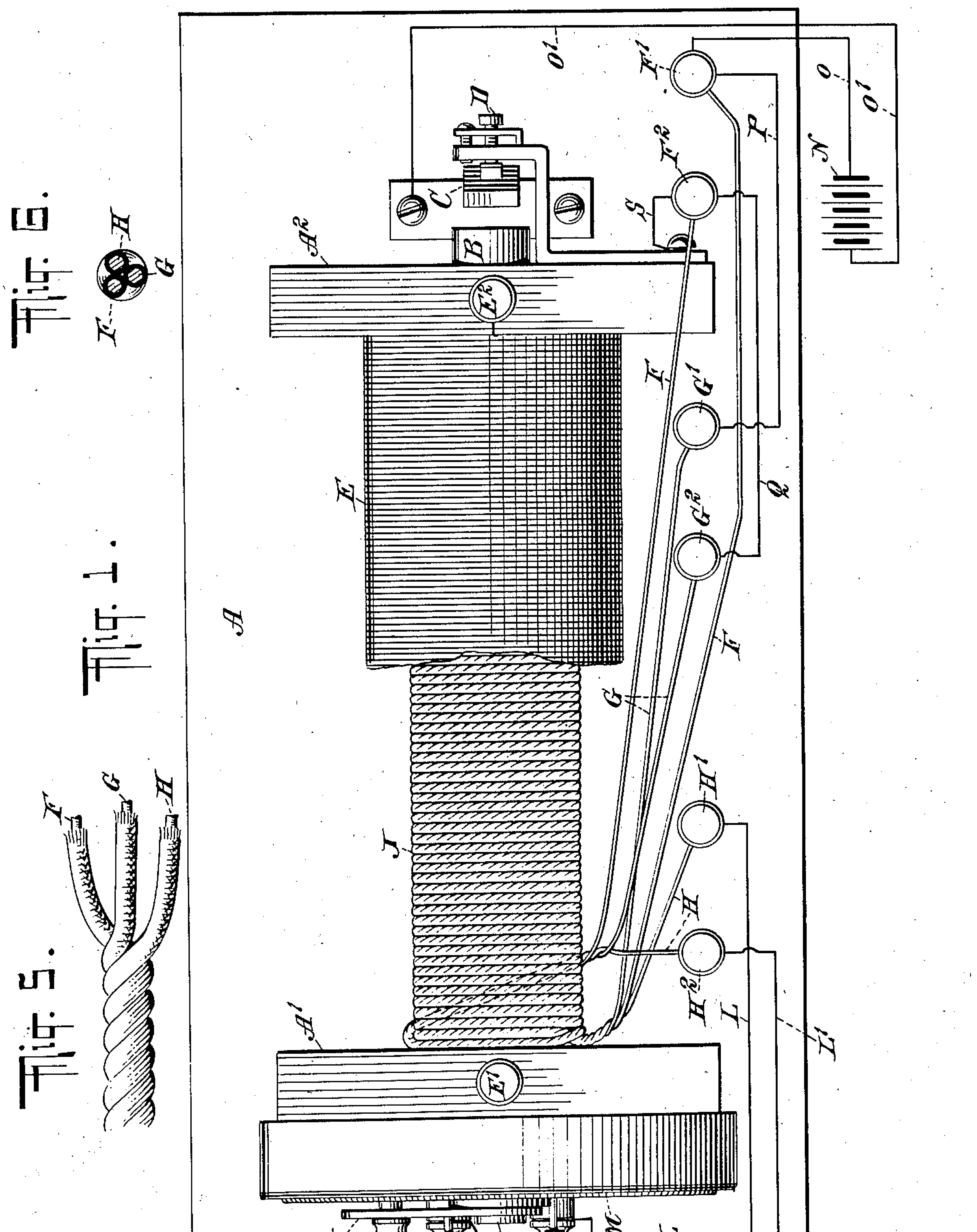
A. E. SINK.

ELECTROMAGNET.

APPLICATION FILED JAN. 26, 1909.

**929,256.** Patented July 27, 1909.

2 SHEETS—SHEET 1.

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ELECTROMAGNET.

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2 SHEETS—SHEET 2.

Fig. 2.

