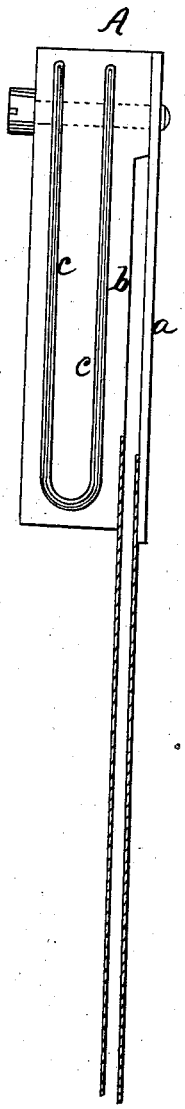
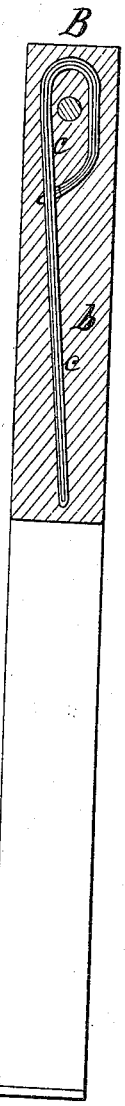
M. G. FARMER & H. J. SMITH.

THERMO ELECTRIC BAR.

No. 51,442. Patented Dec. 12, 1865.





Witnesses

A Gould

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UNITED STATES PATENT OFFICE.

MOSES G. FARMER, OF SALEM, AND H. JULIUS SMITH, OF BOSTON, MASS.

IMPROVEMENT IN THERMO-ELECTRIC BATTERIES.

Specification forming part of Letters Patent No. **51,442**, dated December 12, 1865.

To all whom it may concern:

Be it known that we, MOSES G. FARMER, of Salem, Essex county, and H. JULIUS SMITH, of Boston, Suffolk county, all of the State of Massachusetts, have invented an Improved Thermo-Electric-Battery Bar; and we do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of our invention sufficient to enable those skilled in the art to practice it.

The invention relates to improvements in thermo-electric batteries.

It has recently been pointed out by Marcus that an alloy of twelve parts of antimony with five parts of zinc forms a more energetic negative bar or plate for a thermo pair than any of the simple metals hitherto used. This compound, however, is very brittle, and is extremely liable to be broken by careless handling and by the unequal expansion or contraction produced by alternately heating and cooling it. To obviate such difficulty we strengthen such bars and render them much more stable by casting the alloy in a mold around or upon a wire rod or plate of tough metal or other suitable tenacious material; but we find that the electro-motive force of a thermo pair is in all cases diminished when the antimony-zinc alloy is in contact with such strengthening wire or rod, probably because a short local circuit is formed within the metal, owing to the difference of temperature between the two ends of such rod. Rods of steel, however, seem to act upon the electro-motive force of the pair less prejudicially than rods of other metals; but we find that if a plate of mica be used to strengthen the bar of antimony-zinc alloy, the electro-motive force of the thermo pair is not in the least diminished. So, too, if a metallic strengthening wire or rod—such, for instance, as a steel wire—be enameled or completely covered with some vitreous or other non-conducting substance, so as to be insulated, the wire, when thus protected, does not reduce the force of the pair. A convenient method of insulating wires or rods for this purpose is to plunge them for a moment into melted cryolite, or a mixture of cryolite and fluor-spar. It is better, before immersing the rod, to heat it nearly to the temperature of the melted flux; also to have the surface of the rod clean. Immersion for a few seconds is sufficient for wires of the size of Nos. 14 or 15, wire gage. Before coating the wire it is best to bend it into the shape desired, since much bending after it is coated would cause the covering to crack off.

To construct our improved bar we place the prepared wire rod, strengthening-bar, or "backbone," as we technically term it, within the mold, or in such relation to it as to permit the melted alloy, when poured into the mold, to envelop the wire or rod more or less completely, as may be desired; or we may so place the strengthening-rod as to be partly or wholly exterior to the bar, our object being to strengthen the bar by means of some tenacious support, and at the same time do no injury to its electro-motive force, and it is this strengthening of the bar and the insulation of the backbone which constitutes our improvement.

In large plates we use a number of wires, crossing or interlacing them at pleasure.

A coarse gauze of wire, when well coated or enameled, is very suitable for use in the interior of large plates.

It is plain that the positive bars of a thermo pair may be strengthened in a similar way, if necessary, and also other alloys or materials for the negative bar besides that described by Marcus, and referred to above.

A and B in the drawings represent sections of a thermo pair embodying our improvements.

a denotes the positive bar; *b*, the negative bar; *c*, the backbone or strengthening-wire. Preferably this wire is bent into the form shown in the sections and at C, and it is coated and the alloy melted around it, substantially as above set forth.

What we claim is—

1. The improved thermo-electric bar, constructed substantially as herein described—viz., by the addition of some supporting material more tenacious and less liable to be broken than the bar to which it is applied.

2. The employment of an insulating-coating applied to the supporting rod or wire, for the purpose substantially as set forth.

In witness whereof we have hereunto set our hands this 30th day of September, A. D. 1865.

MOSES G. FARMER.
H. JULIUS SMITH.

Witnesses:
J. B. CROSBY,
F. GOULD.