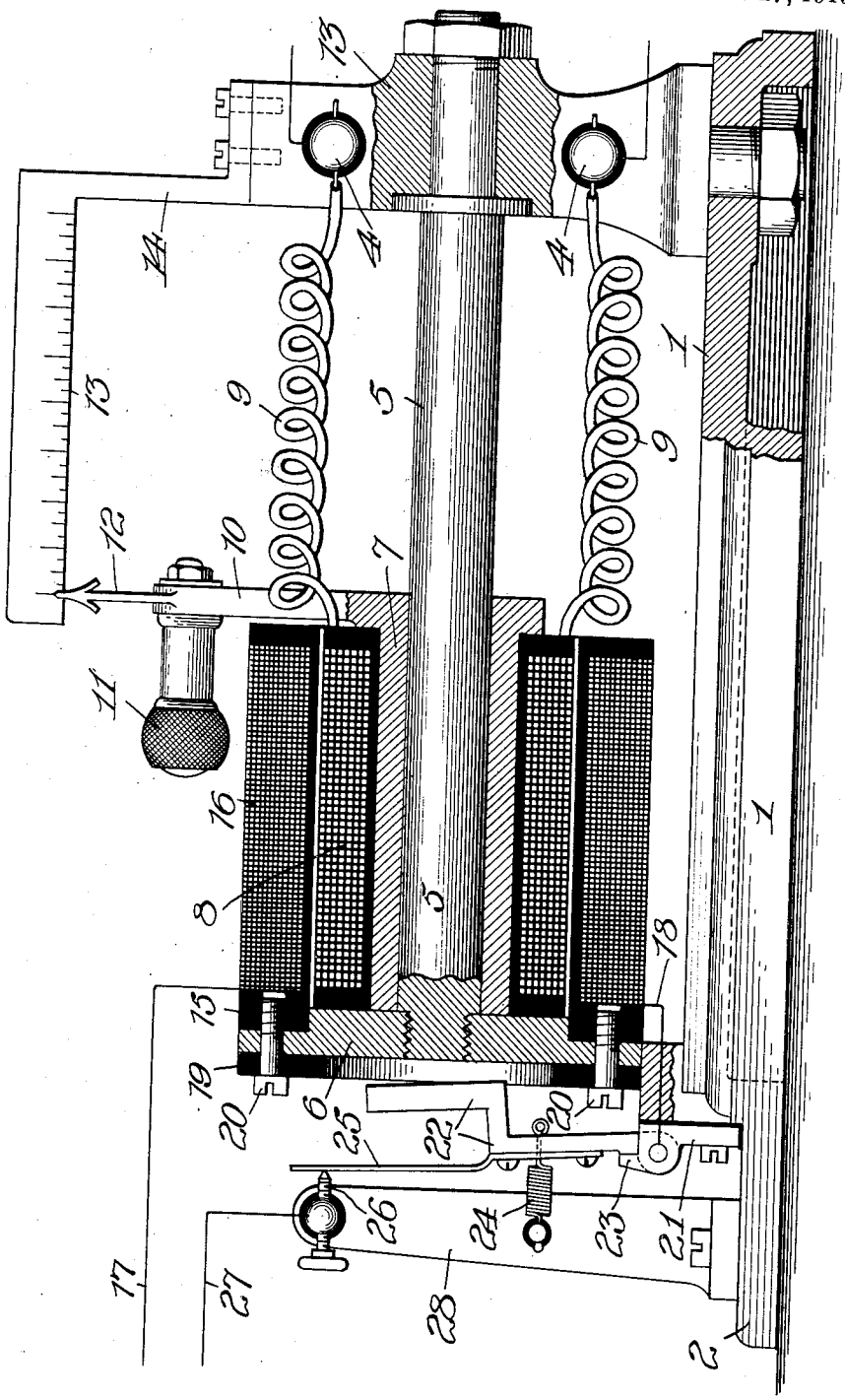
B. F. GARDNER.

ELECTRIC INDUCTANCE APPARATUS.

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1,307,093.

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ELECTRIC INDUCTANCE APPARATUS.

1,307,093. Specification of Letters Patent. Patented June 17, 1919.

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To all whom it may concern:

Be it known that I, BENJAMIN FULTON GARDNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Inductance Apparatus, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to improvements in inductance apparatus and especially in the means of generating and controlling the so-called faradic electric current, also as a reversible transformer, that is, to "step down" or "step up" either alternating or direct electric current, whereby a relatively high potential, supplied by a commercial lighting system, may be used to operate the apparatus and obtain an effect suitable for the most delicate electro-medical service.

The invention will be fully understood from the following specification taken in connection with the accompanying drawing which represents a vertical longitudinal sectional view of the apparatus designed in accordance with the invention.

