E. PODLEŠÁK.

MIXTURE PRODUCING DEVICE AND SPEED GOVERNOR.

APPLICATION FILED MAR. 22, 1913.

1,155,094.

Patented Sept. 28, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

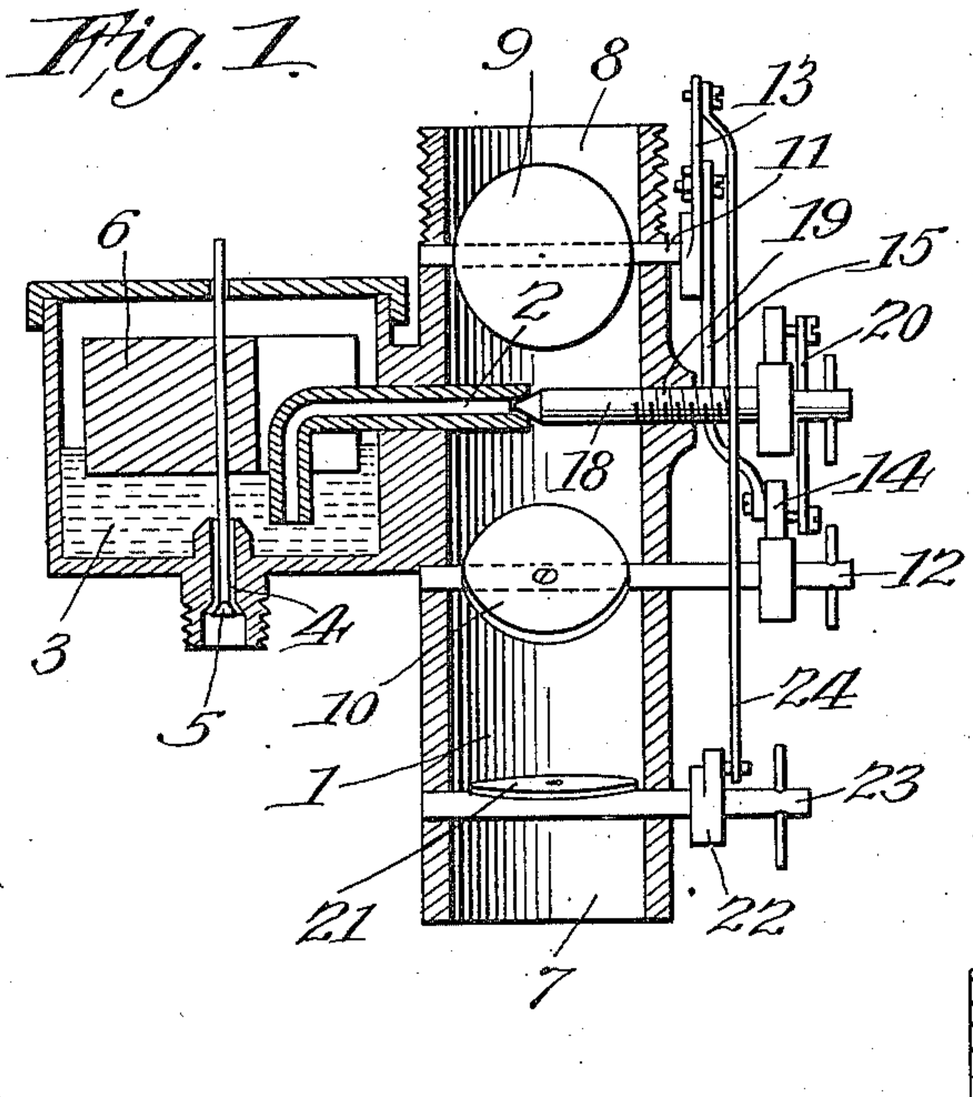


Fig. 2.

