

Aug. 23, 1932.

H. FORD

1,873,369

IGNITION SYSTEM

Filed June 30, 1928

2 Sheets-Sheet 1

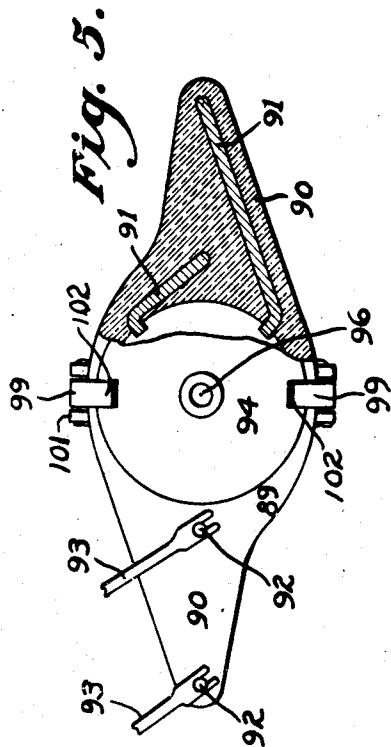
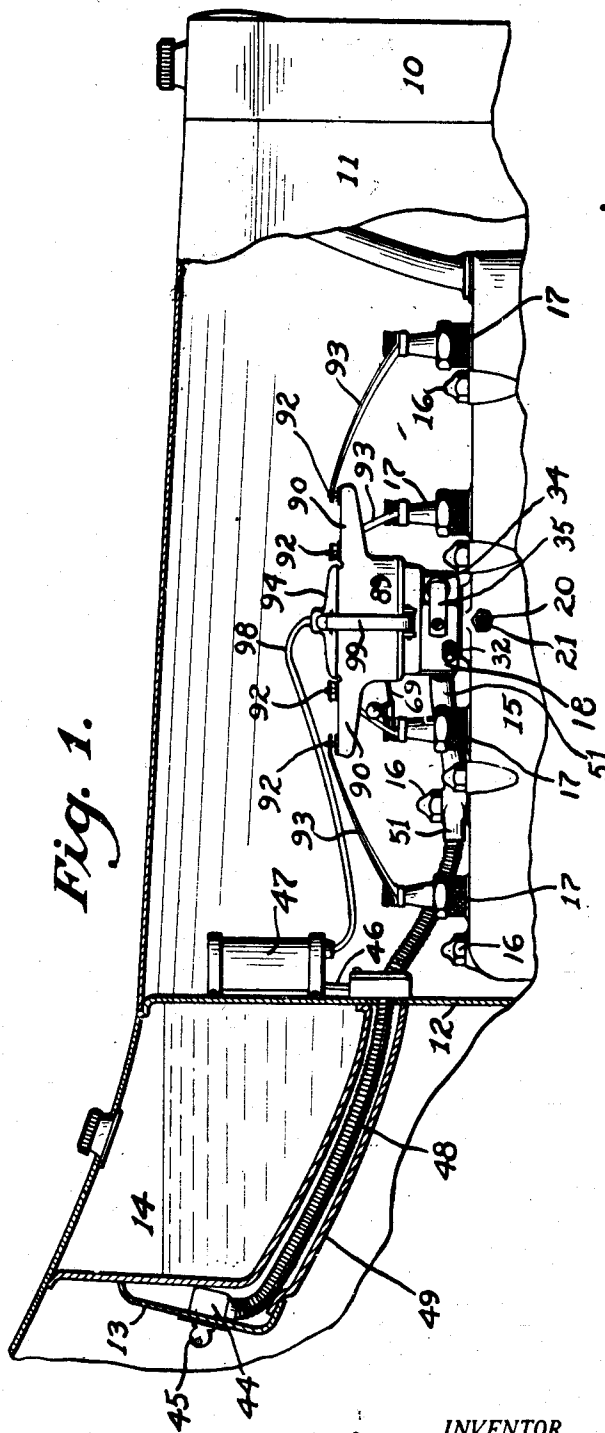


Fig. 1.



