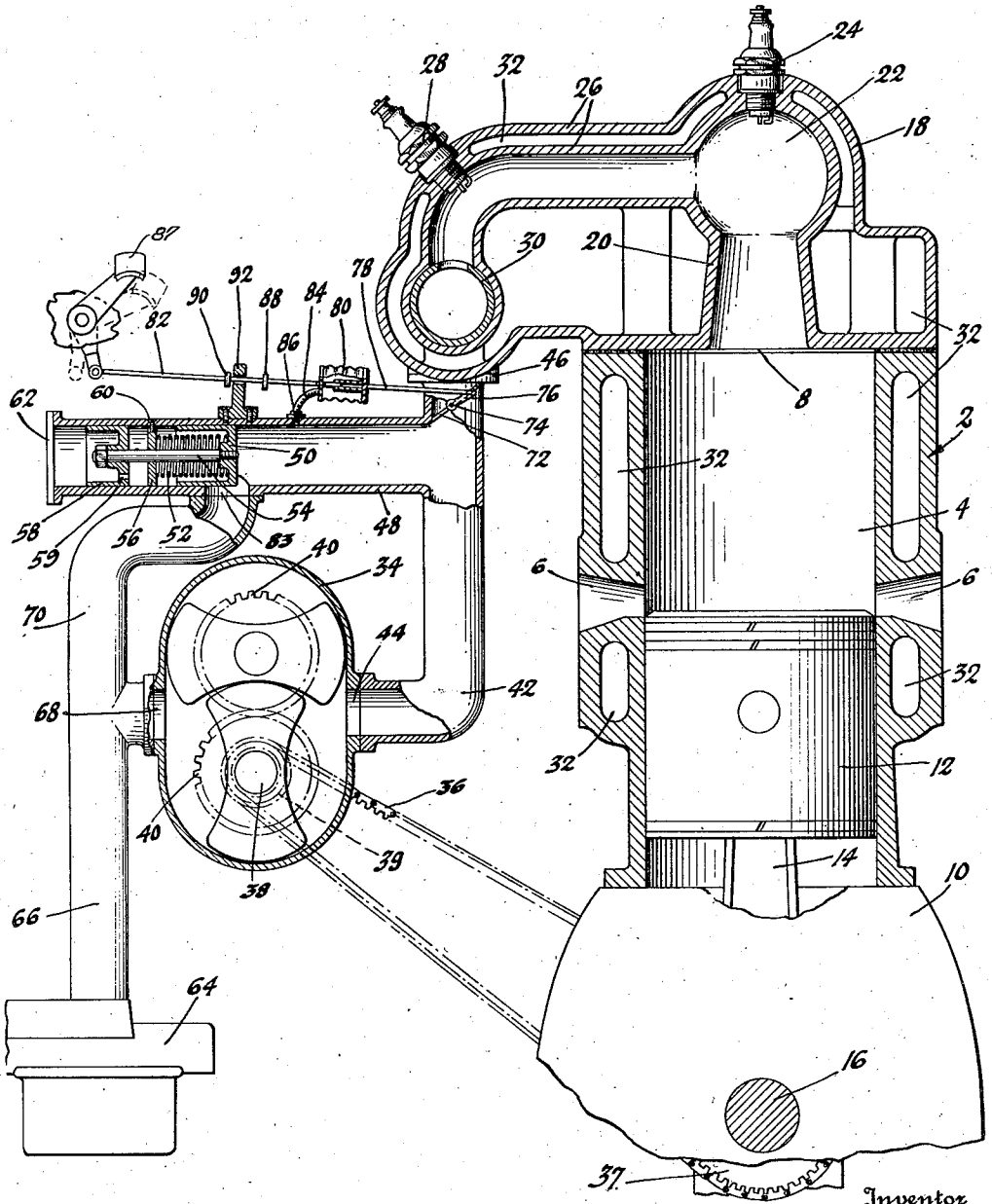
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TWO-CYCLE ENGINE LOAD CONTROL

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TWO-CYCLE ENGINE LOAD CONTROL

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This invention relates to internal combustion engines of the two-cycle type and has particular reference to a device for fully closing the throttle at high engine speeds and leaving the throttle to idle position at low speeds.

