

March 27, 1945.

H. L. HARTZELL

2,372,490

IGNITION APPARATUS

Filed Aug. 12, 1942

4 Sheets-Sheet 1

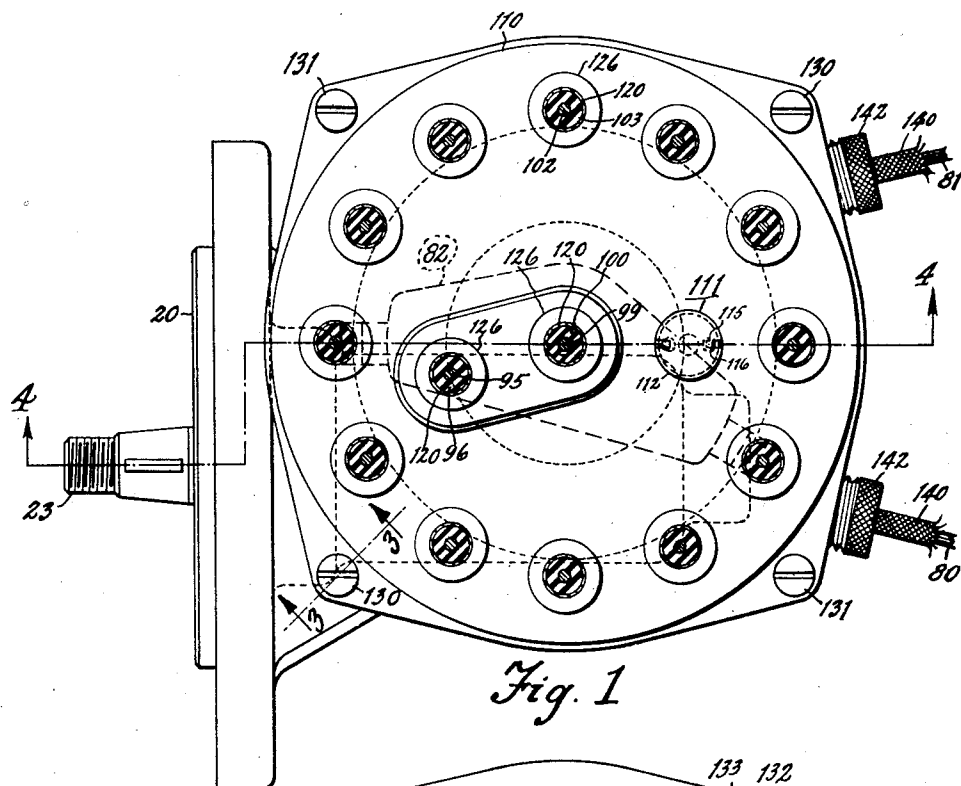


Fig. 1

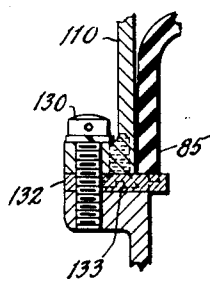


Fig. 3

