July 28, 1936. S. J. ROSCH ET AL 2,048,894

METHOD OF MANUFACTURING INSULATED CONDUCTORS

Filed May 15, 1934 2 Sheets-Sheet 1

Fig. 1.

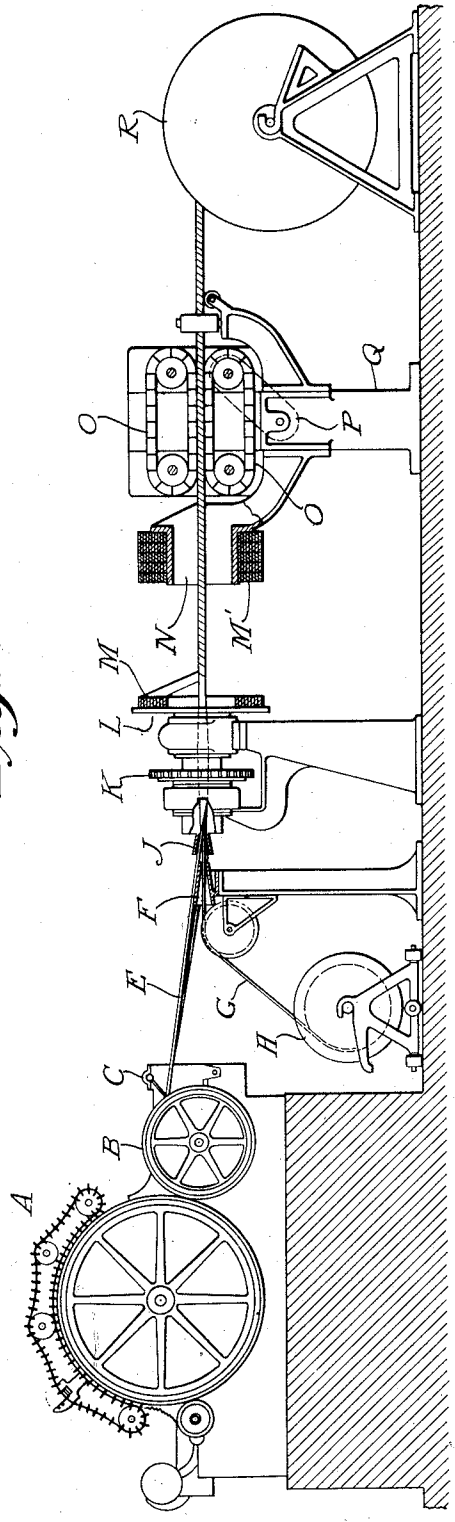
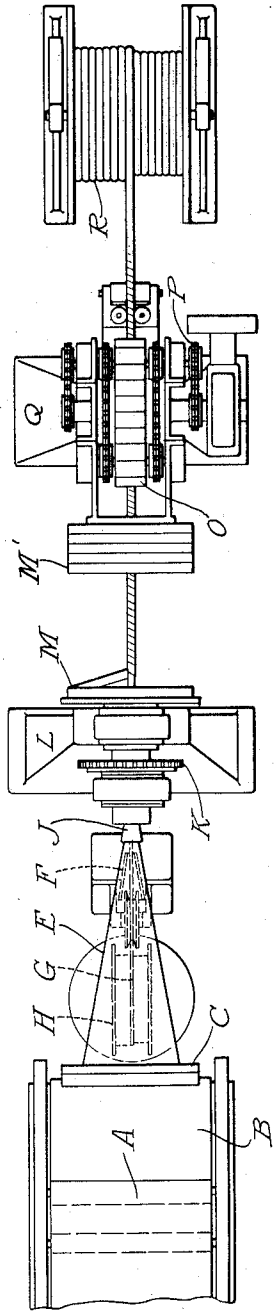


Fig. 2.



