No. 725,644. PATENTED APR. 14, 1903.

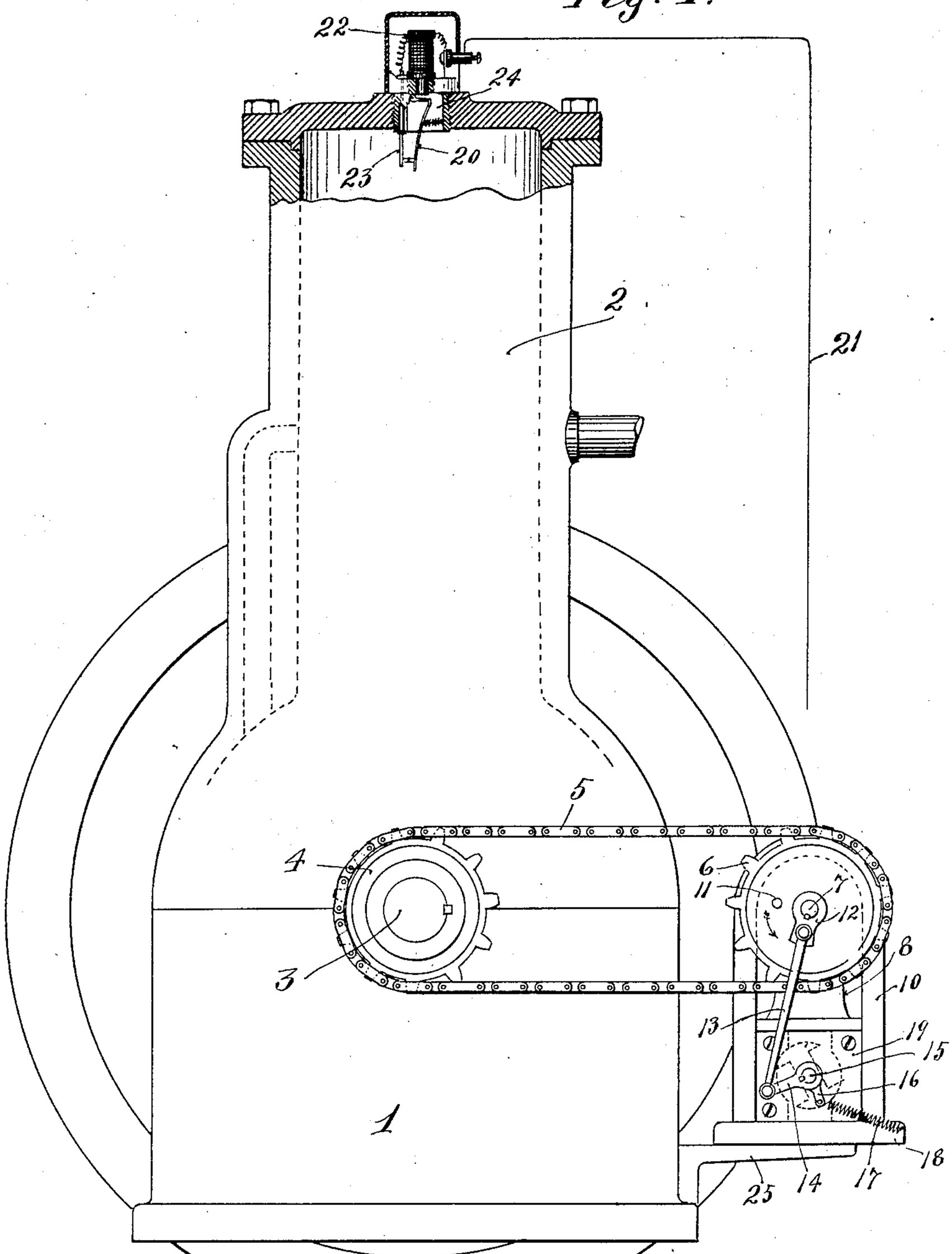
G. A. GOODSON.

ELECTRIC IGNITER FOR EXPLOSIVE ENGINES.