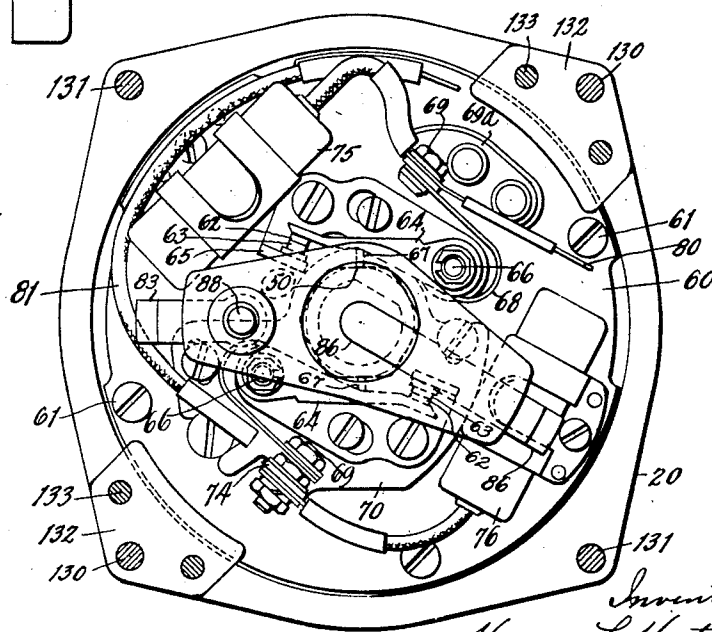


Fig. 2

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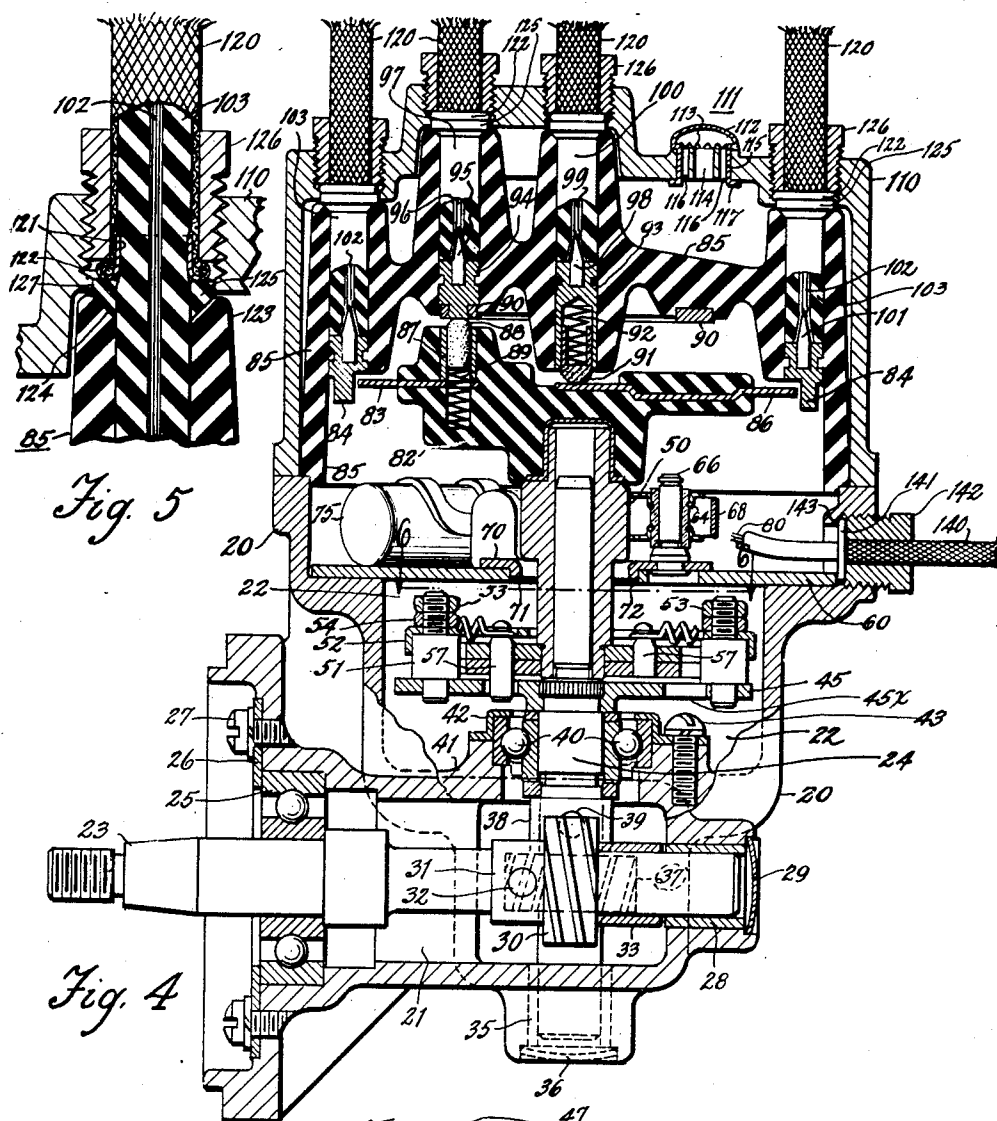
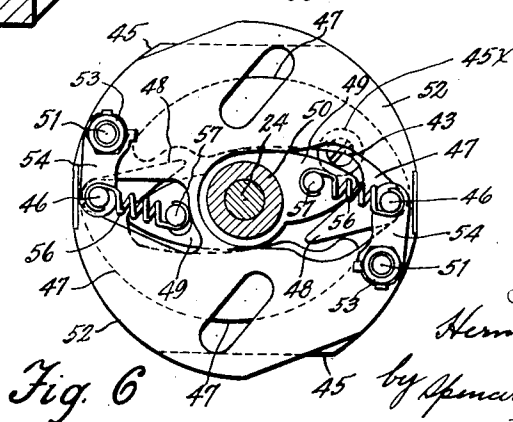
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

