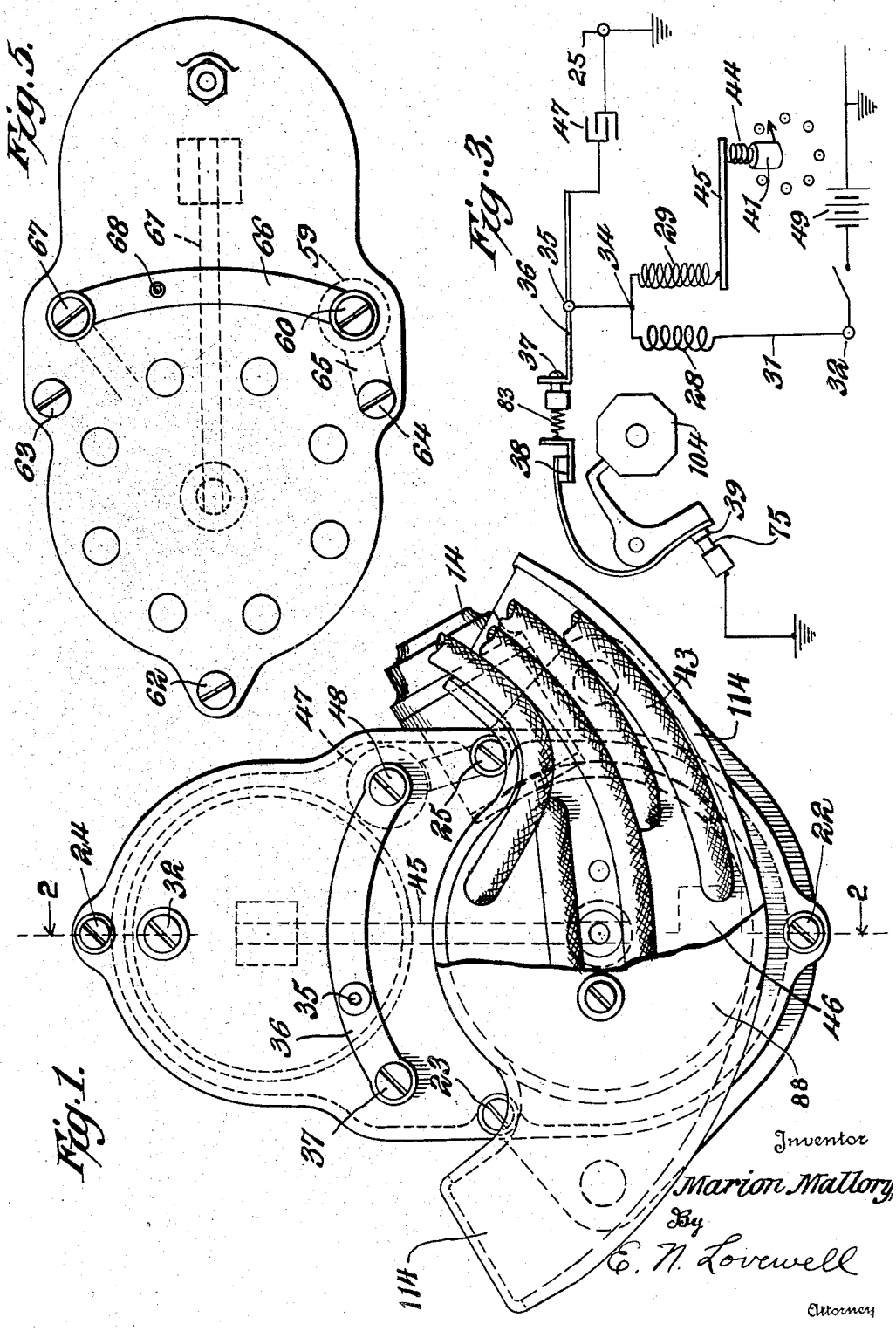
Oct. 13, 1936. M. MALLORY 2,057,240

IGNITION COIL AND DISTRIBUTOR

