L. ERICSON.

IGNITION DISTRIBUTER.

APPLICATION FILED FEB. 14, 1917.

1,385,368.

Patented July 26, 1921.

3 SHEETS—SHEET 1.

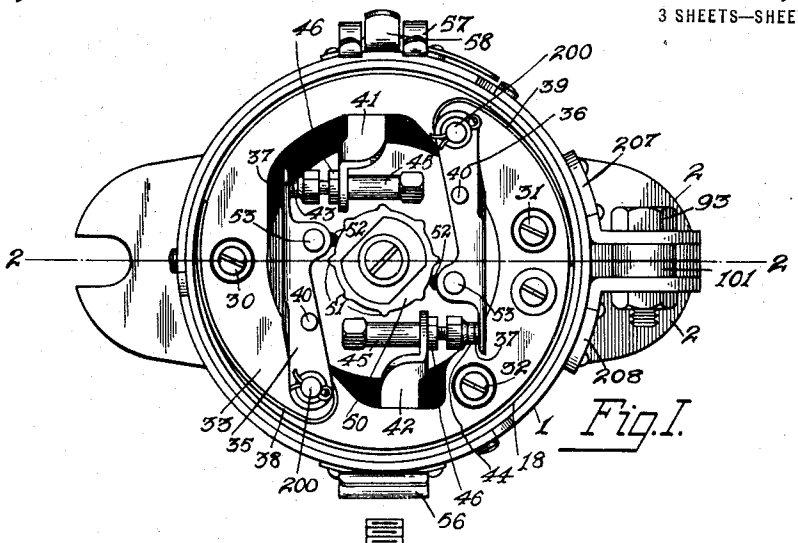


Fig. 1.

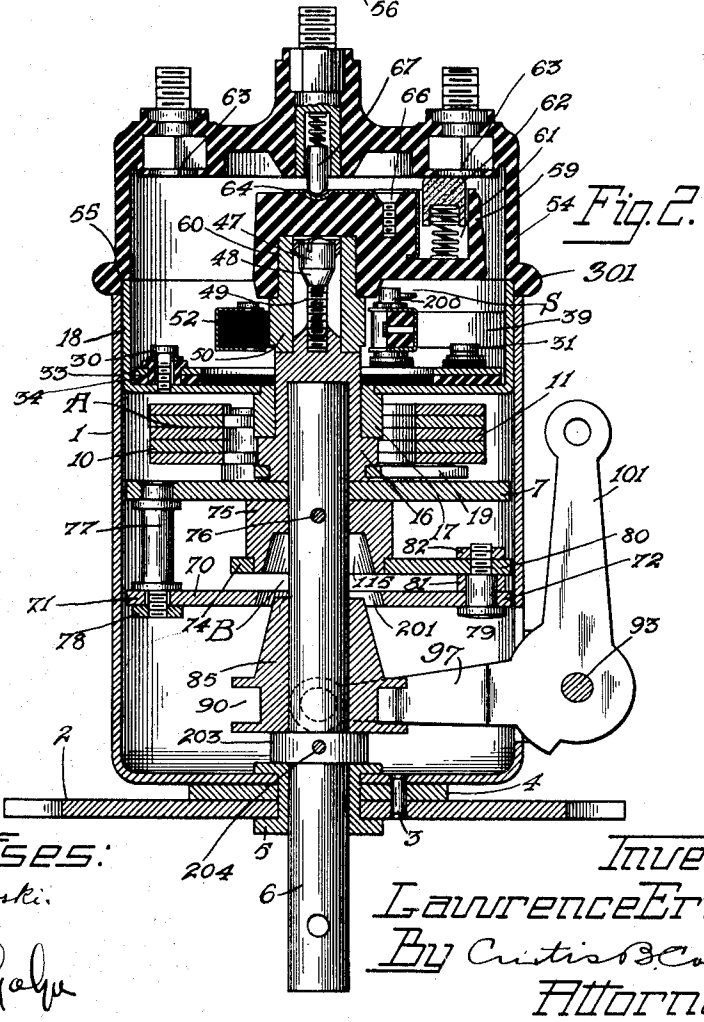


Fig. 2.

Witnesses:

G. A. Yanochowski.

Wm Berghahn

Inventor:

Laurence Ericson

By Curtis B. Comp.

Attorney.

