No. 770,432. PATENTED SEPT. 20, 1904.

T. B. KINRAIDE.

HIGH POTENTIAL INDUCTION COIL.

APPLICATION FILED MAY 25, 1904.

NO MODEL.

Fig. 1.

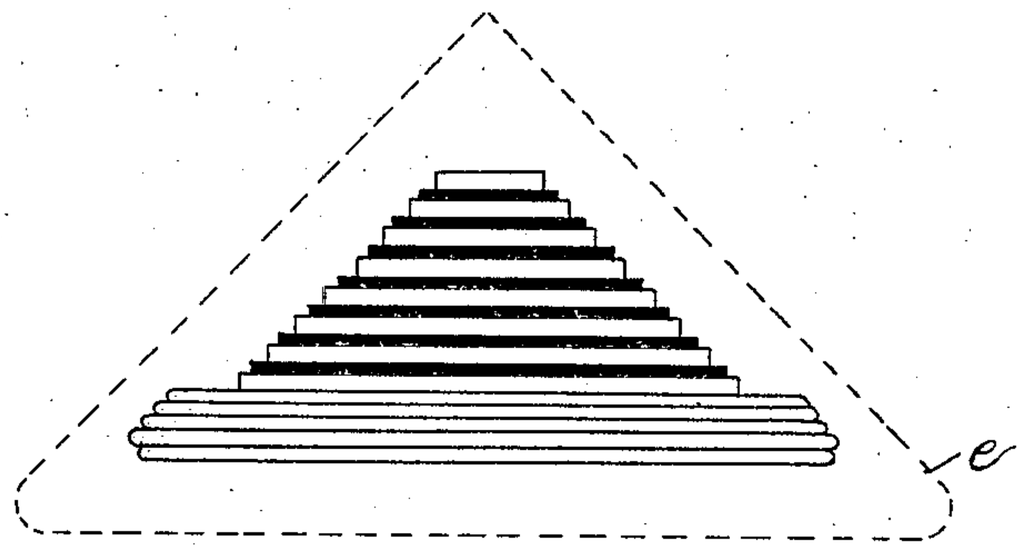


Fig 2.

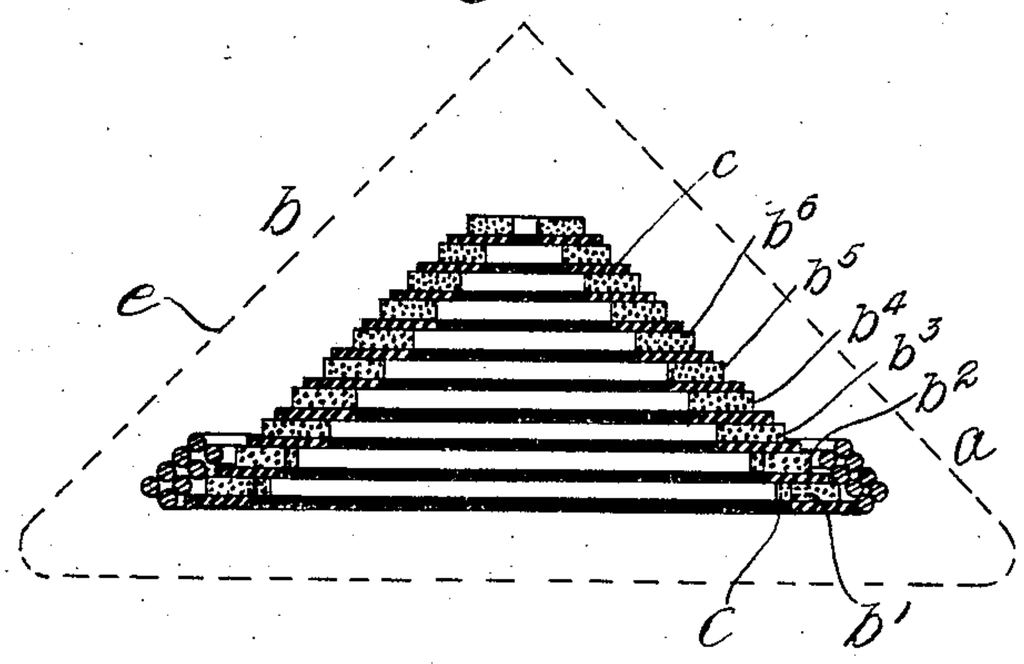
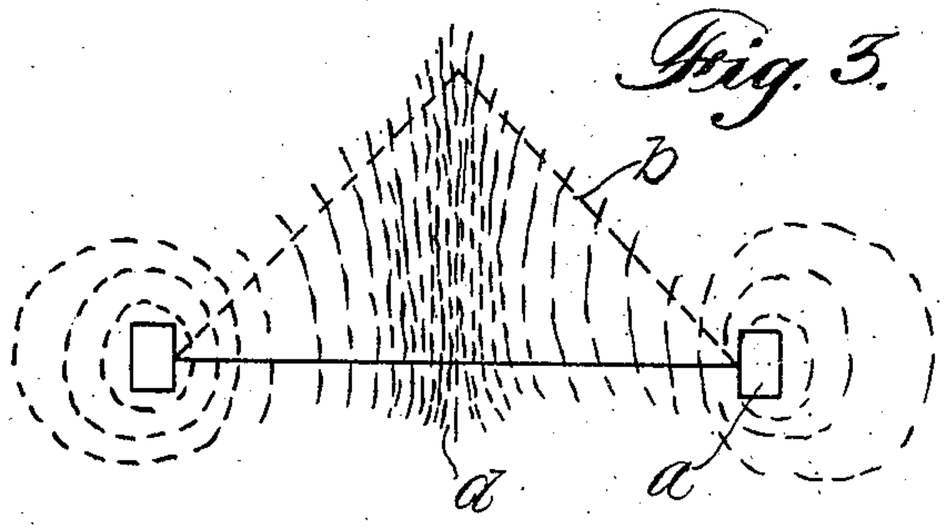


Fig. 3.



