May 5, 1959 G. F. HAUSE 2,885,458

COMBINATION IGNITION COIL AND IGNITION DISTRIBUTOR

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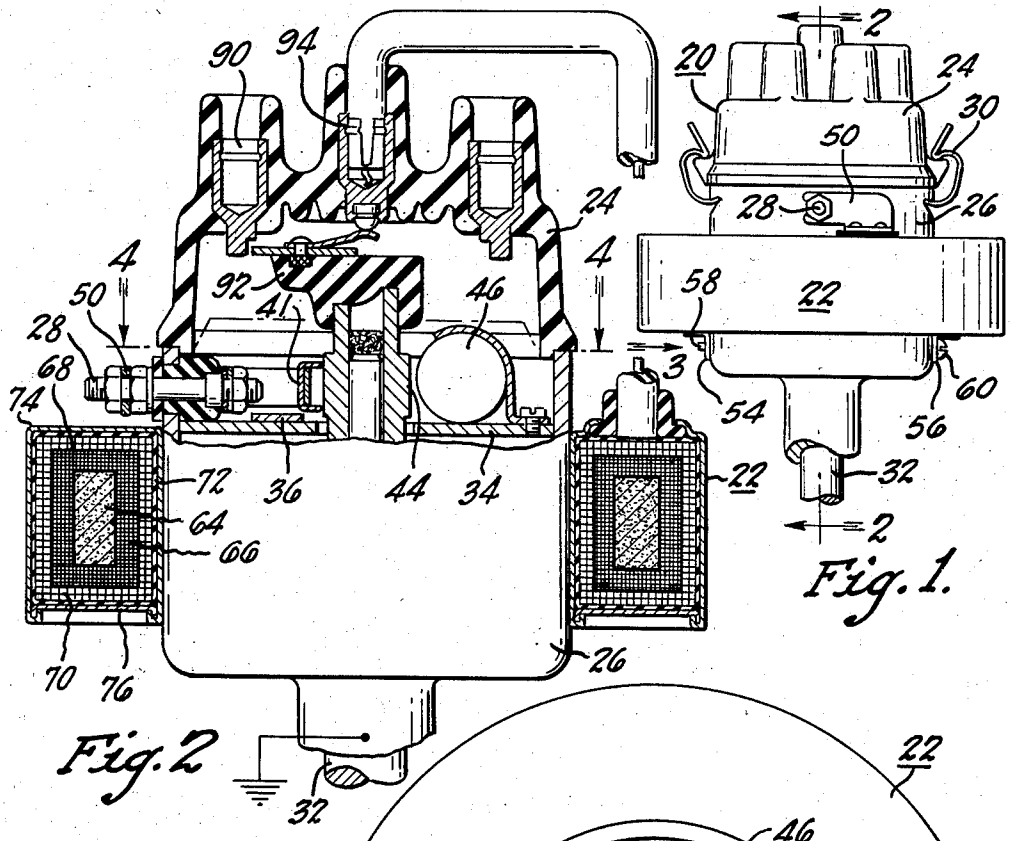

Fig. 1.

Fig. 2

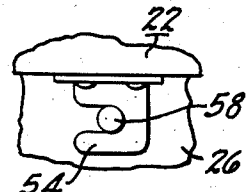

Fig. 3.

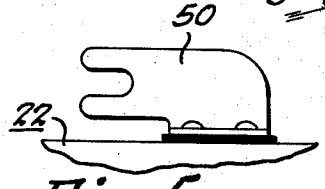

Fig. 5.

