

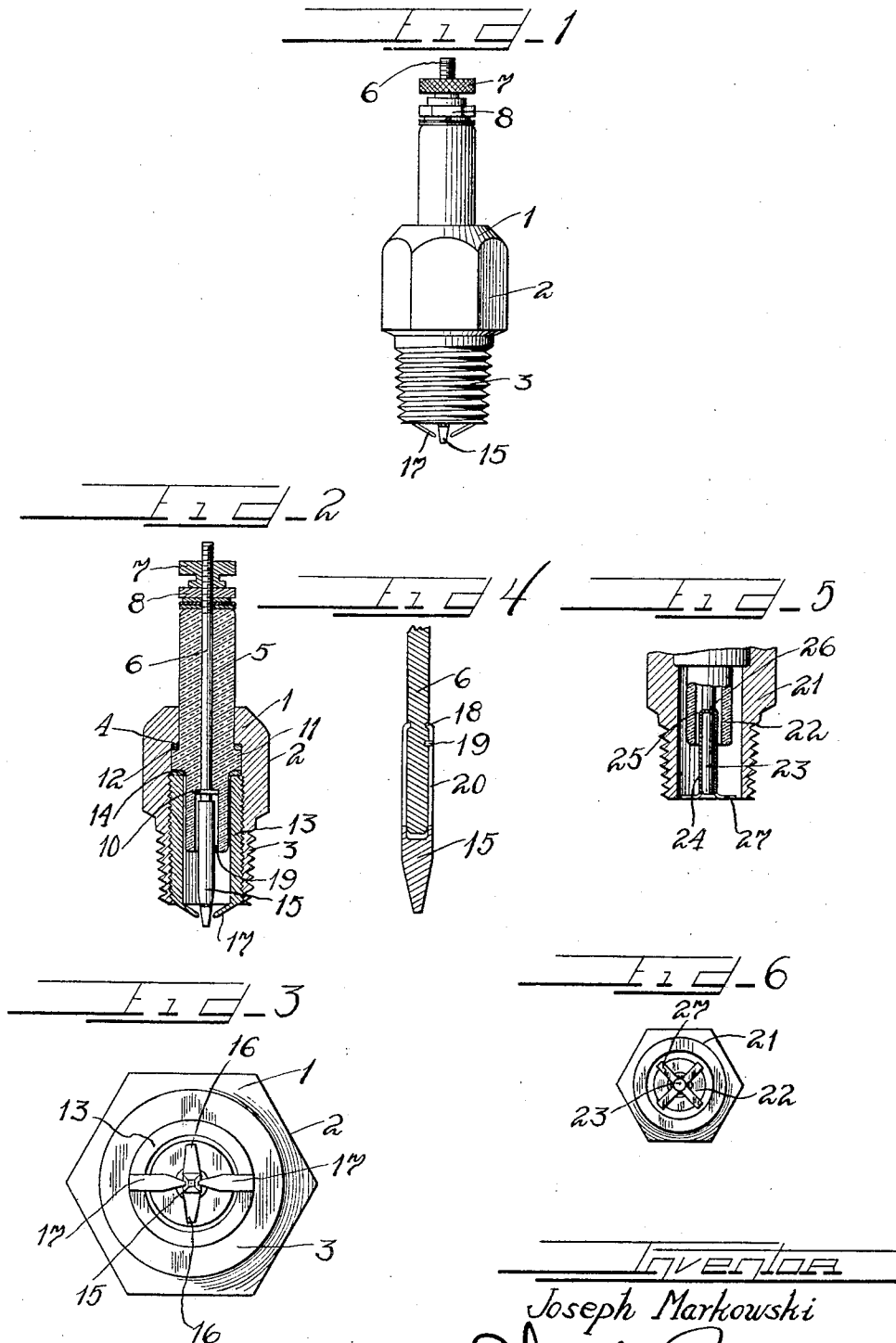
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SPARK PLUG

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UNITED STATES PATENT OFFICE

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SPARK PLUG

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This invention relates to improvements in spark plugs, and more particularly to spark plugs of the type commonly used in connection with automotive and other internal combustion engines, although the device may be used in substantially any location and in substantially any manner where it is desired to produce a spark.

