

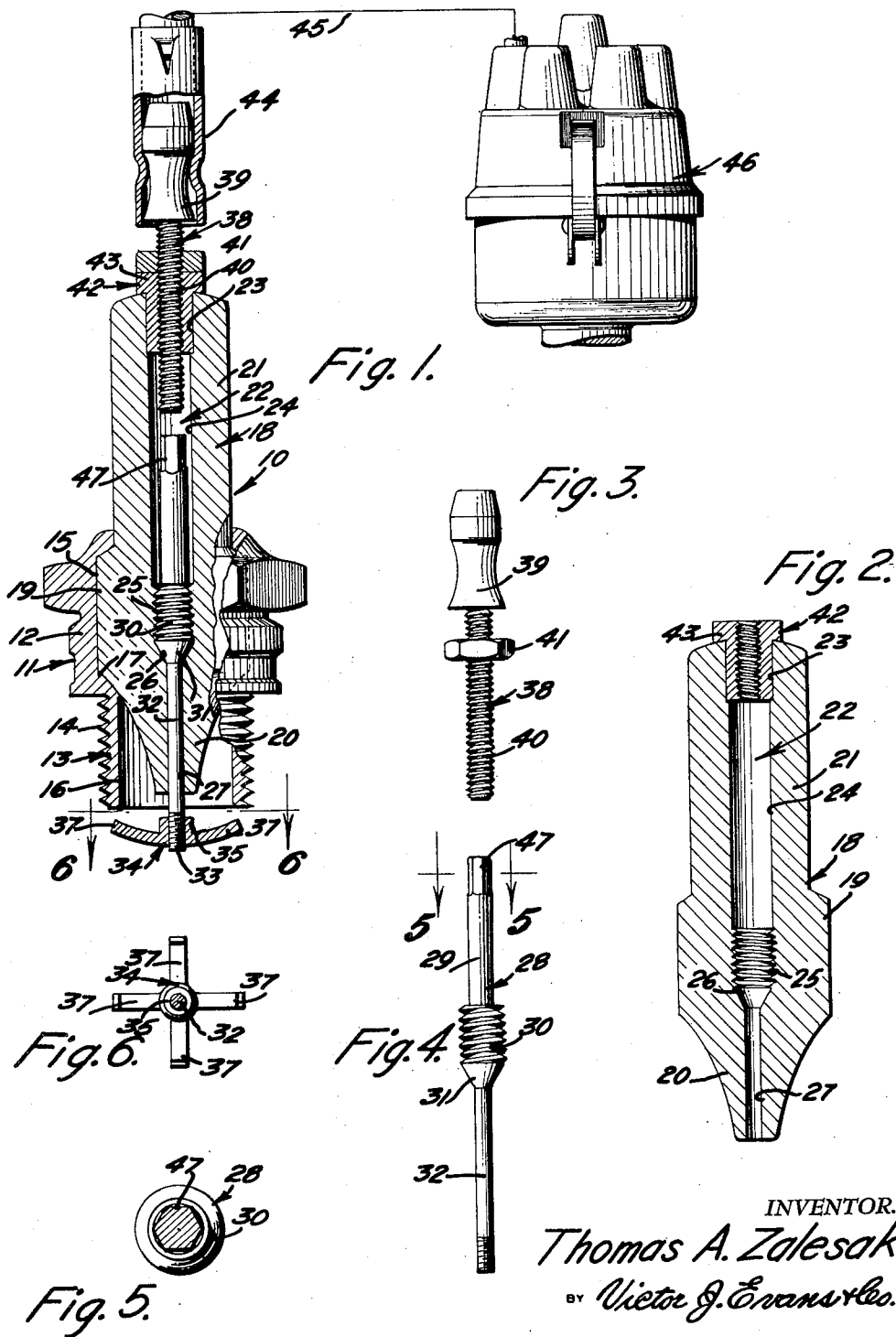
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SPARK PLUG WITH INTENSIFIER

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SPARK PLUG WITH INTENSIFIER

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This invention appertains to new and useful improvements in spark plugs such as spark plugs for internal combustion engines.

The principal object of the present invention is to provide a spark plug which is constructed so that the spark can be intensified as desired, and wherein the spark plug is made up of elements which can be readily replaced as desired or required without the necessity of replacing the entire spark plug.

Another important object of the present invention is to provide an improved spark plug which will have a long life, and wherein the spark plug of the present invention is provided with a built in intensifier so that the spark can effectively fire even through deposits of oil or carbon, and wherein the spark plug will be self-cleaning.

Another object of the invention is to provide a spark plug which is rugged in construction and economical to produce.

Other objects and advantages will be apparent from the drawings which illustrate a preferred embodiment of the invention and in which:

FIGURE 1 is a longitudinal sectional view taken through the improved spark plug of the present invention.

FIGURE 2 is a sectional view taken through the body member.

FIGURE 3 is an elevational view illustrating the intensifier.

FIGURE 4 is an elevational view of the primary electrode.

FIGURE 5 is a sectional view taken on the line 5-5 of FIGURE 4.

FIGURE 6 is a sectional view taken on the line 6-6 of FIGURE 1.

