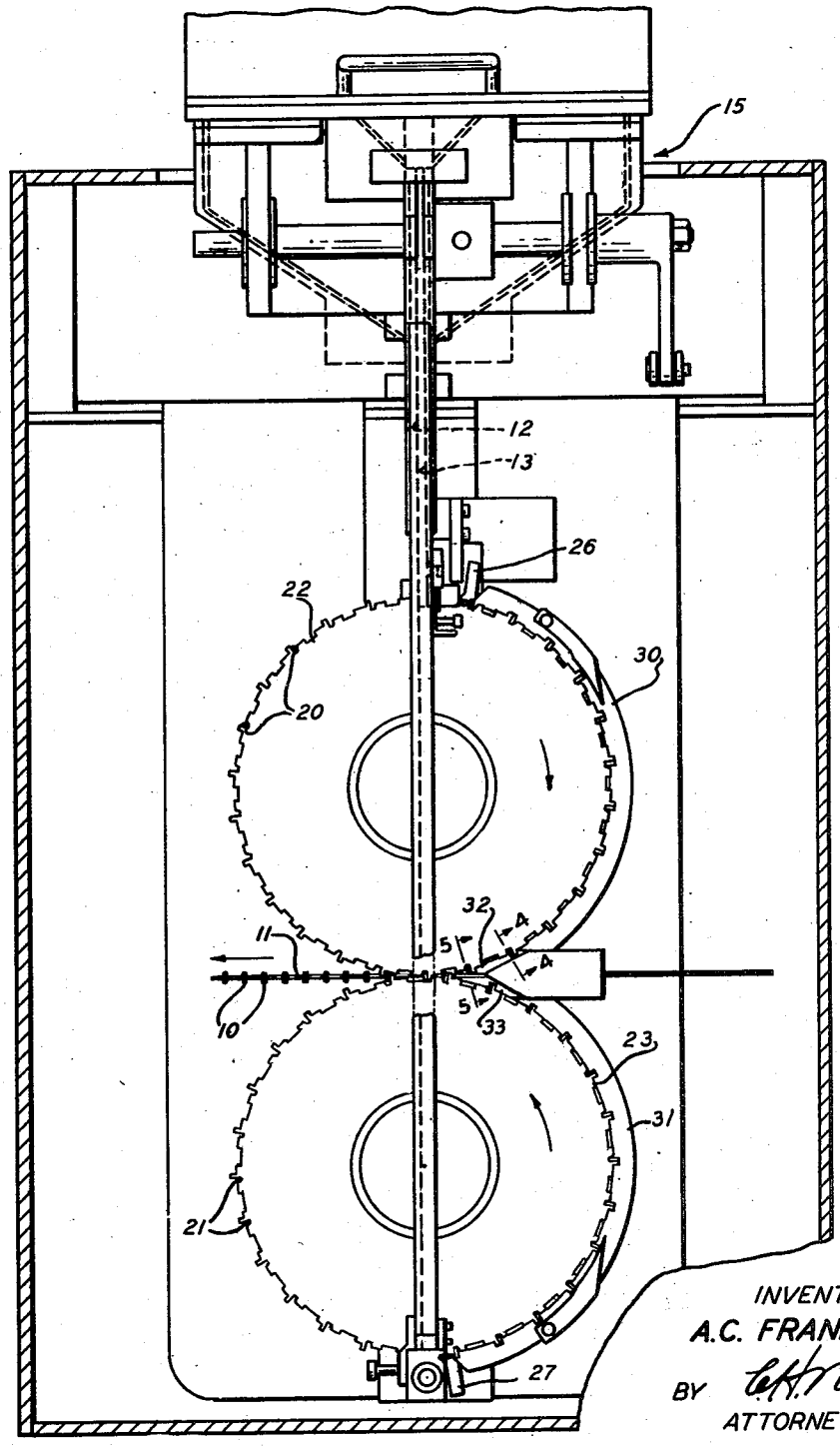
Dec. 25, 1951 A. C. FRANKWICH 2,579,487

METHOD OF AND APPARATUS FOR FEEDING AND APPLYING INSULATING DISKS TO CONDUCTORS

Filed Oct. 10, 1946 2 SHEETS—SHEET 1

FIG. 1



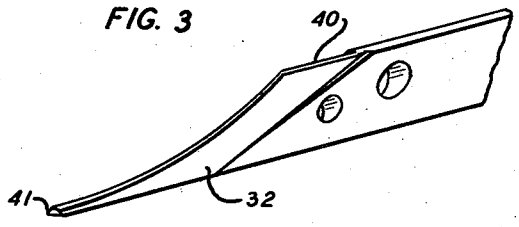
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FIG. 3



