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H. EBERHARDT

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CHOKE VALVE DAMPER

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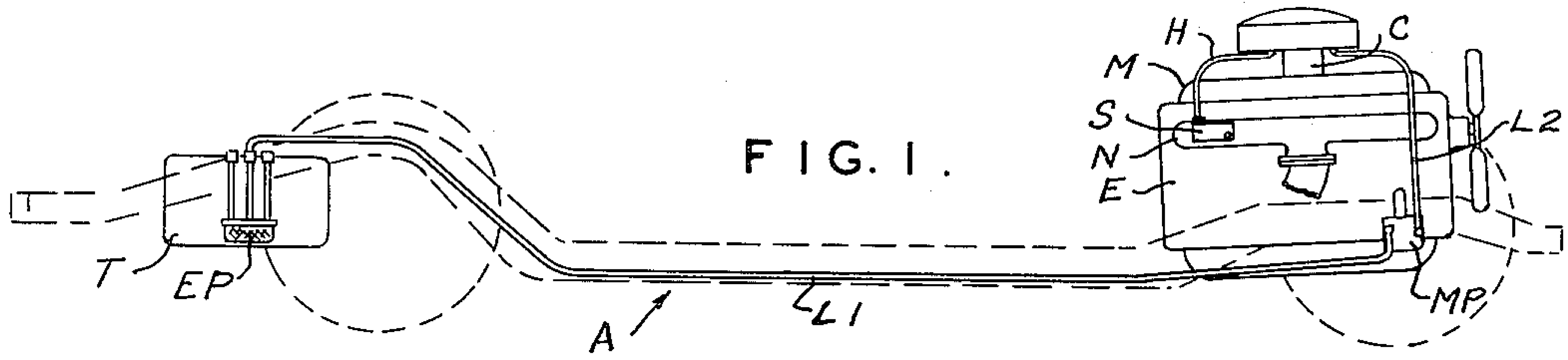
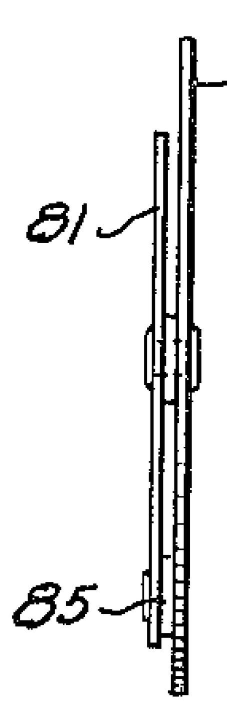


FIG. 1.

FIG. 4.