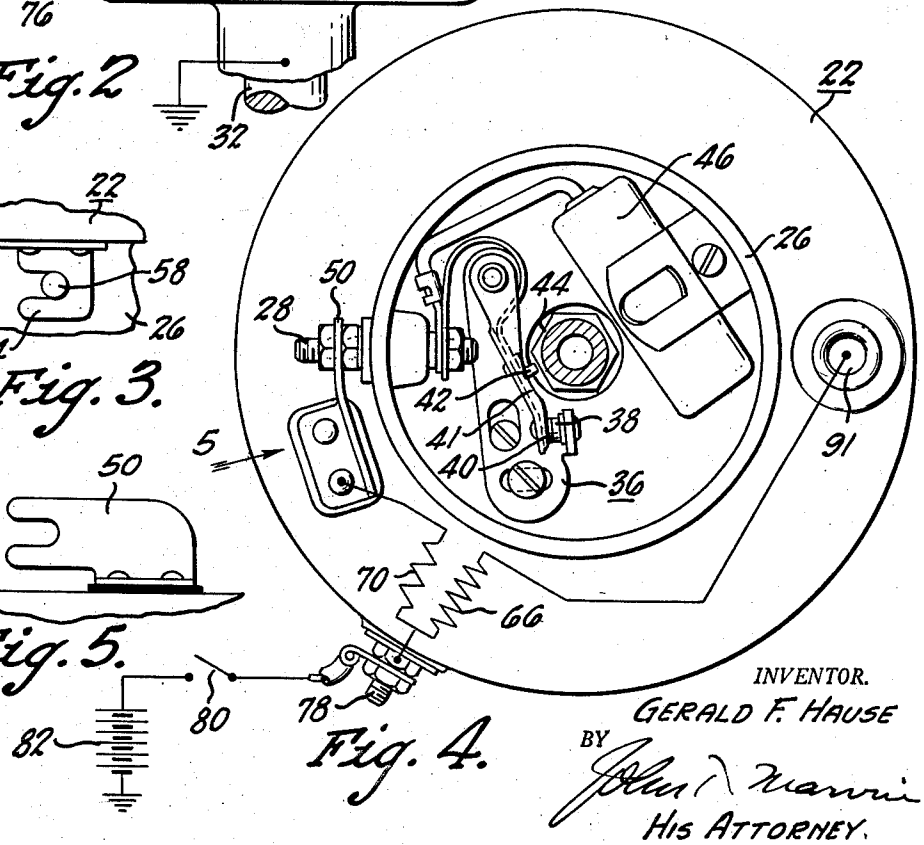

Fig. 4.

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COMBINATION IGNITION COIL AND IGNITION DISTRIBUTOR

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5 Claims. (Cl. 123—148)

This invention relates to ignition coils and is particularly concerned with toroidal ignition coils and combinations including such coils mounted on ignition distributors.

It is the primary object of the invention to provide an ignition coil which is compact and of toroidal shape and is adapted to surround the housing portion of an ignition distributor whereby electrical connections from the coil may be made directly to the distributor and wherein the entire assembly is simplified over existing systems.

In carrying out this object, it is a further object to provide a toroidal ignition coil sealed in a suitable case wherein the coil is fitted over a pair of lugs on a distributor housing and may be locked thereto by partially turning the coil relative to the housing and by then connecting an electrical lead from the coil with the terminal for the breaker point assembly of the distributor for maintaining the coil in position.

Another object of the invention is to provide toroidal ignition coil which utilizes a powdered iron core surrounded by a secondary winding which, in turn, is surrounded by a primary winding, the coil being contained in a sealed container such as a can wherein the terminals for the primary and secondary of the coil extend through the can for easy attachment to related parts.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Figure 1 is a view of a preferred form of the invention used in connection with an ignition distributor for an internal combustion engine.

Figure 2 is a partial sectional view taken on line 2—2 of Figure 1.

Figure 3 is a fragmentary view taken in the direction of the arrow marked 3 in Figure 2 showing the bayonet lock construction on the ignition coil which connects it with the distributor housing.

Figure 4 is a section taken on line 4—4 of Figure 2 showing diagrammatically the electrical hook-up of the coil and distributor.

Figure 5 is a view of a preferred electrical connection for the coil which may be used to connect the coil to the contact terminal of the distributor when using the bayonet lock type of attachment.

In internal combustion engines, the ignition current is distributed to the several spark plugs through an ignition distributor which receives the high voltage ignition current from the ignition coil. The distributor includes a timing mechanism in the form of breaker points which are actuated by a cam wherein the cam position is adjustable to vary the ignition timing of the engine.

