Jan. 13, 1970 A. McKELVEY, JR 3,489,273

LOCKING DEVICE FOR REEL CONTAINER

Filed June 16, 1968 4 Sheets-Sheet 1

FIG. 2.

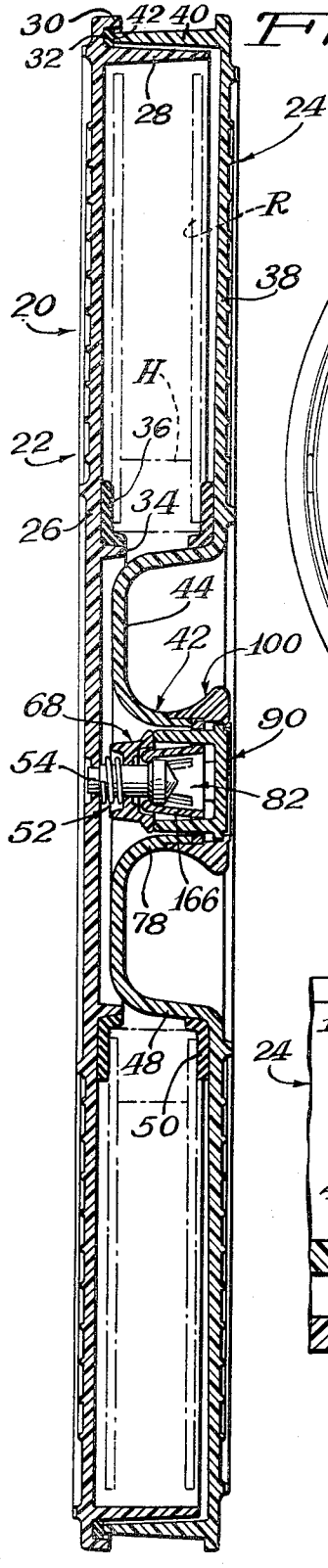


FIG. 1.

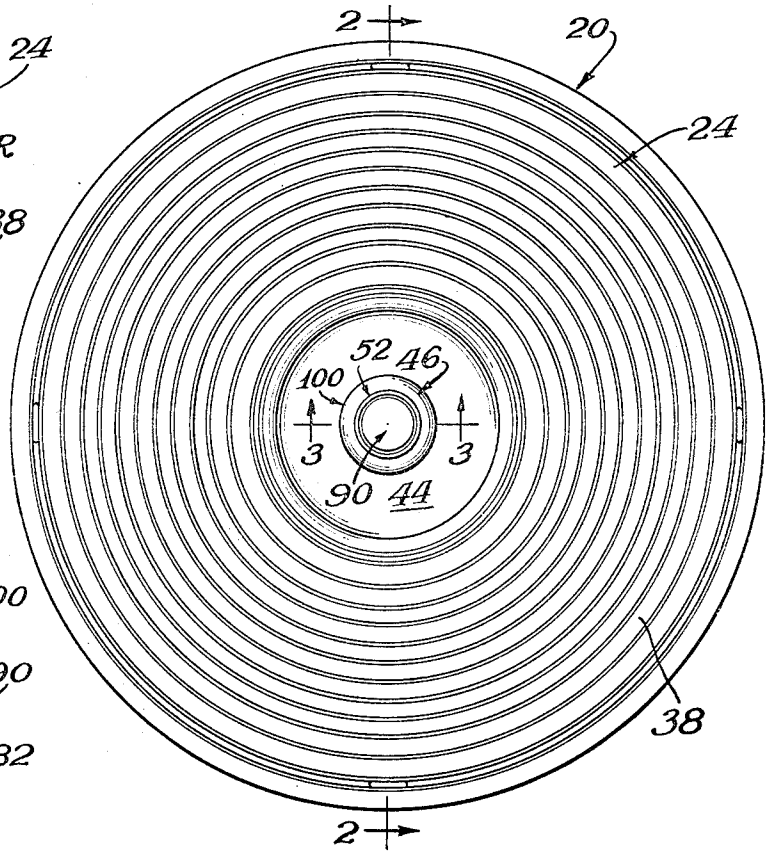
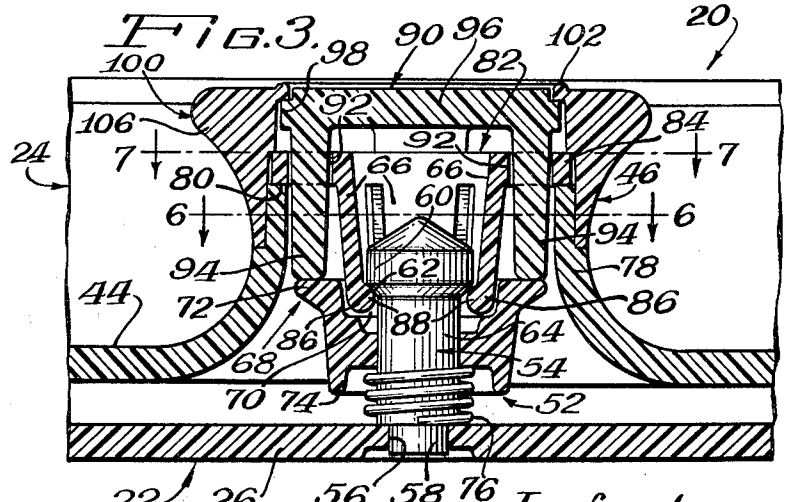


FIG. 3.



Inventor:
Andrew McKelvey, Jr.
By Bair, Freeman & Molinare
Attys.

Jan. 13, 1970 A. McKELVEY, JR 3,489,273

LOCKING DEVICE FOR REEL CONTAINER

Filed June 16, 1968 4 Sheets-Sheet 2

FIG. 4.

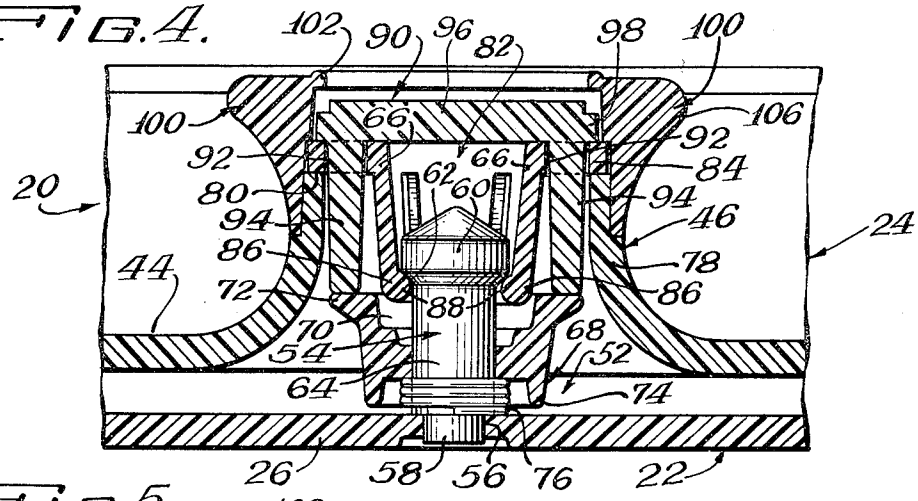


FIG. 5.

