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(54) Improved structure of audio signal cable

(57) An improved structure of audio signal cable, the features of which are that the audio signal cable is comprised of arrayed solid and tinsel wire conductors. After each of the conductors are insulated and bundled, they are placed into a surrounding insulation. The solid conductors are of a circular and a flat, thin shape. The solid conductors are of differing larger and smaller diameters

and, furthermore, disposed in unequal quantities. The smaller diameter tinsel wires are twined to increase distance and enlarge their surface area to reduce skin effect for better high frequency transmission, while the larger diameter conductors enable the rapid conveyance of low frequencies. As such, the present invention achieves the synchronous phasing of high and low frequency signals.

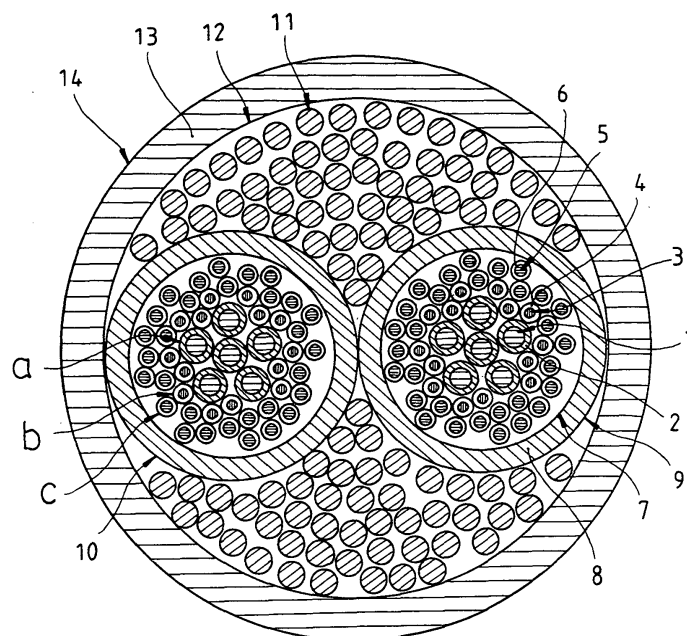


FIG. 1

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Description

BACKGROUND OF THE INVENTION

1) FIELD OF THE INVENTION

[0001] The invention herein relates to high-fidelity sound system equipment and accessories, specifically an improved structure audio signal cable suitable for full frequency range (high, medium and low frequency) applications.

2) DESCRIPTION OF THE PRIOR ART

[0002] Signal transmission requirements have become higher because of the greater fidelity and sensitivity of currently available high fidelity audio system equipment. However, the signal cables utilized to convey alphanumeric pulse or audio frequency, alternating current signals involve transmission principles that are much more complex than that of direct current transmission. In addition to the resistance encountered by electricity flowing through the conductors and the generation of a magnetic field, there is skin effect occurring between high and low frequencies as well as phase distortion. To transmit a signal via a conductor at a balanced and total true-fidelity, acoustic frequency range (20Hz to 20kHz or wider), the design of the conductive material is extremely painstaking. Only this way can an amplified signal sound like the original when replayed through a loudspeaker.

[0003] Good signal cables should support fine dynamics, separation, and rich overtones as well as presence and musicality, but most importantly, it must have a very high degree of balance. Since balance is the most essential factor of high fidelity acoustics, when full-range balance is poor, this results in various problems. For example, insufficient bass makes people feel that music is muted and diluted. Conversely, when bass is excessive, sound becomes too dense and even burdensome. Sound becomes cold when midrange is lacking and overly warm when too much is heard. At the same time, overall definition is decreased, resulting in acoustic dispersion, sound alteration, and positional inaccuracy problems. When treble projection is inadequate, music becomes depressive, monotonous, and spatially confined, while the reverse situation results in a presentation that is too bright and lively. Interfacing robust cabling with other equipment involves a certain degree of difficulty; in conventional signal cables, skin effect is a challenging problem in that it is a common cause of distortion and adversely affects signal transmission.

