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PATENTED JULY 25, 1905.

C. JACOBSON.

SPARKING IGNITER FOR EXPLOSIVE ENGINES.

APPLICATION FILED JULY 11, 1900. RENEWED DEC. 31, 1904.

2 SHEETS—SHEET 1.

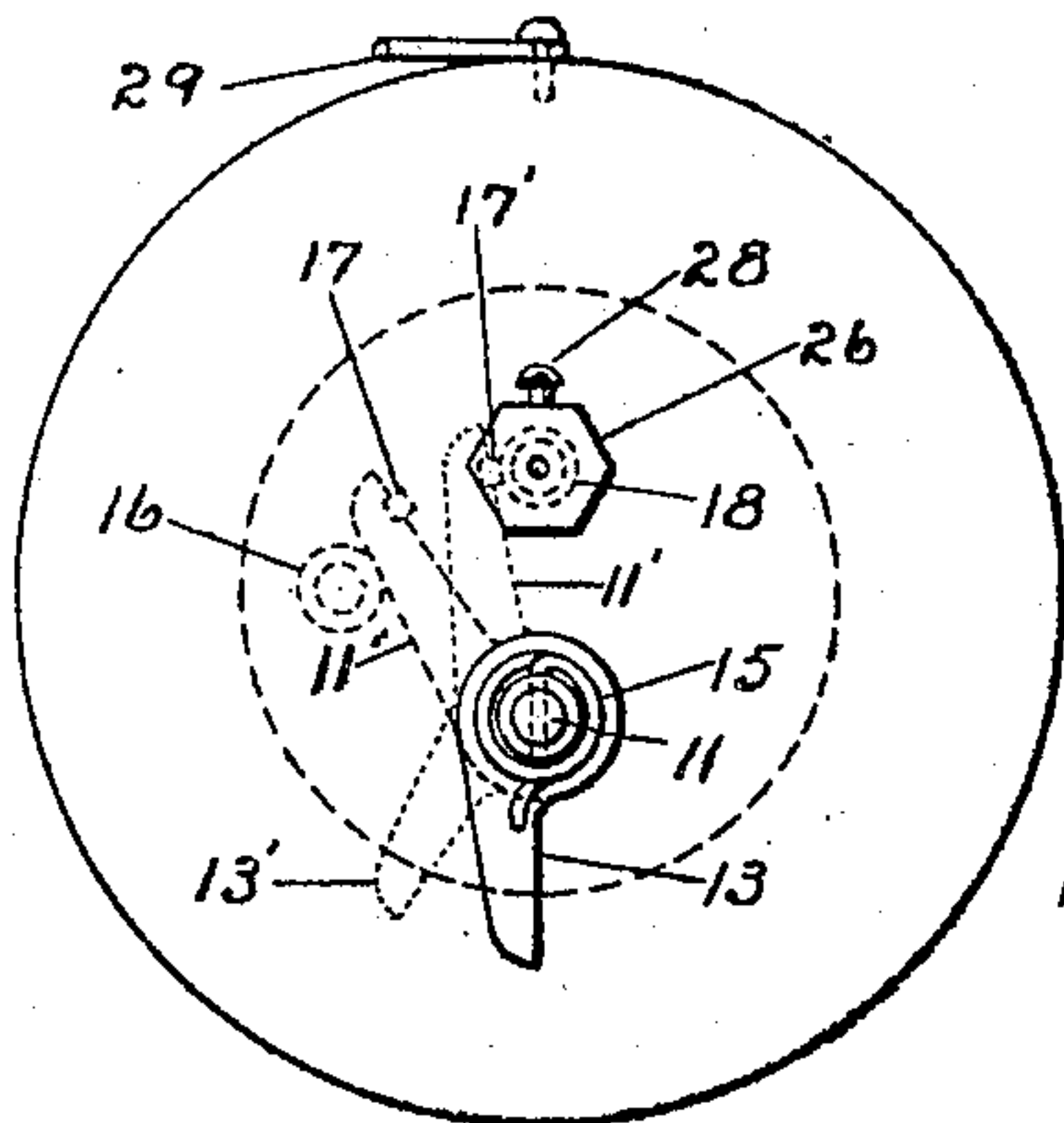


FIG. 2.

