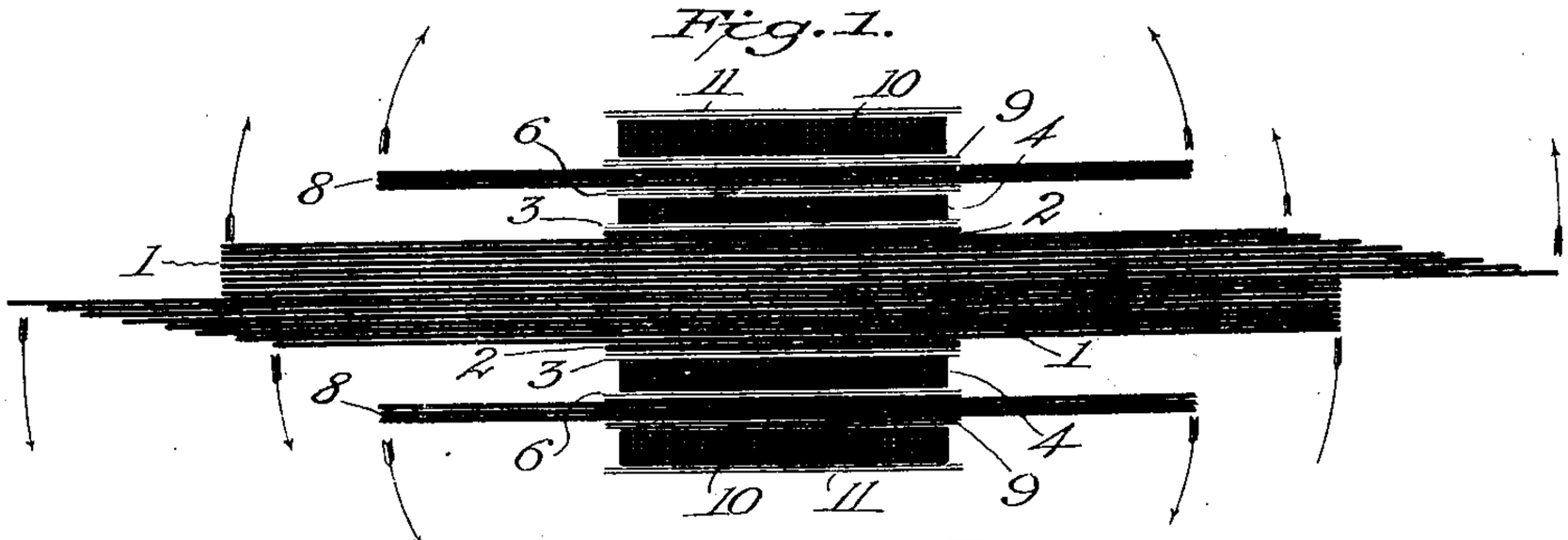
O. W. LUNNON & E. HARVEY.

POTENTIAL TRANSFORMER.

APPLICATION FILED JAN. 27, 1913.

1,154,866. Patented Sept. 28, 1915.

Fig. 1.



