

Feb. 27, 1968

B. W. GEIER

3,370,698

REEL CONTAINER

Filed July 7, 1966

2 Sheets-Sheet 2

Fig. 3

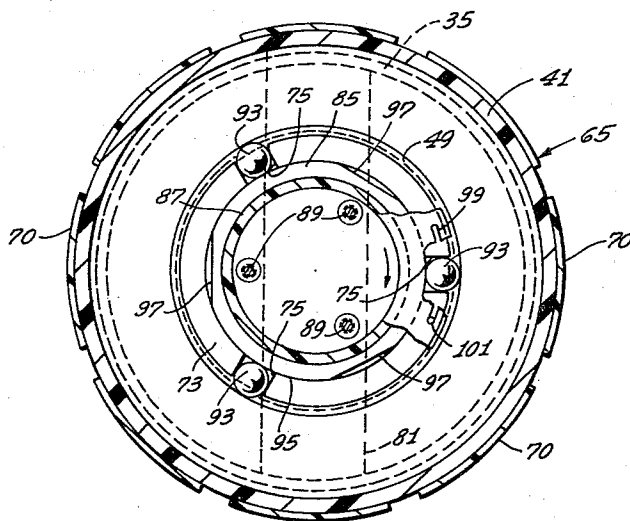


Fig. 4

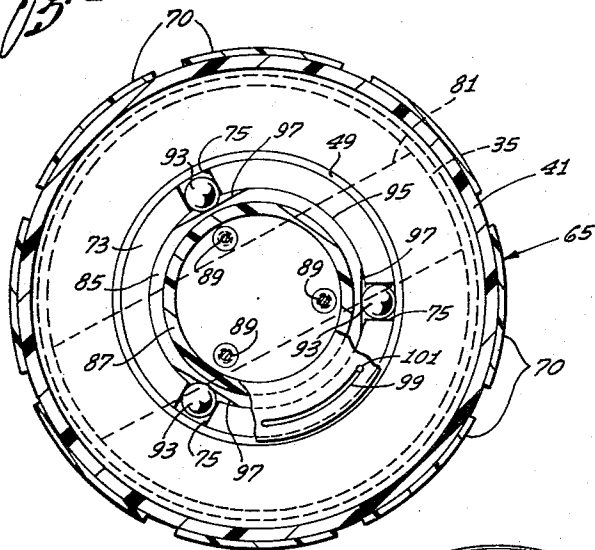
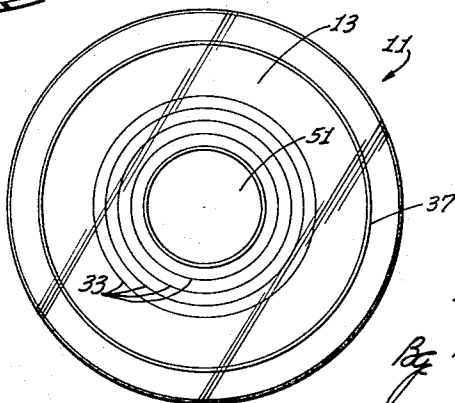


Fig. 5



INVENTOR:
BEVERLY W. GEIER

By *Ameyth, Roston & Parrott*
ATTORNEYS

1

3,370,698

REEL CONTAINER

Beverly W. Geier, Torrance, Calif., assignor to Comdata Corp., Los Angeles, Calif., a corporation of California
Filed July 7, 1966, Ser. No. 563,456
9 Claims. (Cl. 206—52)

ABSTRACT OF THE DISCLOSURE

This disclosure describes a container for a reel which includes first and second complementary container sections. One of the container sections defines a locking surface and the other of the container sections carries a movable detent engageable with the locking surface to tightly hold the container sections together.

This invention relates to a container and more particularly to a container for storing and transporting articles that must be kept dust-free, such as certain types of tapes and film.

Tape which is designed for computer use is usually wound on a reel and must be kept very clean if it is to perform satisfactorily. Even small quantities of dust or other contaminants can make the tape unsuited for its intended purpose. It follows that ordinary packaging techniques are totally unsuited for storing and transporting this type of tape.

One type of prior art container, which was particularly designed for tape storage includes two container sections and locking means for holding the container sections together. The locking means includes a plunger member extending into the container and mounted for axial movement relative thereto. An annular resilient gasket rests on the upper side of the plunger. The other container section provides an annular lip which surrounds the resilient gasket in close proximity thereto. By moving the plunger upwardly, the resilient gasket is axially compressed against the first container section. Continued upward movement of the plunger causes radial expansion of the gasket into frictional engagement with the annular lip provided on the other container section. It is this frictional contact between the expandable gasket and the annular lip that holds the two container sections together. A rather complicated and difficult to assemble arrangement of a cam and cam follower are used to cause the upward movement of the plunger.

