CELLULOID ARTICLE AND METHOD OF MAKING SAME

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By
his attorneys.
This invention relates to the treatment of celluloid or like material to form tubular objects, and has for its purpose to provide an improved method of manufacture which permits of the preservation of any design or configuration, such as motting, inherent in the material. Another object is to produce casings of strip material. Another object of the invention is to provide a method of binding and securing strip material to form a substantially integral tubular casing. A further object is to devise a method that is simple and which permits of economical manufacture. The invention consists in the combination of elements and in the steps of the process of combining them, as herein shown and described, and as indicated by the claims.

In the drawing:

Figure 1 is a somewhat diagrammatic plan view of apparatus for carrying out one phase of my invention.

Figure 2 illustrates a method similar to that of Figure 1, except that the heating means is supplied for the strip material and it is wound on a temporary mandrel.

Figure 3 illustrates a method of binding a plurality of strips of celluloid helically on a mounting member by means of apparatus similar to that shown in Figure 1.

Figure 4 illustrates rather diagrammatically apparatus for carrying out a modification of the process in which the celluloid strips are secured longitudinally to the mounting member.

Figure 5 is a transverse section through the apparatus taken as indicated at line 8—8 on Figure 4.

Figure 6 discloses apparatus for carrying out a further modification of my process.

Figure 7 is a diagrammatic sectional view illustrating the relation of the strips of celluloid to a mounting member just prior to their entry into the heating chamber of the apparatus shown in Figure 6.

Figure 8 is a fragmentary perspective view of a finished tubular member produced by the method employing either the apparatus shown in Figure 4 or that shown in Figure 6.

There are various methods and processes for making tubular casings of celluloid and like material. For example, one inexpensive method is that of extrusion, but by this process any design, configuration or motting effect in the material is practically destroyed or is altered in a manner which cannot be controlled. An original design or motting of the material may be retained by a process which consists in first mold-
Adjacent the roller, 16, there is mounted a pad or brush, indicated at 17, for applying acetone to the abutting marginal edges of the coils, 12, as they are formed; the acetone, being a solvent for celluloid, softens these marginal portions of the coils, causing the material to flow into any crevices between the coils, and thus fusing them together into an integral tubular casing. This tubular casing is then forced through a final forming die, 18, which may also serve to partially support the same as it is fed longitudinally. The casing may be applied to the tubular mounting member, 12, in any convenient length, and then cut into shorter lengths, if desired, to meet the particular requirements of use. A light finishing coat may be taken off the surface of the tubular casing in a lathe, or similar machine, if desired, so that the final product will appear as though turned from solid stock, the welded or fused connection between the abutting coils being substantially invisible, unless the pattern or configuration of the material itself renders it noticeable.

It may be understood that the celluloid strip material employed in this process is cut from aspects of rolled celluloid and may be formed with certain multi-colored patterns or molded effects, which serve a decorative purpose, and which are thus retained unimpaired in forming the strip material into a tubular casing by any improved method. And this celluloid strip material may be made more thin, as there practically no portion of it to be cut away as waste except in the final finishing cut; and this is particularly true where a mounting member, 12, is employed as the structural support for the decorative celluloid casing.

It will also be understood that if desired the celluloid tubing may be formed of helically wound strip material without including a tubular mounting member as a part of the finished product. For this purpose a temporary mandrel, 12', is substituted for the mounting member, 12, as indicated in Figure 2, and instead of applying acetone to the side of the strip which is to form the interior of the tube, the brush, 14, is omitted from the apparatus and a heating element, such as an electric heating coil, 14', is disposed adjacent the strip material as it comes off the reel, 10, and subsequently passed through a heat treatment. This heat treatment reduces the resilience of the material temporarily, so that as it is cooled helically on the mandrel, 12', and then moved thereon, it takes a permanent "set" with the coils in closely abutting relation. If desired, the acetone may be applied to the abutting edges of the coils on the mandrel, 12', as indicated by the position of the brush diagrammatically shown at 17 in Figure 2; but, if preferred, the coil may be permitted to cool completely, and may be removed from the mandrel, 12', before the cementing treatment. If handled in relatively short lengths, these lengths may be dipped in the acetone to soften all exposed surfaces, and then permitted to dry, whereupon it will be found that the abutting coils have become fused together. Ordinarily, where no mounting member is to be left in the tubing, the thickness of the strip material will be slightly greater than that which is merely wrapped onto a mounting member, as in the process of Figure 1, but the general principle of the process is the same.

Figure 3 illustrates a method of inter-helically winding two or more strips of celluloid material on a mounting member, 20. The strips, as shown, are of contrasting colors, the strip, 21 being indicated as white, and the strip, 22, as red, and they are handled by the apparatus as a single strip, being fed parallel to each other onto the mounting member in substantially the same manner as the single strip, 11, is fed onto the mounting member, 12, as shown in Figure 1. It will be evident that three, or even more, strips of contrasting colors may be similarly applied.

