

Oct. 5, 1965

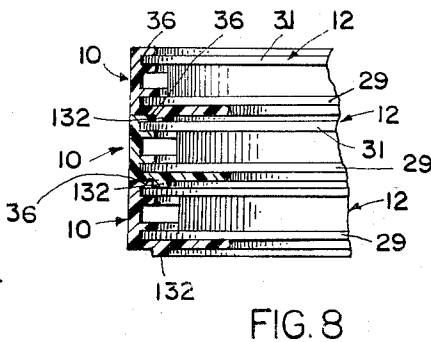
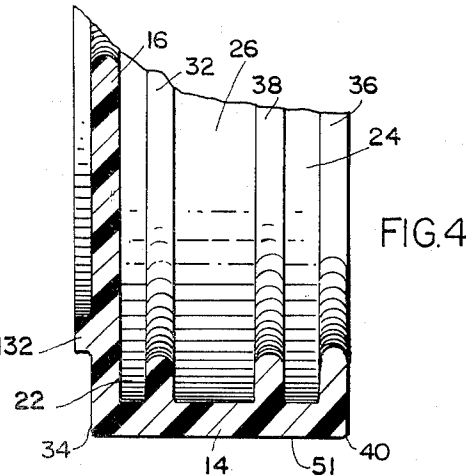
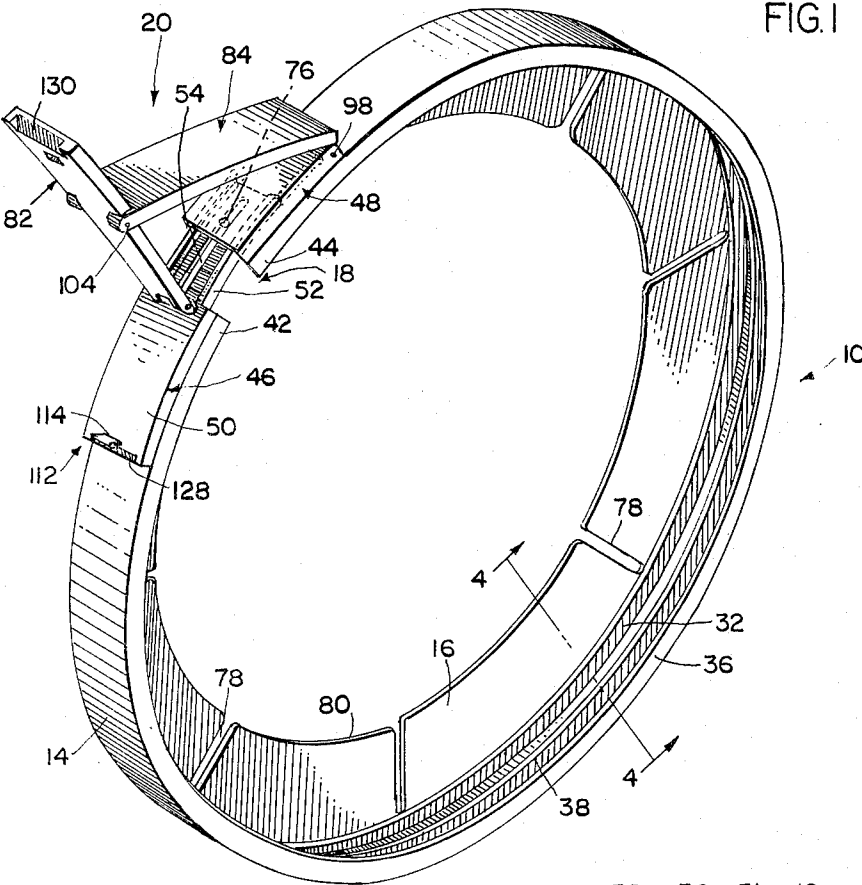
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3,209,904

