Jan. 15, 1929. 1,698,710

E. A. BOHLMAN

DISTRIBUTOR

Filed Oct. 13, 1926 2 Sheets-Sheet 1

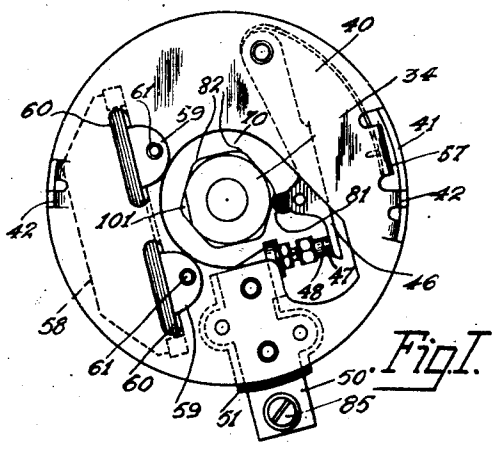


Fig. 1.

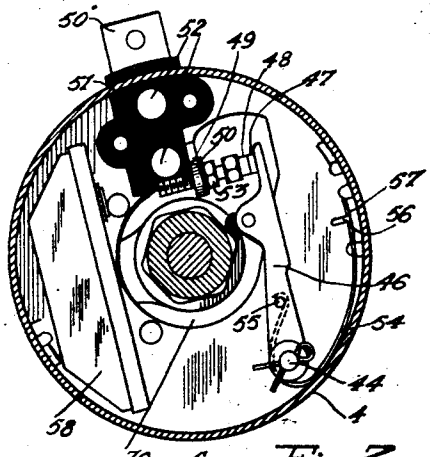


Fig. 3.

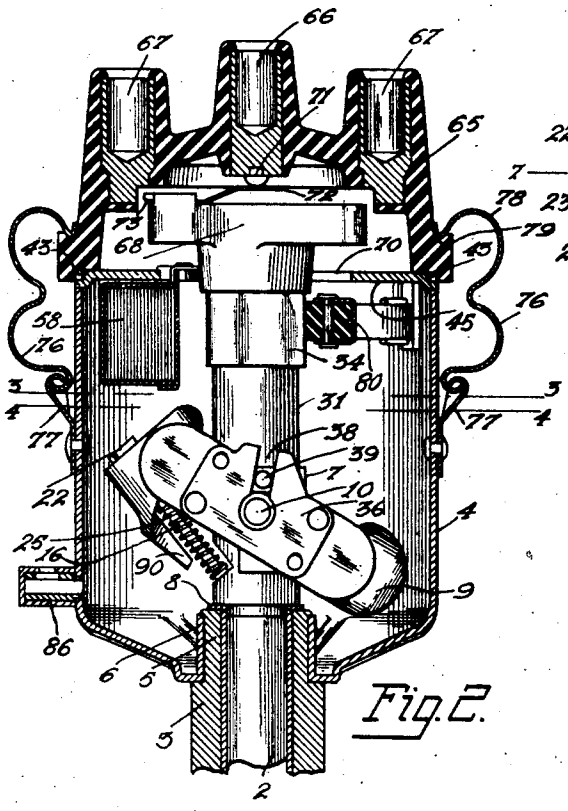


Fig. 2.

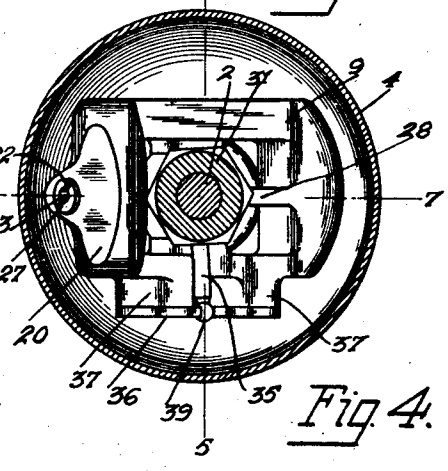


Fig. 4.

