No. 734,852. PATENTED JULY 28, 1903.

G. A. GOODSON.

ELECTRIC IGNITER FOR EXPLOSION ENGINES.

APPLICATION FILED MAR. 13, 1903.

NO MODEL. 8 SHEETS—SHEET 1.

Fig. 1.

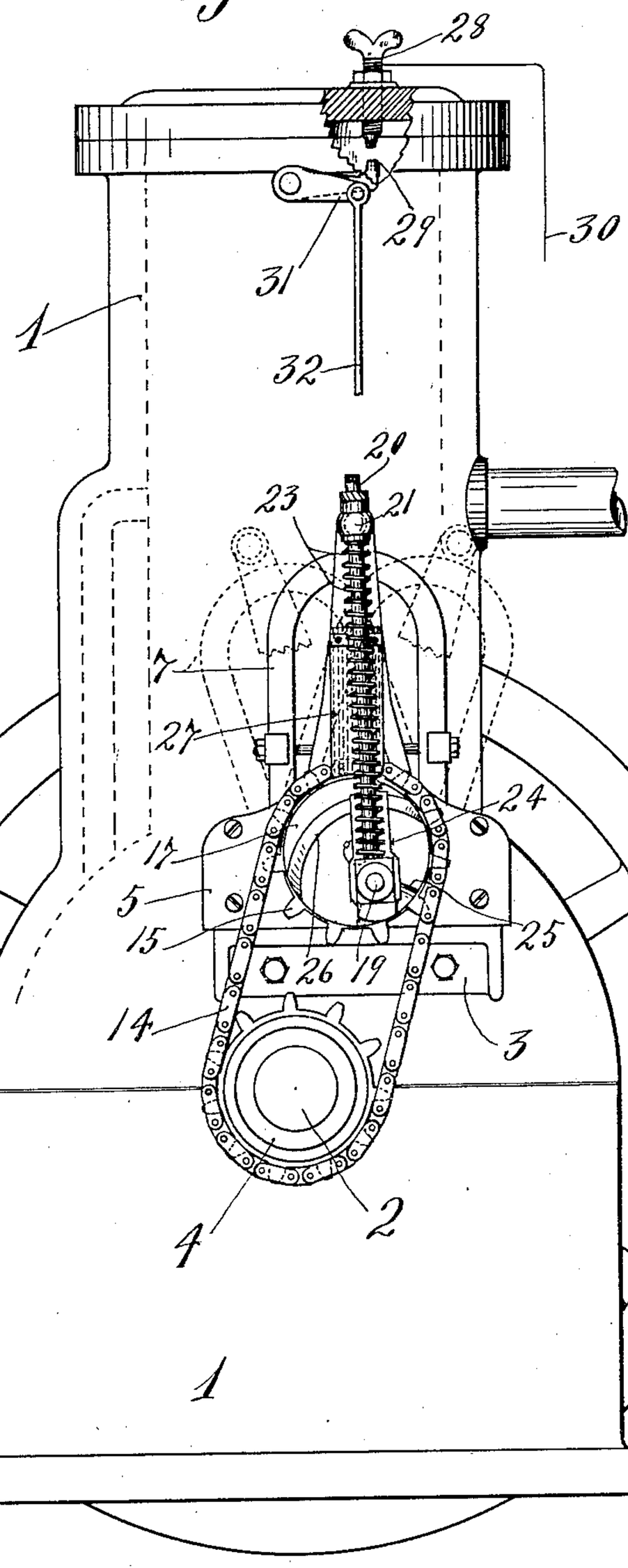
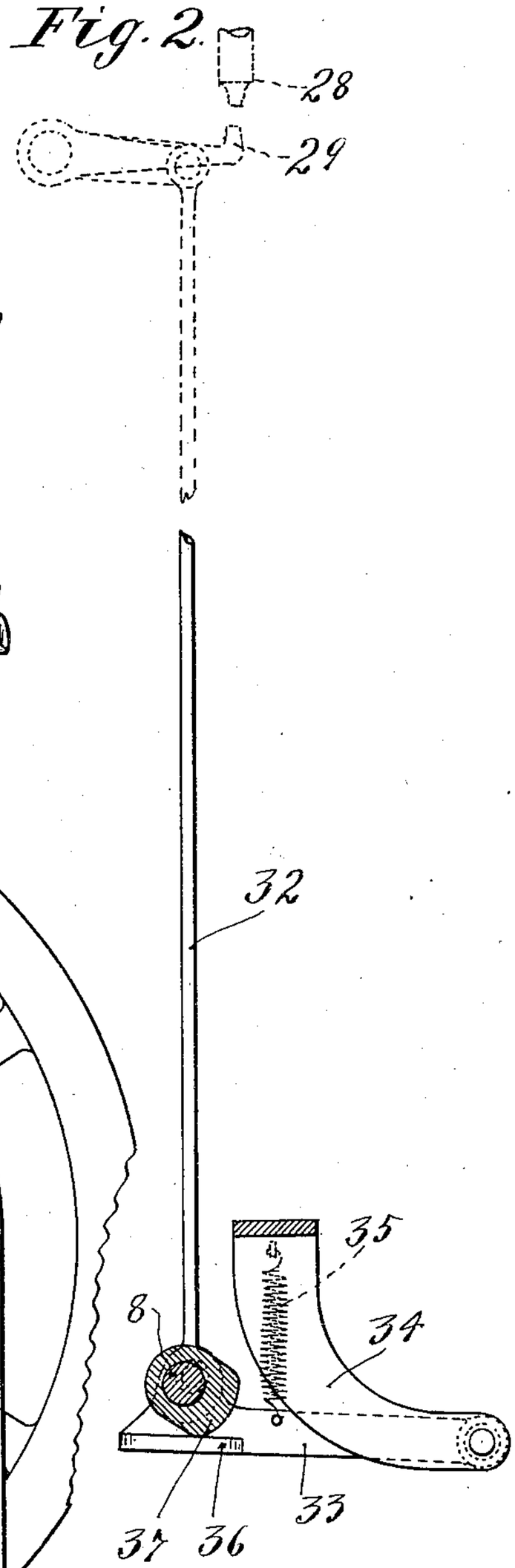