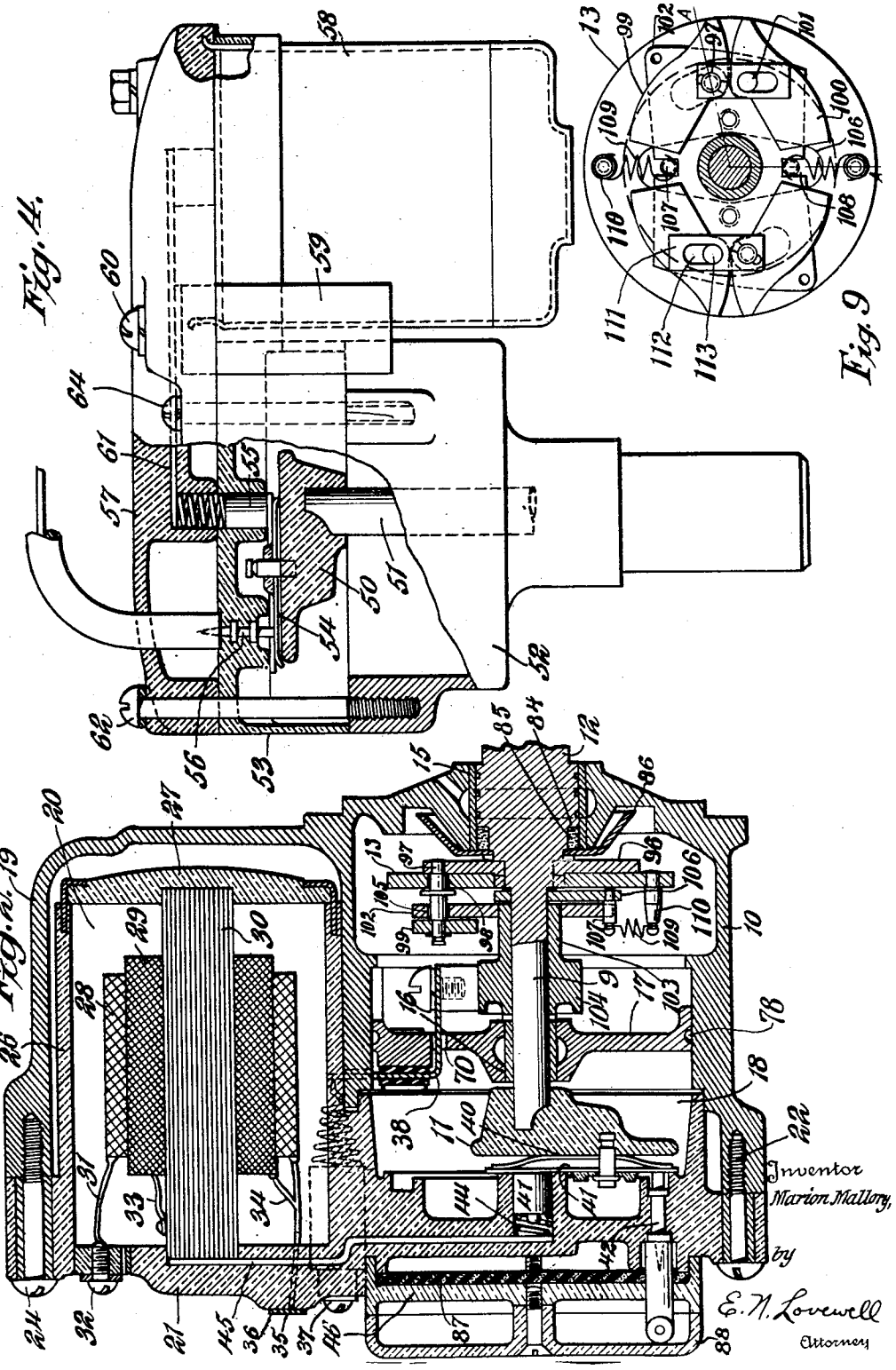
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IGNITION COIL AND DISTRIBUTOR

