

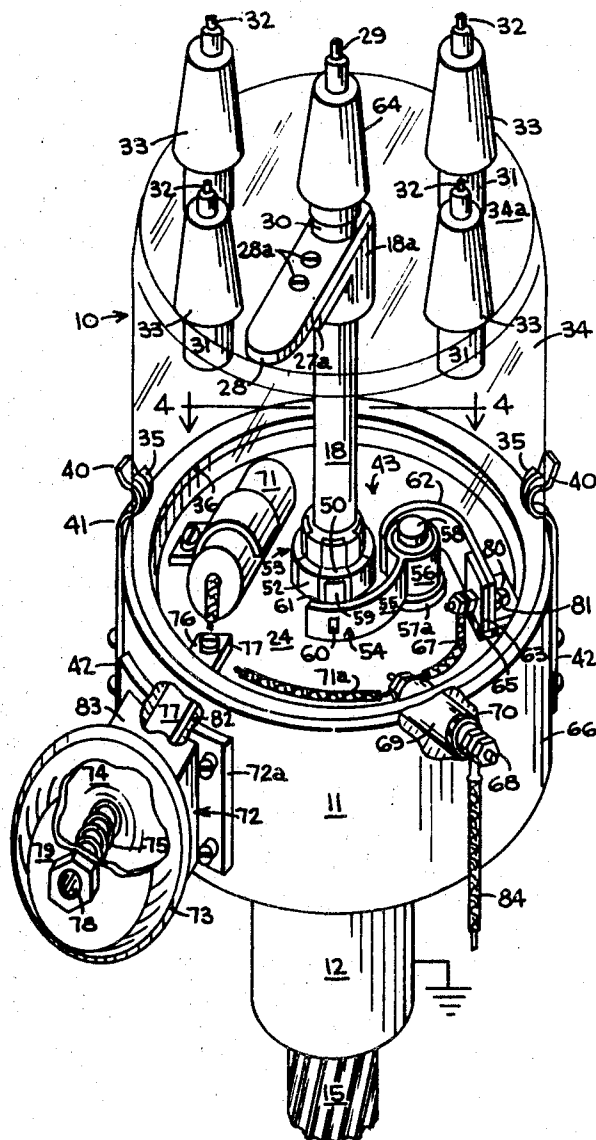
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 Primary Examiner—Laurence M. Goodridge

[54] **ELECTRICAL IMPULSION SWITCH FOR USE WITH AN AUTOMOTIVE DISTRIBUTOR**
3 Claims, 3 Drawing Figs.

[52] U.S. Cl..... 123/146.5,
 200/24
 [51] Int. Cl..... F02p 7/00
 [50] Field of Search.....123/146.5(A);
 200/24

ABSTRACT: An electrical switching device adapted for use with a substantially conventional automotive ignition system of the mechanical-electro type, said switching device being capable of alternately opening and closing an energized feeder serving the primary winding of an associated conventional induction coil for inducing its high electrical potential output; whereby said switching device defines an impulsion switch having wiping means alternately associated with the points of its continuity means; wherein said points automatically maintain themselves in electrical cleanness; thereby, maintaining the efficiency of the ignition system in respect thereto.