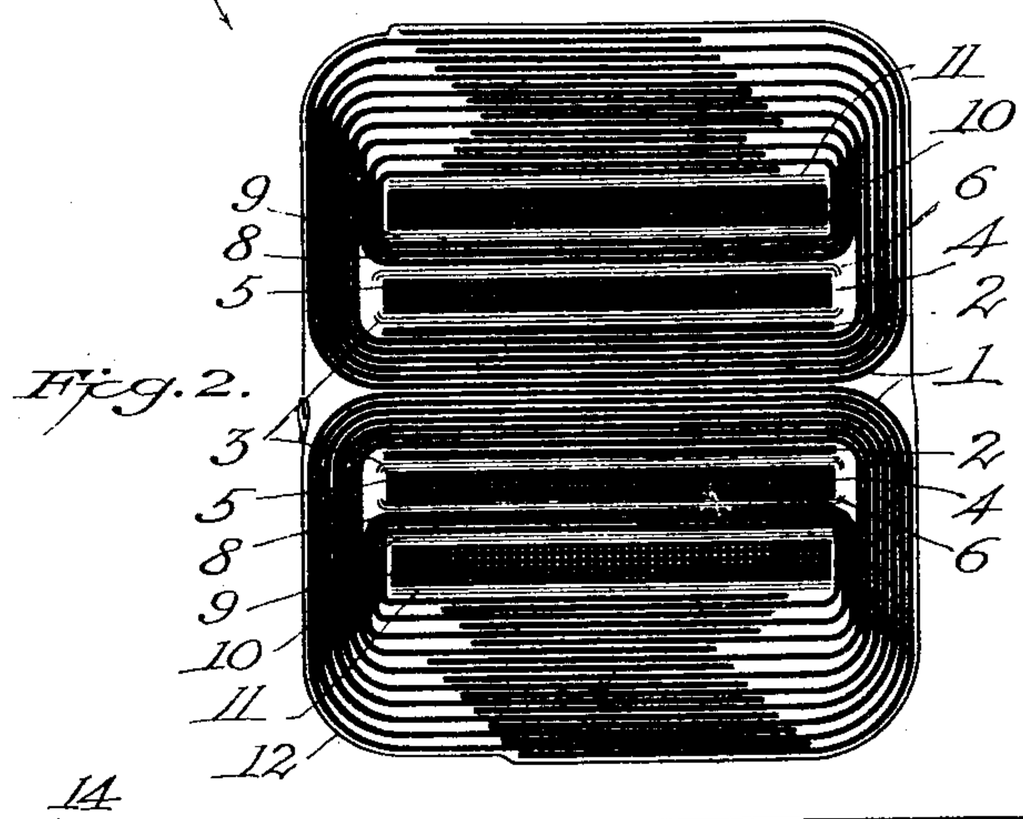


Fig. 2.

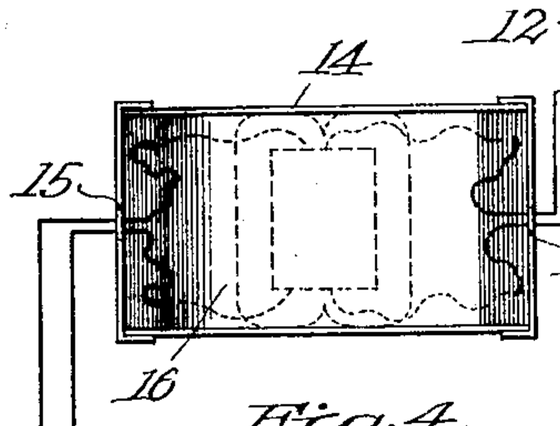


Fig. 4.

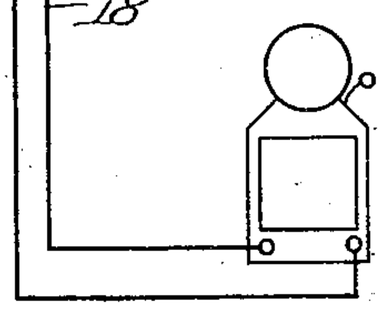
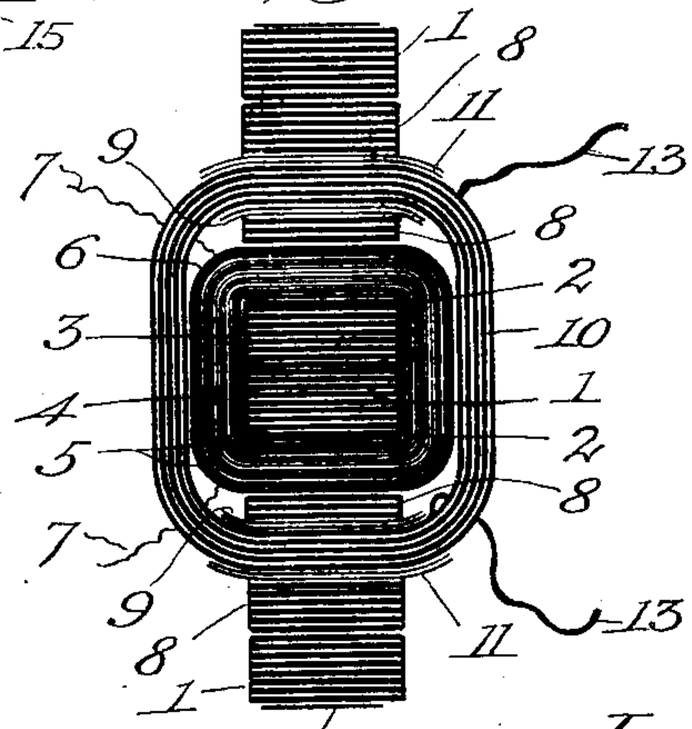
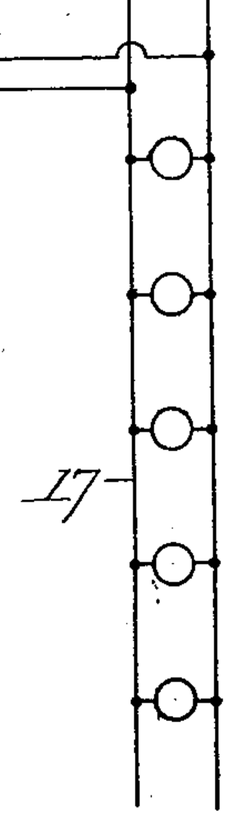