Fig. 2.



Witnesses.
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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3

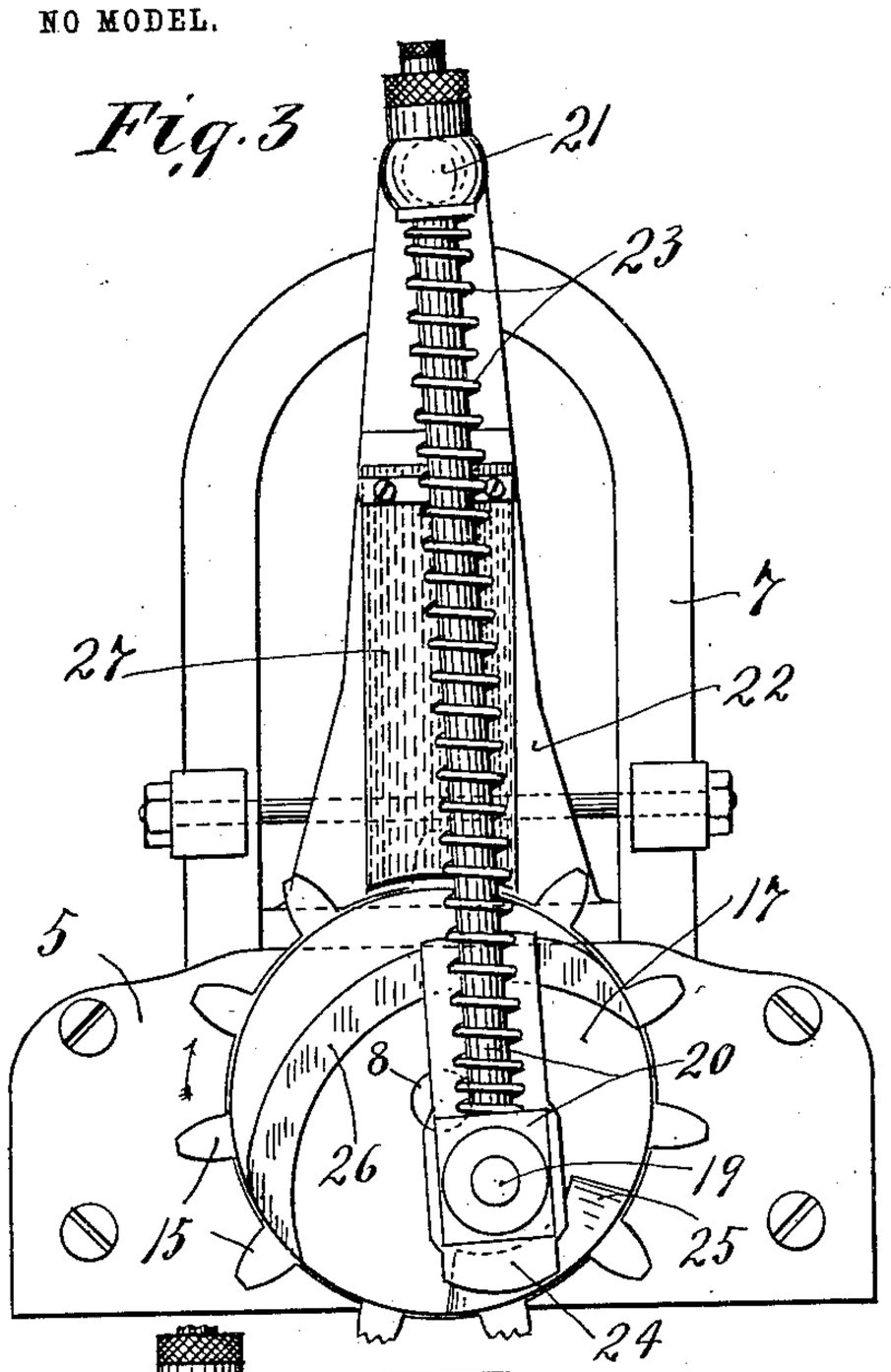

Fig. 6.

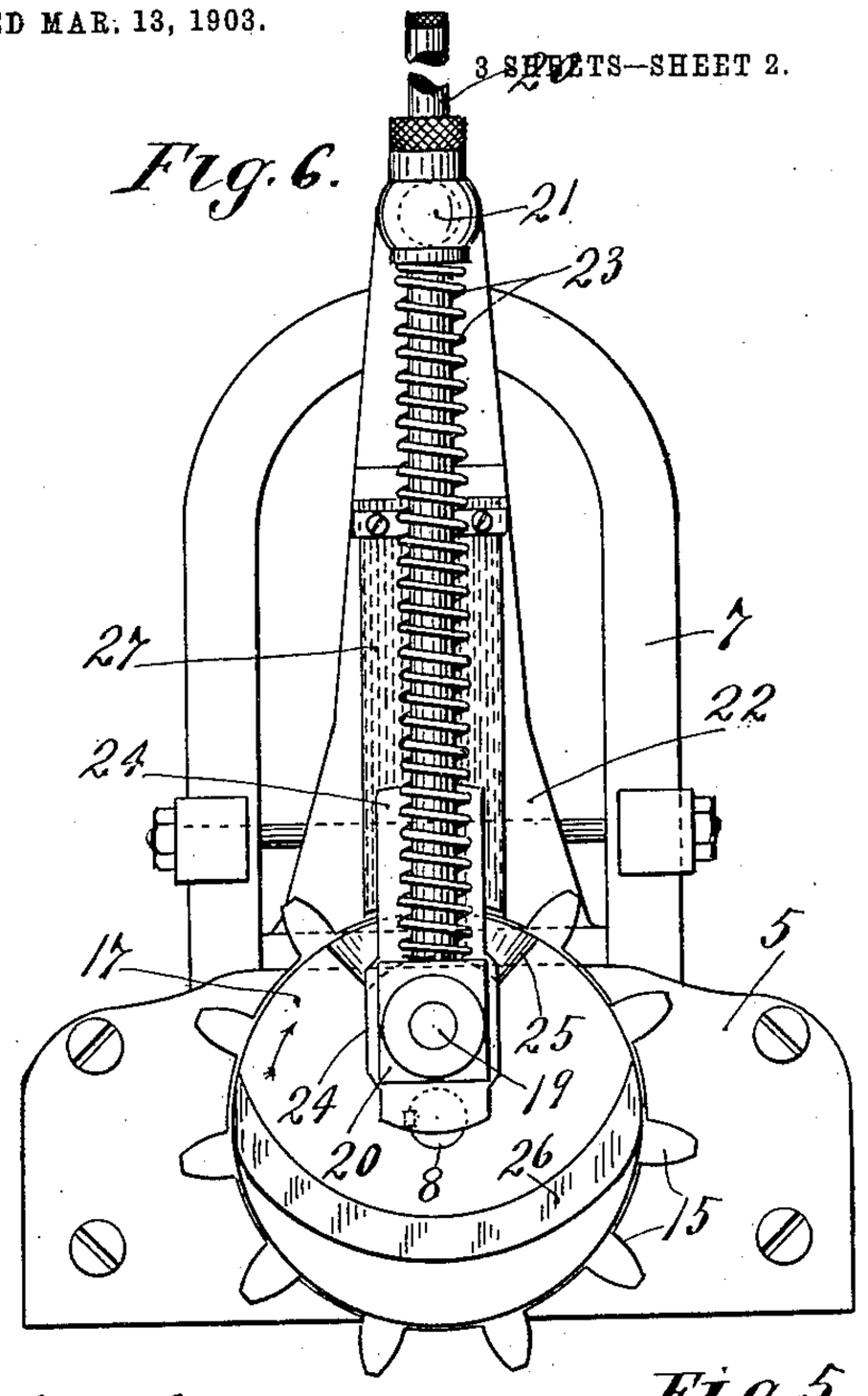

Fig. 4.