REEL CLOSURE

Filed Sept. 10, 1963

3 Sheets-Sheet 1



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REEL CLOSURE

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3 Sheets-Sheet 2

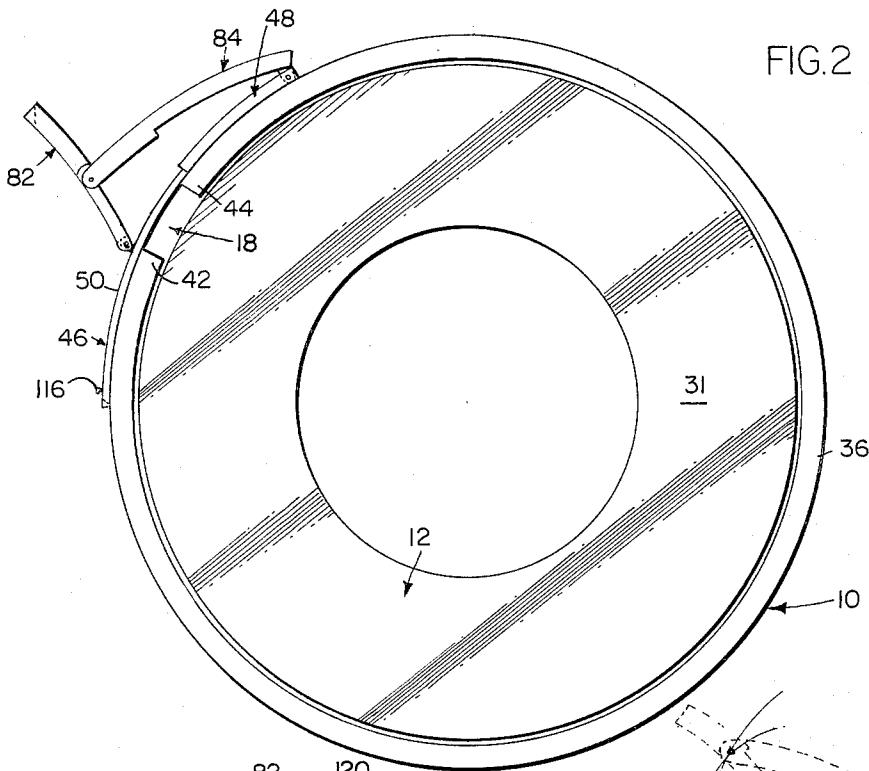


FIG. 2

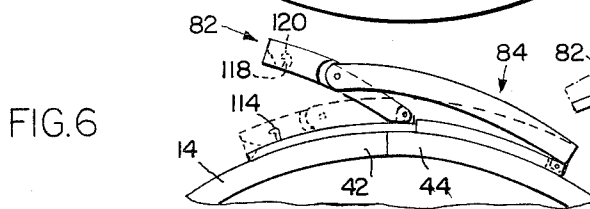


FIG. 6

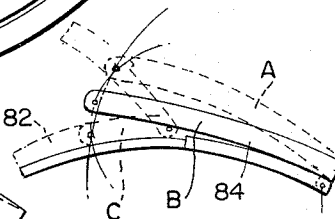


FIG. 7

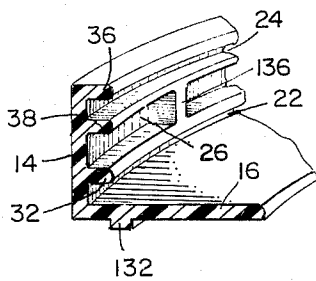


FIG. 10

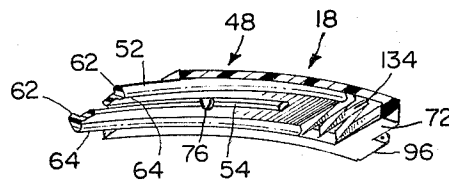


FIG. 9

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3 Sheets-Sheet 3

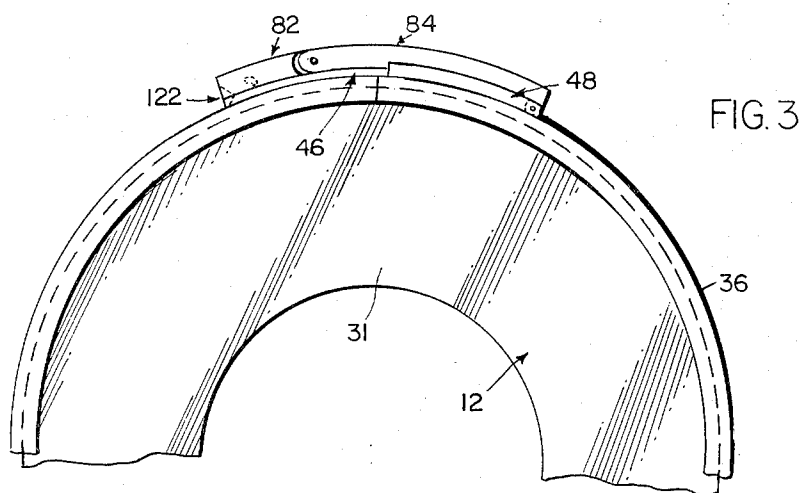


FIG. 3

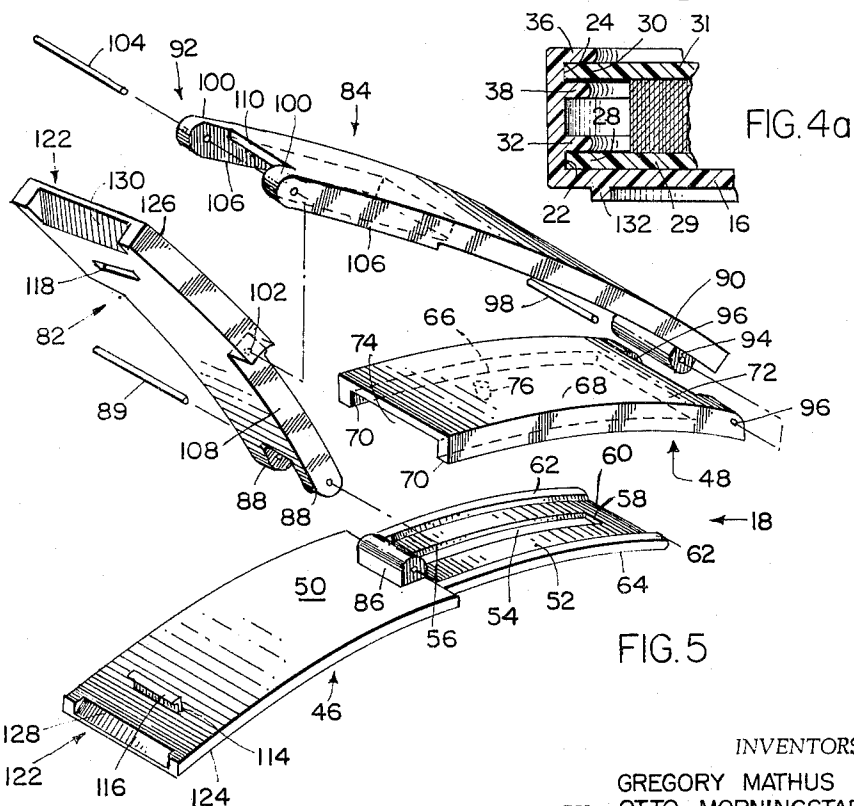


FIG. 5

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3,209,904

REEL CLOSURE

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9 Claims. (Cl. 206—52)

This invention relates to the storage of film and tape reels and more particularly comprises a closure for the periphery of a reel.

Conventionally, tape and film reels are stored in containers which completely enclose the reels. Ordinarily, the containers comprise a base, cover and some form of latch for locking the base and cover closed. Even the most streamlined of those available are approximately twice the thickness of the reel for which they are designed and consequently they effectively halve the storage capacity of bins or shelves upon which the reels are stored.

Many of the containers now in use are molded of plastic material. Because of their size, the plastic materials used must be relatively inexpensive such as polystyrene and polypropylene although they do not provide maximum protection for the reel. Nevertheless, these containers are relatively expensive. Because of the amount of material involved in their manufacture, the use of the better qualities of plastic materials such as polycarbonates and polyamides having the greater strength and heat resistance and longer life, is economically prohibitive.

