

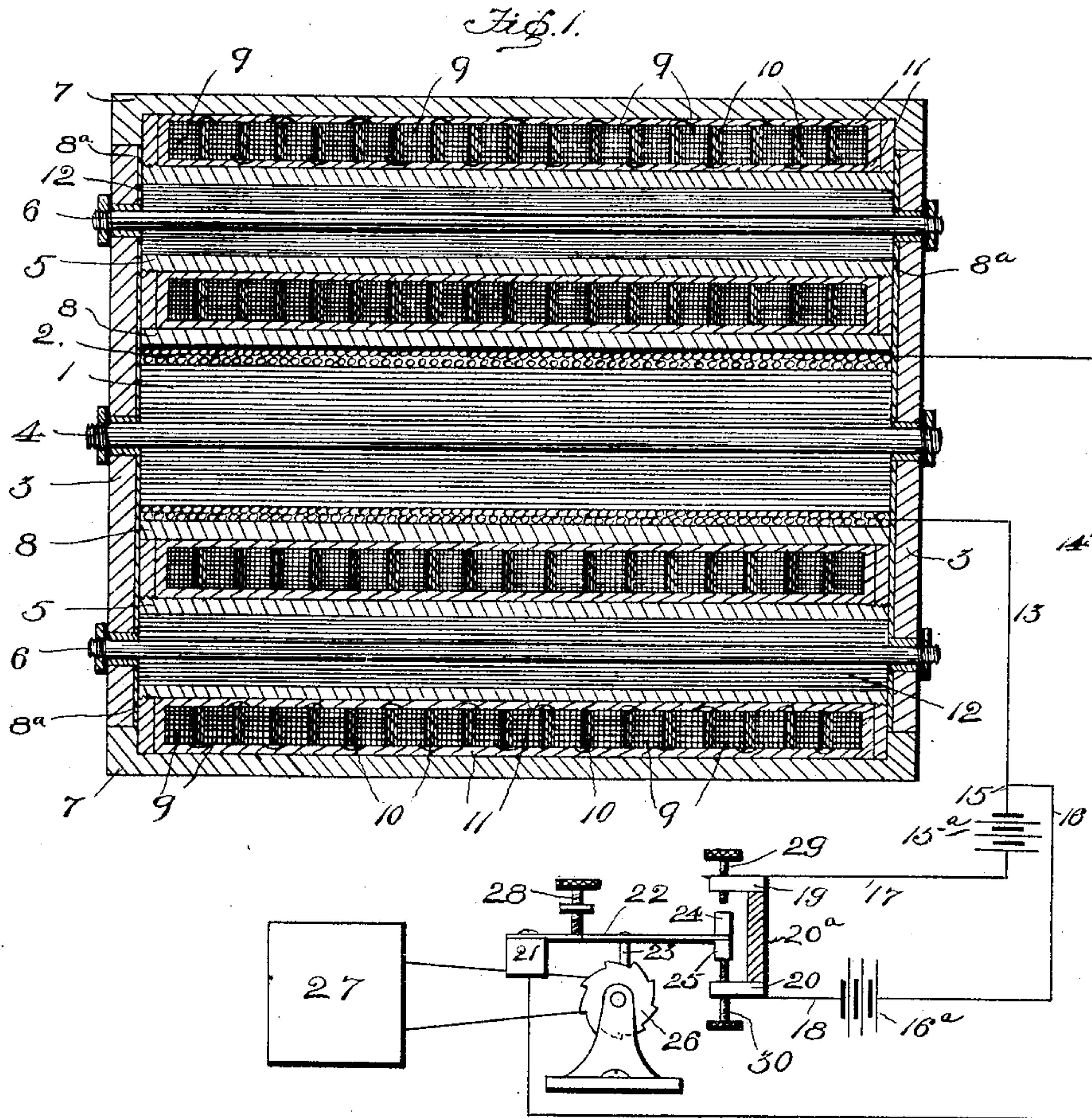
No. 672,989.

Patented Apr. 30, 1901.