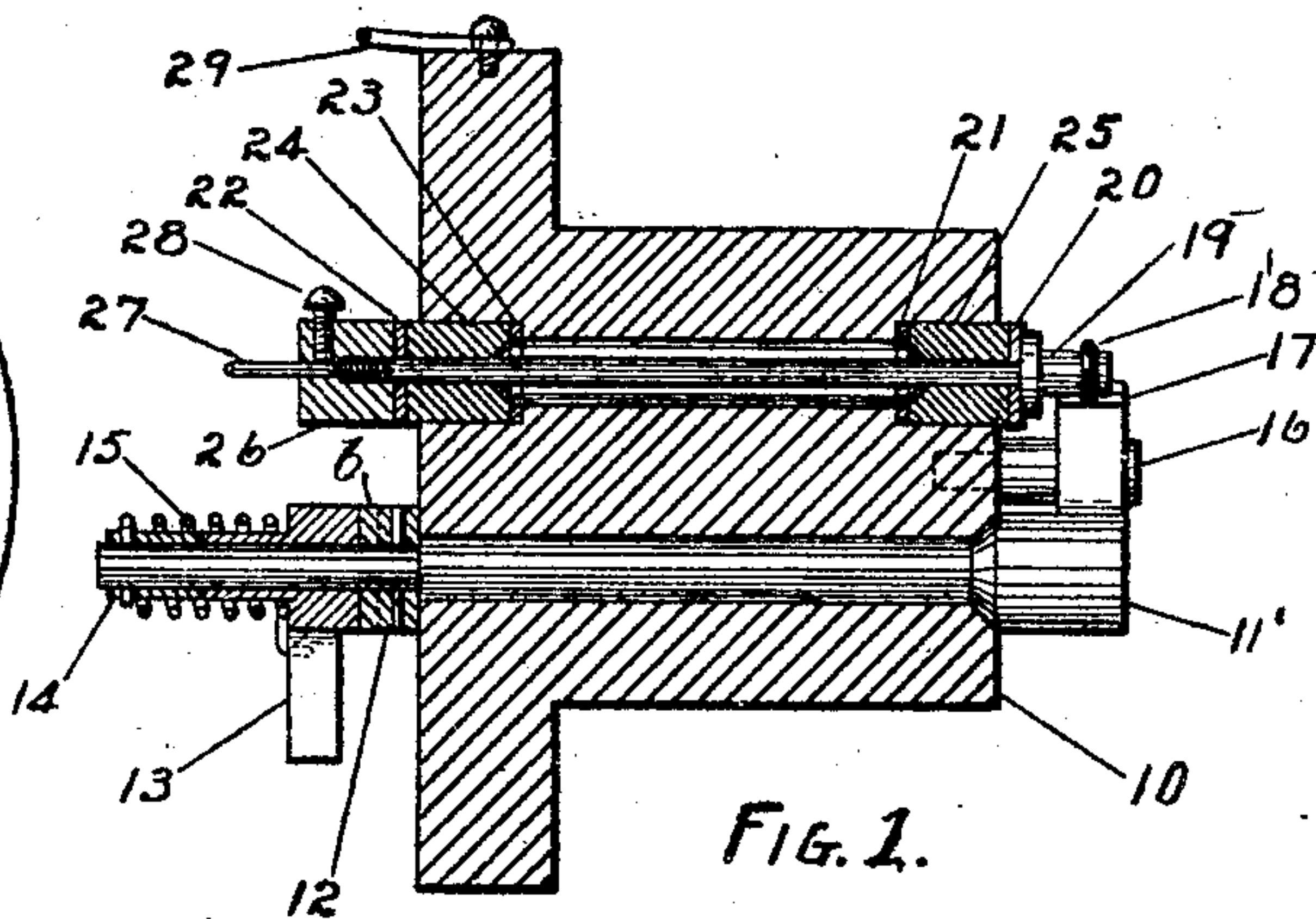


FIG. 1.

