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[54] **ONE PIECE SEALING RING**

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[58] **Field of Search** ..... 206/52 F, 53, 59 E; 264/241; 312/20; 211/40; 242/197

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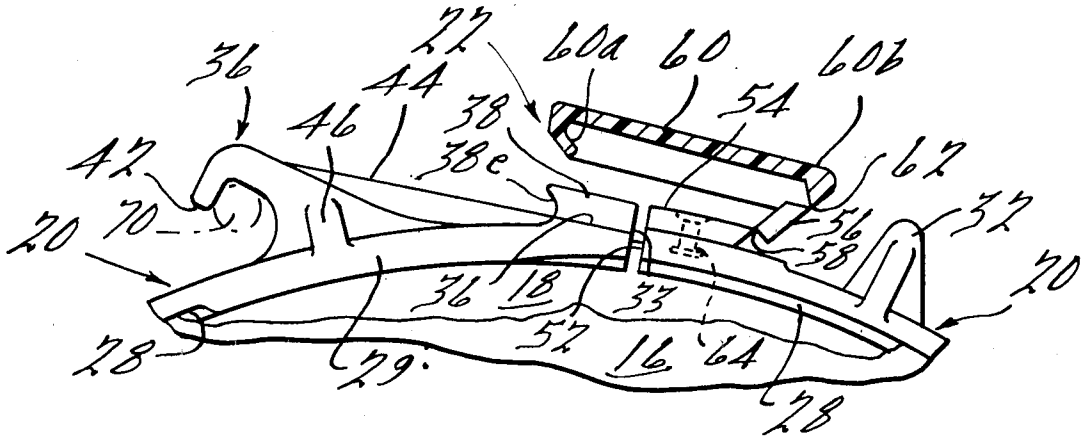
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[57] **ABSTRACT**

A sealing ring for use with a computer tape reel wherein the ring is formed as an integral molded strip having a stiff arcuate portion adjacent one strip end with a radius of curvature approximating that of the reel, and a generally flexible portion extending from the stiff arcuate portion; the stiff portion is built up adjacent its free end to provide an integral keeper structure for coaction with an overcenter latch assembly secured to the free end of the flexible portion, and the radially outer face of the stiff portion is moldingly configured to provide a hook structure adjacent the keeper structure for hanging storage of the ring and encircled reel.

6 Claims, 10 Drawing Figures



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ONE PIECE SEALING RING

BACKGROUND OF THE INVENTION

This invention relates to sealing rings adapted to sealingly encircle a reel of the type having a central spool and spaced flanges. More particularly, it relates to a sealing ring for use with a computer tape reel, and to a method of making such a ring.

Various forms of sealing rings for computer tape reels are presently available. Certain of these rings, while generally satisfactory in performance and durability, are relatively expensive. Others, while relatively inexpensive, provide minimal protection for the reel contents and are susceptible to excessive wear and breakage.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide an improved computer tape sealing ring.

A more particular object is to provide a computer tape sealing ring which is inexpensive and yet provides effective and long-lasting protection for the reel contents.

The sealing ring of the invention comprises a strip of plastics material, which is moldingly configured at one end to define a keeper structure, and an articulated latch assembly of the overcenter type which is fixedly secured to the other end of the strip and is adapted to coact with the molded keeper structure to latchingly draw the strip ends together in an overcenter action to form a loop for sealing encirclement of a reel.

According to a further feature of the invention, the strip is further moldingly configured adjacent the keeper structure end to provide a structure extending outwardly away from the radial outer face of the strip and thereafter curving over to define a hook structure to facilitate hanging storage of the sealing ring and encircled reel.

In the disclosed embodiment, the strip is formed in a molding operation as a composite structure including a stiff arcuate portion adjacent one strip end having a radius of curvature approximating that of the reel, and a flexible portion extending from the stiff arcuate portion to the other strip end; the stiff arcuate portion is selectively moldingly configured at its outer face to provide the aforedescribed keeper and hook structures. Following the molding operation, the strip is selectively chopped at the free end of the flexible portion to provide the desired strip length, and an overcenter latch assembly is secured to the chopped end for latching coaction with the molded keeper structure on the free end of the stiff arcuate portion.

