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MEANS AND METHOD OF CLEANING SPARK PLUGS

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Fig. 1

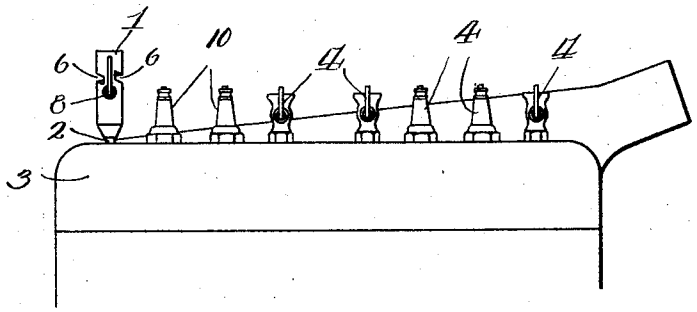


Fig. 2

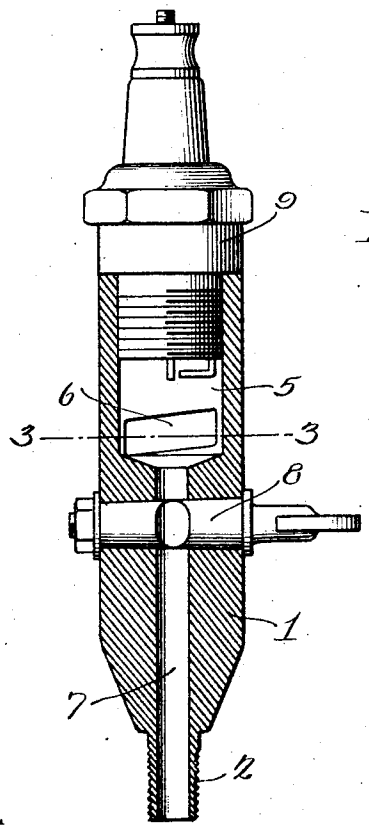
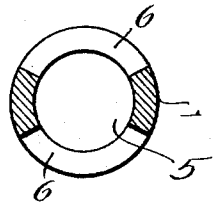


Fig. 3



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MEANS AND METHOD OF CLEANING SPARK PLUGS.

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This invention relates to devices for cleaning spark plugs, after the plugs have become clogged or covered with a deposit of carbon, as frequently happens in the use of hydrocarbon engines.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement and method whereby the fire or heat of combustion of the engine itself may be used for cleaning the spark plugs, by burning off the carbon or other deposit thereon, so that the plugs will then be in condition for satisfactory use again.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and the desirability of a spark plug cleaning apparatus and method of this particular character.

To these and other useful ends the invention consists in matters hereinafter set forth and claimed and shown in the accompanying drawings in which—

Figure 1 is a side elevation of the upper portion of an internal combustion engine, showing a spark plug cleaning device applied thereto, embodying the principles of the invention.

Figure 2 is a vertical section of the said cleaning device shown in Figure 1.

Figure 3 is a horizontal section on line 3—3 in Figure 2.

As thus illustrated, the invention comprises a body 1 having a screw threaded portion 2 which can be screwed into the top of the engine 3 in place of one of the priming cups 4 with which internal combustion engines are commonly provided. This body 1 has its upper portion formed with a chamber 5 having lateral openings 6, and the body has a bore 7 which extends vertically through the screw threaded portion 2 and communicates at its upper end with the chamber 5 previously mentioned. A valve 8 of any suitable character controls communication between the chamber 5 and the combustion chamber within the engine. The upper portion of the chamber 5 is interiorly threaded.

In use the spark plug 9 of any suitable or desired character, is screwed into the top of the chamber 5 in the manner shown in the drawings. The engine is then operated, and the heat of the fire or combustion within the engine will be admitted through the passage 7 to the chamber 5, so that the fire will be dashed violently against the inner end of the plug 9, the valve 8 being opened after the engine is in operation to produce this result. The flame escapes through the lateral opening 6, through which air enters to assist in burning off the carbon from the lower end of the plug—that is to say, conditions are set up which result in the oxidation of the carbon deposit on the plug to be cleaned.

The cleaning device thus constructed can be left on the engine, as the engine can be operated without priming cups on all of the cylinders, or the device can be used occasionally by placing it on any engine which is suitable for this purpose. Most engines have either a priming cup or some other device which can be unscrewed from the top of the cylinders to provide a socket into which the cleaning device can be placed to perform the desired work. It is the hot fire blast that does the work, as it strikes the lower end of the plug to be cleaned, and the construction can be changed or modified without departing from the spirit of the invention.

It will be seen that the passage 7 forms a restricted passage for causing gases and products of combustion and fire to escape in the form of a jet, which jet is received in the expansion chamber 5, this chamber expanding the compressed gases, and causing a swirling motion thereof, so that the blast of fire from the upper end of this passage 7 will impinge upon the lower end of the plug to burn off and clean the plug. The cleaning, therefore, is done at a point where the gases are free to expand into the atmosphere, for the openings 6 are large enough to permit free expansion and escape of the gases, after they have expanded in the chamber 5, after the impingement of the fire against the lower end of the plug has done the required work. Some air will enter, of course, or tend to enter, and the tendency will be to produce a blue flame which will clean the lower end of the spark plug thoroughly. The plug to be cleaned, of course, is inoperative to function as a spark plug, while it is being cleaned, and the combustion is produced by the spark plug 10 nearest the cleaning device, as this is the spark plug which belongs to the cylinder which has communication with the passage 7 of the cleaner. Thus one spark plug func-