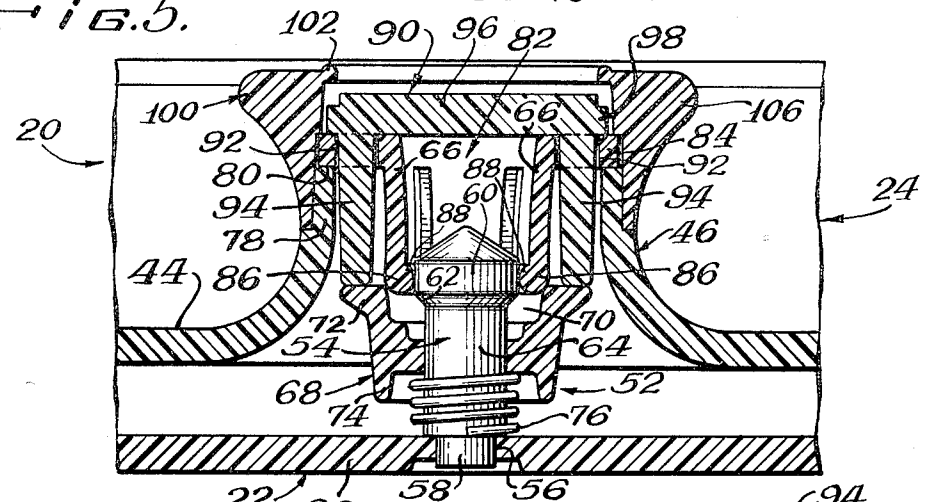


FIG. 6.

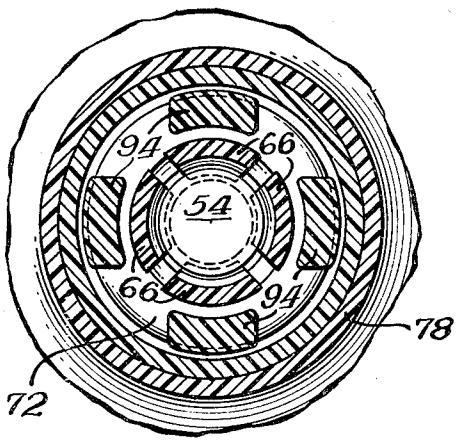
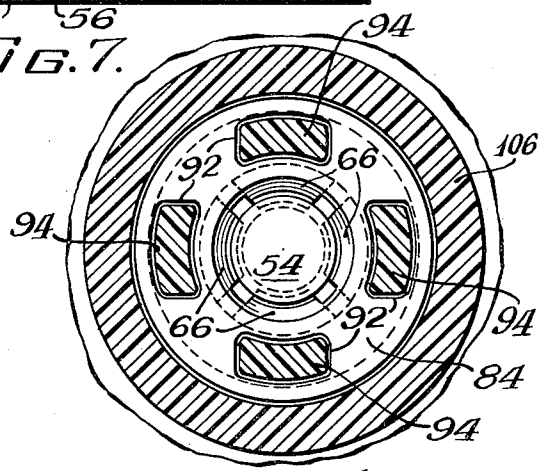


FIG. 7.



Inventor:
Andrew McKelvey Jr.
By Bair, Freeman & Molinare
Attys.

Jan. 13, 1970 A. McKELVEY, JR 3,489,273

LOCKING DEVICE FOR REEL CONTAINER

Filed June 16, 1968 4 Sheets-Sheet 3

FIG. 8.

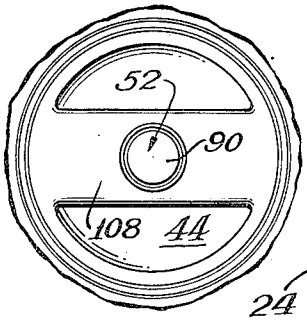


FIG. 9.

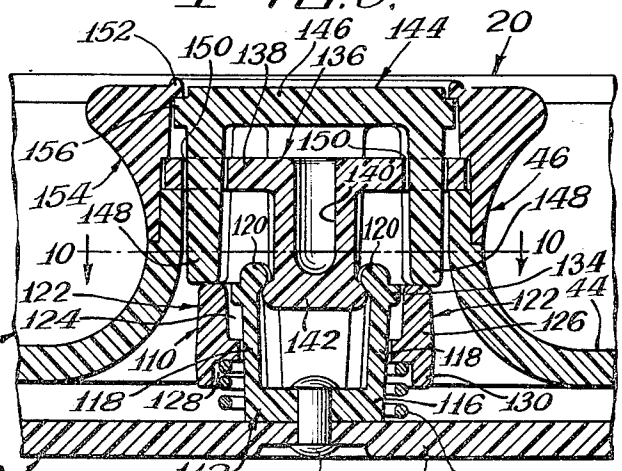


FIG. 10.

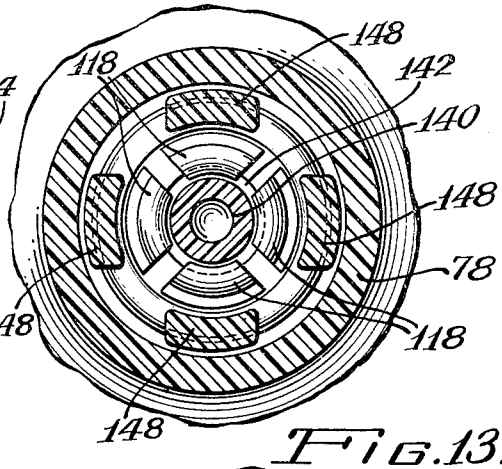


FIG. 11.

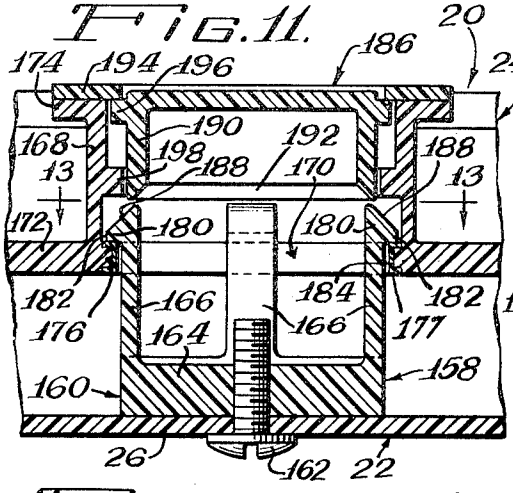


FIG. 12.

