

Dec. 25, 1962

J. A. DURKIN ETAL

3,070,281

FOAM COATED PAPER TUBE

Filed Nov. 2. 1960

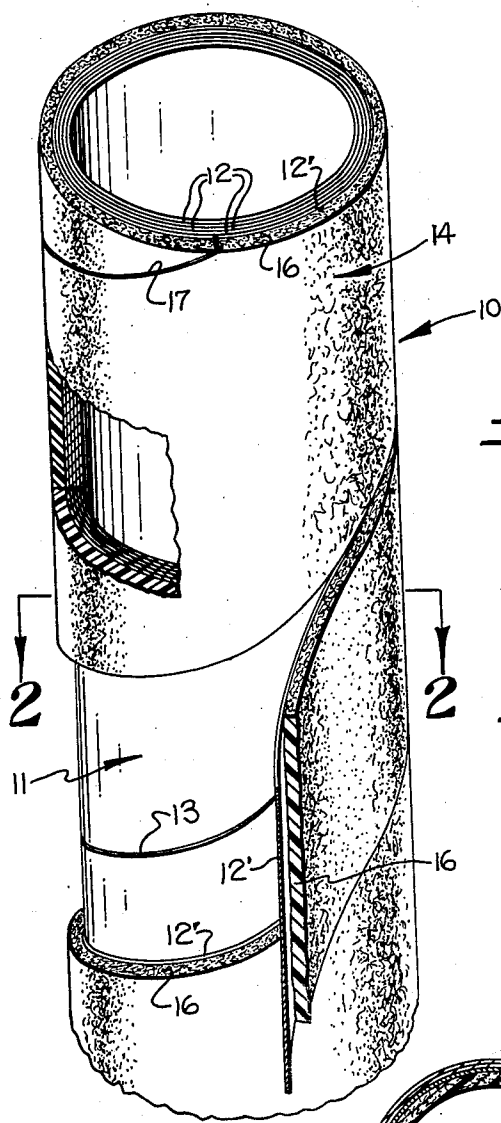


Fig-1

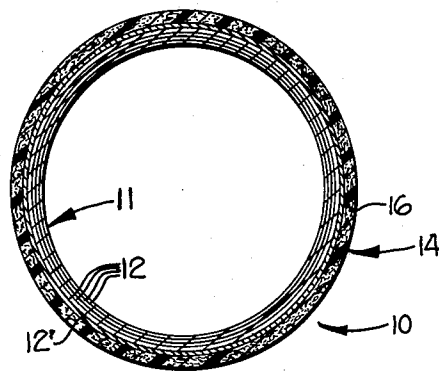


Fig-2

Fig-3

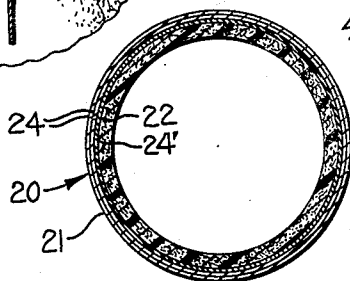
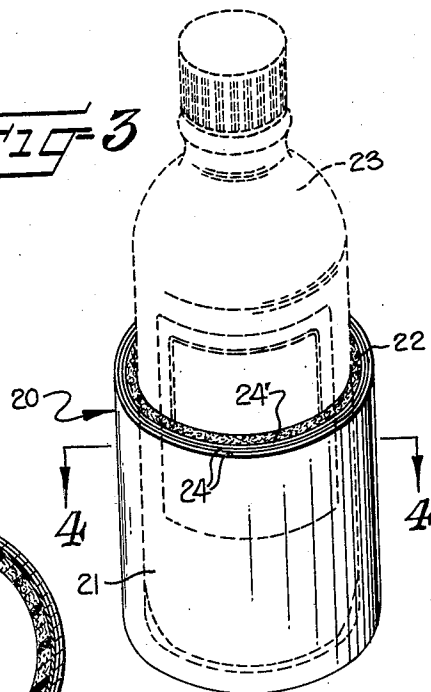


Fig-4

INVENTORS:
JOSEPH A. DURKIN
and OWEN F. FAYNE

BY

P. Russell Foster

ATTORNEYS

1

3,070,281

FOAM COATED PAPER TUBE

Joseph A. Durkin, Montclair, and Owen F. Fayne, Lake Mohawk (Sparta), N.J., assignors to Sonoco Products Company, Hartsville, S.C., a corporation of South Carolina

Filed Nov. 2, 1960, Ser. No. 66,829
4 Claims. (Cl. 229—93)

This invention relates to paper tubes and more particularly to a multi-ply paper tube for winding thin deformable material such as plastic film.

A common practice today in the packaging of sheet material such as plastic film is to provide an elongated multi-ply paper tube, spirally or convolutely wound, which serves as a core on which is wound sheet material or film such as Mylar, polyethylene and the like in a plurality of overlying wraps. These paper winding cores are relatively simple and inexpensive to manufacture and their use is widely accepted throughout the plastic film industry.