Very recently some effort has been made to alter the basic design of reel containers so as to reduce their storage size, cost and other limitations. Many of these designs have taken the form of a band which encircles the periphery of the reel and engages the flange edges so as to form a closure about the reel periphery. When used on a reel having flanges free of any openings, the band cooperates with the reel to define a completely closed container for the tape or film wound about the reel. While such bands may perform their primary function of providing an enclosure for protecting the material stored on the reels, such bands which are now available are uniformly difficult to mount on the reels. In order to mount the bands on the reel flanges it is necessary to very carefully thread the edges of the flanges into channels provided on the bands, and thereafter the latching devices provided on the ends of the bands must be joined with care to avoid dislodging the flange edges from the channels. These manipulations require more time than can reasonably be given for such an operation, and particularly are much more inconvenient than the relatively simple manipulations required to deposit a reel in the more conventional forms of containers. As a result such bands have not met with general approval.

One important object of this invention is to provide a band-type reel closure which is exceedingly simple to mount on and close about the periphery of a reel.

Another important object of this invention is to provide a reel closure which consumes a minimum of space in storage, uses a comparatively small quantity of material in its manufacture and is capable of forming a most satisfactory seal about the reel periphery so as to provide as much protection for the tape or film stored on the reel as the more conventional forms of containers.