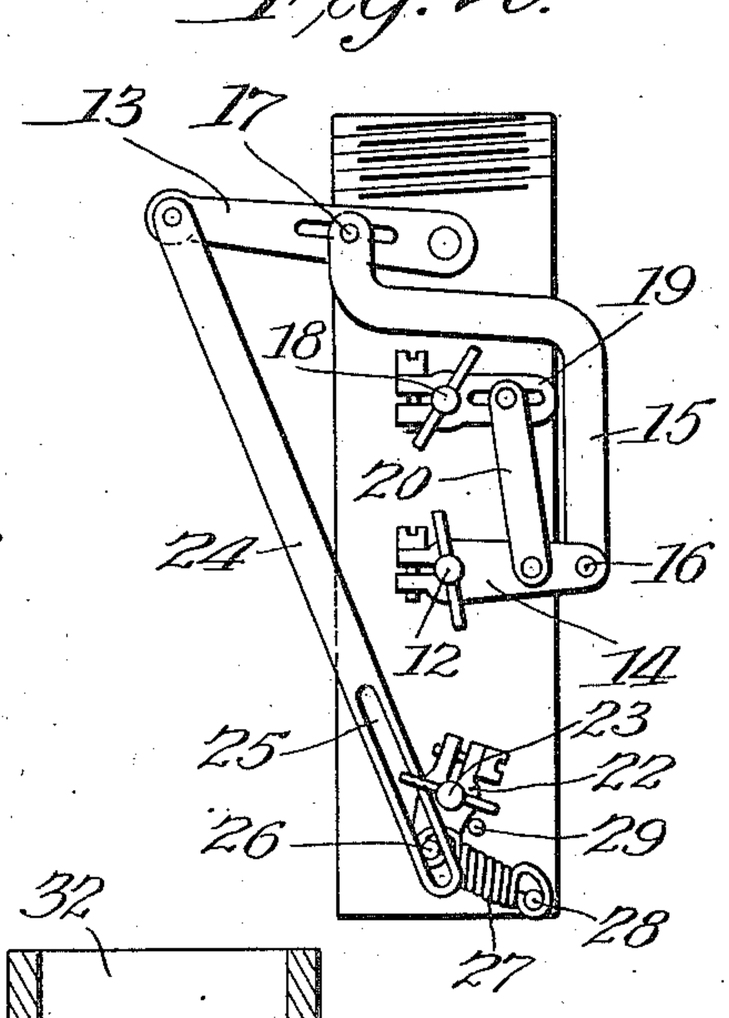


Fig. 3.

