Dec. 15, 1942. H. RABEZZANA 2,304,956

SPARK PLUG CLEANER

Filed Sept. 4, 1941

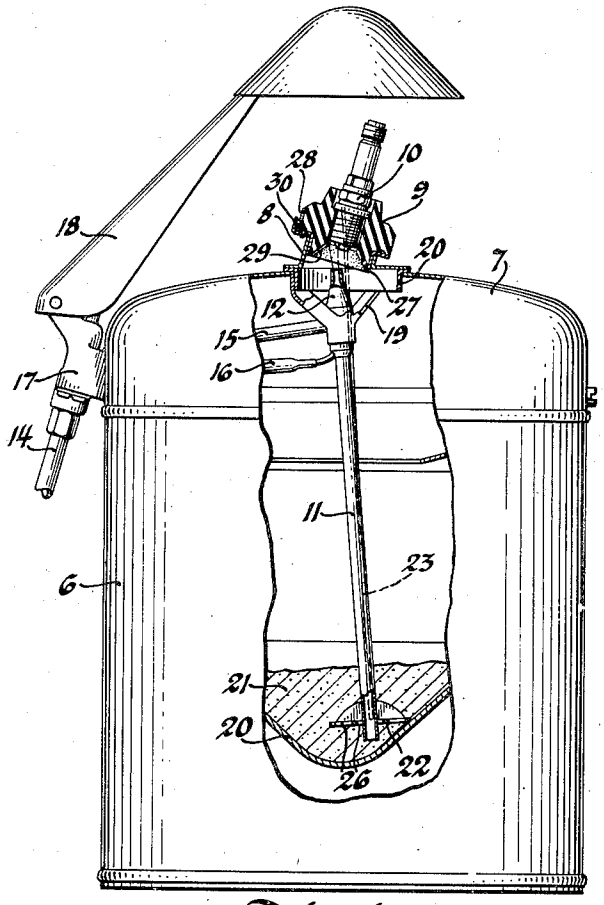


Fig. 1

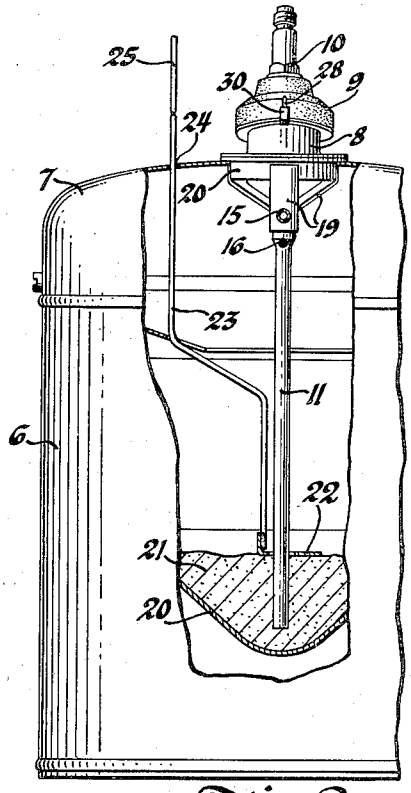


Fig. 2

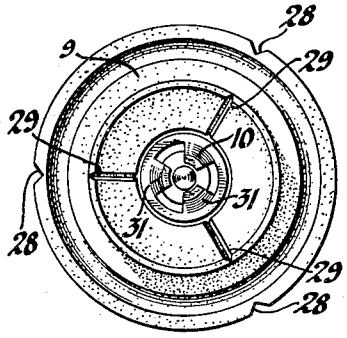


Fig. 3

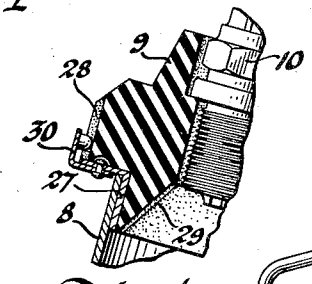


Fig. 4

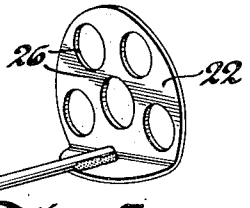
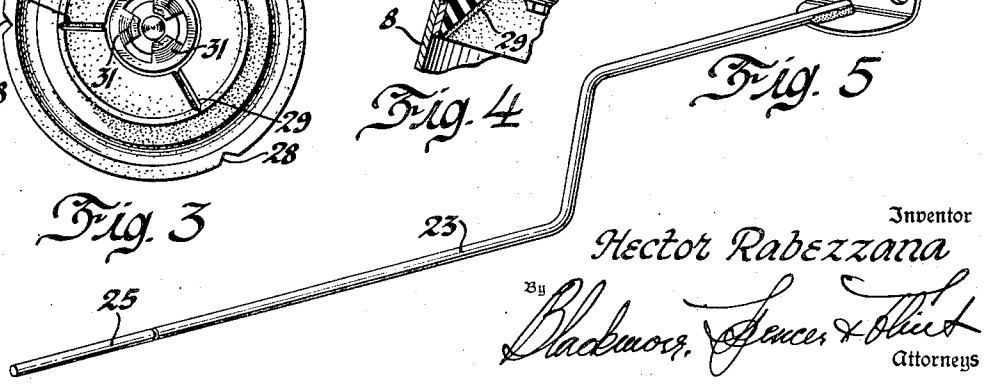


Fig. 5



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SPARK PLUG CLEANER

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3 Claims. (Cl. 51—8)

My invention relates to spark plug cleaning devices for removing encrusted carbon and similar deposits which accumulate upon the electrodes and the inner exposed end of the insulating member of a plug when it is in use, due to the high temperature conditions under which the plug operates, by a jet of air and entrained abrasive material directed against the inner end of a spark plug to be cleaned and the plug thus restored to its original condition so that it may be used again as efficiently as a new plug; and the principal object of my invention is to provide a device for indicating the approximate quantity of abrasive material present in the cleaning device so that the operator can estimate whether the device contains sufficient abrasive material.

It is recognized that such spark plug cleaning devices, while extremely effective to remove scale, carbon and other deleterious accumulations from electrode and insulator surfaces of the plug may, if operated for a greater period than required for the purpose of actual cleaning, impair the condition of the plug due to excessive attrition of the electrodes, the porcelain or other insulator or both. Accordingly, it is extremely desirable that some means be provided in such a device whereby the operator may be apprised of the amount of abrasion accomplished during any given period of use and may determine—without need for repeated removal and inspection of the spark plug—when the scale, carbon, etc., have been adequately removed and when further operation of the device is unnecessary and harmful. The present invention, relating to an abrasive spark plug cleaner and incorporated gauge, affords the solution to this problem.

