Oct. 7, 1941. J. T. FITZSIMMONS ET AL 2,257,844

COIL-TIMER-DISTRIBUTOR UNIT

Filed April 22, 1940 3 Sheets-Sheet 1

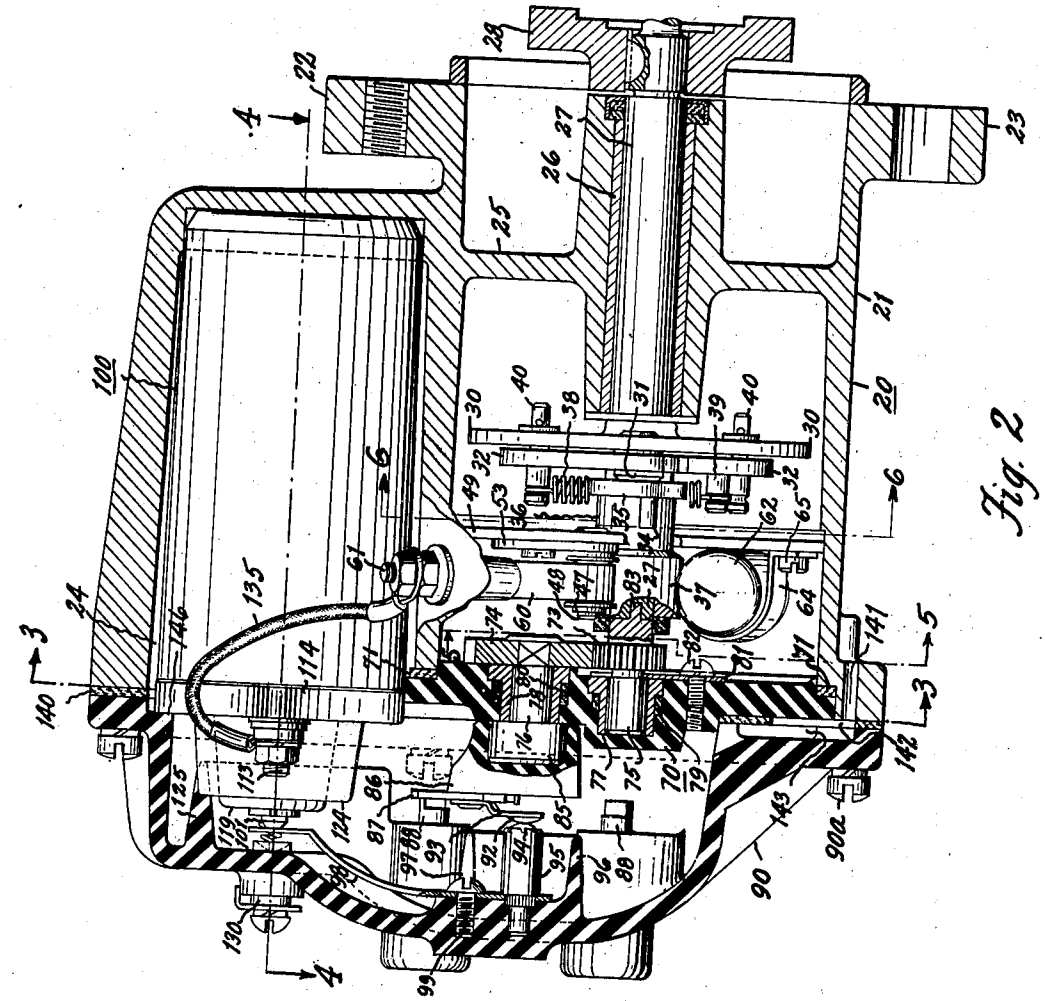


Fig. 2

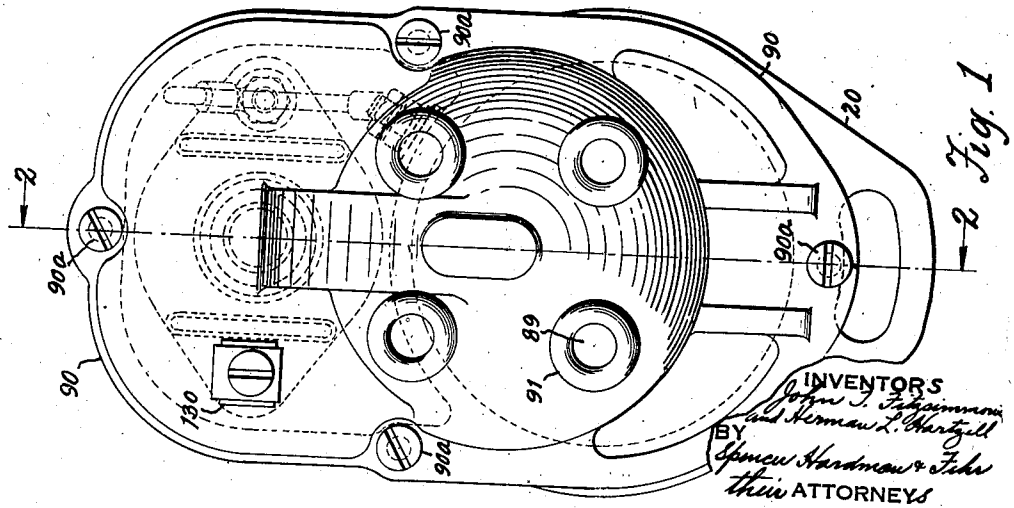


Fig. 1

