No. 842,617. PATENTED JAN. 29, 1907.

H. C. BRASIER.

ELECTRICAL IGNITION MECHANISM FOR EXPLOSION ENGINES.

APPLICATION FILED JULY 12, 1902.

Fig. 2.

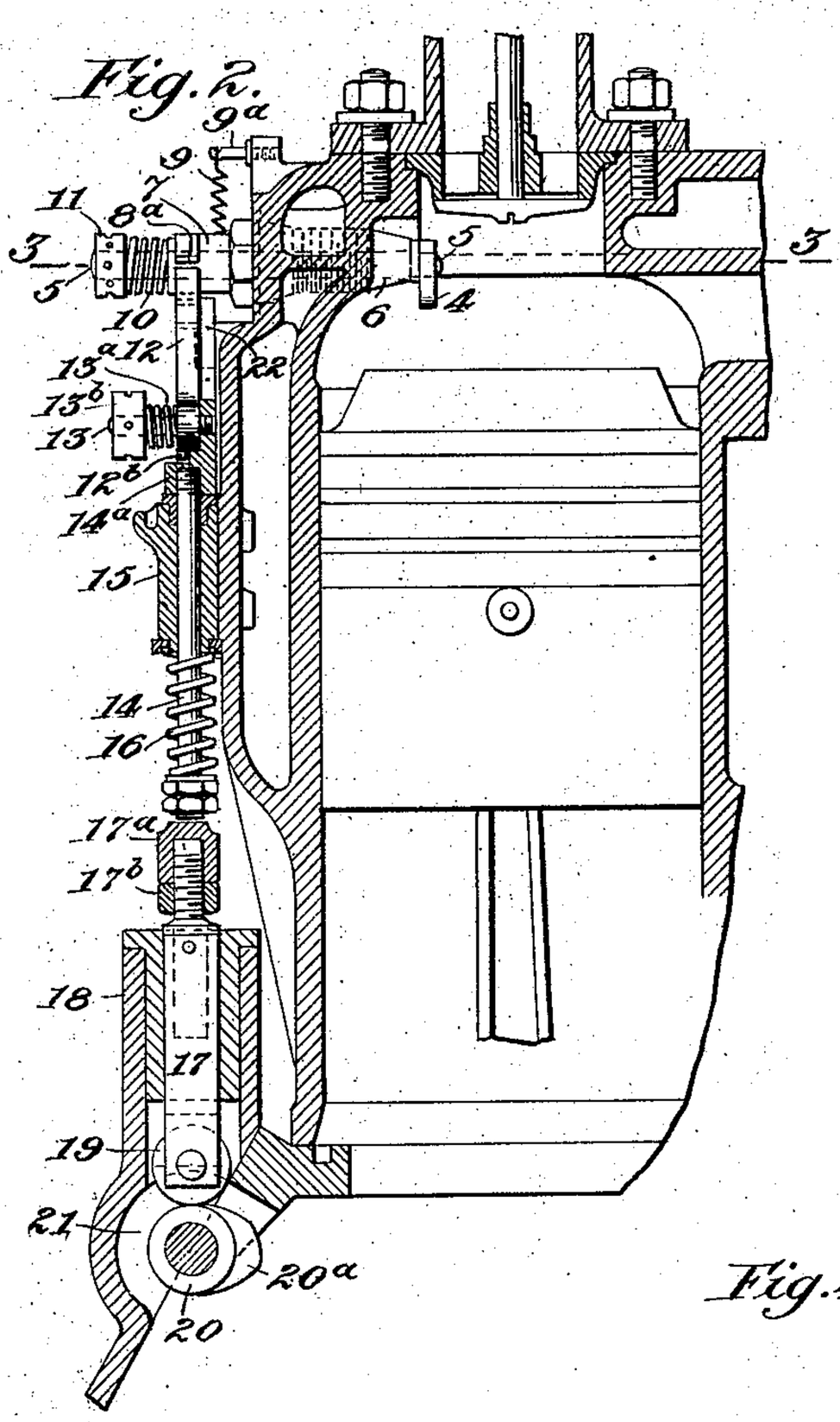


Fig. 1.