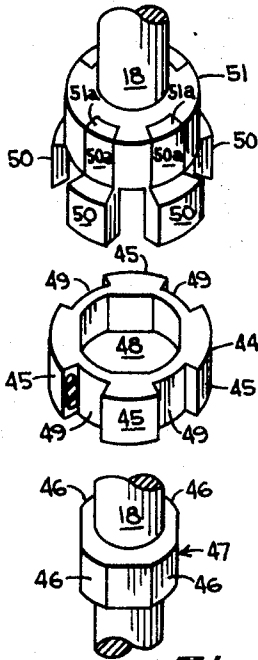


Fig. 3

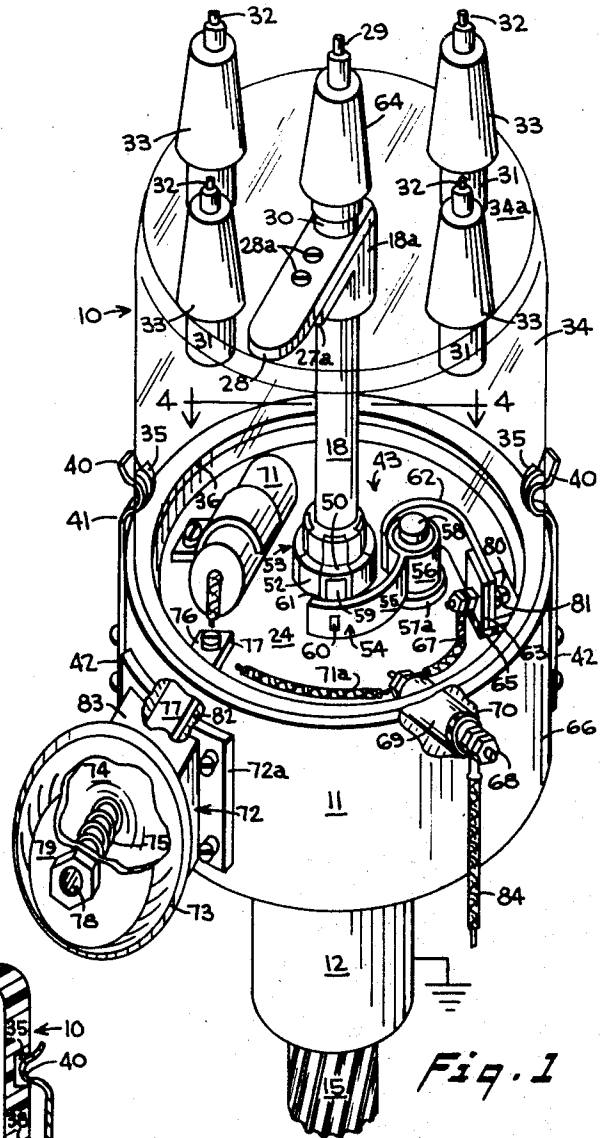


Fig. 1

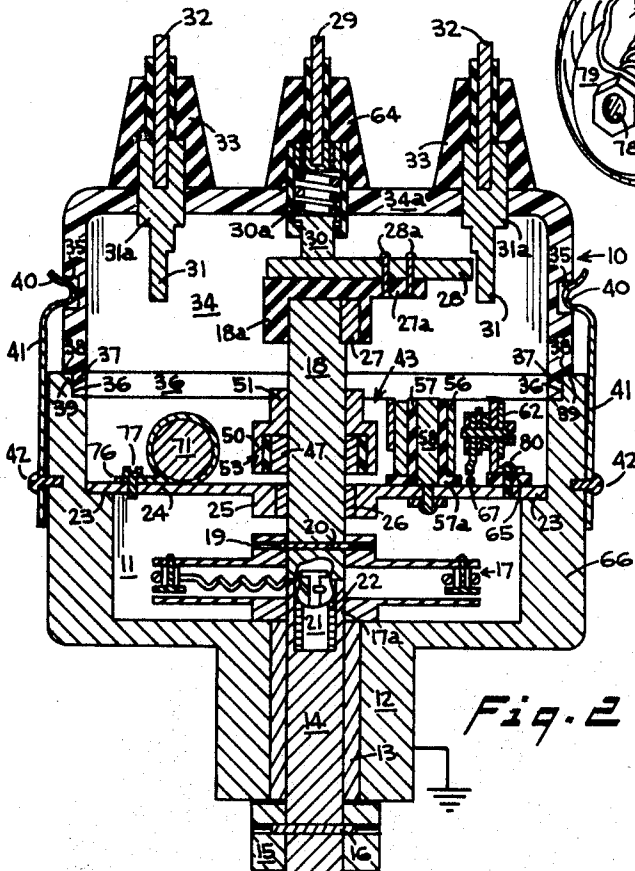


Fig. 2

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ELECTRICAL IMPULSION SWITCH FOR USE WITH AN AUTOMOTIVE DISTRIBUTOR

The main object of my invention is to provide said switch with means for automatically wiping the carbon residue established, with the points thereof, therefrom, as by the electrical arc occurring therebetween; thereby obviating a foreign resistance and consequently a voltage drop within its electrical circuit; which normally would establish a deficiency within the said ignition system.

