

No. 873,954.

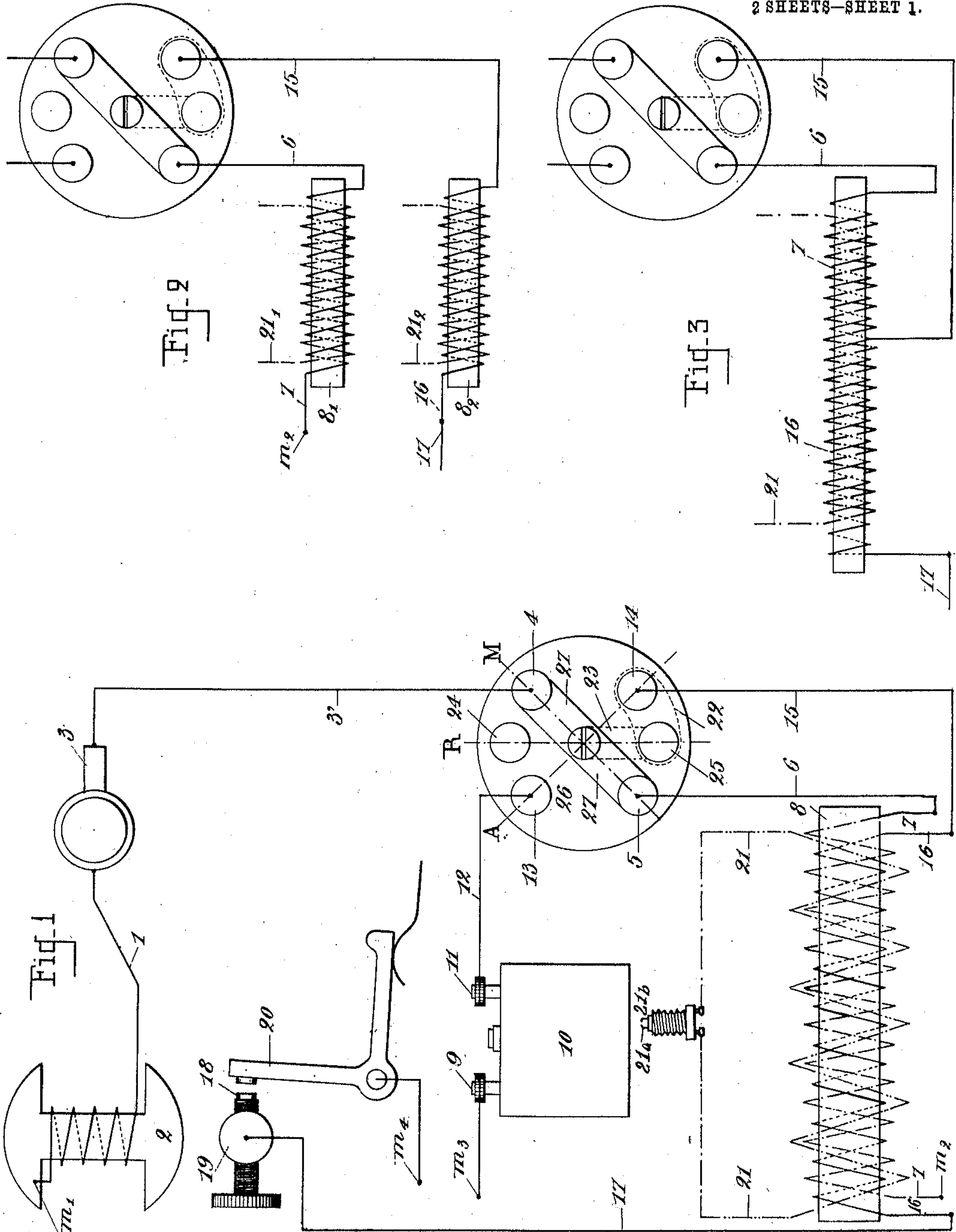
PATENTED DEC. 17, 1907.