In the past, many and various types of spark plugs and sparking devices have been developed but have, in most instances, proven objectionable in that, after relatively short usage, they fail to fire as surely as is desirable, and fail to give as hot a spark as is desired.

The present invention has been provided to overcome the above noted as well as many other defects and objections in the provision of a spark plug or sparking device which will fire surely and positively even after extremely long usage, and which will give a sufficiently hot spark or sparks to cause quick and complete explosion of fuel, thereby affording a saving of fuel and materially lessening, if not eliminating entirely, the customary carbon deposit.

The invention also seeks the provision of a sparking device wherein all or any parts of the device are readily and inexpensively replaceable.

Another object of the present invention is the provision of a sparking device having points or sparking tips removable while the remainder of the plug or device is intact.

Still another object of the present invention is the provision of a sparking device constructed in such a manner that compression within an engine cylinder, or under some similar circumstances, will tend to force the parts of the device more closely together and automatically compensate for expansion or contraction of the various parts.

While some of the more salient features, characteristics and advantages of a device embodying this invention have been above pointed out, others will become apparent from the following disclosures.

The invention includes these and other features of construction and combinations of

parts hereinafter described, and shown in a preferred form in the drawing:

Figure 1 is a view in elevation of a spark plug embodying principles of the present invention.

Figure 2 is a central vertical sectional view, with parts in elevation, of the structure shown in Figure 1.

Figure 3 is an enlarged bottom plan view of the plug.

Figure 4 is an enlarged vertical sectional view of a portion of the main electrode and its terminal.

Figure 5 is a fragmentary sectional view similar to Figure 2, showing a slightly different form of structure including principles of the present invention.

Figure 6 is a bottom plan view of the structure shown in Figure 5.

As shown on the drawing:

The structure selected to illustrate an embodiment of the present invention is in the form of a spark plug highly desirable for use in the common form of internal combustion engines. This spark plug includes a shell or body 1 having an upper portion hexagonally spaced as at 2 to afford easy engagement thereof by a wrench, and a lower threaded portion 3 for engagement in a suitable aperture in an engine cylinder block. As seen more clearly in Figure 2, the shell is provided with an internally threaded bore in the lower portion thereof, and a smaller smooth bore in the upper portion thereof, whereby an inner annular shoulder 4 is formed.

Slidable into the shell through the bottom thereof is an insulator 5 of porcelain or any other desirable material, this insulator having inserted therein a main electrode 6 threaded at its top end to accommodate the customary terminal nut 7 and washers 8. At the lower portion thereof, the insulator is provided with an enlarged inward bore 9, and the electrode 6 is provided with an annular flange 10 substantially of the diameter of the bore 9 and seating against the shoulder formed by the termination of this bore.

To maintain the insulator 5 connected with the shell 1, this insulator is provided with an annular bead or shoulder 11 extending out-

wardly therefrom and of very slightly less diameter than the internally threaded bore of the shell 1. As stated hereinbefore, the insulator is slidable into the shell through the bottom of the shell, and when so placed in position, the bead 11 will underlie the shoulder 4 of the shell, a washer 12 being preferably disposed between the bead 11 and the shoulder 4, this washer being preferably of non-metallic fireproof material, such as asbestos or the equivalent. Threadedly connected in the lower portion of the shell is a sleeve 13 which abuts a washer 14 similar to the washer 4 in its upper end, the washer 4 bearing against the underside of the bead 11, whereby the insulator 5 will be securely held within the shell 1 by the externally threaded sleeve 13.

To provide adequate firing points, in this instance, a terminal 15 is telescopically engaged over the lower end of the main electrode 6, this terminal carrying diametrically disposed firing points or sparking tips 16 thereon. When the proper circuit has been established, sparking will occur between the points 16 and the sleeve 13 which functions as the negative or ground electrode. The ground electrode 13 is also provided with a plurality of diametrically disposed firing points or sparking tips 17 which extend inwardly sufficiently so that sparking will occur between these points and the central portion of the terminal 15 between the points 16. It is at once apparent that there will be at least one, and, in nearly every instance, at least four hot sparks with every firing of the plug, and, obviously, if one of the points fails to fire, a sufficiently hot spark will be created by the remaining points. It is also apparent that, in the event it becomes desirable to renew any of the points, the terminal 15 or the ground electrode 13 may each or both be readily and easily replaced with the remainder of the plug intact. In replacing the ground electrode 13, the points 17 are grasped by any suitable tool and the sleeve is engaged in or disengaged from the shell 1 by the leverage so obtained.

