Nov. 5, 1935. F. H. OWENS 2,019,868

ELECTRIC CONDUCTOR

Filed Nov. 22, 1930

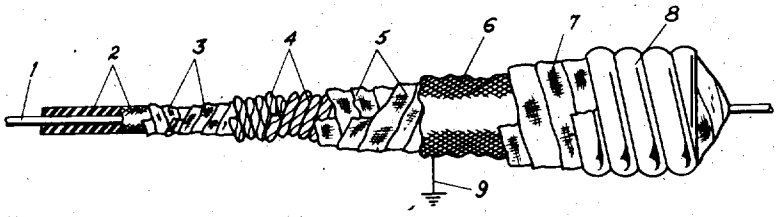


Fig. 1.

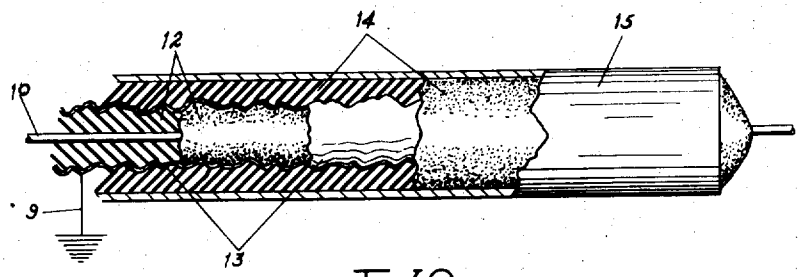


Fig. 2.

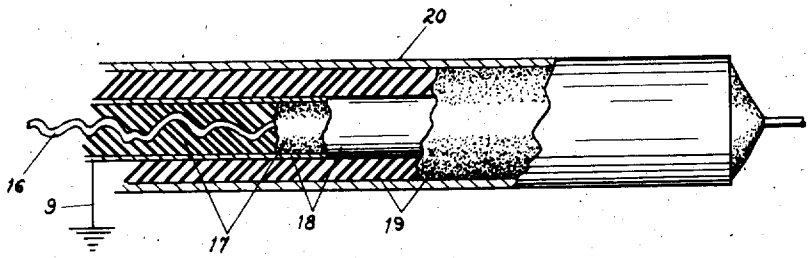


Fig. 3.

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Patented Nov. 5, 1935

2,019,868

UNITED STATES PATENT OFFICE

2,019,868

ELECTRIC CONDUCTOR

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Application November 22, 1930, Serial No. 497,442

9 Claims. (Cl. 173—81)

My invention relates to an electric conductor and particularly to a lead wire or conductor adapted for use with photoelectric cells, as a connection between such cells and the transformer or amplifier tubes with which they are generally used.

In the art of talking motion pictures, and particularly in the reproduction of photographic sound records therewith, a light is passed through the sound track on the moving film, the sound track serving to modulate the light in accordance with the sound record photographed thereon, thus translating such sound record into light variations. This modulated light is then passed to a photoelectric cell which translates the light variations into corresponding electric impulses which are used to modulate an electric current which, after amplification, may be rendered audible by means of loud speakers. In the practical use of devices of this character, it has been found that unless the lead wire or conductor from the photoelectric cell to the amplifier tube or transformer, over which must pass the current modulated by the feeble translated impulses from the photoelectric cell, is very short, the effect of capacity changes and induction combine to materially reduce the volume of the finally reproduced sound record and in addition cause distortion thereof. Consequently it has been the practice heretofore to so place the amplifier tube or transformer and other necessary apparatus a matter of inches only from the photoelectric cell, resulting in inconvenience, additional expense and requiring constant surveillance and attention on the part of the operator.

By my invention I have provided a lead wire or conductor which destroys the deleterious effect of capacity changes and induction and which renders the conductor thus particularly adaptable for use in photographic sound reproduction.

Of course my invention is not limited specifically to this particular use but finds equal adaptation in many other fields as well, such as ordinary electric current transmission wires, radio antennæ, etc. The particular use above described is intended as illustrative only.

Other objects and advantages will be apparent as the description proceeds, reference now being had to the figures of the accompanying drawing forming part of this application and wherein like reference numerals indicate like parts.

In the drawing:—

Figure 1 is a side view of a short section of conductor embodying my invention, certain parts being broken away and certain parts being shown in section for clearness of illustration.

Figure 2 is a similar view showing a modified form of my invention.

Figure 3 is a similar view showing another modification of my invention.

Referring now to the drawing, and particularly to Figure 1 thereof, the reference character 1 indicates a conductor wire for electric currents, such as an ordinary straight copper wire of one or more strands, provided with the ordinary insulation 2 of rubber, woven fabric or other known insulation materials.

In one form of my invention, and a form which has proven thoroughly practical in actual use, the insulated wire 1 is first wrapped with one or more wrappings 3 of cloth, fabric, tape or the like. These windings are wrapped fairly tight around the insulation 2, which in the usual form is, to a degree, rather flexible in character, thus giving to the insulation an uneven and irregular peripheral contour longitudinally of the wire. If more than one wrapping of tape is used, the successive wrappings are wound in opposite directions, thus contributing further to the uneven and irregular effect.

Next, in this form of the invention, there is wound tightly around the wrappings 3, one or more windings of cord 4, two windings being shown and, as illustrated, wound in opposite directions. These cord windings especially give to the peripheral surface of the conduit a very uneven and irregular contour with respect to the wire 1, as the cords 4 of course follow the irregular surface of the tape windings 3, and the round form of the cord is also especially adapted to the formation of an irregular surface.