Another object of my invention is to provide said switch with point spacing means which automatically maintain their initial extent, one in respect to the other; thereby obviating periodic adjustment, and inconvenience to the vehicle operator.

A further object of my invention is to provide said switch with resilient continuity means; thereby, deformation of the said continuity means will be obviated.

A still further object of my invention is to provide said switch with means whereby the self welding of its continuity means, as by the arc established in the breach of the current therebetween is obviated.

Other important objects and advantages of my invention will henceforth become apparent, as through the following description, and accompanying drawing in which a preferred embodiment thereof is illustrated, and wherein:

FIG. 1 is a perspective view of a substantially conventional ignition distributor having the said switch adapted for use therewith.

FIG. 2 is a vertical sectional view of FIG. 1.

FIG. 3 is an exploded view shown in perspective of certain elements of construction which are disposed below the line 4-4 of FIG. 1.

With particular reference now being had to both FIGS. 1 and 2 within the drawing the numeral 10 indicates in general a substantially conventional distributor, which comprises the cup shaped metal housing 11. Depending integrally from housing 11 there is the sleeve member 12, having an internal oilless bushing 13. Journaled through bushing 13 there is provided the shaft 14, wherein the lower extensible end portion thereof is provided with the pinion gear 15 which is removably fixed with the former as at 16. The upper extensible end portion of shaft 14 carries in press-fitting relation therewith the collar 17a associated with the spring loaded shaft coupler 17, and wherein its remaining collar is removably fixed as at 19 with the conventional tapered pin 20 which transverses in press-fitting relation an intermediate body portion of the second coaxially aligned shaft 18 which is provided with the reduced depending terminal portion 21 which serves as a means for journaling the lower body portion of shaft 18 within the oilless bushing 17a provided axially within the terminal body portion of the first shaft 14 as at 22.

Distributor housing 11 further includes the annular shoulder 23 which serves to carry in rotatable seating relation therewith the disc-shaped plate 24 from which depends the integral collar 25 having the internal oilless bushing 26 which serves to journal an intermediate body portion of the second shaft 18.

Distributor 10 further includes the inverted cup-shaped translucent closure or cap 34, which is composed of Lucite; there by enabling a person to observe the distributors operation, and which may serve to diagnose the trouble in trying to start an associated engine. Cap 34 includes the depending reduced end portion 36 which is adapted to fit telescopically within the upstanding annular flange 39 associated with distributor housing 11 and wherein the shoulder flange 38 provided by virtue of end portion 36 serves as a stop therefore, as when seated upon housing rim 37. Serving to removably secure cap 34 with housing 11, there is for this purpose provided the pair of diametrically disposed recess openings 35 within the outer face of cap 34, each of which being provided with a grooved depression within the lower wall thereof which serves to secure the hook member 40 which is carried by the leaf spring 41, which in turn is secured as at 42 with the upper body portion of housing 11.

Distributor shaft 18 is shown to carry in keyed relation therewith as at 27 the dielectric collar 18a from which extends laterally the arm member or integral rotor 27a, which carries in fixed relation therewith as at 28a the flat rectangular-shaped copper bar 28, having its free end portion spaced radially from each of the series of electrodes 31 alternately, and which electrodes 31 depend integrally within the interior of cap 34 from the series of circumferential and equally spaced electrical adapters 31a which extend through the opposite sides in fixed cast relation with cap closure wall 34a, and wherein adapters 31a correspond equally in number to an associated engines spark plugs, not shown, which in practice are established in continuity therewith by the conductors 32 in a predetermined arrangement, respectively, and conventionally serving to insulate the exterior end portion of each adapter 31a there is for this purpose provided the dielectric sleeve 33.