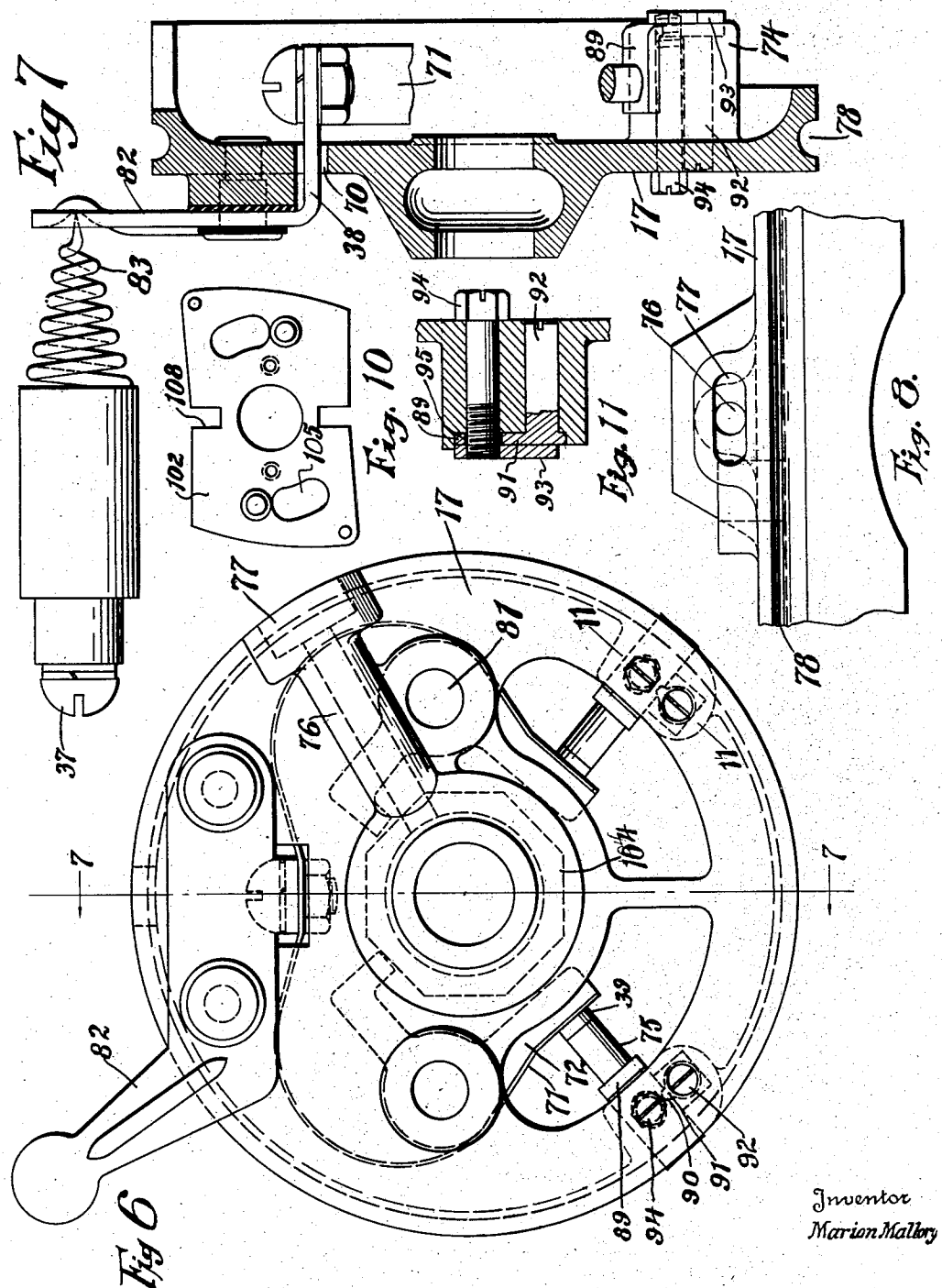
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IGNITION COIL AND DISTRIBUTOR

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IGNITION COIL AND DISTRIBUTOR

Marion Mallory, Detroit, Mich.

