

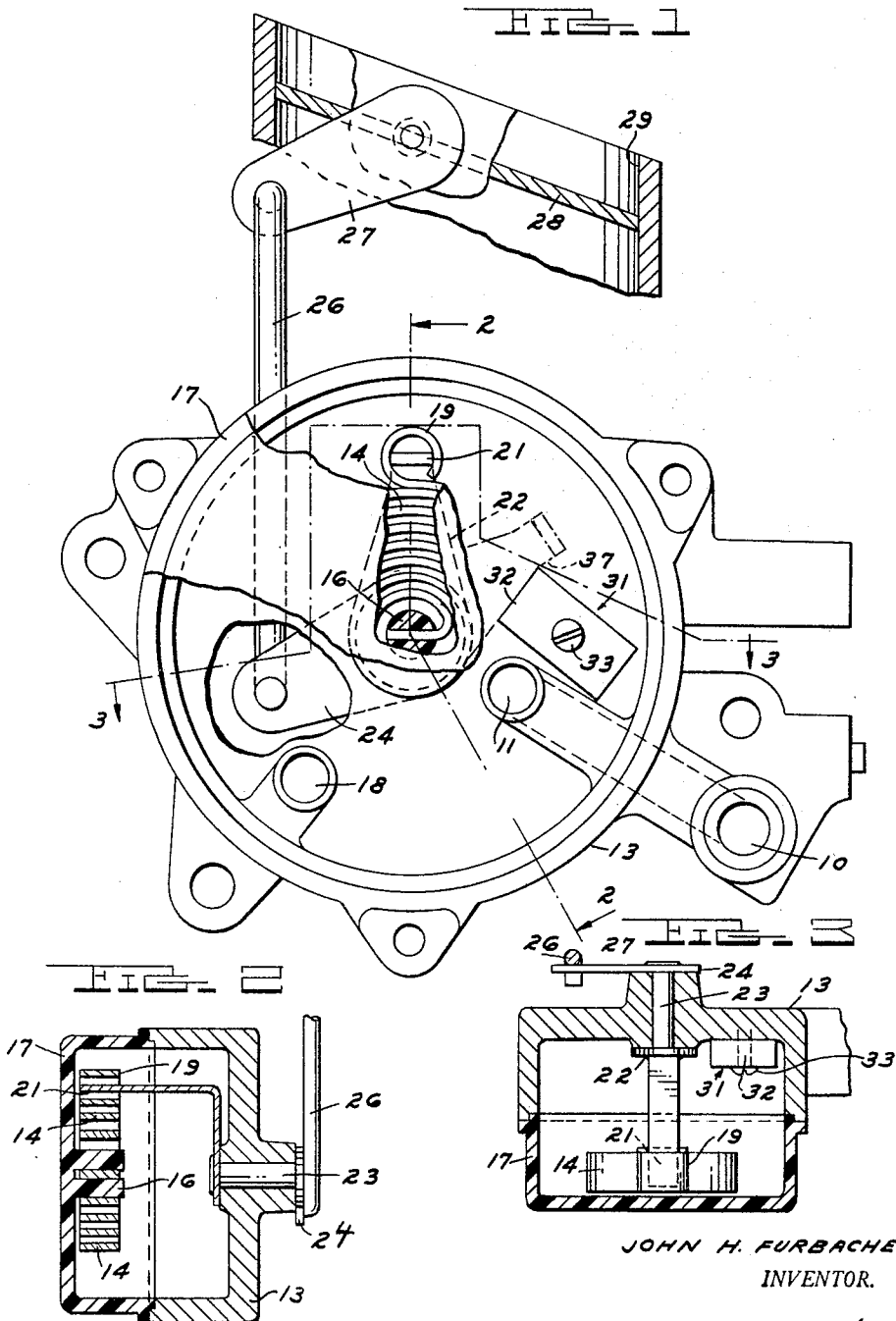
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AUTOMATIC CHOKE

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AUTOMATIC CHOKE

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This invention relates to the art of internal combustion engine carburetion and more specifically to an improved automatic choke.

It is conventional practice in automotive carburetion design to employ an automatic choke. Stripped of its many and varied refinements, the automatic choke includes at least a choke plate commonly located in the carburetor air induction passage; operating mechanism including some form of a temperature responsive element; linkage means connecting the temperature responsive element to the choke plate; and a source of heated air.

Automatic chokes are frequently subjected to overchoking because of a variance between the temperature of the temperature responsive element, usually a flat spiral wound bimetal element, and the engine mass. Because the flat spiral wound bimetal element in the choke housing cover is insulated by the plastic choke cover to which it is attached from the engine mass, it cools more quickly than the engine mass itself. As a result the flat spiral wound bimetal element may call for the carburetor to be automatically choked even though the engine mass is still warm and does not require choking. This type of situation may exist, for example, when a thoroughly warmed engine is stopped briefly and then an attempt is made to restart the engine. Under these circumstances, starting difficulties and resulting fuel wastage may occur.

