

No. 847,894.

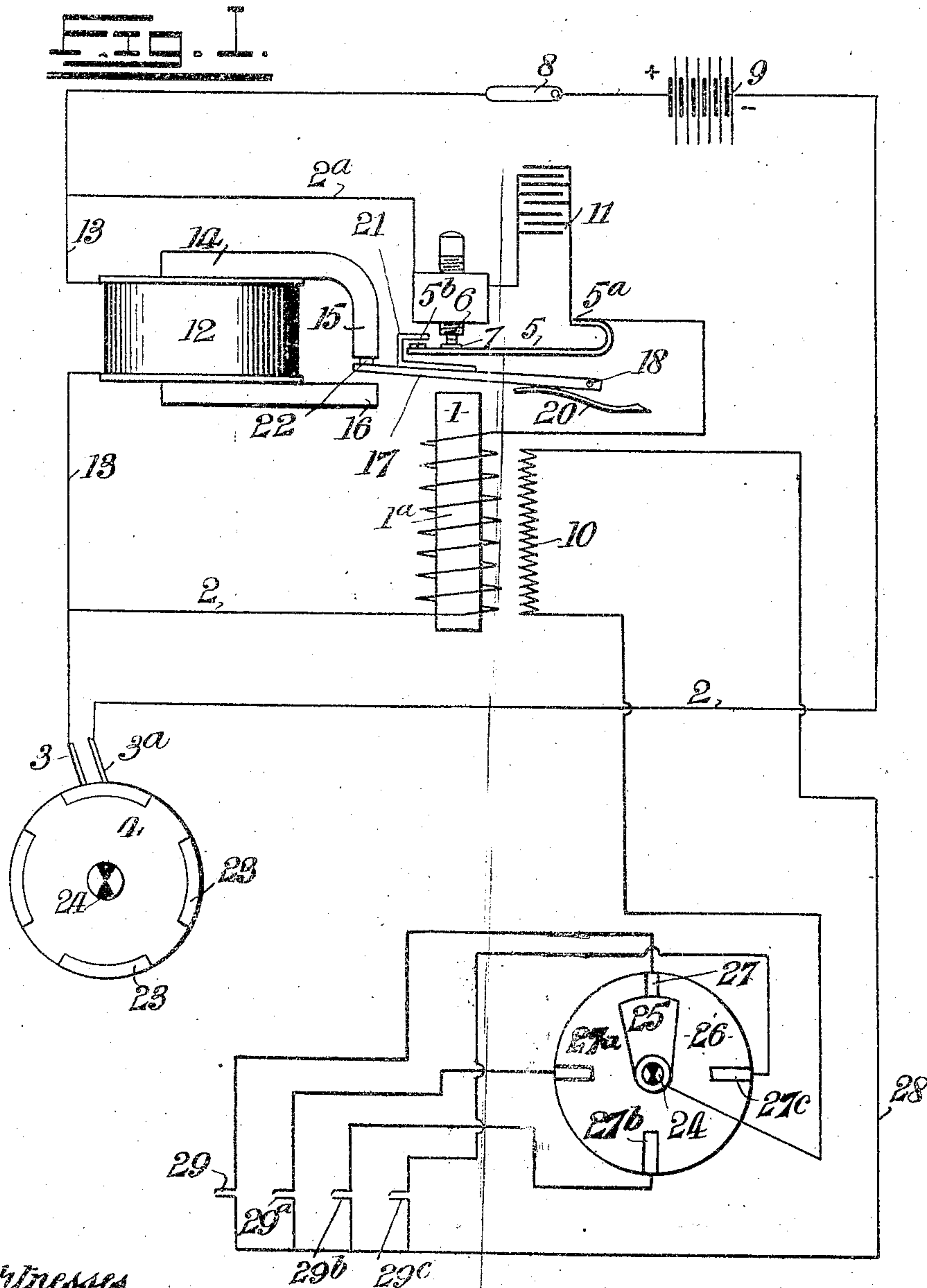
PATENTED MAR. 19, 1907.

E. F. BRADLEY.

SPARKING DEVICE FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED FEB. 2, 1906.

2 SHEETS—SHEET 1.



Witnesses.