To properly hold the terminal 15 in position upon the main electrode 6, this terminal is preferably formed in the nature of a split resilient sleeve having its upper edge intumed as at 18 to seat within a suitable groove formed in the electrode 6. To remove the terminal 15, it is simply necessary to grasp the outer end of the same with a suitable tool and pull the same off of the electrode 6 against the inherent resiliency of the split sleeve body portion of the terminal. To replace this terminal, it is simply necessary to insert the sleeve upon the electrode 6 and push it inwardly until the intumed upper edge 18 thereof snaps into the groove in the electrode. To avoid the possibility of the firing points 16 rotating and thus contacting

with the firing points 17, a detent 19 is provided on the electrode 6, this detent slidably fitting within a slot 20 of the terminal sleeve 15.

From the foregoing, it will be apparent that I have provided a spark plug in which all the parts are readily removable and replaceable, the plug including a plurality of firing points adapted to give a sufficiently hot spark to burn whatever lubricant might be in the cylinder and so eliminate carbon deposit, at the same time causing a quick and complete explosion of the fuel, whereby a resultant saving of fuel will occur. Moreover, the plug is so constructed that the compression in a cylinder or other compression bearing against the lower portion of the plug will cause the parts of the plug to fit more closely together and thus automatically compensate for expansion or contraction of the various portions of the plug, rendering the same leakproof. In addition, the present invention is adapted for extremely long life, is simple in construction, and may be economically manufactured.

In Figures 5 and 6, there is shown a slightly different form of structure, including principles of the present invention. The structure shown in Figure 5 comprises specifically a removable terminal provided with a plurality of firing points or sparking tips adapted for use with substantially any form of spark plug.

In this instance, a shell 21 is shown, which is inwardly bored, there being an insulator 22 extending downwardly within the bore, the insulator carrying a main electrode 23. A split sleeve terminal 24 is slidable over the electrode 23, the terminal having its upper edge intumed as at 25 to engage within a suitable groove 26 formed in the electrode. The terminal 24 is removed and replaced in a similar manner to the terminal 15 previously described herein, with the exception that no detent is used on the electrode to engage within a split in the terminal, since it does not matter if the terminal 24 rotates or not. This terminal 24 is provided with a plurality of outwardly extending firing points or sparking tips 27, whereby sparking will occur between the tips 27 and the shell 21, the shell, in this particular case, acting as the ground electrode.

From the above description, it will be apparent that the structure shown in Figures 5 and 6, as well as the structure shown in Figures 1 to 4, inclusive, includes a spark plug or sparking device wherein a plurality of firing points are provided, the firing points being readily and easily removable and replaceable as desired.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this inven-

tion, and I, therefore, do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

5 1. In a spark plug, a shell, an insulator insertable in said shell through the bottom thereof, an electrode in the form of a sleeve engaged in said shell to retain said insulator in place, diametrically opposed sparking
10 points carried by said sleeve, an electrode in said insulator, a resilient split sleeve removably associated with said last said electrode, opposed sparking points carried by said split sleeve, and means for maintaining the points
15 on said sleeve in a vertical plane normal to the vertical plane of said first said points.

2. In a sparking device, a shell having an inner shoulder, an insulator insertable in said shell thru the bottom thereof and having a
20 shoulder to underlie said inner shoulder, a ground element engaged in the lower portion of said shell flush with the lower end thereof to retain all of the parts connected and a pair of inwardly inclined sparking tips project-
25 ing from diametrically opposite sides of said ground element, a main electrode carried by said insulator, a sparking terminal removably attachable to said main electrode, said sparking terminal including a split sleeve for
30 normally maintaining said terminal on said main electrode, and a pair of sparking tips disposed on said sparking terminal to spark with a portion of the ground element structure between the pair of tips thereon.

35 In testimony whereof I have hereunto subscribed my name at Chicago, Cook County, Illinois.

JOSEPH MARKOWSKI.

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