

June 11, 1963

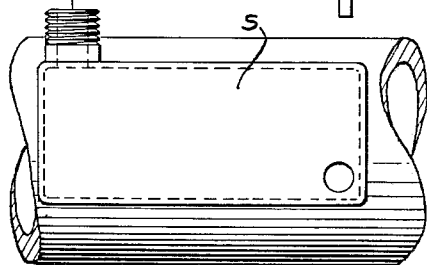
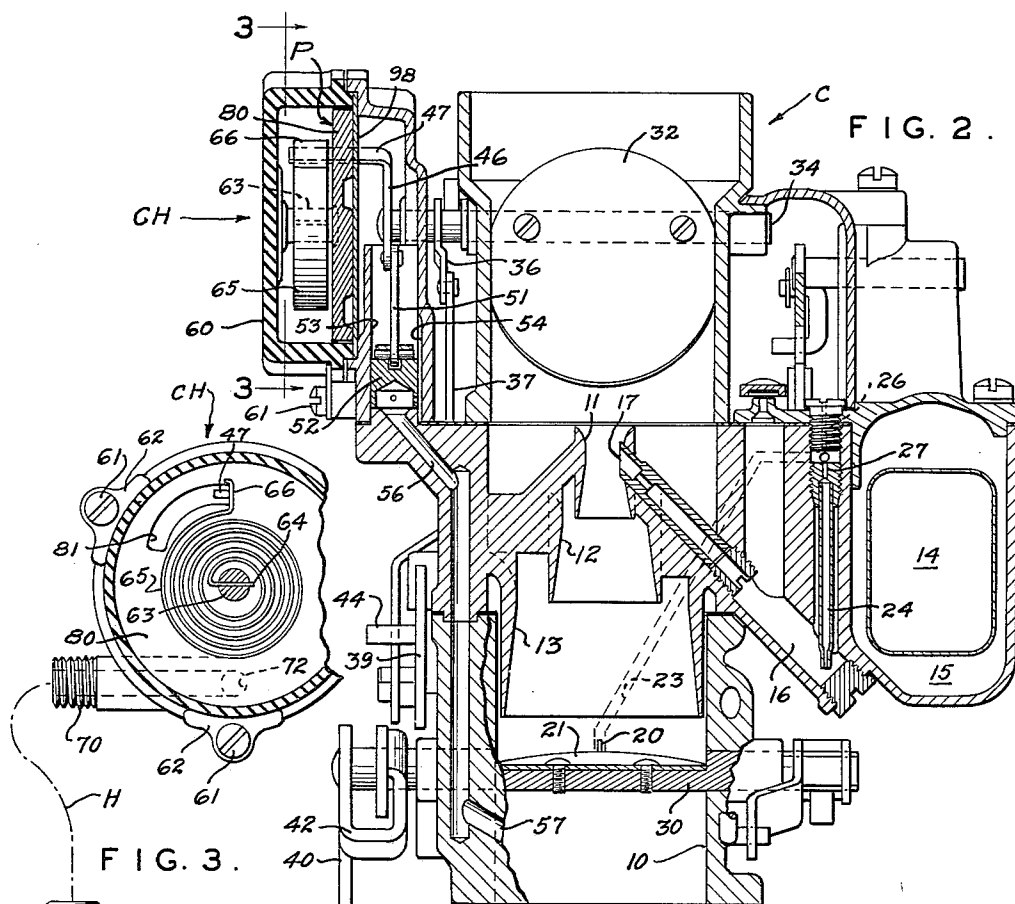
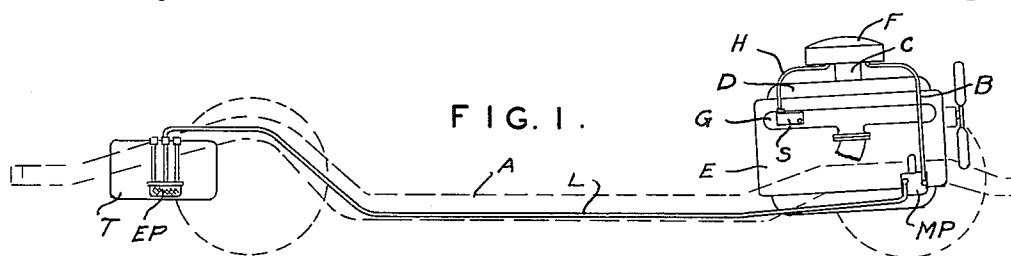
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3,092,999

