Aug. 11, 1959 M. G. SCHRAMM 2,899,478

SPARK MODIFIER FOR SPARK PLUGS AND IGNITION SYSTEMS

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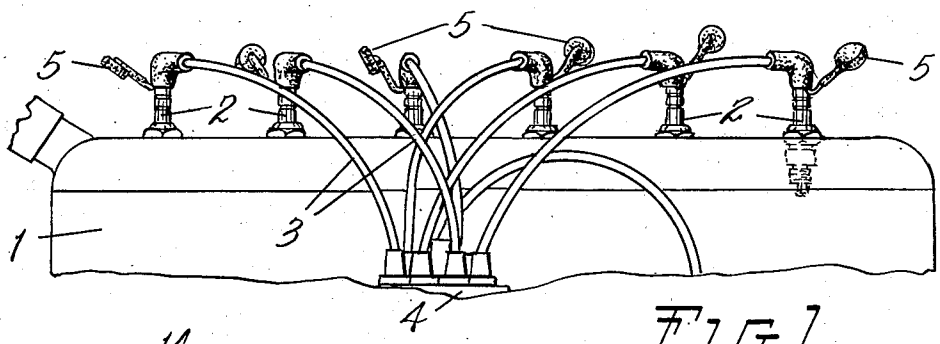



