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SPARK PLUG ASSEMBLY FOR HEATERS

Filed June 4, 1968

FIG. 1

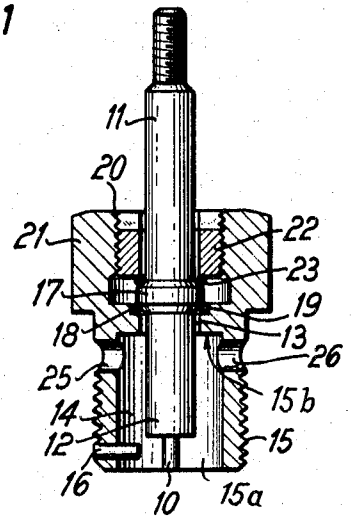
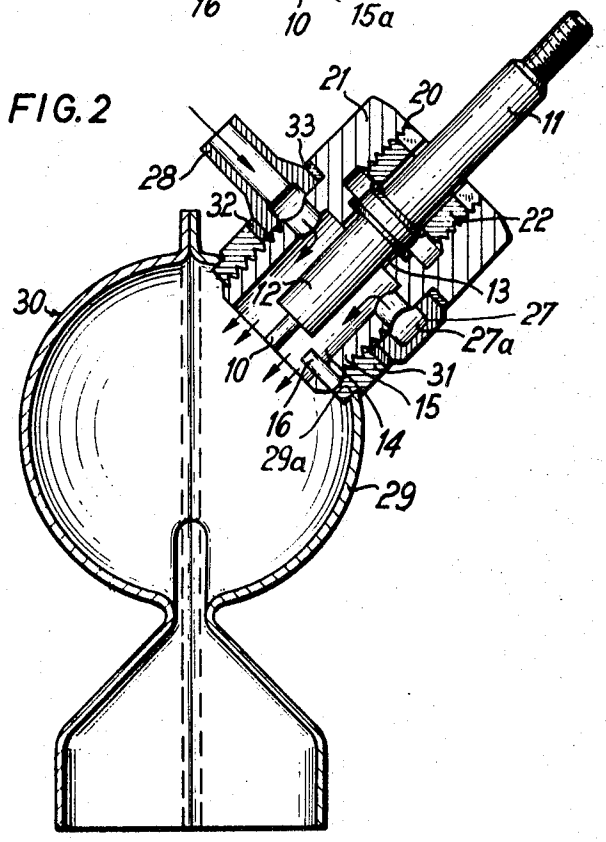


FIG. 2



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SPARK PLUG ASSEMBLY FOR HEATERS

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U.S. Cl. 431—264 10 Claims

ABSTRACT OF THE DISCLOSURE

A spark plug assembly for use in heaters for automotive vehicles comprises a tubular housing which is threadedly connected with the combustion chamber of the heater and accommodates an insulator for a center electrode. The housing is provided with radial inlets and with an internal chamber which surrounds the center electrode and the spark gap and has a discharge end in communication with the interior of the combustion chamber. A mixture of fuel and air is admitted to the inlets by way of an annular member which surrounds the housing whereby the mixture flows through the housing to cool the insulator and the electrodes and to be ignited in the region where it enters the combustion chamber.

CROSS-REFERENCE TO RELATED APPLICATION

Certain details of my spark plug assembly are disclosed in the copending application Ser. No. 646,858, filed June 19, 1967 by Heino Schallert and assigned to the same assignee.

BACKGROUND OF THE INVENTION

The present invention relates to spark plugs in general, and more particularly to improvements in spark plug assemblies for heaters of the type which may be utilized to heat the passenger compartment or cabin of an automotive vehicle. Still more particularly, the invention relates to a spark plug assembly which can be used in fuel-burning auxiliary heaters whose heating action is independent of the condition of the engine in an automotive vehicle.

In heretofore known heaters, the combustion chamber receives a mixture of fuel and air by way of a first opening and the spark plug is installed in a second opening. Such heaters must be provided with means for cooling the spark plug, particularly the insulator of the spark plug because the insulator is subjected to the action of flames which develop on ignition of the mixture.

SUMMARY OF THE INVENTION

It is an object of my invention to provide a novel spark plug assembly which can be used in heaters for automotive vehicles or the like and wherein all heat-sensitive parts are cooled automatically when the heater is in use.

Another object of the invention is to provide a spark plug assembly wherein the part which accommodates the insulator and the electrodes also performs several additional functions.

A further object of the invention is to provide a heater wherein the device which admits a mixture of fuel and oxygen into the combustion chambers simultaneously performs other important and advantageous functions.

A concomitant object of the invention is to provide a heater wherein the spark plug assembly is cooled by the combustible mixture.

An additional object of the invention is to provide a spark plug assembly which can improve the homogeneousness of the fuel-air mixture before such mixture reaches the point of ignition.

A further object of the invention is to provide a spark plug assembly which can be readily assembled or taken apart by resorting to simple tools.