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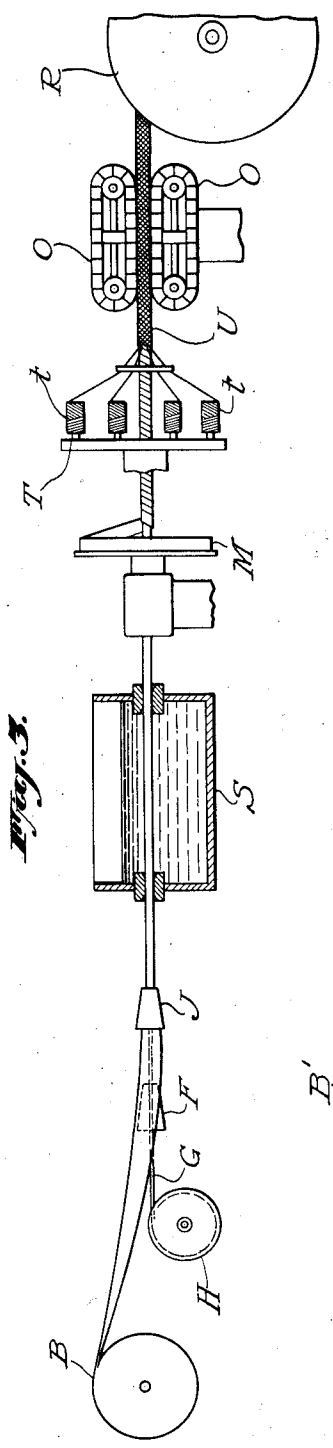


Fig. 3.

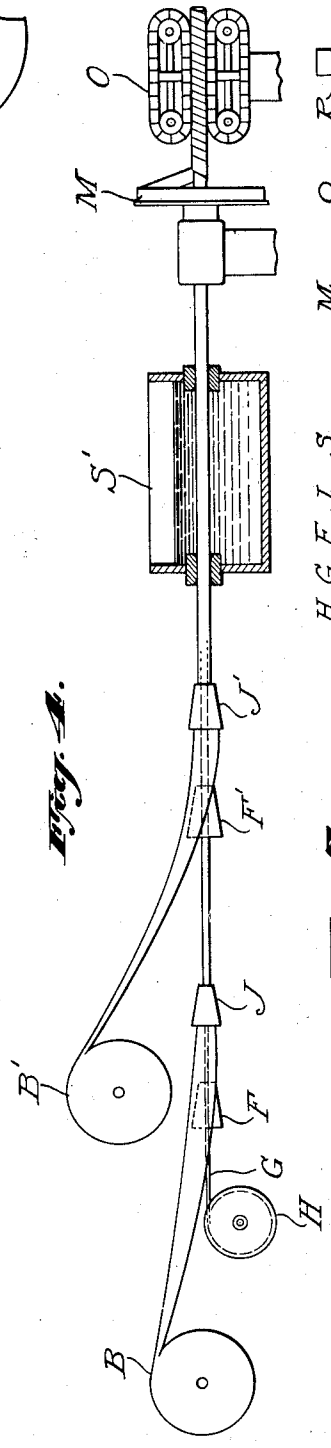


Fig. 4.

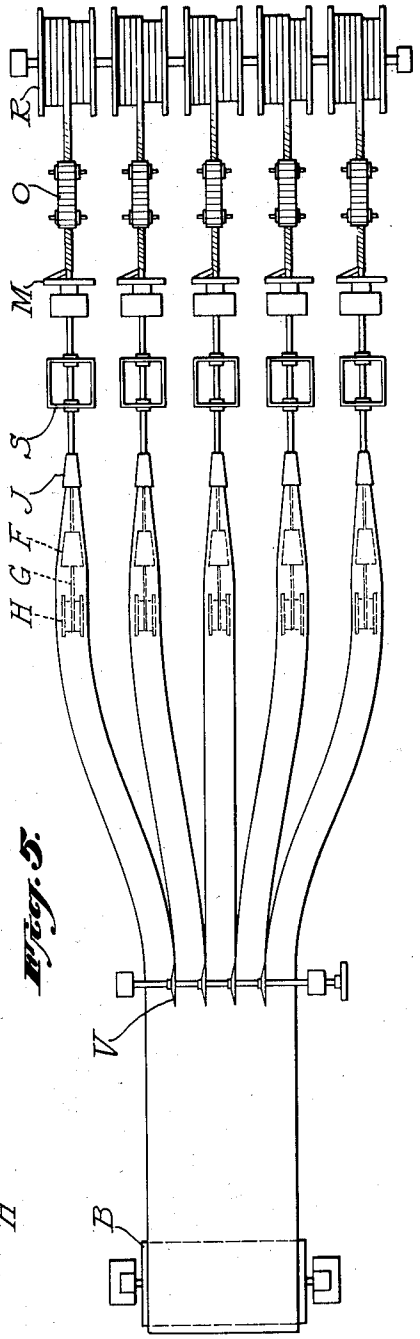


Fig. 5.