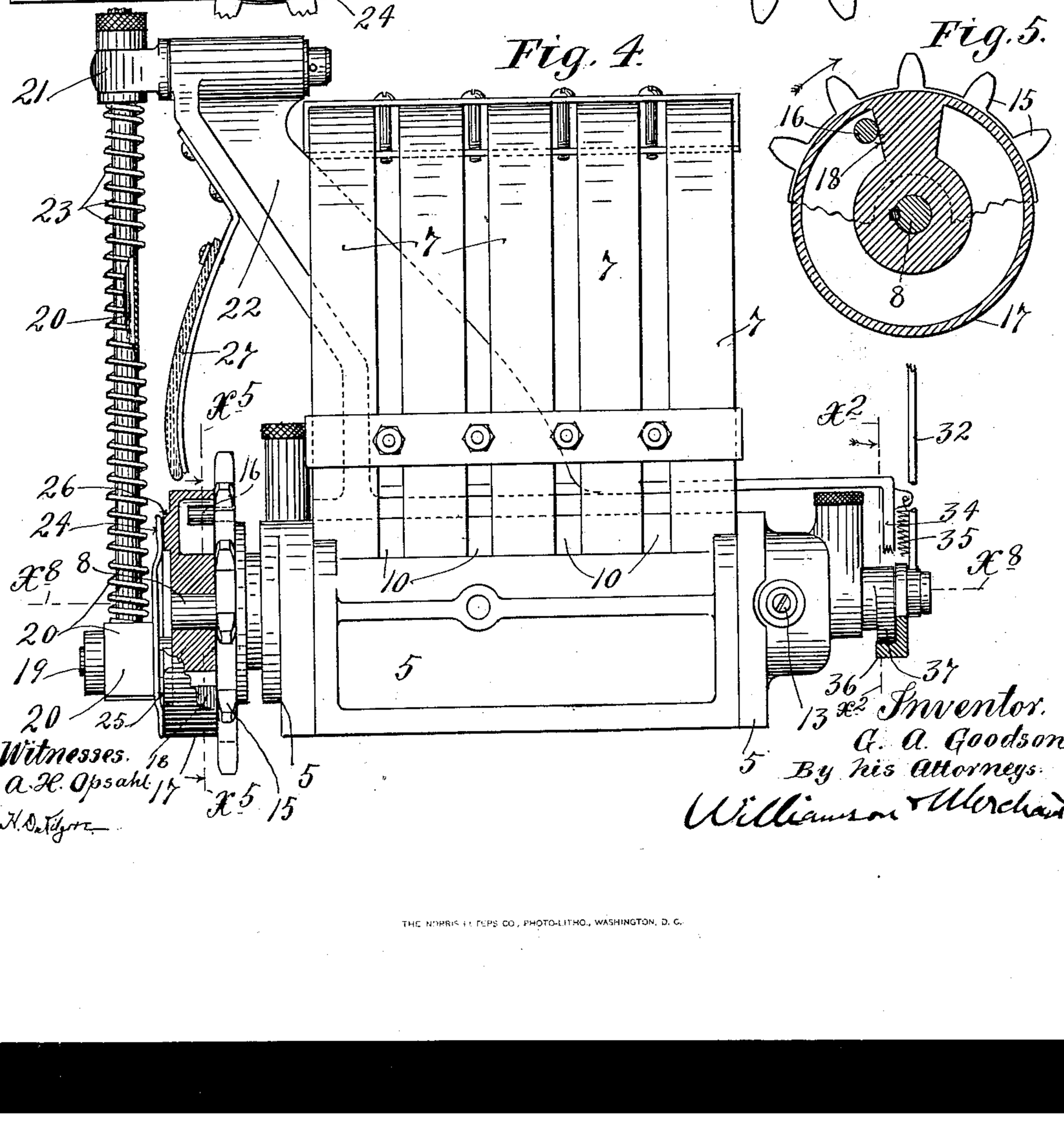

Fig. 5.

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APPLICATION FILED MAR. 13, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 7.

