

No. 649,788.

Patented May 15, 1900.

H. E. WILLIS.  
INDUCTION COIL.

(Application filed Feb. 14, 1900.)

(No Model.)

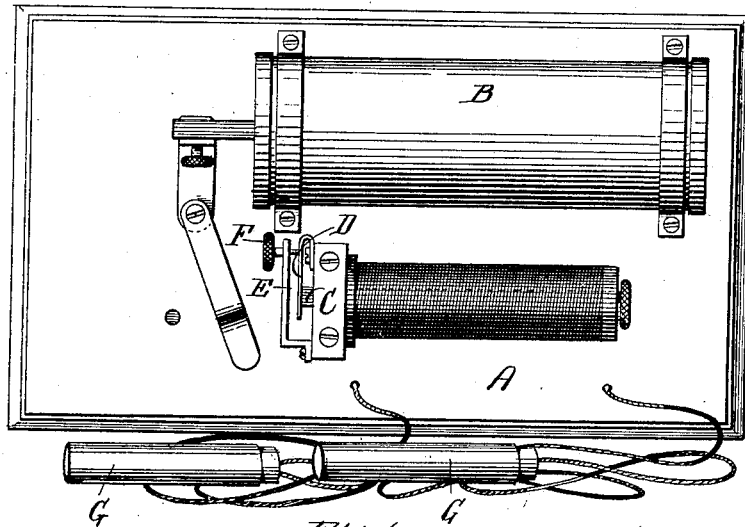


Fig. 1.

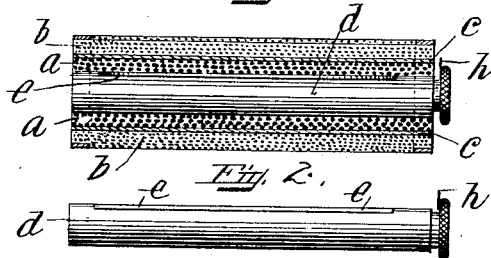


Fig. 2.

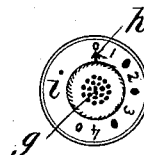


Fig. 3.



Fig. 4.

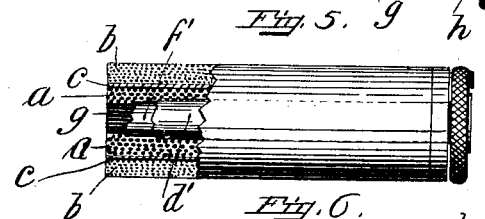


Fig. 5.

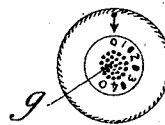


Fig. 6.

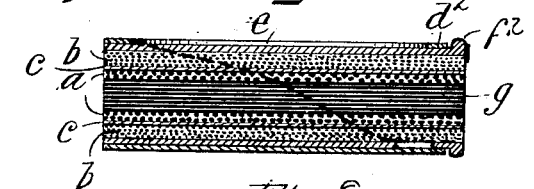


Fig. 7.

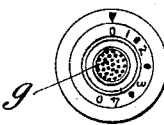


Fig. 8.

Witnesses:  
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C. L. Jenkins

Inventor:  
Halle E. Willis,  
by N. L. Frothingham,  
his Attorney.

# UNITED STATES PATENT OFFICE.

HALLE E. WILLIS, OF LEBANON, NEW HAMPSHIRE, ASSIGNOR TO KENDRICK & DAVIS, OF SAME PLACE.

## INDUCTION-COIL.

SPECIFICATION forming part of Letters Patent No. 649,788, dated May 15, 1900.

Application filed February 14, 1900. Serial No. 5,151. (No model.)

*To all whom it may concern:*

Be it known that I, HALLE E. WILLIS, a citizen of the United States, residing at Lebanon, in the county of Grafton and State of New Hampshire, have invented a certain new and useful Improvement in Induction-Coils, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to an improvement in that class of induction-coils more commonly known as "medical" coils, although it is obvious that it is adapted for use in connection with induction-coils generally and devices of like character.

The invention has for its object to provide a simple and efficient means for regulating or controlling the amount of the current induced in the secondary coil; and the invention consists in providing an induction-coil with two tubes of magnetic insulating material placed one about the other, the said tubes having cut-away portions between their ends, one of said tubes being adapted to be rotated or revolved about the other; and the invention further consists in providing said coil with an index and pointer to indicate the relative position of the tubes, substantially as I will proceed now more particularly to set forth and finally claim.

Referring to the drawings, Figure 1 is a plan view of my preferred form of induction-coil with battery electrically connected therewith, including vibrator. Fig. 2 is a side view of the slotted tube containing inner tube and core, the primary and secondary coils being shown in section. Fig. 3 is a right-hand end view of the coil. Fig. 4 is a side elevation of the slotted tube containing inner tube and core. Fig. 5 is a side elevation of inner tube with core, showing also end elevations. Fig. 6 is a modification. Fig. 7 is a right-hand end view of Fig. 6. Fig. 8 is a further modification, and Fig. 9 is a right-hand end view of Fig. 8.

Like letters of reference refer to like parts throughout the several views.

A denotes the induction-coil; B, the battery; C, the armature; D, the vibrating contact-spring, and E an arm carrying the con-

tact-screw F. The ends of the primary coil are connected with the terminals of the battery in the usual way, the parts C, D, E, and F, constituting a vibrator, being included in the circuit, and the ends of the secondary coil are connected with the handles G G in the usual way.