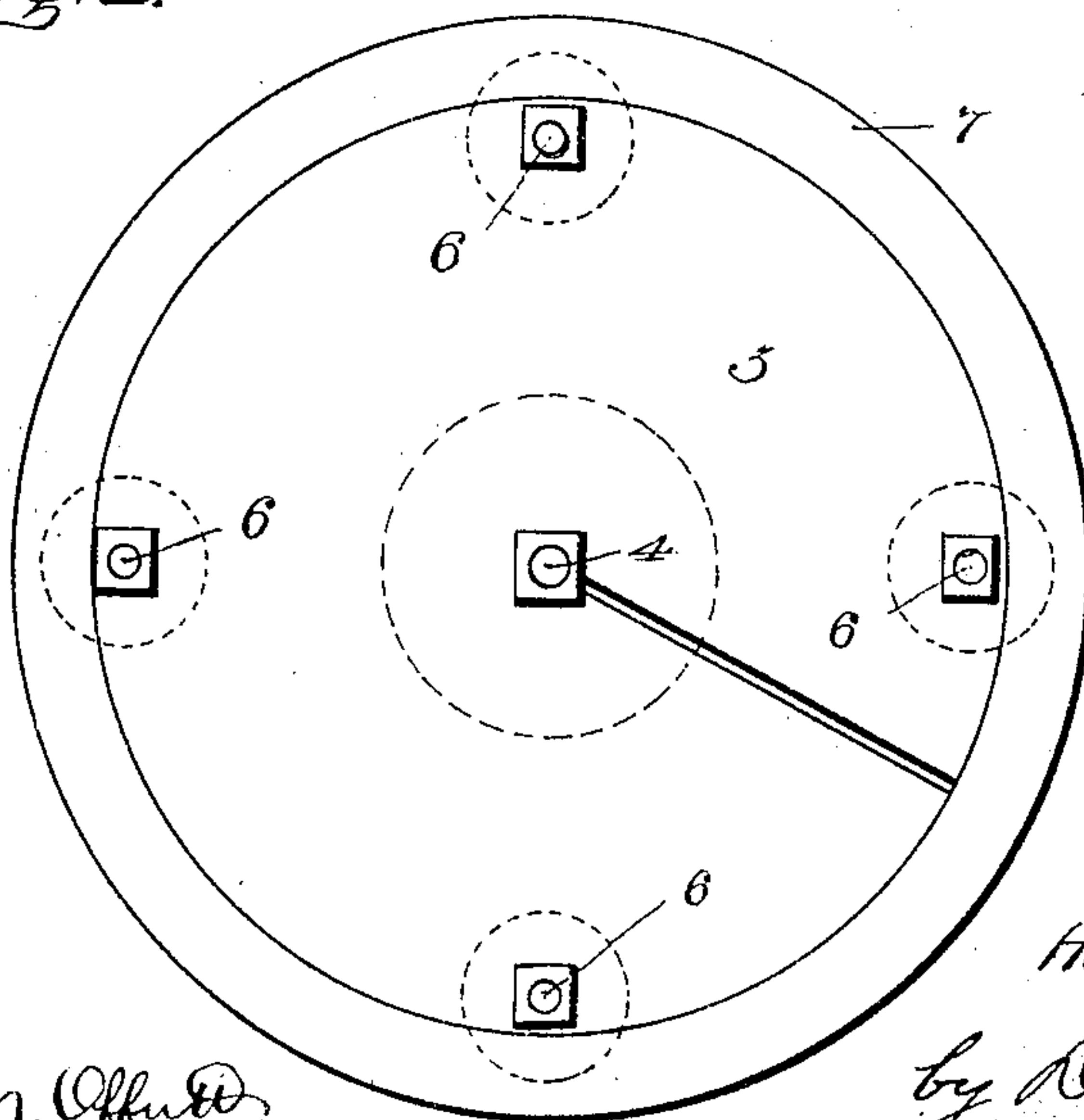
H. SHOEMAKER.  
TRANSFORMER.

(Application filed Feb. 12, 1901.)

(No Model.)



*Fig. 2.*



Witnesses

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# UNITED STATES PATENT OFFICE.

HARRY SHOEMAKER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF  
ONE-HALF TO GUSTAVE P. GEHRING, OF SAME PLACE.

## TRANSFORMER.

SPECIFICATION forming part of Letters Patent No. 672,989, dated April 30, 1901.

Application filed February 12, 1901. Serial No. 46,988. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY SHOEMAKER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Transformers, of which the following is a specification.

My invention relates to improvements in transformers, and has special reference to a novel construction of induction or inductance coils and means for causing intermittent or alternating currents.

The main object of my invention is the provision of an inductance or induction coil which is so constructed as to form a short complete magnetic circuit with a gap of small reluctance.

To attain the desired objects, the invention consists of a transformer embodying novel features of construction and combination of parts, substantially as disclosed herein.

In the drawings, Figure 1 is a central sectional view of my improved induction-coil having the transforming system and instrument in diagram connected therewith. Fig. 2 is an end view of the coil.

Referring to the drawings, the numeral 1 designates the central core of rods, surrounded by the wires 2. Passing through the circular ends or disks 3, of annealed steel, and the core is the insulated brass tie-rod 4, and passing through the hollow of the rubber spools 5 and also the disks are the insulated brass tie-rods 6, which hold the central coils and spools within the casing formed by the disks and the outside insulated casing or covering 7, part of which is of magnetic material. A rubber cylinder 8 is also placed around the coil to insure proper insulation from the other spools, and the sheets of paper 8<sup>a</sup> are placed between the ends of the central and other spools and the disks, as shown. Coils 9, of wire, are placed upon these spools, being separated by strips 10, of wax-paper, a body of wax 11 surrounding said coils between them and the spool and also upon the outside, making the coils solid with the spool. These coils are all connected in series, as shown. A series of these spools are mounted around the central coil, the core 12 of rods in the hollow

of the spool being in magnetic circuit with the core 1 by means of the metal disks.