APPLICATION FILED DEC. 26, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
A. H. Opsahl.
H. D. Kilgore

Inventor.
George A. Goodson.
By his Attorneys'
Williamson & Merchant

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4

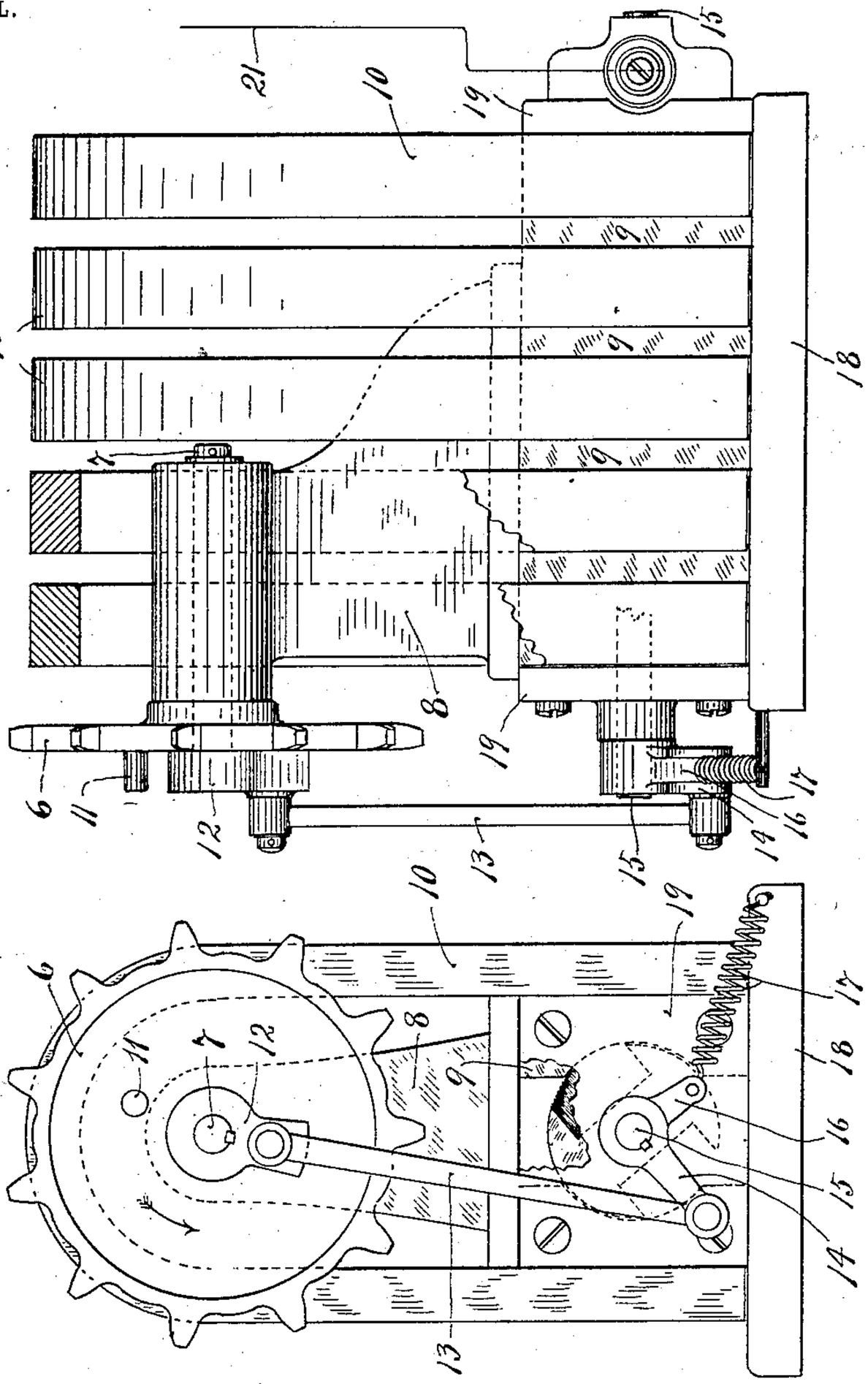
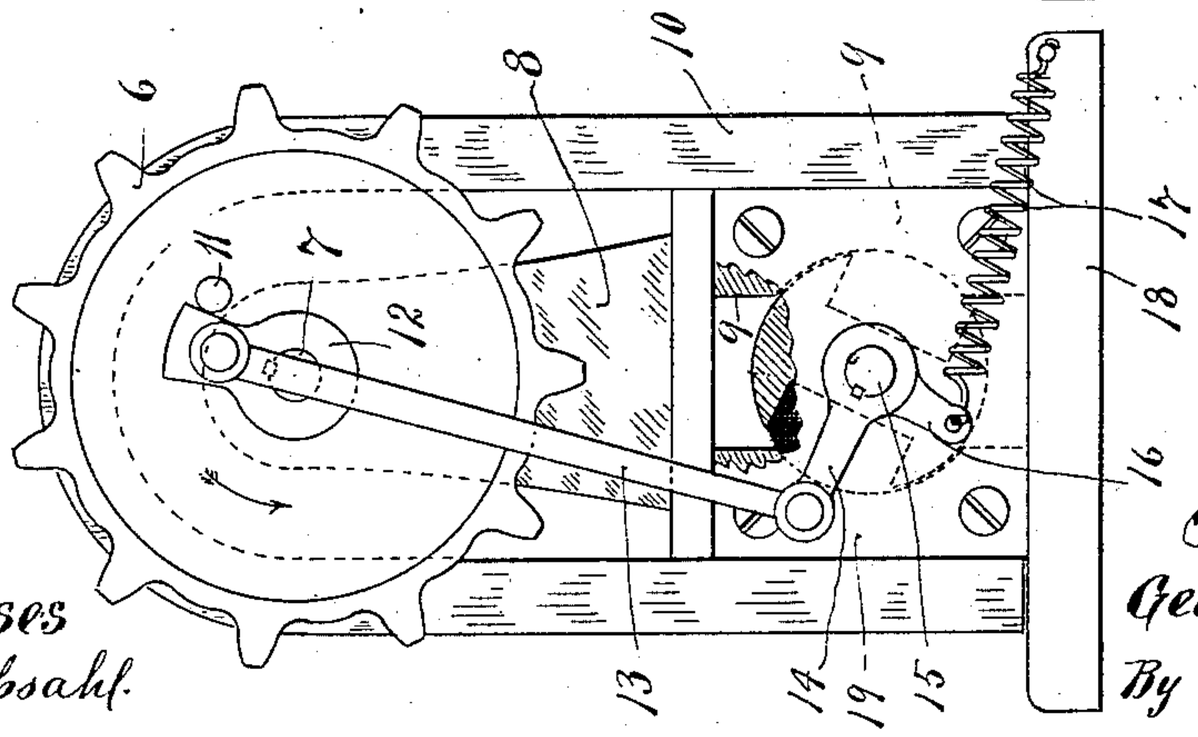


