Jan. 25, 1966 C. R. GOODYEAR 3,230,945

AUTOMATIC CHOKE MECHANISM

Filed May 28, 1964 2 Sheets-Sheet 1

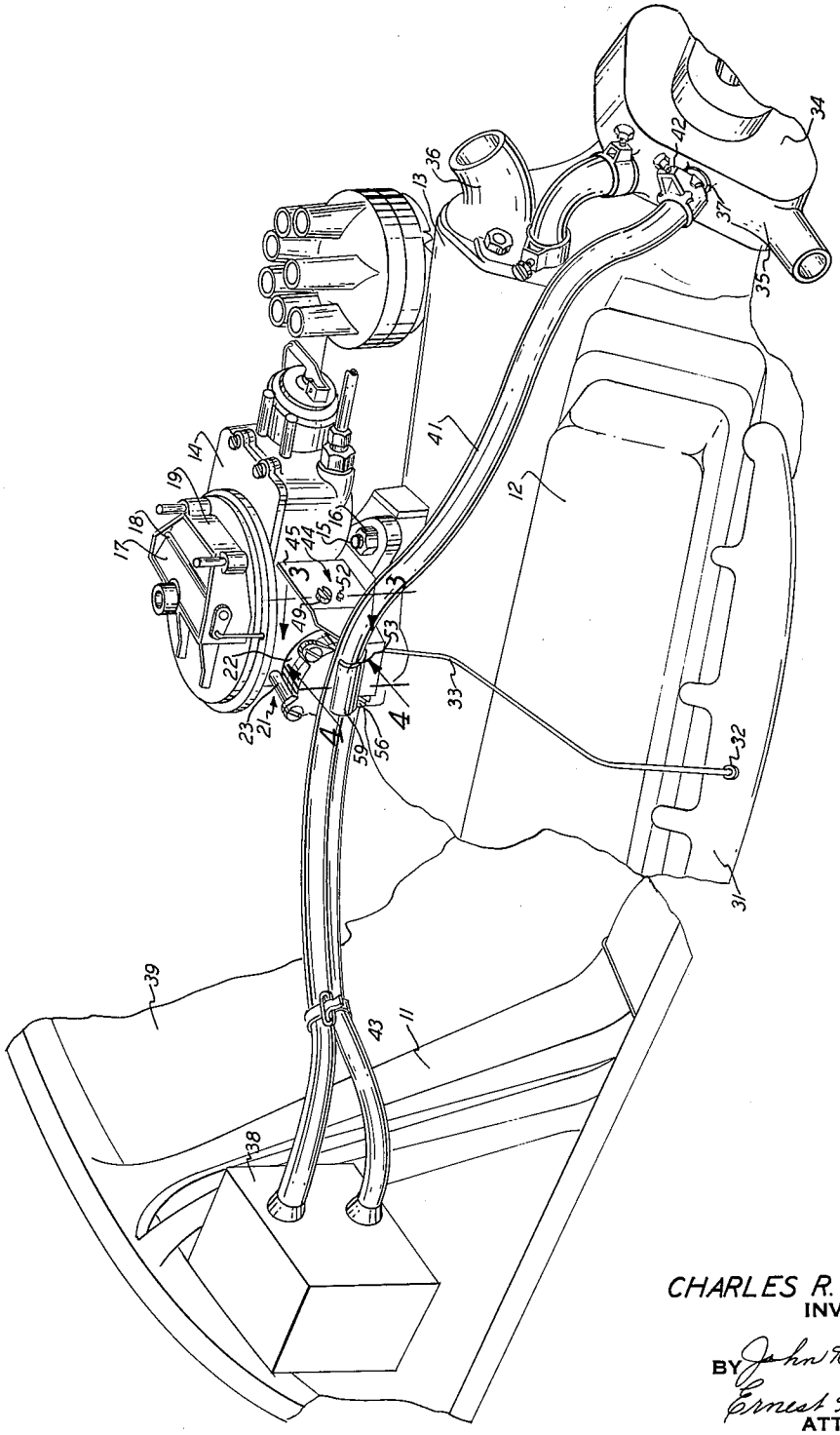

FIG. 1

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Filed May 28, 1964 2 Sheets-Sheet 2