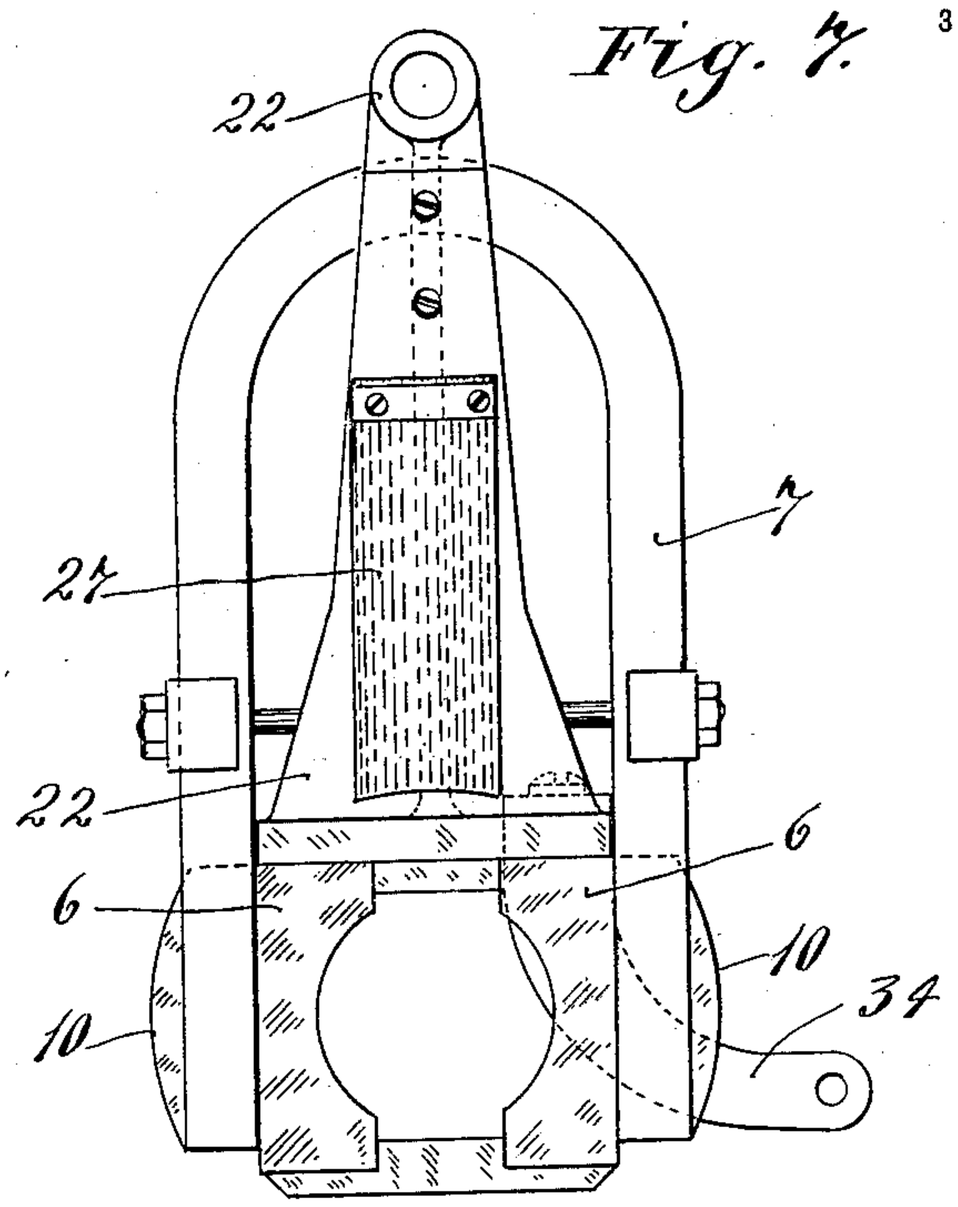
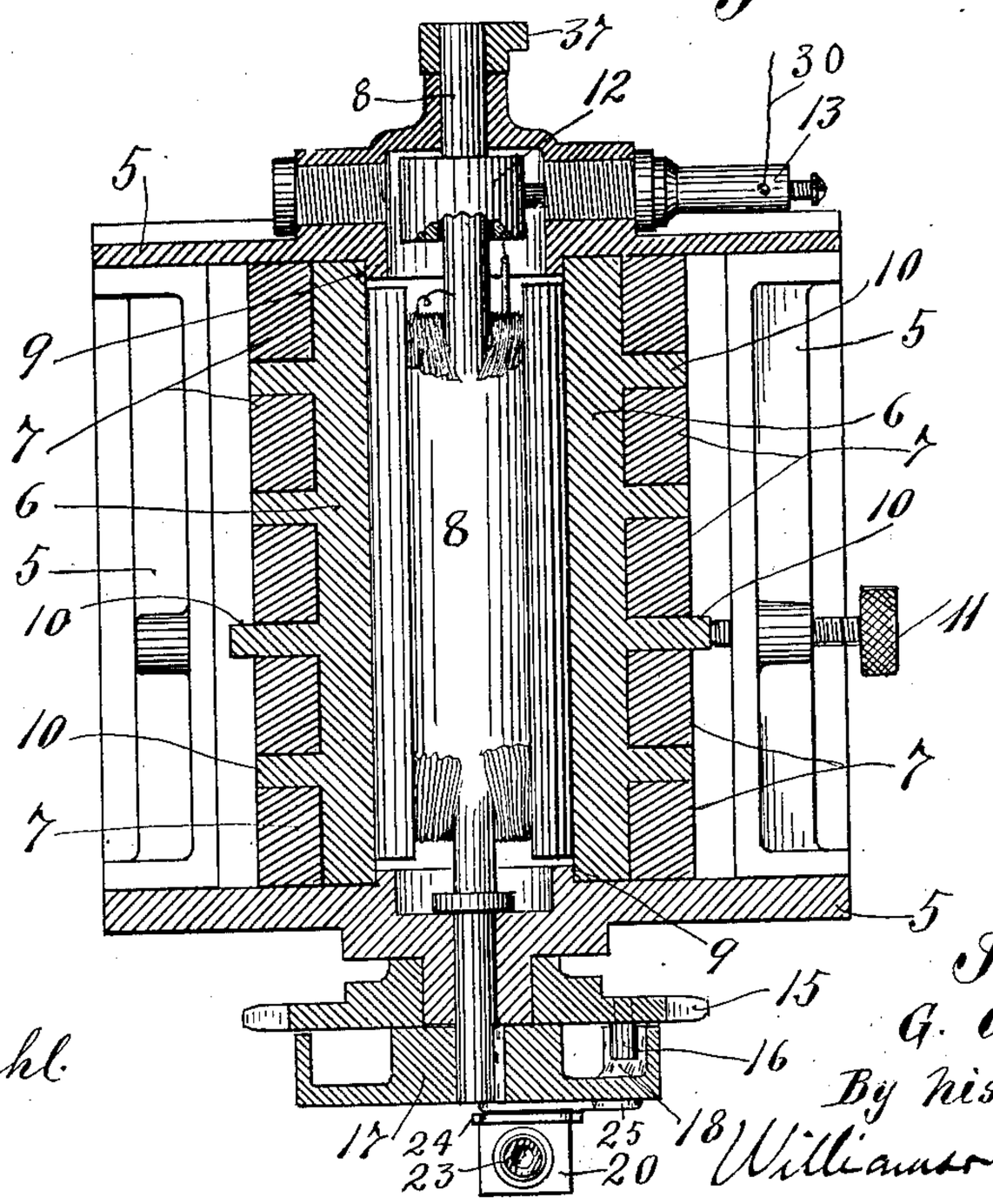


