United States Patent [19]

Zygmunt

[11] **3,861,068**

[45] **Jan. 21, 1975**

[54] **IGNITION CABLE IDENTIFICATION SYSTEM FOR INTERNAL COMBUSTION ENGINES**

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[22] Filed: **Nov. 16, 1973**

[21] Appl. No.: **416,406**

[52] **U.S. Cl.** **40/2,** 116/124, 40/316

[51] **Int. Cl.** **A44c 3/00**

[58] **Field of Search** ..... 35/1, 10, 13, 49, 73; 40/2, 2.2; 33/80 AT, 81 AT; 116/124 D

[56] **References Cited**

UNITED STATES PATENTS

3,020,335	2/1962	Gillis	40/316 X
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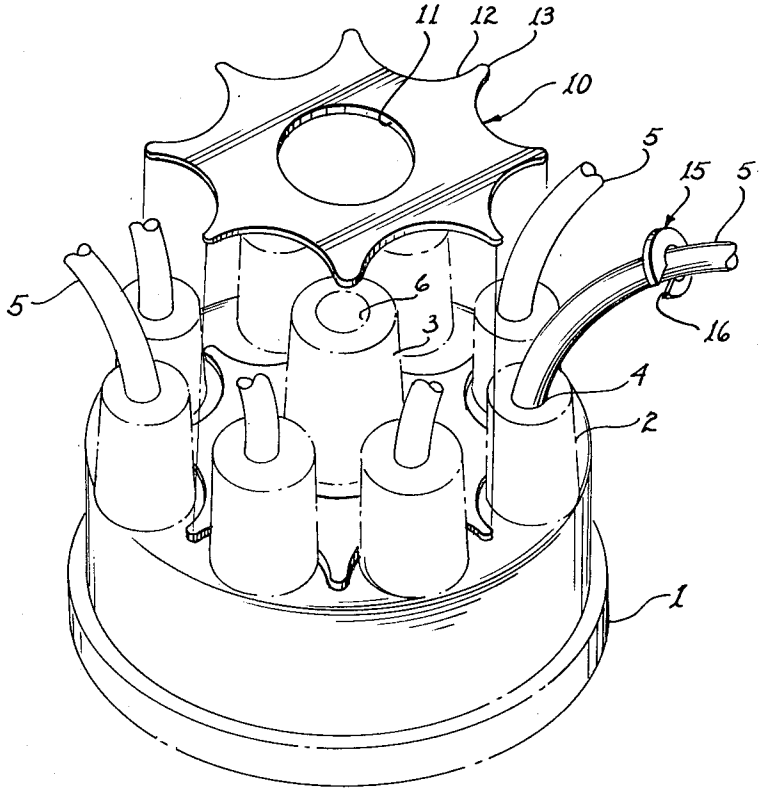
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[57] **ABSTRACT**

Apparatus is disclosed for coding the sockets of a distributor cap and the ignition cables mounted therein to permit temporary separation of the ignition cables from the distributor cap while maintaining correspondence therebetween. A template having a scalloped periphery is located upon the top of the distributor cap to engage adjacent cones of the distributor cap sockets. Each socket is uniquely identified by indicium disposed on the template in proximity to the socket. A plurality of clips, each marked with a similar one of the indicia on template, are attached to the ignition cables mounted in the correspondingly identified sockets. The ignition cables may then be detached from the distributor cap and subsequently reattached in the proper sockets by mating the idicium on the clips with the indicium of the sockets.