Experiments conducted with two cycle engines installed on automotive vehicles have proved that very objectionable intermittent firing takes place when the engine is to be slowed down and/or the vehicle brought to a stop from higher speeds, such as thirty miles per hour and over. The release of the accelerator pedal allows the throttle to move toward closed position but ordinarily leaves the throttle sufficiently open—i. e. in idling position—which will cause the engine to fire after three or four revolutions. This objectionable firing will not take place when slowing down the engine if the throttle is fully closed to prevent carburetted air from reaching the firing chamber. If a device were arranged so that at high engine speeds the throttle could be fully closed when the engine is being slowed down, better firing results, but this device should be so installed that for low speeds and idling it will allow the throttle to assume the customary idle position. The device of the invention has for its purpose to accomplish the above-mentioned object and consists in providing in the connection which leads from the throttle to the accelerator pedal, or other member to operate the throttle, a bellows which is subject to the pressure in the fuel intake conduit on the outlet side of the usual blower. At high speeds this pressure will be appreciable and will be transmitted to the bellows to expand it. This expansion, when the accelerator pedal is released, will tightly close the throttle to its fullest extent in the intake riser. At low speeds the pressure of the blower is very much diminished and this pressure will be insufficient to affect the bellows so that for slow speeds the throttle will be held slightly open or at idle position.

The single figure on the drawing is a sectional view through one cylinder of a multi-cylinder two-cycle internal combustion engine with the invention applied.

Referring to the drawing, the numeral 2 indicates as a whole any two-cycle multi-cylinder internal combustion engine. The engine has the usual cylinders 4 having the exhaust ports 6 and the intake ports 8. The crankcase is indicated at 10, the pistons at 12 and the connecting rods at 14. The piston is connected to the usual crankshaft, the axis of which is indicated at 16. At the top of the cylinder, there is applied any suitable combustion head 18 which, for purposes of disclosure only, is of the special type shown. The combustion chamber for each cylinder includes the neck portion 20 connected at one end to the inlet 8 and at its other end having formed therein the rounded combustion chamber 22. This combustion chamber has the usual spark plug 24 at the top thereof. Connected to the combustion chamber 22 is the pipe 26 which also forms a part of the combustion chamber head 18. The pipe 26 has a usual spark plug 28 which preferably is positioned immediately beyond the rotary valve 30 which controls the admission of carburetted air to the combustion chambers 22, 26. The numeral 32 indicates the usual water cooling system of the engine.

A blower 34 of any suitable type is interconnected with the crankshaft of the engine by any suitable driving means such as the chain 36 and gears 37, 39 which drive the shaft 38 of the blower. The blower in the present instance comprises two figure 8 rotors of the usual type interconnected by means of the gears 40. A pipe 42 is connected to the outlet 44 of the blower and extends upwardly and is connected as at 46 to the inlet to the combustion chamber 26 at the rotary valve 30. The pipe 42 also includes the lateral by-pass extension 48 in which there is positioned the valve 50 urged toward closed position by the coil spring 52 as shown in the figure. The piston valve 50 has connected thereto the stem 54 which passes through a spacer 56 in the by-pass conduit 48, and a second piston 58 is connected to the end of the stem 54 at the other side of the spacer 56. The piston 58 operates in the end of the by-pass extension 48 and has a small air flow opening 59 therein. The piston 58 forms a dashpot. The spacer 56 is rigidly secured in place by one or more screws 60. A suitable end closure 62 is provided for the end of the by-pass conduit 48.

The usual carburetor is shown at 64, the riser therefrom at 66 which delivers at 68 to the blower 34. A pipe 70 is connected to the by-pass connection 48 by the inlet 83.

The throttle valve is shown at 72 mounted on a shaft 74 having a lever 76 secured thereto. The lever 76 is connected to a rod 78 which has a bellows 80 attached thereto. A rod 82 attached to the other end of the bellows is connected with the usual accelerator pedal 87. Inside the bellows 80 the rods 78 and 82 may be telescopically arranged to form a more rigid structure. A flexible connection such as a hose 84 is connected to one end of the bellows while the other end is connected to the extension 48 as shown at 86. In the construction shown in the

figure it will be apparent that the pressure from the connection 48 will be transmitted through the flexible connection 84 to the interior of the bellows 80.

To limit the movement of the rods 78, 82 and bellows 80 adjustable stops 88 and 90 are provided on the rod 82 which passes through an opening in the end of a bracket 92 mounted on any suitable stationary part of the vehicle. The end of the bracket is positioned between the stops 88 and 90.