Fig. 2

Fig. 3



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THE NORRIS PETERS CO., PHOTO LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE A. GOODSON, OF PROVIDENCE, RHODE ISLAND.

ELECTRIC IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 725,644, dated April 14, 1903.

Application filed December 26, 1902. Serial No. 136,527. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. GOODSON, a citizen of the Dominion of Canada, residing at Providence, in the 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.

My igniter is of the class wherein a magneto having an intermittent motion applied to its armature is provided for generating the required current; and my invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like notations refer to like parts throughout the several views.

In said drawings, Figure 1 is a view in side elevation, with some parts broken away, showing my improved igniter as applied to an ordinary two-cycle explosive-engine. Fig. 2 is a front end elevation of the magneto detached. Fig. 3 is a view similar to Fig. 2, but with the parts shown in a different position; and Fig. 4 is a side elevation of the magneto detached, with some parts broken away.

The engine being of a well-known type requires no detailed description. It is sufficient to note the base-casting 1, the cylinder-casting 2, and the crank-shaft 3. On the crank-shaft 3, as shown, is fixed a sprocket-wheel 4, connected by sprocket-chain 5 with a sprocket-wheel 6, which wheel 6 is loosely mounted on a shaft 7, that is rotatively mounted in a brass bearing-bracket 8, fixed to the pole-pieces 9 between the magnets 10 of the magneto. The sprocket-wheel 6 is provided on its profile face with a lateral stud 11, located at the proper radial distance from the center of the wheel for contact with a crank 12, which, as shown, is keyed fast to the outer or front end of said shaft 7. The crank 12 is connected by rod 13 with a crank 14, fixed to the armature-shaft 15. The hub of the crank 14, as shown, is provided with another crank-arm 16, to which is attached one end of a spring 17, the other end of which spring is anchored to the base-plate 18 of the magneto. Said base-plate 18, said bearing-bracket 8, and the bearing-plates 19 for the armature-shaft 15 are all made of brass. The bearing-bracket 8 is supported by the upper surfaces of the pole-pieces 9 and is of such height as to bring the shaft 7, the sprocket-wheel 6, and the crank 12 so far away from the active magnetic field of the permanent magnets 8 that the said parts 6, 7, and 12 may be of steel or iron instead of brass.