AUTOMATIC CHOKE

Filed Aug. 4, 1959

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

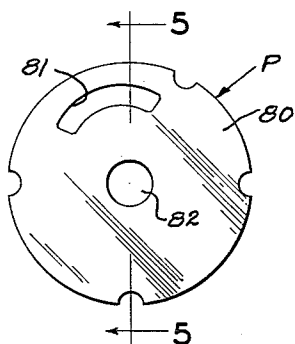


FIG. 4.

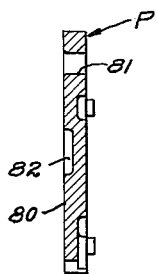


FIG. 5.

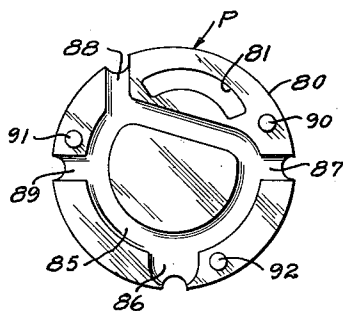


FIG. 6.

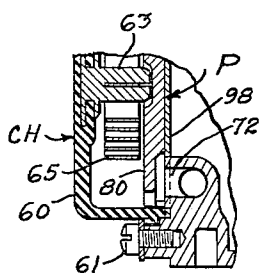


FIG. 11.

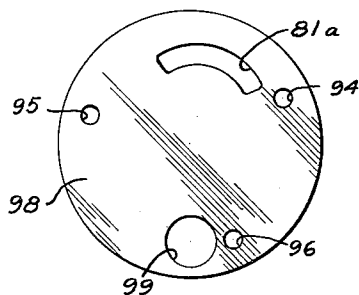


FIG. 7.



FIG. 8.

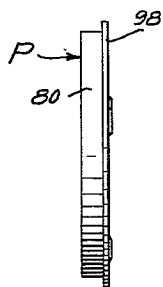


FIG. 9.

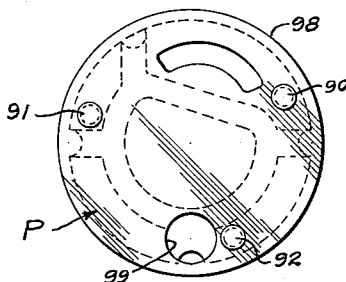
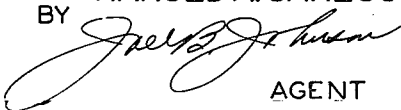


FIG. 10.

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AUTOMATIC CHOKE

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Filed Aug. 4, 1959, Ser. No. 831,505
5 Claims. (Cl. 73-363.7)

This invention relates to a carburetor automatic choke device with a thermostat control, and more specifically to such a control with a means for preventing excessive rapid cooling of the choke control thermostat with respect to the rate of cooling of the engine when stopped, with the consequent result that the mixture delivered by the carburetor on restarting becomes excessively rich due to premature closing of the choke valve. In addition, the same means also provides for uniform distribution of the heating air over the thermostat so as to provide for more uniform operation thereof during operation of the engine.

The control mechanism for this type of automatic device includes a thermostat which is usually mounted within an insulated chamber, so that it is within a free air space; hot air is admitted from a stove on the engine manifold at one point in the chamber and exits from the chamber through passages leading posterior of the throttle of the carburetor. Generally speaking, the source of heat for the choke housing is at some distance from the carburetor and also of course, from the choke housing itself, so that the air space surrounding the thermostat is not influenced directly by engine temperature in the absence of a circulation of air there-through which occurs only during engine operation. As soon as the engine ceases to function, the engine suction is no longer available to produce circulation through the choke thermostat housing and the thermostat begins to cool. The position of the choke valve in the carburetor is directly influenced by the temperature of the thermostat. Consequently, when the source of heat becomes unavailable after the engine stops, the cooling of the thermostat immediately begins, and as it cools the choke valve begins to close. But, since the position of the choke valve directly influences mixture ratio, the lack of conformity between engine temperature and thermostat temperature results in a lack of a suitable mixture for engine starting. This effect becomes most pronounced at low temperatures under the hood, and restarting of the engine after a temporary stop is adversely affected by improper mixture ratio due to the action of the thermostat, the undesired enrichment of fuel mixture delays restarting.