The cord windings 4 may next be, and preferably are, wrapped with one or more wrappings 5 of tape or other insulation material, the same as the wrappings 3. These wrappings 5 of course follow the irregular contour provided by the previous wrappings and particularly as provided by the cord windings 4.

Next, there is placed about the conductor thus provided with a very uneven and irregular peripheral contour longitudinally, a shield 6 of lead, tin, copper or other suitable shielding material. Woven or braided fine copper wire is excellent for this purpose. This shield 6 is caused to follow the irregular contour of the conduit. This may be accomplished in any suitable manner as by pressing the shield into tight engagement with the wrappings 5 or, as shown in Figure 1, by wrapping the outside of the shield tightly with

tape 7, the same as 5 and 3. This causes the shield to engage and follow closely the irregular surface of the wrappings 5. Thus, the shield 6 is caused to have a very uneven and irregular contour with respect to the wire 1 passing therethrough, and heavily insulated therefrom by the various windings.

The conduit may then be entirely enclosed in an outer sheath 8 of well known form and construction, either flexible or rigid. The sheath 6 is, in use, preferably grounded as at 9.

Thus there is provided a conductor for electric currents, in which the conducting wire itself is insulated and shielded irregularly and unevenly through its length.

Actual practice and experiment has shown by comparison, that capacity changes and induction do not affect to any material extent, the current passing through a conduit or conductor made in accordance with my invention, that is with the conductor wire and its shield irregularly spaced from each other. As a result, and this has been borne out by actual practice in the talking picture art, a lead wire made in accordance with this invention and used between the photoelectric cell and the first tube of the amplifier or transformer made of any desired length without loss in quality or volume of the reproduced sound record.

It appears that the irregular spacing between the conductor wire and the shield serves to break up or neutralize the effect of capacity changes and induction to the extent that they have little or no effect upon the current passing through the wire conductor itself.

A modified form of my invention is illustrated in Figure 2, wherein reference character 10 indicates the conductor wire corresponding to the wire 1 in Figure 1, around which wire is the insulation covering 12. This insulation is enclosed in a shield 13 the same as shield 6 in Figure 1. It will be observed that the shield 13 and the insulation 12 are completely irregular and uneven with respect to the wire 10 passing therethrough. This formation may be accomplished by placing the wire 10 within the shield and insulation and then pressing, winding, twisting or otherwise deforming the same to produce the relative irregularity in space between the shield and wire, or by molding or otherwise forming the insulation 12 irregularly and causing the shield to conform to the shape thereof. I do not limit myself to any particular method or means of producing this relative irregularity.

Preferably another layer of insulating material 14 is provided around the shield 3, such insulation material being rubber or other suitable material, and the entire device is then enclosed within an outer sheath 15, the character of which may vary or differ according to the particular needs or requirements, for instance, the outer sheath 15 may be a section of piping or it may be in the form of flexible tubing similar to the sheath 8 in Figure 1.

In the modification shown in Figure 3, the conducting wire or core 16 is of bent irregular form longithdinally and is enclosed in a layer or coating of insulating material 17 encircling which is a tubular shield 18. Another layer of insulating material 19 covers the shield 8 and the entire device is enclosed by an outside sheath 20 corresponding with sheaths 8 and 15 of Figures 1 and 2.

In this form the irregularity of space between the wire core or conductor 16 and the shield 18, is provided by the irregular shape of the wire 16.

There are many other mechanical ways for bringing about the desired construction, and many forms which the invention may take. I do not limit myself, therefore, to the forms shown and described herein other than by the appended claims.

I claim:

1. A conductor for electric currents comprising a conducting wire and a shield around said wire, the distance between the wire and the shield varying irregularly along the length thereof and means for holding said wire and shield in said distance relationship.

2. A conductor for electric currents comprising a conducting wire and a shield around said wire, the distance between the wire and the shield varying irregularly along the length thereof, said wire being completely insulated from said shield and tightly held in said distance relationship.

3. A conductor for electric currents comprising a conducting wire and a shield around said wire, and a sheath disposed around said shield, the distance between the wire and shield varying irregularly along the length thereof.

4. A conductor for electric currents comprising a conducting wire and a shield around said wire, and a sheath disposed around said shield, the distance between the wire and shield varying irregularly along the length thereof, and insulating material filling the irregular spaces between said wire and said shield and the spaces between said shield and said sheath.

5. A conductor for electric currents comprising a conducting wire, an insulation covering of irregular peripheral contour around said wire, a shield around said covering and following the irregular contour thereof, a covering of insulation around said shield, and a sheath around said last named insulation.

6. A conductor for electric currents comprising a conducting core, a shield around said core, and means irregularly spacing apart said core and shield along the lengths thereof and for holding them tightly so spaced, for preventing distortion of current passing through said core.

7. A conductor for electric currents comprising a conducting core, a shield around said core, and insulating means irregularly spacing apart said core and shield along the lengths thereof and for holding them tightly so spaced, for preventing distortion of current passing through said core.

8. An electric conductor including a conductor core member, a metallic shield member surrounding said conductor core member and insulation means tightly holding said members in fixed spaced position relative to each other, the space between said members having an irregular and haphazard shape along the length thereof.

9. The method of neutralizing the capacity and inductance effects of a shielded conductor whereby distortion of current in said conductor is prevented which consists in irregularly varying the spacing between said shield and said conductor along the lengths thereof and tightly maintaining said shield and said conductor so spaced.

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