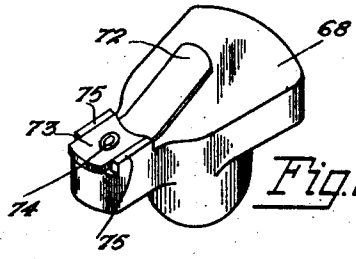


Fig. 9.

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2 Sheets-Sheet 2

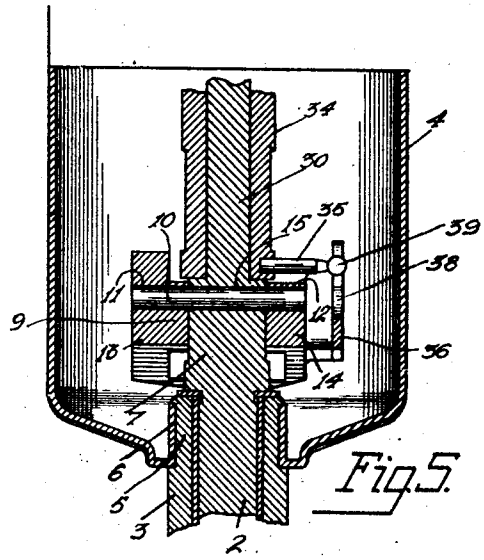


Fig. 5.

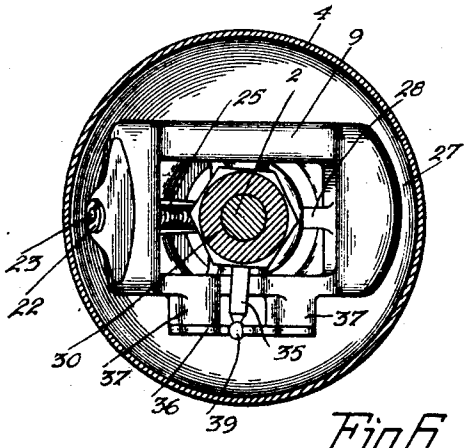


Fig. 6.

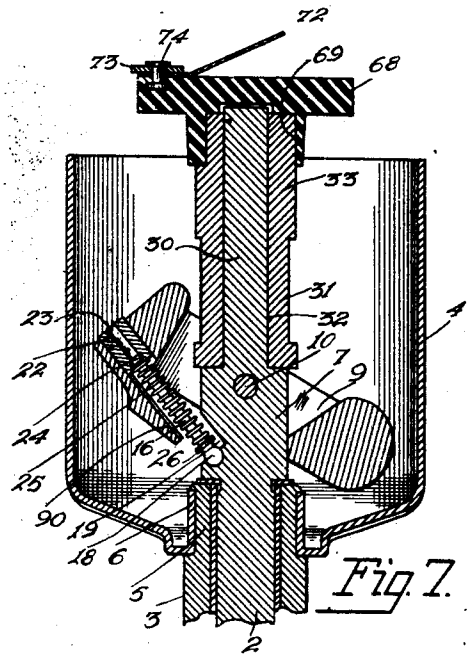


Fig. 7.

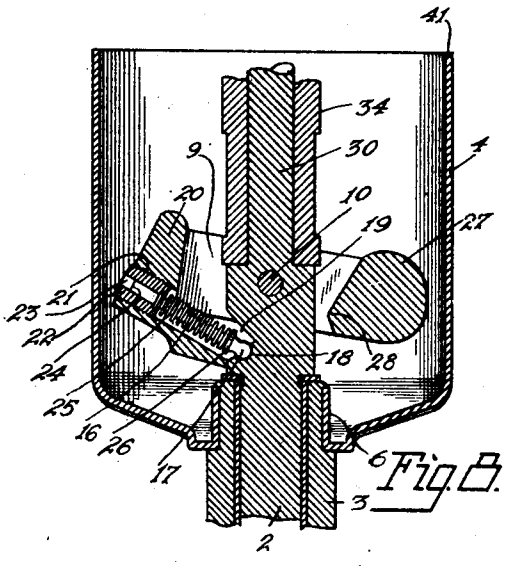


Fig. 8.