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2,048,894

METHOD OF MANUFACTURING INSULATED CONDUCTORS

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Application May 15, 1934, Serial No. 725,750

6 Claims. (Cl. 173—244)

This invention relates to the manufacture of insulated conductors and aims to provide an improved method whereby loosely carded fibres can be assembled relatively to and incorporated in an insulated conductor or cable. The invention will be fully apparent from the following specification when read in connection with the accompanying drawings and will be defined with particularity in the appended claims. Heretofore, when loosely carded fibres of cotton, asbestos, jute or the like have been applied directly to conductors, it has been thought necessary to first secure to the sliver or other mass of carded fibres a filamentary reinforcement so as to prevent the fibres from pulling apart when wrapped around or otherwise applied to a conductor or cable.

Other methods for applying loosely carded fibrous materials directly from a carding machine upon a conductor without the use of reinforcing means, have been proposed in the past, but in none of these has any attempt been made to apply the fibres in a uniform manner about the conductor. These means have rather concerned themselves with applying the fibres to the conductor in any fashion, and then, by means of advancing and rotating these fibres, an attempt was made to fashion a uniform fibrous wall of insulation or covering encircling the conductor.

By our improved method, we avoid the necessity of using such filamentary reinforcement or the necessity of advancing and rotating the fibrous mass about the conductor and thus eliminate these particular steps in the method of manufacture with a resultant saving in cost of production and yet we secure an insulated conductor, which is satisfactory for its intended purpose. In the drawings—

Fig. 1 diagrammatically represents apparatus for carrying out our improved method; Fig. 2 illustrates a plan view thereof; Figs. 3, 4 and 5 diagrammatically illustrate modifications of our improved method.

Referring in detail to the drawings, a mass of fibrous material, for example "picker lap", is fed to a carding machine A of known construction. This machine acts on the fibres with sort of a combing action and delivers the product by way of the doffer B and the comb C in the form of a loose fluffy body or web of fibrous material. This web emanating from the carding machine, as indicated at E is laid or draped over the exterior of a cone-like member or trumpet F.

The conductor G to be insulated is fed from a reel H in a direction lengthwise of the web and through the center of the hollow trumpet F and also through the center of a smaller trumpet J. As the wire G and the web E move forward longitudinally, the trumpets F and J serve to first loosely drape the web about the exterior of the wire and then to slightly constrict the fibrous mass around the wire. As the thus assembled wire and web move in a longitudinal direction, they pass through the hollow interior of a taping machine K carrying a rotatably mounted taping head L.

The head L carries a roll of tape M, which upon rotation of the head helically wraps convolutions about the fibrous body, thereby compressing or compacting the same. This tape may be any suitable type of insulating tape, known to those skilled in the art, such as paper or cambric. It may be a dry or a presaturated tape, or in some cases, it may carry an adhesive.

When one reel of tape becomes exhausted, additional reels from the magazine carried on a hollow extension N may be applied to the taping head so as not to interfere with the substantially continuous operation. The taped conductor may be fed forwardly by the double caterpillar-drive including belt-like members O—O driven by suitable mechanism P and carried by the standard Q. The insulated conductor will be wound on a take-up mechanism including a suitable driven reel R. It is contemplated that the fibrous sliver may be impregnated or saturated with suitable insulating compounds known to those skilled in the art in order to increase its dielectric strength and to endow it with weather-resisting characteristics.

In some cases, prior to the taping operation, the mass of fibres around the conductor will be saturated or impregnated with a suitable insulating or weather proofing compound. This saturating step is illustrated in Fig. 3, wherein the conductor or cable with the fibrous mass formed therearound is passed through a tank S within which is retained a body of liquid such as asphalt or any of the other materials frequently used for saturating conductor insulation. Where the fibrous material is saturated or impregnated with asphalt, or with oil or other insulating compound prior to the application of tape wrapping, the tape will serve as a barrier or substantially impervious dam to restrain the impregnating compound within the part of the insulated conductor, where it will be most effective and will also prevent such compound from leaking out when the same becomes softened in use due to the action of heat causing an expansion of the insulation and a moving of the impregnating compound.

