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CARBURETOR CHOKE CONTROL

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FIG. 1.

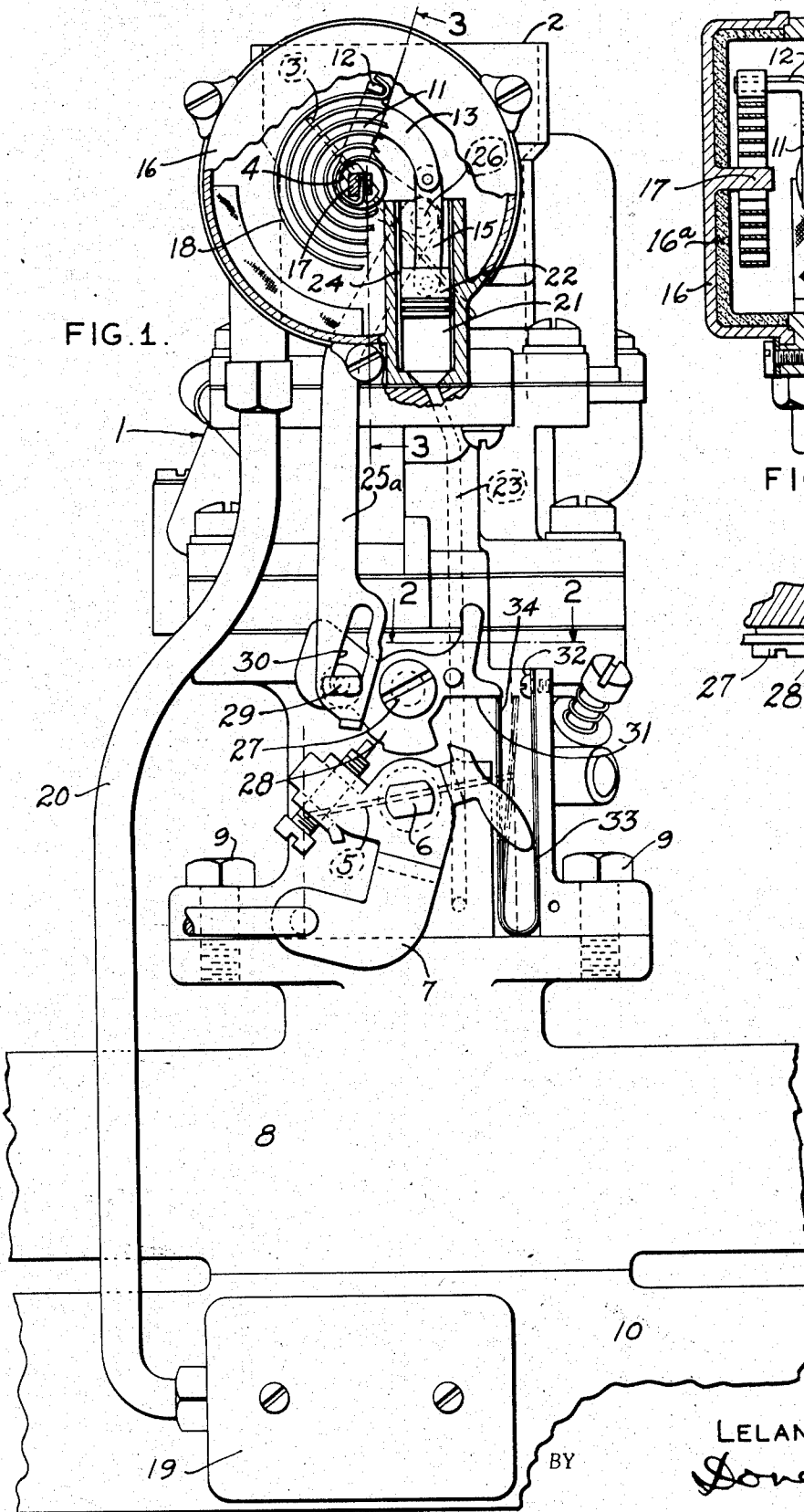


FIG. 3.

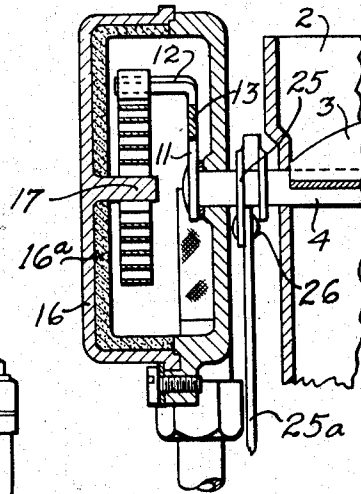
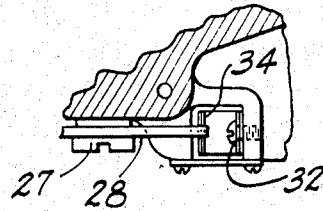


FIG. 2.



