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[54] TAPE REEL
5 Claims, 3 Drawing Figs.
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[51] Int. Cl. B65h 75/18
[50] Field of Search 242/71.8 A,
71.8

ABSTRACT: A reel comprising a hub and axially spaced parallel said flanges, said hub having an inner ring formed with a central opening to receive a spindle, a web supported about the periphery of the inner ring upon which the flanges may be mounted, and an outer compression ring positioned between the flanges and surrounding said web and supported therefrom by resilient means.

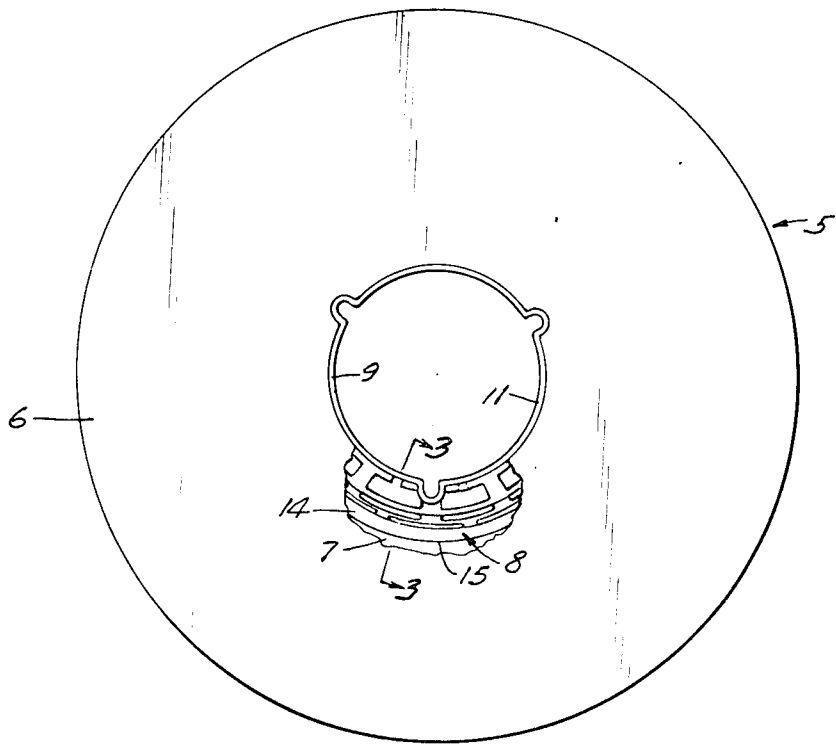


FIG. 1

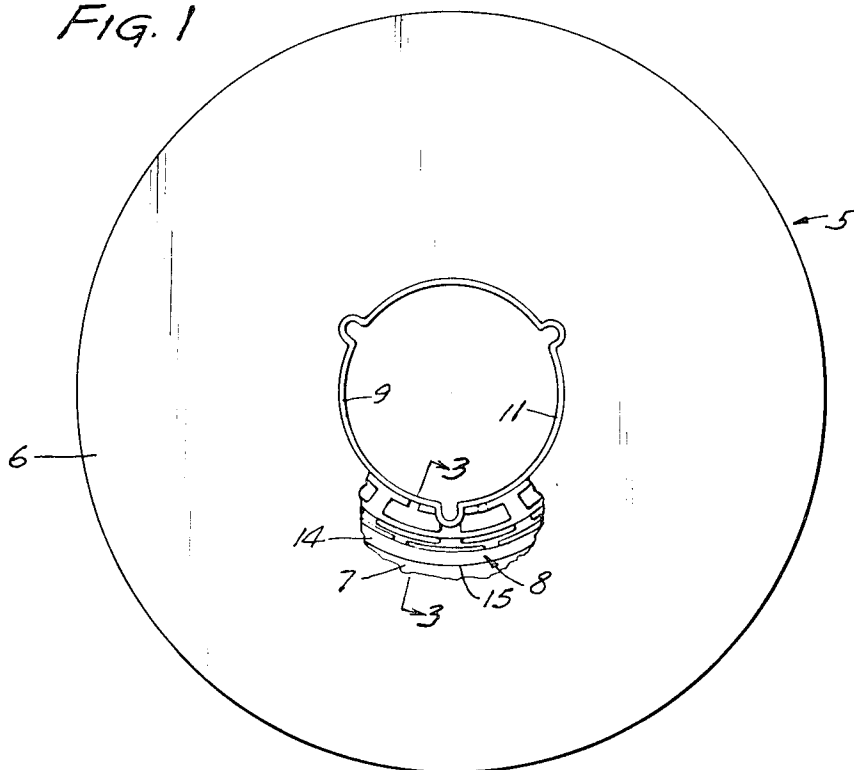


FIG. 2

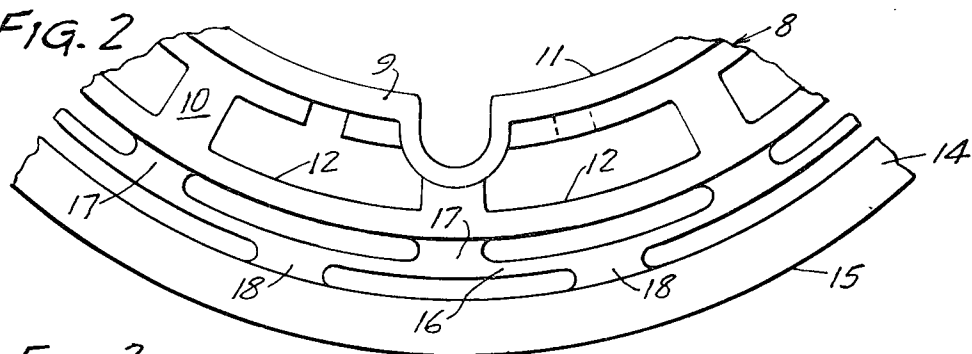
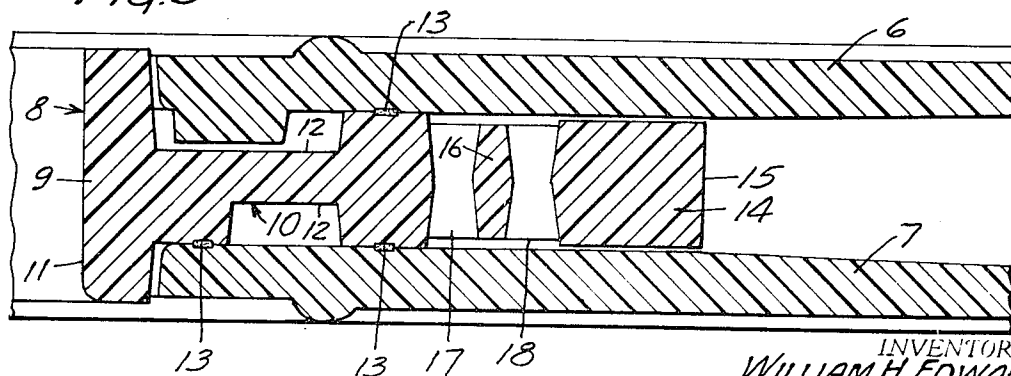


FIG. 3



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TAPE REEL

This invention relates to an improved reel structure and in one aspect to a reel structure which will support the heavy loading and permits the use of lighter and less expensive materials.

In the prior art, the reel structures for long lengths or large volumes of strip material, such as magnetic tape or thin films have required considerable strength in the hub sections to prevent them from being compressed or collapsed onto the spindle supporting the reel. The problem is particularly acute when the material being wound is very thin (approaching 0.0005) and is elastic, e.g. web material formed of polyethylene terephthalate. Winding tension from such material is transmitted to the hub as a compressive pressure and is cumulative with each successive wrap causing the reel to collapsed or be crushed and pressed onto the spindle, thus causing the reel flanges to be distorted and move toward each other closing the tape path. This situation can be alleviated by reel hubs constructed according to the present invention.