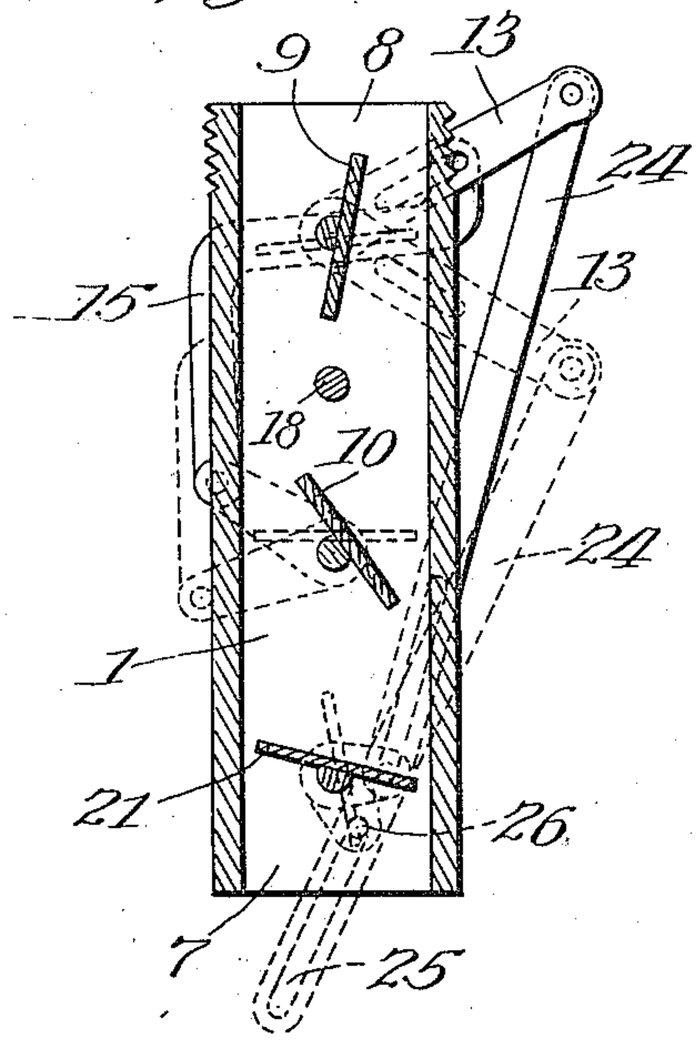
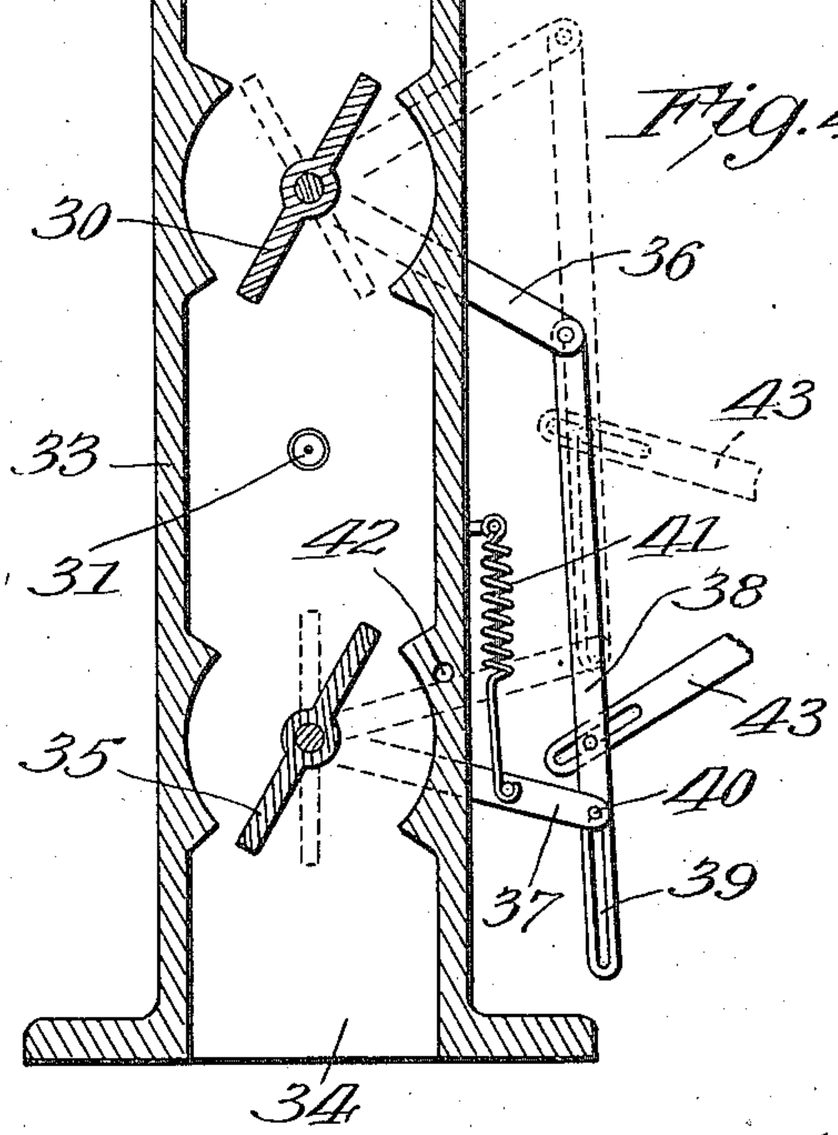


