Dec. 31, 1963 F. J. BOCK 3,116,033

TEAR TAPE SPOOL

Filed Nov. 4, 1960

Fig. 1

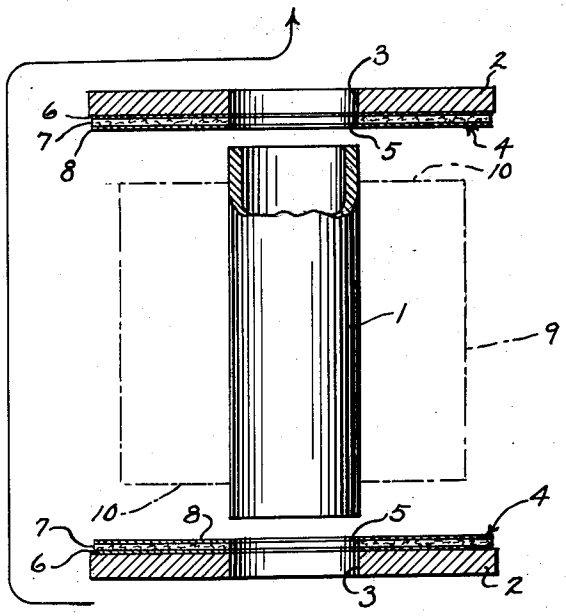


Fig. 2

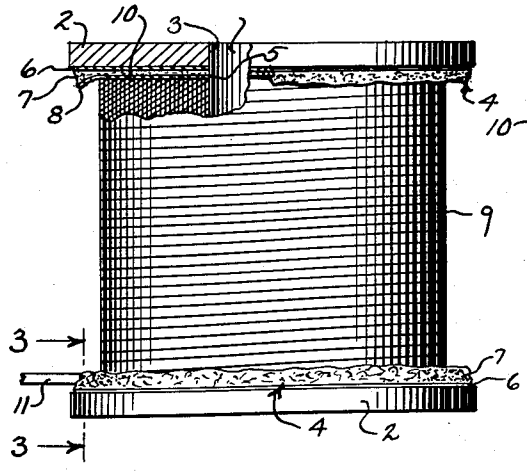
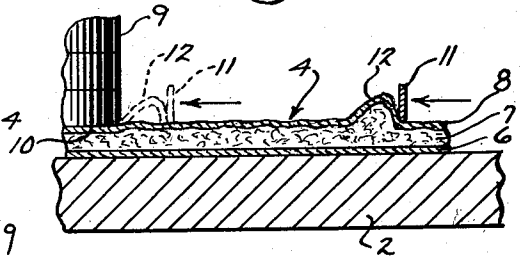


Fig. 3



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TEAR TAPE SPOOL

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This invention relates to spools for thin, easily crushed or twisted tape such as the tear tape used in cigarette packaging; and it more particularly resides in a tape spool having at least one disc-like end flange with a fluffy facing on its inner surface, which facing is adapted to form a supporting undulation in the path of a length of tape sliding across the facing.

Tear tapes are commonly used as opening strips for cigarette packages or other packages which include an outer covering of a film material such as cellophane. Spools of such tape are usually prepared by winding the tape spirally on an elongated core to form a cylindrical body of tape with perpendicular end faces. Disc-like end flanges are attached, either before or after winding, to one or both ends of the core to support the end faces of the tape body. The completed spools may be rotatably mounted in conjunction with a packaging machine, and measured lengths of tape may be withdrawn from the spools as each package is formed.

Since the flat tape is spirally wound on the core, the end faces of the tape body are not perfectly smooth. That is, some portions of tape extend outwardly further than others and those portions are not adequately supported.

As a length of tape is withdrawn, the tension on the tape may cause the unsupported portions of tape to be twisted or shouldered over the edge of an end face of the tape body and then to be pulled between the tape body and flange whereby the tape may be jammed or broken. Also, should the tension on the tape be relaxed for any reason, the inertia of the rotating spool may cause a loop of tape to be loosened. Such a loosened loop could fall or move toward the end flanges and, when the tape is again put under tension, could be pulled between the tape body and end flange and be broken.

