Sept. 30, 1969 J. D. NORMAN, JR 3,469,681

TAPE REEL CONTAINER

Filed Nov. 2, 1967 2 Sheets-Sheet 1

Fig. 1.

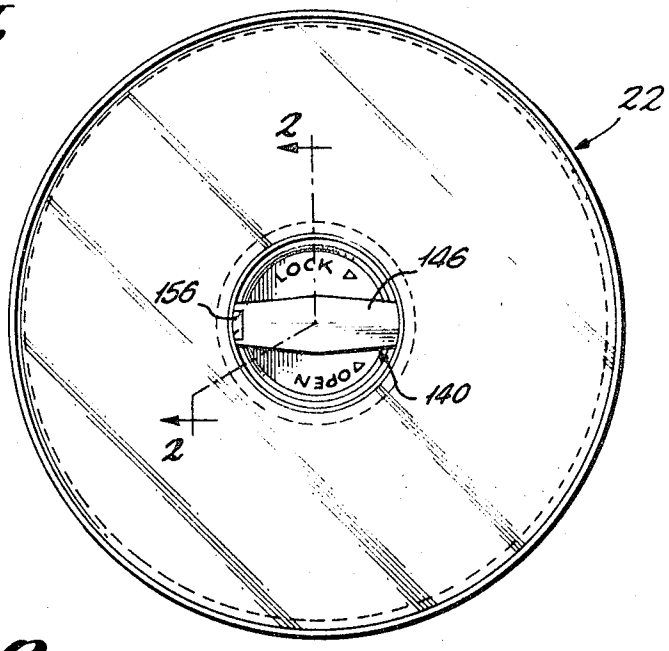


Fig. 2.

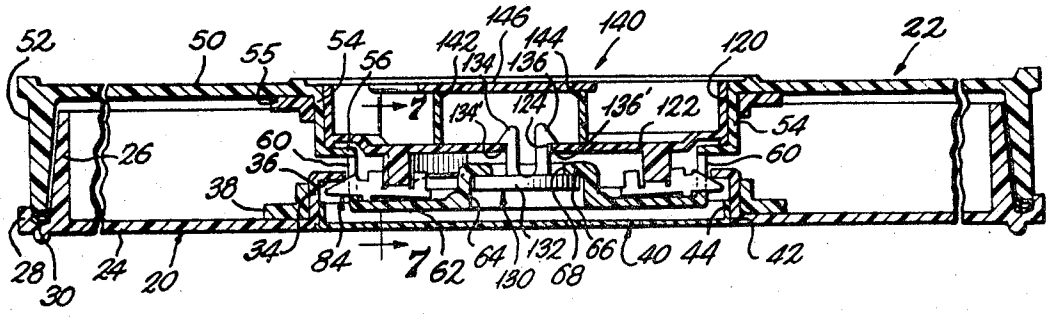
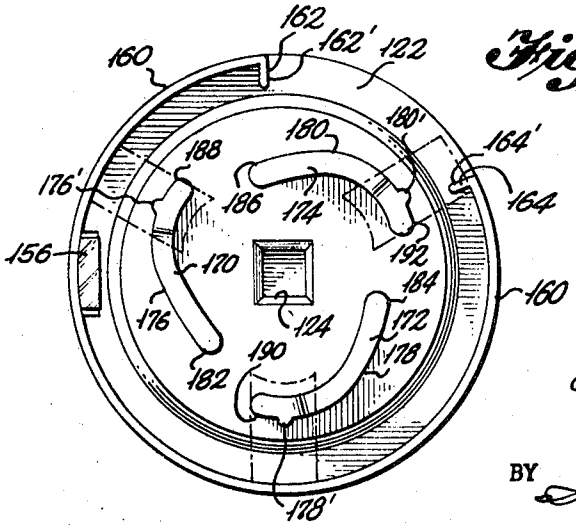


Fig. 3.



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TAPE REEL CONTAINER

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Fig. 4.