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CARBURETOR CHOKE CONTROL

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6 Claims. (Cl. 123-119)

This invention relates to carburetors for internal combustion engines and more particularly to automatic choke control devices therefor.

Many of the current automatic choke constructions involve the use of a spirally wound bi-metallic element which is either directly attached to the choke valve shaft or disposed immediately adjacent thereto and subjected to a controlled amount of heat conducted thereto from some part of the engine which becomes more quickly heated after starting. The means employed for controlled heating usually comprises providing a housing for the coil, a stove or heating jacket attached to the exhaust manifold and a conduit for conducting the heated air from the stove to the coil housing. The flow of warm air from the stove to the coil housing being induced and controlled by a calibrated and sometimes variable passageway connecting the coil housing with a zone of high suction in the carburetor mixture conduit.

In downdraft carburetor constructions in which the air inlet and choke valve are at the upper end of the carburetor, it will be seen that when the choke control coil is arranged in the above manner it will be located at a considerable distance from the engine and exhaust manifold. Also that when the engine is turned off the induction of hot air from the stove to the coil housing will be discontinued and the rate of cooling of the coil and housing structure will be much greater than the engine and exhaust manifolds due to the much greater mass of these latter elements and the remote disposition of the coil with respect thereto.

While the advantage of disposing the temperature responsive coil element so as to minimize uncontrolled heating thereof by the engine is apparent, it has been found that under the following conditions; as when, a motor vehicle which has been driven sufficiently to thoroughly heat the engine and then parked, with the engine turned off, that after a certain interval a condition exists wherein the temperature responsive coil has cooled and responded to move the choke valve to a position which will result in the deliverance of a starting mixture which is too rich for the still comparatively warm engine if re-started at this time. This difficulty will be aggravated on cold windy days when the temperature within the engine hood enclosure is lowered by drafts of cold air. Obviously, during the cooling down period a critical point is reached at which the difference in the temperatures of the coil and the engine is greatest and

thereafter diminishes until such difference ceases to give rise to the aforementioned difficulty.

It is an object of the present invention to provide an automatic choking device of the above character, in which the aforementioned difficulty is overcome by the provision of a secondary temperature responsive controlling element which is more directly effected by the engine temperature.

It is a further object of the present invention to provide an improved automatic choking device having a temperature responsive choke actuating element subjected to a controlled temperature during operation of the engine and a secondary temperature responsive element directly effected by the engine temperature for limiting the control of the choke actuating element.

Other objects and advantages will appear upon reference to the following description and accompanying drawing. Referring to the drawing:

Fig. 1 is a side elevation of a downdraft carburetor equipped with a choke control mechanism constructed in accordance with the present invention. Parts being broken away to more clearly illustrate.

Fig. 2 is a fragmentary section taken on line 2-2 of Fig. 1.

Fig. 3 is a fragmentary section taken on line 3-3 of Fig. 1.

Numerals 1 indicates a modern downdraft carburetor having an air inlet 2 at its upper end in which is mounted a disk-type choke valve 3 on a rotatable choke shaft 4. The outlet at the lower end of the carburetor is controlled by a throttle valve 5 mounted on a rotatable throttle shaft 6 which carries rigidly attached to its near end a throttle lever 7.

The carburetor is mounted on an engine intake manifold 8 and is attached thereto by the bolts 9. An engine exhaust manifold is indicated at 10 below and parallel to intake manifold 8. The near end of the choke shaft 4 carries rigidly attached thereto a lever 11 having a bent-up axially extending arm 12 and a second arm 13 which carries pivotally attached thereto a link 15. Attached to the air inlet is a thermostatic coil housing 16 having a square split mounting stud 17 rigidly attached thereto which receives and rigidly anchors the inner end of a temperature responsive coil 18. The outer end of coil 18 engages the projection 12 on lever 11. Coil 18 is constructed of a bi-metallic strip and is so wound as to tend to unwind with decreasing temperatures. Being thus wound and anchored at its inner end the outer end will urge

lever 11 in a counterclockwise or valve closing direction with decreasing temperatures. A substantial portion of the inside of housing 16 is lined with insulating material 16a.

Attached to the exhaust manifold 10 is a stove 19 and a conduit 20 connects the stove 19 with the inside of housing 16. A cylinder 21 is formed in the lower right hand side of housing 16 and has fitted therein a piston 22 which is pivotally connected to the link 15. A passageway 23 connecting the lower end of cylinder 21 with the carburetor mixing conduit at a point below the throttle valve is provided. A slot 24 in the wall of the cylinder 21 allows a predetermined amount of by-passing of the piston. The piston 22 responding to suction tends to move the choke valve open against the resistance of the coil element 18. The combination of coil 18 and suction actuated piston 22 provides the well known "thermo-suction control" and its operation is well understood.