FIG. 1

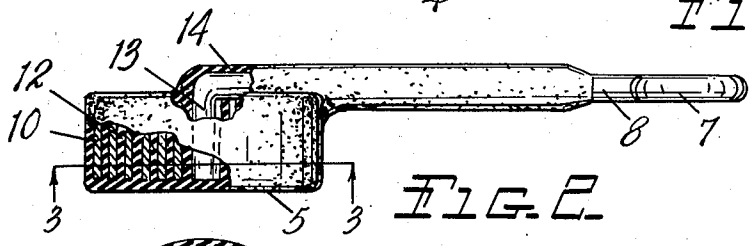



FIG. 2

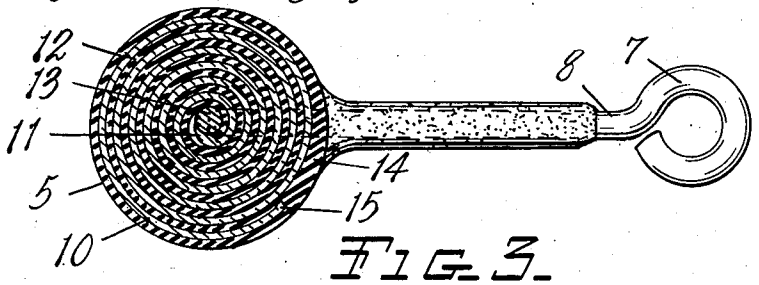



FIG. 3

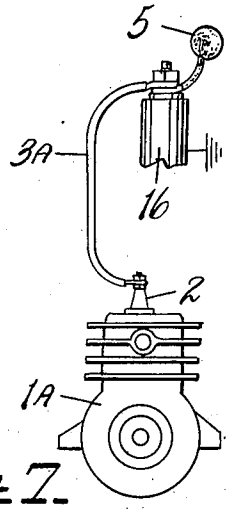



FIG. 7

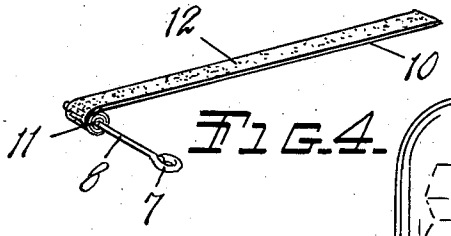



FIG. 4




FIG. 5

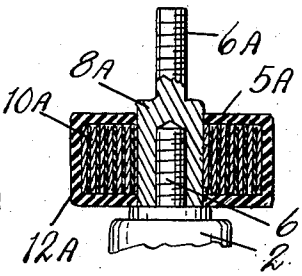



FIG. 6

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SPARK MODIFIER FOR SPARK PLUGS AND IGNITION SYSTEMS

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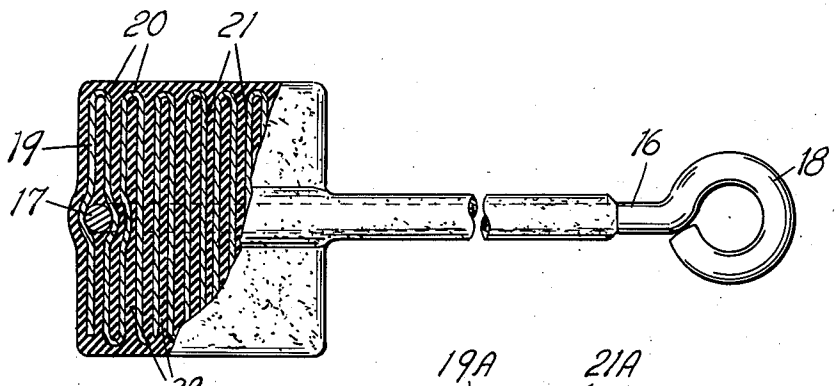



FIG. 8.

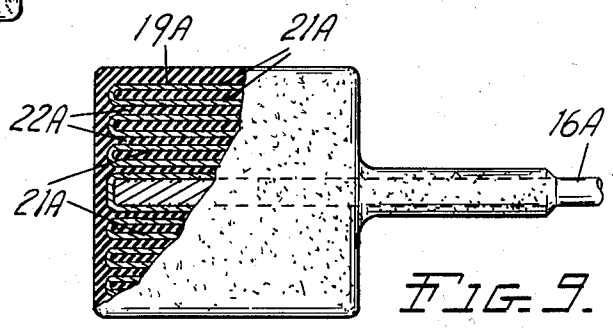



FIG. 9.

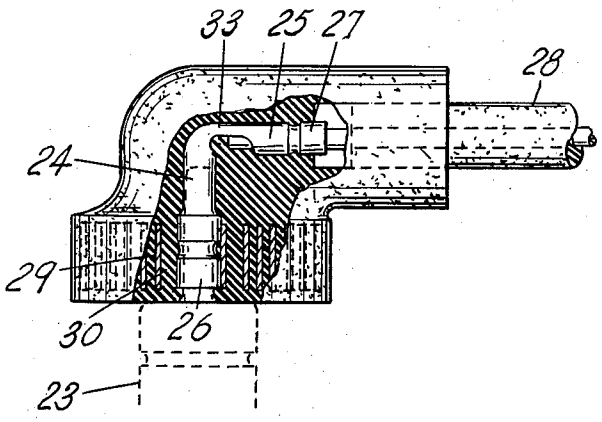



FIG. 10.

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# SPARK MODIFIER FOR SPARK PLUGS AND IGNITION SYSTEMS

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12 Claims. (Cl. 123—148)

This invention relates to improvements in spark modifier for spark plugs and ignition systems.

The technical theory on which this invention operates is as yet unknown and its objects as they relate to the functioning of a spark plug are therefore unexplainable. The results obtained by using the invention are, however, readily visible and since they are all desirable in the operation of an internal combustion engine with spark plugs they can be listed as the immediate objects of the invention. They are:

First, to provide an attachment for the spark plugs of an engine that improves the acceleration and power factors of the engine.

Second, to provide an attachment for spark plugs that eliminates burning of the sparking points of the plugs and further results in the automatic burnishing and smoothing of burned points on old spark plugs.

Third, to provide a spark plug attachment that causes accumulations of carbon and other deposits on spark plug points to be burned off in normal operation of the engine and prevents the fouling of spark plugs.

Fourth, to provide an attachment having the foregoing advantages which is inexpensive to manufacture and easy to install.

Fifth, to provide a high voltage ignition system for internal combustion engines that clears old engines of carbon deposits and improves the operating characteristics of the engine.

The drawings, of which there are two sheets, illustrate five highly practical forms of the ignition system modifier.

Fig. 1 is a side elevational view of a conventional internal combustion engine with spark modifiers of the invention connected to the spark plugs thereof.

Fig. 2 is a side elevational view of the modifier shown in Fig. 1 with portions broken away in cross section.

Fig. 3 is a cross sectional view taken along the plane of the line 3—3 in Fig. 2.

Fig. 4 is a perspective view of the metallic portion of the modifier shown in Figs. 1 to 3 prior to being formed into its final form.

Fig. 5 is an enlarged view, partially in section, showing the mounting connection between the modifier and a spark plug.

Fig. 6 is a fragmentary view partially in section showing a modified form of the spark modifier and its connection to a spark plug.