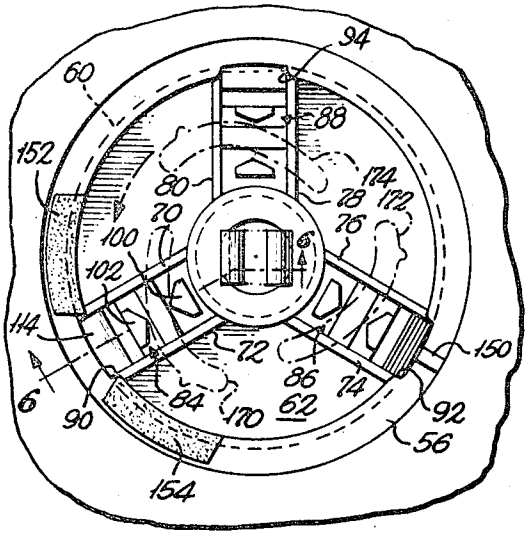


Fig. 5.

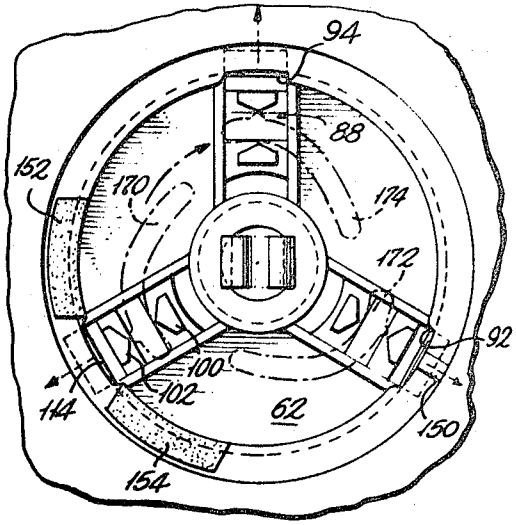


Fig. 6.

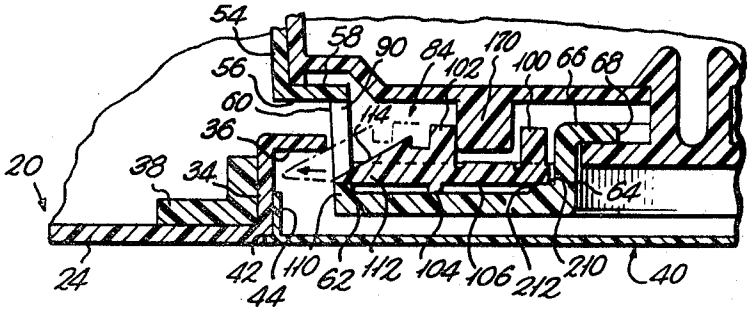
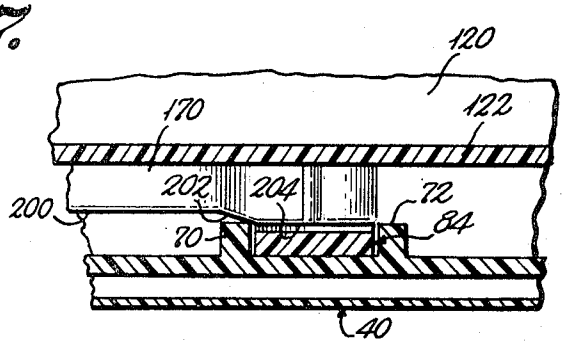


Fig. 7.



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TAPE REEL CONTAINER

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Int. Cl. B65d 75/02, 85/67
U.S. Cl. 206—52 14 Claims

ABSTRACT OF THE DISCLOSURE

A pair of plastic body portions are interconnected by unique locking mechanism including a plurality of separate lock members which are cammed inwardly and outwardly by interengagement with rotatable actuating means having cam portions thereon. The lock members are supported by one of the body portions and engage an annular lip portion on the other of the body portions, the cam portions having a plurality of cam surfaces thereon which are interengageable and cooperate with portions of the lock members for holding them in the desired operative positions.

Cross-references to related applications

The present application is related to copending U.S. Patent application Ser. No. 618,495, filed Feb. 24, 1967 and is also related to U.S. Patent application Ser. No. 680,238, filed Nov. 2, 1967.

Background of the invention

The present invention relates to a tape reel container for receiving and holding therein a conventional tape reel and the like, and includes unique means for locking the two body portions in clamping engagement with one another.

Prior art tape reel containers have generally presented a problem in that the locking mechanism thereof has a tendency to open too easily when in lock position. Additionally, such arrangements have employed metal-to-plastic contact surfaces for obtaining closure pressure, and this type of arrangement can cause contamination due to wearing action.

