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3,315,949

AUTOMATIC CHOKE

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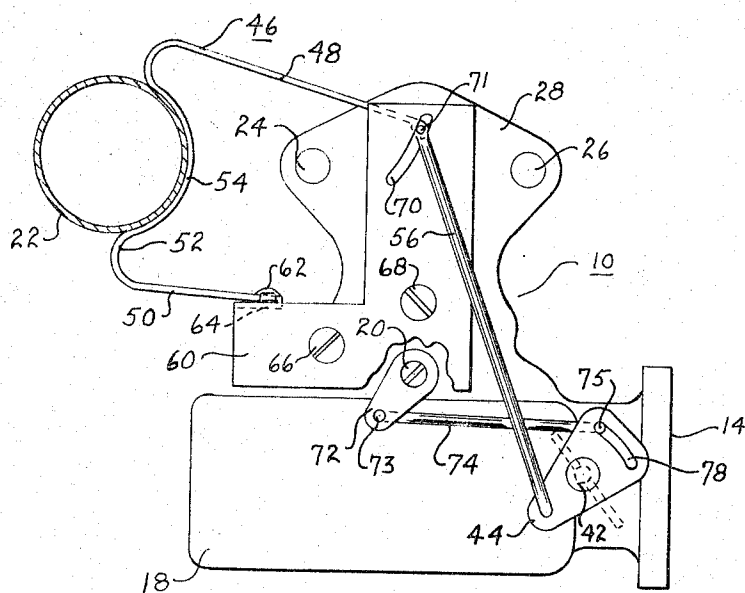


FIG. 1

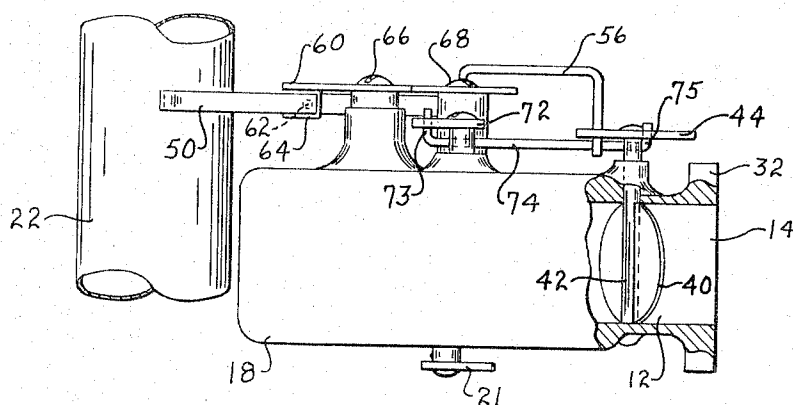


FIG. 2

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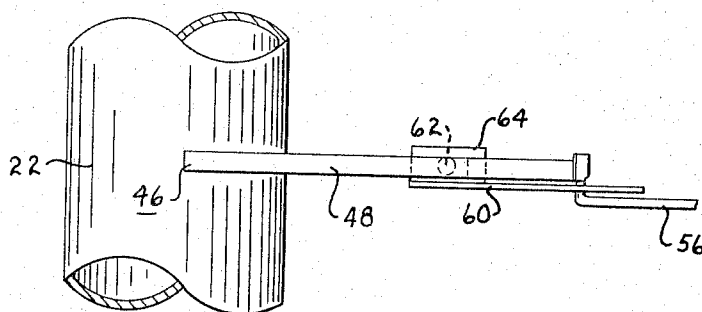


FIG. 4

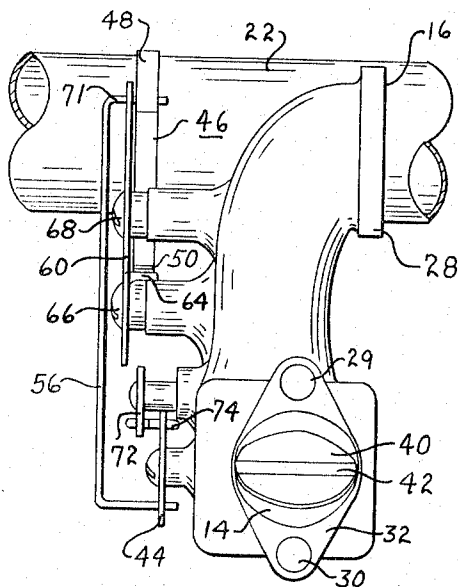


FIG. 3

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AUTOMATIC CHOKE

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6 Claims. (Cl. 261—39)

The present invention relates to carburetors, and more particularly to a mechanism for operating the choke valve of carburetors used on one and two cylinder internal combustion engines.

