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A. O. ANDREW
AUTOMATIC SPARK CONTROL

Filed March 30, 1926

Fig. 1.

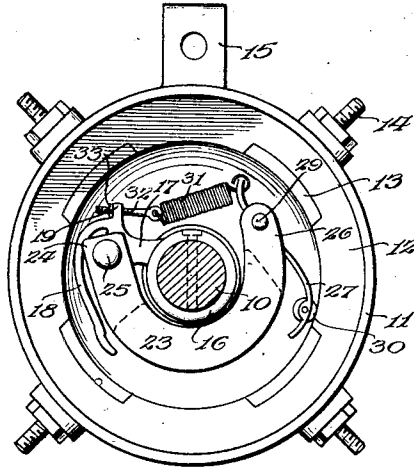


Fig. 2.

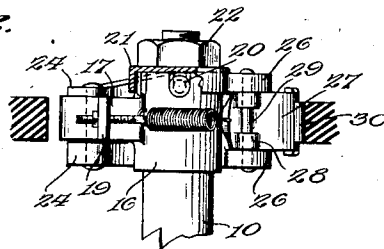


Fig. 3.

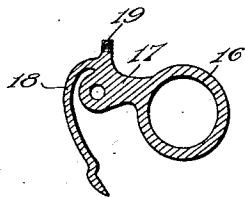


Fig. 4.

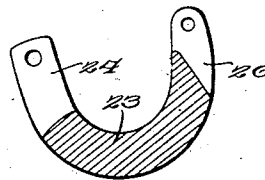


Fig. 5.

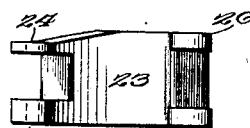
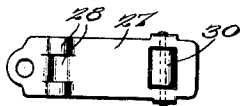


Fig. 6.



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AUTOMATIC-SPARK CONTROL.

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This invention relates to an improved automatic spark control for internal combustion engines, being especially, although not exclusively, designed for use in connection with the engines of Ford motor vehicles, and seeks, among other objects, to embody means in the commutator of such an engine for automatically advancing and retarding the ignition as the speed of the engine is increased or decreased.

The invention seeks, as a further object, to provide an improved commutator brush embodying a weighted lever and articulated contact lever peculiarly constructed and assembled in such manner that, as the speed of the engine is increased, the weighted lever will function to angularly advance the contact lever and consequently the instant of firing, while, as the speed of the engine is decreased, the weighted lever will be retracted for retarding the instant of firing.

A further object of the invention is to provide a brush wherein a single spring will be utilized for the dual purpose of retracting the weighted lever and maintaining a tension on the contact lever tending to press the contact roller of the latter lever into engagement with the fixed contacts of the commutator shell, and wherein means will be provided for adjustably tensioning said spring.

And the invention seeks, as a still further object, to provide a brush which will be simple and sturdy in its construction and which may be readily applied without the necessity for structural change in the engine.

Other objects of the invention not specifically mentioned in the foregoing, will appear during the course of the following description.

In the accompanying drawings:

Figure 1 is a rear elevation showing my improved spark control in conjunction with a conventional commutator shell and timer shaft.

Figure 2 is a fragmentary plan view of the brush employed.

Figure 3 is a sectional view of the supporting arm, and particularly showing the stop finger carried thereby.

Figure 4 is a detail sectional view of the weighted lever.

Figure 5 is a plan view of the weighted lever.

Figure 6 is a plan view of the contact lever.

Referring now more particularly to the drawings, I have conventionally shown the timer shaft of a Ford engine at 10 and the usual commutator shell at 11. Fixed in the shell is the customary annular race 12, of suitable insulating material, and embedded in said race are quadrantly spaced segmental contacts 13 having terminals 14 to which the circuit wires are connected. Projecting from the shell is a lug 15, and the customary control rod (not shown) is attached to this lug for rotating the shell and advancing or retarding the instant of firing. As is well known, it is necessary to thus rotatably adjust the shell manually, with the result that the adjustment thereof is often forgotten or neglected. Consequently, in starting the engine, backfiring not infrequently results while, in climbing grades, the engine is caused to pound. The present invention accordingly seeks to eliminate these abuses.

In carrying the invention into effect, I employ a sleeve 16 which is formed to fit over the timer shaft 10, and projecting from said sleeve is a radial arm 17. Formed on the forward side of said arm near its outer end, as seen in Figure 3, is a rearwardly curved stop finger 18 which extends over the outer end of the arm, and formed on the arm at the base of said finger is a lateral lug 19. As shown in Figure 2, the sleeve 16 is notched to receive the usual locking pin 20, and fitting over the forward end of the shaft 10 is the customary cap 21 overlying said pin, the cap being held in position by the usual nut 22. Thus, as will be seen, the sleeve may be readily applied to the shaft.

Pivoted at one end upon the free end of the arm 17 is a substantially U-shaped weighted lever 23. At said end thereof the lever is provided with lugs 24 which straddle the arm, and extending through said lugs and through the arm is a pivot pin 25 swingingly connecting the lever with the arm. As will be observed, the stop finger 18 extends over the inner end of the lever in close spaced relation thereto to coact, at its free end, with the outer side of the lever.