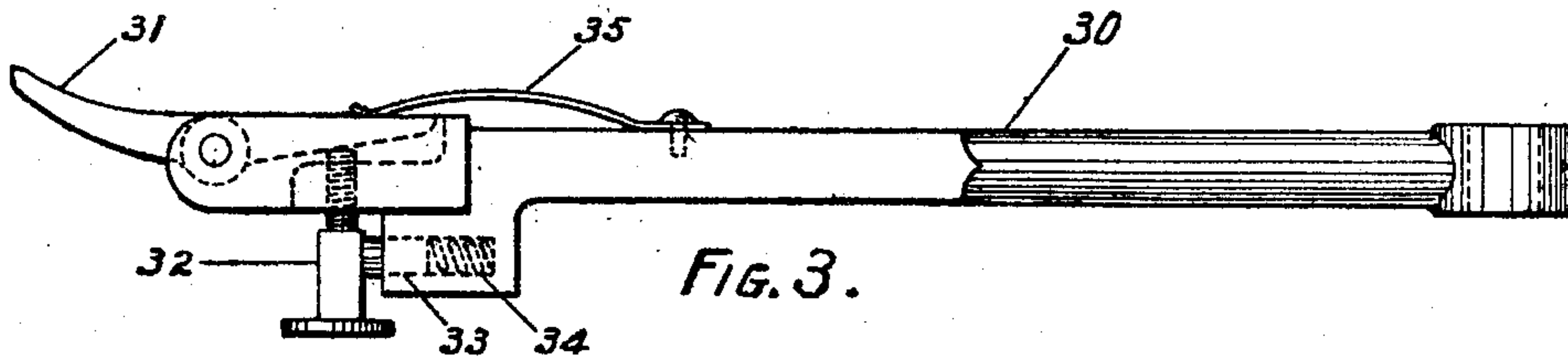


FIG. 3.

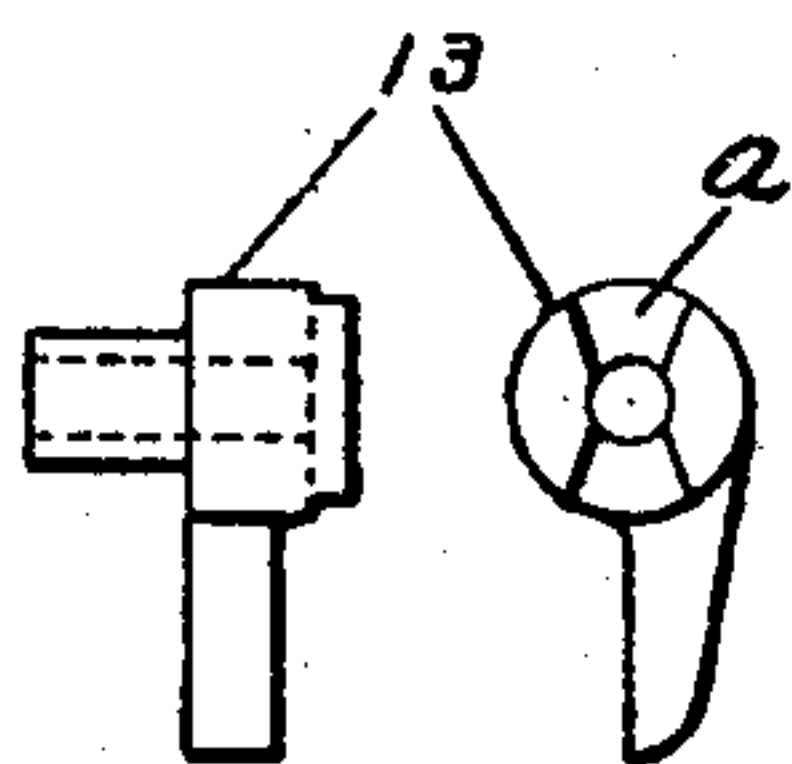


FIG. 4.

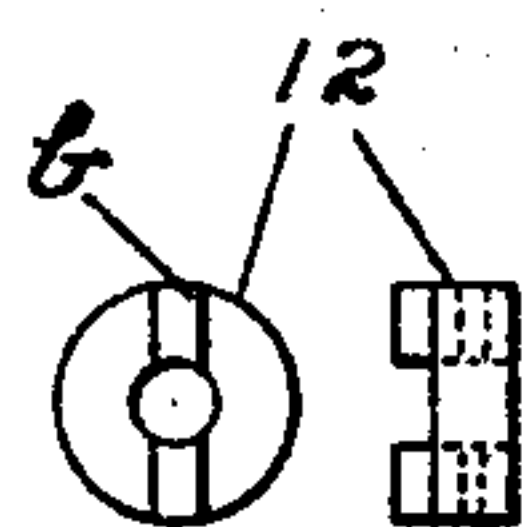


FIG. 5.