These and other objects, features and advantages of the invention will be apparent from the drawing and from the detailed description of the preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWING

A preferred embodiment of the invention is illustrated in the accompanying drawing in which:

FIG. **1** is a view of a sealing ring according to the invention shown in encircling relation to a computer tape reel;

FIG. **2** is an enlarged view of the sealing ring and reel structure within circle **2** of FIG. **1**;

FIG. **3** is a fragmentary view of a molded band used in the manufacture of the invention sealing ring;

FIG. **4** is a fragmentary top view of a portion of the band of FIG. **3** looking in the direction of arrow **4**; and

FIGS. **5–10** are transverse cross-sectional views taken on lines **5—5, 6—6, 7—7, 8—8, 9—9,** and **10—10,** respectively, of FIG. **3.**

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention sealing ring, seen generally at **10** in FIG. **1,** is especially suited for use with a reel **12** of the type including a central hollow spool **14** and spaced circular flanges **16, 18.** Reels of this type are commonly used for winding and storing computer tape.

Sealing ring **10,** broadly considered, comprises a band or strip **20** and latch means **22** adapted to draw the ends of the strip together in sealing, encircling relationship to reel **12.**

Strip **20** is best seen in FIGS. **3** and **4** to which reference is now made. Strip **20** is formed in a molding operation and includes a stiff arcuate portion **24** adjacent one strip end and having a radius of curvature approximating that of reel **12,** and a relatively flexible portion **26** extending from stiff portion **24** to the other end of the strip. The mold (not shown) for forming strip **20** corresponds to the shape of the strip **20** as seen in FIG. **3**; that is, the right-hand portion of the mold in which arcuate strip portion **24** is formed is actually arcuate in configuration and the left-hand portion of the mold in which portion **26** is formed is flat in configuration. Since the entire strip is formed of the same plastics material, the generally flexible nature of portion **26** and the stiff nature of portion **24** are produced, respectively, by selectively controlling the cross-sectional configuration of the strip.

Thus, flexible portion **26,** as seen in FIG. **5,** has a relatively frail cross section including a thin web section **27,** circumferential rib sections **28** for seating engagement within the reel flanges, and relatively shallow lip sections **29** for embracing the outer peripheral edges of the reel flanges. Portion **26** may thus be readily bent out of its as-molded flat configuration of FIG. **3** to assume the circular reel wrapping configuration of FIGS. **1** and **2.** A portion of the outer face of flexible strip portion **26** is moldingly configured to provide a label holder defined by thin longitudinal lips **30** (FIG. **10**) and end lips **31**; however, these lips are not sufficiently beefy to appreciably detract from the flexibility of strip portion **26.** The outer face of flexible strip portion **26** is further moldingly configured to provide a cored-out protuberance **32,** but this protuberance is very local and has no appreciable effect on the general flexibility of strip portion **26.**

Stiff portion **24,** by contrast, has a relatively bulky cross section, as seen in FIGS. **6–9,** and is extremely resistant to deformation out of its as-molded arcuate configuration. Specifically, stiff portion **24** is moldingly configured at its free end **33** to define a keeper structure **34** for latching coaction with latch means **22,** and is further moldingly configured inward of keeper structure **34** to provide a hook structure **36.**

Keeper structure **34** comprises a moldingly built-up structure on the radially outer face of the strip at free end **33**; this built-up structure comprises a platform section **36** raised above the general level of the radially

outer face of the strip, and a keeper section **38** moldingly raised centrally on platform section **36.** Keeper section **38** includes a flat upper face **38***a*, an end face **38***b* coterminous and coplanar with strip end **33,** side faces **38***c*, **38***d*, and an undercut face **38***e* remote from end face **38***b*. Keeper section **38** is selectively cored to provide a core cavity **38***f*. The transverse cross-section of the keeper structure (FIG. **6**) will be seen to be extremely bulky when compared to the frail cross section of flexible strip portion **26** (FIG. **5**). Specifically, the overall section has considerably more depth, the ribs **28** are considerably beefier, the lips **29** are deeper (extending down almost to the depth of ribs **28**) and the central web section is considerably thicker throughout its transverse width.