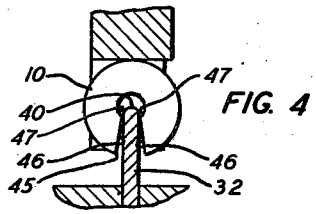


FIG. 4

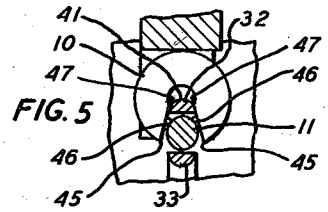


FIG. 5

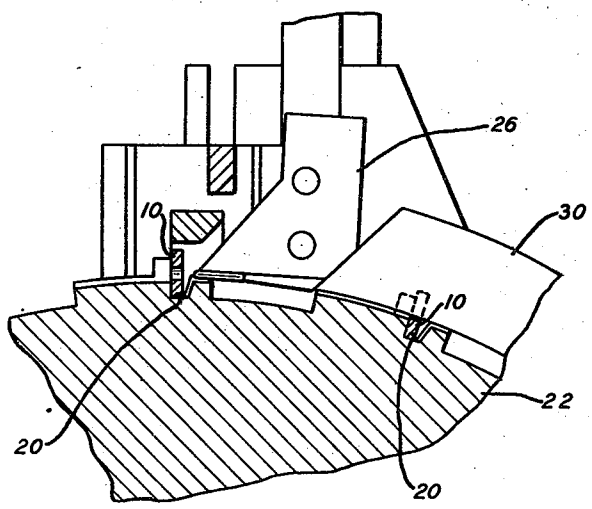


FIG. 2

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UNITED STATES PATENT OFFICE

2,579,487

METHOD OF AND APPARATUS FOR FEEDING AND APPLYING INSULATING DISKS TO CONDUCTORS

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Application October 10, 1946, Serial No. 702,494

8 Claims. (Cl. 29—155.5)

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This invention relates to methods of and apparatus for feeding and applying insulating discs to conductors, and more particularly to methods of and apparatus for expanding slits in plastic insulating discs to facilitate application of the discs to conductors.

In some types of apparatus for forming coaxial cable core units of a type having washer-like, plastic insulating discs positioned on a central conductor, the insulating discs are slit radially and are wiped onto a conductor, the conductor passing through the slits into the central openings in the discs. In the past, in order for the conductor to pass through the slits, the slits have been expanded by a wedging action of the conductor thereon as the slits are wiped thereover. When the slits in the discs are expanded by the conductor, they are expanded abruptly, and as a result, the discs are sometimes damaged physically. Furthermore, if the conductor has loose particles of conductive material on the surface thereof, the walls of the slits in the insulating discs sometimes carry away the conductive particles as they are wiped onto the conductor. The conductive particles reduce the dielectric strength of the insulating discs along the slits thereof, and sometimes cause dielectric breakdowns in the discs. The dielectric strength of the discs applied to the conductor is tested, and if any of the discs are defective, the entire cable forming apparatus must be stopped in order to replace the defective discs with non-defective discs.

An object of the invention is to provide new and improved methods of and apparatus for feeding and applying insulating discs to conductors.

A further object of the invention is to provide new and improved methods of and apparatus for expanding slits in plastic insulating discs so that, when the discs are wiped onto a conductor, at least the major portions of the walls of the slits are held out of contact with the conductor and pressure on the discs by the conductor and contamination of the walls of the slits in the discs by foreign particles on the conductor are minimized.

In a method illustrative of the invention, a washer-like, plastic insulating disc having a radial slit therein extending from the outer periphery thereof to the central aperture thereof is moved through a predetermined path to a conductor. As the disc approaches the conductor, the slit is expanded, and the disc is moved onto the conductor. The expansion of the slit is sufficiently gradual that the disc is not mechanically damaged thereby. The width of the expanded slit is such that for the most part, the walls of the slit do not contact the conductor as the disc is moved onto the conductor.

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An apparatus illustrative of the invention includes an applicator wheel having a plurality of notches therein for carrying washer-like insulating discs and for applying the insulating discs to a conductor. A knife slits the discs carried by the applicator wheel so that the discs may be wiped onto the conductor and an expander positioned near the point of application of the discs to the conductor serves to expand the discs as the discs are wiped onto the conductor by the applicator wheel. The expander opens the slits in the discs in such manner that the discs are not crushed and opens the slits sufficiently to insure that the major portions of the walls of the slits do not contact the conductor as the discs are wiped onto the conductor, whereby contamination of the walls of the slits is avoided.