This invention will be better understood upon reference to the attached figures of the drawing, in which:

FIGURE 1 is an elevational view in somewhat schematic fashion of the essential elements of an automatic choke that embodies the invention; the automatic choke is shown in the full "choked" or "closed" position; and the flat spiral wound bimetal element and the choke cover are fragmentarily shown, and

FIGURE 2 is a sectional view taken on the line indicated as 2-2 of FIGURE 1, and

FIGURE 3 is a sectional view taken on the line indicated as 3-3 of FIGURE 1.

Referring now to the drawings, and in particular FIGURE 1, the heated stream of air is introduced into the conduit 10 of choke housing 13 from a source of heated air, such as the refractory metal tube located in the exhaust manifold (not shown). The heated stream of air actuates the temperature responsive element which is in the form of a flat spiral wound bimetal element 14 when the internal combustion engine is in operation. The heated stream of air is then discharged through opening 11 into the interior of the choke housing 13. Choke housing 13 is further provided with an exhaust opening 18 that is connected to the induction system and through which opening the heated air stream flows out of the choke housing 13. A choke housing cover 17 (shown in part in FIGURE 1) is secured to the choke housing 13 by conventional bolt means (not shown).

The operating mechanism of the choke is more clearly shown in FIGURES 2 and 3. It is comprised of a flat spiral wound bimetal element 14 that has its inner convolution anchored to a split hub 16 of the plastic choke cover 17. The outer convolution of the flat spiral wound bimetal element 14 terminates in a loop 19. Because of its connection to the plastic choke housing cover 17, flat spiral wound bimetal element 14 is essentially insulated from the internal combustion engine mass.

A shaft 23 is journaled in the choke housing 13 in

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the usual manner. A lever 22 is rigidly connected to the terminal end of the shaft 23 located inside the choke housing 13. Lever 22 is fabricated from a ferrous alloy so that it is capable of being attracted by a magnetic force. Lever 22, furthermore, is bent at a right angle remote from its connection to the shaft 23 to define an end portion 21 that extends through the loop 19 of the bimetal element 14.

An arm 24 is rigidly connected to the terminal end of the shaft 23 located outside the choke housing 13. A link 26 is pivotally mounted to choke plate arm 27 and arm 24. Choke plate arm 27 is in turn rigidly connected to the choke plate 28 which is pivotally mounted in the air horn 29 of the carburetor. Choke plate 28 controls the volume of air entering the carburetor and is shown in the "choked" or "closed" position.

Rotary movement of the bimetal element 14 caused by winding or unwinding in response to temperature variations results in a like rotary movement of the choke plate 28 by virtue of the intervening connecting parts. The foregoing construction is known and conventional.

The latch means is shown more clearly in FIGURES 1 and 3 and is indicated by the reference numeral 31. Latch 31 is in the form of a permanent magnet which is secured to the choke housing 13 by a drive screw 33. Latch 31 is mounted in an inclined position so that its edge 32 may contact the edge of the ferrous metal lever 22.

In the "choked" or "closed" start position, the choke plate 28 has closed the air horn 29 while the lever 22 is in a substantially upright position, as shown in elevation in FIGURES 1 and 2 of the drawing. As the engine warms up, the ferrous metal lever 22 will move clockwise as a result of the urging of the progressively warming and unwinding flat spiral wound bimetal element 14. Likewise choke plate 28 (by reason of the intervening parts) will rotate clockwise in the carburetor air horn 29. As the internal combustion engine nears the fully warmed condition, the lever 22 will come within the magnetic field of the latch 31. Because of the magnetic attraction of the latch 31, lever 22 will be snapped against the edge 32 of the latch 31 and will be magnetically held in the position shown by the dotted line 37. The choke plate 28, of course, will be in the full open position (not shown).

When the engine has been turned off, the bimetal element 14 will start to cool at a more rapid pace than the engine mass. Bimetal element 14 as it progressively cools attempts to wind and contract to move the lever 22 in a counterclockwise direction away from the latch 31. Initially, however, latch 31 exerts a magnetic force sufficient to hold the ferrous metal lever 22 against movement and prevent the choke plate 28 from closing. As continued cooling takes place, a greater winding and contracting force will be exerted by the bimetal element 14. When the temperature has dropped to a point where partial choking action is required for good engine performance, the bimetal element 14 is applying a winding and contracting force sufficient to break the magnetic hold on the lever 22 and move the lever away from the latch 31. Upon breaking away, the lever 22, arm 24, and choke plate arm 27 will move in a counterclockwise direction to partially close the choke plate 28 in the air horn 29. Continued cooling will result ultimately in the complete closing of the choke plate 28.