SUMMARY OF THE INVENTION

[0004] Therefore, the primary objective of the invention herein is to provide a full frequency range, improved structure audio signal cable capable of solving the tech-

nological problems that would allow the output of different frequency band signals (i.e., treble, midrange, and bass), while also preventing phase differences.

[0005] To achieve the said objective, the invention herein utilizes the following technological means: The audio signal cable of the present invention is comprised of arrayed solid and tinsel wire conductors; after each of the conductors are insulated, they are placed into a surrounding insulation

[0006] The solid conductors of the invention herein are of a circular and a flat, thin shape as well as differing larger and smaller diameters and, furthermore, disposed in unequal quantities.

[0007] The solid conductors of the invention herein are of differing larger diameters, wherein the diameter of the larger solid conductors is two to three times that of the smaller solid conductors.

[0008] In the audio signal cable of the invention herein, there are different diameter larger and smaller and, furthermore, circular and flat-, thin-shaped cables as well as tinsel wires disposed in unequal quantities that are covered to form cables, with filler elements disposed in the space between the cables and the insulation.

[0009] To compare the invention herein with the prior art, each cable is a structure consisting of a plurality of parallel, separate, and insulated conductors, wherein the cables thereof are thin and light, and most importantly have exceptionally low inductance and capacitance to convey tone color clearly and accurately. Furthermore, since high frequency signals are conveyed at faster speeds along metal surfaces and arrive first, while low frequency signals travel along the center of the conductors and arrive later, the smaller diameter tinsel wires are twined to increase distance and enlarge their surface area to reduce skin effect for better high frequency transmission, with the larger diameter conductors enabling the rapid conveyance of low frequencies. As such, the present invention achieves the synchronous phasing of high and low frequency signals.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Figure 1 is a cross-sectional drawing of the structure of the invention herein.

Figure 2 is a cross-sectional drawing of another embodiment of the invention herein.

DETAILED DESCRIPTION OF THE INVENTION

[0011] First, the advantages of tinsel wire for amplified music broadcasting is explained. As is well known, for any conductor carrying an electric current, the electric current transmitted is affected by capacitance, inductance, and impedance inherent in the conductor itself. Such capacitance, inductance, and impedance inevitably causes phase shifts and frequency attenuation of the

electrical signal, resulting in transmission losses. Moreover, high frequency signals and rich harmonic waves are easily dissipated by the low quality physical characteristics of the cable and insulative covering, noticeably reducing acoustic detail and timbre as well as other high fidelity components. To remedy such situations, in addition to improving the material quality of the cables and utilizing a relatively thin, flat material to achieve greater optimization within the bounds of practicality, the surface area of the conductor is enlarged to offset the skin effect that becomes more serious as the conductive efficiency of a conductor is raised. The best means of increasing conductor surface area is to utilize ultra-thin copper foil as the material; superior tinsel wire has a transmission impedance of only 2.5 ohms, which is approximately 1/50 that of a conventional rod-shaped material; as such, tinsel wire has low transmission impedance, meaning that it has even higher transient current conductivity, better transmission speed and load control capability, and a signal transmission phase shift of nearly zero, ensuring no signal phase shifting and noticeably enhancing sound position, focus, and separation.

[0012] Referring to FIG. 1, larger solid conductors 1 and their insulation 2 comprise cables a, smaller solid conductors 3 and their insulation 4 comprise cables b, and tinsel wires 5 and their insulation 6 comprise cables c; after the cables a, b, and c of differing quantity and size are bundled into a multiple core conduit 7, an insulation 8 is placed around the outer extent of the multiple core conduit 7 to form a multiple core signal cable 9 and 10, filler elements 11 are disposed laterally along the multiple core signal cables 9 and 10 to form a multiple core composite cable 12, following which insulation 13 is placed around the multiple core composite cable 12 to complete the first embodiment cable 14 of the invention herein.