United States Patent No. 2,859,868 discloses a tape reel package for containing a tape reel, this arrangement employing a plurality of latch fingers having inclined upper surfaces which provide a limited degree of locking action. In order to interengage and lock the two body portions of this type of arrangement, the latch fingers thereon must be properly aligned with corresponding clearance openings in the other body portion thereby necessitating careful observation of the alignment of the two body portions prior to assembly.

Summary of the invention

The present invention employs a unique locking arrangement wherein a plurality of separate lock members are mounted for sliding and tilting movement with respect to the associated components so that when the lock members move into lock position, a very strong and positive locking action is obtained. Furthermore, when the

lock members are in the lock position, they are retained in such lock position and will not be accidentally released until the actuating means of the apparatus is manually operated.

The components of the present invention may all be constructed of a suitable plastic material thereby eliminating any metal-to-plastic contact in the apparatus.

A further important advantage of the present invention is the fact that the lock members are interengageable with an annular lip portion formed on one of the body portions whereby the first and second body portions can be readily lockingly clamped to one another in any relative position of the two body portions. This of course eliminates the necessity of aligning the two body portions when locking them to one another.

The present invention also is an improvement over the construction shown in copending application Ser. No. 618,495, filed Feb. 24, 1967, in that the actuating means of the present invention as well as the locking members are of considerably simpler construction, and in particular the actuating means of the present invention is much simpler in that it requires only three integral cam portions extending therefrom for accomplishing the locking and unlocking function in cooperation with the individual lock members. Additionally, a very simple positive locking action of the lock members is obtained in the present invention in contrast to the rather complicated mode of movement of the lock members in said copending patent application.

An object of the present invention is to provide a new and novel tape reel container which provides a positive clamping action and which does not accidentally release or open too easily; which further may be formed substantially entirely of a plastic material or the like; and wherein the two body portions of the container may be readily locked together at any relative position with respect to one another.

Brief description of the drawings

FIG. 1 is a top view of a tape reel container according to the present invention;

FIG. 2 is a sectional view partly broken away taken substantially along line 2—2 of FIG. 1 looking in the direction of the arrows;

FIG. 3 is a view looking up at the bottom of the actuating means of the structure shown in FIG. 2;

FIG. 4 is a view looking down on the body portion which slidably supports the lock members, and illustrates the lock members in unlocked position with the actuating means removed for the sake of clarity;

FIG. 5 is a view similar to FIG. 4 illustrating the components in the locked position as in FIGS. 1–3;

FIG. 6 is an enlarged sectional view taken substantially along line 6—6 of FIG. 4 looking in the direction of the arrows; and

FIG. 7 is an enlaged sectional view taken substantially along line 7—7 of FIG. 2 looking in the direction of the arrows.

Description of the preferred embodiment

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the

several views, as seen in FIG. 2, the container includes a body means comprising a first body portion indicated generally by reference numeral **20** and a second body portion indicated generally by reference numeral **22**. These body portions as well as the remaining components of the container according to the present invention are preferably all formed of a suitable plastic material such as acrylanitrile or the like. It is apparent that various other plastic substances may be selected for use in the present invention, and the material used may be varied as desired.

The first body portion **20** includes a side wall **24** having an outer flange **26** extending substantially normally thereto, this flange being generally annular in configuration. A further flange **28** is disposed outwardly of the outer flange **26** and also extends substantially normally from the side wall **24** but extends from wall **24** a much smaller distance than the outer flange **26**. A space is defined between flanges **26** and **28** for receiving a suitable sealing gasket **30** of generally circular cross sectional configuration, this gasket being formed of a resilient material such as plastic which is adapted to be deformed when pressure is applied thereto as hereinafter discussed.

An inner flange **34** extends inwardly from the inner portion of side wall **24** and includes an inturned portion defining an annular lip portion **36** which is adapted to cooperate with the lock means hereinafter described for clamping the two body portions to one another. A gasket **38** is disposed in surrounding relationship to the outer surface of flange **34** and is adapted to fit in snug engagement therewith.

The first body portion **20** defines a central hole formed through the side wall **24** thereof, this hole being closed by a cover plate indicated generally by reference numeral **40**, the cover plate being of generally disc-like configuration with the peripheral edge **42** thereof disposed in a recess portion provided adjacent the inner flange **34**. An annular flange **44** extends from cover plate **40** and is fitted within the inner flange **34** and is suitably secured therein as by ultrasonic welding, spin welding or by bonding it in place with a suitable bonding material such as glue or the like. In this manner, the cover plate serves to close off the hole formed through the body portion **20**.