With the above and other objects in view my invention consists in the means for indicating the quantity of abrasive material within the cleaning device illustrated in the accompanying drawing and hereinafter described and claimed; and in various other features of and associated with spark plug cleaning devices of the type herein described as will hereinafter and more particularly appear.

In the drawing accompanying and forming a part of this specification and wherein the preferred form of my invention is illustrated:

Figure 1 is a view showing a spark plug cleaning device in side elevation, the casing thereof being broken away to show the particular features wherein my invention consists.

Figure 2 is a view as seen from a position at 90 degrees from the station of the observer assumed in Figure 1, with the abrasive level indicating device in its uppermost position.

Figure 3 is a view showing the device for supporting the plug, alone, and upon a larger scale than in Figures 1 and 2.

Figure 4 is a fragmentary view showing a latch or stop mechanism of my invention.

Figure 5 is a view showing the abrasive level indicator of my invention separate and alone and in perspective.

Referring now to the drawing and to the numerals associated with the views thereof, the numeral 6 designates the cylindrical casing of a spark plug cleaning device which may be of the particular form disclosed in my Patent No. 2,222,518, November 19, 1940; and the numeral 7 designates a cover which closes the upper end of the casing 6 and has an annular support 8 the upper end of which is inclined and serves as a support for an annular rotatable member 9 adapted to support a spark plug 10 to be cleaned.