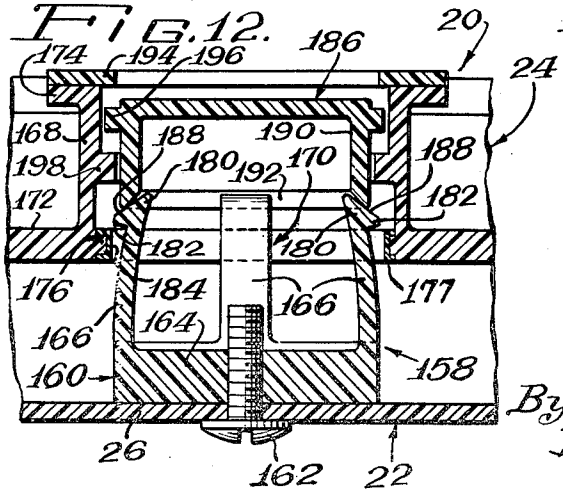
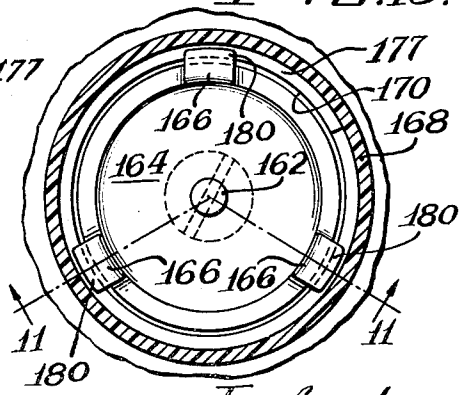


FIG. 13.



Inventor:
By Andrew McKelvey
Bair, Freeman
& Molinare Attys.

Jan. 13, 1970 A. McKELVEY, JR 3,489,273

LOCKING DEVICE FOR REEL CONTAINER

Filed June 16, 1968 4 Sheets-Sheet 4

Fig. 14.

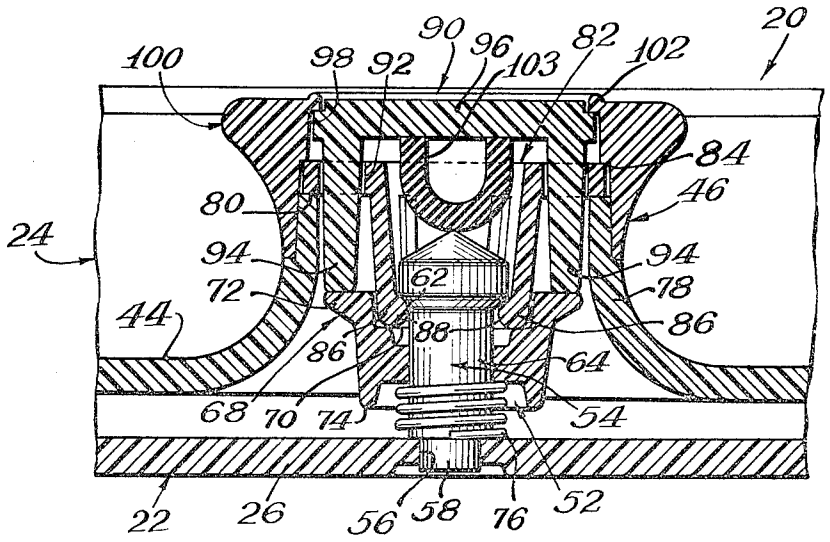
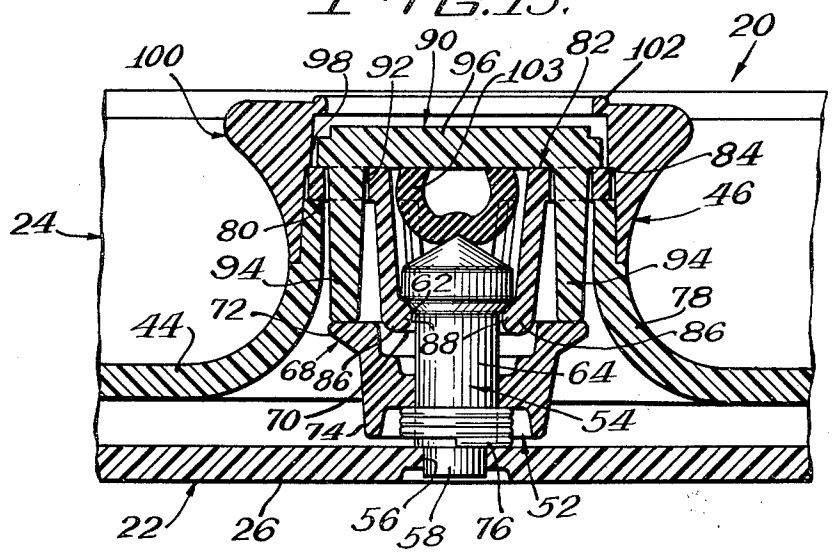


Fig. 15.



Inventor:
Andrew McKelvey, Jr.
By Bair, Freeman & Molinare
Attys.

United States Patent Office 3,489,273 Patented Jan. 13, 1970

3,489,273

LOCKING DEVICE FOR REEL CONTAINER

Andrew McKelvey, Jr., La Grange Park, Ill., assignor to Amerline Corporation, a corporation of Illinois

Continuation-in-part of application Ser. No. 632,337, Apr. 20, 1967. This application June 16, 1967, Ser. No. 646,614

Int. Cl. B65h 75/18

U.S. Cl. 206—52 10 Claims

ABSTRACT OF THE DISCLOSURE

A locking mechanism for containers for computer tape reel which may be opened and closed by one-hand operation only. The locking mechanism for the reel container has a locking element on the base, another locking element on the cover of the reel container, and means are provided for normally maintaining these elements in interlocking engagement. Means axially slidable within the cover are provided for disengaging the first and second locking elements so as to permit separation of the cover portion and the base portion and to permit access to the reel contained within the container.

REFERENCE TO RELATED CASES

This invention is a continuation-in-part application of my co-pending application Ser. No. 632,337 filed Apr. 20, 1967, now abandoned.

BACKGROUND OF THE INVENTION—FIELD OF THE INVENTION AND DESCRIPTION OF THE PRIOR ART

This invention relates to an improved locking mechanism for containers for storing computer tape reels.