Application September 10, 1934, Serial No. 743,473

5 Claims. (Cl. 123—148)

This invention relates to an ignition coil and distributor for internal combustion engines, and particularly to their arrangement with reference to each other.

The general object of the invention is to provide a coil and distributor assembly which is very compact, so that it occupies a comparatively small space. Their construction and relation to each other are such that they may be manufactured and installed, or easily removed for servicing or replacement, as a single unit. At the same time, the close proximity of the coil to the distributor and the resultant short length of the high tension lead from the coil insure a minimum corona loss and consequently the highest electrical efficiency and a hotter spark than can be obtained with any arrangement heretofore used. Incidentally, the entire length of the high tension lead from the coil to the central distributor brush is molded within a bakelite cap, so that it is entirely free from troubles due to moisture.

The above and other objects of the invention will be more fully explained in connection with the accompanying drawings, in which,—

Figure 1 is a front elevation of a coil and distributor unit constructed according to the invention.

Figure 2 is a section taken substantially on the line 2—2 of Figure 1, the section through the governor being on the line A—A of Figure 9.

Figure 3 is a wiring diagram for the construction shown in Figures 1 and 2.

Figure 4 is a view partly in elevation and partly in section of a modified form of the invention.

Figure 5 is a plan view of the construction shown in Figure 4.

Figure 6 is a front elevation of the circuit breaker support plate shown in Figure 2.

Figure 7 is a section taken on the line 7—7 of Figure 6, showing also the spring contact for completing the high tension circuit through the circuit breaker.

Figure 8 is a detail view of the circuit breaker plate, looking from the right hand side of Figure 6.

Figure 9 is a front elevation of the governor assembly shown in Figure 2.

Figure 10 is a detail view of the governor weight plate.

Figure 11 is a detail sectional view taken on the line 11—11 of Figure 6.

As illustrated in Figures 1 and 2, the distributor shaft 9 is rotatably mounted in a metallic housing 10 and has a rotor 11 on its front end. The housing 10 is adapted to be secured to the gear case and the distributor mechanism is driven by a member 12, preferably from the cam shaft of the engine. A centrifugal governor is provided for advancing the spark with reference to the speed of operation, and in connection with this governor there is a brake plate 13 adapted to be engaged by a vacuum brake which is indicated conventionally at 14 and which may be controlled from the engine intake in a manner similar to that shown and described in U. S. Patent No. 1,896,714, issued to me February 7, 1933.

In connection with the centrifugal governor, a drive plate 96 is secured to the shaft 9. A pin 97 secured in the plate 96 extends through a slot 98 in the brake plate 13 and a governor weight 99 is pivotally mounted on its front end. A governor weight 100 cooperating with the weight 99 is pivotally mounted on a pin 101 which is secured to the governor weight plate 102, the latter being secured to the hub 103 of the circuit breaker cam 104. Preferably there are two pairs of these governor weights, as shown in Figure 9. As the weights move outwardly under the influence of centrifugal force, their edges roll against each other substantially without friction and their pivots 97 and 101 move away from each other. This causes an advance of the plate 102 and cam 104 with reference to the drive plate 96 and the shaft 9. Slots 105 in the plate 102 provide clearance for the pins 97 as the plate 102 is advanced.

A spring perch 106 is loosely mounted on the shaft 9 and pins 107 project therefrom through notches 108 in the plate 102. The notches 108 are a little wider than the diameter of the pins 107 so that the initial advance of the plate 102 is unresisted except by the friction of the high tension distributor brush and the circuit breaker arms, so that the initial spark advance is quite rapid as the speed increases from idling, but as soon as the pins 107 engage the edges of the notches 108, the spring perch 106 must advance with the plate 102, and this is resisted by the governor springs 109, which are initially radial. Each of these springs is connected at one end to the pin 107 and at the other end to a pin 110 projecting from the brake plate 13. Application of the brake to the plate 13 retards the latter and therefore increases the tension of the springs 109. The maximum outward movement of each pair of weights is limited by a link 111 which is pivoted to one of the weights and provided with

a slot 112 receiving a stop pin 113 which projects from the other weight. This limits the maximum spark advance.