During engine operation, it is also advantageous that the thermostat be uniformly heated. Generally speaking, this does not occur since the draft of air from the hot air inlet to the choke housing is concentrated in one portion of the thermostat. Rapid heating of one portion of the thermostat results in a thermostat reaction which is variable, because it can readily be understood that the reaction of the thermostat will be different where the heating is concentrated at one portion rather than uniformly distributed over the entire thermostat coil.

It is, therefore, an object of this invention to provide a means effecting thermostat reaction whereby restarting of the engine is facilitated at all times regardless of the duration between stopping and restarting of the engine by preventing premature closing of the choke valve when the engine is still warm.

Another object of this invention is to provide a simple, yet effective, heat storage means for delaying the cooling of the thermostat for controlling the automatic choke

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so that it will more nearly correspond to the rate of cooling of the engine.

It is still another object of this invention to provide for a more even distribution of heat over the thermostat for controlling the automatic choke, so as to obtain a more uniform reaction on each heating of the thermostat control mechanism for the automatic choke.

These and other objects are attained by the mechanism in the accompanying drawings, which illustrate one embodiment of the invention, in which:

FIG. 1 is an environmental view, schematically illustrating the position of a carburetor on the engine and of the carburetor stove for heating the automatic choke control mechanism;

FIG. 2 is a vertical section through the carburetor shown in FIG. 1;

FIG. 3 is a fragmentary view partially schematic illustrating the arrangement of parts to supply the heat to the thermostat of the automatic choke mechanism;

FIG. 4 is a plan view of one side of the heat distributing plate shown in FIG. 2;

FIG. 5 is a sectional view taken on the line 5-5 of FIG. 4 of the heat distributing plate;

FIG. 6 is a plan view of the opposite side of the heat distributing plate;

FIG. 7 is a plan view of the heat baffle shown in FIG. 2;

FIG. 8 is a side view of the baffle shown in FIG. 7;

FIG. 9 is a side view in elevation of the assembled baffle and heat distributing plate;

FIG. 10 is a plan view of the assembled baffle and heat distributing plate in FIG. 9; and

FIG. 11 is a fragmentary sectional view taken on the line 11-11 of FIG. 3 showing the arrangement between the assembled heat distributing plate and baffle with the hot air inlet for the choke housing.

Referring to the drawings, FIG. 1 illustrates an automobile chassis A mounting a fuel tank T at one end, and an engine E at the opposite end. The fuel is supplied to the engine E from the tank T through a fuel line L which extends from an electric pump EP in the fuel tank T to a mechanical engine driven fuel pump MP on the side of the engine E. From the fuel pump MP the fuel is delivered through a fuel line B to a carburetor C which in turn mounts an air filter F. Engine E has an intake manifold D to which the carburetor C is connected and an exhaust manifold G upon which is mounted a stove S. A conduit H connects the stove S with the automatic choke housing on the carburetor C which is indicated in FIG. 2 as CH. Note also, FIG. 3 illustrates more specifically the interconnection of the stove S by the heat tube H with the choke housing CH.

The choke housing CH is in turn a portion of the carburetor C shown in FIG. 2 which carburetor has a mixture conduit 10 formed with a venturi 11, 12 and 13 cast as an integral part of the float bowl section of the carburetor C.

The fuel is supplied to the carburetor C through the line B which connects with a constant level fuel chamber 15 controlled by a float operated inlet valve mechanism which float part of the mechanism is shown at 14. The main fuel metering circuit discharges fuel into the mixture conduit by way of main fuel passage 16 and fuel nozzle 17 at the throat of boost venturi 11. It will be understood that the fuel may be metered at the point of entry from the fuel bowl 15 into the main fuel passage 16 by the usual metering rod and jet.