Computer tape is highly sensitive to any impurities which may come in contact with the tape. Computers themselves are normally operated in rooms having very carefully controlled temperature and humidity conditions while being maintained in a substantially dust-free atmospheric condition. The tape reels themselves are normally kept in containers which store the tape in dust-sealing relationship from the atmosphere.

It is extremely important that the tape stored on the reel be free of dust or other impurities which may cause "drop-outs" or errors in reading of the tape when the tape is being used on a computer. Computer manufacturers are necessarily highly sensitive to the manner in which tape reels used on their computers are stored. The manufacturers require that the tapes not only be stored in dust-sealing containers, but they also require that the locking mechanism which secures the reel container in a locked condition must not produce any wearing of the parts resulting in generation of dust or impurities which may come into contact with the tape stored on a reel.

One of the most common types of computer tape reel containers used today is the type shown in Hultgren Patent No. 3,208,585, wherein the container includes a cover portion and a mating base or bottom portion. The bottom container half includes a central aperture wherein a gasket, secured to the cover portion of the container, is inserted. A handle on the cover is rotated by one hand while the other hand holds the bottom half. This rotation causes the gasket to be distended outwardly into dust-sealing engagement with the inner periphery of the central aperture in the base portion. This prior art construction, although highly successful, has certain disadvantages.

One of the disadvantages of the construction shown in Hultgren et al. Patent No. 3,208,585 is that to open and close the container, it is necessary that the operator

use two hands, as described above. A locking mechanism, which is simple and fast in operation, wherein the tape reel container could be opened and closed by single-hand operation would be highly desirable.

As in any device which is competitive with other devices, it is important that the construction be as economical as possible while providing a product of a high quality. Although the mechanism shown in Hultgren et al. Patent No. 3,208,585 is relatively economical, any reduction in the number of parts, simplification of assembly costs, and overall reduction in manufacturing costs would be highly desirable.

Also, the lock of Hultgren et al. Patent No. 3,208,585 provides no axial force pulling the container halves together. Thus, once the container halves are positioned together and the lock closed, there is no assurance that the periphery of the container halves is in dust-sealing relationship because there is no axial force pulling the container parts together.

SUMMARY OF THE INVENTION

It is therefore an important object of this invention to provide an improved locking mechanism for a container for a computer tape reel wherein the locking mechanism may be easily manipulated by one hand only, merely by depressing a button to disengage the locking elements of the mechanism.

It is also an object of this invention to provide an improved computer tape reel container which has a locking mechanism operable by one-hand manipulation only which at the same time provides for a quick and simple opening for the container.

It is a further object of this invention to provide an improved lock for containers for computer tape reels wherein the locking mechanism has substantially no wearing of parts to cause undesired generation of particles which could come into contact with the tape.

It is yet another object of this invention to provide an improved locking mechanism for a computer tape reel wherein the locking mechanism is particularly characterized by its simplicity and economy in construction and manufacture.

It is still another object of this invention to provide an improved locking mechanism for a computer tape reel wherein substantially the entire construction is made of molded plastic parts.

Still a further object of the invention is the provision of a lock for a computer tape reel container wherein the lock axially pulls the container halves together into dust-sealing relationship.

Further purposes and objects of this invention will appear as the specification proceeds.

In one aspect of the invention, the improved lock for a computer tape reel container generally includes a locking element secured to the top half of the container, another locking element secured to the bottom half of the container, the two locking elements being in interlocking engagement to secure the container halves together, and an axially slidable pushbutton for permitting disengagement of the two locking elements so that the container halves can be separated. In another aspect of the invention, the top of the container has finger grips proximate to the pushbutton so that an operator can lift upwardly on the finger grips to raise the top container half while the operator depresses the pushbutton to disengage the locking elements so that the container halves may be separated with one hand only.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the accompanying drawings, there are illustrated various preferred embodiments of the present invention, wherein:

FIGURE 1 is a top plan view of a container having my improved locking mechanism for storing a computer tape reel;

FIGURE 2 is an enlarged cross-sectional view of the container and locking mechanism of FIGURE 1 taken along the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary sectional view taken along the line 3—3 of FIGURE 1, particularly showing the internal construction of one preferred form of the improved locking mechanism while in the locked position;

FIGURE 4 is an enlarged fragmentary sectional view, similar to FIGURE 3, showing the locking mechanism as the actuating pushbutton disengages the locking elements of the locking element;

FIGURE 5 is another enlarged fragmentary sectional view, similar to FIGURES 3 and 4, showing the actuating pushbutton in the depressed position with the locking elements disengaged;

FIGURE 6 is a transverse sectional view through the locking mechanism taken along the line 6—6 of the emmodiment of FIGURE 3;

FIGURE 7 is another transverse cross-sectional view through the locking mechanism taken along the line 7—7 of the embodiment of FIGURE 3;

FIGURE 8 is a top plan view of an alternate embodiment for the finger grips on the cover portion of the reel container of FIGURE 1;

FIGURE 9 is an enlarged fragmentary sectional view, similar to FIGURE 3, showing an alternate embodiment of my improved locking mechanism for a computer tape reel container;

FIGURE 10 is a transverse cross-sectional view through the alternate locking mechanism taken along the line 10—10 of FIGURE 9;

FIGURE 11 is an enlarged fragmentary sectional view, similar to FIGURES 3 and 9, showing still another alternate embodiment of my improved locking mechanism for a tape reel container;

FIGURE 12 is an enlarged fragmentary sectional view, similar to FIGURE 11, showing the locking elements in the disengaged position;

FIGURE 13 is a transverse cross-sectional view through the embodiment of FIGURE 11 taken along the line 13—13 of FIGURE 11;

FIGURE 14 is an enlarged fragmentary sectional view, similar to the embodiment shown in FIGURE 3, showing the internal construction of a preferred embodiment of the improved locking mechanism while in the locked position, including flexible means for positively moving the container halves apart; and

FIGURE 15 is a view similar to FIGURE 14, showing the flexible means as it moves the container halves apart.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings and particularly to FIGURES 1 and 2, an enclosed container, generally 20, for storing a computer tape reel R, shown in phantom view in FIGURE 2, includes a bottom portion or half 22 and a top or cover portion or half 24.

The bottom container half 22 includes a planar circular base 26 having an upright outer cylindrical wall 28 extending from the base portion 26. The outer periphery of the solid base 26 includes a relatively short, peripheral upright flange 30 substantially parallel to the circular container wall 28. A compressible gasket 32 is confined in the channel defined between the upright flange 30 and the upright wall 28. The interior central area of the continuous base 26 includes an upright annular shoulder 34 which is spaced inwardly from and is substantially parallel to the outer container wall 28. A circular gasket 36, L-shaped in cross section, extends around the shoulder 34 and extends outwardly therefrom to provide for dust-sealing engagement with the inner periphery of the hub H on the reel shown in FIGURE 2. The bottom half 22 of the container 20 is preferably molded of a rigid, clear, high impact plastic, such as high impact styrene.

