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E. T. CURRAN
SPARK PLUG COOLING DEVICE

Filed July 18, 1921

Fig 1

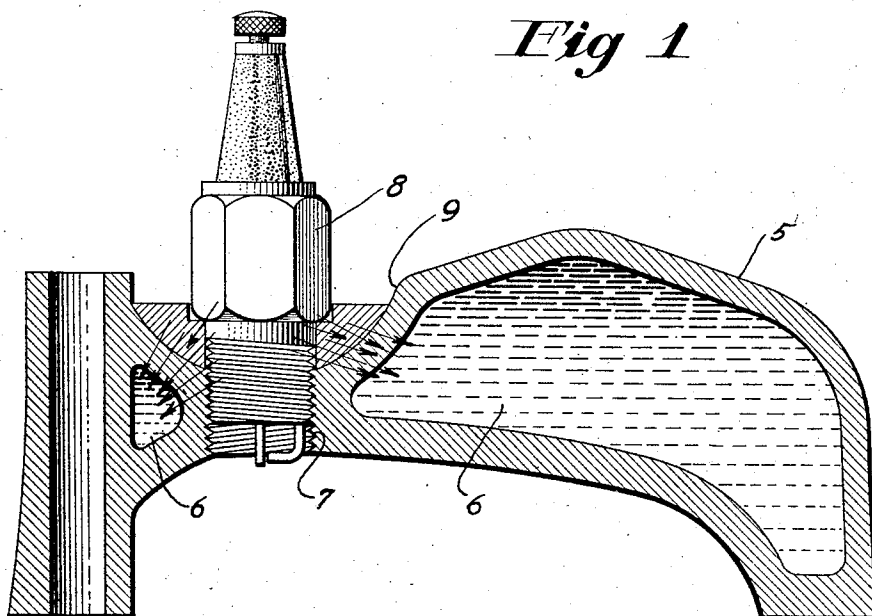
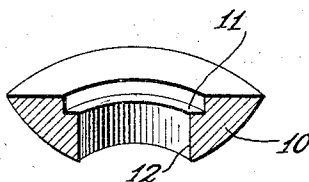


Fig. 2

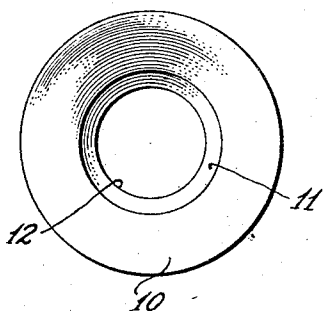


Fig. 3

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SPARK-PLUG-COOLING DEVICE.

Application filed July 18, 1921. Serial No. 485,459.

To all whom it may concern:

Be it known that I, EDWARD T. CURRAN, a citizen of the United States, residing at Detroit, in the county of Wayne and the State of Michigan, have invented a certain new and useful Spark-Plug-Cooling Device, of which the following is a specification.

This invention is a spark plug cooling device and the object of the invention is to provide simple and effective means for keeping spark plugs of internal combustion engines cool. It is a well known fact that the overheating of plugs is the main reason for the many ills to which plugs are susceptible and many attempts have been made to effect cooling thereof. The present invention provides a simple and effective means for accomplishing this result.

Spark plugs are generally received in tapped holes formed in the cylinder head, which holes extend through the water jacket of the engine, so that the treaded shank of the plug passes through a substantially tubular formation surrounded by a body of cooling fluid. The shank of the plug is thus fairly well cooled by fact that the heat absorbed by the shank from the explosion in the cylinder is conducted through the relatively thin wall of the jacket to the water therein. However the parts of the plug directly above the shank are not intimately in contact with the walls of the jacket but are surrounded by air, which, being a poor conductor of heat causes the plug to unduly heat up. In practically every instance the tapped hole for the plug is in the base of the relatively wide bowl or recess in the cylinder head and since the lower portion of the plug seats in the base of such bowl the circulation of air from the fan does not efficiently cool the plug.

With the foregoing considerations in mind I have experimented extensively with the problems under consideration and have found that I can efficiently conduct the heat from the plug to the cooling fluid within the jacket of the cylinder head by positioning within the bowl a heat conducting bridge which is maintained in engagement with the outer wall of the water jacket and also in engagement with the plug. The metal employed in the manufacture of this bridge is preferably one of high conductivity so as to rapidly take up the heat from the plug and

conduct it to the wall of the water jacket which at this point in engine construction is relatively thin. By this arrangement I have found that the heat from the plug is rapidly conducted to the water in the jacket, the temperature of which water never exceeds 212°. Practice has shown that when the construction described is employed the heat from the plug will be so rapidly absorbed that in engines where the plugs have been in the habit of heating to approximately 700° Fahrenheit be may, through the employment of the present invention, they operated for extended periods without heating to a temperature which is in excess of 250°.