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2 SHEETS—SHEET 2.

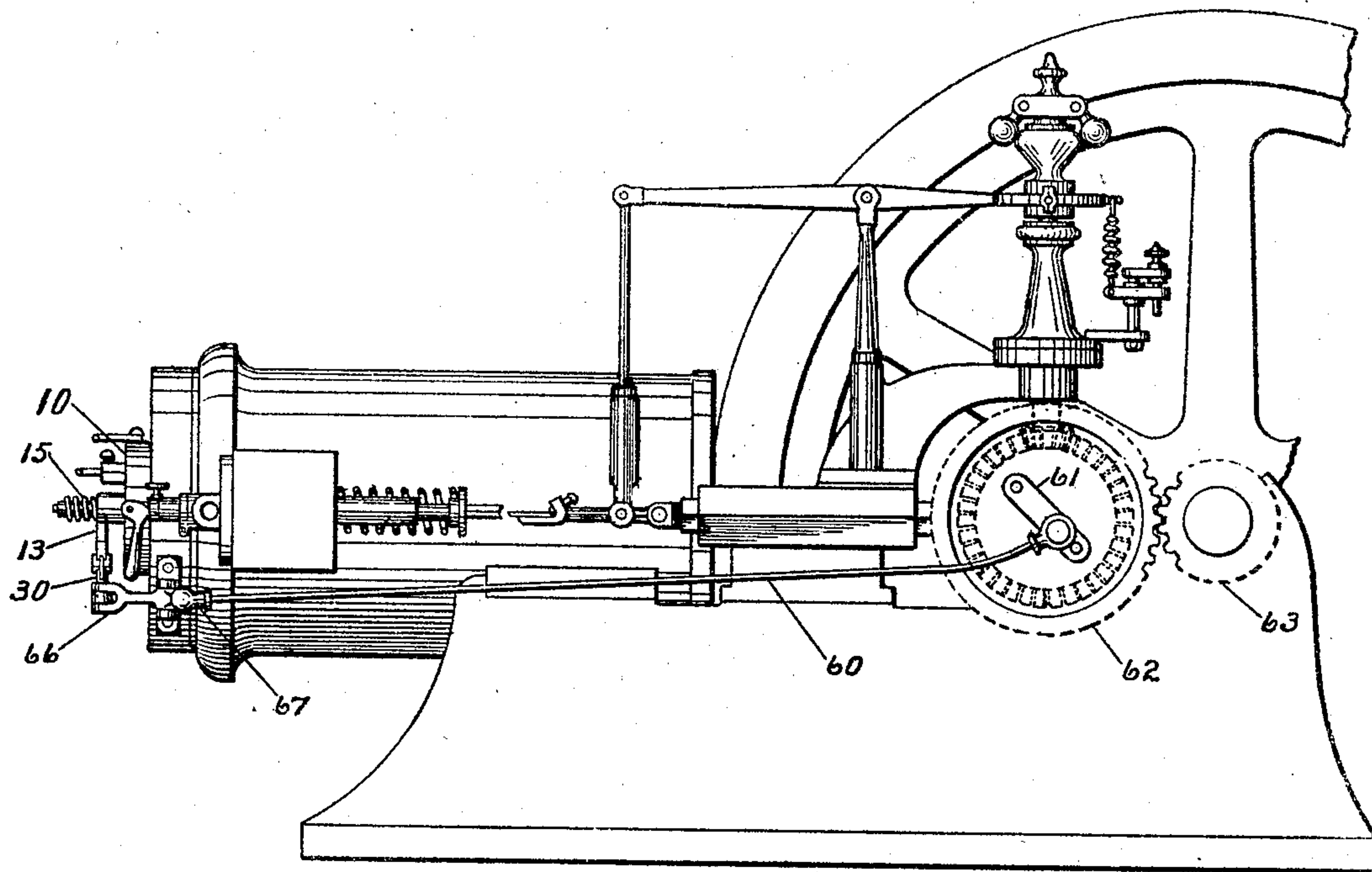


FIG. 6.