The primary problem with this type of prior art container is that the locking means thereof is subject to spontaneously releasing. When the locking means is in its locked position, the resilient gasket is forcibly axially compressed. This causes the gasket to apply a corresponding outwardly directed axial force to the two container sections, thereby tending to separate them. Under these conditions the gasket sometimes cold flows to the extent that the locking engagement between the gasket and the annular lip is broken. This causes the compressed resilient gasket to forcibly separate the two container sections. This results in exposing the tape to surrounding contaminants and to possibly dumping the reel of tape completely out of the container.

This problem is aggravated during manual transport of the container. In this prior art device, the upper container section provides a handle for manually transporting the container. The reel of tape, which is relatively heavy, rests against the lower container section. Accordingly, when the container is being transported by the handle, the weight of the reel of tape adds to the axial forces tending to separate the two container sections. Thus, the two container sections are most likely to separate during the manual transport thereof, in which case

2

the reel of tape would undoubtedly fall to the floor and become unsuited for use with a computer.

Another problem with this prior art type of container is that the resilient gasket, which is usually made of rubber or Neoprene, is subject to cracking and flaking. The flakes of rubber that separate from the gasket increase the likelihood of contaminating the tape. This is true even though the resilient gasket is provided in a recessed well within the container because this well is not 100% effective in retaining the flakes, particularly when the container sections are separated and this well is exposed within the room. Furthermore, when the gasket begins to flake, it should be replaced or an entirely new upper container section should be provided.

Another problem with this prior art type of container is that in some instances the user of the container might only partially radially expand the gasket and therefore only partially lock the container sections together, yet believe that the container sections were fully locked together. Of course, an only partially locked container is more easily inadvertently opened. Finally, this prior art type of container locking means is relatively complicated and difficult to assemble in that it uses a complex cam, a pin type cam follower, an axially movable plunger, and the resilient gasket.

According to the present invention, a strong positive locking means is provided for a container. When the lock of the present invention is in the locked position, the container sections cannot spontaneously separate. In fact, when the lock is in the locked position, the container sections can only be separated by applying sufficient force thereto to rupture the container walls. With the present invention the resilient gasket of the prior art is eliminated and, therefore, the problems of gasket flaking and gasket replacement are eliminated. The locking means for the container of the present invention moves from the fully unlocked to the fully locked positions by rotating the handle or actuator through only a few degrees, thereby making it virtually impossible to leave the container in a partially locked condition. Finally, all of the above features are accomplished by a relatively simple, easily assembled structure in which no portion of the locking means need be subjected to axial movement.

Briefly stated, the invention includes two container sections secured together to form a substantially dust-tight enclosure, one of the container sections providing a locking surface and the other of the container sections having a detent secured thereto for bodily movement toward and away from the locking surface of the first container section. An actuator is secured to one of the container sections for movement relative thereto and means are provided which are responsive to such movement of the actuator to force the detent into engagement with the locking surface to rigidly hold the container sections together. The detent is constructed of hard, substantially noncompressible material and the locking surface is rigid. Accordingly, the engagement of these two elements rigidly locks the two container sections together and there is no possibility of cold flow of the detent or of spontaneous opening of the container. Furthermore, as the detent is constructed of a hard material, the problem of flaking of the resilient gasket heretofore associated with tape containers is eliminated. Also, the hard detent is not subject to any significant amount of wear, and accordingly, does not require replacing.

More particularly, the first container section has a generally centrally disposed wall portion which defines a recess which extends generally axially into the enclosure. The recess opens inwardly toward the second container section. The wall portion of the first container also defines the locking surface which is preferably exposed with-

in the recess. The second container section has a flange, which is preferably annular, extending into the enclosure and into the recess when the container sections are in engagement. The flange has a laterally extending opening therethrough adjacent the locking surface.

The hard detent is retained within the opening for lateral movement radially outwardly into engagement with the locking surface. By providing the locking surface and the detent within the recess, the parts of the device which are subject to possible wear are separated and substantially sealed from the remainder of the enclosure which forms a storage space for the reel of tape.