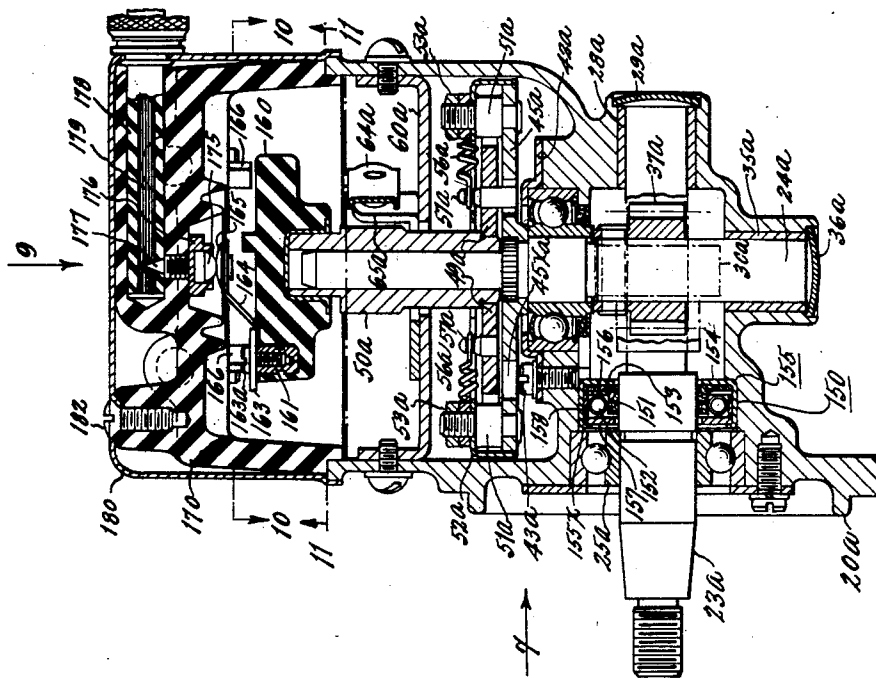


Fig. 8

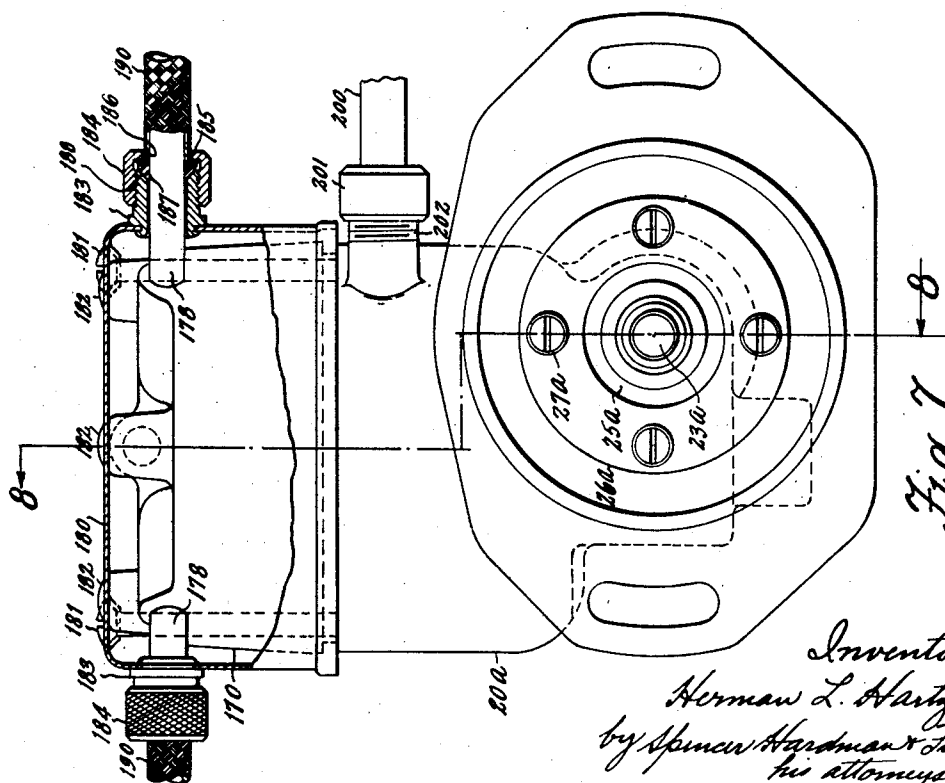


Fig. 7

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4 Sheets-Sheet 4