The top half 24 of the container 20 includes an annular planar portion 38 and a cylindrical wall 40 at the outer periphery which extends from and is perpendicular to the planar portion 38. The wall 40 telescopes around the wall 28 of the bottom portion 22. The bottom edge 42 of the wall 40 is pressed in dust-sealing relationship with the gasket 32 in the bottom container half 22. The cover 24 includes a central depression 44 and a central substantially cylindrical raised portion 46. The depression 44, raised portion 46, and wall 40 are integrally formed with the planar portion 38. An upright wall 48 defines the outer portion of the central depression 44. The wall 48 has an L-shaped gasket 50 secured around its inner surface at the place of meeting the inner surface of the annular planar portion 38. The L-shaped gasket 50 also extends inwardly along the inner surface of the planar portion 38. The gasket 50, like the gasket 36, provides dust-sealing engagement for the hub H of the reel R within the contatiner 20. Referring to FIGURE 2, when the container is in the closed position, the reel R is held in dust-sealing relationship since the opposite sides of the inner periphery of the hub H engage the gaskets 36 and while the outer periphery of the container 20 is sealed by abutment of the bottom edge 42 of the wall 40 with the gasket 32.

Referring particularly to FIGURES 3–7, one preferred form of my improved locking mechanism, generally 52, is shown in detail. The locking mechanism 52 is generally coextensive with the central portion 46 of the cover 24. The locking mechanism 52 includes certain portions which are permanently secured to the bottom container half 22 while other portions are permanently secured to the top half 24 of the container 20.

An upright rigid locking post 54 is fixedly secured to the bottom container half 22. An aperture 56 is provided at the center of the base 26. The upright post 54 includes a reduced lower cylindrical end 58 which is snugly received within the aperture 56. Since the upright post 54 is preferably constructed of a suitable rigid molded plastic material, such as nylon, a suitable plastic cement or solvent may be used to rigidly secure the post 54 to the bottom container half 22. The locking portion of the post 54 has an enlarged upper end or head portion 60. A tapered or frusto-conical surface 62 extends outwardly from the shank 64 of the post 54 to the outer cylindrical periphery of the upper head 60. The upwardly tapered surface 62, as will be hereinafter described in greater detail, cooperates with flexible locking fingers 66 which are secured to the top container half 24.

A collar 68 is reciprocally slidably received around the shank 64 of the locking post 54. The collar 68 is slidably confined between the upper surface of the base portion 26 and the enlarged head 60 at the upper end of the post 64. The collar 68 has an important provision of an annular recess 70 which is defined between the rigid locking post 54 and an outer upright annular wall 72 of the collar 68. The collar 68 also has a downwardly extending annular wall 74 which acts as a stop to limit the downward movement of the collar 68.

A spring 76 is mounted around the shank 64 of the rigid locking post 54 and is axially confined between the collar 68 and the base portion 26 of the bottom container half 22. The spring 76 is a compression spring and normally biases or urges the collar 68 upwardly towards the enlarged head portion 60 of the locking post 64.

The central raised portion 46 of the container top half 24 includes an annular upright integral wall 78 which terminates with an upper edge 80 defining an opening therearound. A flexible locking element, generally 82, of the locking mechanism 52 is secured to the annular upper edge 80. The flexible locking portion 82 includes an

annular planar portion **84**, the lower surface of the outer periphery being secured to the upper edge **80** of the wall **78**. The parts are desirably rigidly secured by a suitable plastic cement or solvent.

The inner periphery of the annular portion **34** has the downwardly extending flexible fingers **66** integral therewith. The flexible fingers **66** provide locking engagement with the enlarged head portion **60** of the locking post **54**. It is important that sufficient flexibility be provided for the fingers **66**, since they must flex around the head **60**. A suitable strong, yet flexible, molded plastic, such as nylon, is used for the flexible locking element **82**. Elongated slots separate a plurality of flexible fingers **66**, such as four, from each other. The lower ends **86** of the flexible fingers **66** include generally arcuate inwardly projecting portions or beads **88** which engage the sloped locking surface **62** of the locking post **52** to maintain the top and bottom container halves **22** and **24** in the desired interlocking engagement. The inwardly projecting beads **88** are, when maintained in the closed position, in abutment with the sloped locking surface **62** of the enlarged head **60**. The inwardly projecting beads **88** of the locking fingers **66** are confined in the annular recess **70** between the collar wall **72** and the enlarged head **60**. Since the rigid locking element **54** and the flexible locking element **82** are both of suitable molded plastic, there is no wear therebetween when the parts are moved in and out of locking engagement, thereby avoiding the undesired generation of particles.

An actuating member or pushbutton **90** is slidably carried axially of the container **20** by the planar connecting portion **84** of the flexible locking member **82**. A plurality of apertures **92** are provided in the planar portion **84** and slidably receive downwardly extending actuating fingers on the pushbutton **90**. A circular top **96** is provided on the pushbutton **90** and is integral with the actuating fingers **94**.

The lower ends of the actuating fingers **94** are in abutting relationship with the upper end of the annular wall **72** of the collar **68**. The spring **76** biases the collar **68** and thereby the button member **90** upwardly. An outwardly extending annular flange **98** is provided at the upper end of the button **90**. A cap **100** is secured, as by adhesive or solvent, to the outer upper portion of the upright central wall **78** of the container central portion **46**. The cap **100** includes a central aperture coextensive with the opening defined by the wall **78**. The pushbutton **90** is slidably contained within these apertures. It is important to have the cap **100** include a continuous inwardly projecting peripheral lip **102** which abuts the annular shoulder **98** of the button **90**. The spring **76** thereby biases the button **90** upwardly into abutting relationship with the annular lip **102** of the cap **100**.

It is important for the cap **100** to have an outwardly projecting radial ridge **106**. The continuous ridge **106** provides a place for an operator to place his fingers thereunder and thereby open and close the container **20** by the use of one hand only. The fingers are inserted downwardly into the annular depression **44** of the top container half **24** and under the annular ridge **106** while the actuating button **90** is depressed by thumb pressure.

Although it is believed that the manner of using the locking mechanism **52** is apparent from the foregoing description, a brief description of the operation will be provided to more clearly explain the invention. Referring to FIGURE 3, the locking mechanism **52** is shown in the closed position, locking the bottom container half **22** to the top container half **24**. In this position, the flexible locking fingers **66** have their inwardly projecting beads **88** in locking engagement with the frusto-conical surface **62** at the enlarged upper head **60** of the rigid locking post **54**. The annular wall **72** of the collar **68** acts to maintain the flexible fingers **66** in locking engagement with the enlarged head **60**. The spring **76** urges the collar **68** upwardly to confine the locking beads **88** in the recess **70**. Without depressing the actuating button **90**, it is impossible to separate the bottom container half **22** from the top container half **24** because of the locking engagement between the rigid post **54** and the flexible fingers **66**.