Referring to this drawing the numeral 1, designates a base or bedplate on which the instrument is mounted, 2 is an extension of the bedplate, which supports the arm 28. The round solid part 5, illustrates an immovable magnetic core, iron or steel, this core is carried by the parts 6 and part 13. The part 6, is of paramagnetic material. The part 7, is a split tubular core of iron or steel and adapted to move over and along the solid round core 5. Numeral 8, designates a coil of wire which is capable of use either as a primary or secondary winding. The dark part is an insulating spool, not numbered. This spool and winding 8, is fixed to and carried on the tubular core 7, to any point it may be adjusted on the round solid core 5. The coil 16, may be used either as a primary or secondary current part. The wire of this coil is also wound upon a spool of insulating material as shown by the black shading. This coil is immovable and supported at one end by the part 21, which is attached to the bedplate 1. The part 6, and part 19, by means of the screws 20, fix and support the coil 16. The upright part 10, is attached to the core 7, and moves with it, 11 is a knob or handle mounted upon the part 10. The arrow 12, is an index pointer which moves along the scale 13. This scale is permanently fixed integral with the part 14, mounted upon the stanchion 13. The spiral conductor parts 9, transmit the current induced in coil 8, to the binding posts or connectors 4. These spiral wires are flexible and capable of elongation and accommodate the free movement of the coil 8, in which they form the coil terminals. The insulating part 19, is cut away in the center to allow the armature of the vibrator 22, to approach the parts 5, and 6. The contact part, of the vibrator 25, attached to the armature 22, is normally held in contact with the contact part 26, by the spiral spring 24, mounted upon the arm 28, which rises from part 2, of the base part 1. The part 23, integral with 21, is a stop for the back throw of the armature 22, of the vibrator 25.

The positive and negative wires 17, and 27, are conductors from a source of potential not shown, to energize the permanent coil 16. The circuit from coil 16, is completed by wire 18, through the vibrator 25, and contact part 26.

The operation of my improved induction apparatus is as follows:

Assuming a faradic current is required, with a lamp cord and attachable plugs, the device may be connected to a lamp socket and energized with a current of 110 volts, the usual potential of a public service. The current is conducted through the vibrator to the permanent coil which is wound with wire of sufficient resistance to carry the current required—one ampere or less—and to avoid undue heating, the make and break of the vibrator sets up an alternating current in the coil 16, which in turn induces a secondary current in the coil 8, and the permanent core 5, the stationary part 6, and the movable tubular core 7, is rapidly magnetized and demagnetized. This secondary or induced current is of a pulsating nature, and it is regulated and controlled by the movement of the coil 8, and tubular core out, along and over the permanent solid round core 5. This telescoping coil and core 7, may be adjusted at any point on the scale. In fact, it may be moved entirely out of the cylindrical coil 16, and by the magnetic

effect of the permanent core, the secondary coil 8, is energized, producing an effect suitable for the most delicate physical condition.

It is only necessary to reverse the connections in order to adapt the instrument for "high frequency" service which requires an exceedingly high potential. In brief, the energizing current is conducted through the vibrator and the inner coil 8, which is wound for a larger current than the outer coil 16, in which the greater number of turns of wire gives an enormous increase in voltage, which is essential to produce the violet ray. A Tesla coil as an adjunct, is necessary in this work.

My invention departs from the well known forms of the faradic device and so far as I am informed from all other inductance apparatus and transformers. The improvement consists in a dual core, one of which is permanent and solid, and the other tubular on which a coil of wire is carried, and the control and adjustment of the secondary current is effected in almost imperceptible gradations by the movement of the outer tubular core and coil from out the inner coil and over and along the fixed central permanent core. By this construction the vibrator is operable, regardless of the position of the outer core 7, in relation to the inner core 5. It will also be noted that the frequency of the vibrations of the vibrator changes with the movement of the outer core. The magnetic attraction is altered and the current through the primary or outer coil, is likewise controlled by the telescoping process as heretofore described. A simultaneous action is accomplished in the primary current in the secondary or induced current and in the vibratory frequency, and all of these actions conduce to the efficiency of apparatus for the purpose intended.

While I have described in considerable detail one specific embodiment of my invention, it will be understood that this is illustrative only and for the purpose of making the invention more clear, and that I do not regard the invention as limited to these details, nor any of them, except in so far as such limitations are included within the terms of the accompanying claims in which it is my intention to claim all novelty inherent in my invention as broadly as is permissible in view of the prior art.

What I claim is:

1. In an electric induction apparatus of the class described, an outer coil of the solenoid type, a secondary coil mounted upon a tubular core and adapted to move in and out of said outer coil, an immovable inner core supporting said secondary coil and said tubular core, said cores being of magnetic material.

2. In an electric induction apparatus of the class described, a coil of the solenoid type, a tubular iron core, a secondary coil spooled thereon, and means to move said secondary coil and core in and out of said solenoid coil, and a magnetic circuit interrupter operable regardless of its distance to or from said tubular iron core.

3. In an electric induction apparatus of the class described, a base plate upon which is rigidly mounted vertically an iron or steel plate, to which is attached a shaft fitted to a stanchion at its opposite end, said shaft and its supporting parts of magnetic material, a tubular iron core carrying a coil, with means to slide said tubular core and coil to and fro along said shaft, and a magnetic current interrupter operable by the magnetic force of said iron plate, said shaft core, said tubular core, and also by the inductive energy of an outer immovable coil of the solenoid type mounted upon said base plate.

4. In an electric induction apparatus of the class described, comprising an immovable core and a movable core, said cores being located within an outer fixed coil and an inner movable coil, said cores of magnetic material and means to adjust said cores and said coils in relation one to the other, and means to indicate the adjustment, a magnetic electric current interrupter, a plate part, and means to magnetically energize said plate part, whereby said magnetic electric current interrupter is caused to vibrate regardless of the position of said movable coil, and said movable core, means to accelerate or lessen the speed of the vibrator movement, whereby current is controlled and a variety of electric effects are produced.

In witness whereof I hereunto subscribe my name this 20th day of June, A. D. 1918.

BENJAMIN FULTON GARDNER.

Witnesses:

B. A. DUNLAP,

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