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2 Sheets-Sheet 2

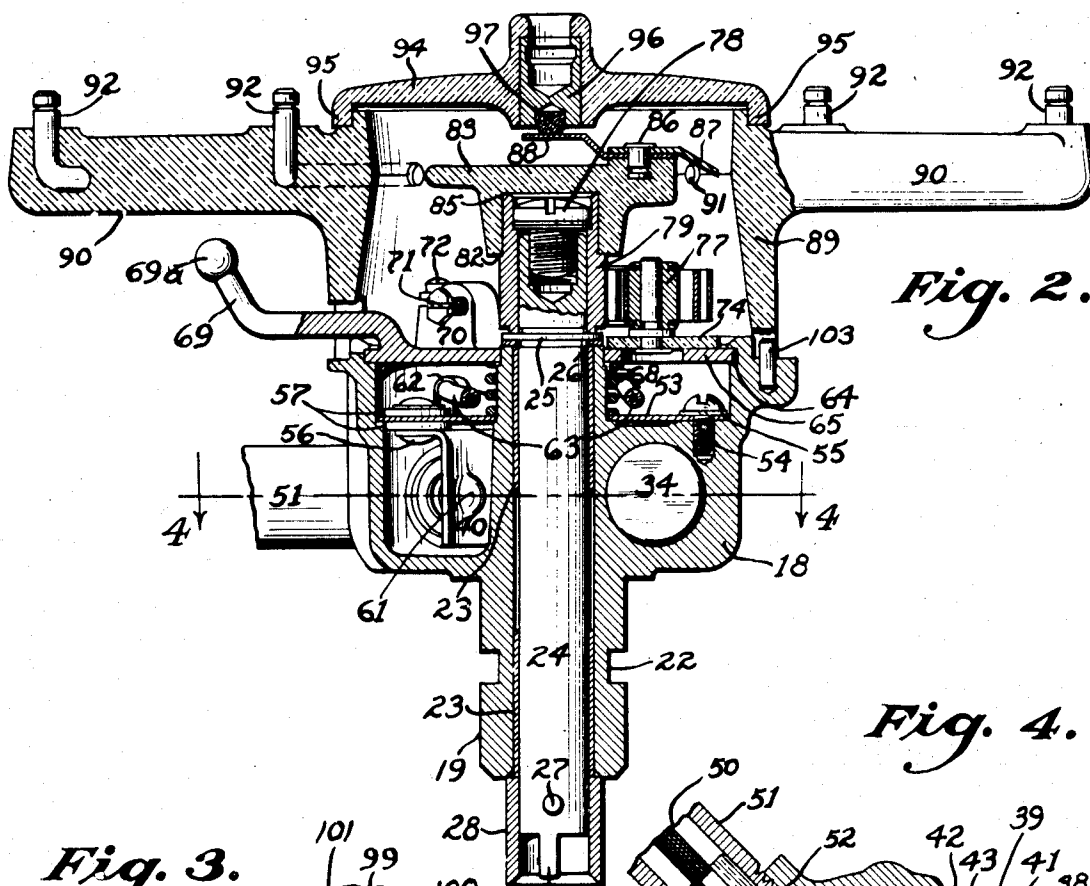


Fig. 2.

Fig. 4.