It is important that the force exerted from the interlocking engagement of the flexible fingers **66** and the locking post **54** is in an axial direction and resists separation of the container halves. The axial force also pulls the two container halves together in an axial direction so that the gasket **32** is positively held in sealing engagement with the bottom edge **42** of the outer container wall **40**. This axial force also assures that the hub H of the reel R is held in snug, sealing engagement with the L-shaped gaskets, **50** and **36**. The spring **76** not only serves the function of maintaining the collar **68** in position to maintain the flexible fingers **66** in interlocking engagement with the rigid locking post **54**, but the spring **76** also forces the actuating fingers **94** and thereby the actuating button **90** upwardly. This upward force drives the annular shoulder **98** of the pushbutton **90** into contact with the peripheral lip **102** of the cap member **100**, to thereby substantially provide dust-sealing engagement between the cap **100** and the button **90**. When the container is in the closed position, there is substantially no opportunity for dust or other particles of any type to pass to the interior of the container.

Referring to FIGURE 4, when it is desired to open the container, it is merely necessary for an operator to place two fingers underneath the gripping ridge **106** of the cap **100**, which is secured to the top container half **104**, and then depress the actuating button **90** with the thumb of the same hand. As shown in FIGURE 4, as the actuating button **90** is depressed downwardly, the actuating fingers **94** drive the collar **68** downwardly. When this occurs, the annular collar wall **72** no longer confines the lower ends of the flexible locking fingers **66** in the recess **70** between the wall **72** and the rigid post **54**.

Referring to FIGURE 5, to separate the container halves **22** and **24**, the operator merely lifts upwardly with his fingers under the gripping ridge **106** while the thumb maintains pressure on the actuating button **90**. The locking beads **88** on the flexible fingers **66** slide along the sloped locking surface **62** of the rigid post **54** upon flexing of the fingers **66**. The locking engagement between the flexible fingers **66** and the enlarged locking head **60** of the rigid post **54** is thereby released so that the container halves may be readily separated.

In order to reclose the container **20**, downward pressure is applied to the cap **100** and the container halves are pushed together. This downward force activates the collar **68** since the lower ends of the flexible fingers **66** engage the top of the wall **72** to force the collar **68** downwardly. When this occurs, the flexible fingers **66** flex outwardly to permit their locking beads **88** to slip under and into engagement with the locking surface **62** of the rigid locking post **54**. When the locking beads **88** are in engagement with the post **54**, the spring **76** biases the collar **68** upwardly so that the flexible fingers **66** are trapped in the recess **70** between the annular wall **72** and the rigid post **54**. The container is now in the closed position.

The locking device **52** enables an operator to handle the opening and closing of the container with one hand only. There is substantially no wear between the various parts of the locking mechanism including the rigid locking post **54** and the flexible fingers **66**, at least partially due to the molded plastic structure for most parts. Although there is sliding engagement between the flexible fingers **66** and the rigid head **60**, tests have failed to show any wear of the parts. Also, the locking mechanism **52** is simple and economical in cost of parts and in assembly costs. There are only three parts required for the upper container half and only three parts required for the lower container half, and the assembly of these parts on each half is simple. The economy of the lock **52** is enhanced by the use of molded plastic parts. No fasteners are required in the

device **52**. Since the connected parts are preferably of molded plastic, a rigid connection is accomplished by the use of a suitable solvent or plastic cement. The lock **52** also axially pulls the container halves together to provide a positive dust-seal for the container.

Referring to FIGURES 14 and 15, there is shown an alternate embodiment similar to the embodiment of FIGURES 3–7 except for the addition of a part for moving the container halves apart. When the container **20** is in the closed position, and particularly when there is no reel within the container, the container halves **22** and **24** sometimes do not separate as readily as desired and the operator may be required to use two hands to pull the container halves **22** and **24** apart. In order to positively force the container halves apart, a compressible element **103** is inserted in the space defined between the upper end of the rigid stud **54** and the lower surface of the actuating button **90** and the interior of the flexible legs **94**. As shown in FIGURE 14, when the container **10** is in the closed position, the compressible element **103**, preferably a hollow button-like member made of a molded flexible material, such as rubber, is held between the upper end of the stud **54** and the actuating button **90**. As shown in FIGURE 15, when the actuating button **90** is depressed to move the collar **68** downwardly, the button-like member **103** compresses and deforms so as to normally bias the top and bottom container halves **20** and **22** apart and positively forcing the container halves **22** and **24** apart, assuring that the container **20** may be opened and closed by one-hand manipulation only.

Referring to FIGURE 8, there is shown an alternate embodiment for gripping the top container half **24** with one hand while operating the locking mechanism with one hand. In the embodiment of FIGURES 1–7 an annular gripping ridge **106** is used. In the embodiment of FIGURE 8, the locking mechanism **52** is substantially the same as that shown in FIGURES 1–7, but the gripping is accomplished by a rigid molded plastic bar **108** passing diametrically across the annular depression **54** of the top container half **24** and being secured to the central portion **46**. As in the previous embodiment, it is merely necessary for the operator to place two fingers underneath the gripping bar **108** while pressing the button **90** downwardly to effect release of the top and bottom container halves.

Referring to FIGURES 9 and 10, an alternate embodiment locking mechanism **110** is shown in detail. The locking mechanism **110** of the embodiment of FIGURES 9 and 10 is similar in construction to the embodiment **52** shown in FIGURES 1–7. The primary difference is that the locking mechanism **110** has the flexible portion of the locking device secured to the bottom container half **22**, while the rigid locking element is secured to the top container half **24**.

The locking mechanism **110** includes a cup-shaped flexible locking element **112** secured to the center of the interior of the base **26** of the container half **22**. A rivet **114** secures the locking element **112** to the base **26** and passes through aligned apertures in the center of the base **26** and in the circular planar base portion **116** of the flexible element **112**. A plurality, as four, of upstanding flexible locking fingers **118** extend upwardly from the base portion **116**. The fingers **118** include inwardly projecting beads **120** at their upper ends. The flexible fingers **118** are separated by elongated slots so as to provide the necessary flexibility. Preferably, the flexible locking element **112** is molded of a suitable plastic material, such as nylon or Delrin.

As in the embodiment of FIGURE 2, a collar **122** is reciprocally slidably carried around the outer periphery of the flexible fingers **112**. An annular recess **124** is defined between the flexible fingers **112** and the annular upright wall **126** of the collar **122**. A recess **128** is also provided in the lower end of the collar **122**. An annular downwardly extending wall **130** on the collar **122** acts as a stop to limit the downward movement of the collar **122**.