Features of the invention other than those specified will be apparent from the following detailed description and claims when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a transverse section of a Ford cylinder head showing the present invention associated with one of the plugs mounted thereon;

Figure 2 is a central section perspective of the device of the present invention removed from the cylinder head; and

Figure 3 is a plan view of the device.

While the present invention may be associated with the engine of any make of car, I have shown for the purpose of illustration the same as embodied in Ford construction. Thus in Fig. 1 of the drawings the cylinder head 5 of the Ford engine is shown in section. The head is cored to provide the jacket 6 for the circulation of the cooling fluid and is also tapped as at 7 to receive the shank of the spark plug 8. The tapped hole 7 extends through the head 5 at the base of a bowl shaped depression 9 and when the plug 8 is screwed into the hole 7 the shank of the plug extends down through the cylinder head so that the points of the plug are either in or directly adjacent the compression space of the cylinder.

In associating the present invention with the construction described the device may conveniently partake of the form shown in Figures 2 and 3, wherein it is illustrated as

an annular casting 10, the outer periphery of which is shaped complementarily to the base of the bowl shaped depression 9 so that when the casting is placed in the depression 9 it will seat in the base thereof. The outer face of the casting is preferably provided with a depressed seat 11, while in the centre of the casting is a hole 12 through which the shank of the plug is adapted to extend.

10 In assembling the parts the casting is placed into the bowl shaped depression and the shank of the plug 8 is thereupon passed through the opening 12 and screwed into the tapped hole 7 by means of a wrench or

15 other convenient tool applied to the hexagonal portion common to conventional plugs. The screwing down of the plug 8 causes the casting 10 to be forced to a tight seat in the depression 9 so that the outer periphery of

20 the casting will come into intimate and continuous contact with the superficial surface of that portion of the water jacket wall which it over lies, and at the same time the base of the hexagonal portion of the plug

25 will be forced to a tight seat on the ledge or seat 11 of the casting. If the casting 10 is of aluminum, copper or some other relatively soft and malleable material it will be caused by pressure exerted thereon by

30 the plug through the assembling of the parts, to conform to the portions with which it contacts so that the need of copper gaskets will be obviated and gas tight joints will be produced which will effectually hold

35 compression.

When the parts are assembled as shown in Fig. 1 the heat taken up by the plug from the burning gases within the cylinder will be dispersed by conduction after the manner indicated by the arrows in Fig. 1 where-

40 in it will appear that the heat will be conducted from the plug through the casting 10 to the jacket wall which, being relatively thin, will rapidly conduct such heat to the

45 water within the jacket 6 so that the building up of heat to high temperatures within the plug will be impossible. The plug will thus be kept relatively cool, which cooling has heretofore been possible only through

50 the employment of expensive water and air circulating mechanism.

I am aware that the present invention, which contemplates the employment of a heat conducting bridge broadly, may be

55 made of different shapes than as shown in the drawings which shapes will depend on the engine with which it is to be associated. This invention is not limited to the construction shown, but contemplates the substitution of equivalents and is broadly as is com-

60 mensurate with the appended claims.

Having thus fully described the inven-

tion, what I claim as new and desire to secure by Letters Patent is:

1. A spark plug cooling device embodying a conducting member one side of which is shaped complementarily to the depression in a cylinder head from the base of which depression a tapped spark plug hole of the cylinder head extends, said member being provided with an opening substantially equal to the diameter of said tapped hole, whereby the threaded shank of the spark plug may be passed through said opening and screwed into the tapped hole in the cylinder head to bring the plug to a seat on said member and simultaneously force said member to a seat in said recess.

2. A spark plug cooling device embodying a member of conducting material provided with an opening substantially equal in diameter to the diameter of the tapped spark plug hole of an engine cylinder and one face of which member is shaped to seat on the engine cylinder adjacent said spark plug hole, whereby the threaded shank of a conventional plug may be passed through the opening in said member and screwed into the tapped hole of the cylinder for the purpose of seating the plug on said member and simultaneously seating the member on the cylinder head.

3. A spark plug cooling device embodying an annular member of highly conductive metal shaped to seat in the bowl shaped depression of a cylinder head from the base of which depression the tapped spark plug hole extends, the inner periphery of the annular member being formed with a seat for a spark plug whereby the plug may be passed through said member and screwed into the plug hole of the cylinder head to come to a tight seat with said member and to force the member to a tight seat with the cylinder head for the purpose of providing a heat conducting medium between the plug and the cylinder head, through said medium the heat from the plug is conducted to the water jacket of the cylinder head.

4. Spark plug cooling device embodying a disc of metal shaped to seat in the depression in the cylinder head from the base of which depression the tapped spark plug hole leads, said disc being provided with an opening coaxial with the tapped hole of the cylinder head, whereby the threaded shank of a spark plug may be passed through said opening and screwed into the tapped hole in the cylinder head to firmly seat the plug on the disc and simultaneously seat the disc in the depression.

In testimony whereof I have signed the foregoing specification.

EDWARD T. CURRAN.