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[54] **TAPE CANISTER**
23 Claims, 8 Drawing Figs.

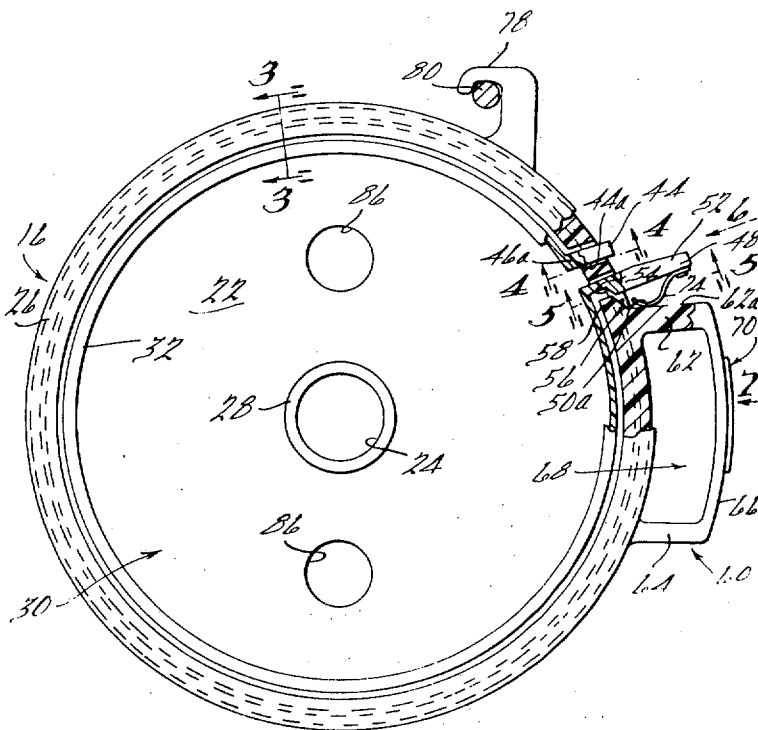
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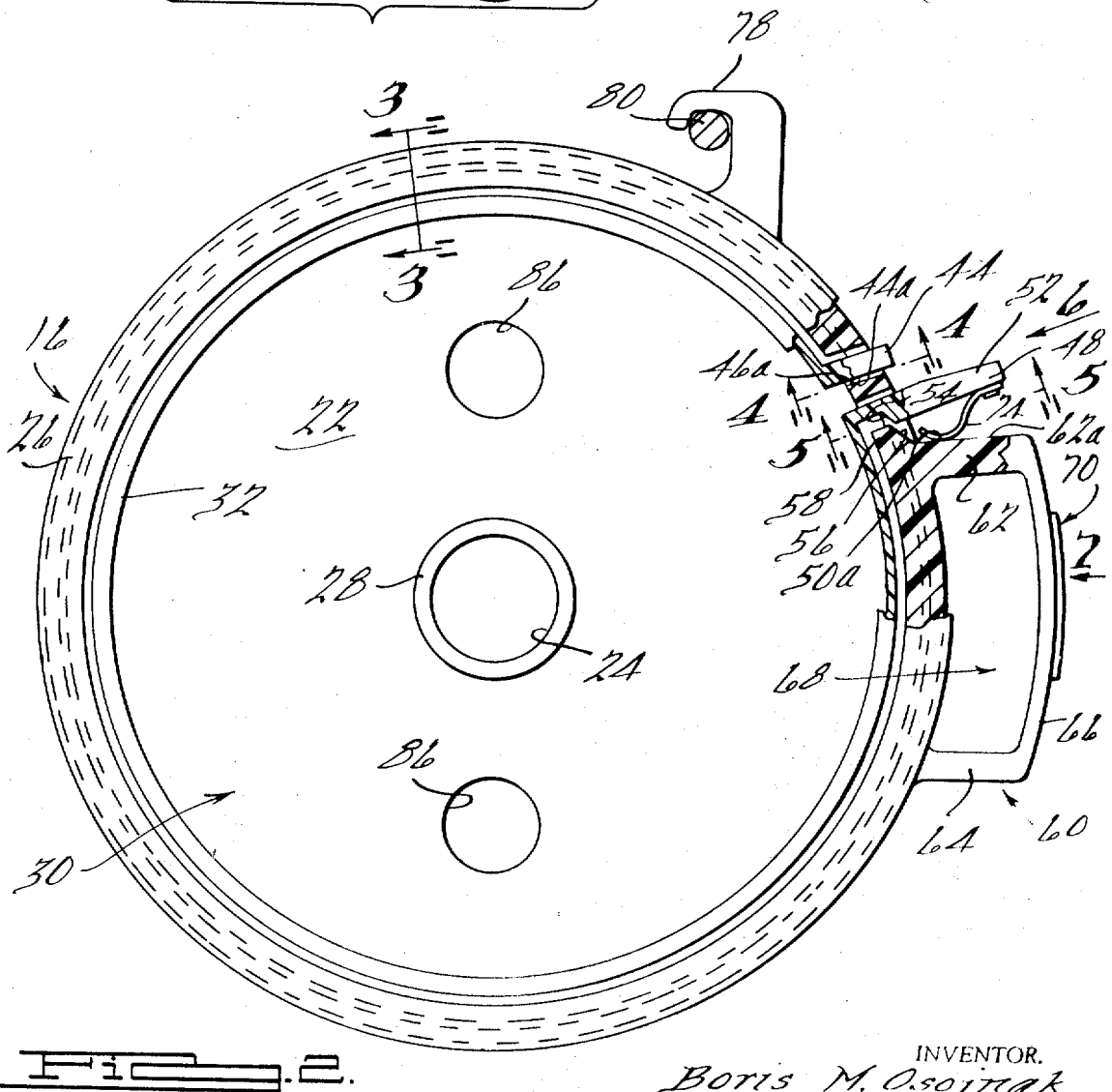
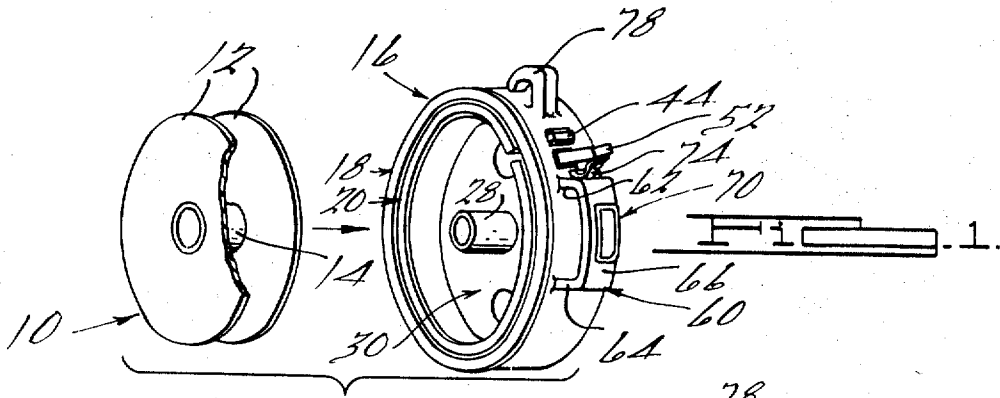
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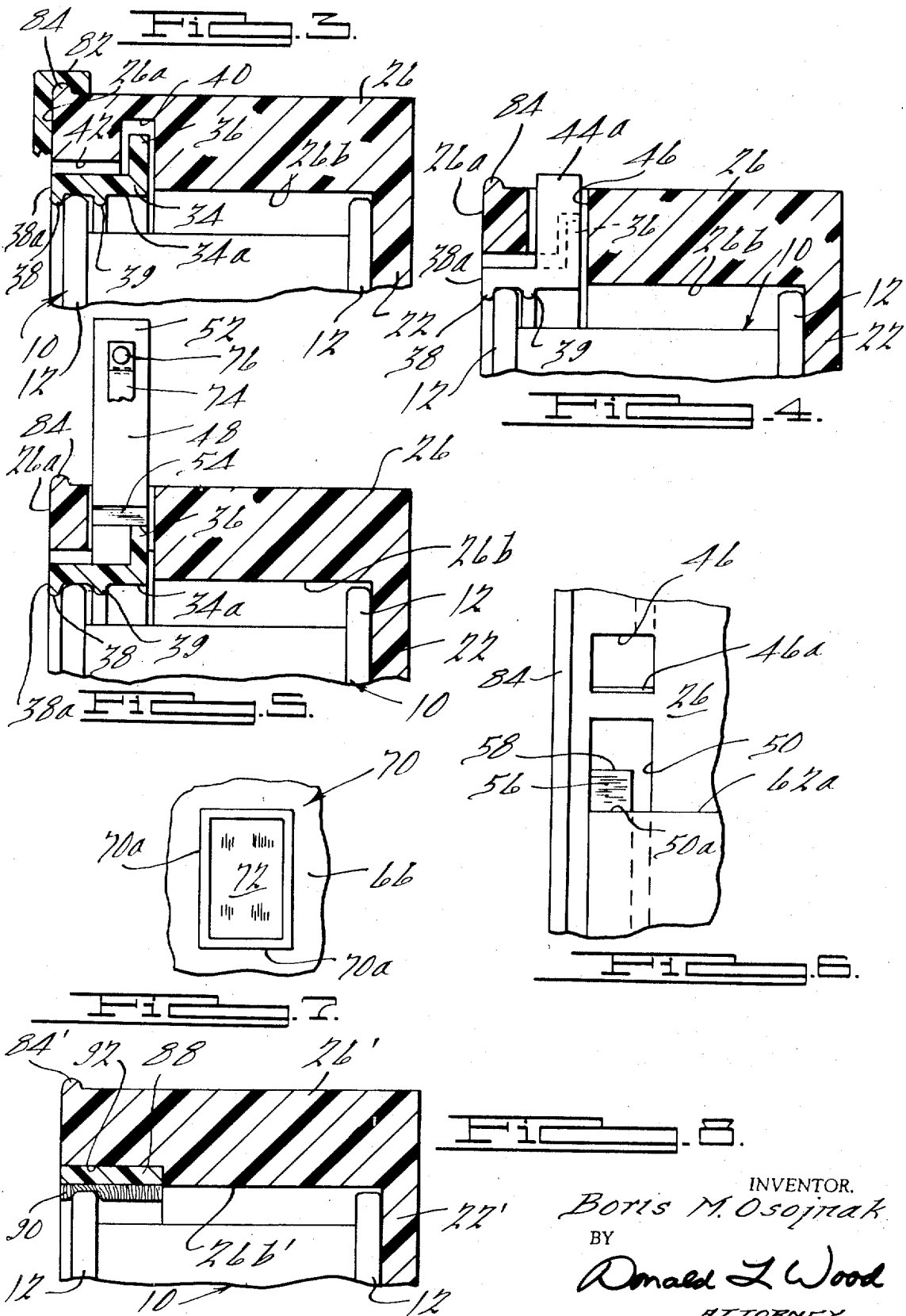
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ABSTRACT: A canister for storing a tape reel, comprising a base or shell member of generally cup-shaped configuration and a split sealing ring positioned on the inner periphery of the rim portion of the shell member and having a handle portion at one end projecting outwardly through the rim portion for manipulation by an operator so that the ring may be expanded to allow passage of the flange of a tape reel and thereafter contracted to trap the reel within the canister. In an alternate form, the sealing ring is replaced by a strip of flexible material positioned around the inner periphery of the shell rim portion and carrying a flocking of resilient bristles which deflect to allow insertion of the reel and thereafter coact with the outer reel flange to seal the reel within the canister.