tions to produce the combustion necessary to clean another plug, for the plug being cleaned is in such a position that it is inoperative to fire the charge, being too remote from the cylinder to do that. The opening 6 for the discharge of the gases, and incidentally for admission of air, are between the passage 7 and the lower end of the plug to be cleaned, and the plug to be cleaned forms no operative portion of the engine. The cleaner, when not in use as such, is closed by the valve 8, and remains in position, just as an ordinary small valve may be used on a cylinder of an internal combustion engine. The cleaner is adapted to fit ordinary plugs, and no special construction of the plugs is necessary, and the cleaner can be used successively with any number of plugs, as a cleaner for each plug is not necessary. The gases and fire escape with great force from the upper end of the passage 7, and impinge upon the lower end of the plug, and then expand in the chamber 5, and escape through the opening 6 in the manner explained, in order to knock the carbon off the lower end of the plug, as well as to burn it off. The plugs are only in the cleaner while being cleaned, and while the plugs are operative as spark plugs, on an engine, they are not in the cleaner, but to the contrary are in their customary places on the engine. While being cleaned, the plugs are not in circuit, and are not functioning as spark plugs, of course. To do the cleaning, the charge is fired inside of the cylinder, in the usual way, and the jet or blast of gases and fire is allowed to escape from the engine, to a point where the gases and fire are in contact with the atmosphere, and at this point the cleaning is effectively done in the manner shown and described. The valve 8, of course, is operable without disturbing the position of the plug 9, so that the passage 7 is controllable independently of the plug and without disturbing its position. As shown, an internal combustion engine is used as the means for producing the fire and flame, but it is obvious that the passage 7 can be connected to any source of hot gases or fire or flame, supplied under pressure, to thereby form a powerful jet of flame which will impinge upon the lower end of the plug and thereby perform the desired cleaning operation.

Essentially, therefore the principle and mode of operation of the invention require that the internal combustion engine be operative to produce the explosive pressure and the consequent jet of gases and flame, independently of the plug to be cleaned, inasmuch as the plug to be cleaned is not in position to be operative as a spark plug to fire the charge. Therefore, one plug fires the charge in the engine, and the other plug in communication with the same cylinder receives the discharge of explosive pressure for cleaning purposes, in the manner shown and described.

What I claim as my invention is:—

1. Instrumentalities for cleaning spark plugs, comprising an internal combustion engine, means for permitting the fire and explosive pressure to escape from the engine, and means for presenting the plug to be cleaned to the impinging blast of fire which has escaped from the engine, said engine being operative to produce said cleaning blast of fire independently of the plug to be cleaned, so that the plug is cleaned while not operative to function as a spark plug.

2. A structure as specified in claim 1, said means comprising a hollow body adapted to be fastened to the engine, having a chamber into which the end of the spark plug is screwed, with an opening from said chamber to the atmosphere, and with a communicating passage between said chamber and the interior of the engine.

3. A structure as specified in claim 1, said plug presenting means comprising a body having a chamber into which the spark plug is screwed, with a lateral opening for said chamber, so that the fire may escape through said opening, and means to control communication between said chamber and the interior of the engine.

4. A structure as specified in claim 1, said plug presenting means comprising a hollow body adapted to be substituted for some other device which is ordinarily screwed into the top of the engine.

5. The method of cleaning spark plugs, comprising the establishing of combustion in an internal combustion engine, allowing the fire to escape in the form of a jet from the engine, and presenting the spark plug to be cleaned to the blast of fire which has escaped with force from the engine, so that the cleaning is done where the jet is free to expand into the atmosphere.

6. A spark plug cleaner comprising a hollow body having a passage to form a jet of hot gases and fire, and having an expansion chamber to receive said jet, in which the plug to be cleaned is inserted, adapted to hold the plug such a distance from the end of said passage that the jet of gases and fire will pass through said chamber and impinge upon the end of the plug, said chamber having an outlet communicating with the atmosphere, whereby the impinging jet is free to expand in said chamber and finally escape into the atmosphere.

7. A structure as specified in claim 6, and a valve controlling said passage, whereby the jet of gases and fire may be controlled without disturbing the position of said plug.

8. A structure as specified in claim 6, in combination with an internal combustion engine operative independently of said plug

for supplying the hot gases and fire to said passage.

9. In a spark plug cleaner, means providing a passage to form a fluid jet of flame and gases for cleaning the plug, means for holding the plug a distance from the end of said passage and in position to have the jet violently impinge thereon, means for controlling said passage without disturbing the position of said plug, and means independent of said plug for producing explosive pressure to form said cleaning jet.

10. A structure as specified in claim 9, there being an expansion chamber between the plug and the discharge end of said passage, into which the fluid jet expands, and there being an opening to provide communication between said chamber and the atmosphere.

11. A method as specified in claim 9, said expansion of the jet of flame being directly into the atmosphere, so that air may mix with the flame where the cleaning takes place.

12. In combination with an internal combustion engine, a spark plug cleaner mounted on the engine, having means to form a passage through which hot gases and fire and flame may escape from the cylinder of the engine, and having means for holding the plug to be cleaned in position to receive the impinging blast or jet of flame, said cleaner being adapted to receive ordinary spark plugs for cleaning purposes, the engine being operative to produce said jet of flame independently of the plug to be cleaned, and means for shutting off the discharge of flame while the cleaner is empty and not in use, and while the engine is running for ordinary purposes.

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