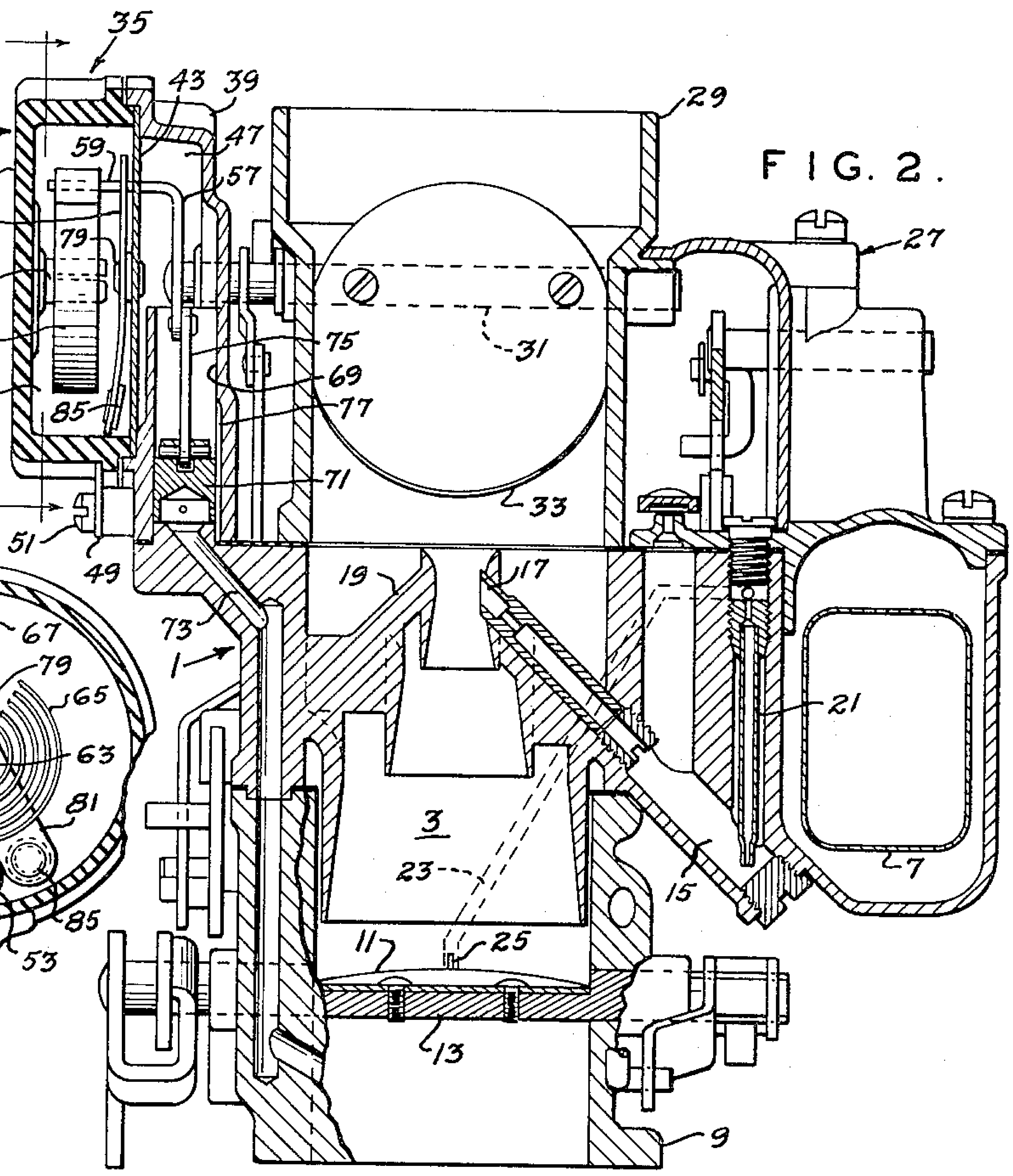


FIG. 2.