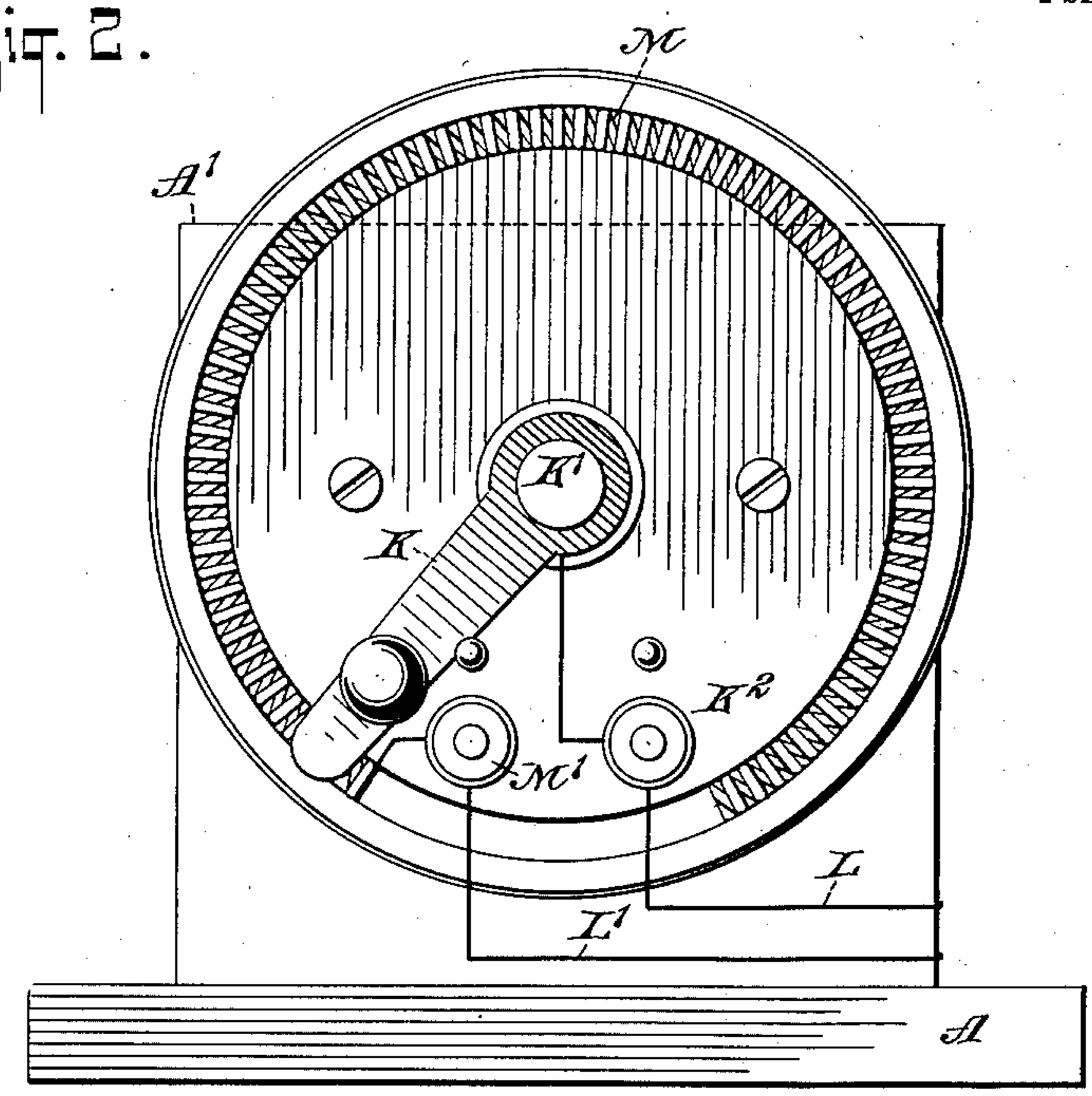



Fig. 3.

