June 20, 1944. R. FINZI CONTINI 2,351,927

CROSS STRIP INSULATING STRUCTURE FOR CONCENTRIC CABLES

Filed March 16, 1940

Fig. 4

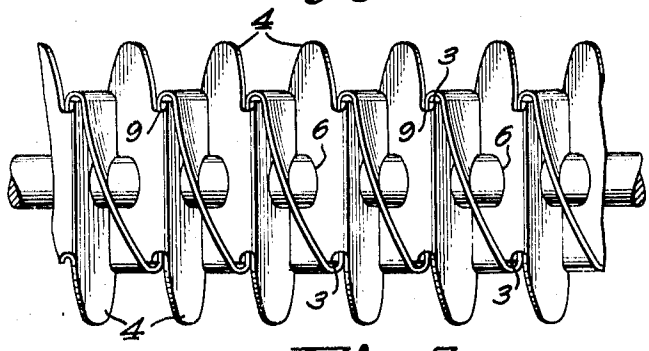


Fig. 3

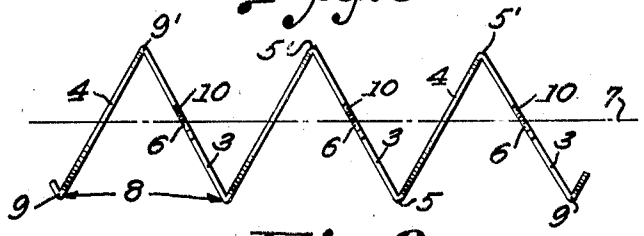


Fig. 2

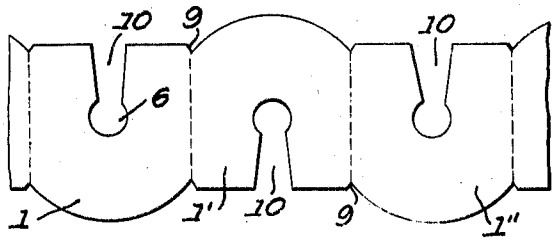
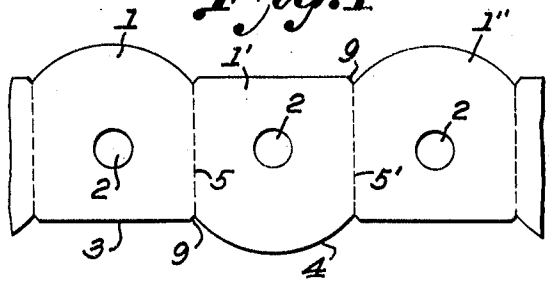


Fig. 1



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CROSS STRIP INSULATING STRUCTURE FOR CONCENTRIC CABLES

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6 Claims. (Cl. 174—29)

Insulation for concentric cables may be subdivided into two fundamental types, one of which consists of small discs through which the inner conductor passes and which are made of rigid insulating material with a relatively great loss angle and, therefore, necessarily widely spaced, while the other type consists of a multi-spiral with a very small loss angle, made in the form of continuous coils and strips wound around the central conductor. In the first case the absence of any support in the spaces between the discs may cause a harmful relative displacement of the two conductors, also it requires the outer conductor to be of considerable thickness entailing a loss of flexibility and a high cost of the metallic part. In the second case the nature of the material makes possible a greater space factor, but here also there is the drawback of imperfect support of the conductors.

The object of the present invention is to provide an insulating structure which prevents the above drawbacks and while reducing the space factor to vary low figures, provides an almost continuous support to the outer conductor which may be of minimum thickness, ensuring in the same time considerable flexibility, perfect centering and a low cost of the concentric cable.

Said structure consists of at least two strips of low loss insulating material, of known type, each formed by a succession of elements pierced in their centre, and of non-symmetric shape about one axis, alternate elements being displaced by 180° to each other and folded in bellows fashion. A pair of such strips can be threaded on a central conductor and interlaced with each other, one strip at 90° to the other so their outer edges constitute a substantially helicoidal surface of a sufficient transverse rigidity, flexible with respect to its centre line. Said structure is of a cellular appearance and affords a great evenness of construction, when the ratio between the volume of air and the volume of solid dielectric is high. The inner conductor passes through the aligned centre holes of the alternating and closely spaced elements of the two interlaced strips, while the outer conductor is supported almost continuously on curved surfaces approximating cylindrical coils, formed by the suitably arc shaped sides of the elements of the strips. The assemblage of conductors and dielectric is very compact and allows the use of a very thin outer conductor, it being possible to reduce the latter, if desired, to a simple tape with a considerable saving of metal and increased flexibility.