In cold starting and initial running of one and two cylinder engines, the choke valve is placed in fully closed position during cranking and, promptly after the engine starts, is moved to its fully or nearly fully opened position. While the opening operation of the valve takes place soon after starting, movement of the choke valve should be responsive to engine temperature, which, in the one and two cylinder engines, rapidly reaches normal operating conditions. The operation of the choke valve during starting and initial operation of the engine can be performed manually though proper fuel-air mixture for optimum engine performance is often difficult to obtain, and the conventional automatic choke devices for larger engines normally will not respond sufficiently fast to the changing operating conditions to provide the required fuel-air mixture. Various mechanical means in combination with thermostatic controlled means and vacuum devices have been tried, but these have, in the past, generally not given the degree of control of the choke valve necessary to provide satisfactory performance. It is therefore one of the principal objects of the present invention to provide a choke control mechanism for one and two cylinder engines, which is highly responsive to engine temperature conditions and which will hold the valve in fully closed position for starting, and immediately thereafter, in response to engine temperature, move the valve to fully or nearly fully opened position to provide the proper fuel-air mixture for normal engine operation.

Another object of the invention is to provide a relatively simple and compact automatic choke for one and two cylinder engines which can readily be adapted to carburetors of different sizes and types and to various makes of engines, and the parts of which can easily be fabricated and assembled on the carburetor and which, when installed on an engine, are readily accessible for servicing and adjusting.

Still another object of the invention is to provide a compact choke control device for engines of the aforesaid type which has few and relatively simple parts and which is so constructed and arranged that it does not interfere with the mounting of the carburetor in confined areas around the engine.

Further objects and advantages of the invention will become apparent from the following description and accompanying drawings, wherein:

FIGURE 1 is a side elevational view of a carburetor having the present choke control mechanism mounted thereon, showing the exhaust conduit or manifold in cross section;

FIGURE 2 is a bottom elevational view of the carburetor and choke control illustrated in FIGURE 1, with a portion of the induction passage broken away to illustrate the operation of the choke valve;

FIGURE 3 is an end elevational view of the carburetor and choke control mechanism of FIGURES 1 and 2, showing the exhaust manifold in action to better illustrate the manner in which the mechanism is operated thereby; and

FIGURE 4 is a fragmentary plan view of the thermo-

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static means incorporated in the present choke control mechanism.

Referring more specifically to the drawings, numeral 10 indicates generally the present carburetor on which the choke control mechanism is mounted, the carburetor having an induction passage 12, air inlet 14, mixture outlet 16, and fuel bowl or float chamber 18. The induction passage, which is only shown in part in FIGURES 2 and 3, contains a conventional throttle valve mounted on a shaft 20, controlled by a lever 21, the lever being connected by a linkage to a manually operated control knob or lever. The carburetor, which is mounted in a position relatively close to an exhaust manifold or pipe 22, is connected to the intake passage by bolts in holes 24 and 26 in flange 28 at the outlet of the carburetor induction passage, and a filter is normally mounted at the inlet opening of the induction passage and is secured to the carburetor by bolts extending through holes 29 and 30 in flange 32 around the air intake 14. The particular carburetor shown in the drawings is merely for the purpose of illustrating the present invention and the present choke mechanism may be mounted on various types of float-type carburetors of well known construction.