Referring in detail to the drawings, the numeral 10 indicates the improved spark plug of the present invention which is shown to comprise an outer shell 11 that includes an upper portion 12 and a lower portion 13, and the lower portion 13 is threaded externally as at 14. The interior of the shell 11 is hollow and the upper inner space 15 is of larger size than the lower inner space or area 16, as for example, as shown in FIGURE 1, whereby there is provided or defined a shoulder 17 between the spaces 15 and 16.

The numeral 18 indicates a body member which is adapted to be made of a suitable insulated material such as porcelain. The body member 18 includes an enlarged section 19 which is seated in the upper recess 15 of the shell 11 and the body member 18 further includes a lowered tapered section 20 which is arranged in the lower space 16 of the shell 11. The body member also includes an upwardly disposed section 21 of reduced size, and there is provided in the body member 18 a longitudinally extending bore which is indicated generally by the numeral 22. The bore 22 is shaped to include an upper first section 23, and there is also provided a second section 24 which is of smaller diameter or size than the section 23, and a threaded section 25 is adjacent the bottom of the section 24, and as shown in the drawings, there is provided a tapered shoulder 26 which is arranged above a third section 27 of the bore.

The numeral 28 indicates a primary electrode, and the primary electrode 28 includes an upper first portion 29 which is arranged in the section 24 of the bore 22, and the electrode 28 also includes a threaded portion 30 which

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is arranged in threaded engagement with the third section 25 of the bore, the electrode further including a tapered portion 31 which abuts or engages the shoulder 26. Furthermore, the electrode 28 includes a lower reduced size portion 32 which extends through the section 27, and the outer end of the portion 32 is threaded as at 33, and the outer end of the portion 32 projects beyond the outer end of the shell and around the end of the body member.

As shown in the drawings, there is provided a firing element 34 which includes an internally threaded hub or sleeve 35 that is arranged in threaded engagement with the threaded end 32 of the electrode 28, and formed integral with the hub 35 or secured thereto is a plurality of radially disposed lugs or fingers 37.

There is also provided an intensifier which is indicated generally by the numeral 38, and the intensifier element or electrode 38 includes an enlarged head 39 on its upper end and there is also provided an externally threaded shank 40, and a fastener such as a lock nut 41 is arranged in threaded engagement with the shank 40. The numeral 42 indicates a bushing which includes an outer enlarged flange 43, and the shank 40 is arranged in threaded engagement with the bushing 42. The numeral 44 indicates a bracket or clip which is arranged in engagement with the head 39, and a conductor 45 is adapted to be used for connecting the bracket 44 to the member such as the vehicle distributor 46.

From the foregoing, it will be seen that there has been provided an improved spark plug with an intensifier, and with the parts arranged as shown in the drawings, it will be seen that the firing element 34 is adapted to have its hub 35 threaded on the end 33 of the electrode 28 and the firing element 34 is provided with the plurality of spaced apart lugs or fingers 37 which insure that a most efficient sparking will take place as for example when spark is being supplied to an internal combustion engine or the like. The clip such as the clip 44 is adapted to be mounted on the head 39 in order to provide a means for completing the electrical circuit to the vehicle ignition component such as the distributor 46. In addition, as shown in FIGURE 1, there is a gap or space between the inner end of the intensifier 38 and the adjacent end portion of the electrode 28 and by loosening the lock nut 41, the intensifier 38 can be rotated in the bushing 42 so as to vary or change the size of the gap between the members 38 and 28 in order to change the position of the spark produced by the plug 10 of the present invention, and after the intensifier 38 has been adjusted to its desired location, the lock nut 41 can be tightened in order to maintain the intensifier immobile in its desired position.

The spark plug of the present invention will have a minimum tendency to become fouled, and wherein the spark plug will also have a long life during use. The spark plug is adjustable as previously stated and the spark plug can be used in conventional vehicle ignition systems without requiring any alteration of the usual parts of the vehicle. The various elements of the spark plug can be interchanged or replaced when desired so that it will not be necessary to replace the entire spark plug and this will provide an economical advantage for the use of the spark plug. In addition, the spark plug has a built in intensifier which is adjustable and this intensifier 38 will permit the spark to fire through oil or carbon deposits and the plug will be self-cleaning. The intensifier is adjustable, and if the intensifier is not needed it can be adjusted so that the spark of the plug can be suitably regulated whereby it will not interfere with the operation of the remaining portion of the plug.