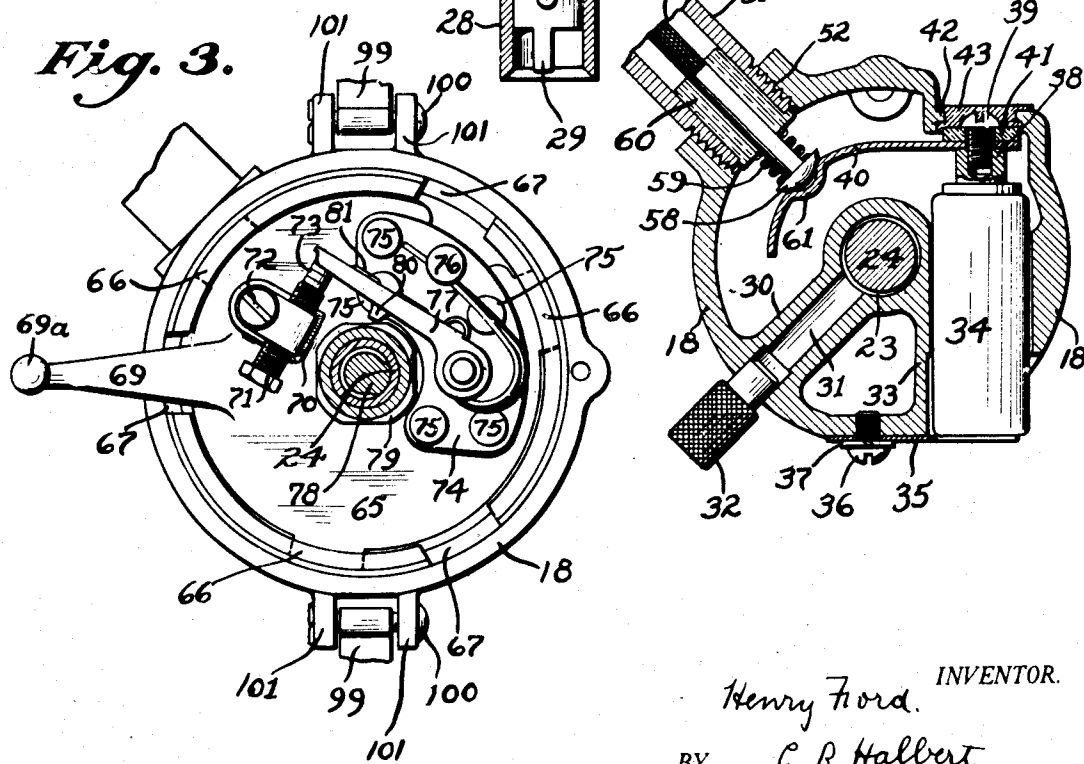


Fig. 3.

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UNITED STATES PATENT OFFICE

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IGNITION SYSTEM

Application filed June 30, 1928. Serial No. 289,444.

The object of my invention is to provide an ignition system of simple, durable, and inexpensive construction.

Still a further object of my invention is to provide an ignition device for use in connection with an automobile engine which is cheap to manufacture, easy to assemble and readily replaced or repaired.

Still a further object of my invention is to provide in connection with an ignition device, a locking device and switch connected through an armored cable with the ignition device whereby the lock may be used to ground the circuit or to supply the proper current to the device.

Still a further object of my invention is to provide means for connecting the lead wire for the ignition device to the condenser and breaker members in such a way that it will render difficult and delay unauthorized tampering with the ignition circuit.

Still a further object of my invention is to provide a plate which serves to support and protect a bus-bar which connects the lead wire with the condenser, the parts being so arranged that concealed screw must be unscrewed before this plate can be removed so that the connection between the lead wire and the condenser may be so protected that it cannot be tampered with expeditiously.

Still a further object of my invention is to provide a breaker supporting plate which is readily detached and attached in the assembly by means of projecting lugs and inter-locking slots.

With these and other objects in view, my invention consists in the arrangement, combination, and construction of the various parts of my improved device, as described in the specification, claimed in the claims, and illustrated in the accompanying drawings, in which

Figure 1 shows a side elevation of an ignition device constructed in accordance with my invention, the device being installed on an automobile, parts being broken away to better illustrate the construction.

Figure 2 shows a longitudinal vertical sectional view through my improved device, one

of the extending arms being shown in elevation to better illustrate the construction.

Figure 3 shows a top or plan view of the distributor with the head removed thereby exposing the breaker mechanism used.

Figure 4 shows a horizontal sectional view taken on the line 4-4 of Figure 2, and

Figure 5 shows a top or plan of my distributor, the one end being broken away and shown in section to better illustrate the construction.