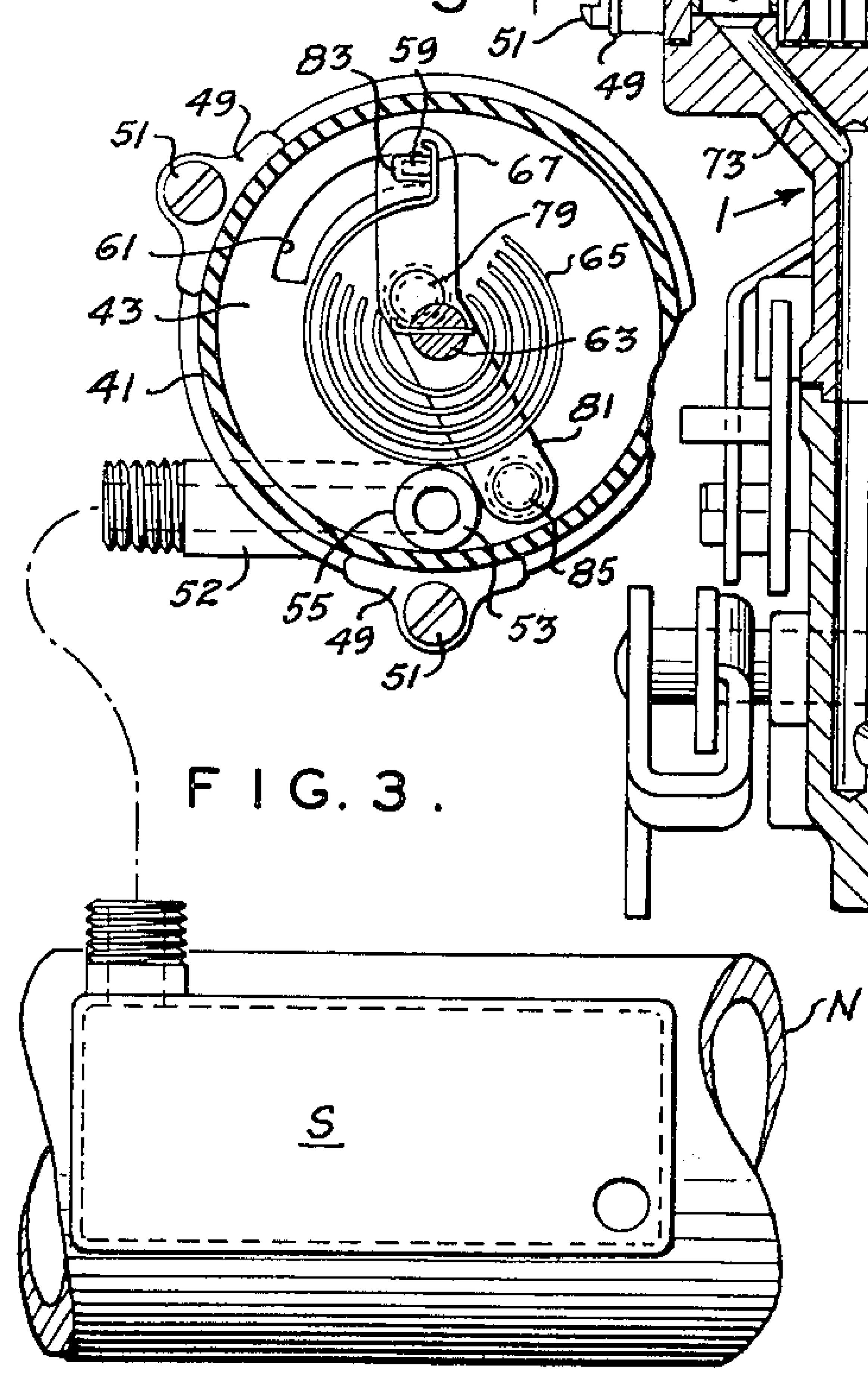


FIG. 3.

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CHOKE VALVE DAMPER

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This invention relates to carburetors for internal combustion engines and more particularly to a damper for the choke valve of such a carburetor adapted to keep the choke valve from fluttering when the engine is cold and under load.

Conventionally, a carburetor for an internal combustion engine, such as the engine of an automotive vehicle, has a choke valve adapted to restrict the air intake through the carburetor to provide an enriched air-fuel mixture during the cranking of the engine for starting purposes and during the engine warm-up period. An automatic control for the choke valve is usually provided, including a thermostatic element responsive to engine temperature adapted to hold the choke valve closed when the engine is cold, and which relaxes to allow the choke valve to open as the engine warms up. A typical automatic control also includes a vacuum-operated piston responsive to vacuum developed in the intake manifold of the engine for opening the choke valve, and the choke valve itself is unbalanced to open. With prior controls such as described, engine breathing and back ram from the manifold may cause an undesirable flutter of the choke valve during the warm-up period when the engine is under load.

Accordingly, it is an object of this invention to provide means which is operative when the engine is cold and under load for keeping the choke valve from fluttering by initially imposing resistance to rotation of the choke-valve during the warm-up period, but which becomes inoperative as the engine warms up so that ultimately it imposes no resistance to the free movement of the choke valve.

In general, this object of the invention is attained by providing a thermostatic damping means for the choke valve responsive to engine temperature which is operative when the engine is cold and under load to keep the choke valve from fluttering, and which ultimately becomes inoperative as the engine warms up, then imposing no resistance to free movement of the choke valve.

Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is a view in elevation illustrating a carburetor in which this invention is incorporated mounted on the engine of an automotive vehicle;

FIG. 2 is a vertical section through the carburetor, on a larger scale than FIG. 1, showing the choke valve fully open and the damping means of this invention in its inoperative or "off" position as when the engine is warmed up;

FIG. 3 is a view partly in section on line 3—3 of FIG. 2 illustrating an automatic choke control of the carburetor and the connection thereto from a stove on the exhaust manifold of the engine; and

FIG. 4 is an edge elevation of a subassembly used in the choke control including the damper of this invention, the damping means being shown in its operative or "on" position as when the engine is cold.