Hook structure **36** includes a hook section **40** extending outwardly away from the radially outer face of the strip and thereafter curving over to define a tip end **42.** Hook structure **36** further includes a dorsal stiffening fin or rib **44** and a pair of lateral buttresses **46** reinforcing each lateral face of hook section **40.** Dorsal fin **44** extends from the back side of hook section **40** to keeper section **38** with the upper edge of fin **44** forming a straight line with the upper surface of platform section **36.** Hook section **40** is selectively cored to provide a core cavity **48.** The transverse section of the hook structure (FIG. **7**), like the keeper structure section, will be seen to be extremely bulky with great overall depth, lip sections extending all the way down to the depth of ribs **28,** and a thick central web section.

The section of arcuate strip portion **24** between the hook structure and the keeper structure is also quite stiff (FIG. **8**) by virtue of the fill portion **50** between ribs **28,** the deep lips **29** extending all the way down to the depth of the ribs, and the dorsal fin **44.** Similarly, the section of arcuate portion **24** inward of hook structure **36** is quite stiff (FIG. **9**) by virtue of the fill portion **50** between ribs **28** and the deep lips **29** extending to the full depth of ribs **28.**

The deep, stiff sections of FIGS. **6–9** will be seen to coact, in toto, to provide extreme stiffness to arcuate strip portion **24** so that portion **24** behaves essentially like a rigid member and retains its as-molded arcuate configuration, in contrast to the readily flexing behavior of strip portion **26.**

In the manufacture of the invention sealing ring **10,** strip **20** is first formed in a molding operation to provide stiff portion **24** and flexible portion **26,** whereafter the total strip length is measured and strip end **52** is chopped to provide the desired strip length. Latch means **22** is thereafter secured to strip end **52** to complete the sealing ring.

Latch means **22** may take any of various overcenter or toggle forms. In the disclosed embodiment, latch means **22** comprises (FIG. **2**) an integral three-part structure including an anchor portion **54,** an intermediate portion **56** hinged to anchor portion **54** at **58,** and a latching portion **60** hinged to intermediate portion **56** at **62.** Latch means **22** is secured to strip end **52** by an aluminum rivet **64** passing through a suitable bore in anchor portion **54** and through the strip web **28,** which is locally thickened adjacent end **52** (FIG. **3**) to provide an adequate mounting structure for the latch means. Latch means **22** of the type shown are available from Southco Division of South Chester Corporation, Lester, Pa., as Part No. 07-10-102.

In use, sealing ring **10** is wrapped around reel **12** with rigid arcuate portion **24** concentrically embracing a corresponding arcuate portion of the reel flanges and flexible portion **26** wrapped flexibly around the remaining reel circumference to dispose strip ends **52** and **33** in juxtaposition, whereafter latch member **60** may be engaged over keeper section **38** with undercut keeper face **38***e* coacting with latch member face **60***a* to provide a latching interconnection between the two strip ends; latch member **60** is then pushed downwardly adjacent end **60***b* to move intermediate portion **56** into coplanar relation with anchor portion **54** and move hinge axis **62** overcenter with respect to hinge axis **58,** whereby to draw the strip ends together in an overcenter action and securely latch the sealing ring on the reel. The sealing ring and encircled reel may now be stored by hanging engagement of hook structure **36** with a suitable rod member **70** (FIG. **1**).