The numeral 11 designates an abrasive material supply tube the upper end of which has a nozzle 12 arranged so as to discharge a jet of air and abrasive material, or of air alone, against the lower end of a spark plug, as the plug 10, to which end air under pressure is supplied by a pipe 14 to the nozzle 12, through conduits 15, 16; the flow of air through said conduits being controlled by valves within a valve casing 17 which are operated by a manually operable level 18, all as in my patent hereinbefore referred to.

The nozzle 12 and the upper end of the abrasive material supply tube 11 are supported by a bracket 19 having an annular band 20 to which the lower flanged portion of the annular support 8 is fastened, as by the two being welded together, so that tube 11 depends from the supporting member 8 and from the spark plug supporting member 9; which member is adjustable relative to the annular member 8 whereby it is supported.

The abrasive material supply tube 11 depends into a hopper or sump 120, preferably conical in form, located within the casing 6, so that air supplied to the nozzle 12 will cause abrasive material from the base of the mass constituting the abrasive charge 21 thereof to flow upward through the supply tube 11 and to be discharged as a jet of commingled air and abrasive material against the lower end of the spark plug 10. After discharge from the nozzle 12, the abrasive particles, spending their projective force upon impact with the spark plug 10 and adjacent parts, precipitate under the force of gravity and fall

upon the top surface of the abrasive material in the sump 120.

The means for indicating the level of the abrasive material 21 within the hopper 120 comprises a plate portion 22, and a lifting portion 23 which extends upwardly therefrom and through a hole at 24 in the cover 7; which lifting portion preferably has its upper end bent to form a handle or ring 25 so the lifting portion 23 and plate 22 may be readily re-elevated when the initial level of the abrasive charge in the sump 120 has been depressed by withdrawal of a portion of the charge from the base of the sump and the instant level of abrasive material has been re-defined by precipitation of the thus-withdrawn portion of the charge to a position on top of the former surface-defining charge portion. Thus, the stem 23 and its plate or follower member 22 must be manually lifted so that the latter will rest upon the instant surface of the abrasive charge whenever the static level of the abrasive in the sump 120 is to be ascertained. The plate 22 is shown as having a hole 26 through which the abrasive material supply tube 11 extends as a guide, and whereby sidewise movement of the plate is prevented as will be understood.

The plate portion 22 is progressively submerged in the mass 21 of abrasive material as indicated in Figure 1, because upward flow thereof will undermine the plate and permit it to descend which will be followed by a down flowing of abrasive material onto and around the plate; and such jarring of the cleaning device as it will naturally be subjected to will tend to level the upper surface of the abrasive material

The position of the plate 22 has no effect upon the upward flow of abrasive material through the tube 11 and the cleaning device will continue to operate with the plate 22 in its down position shown in Figure 1. When, however, the user wishes to know how much abrasive material there is in the hopper 120, and whether more or a fresh replacement charge should be supplied to the hopper, he lifts the plate 22 by upward movement of the operating rod 23; and then drops it onto the surface of the abrasive material as indicated in Figure 2. The distance which the handle or ring 25 then stands above the cover 7 is a measure or indication of how much abrasive material there is within the hopper 120. If more is needed the plug supporting member 9 is removed and more is supplied through the open upper end of the annular supporting member 8. It may occur, after the use of the device to clean a large number of extremely dirty spark plugs, that the quantity of detritus will so augment and contaminate the abrasive charge that replacement of the abrasive charge is desirable. The accumulation of such detritus may—in extreme instances—manifest itself in an increase of sump-contained material evidenced by a heightening of the gauge level shown by the stem 23 when manually re-elevated as outlined above. Under such circumstances, of course, the intelligence of the user may be relied upon to dictate the replacement of the thus-contaminated abrasive charge with a fresh one. Moreover, the level-indicating stem 23 has the further faculty of providing the intelligent operator with an accurate indication of the amount of spark plug cleaning at any given instant of use. This is possible because—for any character of fouling on a plug (oily grime, soft soot, hard scale or crust)—the device will accomplish cleaning at a fairly definite rate. Thus, so much abrasive withdrawn from the sump 120 and projected against the plug 10—evidenced by corresponding depression of the stem 23 from its initially-elevated position—affords a remarkably accurate criterion of the amount of spark plug cleansing effected. If the operator will practice the simple policy of interpreting depression of the initially-elevated stem 23 in terms of spark plug cleaning work done, it will be possible for him to obtain thorough results every time without repeated removal and inspection of each plug to guard against deleterious abrasion of electrodes and insulation through excessively prolonged operations of the device.

