June 11, 1957 W. E. ATWOOD ET AL 2,795,220

GLOW PLUG

Filed March 24, 1953

Fig. 1.

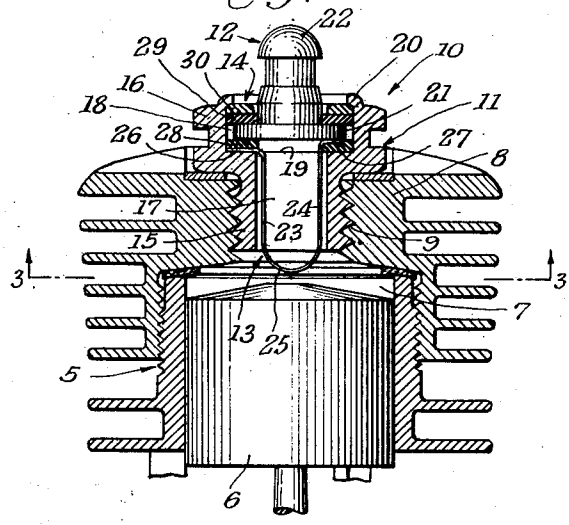


Fig. 2.

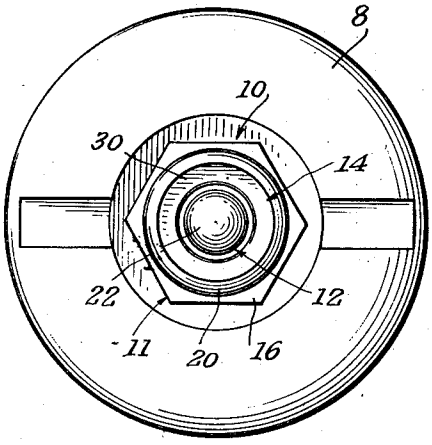


Fig. 3.

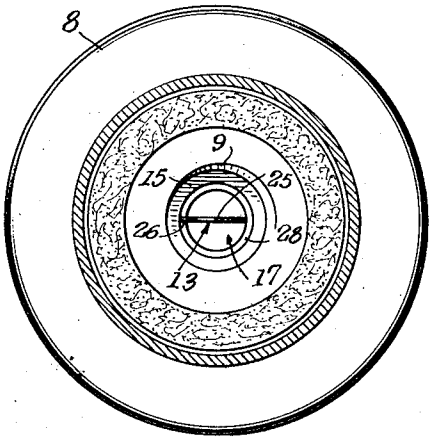
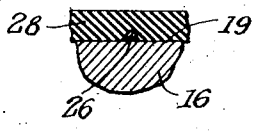


Fig. 4.



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GLOW PLUG

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5 Claims. (Cl. 123—145)

This invention relates to a glow plug for the combustion chamber of an internal combustion engine of the type used in model airplanes.

The fuel compressed in the combustion chamber of a model airplane engine requires heat to supplement the heat resulting from compression by the piston in order to cause the same to properly burn or explode. Such additional heat is commonly provided by an incandescent filament receiving its current from a dry cell battery and located in the upper portion of the combustion chamber. It will be realized, therefore, that the heat-transmitting efficiency of such filament controls the efficiency of combustibility of the fuel.

A common type of glow plug comprises a helical coil of high resistance wire that has one end connected to an insulated terminal in the battery circuit and the other end connected and, therefore, grounded to a wall of the combustion chamber, the battery being similarly grounded. It is the latter connection that has been found to be faulty in that the same comprises a short, direct connection so near to the coil itself that the latter is robbed of its heat by a substantially direct conduction of such heat to the relatively large mass of metal of the combustion chamber walls. The result of such faulty construction is that the portion of the coil that is more nearly adjacent to the terminal heats to greatest incandescence while the portion adjacent to the combustion chamber, and which has greater proximity to the fuel in said chamber, has materially less heat and fuel-exploding efficiency.

Recognizing the above faults, it is an object of the present invention to provide a glow plug of such novel construction and form that the portion thereof that is heated to greatest incandescence is disposed directly within the combustion chamber.

Another object of the invention is to provide a novel glow plug unit especially adapted for incorporation in the head of the cylinder of a model airplane engine.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawing merely shows and the following description merely describes one embodiment of the present invention, which is given by way of illustration or example only.

In the drawing, like reference characters designate similar parts in the several views.

Fig. 1 is a considerably enlarged vertical sectional view of the cylinder and piston of a model airplane engine and provided with a glow plug unit according to the present invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is a cross-sectional view as taken on line 3—3 of Fig. 1.

Fig. 4 is a further enlarged fragmentary sectional view showing a detail of construction.

The cylinder 5 and the piston 6 illustrated in the drawing are generally conventional, the latter having a combustion chamber 7 that is defined by its head 8 and the top of piston 6. It will be understood that fuel is brought to said chamber in any suitable manner and is compressed therein by piston 6.

The head 8 is shown with a central internally threaded bore 9 and a glow plug unit 10 is threadedly engaged with said bore substantially as shown. Unit 10 comprises, generally, a metal fitting 11, a metal terminal 12, a high resistance glow wire 13, and a set of washers 14 to firmly mount said terminal and wire in said fitting.

The fitting 11 has a threaded shank 15 that extends into cylinder head bore 9 and a larger upper end 16 that has a polygonal outer form adapted for engagement by a suitable tightening tool to firmly connect the unit to the cylinder head. Shank 15 is provided with a central passage 17 and the end 16 with a seat 18 coaxial with said passage and of larger size to define an annular shoulder 19 in said fitting. When initially formed, fitting end 16 is provided with a collar-like flange 20 defining the open end of seat 18.