The choke valve 40 is mounted near the inlet of induction passage 12 on a shaft 42 journaled in the side walls of the carburetor inlet and is operated by a lever 44 fixedly mounted on one end thereof for rotation therewith. The choke valve is rotated between fully closed position and fully opened position by a thermostatic bi-metallic element 46 of generally U-shaped configuration with arms 48 and 50 and intermediate connecting portion 52. The intermediate connecting portion contains an arcuate section 54 which is of the same curvature as the external surface of exhaust conduit 22, and which seats firmly against the external surface to receive direct flow of heat therefrom. The upper arm 48 of the thermostatic element is connected by a lever 56 to lever 44 on the choke valve shaft, and arm 50 of the thermostatic element is rigidly anchored to a bracket 60 by a screw 62 and lug 64 on bracket 60. The bracket is secured rigidly to the carburetor body by screws 66 and 68 and is provided at its upper end with a slot 70 for receiving laterally extending portion 71 of lever 56 and guiding the upper end of said lever. The end of arm 48 of the bi-metallic element to which lever 56 is connected, moves downwardly in response to an increase in temperature of the exhaust conduit as transmitted through intermediate portion 52 to the arm.

In order to provide sufficient air for idling while the choke is either substantially or fully closed, lever 44 is connected to the throttle valve shaft by a lever 72 rigidly mounted on one end of the throttle valve lever and connected to lever 44 by a rod 74 pivotally connected at one end to lever 72 and at the other end to lever 44 by laterally extending ends 73 and 75, respectively, end 75 seating in a slot 78 and forming a one-way connection with lever 44. As the throttle valve approaches fully closed position, end 75 engages the end of slot 78 and cracks the choke valve to provide sufficient air for idling before the choke valve has opened in response to an increase in temperature after starting. The slot 78 permits the choke valve to be moved to fully opened position by bi-metallic element 46, regardless of the position of the throttle valve.

In the operation of the present choke mechanism, starting with the engine cold, arm 48 is in its fully raised position and the laterally extending portion 71 of lever 56 is in the upper end of slot 70 and choke valve 40 is held in its fully closed position by lever 56, provided the throttle valve is in a partially opened position for effective starting. As the carburetor is set for starting, the throttle valve is normally partially opened, thereby permitting rod

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74 to release lever 44, and likewise permitting lever 56 to be raised upwardly against the upper end of slot 70 by thermostatic bi-metallic arm 48. As the engine is cranked, an enriched mixture is provided to the cylinders, and, as soon as the engine fires, the temperature of the exhaust conduit 22 increases rapidly. As the temperature of the exhaust conduit increases, the temperature of the intermediate portion 52 of the thermostat likewise increases rapidly by the direct metal-to-metal contact, transmitting the increasing heat to the two arms 48 and 50, and thereby causing the outer end of arm 48 to move downwardly, pushing the end 71 of lever 56 downwardly in slot 70. The downward movement of lever 56 rotates lever 44 on choke shaft 42, thereby rotating the choke valve toward open position. If the throttle valve is moved to closed position during the early part of the warming up period, the lever 72 and rod 74 rotate lever 44 in a counter-clockwise direction, as viewed in FIGURE 1, thereby cracking the choke valve sufficiently to provide the required amount of air to maintain the operation of the engine. As the temperature of the conduit 22 increases and this increase in temperature is transmitted to bi-metallic element 46, the outer end of arm 48 moves further downwardly, pushing lever 56 downwardly, and thereby rotating lever 44 and shaft 42 and choke valve 40 toward fully opened position. After the engine has become fully warm, the outer end of arm 48 is positioned adjacent the lower end of slot 70 and lever 56 is in its fully lowered position where it is held by bi-metallic element 46 until the engine again cools. With the choke valve in its fully opened position, the one-way connection formed by end 75 of rod 74 and slot 78 does not change the position of the choke valve.

The construction of the various parts of the present mechanism may be varied to adapt them to a particular carburetor and/or to a particular engine. The bi-metallic element may be of a different configuration and the arms thereof of different lengths to position the intermediate section 52 firmly against or in proximity to the exhaust manifold or pipe in adapting the carburetor from one engine to another. It is apparent that direct metal-to-metal contact between the bi-metallic element and the exhaust conduit inherently results in effective and rapid transfer of heat from the conduit to the bi-metallic element in response to engine operation. While only one embodiment of the present choke valve control mechanism has been described in detail herein, various changes and modifications may be made without departing from the scope of the invention.