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TAPE CANISTER

This application is a Continuation of Ser. No. 768,023, filed Oct. 16, 1968, and now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to storage devices for reels of film or tape. More particularly, it relates to storage devices for reels of computer tape. Computer tape is typically stored in a wound condition on reels of the type including spaced circular flanges interconnected by a circular hub. These reels, in turn, are stored primarily by one of two general types of storage devices.

One type of reel storage device comprises a two part canister in which the reel is placed in one part of the canister and the other part is then fitted over the first part in telescopic fashion to form a complete enclosure for the reel. While these canister-type devices are generally satisfactory, they require a rather complex latching construction to hold the two parts releasably together, thereby creating a high initial cost, and they create a relatively large overall package width, thereby increasing the amount of storage space required for each reel.

The other type of storage device in popular usage comprises a flexible band which is adapted to be wrapped in sealing relationship around the periphery of the reel flanges and which is releasably held in its encircling relationship by coacting latch means carried on the opposite ends of the band. These sealing bands have also been generally satisfactory; however, the band does not provide as much actual physical protection for the reel as the canister type, the reel hub support provided by the canister type is generally preferable to the circumferential reel support provided by the band, when hung by a hook in a suspended position the band tends to pull away from the reel flanges to destroy the seal, the band is perhaps more susceptible to failure by fatigue or rupture than the canister type, and the coacting latch elements on the opposite ends of the band tend to fail, or become wholly or partially inoperative, after sustained usage.

