

No. 832,189.

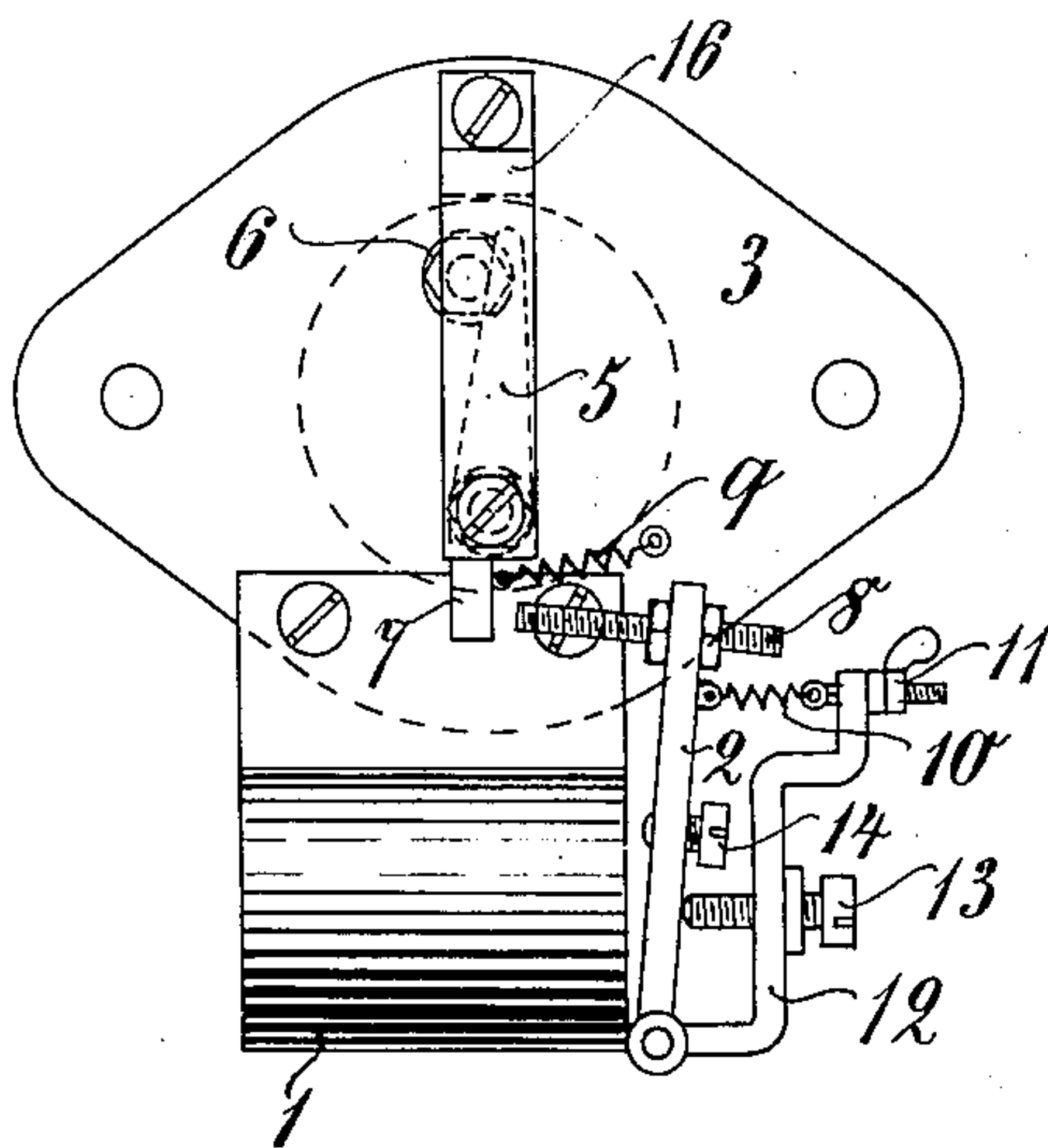
PATENTED OCT. 2, 1906.