Corresponding reference characters indicate corre-

sponding parts throughout the several views of the drawings.

Referring to the drawings, there is indicated at A in FIG. 1 an automotive vehicle having an engine E on which is a carburetor C. Fuel is supplied to the carburetor C from the fuel tank T of the vehicle. As shown, there is an electric pump EP in the fuel tank for pumping fuel from the tank through a line L1 to a mechanical fuel pump MP on the engine. Pump MP is operated by the engine and is adapted to pump fuel to the carburetor through a line L2. Carburetor C is mounted on the intake manifold M of the engine. Air filter F is mounted on the air horn of the carburetor. The exhaust manifold of the engine is indicated at N. Air is heated in a stove S on the exhaust manifold and delivered through a hot air duct H to the carburetor for choke control purposes, as will be made clear.

Essentially, carburetor C comprises a main body casting 1 formed to provide a mixture conduit 3 and a fuel bowl 5. Fuel is delivered to the bowl 5 via fuel line L2 under control of the usual float-controlled valve, the float for which is indicated at 7 in FIG. 2. Secured to the bottom of the main body casting 1 is a throttle body casting 9, which forms the lower part of the mixture conduit and in which is the usual throttle valve 11 on throttle shaft 13. Fuel for high speed operation is supplied from the bowl via high speed fuel passage 15 and main fuel nozzle 17 to a venturi cluster 19 in the mixture conduit 3. The high speed fuel system may include the usual metering jet, flow through which is controlled in conventional manner by a metering rod (not shown). Fuel for idling is supplied to the mixture conduit via idle tube 21, passage 23 and idle port 25.

On the top of the main body casting 1 is secured the air horn section 27 which includes air horn 29 in register with mixture conduit 3. A choke valve shaft 31 extends across the air horn 29 and has choke valve 33 fixed thereon. As shown, the choke valve comprises a disk mounted off-center on shaft 31 so as to be unbalanced to open. The choke valve is controlled by choke valve control generally designated 35. The elements of this control are contained in a two-part housing 37, one part consisting of a cup-shaped body casting 39, and the other consisting of a cup-shaped cover 41 for the body 39. A partition 43 constituted by a circular sheet metal baffle plate divides the housing into two chambers 45 and 47, chamber 45 being defined by cover 41 and chamber 47 being defined by body 39. The partition or plate 43 is held against the rim of the body 39 by the rim of the cover, the latter being rotatable to different positions of adjustment relative to the body and adapted to be clamped in adjusted position by means of clamp members 49 and screws 51. Chamber 45 (in cover 41) is adapted to receive hot air heated in stove S and conducted by duct H via a hot air inlet 52 formed as part of the body casting 39 and having an end portion 53 (see FIG. 3) extending through a hole 55 in plate 43. This holds the plate against rotation.

As shown, the housing 37 is mounted on air horn section 27 at one end of the choke valve shaft 31. The latter extends into chamber 47 of the housing, terminating short of plate 43. Secured on the end of shaft 31 in chamber 47 is a crank arm 57. This arm is formed with a lateral finger 59 extending parallel to shaft 31 through an arcuate slot 61 in plate 43 into chamber 45. Cover 41 has a central stud 63 to which is secured the inner end of a spiral thermostat coil 65. The outer free end of coil 65 is formed as a hook 67 engageable with finger 59, the arrangement being such that the coil exerts a spring force on the finger biasing the choke valve 33 toward closed position, this force decreasing as the temperatunre of the coil increases. Cover 41 is rotatable to different positions of adjustment to vary the spring force, Body casting 39 is formed with a choke cylinder 69 in which is slidable choke piston 71. The lower end of cylinder 69 is in communication with mixture conduit 3 below the throttle valve 11 via a passage 73. Piston 71 is connected to crank arm 57 by a link 75. Cylinder 69 has the usual longitudinal score 77 extending part way up the cylinder wall to determine the initial opening of the choke valve.