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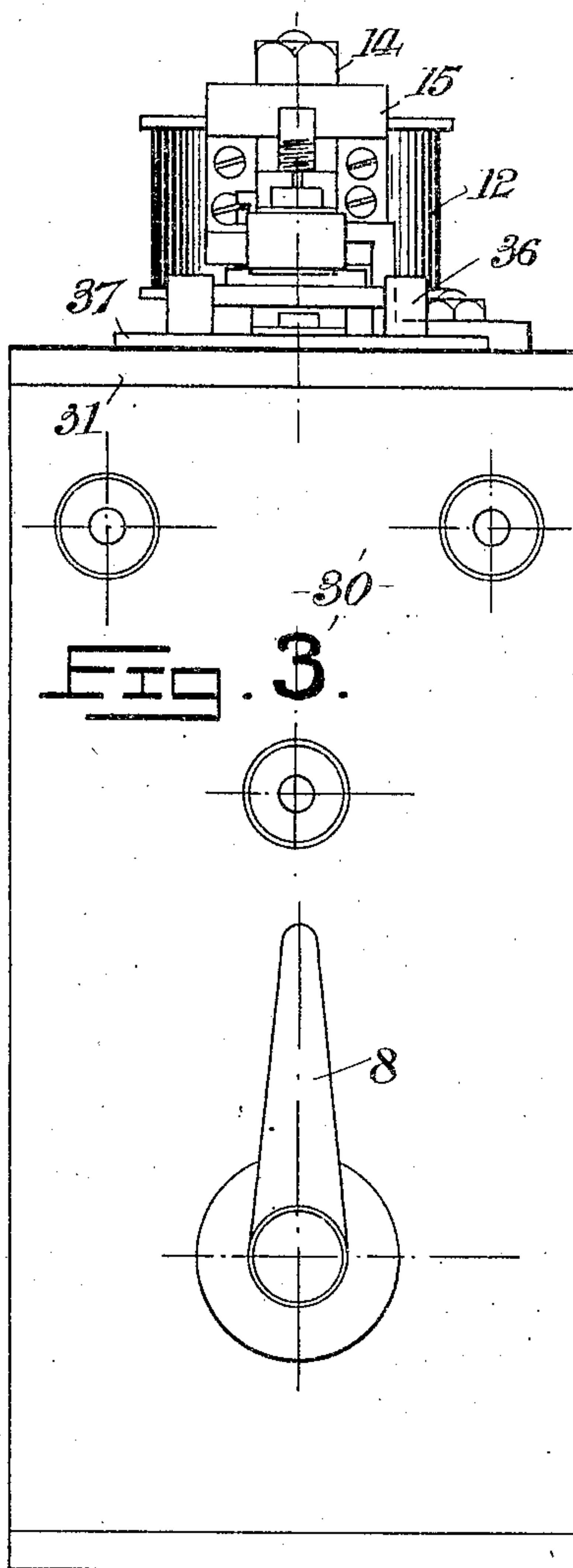