The magneto is shown in Fig. 1 as supported by a shelf-bracket 25, projecting from the engine-base casting 1. The magneto is of course made securely fast to its supporting-bracket.

One terminal of the armature-winding is brazed or otherwise made fast to the armature-shaft 15 in direct contact therewith, and hence current can pass through the metallic parts of the magneto to the engine-castings, and thereby reach the movable or armature member 20 of the two electrodes or circuit-breaking contacts in the explosion-chamber of the engine. The other terminal of the armature-winding is insulated from the armature-shaft and by the customary means (not shown) leads to a wire 21, which in turn leads, as shown, to a magnet 22 and through the same to the fixed member 23 of the circuit-breaking electrodes in the explosion-chamber. The said parts 20, 22, and 23 are carried by a screw-plug 24, seated in the head of the cylinder-casting 2, and, taken together, constitute a sparking plug wherein the movable member 20 of the two electrodes is in the form of an armature subject to the electromagnet 22, which is directly connected into the igniter-circuit. The magnet 22 is energized at the instant of maximum generation at the magneto, and hence the circuit is broken at the electrodes at the proper time to produce the desired spark to effect the explosion. This sparking plug is identical with the sparking plug disclosed and claimed in my pending application, Serial No. 93,136, filed February 8, 1902.

Operation and advantages: Directing attention now to the especial characteristic features of this magneto and the advantages thereof, let it first be noted that, as shown, the crank 12 is relatively short as compared

with the crank 14 on the armature-shaft. The difference in length between said two cranks 12 and 14 is such that the crank 12 may rotate, while the crank 14 and the armature will only receive a vibratory motion under the rotary motion of the crank 12. Moreover, the throw of the crank 14 and the armature is considerably less than a half-revolution. Let it also be noted that the spring 17 is applied under tension and tends to hold the parts in the position shown in Fig. 2—to wit, with the short crank 12 and the rod 13 on their lower dead-center in respect to each other and with the rod 13 standing at an angle to the armature-crank 14 when said parts are in their idle or normal position. Under the rotation of the engine-driven wheel 6 its lateral stud 11 will come in contact with the crank 12 and rotate the same, with the wheel, for slightly more than a half-revolution, thereby forcing the armature and the parts 12, 13, and 14 away from their normal or idle position (shown in Fig. 2) against the tension of said spring 17, as shown in Fig. 3. Then when the crank 12 and the rod 13 have been rotated by the wheel 6 to a point beyond the upper dead-center of said parts 12 and 13 the crank 12 will be released from the driving action of the wheel 6, and the spring 17 will become operative to throw the crank 12 forward in advance of the wheel 6, but in the same direction, thereby imparting a quick throw to the armature at a speed solely dependent on the tension of the spring 17 and entirely independent of the speed of the engine, and this return throw of the armature is at a speed sufficient to generate the required current. Otherwise stated, the engine-driven part 6, which may be regarded as the primary impelling device, first forces the spring-impelled parts away from their normal or idle spring-held position against the increasing tension of said spring and then releases the same, thereby permitting the spring to restore all of the spring-impelled parts to their normal or centered position. The spring 17, crank 12, rod 13, and crank 14 may be regarded as the secondary impelling devices.