SUMMARY OF THE INVENTION

It is a primary object of the present invention to provide an improved storage device for reels of computer tape.

A more specific object is to provide a storage device for reels of computer tape which combines the primary advantages of the two piece canister type of device with the primary advantages of the flexible band type of device.

Conversely, it is an object of the invention to provide a storage device for computer tape reels which eliminates the disadvantages of both the two piece canister type and the flexible band type.

A more specific object is to provide a storage device for reels of computer tape which combines the narrow package width and low cost of the flexible band type of sealing device with the superior reel protection characteristics, the superior durability, and the superior sealing capabilities of the two piece canister type of device.

The storage device of the invention is generally of the canister type. However, instead of two telescopically coacting cup-shaped canister pieces defining a completely enclosed canister, the invention device comprises a single cup-shaped shell member with an annular resilient sealing member positioned around the inner periphery of the rim portion of the shell member. The sealing member has a normal inner diameter slightly less than that of the flanges of the reel. The annular sealing member is resiliently expandable to allow passage of the flanges so that the sealing means may expand to allow insertion of the reel into the canister and may thereafter contract toward its normal diameter to sealingly hold the reel within the canister.

In one disclosed embodiment, the sealing member comprises a split ring positioned around the inner periphery of the rim portion of the shell member, and the rim portion includes

means mounting the ring thereon for resilient, expandable movement relative to the rim portion to a diameter to allow passage of the reel flanges. One end of the split ring is anchored in the rim portion, and the other end of the ring includes a handle portion extending outwardly through the rim portion for manipulation by an operator so that the effective diameter of the ring may be selectively varied by selective movement of the handle portion.

In another disclosed embodiment, the sealing member comprises a strip of flexible material fixedly secured to the inner periphery of the shell rim portion and presenting a resilient material at its inner periphery capable of resilient outward deflection to allow passage of the reel flanges. For example, the sealing member may comprise a backing strip carrying a flocking of resilient upstanding bristles which resiliently deflect to allow insertion of the reel and thereafter coact with the peripheries of the outer reel flange to seal the reel within the canister.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of a canister according to the invention showing its coaction with a tape reel;

FIG. 2 is a view of an enlarged scale of the canister of FIG. 1 with portions of the canister broken away to reveal constructional details;

FIGS. 3, 4, and 5 are fragmentary cross-sectional views taken on lines 3-3, 4-4 and 5-5 of FIG. 2;

FIGS. 6 and 7 are fragmentary views looking in the direction of the arrows 6 and 7, respectively, in FIG. 2; and

FIG. 8 is a fragmentary cross-sectional view of an alternate form of canister according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The tape reel 10 seen fragmentarily in FIG. 1 is of known construction and includes a pair of spaced circular flanges 12 interconnected by a hollow central hub 14 around which computer tape or the like may be wound for storage purposes.

The canister 16 for receipt of reel 10 comprises a shell or main body member 18 and annular resilient sealing means 20 carried by shell 18.

Shell 18 is preferably formed in a molding operation from a relatively rigid plastics material such, for example, as a high impact polystyrene. As best seen in FIGS. 2-6, shell 18 includes a generally circular base portion 22 having a central circular aperture 24; an annular rim portion 26 upstanding from one side of base portion 22 and extending around the outer periphery of the base portion; and a central hollow hub portion 28 upstanding from the same side of the base portion. Hub portion 28 and rim portion 26 are concentrically disposed with respect to each other and with respect to the central axis of the canister and define therebetween an annular cavity 30 for receipt of reel 10.

Sealing means 20 comprises a split ring 32 positioned around the inner periphery of shell rim portion 26 adjacent the free or outer edge of the latter. Ring 32 is preferably formed in a molding operation from a suitable plastics material such, for example, as polycarbonate.

Ring 32, as best seen in FIG. 3, includes a cylindrical, axially extending main body portion 34, an external peripheral flange portion 36 adjacent the axially inner edge of main body portion 34, and axially spaced inner and outer annular lip portions 38, 39 extending radially inwardly from the axially outer portion of main body portion 34.