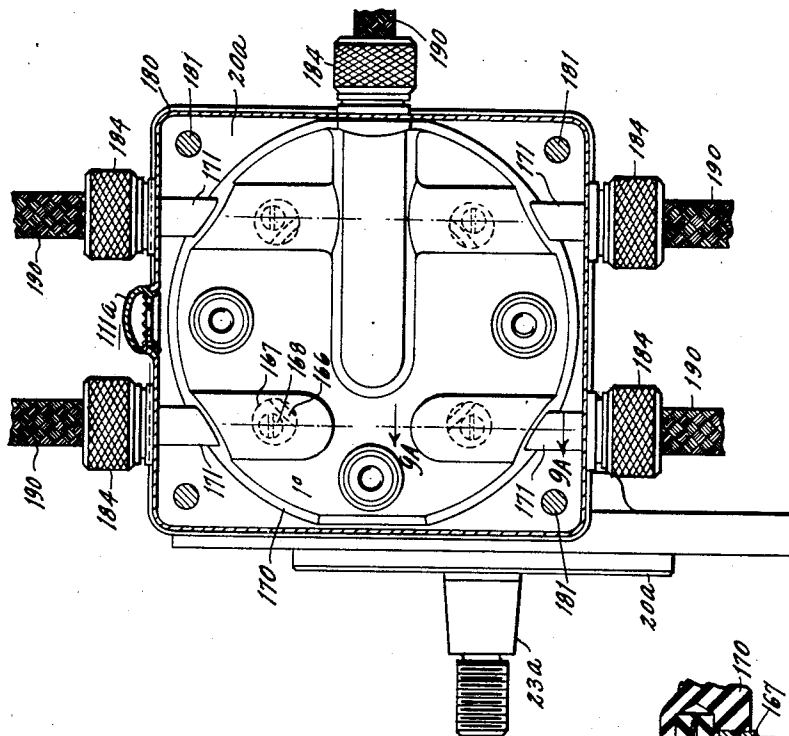


Fig. 9

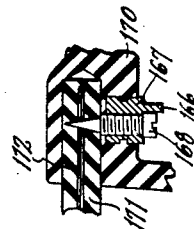
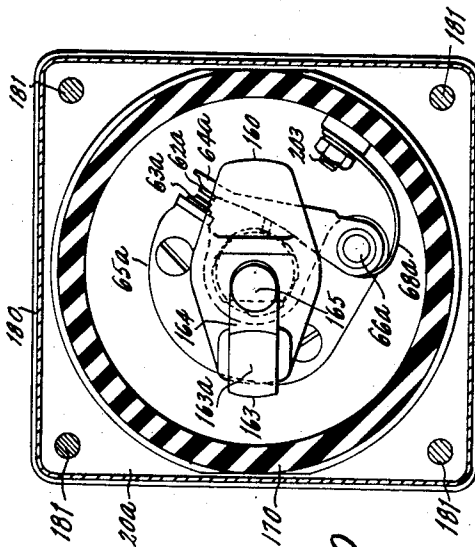