It will be apparent that the nature of the plastics material comprising the strip **20** is extremely critical to the effectiveness and durability of the sealing ring. Specifically, the plastics material of strip **20** must be sufficiently supple when formed in the frail section of strip portion **26** to allow repeated flexing and unflexing without strain or fatigue, must be sufficiently stretchable in the frail section of strip portion **26** to stretchingly accommodate normal circumferential variations among reels of a given nominal size, must be sufficiently rigid and strong when formed in the bulky cross section of the keeper structure to preclude creeping or deformation of the keeper section, must be sufficiently rigid and strong when formed in the deep cross section of the hook structure to preclude creeping or failure of the hook section under the relatively heavy weight of the suspended tape reel, and must be sufficiently rigid and strong when formed in the composite section of arcuate strip portion **24** to preclude "gapping" of the strip away from the encircled reel in the strip area immediately beneath the hook section.

Extensive testing and experimentation with various plastics materials have established that the material of the strip should have the following characteristics:

1. flex modulus as measured by American Society for Testing and Materials (ASTM) Test Method D790 of between 60,000 and 110,000 psi with an ideal value of between 95,000 and 100,000 psi;
2. Izod impact strength as measured by ASTM Test Method D256 greater than 4.5 ft. lb/in of notch;
3. tensile strength as measured by ASTM Test Method D638 and D651 greater than 3,000 psi; and
4. hardness as measured by ASTM Test Method D785 of less than 55 Rockwell R.

The strip material must also have an extremely high resistance to environmental stress cracking. One material that has been found to satisfy the above characteristics is Eastman Polypropylene 4E11A available from Eastman Chemical Division of Eastman Kodak Corporation; however, any plastics material generally satisfying these characteristics may be used in carrying out the invention.

Although a preferred embodiment of the invention has been illustrated and described in detail with reference to a preferred embodiment, it will be apparent that various changes and modifications may be made in the preferred embodiment without departing from the scope or spirit of the invention.

I claim:

1. A method of manufacturing a sealing ring for use with a tape reel of the type including a central spool and spaced flanges, said method comprising the steps of

A. moldingly forming a strip of plastics material to provide

1. a stiff arcuate portion adjacent one strip end having a radius of curvature approximating that of said reel and

2. a generally flexible portion extending from said arcuate portion to the other strip end; and

B. providing coacting latch means on said strip ends, so that said strip may be placed around said reel with said arcuate portion arcuately embracing said flanges and said flexible portion wrapped flexibly around said flanges to depose said strip ends in juxtaposition and allow said strip ends to be latchingly drawn together by said coacting latch means.

2. A method according to claim 1 and including the further step of

C. moldingly configuring said arcuate strip portion to provide a stiff hook structure extending outwardly from the radially outer face of said strip.

3. A method according to claim 2 and including the further step of

D. moldingly configuring said arcuate strip portion at said one strip end to provide a keeper structure formed as a built-up structure on said radially outer face, said keeper structure providing the aforesaid coacting latch means on said one strip end.

4. A sealing ring for use with a tape reel of the type including a central spool and spaced flanges, said ring comprising

A. a strip of plastics material having

1. a stiff arcuate portion adjacent one strip end having a radius of curvature approximating that of said reel and

2. a generally flexible portion extending from said arcuate portion to the other strip end; and

B. coacting latch means on said strip ends, whereby said strip may be placed around said reel with said arcuate portion arcuately embracing said flanges and said flexible portion wrapped flexibly around said flanges to dispose said strip ends in juxtaposition and allow them to be latchingly drawn together by said latch means.

5. A sealing ring according to claim 4 wherein

C. said latch means includes

1. a keeper structure moldingly built up on the radially outer face of said arcuate portion adjacent said one strip end and

2. an overcenter latch assembly secured to the other strip end for latching coaction with said molded keeper structure.

6. A sealing ring according to claim 4 wherein

C. said arcuate portion is moldingly configured on its radially outer face to provide an integral hook member extending outwardly from said outer face and thereafter curving over for hanging coaction with a suitable hanger member.

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