I claim:

1. A choke control mechanism for a carburetor having an induction passage with a throttle valve and a choke valve therein on rotatable shafts, and for an engine having an exhaust conduit with an exposed metal wall, said mechanism comprising a generally U-shaped bi-metallic element having two arms connected by an intermediate portion of a configuration corresponding to said external wall for metal-to-metal contact therewith, a lever on said choke valve shaft for rotation therewith, a lever connected at one end to said choke valve lever and at the other end to one of said arms, a bracket mounted on the carburetor and having a slot therein for receiving the end of said last mentioned lever and controlling the movement of said last mentioned lever and the rotation of said choke valve, a means on said bracket for anchoring the other arm of said bi-metallic element, a slot in said choke valve lever, a lever on said throttle valve shaft, and a rod connected at one end to said throttle valve lever and at the other end to said choke valve lever at said slot for opening the choke valve only when the throttle valve is in idle position.

2. A choke control mechanism for a carburetor having an induction passage with a throttle valve and a choke valve therein on rotatable shafts, and for an engine having an exhaust conduit with an exposed external wall, said

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mechanism comprising a bi-metallic element having two arms and being shaped for direct contact with said conduit, a lever on said choke valve shaft for rotation therewith, a lever connected at one end to said choke valve lever and at the other end to one of said arms, a bracket with a slot therein for receiving the end of said last mentioned lever and controlling the movement of said last mentioned lever and the rotation of said choke valve, a means for anchoring the other arm of said bi-metallic element, a lever on said throttle valve shaft, and a rod connected at one end to said throttle valve lever and at the other end to said choke valve lever and having a one-way means therein for opening the choke valve only when the throttle valve is in idle position.

3. A choke control mechanism for a carburetor having an induction passage with a throttle valve and a choke valve therein on rotatable shafts, and for an engine having an exhaust conduit with an exposed external wall, comprising a bi-metallic element having two arms connected by an intermediate portion of a configuration corresponding to said external wall for direct contact with said conduit, a lever on said choke valve shaft for rotation therewith, a lever connected at one end to said choke valve lever and at the other end to one of said arms, a means for anchoring the other arm of said bi-metallic element, a slot in said choke valve lever, a lever on said throttle valve shaft, and a rod connected at one end to said throttle valve lever and at the other end to said choke valve lever at said slot for opening the choke valve only when the throttle valve is in idle position.

4. A choke control mechanism for a carburetor having an induction passage with a throttle valve and a choke valve therein on rotatable shafts, and for an engine having an exhaust conduit, comprising a bi-metallic element having two arms connected by an intermediate portion of a curved configuration conforming to said conduit for direct contact with said conduit, a lever on said choke valve shaft for rotation therewith, a lever connected at one end to said choke valve lever and at the other end to one of said arms, a means for anchoring the other arm of said bi-metallic element, a lever on said throttle valve shaft, and a rod connected at one end to said throttle valve lever and at the other end to said choke valve lever and having a one-way means therein for opening the choke valve only when the throttle valve is in idle position.

5. A choke control mechanism for a carburetor having an induction passage with a throttle valve and a choke valve therein on rotatable shafts, and for an engine having an exhaust conduit with an external wall, comprising a bi-metallic element having an arm and being of a configuration corresponding to said external wall for direct contact with said conduit, a lever on said choke valve shaft for rotation therewith, a lever connected at one end to said choke valve lever and at the other end to said arm, a bracket mounted on the carburetor and having a slot therein for receiving the end of said last mentioned lever, a slot in said choke valve lever, a lever on said throttle valve shaft, and a rod connected at one end to said throttle valve lever and at the other end to said choke valve lever at said slot and having a one-way means therein for opening the choke valve only when the throttle valve is in idle position.

6. A choke control mechanism for a carburetor having an induction passage with a throttle valve and a choke valve therein on rotatable shafts, and for an engine having an exhaust conduit with an exposed external wall, comprising a bi-metallic element having an arm connected to a portion of said bi-metallic element of a curved configuration corresponding to said external wall for direct contact with said conduit, a lever on said choke valve shaft for rotation therewith, a lever connected at one end to said choke valve lever and at the other end to said arm, a lever on said throttle valve shaft, and a rod connected at one end to said throttle valve lever and at the other end to said choke valve lever and having a one-way means

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therein for opening the choke valve only when the throttle valve is in idle position.

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