A number of spools have been devised to overcome this difficulty, but none has, heretofore, proved successful. For example, it has been proposed that a facing of felt, velvet or a similarly dense material be applied to the end flange as in those spools heretofore used for thread. In such spools, the faced end flanges are held against the tape body under considerable pressure and the felt serves to fill substantially all of the space between the body and the flange. Such a construction has not, however, proven adequate for tape spools for a number of reasons. For example, if a felt-faced flange is held against the tape body under sufficient pressure to prevent the tape from sliding between the body and flange, the edges of the furthest extending portions of tape may be crushed, rendering those portions useless. Thus, a felt facing which may be quite suitable for thread of circular cross section is not effective in the case of flat tapes.

Accordingly, it is an object of this invention to provide a fluffy facing material for the end flange of a tape spool which is laterally and vertically deformable, whereby the facing is adapted to form a supporting undulation or flange in the path of a length of tape moved across the facing, which undulation serves both to support and prevent twisting of the tape and to prevent it from sliding between the body and the flange.

It is a further object of this invention to provide such a facing that is highly compressible whereby it also serves to support the end faces of the tape body under minimum pressure.

It is another object of this invention to provide a facing material with the foregoing properties which may be inexpensively and permanently attached to the end flanges rendering them capable of repeated use.

The foregoing are merely illustrative, and further objects and advantages will appear from the description to follow. In the description, reference is made to the accompanying drawing, forming a part hereof, in which there is shown by way of illustration and not of limitation a preferred embodiment of the invention.

In the drawing:

FIG. 1 is an exploded view of a tape spool formed according to the invention herein, with parts broken away and in section,

FIG. 2 is a front view with parts broken away and in section showing a filled tape spool formed according to the invention herein, and

FIG. 3 is an enlarged fragmentary view in cross section of the tape spool shown in FIG. 2, taken along the plane 3—3 therein.

Referring again to FIG. 1, it can be seen that the tape spool includes a hollow cylindrical core 1 which may be formed of pressed paper or any other suitable material. A pair of disc-like end flanges 2, also formed of pressed paper or a similar material, are provided and have circular apertures 3 which are of only slightly greater diameter than the core 1 whereby the flanges 2 may be frictionally attached to the ends of the core 1. A fluffy facing disc 4 is adhesively secured to the inner surface of each end flange 2 and is provided with a circular aperture 5 in register with the flange aperture 3.

As seen more clearly in the enlarged view of FIG. 3, the facing 4 preferably includes a bottom or support layer 6 lying next to the face of the flange 2 and adhesively secured thereto, an intermediate or cushioning layer 7 adhesively secured to the bottom layer 6 and an upper or surface layer 8 adhesively secured to the cushioning layer 7. The surface layer 8, when provided, should be relatively thin, smooth and flexible and, for example, may comprise a suitable combination of non-woven fibers such as cotton, wool, and cellulose brought together with a binder to form a homogeneous mat. The cushioning layer 7 may be formed of any suitable non-woven, fluffy material such as cotton or cellulose. The support layer 6 may be formed of a material similar to that of the surface layer 8 or of any other suitable material. If desired, it is not necessary to provide the support layer 6 and the lower surface fibers of the cushioning layer 7 may be adhesively secured directly to the face of the flange 2.

The facing 4 as a whole is quite fluffy. That is, it is readily deformable, both laterally and vertically, and is highly compressible in comparison to the usual felt materials. For example, the following table shows the approximate compressibility of the facing 4 under various pressures as contrasted with the approximate compressibility of an ordinary felt facing material under like pressures:

Pressure (gm./sq. in.)	Percent of Original Thickness	
	Facing 4	Felt
5	74	96
10	66	94
15	61	93
50	49	88
100	39	85

Referring to FIGS. 1 and 2, it can be seen that a cylindrical body 9 of tear tape such as that used in cigarette packages is spirally wound on the core 1 and has perpendicular end faces 10. The end flanges 2, with facings 4,

are frictionally attached to the ends of the core 1 and press against the end faces 10 of the body 9. Due to the compressibility of the cushioning layer 7, a minimum amount of pressure will serve to compress the facing 4 between the flange 2 and the body 9 to support the end faces 10. If desired, unfaced end flanges (not shown) may be attached to the ends of the core 1 to increase the ease of operation as the body 9 is being formed on the core 1. The unfaced flanges may then be removed and replaced with the faced flanges 2.