L. ERICSON.

IGNITION DISTRIBUTER.

APPLICATION FILED FEB. 14, 1917.

1,385,368.

Patented July 26, 1921.

3 SHEETS—SHEET 2.

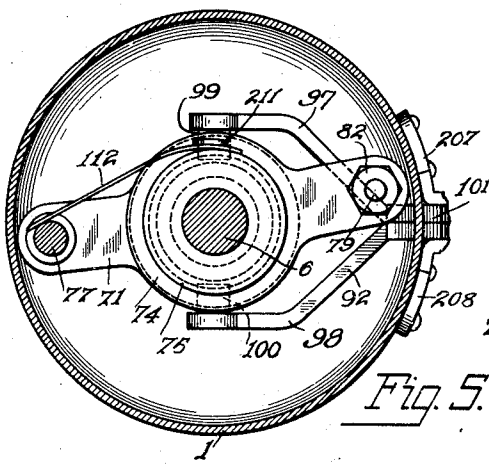


Fig. 5.

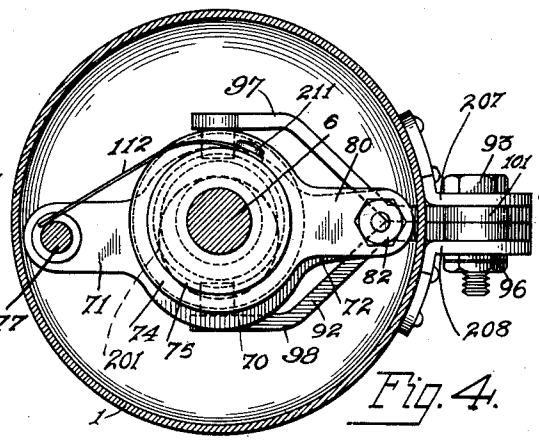


Fig. 4.

Fig. 6.

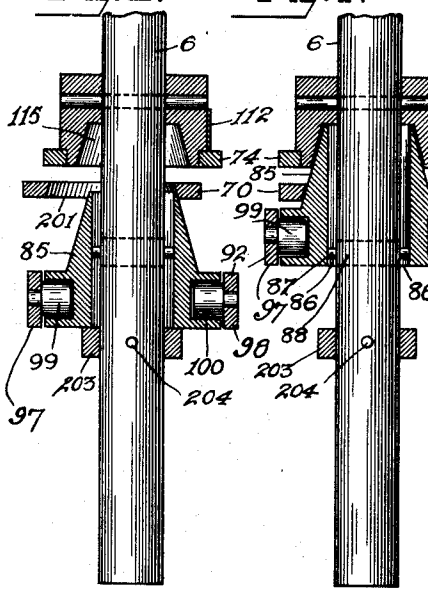
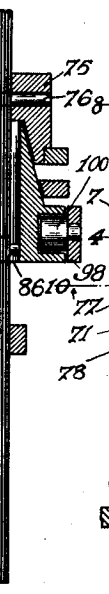


Fig. 7.



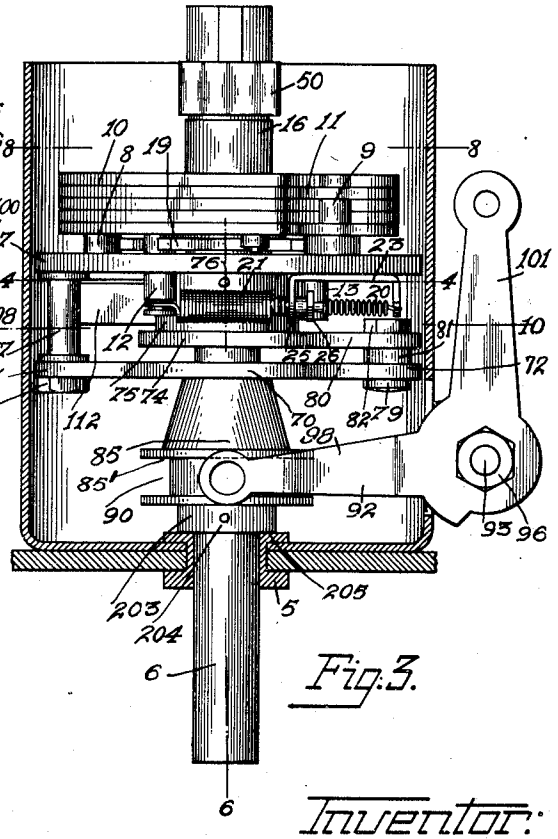


Fig. 3.

