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FLUID-COOLED ELECTRIC CABLE

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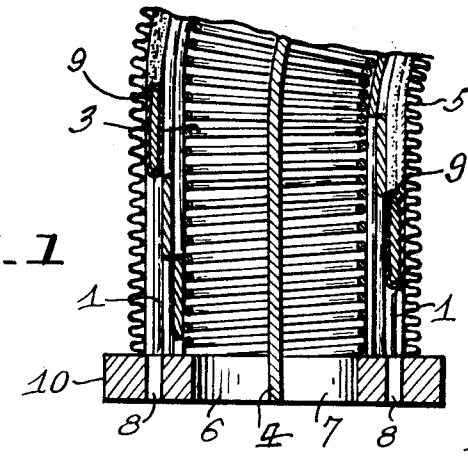


Fig. 1

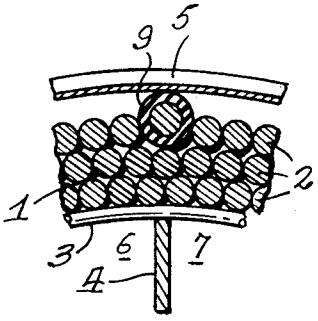


Fig. 3

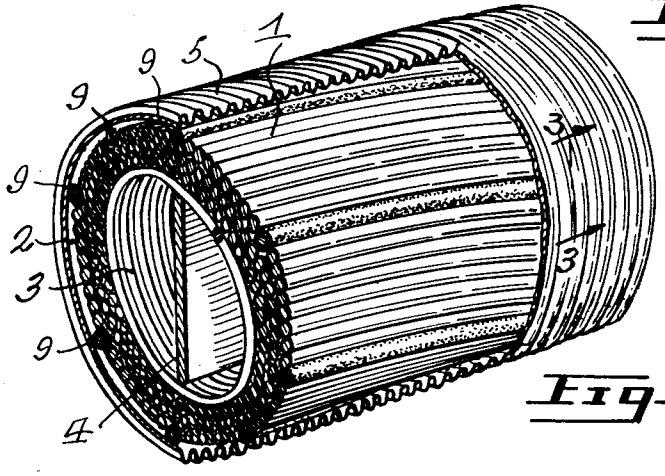


Fig. 2

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FLUID-COOLED ELECTRIC CABLE

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9 Claims. (Cl. 174—15)

This invention relates to electric cables and more particularly to fluid-cooled cables capable of conveying heavy currents.

In fluid-cooled electric cables, such as those employed as furnace cables which generally include a central annular conductive core and an outer tubular member encompassing the core, some difficulty has been encountered due to the chafing of the inner surface of the tubular member by the outer surface of the annular core owing to the vibration of the cable when in use. This condition is particularly evident when the frequency of the energy employed is low, such as 25 cycles.

It is an object of the present invention to provide a fluid-cooled cable, capable of conveying heavy currents, with means to eliminate the adverse effects due to the movements between the elements of the cable.

This and other objects of this invention are attained by providing in one embodiment a self-supported fluid-cooled cable which includes a hollow core consisting of a plurality of layers each of which layers consists of a plurality of bare conductors, includes an outer flexible sheath encompassing the core and includes a plurality of spaced covered conductors, or resilient members, interspersed with the bare conductors in the outer layer of the core, which covered conductors or resilient members act as dampeners and are of such a cross section as to provide a space between the inner surface of the outer sheath and the outer surface of the outer layer of the core.

A better understanding may be had by referring to the following description, taken in conjunction with the drawings, in which like numbers refer to like parts, in which:

Figs. 1 and 2 illustrate a fragmentary sectional side and an end view respectively of a part of the loop of a fluid type cable in which the invention is represented.

Fig. 3 is a partial sectional view of Fig. 2 taken along lines 3—3.

Considering the drawings, there is illustrated a section of a cable having a hollow conductive core 1, comprising a plurality of bare conductors 2 stranded together; a spiral spring member 3 and a flexible flat member 4, both members being located within the core; an outer flexible liquid-tight metal sheath 5, inner passages 6, 7 and outer passages 8 in terminal 10 for a coolant liquid. A cable of this type is described in U.S. application Serial No. 574,773, filed March 29, 1956, of T. D. I. Ker, now abandoned.

Interspersed with the bare conductors 2 so that they are anchored thereto and spaced apart from each other, are members 9, consisting of conductors similar to conductors 2 but covered with an abrasion resistant resilient material having a low coefficient of friction such as polyethylene or neoprene and arranged so as to space the outer sheath 5 a predetermined distance apart from the conductors 2. The members 9 could equally well consist entirely of resilient material.

Since the inner surface of the sheath 5 and the outer surface of the core 1 are separated by the covered conductors 9, the possibility of any chafing by the movement or vibration of the cable will be reduced. As the outer sheath 5 and the core 1 generally vibrate at different rates, the vibration of the outer sheath 5 will be damped so that any chafing due to this condition will be reduced. Since the conductors 9 are covered with a resilient material, the expansion and contraction of the cable will be cushioned by these conductors.

What is claimed is:

1. An electric cable capable of carrying heavy currents and adaptable to be cooled comprising in combination: a central core, including a plurality of layers of bare conductors; a flexible liquid-tight outer sheath encompassing the core; a plurality of covered conductors, spaced apart and stranded with and partially contained within the conductors of the outer layer of the core, the cross section of the covered conductors being of larger diameter than that of the bare conductors among which they are stranded so as to provide a predetermined passageway between the inner surface of the flexible sheath and the surface of the outer layer of the core; means for applying a coolant to the passageway.

2. An electric cable in accordance with claim 1 in which the cover of the said covered conductors consists of a resilient material.

3. An electric cable in accordance with claim 2 in which the resilient material is abrasion resistant and has a low coefficient of friction.

4. An electric cable in accordance with claim 1 which is self-supported.

5. A self-supported electric cable capable of conveying a heavy current from an energy source to an electrical device and adapted to be cooled, comprising in combination: a flexible hollow core defining a cylindrical passageway and consisting of a plurality of layers of bare conductors and flexible means disposed within the passageway for supporting the bare conductors; a flexible liquid-tight outer sheath encompassing the core; a plurality of covered conductors, spaced apart and stranded with and partially contained within the conductors of the outer layer of the core, the cross-section of the covered conductors being of a larger diameter than that of the bare conductors among which they are stranded so as to provide a predetermined passageway between the inner surface of the flexible sheath and the surface of the outer layer of the core; means applying a coolant to the passageway.

6. A self-supported cable in accordance with claim 5 in which the cover of the said covered conductors consists of a resilient material.

7. A self-supported electric cable in accordance with claim 6 in which the resilient material is abrasion resistant and has a low coefficient of friction.

8. A self-supported electric cable capable of conveying a heavy current from an energy source to an electrical device and adapted to be cooled, comprising in combination: a flexible hollow core defining a cylindrical passageway and consisting of a plurality of layers of bare conductors and flexible means disposed within the passageway for supporting the bare conductors; a flexible liquid-tight outer sheath encompassing the core; a plurality of resilient members, spaced apart and stranded with and partially contained within the conductors of the outer layer of the core, the cross section of the covered conductors being of a larger diameter than that of the bare conductors among which they are stranded so as to provide passageway between the inner surface of the flexible sheath and the surface of the outer layer of the core; means for applying a coolant to the passageway.

9. A self-supported electric cable in accordance with

claim 8 in which the resilient members are made from an abrasion resistant material having a low coefficient of friction.

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