No. 819,654. PATENTED MAY 1, 1906.

H. E. HEATH.

FLEXIBLE SHEET RESISTANCE.

APPLICATION FILED DEC. 12, 1904.

Fig. 4.

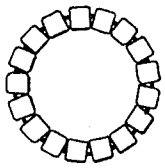


Fig. 5.

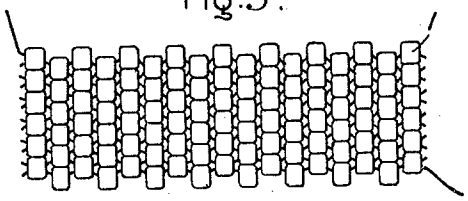


Fig. 1.

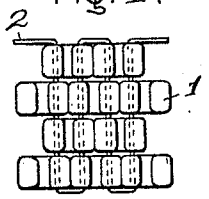


Fig. 2.

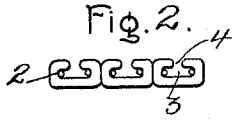
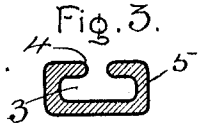


Fig. 3.



Witnesses.

Harry H. Tibbetts.

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Att'y.

UNITED STATES PATENT OFFICE.

HARRY E. HEATH, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

FLEXIBLE SHEET RESISTANCE.

No. 819,654. Specification of Letters Patent. Patented May 1, 1906.

Application filed December 12, 1904. Serial No. 236,457.

To all whom it may concern:

Be it known that I, HARRY E. HEATH, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Flexible Sheet Resistances, of which the following is a specification.

This invention relates to electrical resistance material, and has for its object the provision of a resistance fabric that may readily be constructed into various forms to adapt it for many uses in connection with electric heating and resistance units generally and which is thoroughly efficient and durable.

In carrying out my invention I provide a web of fabric composed of beads or buttons of refractory insulating material, preferably of vitreous character, such as glass, porcelain, or earthenware. These beads or buttons are formed into a fabric and supported and retained in that form by electrical conductors. The beads are slotted to receive the conductor, and the contacting of the adjacent beads with each other prevents short-circuiting of the conductor, while the rounded corners of the beads permit them to slip past each other, so as to render the fabric flexible. This construction permits of the fabric being made into any desired form and may be sewed between cloth covers or held in felt for a heating-pad. The beads are slotted, so as to make them readily detachable and to make it unnecessary to thread the conductor through the beads, which, especially in the case of a very long conductor, is very undesirable.

In the drawings I have illustrated various methods of carrying out my invention, while the claims appended hereto indicate the scope thereof.

In the drawings, Figure 1 is a plan view of one form of my insulating fabric. Fig. 2 is an end view thereof. Fig. 3 is an enlarged view of one of the beads shown in Figs. 1 and 2. Fig. 4 shows the fabric made into a cylindrical form, and Fig. 5 is a development of the cylinder shown in Fig. 4.

Referring to the drawings, the fabric is composed of beads 1, made C-shaped of some good refractory insulating material, preferably of a vitreous character, such as glass, porcelain, or earthenware. They may, however, be made of slate, wood, or of metal coated with enamel and may vary in shape. I arrange these buttons in columns in contact with each other, as shown, the contacting portions of the buttons of one row being opposite the slotted portions of the buttons in the adjacent row. An electrical conductor 2 is arranged to engage the slotted portions of the buttons, so that when the conductor is drawn taut the buttons are in contact, while their rounded edges permit them to slip past each other to form a flexible fabric.

In Figs. 4 and 5 I have shown a cylinder constructed from the same kind of buttons as those of Fig. 1, the cylinder being developed in Fig. 5. The buttons themselves are made, as shown in Fig. 3, with a flat hole 3 and one side 4, cut away sufficiently to permit the conductor to pass through it and into the hole 3. I have shown the button in Fig. 3 as made of metal with its surface 5 enameled. This makes a very cheap and efficient construction, for very little harm could be done by the chipping of the enamel, unless it chipped under both wires, in which case only one turn of the conductor would be short-circuited. By this construction any bead may be removed and another substituted therefor without disturbing the others. This construction also permits the use of long lengths of wire, which is not permissible where the conductor is threaded through the button.

A fabric formed of insulating-buttons, as herein described, will withstand a high heat and prevent short circuits when the conductor runs hot, as is frequently necessary in electric heaters. The beads are very strong and will withstand rough usage. As a resistance medium I may use any approved wire, satisfactory results having been obtained with "Climax" wire, being a nickel-steel compound, and with "Advance" wire or nickel-copper.

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

1. A resistance unit comprising a sheet of buttons having an electrical conductor running therethrough, and means whereby any one of said buttons may be detached from the unit without removing any of the others.

2. A resistance fabric comprising a plurality of rows of insulating apertured buttons

having one face slotted to admit a conductor to the aperture, and an electrical conductor running through said aperture.

3. A resistance fabric comprising a plurality of rows of insulating apertured buttons having one face slotted to admit a conductor to the aperture, and an electrical conductor running through said aperture, said conductor engaging each button on opposite sides of its interior wall.

4. A resistance fabric comprising a plurality of rows of insulating apertured buttons having one face slotted to admit a conductor to the aperture, and a continuous electrical conductor running through said aperture, said conductor engaging each button on opposite sides of its interior wall.

5. A resistance fabric composed of a plurality of rows of insulating-buttons, and an electrical conductor in engagement with said buttons, and means whereby any one of said buttons may be removed from said engagement without removing any of the others.

In witness whereof I have hereunto set my hand this 9th day of December, 1904.

HARRY E. HEATH.

Witnesses:

JOHN A. McMANUS, Jr.,

DUGALD McK. McKILLOP.