The shaft 9 is mounted in a bearing 15 in the base of the housing 10, and in a bearing 16 in the plate 17 which is secured within the housing 10 and supports the circuit breaker arms 72. The plate 17 constitutes a partition which prevents oil or oil vapor from entering the chamber 18 within which the rotor 11 is located.

The housing 10 is formed with an integral extension 19, which constitutes a housing for the coil assembly 20. A molded cap 21 of bakelite or similar material forms a cover for the housing 10 and its extension 19, providing separate chambers for the rotor and the coil assembly, which are in close proximity to each other. Screws 22, 23, 24 and 25 secure the cover 21 in position. The cap 21 has an extension 26, to which an end piece 27 is secured to form a closed chamber for the primary coil winding 28, secondary winding 29 and core 30.

One end of the primary winding 28 is connected by a conductor 31 to a terminal 32 and one end of the secondary winding 29 is connected to the core 30, as indicated at 33. The other ends of these windings are connected together at the point 34, which is electrically connected through a stud 35 and bar 36 to a terminal post 37. The shaft 9 is formed with an annular shoulder 84 within the bearing 15 and a leather sealing ring 85 is compressed between the oil throw ring 86 and the shoulder 84. The oil throw ring is pressed firmly over the leather and swedged into place. Under this operation the leather expands laterally a few thousandths of an inch and forms a tight fit in the bushing to prevent corrosive gases that blow by the pistons from entering the distributor and serves also as an oil seal. The constructional advantage is that no retaining washer is required.

The rotor 11 carries a spring loaded blade 40 which connects the central brush 41 successively to the terminals 42 and the high tension wires 43 leading to the respective spark plugs. The brush 41 is electrically connected through its spring 44 and a conductor 45, embedded in the cap 21, to the core 30. The cover 46 secured to the cap 21 holds the wires 43 in place and a rubber seal 87 is compressed against these wires within the cover as the latter is secured to the cap 21, so that moisture is effectively excluded from the interior of the distributor. An outer cap 88 is secured to the cover 46 and in the present instance the two members 46 and 88 are formed with oppositely disposed conduits 114 for the wires 43, which are adapted to be connected to the spark plugs on opposite sides of a V-8 engine.

An insulated post 38, secured to the plate 17, extends through a hole 70 therein, and the circuit breaker spring 71, secured to its inner end, passes about the circuit breaker arms 72 and carries the movable contact points 39, which cooperate with the fixed contact points 75. An oil channel 76 for the bearing 16 is cast in the plate 17 and has an elongated mouth 77 to allow for timing adjustment without throwing it out of registry with the oil hole in the wall of the housing 10. The plate 17 is also formed with a peripheral groove 78, which is engaged by a pointed set screw, the latter serving as an additional means to secure the plate against displacement. Bosses and holes for the pins 81, which support the breaker arms 72, are cast in the plate 17. This reduces manufacturing error and eliminates the need for locating jigs and drilling operations.

In adjusting the circuit breaker points 75, it is desirable not to turn them, so that the interlocking of the pitted surfaces will not be disturbed. For this purpose, therefore, each point 75 is secured to a slide 89, the latter being formed with a notch 90 which is engaged by a cam 91 having a stem 92 adapted to be turned by a screw driver. When the proper adjustment is effected, a clamp 93 is drawn down against the slide 89 by a machine bolt 94, which extends through a slot 95 in the slide.