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

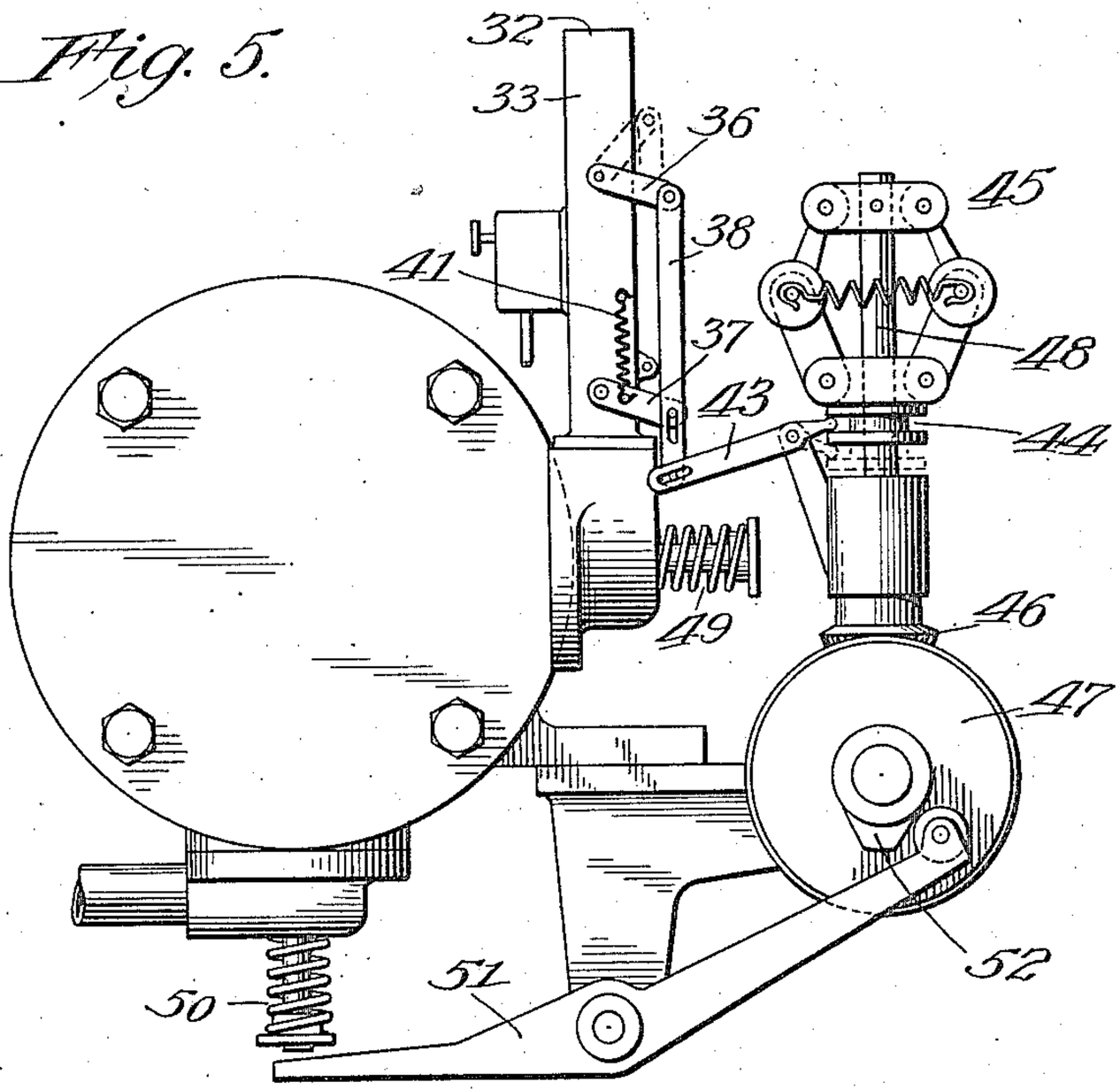
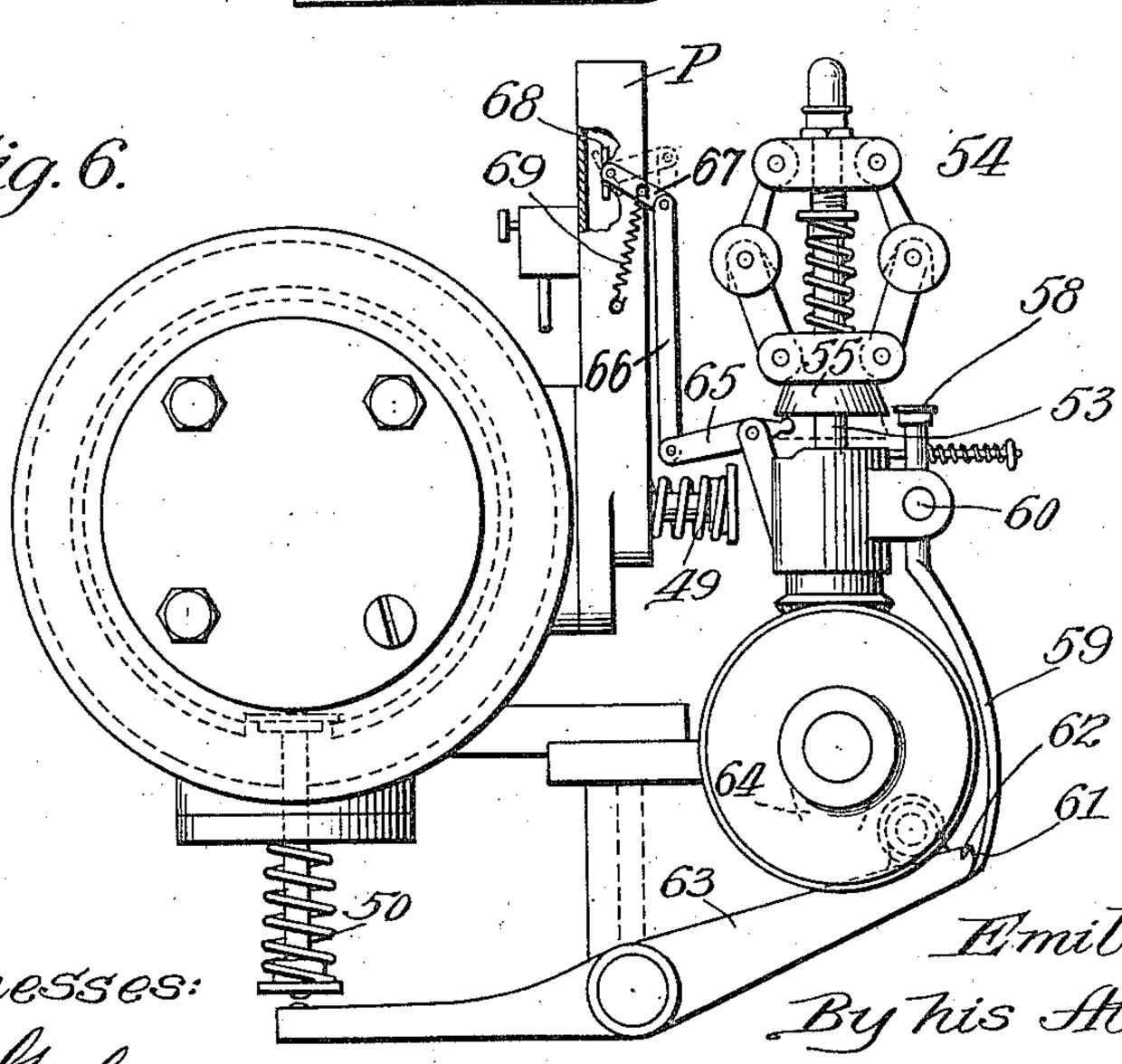