The purpose of the intensifier 38 is to regulate the intensity of the spark discharged from the firing points 37, and the head 39 of the intensifier is adapted to receive the spark plug clip 44 on the ignition wire 45 from the

distributor 46 of the spark plug, and the intensity of the spark can be regulated by increasing or decreasing the gap between the members 38 and 28 as for example by screwing the intensifier 38 in or out of the bushing 42. The nut or fastener 41 serves to lock the intensifier 38 in its various adjusted positions by cooperating with the bushing 42 and the lock nut 41 can be tightened after the intensifier 38 has been adjusted. In certain instances certain of the threaded connections of the parts can be replaced by the use of other fastening means such as a bonding cement, adhesive or the like. The primary electrode 28 includes the tapered portion 31 which coacts with the tapered shoulder 26 of the body member 18 whereby the parts will be snugly and properly fitted together and whereby the electrode 28 will be maintained in its proper aligned position. The upper end of the electrode 28 may be suitably shaped such as it may have a hexagonal shape as indicated by the numeral 47 in order to receive a suitable tool such as wrench which can be used for tightening or loosening the electrode 28, and the threads 30 and 25 are adapted to coact in order to maintain the electrode 28 in its proper position. The lower portion of the electrode 28 is reduced in size as indicated by the numeral 32 and the lower end as at 33 is threaded and extends beyond the skirt or portion 13 so as to provide a support for the firing points 37 of the firing element 34, and these points 37 are part of the element 34 which is threaded on the end 33 so that the element 34 can be removed and replaced if necessary. Instead of the threaded connection between the firing element 34 and the portion 32, a force fit may be utilized to maintain the member 34 on the portion 32, or other securing means can be utilized. However, the element 34 is of the changeable type and does not function to maintain any of the other parts connected together so that no difficulty is encountered in changing the firing element 34 when desired.

The intensifier 38 is one piece construction, and the lock nut 41 is threaded internally for engaging the intensifier 38. The bushing 42 is threaded internally, and the flange 43 on the upper end of the bushing 42 prevents the bushing from being turned too far into the interior of the body member 18, and in addition the portion 23 of the bore 22 is of a shape or size so as to snugly receive the major section of the bushing 42 as for example as shown in FIGURE 1. In certain instances the bushing per se can be eliminated and/or can be molded as an integral part of the upper end of the body member 18.

The various parts of the spark plug are interchangeable so that they can be readily replaced whereby it is not necessary to purchase an entirely new spark plug instead of a needed part, and the spark plug has a built in intensifier whereby the spark will be able to fire through deposits of oil, carbon or the like, and due to the intensity of the spark, adjustments of the spark plug gap will be minimized and the intensifier will also help make the spark self-cleaning. The intensifier provides the means for regulating the intensity of the spark discharged from the plug. The bushing may be made of a suitable material such as metal, and the body member 18 may be made of a suitable heat resisting or non-conductive material such as porcelain, and the interior and exterior of the body member is shaped or molded to fit the adjacent parts of the other elements. The primary electrode 28 is of conductive material and the upper end of the primary electrode is shaped as at 47 to receive a tool such as a socket of a wrench, and matching threads are arranged on the coacting elements or parts. The firing points 37 are adapted to be made of heat resisting metal and they may have different shapes and the number thereof can be varied. In addition with the spark plug of the present invention an intensified spark can be provided if desired or required, and if an intensified spark is not wanted, the member 38 can be screwed in so that the inner end of the member 38 is in engagement with or contact with the

adjacent end of the electrode 28 so that there will be no gap between the members 38 and 28.

As shown in FIGURE 1 for example, the lugs 37 of the firing element 34 have a generally curved or arcuate formation so that the free ends thereof will point in the direction of the portion 13 so that the spark can be effectively and efficiently jumped between the ends of the lugs 37 and the portion 13.

It is to be noted that when the intensifier 38 is to be adjusted, the lock nut 41 is loosened, and then after the intensifier 38 has been adjusted or regulated in order to have the gap between the intensifier and the electrode 28 of the desired size, the lock nut 41 can be tightened whereby this gap will not vary or change when the spark plug is being used.

Minor changes in shape, size and rearrangement of details coming within the field of invention claimed may be resorted to in actual practice, if desired.

What is claimed is:

1. In a spark plug, a shell including an upper portion and a lower portion, said lower portion being threaded externally, the interior of said shell being hollow, and the upper portion of the shell being larger in cross section than the lower portion thereof, an inner shoulder between the upper and lower portions, a body member having a section seated in the upper portion of said shell and said section abutting said shoulder, a tapered section on the lower end of said body member, and said tapered section being arranged in said lower portion, said body member further including an upwardly disposed section, said body member having a bore therein and said bore including an upper first section, a second section below said first section, there being a threaded section adjacent the bottom of the second section, a tapered shoulder contiguous to said threaded section, said bore further including a third section below said tapered shoulder; a primary electrode including an upper first portion positioned in the second section of said bore, an externally threaded portion of the primary electrode threadedly engaging the threaded section of the bore, said electrode also including a tapered portion engaging the tapered shoulder, and a third section projecting beyond the end of the shell and beyond the body member, and the outer end of the primary electrode being threaded, a firing element comprising a central hub threadedly engaging the outer threaded end of the primary electrode, said firing element further including a plurality of firing lugs; an intensifier element including a threaded shank having a head on its upper end, a fastener threadedly engaging said shank, and a bushing having an upper flange abutting the outer end of said body member, said bushing being threaded internally and threadedly engaging said shank, said bushing being seated in the first upper section of said bore.

2. The structure as defined in claim 1 wherein said head can be rotated in order to adjust the size of the gap between the inner end of the shank and the adjacent end of the primary electrode.

3. The structure as defined in claim 1 and further including a clip mounted on the head of said intensifier element and said clip adapted to have an electrical conductor connected thereto.

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