The terminal 12 comprises a circular plate 21, substantially smaller in diametral size than the seat 18, and a reduced conductor-connecting and upstanding stud 22 integrally and centrally extending from said plate.

The glow wire 13 is generally U-shaped, having legs 23 and 24, connected by a loop 25, and laterally directed foot portions 26 and 27 extending respectively from legs 23 and 24. Loop 25 is shown as rounded and it will be evident that the same may be straight or may embody therein one or more helical coils, as desired. In practice, the spacing between legs 23 and 24 is made to be substantially less than the diameter of passage 17, and leg 24 longer than leg 23 for reasons later apparent. Foot 26 is of such length that the distance between the end thereof and a point midway between legs 23 and 24 equals the radius or half the diameter of seat 18. The other foot 27 is substantially shorter.

From the foregoing, it will be seen that when the glow wire is placed in position in fitting 11 with foot 26 resting on shoulder 19, the end of said foot, being engaged with the cylindrical wall or face of seat 18, locates legs 23 and 24 and loop 25 centrally in passage 17 and safely out of contact with the wall of said passage. Foot 27 will then be spaced above shoulder 19 and will be inwardly spaced from the cylindrical face of seat 18. By making legs 23 and 24 of suitable length, loop 25 can be located, as desired, in combustion chamber 7 and safely spaced from the top of piston 6 when the latter is at top dead center.

The set of washers 14 comprises a dielectric washer 28 that is positioned on seat shoulder 19, a similar washer 29 above and engaged with plate 21 of terminal 12, and a metal washer 30 on top of washer 29. The three washers have an external size to fit seat 18. Washer 28 has a hole the same diametral size as the distance between legs 23 and 24. Washer 29 has a hole to accommodate stud 22 and to center said stud in seat 18 to insure clearance between plate 21 and said seat. Washer 30 has a hole large enough to safely clear said stud 22.

In practice, glow wire 13 is assembled with washer 28 so that its foot 26 is below and its foot 27 above said washer. Such two assembled elements are then placed in seat 18 on shoulder 19. The only care that need be exercised is that of positioning the wire on a diameter

of said washer to insure full clearance from passage **15** of legs **23** and **24**. Such assembly may be facilitated, if desired, by providing said washer with a shallow radial groove in one face on one side of the hole, and with an aligned radial groove in the opposite face on the other side of said hole. Terminal **12** and washers **29** and **30** are then placed in seat **18**. Finally, collar flange **20** is spun over washer **30** to tightly and permanently compress the assembled parts in said seat.

It will be seen from the foregoing that foot **26** is in physical and, therefore, in electrical contact with shoulder **19** and, thereby, is grounded to cylinder **5**, and that foot **27** is in electrical contact with terminal plate **21**. Consequently, the remainder of the glow wire, namely, the legs and loop, is clear of all physical engagement with fitting **11**. Upon current being applied to terminal **12**, said glow wire will heat to incandescence and will be hottest at the loop and at the adjacent portions of the legs, since the latter are most remote from heat-conducting portions of the device. Conversely, the terminals of said glow wire, the same being the feet **26** and **27**, are most remote from chamber **7**.

It will be noted that the present construction obviates welding of the wire either to fitting **11** or to the cylinder head, and that sure electrical connections are made by suitable compression resulting from spinning over collar flange **20**.

While we have illustrated and described what we now contemplate to be the best mode of carrying out our invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what we claim and desire to be secured by Letters Patent is:

1. A glow plug for an internal combustion engine having a cylinder head defining a combustion chamber therebeneath, said glow plug comprising a metal fitting having a central passage for opening into said combustion chamber, and an open seat larger than said passage, a glow wire disposed within the passage and having outturned ends disposed in said seat, a terminal in the seat and extending above the open end thereof, and a set of washers in the seat for clamping said wire and terminal to the fitting, a portion of the fitting being spun over said washers and compressing the same into clamping engagement with said wire end and said terminal.

2. A glow plug for an internal combustion engine having a cylinder head defining a combustion chamber therebeneath, said glow plug comprising a metal fitting and having a central passage for opening into said combustion chamber, and an open seat larger than said passage, a glow wire disposed within the passage and having outturned ends disposed in said seat, a dielectric washer in the seat, one said outturned end of the glow wire being disposed between said washer and the fitting, a terminal in said seat, the other outturned end of the wire being disposed between said washer and said terminal, and means clamping the terminal to the fitting.

3. A glow plug as defined in claim 2 additionally including radial grooved portions on opposed faces of the washer and wherein the outturned ends of the glow wire are positioned in said grooved portions.

4. A glow plug for an internal combustion engine having a cylinder head defining a combustion chamber therebeneath, said glow plug comprising a metal fitting having a central passage for opening into said combustion chamber, a high resistance electrical element formed to have two end legs and disposed in said passage with the closed end thereof directed toward the combustion chamber, one leg of said element having its end grounded to said fitting above the passage therein, and a terminal carried by and insulated from said fitting and electrically engaged with the end of the other leg, the end of each said leg being provided with an outturned foot, and a dielectric washer between said terminal and fitting and clamping one foot against the terminal and the other against the fitting.

5. A glow plug according to claim 4, said fitting having a seat for said washer, and means comprising a second dielectric washer and a spun-over portion of the fitting to clamp the terminal against the first washer.

References Cited in the file of this patent

UNITED STATES PATENTS

1,784,541	Rouillard	Dec. 9, 1930
2,046,650	Nowosielski	July 7, 1936
2,130,208	Vincent	Sept. 13, 1938

FOREIGN PATENTS

490,530	Great Britain	Aug. 16, 1938
109,970	Switzerland	May 1, 1925