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SPARK PLUG CLEANING DEVICE

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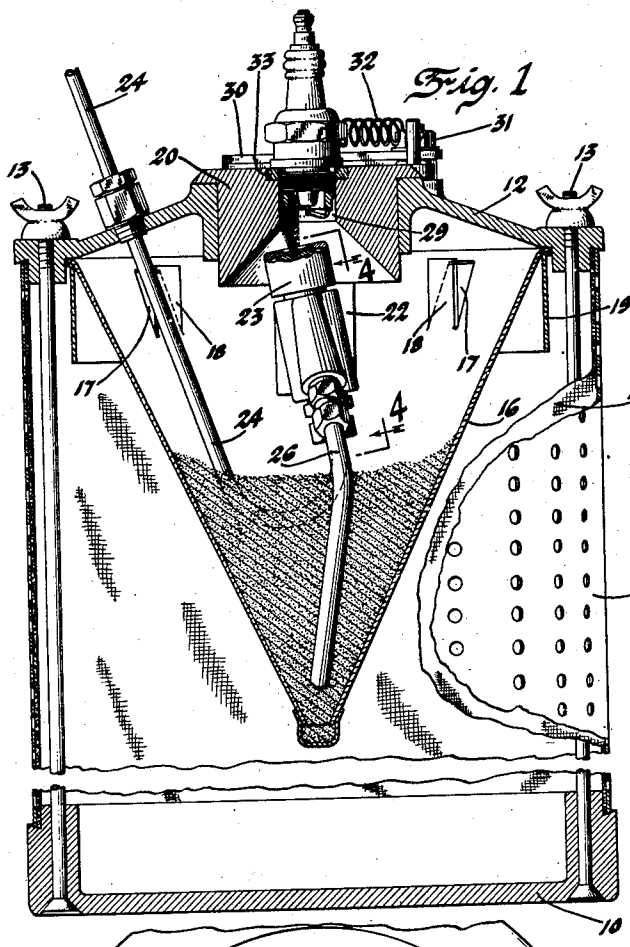