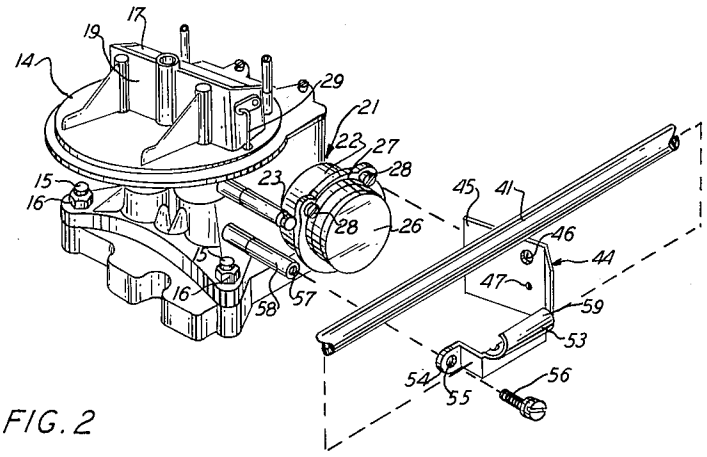

FIG. 2

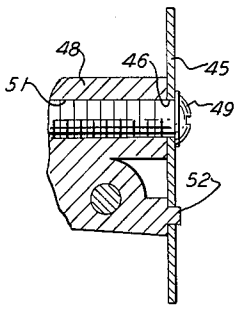

FIG. 3

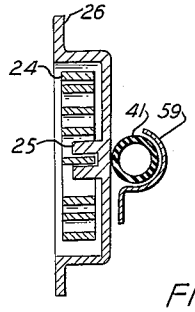

FIG. 4

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AUTOMATIC CHOKE MECHANISM

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4 Claims. (Cl. 123—119)

This invention relates to an automatic choke mechanism for the charge forming device of an internal combustion engine and more particularly to an improved device for heating the thermally responsive element of an automatic choke mechanism.

In the copending patent application of George Nastas entitled "Automatic Choke," Serial Number 265,123, filed March 14, 1963, a unique and simplified structure was disclosed for permitting the combined application of exhaust and engine coolant heat to the thermally responsive element of an automatic choke mechanism. Coolant heat was employed in that application by securing a portion of one of the flexible engine coolant hoses against the choke mechanism by means of a clamp. In that application it was necessary to remove the clamp and hose to permit adjustment of the temperature responsive element. The clamp disclosed in the aforementioned application also required three additional theaded fastening means to secure the clamp and hose to the automatic choke mechanism.

It is therefore a principal object of this invention to provide an improved clamp for securing a coolant hose against an automatic choke mechanism.

The automatic chokes of internal combustion engines that are positioned in motor vehicles also are exposed in the path of considerable air flow. The air flow across the choke mechanism and, in particular, the portion of the choke mechanism that contains the temperature responsive element can cause sufficient cooling of the temperature responsive element to result in enrichment even though the engine temperature does not require it. It has been the general practice, therefore, to provide some form of heat shield that obstructs the air flow across the choke mechanism to prevent this cooling action.

It is a further object of this invention to provide an improved heat shield that performs the additional function of clamping a coolant hose to the automatic choke mechanism.

An internal combustion engine embodying this invention includes a cooling jacket and means including a flexible conduit for circulating coolant through the cooling jacket. An induction system is provided as in a charge forming device for discharging a combustible mixture into the induction system. An automatic choke mechanism alters the richness of the combustible mixture in response to temperature variations. The automatic choke mechanism comprises a thermally responsive element supported within a housing. A cover is affixed to the housing to enclose the thermally responsive element within the housing. The engine is positioned with the housing interposed in an air stream. A combined heat shield and clamp is provided that comprises a baffle interposed between the housing and the source of air flow for obstructing the circulation of air across the housing. An integral clamp portion engages the flexible conduit and urges it into heat exchanging relationship with the cover.

Further objects and advantages of this invention will become more apparent when considered in conjunction with the accompanying drawings, wherein

FIGURE 1 is a partial perspective view of the engine compartment of a motor vehicle embodying this invention.

FIGURE 2 is an exploded perspective view of the charge forming device shown in FIGURE 1, taken from another direction.

FIGURE 3 is a cross-sectional view taken along the line 3—3 of FIGURE 1.

FIGURE 4 is a cross-sectional view taken along the line 4—4 of FIGURE 1.