Fig. 9A



UNITED STATES PATENT OFFICE

2,372,490

IGNITION APPARATUS

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6 Claims. (Cl. 200—19)

This invention relates to timer and distributor units for internal combustion engine and it is an object of the present invention to provide a shielded ignition apparatus of economical construction. To accomplish this object I provide a metal cover which is attached to the metal timer housing and which encloses the distributor cap provided for directly attaching the distributor cap cover to the ignition timer housing.

A further object of the invention is to provide an ignition distributor and unit which is interchangeable with a magneto. To accomplish this object I provide the timer distributor unit with a horizontal shaft in substitution for the usual horizontal shaft of the magneto and I provide a vertical shaft driven by the horizontal shaft for driving the ignition timer cam and the distributor rotor. In this connection it is an object to facilitate the assembly of the horizontal and vertical shaft with the ignition timer housing and I provide a construction whereby these two shafts together with their bearings and gears associated therewith may be assembled as sub-assemblies with the ignition timer housing.

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

In the drawings:

Fig. 1 is a plan view of the ignition timer distributor unit embodying the present invention.

Fig. 2 is a plan view of the ignition timer, the shield cover and the distributor cap having been removed, certain screws being shown in section.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a vertical longitudinal sectional view on the line 4—4 of Fig. 1.

Fig. 5 is a fragmentary longitudinal sectional view on an enlarged scale of one of the spark plug cables.

Fig. 6 is a sectional view on the line 6—6 of Fig. 4.

Fig. 7 is a side elevation partly in section of a modified form of the invention, said view being taken in the direction of arrow 7—7 of Fig. 8.

Fig. 8 is a sectional view on line 8—8 of Fig. 7.

Fig. 9 is a plan view taken in the direction of arrow 9 of Fig. 8, the shield cover being shown in section.

Fig. 9A is a sectional view on line 9A—9A of Fig. 9.

Figs. 10 and 11 are sectional views on the lines 10—10 and 11—11 respectively of Fig. 8.

Referring to Fig. 4 the housing 20 provides sockets or wells 21 and 22 for the reception of shafts 23 and 24 respectively and the bearings and gears associated therewith. Shaft 23 is supported by a ball bearing 25 retained by a plate 26 attached to housing 20 by screws 27. Shaft 23 is journaled in a plain bearing 28 at the end of the socket 21 which is covered by a plug 29. Shaft 23 drives a spiral gear 30 having a hub 31 attached by pin 32 to the shaft. Between gear 30 and the bearing 28 there is located a spacer sleeve 33. The shaft 23 together with the gear 30 and the sleeve 33 and the bearing 25 can be assembled as a subassembly unit and then moved into the socket 21 after which the bearing 25 is secured in place by the plate 26 attached by screws 27 to housing 20. The shaft 24 is supported at its lower end by bearing 35 covered by a plug 36 fitting into the lower end of the socket or well 22. Shaft 24 is driven by a gear 37 meshing with gear 30 and having a hub 38 attached to the shaft by pin 39. Shaft 24 is supported also by a ball bearing 40 retained upon a wall 41 by the housing 20 by retainer ring 42 secured by screws 43. Shaft 24 is connected with a weight plate 45 carrying studs 46 pivotally supporting weights 47 having tails 48 for engaging lever arms 49 attached to a cam 50. Plate 45 carries studs 51 which support a cover plate 52 and have threaded portions reduced in diameter and extending thru holes in the cover 52 and extending thru holes in straps 54 and receiving nuts 53 which secure the straps 54 and the cover 52 is positioned upon the studs 51. Each stud 46 provides an anchor for one end of a spring 56 attached at its other end to a stud 57 on a lever arm 49. As the speed of the shaft 24 increases the weights 47 move outwardly from the shaft 24 to vary the angular relation between the shaft 24 and the ignition timer cam 50 in order to increase the spark advance as the speed increases. Before the weights are assembled with the plate 45, the shaft 24 assembled with gear 37, bearing 40 and bearing retainer 42 is assembled with housing 20. Plate 45 is provided with a hole 45x which can be brought into registry with holes in retainer 42 and in housing wall 41 in order to provide for the attaching of screws 43. After the screws 43 have been applied, the weights 47, lever arms 49, cam 50, cover 52, springs 56 and other associated parts are assembled; and then a circuit breaker plate 60 is assembled with the housing 20.