After the application of the tape to the con-

ductor, we contemplate, in some cases, providing a braided or woven jacket. Such jacket may be secured by various instrumentalities known to those skilled in the art. We have illustrated in Fig. 3 the braiding machine T having a plurality of bobbins or cops *t* actuated in the usual manner to form an outer braid or jacket U about the conductor.

Our invention contemplates the application of a single ply of fibrous material about the conductor as above described and also the application of a plurality of plies of fibrous material.

Fig. 4 diagrammatically illustrates the application of such plurality of plies. The first ply is fed from the doffer B, as indicated in Fig. 4, and over the exterior trumpet F and through the smaller trumpet J, as in the case of Fig. 1. The second ply is fed from a doffer B' of a second carding machine and draped over the trumpet F' and passed through the trumpet J', the two latter trumpets being arranged in tandem with the trumpets F and J. The conductor enveloped with the two ply fibrous material is then passed through tank S' carrying suitable insulating compound and the tape is applied and the taped conductor fed away to a suitable take-up roll.

The rate of feed of the conductor is controlled by the speed of the caterpillar drive members O—O and the relationship of their speed to the speed of the carding machine enables us to control the amount or bulk of fibrous insulation applied to the conductor and we contemplate either driving the carding machine and the caterpillar feed members O—O from the same source of power or to drive them by independent motive means so synchronized or controlled that the desired relationship of the feed of the carding machine or carding machines to the feed of the covered conductor is maintained to insure that the required bulk of fibrous insulation is supplied.

The web of fibrous material coming from a carding machine or other machine for removing the grosser impurities from the fibres, in some cases, is of great width. And we contemplate dividing such a wide web into a plurality of smaller bodies, for example, by the means of the rotary slitting knives, indicated at V in Fig. 5. Merely by way of illustration, we have shown the wide web divided into five smaller webs. In such an arrangement, there will be an equal number of separate units such as the trumpets, taping heads, caterpillar feeds, braiding heads, take-off mechanism, etc., so that the method as above described may be carried on in multiple in the interest of economy of operation, it being apparent that with such multiple operation a single carding machine may serve a plurality of wire covering units.

It is to be understood that the foregoing description and the illustrations herein are to be interpreted in an illustrative rather than a limiting sense.

What we claim is:—

1. In the manufacture of insulated conductors, the method which comprises providing a web of loosely associated fibres, feeding a conductor horizontally in the direction of the length of the web, loosely draping the web longitudinally over the conductor and constricting it thereabout and wrapping a tape helically over the fibre encompassed conductor thus successively compressing and confining longitudinally extending areas of the web about the conductor.

2. In the manufacture of insulated conductors, the method which comprises carding fibrous material to thus form a longitudinal web of fluffy fibres, feeding a conductor horizontally lengthwise of said web, encompassing said web about said conductor while advancing it horizontally without rotation as the two travel longitudinally and successively compressing longitudinally extending annular areas of the web about the conductor.

3. In the manufacture of insulated conductors, the method which comprises providing a horizontally disposed web of fibrous material, feeding an uncoated conductor horizontally in the direction of the length of the web, draping the web over the top of a cone-like trumpet and without rotation through the interior of another similar trumpet while feeding a conductor horizontally and longitudinally through said trumpets, thus encompassing the conductor with said fibrous material, and successively confining considerable annular lengths of said web about the conductor.

4. In the manufacture of insulated conductors, the method which comprises providing a sliver of carded fibres, feeding a conductor horizontally in the direction of the length of the sliver, loosely draping the sliver over the top of a fixed cone-like trumpet and through the interior of another similar fixed trumpet while feeding said conductor longitudinally through said trumpets, thus encompassing the conductor with said fibrous material and wrapping a tape helically over said fibrous material thus successively confining annular lengths of the web about the conductor.

5. In the manufacture of insulated conductors, the method which comprises providing a web of loosely associated fibres, feeding a conductor in the direction of the length of the web, draping the web longitudinally over the conductor, constricting it thereabout, impregnating the fibrous material thus applied, and successively compressing lengths of the fibrous mass with a substantially impervious covering.

6. In the manufacture of insulated conductors, the method which comprises providing a web of loosely associated fibres, feeding a conductor in the direction of the length of the web, draping the web longitudinally over the conductor, constricting it thereabout, impregnating the fibrous material thus applied, successively enclosing considerable lengths of the fibrous mass with a substantially impervious covering and applying an outer jacket thereto.

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