Movement of the detent is preferably controlled by a cam which is surrounded by the annular flange. To conserve space, the cam is preferably an annular disk having an outer peripheral camming surface. The camming surface is generally cylindrical and in sliding engagement with the inner surface of the flange. The camming surface also provides a flattened portion defining a recess into which the detent may move to allow unlocking of the two container sections. Use of the cylindrical camming surface with a flattened portion allows movement of the detent between the fully released and fully locked positions with only a slight rotational movement of the cam, thereby making it virtually impossible for the handler of the container to inadvertently leave the container only partially locked.

It is preferred to utilize a plurality of spherical detent balls and to shape the flange and cam accordingly. The detent balls are preferably retained within the several openings in the flange by a peripheral lip on a member which is secured to the cam. Rotational or actuating movement is imparted to the cam by a handle unit which is rotatably mounted in an aperture in the upper or second container section. The cam is integral with or otherwise secured to the handle unit for rotation therewith. Preferably, a well is provided in the outer surface of the upper or second container section to receive the handle unit, thereby allowing the handle unit to be substantially flush with the uppermost surface of the container. A stop pin and cooperating slot are provided in relatively rotatable portions of the container to limit the rotation of the handle unit and cam.

The invention, both as to its organization and method of operation, together with further features and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying illustrative drawings, in which:

FIG. 1 is a top plan view of the container;

FIG. 2 is an enlarged sectional view taken along line 2—2 of FIG. 1 and showing the container sections locked together by the locking means;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2 showing the detent balls in the locked position and having portions thereof broken away to clearly illustrate the slot and cooperating stop pin for limiting rotational movement of the cam;

FIG. 4 is a sectional view similar to FIG. 3 illustrating the detent balls in the released or unlocked position; and

FIG. 5 is a bottom view on a reduced scale of the container.

Referring to the drawings and in particular to FIGS. 1 and 2 thereof, reference numeral 11 designates a container constructed in accordance with the teachings of this invention. The container 11 includes a lower container section 13 and an upper container section 15 in engagement with the lower container section to define an enclosed space 17. Both of the container sections 13 and 15 are preferably formed from clear sheet-like plastic material.

The lower container section 15 defines a lower wall 19 having a generally circular periphery. Outer and inner concentric spaced projections 21 and 23, respectively, extend upwardly from the lower wall 19 and define an annular channel 25. The upper container section 15 de-

fines an upper wall 27 and a cylindrical peripheral side wall 29 which is received within the annular channel 25. A resilient annular seal 31 is disposed in the channel 25 to assure that the enclosed space 17 remains dust-tight.

Each of the container sections 13 and 15 is provided with one or more circular reinforcing ribs 33. Annular interlocking ribs 35 and 37 are provided on the upper and lower container sections, respectively. As shown in FIG. 2, the lower rib 37 is offset radially inwardly from the upper rib 35 so that adjacent containers may be stacked in nested interlocking relationship.

More particularly, a central portion of the lower wall 19 is offset axially inwardly to form a cylindrical boss 39 which is coaxial with the container 11. The boss 39 has an annular cylindrical side wall 41 which terminates in a transverse end wall 43 which is integral therewith and which is substantially parallel to the outer portion of the lower wall 19. The boss 39 defines an axial recess 45 which opens inwardly through an axial circular aperture 47 in the transverse end wall 43 toward the upper container section 15. The transverse end wall 43 terminates in an annular curved locking surface 49 which tapers radially and outwardly as it extends downwardly (FIG. 2). The depression in the outer surface of the lower section 13 which is formed by the inwardly protruding boss 39, is closed by a thin circular cover 51.

Similarly, the upper wall 29 is offset axially inwardly to form a cylindrical boss 53 which is axially aligned with the boss 39. The boss 53 has an annular cylindrical side wall 55 and a transverse end wall 57 integral therewith. The inwardly offset boss 53 defines an axial cylindrical well 59 in the upper exterior surface of the upper container section 15.

The side walls 41 and 55 form a hub on which a reel 61 carrying tape 63 may be positioned. Identical ring members 65 frictionally embrace the side walls 41 and 55, respectively. Each of the ring members 65 includes an axial section 67 and a radial section 69 integral therewith which are arranged to form an angle of less than 90 degrees. The ring members 65 are constructed of a resiliently flexible plastic material, such as nylon, and the axial section 67 is notched to form a plurality of axially-extending resilient fingers 70 (FIGS. 3 and 4). With the reel 61 within the container 11, the reel engages the radial section 69, thereby urging the axial section 67 radially outwardly into engagement with the inner periphery of the reel to firmly retain the reel within the case. These ring members form the basis of common assignee's co-pending U.S. application Ser. No. 530,486.

As shown in FIG. 2, the transverse end walls 43 and 57 are spaced only slightly from each other. The transverse end wall 57 has a circular aperture 71 therethrough, which is of smaller diameter than and coaxial with the aperture 47 in the transverse end wall 43.