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Patented Jan. 15, 1929. 1,698,710

UNITED STATES PATENT OFFICE.

ERNEST A. BOHLMAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DISTRIBUTOR.

Application filed October 13, 1926. Serial No. 141,265.

My invention relates to distributors, such as are employed to distribute the spark to the cylinders of an internal combustion engine of an automobile; and has to do more particularly with a distributor of the character which is adapted to automatically advance or retard the spark to the cylinders of the engine as its speed increases or decreases.

The object of my invention is the provision of a simple and efficient device of the above character which will automatically advance and retard the spark supplied to the combustion chambers of the engine.

A feature of my invention is the provision of centrifugal mechanism in association with a compression spring which automatically governs the rate of advance or retardation of the spark as the speed of the engine increases or decreases.

Another feature of my invention is the provision of an interrupter cam and its association with the centrifugal mechanism whereby as the speed of the distributor shaft increases or decreases the centrifugal mechanism through novel connecting means effects the movement of the interrupter cam to advance or retard the spark.

A still further feature of my invention is the provision of a plate member which carries the interrupter arm and interrupter contacts, and the means for securing the plate and its supported parts to the housing of the distributor and at the same time associating its interrupter arm with the interrupter cam on the distributor shaft.

Another feature of my invention resides in the use of a compression type of spring for the centrifugal means, and means for regulating the tension of said spring.

The above features as well as others will be more particularly pointed out in the ensuing specification and appended claims.

For a more complete understanding of my invention reference may be had to the accompanying drawings in which like reference characters in the several views denote like parts, and in which:

Fig. 1 is a top view of my distributor, with the cap or distributor head removed;

Fig. 2 is a vertical sectional view through the distributor of Fig. 1 with the distributor head in place;

Fig. 3 is a sectional view along the line 3—3 of Fig. 2 looking in the direction of the arrows to clearly illustrate the interrupter contacts;

Fig. 4 is a sectional view along the line 4—4 of Fig. 2;

Fig. 5 is a sectional view along the line 5—5 of Fig. 4;

Fig. 6 is a sectional view similar to Fig. 4 but showing the weighted member in its operative position;

Fig. 7 is a sectional view along the line 7—7 of Fig. 4 showing the weight in its normal position;

Fig. 8 is a sectional view similar to Fig. 7 but showing the weight in its operative position; and

Fig. 9 is a perspective view of the distributor arm.

Referring now more in detail to the distributor of my invention as illustrated in the accompanying drawings a distributor shaft 2 is connected to an engine of an automobile or the like and driven therefrom by suitable means to rotate the interrupter cam and distributor arm at the proper rate of speed to distribute the sparks to the cylinders of the engine at the proper times.

A bearing 3 through which the shaft 2 extends into the cup-shaped housing 4, within which the centrifugal spark advancing mechanism is arranged, is provided with a reduced end portion 5 which extends into a thimble 6 integrally formed with the cup-shaped inclosing housing 4. The reduced portion 5 of the bearing 3 extends or protrudes slightly beyond the end of the thimble 6, and this protruding end is spun over or staked to secure the same to the housing 4. The shaft 2 is provided with an intermediate enlarged portion 7 which, when the shaft 2 is in position in the bearing 3, rests upon a washer 8 inserted between the enlarged portion 6 and the end of the bearing 3.

A centrifugal device or governor weight 9 which is substantially rectangular in shape is pivotally secured to the shaft 2 at its intermediate enlarged portion 7 by means of a pivot pin 10 which extends through suitable orifices 11 and 12 in the sides 13 and 14 of the governor weight 9 and a transverse orifice 15 through the enlarged portion 7 of the shaft 2. A pin member 16 provided with a spherical end 17 rests in an orifice 18 positioned in an angular faced slot or notch 19 located in the enlarged inter-