Fuel is also supplied to the mixture conduit 10 through the idle fuel circuit extending from a port 20 at the edge of a throttle 21 by way of passage 23 and idle tube 24

which draws its supply of fuel from the main fuel passage 16. Suitable bleeds 26 and metering restrictions such as 27 control the delivery of fuel through the idle mixture circuit.

The throttle body of the carburetor rotatably mounts a throttle shaft 30 which in turn forms a rotatable support for the throttle valve 21.

The inlet or air horn portion of the carburetor is controlled by the choke valve 32 mounted eccentrically on a rotatable shaft 34. It will be understood, that the amount of fuel nozzle circuit and the idle mixture circuit depends upon the depression created by the pumping action of the engine at the outlet of the nozzle 17 and at the port 20 respectively, and this in turn depends on the degree of throttle opening and on the position or throttling action of the choke valve 32. The degree of throttling action of the choke valve 32 in turn depends upon the action of the choke control mechanism. This mechanism in turn may be broadly described as one responsive not only to thermostat temperature, but also to suction anterior and posterior of the throttle 21. An explanation will appear as this description proceeds.

Choke valve shaft 34 carries a series of levers one of which is 36 which is in turn, connected by a link 37 with a fast idle cam 39 which limits the closing of the throttle valve 21. On the throttle shaft 30 is a compound lever 40 for connection with the throttle linkage of the motor vehicle. It will be understood that this throttle linkage is one which opens the throttle in response to foot pressure and closes the throttle when foot pressure is removed from the throttle pedal by the action of a return spring. On the compound lever 40 is an arm such as 42 arranged for engagement with a lug 44 when the throttle is moved to wide open position so as to tension the link 37 and move the choke valve 32 toward an open position against the closing force of the thermostat when the throttle valve is opened wide.

As heretofore stated, the choke valve shaft carries several levers another one of which is lever 46 which has an angularly directed end portion 47. This latter mentioned lever 46 also is connected by a link such as 51 to a choke piston 52 slidably mounted within a choke cylinder 53. Slots 54 and the sidewall of the choke cylinder 53 provide for by-pass of air around the piston 52, when the choke valve 32 has been moved to a partially open position. Slots 54 in turn communicate with the passage 56 which extends posterior of the throttle 21 and opens at a port 57.

As will be noted from an inspection of FIG. 2, the choke housing CH includes the choke cylinder 53 which opens at its upper end into the choke housing CH adjacent one wall thereof, the inner wall. The outer wall thereof is formed by a removable cover 60 rotatably mounted for adjustment on the inner wall and secured thereto by a plurality of screws 61 acting against a clevis clip such as 62.

Projecting from the center of the wall of the thermostat cover 60 is a stub shaft 63, better shown in FIG. 3. This stub shaft 63 is slotted transversely to receive the inner end 64 of a thermostat coil 65. The opposite end of the coil has a radially extending lug 66 which in turn is arranged for engagement with the angularly directed portion 47 of the lever 46 on the choke shaft 34.

The inner wall of the choke housing CH is provided with an integral threaded nipple such as 70 which is connected at its inlet end to the heat tube H extending from the stove S. The outlet from the threaded nipple 70 is a port 72 located as shown in FIG. 3 and in FIG. 11. Choke housing CH is divided by a vertical partition enclosing the thermostat coil 65. This partition is indicated generally in FIGS. 2, 3, 9, 10 and 11 as P.

As shown in FIGS. 4 through 10, inclusive, the partition P comprises a heat distributing plate 80 with the circumferential slot 81 to accommodate the movement of the off-set end 47 of lever 46 and has a circular recess

82 to accommodate the free end of the stub shaft 63 on the rotatable choke housing 60, all as shown in FIGS. 4 and 5. The opposite side of this heat distributing plate contains main passage 85 in the heat distributing plate 80 which connects with four branches 86, 87, 88 and 89 which in turn have outlets at the periphery of the heat distributing plate. The plate also carries a plurality of lugs such as 90, 91 and 92.