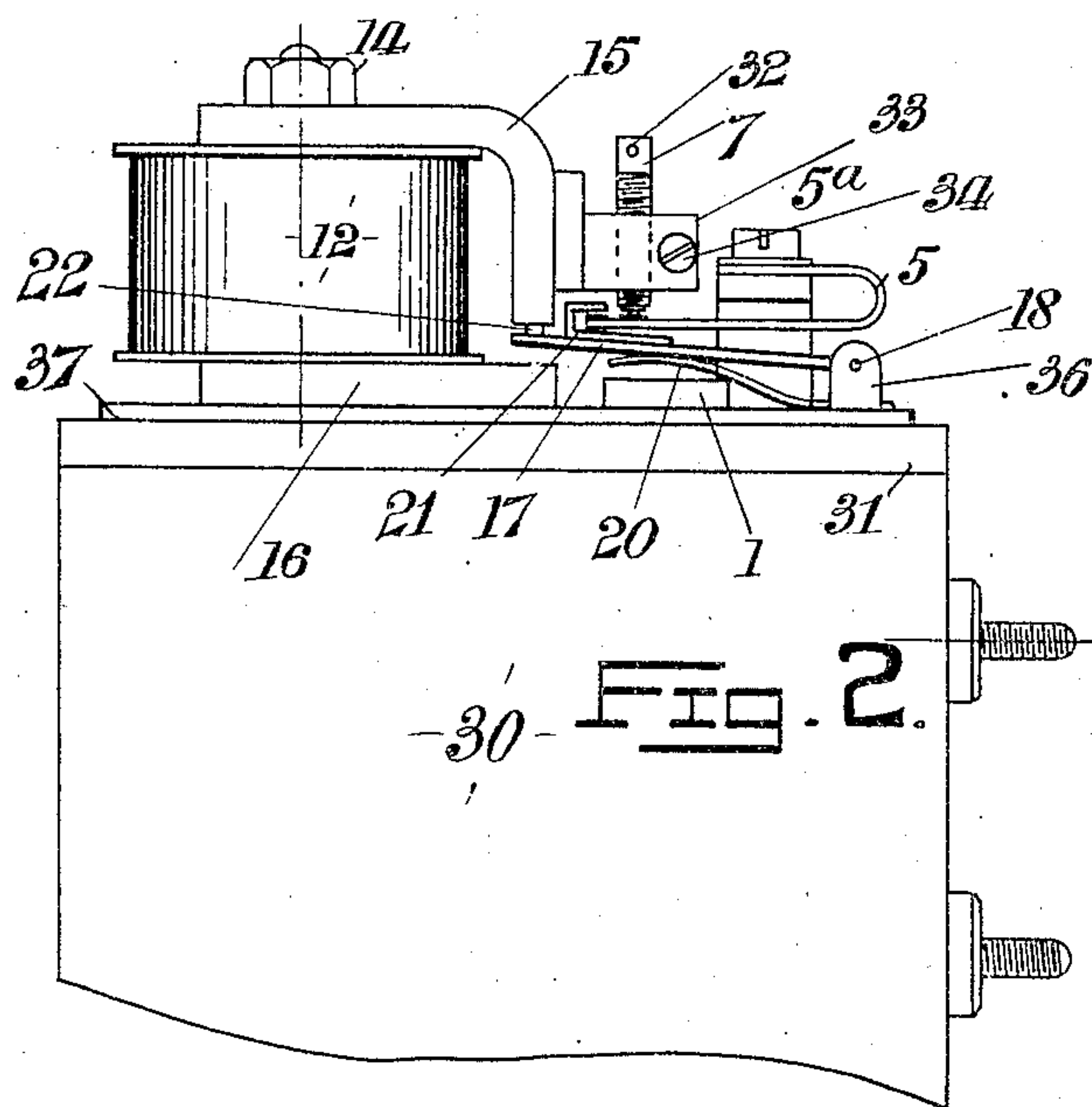
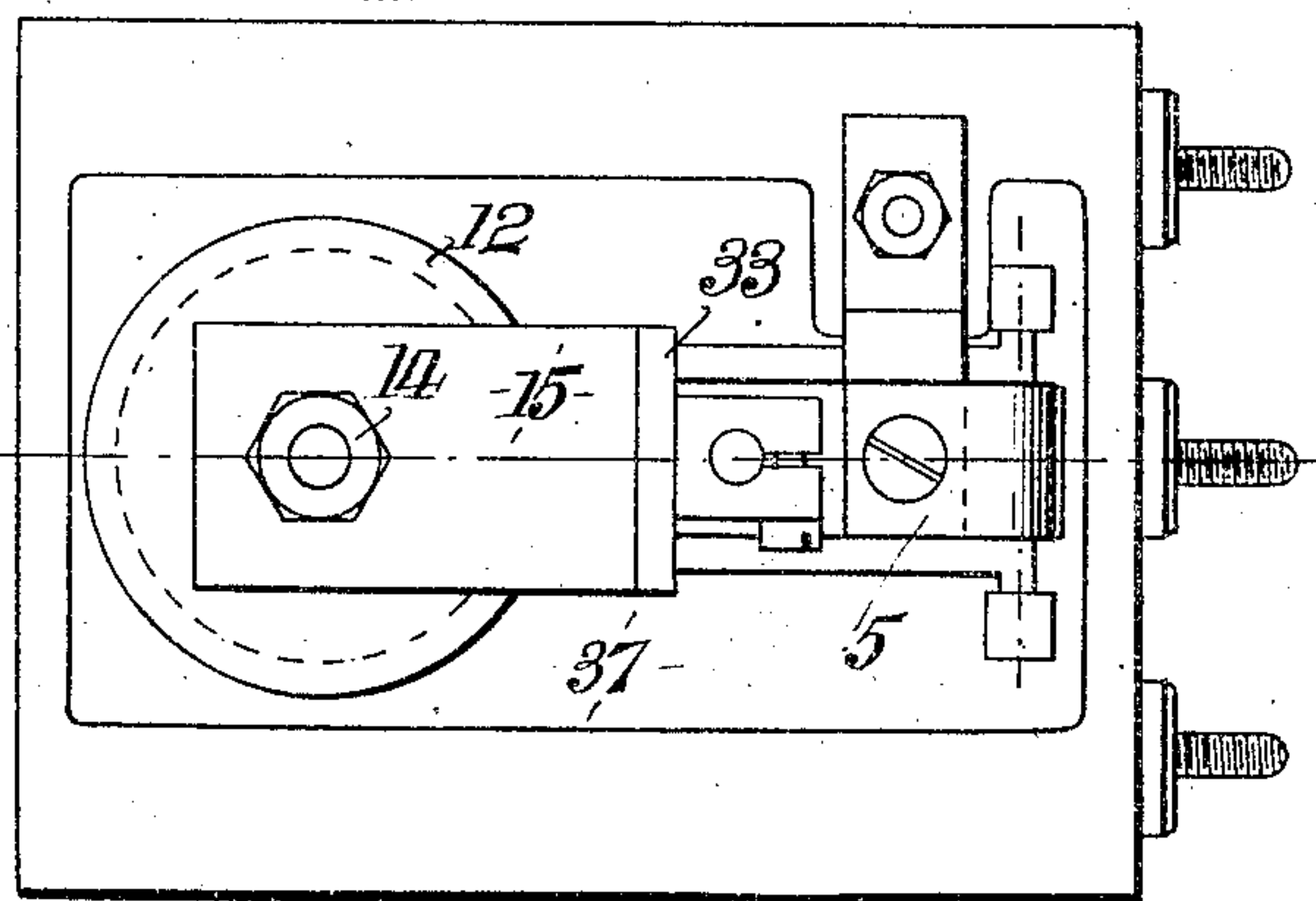


