Dec. 2, 1958 G. NASTAS 2,862,488

AUTOMATIC CHOKE

Filed June 12, 1957

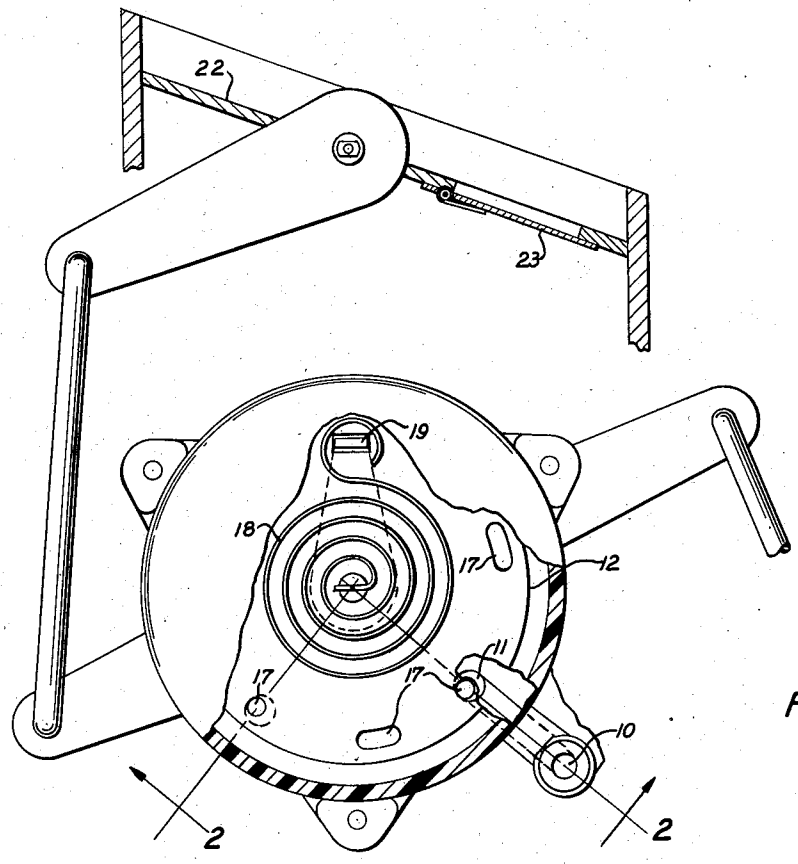


FIG. 1

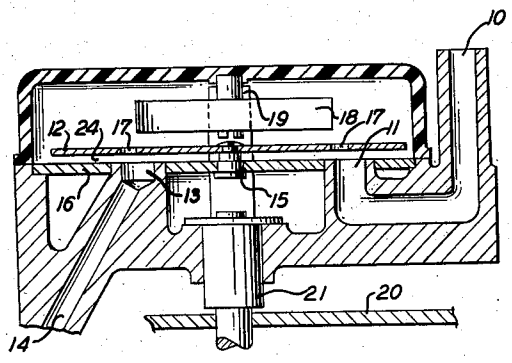


FIG. 2

G. NASTAS
INVENTOR.

BY E. C. McRae
J. R. Faulkner
G. N. Oster

ATTORNEYS

United States Patent Office

2,862,488

Patented Dec. 2, 1958

2,862,488

AUTOMATIC CHOKE

George Nastas, Livonia, Mich., assignor to Ford Motor Company, Dearborn, Mich., a corporation of Delaware

Application June 12, 1957, Serial No. 665,287

5 Claims. (Cl. 123—119)

This invention relates to the art of internal combustion engine carburetion and more specifically to a particular improvement in an automatic choke for the regulation of internal combustion engine carburetors.