Disposed centrally cap closure wall 34a there is provided an additional electrical adapter 30a from which depends the spring biased plunger electrode 30 which is adapted to bear resiliently upon rotor bar 28 for slidably establishing continuity therewith; thereby, a high electrical potential received by electrical adaptor 30a through conductor 29 from a conventional induction coil, not shown, may be passed consecutively upon each respective electrode 31 in the form of a spark, as when rotor bar 28 is disposed in proximity therewith, which in turn is passed to an associated spark plug for use in igniting a combustible gas mixture stored within an associated engine cylinder, respectively.

Distributor 10 further includes the ignition timing device 72 which serves conventionally to either retard or advance the timing of the engines ignition firing for optimum engine efficiency. Timing device 72 includes a pair of outwardly-dished comated shell members 79 which is provided with a medially disposed partition provided by virtue of a flexible disc or diaphragm 74, which is normally biased by the spring 75 which is axially disposed in the outer chamber of the elliptical-shaped housing 73, and wherein said force moves diaphragm 74 inwardly the opposite chamber thereof. Housing 73 extends axially from the rectangular shaped housing 83 in fixed central relation therewith, and in turn housing 83 is fixed with the wall 66 of housing 11 as at 72a, in a manner wherein the link 77 which is pivotally secured at its outer end with the free face of diaphragm 74, may be capable of passing axially through the opening 82 provided in wall 66 therethrough, and further, that the free end portion of link 77 may be pivotally secured as at 76 in eccentric relation with distributor plate 24. In practice, pipe coupler 78 which communicates with the outer chamber of housing 73, as when disposed in fixed central axial relation with the outer-dished shaped member 79 thereof; further, communicates with a selective engine suction port, not shown, through a flexible interposed conduit, not shown, it then being apparent that when the engine suction pressure exceeds the spring force acting upon diaphragm 74, will in effect influence the movement thereof in the direction of the outer housing 73 chamber, and in turn, link 77 will follow accordingly, and in turn, will pull disc-shaped plate 24 in a counterclockwise direction; the action of which serves a henceforth described purpose.

Second distributor shaft 18 is provided in fixed axial relation with the prior art cam 47 having lobes 46 which correspond equally in number to distributor electrodes 31 for an obvious reason. In the prior art lobes 46 served to force the electrical point of a pivoted contactor alternately into collision with a fixed contact, not shown, the composite of said points being identified as breaker points, which served as a switch for alternately closing and opening an energized electrical circuit in which the primary winding of a conventional induction coil, not shown, was interposed. It being well known to those persons versed in this art, that the electrical spacing of the points had to be periodically adjusted, in order to compensate for the wear incurred by a dielectric rubbing block or cam follower, which was disposed in fixed lateral relation with the pivoted said contactor; further, it being established that due to the wear of said rubbing block, the points soon become

carbonized by erratic continuity therebetween; which in effect established a foreign electrical resistance to the current flowing therethrough alternately, and thereby provided a voltage drop within the said primary winding of the induction coil, and consequently the coil was unable to deliver the extent of its high potential electrical supply to the engines spark plug, which in effect, reduced the associated engines efficiency in respect thereto. Therefore, and in order to obviate the deficiency of the prior art switch; I have provided switch 43 which constitutes my invention.

Electro switch 43 comprises the commutator 53 and the contactor 54; of which the commutator 53 includes the dielectric collar 44 which is preferably composed of Nylon, as it provides a durable wearing surface substantially resistive to friction. Collar 44 is provided with an opening 48 therethrough which is adapted to circumscribe in press-fitting relation prior art cam 47. Further, collar 44 is provided with the circumferentially and equally spaced lobes 45 which correspond equally in number to prior art cam lobes 46, and by virtue of lobes 45 there is provided with collar 44 the sector-shaped recesses 49, which are disposed in a manner wherein the central longitudinal axis of each thereof being disposed in radially opposed relation with an identical axis of a respective prior art cam lobe 46, the positioning of which serves to retain the initial ignition timing of distributor 10 in a manner henceforth described.

