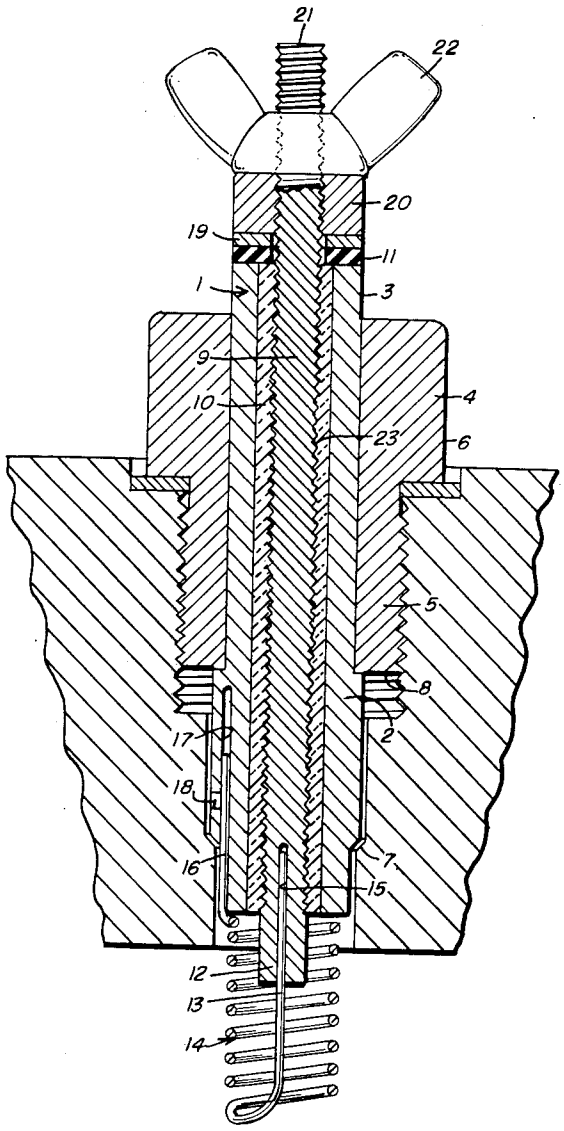
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ELECTRONIC STARTER PLUG FOR DIESEL ENGINES

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INVENTOR

HJALMAR FINVIK

BY Hurwitz and Rose

ATTORNEYS

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ELECTRONIC STARTER PLUG FOR DIESEL ENGINES

Hjalmar Finvik, 1127 Rahway Ave., Avenel, N.J.

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This invention relates to glow plugs, and more particularly to glow plugs for preheating compression-ignition type engines prior to starting.

Combustion-ignition engines are often difficult to start in cold climates because the fuel is cold and because the temperature rise of gases within the combustion chambers due to momentum transfer from piston to gases is a constant at a given cranking rate. Cold fuel and lowered temperature of compressed gases result in a temperature of the fuel-air mixture below that necessary for ignition.

The provision of a glow plug with a heating element projecting into the combustion chamber of compression-ignition engines serves to alleviate this difficulty. Such plugs normally include resistance heater elements, having one terminal grounded to the block of the engine and the other terminal connected to an electrode insulated from and passing through the grounded portion of the plug.

The maximum pressure normally attained in the combustion chambers of compression-ignition type engines may exceed 35 atmospheres, thus lowering stress and strain thresholds, which may cause damage to the plug and its element. The excessive demands made by great pressures and sudden shocks have a tendency to loosen the heating element from the electrode and from the ground connection. In addition tightly wound heating elements are unable either to dissipate the heat developed therein in an efficient manner before starting or to maintain a low operating temperature once the engine is operating. Current methods of overcoming the above difficulties involve use of a very complex glow plug, which, because of complexity, is both expensive and unreliable.

It is therefore an object of this invention to provide a glow plug which is resistant to separation of adhesive joints as well as cohesive parts, when subject to great pressures and shocks.

Another object of this invention is to provide a glow plug to aid in starting internal combustion engines of the compression-igniting type, having a loosely wound resistive element for rapid dissipation of heat.

It is a further object of this invention to provide a glow plug which is adjustable from the exterior to prevent passage of gases through the plug.

It is still another object of this invention to provide a glow plug of great strength which can be fabricated from readily available materials, at low cost.

Basically, this invention comprises a glow plug having a threaded cylindrical electrode and a tubular insulator having a threaded internal bore. The threaded sections of the insulator and the electrode frictionally provide the sole means for securing these parts together. The interior bore of another tubular member constructed of electrically conducting material is permanently secured to the exterior surface of the insulator and is located in the engine block by means of an external rib contained thereon and by a holding screw that fits into the block. One end of the holding screw engages an edge of the external rib to prevent longitudinal movement of the plug with respect to the block. A helical, electric heating coil is connected between the electrode and the electrical conducting tubular member to provide a means for heating the fuel when the engine is cold.