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COIL-TIMER-DISTRIBUTOR UNIT

Filed April 22, 1940 3 Sheets-Sheet 2

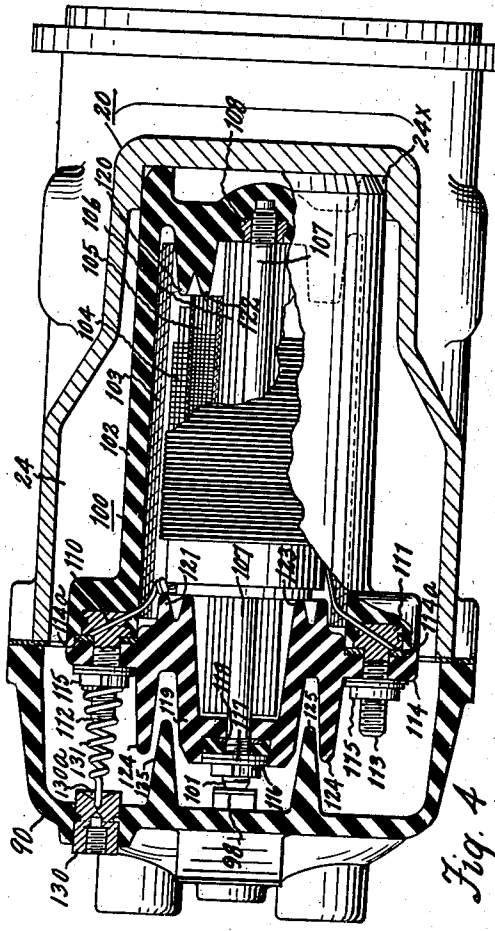


Fig. 4

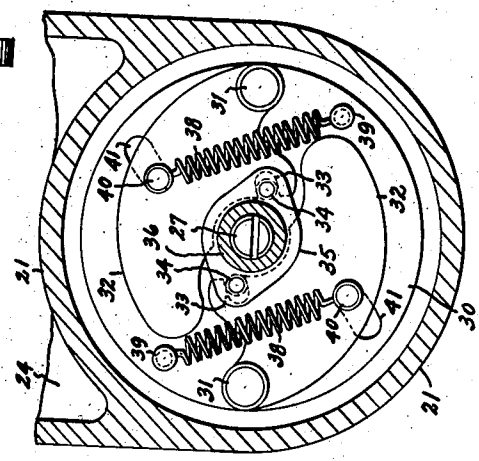


Fig. 6

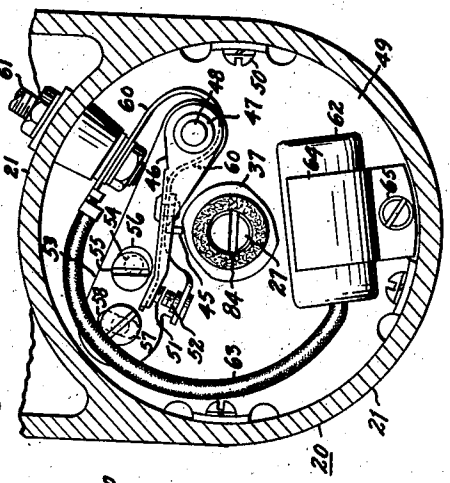