In the conventional setup, a separate ignition coil is used, for example, coil as shown in Patent 2,355,864,

wherein an automotive type ignition coil is described in detail which includes a core of soft iron wires having a secondary winding and a primary winding wrapped therearound, the core and windings being sealed within a casing that may be filled with wax or oil as desired. This coil is mounted in proximity to the engine and is connected through a high tension lead to the ignition distributor which is mounted on the engine. A standard ignition distributor as shown in Patent 2,107,470 may be used wherein the entire distributor housing is rotatable to change the cam position, relative to the rubbing block of the breaker points, in accordance with engine suction for affecting advance or retard of the ignition timing. Such a distributor is disclosed in the drawings of this application.

It is to be understood that the same result may be obtained by utilizing a rotatable breaker plate within the housing and maintaining the housing stationary. This type of distributor structure is shown in Arthur 2,131,019, Fitzsimmons 2,471,318 and Bales 2,739,195. It is apparent that the coil as hereinafter disclosed may be applied to any of these several types of distributors with minor modifications in mechanical structure which do not affect the coil position with respect to the distributor housing.

The present invention is specifically directed to the combination of a toroidal ignition coil mounted directly on the distributor. This eliminates electrical leads, reduces and simplifies wiring beneath the hood of an automotive vehicle, and, in general, makes the entire assembly more compact and neat. Furthermore, the toroidal coil, provides a compact ignition coil which may readily be assembled or disassembled with respect to the distributor housing when replacement thereof is necessary.

Referring specifically to the drawings, Figure 1 is a view of an ignition distributor **20** which is shown in assembled relation with a toroidal ignition coil **22**. The distributor **20** includes an insulating cap **24**, an iron housing **26**, and a breaker point terminal **28**. The cap **24** is held to the housing **26** by means of a pair of spring clips **30** and the mechanism within the distributor is driven through a rotatable distributor shaft **32** which passes through the bottom of the housing and is driven by the engine.

Figure 2 shows the internal structure of the distributor which includes a breaker plate **34** that carries a circuit breaker **36** that includes contacts **38** and **40** wherein **40** is a movable contact on arm **41** which carries a rubbing block **42** that engages a cam **44** carried by the end of the distributor shaft. When the shaft **32** rotates, cam **44** likewise rotates and, as the lobes of the cam pass the rubbing block **42**, the contacts **38** and **40** of circuit breaker **36** are opened and closed to make and break the circuit to the ignition coil primary. Within the housing **26** is a centrifugal weight mechanism, not shown, which modifies the ignition timing with respect to speed. That is to say, it advances the cam position with respect to the rubbing block whereby the ignition timing is advanced as speed increases and vice versa. Superimposed upon this control is the control of a suction device, not shown, that is responsive to engine suction and which rotates the entire distributor housing, in this instance, to move the circuit breaker rubbing block relative to the cam for advancing or retarding the ignition timing in superimposed relation to the speed control of the centrifugal mechanism. These timing functions and controls are well known in the art and form no part of this invention.

The terminal **28** for the distributor breaker points is connected through the housing **26** to the circuit breaker **36** and is parallelly connected to condenser **46** that is

grounded to the housing 26. Connected to the terminal 28 is a fixed connector 50 from ignition coil primary 70 of the coil 22. Coil 22 has two or more lugs 54 and 56 thereon wherein the lug 54 passes over pin 58 while the lug 56 passes over a pin or screw 60. Thus, the coil 22 may be mounted on the housing 26 by removing terminal 28, passing the coil over the housing from the top and aligning the lugs 54 and 56 with the pins 58 and 60 and then turning the coil 22 slightly to engage the bayonet slots whereupon the screw 60 may be tightened to lock the distributor in place.

In order to hold the coil in place, the rigid connector lead 50, as shown in Figure 5, is provided with a bifurcated end that embraces the terminal 28 when the bayonet slots are engaged with the pins whereby the lock nut thereon may be tightened for assuring a good electrical connection. This connection may take the place of the lock screw 60 if desired. It is understood that the connector 50 is properly insulated with respect to the case and that a wire lead may be substituted thereon, if desired, although such modification will require the use of other locking means such as screw 60. In place of two lugs 54 and 56, any number may be used as is desired or other means may be used to attach the coil to the housing, the main feature being that the coil 22 is toroidal in shape and passes over the housing whereupon the terminal 28 can be passed through the housing wall and assembled in place.