Fig. 4



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UNITED STATES PATENT OFFICE.

EDWARD FRANKLIN BRADLEY, OF TUFNELL PARK, LONDON, ENGLAND.

SPARKING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

No. 847,894.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed February 2, 1906. Serial No. 299,159.

To all whom it may concern:

Be it known that I, EDWARD FRANKLIN BRADLEY, engineer, a citizen of the United States of America, residing at "The Hive," Anson Road, Tufnell Park, in the county of London, England, have invented certain new and useful Improvements in Sparking Devices for Internal-Combustion 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 improvements in sparking-devices, and is specially applicable for firing the charges in internal-combustion engines possessing a plurality of explosion-cylinders. Its chief features are that only a single spark is produced for ignition, making the firing more capable of precision of control and adding to the efficiency of the engine, while the battery energy is economized.

I carry my invention into effect by the employment of a specially-designed electromagnetic switch which is very rapid and certain in action, operating, as it does, both by repulsion and attraction. The current from any convenient source of electrical energy is supplied to the mechanism hereinafter described by a mechanically-operated circuit-closing device attached to or actuated by any moving or rotary part of the engine that energizes an induction-coil to which the switch mechanism is fitted. As usual, the induction-coil has its primary winding connected up in the main circuit and the secondary coil is connected with a distributor with the object of producing a spark in successive cylinders, the moving part of the said distributor being driven or actuated by any convenient moving part of the internal-combustion engine.

To enable, however, my invention to be more fully understood, I will now proceed to describe same, special reference being made to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of the complete system with the connections. Fig. 2 is a front view of the actual apparatus. Fig. 3 is a side view of Fig. 2. Fig. 4 is a plan.

Referring to the drawings, 1 is the core of the induction-coil 1^a. A conducting-wire 2 is led from the primary winding of induction-coil to contact-brush 3, engaging with rotary

contact-plate 4, (see Fig. 1,) which latter is attached to any convenient part of the engine. This coil is in series with spring-plate 5 and platinum contacts 6 and 7, by means of conducting-wire 2^a, with switch 8 to, say, 60 pole of battery 9.

The other pole of battery 9 is connected by wire 2 to a second brush 3^a, placed adjacent to the other brush 3. I bridge a condenser 11 of convenient capacity between the make-and-break contacts 6 and 7, as shown diagrammatically in Fig. 1. In this primary conducting-circuit and in shunt between the platinum contact 6 and brush 3, as shown, I place a comparatively high resistance shunt-coil 12 by conducting-wires 13.