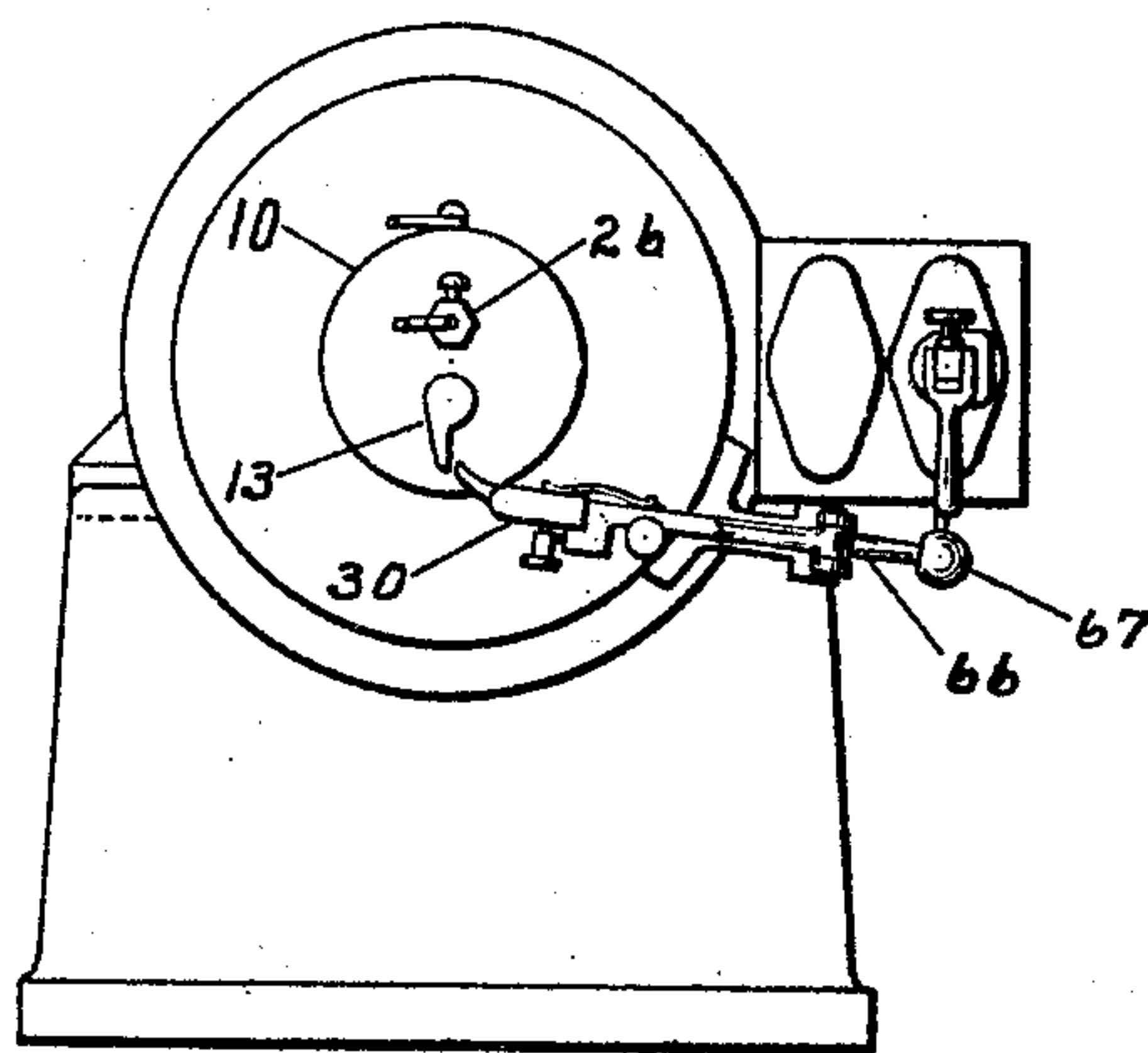


FIG. 7.

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UNITED STATES PATENT OFFICE.

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SPARKING IGNITER FOR EXPLOSIVE-ENGINES.

No. 795,617.

Specification of Letters Patent.

Patented July 25, 1905.

Application filed July 11, 1900. Renewed December 31, 1904. Serial No. 239,235.