With reference to FIGS. 2-4, an annular cylindrical flange 73 which surrounds the aperture 71 extends axially inwardly into the recess 45. Three radially extending openings 75 are formed in the flange 73 and terminate closely adjacent the locking surface.

A handle unit 77 is provided in the well 59. The handle unit 77 includes a shallow generally cylindrical cup-shaped portion 79 and a handle 81 extending diametrically across the cup-shaped portion and secured thereto. As shown in FIG. 2, the uppermost surface of the handle unit 77 is substantially flush with the uppermost surface of the container 15.

The portion 79 of the handle unit 77 has an opening 83 (FIG. 1) therein to expose a portion of the upper surface of the transverse end wall 57. As is described more fully hereinbelow, the handle unit 77 is rotatable to lock and unlock the container. Accordingly, appropriate indicia are recorded on the upper surface of the transverse end wall 57 so that the locked and open positions of the device are made known to the user as indicated in FIG. 1.

The handle unit 77 is mounted for rotation by a ring-

5

shaped cam 85 which is rotatably mounted in the aperture 71. The cam 85 may be integral with the handle unit 77 or otherwise appropriately secured thereto. An inverted hat-shaped member 87 is secured to the handle unit 77 by a plurality of screws 89. The hat-shaped member 87 has a peripheral lip 91 which passes beneath the cam 85 and the flange 73 and closes the lower end of the openings 75. Thus, the lip 91 cooperates with the opening 75 to form three passageways for three spherical detent balls 93. As shown in FIG. 3, the walls of the openings 75 are tapered toward each other as they extend radially outwardly to prevent the detent balls 93 from falling out of the passageways when the container section 13 and 15 are separated. Although three balls 93 spaced 120 degrees apart are illustrated, any suitable number and spacing of detents may be provided.

As best seen in FIGS. 3 and 4, the cam 85 is ring-shaped and has a generally cylindrical peripheral camming surface 95 which is engageable with the detent balls 93. The camming surface 95 has three flat portions or recesses 97 which permit movement of the detent balls 93 inwardly out of engagement with the locking surface 49.

The detent balls 93 are constructed of a hard, substantially noncompressible material. Various sizes and shapes of detents may be utilized although the ball-type detents illustrated are preferred because they are easily rotatable and do not add to the frictional force resisting rotation of the handle unit 77.

To limit the rotational movement of the handle unit 77 and the cam 85, an arcuate slot 99 is provided in the lip 91 of the hat-shaped member 87. A stop pin 101 is rigidly affixed to the lower side of the flange 73 and extends into the slot. The stop pin 101 is stationary, and the slot 99 turns with the hat-shaped member 87 in the cam 85. The stop pin 101 is engageable with the extremities of the slot 99 to limit the pivotal or rotational movement of the cam 85.

The operation of the device is as follows. With the handle unit 77 rotated to the unlocked position shown in FIG. 4, the upper container section 15 may be positioned over the lower container section 13 with the flange 73 lying within the recess 45 as shown in FIG. 2. As shown in FIG. 4, in the unlocked position the detent balls 93 are radially retractable to a position in which they are engageable with the flat portions or recesses 97. The cam 85 can be rotated by turning the handle unit 77. As is apparent from viewing FIG. 4, after the cam 85 has rotated through a small number of degrees, the curved portion of the camming surface 95 will force the detent balls 93 radially outwardly to the locked position shown in FIGS. 2 and 3 in which the detent balls 93 firmly and rigidly engage the locking surface 49. The user of the container 11 is advised that the container is in the locked position by the indicia which is visible through the opening 83 (FIG. 1). The arcuate slot 99 and the stop pin 101 prevent the cam 85 from being turned beyond either the locked or unlocked positions.

Because the detent balls 93 are constructed of hard, noncompressible material, there are no forces of compression that tend to separate the container sections 13 and 15 merely by virtue of locking the two container sections together. Because the detent balls 93 are of hard, noncompressible material, there is no danger that they may cold flow and cause the container sections 13 and 15 to separate. Furthermore, the hard detent balls 93 are not subject to flaking or partial disintegration through normal use. However, to the extent that even hard moving parts tend to create flakes or dust, such dust would be entirely substantially trapped within the recess 45. That is, the moving parts of the container 11 are substantially sealed from the annular storage space 17.