Fig. 6.



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UNITED STATES PATENT OFFICE.

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MIXTURE-PRODUCING DEVICE AND SPEED-GOVERNOR.

1,155,094. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed March 22, 1913. Serial No. 756,032.

To all whom it may concern:

Be it known that I, EMIL PODLEŠÁK, a citizen of the United States, residing at Tiffin, in the county of Seneca and State of Ohio, have invented certain new and useful Improvements in Mixture-Producing Devices and Speed-Governors, of which the following is a specification.

With mixture producing devices of that type now in common use, wherein each charge of explosive mixture is made during each suction stroke of the engine by a supply of air being drawn past a spray nozzle or equivalent device for incorporating the proper amount of fuel with the air to create an explosive mixture, difficulties are encountered when a load is suddenly placed on the engine, greatly decreasing its speed, or when the same effect is produced by failure of ignition of one or more charges, and unless measures are immediately taken to check the decrease in speed, the engine is liable to stop altogether. Heretofore, it has been necessary to check the decrease in speed and stopping of the engine manually by the attendant who must either throw off the load to allow the engine to recover its normal speed, increase the fuel feed by temporarily opening the fuel valve to a greater extent, or inject liquid fuel into the air intake pipe, or by partly closing the air intake pipe so as to increase the degree of vacuum, and hence suction, of the air passing the fuel spraying nozzle or equivalent fuel admitting means.

