

E. A. COOPER.
 SPARK TIMING DEVICE FOR EXPLOSIVE ENGINES.
 APPLICATION FILED MAR. 25, 1907.

976,345.

Patented Nov. 22, 1910.

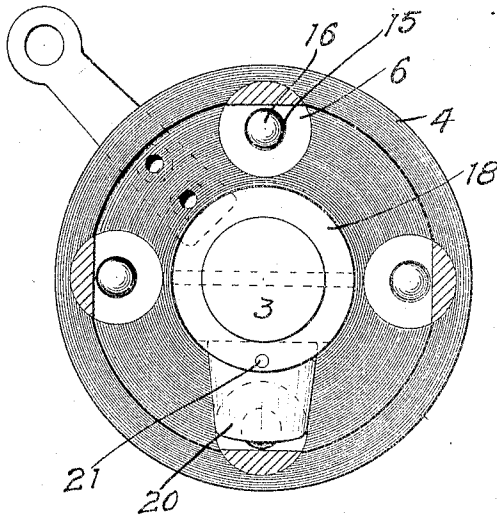


Fig. 1.

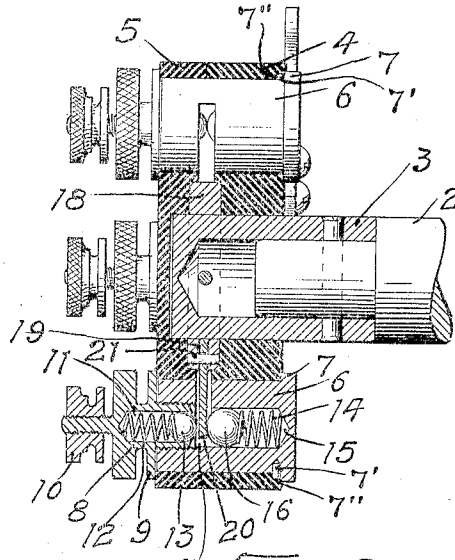


Fig. 2.

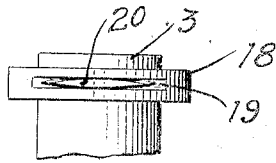


Fig. 3.

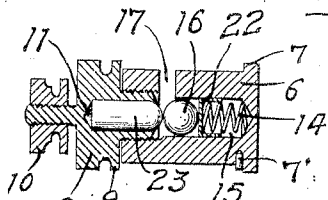


Fig. 4.

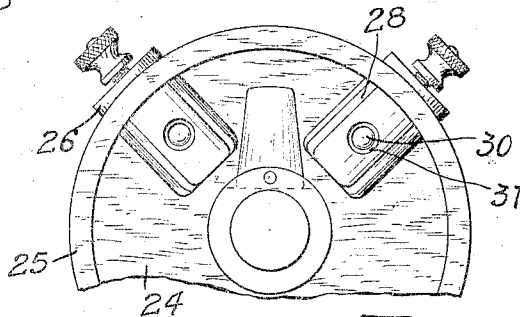


Fig. 5.

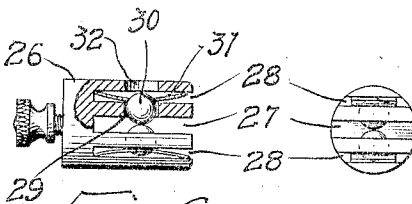


Fig. 6.

Fig. 7.

WITNESSES
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EUGENE A. COOPER, OF BRITTON, SOUTH DAKOTA.

SPARK-TIMING DEVICE FOR EXPLOSIVE-ENGINES.

976,345.

Specification of Letters Patent.

Patented Nov. 22, 1910.

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To all whom it may concern:

Be it known that I, EUGENE A. COOPER, of Britton, Marshall county, South Dakota, have invented certain new and useful Improvements in Spark-Timing Devices for Explosive-Engines, of which the following is a specification.

The object of this invention is to provide a timing device of simple inexpensive construction by means of which the time of spark generation in a cylinder can be advanced or retarded, and a further object is to provide a timer that will be positive and reliable in its action and very durable.

The invention consists generally in a revolving tongue or blade and contacting surfaces in circuit with a spark plug and arranged to engage both sides of said tongue simultaneously.

Further, the invention consists in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a view of the spark timing device with one section removed, showing the position of the electrodes and the contact tongue therein. Fig. 2 is a sectional view of the device taken on a section line substantially at right angles to the section line of Fig. 1. Fig. 3 is a detail view of the tongue showing the shape of the same and its thin edges. Fig. 4 is a detail sectional view illustrating a modification in the construction of the electrodes. Fig. 5 is a detail view showing the timing device with a modified form of electrode. Figs. 6 and 7 are detail views of the electrode shown in Fig. 5.

In the drawing, 2 represents a shaft geared to some moving part of the engine in the usual way.

3 is a stub shaft secured to the shaft 2 and on which the shell or casing of the timing device is mounted. This casing consists preferably of a base 4 and a cover 5.