Witnesses:

G. A. Yanochowski.

W. Borghalm

Inventor:

Lawrence Ericson.

By Curtis B. Camp.

Attorney.

L. ERICSON.

IGNITION DISTRIBUTER.

APPLICATION FILED FEB. 14, 1917.

1,385,368.

Patented July 26, 1921.

3 SHEETS—SHEET 3.

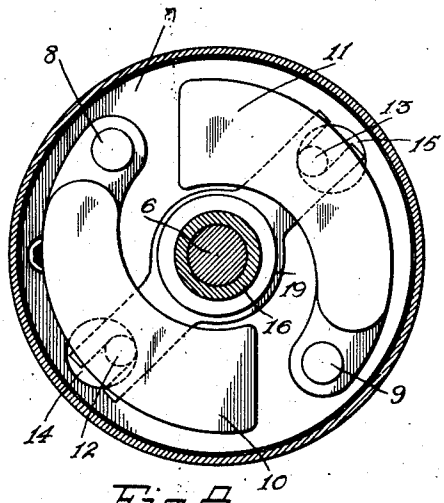


Fig. 8.

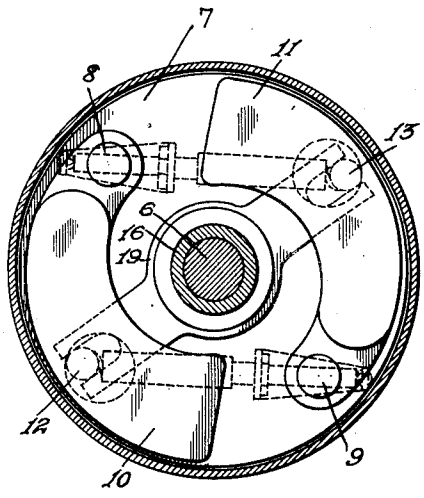


Fig. 9.

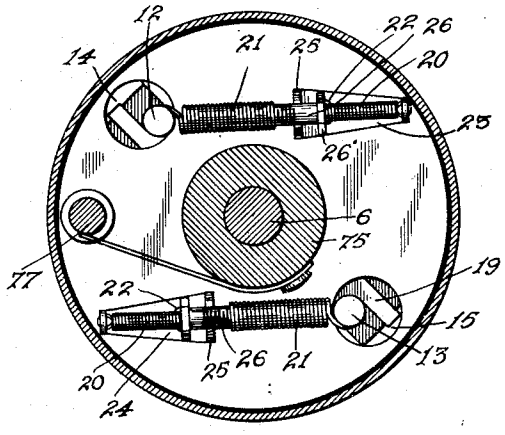


Fig. 10.

Witnesses:

G. Yanochowski.

W. M. Borghalyn

Inventor:

Lawrence Ericson

By Curtis B. Camp.

Attorney.

UNITED STATES PATENT OFFICE.

LAWRENCE ERICSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

IGNITION-DISTRIBUTER.

1,385,368. Specification of Letters Patent. Patented July 26, 1921.

Application filed February 14, 1917. Serial No. 148,666.

To all whom it may concern:

Be it known that I, LAWRENCE ERICSON, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Ignition-Distributers, of which the following is a specification.

My invention relates to current controllers or ignition distributers for use in connection with internal combustion engines that are subject to various and sudden changes of speed, such as automobile engines, and more particularly relates to that type of distributer which is provided with manual means, in connection with automatic means or by itself, for advancing or retarding the spark furnished the engine by the distributer.

The object of my invention is to provide an improved device provided with improved manual control mechanism which will obviate the undesirable features found in the present devices in use, and embody desirable features and advantages, all in a simple, efficient and economical manner, and to the accomplishment of this object and such others as may hereinafter appear, my invention consists in the novel details of construction, parts, and combination of parts hereinafter described and particularly pointed out in the appended claims.

For an understanding of my invention reference is to be had to the accompanying drawings, in which like parts are indicated by like reference characters, and in which:

Figure 1 is a top view of the distributer of my invention with the cover and distributer arm removed.

Fig. 2 is a sectional view on line 2—2 of Fig. 1 with the cover and the distributer arm in their respective positions.