The principal object of the present invention is to overcome the difficulties mentioned by providing automatic means responsive to the drop of speed below normal to govern the indrawn air in such a manner that the suction at the fuel spraying nozzle or equivalent device is increased as the rate of the piston speed is diminished, the consequence being that a sufficiently rich mixture is obtained to enable the engine to recover its speed by the more powerful explosions in the cylinder, and when the speed is brought up to normal, the fuel and air will be properly proportioned by the regular air inlet means, fuel valve and throttle valve to maintain normal speed until the engine again becomes overloaded or its speed slackens, due to failure of ignition of the charges.

More specifically, another object of the invention is the provision of an auxiliary air inlet valve for the mixture producing device or carbureter, which valve is at normal speed in open position but is connected with a speed responsive device which moves the valve closed as the speed drops below normal, and after the throttle has been moved to open position by the governor in an effort to increase the volume of the charges of mixture to maintain speed. In other words, the auxiliary air inlet valve does not come into play while the throttle valve is moved through its normal range of movement by the regulating action of the governor incident to average load fluctuations, but does come into play under the action of the governor during an abnormal drop in speed of the engine.

With such and other objects in view, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate certain embodiments of the invention, Figure 1 is a sectional view of a mixture producing device or carbureter of that type having an auxiliary air inlet valve in combination with a throttle valve, a main air valve and fuel valve. Fig. 2 is a side elevation of Fig. 1, showing the connections between the various valves. Fig. 3 is a sectional view taken transversely to the axes of the valves to show their different open and closed positions. Fig. 4 is a sectional view of a modified form of mixture producing device wherein one valve is used in connection with the throttle. Fig. 5 is an end view of an engine showing the mixture producing device of Fig. 4 in applied position. Fig. 6 is an end view of an engine showing the mixture producing device in connection with a hit-and-miss speed governor.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawings, 1 designates the body of the mixture producing device or carbureter, which body is in the present instance in the shape of a straight conduit, but it is obvious that the form and size may be variously altered, and into this conduit projects a spray nozzle 2 which communicates with a fuel reservoir 3 containing liquid fuel that is admitted through a port 4 controlled by a valve 5 that is connected with a float 6 in the reservoir 3. The end 7

of the body 1 is open to the atmosphere for admitting air which sweeps past the nozzle 2 and causes liquid fuel to be sprayed into and intimately mixed with the air for producing the explosive mixture, the volume of which passing to the engine through the outlet 8, is controlled by a throttle valve 9. This throttle valve is shown as of the butterfly type but any other form may be employed. At the inlet side of the nozzle 2 is a main air valve 10 also of the butterfly type and connected with the spindles or axles 11 and 12 of the valves 9 and 10. respectively, are arms 13 and 14 which are connected together by an elbow link 15, which link has a fixed hinged connection at 17 with the arm or lever 13, and by means of this link the valves 9 and 10 move in synchronism, but their relative position as well as the range of movement may be adjusted for obtaining the proper operative conditions. Associated with the spray nozzle 2 is a needle valve 18 which is threaded in an opening 19 in the wall of the mixing chamber, and on the outer end of this valve is an arm 19 which is connected by a link 20 with the arm 14, the link being adjustably connected with arm 19 so as to obtain the proper range of movement of the needle valve with respect to the movement of the air valve 10 and throttle.

