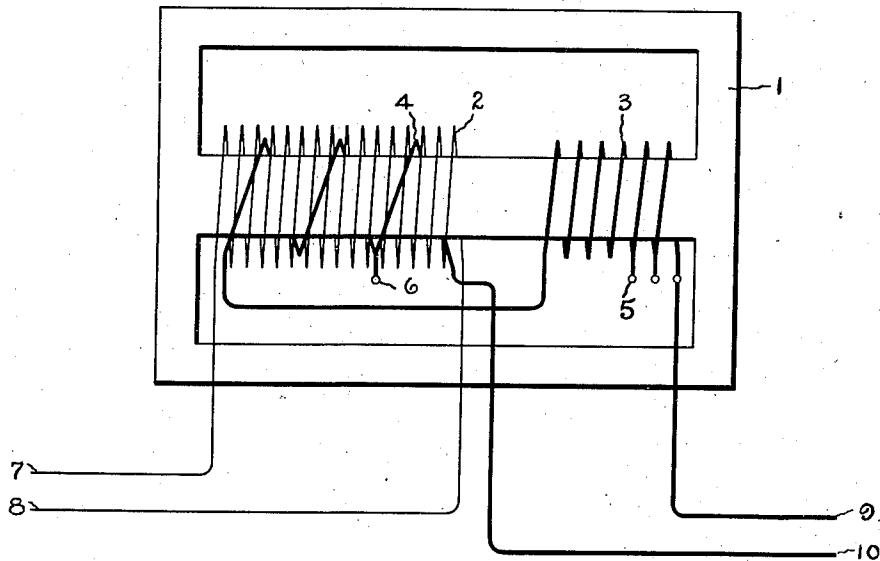


S. E. JOHANNESEN.
BELL RINGING TRANSFORMER.
APPLICATION FILED AUG. 14, 1909.

1,021,252.

Patented Mar. 26, 1912.



WITNESSES:

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SVEND E. JOHANNESSEN, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

BELL-RINGING TRANSFORMER.

1,021,252.

Specification of Letters Patent. Patented Mar. 26, 1912.

Application filed August 14, 1909. Serial No. 512,814.

To all whom it may concern:

Be it known that I, SVEND E. JOHANNESSEN, a citizen of the United States, residing at Pittsfield, county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Bell-Ringing Transformers, of which the following is a specification.

My invention relates to electrical transformers.

Although it is not limited in its application, it is more particularly adapted for use in connection with those transformers which are employed for ringing electric bells.

One of the chief requisites of bell ringing transformers is that they shall be constructed as cheaply and at the same time as durably as possible, as they are used for the energization of electrical circuits of comparatively minor importance. In such circuits there is a great possibility of the bell, the wiring, or other devices in series with the secondary of the transformer, being short circuited, which would cause a large current to flow in the secondary winding, unless some precautions are taken to prevent it. Because of the size of these transformers, it is not convenient to connect the protective device in series with them. It is therefore customary to design transformers of this character so that if the secondary winding becomes short circuited, the short circuited current will be limited in value, and the transformers will be able to stand this short circuit for a long period of time. In order to reduce as far as possible the size, and, therefore, the cost of such transformers, the short circuited current must be made as small as possible, as by so doing the size of wire used for both primary and secondary winding may be made a minimum, and hence the cost of the transformers may be made a minimum.

The object of my invention then is the construction of a transformer which will give a smaller short circuited current than is given by those transformers at present in use, and thus I effect a considerable saving in the cost of such transformers. In the past, transformers of this character have been built with a large magnetic leakage between the primary and secondary windings. But with such a construction the short circuited current will be greatly in excess of the current which is required un-

der normal operating conditions. I have found that by a special construction and arrangement of the transformer windings, I am enabled to reduce the short circuited current so that it will not be greatly in excess of the normal load current, and I am therefore able to decrease the size of the wire used for the windings and thus decrease the cost of a transformer without impairing its ability to stand a short circuit for a long period.

For a further understanding of my invention, reference may be had to the accompanying drawing, which shows diagrammatically the core and windings of a transformer.

