July 22, 1947. A. L. DUNA 2,424,388

BUOYANT CABLE

Filed Nov. 18, 1943

FIG. 1.

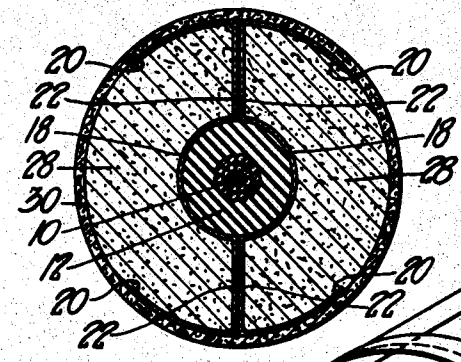


FIG. 2.

FIG. 3.

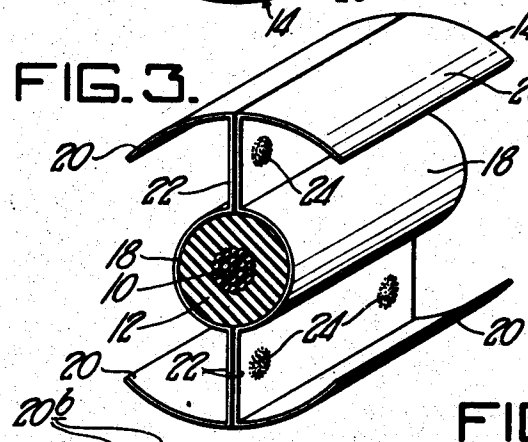


FIG. 4.

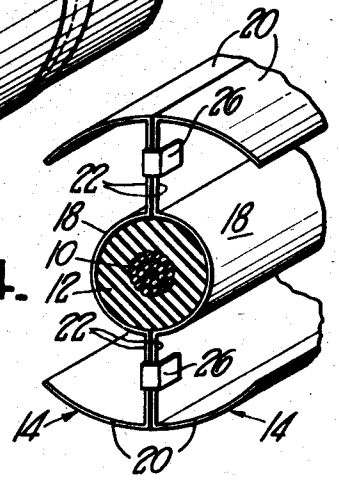


FIG. 5.

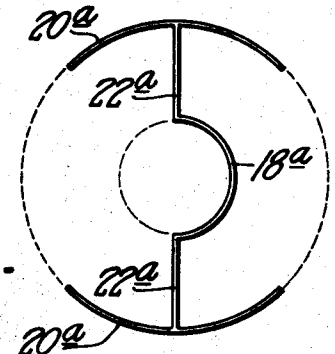
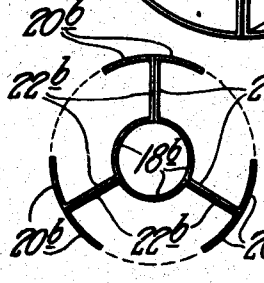


FIG. 6.



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BUOYANT CABLE

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5 Claims. (Cl. 174—101.5)

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The present invention relates to improvements in details of structure and arrangement of a buoyant cable or insulated electric conductor. Buoyant cables are broadly old, hence the same is not broadly claimed, the invention relating chiefly to improvements in the composite structure and arrangement which provides desirable economies in the initial cost of production and also enables the cable to be kept in practical service over a long period of time at a minimum maintenance cost. The invention will be fully apparent from a consideration of the following detailed disclosure and appended claims when read in connection with the accompanying drawings, in which:

Figure 1 is a cross section through a conductor cable illustrating a preferred form of the herein claimed invention.

Figure 2 is an isometric sectional view of the cable shown in Figure 1.

Figure 3 is an isometric view showing the heat conducting skeleton engaging the conductor of Figures 1 and 2 prior to the assembly therewith of the buoyant body.

Figure 4 is an isometric detail illustrating a modification.

Figures 5 and 6 illustrate further modifications of one of the elements of the buoyant cable.

Referring in detail to the embodiment of the invention illustrated in Figures 1 to 3, 10 may be regarded as either a solid or stranded electrical conductor of conventional form surrounded by any approved type of dielectric material such as rubber or conventional wrappings of insulation. The characteristic feature of the herein claimed invention relates to improved means for applying a buoyant body to an insulated cable adapted to render the entire assembled structure buoyant and at the same time to provide means which will effectively transmit heat generated in the conductor outwardly and dissipate the same to the surrounding medium. To these ends, I provide a plurality of skeleton sections, such, for example, as shown at 14 in Figure 3. A number of these skeletons, indicated at 14 and 14ª in Figure 2, are arranged end to end, lengthwise of the cable, and are coupled or united in such endwise relation by exterior peripheral bands 16 of pliable material. The skeletons 14, 14ª, etc., are preferably duplicates and are of the segmental form shown in Figure 3, each skeleton comprising an inner substantially semi-circular segment 18 and a pair of outer arcuate segments 20—20, the latter being connected to the inner segment 18 by radial web portions 22—22. The web portions are arranged in face-to-face abutting engagement and are adapted to be either welded together as indicated by the spot welds 24 in Figure 3, or secured by clips or bent-over portions indicated at 26 in Figure 4 or wire stitches.