Referring to FIG. 3, the operation of the facing 4 may be described. In FIG. 3, a section of tape 11 is shown sliding across the surface layer 8 of the facing 4. Because the fluffy cushioning layer 7 is readily deformable both laterally and vertically, the flexible surface layer 8 is free to form an undulation 12 in the path of the tape 11. The undulation 12 has a crest rising substantially above the normal plane of facing 4, which serves to support the tape 11 and prevent it from twisting in the direction of its movement as shown in FIG. 3. As the tape 11 and undulation 12 move to the dotted line position to the left as seen in FIG. 3, the undulation 12 will form an effective barrier to prevent the tape 11 from twisting and sliding between the body 9 and the flange 2. The tape 11 is supported against twisting at all times as it moves across the facing 4 and is also effectively prevented from sliding between the body 9 and the flange 2 by the undulation 12 formed in the surface layer 8.

Although the specific embodiment shown herein includes the flexible surface layer 8, such a surface layer need not necessarily be provided. A single fluffy layer similar to the layer 7 could effectively serve the same purpose, since the outer surface of such a readily deformable layer would itself be capable of forming undulations similar to those formed in the layer 8. The smooth, flexible layer 8, however, serves to enhance this undulatory effect.

Although a pair of end flanges 2, one of which is attached to each end of the core 1, are shown herein, it will be apparent that when the completed spool is to be disposed vertically with respect to a packaging machine it may not be necessary to provide an upper end flange although such a flange is generally preferable.

The faced flanges 2, because of their frictional connection to the core 1, may be easily removed when the spool has been emptied and may be re-used repeatedly.

Although a preferred embodiment of the invention has been shown herein, it is desired that it be understood that the invention is not to be limited to the specific form or arrangement of parts shown except insofar as such limitations are contained in the following claims.

I claim:

1. In a tape spool comprising an elongated core, a body of thin, narrow, easily crushed tape spirally wound about the core with the width of the tape parallel to the longitudinal axis of the core, said body of tape having an end face that is generally perpendicular to the longitudinal axis of the core with concentrically alternate segments of tape at the end face projecting outwardly of the body further than adjacent segments, and a disc-like flange portion attached to an end of the core in facing relation to the end face of the tape body, a facing for the surface of the flange portion that faces the end face of the tape body comprising: a relatively thick, fluffy cushioning layer attached to the flange portion; and a relatively thin, flexible surface layer attached to the cushioning layer, said facing pressing against the end face of the tape body without exerting sufficient force thereon to crush the outwardly extending tape segments, said cushioning layer being readily deformable both vertically and laterally to allow the surface layer to be capable of relative undulatory movement with respect to the flange portion so that a twisting movement of an outwardly extending tape segment generates a supporting undulation in the surface layer that holds the segment against such twisting.

2. An end flange for a spool for thin, easily crushed tape comprising: a disc-like flange portion; a facing secured to one face of the flange portion; said facing comprising a cushioning layer secured to the flange portion and a relatively smooth, flexible surface layer attached to the cushioning layer, said facing being characterized in that the cushioning layer is formed of a non-woven fibrous material that is relatively loosely packed to be readily deformable both laterally and vertically so that as a segment of tape is moved along the surface layer, with the width of the tape substantially perpendicular to the surface layer and with the surface layer in frictional engagement with the tape without exerting sufficient force thereon to crush the tape, the fibers of the facing are displaced in the direction of movement of the tape to form an undulation in the surface layer which lies in the path of and preceding the tape throughout its movement, which undulation supports the tape against twisting in the direction of its movement.

3. An end flange for a spool for thin, easily crushed tape comprising: a disc-like flange portion; and a facing attached to one face of the flange portion and having a normally planar outer surface, said facing being characterized in that it is formed of a non-woven fibrous material sufficiently loosely packed to be compressed to approximately one-half of its original thickness upon the application of a force of approximately fifty grams, whereby as a segment of tape is moved along the outer surface, with the width of the tape substantially perpendicular to the outer surface and with the outer surface in frictional engagement with the tape without exerting sufficient force thereon to crush the tape, the fibers of the facing are caused to be displaced in the direction of movement of the tape to form a supporting undulation of sufficient magnitude to have a crest rising substantially above the normal plane of the outer surface of said facing to support the tape against twisting in the direction of its movement.

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