H. W. HELLMANN.

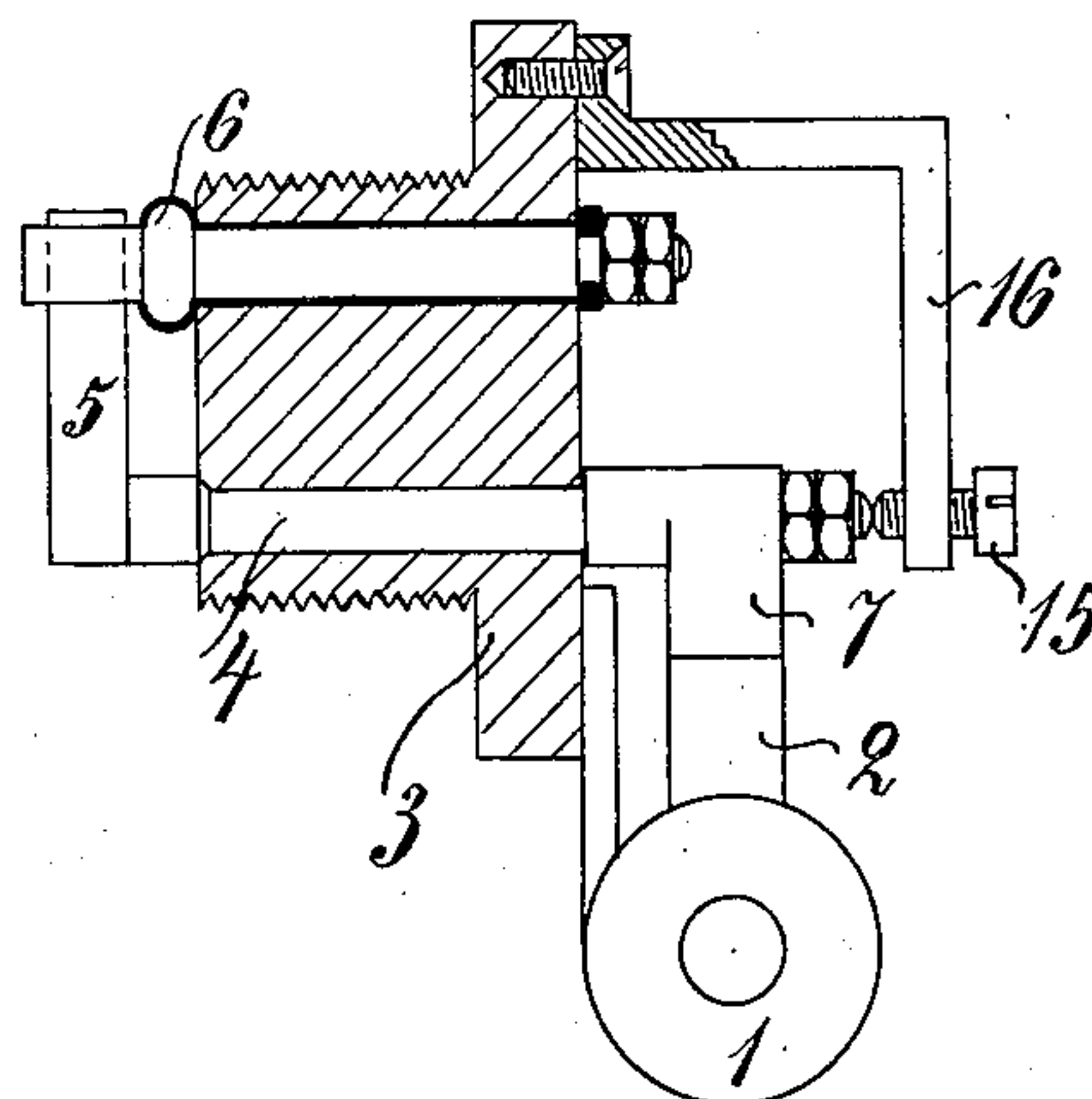
MAGNETIC IGNITION DEVICE FOR EXPLOSION ENGINES.

APPLICATION FILED NOV. 14, 1902.

*Fig. 1.*



*Fig. 2.*



Witnesses:  
Rudolf Zetsche.  
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# UNITED STATES PATENT OFFICE.

HEINRICH WILHELM HELLMANN, OF BERLIN, GERMANY.

## MAGNETIC IGNITION DEVICE FOR EXPLOSION-ENGINES.

No. 832,189.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Application filed November 14, 1902. Serial No. 131,373.

*To all whom it may concern:*

Be it known that I, HEINRICH WILHELM HELLMANN, engineer, a citizen of Germany, and a resident of Berlin, Prussia, Germany, (whose post-office address is Zinzendorfstrasse 7, Berlin, N. W.,) have invented certain new and useful Improvements in Magnetic Ignition Devices for Explosion-Engines, of which the following is a specification.

My invention concerns an electric igniting device for explosion-motors in which a movable electrode mounted capable of being turned in the combustion-chamber is influenced through an electromagnet. In the known electric igniting devices of this nature the movable electrode, mounted in the igniting-chamber, is fixed to the armature of the electromagnet. Therefore the spark-contact is broken immediately upon the attraction of the armature, causing the spark between the movable and the fixed electrode very often to occur too early—that is, before the current through the electromagnet and spark-contact has reached its maximum value—the consequence of which may be a spark insufficient for the certain explosion of the gases. This disadvantage is caused by the circumstance that the armature is attracted less the farther it is removed from the electromagnet. The weakness of this attractive force causes a proportionately slow movement of the movable electrode. As, however, the rapid opening of the spark-gap has a marked influence upon the nature of the spark, it can be seen that the above-mentioned contrivance is unsuitable for insuring a certain explosion of the gases. I avoid this fault in my electromagnetic igniting device by arranging the movable electrode to move quite independently of the armature of the electromagnet. In this way it is possible to allow the armature to attain a certain speed before striking the movable electrode, and thereby breaking the spark-contact.