A. MICHEL.

SPARKING COIL WITH MULTIPLE WINDING FOR IGNITION AND LIKE PURPOSES.

APPLICATION FILED NOV. 20, 1905.

2 SHEETS—SHEET 1.



Witnesses  
C. Faconprey  
J. B. Charbonneau

Auguste Michel, Inventor,  
By Marion & Marion  
Attorneys

No. 873,954.

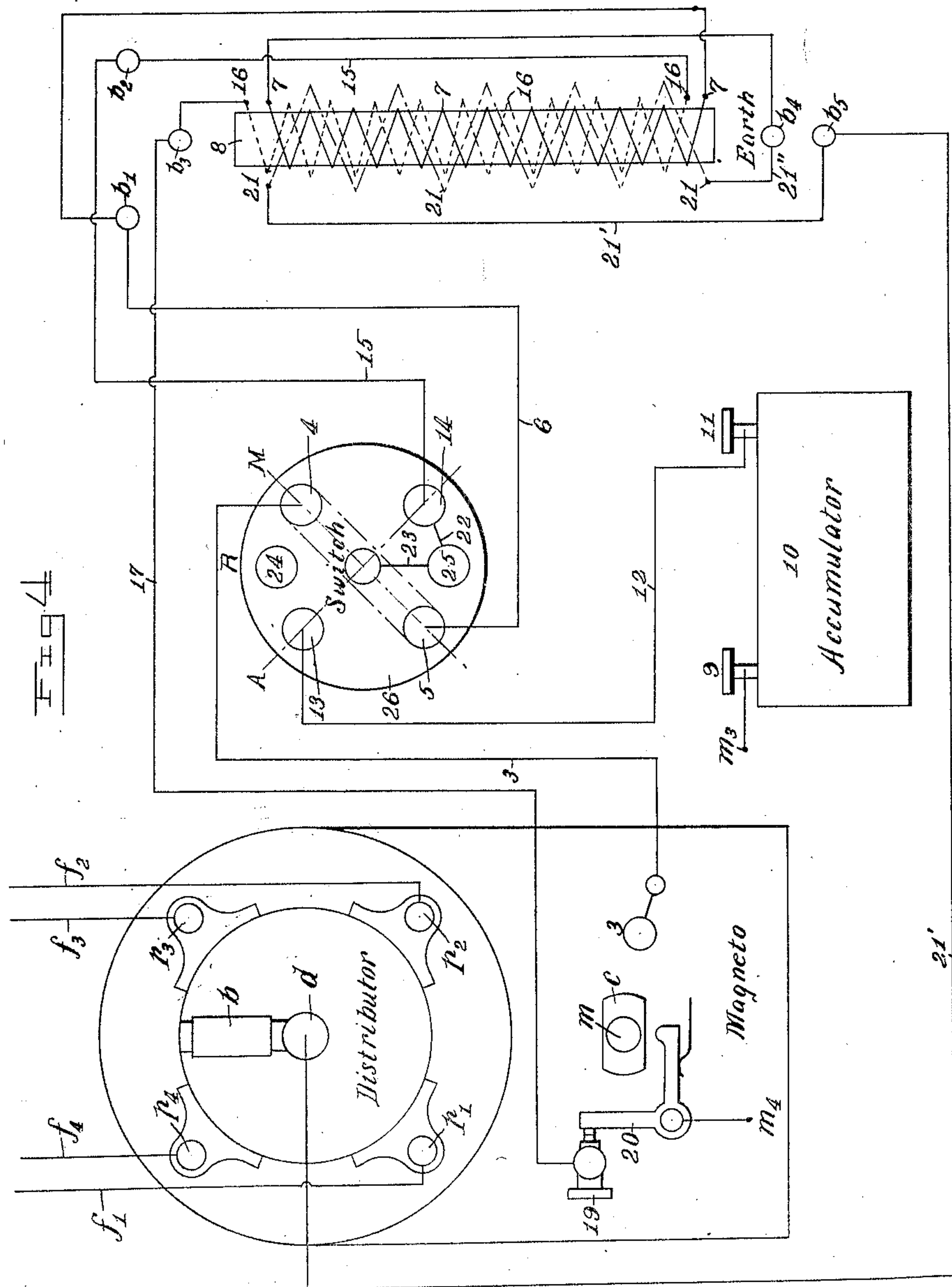
PATENTED DEC. 17, 1907.