[0013] Referring to FIG. 2, the cross-sectional drawing of another embodiment of the invention herein, this variation is based on the first embodiment of the invention herein and additionally includes a thin, flat conductor 15 that is cross-sectionally rectangular which becomes a cable following the placement of insulation 16 around it; after the cables a, b, c, and d of differing quantity and size are bundled into a multiple core conduit 7, an insulation 8 is placed around the outer extent of the multiple core conduit 7 to form the multiple core signal cables 9 and 10, filler elements 11 are disposed laterally along the multiple core signal cables 9 and 10 to complete a multiple core composite cable 12, following which an insulation 13 placed around the multiple core composite cable 12 to complete the second embodiment cable 14 of the invention herein.

[0014] The said conductor refers to any conductive material; conductive cables are typically available in range of certain metals, but can be constructed of any suitable metallic material such as solid copper or multi-stranded copper cable, metal-based coatings containing silver, aluminum, iron, and other metals as well as

alloys and other different formulations; the conductor can also be a non-metallic compound having conductive properties.

[0015] The said insulation, also known as a dielectric, refers to a material suitable for cable insulation such as polyethylene, polypropylene, fluoropolymer, crosslinked polyethylene, rubber, and other similar materials; many insulation materials also contain more than one type of additive such as a flame retardant agent and a mildew-proofing agent.

[0016] The said larger solid conductors 1 and smaller solid connectors 3 have physical diameters that are determined through actual testing; in the embodiments herein, the diameter of the larger solid conductors 1 is two times that of the smaller solid conductors 3.

[0017] The multiple core signal cables of the invention herein consists of a plurality of parallel, separate, and insulated conductors, wherein the cables are thin and light and most importantly have exceptionally low inductance and capacitance to convey tone color clearly and accurately. The acoustic characteristics of the thin, flat conductor include clarity, high definition, rich detail, tighter low frequency response, and enhanced liveability; furthermore, the insulating of each conductor prevents interference between different conductors, thereby avoiding distortion losses in the original signal.

[0018] A signal audio cable constructed using varying combinations of multiple tinsel wire, flat solid conductors, and round solid core conductors of varying gauges with individual insulation. Unique invention is that these different conductor types handle specific frequency ranges differently and can be combined and optimized size, number and type for best performance in various audio applications. An unique cable type has been invented using combinations of these different conductor types. The tinsel wire is constructed with special core and dielectric materials for further optimization, and it minimizes sonic degradation caused by skin effect, thus yielding better high frequency performance. Because low frequencies are compromised with tinsel wire, solid bass conductors are used, thus balancing the frequency response. Flat conductors also handle midrange frequencies with greater accuracy, and these are used for this purpose. Specifically selected round conductor gauges are also used for the midrange to give proper balance between the bass and treble spectrums. Different gauge round conductors appear to emphasize particular frequency ranges, and can be selected to flatten frequency balance. The unique combination of tinsel wire and selected round and flat solid conductors gives better full range frequency balance and sound quality. The composite construction yields superior frequency balance and response accuracy than can be obtained by using constructions consisting of only one conductor type. The reasons for this are not clearly understood, but it appears that the different types of conductors are superior in certain frequency ranges. By combining conductors that each appear to be superior in the treble

range, the bass range, and the midrange, a superior full range cable results. This construction is applicable to any type of audio signal.

[0019] While the said detailed description elaborates a workable embodiment of the improved structure audio frequency cable herein, the said embodiment shall not be construed as a limitation on the patented scope and claims of the present invention and, furthermore, all equivalent adaptations and modifications based on the technological spirit of the present invention shall remain protected within the scope and claims of the invention herein.

