

No. 851,467.

PATENTED APR. 23, 1907.

F. W. WOOD.
MEANS FOR PREVENTING SPARKING.

APPLICATION FILED JAN. 2, 1907.

FIG. 1.

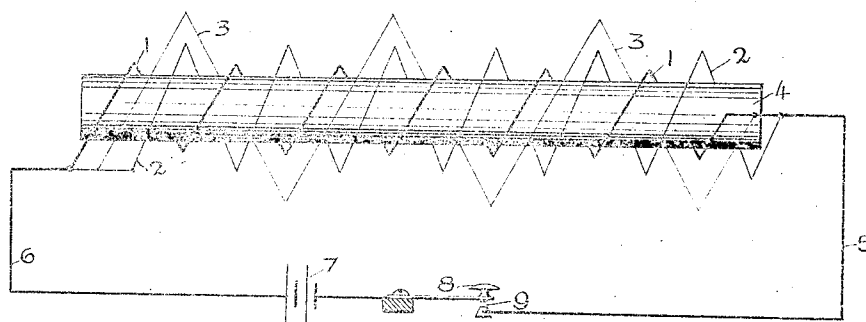
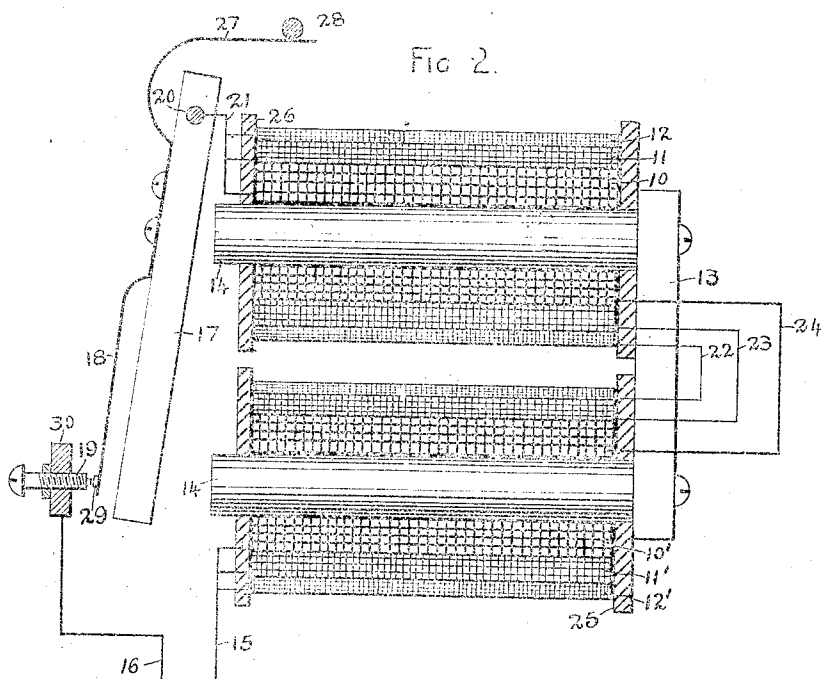


FIG. 2.



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MEANS FOR PREVENTING SPARKING.

No. 851,467.

Specification of Letters Patent.

Patented April 23, 1907.

Application filed January 2, 1907. Serial No. 350,390.

To all whom it may concern:

Be it known that I, FRANK W. WOOD, a citizen of the United States, residing at Newport News, in the county of Warwick and State of Virginia, have invented new and useful Improvements in Means for Preventing Sparking, of which the following is a specification.

My invention relates to means for preventing sparking, and more particularly to means for preventing the sparking incident to opening a circuit containing inductive coils, such as electromagnets.

My invention permits of a wide application, but is especially useful in connection with the electromagnets of vibrating bells, buzzers and the like, in which the circuit is made and broken frequently. Heretofore such apparatus has been subject to rapid deterioration due to the burning away of the contact points between which the circuit is interrupted. By the use of my invention, these deleterious effects are in large measure prevented. I accomplish this result by the means hereinafter described, and illustrated in the accompanying drawings, in which:—

Figure 1 is a diagrammatic view illustrating the principle of my invention. Fig. 2 is a view in partial section illustrating the use of my invention in connection with an ordinary vibrating bell.

