move the latter to locate said spring in position to retard opening movement of said valve when said gear shifting member is operated to effect rate of speed in low gear.

3. A carburetor including a shell having an air inlet opening and a passage for air therein, an air valve positioned across said passage and unimpededly movable under the influence of air currents in said passage, means for biasing said valve to a closed position, a movably mounted spring support, a supplemental spring mounted on said support, a change speed gear shifting member, and a connection between said gear shifting member and said spring support to move the latter to locate said supplemental spring in position to retard opening movement of said valve when said gear shifting member is operated to effect rate of speed in low gear.

4. A carburetor including a shell having an air inlet opening and a passage for air therein, an air valve positioned across said passage and movable under the influence of air currents therein, a shaft on which said valve is mounted, a stop projecting from said shaft, means for biasing said valve to a closed position, a movably mounted spring support, a supplemental spring mounted on said support, a change speed gear shifting member, and a connection between said gear shifting member and said spring support to move the latter to locate said spring in the path of said stop to retard opening movement of said valve when said gear shifting member is operated to effect a predetermined rate of speed.

5. A carburetor including a shell having an air inlet opening and a passage for air therein, an air valve positioned across said passage and movable under the influence of air currents therein, a shaft on which said valve is mounted, a stop projecting from said shaft, means for biasing said valve to a closed position, a movably mounted spring support, a supplemental spring mounted on said support, a change speed gear shifting member, and a connection between said gear shifting member and said spring support to move the latter to locate said spring in the path of said stop to retard opening movement of said valve when said gear shifting member is operated to effect rate of speed in low gear.

6. In combination with an engine and a connection therefrom to drive a vehicle, a carburetor including a shell having an air inlet opening to a passage for air therein, an air valve positioned across said passage and movable under the influence of air currents in said passage, a shaft on which said valve is mounted, a stop projecting from said shaft, means for biasing said valve to a closed position, an axially movable gear shifting member, a supplemental spring, and a spring supporting arm to which said spring is secured, said arm being secured to said gear shifting member and located and positioned

to carry said spring into the path of movement of said stop when said gear shifting member is moved into low gear operating position.

7. In combination with an engine and a connection therefrom to drive a vehicle, a carburetor including a shell having an air inlet opening to a passage for air therein, an air valve positioned across said passage and movable under the influence of air currents therein, a shaft on which said valve is mounted, a stop projecting from said shaft, means for biasing said valve to a closed position, a supplemental spring having a spring finger, an axially movable gear shifting member, and a spring supporting arm to which said spring is secured, said arm projecting at an angle from said gear shifting member to project said finger into the path of movement of said stop when said gear shifting member is moved into position for operation in low gear.

8. In combination with an engine and a connection therefrom to drive a vehicle, a carburetor including a shell having an air inlet opening to a passage for air therein, an air valve positioned across said passage and movable under the influence of air currents therein, a shaft on which said valve is mounted, a stop projecting from said shaft, means for biasing said valve to a closed position, a supplemental spring having a finger projecting therefrom, a gear shifting rod mounted on the steering shaft of said vehicle, and a spring supporting arm to the upper end of which said spring is secured, said arm being secured to said gear shifting rod and projecting upwardly at an angle therefrom to locate said spring finger in the path of movement of said stop when said gear shifting rod is moved downwardly.

9. In combination with an engine and a connection therefrom to drive a vehicle, a carburetor including a shell having an air inlet opening and a passage for air therein, an air valve positioned across said passage and movable under the influence of air currents therein, a shaft on which said valve is mounted, a stop projecting from said shaft, means for biasing said valve to a closed position, a supplemental spring, a gear shifting member, a supplemental spring supporting arm to which said supplemental spring is secured, said supporting arm being connected with said gear shifting member for movement thereby to carry said spring into the path of said stop, and a guide secured to and projecting from said carburetor to support and guide said spring supporting arm.

10. In combination with an engine and a connection therefrom to drive a vehicle, a carburetor including a shell having an air inlet opening to a passage for air therein, an air valve positioned across said passage and movable under the influence of air currents therein, a shaft on which said valve is mounted, said shaft projecting out of the side of said carburetor shell, means for biasing said valve to a closed position, a stop extending from the projecting end of said shaft, a bracket secured to and projecting from the side of said shell, a supplemental spring support mounted in said bracket for movement toward and from said stop, a supplemental spring carried by said support and movable thereby into and out of the path of movement of said stop, a gear shifting member, and a connection between said gear shifting member and said spring support for operation of the latter.

11. In combination with an engine and a connection therefrom to drive a vehicle, a carbure-

tor including a shell having an air inlet opening to a passage for air therein, an air valve positioned across said passage and movable under the influence of air currents therein, a shaft on which said valve is mounted, a stop projecting 5 from said shaft, means for biasing said valve to a closed position, a movably mounted spring support including the armature of an electromag-

net, a supplemental spring carried by said support for movement into and out of the path of said stop, said electromagnet being connected into a circuit which is controlled by movement of a member of a gear shifting mechanism when the latter is operated for low gear.

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