As shown in FIGS. 7 and 8, the baffle plate 98 which encloses the passages 85 through 89, inclusive, has apertures 94, 95 and 96 for receiving the lugs 90, 91 and 92 and a slot 81a which aligns with, and is coextensive with, the slot 81. In the baffle 98 is a hole 99 for registry with hot air outlet 72.

FIGS. 9 and 10 are views showing the baffle and the heat distributing plate assembled by mounting the plate over the lugs 90, 91 and 92 and heading over the lugs, the plate and the baffle are permanently united to form a partition P. The partition P formed by the heat distributing plate and the baffle 98 includes a plurality of heat distributing passages extending to its periphery from the heat inlet opening 99 for distributing the heated air from the stove S around the periphery of the partition P into contact with the thermostat 65 in a more uniform manner. It should also be noted that the heat distributing plate 80 is of substantial thickness and preferably is formed from a zinc casting of sufficient mass to retain the heat transferred thereto from the heated air passing through the passages, so as to form a "heat fly wheel," in the choke housing CH to delay the cooling of the thermostat 65.

Operation

If the engine is cold, the choke valve 32 will be closed, thereby to concentrate the suction produced by the pumping action of the engine during cranking on the fuel nozzle so as to draw a very rich mixture suitable for starting a cold engine. When the engine starts, the pumping action of the engine increases as does also the suction produced in the intake manifold D. This suction is communicated to the choke piston 52 to pull the choke valve part way open and lean out the mixture during engine warmup. When the engine is cold the thermostat tends to unwind so as to create the closing force on the choke valve 32 and the piston 52 and the cylinder 53 creates the opposing force after the engine starts, due to suction in the passage 56 communicated thereto.

Soon after the engine starts, stove S will begin to be heated, thus, heating the air drawn by the pumping action of the engine through the heat tube H out of the heat outlet 72 into the passages 85, 86, 87, 88 and 89 and into the choke housing CH surrounding the thermostat 65. As the temperature of the heated air increases, so also will the temperature of the heat distributing plate 80 and the thermostat 65, and as the thermostat temperature increases it tends to wind up reducing the closing force imposed on the choke valve 32 so as to permit it to reach, in due course, a wide open position such as indicated in FIG. 2. This stage in the warmup cycle is reached after the car has been driven, say, two or three miles.

When the engine is stopped, sufficient heat will be stored in the heat distributing plate so as to delay the cooling of the thermostat 65 and the closing of the choke valve so that the rate of cooling of the thermostat 65 will more nearly correspond to the rate of cooling of the engine.

The novel partition structure consisting of the baffle plate 98 and the distributing plate 80, thus serves to uniformly heat the thermostatic spring 65. This results from the even distribution of the heated air drawn up from the stove S into the choke housing CH. Instead of the heated air passing directly from the inlet 72 across to the outlet through passages 81 and 81a, the hot air passes into the channels 85 of the distributing plate 80 and is uniformly fed radially out into the choke housing CH. In this manner then, the thermostatic spring 65 is heated evenly,

rather than hotter in one place than others. This eliminates variable heating of the thermostat spring 65 so that it will operate at the desired temperature for releasing the choke valve 32.

Furthermore, the distribution of the heated air over the thermostatic coil 65 and uniformly into the chamber CH provides a slower heating of the coil 65, so that the choke valve is not released before the engine is fully heated up. The heavy mass of the distributing plate 80, furthermore, retains the heat within the choke chamber CH, so that the choke housing and the thermostat spring 65 do not cool off too rapidly and prior to the cooling of the engine. This prevents the over-choking and flooding of a heated engine, which has been allowed to stand for a short time.

The structure described above is that of one possible modification of the baffle plate 98 and distributing plate 80. It is obvious that other arrangements of the plates can be obtained. For example, some choke housings bring the heated air, from the conduit H into a center portion of the housing CH, where the baffle plate 98 has its inlet aperture 99 at the center. For this modification, the distributing plate 80 would have the air channels 85 extending from the center of the plate 80 and outwardly to the peripheral edges, so that the heated air can be evenly distributed radially about the choke coil 65.