Figure 4 illustrates a modification of carrying out the process in which the strips of celluloid are secured longitudinally instead of helically. They are shown applied to a mounting member, 25, to form a polyhedral or multi-faced casing, which is illustrated, as octagonal. The mounting member, 25, is originally in the form of a cylindrical tube, preferably of celluloid or other material susceptible of deformation. It may be understood that suitable means, not shown, is furnished for feeding the tubing longitudinally. A coating apparatus, indicated at 26, applies acetone or other solvent to the outer surface of said member, 25, as it moves in axial direction. This solvent softens the outer surface of the mounting member, rendering it gummy, adhesive, and in condition to be deformed by the application of pressure. As the mounting member, forwardly of the coating apparatus, 26, are two batteries of four reels each, of celluloid strip material, 27. As shown in the drawing, the reels of one battery are positioned 90 degrees apart, and the reels of the other battery are also spaced 90 degrees apart, but offset 45 degrees with respect to the reels of the first battery, so that strip celluloid may be thus fed onto the mounting member, 25, in eight equi-angularly spaced planes, as shown in Figure 4, so as to form an octagonal casing. The strips may be of any color, or combinations of color, and, as herein shown, and merely by way of illustration, the strip celluloid of the battery of reels positioned further forward in the direction of movement of the tube, 25, is lined to indicate blue. Any suitable casing, for surface pattern may be formed in the strip material, and will be retained unimpaired in the finished product.

A brush or pad, 38, is positioned for contact with the under surface of each strip as it feeds off the reel, so that these surfaces are coated with acetone to insure adhesion of the strips to the mounting member, 25. Associated with each set of reels I provide pressure rollers, 29, which not only operate to press the strip material against the mounting member, 25, but also exert sufficient pressure to slightly deform the outer surface of the cylinder, 25, flattening it to give the mounting member octagonal cross-section, and to permit the several strips of celluloid to be fitted snugly thereon. When thus fitted, the edges of the strips abut each other, as shown in Figure 7, and the softened surfaces of the strips adjacent these edges are forced together, fusing the strips into an integral enclosing casing for the part 25. The assembled structure is then drawn through a final forming die, 30, to rectify any inaccuracies in the material, and by this type of assembly, the lateral edges of the strips may be slightly beveled, so that they shall fit better in their assembled abutting relation and form a closed sharp corner, as seen in Figure 7. This integral tubular member may be made up in any convenient length, and then cut into shorter lengths for final use, if desired. Ordinarily, it will require no further finishing of the exterior or interior surface.

Figure 6 illustrates a slight modification of the
process shown in Figures 4 and 5, in that heat is employed for softening the mounting member to permit its deformation. This member is indicated at 35 as being fed longitudinally by any suitable means, not shown, while strip celluloid, 36, is applied to the surface to form any desired number of polygonally related faces. As shown, two batteries of four reels each are provided for supplying the celluloid strips, 36, and these batteries are arranged substantially as in Figure 4, to produce an eight-sided surface. A brush or pad, 37, may be arranged to coat the inner surface of each strip with acetone, or similar solvent, as the material approaches the tubular mounting member, 35, and pressure rollers, 38, are positioned to ensure initial adhesion of the strips. Beyond the rollers, 38, the mounting member with the stripping applied is fed through a heating chamber, 39, which softens the material, rendering the cylindrical member, 35, sufficiently ductile so that as it emerges from the heating chamber a set of pressure rollers, 40, arranged in diametrically disposed pairs, will serve to force the strips more firmly onto the mounting member, and at the same time deform the celluloid of the latter to produce a shape similar to that shown in Figure 7. This step is completed by passing the material through the final forming die, 41, corresponding to the die, 30, of Figure 3.

It will be evident that in some instances where the mounting member is of tubular stock, as shown in all the examples illustrated herein, it may be desirable to support such tubular member on a mandrel in order to increase its stability during the application of the strip material to its surface. The provision of such a mandrel and a means for supporting it are matters well understood by those skilled in the art, and need not be shown or described in detail.

I claim:

1. The method of making a tubular article which consists in winding strip celluloid helically upon a relatively rigid unitary tubular mounting member, with the marginal edges of the strip substantially in abutting contact, uniting said strip with the mounting member, and uniting said edges to form an integral casing for the mounting member; thus to provide a laminated tube with its outer lamination helically wound about an inner lamination in unitary-tube form.

2. The method of making a tube from strip celluloid or similar semi-rigid material which method comprises feeding the material with the edges thereof opposed, on to a longitudinally extending support associated with a surrounding forming die for contact with the material, and advancing the support and said material through said forming die, thereby to crowd said edges together face-to-face.

3. The method of making a multi-colored tubular article which consists in helically winding two or more strips, arranged edge to edge as fed and of contrasting colored celluloid or like material, onto a relatively rigid unitary tubular mounting member, uniting said strips with the mounting member, and uniting said edges, thus to form an integral casing for the mounting member, thus to provide a laminated article with its outer lamination helically wound about an inner lamination in unitary tubular form.

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