Fig. 3.





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POTENTIAL-TRANSFORMER.

1,154,866. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed January 27, 1913. Serial No. 744,551.

To all whom it may concern:

Be it known that we, OTTO W. LUNNON and EARL HARVEY, citizens of the United States of America, residing in the city and county of Denver and State of Colorado, have invented new and useful Potential-Transformers, of which the following is a specification.

This invention relates to electric current transformers.

The object of the invention is to provide a transformer having a laminated core comprising groups of metal strips, the strips of each group being bent outward and around the adjacent portions of the primary and secondary coils. Further, to provide a transformer having a main laminated core, and supplemental laminated core portions, which latter are disposed in opposite groups between the primary and secondary coils, the strips of one of said groups, and half of the strips of the main core, being bent outwardly around the coils, their ends overlapping in alternate order, while the strips of the other group and the other half of the strips of the main core are oppositely bent around the coils, their ends overlapping in the same manner. Further, to provide a transformer provided with a laminated core which is so wound or bent that its contour will correspond to the outline or circles described by the lines of magnetic force, produced by the primary coil, and one in which joints are reduced to a minimum, thereby lessening the magnetic reluctance. I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a longitudinal sectional view through the transformer as it appears before bending the strips of the laminated core around the windings. Fig. 2 is a similar sectional view of the completed transformer, the manner of bending the core forming strips or laminæ, being clearly shown. Fig. 3 is a transverse sectional view thereof. And Fig. 4 is a view showing the manner of housing the transformer, the same being shown in connection with a lamp circuit and bell.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the accompanying drawings: The numeral 1 indicates a laminated core, composed of thin iron strips of suitable width, and sufficient in number to produce the required magnetic field. Half of these strips are adapted to be bent around in one direction so that their ends overlap, and half in the opposite direction, with their ends overlapping; and in order that their ends may overlap in such a manner as to prevent bunching and give the desired outline to the transformer, I arrange them as follows: The strips are first cut in pairs which vary in length, in regular order or step form. One-half of the strips are then arranged so that at one end of the group their ends are all flush, while at the other end of the group their ends are in step fashion, or are shortened by regular intervals. The other half of the strips are arranged in the same manner and the two groups are then placed together with their longest strips back to back, but so that the longest strip of each group extends a suitable distance beyond the flush ends of the other group, the outside strip of each group being the shortest strip of the group, as will be fully understood by reference to Fig. 1. On opposite sides of the core thus formed are placed one or more short metal strips 2, which not only become part of the core, but are primarily intended to define the bending points of the two groups of core strips, and prevent them from crowding the ends of the primary coil, as the said strips are bent around. Around these strips and the other strips composing the core, is wound one or more layers of any suitable flexible insulating material 3, such as what is known as "Empire cloth," the strips having first been tightly wrapped with suitable tape to hold them firmly together. Around this insulating wrapping is wound the fine insulated wire which forms the primary coil or winding 4. This winding may consist of a greater or less number of turns to meet the requirements in the case, and at intervals in the winding, thin strips of insulating paper are wrapped about the wire, as shown at 5, to prevent the under or inner layers of wire from being crowded out of position by the surrounding layers, as will be understood.