A. MICHEL.

SPARKING COIL WITH MULTIPLE WINDING FOR IGNITION AND LIKE PURPOSES.

APPLICATION FILED NOV. 20, 1905.

2 SHEETS—SHEET 2.



Inventor

Auguste Michel

Witnesses

E. A. Panabaker,  
H. A. Robinette,

By

Marion Marion

Attorneys



# UNITED STATES PATENT OFFICE.

AUGUSTE MICHEL, OF PARIS, FRANCE.

## SPARKING COIL WITH MULTIPLE WINDING FOR IGNITION AND LIKE PURPOSES.

No. 873,954.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed November 20, 1905. Serial No. 288,129.

*To all whom it may concern:*

Be it known that I, AUGUSTE MICHEL, a citizen of France, residing at Paris, France, have invented a new and useful Improved Sparking Coil with Multiple Winding for Ignition and Like Purposes, (for which I have obtained a patent in France, No. 355,678, dated June 28, 1905; in Belgium, No. 185,820, July 20, 1905; in England, No. 14,959, July 20, 1905,) of which the following is a specification.

The present invention has for its object a sparking coil with multiple winding, especially devised for the ignition of explosion motors, the said system permitting of the supply of the sparking terminals either by means of magnetos or by means of a source of electric current of any kind.

The essential feature of this system consists in having the primary circuit of the coil formed by means of two windings. The first of these windings is connected at one end to one of the poles of the magneto and its other end is connected to earth. The second winding has one of its ends connected to one of the terminals of the second source of electric current (accumulators, batteries, etc.) and its other end is connected to an interrupter which is also in connection with earth. A suitable switch permits of connecting the coil wound in this manner either with the magneto or with the second source of current.

In order to make the description clearer, the invention is illustrated by way of example in the accompanying drawing.

Figure 1 is a complete diagram of a coil constructed according to the present invention including the connections which it requires. Figs. 2 and 3 are diagrams of modifications of the construction of the said coil. Fig. 4 is a diagrammatical view illustrating my invention applied to an explosive engine.

Referring to Fig. 1, it will be seen that the winding 1 of a magneto 2 is connected on the one hand to earth at  $m^1$  and on the other hand by the interposition of a collector with brush 3 and of a conductor 3' to one of the contacts 4 of a suitable switch 26, the connecting bar 27 of which may occupy one of three positions M, A or R, thereby uniting either the contacts 4 and 5, or the contacts 13 or 14, or the contacts 24 and 25; these latter contacts corresponding to the stopping position of the system because the contact 24 is insulated from any source of electric

current. The contact 5 is connected by means of a conductor 6 to one of the ends of the coil 7 which forms the first primary winding of the coil, 8 being the core. The other end of the winding 7 is connected to earth at  $m^2$ . One of the terminals 9 of the second source 10 of electricity is connected to earth at  $m^3$ , while its other terminal 11 communicates by means of the conductor 12 with the contact 13 of the switch 26. The contact 14 of this switch communicates by means of the conductor 15 with one of the terminals of the second primary winding 16, the other end of which is connected by the conductor 17 to the platinum terminal 18 of the interrupter 19, 20 which is itself connected to earth at  $m^4$ .

A secondary coil 21 of the spark coil has its respective ends connected in the usual way to the terminals 21<sub>a</sub>, 21<sub>b</sub> of any suitable sparking igniter.