Fig. 3 is a side view of the distributer with the cup shaped containing casing in section to more clearly show the operating mechanism, certain parts of the distributer being omitted.

Fig. 4 is a sectional view on the line 4—4 of Fig. 3 showing parts of the manual advance in normal position.

Fig. 5 is a view similar to that of Fig. 4 but showing parts of the manual advance in an operated position.

Fig. 6 is a partial sectional view on the line 6—6 of Fig. 3 showing the manual advance in retarded position.

Fig. 7 is a view similar to that of Fig. 6 but showing parts of the manual advance in an advanced position.

Fig. 8 is a sectional view on the line 8—8 of Fig. 3 showing the automatic control mechanism in its normal position.

Fig. 9 is a view similar to Fig. 8, but showing the automatic control mechanism in its fully operated position and showing the operating springs of the mechanism in dotted line.

Fig. 10 is a sectional view on line 10—10 of Fig. 3 looking in the direction of the arrows.

Referring now more in detail to my invention as illustrated, it comprises in general, distributer mechanism S, automatic mechanism A for automatically advancing and retarding the spark in response to the changes in speed of the motor, and manual mechanism B for manually advancing and retarding the spark.

The distributer comprises a cup shaped outer inclosing member 1 which contains the mechanisms A, B and S, and a cap or distributer head 54. A plate 2 is provided and suitably fastened to the cup member 1 by means of rivets 3, a spacing washer 4 being placed between the cup member 1 and the plate 2. A collar 5 is suitably fastened to the cup shaped containing member 1 by means of staking, and forms a bearing for the distributer shaft 6. The plate 2 serves as a mounting member for fastening the distributer to the engine base by means of bolts or other suitable means. The upper portion of the distributer shaft 6 extends into the casing 1 and the lower portion extends down through the bearing 5 and is suitably connected to the engine shaft through the train of gearing of the necessary ratio to rotate the distributer in proper cycle.

Referring first to the automatic mechanism A for automatically advancing and retarding the spark in response to the changes in speed of the engine, it comprises a circular mounting plate 7 that carries the mechanism which brings about the automatic advancing and retarding of the spark. Pivotally secured to the plate 7 at its outer periphery by means of pins 8 and 9 are a pair of semi-circular laminated weighted members 10 and 11. The laminations which form the weighted members 10 and 11 are suitably held together by means

of rivets. To limit the outward movement of the weighted members 10 and 11, a pair of pins 12 and 13 are provided, staked to the said weighted members 10 and 11 and extending downwardly through circular openings 14 and 15 in the circular plate 7. Loosely surrounding the upper portion of the shaft 6 is a cylindrical sleeve 16 which abuts against the plate 7. Surrounding the upper portion of the sleeve 16 is a collar 17 which rotatably supports and forms an upper bearing for the sleeve 16. The collar 17 is suitably staked in an annular recess in the bottom portion of the cup shaped member 18 which cup shaped member 18 carries a set of interrupter contacts that will be hereinafter fully described. Securely fastened to the bottom of the sleeve 16 is a plate 19 having extended bifurcated ends into which the pins 12 and 13 of the weighted members 10 and 11 fit.

To permit the weighted members 10 and 11 to move outwardly in the desired manner, thereby advancing the spark a proper amount, I provide a pair of relatively light coil spring members 20 and a pair of relatively heavy spring members 21. Secured to the bottom of the circular plate 7 by means of screws 22 is a pair of U-shaped members 23 and 24. One leg of each of the U-shaped members is arranged to receive one loop of the lighter coiled springs 20. A semi-circular recess is provided for each of the other legs 25 of the U-shaped members 23 and 24, through which extend the cylindrical members 26 which are provided with hexagonally shaped heads 26^1. Each of the cylindrical members 26 is threaded to receive one end of each of the light and one end of each of the heavy coiled springs 20 and 21, respectively. The opposite ends of the heavy coiled springs 21 are fitted in grooves cut in the staked pins 12 and 13. The coiled springs and the cylindrical members 26 are so arranged that when the weighted members move outwardly through the influence of centrifugal force, the tension of the light coiled springs 20 is first acted upon until the hexagonal portion of the cylindrical members 26 engage the legs 25 of the U-shaped members 23 and 24 at which time the heavy coiled springs 21 come into operation, as the weighted members 10 and 11 move on outwardly. By this method of increasing the spring tension that operates upon the weighted members the desired amount at the desired time, the sleeve member 16 can have its relation to the distributer shaft changed in the desired manner as will be more fully hereinafter explained.