The various valves are so proportioned and so adjusted with respect to each other that the proper mixture will be produced for operating the engine within a certain range of speed, and when automatic governing is desired, the valves will be connected with a suitable speed-responsive device, as will be readily understood. The adjustment and operation of the valves, however, is not suited to take care of a decided drop in speed of the engine, due for instance to an excessive load being placed thereon, or due to failure of the charges to ignite on account of some ignition trouble, and unless the attendant acts promptly to check the decrease in speed, the engine will stop altogether. An automatic device, however, is provided to take care of thi· contingency, so that a mixture of proper proportion will be drawn into the engine during its slackened speed, whereby the speed will be automatically brought up to normal. This device comprises an auxiliary air valve 21 which is mounted between the air inlet port 7 and the main air valve 10. This auxiliary valve 21, which is also of the butterfly type, has an arm or lever 22 attached to the stem 23 and this arm 22 is connected with the throttle valve by a link 24 in such a manner that there is lost motion between the throttle valve and auxiliary air inlet valve, this lost motion being provided by a slot 25 in the link 24, and a pin 26 on the arm 22. A spring 27 is connected with the arm 22 and anchored at 28 on the body of the carbureter, and this spring yieldingly holds the arm 22 in engagement with the stop 29 which is located in such position that when the arm is engaged with the stop, the auxiliary air inlet valve 21 is open, as shown by the dotted lines in Fig. 3. By means of the slot 25 in the link 24, the throttle valve can travel through its range of movement for taking care of reasonable speed fluctuations, but when the speed drops below a certain point the further movement of the throttle valve is accompanied by the closing movement of the auxiliary air inlet valve 21, for as the throttle valve changes from the dotted to the full line position, Fig. 3, the lower end of the slot 25 in the link 24 engages the pin 26 on the arm 22 and moves the auxiliary air inlet valve toward closed position. This air inlet valve thus reduces the effective inlet area of the mixture producing device and consequently creates a stronger suction past the fuel nozzle, so that a rich mixture is produced suitable for bringing the speed of the engine back to normal. As the speed returns to normal, the auxiliary air inlet valve returns to its open or inoperative position.

In the modification shown in Figs. 4 and 5, a single air valve 30 is employed between the spray nozzle 31 and the air inlet port 32 of the mixture producing device 33, and between the outlet 34 of the device and spray nozzle is the throttle valve 35. The arms or levers 36 and 37 of the valves 30 and 35 are connected together by a link 38, the lower end of the link having a slot 39 into which engages a pin 40 on the arm 37. A spring 41 is connected with the throttle valve arm 37 and with the body of the carbureter and this spring tends to move the throttle valve from a closed or a partially closed position, as shown by full lines, to a full open position, where the valve is arrested by the arm 37 engaging a stop 42. During this movement of the throttle valve, the air valve moves from the full to the dotted line position, first increasing the effective air inlet area and later decreasing it, the air inlet valve passing from one side to the other side of its full open position to a point almost closing the air port. The link 38 is connected with a governor actuated lever 43 which moves up and down within a limited range during normal speed regulation, but during a decided drop in speed the lever rises a considerable distance and throws the throttle valve to full open poistion and continues its movement to almost close the air inlet valve while the throttle valve remains fully open. In Fig. 5, the lever 43 is shown connected with the sliding collar 44 of the speed responsive device 45 of the engine, said device being driven by bevel gears 46 between the secondary shaft 47 and governor shaft 48. The inlet valve 49 of the en-

gine is of the automatic type, while the exhaust valve 50 is operated through a lever 51 by a cam 52 on the shaft 47.

In Fig. 6, the invention is shown in connection with a hit-and-miss governor. On the governor shaft 53 is the usual speed responsive device 54 that is provided with a cone 55 which, in rising, is adapted to engage a head 58 on the latch 59 fulcrumed at 60, and by this engagement, the lower end 61 of the latch is thrown into line with the recess 62 in the exhaust valve operating lever 63, when said lever is raised by the cam 64 and thereby the latch 59 holds the exhaust valve open so that no explosion will take place while the speed is abnormally high. When the speed decreases, the cone 55 drops and allows the latch 59 to disengage from the lever 63. When the speed drops below normal this same cone 55 operates on the lever 65 of the mixture producing device. This lever is connected by a link 66 with an arm 67 of the choking air inlet valve 68 of the mixture producing device 69 so that as the speed of the engine drops materially, the downward movement of the cone 55 will move the choking air inlet valve 68 from the full to the dotted line position and thereby cause a rich mixture to be produced for the engine during its low speed.