Referring now in detail to the drawings and in particular to FIGURE 1, the reference numeral 11 indicates generally a portion of a motor vehicle body. An internal combustion engine 12 is supported within an engine compartment of the body portion 11. The engine 12 comprises an intake manifold 13 for distributing a combustible mixture to the cylinders of the engine. A charge forming device in the form of a dual downdraft carburetor 14 is supported upon the inlet of the intake manifold 13 by a plurality of studs 15 and nuts 16.

The carburetor 14 includes a choke valve 17 that is supported for rotation upon a choke valve shaft 18 in an air horn 19. The choke valve 17 is positioned by an automatic choke mechanism, indicated generally by the reference numeral 21 and shown in greater detail in the remaining figures, to provide enrichment for cold weather operation. The automatic choke mechanism 21 comprises a choke housing 22 that is affixed to the body of the carburetor 14 by a plurality of bolts 23, only one of which is shown. A bimetallic coil spring 24 (FIGURE 4) is contained within a cavity of the choke housing 22. One end of the bimetallic spring 24 is received within an inwardly extending boss 25 formed upon an insulating choke housing cover 26 that is affixed to the choke housing 22 by a sheet metal clamp 27 and a plurality of bolts 28. The other end of the coil spring 24 is connected to the choke valve 17 to operate it in response to temperature variations by a linkage system, indicated generally by the reference numeral 29.

The thermally bimetallic spring 24 is heated during engine operation by circulating heated air through the housing 22. For this purpose, the engine exhaust manifold 31 is provided with an exhaust heat stove 32. Warm air is drawn by intake manifold vacuum from the heat stove 32 through a conduit 33 to the interior of the choke housing 22. The choke mechanism heretofore described is conventional and well known. For this reason it has not been described in any great detail.

The engine 12 is liquid cooled and is provided with a suitable cooling jacket (not shown) for dissipating the heat generated by engine operation to a coolant that is circulated by a coolant pump 34. In addition to circulating the coolant through the engine cooling jacket, the coolant pump 34 also causes circulation through a heat exchanging radiator (not shown) that is positioned in front of the engine, within the vehicle engine compartment. A coolant inlet fitting 35 formed on the inlet side of the coolant pump 34 communicates with the radiator by means of a flexible hose (not shown). After circulation through the interior of the engine, the coolant is discharged from a coolant outlet fitting 36, positioned

at the front of the intake manifold 13, into the radiator by means of a flexible hose (not shown).

A heater outlet fitting 37 is provided in the coolant pump 34. A portion of the engine coolant is circulated from the coolant pump 34 through a heater 38 positioned upon the fire wall 39 of the body portion 11. As is well known, the heater 38 contains a heat exchanging core through which coolant may be passed. The coolant is conveyed from the water pump 34 to the heater 38, by means of a flexible hose 41. One end of the flexible hose 41 is connected to the heater outlet fitting 37 by means of a clamp 42. The circulated coolant is returned to the engine cooling system from the heater 38 by means of a return hose 43.

As is discussed in the earlier noted application of George Nastas, when a thoroughly warmed engine is stopped briefly, the flow of heated air from the exhaust manifold heat stove 32 to the choke housing 22 and bimetallic spring 24 is stopped. Even though the choke housing 22 and cover 26 may be insulated, the bimetallic spring 24 will cool rapidly and cause the choke valve 17 to close prematurely. The premature closing of the choke valve 17 may be precluded by affixing one of the coolant conduits against the choke housing 22 or against choke housing cover 26. It is preferable to secure the conduit against the cover 26 since the bimetallic spring 24 is in thermal contact with the cover 26.

When the engine is running there is also a steady stream of air across the engine 12. The air flow is caused either by the engine cooling fan (not shown) or because of the motion of the vehicle. The air flow at low temperatures across the housing 22 will cause the bimetallic spring 24 to be cooled and cause the choke valve 17 to partially close even though the engine 12 may be at full operating temperature.

A combined heat shield and clamp element, indicated generally by the reference numeral 44, is provided to obstruct the flow of cold air across the choke housing 22 and to retain the hose 41 against the choke cover 26. The element 44 comprises a first part 45 that extends between the choken housing 22 and the front of the engine 12 at a spaced distance from the housing 22. The first portion 45 is provided with a large aperture 46 and a smaller aperture 47. The portion 45 contacts a boss 48 (FIGURE 3) formed integrally with the choke mechanism. A bolt 49 passes through the large aperture 46 and is threaded into a tapped hole 51 in the boss 48. A pin-like projection 52 of the boss 48 passes through the aperture 47 to retain the element 44 with respect to the carburetor 14.