Disposed in circumscribed press-fitting relation with the distributor shaft 18 and in superposing abutting relation with both prior art cam 47 and Nylon collar 44, there is provided the conductive collar 51 which is preferably composed of copper, which serves for a henceforth described electrical purpose. Conductive collar 51 is provided with the series of sector-shaped recesses 51a within the periphery thereof which are spaced in a manner whereby each recess 51a will be coaxially aligned with a respective Nylon collar recess 49. Conductive collar 51 further has its periphery spaced inwardly the periphery of Nylon collar 44 in a manner whereby the recess 49a associated with the latter will be capable of accommodating in press-fitting relation therewith the sector-shaped shoe or bar 50 composed preferably of copper, in a manner whereby the periphery of bar 50 will be disposed in flush relation with the periphery of a pair of contiguous Nylon collar lobes 45; thereby, the periphery of the cited bars 50 in respect to the periphery of the cited lobes 45 will provide commutator 53 with the continuous face 52, and in a similar manner the integral leg members 50a which are associated with the bars 50 respectively, are disposed in flush relation with the periphery of conductive collar 51.

Spaced in concentric relation with commutator face 52 there is provided the cited electrical contactor 54, which comprises the semicircular and rectangular shaped arm member 55, having the integral collar 56 provided with one end thereof, which serves to pivotally secure arm member 55 upon the prior art upstanding pintle 58 which is disposed in fixed relation with distributor plate 24. In order to insulate contactor 54 both from pintle 58 and distributor plate 24, then for this purpose there is provided the nonconductive Nylon bushing 57 having the flange 57a wherein bushing 57 interposes both pintle 58 and collar 56, and flange 57 interposes distributor plate 24 and the lower end of collar 56; further, the oilless inherent characteristic of Nylon bushing 57 serves to lubricate the cited action of contactor 55 in respect to pintle 58. Arm member 55 further includes the electrical point 59 which is adapted in a manner wherein its transverse extent will not exceed the width of either a respective Nylon collar lobe now defined as nonconductive spacer 45, and that of a respective commutator bar 50; thereby, the possibility of point 59 being established in continuity with a pair of commutator bars 50 simultaneously is obviated, as when point 59 is fixed as at 60 with the inner face 61 of arm member 55; further, the positioning of point 59 in respect to arm member 55 is such that when point 59 is disposed in continuity with a respective commutator bar 50, then rotor bar 28 will be disposed in proximity

with a predetermined spark plug electrode 31, as when rotor bar 28 is influenced to move by distributor shaft 18 by its associated driven gear 15 in a clockwise direction, it being apparent that commutator 53 will also move in an identical direction, and in practice, when point 59 is spaced from a pair of adjacent commutator bars 50, as when disposed in contiguous relation with a nonconductive spacer 45, that rotor bar 28 will be disposed in transverse relation with the cited electrode 31, thereby, the cited mechanical action, transposed upon commutator 53 will influence the cited induction coil to fire its high electrical potential which conventionally serves to ignite a gaseous vapor within a preselected automotive cylinder as associated with a conventional internal combustion engine, in a manner henceforth described.

Serving to establish contactor 54 in resilient contiguous relation with commutator face 52 there is for this purpose provided the substantially U-shaped spring 62 having one end thereof weldingly fixed in tangent relation with contactor collar 56 as with a sector portion thereof spaced from commutator face 52, and the opposite end thereof being removably fixed as at 81 with the upstanding leg of the L-shaped bracket 63 which is fixed in removably secured insulated relation with distributor plate 24, as when nonconductive sleeper 65 interposes the opposite leg of L-shaped bracket 63 and distributor plate 24, and wherein the Nylon machine screw 80 is accommodated to pass through both the cited bracket leg and the sleeper slidably for threadedly secured relation with distributor plate 24. Spring 62 is connected electrically with the prior art body terminal screw 63 which is disposed in insulated relation by the nonconductive sleeve 69 which is disposed in press-fitting relation with the bore 70 provided in distributor wall 66 therethrough, as by the electrical conductor 67 which terminates with the inner extensible end portion of screw 68, and wherein the outer extensible end portion of screw 68 is connected electrically with one terminal side of the primary winding of the cited induction coil, as by the conductor 84, the wiring scheme being well known to those persons versed in the art, and for this reason a further illustration thereof is deemed unnecessary; further, the opposite terminal side of the cited primary winding is connected with one terminal side of the engines power supply, and wherein the connection is generally interposed by a keyed electrical switch, not shown; further, the remaining side of the engines power supply or battery is grounded to the engine frame, in this manner commutator bars 50 are established in a common polarity as through both copper collar 51 and distributor shaft 18.