The circuit breaker plate 60, attached to the housing by screws 61 (Fig. 2), supports a double breaker mechanism each breaker comprising a

pair of contacts 62, 63 supported, respectively, by a lever 64 and a bracket 65. Lever 64 is insulatingly supported by a stud 66 and carries a rubbing block 67 cooperating with the cam 50. A leaf spring 68 conducts current to the lever 64 from a terminal screw 69 and urges the rubbing block toward the cam. The upper one of the brackets 65 is directly mounted upon the plate 60 and the lower one is mounted upon a plate 70 having a flange 71 (Fig. 4) located within a central hole 72 of plate 60, said plate providing a bearing for the plate 70 concentric with the bearing 40. Plate 70 is axially adjustable to provide for simultaneous separation of the pairs of contacts 62, 63. The upper one of the screws 69 supported by a bracket 69a, insulatingly supported by the plate 60, is connected by a wire 80 with an ignition coil primary. The lower one of the screws 69 which is insulatingly supported by an ear 74 of the bracket 70 is connected by a wire 81 with the primary of another ignition coil. A condenser 75 is in parallel with the upper set of contacts 62, 63 and a condenser 76 is in parallel with the lower set of contacts.

The two pairs of contacts are separated simultaneously by the coaction of the cam with the rubbing blocks so that the two ignition coils connected with the wires 80, 81 will provide simultaneously two sparking impulses which are distributed simultaneously by a rotor 82 to spark plugs of the same engine cylinder. For this purpose the ignition timer cam 50 drives the distributor rotor 82 carrying segments 83 and 86 for distributing to alternate posts 84 embedded in a distributor cap 85 of insulating material.

Segment 83 is electrically connected with a sleeve 87 carrying a brush 88 urged upwardly by a spring 89 against a ring 90 embedded in the cap 85. Segment 86 is electrically connected with a button 91 urged downwardly by a spring 92 located in a cap insert 93 and electrically connected with the button 91. The ring 90 is connected with an insert 94 carrying a metal pin 95 which enters between the strands of a high tension wire 96 covered by insulation 97 and connected with an ignition coil secondary. The insert 93 carries a pin 98 which enters between the strands of a high tension wire 99 covered by insulation 100 and connected with the secondary of another ignition coil.

Each distributor post 84 carries a pin 101 entering between the strands of a wire 102 covered by insulation 103 and connected with an engine spark plug.

The distributor cap 85 is enclosed by a cover or shield 110 having an opening 114 between two small holes 116. Shield 110 supports a breather 117 which comprises a domelike button 112 having a serrated edge 113 secured over the opening 114 and having integral tangs 115 which extend through the holes 116 and which are bent over at 117 against the inside of the shield 110. Each of the spark plug wires 102 and each of the ignition coil wires 96, 99 which pass through the shield 110 are associated therewith in the same manner as now will be described with reference to Fig. 5. For example, wire 102 covered by insulation 103 is encased in a flexible metal tube 120 which at its lower end surrounds the shank 121 of an eyelet whose bead 122 is turned around the lower edge of the tube 120. Each wire, such as 102, extends into an upwardly extending tubular boss 123 of the distributor cap 85. At its upper end, each boss 123 is provided with a conical surface 124. Between this surface 124 and the

bead 122 of the eyelet there is located a soft rubber sealing washer 125 which is clamped against the upper end of the boss 123 and is forced against the insulation 103 of the wire 102 by the tightening of a bushing 126 threadedly engaging the shield 110. As the bushing 126 is screwed downwardly to force the eyelet bead 122 downwardly against the soft rubber washer 125 the outward expansion of the washer 125 is resisted by its engagement with an annular shoulder 127 provided by the shield 110.