*a* denotes the primary coil, *b* the secondary coil, and *c* the insulating material between the primary and secondary coils.

*d* is a stationary brass tube slotted, as at *e*, between its ends and almost its entire length, and *f* is an inner tube or shell, with a portion of its body cut away between its ends, as shown in Fig. 5, and surrounding the iron core *g* and adapted to be rotated or revolved within the tube *d*.

*h* is an index or pointer carried by the rim or head of the tube or shell *f*, and *i* the outer end of the bobbin of the coil, provided with the numerals "1" to "4," inclusive.

The mode of operation of the above, my preferred form of coil, is as follows: When the current passes through the primary coil, so long as the slot *e* in the tube *d* is entirely covered or closed by that portion of the metal in the shell or tube *f* which has not been cut away little or no current will be induced in the secondary coil; but as the tube or shell *f* is rotated to the right and the index-points to the numeral "1" the slot is partially uncovered and becomes gradually more and more uncovered until, when the index reaches the numeral "4," it is entirely uncovered, at which time the current induced in the secondary is strongest. By turning or rotating the tube *f* still farther to the right the slot is again covered and the current reduced to a minimum, and by turning the tube *f* to the left at any given time when there is a current in the secondary the current may be gradually reduced.

In the preferred form of coil the iron core is rotated with the tube *f*; but it is obvious that the result would be the same if the core were stationary and the tube *f* revolved about it without departing from the spirit of the invention; but I prefer to make the coil as shown in Figs. 2 to 5, inclusive.

In the modification shown in Fig. 6 the construction is practically the reverse of that of

my preferred form above described. In the modification the slotted tube  $d'$  is rotatable or revoluble and the tube  $f'$  and iron core stationary; but otherwise the operation is the same, except that the index or pointer is carried by the tube  $d'$  and the index-dial, with numerals, is on the head or rim of the tube  $f'$ .

In the modification shown in Fig. 8 the slotted tube and the tube or shell within it encircles the secondary coil instead of the iron core. In this construction the slotted tube  $d^2$  is shown as being stationary and the tube  $f^2$  revoluble. The operation, however, is substantially the same as that first above described and the result produced the same. It is also obvious that the tube  $f^2$  may be made stationary and the slotted tube  $d^2$  revoluble without departing from the spirit of my invention.

It will be observed that slotting or cutting away the tubes between their ends leaves the ends of said tubes intact and rigid, and when the tubes are placed one upon the other in accordance with this invention they will not be liable to bind one upon the other, and thereby interfere with the operation of the device.

What I claim, and desire to secure by Letters Patent, is—

1. In an induction-coil, the combination of the primary and secondary coils and core, with means for regulating or controlling the induced current, said means comprising a tube made of magnetic insulating material slotted between its ends and a tube or shell of like material having a portion of its body between its ends removed, one of the said tubes being rotatable or revoluble.

2. In an induction-coil, the combination of the primary and secondary coils and core, with means for regulating or controlling the induced current, said means comprising a tube made of magnetic insulating material slotted between its ends and a tube or shell of like material having a portion of its body between its ends removed and encircling the core, one of said tubes being rotatable or revoluble.

3. In an induction-coil, the combination of the primary and secondary coils and core, with means for regulating or controlling the induced current, said means comprising a tube made of magnetic insulating material slotted between its ends and a tube or shell of like material having a portion of its body between its ends removed and rigidly connected with said core, one of said tubes being rotatable or revoluble.

4. In an induction-coil, the combination of the primary and secondary coils and core, with means for regulating or controlling the induced current, said means comprising a tube made of magnetic insulating material slotted between its ends and a tube or shell of like material having a portion of its body

between its ends removed and adapted to be rotated or revolved within said slotted tube.

5. In an induction-coil, the combination of the primary and secondary coils and core, with means for regulating or controlling the induced current, said means comprising a tube made of magnetic insulating material slotted between its ends and a tube or shell of like material having a portion of its body between its ends removed and encircling the core and adapted to be rotated or revolved within said slotted tube.

6. In an induction-coil, the combination of the primary and secondary coils, a movable core with means for regulating or controlling the induced current, said means comprising a tube made of magnetic insulating material slotted between its ends and a tube or shell of like material having a portion of its body between its ends removed and rigidly connected with said core, and adapted to be rotated or revolved within said slotted tube.

7. In an induction-coil, the combination of the primary and secondary coils and a movable core with means for regulating or controlling the induced current, said means comprising a brass tube having a slot extending almost its entire length between its ends and a revoluble or rotatable tube or shell having a portion of its body between its ends cut away and rigidly connected to said core and encircling the same.

8. In an induction-coil, the combination of the primary and secondary coils and a core therefor, with means for regulating or controlling the induced current, said means comprising a tube or shell of magnetic insulating material having a portion of its body removed and surrounding said coils, and a stationary slotted tube of like material encircling said first-named tube or shell, the said first-named tube being adapted to be revolved within the stationary tube, substantially as described.

9. In an induction-coil, the combination of the primary and secondary coils and a core therefor, with means for regulating or controlling the induced current, said means comprising a slotted tube of magnetic insulating material, and a tube or shell of like material having a portion of its body removed, one of said tubes being rotatable or revoluble, and an index and pointer arranged on said coils and revoluble tube respectively, substantially as and for the purpose described.

In witness whereof I have hereunto affixed my signature to this specification, on the 5th day of February, A. D. 1900, in the presence of two witnesses.

HAILIE E. WILLIS.

Witnesses:

JOHN L. SPRING,  
C. H. JENKINS.