It can now be described how my impulsion switch 43 will serve distributor 10 as when the cited engine is established into operation, and thereby, rotor bar 28 will be moving in the cited clockwise direction, and when rotor bar 28 is disposed in proximity with each consecutive spark plug electrode 31 respectively, then the cited positioning of contactor point 59 in respect to its continuity with a respective commutator bar 50, will then be capable of simultaneously closing the energized electrical circuit as served upon the primary winding of the cited induction coil and thereby build up a residual source of electrical energy within the induction coil which is released upon the rotor bar 28 as when the cited electrical circuit is breached by virtue of the cited and respective commutator bar 50 moving from continuity with contactor point 29, and then rotor bar 28 will then be capable of firing the cited predetermined engine spark plug, as it will now be positioned in substantially transverse relation with the cited electrode, as when distributor plate 24 is disposed in a substantially retarded position in respect to the automatic timing device 72, which has been cited as being capable of moving distributor plate 24 in a counterclockwise direction as when the cited engine suction force is increased in magnitude; thereby contactor 54 will move accordingly and its associated electrical point 59 will simultaneously advance upon commutator bars 50 in a consecutive order, and in turn rotor bar 28 will dispose of its electrical energy more quickly and thereby engine ignition will be established accordingly. Serving conventionally to suppress

the electrical arc occurring by the cited breaching of the energized electrical circuit, there is then for this purpose provided the condenser 71 wherein the inner convolution of its foil is connected with the cited conductor 67, and the outer convolution thereof is established into continuity with the frame ground as through its metal housing; the cited electrical connections then establishes condenser 71 in electrical parallel with commutator 53 and contactor 54.

From the cited operation of impulsion switch 43 it then becomes apparent that I have provided a switching device for distributor 10 which will automatically provide a wiping means between commutator bars 50 and contactor point 59 which will serve to maintain both the former and the latter in electrical cleanliness; and thereby obviate the growth of a foreign resistance from being established therebetween; further, and in as much as spring 62 serves to hold contactor 54 against commutator face 52 in resilient relation therewith, then further adjustment thereof is obviated; further, as the rotary action transposed upon commutator 53 is of substantial torque then it is impossible for a respective commutator bar 50 to weld with contactor point 50 under normal operating conditions.

While in the foregoing description of my invention therein has been disclosed a preferred embodiment thereof; however it is to be understood that minor changes in the details of construction may be resorted to without departing from the spirit and scope of the invention as I herein claim.

I claim:

1. The combination with a distributor for use in the ignition system of an internal combustion engine having a plurality of cylinders, said distributor comprising a cup-shaped housing, a sleeve depending centrally therefrom, a shaft disposed in rotatable relation within the latter and extensible therethrough, a gear disposed in fixed circumposed relation with said shaft adjacent the free end of said sleeve, said gear being adapted for meshing relation with a second engine driven gear, as when said sleeve is removably secured within a collar associated with said engine, a disc-shaped plate adapted for seating and rotatable relation upon an annular shoulder provided within the upper end of said housing, said plate having a depending central collar a second shaft disposed in extensible rotatable relation with said latter collar, a spring loaded coupler disposed in interposed fixed relation with both the first and second said shafts respectively, whereby the torque of the first shaft is transposed upon the second shaft in a resilient manner, a cam adapted for fixed circumposed relation with said second shaft, said cam being disposed in superposed spaced relation with said plate, said cam having a series of circumferentially and equally spaced lobes provided in the periphery thereof, a pintle disposed in fixed upstanding relation with said plate, said pintle being spaced radially from said cam, a post disposed in fixed insulated relation with said plate, said post being located adjacent the wall of said housing and substantially spaced from said pintle, an electrical terminal screw disposed in transverse insulated relation with said wall, and extensible therethrough, said screw having its external end portion established in continuity with one leg of the primary winding of an induction coil associated with said ignition system wherein the opposite leg thereof is established in continuity with one terminal side of a battery, through an interposed single pole single throw switch, and wherein the opposite battery terminal is grounded to the engine frame; thereby said grounded polarity will be transposed upon said distributor shafts; of a switch for impulsing said primary winding in order for said induction coil to provide a high tension spark through its secondary winding for firing the spark plugs associated with said engine in a respective predetermined manner by virtue of a spark distribution system associated with said distributor, wherein the optimum timing of said engine ignition is automatically controlled by a conventional suction operated motor of the reciprocating type, which is adapted to pull said distributor plate in a counterclockwise direction for advancing said ignition, and conversely to push