Claims

1. An improved structure of audio signal cable, the features of which are that the said audio signal cable consists of larger solid conductors each covered with insulation to form individual cables, smaller solid conductors each covered with insulation to form individual cables, and tinsel wires each covered with insulation to form individual cables; after the said cables and the said tinsel wires of differing quantity and size are combined into a multiple core conduit, an insulation is placed around the said multiple core conduit to form multiple core signal cables; and filler elements are disposed laterally along the said multiple core signal cables to form a multiple core composite cable, following which insulation is placed around the said multiple core composite cable to complete the audio signal cable of the invention herein.
2. As mentioned in Claim 1 of the improved structure of audio signal cable of the invention herein, the said solid conductors are cross-sectionally circular solid conductors.
3. As mentioned in Claim 1 of the improved structure of audio signal cable of the invention herein, the said solid conductors are flat, thin solid conductors.
4. As mentioned in Claim 2 and Claim 3 of the improved structure of audio signal cable of the invention herein, the said solid conductors are of differing larger and smaller diameters and, furthermore, disposed in unequal quantities.
5. As mentioned in Claim 4 of the improved structure of audio signal cable of the invention herein, the said solid conductors are of differing larger and smaller diameters, wherein the diameter of the said larger solid conductors is two to three times that of the smaller solid conductors.