I will now, with the help of the drawing of the igniting device, forming the subject of my invention, proceed to fully describe the arrangement of the same.

Figure 1 is an elevation illustrating one embodiment of my invention, and Fig. 2 is a longitudinal sectional view of the construction shown in Fig. 1.

The electromagnet 1, together with its movable armature 2, is fixed to the ignition-flange 3. The spark-contact consists of the fixed electrode 6, which is insulated from the

ignition-chamber, and the movable electrode 5, carried on one end of the axle 4, this axle carrying at its other end—that is, outside the ignition-chamber—a short arm 7. The movable armature 2 of the electromagnet 1 carries on its upper end an arm 8, which can advantageously consist of an adjustable screw, as shown in Fig. 1. When the armature is attracted by the electromagnet, this arm or screw strikes against the short vertical arm of the movable electrode 5, causing the spark between 5 and 6. Instead of the adjustable arm 8 of the armature 2 an adjustable screw could be provided on the arm 7 of the movable electrode. A spring 9 engages with the vertical arm 7 of the movable electrode, pressing it against the fixed electrode 6 and insuring a good contact between the two electrodes. A spring 10 acts on the armature 2 in opposition to the electromagnet, the other end of the spring being fixed to an adjustable screw 11 in the piece 12, which is fixed to the case of the electromagnet 1. The piece 12 carries, further, another adjustable screw 13, against which the armature 2 rests when the apparatus is in its normal condition.

The extent of the movement of the armature can be regulated by means of the screw 13. The tension of the spring 10 fixes the attractive force which the electromagnet must exert upon the armature in order to attract it. The length of the spark-gap between the electrodes 5 and 6 can be regulated by means of the horizontal arm or adjusting-screw 8. The armature carries a screw 14, which prevents the armature from sticking to the electromagnet and which, further, allows the striking force of the armature to be adjusted, as will be seen from the explanation of the method of working of the contrivance. The small bridge-piece 16, which is fixed to the combustion-chamber, carries the adjustable screw 15, the point of which presses against the outer end of the axle 4, carrying the movable electrode 5. This screw is to be so adjusted that the axle is quite free to turn in its gas-tight bearings. By means of this arrangement the pressure of the motor-cylinder gases upon the movable electrode does not hinder the free movement of the axle, as the gas-pressure acts only upon the pivot 15, which offers very little frictional resistance.

The method of working of my ignition device is as follows: The current coming from a suitable source passes successively through the windings of the electromagnet, the mov-



able electrode 5, and the fixed electrode 6. When the current begins to pass, the armature is in the position shown in Fig. 1, where the spring 10 holds the armature against the adjusting-screw 13. The movement of the armature 2 can be controlled to a certain degree by means of the screw 13, in so far that a certain strength of current is necessary to cause a movement of the armature. The adjustment of the spring 10 acts in the same way, in that the tension of the spring must be overcome by the attractive force of the electromagnet. By the suitable adjustment of the spring 10 and the screw 13 it is possible to delay the movement of the armature until the current in the magnet-windings has reached its maximum. The armature 2 then approaches the coil of the electromagnet with an increasing speed. This is explained by the fact that the nearer the armature approaches the electromagnet the greater is the attractive force upon it. Near the end of the armature movement its horizontal adjustable arm 8 strikes the vertical arm 7 of the movable electrode with great force and the greatest possible velocity, causing a sudden and rapid opening of the spark-contact. The length of the spark-gap can be conveniently varied by means of the adjustable arm 8 of the armature, or other suitable means. The powerful blow of the armature on the arm 7 of the movable electrode permits of such a tension in the spring 9 (which spring can be replaced by other suitable contrivance) that a good contact between the electrodes is insured. All these circumstances combine to cause the current through the electromagnet to be broken at its full strength with a fine powerful spark. In addition to preventing the armature from sticking to the magnet the screw 14 allows of the adjustment of the force

with which the armature strikes the movable electrode by limiting the distance within which the armature can approach the magnet, and thus allowing a greater or less portion of the attractive force of the electromagnet to exert its effect on the armature.

Having now fully described the construction and method of working of my electromagnetic ignition device, I declare that what I claim is—

1. In an electric igniter for explosive-engines, the combination of fixed and movable electrodes, an electromagnet arranged in circuit with said electrodes, an armature for engaging said movable electrode, means for varying the time of actuation of said armature, means for adjusting the length of the spark-gap, and independent means for regulating the force with which said armature engages the movable electrode, substantially as described.

2. In an electric igniter for explosive-engines, the combination of fixed and movable electrodes, an electromagnet arranged in circuit with said electrodes, an armature for engaging said movable electrode, a bracket secured to said magnet, adjustable means carried by said bracket for varying the time of actuation of said armature, adjustable means carried by said armature for adjusting the length of the spark-gap, and independent adjustable means carried by said armature for regulating the force with which the armature engages the movable electrode, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HEINRICH WILHELM HELLMANN.

Witnesses:

HENRY HASPER,  
OSKAR ARENDT.