6 represents a series of shells extending through the base and cover and having a flange 7 at one end to bear on said base and substantially flush with the surface of the cover at the other end. A pin 7' is provided in each shell 6 and adapted to slip into a socket 7'' in the wall of the base and prevent rotary displacement of the shell. Plugs 8 have threaded ends fitting within the correspondingly threaded ends of the

shell 6 and flanges 9 are provided on these plugs, which lap by the ends of the shells a sufficient distance to hold the cover in place thereon. No other securing means is therefore necessary. The plugs have binding nuts 10 at their outer ends and sockets 11 at their inner ends adapted to receive springs 12 and bearing balls 13. Similar springs 14 are provided in sockets 15 formed in the shells 6 and bearing balls 16 normally held toward the balls 13 by the pressure of the springs 14. Slots 17 are provided in the walls of the shell 6 at right angles substantially to the socket 15 and opposite the point of contact between the bearing balls, or electrodes as I prefer to designate them.

The base plate and cover are composed of insulating material such as fiber, wood or hard rubber, and the primary circuit will normally be broken at this point, as is usual in devices of this kind.

The shaft 3 has a ring or collar 18 therein provided with a socket 19, and a tongue 20 is secured within said socket by a pivot pin 21. This tongue has knife edges on each side and between said edges is provided with broad substantially flat bearing surfaces. When the shaft 3 is revolved the tongue will pass between the bearing balls and press them apart and the tongue being also in the primary circuit in the usual way, said circuit will be closed at and during the time of passage of the tongue between the balls of each pair of electrodes. The pivotal connection of the tongue with its support will allow it to rock and accommodate itself to any unevenness of adjustment of the balls and insure perfect contact thereof on each side without jar or shock. The tongues have knife edges adapted to slip between the electrodes and force them apart closing the circuit and causing the vibrator on the induction coil to produce a spark or series of sparks.

By rotating the supporting plate and its cover on the shaft 3 the relative position of the electrodes and tongue may be changed and the time of spark generation advanced or retarded.

In Fig. 4 I have shown a slight modification in the construction of the electrodes which consists in providing a cap 22 between the bearing ball 16 and the spring 14, and instead of having a yieldingly mounted ball in the plug I provide a fixed pin 23 having a rounded end to contact with the

ball 16. When the circuit closing tongue passes between these electrodes one of them obviously will remain stationary while the other will be forced into its socket against the tension of its spring.

In Figs. 5, 6 and 7 I have shown another construction which consists in a shell 24 having an annular flange 25 in which supports 26 for the electrodes are mounted. These supports have a centrally arranged slot 27 and slots 28 on each side and parallel with the center slot. Holes 29 are formed in the walls of the center slot and adapted to receive bearing balls 30 which fit within said holes and are pressed toward one another by flat springs 31 arranged in the slots 28. A hole 32 allows the insertion of one of the balls into its seat after the first one has been put in place. The circuit closing tongue is substantially the same as the one described and is adapted to sweep through the slot 27, engage the balls 30 and separate them against the tension of their springs and temporarily close the primary circuit. A suitable cover, not shown, will be employed to conceal the tongue and the electrodes of the modification shown in Fig. 5. This device may also be rotated to change the time of formation of the spark.

I claim as my invention:

1. A spark timing device comprising a shaft, a ring secured thereon, and having a socket in its periphery, a tongue pivoted at one end in said socket and decreasing in thickness from its longitudinal center toward each edge and adapted to rock on its pivot pin and electrodes inclosing said shaft and between which said tongue is adapted to sweep by the revolution of said shaft.

2. The combination, with a casing, of a shell fitting therein and having a socket, a spring provided in said socket, an anti-fric-

tion ball fitting within said socket and engaging said spring, said shell having a slot extending therethrough substantially at right angles to said socket, a plug fitting within said shell on the opposite side of said slot from said ball, a second ball carried by said plug, a spring yieldingly holding said second ball, and a tongue arranged to sweep between said balls and having a rolling contact with both of them.

3. A spark timing device comprising a base having a recess, a shaft fitting within said base and revolving therein, a tongue carried by said shaft, a cover fitting on said base, shells having flanged ends extending through said base and cover, plugs fitting within sockets in said shells and also having flanges to bear on said cover, whereby said base and cover will be held together, anti-friction bearing balls mounted in said shells, and plugs, and between which said tongue is adapted to pass during the revolution of said shaft.

4. A spark timing device comprising a revolving shaft, a tongue pivotally supported at one end on said shaft and projecting laterally therefrom, said tongue being held against rotary movement on its pivot, but capable of oscillation thereon, a series of electrodes arranged at intervals around said shaft, each electrode comprising two normally contacting surfaces, and said tongue being adapted to pass between and separate said surfaces, for the purpose specified.

In witness whereof, I have hereunto set my hand this 16th day of March 1907.

EUGENE A. COOPER.

Witnesses:

RICHARD PAUL.
J. B. EVA.