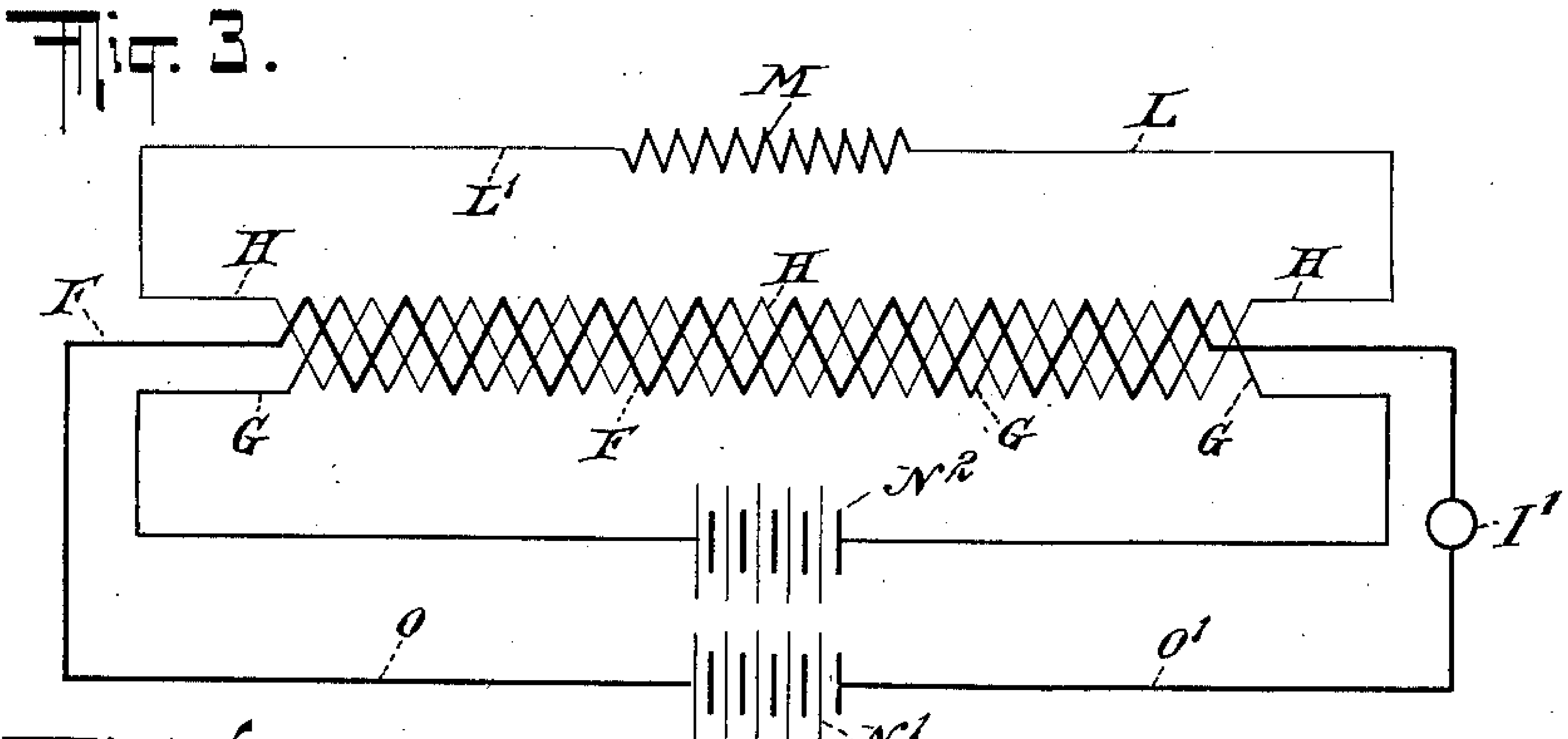
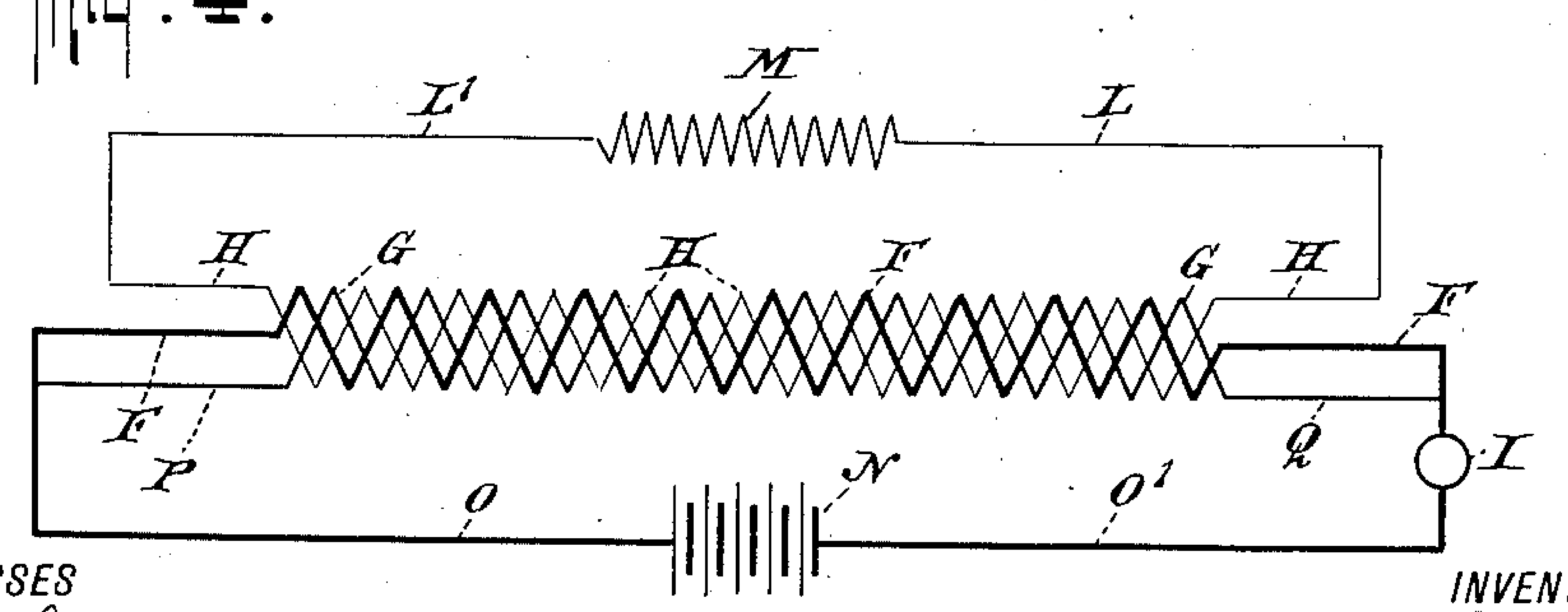