In the winding of plastic film formed from relatively thin material which is relatively easy to deform such as Mylar and polyethylene, the surface of the winding core must be extremely smooth otherwise any irregularities on the peripheral surface of the core are transmitted radially outward through all of the overlying wraps with a resultant marking or deformation of all of the wraps of the film. Smooth surfaces, free of irregularities, are therefore provided on these winding cores, but it has been found that the inner or starting end of the film, which is placed directly on the core surface, creates a slight vertical rise on the core surface which is followed by the film during winding as it overlaps its inner end. This slight elevation produced by the film inner end is transmitted through the successive overlying wraps of film so that even with an extremely smooth winding core surface, marking or deforming of each layer of film occurs as in the case of core surface irregularities discussed above.

Accordingly, a primary object of this invention is to provide a new and novel paper tube for winding thin deformable sheet material such as plastic film and the like which eliminates marking or deforming of the film by the film inner end.

Another object of this invention is to provide a new and novel winding core for thin deformable film composed of plastic material such as Mylar, polyethylene and the like which is provided with a peripheral layer of resilient compressible material for receiving the inner end of the film to avoid marking or deforming the overlying wraps of film.

A further object of this invention is to provide a new and novel tubular package for packaging frangible articles which substantially reduces the likelihood of breakage of the article due to shock such as by dropping the package or the like.

This invention further contemplates the provision of a spirally wound multi-ply tube for winding thin deformable sheet material such as polyethylene or Mylar without deformation or marking of the film by its inner end which is simple and inexpensive in construction, which utilizes readily available materials and which may be formed using present day conventional spiral tube winding apparatus.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawing.

In general, the objects of the invention and related objects are accomplished by providing a tubular body member formed from a plurality of overlying paper plies which in the preferred embodiment is spirally wound. A layer of resilient compressible material, also spirally

2

wound, is secured to the peripheral surface of the paper tube to form the winding core of the invention. When film material such as Mylar, polyethylene and the like is wound on this core, the inner end of the film is urged into the yielding layer of resilient material by the overlying wraps of film so that the inner end is prevented from producing an elevated area on the surface of the winding core which would produce marking or deforming of the subsequent wraps of deformable film.

The novel features which are believed to be characteristic of the invention are set forth with particularity in the appended claims. The invention itself may be best understood by reference to the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is an isometric view of a portion of a winding core constructed in accordance with the invention which is partially cut away and unfolded to illustrate its construction;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1 in the direction of the arrows;

FIGURE 3 is an isometric view of a modification of the invention; and

FIGURE 4 is a sectional view taken along line 4—4 of FIGURE 3 in the direction of the arrows.

Referring now to the drawing and to FIGURE 1 in particular, there is shown a winding core designated generally by the numeral 10 which is constructed in accordance with the invention and which is utilized as a core for winding relatively thin deformable sheet material such as film formed from plastic material such as Mylar, polyethylene and the like. The core 10 includes a paper tube 11 which is formed from a plurality of overlying paper plies. In the preferred embodiment, the paper tube 11 is formed by spirally winding a plurality of paper plies 12 to form a spirally wound multi-ply paper tube with adjacent edges of the plies forming seams 13. As is well known, in conventional spiral tube winding apparatus, a plurality of paper plies with adhesive therebetween are wound on a mandrel to form a spiral tube which is continuously stripped from the mandrel and cut into appropriate lengths.

In accordance with the invention and as shown in FIGURE 1, a layer 14 of resilient compressible material is secured to the peripheral surface of the paper tube 11. This resilient compressible material forming the layer 14 is a plastic foam and preferably a polyurethane foam of any suitable well known type. The layer of plastic foam may be of any suitable thickness and by way of example, it has been found that a polyurethane foam layer 14 having a thickness of $\frac{1}{8}$ " on a tube approximately 5 feet in length gives the desired results of the invention for use as a winding core for plastic film.

In the specific embodiment illustrated, the foam layer 14 is formed by spirally winding an elongated strip 16 of the polyurethane foam so that a helically wound layer of uniform thickness results, and the longitudinal side edges of the strip 16 form a helical seam 17.

The winding core 10 of the invention, including the foam layer, is preferably formed using conventional spiral winding apparatus. To this end, a strip 16 of polyurethane foam is secured as shown in FIGURE 1 to the outermost paper ply 12' with the use of any suitable adhesive. The paper ply 12' which corresponds in width to the strip 16 may be wound onto the mandrel (not shown) together with the other paper plies 12 used to form the tube 11 and thereby form the winding core 10 of the invention as shown in FIGURE 1 with the strip 16 carried by the ply 12' forming the layer 14 on the winding core. FIGURE 2 shows the completed winding core clearly in section with the multi-ply paper tube 11 having the polyurethane peripheral layer 14 securely positioned thereon.

When deformable film such as Mylar, polyethylene or the like is wound onto the winding core 10, the layer 14 of foam yields to receive the film inner end as the wraps of film are placed on the core with the result that the film inner end does not produce an elevated area on the core which would cause marking or deformation of the wraps of deformable film.