Other reel structures are known in the art which are formed with grooves or slots affording some flexure of the reel under these compressive forces, however, they do not close uniformly and thus do not retain the uniform circular winding surface as afforded by the structure of the present invention.

The reel hub and reel of the present invention comprises a hub through which a bore is formed to receive the spindle and around which is formed a peripheral web for supporting axially spaced parallel reel flanges. Supported also from the web and positioned between the reel flanges is an outer compression ring upon which the tape is wound, which ring is supported by resilient means from the web. The resilient means may be beamlike members which support the compression loading of the outer ring, however, other resilient rings or members may be positioned between the web and the outer ring to absorb the compression loading.

The above and further advantages of the present invention will be more fully understood after reading the following detailed description which refers to the accompanying drawing wherein:

FIG. 1 is an elevational view of a reel constructed in accordance with the present invention having portions of one flange removed to show the interior parts of the hub;

FIG. 2 is an enlarged detailed view of a portion of the hub; and

FIG. 3 is an enlarged fragmentary sectional view taken along the line 3—3 of FIG. 1.

Referring now to the drawing there is illustrated in FIG. 1 a reel 5 having axially spaced parallel flanges 6 and 7 supported from a hub generally designated by the reference numeral 8.

The hub 8 comprises an inner ring 9 with an axial thickness substantially equal to the axial thickness of the reel 5 and including a peripherally mounted web 10 for supporting the flanges 6 and 7. The inner ring 9 has a central opening 11 formed to receive and support a driving spindle of a winding mechanism or of a reproducing, projecting or recording apparatus.