mediate portion 7 to form a ball and socket joint. The end 20 of the governor weight 9 is provided with a tapped orifice 21 which is adapted to receive a threaded member 22. This threaded member 22 is provided with a central orifice 23 of a size to receive the end 24 of the pin 16. A coil spring 25 around the pin 16 rests between a collar 26 integral with the pin 16 and the threaded member 22 serves to hold the governor member 9 in its normal or unoperated position as clearly illustrated in Figs. 2 and 7. The threaded member 22 is provided with a slot in one end which is adapted to receive a suitable tool so as to turn the member 22 to properly adjust the tension of the spring 25 with relation to the governor 9 to regulate the instant at which centrifugal force will overcome the tension of the spring 25 as the shaft 2 is rotated to cause the governor 9 to move to its balanced position. The pin 16 which supports the spring 25 serves as a support for the same to prevent it from buckling as it is compressed when the governor 9 is moving to a balanced position as will be more fully hereinafter described.

The end 27 of the governor member 9 is provided with an integrally formed stop projection 28 which engages the shaft 2 when the governor member 9 is in its normal or ineffective position as illustrated.

The distributor shaft 2 is provided with an upper reduced portion 30, and a sleeve member 31 provided with a central orifice 32 is adapted to slip over this reduced portion 30 and rest upon the enlarged intermediate portion 7 of the shaft 2. The upper portion 33 of the sleeve member 31 is hexagonal in shape and forms the interrupter or timer cam 34. A pin member 35 is provided which is secured to the sleeve member 31 and a plate 36 secured to integrally formed projecting portions 37 on the governor weight 9 is provided with a slot 38 into which the ball shaped end 39 extends for purposes as will presently be described.

A plate member 40 of substantially the same diameter as the housing 4 rests on the peripheral edge 41 of the housing 4 and a pair of integrally formed ears 42 extend into notches 43 in the peripheral edge 41 of the housing 4 to prevent movement of the plate 40 relative to the said housing. A stud 44 secured to the bottom face 45 of the plate 40 pivotally supports an interrupter arm 46 which is associated with the timer cam 34. The arm 46 is provided with a contact 47 adapted to engage a contact 48 carried by a threaded pin or screw 49 adjustably mounted in a bracket 50 which is insulated from the plate 40 by insulation strips 51, the said bracket 50 and insulating strips 51 being secured to the said plate 40 by means of rivets 52. The bracket 50 is provided with an integrally formed member 50′ which extends through a suitable opening in the housing 4 and has secured to its protruding end a screw 85 to which external conductors may be secured. The contact member 48 is adapted to be retained in its adjusted position relative to the contact 47 on the arm 46 by means of a lock nut 53. The contact 48 on the arm 46 is held in engagement with the contact 48 on the screw 49 by means of a substantially U shaped leaf spring 54 one end of which engages a stud 55 on the arm 46 and its other end resting between a pair of pins 56 secured to a depending tongue 57 integrally formed with the plate 40, the said pins 56 maintaining the end of the spring 54 in position against movement. A condenser 58 for the usual purposes is mounted upon the bottom face 45 of the plate 40 and suitable ears 59 integral with the casing of the condenser 58 extend through suitable slots 60 in the plate 40 and rivets 61 passing through suitable orifices in the ears and plate 40 secure the condenser 58 to the plate 40.

Overlying the plate 40 and housing 4 is a cover cap or distributor head 65 of suitable moulded insulation material within which is moulded a high tension terminal 66 and the distributor terminals 67 which are connected, respectively, to the spark plugs of the motor. A distributor arm 68, provided with an orifice 69 substantially hexagonal in shape is adapted to be positioned on the hexagonal end of the sleeve 31 which extends through a central orifice 70 in the plate 40 resting on the open end of the housing 4. The arm 68, however, is adapted to fit onto the shaft in only one position, one point of the hexagonal end of the shaft being chamfered off slightly, as at 101. Secured to the terminal 66 is a contact button 71 arranged to be engaged by the free end of a contact spring 72 carried by the distributor arm 68. The other end of the contact spring 72 is in engagement with the distributor arm contact 73, the said spring end and contact 73 being secured together by means of suitable means as the rivet 74. Suitable extending portions 75 integral with the arm 68 form a channel in which the contact 73 and end of the spring 72 rest to prevent them from turning about the rivet 74 which fastens them to the arm 68.