The increasing use of automatic chokes on vehicular internal combustion engines to relieve the operator of the necessity of manually choking the carburetor during cold weather operation has brought to light several shortcomings in these devices as commercially marketed. One of the most annoying difficulties with automatic chokes has been the inability of the thermal element which operates the automatic choke to faithfully mirror the thermal conditions within the induction system of the engine. This is particularly manifest where a thoroughly warmed engine is stopped briefly and then an attempt is made to restart the engine. Under these circumstances the thermal element in automatic chokes new in use will cool much more rapidly than the massive engine and, hence, will establish a choked condition upon a thoroughly warmed engine with the concomitant starting difficulties and waste of fuel.

The instant invention has been developed specifically to alleviate this deficiency and has been explained in conpunction with the figures of drawing in which,

Figure 1 is a showing, in a somewhat schematic fashion, of the essential elements of one form of an automatic choke, and,

Figure 2 is a sectional view of a portion of Figure 1.

It is conventional practice in automotive carburetion design to employ a stream of heated air to cause the operation of an automatic choke. This stream of heated air is usually derived from the main air induction system down stream from the air cleaner and is drawn by manifold suction through a refractory metal tube directly exposed to exhaust gas wherein it is heated. This heated air is drawn over the operating mechanism of the automatic choke and then discharged into the intake manifold.

In the conventional automatic choke, the bimetal element which actuates the choking mechanism is arranged to be heated either by direct contact with the stream of hot air from the refractory metal tube, or indirectly by heat obtained from this heated stream of air by conduction through a control plate. When a cold engine is first started, the heating of the bimetal element is accomplished by direct contact with the stream of hot air. As the engine warms up, the direct contact of the heated air stream and the bimetal element is interrupted and further and slower heating of the bimetal element is accomplished by heat which is conducted through a metal control plate.

The present invention operates in a similar manner with one vital exception. The initial heating of the bimetal is accomplished by direct contact with a stream of heated air and later heating by heat conducted through a control plate. However, after the engine has been heated to normal operating temperature and the choke

valve has been completely or almost completely opened, the bimetal element and its surroundings are again subjected to direct contact with a stream of heated air and heated to a temperature far in excess of that which could be obtained only by heat being conducted through a control plate. When the bimetal and its surroundings have been heated to this extent they serve as a high head heat reservoir and prevent the premature application of the choke during the time required for the heated engine to cool to the point where choking is necessary for proper starting.

Referring to Figures 1 and 2, the heated stream of air is introduced into conduit **10** from the refractory metal heating tube. The heated air flows through conduit **10** and is discharged through opening **11** just under control plate **12**. The hot gas stream exits through opening **13** and conduit **14**.

Control plate **12** is rotatably mounted on pivot **15** which is rigidly secured to base **16**. Figure 1 clearly shows control plate **12** to be provided with four openings. **17**. A study of Figure 2 will show that the heated air stream in passing from conduit **10** to conduit **14** may either flow through space **24** between control plate **12** and base **16**, or it may flow through opening **11**, matching opening **17**, across bimetal element **18** and out through another opening **17** and matching opening **13**. The stream of heated gas is confined to the first mentioned path when the openings in the control plate **12** do not coincide with the corresponding openings in base **16**. At such times the only heat which can reach bimetal element **18** must pass through control plate **12** by conduction. When the two sets of openings do coincide, the bimetal element **18** is rapidly heated by being in direct contact with the heated stream of air.

Figure 1 shows the control plate **12** in the position assumed with the bimetal element **18** completely chilled and the choke valve fully closed. In this position one of the two pairs of openings **17** are aligned with openings **11** and **13** and a direct flow of heated air across bimetal element **18** is possible. As the engine warms, the motion of bimetal element **18** rotates control plate **12** in a clockwise direction and interrupts the alignment between openings **17** and openings **11** and **13**. Heat is then slowly conducted through control plate **12** resulting in a slow continued opening of the choke valve.

Further soaking of heat through control plate **12** to bimetal element **18** causes further rotation of control plate **12** in a clockwise direction until the other pair of openings **17** are aligned with openings **11** and **13** in stationary base **16**. This again permits the rapid application of heat to bimetal element **18** and its container. This high rate of heat application results in bimetal element **18** and its container becoming stabilized as to temperature at a much higher value than would be possible by the simple conduction of heat through control element **12**. The rotation of control plate **12** is mechanically stopped to prevent this high temperature from carrying the control plate **12** clockwise past the point of coincidence of the openings **11** and **13** and the second pair of openings **17** in the control plate **12**.