Upward movement of the cap 85 is prevented by its engagement with the rubber washers 125 which are held in place by the shield 110 which is attached to the housing 20 by screws 130 and 131, Figs. 1 and 3. Each of the screws 130 pass also thru a block 132 attached by screws 133 to the shield 110. Each block 132 is received by a notch in the shield 110 and by a notch at the lower edge of the cap 85. One of the blocks 132 is wider than the other so that the cap 85 will fit upon the housing 20 only in one position.

The form of the invention shown in Figs. 7 through 11 is like the form shown in Figs. 1 through 6 with respect to certain parts to which reference is made by reference numbers which are the same as applied to corresponding parts in Figs. 1 through 6, but with the affixed "a."

An oil seal unit 150 surrounds the shaft 23a and comprises a felt ring 151 urged against the shaft 23a by a garter spring 152. The annular flange 153 of ring 151 is clamped between the flat wall 154 of the housing 155 of the unit 150 and a washer 156. The edge 155x of the housing forces a washer 157 against a metal spacer ring 158 and the latter against the washer 156.

The cam 50a drives a rotor block 160 carrying an insert 161 to which a screw 163a attaches a segment 163 and a leaf spring 164 carrying a button 165. Segment 163 distributes sparking impulses to a series of four posts 166 (Figs. 11 and 9A). Each post 166 is integral with an insert 167 molded in a distributor cap 170 and receiving a pointed screw 168 adapted to pierce through the insulation 171 of a wire 172 and to contact with the strands thereof.

The rotor button 165 engages a button 175 carried by a screw 176 threaded into the cap 170 and having a point 177 adapted to pierce through the insulation 178 of a wire 179 and to contact with the strands thereof. Wire 179 is connected with secondary winding of the ignition coil.

The distributor cap 170 is retained upon the upper edge of the distributor housing 20a by a metal cover or shield 180 corresponding in function to shield 110 of the form shown in Figs. 1 to 6. Screws 181 secure the cover 180 to the housing 20a. Screws 182 secure the cover 180 to the cap 170. The cover 180 is provided with a plurality of bushings 183 each threaded to receive a nut 184 having a flange 185 for engaging and urging a ferrule or eyelet 186 against a rubber washer 187 and the latter against the conical surface 188 provided by the bushing 183. The ferrule or eyelet 186 is attached to an end of a flexible metal sheath 190 through which each wire 179 or 172 passes. The ignition timer is connected with the primary of an ignition coil by wires enclosed by a flexible metal sheath 200 secured by a nut 201 to a threaded tubular boss 202 integral with the housing 20a. Through this boss the wire passes and is attached to a terminal 203 (Fig. 10).

The timer housing 20a and the shield 180 are

each provided with a breather 111a as shown in Fig. 9.

While the embodiments of the present invention as herein disclosed, constitute preferred forms, 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. An ignition distributor comprising a metal housing, a shaft journaled in the housing, a distributor rotor driven by the shaft and having a distributing segment, a non-conducting distributor cap located upon the housing and enclosing the rotor and supporting a conductor electrically connected with the segment and supporting conducting posts to which sparking impulses are distributed by the rotor segment and providing cable receiving sockets having a tapered seat at its outer extremity for receiving insulated wires for making connection with the conductors of the cap, means located within the sockets for electrically connecting the wires with the conductors of the cap, a metal shield enclosing the cap and located upon the metal housing and retaining the cap upon the housing, said shield having openings in alignment with the wire receiving sockets of the cap, means for attaching the shield to the housing, insulated wires extending through the holes in the shield and into the sockets of the cap and provided with flexible metal sheaths terminating at the shield, a member of compressible water-proof material providing a gasket which is slipped over the end of the insulated wire, said member resting on the seat, ferrules each at the terminus of a cable sheath; and means cooperating with the ferrules for securing the cables to the distributor and for compressing the gasket to seal the joint between the cable and gasket and between the gasket and seat.

