

Oct. 22, 1968

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3,407,263

FLEXIBLE ELECTRICAL CONDUCTOR

Filed Dec. 20, 1967

Fig. 1.

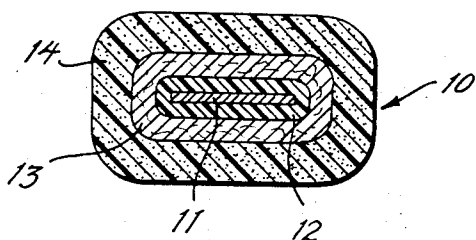
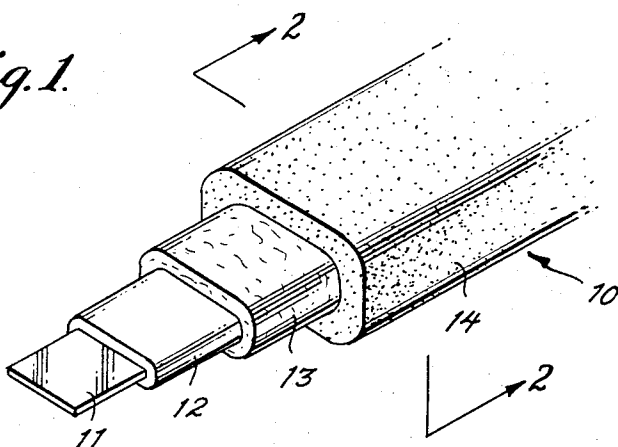


Fig. 2.

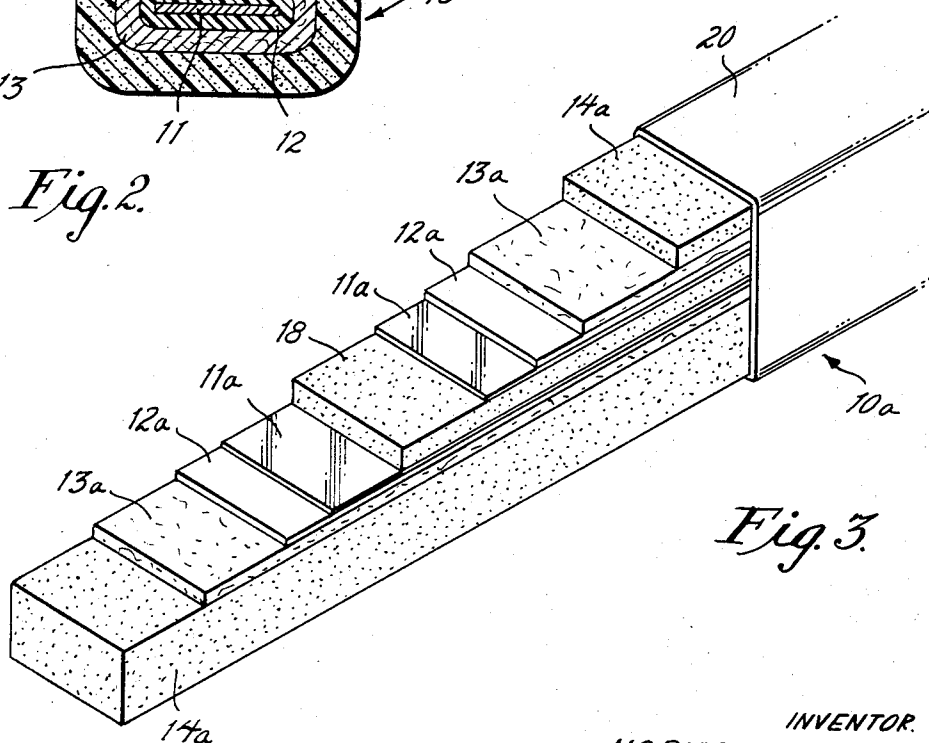


Fig. 3.

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FLEXIBLE ELECTRICAL CONDUCTOR
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Continuation-in-part of application Ser. No. 370,581, May 27, 1964. This application Dec. 20, 1967, Ser. No. 692,206

6 Claims. (Cl. 174-113)

ABSTRACT OF THE DISCLOSURE

A flexible electrical-conductor structure wherein a conductor of aluminum foil is immediately protected by a contiguous layer of flexible terephthalate, a woven fabric being in intimate engagement with the terephthalate, and an insulation covering a foam being adhesively secured to the woven fabric.

Cross-references to related applications

This application is a continuation-in-part of my co-pending patent application Ser. No. 370,581 filed May 27, 1964, now abandoned.

Background of the invention

In the field of conductor structures, there are certain conditions of use wherein such structures must withstand repeated impact and flexure without failure or diminution of useful life. While these features may be advantageous in many circumstances, they are absolutely essential in the use of conductor structures as treadles for persons or vehicles, safety edges for doors, and many others.

Prior to the instant invention, these and similar applications were subject to frequent malfunction by fracture or other failure of conductors, or required extremely expensive conductor structures or other forms of power, such as pneumatic and hydraulic.

Summary

Accordingly, it is an important object of the present invention to provide a unique conductor structure which is relatively freely deflectable and flexible, while possessing greatly enhanced resistance to impact and damage from flexure.