At its free end, the lever 23 is provided with lugs 26 similar to the lugs 24, and pivoted between the former lugs is a contact lever 27. As shown in Figure 6, this lever is slit near its inner end along parallel lines

to define alined loops 28, and extending through said loops and through the lugs 26 of the lever 23 is a pivot pin 29 swingingly connecting the levers with each other, the lever 27 being preferably formed of suitable resilient sheet metal. At its free outer end, the lever 27 is curved rearwardly, and journaled thereon is a contact roller 30 to engage the inner periphery of the raceway 12 and cooperate with the contacts 13 of the commutator shell 11.

Secured at one end to the inner end of the lever 27 is a spring 31, and engaged with the opposite end of said spring is an anchoring screw 32 which is screwed through the lug 19 of the arm 17 and carries a lock nut 33. Thus, as will be seen, the spring will tend to swing the outer end of the lever 27 outwardly and press the contact roller 30 into engagement with the raceway 12 so that said roller will, at all times, be held tightly in contact with the raceway to cooperate with the contacts 13. At the same time, the spring 31 will, as will be seen, act on the lever 27 for swinging the free end of the weighted lever 23 inwardly and, as shown in Figure 1, normally holding the weighted lever close about the sleeve 16.

As will now be seen, the weighted lever 23 will, as the shaft 10 revolves, be swung outwardly by centrifugal force for advancing the lever 27 about the axis of said shaft and accordingly advancing the instant of firing. As the speed of the timer shaft is increased, the lever 23 will, of course, be further swung outwardly so that the instant of firing will be advanced with the increasing speed of the timer shaft until the lever 23 strikes the stop finger 18, when further outward movement of said lever will be limited by the finger. Conversely, as the speed of the timer shaft is decreased, the spring 31 will function to retract the lever 23 so that the lever 27 will, in turn, be retracted with respect to the axis of said shaft for retarding the instant of firing. Thus, the mechanism will automatically function to control the instant of firing with the speed of the engine and, of course, the screw 32 may be adjusted for varying the tension of the spring 31 and regulating the movement of the weighted lever 23.

Having thus described the invention, what I claim is:

1. A commutator brush including an element adapted for attachment to a timer shaft, a weighted centrifugal lever carried by said element, a contact lever pivoted between its ends upon the weighted lever with its contact end at the outer side of the weighted lever, the weighted lever being between said contact end and the timer shaft, and means tending to move the contact lever independently to active contact engaging position and normally holding said weighted lever retracted toward the timer shaft.

2. A commutator brush including an element adapted for attachment to a timer shaft, a weighted centrifugal lever carried by said element, a contact lever pivoted to the weighted lever for independent movement but movable with the weighted lever for advancing the instant of ignition, the contact lever extending rearwardly from its pivot at the outer side of the weighted lever, and a single yieldable means pulling constantly upon the contact lever to move the contact lever independently to active contact engaging position and normally holding said weighted lever retracted toward the timer shaft.

3. A commutator brush including an element adapted for attachment to a timer shaft, a weighted centrifugal lever carried by said element, a contact lever pivoted between its ends at the free end of the weighted lever for independent movement but movable therewith for advancing the instant of ignition, the working end of the contact lever extending rearwardly from its pivot at the outer side of the weighted lever between said lever and the contact raceway, and a spring connected to the opposite end of the contact lever and to the element on the timer shaft to move the contact lever independently to active contact engaging position and normally holding said weighted lever retracted.

4. A commutator brush including an element adapted for attachment to a timer shaft, a weighted centrifugal lever fulcrumed at one end on said element, a contact lever pivoted upon the weighted lever for independent movement but movable therewith for advancing the instant of ignition, the contact lever extending rearwardly from its pivot at the outer side of the weighted lever, a spring extending between the contact lever and said element to move the contact lever independently to active contact engaging position and normally holding said weighted lever retracted, and a stop extending from said element at the outer side of the weighted lever adjacent the fulcrumed end thereof for limiting the weighted lever in its movement by centrifugal force.

5. A commutator brush including a sleeve adapted for attachment to a timer shaft and provided with a lateral arm, a weighted lever pivoted near one end upon said arm, a contact lever pivoted upon the free end portion of the weighted lever and movable therewith for advancing the instant of ignition, means extending between the contact lever and the lateral arm on the sleeve and constantly pulling to swing the contact lever to active contact engaging position as well as normally holding said weighted lever retracted, and a stop finger extending from said lateral arm of the sleeve at the outer

side of the weighted lever for limiting the centrifugal movement of the weighted lever.

5 6. A commutator brush including an attaching element to be secured on a timer shaft, a centrifugal lever pivoted at one end to said attaching element, a resilient contact lever pivoted to the free end of the centrif-

ugal lever, and means constantly pulling on the contact lever to swing the same to active 10 contact-engaging position and to hold the centrifugal lever against centrifugal action.

In testimony whereof I affix my signature.

ARTHUR O. ANDREW. [L. S.]