Referring to the accompanying drawings, I have indicated an automobile having the radiator shell 10, hood 11, dash 12, instrument board or panel 13, a gas tank 14, and an engine having the cylinder head 15. This cylinder head is held in place by bolts or studs and nuts 16. Sparkplugs 17 are mounted in the cylinder head 15 in the ordinary manner. Mounted on this cylinder head is my improved ignition device or distributor.

The housing 18 of the distributor has a downwardly projecting sleeve or pilot 19 which extends into the cylinder head 15 and is locked from vertical reciprocation therein by a set screw 20 having the lock nut 21, the set screw extending into the annular groove 22 in the pilot 19. This mounting permits rotary movement of the housing 18 relative to the cylinder head 15.

A pair of bearing sleeves 23 are set into the bore through the center of the housing 18 and the pilot 19, and the distributor drive shaft 24 is journaled in this bore and the sleeves 23. An annular shoulder 25 is formed on the shaft 24 just above the top of the casting 18 and a gasket 26 is disposed between this shoulder 25 and the casing 18. A pin 27 is extended to the lower end of the shaft 24 just below the bottom of the pilot 19 and serves to lock a sleeve 28 onto the lower end of the shaft 24. This sleeve 28 and the shoulder 25 serve to normally hold the shaft 24 from axial displacement in the housing 18.

The lower end of the shaft 28 is provided with an eccentric extension 29 which is designed to co-act with a corresponding groove in the shaft which co-acts with the drive shaft 24 so that the latter may be driven from some driven shaft on the engine.

The bottom of the housing 18 has a boss 30 cast integral therewith near the bottom thereof and the passageway 31 is drilled through this boss 30 from the exterior of the housing 18 to the central bore. This passageway communicates with the central bore midway between the bearing sleeves 23 so that when oil is put into the oil cup 32, then this oil may run down the passageway 31 to the space between the sleeves 23 around the shaft 24 and thereby lubricate the bearing for this shaft in the pilot 19.

A second boss 33 is cast in the housing 18 adjacent to one side thereof and a hole is cored through this boss with its axis laying in a chord of the housing so that a round condenser assembly 34 may be slipped into this opening in the boss 33. The condenser is held from movement of the housing 18 by a laterally extending bracket 35 which has one end secured to the adjacent end of the condenser 34 and the other end secured to the exterior of the housing 18 by the screw 36 which is held from accidental loosening by the lock washer 37.

The inner end of the condenser 34 is provided with a screw threaded sleeve 38 designed to receive the screw 39. A bus-bar 40 is extended into proximity to the sleeve 38 so that the bus-bar may be clamped between a fiber washer 41 and the sleeve 38 by means of the screw 39. The parts are so shaped that the head of the screw and the outer surface of the washer will be just inside the casing and just in front of the condenser 34. An opening is made in the casing at this point having an annular shoulder 42 surrounding the opening so that a wax or asphalt seal 43 may be set in this shouldered opening 42 around the head of the screw 39 and against the surface of the washer 41, this seal being held in place by the shoulders of the opening 42.

When it is desired to remove the condenser 34, it will be seen that it is necessary to unscrew the screws 36 and to break the seal 43 so as to get at the head of the screw 39 to loosen the condenser from the bus-bar 40, the latter being locked in place in the casing by means which will hereafter be described.

Mounted on the dash 12 of the vehicle is a lock switch 44 which is operated by the lock 45 mounted on the instrument board. This locking switch 44 is constructed so that when it is locked, then the lead wire therefrom will be grounded and so that when it is in unlocked position then the lead wire therefrom will be connected through a wire 46 with the coil 47. The switch and lock, in the form of device here shown, are connected through a flexible shaft 48 which is housed in an armor conduit 49 extending between the dash 12 and instrument board 13. An armored wire 50 serves as the lead wire from the switch 44 to the distributor housing 18.