Ring flange portion 36 is expansibly received in a radially inwardly opening annular groove 40 in the inner periphery of shell rim portion 26, and the axially outer edge 26a of rim portion 26 is cut away at 42 to accommodate ring main body portion 34 and allow the inner peripheral surface 34a of main body portion 34 to assume a normal or relaxed diameter sub-

stantially equal to the diameter of the inner peripheral surface 26b of the shell rim portion. Groove 40 is located with respect to the axial width of ring 32 to position the axially outer edge face 38a of outer lip 38 generally flush with edge face 26a of rim portion 26.

As best seen in FIGS. 2 and 4, one end of ring 32 is provided with an anchor portion 44. Anchor portion 44 extends generally radially outwardly from the main body of the ring and is slideably received in an aperture 46 (see also FIG. 6) in rim portion 26. The leading face 44a of anchor portion 44 is not normal with respect to a tangent to ring 32 at that point but rather assumes an acute angle with respect to such tangent so that the plane of face 44a passes above the central canister axis as viewed in Fig. 2. The adjacent face 46a of aperture 46 is similarly inclined with respect to a normal to the tangent at that point so that the confronting faces 44a-46a define coacting cam faces.

The other end of ring 32 is shaped to provide ring actuator member in the form of a handle portion 48 which extends generally radially outwardly from the main body of the ring through an oversized aperture 50 (see also FIG. 6) in rim portion 26 to dispose the free end 52 of the handle portion radially outwardly of the outer periphery of rim portion 26.

Handle portion 48 is selectively cut away at its juncture with rim portion 26 to define a cam surface 54 for coaction with a complimentary cam surface 56 defined by the inclined upper face of a finger 58 molded integrally with rim portion 26.

Shell 18 is formed with an integral handle 60 providing a carrying handle for the canister. Handle 60 has a generally U-shaped configuration and includes a forward or leading portion 62 extending radially outwardly from the rim portion adjacent aperture 50, a rearward or trailing portion 64 extending radially outwardly from the rim portion adjacent aperture 50, a rearward or trailing portion 64 extending radially outwardly from the rim portion at a location thereon circumferentially spaced from leading portion 62, and a bridge portion 66 interconnecting the radially outer ends of portions 62 and 64 and spaced outwardly from the rim portion to define a handle opening 68 therebetween. The leading face 62a of handle portion 62 forms a smooth outward extension of the trailing face 50a of aperture 50. A label holder 70, best seen in FIG. 7, is formed integrally with the outer face of bridge portion 66. Label holder 70 is defined by a plurality of lips 70a forming a recess for removable receipt of a label 72 identifying the contents of the reel stored in the canister.

A leaf spring 74 is secured at one end as by a rivet 76 to the free end 52 of ring handle portion 50; the other end of spring 74 is curved over and bears against face 50a-62a. A hook 78 is formed integrally with rim portion 26 and extends outwardly therefrom at a location thereon spaced circumferentially from handle 60.

In operation, when it is desired to place a reel 10 inside the canister 16, the operator grasps the canister by handle 60, passing his fingers through handle opening 68 and positioning his thumb adjacent ring handle portion 48. The thumb is now squeezed in to draw ring handle portion 48 toward canister handle portion 62 against the bias of leaf spring 74. Since the other end of ring 32 is constrained against circumferential movement relative to rim portion 26, this movement of handle portion 48 has the effect of spreading the ends of ring 32 apart and thereby increasing the effective diameter of the ring.

Cam faces 54-56 and 44a-46a coact during this end spreading movement to ensure that the ring expands uniformly and maintains a substantially concentric relationship to the central axis of the canister. Specifically, as ring handle portion 48 is squeezed toward canister handle portion 62, cam surface 54 rides gradually up on cam surface 56 to gradually move the handle end portion of ring 32 radially outwardly with respect to rim portion 26; simultaneously, anchor portion 44 at the other end of the ring pushes against rim portion face 46a and rides gradually radially outwardly on that face by virtue of the radially outward force component generated by the inclined disposition of the interface of faces

44a-46a. The ring is thus expanded uniformly and concentrically to a diameter to allow passage of the flanges 12 of reel 10. After reel 10 is positioned within canister cavity 30, ring handle portion is released to allow ring 32 to contract under the urging of spring 48; as the ring contracts, lips 38, 39 sealingly embrace the perimeter and the adjacent outer edge portions of the outermost reel flange 12 to trap the reel within the canister cavity.