Fig. 4.

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# UNITED STATES PATENT OFFICE.

ALBERT E. SINK, OF NEW YORK, N. Y.

## ELECTROMAGNET.

No. 929,256. Specification of Letters Patent. Patented July 27, 1909.

Application filed January 25, 1909. Serial No. 473,971.

*To all whom it may concern:*

Be it known that I, ALBERT E. SINK, a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Electromagnets, of which the following is a specification.

My invention relates to electromagnets whether of the usual kind having cores, or of the coreless type (solenoid). By a peculiar winding of the coils, as described and claimed hereinafter, I avoid self-induction and the sparking which results therefrom when the circuit is broken.

Reference is to be had to the accompanying drawings in which—

Figure 1 is a plan view of a spark coil embodying my invention, with part of the secondary winding omitted; Fig. 2 is an end view of such coil, Figs. 3 and 4 are diagrams showing two ways of arranging the connections of the primary windings; Fig. 5 shows, upon an enlarged scale, a portion of the intertwined or twisted wire strands used in my invention; and Fig. 6 is a cross section of the composite wire.

A indicates a suitable base with the customary heads A′ A² at the ends of the coils. B is the core projected adjacent to the armature or vibrator C, engaged by the contact screw D. Any other approved construction may be adopted for the interrupter.

E is the secondary winding of the induction coil, having terminals E′ E², and surrounding the primary winding.

So far the construction need not differ from the usual construction of spark coils.