The upper portion of the wire 50 is of the flexible armor type, whereas the lower part which lays along the cylinder block is made of a hardened steel rigid tube 51 which is screwed into the housing 18 at 52. This tube has a lug projecting therefrom which is engaged by one of the bolts or nuts 16 whereby the armored wire is protected against unauthorized tampering. This steel tube 51 makes it about impossible to cut the armored wire by using a hatchet or chisel with the top of the cylinder block as an anvil and has the further function of making it necessary to unscrew the appropriate bolt or nut 16 and to unscrew the tube 51 from the housing 18 in order to remove the distributor assembly from the cylinder head.

A protecting and supporting disc 53 is mounted about the middle of the housing 18 just above the bosses holding the condenser 34 and the oil passageway 31. This disc is screwed down to the housing 18 by the screws 54 which are held from accidental displacement by the lock washers 55. It will be noted that this disc extends out to the inner surface of the housing 18 and inwardly to the central boss which has the distributor shaft 24 therein so that access to the lead-in wire 50 and the condenser 34 from the outside can only be secured by removing the protecting disc 53. The bus-bar 40 is riveted to but insulated from the lower side of the protecting disc 53 by means of the rivets 56 and the insulating washers 57.

As has heretofore been described, the bus-bar 40 is secured to the condenser 34 by the screw 39 which can only be removed by knocking out the seal 43 so that this protecting disc 53 cannot be removed to remove the bus-bar 40 until this screw 39 has been unscrewed from the condenser 34. The end of the wire 50 which extends through the steel tube 51 into the housing 18 is provided with an integral rounded head 58 which has a spring 59 back of it which bears against an insulating sleeve 60 mounted in the end of the tube 51 whereby the end of the wire 50 may be pressed inwardly toward the center of the housing 18 by the spring 59. The bus-bar 40 has the pocket 61 formed therein which receives this head 58 on the wire 50.

From the description of the foregoing it will be seen that the head 58 is yieldingly urged into contact with the bus-bar 40 so that this lead wire 50 has an electrical connection with the bus-bar 40. It will also thus be seen that when the switch 44 is operated to furnish the proper current to the lead wire 50, then the current may be furnished to the distributor through the bus-bar 40. On the other hand if the switch 44 is grounded, then the lead wire 50 will also be grounded and the condenser and the distributor will be grounded. The bus-bar 40 has an extension 62 which extends up through a notch in the disc 53 and which is connected to

a wire 63. The notch in said disc is considerably larger than the extension 62 so that there is no electrical connection between these two parts.

5 Adjacent to the upper inner edge of the housing 18, an annular groove 64 is formed and the breaker assembly supporting plate 65 is provided with a plurality of lugs 66 which are unequally spaced from each other and which enter notches 67 in the upper side of the groove 64 to form a bayonet joint connection so that the breaker assembly plate 65 may be rotatably mounted in the casing 18 and held from axial movement relative thereto. A coil spring 68 extends between the protecting plate 53 and the breaker assembly supporting plate 65 so as to eliminate any possibility of rattle of the breaker assembly plate.

This breaker assembly supporting plate 65 has an integral arm 69 extended therefrom which is provided with a ball 70 at the end thereof. This arm is designed to extend out from the distributor and to be connected to a time control lever whereby the breaker mechanism position may be varied to thereby vary the timing of the engine as desired.

Extending upwardly from this plate 65 and formed integrally therewith is an upwardly extending boss 70 having a transverse bore therethrough designed to receive an adjusting screw 71. One side of the bore is slotted so that a clamping screw 72 may be screwed down to lock the adjusting screw 70 very tightly in place when it has been properly adjusted. A contact point 73 is welded or otherwise secured to the end of the adjusting screw 71.