Considering the position of the parts as shown in the figure, the pressure on the accelerator pedal and rod 82 has been released, the throttle 72 is in fully closed position and the bellows 80 expanded. This is the condition of a relatively high pressure in the passages 42 and 48, or a pressure indicative of high speeds such as 30 miles per hour or higher. In this expanded position, the bellows 80 will push the rod 78 to the right tightly to close the throttle 72 as indicated. The expansion of the bellows 80 will push the rod 78 to the right instead of pushing the rod 82 to the left because of the greater resistance offered by the accelerator pedal which now is in released position and which has associated therewith the usual spring to hold it in a position corresponding to throttle closed position. For lower speeds, the pressure in the passages 42, 48 will be considerably less so that the pressure transmitted through the connection 84 and bellows 80 will be insufficient to overcome the resistance or tension of the bellows to cause its expansion. The bellows 80 will therefore be contracted from the position shown in the figure. This will pull the rod 78 and lever 76 a little to the left to open the throttle 64 slightly or to move it to a position to allow efficient idling.

When the throttle valve 72 closes it causes an increase in pressure in the conduits 42, 48 which pressure increase pushes the piston valve 50 to the left to open the inlet 83 of the pipe 70. This allows a by-passing of fuel mixture through the blower 34.

I claim:

1. In combination with an internal combustion engine having an induction system including a blower, a by-pass to enable the carbureted fuel to circulate through the blower when excessive pressures are reached, and a throttle, means manually to operate the throttle, a bellows to operate the throttle, said bellows having its interior connected at the by-pass to the air from the blower whereby to cause a full closing of the throttle at certain intake pressures and manual control settings.

2. In combination with an internal combustion engine having an induction system including a blower, a by-pass to enable the carbureted fuel to circulate through the blower when excessive pressures are reached, and a throttle, means manually to operate the throttle, a second means to operate the throttle, said second means having its interior connected at the by-pass to the air from the blower whereby to cause a full closing of the throttle at certain intake pressures and manual control settings.

3. In combination with an internal combustion engine having an induction system including a blower, a by-pass to enable the carbureted fuel to circulate through the blower when excessive pressures are reached, and a throttle, means manually to operate the throttle, a second means to operate the throttle, said second means being in communication with the air pressure in the by-pass whereby to cause a full closing of the throttle at certain intake pressures and manual control settings.

4. In combination with an internal combustion engine having an induction system including a blower, a by-pass to enable the carbureted fuel to circulate through the blower when excessive pressures are reached, and a throttle, means manually to operate the throttle, means outside the induction system to operate the throttle, said second named means having its interior connected at the by-pass with the air from the blower whereby to cause a full closing of the throttle at certain intake pressures and manual control settings.

5. In a two-cycle internal combustion engine, a blower to force carbureted fuel to the combustion chamber of the engine, a throttle valve between the blower and the combustion chamber, manual means to operate said throttle, and means having its interior subjected to the air pressure of the blower and interrelated with said first-named means to close said throttle fully at certain intake pressures and manual control settings.

6. In a two-cycle internal combustion engine, a blower to force carbureted fuel to the combustion chamber of the engine, a throttle valve between the blower and the combustion chamber, manual means to operate said throttle, and a bellows having its interior subjected to the air pressure of the blower and interrelated with said means to close said throttle fully at certain intake pressures and manual control settings.

7. In a two-cycle internal combustion engine, a blower to force carbureted fuel to the combustion chamber of the engine, a throttle valve between the blower and the combustion chamber, manual means to operate said throttle, and means having its interior subjected to the air pressure of the blower and interrelated with said first-named means to close said throttle fully at high intake pressure and certain manual control settings.

8. In a two-cycle internal combustion engine, a blower to force carbureted fuel to the combustion chamber of the engine, a throttle valve between the blower and the combustion chamber, manual means to operate said throttle, and means having its interior subjected to the air pressure of the blower and interrelated with said first-named means to close said throttle fully at certain intake pressures and manual control settings.

9. In a two-cycle internal combustion engine, a blower to force carbureted fuel to the combustion chamber of the engine, a throttle valve between the blower and the combustion chamber, manual means to operate said throttle, and means having its interior subjected to the air pressure of the blower and interrelated with said first-named means to close said throttle fully at high intake pressure and certain manual control settings at low speeds said throttle being capable of taking its idling position without interference from the pressure controlled means.

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