A spring **132** is positioned around the flexible fingers **118** within the recess **128** and is interposed at its upper and lower ends between the collar **122** and the base **26** of the container bottom **22**. The compression spring **132** urges or biases the collar **122** upwardly so that the recess **124** normally confines the outward flexing movement of the flexible locking fingers **118** so as to maintain them in a locking position. The flexible fingers **118** include outwardly projecting peripheral flanges **134** which engage the inner surface of the upright annular wall **126** of the collar **122**.

A rigid locking element, generally **136**, is fixedly secured to the upper edge **80** of the upright central wall **78** of the top container half **24**. The planar annular portion **138** of the locking element **136** is secured, as by cement or solvent, to the upper surface of the edge **80**. The annular connecting portion **138** has an integral downwardly extending hollow rigid post **140**. An enlarged lower end or head **142** is provided on the post **140**. The locking beads **120** of the flexible fingers **118** are normally engaged around the curved upper edge of the bottom head **142** of the rigid element **136**.

An actuating pushbutton, generally **144**, is similar in construction to the actuating button **90** of the embodiment **52**. The button **144** includes a planar top **146** and downwardly projecting actuating fingers **148**. The actuating fingers **148** are aligned to abut the upper edge of the annular wall **126** of the collar **122**. The actuating fingers **148** slidably pass through apertures **150** provided in the annular connecting portion **138** of the rigid locking element **136**. The uppermost sliding portion of the locking button **144** is provided by the inwardly projecting peripheral lip **152** on the annular gripping ridge **154** secured around the upright wall **78**. As in the embodiment of FIGURES 1–7, the lip **152** limits the upward movement of the button **144** by engagement with an outwardly extending peripheral ridge **156** on the actuating button **144**. The spring **132** normally biases the collar **122** and the button element **144** upwardly so that there is substantial dust-sealing engagement between the lip **152** and the ridge **156**.

Although it is believed that the foregoing description clearly shows the manner of using the device, a brief description of the operation of the locking mechanism **110** will be provided for a more clear understanding of this particular embodiment of the invention.

In FIGURE 9, the locking mechanism **110** is shown in the locked position. In this position, the spring **132** normally biases the collar **122** upwardly so that the wall engages the lower ends of the actuating fingers **148** of the actuating button **144**. Dust-sealing engagement is thereby provided between the lip **152** and the ridge **156**. The locking beads **120** of the flexible fingers **118** are maintained in engagement with the curved upper portion of the enlarged head **142** at the bottom of the rigid locking element **136**. Since there is interfering engagement between the enlarged head **142** and the locking beads **120**, an axial force draws the container halves **22** and **24** together to provide positive engagement with each other. The outer ridges **134** on the flexible fingers **118** abut the inner surface of the wall **126** so as to maintain the parts in a normally locked position.

When the operator desires to open the container, two fingers are placed under the gripping ridge **156** and the thumb is used to depress the actuating button **144** downwardly. This drives the collar **122** downwardly in opposition to the biasing force of the spring **132**. The annular collar wall **126** thereby moves out of contact with the ridge **134** on the flexible fingers **118**. When the operator lifts upwardly with his fingers, the enlarged lower end **142** slips around the beads **120** and causes outward flexing of the fingers **118** to thereby permit separation of the container halves.

To reclose the container **20**, since the spring **132** normally biases the collar **122** upwardly into engagement

with the ridges **134** on the flexible fingers **118**, it is necessary for the operator to depress the actuating button **114** and place fingers under the gripping ring **156**. Depression of the actuating button **144** moves the annular wall **126** downwardly out of contact with the ridges **134** when the container halves are being locked together. With the button **144** depressed, the enlarged lower end **142** of the rigid element **136** flexes the fingers **118** outwardly and the end **142** passes under the locking beads **120**. Pressure is released from the button **144** and the spring **132** slides the collar **122** upwardly so that the annular wall **126** confines the locking beads **120** of the flexible fingers **118** in engagement with the enlarged locking portion **122** of the rigid locking element **136**.

As in the embodiment of FIGURES 1–7, the locking mechanism **110** of FIGURES 9–10 is highly economical and simple to manufacture. All of the parts, except for the spring **132** and possibly the rivet **114**, are made of molded plastic materials, such as nylon or Delrin. The rivet **114** shown in the construction of FIGURES 9–10 could be replaced by providing a construction similar to that shown for locking the rigid post **54** to the base **26** in the embodiment of FIGURES 1–7. The locking mechanism **110** also has substantially no wear between moving parts. The locking mechanism **110** further provides an axial force for pulling the container halves into positive sealing engagement.

Referring to FIGURES 11–13, still another embodiment of my invention is shown in detail. The locking mechanism **158** shown in FIGURES 11–13 is even simpler in construction than the previous embodiments. The bottom container half **22** has a flexible locking element, generally **160**, secured to the center of the inner surface of the base **26**. Although a suitable solvent or cement may be used for securing the element **160**, in the embodiment of FIGURES 11–13, a screw **162** passes through the center of the base **26** and is threadably received by a threaded aperture in the center of the circular planar base **164** of the flexible locking element **160**. The base **164** includes a plurality, as three, upstanding flexible locking legs **166**. The flexible locking legs **166** are spaced about 120° apart and extend straight up from the outer periphery of the circular base **164**. The locking element is preferably of a molded plastic, such as nylon or Delrin, as with other operating parts described before.

In the embodiment of FIGURES 11–13, the rigid locking element is secured to the top container half **24**. The top container half **24** is somewhat different in construction than the embodiments shown in FIGURES 1–10. An upstanding central annular wall **168** surrounds a central well **170** at the center of a depressed central annular portion **172** in the top container half **124**. The wall **168** is substantially cylindrical and includes an outwardly projecting peripheral flange **174** at its upper end. An inwardly projecting peripheral edge **176** is defined at the lower end of the central aperture **170**. A channel-shaped plastic insert **177** is received on the edge **176**. The insert is of a plastic, such as nylon, not subject to flaking such as the styrene edge **176**. It is to be understood, however, that the insert is preferable only to increase the wear resistance of the device. The insert can be replaced by the integral edge **176** having a suitable dimension. The locking insert **177** has its innermost edge at a diameter less than the outer diameter of outwardly projecting locking elements **180** at the upper ends of the flexible fingers **166**. The locking elements **180** include peripheral locking shoulders **182** which engage the planar upper surface of the inwardly projecting locking edge **176**, as shown best in FIGURE 11. The peripheral upper edge **184** of each of the flexible legs **166** is slanted upwardly and inwardly. In the relaxed position, the slanted surface of the legs is in alignment with the locking edge **177** before there is locking engagement between the legs **166** and the locking edge **177**.