My invention resides particularly in the peculiar winding and its connections, which in the present embodiment are illustrated as applied to the primary winding of the coil. According to my invention, I employ a plurality of strands or windings intertwined or twisted together. In the particular example shown, the primary coil consists of three separately insulated strands or windings F, G, H, twisted together longitudinally as shown in Fig. 1 and more clearly in Figs. 5 and 6, the composite wire or cable thus produced being wound to form the primary winding J in the same manner as if it were a single strand of insulated wire. The ends of the strand F are connected with the binding posts or terminals F′, F²; those of the strand G with terminals G′, G²; and those of the strand H with the terminals H′, H². One of the strands, for instance H, is connected in series with a resistance or rheostat, to form a closed circuit therewith. In Figs. 3 and 4 the rheostat is indicated diagrammatically at M. In Figs. 1 and 2 I have illustrated a particular construction of such rheostat, which comprises a conducting handle K, mounted to swing about the center K′ and connected with a binding post K² from which a wire L leads to the terminal H′. This handle engages a bare resistance coil M, arranged in the arc of a circle whose center is at K′; adjacent windings or turns of this coil are not in contact with each other. One end of the coil M is connected with the binding post M′, from which a line L′ leads to the terminal H². The other strands, F and G are connected with a source of electricity. In Figs. 1 and 4, the two strands F and G are connected in parallel with the same source of electricity, such as a battery N. The position of the interrupter is indicated diagrammatically at I in Fig. 4. In detail, the connections may be as follows (Fig. 1): A wire O leads from one pole of the battery to the terminal F′ which in this case is connected with the terminal G′ by a wire P. The terminals G² and F² are connected by a wire Q, and a wire S connects the terminal F² with the contact screw D (through the medium of the usual metallic parts). The armature or vibrator C is connected with the other pole of the battery by a wire O′.

The wires P, Q are readily removable so that other connections may be made if desired. For instance, as indicated in Fig. 3 I may connect the strands F in series with a battery N′ and an interrupter I′ and the strand G in a separate circuit with a battery, N², this latter circuit being simply a charging circuit; I find that the addition of such a charging circuit apparently increases the strength of the current induced in the secondary coil E this current being sparkless, or practically so.

My invention is applicable wherever a magnetic or induction effect is desired and the current for producing this effect varies, whether such current simply fluctuates or is entirely interrupted at times as in the examples shown. With my invention I avoid the disturbing and detrimental effect of the self-induction arising when the current condition changes. The strand (H) which is connected with the (variable) resistance (M) acts inductively to throttle or neutralize the electromotive force generated by self-induction within the active or charged portion (F, G) of the composite primary coil, whenever the current flowing therein varies, or specifically, is interrupted and restored. The longitudinal twisting or intertwining of the individual strands brings them to different relative positions at different points of their length, thus producing the neutralizing effect mentioned above.

The electromotive force produced in the inductively charged circuit (H, M) when a current is flowing through the other circuit or circuits (whether they are connected in parallel as in Figs. 1 and 4, or operated separately as in Fig. 3) acts in direct opposition to the electromotive force of self-induction produced in the active circuit or strands (such as F and G). This neutralization is obtained without detracting from the magnetizing power of the active portion (F and G) of the composite coil, provided the resistance of the inductively charged circuit (H, R) is equal to or exceeds within reasonable limits, that of the charged circuits (F and G).

It will be understood that the number of strands intertwined or twisted together may be varied without departing from the nature of my invention as defined in the claims. The invention has been described in connection with the primary coil of an induction apparatus, but may be used for electric motors and dynamos, telephones and in general any apparatus using coils and exposed to detrimental self-induction.

I claim as my invention:

1. An electromagnet coil provided with a composite wire comprising a plurality of insulated strands intertwined longitudinally, said composite wire being wound to form a coil, and a resistance in closed circuit with one of said strands.

2. An electromagnet coil provided with a composite wire comprising a plurality of insulated strands intertwined longitudinally, said composite wire being wound to form a coil, and a variable resistance in closed circuit with one of the said strands.

3. An electromagnet coil provided with a composite wire comprising a plurality of insulated strands twisted together and forming a body which is approximately circular in cross section, said composite wire being wound to form a coil, and a resistance in closed circuit with one of said strands.

4. An electromagnet coil provided with a composite wire comprising a plurality of insulated strands twisted together and forming a body which is approximately circular in cross section, said composite wire being wound to form a coil, and a variable resistance in closed circuit with one of said strands.

5. An electromagnet coil provided with a composite wire comprising a plurality of insulated strands intertwined longitudinally, said composite wire being wound to form a coil, a resistance in closed circuit with one of said strands, and means for supplying a varying current to the remaining portion of the composite wire.

6. An electromagnet coil provided with a composite wire comprising a plurality of insulated strands intertwined longitudinally, said composite wire being wound to form a coil, a variable resistance in closed circuit with one of said strands, and means for supplying a varying current to the remaining portion of the composite wire.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALBERT E. SINK.

Witnesses:
JOHN LOTKA,
F. F. KIRKPATRICK.