

[72] Inventor **Jean Royet**
Orsay, France
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 [73] Assignee **Compagnie Generale D'Electricite**
Paris, France

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Primary Examiner—Lewis H. Myers
Assistant Examiner—A. T. Grimley
Attorney—Sughrue, Rothwell, Mion, Zinn & Macpeak

[54] **SUPERCONDUCTING CONDUCTOR**
 3 Claims, 2 Drawing Figs.

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 H01b 7/34

[50] Field of Search 174/126,
 128, 128 SC, 15, 15 C; 335/216

ABSTRACT: A stabilized superconducting conductor formed of a tube of aluminum alloy having at least one wire of superconductive material disposed therein and a sheath of high-strength material covering the outside of the tube in good thermal and electrical contact with the tube.

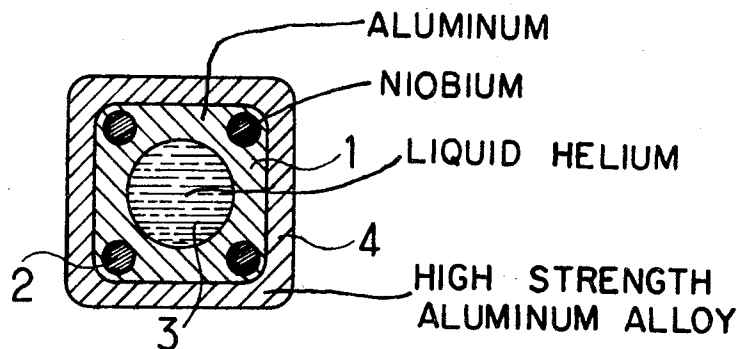


FIG. 1

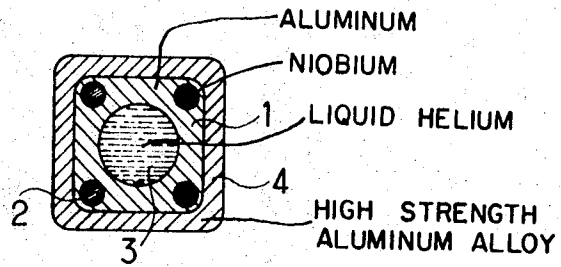
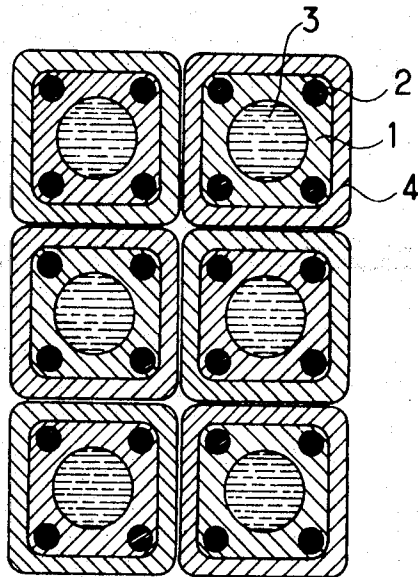


FIG. 2



SUPERCONDUCTING CONDUCTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a stabilized tubular superconducting conductor, preferably consisting of aluminum and having a high-mechanical strength.

2. Description of the Prior Art

A superconducting conductor consisting of a metal tube having good electrical conductivity at normal temperature, such as aluminum, and in which there are inserted wires or strips of superconducting material, are already known. The conductor is kept at a low temperature by circulation of a cryogenic fluid within the tube.

Also known are superconducting conductors of a similar type wherein good mechanical strength is achieved by introducing into the tube strips or wires of material having high mechanical strength, such as steel.

These prior art conductors have the disadvantage that they have poor resistance to mechanical forces developed transverse to the axis of the conductor, because the conductor is reinforced by wires or strips, whose mean direction is perpendicular to the forces.

It has been suggested to substitute a copper or iron tube for the aluminum tube in order to achieve greater strength, however, considerable difficulties are then encountered in the fabrication of the conductor, for example, it becomes very difficult to produce the conductor by the method of extrusion.

In addition, tubular conductors of the prior art were formed of elements of given lengths which are then joined together. The danger of leakage at the connecting joints is considerable and this is totally unacceptable where the conductors are placed in a vacuum while being subjected to an internal pressure.

SUMMARY OF THE INVENTION

The present invention has for its object the provision of a stabilized superconducting conductor having good mechanical strength in the transverse direction and which can be entirely produced by extrusion in lengths as great as a number of kilometers.

The present invention concerns a superconducting conductor consisting of at least one wire or strip of superconducting material which is disposed within a tube consisting of a material having good electrical conductivity at normal temperature and which wire or strip is substantially parallel to the axis of the tube. The conductor is distinguishable in that it is provided with a sheath of high strength material which covers the external surface of the tube and is in good contact with the surface. The sheathing preferably consists of an aluminum alloy which can be applied around the tube by a method of extrusion.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments are set forth in the following description by way of nonlimiting example and with reference to the accompanying drawings, in which:

FIG. 1 illustrates a superconducting conductor according to

the invention, as seen in transverse section, and FIG. 2 illustrates a superconducting conductor as seen in transverse section, in accordance with another embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, numeral 1 designates a tubular element which preferably consists of aluminum, but which may also consist of any material having, at normal temperature, an electrical conductivity similar to that of aluminum, for example, copper or silver.

Tube 1 has a substantially square external cross section and a circular internal cross section. It would be possible, without departing from the scope of the invention, to employ a tube 1 having external and internal cross sections of different form.

Wires 2 are embedded within the tube 1 substantially parallel to the axis of the tube 1, or the wires 2 may be disposed helically. The wires 2 consist of superconducting material such as niobium-zirconium, niobium, tin, lead, niobium-titanium, etc.

As a variant, the wires may be replaced by tapes or strips, or all three (wires, tapes and strips) may be used at the same time. The wires 2 may also be coated with a thin layer of metal such as indium or copper.

The superconducting tube 1 and wire 2 assembly is preferably produced by a method of extrusion. The central passage 3 within the tube 1 permits the circulation of a cooling fluid such as liquid helium.

The tube 1 consists of metals which have a high degree of purity in order to ensure stabilization of the conductor when it operates in the superconductive state.

In order to ensure that the conductor has good mechanical strength in the transverse direction, the tube 1 is covered by a sheathing 4 consisting of a material having high-mechanical strength. The material is preferably metallic and consists of, for example, aluminum alloys of the following types, Au 4, G, AZ 5 G, AZ 8 Gu, etc.

The aluminum alloy sheathing 4 is positioned around the tube 1 by a method of extrusion, which ensures good thermal and electrical contact with the tube 1. Conductors may therefore be constructed of great length, such as, for example, a number of kilometers, without requiring a joint of any form.

FIG. 2 illustrates the transverse section of a composite conductor formed of six conductors, each of which is similar to that described in FIG. 1, and disposed adjacent one another to form a conductor of rectangular cross section.

What is claimed is:

1. A superconducting conductor consisting of:

- a tube of a material having an electrical conductivity similar to that of aluminum at normal temperature,
- at least one wire of superconducting material disposed within and substantially parallel to said tube, and
- a sheathing of high-strength material covering the external surface of said tube in thermal and electrical contact with said surface.

2. A conductor according to claim 1 wherein said sheathing consists of an aluminum alloy.

3. A conductor according to claim 2 wherein said sheathing is extruded around said tube.