

G. HONOLD.

SHORT CIRCUITING DEVICE FOR MAGNETO ELECTRIC IGNITING APPARATUS FOR EXPLOSION MOTORS.

APPLICATION FILED AUG. 7, 1906.

993,375.

Patented May 30, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

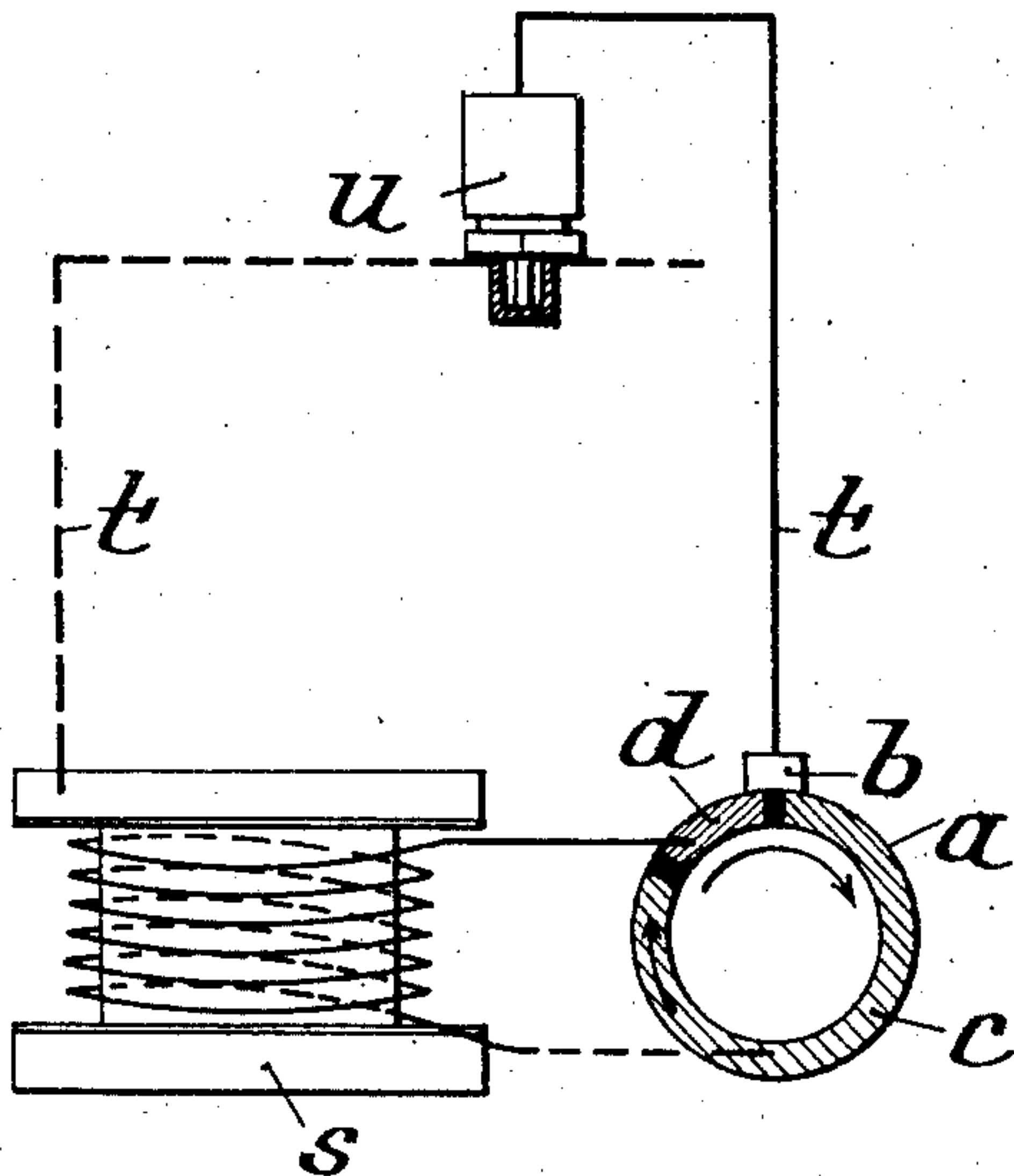
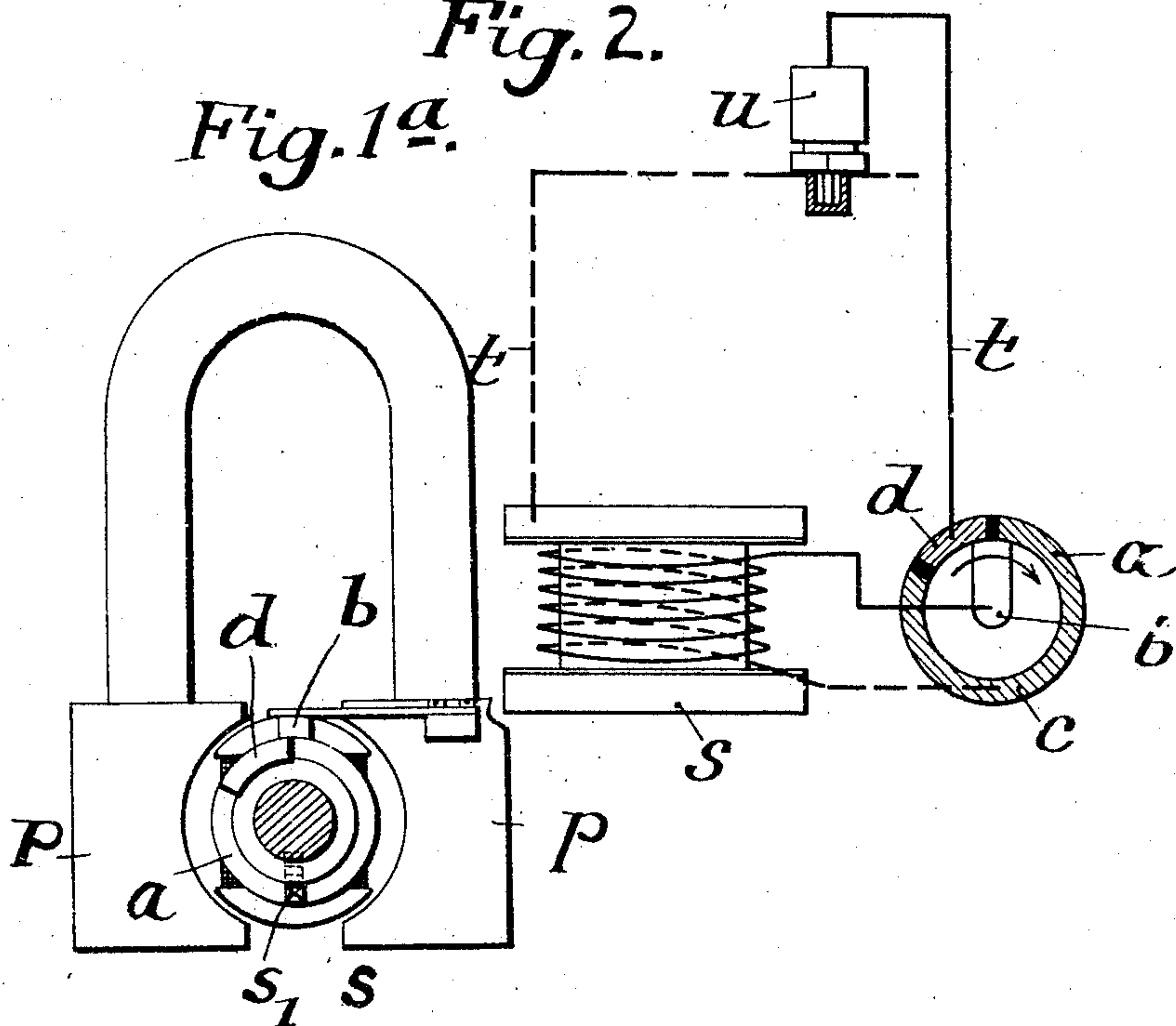


Fig. 2.

Fig. 1a.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3.