The fact of the construction being such that when the armature and the parts 12, 13, and 14 are in their normal or spring-held position the crank 12 and rod 13 will be on a dead-center in respect to each other and that the rod 13 will stand at an angle to the armature-crank 14 constitutes the radical features of improvement in this magneto, for the reason that in virtue of this construction all the spring-impelled parts will come instantly to a dead stop without shock or vibration. The crank 12 is comparatively light, and as it comes onto a dead-center in respect to the rod 13 as its stopping position it will have no tendency to vibrate. The armature-crank 14 rocks within an arc less than a half-circle, and hence never comes onto a dead-center in respect to the rod 13, and when the parts are in their idle or centered position the armature may be said to be locked against vibration, for the reason that the forces of vibration in the armature must be taken lengthwise of the rod 13, which is then on a dead-center in respect to the crank 12. Hence the armature cannot vibrate after it is brought to a stopping position, and as it is brought to that position under the action of the spring 17 it will stop without jar or pounding action of any kind other than what may be incidental to the lost motion from wear and tear in the connections between the cranks 12 and 14. This is a great advantage in practice. Experience has shown that the vibration or pounding incidental to intermittently-acting magnetos as hitherto constructed has usually been of such a serious character as to prevent their commercial success. Unless properly cushioned by buffing devices the vibration was ofttimes so great that it would so shake the coils of the armature-winding as to destroy the insulation between the wires and to short-circuit the current. The noise incidental to the contact between the driving and the driven parts when such vibration was permitted was also very objectionable. To obviate such difficulties, cushioning or buffing devices have been proposed and employed; but these always added complication and expense and seldom proved satisfactory. They would break and quickly wear out.

By my invention herein disclosed I am able to overcome all the said difficulties without the use of any buffing or cushioning devices of the classes hitherto proposed or employed. In fact, no cushioning or buffing devices whatever are used on my magneto herein disclosed and claimed, and the magneto is simpler in construction and cheaper to make than any hitherto proposed or used wherein an intermittent action was employed. Otherwise stated, my magneto is of such construction that no vibration can occur in any of the spring-impelled parts at their stopping positions, and hence no cushioning or buffing devices are required.

From one point of view it will be seen that the primary impelling device or engine-driven wheel 6 forces the spring-impelled parts away from their dead-center or idle position and then releases the same, permitting said spring-impelled parts to settle back to their dead-center, with the armature locked against vibration, as the normal position of said parts. It follows that the crank 12 instead of having a rotary motion, as shown, might have a reciprocating motion, which could be easily provided for by simply mounting the engine-driven wheel 6 eccentric to the crank 12. Such obvious modification would be within the scope of my invention. In such a modification it would not be necessary for the cranks 12 and 14 to be of different lengths.

It is of course obvious that the engine-driven part 6 is driven in time with the en-

gine-shaft by positive means of some sort, which might be gearing instead of the sprocket wheels and chains shown. It must be equally obvious that the spring 17 might be otherwise applied so long as it was capable of the functions stated, and it will also be understood that instead of the impelling-spring that a suitable fluid-pressure device might possibly be employed.

As the crank 12 is first driven by the stud 11 of the engine-driven wheel 6 and then becomes released therefrom when the parts 12 and 13 pass their upper dead-center, said crank 12 may be called the "trip" or "tripped" crank, and as the crank 14 is on the armature or movable member of the generator it may be called the "generator-crank."

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In an electric igniter for explosive-engines, the combination with an electric generator having a crank on its movable member, of an engine-driven part, a trip-crank, a rod connecting said two cranks, and a tension device tending to hold said trip-crank and rod on a dead-center and said rod at an angle to the generator-crank, when in normal or idle position, with said-named elements so disposed that the engine-driven part will first force said trip-crank and connected parts away from their normal or idle position, against the yielding strain of said tension device, and then release the same, thereby permitting said tension device to restore said parts to their normal position and stop the same without jar or vibration, substantially as described.

2. In an electric igniter for explosive-engines, the combination with an electric generator having a crank on its movable member, of an engine-driven part, a trip-crank, a rod connecting said two cranks, the trip-crank being short as compared with the generator-crank, and a spring tending to hold the movable member of the generator, said two cranks and said rod in their normal or idle position, with the rod and the trip-crank on a dead-center in respect to each other and the rod at an angle to the generator-crank, the named elements being so disposed that the engine-driven part will first force said spring-held parts away from their normal or idle position against the tension of said spring and then release the same, thereby permitting the spring to throw the trip-crank forward in advance of the engine-driven part, and to restore all the spring-held parts to their normal or idle position and stop the same without jar or vibration, substantially as described.

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

GEORGE A. GOODSON.

Witnesses:
H. H. HAY,
H. E. BARLOW.