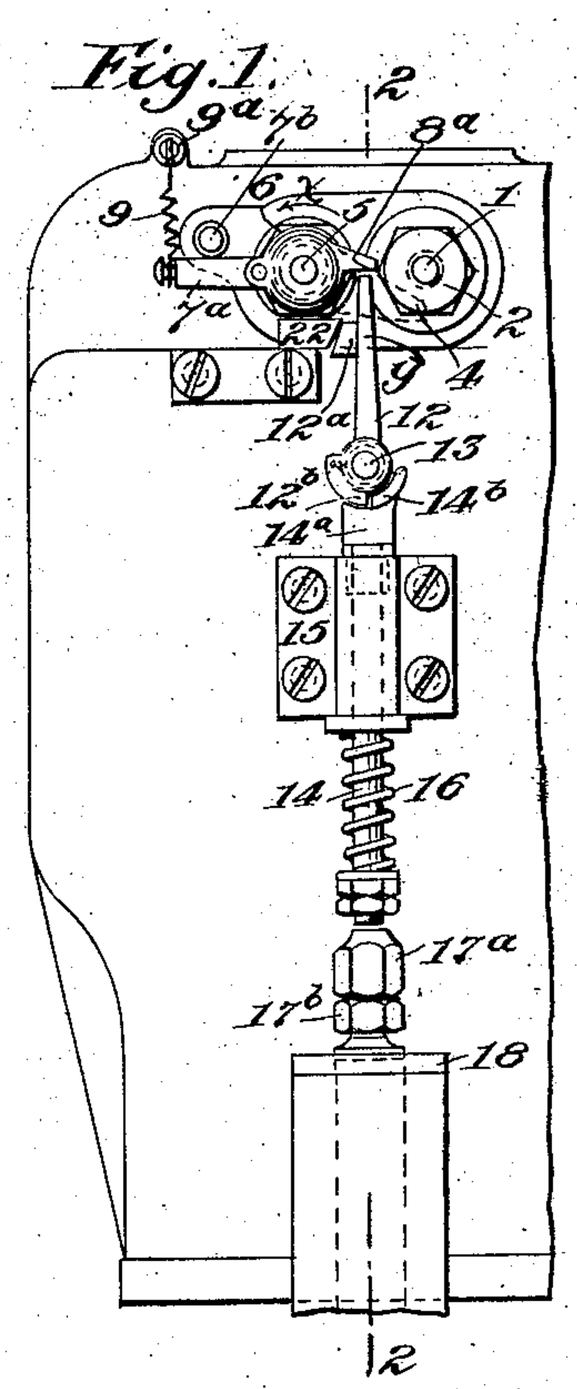


Fig. 3.

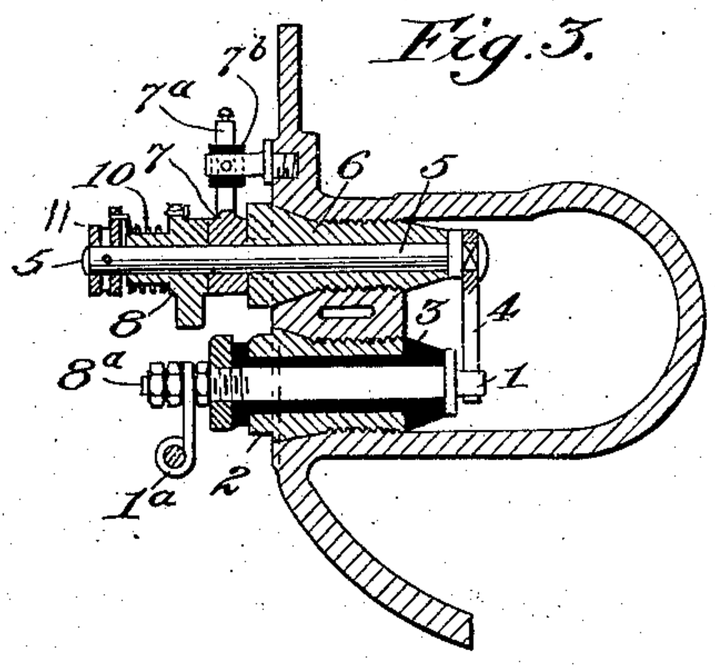
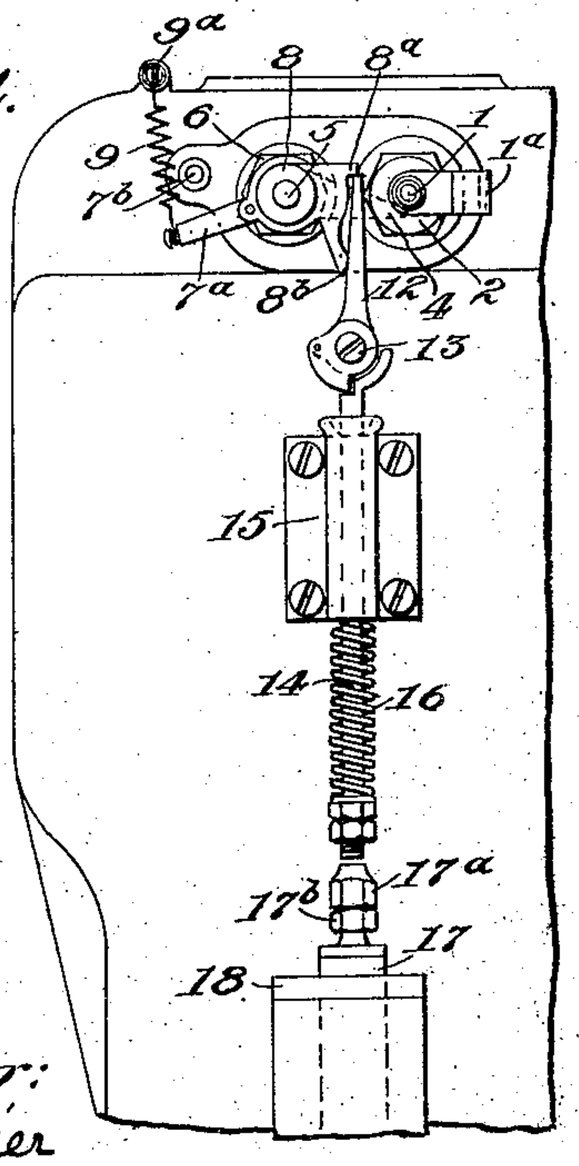