Body means **22** includes a side wall **50** having an outer flange **52** extending substantially normally thereto and being of generally annular configuration. Flange **52** is adapted to fit about the outer flange **26** of body portion **20** so that these flanges nest within one another as shown, the outer edge portion of flange **52** being adapted to engage the sealing gasket **30** previously described to provide an effective fluid-tight seal therewith when the two body portions are locked in clamping relationship to one another.

Body portion **22** includes an inner flange comprising an integral inwardly extending portion **54** of generally frusto-conical configuration having a gasket **55** disposed in surrounding relationship thereto and in snug engagement with the outer surface thereof, portion **54** joining with an annular portion **56** disposed substantially parallel with side wall **50** and defining an annular shoulder **58** upon which the actuating means hereinafter described is adapted to rest.

Portion **56** of the inner flange joins with a portion **60** of generally frusto-conical configuration which in turn joins with an inner wall **62** disposed substantially parallel with side wall **50**. This inner wall includes an integral generally cylindrical projection **64** joining with a radially inwardly extending annular portion **66** having a central hole **68** of generally circular cross sectional configuration formed therethrough for a purpose hereinafter described.

Referring now to FIGS. 4 and 5, each of these views illustrates a top view of body portion **22** with the actuating means associated therewith removed. FIGURE 4 illustrates the apparatus in the unlocked position, while FIG. 5 illustrates the apparatus in the locked position. As seen in these figures, the inner wall **62** of the inner flange of body portion **22** includes a first pair of spaced substantially parallel integral guide walls **70** and **72**. A further pair of spaced parallel integral guide walls **74** and **76** are provided, and a further pair of similar guide walls **78** and **80** are provided. It will be noted that each pair of guide walls is spaced substantially 120° away from the adjacent pairs of side walls to define equal symmetrical spacing of the pairs of guide walls.

The locking means includes three separate lock members indicated generally by reference numerals **84**, **86** and **88** which are supported by the inner wall **62** of the body portion **22** for relative sliding movement with respect thereto, the lock members being adapted to slide inwardly and outwardly generally radially with respect to the body portion **22**, this radial inward and outward movement of the lock members being guided by the associated guide walls hereinbefore described.

The individual lock members are adapted to slide radially outwardly through holes **90**, **92** and **94** provided through the portion **60** of the inner flange hereinbefore described.

Referring now particularly to FIG. 6, the constructional details of lock member **84** may be seen, it being understood that the other lock members **86** and **88** are of substantially identical construction. Lock member **84** comprises a one-piece construction and is formed of a suitable plastic material such as Teflon for example. The lock member includes a pair of integral upstanding lugs **100** and **102** which are adapted to receive therebetween the cam portions formed on the actuating means hereinafter described. An integral stop rib **104** extends downwardly from the undersurface **106** of the lock member, this stop rib **104** being adapted to engage a stop wall **110** formed integral with the inner flange adjacent to the hole **90**. It should be understood that similar stop walls are provided adjacent the holes **92** and **94** for limiting outward movement of the associated lock members by engagement with the stop ribs thereof.

Lock member **84** includes an outer end portion **112** having a tapered upper surface **114**. This tapered upper surface is adapted to engage the inner edge of annular lip **36** formed on body portion **20**, and due to the slope of this tapered surface **114**, outward movement of the lock members with respect to the body portion **20** will cause body portion **20** to be moved into locked engagement toward body portion **22** upon camming interengagement of the tapered surface **114** of the lock member with the annular lip of body portion **20**. Since three of these lock members interengage the annular lip portion **36** of body portion **20** substantially simultaneously, the two body portions will be positively urged into locking engagement with one another.

As seen most clearly in FIGS. 2 and 3, the actuating means of the present invention includes a generally frusto-conical side wall portion **120** which fits snugly within the frusto-conical side wall portion **54** of the inner flange formed on body portion **50**, the lower edge of side wall **120** resting upon portion **56** of the inner flange to support the actuating means in position. The side wall portion **120** of the actuating means joins with a bottom wall portion **122** having a hole **124** formed centrally therewithin as seen in FIG. 3, this hole being of generally square cross sectional configuration.