1 is the core which may be constructed in the usual manner of laminae of magnetic material, and as shown in the drawing consists of three legs with suitable end pieces connecting the legs. The primary winding 2 surrounds a part of the central leg of the core, and the main portion of the secondary winding 3 surrounds another part of the same leg; these windings being shown as wound upon different parts of the core, so that there will be a large magnetic leakage between the two windings. A second portion of the secondary winding 4 is wound upon the same part of the core as the primary winding and in close proximity thereto, and this portion of the secondary winding is so connected that the electromotive force generated in it will be in opposition to or will "buck" the electromotive force generated in the main portion of the secondary winding. The main portion of the secondary winding may have taps 5, so that the voltage supplied to the load may be varied in the well-known manner. If it is desired to obtain a large range of voltages so that only a small portion of this winding is used, the opposing action of winding 4 may become greater than desirable, and therefore this winding I have shown as provided with an intermediate tap 6, to which the load may be connected.

It will be understood that while for clearness I have illustrated the windings as consisting of a small number of turns, and the secondary as having a small number of taps connected thereto, that I do not limit myself to the particular arrangement shown. The primary winding may be connected by conductors 7 and 8 to a suitable

source of supply, which is not shown, and the secondary winding may be connected by conductors 9 and 10 to a suitable load, which is not shown.

5 The operation of the device will then be as follows: The main and opposing portions of the secondary winding may be so designed that the desired secondary voltage will be obtained, and taps 5 and 6 may also
10 be arranged to give suitable lesser voltages. If a short circuit occurs when the secondary winding is connected so as to give either its whole, or a portion of its whole voltage, greater leakage will occur between the pri-
15 mary and the main portion of the secondary winding, and this greater leakage of itself would tend to cut down the short circuit current in the secondary in the well understood manner. The opposing portion of the sec-
20 ondary will have a greater amount of flux proportional to the flux in the main portion flowing through it for a short circuit than for normal load, and will, hence, have more effect in opposing the main voltage than for
25 normal load and its action will therefore still further decrease the secondary current. It will also tend to decrease the primary flux. If the secondary winding is connected so that only a portion of it be used, the short
30 circuited current in this portion will still be low, as the opposing portion 4 of the secondary winding will have a proportionately greater effect upon this portion of the main winding than it does if the entire main
35 winding is used.

While I have shown my invention embodied in a particular form and arrangement of parts, I do not limit myself to this form or arrangement, but seek in the ap-
40 pended claims to cover all forms and arrangements which will be within the scope of my invention and will be obvious to those skilled in the art.

What I claim as new and desire to secure
45 by Letters Patent of the United States, is,—

1. In an electrical apparatus, a core, an

inducing winding surrounding the core, and a winding in inductive relation thereto having a portion wound so that there will be a large magnetic leakage between it and the
50 inducing winding, and a second portion reversely connected to the first portion and in closer proximity to the inducing winding than the said first portion.

2. In an electrical transformer, a core, a
55 primary winding surrounding the core, and a secondary winding having a portion wound on a different part of the core, and a second portion reversely connected to the balance thereof and in closer proximity to
60 the primary winding than the said first portion.

3. In an electrical transformer, a core, a primary winding surrounding the core, and
65 a secondary winding having a portion wound upon a different part of the core and a portion reversely connected to the balance thereof and upon the same part of the core as the primary winding.

4. In an electrical transformer, a core, a
70 primary winding surrounding the core, and a secondary winding having a portion provided with taps wound upon a different part of the core and a second portion reversely connected to the balance thereof and
75 upon the same part of the core as the primary winding.

5. In an electrical transformer, a core, a primary winding surrounding the core, and
80 a secondary winding having a portion wound upon a different part of the core and provided with taps, and a second portion reversely connected to the first portion, wound upon the same part of the core as the pri-
85 mary winding and provided with taps.

In witness whereof, I have hereunto set my hand this 11th day of August, 1909.

SVEND E. JOHANNESSEN.

Witnesses:

WILLIS A. ISLELER,
CORLISS E. LEE.