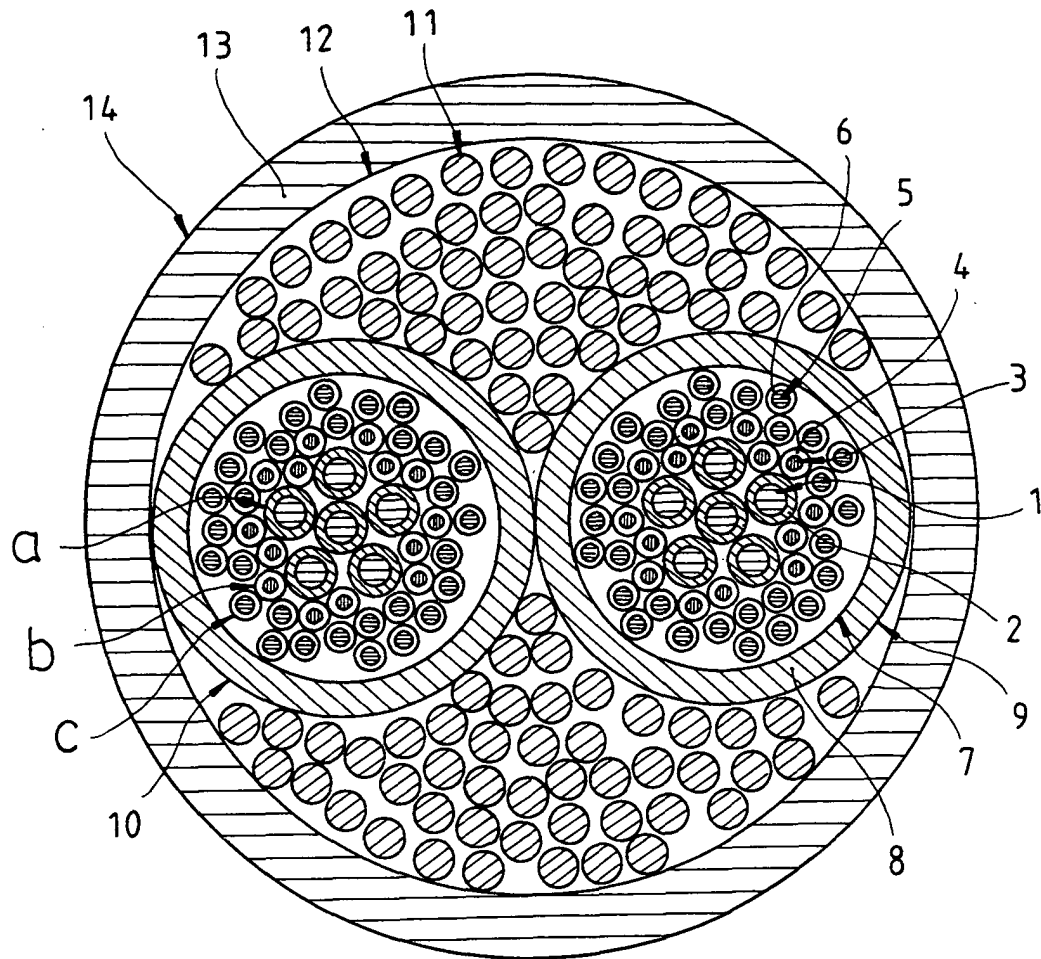


FIG. 1

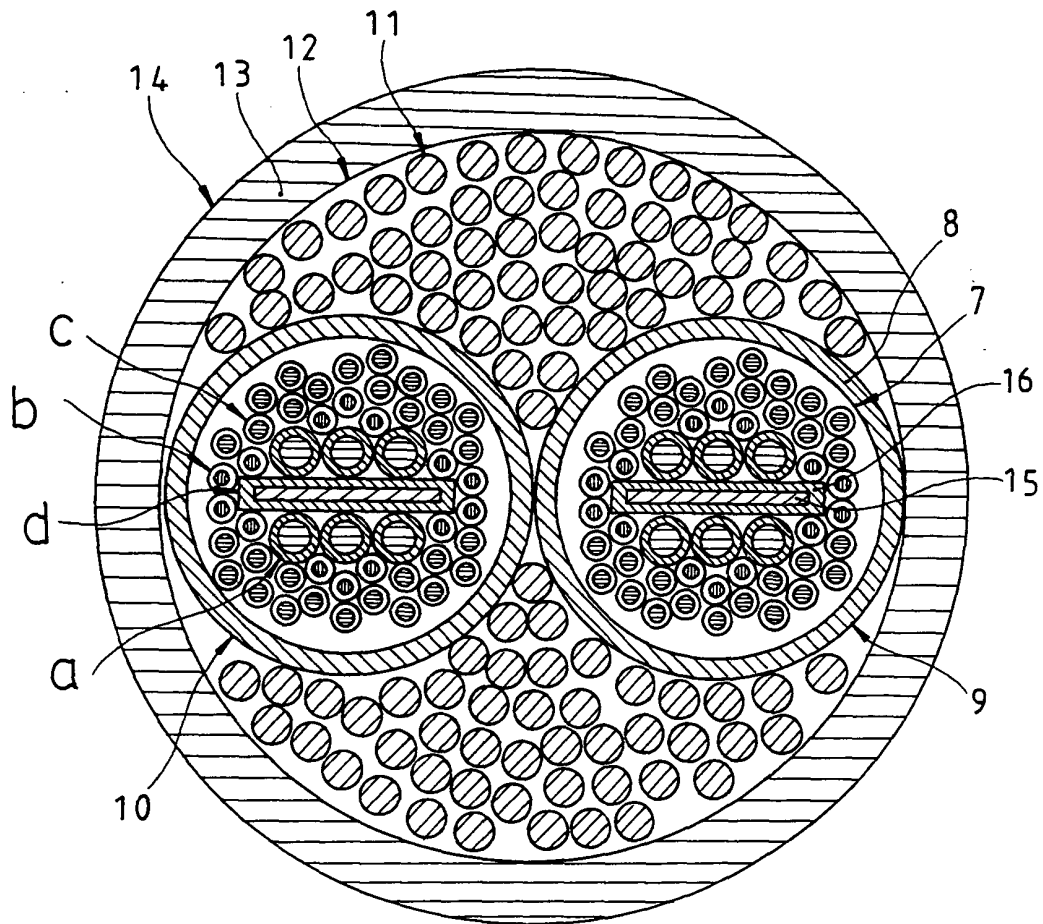


FIG. 2



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 04 00 3645

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 777 324 A (LEE NOEL) 11 October 1988 (1988-10-11) * column 1, line 44 - line 61 * * column 2, line 24 - column 3, line 18; figure 2 *	1,2,4,5	H01B11/12 H01B7/00
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Y	DE 39 11 172 A (SUN AUDIO UNTERHALTUNGSELEKTRO) 26 October 1989 (1989-10-26) * column 1, line 26 - line 39; figure 1 * * column 3, line 14 - line 37; figure 4 *	3	
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A	US 4 538 023 A (BRISSON BRUCE A) 27 August 1985 (1985-08-27) * column 1, line 36 - column 2, line 68 * -----	1	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 4 June 2004	Examiner Colombo, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 00 3645

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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04-06-2004

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