Fig. 8.



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No. 734,852. Patented July 28, 1903.

UNITED STATES PATENT OFFICE.

GEORGE ARTHUR GOODSON, OF PROVIDENCE, RHODE ISLAND.

ELECTRIC IGNITER FOR EXPLOSION-ENGINES.

SPECIFICATION forming part of Letters Patent No. 734,852, dated July 28, 1903.

Application filed March 13, 1903. Serial No. 147,558. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ARTHUR GOODSON, a citizen of the Dominion of Canada, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Electric Igniters for Explosive-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to electric igniters for explosive-engines, and is in the nature of an improvement on the electric igniter described in my prior pending applications, Serial No. 86,009, filed December 16, 1901, and Serial No. 98,465, filed March 17, 1902, and allowed November 7, 1902; and to this end the invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

In the drawings the invention is illustrated as applied to a two-cycle explosive-engine.

In said drawings, like notations referring to like parts throughout the several views, Figure 1 is a view in front elevation with some parts broken away, showing the improved igniter in working position in respect to the engine. Fig. 2 is a detail, chiefly in transverse vertical section on the line x^2 x^2 of Fig. 4, with some parts broken away and others shown by dotted lines in diagram. Fig. 3 is a front end elevation of the magneto detached with the parts in normal or idle position. Fig. 4 is a view showing the magneto chiefly in side elevation, but with some parts broken away and some parts shown in section. Fig. 5 is a detail in vertical transverse section on the line x^5 x^5 of Fig. 4, but with some parts broken away, but with the parts in the same position as shown in Fig. 6. Fig. 6 is a similar view to Fig. 3, but with the movable parts shown in a different position—to wit, near tripping position. Fig. 7 is a view in front elevation, showing the permanent magnets and pole-pieces or what may be called the "body" of the magneto removed from the armature and the base of the magneto; and Fig. 8 is a horizontal section on the line x^8 x^8 of Fig. 4.