Fig. 1

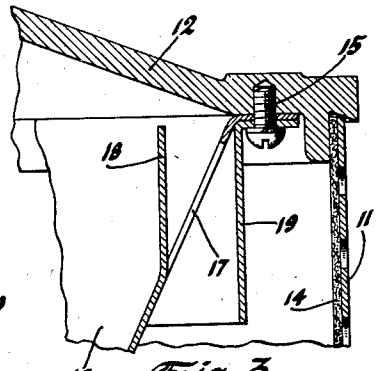


Fig. 3

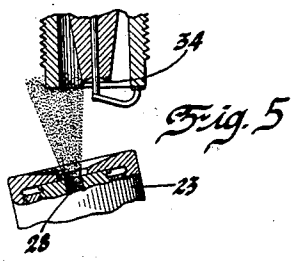


Fig. 5

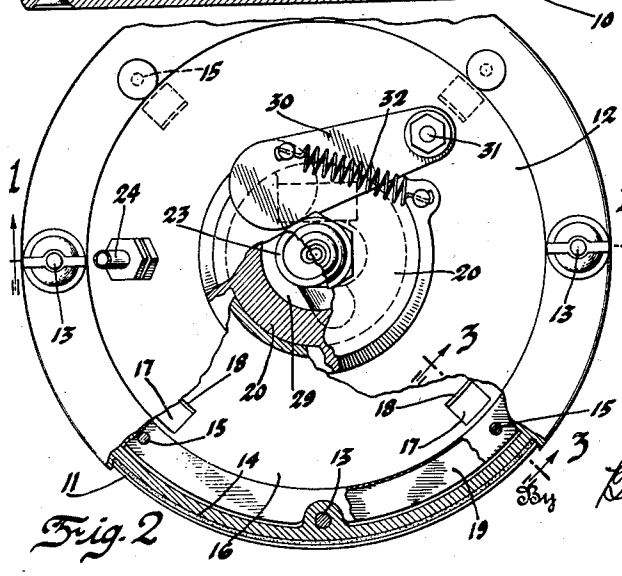


Fig. 2

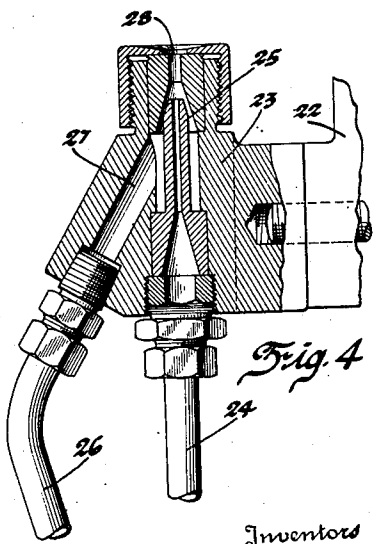


Fig. 4

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SPARK PLUG CLEANING DEVICE

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4 Claims. (Cl. 51—8)

Our invention relates to devices for cleaning spark plugs wherein the sand blast principle is employed, a jet of mixed sand or equivalent abrasive material and air under pressure whereby the sand is propelled being directed toward and insulating member and interior of the shell of the plug to be cleaned; and the object thereof is to provide a sand blast spark plug cleaning device wherein the insulating member of the plug will not be injured by direct impact of the sand therewith during the cleaning operation.

In cleaning carbon deposit due to the burning gases which come into contact therewith when the plug is in use from the inner ends of spark plugs it is of the greatest importance that the inner extremity of the insulating member shall not be injured by the sand; this being particularly the case in spark plugs wherein the extremity of the porcelain insulation is unglazed, and is provided with a sharp ridge which surrounds the inner end of the central insulated electrode. In sand blast cleaning devices of the type heretofore commonly used the jet is discharged in the direction of the axis of the plug, and against the inner end of the porcelain or equivalent insulator, with consequent injury to such inner end because of the abrasive action of the jet thereupon; whereas in our improved sand blast cleaning device the nozzle is inclined so that the jet is discharged at an angle to the axis of the plug. The stream of air and sand therefore misses the extreme end of the insulating member and passes along and about parallel with the exposed portion thereof, thus avoiding injury to the extremity of the insulating member; while at the same time such stream has a more effective scouring action upon the interior of the metallic shell or casing of the plug where its abrasive action is unobjectionable because it impinges upon such surface at an angle, instead of flowing approximately parallel therewith as is the case when the jet is discharged parallel with the axis of the plug.

In addition to arranging the nozzle so that the jet discharged therefrom will not injure the inner extremity of the insulating member of the plug our invention includes certain improvements whereby a more effective separation of dust, which is ineffective as an abrasive, from the sand is secured than in prior sand blast cleaning devices; as well also as various other improvements in and relating to sand blast cleaning devices for spark plugs, all as hereinafter described and particularly claimed.

The drawing accompanying and forming a part of this specification illustrates the preferred embodiment of our invention; although the same may be embodied in other forms and we regard our invention as including such variations and modifications of the particular form thereof herein disclosed as come within the scope of the concluding claims, wherein the particular features which constitute our invention are particularly pointed out.

In the drawing:

Figure 1 is a view illustrating our invention, for the most part upon a vertical central plane indicated by the line 1—1, Figure 2.

Figure 2 is a view showing our invention in plan, with parts broken away so that a better understanding thereof may be secured.

Figure 3 is a fragmentary view showing certain features of our invention upon a larger scale.

Figure 4 is a sectional view, upon a plane indicated by the line 4—4, Figure 1, showing the nozzle element of our invention.

Figure 5 is a sectional view showing the inner end of a spark plug to be cleaned by our device, and illustrating the relation of the cleaning jet thereto.

Referring now to the drawing, the numeral 10 designates a base of cast iron or equivalent material, and 11 a perforated outer casing shown as cylindrical in form supported thereby. The head 12 is a suitable casting; and the three parts are held together by bolts 13 in the form of our invention illustrated. A layer of filter cloth 14 such, for example, as vacuum cleaner bags are made of, overlies the inner surface of the casing 11; so that particles of dust suspended in air within the casing, and which flows therefrom through the cloth layer and the perforations, will be arrested substantially as in common and well known so-called vacuum cleaning devices.