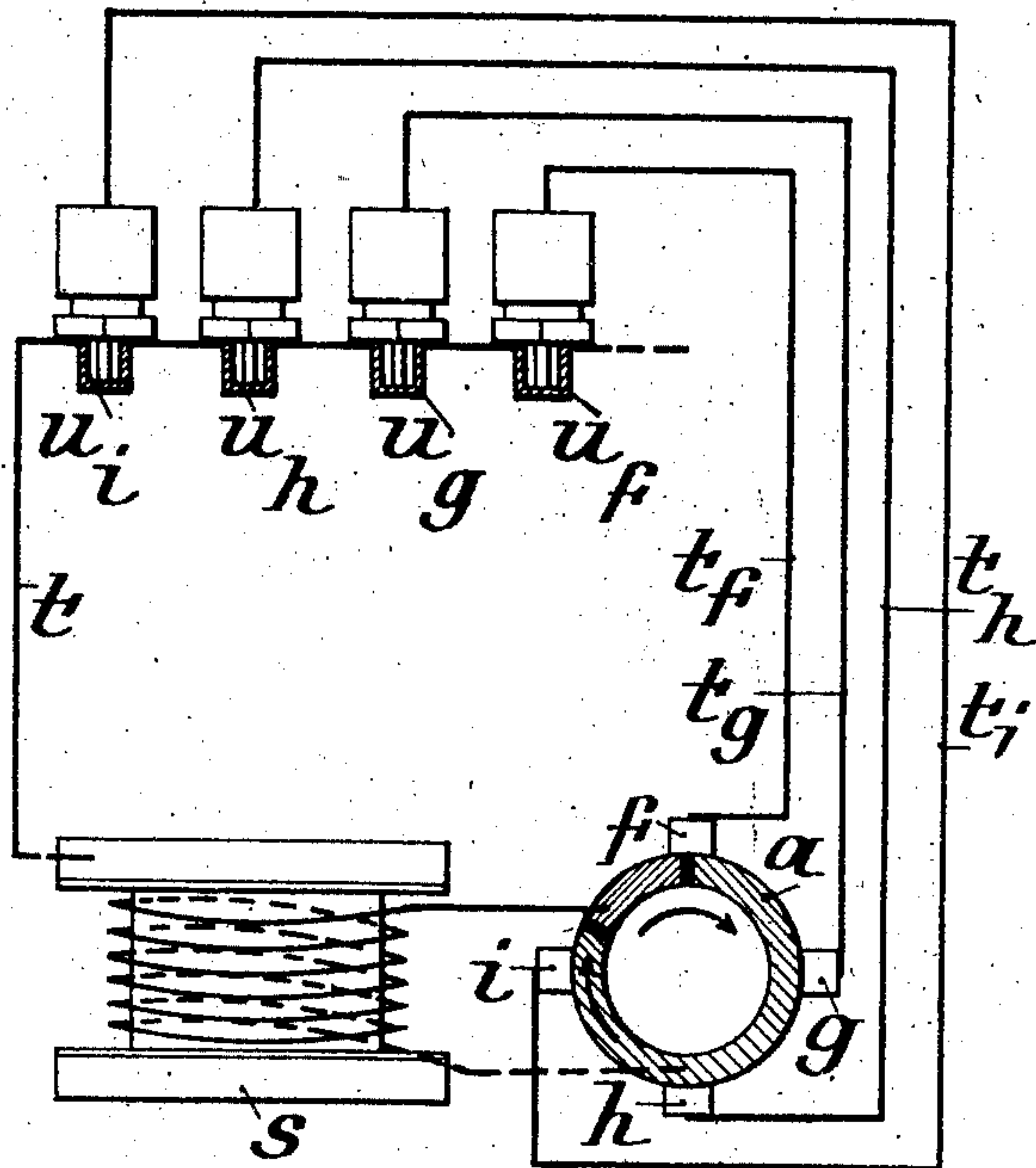