Witnesses:—
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No. 770,432. Patented September 20, 1904.

UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

HIGH-POTENTIAL INDUCTION-COIL.

SPECIFICATION forming part of Letters Patent No. 770,432, dated September 20, 1904.

Application filed May 25, 1904. Serial No. 209,684. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, a citizen of the United States, residing in Boston, in the county of Suffolk, State of Massachusetts, have invented an Improvement in High-Potential Induction-Coils, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention is an improvement in that kind of apparatus which I have patented heretofore and whose advantages and purposes are set forth in my Patent No. 615,653, dated December 6, 1898, the present invention having for its object the provision of means for greatly increasing the efficiency and capacity of the coil.

One of the main objects of my special kind of coil as outlined in the aforesaid patent is to obtain a unidirectional discharge or high voltage at the center, and for this purpose the turns are made successively shorter as they recede from the surrounding primary, or, in other words, the coil is helical for providing the constantly-decreasing resistance per turn, and in my present invention I avail myself of the same principle of construction, having, however, provided means for rendering it feasible to employ coarse wire of many turns, whereby the coil has low resistance, and hence higher frequency and higher voltage. I accomplish this object by winding the coil in the form of a cone, so that the windings overlap each other and gradually approach the center. When the windings are in a flat coil, it is obvious that the extent of wire is limited to that number of turns whose aggregate diameters of wire equal the diameter of the coil, because each turn must necessarily be within the adjacent turn, whereas by building the coil in the form of a cone it is possible to have the successive layers or turns overlap the preceding layers or turns and yet be successively shorter sufficiently to insure a unidirectional flow of the current or a tendency of the current to flow in one direction, due to the constantly-decreasing resistance of the successive portions of the coil.

My invention will be further explained as to its construction, operation, and advantages in connection with the accompanying drawings, in which I have shown one embodiment of my invention, and the latter will be more particularly defined in the appended claims.

In the drawings, Figure 1 is a view in side elevation of the preferred embodiment of my invention. Fig. 2 is a vertical cross-sectional view thereof. Fig. 3 illustrates diagrammatically certain advantages thereof.

It will be understood that in the drawings I have not undertaken to show the complete mechanical embodiment or to illustrate the construction of the coil itself.

A coarse primary *a* of one or more turns is provided at the base of the coil, and from said base the secondary *b* is wound, being preferably wound in successive ring-like layers, the largest being indicated at *b'* at the base of the coil and thence extending diagonally upward, as indicated at b^2 b^3 b^4 b^5 b^6, &c., these successive layers being supported by insulator-rings *c*. This construction permits each successive turn or layer of secondary wire to overlap the preceding layer, and yet each successive layer is shorter, and therefore has less resistance, than the preceding layer. For example, b^2 overlaps *b'* and is overlapped by the layer b^3, so that although each layer may thereby have the same number of turns yet these turns can be composed of coarser wire than would be the case if all the layers were in the same flat plane with the layer *b'*. Also this construction brings the entire mass of secondary within the saturated field *d* of force, as indicated diagrammatically in Fig. 3. The decreasing resistance of the turns maintains the highest potential at the center, and the overlapping of the turns, and hence employment of coarse wire, still further decreases the resistance of the successive turns, so that the frequency and voltage are extremely high. The resistance of any secondary when operated from a condenser determines the frequency of the coil, and by my invention, which permits the employment of coarse wire, the resistance is reduced to a minimum. The angle or pitch of the cone will vary according to the conditions and purposes of use, and

ordinarily the coil will be inclosed in a suitable jacket and incased in wax, as indicated by the dotted line *e*.

My invention is capable of a wide variety of embodiments and an extended field of usefulness, being specially adapted for use wherever exceedingly high frequency is desired without liability of breaking down under severe usage.

While the employment of a long coarse-wire secondary wound as explained is of great value and an important feature of my invention, I do not restrict myself thereto, as the conical arrangement is of advantage for many purposes with fine wire, nor do I limit the invention except as otherwise required in the claims to the particular shape shown.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An induction-coil whose secondary is composed of a plurality of overlapping sections successively shorter as they recede from the primary.

2. An induction-coil having its secondary composed of a plurality of successively shorter sections of greater aggregate width than the diameter of the coil, thereby decreasing the resistance, for affording very high potential.

3. An induction-coil having a conical secondary.

4. An induction-coil comprising a primary and secondary, the latter having its successive sections, toward the center, of decreasing resistance, and having a plurality of the longer sections directly adjacent the primary.

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

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
R. S. FORD.