The actuating means is retained in operative position with respect to the body portion **22** and yet is permitted to rotate with respect thereto by an attaching means indicated generally by reference numeral **130**. This attachment means includes an enlarged generally circular head **132** having a pair of resilient leg portions **134** and **136** extending therefrom. As seen in FIG. 2, the leg portions **134** and **136** extend through holes **68** and **124** and snap into the operative position shown wherein shoulder portions **134'** and **136'** formed on the enlarged upper ends of the attaching means **134** and **136** respectively as seen

in this view engage the upwardly facing surface of the bottom wall **122** of the actuating means for holding the components in the assembled position illustrated. It is apparent that once the attaching means has been snapped into the operative position illustrated, the actuating means will be retained in position relative to the body portion **22**, and yet may rotate with respect thereto.

A handle portion is provided in the actuating means, the handle portion being indicated generally by reference numeral **140** and including a pair of spaced walls **142** and **144** which extend between generally diametrically opposite sides of the inner surface of the side wall portion **120** of the actuating means, these side walls **142** and **144** extending upwardly as seen in FIG. 2 from the bottom wall **122**. The handle portion includes a cover member **146** which extends in spanning relationship between the upper edge of walls **142** and **144**, member **146** being suitably retained in the operative relationship illustrated as by being secured in place by suitable adhesive substance or the like.

As seen in FIGS. 4 and 5, a stop lug **150** is formed integral with the inner flange of body portion **22** and extends upwardly from the portion **56** thereof, this stop lug extending in a generally radial direction. This stop lug cooperates with a pair of stop surfaces formed integrally on the actuating means as hereinafter described.

Visual indicator means for indicating whether the apparatus is in the locked or unlocked position is provided, this visual indicator means including a pair of spaced indicating portions **152** and **154** which may comprise elongated strips of colored paper or the like suitably secured in position as by means of adhesive means, suitable colors being selected for this purpose. As seen in FIG. 1, this indicator means includes a light refracting and transmitting means **156** in the form of a piece of clear plastic or the like which is adapted to be positioned over the colored indicating portions so that the color is readily visible at the upper surface of member **156**. The details of construction of this visual indicator means are disclosed in copending U.S. patent application Ser. No. 680,238, filed Nov. 2, 1967.

Referring now to FIG. 3, the undersurface of the actuating means is illustrated, and as seen in this figure, a wall portion **160** is formed integral with the bottom wall **122** of the actuating means and extends peripherally therearound and terminates in two generally radially extending walls **162** and **164** which define stop surfaces **162'** and **164'** which are adapted to engage opposite sides of the stop lug **150** previously described upon relative rotation of the actuating means with respect to the body portion **22** to limit the relative rotation between the actuating means and its associated body portion.

As seen in FIG. 3, three spaced integral cam portions **170, 172** and **174** extend from the bottom wall **122** of the actuating means, these cam portions defining radially outwardly facing cam surfaces **176, 178** and **180** respectively. These three cam surfaces slope so as to define points of increasing radius from the center from ends **182, 184** and **186** of the cam surfaces to the opposite ends **188, 190** and **192** respectively.

The cam portions **170, 172** and **174** are received between the upstanding lugs of the lock members **84, 86** and **88** respectively, and it is apparent that upon relative rotation of the actuating means and the integral cam portions thereof with respect to the lock members, the lock members will be cammed either inwardly or outwardly depending upon the direction of relative rotation.

Projections **76', 178'** and **180'** extend radially outwardly from the outwardly facing cam surfaces **176, 178** and **180** respectively. Upon movement of actuating means so as to urge the lock members into locking position, these projections will engage the upstanding lugs on the respective lock members so as to give them the final radial outward movement toward locked position as shown in FIG. 2. Referring to FIG. 5, it will be noted that when the apparatus is in the final locked position, the projection **176'** has moved beyond the midpoint of the lug **102** of lock member **84**. The inwardly facing surface of lug **102** tapers toward the center of the device so as to define a medial portion which is radially inward of the remaining portions of the lug. Accordingly, in the position shown in FIG. 5, the projection **176'** has moved past this medial portion thereby allowing the lock member to move slightly radially inwardly due to the camming effect on the outer tapered upper surface **114** thereon under the influence of pressure applied by the inner edge of the annular lip portion **36** on body portion **20** tending to move all of the lock members radially inwardly.