Fig. 5

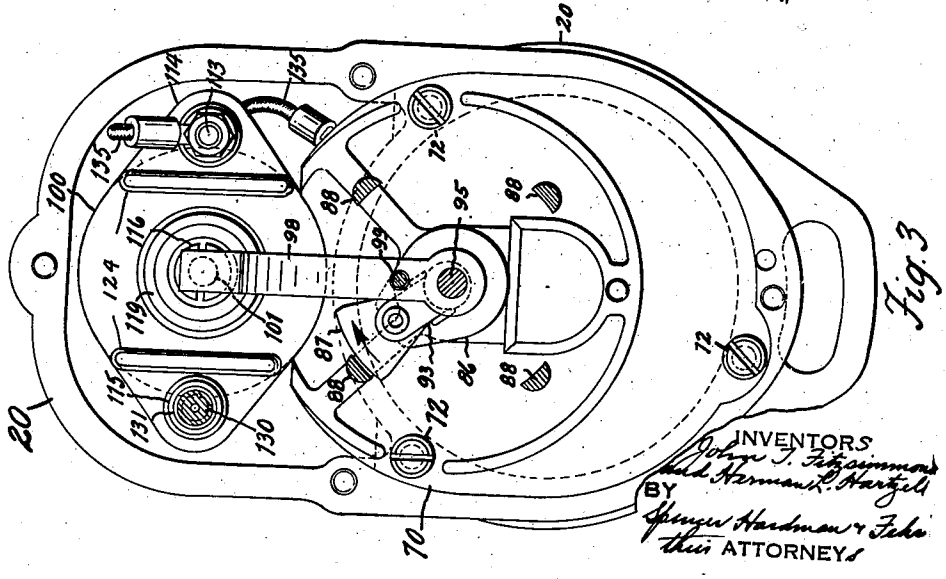


Fig. 3

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COIL-TIMER-DISTRIBUTOR UNIT

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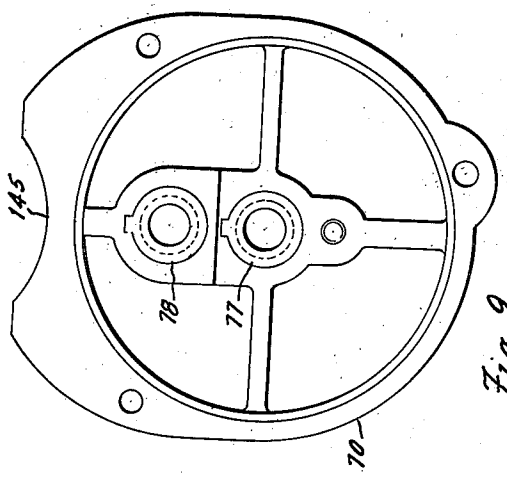