Referring now to FIGURES 3, 4, there is shown a modification of the invention comprising a tubular package designated generally by the numeral 20 which is produced in accordance with the invention. The package 20 is employed for packaging frangible articles such as glass containers or the like and comprises a paper tube 21 the inner surface of which is provided with a layer 22 of resilient compressible material. FIGURE 3 shows a bottle 23 of conventional construction within the package 20. The package 20 has been illustrated only partially in FIGURE 3 in order to clearly show its construction. It should be understood that package 20 will preferably be constructed so as to enclose the packaged article such as the bottle 23 by lengthening the tube 21, by using a pair of co-operating tubes 21 or the like. The package 20 would also be provided with suitable end closures.

In the specific embodiment illustrated, the paper tube 21 is formed from a plurality of overlying plies 24 of paper as in the winding core 10 described above and the tube 21 is preferably of a multi-ply spirally wound construction. The layer 22 of resilient compressible material is preferably polyurethane foam in strip form also preferably spirally wound. To spirally wind the paper tube 21 and the foam layer 22 with conventional spiral winding apparatus, a strip of polyurethane foam is secured to the innermost paper ply indicated by the numeral 24' so that the plies 24, 24' may be readily wound spirally into the package 20. It can be seen that the foam layer 22 will be in contact with the mandrel during winding and consequently compressed, but the polyurethane foam layer 22 will immediately resume its original shape after the tube has been stripped from the mandrel.

The inner diameter of the package 20 is selected so that the bottle or container 23 fits snugly within the tube 21 and is cushioned against shock and the like by means of the yieldable inner foam layer 22. It should be understood that the diameter of the tubular package may be easily varied by selecting the proper diameter mandrel on which the paper tube 21 with the foam layer 22 is wound.

It can be seen that there has been provided with this invention a winding core for deformable plastic films such as Mylar, polyethylene and the like which eliminates the undesirable marking or deforming of such film by the inner end of the wound film. As is well known, this thin deformable film which generally has a thickness of approximately $\frac{1}{4}$ of a mil is wound in great lengths on the core and the deforming of each wrap of film is highly objectionable. By a relatively simple operation utilizing readily available materials such as polyurethane foam, these winding cores can now be provided during the spiral winding operation with a peripheral layer of this foam so that the inner end of the film wound on the core no longer is present to produce this objectionable deforming as it is pushed or urged into the yielding layer of resilient material. When the film is unwound from the winding core, the layer of resilient material springs back into its original form ready for reuse in a film winding operation. Furthermore, by locating the

foam layer on the inner surface of such a tube, which also may be constructed on conventional spiral winding apparatus, frangible articles such as bottles and the like may be packaged without fear of breakage by merely placing the article snugly within the tube. This polyurethane plastic foam is unusually suitable for this type of construction and lends itself readily to the spiral winding tube operation.

While there has been described what at present is considered to be the preferred embodiment of the invention, it will be understood by those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is the aim of the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

Having thus described the invention, what is claimed is:

1. A packaging tube for packaging products comprising, in combination, a spirally wound tubular body member formed from a plurality of overlying paper plies, a spirally wound layer of resilient elastomeric material secured to the peripheral surface of said tubular body member on which is wound deformable sheet material such as plastic film, said resilient elastomeric layer being arranged to yield and receive the inner end of said sheet material to thereby avoid marking of the overlying wraps of said deformable sheet material by said inner end.

2. A core for winding thin deformable sheet material such as plastic film comprising, in combination, a tubular spirally wound multi-ply paper tube, a spirally wound outer ply of plastic foam adhesively secured to the peripheral surface of said paper tube, said foam outer ply being arranged to yield and receive the inner end of said deformable sheet material whereby said inner end is prevented from deforming the wound wraps of said sheet material overlying said inner end.

3. A packaging tube for packaging products comprising, in combination, a spirally wound, tubular body member formed from a plurality of overlying paper plies, a spirally wound layer of plastic foam secured to the peripheral surface of said tubular body member on which is wound deformable sheet material such as plastic film, said plastic foam layer being arranged to yield and receive the inner end of said sheet material to thereby avoid marking of the overlying wraps of said deformable sheet material by said inner end.

4. A packaging tube for packaging products comprising, in combination, a spirally wound tubular body member formed from a plurality of overlying paper plies, a spirally wound layer of polyurethane foam secured to the peripheral surface of said body member on which is wound the deformable sheet material such as plastic film, said polyurethane foam layer being arranged to yield and receive the inner end of said sheet material to thereby avoid marking of the overlying wraps of said deformable sheet material by said inner end.

References Cited in the file of this patent

UNITED STATES PATENTS

353,021	Davis	Nov. 23, 1886
2,484,608	Cheyney	Oct. 11, 1949
2,766,920	Pawley	Oct. 16, 1956
2,977,014	Kock	Mar. 28, 1961
2,979,246	Liebeskind	Apr. 11, 1961

FOREIGN PATENTS

715,845	Great Britain	Sept. 22, 1954
---------	---------------	----------------