The operation of my invention is as follows: When the connecting bar 27 occupies the position M (Fig. 1) which corresponds to the operation with the magneto, the primary circuit is closed through the coil 7 passing by the following points:  $m^1$ , 1, 3, 3', 4, 27, 5, 6, 7,  $m^2$ . On the other hand an auxiliary circuit is closed through the coil 16 passing through the following points:  $m^3$ , 1, 3, 3', 4, 27, 23, 25, 22, 14, 15, 16, 17, 19, 18, 20 and  $m^4$ . This auxiliary circuit is interrupted intermittently by reason of the operation of the contact breaker 19, 20. The sudden interruptions thus caused have the effect of producing in the core 8 variations corresponding to the variations of the magnetic flow, which causes in the winding 7 an additional induced current, which influences in corresponding proportions the current produced in the secondary circuit 21 increasing the sparks at the sparking points. When the handle 27 takes the position A, which corresponds to the working of the second source of electric current the primary circuit is formed through the winding 16 passing through the following points:  $m^3$ , 9, 10, 11, 12, 13, 27, 14, 15, 16, 17, 18, 20,  $m^4$ . The sudden interruptions caused in this circuit by reason of the action of the interrupter 19, 20, cause in the core 8 a flow which gives rise to an induction current in the secondary circuit 21.

It should here be remarked that the connection through earth of the points  $m^1$ ,  $m^2$ ,  $m^3$ ,  $m^4$  can be equally obtained by means of



suitable conductors fixed between these points.

Obviously the method of arrangement of the two primary windings 7 and 16 may be different from that which is shown in Fig. 1, while preserving the principle on which the present invention is based. Thus for instance, the two windings in question might be arranged each upon a separate core, Fig. 2, marked  $S_1$ ,  $S_2$  respectively. To each of these cores there may correspond a secondary winding  $21_1$ ,  $21_2$ , which can act separately or be coupled together. The remainder of the arrangement of the system is not altered thereby nor is its operation. Further the effect of the two primary windings may be attained by means of a single winding divided into two parts. The total number of turns of this single winding is equal to the sum of the turns of the two windings 7 and 16. At the end point of the number of turns corresponding to the winding 7, there is fixed the conductor 15 and at the end point of the winding 16 there is fixed the conductor 17. The conductors 15 and 17 effect on the other hand the connections shown in Fig. 1.

From the above description, it will be understood that my invention provides a compact and efficient construction in which the action of the interrupter 19 and 20 causes self-induction currents, which act to intensify the current induced in the secondary circuit 21 and strongly reinforce the sparks produced at the igniter. Further, the magneto device can be instantly cut out, and any other suitable source of electric energy substituted therefor, such as accumulators or batteries.

Fig. 4 illustrates my invention applied to a gas engine provided with four independent explosion cylinders. In this construction, the secondary circuit terminates on the spindle  $d$  of a suitable distributor provided with a

brush  $b$  which engages successively the four contacts  $p_1$ ,  $p_2$ ,  $p_3$  and  $p_4$ ; such contacts being connected by wires  $f_1$ ,  $f_2$ ,  $f_3$  and  $f_4$  to the igniters of the respective engine cylinders.

The axle  $m$  of the magneto armature carries a cam  $c$ , which engages a spring-pressed interrupter 20 in the primary circuit 16. The sparking coil is placed in any convenient position, and is provided with binders  $b_1$ ,  $b_2$ ,  $b_3$ ,  $b_4$ , and  $b_5$  for its proper connections.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim and desire to secure by Letters Patent of the United States is:

In an electric igniting system, the combination of an igniter and spark coil, a secondary winding on said spark coil connected to said igniter, a primary winding on said spark coil having its respective ends connected to a source of electric energy and to the earth, a second independent primary winding on said spark coil having its ends connected respectively to an independent source of electric energy and to the earth, an interrupter in the earth connection of said second primary winding, and a switch for controlling the connection of each of said primary windings to its source of electric energy, said switch constructed to connect said two primary windings in parallel upon the switch adjustment for connecting the first of said windings with its source of electric energy, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUSTE MICHEL.

Witnesses:

EUGÈNE PICHORN,  
ANDRÉ BORDILLON.