The shunt-coil energizes the electromagnet 14, the upper pole 15 of which is bent over and down, as shown in Figs. 1 and 2, leaving but a small gap between itself and the opposite pole-piece 16. Between the pole-pieces 15 and 16 of electromagnet 14 is placed the tongue or armature 17, of soft iron. This armature is pivoted at 18 and lies immediately over the core 1 of induction-coil 1^a.

A spring 20 tends to keep the armature off the pole of magnet 1. To this armature is riveted a hook 21, which is arranged to catch and pull down the spring contact-plate 5 (screwed and held at 5^a) when under the influence of electromagnet 1, formed by induction-coil 1^a and shunt-electromagnet 14, and at the extremity of the armature I rivet a brass tip 22 on either side to prevent this sticking between the electromagnet-poles.

The rotary contact-plate is formed of any convenient insulating material, such as ebonite, and has contact-plates 23 attached to its periphery or face. These contact-plates are insulated from each other and correspond in number with the number of sparking plugs required and are mounted on shaft 24, driven by any convenient part of the engine.

Any system of distributing current to the sparking plugs may be employed; but in the example shown the contact-arm 25 on shaft 24 moves over stationary plate 26, containing contact-studs 27 27^a 27^b 27^c, which are in connection with sparking plugs 29 29^a 29^b 29^c.

The sparking plugs are connected by a wire 28 with one end of the secondary coil 10 of the induction-coil 1^a, and the other end of the coil 10 is connected by a wire with the

arm 25. The contact-studs of the plate 26 are also connected by suitable wires with the sparking plugs.

In construction (see Figs. 2, 3, and 4) I prefer to mount the coil and condenser in a wooden box 30, as usual, the make-and-break apparatus being on the core 31, as shown, and the platinum contact-screw 7 I prefer to make adjustable. For this purpose the screw is preferably made with a hole 32 for a wrench-bar and is threaded through the body of the split brass nut 33, screwed to electromagnet pole-piece 15. A tightening-screw 34, threaded through the split ends of the nut, enables me to fix the contact-screw permanently, this being needful owing to the vibration of the car when the sparking device is attached to motor-vehicles.

The armature is hinged on a hard-steel pivot 18 between brackets 36 on brass plate 37.

The operation of my invention is as follows: The switch 8 in primary circuit is closed and the contact-brushes 3 just enter into engagement with the plate 23. The current passes from the battery 9, through the switch 8, through the platinum contacts 6 and 7 on spring-plate 5, and thence through the primary of induction-coil winding 1, through contact-piece 23, by conductor 2, and thence back to the battery 9. The induction-coil primary winding is so connected that its polarity is opposite to that of the lower pole-piece 16 of the shunt-coil 12. The passage of the current from the battery also energizes this shunt, and the combined effect of the induction-coil, together with the effect of the shunt-coil, smartly pulls down the soft-iron armature 17 against the action of the spring 20. The brass hook 21 on arma-

ture 17 engages with a bone contact-strip 5^b on spring-plate 5, breaking the circuit between the platinum contacts 6 and 7. The current continuing to pass through the shunt holds down the armature until the contact-plate 23 on commutator-disk 4 has rotated sufficiently to break contact with the brushes 3 3^a. This breaks the primary circuit, allowing the armature 17 to return to normal position, the extra current in the primary of induction-coil being absorbed by condenser 11, which, being bridged between the contacts 6 and 7, also prevents sparking. The contact-arm 26 is so arranged that when one of the contact-pieces 23 on commutator 4 is in contact with the two brushes 3 the said contact-arm is in contact with one of the contact-pieces 27 27^a 27^b 27^c, causing a spark at the plug on breaking the primary circuit.

I claim—

The combination, with an induction-coil, a circuit maker and breaker, and a battery; of a stationary contact 6 and a spring-plate having a contact 7 included in circuit with all the aforesaid parts; a condenser bridged between the said spring-plate and the contact 6, an electromagnet arranged in shunt-circuit with the said coil and the contact 6, a pivoted armature for the core of the said induction-coil having its free end portion arranged between the two pole-pieces of the said electromagnet, and a hook carried by the said armature and engaging with the free end portion of the said spring-plate.

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

EDWARD FRANKLIN BRADLEY.

Witnesses:

HUBERT MURRAY ROGERS,
ALFRED NUTTING.