The invention is embodied in a heater which comprises a combustion chamber, a spark plug assembly including a tubular housing having an open discharge end in communication with the interior of the combustion chamber and at least one inlet remote from the discharge end, an elongated insulator having a portion received with clearance in the housing and extending between the inlet and the discharge end, and a center electrode in the insulator portion, and a feed for admitting a mixture of fuel and air by way of the inlet so that the mixture flows around the insulator and past the center electrode to enter the combustion chamber by way of the discharge opening. In this way, the mixture cools the adjoining parts of the spark plug assembly. The latter further comprises a second electrode which may be installed in the housing so as to define with the center electrode a spark gap located in the path of the inflowing mixture.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved spark plug assembly itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of a specific embodiment with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an axial sectional view of a spark plug assembly which embodies the invention; and

FIG. 2 is a fragmentary axial sectional view of a heater wherein the spark plug assembly is coupled with a combustion chamber and with a feed for a mixture of fuel and oxygen.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The improved spark plug assembly is shown in FIG. 1. It comprises a metallic sleeve or housing **15** having a hexagonal head **21** provided with internal threads **20**, an elongated insulator **11** which is coaxial with the housing, a center electrode **10** which extends beyond the inner end portion **12** of the insulator, a second electrode **16** which is mounted in the externally threaded portion of the housing **15** and defines with the center electrode **10** a spark gap, and coupling means including an externally threaded ring **22** which serves to releasably connect the insulator to the housing.

The externally threaded portion of the housing **15** has a pair of inlets **25**, **26** which are disposed diametrically opposite each other and communicate with the inner end of a cylindrical chamber **14**. The discharge end **15***a* of the housing **15** is open and is adjacent to the outer end of the chamber **14**.

FIG. 2 shows a portion of a small combustion chamber **30** having two thin-walled shells **29** one of which has a circular opening **29***a* for an internally threaded socket **31** which meshes with the housing **15** and is welded to the combustion chamber. The feed which delivers to the chamber **30** a mixture of fuel and air includes an annular member **27** which surrounds the housing **15** and is held between two gaskets **32**, **33** which respectively bear against the socket **31** and against the head **21**. The annular member **27** defines an annular channel **27***a* which communicates with the inlets **25**, **26** and receives a mixture of fuel and air from a radial nipple **28**. The manner in which the nipple is connected with a carburetor and the manner in which the products of combustion are discharged from the chamber **30** (either into a heat exchanger or into a

tail pipe) is fully disclosed in the aforementioned copending application Ser. No. 646,858. Said application also discloses an electrical connection between the center electrode and an igniter.

The spark plug assembly can be detached from the combustion chamber **30** by unscrewing the housing **15** from the socket **31**. The housing **15** is provided with a transversely extending internal partition **15***b* having a bore **13** for an intermediate portion of the insulator **11**. This intermediate portion is adjacent to an external annular flange **17** which is disposed between two sealing rings **18** and **23**. The ring **23** is compressed by the ring **22** which meshes with the threaded portion **20** of the head **21**, and the ring **18** extends into an annular groove **19** provided in the partition **15***b* of the housing **15**.

When the inlets **25**, **26** admit a mixture of fuel and air into the inner end of the chamber **14**, such mixture flows in the direction indicated by arrows shown in FIG. 2 and cools the insulator portion **12**, the housing **15** and the electrodes **10**, **16**. It will be noted that the housing **15** performs several functions including that of releasably accommodating the insulator **11** and center electrode **10**, of supporting the second electrode **16**, of establishing a separable connection with the socket **31** of the combustion chamber **30**, of conveying the mixture of fuel and air to the combustion chamber, of insuring satisfactory cooling of the insulator and both electrodes by means of the fuel-air mixture, and of guiding the mixture past the spark gap.

Another important advantage of the structure shown in FIG. 2 is that the internal surface of the housing **15** around the cylindrical chamber **14** serves as a depository for a fuel-air mixture which is richer on fuel than a mixture which develops when fuel and air begin to mix in the region of the spark gap. Furthermore, the housing **15** replaces a separate fuel-admitting nozzle. The mixture is homogenized while it flows from the nipple **28** toward the discharge end **15***a* of the housing **15**.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art and, therefore, such adaptation should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

What is claimed is:

1. In a heater, particularly in an auxiliary heater for automotive vehicles, a combination comprising a combustion chamber; a spark plug assembly including a tubular housing having an open discharge end in communication with the interior of said combustion chamber and at least one radial inlet remote from said discharge end, an insulator having a portion received with clearance in said housing and extending between said inlet and said discharge end, and a center electrode in said portion of said insulator; a feed for feeding to said combustion chamber the total quantity of fuel and oxygen mixture required for supporting combustion commensurate with the operational parameters of said heater; and admitting means admitting said total quantity of mixture from said feed into said inlet whereby such mixture flows radially to and around said portion of the insulator and along said electrode and enters the interior of said combustion chamber by way of said discharge end to cool the adjoining parts of the spark plug while it flows through said housing.

2. A combination as defined in claim **1**, wherein said inlet extends substantially radially of said housing.

3. A combination as defined in claim **2**, wherein said spark plug assembly further comprises a second eletcrode mounted in said housing adjacent to said center electrode to define therewith a spark gap, said second electrode and said spark gap being located in the path in which the mixture flows from said inlet to said discharge end.

4. A combination as defined in claim **2**, wherein said housing defines a substantially cylindrical chamber surrounding with clearance said portion of said insulator and defining a path for the flow of the mixture from said inlet to said discharge end.

5. A combination as defined in claim **2**, wherein said feed comprises a hollow annular member surrounding said housing and defining an annular channel in communication with said inlet.

6. A combination as defined in claim **5**, wherein said feed further comprises a nipple connected to said annular member and arranged to deliver the mixture to said channel.

7. A combination as defined in claim **1**, further comprising a threaded connection between said housing and said combustion chamber.

8. A combination as defined in claim **1**, further comprising coupling means providing a separable connection between said housing and said insulator.

9. A combination as defined in claim **1**, wherein said housing is provided with a plurality of substantially radial inlets.

10. A combination as defined in claim **1**, wherein said insulator is coaxial with said housing.

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U.S. Cl. X.R.

237—12.3