When the cam 85 and the detent balls 93 are in the locked position, the upper container section 15, and in particular the flange 73 and detent balls 93 are of too large a diameter to fit through the aperture 47 in the

6

transverse end wall 43. The thin disk-like cam 85 takes up very little room and the flat portions 97 thereof function to cam the detent balls 93 from a completely retracted position to a completely extended position with only a slight amount of rotation of the cam, thereby making it difficult or impossible for the user to leave the container 11 in only a partially locked condition.

Although an exemplary embodiment of the invention has been shown and described, many changes, modifications and substitutions may be made by one having ordinary skill in the art without necessarily departing from the spirit and scope of this invention.

What is claimed is:

1. In a container for a reel, the combination of: first and second complementary container sections, said container sections being engageable to form a substantially dust-tight enclosure; said first container section having a protruding portion extending generally axially into the interior of said enclosure in spaced relation to the lateral periphery of said enclosure to define a space for the reel, said protruding portion having a locking surface exposed within said enclosure; said second container section having an offset portion extending generally axially inwardly into the interior of said enclosure toward said protruding portion of said first section and said locking surface; a hard substantially noncompressible detent; said offset portion including means for mounting said detent on said second container section for bodily movement toward and away from said locking surface of said first section when said container sections form said enclosure; an actuator; means for securing said actuator to one of said container sections for movement relative thereto; and means responsive to said movement of said actuator for forcing said detent into engagement with said locking surface to rigidly hold said container sections together.
2. A combination as defined in claim 1 wherein each of said protruding portion of said first section and said offset portion of said second section includes generally annular side walls surrounding said detent and said last-mentioned means and substantially sealing the remainder of said container therefrom.
3. A combination as defined in claim 1 wherein each of said container sections is formed from sheet-like material and each of said protruding portion and said offset portion includes a central inwardly extending boss formed in said first and second container sections, respectively, each of said bosses having apertured transverse end walls, said actuator being rotatably mounted in said aperture of said second container section.
4. A combination as defined in claim 1 wherein said last-mentioned means includes a cam engageable with said detent.
5. A combination as defined in claim 1 wherein said last-mentioned means includes a rotatably mounted member having a peripheral camming surface, said peripheral camming surface defining a recess to permit movement of said detent inwardly out of engagement with said locking surface.
6. In a container for a reel, the combination of: first and second complementary container sections, said container sections being engageable to form a substantially dust-tight enclosure; said first container section having a generally centrally disposed wall portion defining a boss which extends generally axially inwardly into said enclosure in radially spaced relationship to the lateral periphery of the enclosure to define a space for the reel, said boss having a transverse end wall with an aperture there-through, said transverse end wall defining a locking surface adjacent said aperture;

said second container section having a flange extending generally axially inwardly into said enclosure and through said aperture in said transverse end wall when said container sections form said enclosure, said flange having a laterally extending opening therethrough adjacent said locking surface when said container sections form said enclosure;

a detent mounted in said opening for lateral movement outwardly into engagement with said locking surface and for movement inwardly out of engagement with said locking surface;

cam means for forcing said detent laterally outwardly into engagement with said locking surface to rigidly hold said container sections together; and

means for securing said cam means to one of said container sections for movement relative thereto.

7. A combination as defined in claim 6 wherein said flange is generally annular and includes a plurality of openings, each of said openings having a separate detent in the form of a ball movably mounted therein and engageable with said locking surface.

8. A combination as defined in claim 6 wherein said second container section defines a generally centrally disposed well on the exterior of the enclosure and said flange depends from the portion of said second container section which defines said well and said cam means includes a rotatable handle rotatably mounted in said well and a cam surface lying axially inwardly of said flange opposite said opening and engageable with said detent.

9. In a container for a reel, the combination of: first and second complementary container sections,

peripheral portions of said container sections being engageable to form a substantially dust-tight enclosure;

means on said first container section defining a locking surface adjacent a central portion of said first container section;

a relatively hard detent;

means on said second container section adjacent said locking surface for mounting said detent for movement toward and away from said locking surface, said detent being movable into engagement with said locking surface to interlock said container sections; at least one of said detent and said locking surface being inclined so that forcible movement of said detent into engagement with said locking surface draws the peripheral portions of said container sections tightly together to thereby assure that the enclosure is dust-tight; and

cam means for forcing the detent into engagement with said locking surface and for maintaining said detent in engagement with said locking surface.

References Cited

UNITED STATES PATENTS

1,765,207	6/1930	Coffee.	
3,074,546	1/1963	Burgess et al.	206—52

FOREIGN PATENTS

182,283	7/1922	Great Britain.
---------	--------	----------------

WILLIAM T. DIXSON, JR., *Primary Examiner.*