As seen in FIG. 5, each of the projections is adapted to move beyond the medial portion of the lug on the associated lock member. This intercooperation between the projections and the lugs on the lock members tends to retain the actuating means in locked position since in order to move the actuating means to unlocked position, the lock members must first be forced radially outwardly. Accordingly, the resistance to movement of the actuating means in the unlocking direction makes it virtually impossible for the apparatus to be accidentally moved into unlocked position from the locked position without deliberate manual effort being applied thereto.

Referring now to FIG. 7, the cam portion **170** defines a downwardly facing surface **200** which faces toward the associated lock member **84** during operation of the apparatus, surface **200** including a sloping surface **202** which slopes away from the actuating means and terminates in a lock surface **204** which engages the upwardly facing surface of the associated lock member **84**. It should be understood that the remaining cam portions have corresponding sloping surfaces and lock surfaces for engagement with the associated lock members.

It is apparent that when moving from the unlocked position as shown in FIG. 4 to the locked position as shown in FIG. 5, the actuating means is rotated in a clockwise direction whereupon the outwardly facing cam surfaces of the various cam portions will engage the integral upstanding lugs formed on the lock members so as to urge the lock members radially outwardly into locking position, the projections on the cam surfaces moving the lock members into final operating position.

Referring to FIG. 6, an inner annular shoulder **210** is formed integral with the inner wall **62** of the inner flange of body portion **22**, this annular shoulder extending completely around the projection **64**. An annular sloping surface **212** is formed adjacent to the shoulder **210**. When the lock members are in the unlocked position as shown in FIG. 6, the radially inner ends of the lock members rest upon annular shoulder **210**. When the lock members are subsequently cammed outwardly into locked position, the inner edges of the lock members ride down along the sloping surface **212** so that the lock members are moved into the tilted phantom line position shown in FIG. 6 as they are cammed outwardly until the lock members reach their limit of outward movement, the lock members being urged into this tilted position by the sloping surface **202** and held in such position by the locksurface **204** of cam portion **170** for example as described in connection with FIG. 7.

It is apparent from the foregoing that there is provided according to the present invention a new and novel tape reel container which provides a positive clamping action when in the lock position and which will not open too easily. The apparatus is formed completely of plastic components, and the lock means of the apparatus can be engaged in any relative position of the two body portions.

I claim:

1. A tape reel container comprising a first body portion including a side wall having an outer flange extending therefrom, an inner flange extending from said side wall and terminating in an inwardly extendnig annular lip portion, a second body portion including a side wall

having an outer flange extending therefrom, an inner flange extending from said second body portion, lock means for locking said first and second body portions in operative relationship with respect to one another, actuating means, said lock means being supported on said inner flange between the inner flange of said second body portion and said actuating means and radially movable relative thereto inwardly and outwardly thereof, the inner surface of said inner flange having parallel radially extending guide walls, said locking means including a lock member positioned within said guide walls and having its outer end tapered to provide a camming surface, said actuating means including cam portions engaging said lock member for moving the lock member outwardly into camming engagement with said lip portion in locking position and inwardly out of engagement with said lip portion to release position upon relative rotation of said actuating means with respect to said second body portion.

2. Apparatus as defined in claim 1 wherein said lock means include a plurality of separate lock members, said inner flange of the second body portion having holes formed therethrough for receiving said lock members and permitting said lock members to move inwardly and outwardly with respect to said last-mentioned inner flange.

3. Apparatus as defined in claim 1 including cooperating stop means formed on the inner flange of said second body portion and each of said lock members for limiting outward movement of said lock members with respect to said last-mentioned inner flange.

4. Apparatus as defined in claim 1 including stop means on the inner flange of said second body portion interengageable with portions of said actuating means for limiting movement of said actuating means in opposite directions with respect to the inner flange of said second body portion.

5. A tape reel container comprising a first body portion including a side wall having an outer flange extending therefrom, an inner flange extending from said side wall and defining an annular lip portion, a second body portion including a side wall having an outer flange extending therefrom said second body portion, lock means for locking said first and second body portions in operative relationship with respect to one another, actuating means, said lock means being supported between the inner flange of said second body portion and said actuating means and radially movable relative thereto inwardly and outwardly thereof, said actuating means including cam portions engaging said lock means for moving the lock means outwardly to engage said lip portion in locking position and inwardly out of engagement with said lip portion to release position upon relative rotation of said actuating means with respect to said second body portion, a stop wall formed on the inner flange of the second body portion adjacent each of said holes therein, each of said lock members having a stop rib formed thereon for interengagement with one of said walls.