The canister and enclosed reel may now be stored in any of several known manners. For example, the canister may be hung by hook 78 from a suitable storage rod 80 in which event handle 60 provides a convenient readily graspable handle for removing the canister from storage and label holder 70 on handle 60 is presented in a prominent front and center position where label 72 may readily identify the contents of the tape reel stored in the canister. The canister with enclosed reel may also be stored in a stacked configuration with other canisters or it may be stored on edge in a bottom supported position in a rack, cabinet or the like.

The seal provided by the sealing engagement of lips 38, 39 with the outer flange of the reel will be sufficient for most storage requirements. Where storage is to be for a prolonged period, or where a greater degree of sealing is for any reason required, a snap-on cover 82 (FIG. 3) of polyethylene or other suitable plastics material may be provided. Cover 82 snappingly coacts with an external peripheral bead 84 on rim portion 26, and, when in place, completely covers the open end of shell 18 to form an essentially hermetic enclosure.

When it is desired to remove the reel from the canister, the canister is removed from its stored position and ring handle portion 48 is squeezed to expand the ring. The reel may now be removed by turning the canister upside down to allow the reel to drop out by gravity; or the ring may be pushed out of the canister by fingers thrust through access holes 86 in shell base portion 22.

If the canister is stored in a suspended position by hook 78, the canister may be removed from the storage rod 80 and the reel removed from the canister in a smooth, continuous operation. Specifically, an operator, having wrapped the fingers of one hand around the handle 60 of the suspended reel while placing the thumb of that hand on ring handle portion 48, may pull the canister off of rod 80 while simultaneously squeezing handle portion 48 to free the reel, and thereafter, as the canister is pulled clear of the adjacent suspended canisters, may tilt the canister to dump the reel out into his other hand.

In the alternate form of canister seen in FIG. 8, the resilient sealing means on the inner periphery of shell rim portion 26' comprises a strip of flexible material fixedly secured to the inner periphery and presenting a resilient material at its inner periphery capable of resilient outward deflection to allow passage of the reel. For example, the sealing means may comprise an adhesive backed polypropylene strip 88 in which are imbedded a plurality of closely packed, upstanding bristles 90 of polypropylene or other synthetic material. Rim portion 26' is cut away at 92 to provide an annular cutout in which strip 88 is adhesively positioned so that the free tips of the bristles project inwardly slightly beyond the inner periphery 26b' of the rim portion. In this embodiment, the reel is pushed forcibly into the canister with the bristles 90 resiliently deflecting to allow passage of flanges 12 and thereafter springing back to their normal positions to sealingly engage the outer periphery of the outer reel flange in the stored position of the reel. To remove the reel, the canister may be turned upside down to allow the reel to drop out, or the reel may be forced out by fingers thrust through access holes corresponding to access holes 86 in the FIG. 2 embodiment.

The disclosed one piece canister reel storage constructions will be seen to provide the advantages of both the prior art two piece canister design and the prior art flexible band design. Specifically, shell 18 can be fabricated as a strong, rigid unit to securely enclose the tape reel and generally provide the superior reel protection, the superior reel hub support, the superior sealing, and the superior durability characteristics of

the prior art two piece canister; and yet the invention sealing construction, either with the split ring of FIGS. 1—7 or the flocked strip of Fig. 8, is considerably less expensive than the complex latching mechanisms typically associated with two piece canister designs. Further, the overall package width for storage space considerations need only be as wide, in the FIG. 8 embodiment, as the thickness of shell wall 22' plus the reel width or, in the FIGS. 1—7 embodiment, as the combined thickness of shell wall 22, reel 10, and lip 38. In the two piece canister designs, by contrast, the overall package thickness is equal to the combined thickness of the shell wall of the first canister half, plus the reel width, plus the shell wall of the second canister half. Since the shell wall of the second canister half must, for constructional strength considerations, be considerably thicker than lip 38, the overall width of the prior art two piece design is significantly thicker than the single piece invention design. Also, it has been common practice in prior art two piece designs to draw the two halves together with a wedging or camming action. In order to avoid crushing damage to the reel during such wedging action due to a manufacturing tolerance stackup, it has been necessary to provide clearance at either side of the reel between the reel side faces and the confronting inner faces of the canister halves. This clearance is not necessary in the one piece invention design since there is no such wedging action to be safeguarded against; accordingly, the invention one piece design may be further thinner than the two piece design by the amount of such clearance. In actual practice, it has been found that a canister according to the invention design can be made approximately 20 percent thinner than a comparable canister of two piece design.