9 Claims, 3 Drawing Figures



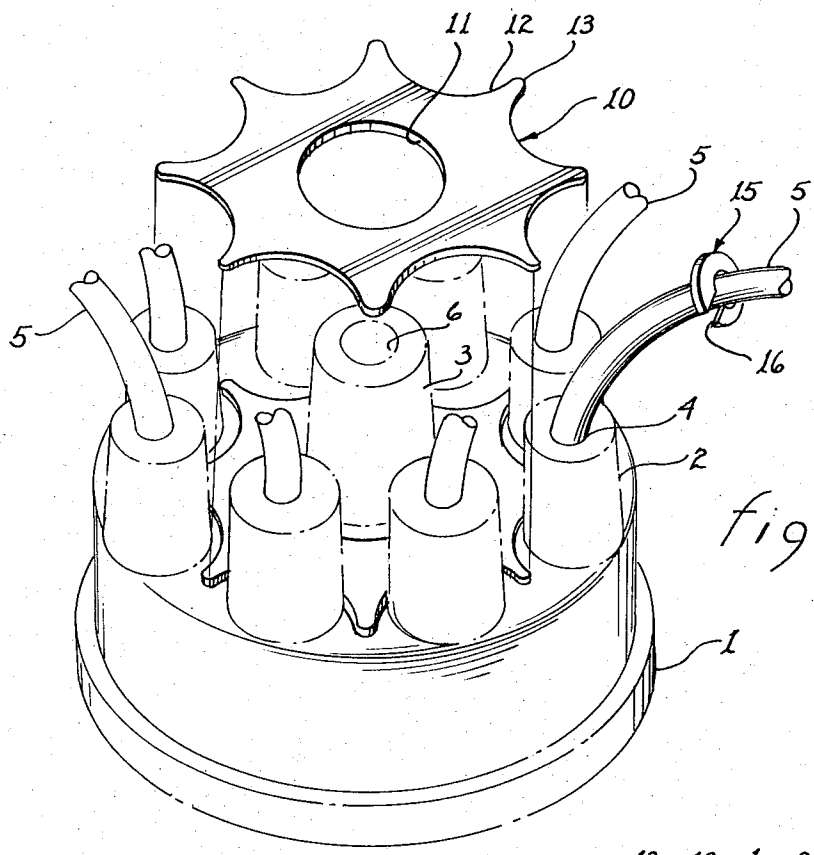


fig. 1

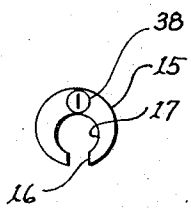


fig. 3

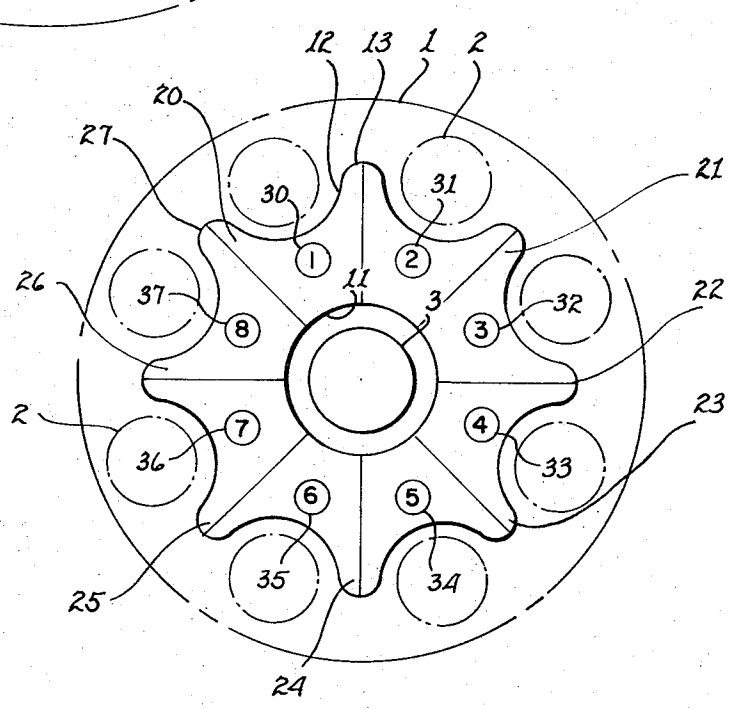


fig. 2

IGNITION CABLE IDENTIFICATION SYSTEM FOR INTERNAL COMBUSTION ENGINES

The present invention relates to coding systems for electrical cables, and, more particularly, to a coding system for establishing correspondence between the ignition cables in an internal combustion engine and the sockets of a distributor cap.

When repairs are made to an internal combustion engine, it is often necessary to remove the ignition cables from within the sockets of the distributor cap. These ignition cables must be replaced in the proper socket or else the firing order will be disrupted. The resulting misfiring, should the engine be operated, may cause damage to the engine.

Several approaches have been taken in an attempt to uniquely mark each of the ignition cables to permit temporary detachment thereof without danger of misassembly. An early approach to a solution of the problem is shown in U.S. Letters Pat. No. 1,551,954, wherein color coded ignition cables were connected to similarly identified cables forming a part of the total wire harness in an automobile. However, the patent does not teach any means for mating the ignition cables with the respective terminals of the timer itself. The use of color coded cables presents several disadvantages. The color code may be indistinguishable after a period of time in that dirt and grease would tend to hide or otherwise obliterate the colors. Further, the coding system taught by the above cited patent would require that existing ignition cables be replaced with appropriately color coded cables, which replacement would entail substantial cost to an operator.