The web 10 extends around the outer periphery of the ring 9 and is formed with recessed areas 12 permitting a reduction in material and weight of the hub but is a generally continuous member having opposed axial surfaces to which the reel flanges may be secured by sonic welding such as illustrated by the weldments 13 in FIG. 3. Positioned between and spaced slightly from each inner face of the reel flanges is an outer compressible ring 14 having an outer peripheral surface 15 upon which a strip of material may be convolutely wound. As the strip material is wound around the compressible ring 14 under some tensile loading, the forces increase causing a tremendous radial inward compressive stress to be applied against the ring 14 causing the same to be compressed and to shrink from its normal diameter, i.e., by 0.010 to 0.015 inches on a reel with the outer ring having an internal diameter of 4.340 inches and outer diameter of 4.750 $\pm$ 0.002 inches. To avoid this compression force from affecting the inner ring supported on the spindle, a resilient member is positioned around

the outer edge of the flange supporting web 10 of the hub 8 to support the compression ring 14. This resilient member in the illustrated embodiment generally comprises a rib structure comprising members joined to the web and to the compressible ring and affording deflection of the members.

The structure illustrated comprises 12 equally spaced radially extending ribs or pillars 17 supporting a continuous resilient beam member 16, and said beam supports the compressible ring 14 from 12 spaced radially positioned ribs or posts 18 positioned between the beam and the inner diameter of the ring and circumferentially spaced from, or positioned on the beam intermediate, each pillar. The structure supports the outer ring 14 as the compression loading is applied to the outer ring upon the winding of a magnetic tape or thin film upon the reel. The compression forces are taken up by flexure of the beam 16 between each of the pillars 17 from the loading transferred thereto by posts 18. The beams or portions of beam member 16 between the pillars are capable of withstanding the compressive stresses applied thereto from the ring 14 and deflect under the compressive stresses. When the stress is relieved the beam will return to its original circular shape.

A suitable material for constructing the reel of the present invention is a glass-filled styrene which is a common material used in the art where it is desired that shrinkage of the polymeric material after the molding operation be reduced. It is understood however that other light materials such as aluminum may be used. The number of pillars or posts used with the resilient structure, as illustrated in the accompanying drawings, may vary in number, however supporting the outer ring from 12 positions affords only a slight change in the outer peripheral surface 15 and is much preferred over a lesser number, for example, three or four posts, where the compressible ring could be caused to crush or fail and form three or four lobes, thus making a substantial change in its configuration.

Having thus disclosed the present invention what is claimed is:

1. A reel hub comprising
 - an inner ring defining a central opening for receiving a spindle,
 - a resilient beam member positioned around said inner ring,
 - an outer ring upon which a web is to be wound surrounding said inner ring and said resilient beam member, and
 - first support means for supporting said resilient beam member in radially spaced relation from said inner ring,
 - second support means for supporting said outer ring in radially spaced relation from said resilient beam member,
 - said second support means being spaced circumferentially about said beam from said first support means such that along any radial path between the outer periphery of the outer ring and the opening in the inner ring there is a discontinuity of material on at least one of the radially opposite sides of said beam member such that compressive stresses imparted to said outer ring as a web is wound thereon will be restricted from the inner ring.
2. A reel hub comprising an inner ring defining a central opening for receiving a spindle, an outer ring upon which a web is to be wound, a plurality of spaced pillars extending radially from said inner ring, a continuous circular beam surrounding said inner ring and supported on said pillars, and spaced radially extending posts joined to said beam at points circumferentially spaced from said pillars and joined to said outer ring affording a resilient support for said outer ring and affording relative movement of the outer ring with respect to the inner ring under the stresses imparted thereto by a web wound on the outer ring and restricting transfer of said stresses to the inner ring.
3. A tape reel comprising a hub, said hub having
 - an inner ring defining a central opening for receiving a spindle,
 - means secured to said inner ring for supporting axially spaced parallel reel flanges,
 - a resilient beam member positioned around said inner ring,

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an outer ring upon which a web is to be wound surrounding
said inner ring and said resilient beam member, and
first support means for supporting said resilient beam
member in radially spaced relation from said inner ring,
second support means for supporting said outer ring in radi- 5
ally spaced relation from said resilient beam member,
said second support means being spaced circum-
ferentially about said beam from said first support means
such that along any radial path between the outer
periphery of the outer ring and the opening in the inner 10
ring there is a discontinuity of material on at least one of
the radially opposite sides of said beam member such that
compressive stresses imparted to said outer ring as a web
is wound thereon will be restricted from the inner ring
and said means for supporting reel flanges, and

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spaced parallel flanges secured to said means on said hub
for supporting reel flanges such that said reel flanges are
positioned on axially opposite sides of said resilient beam
member and said outer ring for confining the web as the
same is wound on said outer ring.

4. A tape reel according to claim 3 wherein said means on
said hub for supporting said flanges is a web formed about the
periphery of said inner ring, which web has an axial dimension
less than that of said inner ring, and which web supports said
resilient beam member and said outer ring.

5. A tape reel according to claim 3 wherein said flanges are
axially spaced from said resilient beam member and said outer
ring.

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