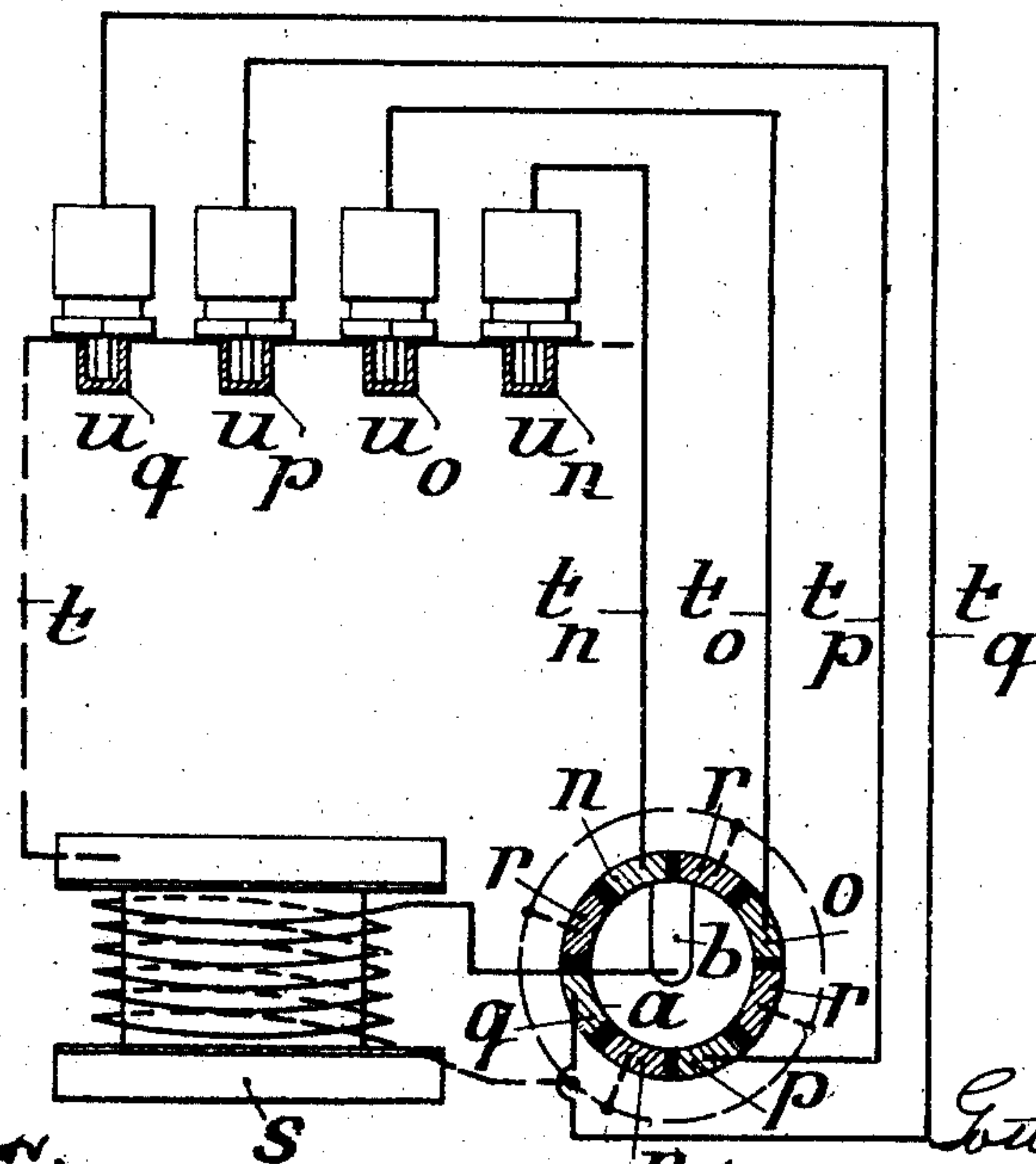