A complete understanding of the invention may be obtained from the following detailed description of a method and an apparatus forming specific embodiments thereof, when read in conjunction with the appended drawings, in which:

Fig. 1 is a fragmentary, vertical section of an apparatus forming one embodiment of the invention;

Fig. 2 is an enlarged, fragmentary, vertical section of a portion of the apparatus;

Fig. 3 is an enlarged, fragmentary, perspective view of another portion of the apparatus;

Fig. 4 is an enlarged, fragmentary, substantially vertical section taken along line 4—4 of Fig. 1, and

Fig. 5 is an enlarged, fragmentary, substantially vertical section taken along line 5—5 of Fig. 1.

Referring now in detail to the drawings, there is shown in Fig. 1 an apparatus for feeding, slitting and applying washer-like, plastic insulating discs 10—10 composed of a dielectric material, such as, for example polyethylene, to a conductor 11 to form a core unit of a coaxial cable. The complete apparatus is described and claimed in copending application, Serial No. 702,491, filed October 10, 1946 by S. E. Brillhart. The discs 10—10 are fed to straight, vertical guide chutes 12 and 13 by a hopper feed 15 certain features of which are described and claimed in my copending application, Serial No. 702,493, filed October 10, 1946. The guide chutes 12 and 13 feed the discs by gravity to transfer devices 16 and 17, respectively, which feed the discs into notches

20—20 and 21—21 formed in inrunning applicator wheels 22 and 23, respectively. The applicator wheels 22 and 23 move the discs over knives 26 and 27, respectively, which form line-like radial slits 28—28 in the discs.

The applicator wheels 22 and 23 move the discs 10—10 along thin arcuate guides 30 and 31, respectively, extending from the knives 26 and 27, respectively, and along expanders 32 and 33, respectively, and apply the discs to the conductor 11, which enters the holes in the discs through the slits 28—28 formed therein. The thin arcuate guides 30 and 31 form continuations of the knives 26 and 27 and enter the slits 28—28 immediately after they are formed. The guides hold the discs 10—10 slightly open and in oriented positions as the discs are moved by the applicator wheels 20 and 21 toward the conductor 11, in which positions the slits are directed radially with respect to the applicator wheels.

The wedge-shaped expanders 32 and 33 are identical, and for purposes of simplicity, only the expander 32 will be described in detail. One end 40 (Fig. 3) of the expander 32 is the same thickness as and abuts an end of the arcuate guide 30 so that the expander engages the walls of the slits 28—28 as the discs are moved therealong. The expander 32 gradually increases in thickness to the opposite end 41 thereof.

As the discs 10—10 are moved along the expander 32, the expander 32 gradually opens the slits 28—28 therein, and as outside corners 45—45 (Fig. 5) of the slits start to pass over the conductor 11, these corners are held sufficiently far apart to insure that they do not contact the conductor 11. As the discs are moved further along the expander 32, the slits 28—28 are expanded still more in order that most of the surfaces of walls 46—46 of the slits will not contact the conductor and cannot be contaminated thereby. When the discs are almost on the conductor, they are moved off the end 41 (Fig. 3) of the expander 32 and the portions of the walls 46—46 of the slits near inside corners 47—47 of the slits contact the conductor. At this point, the slits are opened almost sufficiently for the corners 47—47 to move over the conductor and hold the outer portions of the walls 46—46 out of contact with the conductor. The applicator wheel 22 then wipes the inside corners 47—47 of the slits overcenter on the conductor and the discs snap into place thereon.

The expanders 32 and 33 are mounted on a conductor guide 50, and guide the conductor 11 therebetween. The applicator wheels 22 and 23 support the conductor passing therebetween as the discs 10—10 are applied to the conductor alternately by the wheels.

In the method and apparatus described hereinabove, the discs 10—10 are moved along the long, thin guides 30 and 31 which keep the discs oriented but keep the slits 28—28 in the discs only slightly open so that no permanent deformation of the discs occurs from the travel of the discs along the long guides 30 and 31. The discs then are moved over the relatively short expanders 32 and 33 which are sufficiently long to open the slits gradually enough to prevent crushing the discs, but which are short enough that no permanent deformation of the discs is caused by the expanders.

The expanders 32 and 33 expand the slits relatively slowly and sufficiently to cause the conductor 11 to expand the slits only a small amount further as the final stages of the application of the discs to the conductor are effected. Hence, the discs are not bent or crushed as they might be if they were forced over the conductor without preexpansion of the slits therein. Also, if the conductor has any loose conductive particles on the periphery thereof, the particles are not pressed against the walls 46—46 of the slits 28—28 to form conductive paths, except for the portions of the walls adjacent to the inside corners 47—47 of the slits. Hence, contamination which might cause dielectric breakdown of the discs is minimized.