Attached to the choke valve shaft 4 at a point between the housing 16 and the air inlet 2 is a lever 25 having a link 25a pivotally attached to its outer end at 26. Mounted on a pivot 27 toward the lower end of the carburetor is a rotatable throttle blocking element 28 usually called the "fast idle cam." The portion of element 28 which extends to the left of pivot 27 carries a pivot pin 29 which engages the slot 30 in the lower end of link 25a. The portion of element 28 extending to the right of pivot 27 is provided with an abutting surface 31. Attached to the lower flange portion of the carburetor by means of a screw 32 is a U-formed strip of temperature responsive bi-metal 33 positioned so that at certain temperatures the end of free left leg 34 will block the clockwise rotation of element 28. The arrangement of the mechanism, as shown, is such that the choke valve will be held in a substantially open position when element 33 is in a position to block the clockwise rotation of element 28. The temperature responsive bi-metallic element 33 is formed with the metal having the greater expansion on the inside so that with increasing temperatures the free leg 34 will move to the left into a blocking position and to the right out of blocking position (as shown by dotted lines) with decreasing temperatures.

The operation is as follows:

When, after operation, the engine is stopped the flow of warm air from the exhaust manifold to the coil housing 16 will stop and the rate of cooling of the coil 18 will be greater than that of the engine and the blocking element 33 which is positioned closer thereto than coil 18. As the coil 18 continues to cool it will uncoil and move the choke valve toward a closed position. If the rate of cooling of coil 18 has been appreciably greater than that of element 33, the movement of the choke valve toward a closed position will be blocked by element 33 as it reaches the position shown. However, as soon as the engine temperature has dropped sufficiently for the adjacent element 33 to re-act and move out of blocking position the choke valve will again be under full control of element 18. It will be understood that the invention is susceptible to modification, and therefore I do not wish to be limited in my protection except as set forth in the accompanying claims.

I claim:

1. In an internal combustion engine, a carburetor having a choke valve, a temperature re-

sponsive element constructed and arranged to gradually move said choke valve toward a closed position with decreasing temperatures, and a second temperature responsive element constructed and arranged to prevent the closing of said choke valve until the temperature has fallen below a predetermined point, said first mentioned element being positioned at a greater distance from said engine than said last mentioned element.

2. In an internal combustion engine having an exhaust manifold, a carburetor having a choke valve, a temperature responsive element for controlling said choke valve, and a second temperature responsive element constructed and arranged to prevent the closing of said choke valve until the temperature has fallen below a predetermined point, said first mentioned element being positioned at a greater distance from the engine manifold than said last mentioned element.

3. In a carburetor, a choke valve, a temperature responsive element constructed and arranged to gradually close said choke valve with decreasing temperatures, a second temperature responsive element constructed and arranged to block the closing of said choke valve until the temperature has fallen below a predetermined point, said last mentioned element being subjected, under certain conditions, to higher temperature than said first mentioned element.

4. In an internal combustion engine, a carburetor having a choke valve, a temperature responsive element for controlling said choke valve, an insulated housing for said choke valve, means dependent upon the operation of the engine for supplying heated air to said housing, and a second temperature responsive element constructed and arranged to block the closing of said choke valve until the temperature has fallen below a predetermined point, said last mentioned element being positioned so as to receive heat from the engine by conduction and radiation more directly than said first mentioned element.

5. In an internal combustion engine having a downdraft carburetor mounted above the engine, an air inlet to said carburetor at the upper end thereof and a flanged outlet portion at the lower end thereof attached to said engine, a choke valve in said air inlet, a temperature responsive element for controlling said choke valve positioned adjacent said choke valve, and mechanism including a second temperature element for blocking the closing movement of said choke valve under certain conditions, said second temperature responsive element being positioned adjacent said lower flanged outlet portion.

6. In an internal combustion engine having intake and exhaust manifolds, a downdraft carburetor mounted above said manifold, said carburetor having an air inlet at its upper end and a flanged outlet portion at its lower end adjacent said manifold, a choke valve in said air intake, a temperature responsive element for controlling said choke valve positioned adjacent said air inlet, an insulated housing for said choke valve, means including intake manifold suction whereby air heated by the exhaust manifold is induced to flow through said housing, and mechanism including a second temperature responsive element for limiting the control of said first mentioned temperature responsive element, said second element being positioned adjacent said lower flanged portion.

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