Mounted within the cup 18 and secured by means of screws 30, 31, and 32, is a contact carrying ring 33. The contact ring is insulated from the cup 18 by means of a layer of insulation 34. A pair of interrupter arms 35 and 36 are insulatingly pivoted opposite each other to the contact carrying ring 33, and attached to the free extremity of each of the interrupter arms 35 and 36 is a movable contact 37. To yieldingly hold the interrupter arms 35 and 36 in their normal position, leaf springs 38 and 39 are provided, each of the said springs being provided with a hooked end that fits around a pin 40 in its interrupter arm and is then bent around the pin 200 that pivots its interrupter arm and lies against the inner surface of the cup 18. Formed integrally with the contact carrying ring 33 is a pair of raised arms 41 and 42 each of said arms 41 and 42 carrying stationary contacts 43 and 44, respectively. The contacts 43 and 44 are adjustably secured to the said arms by means of threaded studs 45 and lock nuts 46. The movable contacts 37 normally engage the said stationary contacts 43 and 44. The upper reduced portion of the sleeve 16 is drilled and tapped to receive a screw-threaded member 47 that is provided with a tapered head 48. Cut lengthwise in the upper portion of the sleeve 16 are a number of slots 49 that extend through into the drilled and tapped hole. Loosely surrounding the upper portion of the sleeve 16 is mounted a timer cam 50 which is provided with a number of ribs 51 equal in number to the number of explosive chambers or cylinders of the engine. The timer cam may be adjustably secured in any position by tightening the screw 47 which operates through the medium of its tapered head to press the slotted side pieces of the extended end of the sleeve 16 outwardly to securely hold the said timer in place.

When the timer cam is rotated, the ribs 51 contact with the nose of the fiber members 52, which are secured to the contact arms 35, 36 by means of rivets 53 to open and close the contacts 37—43, and 37—44 as the distributer shaft revolves. The cover plate or distributer head 54 which is made of insulating material, is provided with an inner annular recess 55 which is adapted to fit over the upper edge of the cup member 18 and abuts against the upper edge of the casing 1. A pair of spring 56 and 57 are adapted to yieldingly hold the cap 54 in its position upon the cup casing, while an outwardly and upwardly extending spring 58 is provided to prevent rotation of the cap 54 in relation to the cup casing 18 when it is placed in locked position. The spring 56, and the spring 57, which includes two upwardly extending prongs, yieldingly fit over the annular rim 301 of the cap 54 to prevent the said cap from becoming displaced. The spring 58 which is formed integrally with the spring 57, and which extends upwardly independent thereof, is adapted to fit into a groove (not shown) cut lengthwise in the rim 301 of the cap 54 to prevent the cap 54

from rotating relative to the cup-shaped member 18. A distributer arm 59 is provided with a recess 60 for securing it to the timer cam 50 so that when the timer cam 50 is rotated, the arm 59 is rotated therewith. A cylindrical recess 61 is cut in the upper surface of the arm 59 into which is yieldingly fitted a cylindrical member 62, that is adapted to wipe over the contact terminals 63 of the head 54.

A metallic strip 64 is secured to the upper surface of the arm 54 by means of a screw 66 and forms electrical connecting means for the contact terminal 62 to the contact pin 67 which is carried by the distributer cap 54. The contact terminal studs 63 extend through the upper surface of the distributer cap 54 into position to be engaged by the contact button 62 as the arm 59 is rotated. The threaded ends of the terminals 63 constitute the secondary terminals that connect to the cylinders that contain the explosive mixture ready for firing. At the same time that the contact button 62 is rotated over the terminals 63, the cam 50 is of course operated to open and close the contacts 37 and 43 and 44 to send impulses through the primary winding of the induction coil.