Fig. 9

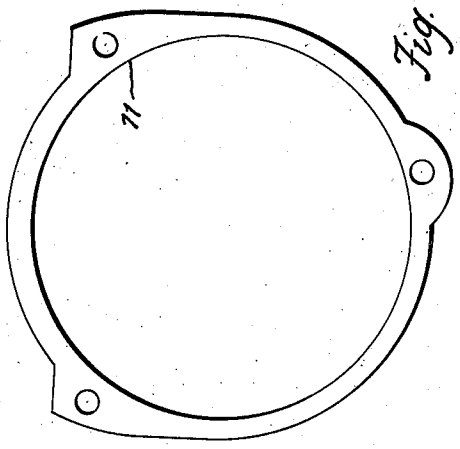


Fig. 10

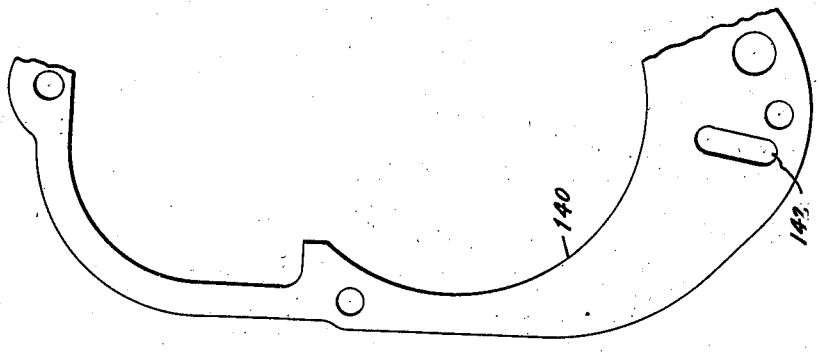


Fig. 8

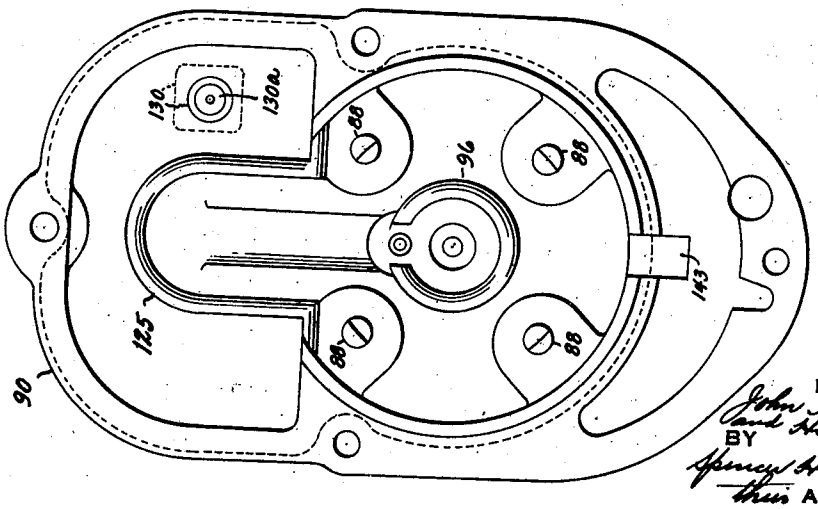


Fig. 7

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UNITED STATES PATENT OFFICE

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COIL-TIMER-DISTRIBUTOR UNIT

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Application April 22, 1940, Serial No. 330,848

4 Claims. (Cl. 123—148)

This invention relates to ignition apparatus for automotive vehicles and particularly to tractors where the engine and its accessories are more or less exposed to dirt and moisture.

One of the objects of the invention is to provide in a unitary structure a combined ignition coil, timer and distributor unit which is substantially dirt and moisture proof in construction. In this connection it is a further object to provide a unitary coil, timer and distributor unit which can be substituted for magneto type ignition.

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 invention is clearly shown.

In the drawings:

Fig. 1 is an end elevation of a coil timer and distributor unit embodying the present invention.