The engine shown being of a well-known standard construction, it is sufficient for the purposes of this case to mark the castings 1 and the crank-shaft 2. The electric generator is in the form of an alternating magneto having an H-armature wound with fine wire. This magneto, as shown, is mounted on a bracket 3, fixed to the engine-castings 1. The engine crank-shaft 2 is, as shown, provided with a sprocket 4. The magneto, as shown, is made up of a brass base 5, pole-pieces 6, permanent magnets 7, and the rotary armature 8. The magnets 7 and the pole-pieces 6 are rigidly secured together and are angularly adjustable on bearing-flanges 9, projecting inward from the end plates of the base 5, as best shown in Fig. 8. The pole-pieces 6 are made of the proper concave shape at their ends, as shown in Fig. 7, to fit the bearing-flanges 9 when the parts are in working position. Said pole-pieces 6 are also provided with ribs or flanges 10, which project between the permanent magnets 7 and space the same apart from each other. Two of these ribs 10 project outward beyond the permanent magnets, one from each side of the body of the magneto, and are made of segmental form on their outer faces for interchangeable coöperation with a set-screw 11, which set-screw 11 may be interchangeably seated in either of the side plates of the base and thereby be made to work against either of the projecting ribs 10 to lock the body of the magneto in any desired angular adjustment in respect to the base, as best shown in Fig. 8. One terminal of the armature-winding is soldered or brazed fast to the armature-shaft in direct contact therewith, whence the current can pass through the engine-castings 1 to the movable electrode 29, and the other terminal of the armature-winding is insulated from the armature-shaft and connected to a contact-ring 12, fixed to but insulated from the armature-shaft. A brush contact 13 may be interchangeably seated in opposite sides of the base 5 to engage with either side of the contact-ring 12 as may be desired, and this brush contact 13 is connected by wire 30 with the fixed electrode 28.

The sprocket 4, fixed to the engine-shaft 2, is shown as connected by a chain 14 with a loose sprocket 15 of the same size mounted on a suitable bearing projecting from the

front plate of the magneto-base 5, which bearing is concentric with and forms a part of the bearing for the armature-shaft, as best shown in Fig. 8. Said sprocket 15 is provided with a driving-stud 16 on its outer face for coöperation with an internal driving-lug 18, projecting from the inner face of a channeled crank-disk 17, fixed to the outer end of the armature-shaft alongside the sprocket 15, as best shown in Figs. 4, 5, and 8. The crank-disk 17 is provided with a wrist-pin 19, engaging the headed lower end of a thrust-rod 20. The upper end of said thrust-rod 20 slides freely through the head of a swiveled guide-bolt 21, seated in the upper end of a bearing-bracket 22, fixed to the pole-pieces 6 of the magneto. An impelling-spring 23 is coiled about the thrust-rod 20 and is compressed between the headed lower end of said rod and the head of said swiveled guide-bolt 21. A flat spring-plate 24, fixed at its intermediate portion to the headed lower end of the thrust-rod 20, constitutes a two-tipped brake-shoe for coöperation with the two cam-ended friction-ribs 25 and 26 on the face of the crank-disk 17, which friction-ribs are of segmental form, and the rib 26 is much longer than the rib 25. The long upper tip of the brake-shoe under the rotation of the crank-shaft wipes the oiling-pad 27, fixed to the bearing-bracket 22. The thrust-rod 20 is hollow and holds oil for the wrist-pin 19.

The movable electrode 29 is provided with a crank-arm 31, connected by rod 32 with the free end of a cam-lever 33, pivoted to the fixed arm 34, projecting from the bearing-bracket 22, as best shown in Figs. 2, 4, and 7. The cam-lever 33 is subject to a spring 35 and has a lateral flange 36, bearing against a cam 37, fixed to the rear end of the armature-shaft, as best shown in Figs. 2 and 4.