It will be noted that when the common bakelite cap 21 is installed, three electrical connections are made, which complete four circuits. One of these circuits comprises the high tension connection from the coil to the rotor, another makes the ground for the condenser, the third is the low tension current supply to the breaker points, and the fourth makes the high tension ground for the coil. It is important that these connections be made simultaneously with the installation of the cover in order to obviate the need of separate external wires and connections, also to facilitate servicing. The post 38 has an arm 82 extending into the extension 19 outside of the coil through a slot so formed that the arm does not contact with the metallic side of the distributor chamber. The end of this arm 82 is adapted to be engaged by a spring contact 83, which is secured to the post 37, thus making an electrical connection from the coil windings to the circuit breaker points whenever the cap 21 is placed in assembled position. At the same time, the brush 41 makes contact with the rotor blade 40 and the outside of the condenser 47 is grounded through the screw 25 to the metallic housing 10, the inside being connected through its supporting screw 48 to the bar 36 of the primary circuit.

The electrical circuits will be best understood from Figure 3, considered in connection with Figures 1 and 2. The primary circuit is from the battery 49 to the terminal 32, thence through the primary winding 28, stud 35, bar 36, terminal 37 and post 38 to the circuit breaker points 39 and 75, thence through ground to the battery. The high tension circuit is from the junction point 34 through the secondary winding 29, thence through the connection 33 and the embedded conductor 45 to the brush 41, whence it is distributed by the rotor blade 40 to the various spark plug leads 43.

In Figures 4 and 5, I have shown means by which the invention may be adapted to a conventional type of distributor. Here the rotor 50 is mounted on a vertical shaft 51 within the housing 52, which is provided with a cap 53. A blade 54 carried by the rotor is adapted to connect the brush 55 successively to the spark plug leads 56. Above the cap 53 is a cover 57 which projects beyond the side of the distributor housing to provide a support and cover for the coil assembly 58. The condenser 59 is also secured by a screw 60 to the extension of the cover 57.

A conductor 61, embedded in the cover 57, connects the secondary winding of the coil to the brush 55. The distributor cap 53 and the cover 57 are secured to the housing 52 by screws 62, 63 and 64. The outside of the condenser 59 is connected by a conductor 65 to the screw 64, which is grounded to the housing 52 when the screw is inserted to secure the cover thereto, and

the inside of the condenser is connected by a conductor bar 66 to the terminal post 67, which is connected to the insulated circuit breaker post 38 in the same manner as the screw 37 in Figures 3 and 7, and which is also connected through the stud 68 to the coil windings.

The wiring for the coil assembly 58 and the current flow are substantially the same as that shown and described for the coil assembly 20. In this construction, it will be noted that the coil assembly is set high enough to prevent any possible interference with the cylinder head bolts of the engine.

It is to be understood that the invention is not limited to the specific construction herein shown and described, but includes all other modifications which may fall within the scope of the appended claims.

I claim:

1. In an ignition system for internal combustion engines, a distributor housing, a coil housing, a cover common to both housings, a rotor within the distributor housing, a brush within the cover contacting centrally with the rotor, an ignition coil assembly within the coil housing and including a core anchored at one end in said cover, and a high tension lead from the core to the brush, said lead being continuously embedded in said cover, the high tension circuit being from the secondary winding of the coil through the core and through said lead and brush to the rotor.

2. In an ignition system for internal combustion engines, a distributor and an ignition coil assembly arranged side by side, said distributor including a housing with a cover removably secured thereto and supporting said coil assembly.

3. In an ignition system for internal combustion engines, a distributor and an ignition coil assembly arranged side by side, said distributor including a housing with a cover secured thereto, and a rotor within said housing, said coil assembly being supported by said cover and including a primary winding and a secondary winding, and a conductor continuously molded in said cover throughout its length, one end of said conductor being electrically connected to the rotor and the other end to said secondary winding.

4. The combination with an ignition coil assembly and a distributor for the high tension current, of a common cover therefor, and means for securing the cover thereto and thereby completing three electrical connections, one between the high tension winding and the rotor of the distributor, another between the low tension winding and the circuit breaker points, and the third a ground for the condenser.

5. The combination with a distributor and an ignition coil, of a common housing with chambers for the distributor and coil respectively, a common cover for both chambers, a supplemental cover for the distributor having holes for high tension wires, and a rubber pad with corresponding holes between the cover and the supplemental cover and adapted to be compressed to form a moisture proof rubber seal around the wires, as the supplemental cover is secured in position.

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