This construction yields a considerable reduction in constructional irregularities of the cable, with a considerable advantage for telephone and television communications, both for long and short distances.

The invention will be better understood with reference to the attached drawing, wherein:

Figs. 1 and 2 represent developments of two different embodiments of strips of insulating material which can be assembled to form the insulating structure according to the invention.

Fig. 3 is the profile view of one of said strips in assembled position.

Fig. 4 is a view of the insulating structure assembled on a conductor.

With reference to the drawing (Fig. 1) each strip consists of a plurality of elements 1, 1', 1'', with their centres 2 aligned and each outlined at the opposite sides of the strip by a straight line 3 and a substantially circular arc 4, and by fold lines 5, 5' forming the boundaries between each element of the strip. Each element of the strip is displaced, in the plane of the strip, by 180° with respect to the successive one, so that the curved arcs 4, which are of a diameter corresponding to the inner diameter of the outer conductor, lie on opposite edges of the strip. In Figs. 2 and 3 each element is provided with a central hole 6 of a diameter substantially corresponding to that of the inner conductor. The holes 6 and the curved sides 4 have preferably a hollow shape, so that, for a determined inclination of the elements of the strip to the centre line 7, their perimeters lie snugly against the inner conductor and outer conductor, thus facilitating adherence of the insulating structure to the two conductors. The insulating structure is constituted by two similar strips each having its elements folded in alternate directions at successive fold lines 5, 5' as will be seen in Fig. 3, and the two strips are threaded on the the conductor displaced by 90° to each other with respect to the common centre line 7, so that the arc sides 4 of one strip alternate with the rectilinear sides 3 of the other strip. The elasticity of the thin insulating material forming the strips allows a wide range of variation, according to constructional requirements, of the axial distance 8 between the corners of the folded strips, at the ends of which small notches 9 are preferably provided to facilitate crossing of the two strips. The arrangement shown by Fig. 2, wherein the elements 1, 1', 1'' are provided with slots 10 whereby the holes 6 are accessible from the rectilinear sides 3 of the strips

allows the insulating strips to be mounted even when the ends of the inner conductor are not accessible.

The number and form of the insulating strips employed may be anyhow varied without exceeding the scope of the invention.

What I claim is:

1. A concentric cable having inner and external members and an insulating structure for spacing said members, said structure comprising a pair of strips of insulating material each folded on lines extending laterally of the strip to form elements between the fold lines, adjacent elements being folded in opposite directions forming a zig-zag shape and each element having a central aperture adapted for the passage of the inner member of the concentric cable, said strips being interlaced and threaded on said inner member rotated 90° in respect to each other and with the said elements in close axial spacing, the outer circumferences of said elements when assembled together being shaped to provide at least one continuous helical line of support for the external member of the concentric cable.

2. A cable according to claim 1 in which each element has a slot extending from the central hole to a side of the element, the slots of successive elements opening at opposite sides.

3. A cable according to claim 1 in which each element of a strip has one side of arc shape and the opposite side rectilinear, curved sides and rectilinear sides alternating along the strip.

4. A cable according to claim 1 in which each element of a strip has one side of arc shape and the opposite side rectilinear, curved sides and rectilinear sides alternating along the strip, and in which each element has a slot extending from the central hole to a side of the element, the slots of successive elements opening at opposite sides and into the rectilinear sides.

5. A cable according to claim 1 in which each element of a strip has one side of arc shape and the opposite side rectilinear, curved sides and rectilinear sides alternating along the strip, and in which each element has a slot extending from the central hole to a side of the element, the slots of successive elements opening at opposite sides and into the rectilinear sides, and the diameter of said curved sides corresponding to the diagonal dimension of the element.

6. A cable according to claim 1, in which each element of a strip has one side of arc shape and the opposite side rectilinear, curved sides and rectilinear sides alternating along the strip, and in which notches are cut at the intersections of the arc-shaped sides with the rectilinear sides of the elements.

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