Another advantage resulting from the use of the air inlet valve is that in starting an engine, less difficulty is encountered, especially when the carbureter is cold, because the air inlet valve at this time is nearest its closed position so that the air drawn in during cranking of the engine will attain a high speed and produce a powerful suction at the spray nozzle, so that a rich mixture will be obtained for the initial charge. It is recognized that the difficulty in starting an engine with a cold carbureter is due to the fact that too much air is allowed to enter through the carbureter, but with the present device this difficulty is overcome, since a liberal supply of the liquid fuel will be indrawn, because of the increased suction action upon the fuel feeding nozzle when the said choking or controlling valve is near its closed position.

Having thus described the invention, what I claim as new, is:—

1. The combination of an engine provided with a speed responsive device; a carbureter for the engine including an air conduit having fuel feeding device and air valve therein; and means, controlled by the speed responsive device, whereby said valve is actuated only when the speed of the engine is less than a predetermined normal speed.

2. A carbureter for an engine including a throttle valve, an air inlet valve, and a speed responsive device connected with the throttle valve and with the air inlet valve to move the latter toward closed position after the throttle valve is in full open position.

3. A carbureter for an engine including a throttle valve, an air inlet valve, fuel feeding means intermediate said valves, a device for uniting the valves and including a lost motion connection, and means operating through the device to control the action of the throttle during ordinary speed changes and to move the air inlet valve toward closed position upon an abnormal decrease in speed.

4. The combination of an engine, a carbureter connected therewith, and a speed responsive device controlling the carbureter, said carbureter including an air inlet valve, and a connection between the valve and speed responsive device whereby the valve is moved toward closed position as the speed of the engine drops below a predetermined point.

5. The combination of an engine having a carbureter connected therewith and means controlling the carbureter, said carbureter comprising a fuel spraying nozzle, throttle and air inlet valves at opposite sides thereof, and a connection between the valves for permitting simultaneous movement thereof during average speed changes, and independent movement of the air inlet valve during a drop in speed below a predetermined point.

6. The combination of an engine, a carbureter therefor comprising fuel admitting means and air inlet and throttle valves; arms connected with the valves; a link having a direct connection with one arm and a lost motion connection with the other arm whereby the air inlet valve may be moved toward closed position while the throttle remains open.

7. The combination of a mixture conduit a fuel admitting device therefor, an air inlet valve a throttle valve means for uniting the valves for simultaneous movement in one direction and including a lost motion connection with one of the valves and a spring acting on the valve, connected with the said means through the lost motion connection whereby one valve is movable independently of the other valve.

8. The combination of an engine, a mixture conduit having a throttle valve and an air inlet valve, fuel feeding device between said valves, a link attached to the inlet valve and having a lost motion connection with the throttle valve and arranged to operate the throttle only after the engine's speed has increased to approximately the normal, a spring attached to the throttle for moving it toward open position, and a means for moving the link.

9. The combination of an engine provided with a speed responsive device; a carbureter

for the engine comprising air inlet conduit, mixing chamber, mixture outlet conduit, valve in said inlet conduit, device for feeding fuel into said inlet conduit, and throttle valve in said outlet conduit and operatively controlled by the speed responsive device; and means controlled by the speed responsive device to move the air inlet valve toward closed position during a drop in speed below a predetermined point, and after the throttle valve is moved to full or approximately full open position.

10. A carbureter for an engine comprising air inlet conduit, mixing chamber, mixture outlet conduit, means for feeding fuel into the air indrawn through the inlet conduit, throttle valve in the outlet conduit, valve in said inlet conduit, and means for moving the valves to vary the passage openings through said conduits simultaneously during normal operation and to move the inlet conduit valve toward closed position when the throttle valve reaches its full or approximately full open position.

11. A carbureter for an engine comprising air inlet conduit, mixing chamber, mixture outlet conduit, means for feeding fuel into the air indrawn through said inlet conduit, throttling valve in said outlet conduit and adapted to vary free opening therethrough, valve in said inlet conduit and adapted to vary the free opening therethrough, and means for moving said air inlet valve toward closed position when the throttling valve reaches its full or approximately full open position.

In testimony whereof I affix my signature in presence of two witnesses.

EMIL PODLEŠÁK.

Witnesses:
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A. E. SCHALK.