These and other objects will be apparent from the following description and the appended claims, especially

when taken with reference to the accompanying drawing of which:

The FIGURE is a medial sectional view of a glow plug according to my invention.

Referring now to the drawing, the glow plug comprises an elongated metallic tube **1** having an external rib **2** located in proximity to its lower end, as shown on the drawing. Tube **1** is prevented from slipping into the engine cylinder since the lower end of rib **2** engages protruding flange **7** contained in the engine block. Metallic holding screw **4** is threaded into the engine block and engages at a portion of its lower surface, the upper extremity of rib **2**. Thus rib **2** and the walls it frictionally engages substantially prevent any translational movement of tube **10** and accordingly the entire glow plug with respect to the engine block.

Extending through the tubular body of the glow plug **1** is an electrode **9**, insulated from the body **1** by a cylinder **10** having an interior bore and made of insulating glass material. The inner bore of cylinder **10** is threaded and these threads engage the threads contained on the exterior surface of electrode **9** and the outer surface of insulator **10** is bonded to tubular body **1**. The lower extremity **12** of the electrode **9** protrudes into the engine block and beyond the lower limits of the body **1** to accept an axially directed extremity **13** of an electrical heating coil **14** in a recess **15** so that substantially the same electric potential is applied to the electrode and the coil. The opposite extremity **16** of the heating coil **14** projects into a recess **17** of the glow plug body **1** and is secured by a set screw **18**. This end of the coil is electrically grounded to the engine block due to its connection to metallic rib **2** and metallic holding screw **4** that makes electrical contact with the block. The extremities **13** and **16** of the heating coil **14** are so positioned that the individual coils of the heating coil **14** are spaced to enhance cooling thereof. In order to prevent an electrical short circuit between the electrode **9** and the engine block, insulated washer **11** is secured to the upper end of tubular member **1**.

Securing the insulating disk **11** in relation to the body **1** is a metallic disk **19**, held in close proximity to the insulating disk **11** by a nut **20** threaded to the upper end **21** of electrode **9**. Washers **11** and **19** serve to prevent the escape of combustion gases during operation of the engine. A wing nut **22** is threaded on the upper end **21** of electrode **9** to come into direct contact with the threaded nut **20** to prevent holding screw **4** from being lost during shipping and storage and to further tighten nut **20**.

The use of non-tapered cylindrically machined components in the construction is made possible by the use of glass for the insulating material **10**. Everywhere in contact with beveled threads **23** of the electrode **9** the insulation material **10** creates a wedging effect between the body **1** and the electrode **9** when pressure is exerted by the expanding gases of the exploding combustion mixture.

In keeping with the original objects of this invention, that of providing a glow plug for heating an engine previous to starting, the resistance wire of coil **14** is constructed of heavy material and the coils are sufficiently spaced to allow circulation of gases about the coil, thus cooling it.

While I have described and illustrated one specific embodiment of my invention, it will be clear that variations of the details of construction which are specifically illustrated and described may be resorted to without departing from the true spirit and scope of the invention as defined in the appended claims.

I claim:

1. A glow plug designed to be situated in the block of

internal combustion engines comprising a cylindrical electrode having a threaded surface, a solid tubular electrical insulator having a threaded interior bore, the threads of the interior bore frictionally engaging the threads of the exterior surface, and another tubular member constructed of electrically conducting material, said another member having an interior bore secured to the exterior surface of said insulator, igniting means electrically connected to said electrode, wherein said igniting means comprises an electrical helical heating coil having one end connected to the end of said electrode designed to protrude within the the block, the other end of said coil being connected to said another member, the individual turns of said coil being spaced for permitting cooling thereof, and a set screw for securing said other end of said coil to said another member.

2. The plug of claim 1 wherein a portion of said another member comprises an external rib, one edge of said rib designed to engage a flange within the block, and a holding screw having an internal bore of slightly greater diameter than the exterior diameter of said another member, said holding screw having external threads designed to engage a threaded bore in said block, said rib having another edge for receiving one end of said holding screw.

References Cited in the file of this patent

UNITED STATES PATENTS

2,149,868	Rabezzana	Mar. 7, 1939

FOREIGN PATENTS

755,028	France	Sept. 14, 1933
408,917	Great Britain	Apr. 19, 1934
409,985	Great Britain	May 10, 1934