Referring now to the manual spark advance mechanism B for advancing or retarding the spark in the desired manner, it comprises a plate member 70 having extended arms 71 and 72 and provided with an annular recess 201. A second plate member 74 provided with an annular orifice is staked to a collar 75, which collar 75 is pinned to the shaft 6 by means of the pin 76. The annular recess 201 of the plate 70 is off-set slightly for purposes that will be hereinafter more fully described. The arm 71 of the plate 70 is pivotally secured to the plate 7 by means of a stud 77 which is staked to the plate 7 and has its other end threaded to receive a nut 78 thereby rotatably pivoting the plate 70 to the circular plate 7. The two plates 70 and 74 are connected by means of a stud 79 which passes through suitable openings in the arms 72 and 80 of the plates 70 and 74. A spacer washer 81 is provided and placed between the arms 72 and 80 to separate them, and a nut 82 is provided having screw-threaded engagement with the stud 79 to hold the plates 70 and 74 in operative relation with each other. A collar 85 is also provided which is suitably non-rotatably mounted upon the shaft 6. The collar 85 is provided with an upper portion shaped like the frustum of a cone and is provided with longitudinal grooves 86 into which the ends 87 of pin 88 set, thus permitting an up and down movement of the collar in relation to the said shaft 6 but preventing rotation thereof. The lower portion 85^1 of the collar 85 is provided with a groove 90, and a circular collar 203 is pinned to the shaft 6 by means of a pin 204 to limit the downward movement of the collar 85. The collar 203 is provided with a bearing surface 205 which engages a bearing surface of the collar 5. A pair of angularly shaped members 207 and 208 are riveted to the cup member 1 and are provided with circular orifices through which passes a bolt 93 for pivotally supporting a Y-shaped member 92. A nut 96 is provided which has screw-threaded engagement with the bolt 93. The arms 97 and 98 of the Y-shaped member 92 which extend into the cup 1 are provided with rollers 99, 100, the said rollers fitting into the groove 90 of the collar 85. The Y-shaped member 92 has an arm 101 for moving the Y-shaped member 92 about its pivot 93. A leaf spring 112 is provided for maintaining the normal relation between the plates 70 and 74 when the member 85 is in its lowermost position, *i. e.*, the spring 112 tends to turn the collar 75 and the plate 74 in a counterclockwise direction and causes the inner bearing surface of the orifice in plate 70 to engage the cone shaped portion of the collar 85. A screw 211 is provided for fastening one end of the spring to the collar 75; the other end of the spring engages the post 77. When the shaft is rotated, the cone shaped collar 85 is carried with the shaft and is held from moving vertically by means of the rollers 99 and 100 of the Y-shaped member. The Y-shaped lever is connected by means of a rod or other suitable connecting means to a spark controlling lever which is generally mounted in a position to be easily accessible to the operator of the car.

Referring now to the operation of the device when the shaft 6 is rotated by the combustion motor, the collar 85 is rotated therewith, and also the collar 75 which is pivoted to the shaft 77 as before described. The collar 75 turning with the shaft 6 turns the circular plate therewith through the medium of the plates 74 and 70, the latter plate being fastened to the circular plate 7 by the stud 77. The circular plate operating rotates the sleeve 16 which is staked to the plate 19 and the bifurcated end portions of the plate 19 engage the pins 12 and 13. The rotation of the sleeve 16 causes the timer cam to interrupt the timer contacts to make and break a circuit through the primary of the induction coil. The rotation of the timer cam also causes the distributer arm 59 to be rotated, thereby causing the contact button 62 to make contact with the contact studs 63 thereby distributing the secondary current to the different cylinders of the engine. As the speed of the engine is increased, the weighted-members 10 and 11 move outwardly under the influence of centrifugal force, causing pins 12 and 13 to move outwardly thereby causing the transverse plate

19 to be rotated forward in reference to its relation to the circular plate 7 causing the cam 16 which carries the timer cam to be advanced thereby causing the interrupter contacts to be operated to transmit impulses to the primary of the induction coil in advance of the impulses that would have been transmitted had the timer cam not been advanced. As the speed of the distributer shaft is decreased the weighted members move inwardly thus causing the timer cam to move backwardly in relation to its position with the distributer shaft, thereby retarding the spark.