2. An ignition distributor comprising a metal housing, a shaft journaled in the housing, a distributor rotor driven by the shaft and having a distributing segment, a non-conducting distributor cap located upon the housing and enclosing the rotor and supporting a conductor electrically connected with the segment and supporting conducting posts to which sparking impulses are distributed by the rotor segment and providing cable receiving sockets for receiving insulated wires for making connection with the conductors of the cap, means located within the sockets for electrically connecting the wires with the conductors of the cap, yieldable means supported at the upper ends of the sockets, a metal shield enclosing the cap and located upon the metal housing and retaining the cap upon the housing, said shield having openings in alignment with the wire receiving sockets of the cap, means for attaching the shield to the housing, insulated wires extending through the holes in the shield member and through the yieldable means and into the sockets of the cap member and provided with flexible metal sheaths terminating at the shield member, ferrules each located at a terminus of a cable sheath, and bushings each screw-threadedly connected with the shield member and engageable with a sheath ferrule to clamp the yieldable means between the bushings and the sockets to cause the yieldable means to be compressed and to seal the joint between the insulation of the cable and the sockets and the yieldable means.

3. An ignition distributor comprising a metal housing, a shaft journaled in the housing, a

distributor rotor driven by the shaft and having a distributing segment, a non-conducting distributor cap located upon the housing and enclosing the rotor and supporting a conductor electrically connected with the segment and supporting conducting posts to which sparking impulses are distributed by the rotor segment and providing cable receiving sockets for receiving insulated wires for making connection with the conductors of the cap, means located within the sockets for electrically connecting the wires with the conductors of the cap, a metal shield enclosing the cap and located upon the metal housing and retaining the cap upon the housing, said shield having openings in alignment with the wire receiving sockets of the cap, means for attaching the shield to the housing, insulated wires extending through the holes in the shield member and into the sockets of the cap member and provided with flexible metal sheaths terminating at the shield member, ferrules each located at a terminus of a cable sheath, sealing washers each surrounding an insulated wire and located between a sheath ferrule and one of said members, and bushings each screw threadedly connected with the shield member and engageable with a sheath ferrule for forcing a ferrule against a sealing washer and the latter against the cap to prevent upward movement of the cap relative to the housing.

4. An ignition distributor according to claim 3 in which sockets of the distributor cap each provide a recess having a conical surface against which a resilient sealing washer is forced against the cable and into the recess when a sheath ferrule is clamped against it by a bushing to provide a seal between the washer and the insulation of the wires and between the conical seat and washer.

5. An ignition distributor according to claim 3 in which the holes in the shield member are provided by threaded tubular bosses attached to the shield, each of said bosses cooperating with a bushing and providing a surface against which a soft rubber sealing washer is forced when a sheath ferrule is clamped against it by a bushing to provide a seal between the insulation of the wires and the washer and between the washer and the bushing.

6. An ignition distributor comprising a metal housing, a shaft journaled in the housing, a distributor rotor driven by the shaft and having a distributing segment, a nonconducting distributor cap located upon the housing and enclosing the rotor and supporting a conductor electrically connected with the segment and supporting conducting posts to which sparking impulses are distributed by the rotor segment and providing cable receiving sockets having a tapered seat at its outer extremity for receiving insulated wires for making connection with the conductors of the cap, means located within the sockets for electrically connecting the wires with the conductors of the cap, a metal shield enclosing the cap and located upon the metal housing and retaining the cap upon the housing, said shield having openings provided with threads and in alignment with the wire receiving socket of the cap, said openings being reduced at their lower ends below the threaded portion to provide an annular shoulder of lesser periphery than the threaded portion, said shoulders being adjacent the tops of the sockets of the cap, means for attaching the shield to the housing, insulated wires extending through the openings of the

shield and into the sockets of the cap and provided with flexible metal sheaths terminating at the shield, ferrules each at the terminus of a cable sheath a member of compressible waterproof material, such as soft rubber providing gaskets which are slipped over the ends of the insulated wires below the ferrules, said members

resting on the seats provided by the sockets, and means having threaded engagement with the openings for forcing the ferrules against the gaskets and the gaskets against the seats whereby the gaskets are compressed and forced against the shoulders to provide a moisture seal thereat.

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