The plug supporting member 9 is preferably made of a rubber composition, and an annular supporting band 27 right-angular in cross-section is secured in place within the upper end of the supporting member 8 and forms a support and bearing for the plug supporting member 9 as it is adjusted to secure uniform cleaning action of the jet throughout the periphery of the inner end of the plug being cleaned; and said plug supporting member 9 has a plurality of stop notches or recesses 28, and a corresponding number of radial indexing lines 29 at its lower end, as best shown in Figure 3. The numeral 30 designates a fixed spring stop member secured to the band 27 and through said band to the supporting member 8; and the free upper end of this spring member enters one or another of the notches 28 to hold the plug supporting member 9 and the spark plug 10 supported thereby in definite angular positions.

In using my cleaning device to clean spark plugs having three shell electrodes, as is the case with the plug shown, the plug is placed within the supporting member 9 with the centers of the electrodes 31, see Figure 3, in line with the indices 29; and the two while held together are placed within the annular supporting band 27 and the member 9 is so positioned, angularly, that the spring stop member 30 engages one of the notches 28. Then when a jet of air and abrasive material is projected against the inner end of the plug, as hereinbefore explained, approximately one-third of the circumferential extent of the plug will be acted upon by the jet; and thereafter the support 9 and the plug carried thereby are angularly adjusted to cause the spring stop to engage the second and the third of the notches 28, to complete the cleaning of the plug. Ordinarily but not necessarily the jet will be established by depressing the lever 18 only at such times as the spring stop 30 is in engagement with a notch 28 to hold the support 9 and the plug in a definite angular position.

Having thus described and explained my invention I claim and desire to secure by Letters Patent:

1. In a spark plug cleaning device of the class described, a suitable casing closed at its upper end; an abrasive containing hopper within said casing; a member adapted to support a spark plug to be cleaned; means at the upper end of said casing for supporting said plug supporting member; an abrasive material supply tube depending from said supporting member into said hopper and adapted to discharge a jet of air and abrasive material against the lower end of a spark plug supported by said supporting member; a vertically movable plate adapted to rest upon a mass of abrasive material contained with-

in said hopper, and having a hole through which the lower end of said abrasive material supply tube extends; and an upwardly extending member for lifting said plate, and which lifting member extends through a hole in the closed upper end of said casing.

2. In a spark plug cleaning device of the class described, a casing having a cover at its upper end; an abrasive containing hopper within said casing; a rotatable member adapted to support a plug to be cleaned and having a plurality of notches spaced apart from one another, and a like number of radial indexing lines at its lower end; a fixed stop member adapted to engage said notches to hold said rotatable member in definite angular positions; means upon said cover for supporting said rotatable plug supporting member; an abrasive material supply tube depending from said supporting member into said hopper and adapted to discharge a jet of air and abrasive material against the lower end of a spark plug supported by said supporting member; and a vertically movable abrasive level indicator having a lower plate portion adapted to rest upon a mass of abrasive material contained within said hopper, and an upwardly extending lifting portion which extends through a hole in said cover.

3. A spark plug cleaning device of the class described, comprising: a casing, a charge of loose abrasive material disposed in the sump of said casing, means for supporting a spark plug to be cleaned above the surface of the abrasive charge, a follower member within said casing and adapted to be supported by such portion of said abrasive charge as lies therebeneath, an indicating and follower-member-lifting stem secured to said follower member and slidably-extending upwardly through the top wall of said casing to constitute a follower-lifting handle as well as to afford an indication of the instant level of the follower member, and means including an abrasive duct for progressively withdrawing abrasive material from the casing sump at a point beneath said follower member, for projecting the thus withdrawn abrasive particles against the portions of the spark plug requiring cleaning and for causing the particles projected to be precipitated on top of the follower member to effect descent of the initially manually elevated follower member and indicating stem in proportion to the extent of abrasive charge displacement and use as a spark plug cleaning agent.

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