Fig. 7 is a fragmentary view showing a modified form of attachment of the modifier to the ignition system of an engine.

Fig. 8 is a fragmentary plan view portially in section of a further modified form of the spark modifier.

Fig. 9 is a fragmentary plan view partially in section of a variation of the spark modifier shown in Fig. 8.

Fig. 10 is an elevational view partially in section of a still further form of the modifier operatively associated with a spark plug and a spark plug lead wire.

Fig. 1 illustrates a conventional internal combustion engine 1 having conventional spark plugs 2 energized



by spark plug lead wires 3 from a distributor 4. Each plug has connected thereto one of the modifiers 5 of this invention. As is shown more clearly in Fig. 5, each modifier is mounted on the terminal 6 of its plug 2 by having an eye 7 formed in the end of the lead wire 8 of the modifier and slipped over the terminal. A screw cap 9 is then threaded onto the terminal to hold the modifier in place and form the snap connector for the usual hooded spark plug lead wire.

The first form of the modifier shown in Figs. 1 to 5 consists of an elongated thin strip 10 of bendable metal such as copper. A satisfactory size of strip is one quarter inch wide and twelve inches long, but this can be varied. One end of the strip is electrically and mechanically connected as by soldering at 11 to the end of the lead wire. The strip is then given an insulating coating 12 and rolled in a coil about the lead wire. The lead wire is then bent at right angles to form a post 13 in the center of the coil and the assembly is given an overcoating 14 of rubber or insulation that extends part way along the lead wire.

The modified form of the modifier as shown in Fig. 6 has a similar strip of metal 10A wound around a metal connector 8A. The strip is electrically connected to the connector but its separate turns are insulated as in the first form of the modifier. The connector 8A threads onto the terminal 6 of the spark plug and has an auxiliary terminal 6A projecting thereabove. An insulating case or covering 12A desirably encloses the coil.

In each form of the modifier the strip 10 or 10A is electrically connected to the high voltage terminal of the spark plug but its outer end floats free, electrically speaking, from the ignition system as at 15.

The modified form of the system shown conventionally in Fig. 7 connects one of the modifiers 5 or 5A to the lead wire 3A extending from the spark coil or magneto 16 of a two-cycle engine 1A to the spark plug of the engine.

The form of the modifier shown in Fig. 8 consists of a connecting and supporting wire 16 having a post 17 turned up on one end and a mounting eye 18 on the other. The strip of thin metal 19 is formed into a series of reverse folds 20 with successive opposed layers or reaches 21. The post 17 is electrically and mechanically connected between the two end reaches to support the folded strip over the wire 16. Layers of rubber or other insulating material 22 separate the reaches from each other and from the wire and cover the assembly.

Fig. 9 illustrates a variation of the modifier in Fig. 8 in which the middle reaches 21A of the strip of metal 19A are lapped and electrically connected on opposite sides of the wire 16A which does not have an end post. The successive reaches 21A of the folded strip extend parallel to the wire 16A and project laterally from each side thereof. An insulating coating 22A separates the adjacent reaches and encloses a modifier.

The modifier shown in Fig. 10 is designed to fit directly on the terminal tip of a spark plug, indicated by dotted lines 23. The interior of the modifier consists of a sheet metal clip 33 having downwardly and laterally extending arms 24 and 25 respectively. The end of the downwardly extending arm is folded into a vertically opening socket 26 adapted to receive the terminal tip of the spark plug. The end of the arm 25 is formed into a laterally opening socket 27 adapted to receive the terminal tip on a conventional spark plug lead wire 28.

The strip of sheet metal that forms the mass and area of the modifier is wound in a concentric coil 29 and electrically and mechanically connected around the downwardly opening socket 26. Insulating material 30

separates the turns of the coil and encloses the coil, clip and socket 27. The modifier will thus removably and frictionally grip the terminals of the spark plug and the lead wire.