An actuating pushbutton **186** is axially slidable within the aperture **170** defined by the cylindrical central wall **168**. The actuating button **186** has a continuous upper surface **188** and a downwardly projecting cylindrical wall **190** along its outer periphery. The lower edge of the wall **190** has a sloped or frusto-conical edge **192**. The edge **192** is tapered upwardly and inwardly. The outer diameter of the cylindrical wall **190** is greater than the inner diameter of the flexible locking legs **166** but is substantially less than the outermost diameter of the locking shoulders **182** of the flexible legs **166**. As shown in FIGURE 11, in the locked position, the sloped edge **192** of the button **186** normally rests upon the upper slanted surfaces **188** of the flexible legs **166**. The shoulders **182** of the legs abut the upper surface of the locking edge **176**.

In order to maintain the pushbutton **186** in sliding engagement with the cover portion **24**, whether in the open or closed position, an upper ring **194** is secured by solvent or cement to the upper surface of the rib **174**. The inner diameter of the ring is greater than the outside diameter of the outwardly projecting stop ridge **196** along the outer periphery of the upper portion of the actuating button **186**. The inner cylindrical surface of the central wall **168** has an outwardly projecting flange **98** which acts as a stop to prevent downward movement of the button **186**, since the flange **198** has an inner diameter greater than the outer diameter of the ridge **196** of the button **186**. The reciprocating sliding movement of the button **186** is thereby limited between the top ring **194** and the intermediate stop flange **198**.

Again it is believed that the foregoing description clearly shows the operation of the device, but a brief description will be provided for a clear understanding of the invention. When in the closed position, the lower edges of the shoulders **182** of the flexible legs **166** normally engage the upper surface of the rigid locking portion **177** on the cover **22**. The legs **166** provide an axial force for holding and pulling the container halves together so as to provide a positive dust-sealing relationship therebetween.

In order to release the container halves, the operator places two fingers underneath the peripheral ridge **174** around the central wall **168** and the thumb depresses the actuating button **186** downwardly to the position shown in FIGURE 12. Upon the depression of the button **186**, the slanted lower edge **192** of the cylindrical wall **190** of the button **186** moves into sliding engagement with the upper slanted surfaces **188** of each of the legs **166**. Since the legs **166** are flexible, the rigid wall **190** causes the legs **166** to flex inwardly out of engagement with the rigid locking portion **177** on the cover **24**. When this occurs, the bottom container portion **22** is separated from the top container portion **24**.

In order to lock a reel R within the container **20**, it is merely necessary for the locking mechanism **158** to be placed in such a position that the rigid locking portion **177** will be aligned with the upper slanted surfaces **188** of the flexible fingers **166**. Pressure is applied to the container half **24** so that the upper slanted surface **188** slides around the rigid locking portion **177** upon inward flexing of the legs **166**. The locking shoulders **182** of the flexible legs **166** then snap outwardly over the rigid edge **176** to the locking position shown in FIGURE 11.

Once again the locking mechanism **158** shown in the embodiment of FIGURES 11–13 is a highly simple and economical construction. The mechanism **158** is also primarily made of plastic parts and is simple to assemble. The mechanism **166** also permits one-handed operation and acts to positively pull the container halves together.

What I claim and desire to secure by Letters Patent is:

1. A container for a computer tape reel, said container comprising, in combination, a bottom member, a top member, said bottom and top members cooperating to define a chamber for receiving said tape reel, said bottom and top members each having central portions and mating outer peripheral portions, gasket means substantially co-

extensive with and between said outer peripheral portions to provide for dust sealing relationship between said bottom and top members, a first locking member secured to the central portion of said bottom member, a second locking member secured to the central portion of said top member, said first and second locking members normally being enclosed by said top and bottom members and being in interlocking engagement for securing said cover and said top members together, one of said locking members being rigid and the other of said locking members including flexible legs, said rigid locking member having a ridge, said flexible legs having projections and said projections and said legs cooperating during interlocking engagement to axially pull said top and bottom members together to apply pressure to said gasket means to provide the said dust sealing relationship between said bottom and top members, means axially movable on the central portion of said top member, one of said locking members being responsive to inward axial movement of said axially movable means towards said bottom member to disengage said locking members and permit the separation of said top member from said bottom member, said locking members being relatively slidable with substantially no wear between during movement into and out of said interlocking engagement, thereby avoiding undesired generation of particles, and means fixedly mounted on said top member and substantially surrounding said axially movable means for receiving fingers of one hand whereby the thumb of the same hand may apply inward pressure to said axially movable means to disengage said locking members.

2. The device of claim 1 in combination with a computer tape reel having a hub portion, gasket members on the interior of both said bottom member and said top member at the central portions thereof, said gasket members being in sealing engagement with said hub of said reel.

3. The device of claim 1 wherein a slidable collar is carried by said first locking member, said first locking member being rigid, said collar and said first member confine said second member in locking engagement with said rigid member, said second locking member being flexible, and said axial movable means moving said collar to permit release of said flexible locking member from confinement between said collar and said rigid locking member.

4. The device of claim 3 wherein said flexible locking member includes a plurality of downwardly extending flexible legs which are confined between said collar and said rigid locking member, said flexible locking member also has a connecting portion secured to said top member, apertures in said connecting portion, and downwardly extending collar-engaging portions on said axial movable means passing through said apertures.

5. The device of claim 3 wherein said flexible locking member comprises a plurality of spaced flexible legs, and said rigid locking member is a substantially cylindrical member engaging said flexible legs.

6. The device of claim 5 wherein said rigid member has an outward projection, and said flexible legs have inward projections, said inward projections being locked in engagement with said outward projections.

7. The device of claim 5 wherein said rigid locking member has an inward projection, and said flexible legs have outward projections, said outward projections being locked in engagement with said inward projection.

8. The device of claim 1 wherein biasing means are normally provided for separating the mating top and bottom members from each other upon disengagement of said first and second locking members.

9. The device of claim 1 wherein at least one of said locking members is of a molded plastic material so as to provide smooth sliding engagement between said locking members.

10. The device of claim 1 wherein both of said locking members are of a molded plastic material so as to provide smooth sliding engagement between said locking members.

References Cited

UNITED STATES PATENTS

1,970,399	8/1934	Shatkin.	
2,727,759	12/1955	Elliott	285—322
3,004,658	10/1961	Rehklan	206—52
3,307,688	3/1967	Widmont	206—52
3,341,044	9/1967	Valk	215—45

WILLIAM T. DIXSON, JR., Primary Examiner

U.S. Cl. X.R.

24—211; 220—55; 285—322