To all whom it may concern:

Be it known that I, CHARLES JACOBSON, a citizen of the United States, residing at Warren, in the county of Warren and State of Pennsylvania, have invented new and useful Improvements in Sparking Igniters for Explosive-Engines, of which the following is a specification.

My invention relates to gas-engines generally or engines of any cycle; and it consists of the parts and the constructions and combinations of parts, which I will hereinafter describe and claim.

In the accompanying drawings, in which similar characters of reference indicate corresponding parts, Figure 1 is a detail showing a sectional view of a plug adapted to fit the cylinder-head and provided with the electrodes for igniting the charge of vapor. Fig. 2 is an end view of Fig. 1. Fig. 3 is a detail in side elevation of a trip-rod for making and breaking the contact between the electrodes. Fig. 4 shows a side and end view of the hammer on one of the electrodes and against which the trip-rod works. Fig. 5 illustrates a face and side view of the collar which coacts with the hammer of Fig. 6. Fig. 6 is a side elevation of the engine, showing the starting-valve in position, the electric igniting devices and operating means, and a governor and attachments for operating a hit-and-miss mechanism embodying my invention. Fig. 7 is an end view of the engine shown in Fig. 6, showing the location of the starting-valve and igniter.

In Figs. 6 and 7 I illustrate generally, but not in detail, a starting-valve having a casing 1 and operating hand-lever 8, this valve being of any appropriate type and is employed to effect the initial movement of the engine and the drawing into the cylinder of the first charge of vapor. I will now describe in detail the devices for exploding this charge.

The igniting devices are shown in Figs. 1 and 2 separate from the engine, and they are also shown in position on the engine in Figs. 6 and 7. The said devices include a plug 10, secured to the head of the engine-cylinder and provided with shafts or rods 11 and 19, one for the stationary and the other for the movable electrode, said plug having its reduced end projecting into the compression-space of the engine-cylinder. The inner ends of the shafts or rods 11 and 19, which project beyond the inner end of the plug, are provided with small pieces of platinum 17 and 18,

adapted to be brought into contact during certain operations, as I will presently describe. The shaft or rod 11, before mentioned, has a bearing in the plug 10 and is connected with one pole of a battery through the medium of a wire 29, and the rod or shaft 19 is insulated from the plug by means of two insulators 24 and 25 and is connected with the other pole of the battery by means of a wire 27, secured in a nut 26, fixed to the end of the rod or shaft 19 by means of a set-screw 28. Between this nut and the insulating-piece 24 and between the plug and the inner ends of the insulators 24 25 and also on the end of the piece 25 which projects within the compression-space of the cylinder are suitable washers—say of asbestos—herein designated by the reference-numerals 20, 21, 22, and 23. A collar 14 is pinned to the outer end of rod or shaft 11 by one end of a spring 15, the opposite end of which is secured to an arm or hammer 13, and a collar 12, secured to the rod or shaft 11, has a lug or projection *b*, (shown in Fig. 5,) adapted to engage a slot or groove *a*, formed in the head of the arm or hammer 13, (see Fig. 4,) said slot or groove *a* having walls diverging upon each side of the axis of the arm or hammer for a purpose I will hereinafter indicate. The rod or shaft 11 is formed with an enlarged head at the inner end, and a conical bearing is formed at the base of this head, said head having an arm 11' or tongue to which the platinum strip is secured. From this description of parts it will be obvious that when the arm or hammer is moved (by devices hereinafter described) from the full-line position in Fig. 2 to the dotted position shown at 13' it coils the spring 15 to cause it to rotate the rod or shaft 11 to carry the arm or projection 11' and platinum piece 17 into the position shown at 17', when the aforesaid slot *a*, Fig. 4, in the head of the arm or hammer (and which slot is purposely made larger than the projection *b* on the collar 12) enables the arm or hammer 13 to continue in movement against the opposing pressure of the spring 15 until it reaches the dotted position 13' in Fig. 2, and upon being released (by means hereinafter indicated) said arm or hammer is snapped back until the lost motion between the slot *a* and the projection *b* on the collar 12 is taken up, when the force of the blow upon the collar insures the quick separation of the platinum points 17 18, thereby producing the spark which explodes the charge of vapor and impels the cylinder-pis-

ton. In Fig. 2 is also illustrated a stop 16 for limiting the return movement of the arm 11' and the consequent return movement of the rod or shaft 11.