It will further be apparent that the single piece canister construction of the invention simplifies storage and handling problems as compared to the two piece canister design. Specifically, since the invention construction consists of only one canister "half," the problem of locating compatible or matching halves of the two piece design is eliminated, and the number of parts which are required to be inventoried, stored and handled in connection with a particular computer tape installation is reduced by fifty per cent.

Although preferred embodiments of the invention have been illustrated and described, it will be apparent that various modifications and changes may be made in the disclosed embodiments without departing from the scope or spirit of the invention.

I claim:

1. A canister for storing a tape reel of the type including spaced circular flanges interconnected by a hollow central hub, said canister comprising

A. a first, unitary member including

1. a generally circular base portion,

2. an annular rim portion upstanding from one side of said base portion and extending around the outer periphery of said base portion, and

3. hub support means upstanding from one side of said base portion within said rim portion and adjacent the center of said base portion to define an annular cavity between the hub support means and said rim portion for receipt of a reel; and

B. annular, resilient sealing means on the inner periphery of said rim portion having a normal inner diameter slightly less than that of said flanges and being resiliently expandable to a diameter to allow passage of said flanges, whereby said sealing means may expand to allow insertion of said reel into said annular cavity and may thereafter contract toward its normal diameter to sealingly hold said reel within said cavity.

2. A canister according to claim 1 wherein said sealing means comprises a strip of flexible material fixedly secured to the inner periphery of said rim portion and presenting a resilient material at its inner periphery capable of resilient outward deflection to allow passage of said reel.

3. A canister according to claim 2 wherein said strip comprises a backing strip and said resilient material comprises bristles secured to and upstanding from said backing strip to resiliently engage and sealingly coact with the peripheries of the flanges of said reel.

4. A canister for storing a tape reel of the type including spaced circular flanges interconnected by a hollow central hub, said canister comprising

A. a first unitary member including

1. a generally circular base portion,

2. an annular rim portion upstanding from one side of said base portion and extending around the outer periphery of said base portion, and

3. hub support means upstanding from said one side of said base portion within said rim portion and adjacent the center of said base portion to define an annular cavity between the hub support means and said rim portion for receipt of a reel;

B. ring means mounted on the inner periphery of said rim portion for movement relative to said rim portion between a contracted condition in which the effective ring means diameter is slightly less than that of said flanges and an expanded condition in which the effective ring means diameter is greater than that of said flanges; and

C. means, including an actuator member disposed adjacent the outer periphery of said rim portion, operative in response to operator finger manipulation of said actuator member to selectively move said ring means between its contracted and expanded conditions, whereby said ring means may be moved to its expanded condition to allow insertion of said reel and may thereafter contract toward its contracted condition to engage the periphery of the reel and sealingly hold the reel within the canister.

5. A canister according to claim 4 wherein

D. said ring means comprises a resilient split ring positioned around the inner periphery of said rim portion; and

E. said portion includes means mounting said ring thereon for resilient, expansible movement relative to said rim portion to a diameter to allow passage of at least one of said reel flanges.

6. A canister according to claim 5 wherein

F. said mounting means includes a radially inwardly opening annular groove around the inner periphery of said rim portion expansibly receiving said ring.

7. A canister according to claim 6 wherein

G. said ring includes

1. a cylindrical, axially extending main body portion from which a flange portion extends radially outwardly, and

2. an annular lip portion extending radially inwardly from said main body portion.

8. A canister according to claim 7 wherein

H. said lip portion is adjacent the outer axial edge of said main body portion and said peripheral flange portion is adjacent the inner axial edge of said main body portion.

9. A canister according to claim 5 wherein

F. one end of said split ring is inhibited against circumferential movement of that end relative to said rim portion, and

G. said actuator member comprises a handle portion extending outwardly from the other end of said ring for manipulation by an operator so that the effective diameter of said ring may be selectively varied by selective movement of said handle portion.

10. A canister according to claim 9 and further including

H. a spring member adapted to be stressed upon increase in diameter of said ring and operative upon release of said handle portion to return said ring to its normal diameter.

11. A canister according to claim 9 wherein

H. said ring and an adjacent portion of said rim portion define cam faces which coact upon movement of said handle portion in a diameter-enlarging direction to positively move said ring radially outwardly with respect to

said rim portion adjacent said cam faces to control the diameter-enlarging movement of said ring.