It is another object of the present invention to provide a conductor structure having the advantageous characteristics mentioned in the preceding paragraph which produces extremely low power loss while utilizing relatively inexpensive conductor material, and effectively protects the conductor material from the effects of repeated impact and flexure to greatly enhance its useful life at substantial savings in cost.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, which will be exemplified in the construction hereinafter described, and of which the scope will be indicated by the appended claims.

Brief description of the drawings

FIGURE 1 is a perspective view showing a conductor structure of the present invention, broken away for clarity.

FIGURE 2 is a transverse section taken along the line 2-2 of FIGURE 1.

FIGURE 3 is a perspective view showing a slightly

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modified conductor structure of the present invention, also broken away for clarity.

Description of the preferred embodiments

Referring now more particularly to the drawings, and specifically to FIGURES 1 and 2 thereof, the conductor structure is there generally designated 10, and, for purposes of illustration, is shown as a single conductor structure. Centrally of the conductor structure 10 is a conductor proper, designated 11, advantageously fabricated of aluminum foil in strip form. In practice, conductor strips 11 of aluminum foil have been employed in thicknesses between .001 and .005 inch. The width of the aluminum-foil conductor strip 11 may be as desired, 1/2 inch having been found satisfactory for certain safety-door-edge uses.

Surrounding the conductor strip 11 is a layer 12 of terephthalate, sometimes sold under the trademark Mylar. The terephthalate layer 12 is secured in intimate face-to-face engagement with the aluminum-foil strip 11 by thermoplastic adhesion, so that the physical characteristics of the terephthalate are effectively imparted to the aluminum strip.

Surrounding the terephthalate is a layer of woven fabric 13, advantageously asbestos. The asbestos 13 is also secured in intimate face-to-face engagement throughout with the terephthalate by thermoplastic adhesion. In this manner, the physical qualities of the asbestos layer are effectively imparted, through the terephthalate, to the aluminum foil. By this intimate, overall securement of the aluminum-foil strip 11, terephthalate layer 12 and asbestos layer 13, these components function in a unitary manner, the reinforcement in flexure of the terephthalate, and the resistance to puncture and rupture of the asbestos being imparted to the foil strip.

In addition, surrounding the asbestos layer is an insulating covering 14 of a relatively soft, resilient plastic or rubber foam. The foam covering 14 is adhesively secured in intimate facing engagement throughout with the asbestos layer 13 and contributes, in addition to its insulation, resilience to restore the structure to its original condition immediately following impact and flexure. The foam covering 14 is advantageously at least 1/8 inch thick, and of a quality generally called soft or medium soft. The terephthalate may be of a thickness between .003 and .006 inch, it having been found satisfactory to employ terephthalate of .005 inch in thickness. The weight of asbestos may vary, within the limits imposed by the desired flexibility.

In the embodiment shown in FIGURE 3, there is a conductor structure generally designated 10a, which is in many respects similar to the conductor structure 10, but is illustrated as being a two-conductor structure.

More particularly, the conductor structure 10a includes an intermediate or spacer strip 18, which may be of foam, or other suitably flexible material. On opposite sides of the spacer strip 18 are a pair of conductor strips 11a, advantageously of aluminum foil such as the conductor strip 11.

Intimately secured by thermoplastic adhesion in face-to-face engagement with the outer face of each conductor strip 11a is a terephthalate strip 12a. The terephthalate strip 12a may be similar to the terephthalate layer 12, say of a thickness between .003 and .006 inch.

Intimately bonded by thermoplastic adhesion on the outer faces of the terephthalate layers 12a, completely covering the latter, are respective layers of woven fabric 13a, advantageously asbestos. On the outer face of each asbestos layer 13a, adhesively secured thereto throughout the faces thereof are covering layers of foam 14a. The upper layer 14a, as shown in the illustrated embodiment, may be of considerable difference in thickness from the

lower layer 14a. An enclosure or casing 20 may surround the structure 18, 11a, 12a, 13a and 14a.

Thus, the conductor structure of FIGURE 2 defines a two-conductor structure, including a pair of aluminum-foil conductor strips 11a. If desired, the spacer 18 may be of a perforate construction, say to permit contact between the conductor strips 11a upon depression through the spacer.

From the foregoing, it is seen that the present invention provides an electrical-conductor structure which fully accomplishes its intended objects and is well adapted to meet practical conditions of manufacture and use.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. A long-life impact- and flexure-resistant electrical-conductor structure comprising an elongate conductor of aluminum foil; a layer of flexible terephthalate in intimate face-to-face engagement with and thermoplastically secured to said foil to enhance flexural life of the foil; a woven fabric in intimate face-to-face engagement with and thermoplastically secured to said terephthalate on the face thereof remote from said foil to afford increased tear resistance to the foil; and an insulating cover of

relatively soft resilient foam material adhesively secured in intimate face-to-face engagement with said fabric on the face thereof remote from said terephthalate for affording resilience to the fabric, terephthalate and foil.

2. An electrical-conductor structure according to claim 1, said aluminum-foil conductor being of a thickness between .001 and .005 inch.

3. An electrical-conductor structure according to claim 1, said terephthalate being of a thickness between .003 and .005 inch.

4. An electrical-conductor structure according to claim 1, said fabric comprising asbestos for insulating said foam from the heat of said conductor.

5. An electrical-conductor structure according to claim 1, said foam being at least $\frac{1}{8}$ inch thick.

6. An electrical-conductor structure according to claim 1, said conductor comprising a pair of spaced aluminum-foil strips, and a flexible spacer strip interposed between said foil strips.

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