Operation and advantages.—By the sprocket 4 and the chain 14 the loose sprocket 15 on the magneto is kept in continuous motion from the engine-shaft. The impelling-spring 23, reacting against the swiveled guide-bolt 21 as its base of resistance, tends to hold the parts subject thereto in the position shown in Figs. 1, 3, and 4 as their normal or idle position, with the crank-pin 19 at or near its lower dead-center. Under the rotation of the loose sprocket 15 its lateral stud 16 comes in contact with the internal lug 18 of the crank-disk 17 and will rotate the crank-disk with the sprocket for a little more than a half-revolution, thereby forcing the spring-impelled parts from their idle position (best shown in Fig. 3) into and slightly beyond the position best shown in Fig. 6. Under this driving section from the sprocket 15 on the crank-disk 17 the spring 23 will be put under considerably-increased tension, and when the crank-pin 19 passes its upper dead-center, as it is shown about to do in Fig. 6, the spring 23 will become instantly operative to throw the crank-disk and the armature forward in advance of the sprocket 15 for the remainder of the revolution in the same direction of rotation and at a speed independent of the speed of the engine. This spring-impelled throw of the crank-disk 17 and the armature 8 is at a speed sufficiently rapid to cause the magneto to generate a current of high electromotive force and render the same available to the igniter-circuit. When the spring-impelled parts are in their normal or idle position, as shown in Figs. 1, 2, 3, and 4, the cam 37 on the armature-shaft acting on the cam-lever 33 holds the movable electrode 29 away from the fixed electrode 28, as shown in Figs. 1 and 2, thereby keeping the igniter-circuit open at that point; but before the spring-impelled parts are brought into tripping position (best shown in Fig. 6) the cam will have rotated far enough to permit the cam-lever spring 35 to have forced the rod 32 and the movable electrode 29 yieldingly upward into tight contact with the fixed electrode 28, thereby closing the igniter-circuit at the electrodes before the impelling-spring 23 is tripped into action, and hence when the impelling-spring 23 is tripped into action the igniter-circuit being closed the generating action will occur under the spring-impelled throw of the armature, and near the limit of said spring-impelled throw of the armature the cam 37 will become operative to pull down the movable electrode 29, thereby opening the circuit and producing the spark in the explosion-chamber of the engine substantially at the instant of maximum generation. It will be seen, therefore, that the impelling-spring 23 not only imparts the quick or generating throw to the armature, but also throws the movable electrode 29 into its open or circuit-breaking position against the tension of the comparatively light cam-lever spring 35. The impelling-spring 23 reacts against the swiveled guide-bolt 21 as its base of resistance on a line which crosses the axis of the armature in each revolution of the crank-disk, and as the bracket 22 is angularly adjustable with the pole-pieces 6, to which it is attached, it follows that the spring's base of resistance may be angularly adjusted, as desired, to vary the time of the tripping of the spring into action, as shown, for example, by dotted lines in Fig. 1, and hence to vary the time of the ignition as may be desired to secure any predetermined lead in either direction of the engine-shaft's motion. The brake-shoe 24, carried by the head of the thrust-rod 20, is so related to the friction-ribs 25 and 26 on the crank-disk 17 that when the spring-impelled parts come into tripping position, as they are shown about to do in Fig. 6, the crank-disk will be free from any braking action, but that when the spring-impelled parts approach the position best shown in Fig. 3 said brake-shoe 24 and said friction-ribs 25 and 26 on the crank-disk will come into contact under considerable friction, thereby stopping the crank-disk and the armature without jar or vibration.

What I claim, and desire to secure by Let-

ters Patent of the United States, is as follows:

1. The combination with an explosive-engine, of an electric generator, an impelling-spring acting intermittently to rotate the movable member of said generator, always in the same direction, at a speed independent of the speed of the engine, an engine-driven trip for setting said impelling-spring under increased tension and tripping the same into action, and a friction-brake operative to stop the spring-impelled parts without jar or vibration.

2. The combination with an explosive-engine, of the magneto having an engine-driven trip loose in respect to the armature-shaft, a crank-disk fixed to the armature-shaft, and having the friction-ribs 25 and 26, the swiveled guide-bolt 21, the thrust-rod 20, pivoted to the crank-pin and working through said guide-bolt, the impelling-spring 23, coiled around said thrust-rod, and reacting against said guide-bolt to impart the spring-impelled throw to said rod, crank-disk and armature, and the brake-shoe 24, carried by said rod and coöperating with the said friction-ribs, on said crank-disk, to stop the spring-impelled parts without jar or vibration.

3. The combination with an explosive-engine, of the magneto having an engine-driven trip, loose in respect to the armature-shaft a crank-disk fixed to the armature-shaft, and having the friction-ribs 25 and 26, the swiveled guide-bolt 21, the thrust-rod 20, pivoted to the crank-pin and working through said guide-bolt, the impelling-spring 23, coiled around said thrust-rod, and reacting against said guide-bolt to impart the spring-impelled throw to said rod, crank-disk and armature, the brake-shoe 24, carried by said rod and cooperating with the said friction-ribs, on said crank-disk, to stop the spring-impelled parts without jar or vibration, and the oiling-pad 27, in position to be wiped by the brake-shoe 25, substantially as and for the purposes set forth.

4. The combination with an explosive-engine, of an intermittently-acting magneto, in the igniter-circuit, having an engine-driven trip, and an impelling-spring for imparting the generating throw to the armature, when released from said trip, at a speed independent of the speed of the engine, the cam-lever 33, the relatively light spring 35, the cam 37, on the armature-shaft, and a connection from said cam-lever 33 to the movable member of the electrode, in the igniter-circuit, substantially as and for the purposes set forth.

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

GEORGE ARTHUR GOODSON.

Witnesses:
ANDREW B. PATTON,
THOMAS F. WEST.