Referring to the drawings in detail, my invention consists, as shown in Fig. 1, in constructing an electromagnet by winding on the core, 4, thereof, a plurality of windings, in this case shown as three, 1, 2, 3, all connected in multiple. The windings are preferably arranged in superposed layers (see Fig. 2) and are so proportioned as to contain different numbers of turns or convolutions, and also different ohmic resistances.

As shown, I prefer to make the inner winding of a greater number of turns, but having a less ohmic resistance than either of the outer windings, by reason of its being wound with a larger wire. The second winding has preferably a greater number of turns than the third, and a less ohmic resistance. This can easily be accomplished by a proper selection of wire, and occurs all the more readily for the reason that the outer convolutions, being of larger diameter, have a greater ohmic resistance per convolution.

The operation is as follows: Upon depressing key 8, closing the circuit at 9, current from battery 7 flows out over lead 3. The

current then divides, and flows through the three windings in inverse proportion to their resistances. Thus it will be seen that the inner winding comprises the greatest number of ampere turns, the middle winding a lesser number, and the outer winding the least number. Then, upon opening the circuit at 9, the collapse of the lines of force through the several coils will cause a sudden, momentary electromotive force to be induced in them, as is well known. It will be observed, however, that, although in the same direction, these induced E. M. F.'s, will, as a consequence of the arrangement above described, be of different values, that in winding 1 being the greatest. The consequence is that the E. M. F., in winding 1 will predominate over those of 2 and 3 and kill them, and, instead of the discharge from winding 1 taking place across gap 9, it will take place through windings 2 and 3, forcing current through them in a direction opposite to that of their own E. M. F.'s.

The above is believed to be the correct theory. Whatever it may be, however, experiment has demonstrated that a magnet wound as above described shows a marked tendency to prevent sparking. It may be stated in this connection that with my arrangement of windings, I have been able to operate vibratory bells on a 110 volt circuit, without destructive sparking, a result hitherto not attained. In Fig. 2 I have shown my invention embodied in such a bell. The magnet consists of the usual cores 14, and yoke 13, associated with suitable washers 25, 26, for holding the coils. The armature 17, pivoted adjacent the pole-pieces at 20, carries a spring 18, provided with a tail 27, taking against a pin 28, whereby the armature is returned. The spring 18, at its forward end, is provided with the usual platinum contact 29. This co-operates with the platinum pointed screw, 19, carried in a post 30, all as well known. The bell clapper may be carried either by an extension of the pin 20, as shown in my prior patent No. 716,301, granted December 23, 1902, or in any other desired manner. The windings consist of the six superposed coils, 10, 11, 12, 10', 11' and 12' of decreasing numbers of turns and increasing resistance from the center, outward. The current, entering at 16, flows along the spring 18, and armature 17, to pin 20, and over wire 21, where it divides through the three coils 10, 11 and 12, then flows over

wires 22, 23, and 24, through coils 10', 11', and 12', and out at 15. By this arrangement, the spark at 20, with a low voltage battery in circuit, is rendered almost negligible.

As is obvious, wide variations may be made, both in the number and arrangement of the coils, and in their relative resistance, the essential features being that the coils be connected in multiple, and that they be of different numbers of turns.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:

1. An electromagnet provided with a plurality of windings of different ohmic resistance, permanently connected in multiple, and wound in the same direction.
2. An electromagnet provided with a plurality of coils permanently connected in multiple, said coils containing different numbers of turns, and the magnetic effect of each being added to that of the others.
3. An electromagnet provided with a plurality of coils, permanently connected in multiple, both the ohmic resistance and number of turns of each coil being different from every other coil, said coils being so arranged that current flows through them in the same direction.
4. An electromagnet provided with a plu-

rality of coils connected in multiple, the ohmic resistance of each coil varying from that of the next, and the number of turns in each coil, also varying, but in inverse order.

5. An electromagnet provided with a plurality of superposed windings, wound in the same sense and connected in multiple the resistance of each winding varying progressively, the convolutions of each winding also varying progressively, but in inverse order.

6. An electromagnet provided with inner, intermediate, and outer windings; the inner winding having the greatest number of turns, but the smallest ohmic resistance.

7. An electromagnet provided with inner, intermediate, and outer windings, connected in multiple, the inner winding comprising the greatest number of turns.

8. An electromagnet provided with inner, intermediate and outer windings, the resistance of each winding varying progressively, the convolutions of each winding also varying progressively, but in inverse order.

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

FRANK W. WOOD.

Witnesses:

J. GRANVILLE METERS,
 CHERYL M. SRECHER.