Assuming that the operator desires to manually advance the spark fed to the combustion chambers of the engine by the distributer, he operates the spark advance lever to cause the connecting mechanism to rotate lever 101 about its pivot point thereby sliding the cone-shaped collar 85 upwardly along the shaft 6, through the medium of the rollers 99 and 100 which fit into the groove 90 of the said collar. The collar 85 and plate 70 are shown in a fully retarded position in Fig. 6 of the drawings, the plate 74 being in a concentrically disposed position in relation to collar 85. The collar 85 moving upwardly causes the circular orifice in plate 70 to move from an eccentric position to a concentric position in respect to the collar 85 and shaft 6, due to the engagement of the outer surface of the cone collar with the inner surface of the circular orifice in plate 70. When the collar 85 is in its fully advanced position, the opening in the plate 70 is concentric with the collar, as shown most clearly in Fig. 7, and the further upward movement of the collar 85 is prevented by the upper cone portion of the collar 85 engaging an inner cut cone-shaped orifice 115 in the collar 75. The movement of the collar 85 upward causes the arm 80 of plate 74 to be moved in a clock-wise direction in relation to shaft 6 against the tension of leaf spring 112, thereby moving plate 7 in the same direction. The plate 7 turning in a clock-wise direction turns the sleeve 16 in the same direction through the medium of the weighted members that are pivoted thereto, the pins 12 and 13 which are fastened to the weighted members, and the plate 19 that is fastened to the sleeve 16 and has its bifurcated end portions extending around the said pins 12 and 13. The sleeve 16 turning in a clock-wise direction advances the interrupter cam 50 and the spark distributing arm 59, thereby advancing the spark supplied to the cylinder of the combustion engine. If the engine speed is now varied at any time, the weighted members will operate to either advance or retard the spark from its advanced position.

Should the operator now wish to retard the spark, he causes the collar 85 to move downwardly, thereby permitting the spring 112 to move the plate 7 in a counterclockwise direction. The plate 7 rotating in a counter-clock-wise direction moves the interrupter cam 50 and distributer arm 59 in a counter-clock-wise direction through the medium of the before-explained connecting mechanism, thereby retarding the spark by changing the angular position of the interrupter cam 50 and distributing cam 59 in respect to shaft 6.

While I have described one form of mechanism well adapted to accomplish the objects sought, it is to be understood that various other forms might be utilized to accomplish the desired results. Therefore, I do not wish to be limited to the exact structure as shown, as many changes and modifications may readily suggest themselves, but I aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent is:

1. In an electric current controller, the combination of a driven rotary member, of a contact operating device rotatable therewith, an arm secured to said rotary member, a second arm pivotally secured to said first arm and mechanically connected to said contact operating device, and a longitudinally movable member adapted to move said second arm to change the angular relation between the contact operating device and the rotary member.

2. A device of the character described including a rotary element, a circuit controlling device rotatable with said rotary element, means for changing the angular relation between said rotary element and said circuit controlling device, said means including a conically shaped member slidable longitudinally of said rotary element and a pivoted member that controls the angular relation between the circuit controlling device and the rotary element.

3. A distributer of the character described including a rotary driven shaft, a circuit controlling device rotatable with said shaft but adapted to have its angular relation with said shaft changed, a plate secured to said shaft, a second plate pivotally secured to said first plate and mechanically linked to said circuit controlling device, an eccentrically disposed orifice for said second plate, a slidable element provided with a wedge-shaped surface for engaging a portion of the inner surface of said orifice, means for longitudinally operating said slidable element to cause the orifice in said second plate to move from its eccentric position to a concentric position, thereby changing the angular position of said circuit controlling device with relation to said shaft.

4. An electric current controller includ-

ing a driven rotary member, a contact operating device rotatable therewith, an arm secured to said rotary member, a second arm pivoted to said first arm and mechanically linked with said contact operating device, and a longitudinally movable member for moving said second arm in relation to said first arm, thereby changing the angular relation between the contact operating device and the rotary member.

5. A device of the character described including a rotary member, a spark-distributing contact rotatable therewith, an arm secured to said rotary member, a second arm pivoted to said first arm and mechanically connected to said spark-distributing contact, and a slidable member adapted to change the angular relation between said arms whereby said second arm operates to change the angular relation between said distributing contact and said rotary member.

6. A distributing device of the character described including a rotary driven shaft, a distributing contact rotatable with said shaft but adapted to be angularly moved with relation to said shaft, an outwardly extending arm secured to said shaft, a plate pivoted at one end to said arm and provided with an eccentrically disposed circular orifice, connecting mechanism for connecting the other end of said plate to said distributing contact, a slidable member provided with a conically-shaped surface for engagement with a portion of the inner surface of the said eccentrically disposed orifice, and means for moving said slidable member, thereby causing the orifice in said plate to assume a concentrically disposed position changing the angular position between said distributing contact and said rotary member.