A segment of insulating material 74 such as fiber is riveted as at 75 to the plate 65. A stud 76 extends down through the insulating segment 74 and a properly placed notch in the plate 75 and the second end of the wire 60 is secured to the lower end of this stud 76. A second stud 77 is similarly secured in the insulating segment 74 and the breaker arm 77 is journaled thereon. A spring 78 cooperates with the stud 76 and 78 to yieldingly urge the arm 77 toward the adjusting screw 71. The arm 77 has a contact 73 thereon which contacts with the contact 73 and the adjusting screw 71 so that a circuit may be completed from the lead-in wire 50 to the ground through plate 65 and housing 18 when the breaker arm is in position with the contacts 73 in contact with each other.

The end of the distributor shaft 24 near the shoulder 25 is bored out and threaded to receive a set screw 78 whereby a cam 79 may be locked from rotation relative to the shaft 24 by its engagement with the set screw and the shoulder 25. The adjacent surfaces of the cam and shoulder may be roughened if desired to insure against accidental rotation of the cam on the shaft 24.

The arm 77 has a fiber cam contact 80

which is secured thereto by the rivets 81 whereby the arm 77 is insulated from the cam 79 but still its movements may be governed thereby.

The upper end of the cam 79 is contracted at 82 to form a shoulder and a distributor arm 83 which is molded from insulating material is slid down over this contracted portion of the cam. The position of this distributor member 83 is governed by a notch 84 formed in the surface of the cam 79 and a corresponding shoulder portion 85 on the inner surface of the distributor member 83 whereby said arm can only be installed in one position and must stay there.

A rivet 86 is molded in the distributor arm 83 and two strips forming the conducting part of the arm are secured to the arm by said rivet and extend in each direction therefrom. One of these strips 87 extends over to position adjacent to the wall of the distributor head and the other extends inwardly and upwardly to position at the top center of the distributor casing.

From the construction of the parts just described, it will be seen that rotation of the distributor drive shaft 24 will rotate the cam 79 which in turn will actuate the breaker arm 77 to bring together and separate the contact points 73. This same rotation of the cam 79 will also rotate the distributor arm 83 to control the output of the high tension current from the distributor.

The head proper of the distributor is formed in two parts, one of them being the body of the distributor casing to which I have given the reference numeral 89 which is generally of hollow cylindrical shape and which has arms 90 projecting in either direction therefrom. These arms 90 and the distributor head body 89 have lead wires 91 molded right in the material thereon and extended from position adjacent to the hollow center of the body through the arms 90. Each lead wire extends from position within the body where it can co-act with the distributor arm out through an arm and its outer end is then turned upwardly to extend out of the arm at 92.

These ends 92 form a contact for a short leaf spring bus-bar 93 which connects this contact 92 with the adjacent spark plug 17. Each wire 91 is extended through the proper arm to position as near as is practical to the appropriate spark plug. The inner ends of these wires 91 are also so arranged that they extend slightly into the interior of the body 89 in symmetrically spaced positions therein so the distributor arm may pass each of these inwardly extending ends during each revolution thereby supplying the high tension current to the spark plugs 17.

The bus-bars 93 are each provided with notches in either end thereof designed to enter annular channels in the ends of the con-

tacts 92 and similar channels in the top of the spark plugs 17 whereby the inherent resiliency of these bus-bars due to the fact that they are of greater length than the straight line distance between said contact and the spark plugs will hold these bus-bars in position and insure good electrical contact therefor.

The top of the distributor is closed by a cap 94 which has an annular flange downwardly extending flange 95 at the outer edge thereof which engages a corresponding upwardly extending flange on the distributor body 89 to thereby center and locate the cap 94. The cap 94 has a metallic contact sleeve 96 molded therein which has a piece of carbon 97 placed into the bottom thereof in position so that the carbon will contact with the upwardly extending strip 88 of the distributor arm 83. The contact sleeve 96 is designed to receive the lead-in wire 98 which extends from the bottom of the coil 47 to this contact 96.

The body member 89 and the cap 94 are detachably secured together and to the housing 18 by means of spring fingers 99 which are journaled at lower ends on the pins 100 which in turn are riveted into the ears 101 which extend outwardly on opposite sides of the housing 18. The tops of these spring fingers 99 are bent over at 102 to engage the top of the cap 94 to thereby hold the cap and body on the housing 18. The body can only be installed on the housing in one position because of the arm 69 and a locking pin 103 which extends upward from the housing.