Fig. 2 is a sectional view thereof on the line 2—2 of Fig. 1.

Figs. 3, 4, 5 and 6 are sectional views taken respectively on the lines 3—3, 4—4, 5—5 and 6—6 of Fig. 2.

Fig. 7 is an inside or back view of the distributor cover.

Fig. 8 is a fragmentary back view of the distributor cover gasket.

Fig. 9 is an inside or back view of the reduction gear carrier.

Fig. 10 is a back view of the reduction gear carrier gasket.

Referring to Fig. 2, the main frame 20 of the unit comprises a tubular portion 21 having apertured ears or lugs 22 and 23 cooperating with bolts or screws to secure the frame to the frame of the engine with which the ignition unit is associated. The frame 20 provides a side pocket 24 for housing an ignition coil 100, to be described. A partition 25 extends across the tubular portion 21 and supports a long bearing 26 for a drive shaft 27 driven by the engine through a coupling device including an engine-driven part (not shown) and a cooperating coupling member 28 attached to the shaft 27.

Referring also to Fig. 6, the shaft 27 supports and drives a weight plate 30 carrying pivot studs 31 upon which weights 32 are pivoted. Weights 32 are provided with notches 33 for receiving pins 34 carried by plate 35 fixed to a sleeve 36 integral with a timer cam 37 (see also Fig. 5). The weights 32 are normally urged toward the shaft 27 by springs 38 connected with studs 39 attached to the weight plate 30 and the studs 40 attached to the weights 32. The studs 40 extend through arcuate slots 41 provided in the plate 30 so that the studs 40 may cooperate with the plate 30 to limit movement of the weights 32. As the speed of the shaft 27 increases, the weights 32 move away from the shaft 27 to effect counter-clockwise rotation of the cam 37 relative to shaft 27 and thus to advance the timing of the ignition, the direction of rotation of shaft 27 being counter-clockwise as viewed in Figs. 5 and 6.

The cam 37 cooperates with the rubbing block 45 of an ignition circuit breaker lever 46 provided with a fiber bushing 47 journalled in a stud 48 attached to the circuit breaker plate 49 secured within the tubular member 21 of frame 20 by screws 50. The lever 46 carries a contact 51 for engaging a contact 52 carried by a bracket 53 which is pivoted around the stud 48 for purposes of adjustment. Adjustment of the bracket 53 is effected by stud 54 rotatably secured to the plate 49 and having an eccentric head 55 received by a slot 56 in bracket 53. The head 55 is provided with a slot for receiving a screw driver in order to turn the stud 54 and thus to effect angular adjustment of the plate 53 with respect to its pivot 48. Movement of the bracket 53 would vary the distance between the rubbing block 45 and the axis of the cam 37. This adjustment is usually made in order to compensate for wear on the rubbing block. The bracket 53 is secured to the plate 49 in the desired position of adjustment by a screw 57 passing through an arcuate slot 58 in bracket 53. The lever 46 is insulated from the plate 49. Current is conducted to lever 46 and the movable contact 51 through a leaf spring member 60 biased to urge the rubbing block 35 toward the cam 37. Leaf spring 60 is attached to a terminal screw 61 insulatingly supported by the tubular housing 21. To reduce sparking across the contacts a condenser 62 is connected in parallel with the contacts. Condenser 62 includes foil strips, one of which is connected with a terminal lead 63 attached to the terminal 61. The other foil strip of the condenser is grounded on the metallic condenser case to which is attached a bracket 64 fixed to the plate 49 by a screw 65.