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Located between the inner and outer segments 18 and 20 are buoyant bodies 28—28 of material having very low thermal conductivity and also low specific gravity, the material selected being of a character which will render the entire assemblage floatable in water. Surrounding the assembled structure, there will generally be provided an outer protective waterproof jacket 30 which may be either a fabric braid, wrapping of tape, or a protective coating of rubber or synthetic compound or the like well known to those skilled in the art.

In the modification shown in Figure 5, the heat-conducting skeleton constitutes an inner substantially semicircular segment 18ª and a plurality of outer segments 20ª connected by web portions 22ª. When this form of heat-conducting skeleton is used, approximately only half of the exterior of the cable will be embraced by the segments 18ª, and it is contemplated that for some uses this may be sufficient, in which case the inner embracing segments may be staggered by having alternate ones in endwise alignment with the intermediate sections between them turned at any angle up to 180° to thus provide means for conducting heat outwardly from all portions along the length of the cable. Generally, the skeleton of Figure 3 including two complementary metallic heat-conducting sections for dissipating the heat from the conductor is preferred. However, I am not limited to such construction since it is also feasible to form the heat-conducting skeleton in three segments, such as shown in Figure 6, consisting of inner segments 18ᵇ of 120°, 18ᵇ connected by radial web portions 22ᵇ with outer arcuate segmental portions 20ᵇ, the webs 22ᵇ being either welded together or secured by clips or by other convenient fastening devices. In the manufacture of all embodiments of the invention illustrated, the heat-conducting skeletons are preferably made of metal of high heat conductivity such as copper, aluminum, or mild steel, although in some instances, non-metallic extrudible plastic material may be used. But it is essential, whether metallic or non-metallic materials are used, that the inner and outer segments and their connecting webs shall be of material characterized by a high degree of heat conductivity so as to readily dissipate the heat generated in conductor 10 to the

surrounding medium, such as water, in which the cable is adapted to float. The provision of such a heat dissipating assemblage is of importance in the cable of the character herein claimed since the normal tendency of the buoyant body 28 is to act as a heat insulator and therefore retain the generated heat in the interior to the detriment of the dielectric value of the insulation 12.

The described cable construction is desirable since its components can be readily produced by mass production methods, it being apparent that the metallic or extruded heat-conducting skeletons are producible by simple bending or extruding operations, and that the low specific gravity buoyant elements 28 can be premolded of vulcanized cellular rubber, compressed granulated cork, or equivalent floatable buoyant material whose specific gravity is less than unity. Such molded or otherwise preformed buoyant elements can be inserted endwise between the inner and outer segments, whereupon the sub-assemblies of complementary units can be applied in such a way as to embrace the exterior of the insulated conductor, the parts then being integrated in end-to-end relation by the pliable connecting strips or bands 16 after which the outer covering 30 in the form of either a braided cover, wrapping of tape, or protective jacket of rubber or synthetic compound can be applied in any conventional manner well known to those versed in the art of wire and cable manufacture.

While I have described quite precisely certain preferred constructions embodying the invention, it is not to be construed that I am limited thereto, since variations and substitutions of equivalents may be made by those skilled in the art without departure from the invention as defined in the appended claims.

I claim:

1. An electrical conductor surrounded with a dielectric cover, a plurality of complementary skeleton sections of high thermal conductivity arranged end to end lengthwise of the conductor, each of said skeleton sections comprising inner and outer arcuate segments connected by web portions, the inner segments jointly enveloping said dielectric cover, means securing the outer segments together in face-to-face abutment and end-to-end relation, respective buoyant bodies of low thermal conductivity retained between said inner and outer segments, and an outer protective enclosure for the aforesaid components.

2. An electrical conductor surrounded with a dielectric cover, a plurality of complementary metallic skeleton sections arranged end to end lengthwise of the conductor, each of said skeleton sections comprising respective inner and outer arcuate segments connected by radial web portions, means integrating said web portions, a buoyant body of low thermal conductivity retained between the inner and outer segments of each of said sections, and pliable connecting strips encircling the arcuate portions of said outer segments and said low thermal bodies retained thereby.

3. An electrical conductor surrounded with a high dielectric cover, a plurality of complementary metallic skeleton sections of high thermal conductivity each comprising inner substantially semi-circular segments and outer peripheral portions connected to one another by contacting radial web portions, welded joints uniting said web portions, respective buoyant bodies of low thermal conductivity retained between the inner and outer portions of said skeleton sections, and pliable means connecting said outer peripheral portions in end-to-end relation.

4. An electrical conductor surrounded with a high dielectric cover, a plurality of complementary metallic skeleton sections of high thermal conductivity, each comprising an inner substantially semi-circular segment, an outer peripheral portion and radial web portions, welded joints uniting said web portions, respective buoyant bodies of low thermal conductivity retained between the inner and outer portions of said skeleton sections, pliable means connecting said outer arcuate portions in end-to-end relation, and an outer protective enclosure for the aforesaid components.

5. An article of manufacture for enclosing and floatingly supporting an inner relatively hot member, said article consisting of a shell-like skeleton of material of relatively high heat conductivity, an outer body of substantial thickness characterized by relatively poor heat conductivity and whose specific gravity is less than one, said skeleton having inner and outer concentric shell-like portions connected by radial web portions, said inner shell portions being shaped to make snug thermal contact with a substantial area of said inner member and said outer portions being adapted to expose a substantial area on the outer periphery for the purpose of dissipating heat conducted outwardly through said body to the surrounding medium.

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