Around the primary winding is wound one or more layers of insulating material 6, of the kind above mentioned, the terminals 7 of the winding being exposed for purposes of connection with other wiring. On opposite sides of the insulation 6, and parallel with the main core strip, are placed groups

of strips 8, of less length than the shortest strips of the main group. These strips form additional core members, and upon them are placed one or more layers 9, of insulating material. The secondary coil 10, is then wound around these strips and the primary coil, and upon opposite sides of the secondary coil, in line with the insulating strips or layers, are placed layers 11 of insulating material. The strips of each group are then bent outwardly and around the adjacent portions of the secondary coil, over the insulation 11, the strips in each group being bent around in alternate order so that their ends overlap and rest one upon the other, as shown by Fig. 2, after which the two groups of strips forming the main core are bent outwardly and around the bent ends of the strips 8, those of each group being bent in alternate order, so that their ends overlap and rest one upon the other, in the same manner as the ends of the strips 8. After the strips are thus bent, they are pressed firmly together, so as to give compact form to the transformer, and at the same time cause the strips to engage each other at all points, thus preventing "humming," which would otherwise occur, when the current is on.

A suitable band, such as a cord or metal band, is then secured upon the core to hold the strips in position. A metal band 12 is shown, for this purpose. By surrounding the secondary coil with the core strips 8, a counter magnetic field is established, sufficient to keep the transformer from overheating on overload. The terminals 13 of the secondary coil, are extended as shown, for connection with feed wires.

In Fig. 4, the transformer is housed in a metal box 14, having holes 15 in its opposite ends, through which the ends of circuit wires are inserted for connection with the terminals of the transformer. This box is of a style in common use, and in practice is provided with a cover, which is omitted in the present instance. The width of the box relatively to the length of the transformer, is such that when the transformer is placed therein, the ends of its core engage the sides of the box, which thus produce a co-acting magnetic field with the core. A bowed metal plate 16, is placed over the transformer, with its ends bearing against the ends and adjacent bottom portions of the box, and this plate is secured by means of the usual cement employed in such cases, and the plate is provided with apertures through which the terminals of the transformer coils extend. In Fig. 4, the transformer is shown in connection with a lamp and bell circuit 17 and 18 respectively, and while it may be used in various connections, the particular style of transformer described above, and illustrated in the accompanying drawings, is well adapted for use in connection with tungsten lamps, bells, mechanical toys, and in other cases where a low voltage is required. While the laminations of the core are shown as groups bent in opposite directions, it is obvious that they could all be bent in the same direction, and in this case the strips or laminations would be cut in suitable lengths, to meet the requirement of bending.

Having described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. A transformer as specified, consisting of a laminated core comprising two groups of contacting metal strips, a primary coil surrounding the core, a secondary coil surrounding the primary coil, the portions of said groups of strips without the coils being bent in opposite directions around the adjacent portions of the coils, the ends of the strips of each group overlapping one another in alternate order, and supplemental core strips between the primary and secondary coils in contact with the strips of the main core.

2. A transformer comprising a main laminated core, primary and secondary coils surrounding said core one within the other, oppositely positioned supplemental core strips interposed between the primary and secondary coils, said main and supplemental core strips being bent around the coils with their ends overlapping in alternate order.

3. In a transformer as specified, the combination with primary and secondary coils, one surrounding the other, of a main laminated core extending through the inner coil, and opposite supplemental laminated cores interposed between the primary and secondary windings, said supplemental cores being bent in opposite directions around the coils, the ends of their strips overlapping in alternate order, one half of the strips composing the main core being bent around over the adjacent supplemental strips, while the remaining strips are bent around those of the opposite supplemental strips, the ends of each half of the strips overlapping in alternate order.

4. A transformer comprising a primary and secondary coil, one around the other, a laminated core extending through the inner coil, the halves of its strips being bent in opposite directions around the coils, and supplemental cores interposed between the primary and secondary coils, and in contact with the main cores, for producing a counter magnetic field.

5. In a transformer as specified, a laminated core, primary and secondary coils surrounding the core one over the other, flexible non-conducting material between the core and inner coil, between the primary and secondary coils, and upon the secondary coil,

oppositely arranged supplemental cores extending between the primary and secondary coils, the half of the main core strips and the adjacent supplemental strips being bent in opposite directions from each other to surround the adjacent portions of the coils, and a band for holding said strips in their bended positions.

In testimony whereof we affix our signatures in presence of two witnesses.

OTTO W. LUNNON.
EARL HARVEY.

Witnesses:
G. SARGENT ELLIOTT,
ADELLA M. FOWLE.