The left end of the tubular housing 21 is closed by a nonconducting plate 70 sealed by gasket 71 (see Figs. 9 and 10). Plate 70 is secured by screws 72 (see Fig. 3). Plate 70 is a carrier for a pair of reduction gears 73 and 74 attached respectively to shafts 75 and 76 journalled respectively in bearings 77 and 78. These bearings are made

of porous metal and are saturated with lubricant. As the temperature of the bearings increase this lubricant may ooze out of the bearing surfaces. In such case it is absorbed by felt washers 79 and 80 associated with these bearings. As the bearing temperature decreases the lubricant will be reabsorbed by the bearing. Shaft 75 is retained in its bearing 77 by a forked plate 81 attached to the carrier 70 by screw 82. The plate 81 straddles a reduced portion of the shaft 75. Shaft 75 is provided with a tongue 83 received by a slot 84 in the end of shaft 27. As the cross slot 84 is not diametrically disposed, the shaft 75 can be connected with shaft 27 only in one direction. The shaft 76 is provided with a head 85 which receives and drives a distributor rotor block 86. This head 85 is provided with a slot (not shown) and the socket of the rotatry block 86 is provided with a similar lug so that the block 86 will fit the head 85 only in one direction. Therefore the relationship between the shaft 87 and the distributor rotor 86 is fixed by the connections which have been referred to. Shaft 27 rotates at engine speed; therefore the cam 37 has lobes equal in number to half the number of engine cylinders, for example, two lobes for a 4-cylinder, 4-cycle engine. As the ratio between gears 73 and 74 is 2 to 1, the rotor 86 will revolve at one-half engine speed.

The rotor 86 carries a segment 87 which swings past distributor posts 88 carried by a non-conducting distributor cover 90. Each post 88 is integral with a metallic socket 89 embedded in a tubular sleeve 91 for receiving a spark plug cable carrying a terminal clip or plug member for making electrical connection between the cable and the metal socket 89. The rotor 86 carries a center button 92 on the free end of a resilient arm 93 attached to segment 87. Button 92 bears against a carbon button 94 carried by metal stud 95 fixed to the distributor cover. Stud 95 is surrounded by a non-conducting sleeve portion 96 of cover 90 to increase the insulation path between the stud 95 and any of the distributor posts 88. Sleeve 96 is notched at 97 to receive a metal strap 98 attached by screw 99 to cover 90. Strap 98 engages the high tension terminal 101 of coil 100.

Coil 100 comprises a non-conducting case 102 molded preferably of Bakelite. The right end of the case 102 fits snugly in the cylindrical cavity 24x provided by the housing 20 and forming a part of the pocket 24. The housing 102 encloses the concentrically arranged parts comprising an outer magnetizable tube 103, a primary coil 104, a secondary coil 105, a center magnetizable core 106 including a center rod 107 threadedly connected with an insert 108 in the right end wall of the coil housing 101. Coil housing 102 carries terminal inserts 110 and 111 provided respectively with threaded portions 112 and 113. The outside lead of the secondary coil 105 and the inside lead of the primary coil 104 are attached to terminal 110. The outside lead of primary coil 104 is attached to insert 111. The coil housing 102 is closed by cover 114 having apertured ears for receiving the screws 112 and 113 which cooperate with nuts 115 to secure the cover 114 to the housing 102. A sealing gasket 114a is compressed between the housing 102 and cover 114. The cover 114 is also centrally apertured to receive the rod 107 having its left end threaded to receive a nut 116, the screwing down of which forces metal washers 117 against a rubber gasket received in a socket provided by the tubular extension 119 of the cover 114. Thus the hole in the cover through which the rod 107 passes is sealed against the ingress of moisture. The left hand end surface of rod 107, provides the high tension terminal 101.

The right end wall of the housing 102 is provided with a skirt 120 and the cover 114 with a skirt 121 for locating the tubular, magnetic member 103 which may consist of a roll of slitted magnetizable sheet metal. The right end wall of the housing 102 is provided with a skirt 122 and the cover 114 with a skirt 123, said skirts bearing against the roll of insulating paper which separates and insulates the layers of the secondary winding 105, thus locating and preventing the shifting of the secondary winding assembly as well as the primary winding 104 which is wound thereon. The exterior of the cover 104 is provided with parallel skirts 124 cooperating with the center bushing 119 to provide pockets which receive an inverted U-shaped skirt 125 integral with the cover 90 (see Fig. 7). This construction increases the leakage distance between the high tension terminal 101 and the primary terminals 112 and 113.