Arranged within the casing 11 and suspended from the upper end of our device as by being fastened to the head 12 by screws 15, as shown in Figure 3, is a cone-shaped sand receptacle 16 which contains the sand whereby the spark plugs are cleaned. This receptacle is provided with outlet openings 17 adjacent its upper end over which baffles 18 are located; a convenient method of providing these elements being to cut portions of the metal wall of the sand container free along three sides, and force the cut-free parts inward, as will be understood from Figure 3. The baffles, however, may be formed separately from the receptacle wall and fastened in place over holes formed therein should such method of forming the holes and overlying baffles be pre-

ferred. Also and as shown best in Figure 3 and additional annular baffle 19 may be supported by the screws 15, the same surrounding the upper end of the sand receptacle 16 and lying opposite the openings 17, so that air flowing out from the receptacle and carrying fine sand particles and dust with it will be directed downward; thus to a degree protecting the upper end of the filter cloth 14 from direct action of the outflowing stream.

The head or cover 12 is preferably made conical, as shown, and a circular opening is provided therein within which fits a spark plug supporting member 20, the same being freely rotatable in the opening during the cleaning of a spark plug supported in a central opening provided in said spark plug supporting member; and depending from the head or cover 12 is an arm 22 to the lower end of which the nozzle 23 of our spark plug cleaning device is secured. Air under pressure is supplied to the nozzle 23 through an air supply pipe 24 and the jet tube 25; and a second sand supply pipe 26 extending to near the bottom of the sand receptacle 16 supplies sand to an interior passage 27 of the nozzle 23. The underside of the supporting member 20 is preferably made conical, as shown in Figure 1 to thereby provide a recess in the lower end of said member so that the discharge end of the nozzle 23 may be positioned close to the end of the plug to be cleaned. The air induces a flow of sand through the pipe 26 and the two mix and are discharged through the outlet opening 28 as will be understood; and the location of this outlet opening as close as practicable to the inner end of the plug being cleaned reduces the spreading of the stream of air and sand, and secures the discharge of a compact stream against the inner end of the plug.

The supporting member 20 is provided with a central opening 29 adapted to receive a spark plug to be cleaned and wherein it is supported with its axis vertical or substantially so, a washer 33 of rubber or similar material being provided for the plug to rest upon in the form of our invention illustrated. The nozzle 23, however, is so arranged that the jet of air and sand issuing therefrom through the passage 28 is at an angle to the axis of the plug so that the stream, instead of impinging directly upon the extremity of the insulating member as heretofore, flows along and approximately parallel with the tapered inner part thereof, thus avoiding injury to the extremity of the insulating member. This stream, however, and as will be understood from Figure 1, impinges with the interior of the metallic shell of the plug at an appreciable angle so that its scouring action upon the interior of the shell is appreciably enhanced over what it would be if the discharge was in the direction of the axis of the plug. This action is further illustrated in Figure 5 from which it will be appreciated that that the sharp ridge 34 at the extremity of the porcelain insulator of spark plugs of approved types is protected from the scouring action of the jet; and it is obvious that the same result of avoiding injury to the extremity of the insulating member of the plug is secured if the end thereof is flat, or slightly rounded, as distinguished from having a depression and a peripheral ridge as in the form illustrated.

The outer shell or casing of the plug is ordinarily made of mild steel and will not be injured by the sand blast. In fact a vigorous scouring action of the sand upon the interior of the shell is advantageous; and the inclined arrangement of the nozzle secures increased scouring action upon the interior of the shell and at the same time avoids such action upon the inner end of the insulating member. The inclining of the nozzle, therefore, results in two mutually opposite results both of which are advantageous in the cleaning of spark plugs; the one being increased scouring action upon the inner surface of the shell, and the other reduced abrasive action upon the inner end of the insulator.

The air supplied through the pipe 24 to cause the sand to flow obviously flows from the sand receptacle 16 through the openings 17 and carries along with it such fine dust as results from the removal of carbon from the plug, and from distintegration of sand particles. Coarse sand particles are returned by the baffle plates 18 to the mass of sand within the receptacle 16, the sand therein being used over and over again, as will be understood. The air and entrained fine dust escaping through the openings 17 is deflected downward by the outer annular baffle 19, thus protecting the upper end of the filter cloth 14, and the dust settles in the bottom of the casing 11 as the air flows therefrom through the filter cloth and perforations to the external atmosphere.