Among the many advantages arising from the use of my improved construction, it should be specifically pointed out that with my improved device it is possible to lock an automobile by means of an armored lead wire connected to the distributor in such a way that several parts have to be displaced or replaced in order to drive away the automobile unlawfully. For instance, if it is desired to change the distributor it is necessary to both remove the set screw 20 and to remove the nut 16 in order to loosen up the sleeve 51. This makes the problem of tampering much more difficult. Still a further advantage results from the use of my improved device in that access can only be obtained to the condenser assembly by removing a concealed screw. The rigid steel sleeve protecting the lead-in wire forms a further protection against unlawful tampering. Still a further advantage results from the manner in which the condenser and lead-in bus-bar is protected from tampering. Still a further advantage results from the novel manner of mounting the breaker contact assembly on a plate which is readily attachable and detachable and which still is prevented from rattling and rotates on the axis of the distributor operating shaft. Still a further

advantage results from the use of my improved distributor head wherein the head is extended by means of arms to such position that the contacts on these arms are so close to the spark plugs that short spring bus-bars can be used and the danger of shorts is reduced to practically nothing. Still a further advantage results from the use of my improved distributor head in that I am enabled to eliminate all flexible lead wires and to make a single piece of wire take the place of inside and outside contacts for a distributor head and also the major portion of the lead wire from the distributor to the spark plug. Still a further advantage results from the ease in assembling and disassembling together with the cheapness with which it may be manufactured.

Some changes may be made in the arrangement, construction, and combination of the various parts of my improved device without departing from the spirit of my invention and it is my intention to cover by my claims such changes as may reasonably be included within the scope thereof.

I claim as my invention:

1. In a device of the character described, a casing, a distributor head mounted thereon, said distributor head having a slot therein, and a breaker assembly supporting plate mounted in said casing with a bayonet joint connection, said plate having an adjusting arm extended therefrom through the slot in the head and the parts being so arranged that the plate will be rotatably mounted in the casing when the head is installed but removal of the plate can only occur when the head is removed from the casing.

2. In a device of the character described, a casing, a distributor head mounted thereon, said distributor head having a slot therein, a breaker assembly supporting plate mounted in said casing with a bayonet joint connection, said plate having an adjusting arm extended therefrom through the slot in the head and the parts being so arranged that the plate will be rotatably mounted in the casing when the head is installed but removal of the plate can occur only when the head is removed from the casing, and yielding means for engaging said casing and plate to urge the plate to one limit of its movement whereby rattle may be eliminated.

3. In a device of the character described, a housing, said housing having an annular groove in the inner wall thereof adjacent to one end thereof, the wall of said groove having portions thereof broken away, a breaker supporting plate having extending lugs thereon adapted to enter said grooves through said broken away portions whereby said breaker supporting plate may be rotatably and detachably mounted in said casing, and yielding means extended between said casing and said plate adapted to yieldingly urge

said lugs into contact with the walls of said groove.

4. In a device of the character described, a distributor housing, an armored lead wire extending into said housing, a protecting plate mounted in said housing adjacent to its junction with said lead wire, a breaker assembly plate mounted in said housing on the side of said plate opposite said junction, a bus bar insulatingly secured to said protecting plate forming an electrical connection between the breaker assembly plate and said lead wire, and a concealed and sealed-in connection for securing said protecting plate in said housing whereby said protecting plate can only be removed by locating said connection and destroying the seal.

5. In a device of the character described, a casing, an armored lead wire extending into said casing near the bottom thereof, a protecting plate mounted in said casing above said lead wire junction, a breaker assembly supporting plate mounted in said casing with a bayonet type connection above said protecting plate, means extending through said protecting plate for electrically connecting the lead wire with the breaker assembly and sealed-in means for securing said protecting plate to the casing whereby said protecting plate can only be removed by locating said seal and destroying same.

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