Connected to the wires 2 are the wires 13 and 14, the wire 13 branching off into the wires 15 and 16, connected to their proper batteries 15<sup>a</sup> and 16<sup>a</sup>, wires 17 and 18 connecting their respective batteries in circuit with the posts 19 and 20, respectively, having the insulation 20<sup>a</sup> between them. The wire 14 is connected with the block or post 21, to which is connected the spring-plate 22. This plate has depending from the under side the lug 23 and is provided with the contact-points 24 and 25 upon its end. A ratchet-wheel 26, which is revolved by any well-known power, (a motor 27 in this case,) engages a lug 23 of the spring-plate 22, and as the ratchet-wheel is revolved the spring-plate is raised or lowered, it being limited in its upward movement by a set-screw 28. As this plate 22 is forced upward the contact 24 engages the adjustable contact point or pin 29, mounted in the post 19, and as the plate moves downward by reason of its tension and also the spaces between the teeth of the wheel the contact-point 25 is brought into contact with the adjustable contact point or pin 30, mounted in the post 20.

From this description, taken in connection with the drawings, the operation of my transformer is readily understood and its numerous advantages fully appreciated, but, briefly stated, it is as follows: The motor is set in operation and the ratchet-wheel revolves. The spring-plate being raised causes the points 24 and 29 to contact, making a circuit through the wire 17, batteries 15<sup>a</sup>, wires 15 and 13, through the central coil of the induction-coil, and through the posts 21 and plate 22 by means of the wire 14, and when the spring-plate 22 is released as the lug 23 passes into the spaces between the teeth of the ratchet-wheel a circuit is made through the contact-points 25 and 30, post 20, wire 18, batteries 16<sup>a</sup>, wires 16 and 13, the central coil, the wire 14, the post 21, and the lever 22, thus producing an alternating current through the primary of said induction-coil.

This transformer can be used without a condenser by making the batteries 15<sup>a</sup> just strong enough to pull the magnetism down to nor-



mal, and on making contact at 20 and 30 the battery 16<sup>a</sup> is brought into circuit to push the magnetism up to the maximum. When the batteries are the same strength, an alternating  
 5 current is caused as one set and then the other are brought into operation. The advantage of this construction is that the rate at which the lines are forced utilizes the secondary coils at a greater rate than is possible by use  
 10 of a condenser, hence giving a greater difference of potential between the secondary windings.

Thus it will be seen that I provide a novel form of construction of induction-coil which  
 15 is composed of a series of spools holding the secondary windings, which are all connected in circuit. I would also have it understood that this coil can be used in place of any induction-coil now in use and that I do not depart from  
 20 the spirit of my invention when I sever the same from connection with the apparatus herein set forth.

I claim—

1. In a transformer, an induction-coil, comprising a central coil, a series of coils arranged  
 25 equidistant apart and surrounding said central coil, and means for making a circuit through said coils; and means for causing an alternating or intermittent current to be im-  
 30 parted to said coils.

2. A transformer comprising an induction-coil, two electrical circuits in connection with the primary thereof, a spring-lever to make  
 35 connections with each of said circuits, one at a time, and a revolving ratchet-wheel to operate said lever to make the connection to produce an alternating or intermittent current as desired.

3. A transformer, comprising an induction-  
 40 coil, consisting of a central coil and a series of coils surrounding said central coils, the cores of said coils all being connected in magnetic circuit; two electrical circuits in connection with said coils, a reciprocating spring-  
 45 lever to make one circuit at a time, and a ratchet-wheel to be revolved to reciprocate the lever.

4. An induction-coil comprising a central coil, a series of coils arranged equidistant  
 50 apart and surrounding said central coil and means for making a magnetic circuit around said coil.

5. An induction-coil consisting of a central coil, a series of coils surrounding said coil,  
 55 and means to connect said coil so as to make one homogeneous coil and cause a magnetic circuit through the cores of said coils.

6. An induction-coil consisting of a central coil, composed of the central rods surrounded  
 60 by wire and insulated covering; magnetic disks or plates connected to said central coil, and a series of coils mounted between said disks and surrounding said central coil.

7. An induction-coil consisting of the central coil covered by an insulated cylinder,  
 65 disks or plates connected to said coil, a series of spools made of insulated material surrounding said central coil and supported between said disks, rods mounted in the hollow of said spools, a series of separated coils sur-  
 70 rounding each of said spools and held apart by a plastic insulating material, and a casing or cover for the entire mass to form one large coil.

8. An induction-coil comprising a central  
 75 coil, a series of coils arranged equidistant apart and surrounding said central coil, means for making a magnetic circuit through the cores of said coils, and paper between the ends of the coils and the means for making  
 80 the magnetic circuit to form a gap in the magnetic circuit.

9. An induction-coil, consisting of a central coil, and a series of coils surrounding said  
 85 central coil; the windings of all the coils being connected in circuit and the cores of all the coils being in magnetic circuit.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY SHOEMAKER.

Witnesses:

M. WIEGAND,  
 JOSEPH S. HAGAN.