It can be seen, therefore, that the choke will remain open until such time as the engine mass has cooled sufficiently to require a choke condition for the next start.

It will be understood that the invention is not to be limited to the exact construction shown and described but that various changes and modifications may be made with-

out departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. An automatic choke mechanism for an internal combustion engine, comprising choking means, temperature responsive means for moving said choking means between choked and open positions in response to temperature variations, and a magnetic latch positioned adjacent a portion of said automatic choke mechanism in the open position of the latter to restrain movement of said choking means toward choked position.

2. An automatic choke for an internal combustion engine, comprising choking means, temperature responsive means, connecting means operatively connecting said temperature responsive means to said choking means to move the latter between choked and open positions in response to temperature variations, said connecting means including a movable ferrous element, and a magnetic latch mounted adjacent the choke open position of said ferrous element to magnetically restrain movement of said element and said choking means toward choked position.

3. An automatic choke for an internal combustion engine, comprising choking means, a choke housing, temperature responsive means in said choke housing, connecting means between said choking means and said temperature responsive means, said temperature responsive means actuating said choking means through said connecting means between a choked position and an open position, and magnetic latch means in said housing, said magnetic latch means being operable to magnetically maintain said choking means in the open position after the initial warming of the engine and during the initial cooling period of the engine, said temperature responsive means upon cooling to a predetermined temperature overcoming and breaking the magnetic hold of said magnetic latch means to position said choking means in a choked position.

4. An automatic choke for an internal combustion engine, comprising choking means, temperature responsive means operatively connected to said choking means to move the latter between choked and opened positions, said temperature responsive means normally expanding in response to a temperature rise and normally contracting in response to a temperature drop, a magnetic latch, said magnetic latch having a magnetic force for operatively holding said temperature responsive means from further movement when the temperature responsive means has expanded a predetermined amount in response to a temperature rise, said magnetic latch continuing to operatively hold said temperature responsive means when said temperature responsive means is subjected to a temperature drop and preventing said temperature responsive means from contracting until such time as the contracting force of said temperature responsive means builds up and exceeds the magnetic force of said magnetic latch.

5. An automatic choke for an internal combustion engine comprising, choking means movable between a choked position and an open position, a choke housing, temperature responsive means in said choke housing and normally expandable in response to a temperature rise and contractable in response to a temperature drop, connecting means between said choking means and said tem-

perature responsive means whereby movement by said temperature responsive means imparts movement to said choking means, and a magnetic latch in said housing, said magnetic latch being operable to magnetically attract and hold a portion of said connecting means in the open position of said choking means when said temperature responsive means expands and moves said portion of said connecting means within the magnetic field of said magnetic latch, said magnetic latch continuing to magnetically hold said portion of said connecting means and prevent said temperature responsive means from contracting in response to a subsequent temperature drop until such time as the contracting force build-up in said temperature responsive means exceeds the magnetic holding force of said magnetic latch thereby breaking the magnetic hold and permitting said temperature responsive means to move said connecting means and return said choking means to a choked position.

6. In combination, a carburetor for an internal combustion engine having an air horn, an automatic choke comprising a pivotally mounted choke plate to control the passage of air in the carburetor air horn between a choke plate choked position and a choke plate open position, a choke housing, means for delivering a heated stream of gas into said choke housing, means for removing the heated stream of gas from said choke housing, a choke housing cover, a flat spiral wound bimetal element having an inner convolution mounted upon the inside of the choke housing cover and an outer convolution formed into a loop, said flat spiral wound bimetal element being capable of winding and unwinding movement in response to temperature changes between a full wound position and a full unwound position, a lever pivotally mounted upon the inside of said choke housing and having an end portion confined within said loop, connecting means between said lever and said choke plate whereby movement of said lever imparts a like movement to said choke plate, said flat spiral wound bimetal element being in full wound position when said choke plate is in the choked position and being in the full unwound position when said choke plate is in the open position, a magnetic latch positioned in said choke housing abutting and magnetically holding said lever when said flat spiral wound bimetal element is in the full unwound position, said magnetic latch continuing to magnetically hold said lever when said flat spiral wound bimetal element subsequently cools until such time as the decreasing temperature has been lowered to a value wherein a winding force build-up occurs in said flat spiral wound bimetal element sufficient to overcome the magnetic hold of said magnetic latch thereby breaking the magnetic hold and permitting said flat spiral wound bimetal element to wind and reposition said choke plate.

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