

L. W. CHUBB.
THERMO-COUPLE AND METHOD OF CONSTRUCTING THE SAME.
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1,289,116.

Patented Dec. 31, 1918.

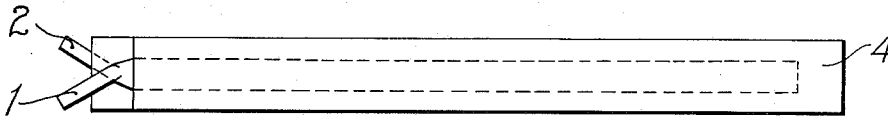


Fig. 1.

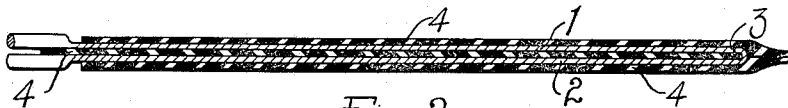


Fig. 2.

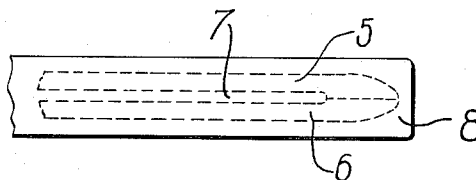


Fig. 3.

WITNESSES:

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LEWIS W. CHUBB, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

THERMO-COUPLE AND METHOD OF CONSTRUCTING THE SAME.

1,289,116.

Specification of Letters Patent.

Patented Dec. 31, 1918.

Application filed February 19, 1914. Serial No. 819,700.

To all whom it may concern:

Be it known that I, LEWIS W. CHUBB, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Thermo-Couples and Methods of Constructing the Same, of which the following is a specification.

My invention relates to thermo-couples and particularly to methods of constructing the same.

The object of my invention is to provide a thermo-couple of economic design and compact construction which will respond quickly, by a change in its thermo-electromotive force, to any change in the temperature to which it is subjected.

The demand for a light-weight thermo-couple of compact form which may be inserted in the slots of a dynamo-electric machine and other similar apparatus has long been felt. Several attempts have been made to supply this demand, but the costs of manufacturing the same have been too high for commercial purposes. It is the purpose of my present invention to provide a flexible thermo-couple which may be easily constructed, is low in cost, and is adaptable to various uses by reason of its size and shape.

Figure 1 of the accompanying drawing is a plan view of a thermo-couple constructed to embody my invention. Fig. 2 is a sectional view of the thermo-couple shown in Fig. 1, and Fig. 3 is a fragmentary plan view of a modified form of thermo-couple also embodying my invention.

Two metal conductors 1 and 2 of dissimilar materials are welded at a point 3, by any of the well known methods, to form a conductor of uniform diameter. The conductors 1 and 2 may be of copper and a nickel-copper alloy, respectively, iron and nickel-copper alloy, respectively, or any other two metals having different values of thermo-electric power. The conductor formed by welding the conductors 1 and 2 together is rolled to form a ribbon of reduced cross section. The flattened portion of the conductor is folded upon itself to form two substantially parallel side-by-side portions, the bend being at a point a short distance from the joint 3. Sheets of treated paper 4, or other suitable insulating material, are placed between the two portions thus

formed, and on each side thereof. The thermo-couple is then placed in a press for approximately fifteen minutes and subjected to a pressure of substantially fifty pounds, while being maintained at a temperature of substantially 150° centigrade, and is then allowed to cool without releasing the pressure on the same. The paper used between and around the conductor is treated on the inner sides, with shellac or any other bonding or adhesive material so that, when it is heated, the sheets adhere to one another, to form a material known in the art as micarta. The paper which is placed between the conductors extends a sufficient distance farther than the outer layers to insure proper insulation of the two conductors from each other, as will be readily understood by those versed in the art.

Since the conductors used in my invention are rolled to reduce their cross section, their heat conductivity will be reduced, and, since the completed thermo-couple is a thin, flexible device, its absorbing surface is increased and its thermal capacity is reduced. The completed device is therefore adapted for use in the slots of dynamo-electric machines and similar apparatus for determining the temperature increases in such localities.

Referring now particularly to Fig. 3, two conductors 5 and 6 of dissimilar materials are welded together end to end, then bent into parallel side-by-side relation and then rolled flat, substantially as shown, leaving an air space 7 between them. Treated paper sheets 8 are placed on the sides of the flattened conductor and a compact body formed substantially by the same process as hereinbefore described with reference to the structure shown in Figs. 1 and 2. The thermo-couple shown in Fig. 3 is relatively thinner than the hereinbefore described couple by reason of the absence of the paper between the conductors and the location of the conductors in the same plane. However, since there is a substantial air gap between the two conductors, it is not desirable to use this form of thermo-couple in a magnetic field as its accuracy would be impaired by an added heating effect.

While I have described my invention with respect to particular constructions and with respect to definite materials, I desire it to be understood that various metals may be welded together and various insulating ma-

materials inserted between and around them to form thermo-couples which do not depart from the scope of my invention as defined in the appended claims.

5 I claim as my invention:

1. In a thermo-couple, the combination with two flexible metal conductors welded together end to end and folded substantially double upon each other, of a plurality of paper strips disposed between and on each side thereof to constitute a flexible structure.

2. A thermo-couple comprising two dissimilar flexible conductors connected together at one end and folded substantially double upon each other, and thin strips of insulating material disposed between and on each side of the conductors to constitute a relatively thin flexible structure.

3. A thermo-couple comprising two substantially flat conductors connected together at one end and folded substantially double upon each other, and strips of insulating material disposed between and on each side

of the conductors to constitute a relatively thin flexible structure.

4. A thermo-couple comprising two substantially flat conductors connected together at one end and folded substantially double upon each other, and strips of impregnated paper disposed between and on each side of the conductors to constitute a relatively compact flexible structure.

5. A thermo-couple comprising a plurality of relatively thin flat conductors of dissimilar metals connected together at one end and disposed in side-by-side relation, and thin strips of insulating material disposed between and on each side of the conductors to constitute a relatively thin flexible structure.

In testimony whereof I have hereunto subscribed my name this 13th day of Feb., 1914.

LEWIS W. CHUBB.

Witnesses:

O. W. A. OETTING,
B. B. HINES.