Fig. 4.



Witnesses:
Walter Abbe
William Abbe

Inventor:
Henri Charles Brasier
By Howson and Howson
ATTORNEYS

UNITED STATES PATENT OFFICE.

HENRI CHARLES BRASIER, OF PARIS, FRANCE.

ELECTRICAL IGNITION MECHANISM FOR EXPLOSION-ENGINES.

No. 842,617. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed July 12, 1902. Serial No. 115,333.

To all whom it may concern:

Be it known that I, HENRI CHARLES BRASIER, engineer, a citizen of the French Republic, residing at 36 Rue Molitor, Paris, France, have invented a certain new and useful Electrical Ignition Mechanism for Explosion-Engines, of which the following is a full, clear, and exact description, and for which I have applied for Letters Patent in France, dated February 11, 1902.

This invention relates to a mechanism for electrically igniting explosion-motors by means of a break-spark.

My invention relates to the mechanism intended to produce the break-spark used for ignition independently of the nature of the source of electricity employed, which latter may consist of an oscillating or rotary magneto or a dynamo or even a primary or secondary battery.

I shall describe my invention with reference to the annexed drawings, upon which—

Figure 1 shows in side elevation this mechanism arranged upon a motor-cylinder. Fig. 2 shows this mechanism in sectional elevation on line 2 2 of Fig. 1. Fig. 3 is a horizontal section on line 3 3 of Fig. 2. Fig. 4 relates to a modification.

The spark is produced in the cylinder between a terminal rod and a movable finger or arm. The terminal rod consists of a metallic rod 1, fitted in a plug 2, screwed into the casing of the cylinder. The terminal rod 1, which is preferably made of an inoxidizable metal, such as nickel, is electrically insulated from the metallic plug 2 by an insulating cover or sheath 3, made, for example, of mica. The rod 1 is connected at 1^a to one of the poles of the source of electricity.

The movable arm intended to come into contact with the rod 1 in order to cause the spark as it separates therefrom is shown at 4. It is fixed to the end of a shaft 5, having a bearing in a plug 6, screwed into the casing of the cylinder, metallic communication being set up between the arm 4, the shaft 5, the plug 6, and the body of the motor.

The shaft 5 projects exteriorly beyond the plug 6, which serves as a bearing therefor. Its projecting portion is fitted with a small cylinder or boss 7, furnished upon its side face with a ratchet, which engages with a corresponding ratchet upon the face of a short sleeve 8, also arranged upon the rod 5. This sleeve 8 is furnished with a projection or nose 8^a. The boss 7 is keyed upon the shaft 5, while the sleeve 8 is mounted loosely upon it.