Other modifications will occur to those skilled in the art, which come within the scope of the appended claims.

We claim:

1. An automatic valve control for a carburetor, said valve control comprising, a housing, a thermostatic coil spring within said housing, means fixing one end of said spring to said housing, a portion of said housing adjacent to said thermostatic spring including a wall structure having an inlet thereto for the passage of the heated air into said wall structure, a plurality of outlets from said wall structure opening into said housing and spaced around the periphery of said wall structure for the passage of air from said wall structure into said housing and adjacent to said coil, closed passages within said wall structure connecting said inlet to said plurality of outlets, and means forming an opening from said housing for the passage of air therefrom.

2. An automatic valve control for a carburetor, said valve control comprising, a housing, a thermostatic coil spring within said housing, means fixing one end of said spring to said housing, a transverse metallic wall structure within said housing and enclosing said spring within a portion of said housing, said metallic wall structure having an inlet thereto for the passage of heated air into said wall structure, a plurality of outlets from said wall structure opening into said housing portion and spaced around the periphery of said wall structure for the passage of air into said housing portion, closed passages within said wall structure connecting said inlet to said plurality of outlets, and means forming an opening from said housing portion for the passage of air therefrom.

3. An automatic valve control for a carburetor, said valve control comprising a closed housing, a thermostatic coil spring within a portion of said housing, means fixing one end of said spring against movement, an annular metal plate mounted in said housing and closing said housing portion, said metal plate positioned adjacent and coaxial to said thermostatic spring, said metal plate having appreciable mass and thickness and an inlet thereto for the passage of heated air into said metal plate structure,

a plurality of outlets from said metal plate structure opening into said housing portion and spaced around the periphery of said metal plate structure adjacent to said coil spring for the passage of air from said wall structure into said housing portion, closed arcuate passages within said metal plate structure connecting said inlet to said plurality of outlets, said metal plate structure having an air outlet passage therethrough extending from said housing portion.

4. An automatic valve control for a carburetor, said valve control comprising a closed housing, a transverse wall structure extending across said housing to form two chambers therewith, a shaft fixed across one of said chambers and supported by said housing, a thermostatic coil spring within said one chamber and having one end fixed to said shaft and the other end adapted to be connected to a carburetor valve, said wall structure having an inlet thereto for the passage of heated air into said wall structure, a plurality of outlets from said wall structure opening into said one housing chamber and spaced around the periphery of said wall structure for the passage of air from said wall structure into said one housing chamber, closed passages within said wall structure connecting said inlet to said plurality of outlets, and means forming an opening from said one housing chamber for the passage of air therefrom, a vacuum piston and cylinder in the second one of said chambers, means within said second chamber for connecting said piston to said other thermostatic coil end, said transverse wall structure including a pair of metallic discs coaxially mounted with adjacent faces in contact with each other, said inlet, outlets and passages being formed in the adjacent face of one of said discs, said one disc being of sufficient mass and thickness to retain heat for an appreciable time.

5. An automatic valve control for a carburetor, said valve control comprising a closed housing, a transverse wall structure extending across said housing to form a chamber therewith, a shaft fixed across said chamber and supported by said transverse wall and an opposite portion of said housing, a thermostatic coil spring within said chamber and having one end fixed to said shaft and the other end adapted to be connected to a carburetor valve, said wall structure having an inlet thereto for the passage of heated air into said wall structure, a plurality of outlets from said wall structure opening into said housing chamber and spaced around the periphery of said wall structure for the passage of air from said wall structure into said housing chamber, closed passages within said wall structure connecting said inlet to said plurality of outlets, and means forming an opening from said housing chamber for the passage of air therefrom, said transverse wall structure including a pair of metallic discs coaxially mounted with adjacent faces in contact with each other, said inlet, outlets and passages being formed in the adjacent face of one of said discs, said one disc being of sufficient mass and thickness to retain heat for an appreciable time.

References Cited in the file of this patent

UNITED STATES PATENTS

2,282,376	Phillips	May 12, 1942
2,715,500	Boyce	Aug. 16, 1955
2,719,519	Sutton	Oct. 4, 1955
2,799,455	Osann	July 16, 1957