The location of the nozzle 23 above the level of the sand in the receptacle 16 provides a device wherein the interior of the nozzle cannot be full of sand when the air is turned on to clean a plug, because any sand which was within the nozzle when the air was shut off will have fallen to a level below that of the end of the jet tube 25. There can therefore be no mass impacted sand within the nozzle and above the discharge end of the jet tube 25 when the device is not in use, and prompt and certain starting of the jet is secured when the air is turned on and supplied to the nozzle through the air supply pipe 24.

The opening 29 for receiving the spark plug is preferably provided with a swinging cover 30 pivoted to the head at 31, and having a spring 32 tending to swing it so as to close the opening, to thereby prevent the escape of the jet of sand and air when the air is turned on and there is no spark plug in the opening. In using our invention the cover 30 is swung to one side and the inner end of the plug to be cleaned is inserted into the opening 29, and the air turned on if it is not already flowing to the nozzle and if the jet is not already established. The plug necessarily fits a little loosely in the rubber washer 33, and the initial effect of the discharge of sand is that some of it is discharged forcibly into the space around the outside thereof and within the opening in the rubber washer which forms a seal and, being packed forcibly within such space and about the external thread of the plug, acts to hold the plug in place within the opening 29 in the spark plug supporting member 20. Thereafter and during the cleaning of the plug the supporting member is rotated one or more times in the opening in the head 12 within which it fits to thereby cause the jet to act throughout the whole inner surface of the plug which is being cleaned.

Having thus described our invention and explained the operation thereof we claim and desire to secure by Letters Patent:

1. In a spark plug cleaning device of the class described, a sand containing receptacle conical in form and arranged with its smaller end downward, and the upper end of which is secured to

and closed by a closing member or head which supports said receptacle and has a centrally located opening, and which receptacle has an air and entrained dust outlet adjacent its upper end; a spark plug supporting member located within said opening and having itself an opening for receiving the inner end of a spark plug to be cleaned; a supporting arm depending from said head; and a nozzle supported by said arm and located above the sand in said receptacle; said nozzle having a depending sand supply pipe, and an air supply pipe leading through the head aforesaid, and which nozzle is arranged to project a jet of air and sand in a direction inclined to the axis of and against the inner end of a spark plug supported as aforesaid.

2. In a spark plug cleaning device of the class described, a sand containing receptacle conical in form and arranged with its smaller end downward, and the upper end of which is closed by a closing member or head which has a centrally located opening, and which receptacle has an air and entrained dust outlet adjacent its upper end; a spark plug supporting member located within said opening and having itself an opening for receiving the inner end of a spark plug to be cleaned; a supporting arm depending from said head; a nozzle supported by said arm and having a depending sand supply pipe, and an air supply pipe leading through the head aforesaid, and which nozzle is arranged to project a jet of air and sand in a direction inclined to the axis of and against the inner end of a spark plug supported as aforesaid; a perforated outer casing enclosing said sand containing receptacle and the upper end of which is closed by the head aforesaid; and a filter element arranged within and overlying the inner surface of said perforated outer casing.

3. In a spark plug cleaning device of the class described, a sand containing receptacle the upper end of which is closed by a closing member or head which has a centrally located opening, and which receptacle has an air and entrained dust outlet adjacent its upper end; a rotatable spark plug supporting member located within said opening and having itself an opening for receiving the inner end of a spark plug to be cleaned; a supporting arm depending from said head; and a nozzle supported by said arm and located above the sand in said receptacle, said nozzle having a depending sand supply pipe, and an air supply pipe leading through the head aforesaid, and which nozzle is arranged to project a jet of air and sand in a direction inclined to the axis of and against the inner end of a spark plug supported as aforesaid.

4. In a spark plug cleaning device of the class described, a sand containing receptacle the upper end of which is closed by a closing member or head which has a centrally located opening, and which receptacle has an air and entrained dust outlet adjacent its upper end; a rotatable spark plug supporting member located within said opening and having itself an opening for receiving the inner end of a spark plug to be cleaned, and the inner end of which member is provided with a conical recess; a supporting arm depending from said head; and a nozzle supported by said arm and located above the sand in said receptacle; said nozzle having a depending sand supply pipe, and an air supply pipe leading through the head aforesaid, and which nozzle is arranged to project a jet of air and sand in a direction inclined to the axis of and against the inner end of a spark plug supported as aforesaid; the upper end of said nozzle being arranged within the conical recess aforesaid to thereby bring it into close proximity with the spark plug to be cleaned.

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