The boss 7 is fitted with a small arm 7^a, to which is attached a spring 9, of which the other end is secured to stud 9^a, fixed on the casing. This spring 9 holds up and brings back the arm 7^a, and therefore the shaft 5 and arm 4, to a position in which this latter is separated from the fixed contact-rod 1. This position is determined by means of a stop 7^b, against which the arm 7^a can abut.

The direction of the ratchets on lateral opposing faces of the boss 7 and sleeve 8 is such that the sleeve 8 is independent of the boss 7 in the direction of rotation x. (See Fig. 1.) The sleeve 8 is acted upon by a spring 10, secured to a ring 11, pinned or keyed upon the axis 5, which ring is shown provided with a number of pin-holes or indentations, whereby the adjustment of the spring 10 by fractions of a turn can be effected. The spring 10 brings back the sleeve 8 to the position in which its ratchet is in engagement with that of the boss 7. This relative position of the parts 8 and 7 is that shown upon Fig. 2.

The spring 10 is much more powerful than the spring 9, and, as will be seen hereinafter, it is this latter alone which has for object the separation of the movable arm 4 from the fixed rod 1 in order to cause the spark.

Under the nose 8^a of the sleeve 8 abuts the upper end of a pallet 12, joined at 13 to the head 14^a of a connecting-rod 14, which is capable of sliding in a guide 15, secured upon the casing, and which rod is brought back to its lower position by means of a coil-spring 16, as shown. This rod 14 receives a rising movement by means of a sliding rod 17, provided in extension thereof, which rod 17, guided in a bush or lining 18, is furnished at its lower part with a roller 19, by means of which it bears upon the periphery of a cam 20. This latter is keyed upon a secondary shaft 21, turning at a suitable speed relatively to the main shaft of the engine.

The size of the head 14^a of the rod 14 is determined in such a way that when the slide 17 rests upon the circular portion of the cam 20—that is to say, is at its lowest point—the rod 14, depressed by its spring 16, is also at its lowest position. The head 14^a, forming a stop, limits this position, so that the lower extremity of the rod 14 is not then in contact with the head 17^a of the slide 17. The head

17ª of the slide 17 is screwed thereon so as to be adjustable, its position being insured by a lock-nut 17ᵇ.

The pallet 12 is provided at its side with a projection 12ª, having a beveled end which is fast thereto and which is intended at the time of the rise of the pallet 12 to bear against an incline formed upon a block 22, which results in the pallet 12 tilting in the direction *y*, Fig. 1. The block 22 is secured to the wall of the cylinder in such a manner as to be movable relatively to the pallet 12 12ª in order that the moment of escapement, and consequently the ignition, can be varied.

The lower end of the pallet 12, pivoted upon the short shaft 13, is fitted with a projection 12ᵇ, abutting against a stop-piece 14ᵇ, projecting from the head 14ª, which determines the vertical position of the said pallet, in which position the pallet is acted upon by its spring 13ª, said spring being at its other end attached to a ring 13ᵇ, secured by pins to the shaft 13.

The working of this mechanism is the following: Figs. 1, 2, and 3 show the parts in the position in which the movable arm 4 is separated from the rod 1, the connecting-rod 14 and the slide 17 being at the bottom of the lower stroke. When the eccentric part 20ª of the cam 20 acts upon the roller 19 of the slide 17, this latter effects its rise and lifts the rod 14. The upper part of pallet 12, which is fast to said rod 14, raises the nose 8ª of the sleeve 8, imparting to it an angular movement in the direction of the arrow *x*. It has already been shown that in this direction this sleeve 8, pivoted upon the shaft 5, cannot move by means of its ratchet the boss 7, keyed upon this shaft. It is connected to this latter by only the spring 10, which connects it to the piece 7 7ª; but since this spring 10 requires in order to be put in torsion a much greater force than that necessary for tensioning the spring 9 it follows that so long as the movable arm 4 has not met a fixed obstacle—namely, the rod 1—the arrangement composed of the sleeve 8, the spring 10, the boss and arm 7 7ª, the shaft 5, and the arm 4 will move as one piece and pivot in the direction *x*, tensioning the spring 9. When the arm 4 meets the fixed and terminal rod 1, the really solid part formed by the arm 4, the shaft 5, and the boss 7 can go no farther and becomes immovable. From this moment the pallet 12 continues to rise, causing the sleeve 8 to turn slightly in the direction *x* relatively to the boss 7, the spring 10 being then torsioned, since immediately the fixed block 22 causes the sliding bevel 12ª; and consequently the pallet 12, to incline toward *y*. The upper end of the pallet 12 then frees itself from the nose 8ª and the spring 9 brings back the piece 7 7ª, and therefore the shaft 5 and movable arm 4, which, separating from the terminal rod 1, causes the spark. The spring 10 does not act in this recoil movement. Its function is solely to afford a practically rigid connection between the sleeve 8 and the boss 7 7ª at the time of the rise of the pallet 12 until the movable arm 4 meets the terminal rod 1, then afterward to be put in tension and allow the pallet 12 to end its upward movement until the contact of the arm 4 with the rod 1 being insured the pallet 12 escapes from the nose 8ª and allows the spring 9 to act, which draws back the arrangement, as explained.