In accordance with this invention, circular plate 43 is provided with a stud 79 coaxial with the choke shaft 31. Pivoted on this stud for rotation in chamber 45 coaxially with the choke shaft 31 is a thermostatic blade 81 (a bimetal blade, for example). The plane of the blade is generally perpendicular to its axis of rotation. The blade has a hole 83 at one end receiving finger 59, thereby being rotatable with the choke shaft and the choke valve. At its other end, which is free, it carries a brake shoe 85. When the engine is cold, blade 81 is cold. Blade 81 is then substantially straight (see FIG. 4) and shoe 85 then frictionally engages the surface of plate 43 to provide resistance to rotation of the choke valve whereby acting as a damper to keep the choke valve from fluttering when the engine is under load. Blade 81 has its high expansion side toward plate 43 so that, when heated by hot air from stove S in response to warming up of the engine, its shoe-carrying end bends away from plate 43 thereby to move shoe 85 away from engagement with plate 43. Ultimately, shoe 85 is moved completely out of engagement with plate 43, and then does not impose any resistance to the free movement of the choke valve (see FIG. 2). Thus, blade 81 and shoe 85 constitute a thermostatic damping means or brake for the choke valve responsive to engine temperature and operative when the engine is cold and under load to provide sufficient resistance to rotation of the choke valve to keep it from fluttering, becoming inoperative as the engine warms up.

It will be understood that the damping action provided by blade 81, while sufficient to prevent fluttering of the choke valve when the engine is cold and under load, is not sufficient adversely to affect the normal breathing action of the choke valve which occurs on starting the engine when cold.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantages results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A carburetor for an internal combustion engine, said carburetor including a choke valve, means operative to keep said choke valve from fluttering when the engine is cold and under load and inoperative when the engine has warmed up, said means comprising a braking member connected to and movable with said choke valve, and a fixed member for providing a braking surface and in frictional engagement with a portion of said braking member, said braking member portion including a thermostatic element for moving away from said surface on being heated.

2. A carburetor as set forth in claim 1, said braking member comprising a thermostatic blade including said thermostatic element and rotatable with said choke valve with the plane of said blade generally perpendicular to its axis of rotation, said braking member portion carrying a shoe for engagement with said braking surface.

3. A carburetor for an internal combustion engine, said carburetor comprising a choke valve and a control for said choke valve, said control including a housing, a partition in said housing forming a chamber in said housing, a thermostatic coil having one end fixed in said chamber, said housing including means for conducting warm air into said chamber, means interconnecting the other end of said coil and said choke valve, and means operative to keep said choke valve from fluttering when the engine is cold and under load and inoperative when the engine has warmed up, said last means comprising a braking member rotatably mounted on said partition and connected for movement with said interconnecting means, said braking member having a thermostatic portion thereof in frictional engagement with said housing, said thermostatic portion being movable away from said housing as said braking member is heated.

4. A carburetor as set forth in claim 3, said braking member comprising a thermostatic blade including said thermostatic portion, said blade being pivotally mounted intermediate its ends on said partition, said thermostatic portion including a shoe at one end of said blade in frictional engagement with said partition, and means connecting said blade at its other end to said interconnecting means.

5. A carburetor comprising a fuel air mixture conduit therethrough, a choke valve rotatably mounted in said mixture conduit, a housing, a braking member mounted in said housing, means operatively connecting said braking member to said choke valve, said braking member having a thermostatic portion thereof in frictional contact with said housing, and means providing passages connected to said housing to pass heated air therethrough and change the frictional contact between said braking member and said housing.

6. A carburetor comprising a fuel air mixture conduit therethrough, a choke valve rotatably mounted in said mixture conduit, a housing, a braking member rotatably mounted in said housing, means operatively connecting said braking member to said choke valve for rotation therewith, said braking member including a thermostatic portion thereof having a shoe in frictional contact with said housing, and means in said carburetor providing passages connected to said housing to pass heated air therethrough and change the frictional contact between said shoe and said housing.

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