The above-described method and apparatus are particularly advantageous in feeding and applying discs composed of polyethylene to conductors. Such discs, while sufficiently hard to have the necessary mechanical properties if placed on the conductor undamaged, are soft enough that they were sometimes damaged as they were placed on conductors by ordinary methods and apparatus. In the method and apparatus described hereinabove, the discs are placed on the conductor without permanently deforming the discs and without crushing the discs. Hence, the discs adhere firmly to the conductor, and do not slide along the conductor after they have been applied thereto.

What is claimed is:

1. The method of feeding and applying insulating discs to conductors, which comprises moving through a predetermined path to and onto a conductor a washer-like insulating disc having an inner periphery, an outer periphery and an opening extending from the outer periphery thereof to the inner periphery thereof, and gradually expanding the opening as the disc approaches the conductor and is moved onto the conductor to prevent abrupt expansion of the opening as the disc is moved onto the conductor.

2. The method of feeding and applying insulating discs to conductors, which comprises moving a discontinuous annulus through a predetermined path onto a conductor in a manner in which the ends of the annulus are moved over the conductor, the distance between the ends of the annulus being less than the diameter of the conductor, and moving the ends of the annulus apart as they are moved over the conductor sufficiently to prevent contact between the conductor and at least the major portions of the ends of the annulus.

3. The method of feeding and applying insulating discs to conductors, which comprises moving toward and onto a conductor a washer-like, soft, plastic insulating disc having a slit therein extending from an outer periphery of the disc to an inner periphery thereof, and gradually expanding the slit in the disc as it is moved toward and onto the conductor to restrict permanent deformation of the slit by the conductor as the disc is moved onto the conductor.

4. The method of feeding and applying insulating discs to conductors, which comprises moving transversely toward and onto a conductor an insulating disc having a slit therein, the slit in the disc moving over the conductor as the disc is moved onto the conductor, expanding the slit gradually as the disc is moved toward the conductor, and further expanding the slit substantially without the aid of the conductor as the disc is moved onto the conductor.

5. The method of feeding and applying insulating discs to conductors, which comprises moving an annular insulating disc facewise through a predetermined arcuate path toward a conductor positioned at the end of the path and

tangent to the path, radially slitting the portion of the annular disc moving through the outer portion of the path as the disc is moved toward the conductor, gradually wedging open the slit in the disc as the disc is moved toward the conductor to an extent that the walls of the slit in the disc are held substantially out of contact with the conductor as the disc is moved to the end of the path.

6. In an apparatus for feeding and applying insulating discs to conductors including an applicator wheel for moving an annular, plastic insulating disc through a predetermined path and for applying the disc to a conductor being advanced tangentially with respect to the applicator wheel, a knife for slitting the disc radially at a predetermined point in the path of the disc and a thin arcuate guide adjacent to the knife for entering the slit to keep it open and to guide the disc, the improvement which comprises an expander positioned to enter the slit in the disc and extending from the guide substantially to the conductor, said expander being tapered outwardly from the end thereof adjacent to the guide to the other end of the expander and serving to gradually open the slit in the disc as the disc is moved over the expander, the portion of the expander near the conductor being sufficiently thick to maintain the walls of the slit out of contact with the conductor during at least a portion of the movement of the discs over the conductor.

7. In an apparatus for feeding and applying annular, radially slit, plastic insulating discs to conductors including an applicator wheel for moving such a disc through a predetermined path and for applying the disc to a conductor being advanced tangentially with respect to the applicator wheel and a knife for slitting the disc, the improvement which comprises an expander extending arcuately along the outer periphery of the applicator wheel from a point spaced from

the conductor to the conductor, said expander being tapered from a thin end at the point spaced from the conductor to a thicker end at the conductor, whereby the slit in the insulating disc is expanded as the disc is moved along the expander, said thicker end being sufficiently thick to expand the slit in the disc to such an extent that the walls of the slit are kept substantially out of contact with the conductor as the disc is applied to the conductor.

8. In an apparatus for feeding and applying annular, radially slit, plastic insulating discs to conductors including an applicator wheel for moving such a disc through a predetermined path and for applying the disc to a conductor being advanced tangentially with respect to the applicator wheel, a knife for slitting the disc radially at a predetermined point in the path of the disc and a thin arcuate guide adjacent to the knife for entering the slit to guide the disc and to hold open the slit therein, the improvement which comprises a wedge-shaped expander positioned to enter the slit in the disc and extending arcuately from the guide substantially to the conductor, said expander being thin near the arcuate guide and being thicker near the conductor and serving to expand the slit in the disc to such an extent that the walls of the slit are kept substantially out of contact with the conductor as the disc is applied to the conductor.

ALEXANDER C. FRANKWICH.

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