Another approach to the problem has been embodied in the concept of cutting each ignition cable to a unique length, which length is proportional to the distance from each spark plug to the respective socket within the distributor cap. Where the distributor cap is centrally mounted with respect to the cylinders of either in line or opposed engines, several of the ignition cables, even though of slightly different lengths, are readily interchangeable. Therefore, the varying length ignition cable system is not fool proof.

It is therefore a primary object of the present invention to provide a coding system for ignition cables, which system is useable in conjunction with presently available internal combustion engines.

Another object of the present invention is to provide a coding system for internal combustion engines having any number of cylinders.

Still another object of the present invention is to provide a coding system for internal combustion engines, which system is useable with any cylinder configuration.

Yet another object of the present invention is to provide a first means for uniquely identifying each of the sockets of a distributor cap and a second means for correspondingly identifying each of the ignition cables.

A further object of the present invention is to provide a template mountable upon a distributor cap for uniquely identifying each of the distributor cap sockets.

A still further object of the present invention is to provide a uniquely identified clip attachable to each ignition cable of an internal combustion engine.

A yet further object of the present invention is to provide an inexpensive coding system for mating each ignition cable with a socket in a distributor cap.

These and other objects of the present invention will become apparent to those skilled in the art as the description thereof proceeds.

The present invention may be described with greater specificity and clarity with reference to the following drawings, in which:

FIG. **1** illustrates the present invention mounted upon a distributor cap of an internal combustion engine.

FIG. **2** illustrates a top view of the template of the present invention mounted upon a distributor cap.

FIG. **3** illustrates a clip of the present invention attachable to an ignition cable.

Referring to FIG. **1**, there is shown a distributor cap **1**, which cap is representative of the distributor caps used for distributors in internal combustion engines. Cap **1** includes a plurality of peripherally displaced upwardly directed cones **2** and a centrally located cone **3**. The peripherally disposed cones **2** correspond in number to the number of cylinders of the internal combustion engine. Each of cones **2** includes a socket **4** for receiving one end of an ignition cable **5**. Generally, the ignition cable **5** extending from each of cones **2** is attached to the anode of a spark plug. The cable (not shown) extending from socket **6** within central cone **3** is generally the high tension cable connected to the high voltage coil of the ignition system.

As is well known to those skilled in the art, the purpose of the distributor is that of generating a timed charge of electrical energy. The purpose of the distributor cap **1** is that of providing a means for connecting each of the ignition cables **5** to the electrical charge generating mechanism in a sequence corresponding to the firing order of the spark plugs. It therefore becomes apparent that each spark plug must be electrically connected to the appropriate socket **4** in order to preserve the specified firing order.

When repairs or maintenance must be performed on an internal combustion engine, it is not unusual to temporarily remove ignition cables **5** from within sockets **4**. On reconnection of the ignition cables to their respective sockets, it is absolutely necessary that each cable is mounted in the correct socket or else the firing order will be disturbed and the engine will not run or may be damaged if it runs at all. To assure the correct reattachment of ignition cables **5** to their respective sockets **4**, a template **10** is mounted upon distributor cap **1**.

Template **10** includes a central aperture **11** for receiving central cone **3** without binding. It is, of course, necessary to remove the high tension cable from within socket **6** of central cone **3** to permit template **10** to be threaded upon the central cone. The periphery of template **10** is scalloped such that each of scallops **12** generally corresponds to and mates with one of cones **2**. The spikes **13** intermediate adjacent scallops **12** fits between adjacent cones **2**. It may therefore be understood that template **10**, resting upon the upper surface of distributor cap **1** will be inhibited from rotation with respect thereto by spikes **13** extending adjacent cones **2**.

As shown more clearly in FIG. **2**, template **10** is divided into a plurality of sections **20–27** with each section being adjacent one of cones **2**. Each section is identified by indicia **30–37**, such as numerals **1–8**, respectively. In the alternative, each section may be color coded or be otherwise distinguished by unique indicia.

Referring jointly to FIGS. 1 and 3, the apparatus for identifying each of ignition cables 5 will be described. Each of a plurality of clips 15 are attached to one of ignition cables 5. Each clip includes unique indicia corresponding to the indicia disposed upon one of sections 20–27. As shown in FIG. 3, the indicia on one of the clips may be in the numberal 1, which numeral corresponds to indicia 30 of section 20.

The clip itself may be formed as a split ring having an internal recess 17 diametrically corresponding to ignition cables 5. By forming clip 15 of resilient material, it may be mounted upon its respective ignition cable by passing the latter through slit 16 into recess 17.