In any of the installations the modifier functions to provide the advantages pointed out at the beginning of this specification. As stated, the theoretical reason for these advantages is not as yet clearly understood but it is pointed out that the structure provides a mass and area of metal connected to the high voltage system in electrically floating relation thereto, that is, the modifier does not provide any additional circuit either in parallel or in series with the ignition circuit. The modifier may have some capacitive effect due to the lapped relation of its turns and it may have some inductive effect due to its coiled structure. It is not known whether the modifier increases or decreases the maximum spark voltage in the plug or whether it prolongs or shortens the duration of the spark or evens off spark voltage. Determination of the explanation of the theory of operation of the device must await the conduct of tests on equipment not presently available to applicant.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. A modifier for attachment to spark plugs comprising an elongated strip of bendable metal arranged in a coil wound concentrically about an electrically conductive center post and electrically connected thereto, an insulating layer separating the turns of said coil, a lead wire extending from said post and having an eye in its outer end adapted for connection to the terminal of a spark plug, and an insulating cover enclosing said coil and part of said lead wire.

2. A modifier for attachment to spark plugs comprising an elongated strip of bendable metal of the order of the one quarter by twelve inches in size arranged in a coil wound about an electrically conductive center post and electrically connected thereto, an insulating layer on said strip separating the turns of said coil, a lead wire extending from said post and adapted for connection to the terminal of a spark plug.

3. A modifier for attachment to spark plugs comprising an elongated strip of metal arranged in a coil, an insulating layer separating the turns of said coil, a connector electrically connected to and extending from said strip and adapted for connection to the terminal of a spark plug, and an insulating cover enclosing said coil and part of said connector.

4. A modifier for attachment to spark plugs comprising an elongated strip of bendable metal of the order of one quarter by twelve inches in size arranged in a coil wound concentrically about an electrically conductive center post and electrically connected thereto, an insulating layer on said strip separating the turns of said coil, said post being adapted for connection to the terminal of a spark plug, and an insulating cover enclosing said coil.

5. A modifier for attachment to spark plugs comprising an elongated strip of bendable metal arranged in a coil wound concentrically about an electrically conductive center post and electrically connected thereto, an insulating layer on said strip separating the turns of said coil, said post being adapted for connection to the terminal of a spark plug.

6. In combination with the ignition system of an internal combustion engine having a high voltage connection to a spark plug of the engine, a modifier comprising an elongated sheet of metal arranged in coiled form with the turns thereof insulated from each other to provide inductive and capacitive relation between the turns, and means connecting one end of said strip at the center of the coil thereof to said high voltage connection at said spark plug.



7. In combination with the ignition system of an internal combustion engine having a high voltage connection to a spark plug of the engine, a modifier comprising an elongated sheet of metal arranged in coiled form with the turns thereof insulated from each other, and means connecting one end of said strip to said high voltage connection.

8. In combination with the ignition system of an internal combustion engine having a high voltage connection to a spark plug of the engine, a spark modifier comprising an elongated sheet of metal arranged with successive portions of its length in spaced lapped relation, means electrically connecting a center portion of said strip to the center terminal of the spark plug and the high voltage connection of the engine, and insulating means separating the lapped portions of said strip and enclosing the strip.

9. In combination with the ignition system of an internal combustion engine having a high voltage connection to a spark plug of the engine, a spark modifier comprising an elongated sheet of metal arranged with successive portions of its length in spaced lapped relation, means electrically connecting a portion of said strip to the high voltage connection of the engine with several of said lapped portions extending serially from the connection to an electrically isolated end, and insulating means separating the lapped portions of said strip.

10. A modifier for attachment to ignition systems comprising an elongated strip of metal arranged with successive portions thereof in opposed lapped relation, said portions being serially electrically connected at adjacent ends and insulated from each other between said ends, and conductive means electrically connected to said strip at the mid-section thereof for connecting the strip to an ignition system.

11. A modifier for ignition systems comprising a supporting and connecting wire having an upturned post on one end and an eye on the other end, an elongated strip of sheet metal secured at one end portion to the post on said wire, said strip being folded into successive overlapping spaced reaches disposed transversely over said wire, and an insulating layer separating said reaches of said strip and covering the strip.

12. A modifier for ignition systems comprising an inner clip having two springable sockets adapted to receive the terminal tips on a spark plug and an ignition lead wire, an elongated strip of metal wound in a concentric coil about one of said sockets and electrically connected thereto, and a covering of insulating material covering said coil and said sockets and extending between the turns of the coil.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,326,366 | Milton | Dec. 30, 1919 |
| 1,994,128 | Foust | Mar. 12, 1935 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 192,024 | Great Britain | Jan. 25, 1923 |
| 1,052,263 | France | Mar. 10, 1952 |