The distributor head 65 is retained in position by means of springs 76 which are hinged to plate members 77 secured to the housing 4. The free loop ends 78 of the springs 76 engage the flanges 79 of the distributor head 65 integrally formed therewith.

A fiber block 80 or block of other suitable insulation material is secured to the arm 46 and the nose 81 of the block 80 is

held in engagement with the interrupter cam 34 by means of the spring 54 as before described. As the sleeve 31 and shaft 2 are rotated, as will be more fully hereinafter described, the corners 82 of the interrupter cam 34 act in a well known manner upon the nose 81 of the block 80 secured to the arm 46 to displace the interrupter arm 46 to open the contacts 47 and 48 at which time the distributor arm contact 73 will be opposite a terminal 67 of the distributor head 65 for purposes as is well understood. An oil cup 86 is also secured to the housing 4 to supply oil to the shaft 2 of the distributor.

The automatic spark controlling mechanism comprises a governor weight 9 pivotally secured to an intermediate portion 7 of the shaft 2 and maintained in its normal or ineffective position by means of the spring 25, as before described and clearly illustrated in Figs. 2 and 7. As the shaft 2 rotates through the agency of the engine, the governor weight 9 also rotates, as it is pivotally secured to the shaft 2 as before described. The sleeve 31 which is supported on the upper reduced portion 30 of the shaft 2 also rotates due to the pin 35 secured to the sleeve 31 resting in the slot 38 in the plate 36 secured to the governor 9.

Now as the speed of the engine increases, the speed of the distributor shaft 2 also increases, and as the governor 9 is secured to the shaft 2 the said governor 9 will also rotate, in such a manner that the said governor 9 will tend to fly out and come to a balanced position against the tension of the spring 25. As the governor 9 tends to assume this balanced position it rotates about its pivot 10 causing the slot 38 in the plate 36 on the governor 9 to change its angular position relative to the axis of the rotating distributor shaft 2. The changing of the angular position of the slot 38 in the plate 36 on the governor weight 9 relative to the axis of the shaft 2 causes a movement of the sleeve 31 loosely supported on the shaft 2 relative to the shaft 2 due to the pin connection 35 between the sleeve 31 and governor 9, as before described, and this movement of the sleeve 31 advances the interrupter cam 34 which is integral with the sleeve 31.

At a predetermined speed of the shaft 2 the stop 90 integral with the governor 9 engages the shaft 2 to prevent further movement of the governor 9 toward a balanced position and also prevent further advance of the interrupter cam 34.

When the speed of the engine is decreased the speed of rotation of the shaft 2 will also be proportionately decreased which will permit the spring 25 which was compressed by the movement of the governor 9 to overcome the force tending to move the governor 9 to a balanced position and cause the slot 38 in the plate 36 to change its angular position relative to the axis of the shaft 2 and due to the pin connection 35 between the sleeve 31 and the governor 9 as before described the sleeve 31 is moved relative to the shaft 2 to move its integrally formed interrupter cam 34 to retard the spark. When the engine to which the distributor shaft 2 is connected stops the governor 9 is moved to its normal or ineffective position under the influence of the spring 25 with its stop 28 again engaging the shaft.

It is to be understood that the relative proportions and arrangements of the parts of the device herein disclosed may be modified to obtain ratios of advance of the spark different from those disclosed. The pin 35 secured to the sleeve 31 may be positioned in the sleeve to place its spherical end 39 thereof farther up or down in the slot 38 relative to the pivotal point of the governor 9 to permit a greater or lesser advance of the interrupter cam 34 depending of course upon the position of the pin 35 in the slot 38. The threaded member 22 may also be adjusted to place the spring 25 under a greater or lesser tension to regulate the instant at which centrifugal force due to the rotation of the shaft will overcome the tension of the spring 25 and cause the governor 9 to move toward a balanced position. It is thus obvious that the device may be readily modified to provide practically any varying ratios of spark advance desired.