said plate in the opposite direction for retarding said firing respectively, said impulsion switch comprising a dielectric collar adapted for an axial press-fit upon the extent of said cam, said dielectric collar having a plurality of circumferentially and equally spaced sector shaped recesses provided within the periphery thereof, which correspond equally in number to said cam lobes, each said recess having its central longitudinal axis aligned transversely to the radius extending through the identical axis associated with each said cam lobe, for the purpose of retaining the initial firing order of said ignition system, said dielectric collar being provided with a plurality of lobes by virtue of said recesses, and which lobes define insulating spacers, a conductive collar adapted for an axial press-fit upon said second distributor shaft, said conductive collar being further disposed in abutting relation with the upper transverse wall of said cam, and with a medial portion of the identical wall associated with said dielectric collar; thereby said dielectric collar will have its periphery spaced outwardly from said conductive collar, said latter having a plurality of identically shaped and equal number of recesses in respect to said dielectric collar recesses, said recesses being coaxially aligned one in respect to the other respectively, a plurality of sector shaped bars adapted for a press-fit within the conductive collar recesses respectively, and for a flush fit with the periphery of said conductive collar lobes, a plurality of shoes depending integrally from said bars, said shoes being adapted for a press-fit within said dielectric collar recesses respectively, and for a flush fit with the periphery of said dielectric collar lobes thereby providing by virtue thereof a continuous face for said dielectric collar, wherein the composite of elements associated therewith defining a commutator, conductive wiping means disposed in resilient contiguous relation with a sector portion of said commutator face, and in pivotal relation with said pintle for automatically maintaining said commutator face and said wiping means in electrical cleanliness, one in respect to the other, as when said commutator is influenced to rotate by said engine through said distributor shafts, and means for alternately closing and opening said electrical circuit during the operation of said engine; thereby making and breaking a magnetic field within said induction coil respectively, for electrically firing said spark.

2. As claimed in claim 1, said wiping means comprising an electrical contactor having a sector-shaped arm member of rectangular cross section, said arm member being adapted for concentric spaced relation with a sector portion of said commutator face, a collar extending integrally from one end of said arm member, a flanged bushing disposed in press-fitting and abutting relation with said collar, said bushing being adapted for pivotal relation with said pintle associated with said distributor plate, and said bushing flange serving to space said arm member from said distributor plate, an electrical point removably fixed with the opposite end of said arm member, said point having an axial extent similar to both said electrical spacers and said commutator bars, and a lesser transverse extent in respect thereto; thereby the possibility of said point bridging any two commutator bars simultaneously is obviated, said point further being positioned against said commutator face in a manner whereby the original timing of said ignition system is retained in respect to said automatic timing device, a substantially U-shaped leaf spring having one end thereof weldingly fixed with said arm collar, adjacent said commutator face, and the other end thereof being removably fixed with said insulated post member associated with said distributor plate, said spring serving to hold said electrical point against said commutator face in a resilient manner thereby the initial adjustment thereof will be automatically maintained, said contactor being established in continuity with the open leg of said primary winding by an electrical conductor which interposes in removably fixed relation both the inner end portion of said electrical terminal screw and the outer end portion of said leaf spring.

3. As claimed in claim 1, wherein the means for alternately making and breaking a magnetic field within said induction

coil for electrically firing said spark during the operation of said engine, comprises the completion of said electrical circuit as when a respective commutator bar is established in con-

tinuity with said contactor point, and conversely said established energized circuit will be broken, as when a commutator spacer passes slidably upon said electrical point.

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