Cover 90 carries an insert 130 threaded to receive a screw by which the insert may be connected with a wire connected with the current source. Insert 130 has a socket 130a which receives a coiled spring conductor 131 soldered to the washer 115 associated with terminal 112. When the cover 90 is attached to the housing 20 by screws 90a (Fig. 1), an electrical connection is made between the current source and primary terminal 110. Primary terminal 111 is connected with the ignition circuit breaker lever 46 by a wire 135 connected with insulated screw terminal 61.

Between the cover 90 and the housing 20 is located a sealing gasket 140 (see Fig. 8). When the screws 90a are tightened this gasket cooperates with cover 90 and housing 20 to provide an effective seal particularly against the entrance of mud which may be splashed against the exterior of the ignition unit. While it is contemplated to seal the unit against the entrance of moisture and dirt as much as possible, it is also necessary to provide for the ventilation of the distributor chamber. This is accomplished by a vent or breather passage including a hole 141 in the lower left hand part of the housing 20 (see Fig. 2), a slot 142 in gasket 140 and the passage 143 provided by the cover 90.

The reduction gear carrier plate 70 is provided with an arcuate notch 145 (see Fig. 9) for receiving a lower left end portion of the ignition coil 100. When the cover 90 is secured in position a shoulder 146 thereof bears against the coil cover 114 to urge the coil into the pocket 24 and thus to take up any lost motion between the cover plate and the housing 10. Thus the plate 70, the cover 90 and the housing 20 cooperate to support the coil unit.

The ignition coil timer distributor unit embodying the present invention comprises three principal sub-assemblies, namely: (1) the sub-assembly of housing 20 with rotating parts including shaft 27, cam 37 and distributor rotor 85; (2) the ignition coil 100; (3) the distributor cover sub-assembly comprising the cover 90 and the strap 98. Each of these sub-assemblies is completed before the final assembly. The sub-assembly of rotating parts may include also the lead 135. After the coil 100 is assembled with

the housing **20**, the lead **135** is connected to the coil terminal **113**. This is the only wire required to be connected in the final assembly of the subassemblies. The attachment of the cover **90** to the housing **20** automatically establishes electrical connection between the strap **98** and the coil high tension terminal **101**, and the electrical connection between the current source terminal **130** and the coil terminal **112**.

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, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A coil-timer-distributor-ignition unit comprising a housing providing a timer-chamber and coil-chamber in substantially parallel relation, an ignition timing circuit interrupter within the timer-chamber and operated by a timer-shaft having a bearing therein, a cover for the timer-chamber, a distributor rotor rotatably supported by the timer-chamber cover, reduction gears supported by the timer-chamber cover for connecting the rotor with the timer-shaft, an ignition coil located within the coil chamber and electrically connected with the timer-interrupter and distributor rotor, and a distributor cover enclosing the rotor, timer-chamber cover and ignition coil, and providing spark plug cable sockets and associated distributor posts with which the rotor cooperates to distribute sparking impulses.

2. An ignition unit according to claim 1 in which the distributor cover carries a center contact engaged by a resilient conductor on the distributor rotor, and a strap connected with the center contact engages a high tension terminal of the ignition coil when the cover is attached to the housing.

3. An ignition unit according to claim 1 in which the coil has a resilient conductor extending from one of its low tension terminals and in which the distributor cover carries a current source terminal engaged by said resilient low tension conductor when the distributor cover is attached to the housing.

4. An ignition unit according to claim 1 in which the housing, the timer-chamber cover and the distributor cover all cooperate to locate and retain the coil within its chamber, said distributor cover closing the terminal carrying end of the coil.

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