Fig. 4.



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SHORT-CIRCUITING DEVICE FOR MAGNETO-ELECTRIC IGNITING APPARATUS FOR EXPLOSION-MOTORS.

993,375.

Specification of Letters Patent.

Patented May 30, 1911.

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To all whom it may concern:

Be it known that I, GOTTLÖB HONOLD, engineer, a subject of the German Emperor, residing at 11 Hoppenlaustrasse, Stuttgart, Germany, have invented certain new and useful Improvements in Short-Circuiting Devices for Magneto-Electric Igniting Apparatus for Explosion-Motors; 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.

This invention relates to those magneto-electric igniting apparatus for explosion motors in which the armature winding of a current generator is in the first instance short circuited and then, at the moment of ignition is connected to the igniting circuit placed parallel to the short-circuit contacts, so that the increased pressure of the extra current occurs therein.

The invention consists in a device which not only serves for conducting the current from the armature of the generator to the exterior circuits, but also as the means for opening and closing the respective external circuits at the required times, as will be more fully explained hereinafter in connection with the drawings.

Of the accompanying drawings Figure 1 is a diagram showing the connections constituting an embodiment of my invention for such engines in which only one cylinder is employed. Fig. 1^a is an elevation of a generator embodying my invention; Fig. 2 a view similar to Fig. 1 showing a modification suitable for an engine employing only one cylinder. Figs. 3 and 4 are modifications as required where four-cylinder-engines are employed.

Referring to Figs. 1 and 1^a *s* is the armature and *p* the pole pieces of the current generator and *a* is a slip ring, assumed to be fixed on the shaft of the armature, as for example, by a set screw *s'* Fig. 1^a. The two ends of the armature winding are led to the two segments *c* and *d* of the slip ring *a* and the one end is, in addition fixed to the armature body *s*. The spark gap or igniter *u* is connected by means of a conductor *t* between a brush *b* sliding on the slip-ring *a* and the body *s* of the armature. The action will be readily understood from the diagram. It is assumed that the slip ring *a* ro-

tates in the direction of the arrow. So long as the brush *b* is in contact with the segment *c*, the armature winding is open; as soon however as it passes over the first insulating piece between segments *c* and *d* into the position shown in the drawing, the armature is short circuited, and when it has advanced so as to leave the segment *c* and only to contact with the segment *d*, the armature circuit is closed through the igniting circuit. During the first period the armature rotates freely, that is without reacting upon the field magnets (not shown in the diagram). Then, as soon as the brush reaches segment *d* and thus short circuits the armature winding, a very strong electromotive force is induced and finally, when the brush leaves the segment *c*, the current generated by this electromotive force is sent through the igniter *u*. For the sake of clearness the leads connected to the armature body are shown in dotted lines while those connected to the free end of the winding are in full lines.

Fig. 2 shows the same arrangement with the difference that the slip ring is supposed to be stationary and the brush rotating. This does not alter anything in the above described action only the free end of the winding is connected to the brush *b* and the body end with the segment *c* while the spark gap *u* is connected to the segment *d*. This affords the advantage that the short circuiting of the armature is maintained as long as the brush remains in contact with the segment *c* and only ceases when it leaves the latter.

Fig. 3 shows the arrangement for four cylinders. The construction likewise does not differ from the foregoing in its essential features; only in place of a single brush *b* four brushes *f*, *g*, *h* and *i* are provided which are connected respectively to the four spark gaps *u_f*, *u_g*, *u_h* and *u_i*, by means of leads *t_f*, *t_g*, *t_h*, *t_i*. All the spark gaps are connected to a common ground lead *t*. By this means the apparatus not only serves for effecting the necessary short circuitings and interruptions but it also acts as a distributor.

Fig. 4 shows the modifications that are necessary when the slip ring is stationary and the brush revolves. The slip ring is for this purpose divided into eight segments of which every alternate one is marked *r*. These segments *r* are all connected with

each other and with the armature body circuit and the intermediate segments n to q are connected by the corresponding leads t_n to t_q with the corresponding spark gaps u_n to u_q , while these are connected by the common lead t with the body s . The free end of the armature winding is connected to the brush b . The action of this arrangement will be readily understood from the foregoing description, and does not differ from that of Fig. 3. The described arrangement affords the advantage that for taking off the current, for short circuiting the armature and for the distribution of the current only a single brush is required, and this brush always slides on metal with only narrow interruptions of insulating material. By this means it is possible to construct these parts in an exceedingly simple and strong manner, which is of great importance for the reliability of the ignitions.