12. A canister according to claim 11 wherein

I. said coating cam faces are defined on said ring adjacent said handle portion and on the adjacent portion of said rim portion.

13. A canister according to claim 9 wherein

H. said handle portion extends radially outwardly from said ring other end through an oversized opening in said rim portion to a location radially outwardly of said rim portion.

14. A canister according to claim 13 and further including

I. a canister handle defined at the outer periphery of said rim portion at a circumferential location thereon adjacent said ring handle portion.

15. A canister according to claim 14 wherein

J. said canister handle comprises a carrying handle for said canister having a generally U-shaped configuration and including

1. a first portion extending radially outwardly from said rim portion adjacent said ring handle portion;

2. a second portion extending radially outwardly from said rim portion at a location thereon circumferentially spaced from said first portion; and

3. a third portion interconnecting the radially outer ends of said first and second portions and spaced outwardly from said rim portion to define an opening therebetween for accommodating the fingers of the hand of an operator whereby to position the thumb of that hand for convenient manipulation of said ring handle portion.

16. A canister according to claim 14 and further including

J. a hook member positioned on the external periphery of said rim portion at a location thereon circumferentially spaced from said canister handle portion.

17. A canister according to claim 9 wherein

H. coating cam faces are provided on said one ring end and the receiving portion of said rim portion; and

I. the interface of said cam faces lies in a plane which passes to one side of the central axis of said canister so that pressure of said one ring end against said rim portion cam face in response to diameter enlarging movement of said ring generates a radially outward force component urging said one ring end radially outwardly.

18. A canister according to claim 15 wherein

K. means are provided at the outer face of said third canister handle portion defining a holder for receipt of a label to identify the contents of the reel to be stored in said canister.

19. A canister according to claim 4 wherein

D. said hub support means comprises a central hollow hub portion concentric with said rim portion.

20. A canister for storing a tape reel of the type including spaced circular flanges interconnected by a central hub, said canister comprising

A. a first unitary member including

1. a generally circular base portion, and

2. an annular rim portion upstanding from one side of said base portion and extending around the outer periphery of said base portion;

B. ring means mounted on the inner periphery of said rim portion for movement relative to said rim portion

between a contracted condition in which the effective ring means diameter is slightly less than that of said flanges and an expanded condition in which the effective ring means diameter is greater than that of said flanges;

C. a handle member fixedly positioned on the outer periphery of said rim portion; and

D. means, including an actuator member disposed adjacent the outer periphery of said rim portion adjacent said handle member and operable by an operator's hand grasping said handle member, operative in response to such operation of said actuator member to selectively move said ring means between its contracted and expanded conditions, whereby said ring means may be moved to its expanded condition to allow insertion of said reel and may thereafter contract toward its contracted condition to engage the periphery of the reel within the canister.

21. A canister according to claim 20 wherein

E. said ring means comprises a split ring;

F. said actuator member comprises a handle portion extending radially outwardly from one end of said ring through an oversize aperture in said rim portion to a location radially outwardly of said rim portion; and

G. said handle member includes

1. a first portion extending generally radially outwardly from said rim portion adjacent and spaced in one direction circumferentially from said split ring handle portion, and

2. a second portion extending generally parallel to and in spaced relation to said rim portion from said first portion in said one circumferential direction.

22. A canister according to claim 21 and further including

H. a hook member extending outwardly from said rim portion at a location thereon spaced circumferentially in the opposite direction from said split ring handle portion, and opening away from said split ring handle portion.

23. A canister for storing a tape reel of the type including spaced circular flanges interconnected by a central hub, said canister comprising

A. a first unitary member including

1. a generally circular base portion, and

2. an annular rim portion upstanding from one side of said base portion and defining an annular surface facing, and lying in a plane generally parallel to, said base portion; and

B. ring means mounted on the inner periphery of said rim portion for movement relative to said rim portion between a contracted condition, in which the effective ring means diameter is slightly less than that of said flanges, and an expanded condition in which the effective ring means diameter is greater than that of said flanges;

C. said ring means including a guide portion having parallel, axially spaced annular surfaces;

D. said rim portion annular surface comprising one side surface of a radially inwardly opening groove extending around said rim portion and having an axial width slightly greater than the axial thickness of said ring means guide portion;

E. said ring means guide portion being slideably received in said groove and expansively guiding in said groove upon movement of said ring means between said contracted and expanded conditions.