The arm or hammer 13 lies in the path of and is actuated by the trip-rod shown in detail in Fig. 3, the position of this rod relative to the hammer being shown in the general views 6 and 7. The trip-rod is disposed transversely across the head of the cylinder and is actuated by a bell-crank lever 66, and it includes in its construction a lever 31, fulcrumed between its ends to one end of the rod and held in position by a spring 35 and an adjusting-screw 32, which latter is designed to break the contact between the platinum points 17 18 earlier or later according to the degree which it adjusts the lever 31 by raising or lowering the outer end of the latter. The spring 35 permits the forward upturned end of the lever 31 to be depressed when passing back over the end of the hammer 13.

Within the outer end of the trip-rod is mounted a plunger 33, backed by a spring 34, the said plunger 33 bearing against suitable flat surfaces on the screw 32 for the purpose of holding it in the position in which it is adjusted to prevent its turning by the vibrations of the engine, and thus altering the adjustment of the lever 31 and the consequent breaking of the contacts 17 18.

The push-rod 30 is, as before indicated, operated by the bell-crank lever 66, to one arm of which the rod is connected, while to the other arm of said lever is connected the forward end of a rod 60, whose opposite end is connected with a crank 61, projecting from a gear-wheel 62, meshing with and driven by a gear 63 on the engine-shaft, as shown in Fig. 6. When the engine is of the four-cycle type, as herein shown, the gear 62 makes only one-half the number of revolutions made by the gear 63, whereby the igniting devices are operated only during each second revolution of the engine-shaft. At every other revolution of the engine crank-shaft the crank 61 and gear-wheel 62 will make one complete revolution, thus giving one forward and one backward movement to the rod 60, which actuates the arm or hammer 13, thereby producing an igniting-spark at each compressive stroke of the engine.

The engine thus described is of a simple construction, effective and reliable in operation, and especially adapted for motive-power purposes, and the several arrangements constituting the engine being capable of modification without materially altering the operation of the engine and without departing from the scope of the invention I do not limit myself to the exact constructions described and shown, nor do I limit them to any particular type of engine, as the improvements are well adapted to engines of any cycle.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an explosive-engine the combination of a plug fitted to the head of the cylinder and having a reduced end projecting into the compression-space thereof, parallel rods both extending longitudinally through the plug from end to end and projecting beyond said ends, contact-pieces on the inner ends of said rods one of said rods uninsulated and having a direct bearing and connection with the plug, insulators fitting in both the inner and outer ends of the plug and receiving the other rod and insulating the same from the plug, a conducting-wire connecting with said plug, a nut on the outer end of the insulated rod in line with the outer insulator, a conducting-wire fitted to the nut, insulating-washers between the nut and insulator and between said insulators and the plug said plug counterbored to receive the insulators, a collar on the outer end of the other rod having a lug across one of its faces, a hammer or arm journaled on said last-named rod, said hammer or arm having a head with a groove to receive said lug, and said groove having walls diverging from its central opening, and a spring surrounding the hub of the hammer or arm, having one end fixed to the rod and the other end fixed to the hammer, said rod carrying the hammer having its inner end provided with an enlarged head, to which one of the contact-pieces is secured, and means for actuating the hammer to cause the engagement of the contacts.

2. In a gas-engine, the combination with fixed and movable electrodes, of means for actuating the same including a push-rod operated by the engine and extending substantially parallel with the cylinder thereof, a trip-rod extending at right angles to the push-rod and substantially parallel with the engine-head, a bell-crank lever connecting the trip-rod with the push-rod, a lever 31 fulcrumed between its ends to one end of the push-rod and a spring-plate having one end secured to the trip-rod and the opposite or free end bearing upon the rear end of said lever, an adjusting-screw bearing upwardly under the spring-pressed end of the lever and adjusting the point of the lever to vary the time of breaking the contacts of the igniter, and a spring-pressed plunger 33 mounted in the end of the trip-rod and bearing against the side of the adjusting-screw for maintaining said screw in its adjusted position.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES JACOBSON.

Witnesses:

MAUDE A. RUSSELL,

CHARLES A. PETERSON.