Referring specifically to the coil 22, it will be noted that it includes a magnetizable core 64 formed from soft iron, lamina or from soft iron powder within a retaining shell such as paper or fiber. This core may be formed from briquetted iron powder preferably sintered or it may be made from mixtures of iron powder and a binder, such as a phenolic, molded to shape. Around this doughnut-shaped core is spirally wound a secondary winding 66 which is then covered with an insulating layer 68 and thereafter a primary winding 70 is wound thereover and is protected by a second insulating cover 72. The entire coil assembly is placed within a metal can 74 which includes a cover 76 which may be sealed in place by means of gaskets, cements or other suitable and well known expedients. Oil or wax may be used to fill the casing, if desired. It is understood that the primary may be wound on core 64 and the secondary wound thereover as is desired provided that the proper electrical characteristics are obtained. Within the coil, the outside secondary winding lead is joined to the inside primary winding lead and this junction is connected to terminal 78 which is connected through an ignition switch 80 to a battery 82, which is grounded at the other side thereof. The other primary lead 50 is connected to the terminal 28 while the other secondary lead is connected to the high tension terminal 91.

In operation, leads from the several spark plugs are connected in sockets 90 at the top of the distributor cap 24 which sockets are progressively energized through a rotor 92 carried at the top of the cam which rotor 92 is connected to a central high tension socket 94 in the distributor cap that, in turn, is connected to high tension terminal 91.

From the foregoing, it is apparent that the present construction eliminates unsupported wires within the motor compartment and reduces the length of connections and, in general, makes for a neater and more compact setup under the hood of the car. Simultaneously, it is possible to support the coil directly on the distributor whereby ease of replacement of the distributor and/or coil is greatly improved.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A combination ignition coil and ignition distributor for use with an internal combustion engine comprising in combination; an ignition distributor including a cylindrical metallic body portion, an ignition coil of toroidal shape adapted to surround and embrace said body portion, positioning means on said coil adapted to engage portions of said body portion for predeterminedly positioning the coil axially thereto, and means cooperating with the coil and body portion for fixedly fastening the coil in said predetermined position, whereby the coil is supported by said distributor body.

2. A combination ignition coil and ignition distributor for use with an internal combustion engine comprising in combination; an ignition distributor including a cylindrical metallic body member, a cooperating member comprising an ignition coil of toroidal shape adapted to surround and embrace said body portion, a pair of bayonet locking ears on one of said members, a pair of cooperating pins on the other of said members whereby the ignition coil may be attached to the cylindrical body member by aligning the ears with the pins and turning the coil through a predetermined angle to engage the pins with the ears whereby the coil is supported by said distributor body, and means for preventing counter-rotation of the coil when said locking ears are assembled with said pins.

3. A combination ignition coil and ignition distributor for use with an internal combustion engine comprising in combination; an ignition distributor including a circuit breaker therein, a cylindrical metallic body portion, a terminal for said circuit breaker extending through and insulated from said body portion, an ignition coil of toroidal shape adapted to surround and embrace said body portion, positioning means cooperating with said coil and said metallic body portion for supporting the coil with respect to said body portion, and a fixed electrical connection extending upwardly from said coil for connecting to said circuit breaker terminal whereby the coil is locked with respect to said positioning means and simultaneously electrically connected to said circuit breaker.

4. A combination ignition coil and ignition distributor for use with an internal combustion engine comprising in combination; an ignition distributor including a circuit breaker therein, a cylindrical metallic body portion, a terminal for said circuit breaker extending through and insulated from said body portion, an ignition coil of toroidal shape adapted to surround and embrace said body portion, positioning ears on said coil, cooperating means on said cylindrical body portion for engaging the ears to position the coil with respect to the body portion for supporting the coil with respect to said body portion, an electrical connection fixedly attached to said coil and so disposed as to engage said terminal when the positioning ears and cooperating means are engaged whereby the electrical connection between the coil and the terminal when completed forms a locking device for preventing relative movement between the positioning ears and the cooperating means.

5. In combination with an ignition distributor having a cylindrical metal body portion, an ignition coil of toroidal shape adapted to surround and embrace the body portion, said ignition coil comprising a magnetic core, a primary and a secondary winding wound around the core, and a metallic casing enclosing said core and windings, and means on the casing for fastening the coil to said cylindrical body portion whereby the coil is fixedly supported in position with respect to said distributor.

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