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AUTOMATIC CHOKE AIR HEATER

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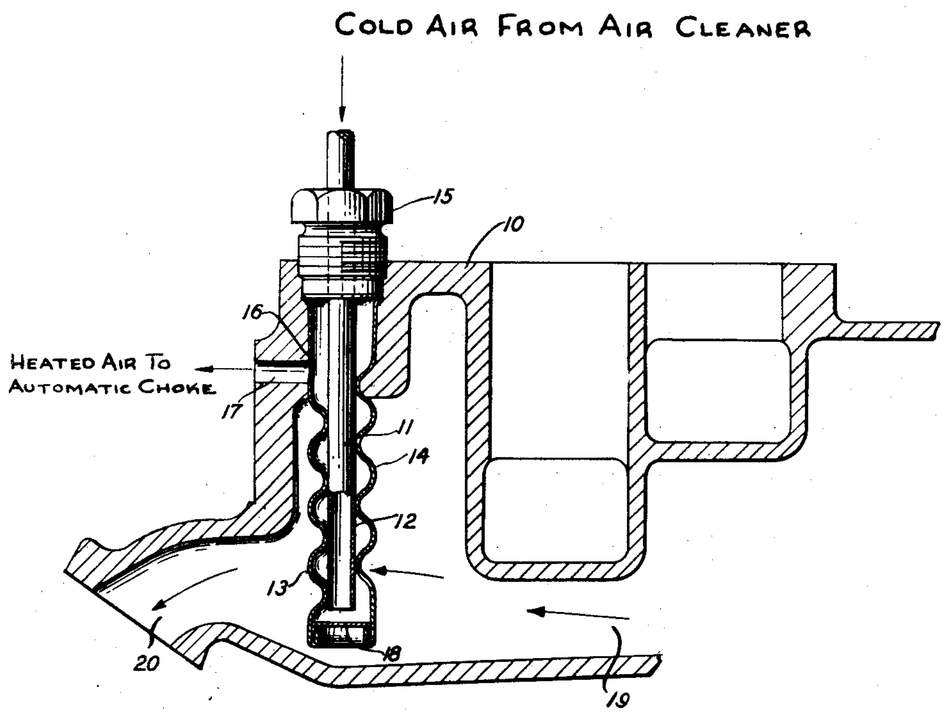

FIG. 1

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AUTOMATIC CHOKE AIR HEATER

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2 Claims. (Cl. 123—119)

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This invention is concerned with the field of internal combustion engine carburation and more specifically with the operation of the so-called automatic choke.

The use of automatic devices to enrich the fuel air mixture during cold weather and in the starting period has become increasingly popular in recent years. These devices have been almost uniformly operated by a bimetallic element which is energized by heat received from engine operation. With a completely cold engine the bimetal closes the choke valve through an appropriate linkage. After the engine starts to fire the bimetallic element becomes heated and actuates the choke valve to cause a progressively leaner mixture to be fed to the engine until finally the choke valve is completely opened and the engine receives the normal operating mixture.

It is obviously important that the temperature of the bimetallic element be a faithful function of the temperatures existing within the engine under a wide variety of operating conditions if the automatic choke is to operate satisfactorily. The bimetallic element is conventionally heated by exposure to a stream of heated air. This air is withdrawn from the downstream side of the air cleaner, heated by passage through a metal tube exposed to heated exhaust gas, passed over the bimetallic choke actuating element and then exhausted into the intake manifold. In order to obtain sufficient heat transfer surface it has been necessary to make the heating tube comparatively long. This has been a handicap as it has necessitated a tube which reflected an integration of various temperatures existing along its length, rather than a single desired temperature. For example these heating tubes which were exposed directly and for a great length to heated exhaust gas would heat too rapidly when a cold engine was started and prematurely open the choke valve. In an effort to circumvent this difficulty, cold air from the outside was bled against the bimetallic element, but this expedient was at best only a palliative.

A further source of difficulty was encountered when a hot engine was stopped and then restarted within a few minutes. The heating tube would quickly cool and hence choke the hot engine with concomitant flooding of the carburation system and waste of fuel. In an effort to remedy these difficulties the instant invention was developed. This invention is probably best understood if considered in conjunction with the accompanying drawing. In the drawing the manifold is indicated at 10. The flow of the exhaust gas through this manifold is indicated by the arrows. An air heater 11 is secured in exhaust manifold 10 and is immersed in the exhaust gas stream. This air heater 11 is immersed in the exhaust gas stream and is heated thereby. This air heater 11 comprised a central tube 12 surrounded by shell 13. Shell 13 is provided with spiral convolutions 14, the inner portions of which make a snug fit with the exterior of central tube 12. Central tube 12 and shell 13 are secured in place by nut 15 which is threaded into the manifold. The upper portion of shell 13 is provided with an opening 16 which is aligned with hole 17 in manifold 10. Shell 15 is closed at the bottom by cap 18. Shell 13, central tube 12 and cap 18 are all fabricated from Inconel, stainless steel or other metal resistant to the combined effects of heat, lead compounds and oxidation. The exhaust gas flows from right to left as seen in the drawing from passageway 19 past the heater and out of outlet 20.

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The air destined to be used to actuate the automatic choke thermal element is withdrawn from the air cleaner (not shown) and enters central tube 12 from above as shown by the arrow. This air flows axially downwardly through central tube 12 and then flows upwards around spiral convolutions 14 and leaves the heater through opening 16 and hole 17 and then passes to the thermal element of the automatic choke which for sake of clarity has been omitted from the drawing.

By using the construction of heater just described it is possible to compress the physical dimensions of the heater to a much greater extent than heretofore without the sacrifice of the necessary heating surface. These small dimensions makes it possible to locate the heater adjacent massive sections of the engine which retain the engine heat for a considerable period of time after the motor has been stopped. This retained heat causes the thermal element of the automatic choke to more nearly follow the true temperature of the engine than is possible with former types of heater construction. Thus a brief interruption to engine operation does not result in unnecessary choking of the engine. This advantage is obtained without any loss in speed of heating.

We claim as our invention:

1. A heating system for producing hot air for use in an automatic choke on an internal combustion engine comprising an exhaust manifold, a central tube adapted to receive air to be heated at one end, a spirally convoluted shell surround-

ing the central tube and extending beyond the discharge end of said tube, and a cap closing the spirally convoluted tube at the discharge end of the central tube so that an elongated tortuous heating passage is provided, a portion of said spirally convoluted shell being located immediately adjacent a massive portion of the exhaust manifold and another portion of said spirally convoluted shell being immersed in the exhaust gas stream.

2. A heating system for producing hot air for use in an automatic choke on an internal combustion engine comprising an exhaust manifold, a central tube adapted to receive air to be heated at one end, a spirally convoluted shell surrounding the central tube and extending beyond the discharge end of said tube, and a cap closing the spirally convoluted tube at the discharge end

of the central tube so that an elongated tortuous heating passage is provided, one portion of said spirally convoluted shell being secured directly in a massive portion of the exhaust manifold, a second portion being located immediately adjacent said massive portion of the exhaust manifold and the terminal portion being immersed in the exhaust gas stream.

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