The moment of ignition may be determined, to some extent, by setting up the parts so that the brush b will occupy a position either to the right or left of the position illustrated in Figs. 1 and 3 so that the igniter will receive current at a different period of the rotation of the ring. In the form shown in Figs. 2 and 4, the same result may be accomplished by shifting the ring annularly, as will be readily understood. This shifting or adjusting of the parts may obviously be accomplished by loosening the set screw s' (see Fig. 1^a), then shifting the ring circumferentially, and then tightening the set screw. Such an adjustment of the moment of ignition must however be so arranged that the moment at which the short-circuiting period commences is not also altered; this must always take place before the occurrence of the maximum pressure. On this account the arrangements at Figs. 2 and 4 offer special advantages because the duration of the short circuiting period is in these cases not dependent upon the width of the brushes.

Having now particularly described and ascertained the nature of my said invention I declare that what I claim is:

50 1. In an electric ignition device, the combination, with an igniter, an electric generator having a rotatable armature winding provided with two terminals, and a permanent connection between the armature winding and one side of the igniter, of a conductor connected to the other side of the igniter, a ring comprising a plurality of contact devices separated from each other by insulation, a brush arranged to contact with the contact devices, means for producing a relative rotation between the brush and the ring, said brush and one of the contact devices being arranged to make an intermittent connection between the aforesaid conductor and one terminal of the armature

winding, the other terminal of said winding being connected to another contact device.

2. In an electric generator, the combination, with an igniter, an electric generator having an armature winding, and a permanent connection between said winding and one side of the igniter, of a ring comprising a plurality of contact devices separated by insulation, a connection between the other side of the igniter and one of said contact devices, a connection between one terminal of the armature winding and another contact device, and a rotatable brush connected to the other terminal of the winding and arranged to travel over and contact with the contact devices.

3. In an electric igniter, the combination, with a plurality of igniters, an electric generator having an armature winding, a permanent connection between said winding and one side of each igniter, and a ring comprising a plurality of contact devices separated by insulation, the alternate contact devices being connected to one terminal of the armature winding, the intermediate contact devices being separately connected to the respective remaining sides of the corresponding igniters, a brush connected to the remaining terminal of the armature winding, and means to produce relative rotation between the brush and the ring, the normally stationary one of the said relatively rotative members being angularly adjustable.

4. In an electric igniter, the combination, with a plurality of igniters, an electric generator having an armature winding, a permanent connection between said winding and one side of each igniter, and a ring comprising a plurality of contact devices separated by insulation, the alternate contact devices being connected to one terminal of the armature winding, the intermediate contact devices being separately connected to the respective remaining sides of the corresponding igniters, a brush connected to the remaining terminal of the armature winding and means to produce relative rotation between the brush and the ring, the face of the brush being of a size sufficiently greater than the width of the insulation to bridge the latter and intermittently connect the adjacent contacts.

5. In an electric igniter, the combination, with a plurality of igniters, an electric generator having an armature winding, a permanent connection between said winding and one side of each igniter, and a ring comprising a plurality of contact devices separated by insulation, the alternate contact devices being connected to one terminal of the armature winding, the intermediate contact devices being separately connected to the respective remaining sides of the corresponding igniters and a rotatable brush connected to the remaining terminal of the

armature winding and arranged to travel over and make contact with the contact device.

6. In an electric igniter, the combination, with a plurality of igniters, an electric generator having an armature winding, a permanent connection between said winding and one side of each igniter, and an angularly adjustable ring comprising a plurality of contact devices separated by insulation, alternate contact devices being connected to one terminal of the armature winding, the intermediate contact devices being sep-

arately connected to the respective remaining sides of the corresponding igniters, and a rotatable brush connected to the remaining terminal of the armature winding and arranged to travel over and make contact with the contact devices. 15

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses. 20

GOTTLOB HONOLD.

Witnesses:

RUDOLF KLEIN,
ERNST ENTENMANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."