While I have illustrated and described a preferred embodiment of my invention it is apparent that changes and modifications will readily suggest themselves to those skilled in the art without departing from the spirit of the invention and I therefore aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

Having described my invention what I claim as new and desire to secure by United States Letters Patent is:

1. A distributor of the character described including a driven shaft, a sleeve supported on said shaft and spark distributing mechanism supported on said sleeve, a pivoted governor carried by said shaft and a compression spring associated with said governor for maintaining said governor in its ineffective position, a pin for supporting said compression spring having its one end slidably associated with the governor and its other end associated with said driven shaft, means secured to said sleeve and associated with said governor for causing rotary movement of said sleeve relative to said shaft responsive to the movement of said governor.

2. A distributor of the character described including a driven shaft, a sleeve supported on said shaft, spark distributing mechanism supported on said sleeve, a pivotally supported governor carried by said shaft, com-

pression spring means associated with said governor for maintaining said governor in its ineffective position, a member for supporting said compression spring having its one end slidably associated with adjustable means in the governor and its other end forming a ball and socket joint with a portion of said driven shaft, a pin secured to said sleeve, a plate on said governor and a slot in said plate for receiving said pin, said pin causing rotary movement of said sleeve relative to said shaft responsive to the movement of said governor.

3. A distributor of the character described including a driven shaft, a sleeve loosely supported on said shaft and spark distributing mechanism supported on said sleeve, a pivotally supported governor supported on said shaft, a spring, means including a pin member having its one end slidably associated with the governor and its other end engaging said driven shaft for supporting said spring between said governor and shaft for maintaining said governor in its ineffective position, a pin secured to said sleeve, a plate secured to said governor and a slot in said plate for receiving an end of said pin, said pin causing rotary movement of said sleeve relative to said shaft responsive to the movement of said governor.

4. A distributor of the character described including a driven shaft, a pin provided with a ball shaped end and an orifice in said shaft for receiving said ball shaped end to form a ball and socket joint, a governor pivotally secured to said shaft, adjustable means supported by said governor in which the other end of said pin is slidably supported and a spring supported on said pin for maintaining said pivotally secured governor in its normal ineffective position.

5. A distributor of the character described including a driven shaft, a pin provided with a ball shaped end, an orifice in said shaft for receiving said ball shaped end to form a ball and socket joint, a governor pivotally secured to said shaft, an adjustable screw supported by said governor and a central orifice through said adjustable screw for receiving the other end of said pin and a spring supported on said pin for maintaining said pivotally secured governor in its normal ineffective position.

6. A distributor of the character described including a driven shaft, a pin provided with a ball shaped end, an orifice in said shaft for receiving said ball shaped end to form a ball and socket joint, a governor pivotally secured to said shaft, an adjustable screw supported by said governor and an orifice therein for slidably receiving the other end of said pin, a spring supported on said pin for maintaining said pivotally secured governor in its normal ineffective position, said adjustable screw regulating the tension of said spring supported on said pin.

7. A distributor of the character described including a driven shaft, a pin having one end pivotally supported in said shaft, a governor pivotally secured to said shaft, means on said governor for slidably supporting the other end of said pin, a spring supported on said pin resting between said means and a collar on said pin for maintaining said pivotally secured governor in its normal ineffective position, said governor moving to assume a balanced position against the normal tension of said spring as said driven shaft rotates.

8. A distributor of the character described including a driven shaft, a pin having one end pivotally supported in said shaft, a governor pivotally secured to said shaft, adjustable means on said governor for slidably supporting the other end of said pin, a spring supported on said pin resting between said adjustable means and a collar on said pin, said spring maintaining said pivotally secured governor in its normal ineffective position, said governor moving to assume a balanced position against the normal tension of said spring impelled by centrifugal force produced by rotary movement of said driven shaft, said adjustable means adapted to regulate the tension of said spring.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 9th day of October, 1926.

ERNEST A. BOHLMAN.