7. An electric circuit controller including a shaft, a sleeve adapted to fit over the extended end of the shaft, a distributing contact carried by said sleeve, a pair of plates connected together and having their free ends connected to the said shaft and sleeve, respectively, a longitudinally movable member provided with a wedge-shaped surface for moving one of said plates, thereby changing the angular relation between said plates and consequently the angular relation between said distributing contact and shaft.

8. A distributing device of the class described including a rotary shaft, a spark distributing member carried by said shaft, automatic means for changing the angular relation between said shaft and said spark distributing member thereby advancing and retarding the spark, a plate secured to said shaft, a second plate pivoted to said first plate and mechanically connected to said distributing member, and a slidable member manually controlled for changing the angular position of said second plate in reference to said first plate thereby changing the angular relation between said shaft and said distributing member causing the spark to be advanced and retarded.

9. A device of the character described including a rotary member, a contact operating device rotatable therewith but adapted to be moved angularly with relation to said rotary member, a link connecting said rotary member and said contact operating device, a longitudinally movable member provided with a wedge-shaped surface for coöperation with said connecting link to change the angular relation between said rotary member and said contact operating device, and manual means for moving said wedge-shaped member.

10. A device of the character described including a rotary member, a contact operating device rotatable therewith but adapted to be moved angularly with relation to said rotary member, a link connecting said rotary member to said contact operating device, a longitudinally movable member provided with a wedge-shaped surface for cooperation with said connecting link to change the angular relation between said rotary member and said contact operating device, an annular groove formed in said longitudinally movable member, a yoke provided with end portions that fit into said groove, and means for moving said yoke thereby changing the angular relation between said rotary member and said contact operating device.

11. A device of the character described including a rotary driven shaft, a contact operating device rotatable with said shaft and adapted to be angularly moved with relation to said shaft, a member secured to said rotary driven shaft and associated with said contact operating device, a slidable member provided with a conically shaped surface for engagement with said member for changing the angular relation between said rotary driven shaft and said contact operating device, and means for moving said slidable member.

12. A distributing device of the class described including a rotary shaft, a contact operating device carried by said shaft and adapted to have its angular relation with said shaft changed, a mechanical link pivotally secured to said rotary shaft and mechanically associated with said contact operating device, and a longitudinally movable member provided with a wedge-shaped surface for engagement with said mechanical link for turning the same about its pivoted point, thereby changing the angular relation between said rotary shaft and said contact operating device.

13. A distributing device of the class described including a rotary shaft, a contact operating device carried by said shaft and

adapted to have its angular relation with said shaft changed, a mechanical link pivotally secured to said rotary shaft and mechanically associated with said contact operating device, a longitudinally movable member provided with a wedge-shaped surface for engagement with said mechanical link for turning the same about its pivoted point, thereby changing the angular relation between said rotary shaft and said contact operating device, an annular groove formed in said longitudinally movable member, a yoke provided with end portions that fit into said groove, and means for moving said yoke.

14. A distributing device of the character described including a rotary shaft, a contact operating device adapted to be rotated when said shaft is rotated but adapted to be moved angularly with relation to said shaft, a mechanical link pivotally secured at its one end to said rotary shaft, and having its other end mechanically connected with said contact operating device, and a longitudinal movable member having a wedge-shaped surface adapted to engage said mechanical link and to move the same about its pivoted point when said longitudinal member is operated to change the angular relation of said contact operating device with said rotary device.

15. A distributing device of the character described including a rotary shaft, a contact operating device adapted to be rotated when said shaft is rotated but adapted to be moved angularly with relation to said shaft, a mechanical link pivotally secured at its one end to said rotary shaft and having its other end mechanically connected with said contact operating device, a longitudinal movable member having a wedge-shaped surface adapted to engage said mechanical link and to move the same about its pivoted point when said longitudinal member is operated, an annular groove formed in said longitudinally movable member, a yoke provided with end portions that fit into said groove, and means for moving said yoke, thereby changing the angular relation between said rotary member and said contact operating device.

Signed by me at Chicago, in the county of Cook and State of Illinois in the presence of two witnesses.

LAWRENCE ERICSON.

Witnesses:
G. A. GANOCHOWSKI,
MARIE BREEN.