6. A tape reel container comprising a first body portion including a side wall having an outer flange extending therefrom, an inner flange extending from said side wall and defining an annular lip portion, a second body portion including a side wall having an outer flange extending therefrom, an inner flange extending from said second body portion, lock means for locking said first and second body portions in opeartive relationship with respect to one another, actuating means, said lock means being supported between the inner flange of said second body portion and said actuating means and radially movable relative thereto inwardly and outwardly thereof, said actuating means including cam portions engaging said lock means for moving the lock means outwardly to engage said lip portion in locking position and inwardly out of engagement with said lip portion to release position upon relative rotation of said actuating means with respect to said second body portion, a plurality of separate lock members, said inner flange of the second body portion having holes formed therethrough for receiving said lock members and permitting said lock members to move inwardly and outwardly with respect to said last-mentioned inner flange, each of said lock members including a pair of integral upstanding spaced lugs, said cam portions on the actuating means being received between the lugs of each of said lock members.

7. Apparatus as defined in claim 6 wherein each of said lock members also includes an outer end portion defining a tapered surface for engagement with said annular lip portion.

8. Apparatus as defined in claim 2 wherein the inner flange of said second body portion defines an inner annular shoulder for supporting a portion of each of said lock members.

9. Apparatus as defined in claim 8 wherein the inner flange of said second body portion also includes a sloping surface disposed adjacent said inner annular shoulder.

10. A tape reel container comprising a first body portion including a side wall having an outer flange extending therefrom, an inner flange extending from said side wall and defining an annular lip portion, a second body portion including a side wall having an outer flange extending therefrom, an inner flange extending from said second body portion, lock means for locking said first and second body portions in operative relationship with respect to one another, actuating means, said lock means being supported between the inner flange of said second body portion and said actuating means and radially movable relative thereto inwardly and outwardly thereof, said actuating means including cam portions engaging said lock means for moving the lock means outwardly to engage said lip portion in locking position and inwardly out of engagement with said lip portion to release position upon relative rotation of said actuating means with respect to said second body portion, stop means on the inner flange of said second body portion interengageable with portions of said actuating means for limiting movement of said actuating means in opposite directions with respect to the inner flange of said second body portion, said stop means on the inner flange of said second body portion including a generally radially extending stop lug, said interengageable portion of the actuating means comprising a pair of generally radially extending stop surfaces engageable with said stop lug.

11. A tape reel container comprising a first body portion including a side wall having an outer flange extending therefrom, an inner flange extending from said side wall and defining an annular lip portion, a second body portion including a side wall having an outer flange extending therefrom, an inner flange extending from said second body portion, lock means for locking said first and second body portions in operative relationship with respect to one another, actuating means, said lock means being supported between the inner flange of said second body portion and said actuating means and radially movable relative thereto inwardly and outwardly thereof, said actuating means including cam portions engaging said lock means for moving the lock means outwardly to engage said lip portion in locking position and inwardly out of engagement with said lip portion to release position upon relative rotation of said actuating means with respect to said second body portion, said cam portions includes a plurality of spaced integral cam portions each of which has a radially outwardly facing cam surface which slopes so as to define points therealong of increasing radius from the central portion of said actuating means.

12. Apparatus as defined in claim 11 wherein each of said radially outwardly facing cam surfaces has a radially outwardly extending projection formed thereon for engagement with a portion of the associated lock members.

13. Apparatus as defined in claim 11 wherein each of said cam portions also includes a surface facing toward the associated lock members which slopes away from

said actuating means, each of said cam surfaces including a lock surface adjacent said last-mentioned sloping surface thereof to hold the associated lock members in operative locked position.

14. Apparatus as defined in claim 12 wherein each of said lock members includes a pair of integral upstanding spaced lugs, said cam portions being received between the lugs of each of said lock members, one of said lugs having a tapered inner surface defining a medial portion which cooperates wih the radially outwardly extending projection of the associated cam surface whereby the actuating means is retained in locked position.

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220—55