In operation, prior to detachment of any ignition cables 5 from distributor cap 1, the high tension lead disposed within central cone 3 is detached. Template 10 is mounted upon distributor cap 1 by threading central cone 3 through aperture 11 while orienting the template to position the spikes 13 intermediate adjacent cones 2. The orientation of indicia 30–37 may be randomly selected with respect to cones 2. Clips 15 are secured to each of ignition cables 5 while insuring that the indicia 38 disposed upon each clip corresponds with the indicia upon template 10 adjacent the cone to which the respective ignition cable is attached. Thereby, each of ignition cables 5 are coded to correspond with one of cones 2 adjacent the identical indicia disposed upon template 10. Ignition cables 5 may now be detached from distributor cap 1.

Where the ignition cables 5 cross the distributor cap 1 and prevent the mounting of template 10, an alternative procedure for positioning the template may be used. In such a case, the clips are sequentially attached to the cables to correspond with the order of indicia upon the template 10. The cables obstructing the template may then be detached from the distributor until the template can be positioned thereon. When the template is mounted on the distributor cap, the indicia thereon is mated with the indicia of the clips on the remaining attached cables. Because the earlier attached clips were arranged in sequence corresponding to the order of the indicia on the template, the removed cables are correctly identified with their respective cones 2. Thus, the integrity of the cable identification system of the present invention is preserved even if some, but not all, of the cables are removed prior to the mounting of the template.

Upon reattaching each of ignition cables 5, care must be taken to insure that the indicia 38 on clip 15 mates with the indicia 30–37 of template 10 adjacent the cone to which the ignition cable is reattached. When all of the ignition cables 5 have been reattached, clips 15 are removed and template 10 is lifted off the distributor cap. The high tension cable is replaced within socket 6 of central cone 3.

In the alternative, the template 10 may be left mounted upon the distributor cap 1 to facilitate later disassembly and reassembly of the ignition cables.

From the above description, it will be readily apparent to those skilled in the art that template 10 and clips 15 may be used in conjunction with any presently existing internal combustion engine without modifying or otherwise altering the existing ignition system. Furthermore, the shape and configuration of template 10 may be varied as necessary to accommodate not only different sized distributor caps 1 but also to accommodate various numbers of cones 2 corresponding to the number of cylinders in the internal combustion engine.

While the principles of the invention have now been made clear in an illustrative embodiment, there will be immediately obvious to those skilled in the art many modifications of structure, arrangement, proportions, the elements, material, and components, used in the practice of the invention which are particularly adapted for specific environments and operating requirements without departing from those principles.

I claim:

1. In an internal combustion engine including a distributor cap having a central cone and a plurality of peripherally positioned cones, each of the cones having a socket disposed therein to receive one of a plurality of ignition cables detachably fitted within the sockets, apparatus for coding the ignition cables with their respective sockets, said apparatus comprising in combination:

a. a template positionable upon the distributor cap, said template including means for mating with the central cone;

b. orientation means disposed in proximity to the periphery of said template for engaging at least one of the peripheral cones to prevent rotation of said template with respect to the distributor cap;

c. a plurality of unique indicium located upon said template, each said indicium being located in proximity to one of the peripheral cones; to identify the respective cone; and

d. identification means detachably connected to each of the ignition cables for identifying each ignition cable, each of said identification means including indicium corresponding to one of said indicium located upon said template; whereby, said template is positioned on the distributor cap and said identification means is connected to each of the ignition cables such that said indicium of said template and said ignition cables correspond with one another prior to detachment of the ignition cables from the distributor cap to permit subsequent correct reassembly of the ignition cables and the distributor cap by matching said indicium.

2. The apparatus as set forth in claim 1 wherein said mating means comprises an aperture for receiving the central cone.

3. The apparatus as set forth in claim 2 wherein said orientation means comprises a plurality of scallops about the periphery of said template, each said scallop being in proximity with one of the peripheral cones.

4. The apparatus as set forth in claim 3 wherein said orientation means includes a plurality of spikes extending radially at the junction between adjacent ones of said scallops.

5. The apparatus as set forth in claim 4 wherein said spikes extend intermediate adjacent peripheral cones.

6. The apparatus as set forth in claim 5 wherein said identification means comprises a plurality of resilient clips.

7. The apparatus as set forth in claim 6 wherein said indicium comprises numerals disposed upon said template and said clips.

8. The apparatus as set forth in claim 1 wherein said identification means comprises a plurality of resilient clips.

9. The apparatus as set forth in claim 8 wherein said indicium comprises numerals disposed upon said template and said clips.

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