It is to be especially noted that the separation of the arms 4 from the fixed contact 1 is solely brought about by the spring 9 and consequently is effected with an ever-increasing speed which depends only on the tension of the spring 9 independently of the speed with which the spring has been tensioned—that is to say, independently of the speed of the engine. This is an essential point of my invention. The timing of the spark is determined, as stated above, by adjusting the fixed inclined block 22. In addition, the adjustment may be completed by the movement of the head 17ª. It will be remarked that when the slide 17 rests upon the circular portion of the cam 20 and when the connecting-rod 14 also occupies its lowest position there is no contact between the lower end of this rod 14 and the head 17ª of the slide. This latter thus rests upon the cam 20 only by its own weight and without the spring 16 intervening, which lessens the wear on this cam 20 and wear of the roller.

Fig. 4 shows a modification of the above-described arrangement. In this form the inclination of the pallet 12 to cause it to escape the nose 8ª is determined not by a fixed inclined block 22, but by a tail 8ᵇ, fast to the sleeve 8 and which at a certain moment in the angular movement of the latter bears against the pallet 12. In this modification the adjustment will be effected only by the movement of the head 17ª.

Having thus described my electrical ignition arrangement, I wish to state that I may make various constructional modifications which are in accordance with the principle set forth.

In devices of this character it is important that the parts be light, the springs few, and the operation simple, not only for the constructional advantages gained thereby, but in order that the parts may respond accurately and always in time with the high speed of the actuating mechanism made inoperative by the high speed of the explosion-motors on which the invention is adapted to be used. For this reason it is important that the spring which returns the movable electrode be untrammeled and positive in its action and always tend to break contact by the pull of its tangentially-arranged spring, independently of all other parts of the mech-

anism. The pallet 12 for similar reasons must be one which is simple, light, and adapted to strike the sleeve 8 in its upward rise at the lowest limiting position which the sleeve ever occupies, rise with it, pass to one side to release it, and return past it without in any wise affecting it until the upward rise of the pallet.

I claim as my invention—

1. An electric ignition device, comprising a fixed electrode, a shaft 5 carrying the movable electrode, a boss 7 secured to the shaft, and having a spring 9 to separate the movable electrode from the fixed electrode, a sleeve 8 loose on the shaft and having a ratchet to normally engage a ratchet on the said boss, a spring 10 around said shaft and secured at one end to the shaft and at the other end to the sleeve in combination with a reciprocating rod having a pivoted pallet to act on the sleeve 8 to turn the latter and the shaft through spring 10 to make the movable electrode contact with the fixed electrode and means to disengage the pallet.

2. In an ignition device, mechanism for actuating the movable electrode, comprising a shaft for said electrode, a boss keyed thereon, and a spring for the boss to operate said shaft by pressure in a line substantially tangential thereto and tending to keep the electrodes apart, a sleeve having a nose loosely mounted on said shaft and turning free of the boss when traveling to bring the electrodes together, and a spring stronger than the first-mentioned spring between the sleeve and shaft, a stop for limiting the return motion of the sleeve, with relation to the boss, to that position where a pallet first engages it, in combination with a vertically-reciprocating rod and means to operate it, an upright pallet pivotally mounted on said rod, and a spring to maintain it in its upright position, said sleeve having an arm adapted to strike and free the pallet from the nose of the sleeve when said nose has been moved a certain distance.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRI CHARLES BRASIER.

Witnesses:
GUSTAVE DUMONT,
EDWARD P. MACLEAN.