As in conventional automatic chokes, the motion of bimetal element **18** is transmitted through a rotatable arm **19**, shaft **21** and lever **20** and an appropriate linkage system to a choke valve **22**. Choke valve **22** is in turn provided with a pressure sensitive, spring biased valve **23** which prevents the generation of an excessive vacuum in the intake manifold due to operation of the automatic choke.

I claim as my invention:

1. An automatic choke for an internal combustion engine comprising a temperature sensitive element for

actuating the choking means, means for delivering a heated stream of gas adjacent the temperature sensitive means, means for removing the heated stream of gas from adjacent the temperature sensitive means and control means for shunting the heated stream of gas out of direct contact with the temperature sensitive element, said control means permitting direct contact of the heated gas stream upon the temperature sensitive element when the temperature sensitive element is below a fixed lower temperature and also when the temperature sensitive element is above a fixed upper temperature and shunting the hot stream of gas out of direct contact with the temperature sensitive element when the temperature sensitive element is at any temperature intermediate said upper and lower temperatures.

2. An automatic choke for an internal combustion engine comprising a temperature sensitive element for actuating the choking means, means for applying heat generated by engine operation to the temperature sensitive element, and control means for regulating the application of such heat to the temperature sensitive element, said control means permitting the rapid application of heat to the temperature sensitive element when the temperature sensitive element is below a fixed lower temperature and permitting a similar rapid application of heat to the temperature sensitive element when the temperature sensitive element is above a fixed upper temperature, and permitting a less rapid application of heat to the temperature sensitive element when the temperature of the temperature sensitive element is intermediate said lower fixed temperature and said upper fixed temperature.

3. An automatic choke for an internal combustion engine comprising a temperature sensitive element for actuating the choking means, means for delivering a heated stream of gas adjacent the temperature sensitive means, means for removing the heated stream of gas from adjacent the temperature sensitive means and control means operated by the temperature sensitive means for shunting the heated stream of gas out of direct contact with the temperature sensitive element, said control means permitting direct contact of the heated gas stream upon the temperature sensitive element when the temperature sensitive element is below a fixed lower temperature and also when the temperature sensitive element is above a fixed upper temperature and shunting the hot stream of gas out of direct contact with the temperature sensitive element when the temperature sensitive element is at any temperature intermediate said upper and lower temperatures.

4. An automatic choke for an internal combustion engine comprising a temperature sensitive element for actuating the choking means, means for applying heat generated by engine operation to the temperature sensitive element, and control means operated by the temperature sensitive means for regulating the application of such heat to the temperature sensitive element, said control means permitting the rapid application of heat to the temperature sensitive element when the temperature sensitive element is below a fixed lower temperature and permitting a similar rapid application of heat to the temperature sensitive element when the temperature sensitive element is above a fixed upper temperature, and permitting a less rapid application of heat to the temperature sensitive element when the temperature of the temperature sensitive element is intermediate said lower fixed temperature and said upper fixed temperature.

5. An automatic choke for an internal combustion engine comprising a temperature sensitive element for actuating the choking means, an opening for discharging heated gas adjacent the temperature sensitive element, a second opening for removing heated gas adjacent the temperature sensitive element, and a control plate operated by the temperature sensitive element and interposed between the openings and the temperature sensitive element, a pair of ports through the control plate, one of said ports being adjacent the opening for the discharge of hot gas and other port of said pair being opposite the opening for the removal of hot gas when the temperature of the temperature sensitive element is below a fixed lower temperature, and a second pair of ports through the control plate, one of said second pair of ports being adjacent the opening for the discharge of hot gas and the other port of said second pair being opposite the opening for the removal of hot gas when the temperature of the temperature sensitive element is above a fixed upper temperature.

No references cited.