A second portion 53 of the element 44 extends normally to the first portion 45 and has an offturned ear 54 with an aperture 55. A bolt 56 passes through the aperture 55 and is threaded into a tapped hole 57 formed in a boss 58 of the choke housing 22. The bolts 56 and 49 and pin-like projection 52 affix the element 44 in respect to the carburetor. The portion 53 has an arcuate clamp part 59 that extends contiguous to the choke cover 26. The clamp part 59 engages the hose 41 and urges it against the choke housing cover 26.

When the engine is being assembled, the element 44 is fixed relative to the carburetor 12. The hose 41 may then be slid between the clamp part 59 and the cover 26 since the clamp part 59 has some resiliency. In addition, the hose 41 will expand to some extent when coolant is being circulated through it. This expansion will also assist in retaining the hose 41 against the choke housing cover 26. Because of the contact of the hose 41 with the cover 26, a heat exchange may take place from the coolant in the hose 41, through the hose 41 and choke housing cover 26 to the temperature responsive spring 24.

It is to be understood that this invention is not limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention, as defined by the appended claims.

I claim:

1. An internal combustion engine comprising a cooling jacket, means including a flexible conduit for circulating coolant through said cooling jacket, an induction system, a charge forming device for discharging a combustible mixture into said induction system, an automatic choke mechanism for altering the richness of the combustible mixture in response to temperature variations comprising a thermally responsive element, a housing supporting said thermally responsive element, a cover affixed to said housing for enclosing said thermally responsive element within said housing, said engine being positioned with said housng interposed in an air stream, and a combined heat shield and clamp for said automatic choke mechanism comprising a baffle interposed between said housing and the source of said air stream for obstructing the circulation of air across said housing and an integral clamp portion engaging said flexible conduit and affixing said flexible conduit in heat exchanging relationship against said cover.

2. An internal combustion engine comprising a cooling jacket, a heat exchanger, means including a flexible conduit for circulating coolant between said cooling jacket and said heat exchanger, an induction system, a charge forming device for discharging a combustible mixture into said induction system, an automatic choke mechanism for altering the richness of the combustible mixture in response to temperature variations comprising a thermally responsive element, a housing for said thermally responsive element, a cover affixed to said housing for enclosing said thermally responsive element within said housing, said thermally responsive element being in heat exchanging relationship with said cover, said engine being positioned with said housing interposed in an air stream, and a combined heat shield and clamp for said automatic choke mechanism comprising a baffle interposed between said housing and the source of said air stream for obstructing the circulation of air across said housing and an integral clamp portion engaging said flexible conduit and urging said conduit into engagement with said cover.

3. An internal combustion engine comprising a cooling jacket, means including a flexible conduit for circulating coolant through said cooling jacket, an induction system, a charge forming device for discharging a combustible mixture into said induction system, an automatic choke mechanism for altering the richness of the combustible mixture in response to temperature variations comprising a temperature responsive element, a housing supporting said temperature responsive element, a cover affixed to said housing for enclosing said temperature responsive element within said housing, said engine being positioned with said housing interposed in an air stream, and a combined heat shield and clamp for said automatic choken mechanism comprising a first part interposed between said housing and the source of said air stream for obstructing the circulation of air across said housing, a second part extending normal to said first part and adjacent to said cover, said second part having an integral clamp portion engaging said flexible conduit and urging said conduit into heat exchanging relationship with said cover, and means for affixing said combined heat shield and clamp to said automatic choke mechanism.

4. An internal combustion engine comprising a cooling jacket, a heat exchanger, means including a flexible conduit for circulating coolant between said cooling jacket and said heat exchanger, an induction system, a charge forming device for discharging a combustible mixture into said induction system, an automatic choke mechanism for altering the richness of the combustible mixture in response to temperature variations comprising a temperature responsive element, a housing supporting said responsive temperature element, a cover affixed to said

housing for enclosing said temperature responsive element within said housing, said temperature responsive element being in heat exchanging relationship to said cover, said engine being positioned with said housing interposed in an air stream, and a combined heat shield and clamp for said automatic choke mechanism comprising a first part interposed between said housing and the source of said air stream for obstructing the circulation of air across said housing and an integral second part extending normal to said first part contiguous to said cover, said second part having an integral clamp portion in engagement with said flexible conduit for urging said

conduit against said cover, and means for affixing said combined heat shield and clamp relative to said housing.

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