To accomplish these and other objects the closure of this invention includes among its features an elongated end wall having its ends permanently secured together to form the wall into a closed ring. Means are incorporated into the ring which enable the diameter of the ring to be varied so that in one condition the ring diameter may exceed the diameter of the reel to be closed by it. Chan-

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nels are provided on the inner surface of the ring for receiving the edges of the reel flanges, and means are provided on the end wall for guiding the edges of the reel flanges into the channels. Latching means are carried as part of the ring for holding the ring in a condition of reduced diameter with the flanges of the reel within the channels to releasably hold the ring about the reel.

These and other objects and features of this invention along with its incident advantages will be better understood and appreciated from the following detailed description of several embodiments thereof, selected for purposes of illustration and shown in the accompanying drawings, in which:

FIG. 1 is a perspective view of a reel closure constructed in accordance with this invention;

FIG. 2 is a top plan view of the closure shown in FIG. 1, in the open position and surrounding the reel to be closed within it;

FIG. 3 is a fragmentary top view of a portion of the closure and reel of FIG. 1, and with the closure closed;

FIG. 4 is a cross-sectional view taken along section line 4—4 of FIG. 1;

FIG. 4a is a cross-sectional view similar to FIG. 4 and showing the manner in which a reel fits into the closure;

FIG. 5 is an exploded view of the connector and latching device of the closure;

FIGS. 6 and 7 are detail views showing the toggle action of the latching device;

FIG. 8 is a fragmentary cross-sectional view of a stack of closures and reels;

FIG. 9 is a detail view of one modification of this invention; and

FIG. 10 is a detail view of another modification of this invention.

The embodiment of this invention shown in the drawings includes a closure 10 and a reel 12 which together define a closed storage compartment for tape, film or other similar strip material. The closure 10 to which this invention particularly relates has an end wall 14, a base flange 16, a connector 18 which joins the ends of the end wall 14, and a latching device 20. Preferably the closure is made of a plastic material such as a polycarbonate which is self extinguishing, substantially indestructible, capable of being cemented and possessed of sufficient flexibility to perform the functions intended.

The end wall 14 of the closure is provided with a pair of channels 22 and 24 on its inner face 26, which receive the edges 28 and 30 respectively of the flanges 29 and 31 of reel 12. The channel 22 is defined on one side by the base flange 16 normal to the end wall 14, and is defined on its other side by a rib 32. It is apparent in FIG. 4 that the flange 16 of the closure is connected to the lower edge 34 of the end wall 14, and the rib 32 is spaced from the flange 16 to define the channel 22. The other channel 24 is defined by upper and lower spaced ribs 36 and 38, and the rib 36 is secured to the upper edge 40 of the end wall 14. As the flange 16 and the rib 36 lie at the extreme edges of the end wall 14, it is evident that the width of the closure 10 just exceeds the width of the reel 12 and just reaches from the outer surface of the reel flange 29 to the outer surface of reel flange 31.

In FIGS. 1—3, the ends 42 and 44 of the end wall 14 are shown joined by the connector 18. The connector 18 with the latching device 20 is exploded in FIG. 5, and the connector is shown basically composed of two parts; namely, a tongue member 46 and a slot member 48. The tongue member 46 is in the form of an arcuate plate having a base portion 50 cemented or otherwise secured to the outer surface of the end wall 14 adjacent its end 42. The base portion 50 carries a tongue 52 that extends beyond the end 42 of the end wall 14. The tongue 52 is substantially the same thickness as the base por-

tion 50 and defines with it a smooth arc substantially of the same diameter as the end wall. The tongue 52 has an elongated slot 54 whose inner end 56 lies substantially in the plane of the edge of the base portion 50 and whose outer end 58 is spaced inwardly from the free end 60 of the tongue. Upper and lower beads 62 and 64 are provided along the two side edges of the tongue to reduce the area of contact between the surfaces of the tongue and the slot in the member 48 in which it slides.

The slot member 48 is also arcuate in form and is channel-shaped in cross section along a major portion of its length. The channel-shaped cross section of the member 48 defines a slot 66 in cooperation with the outer surface of the end wall 14. The slot 66 thus is defined by web 68 forming the upper wall of the member 48, the ribs 70 along the sides of the member 48, and the upper surface 51 of the end wall 14, and the slot is closed at one end by the partition 72. The open end 74 of the slot 66 is disposed substantially in the plane of the end 44 of the end wall 14.

As suggested above, the tongue 52 slides in the slot 66, and the two serve to connect the ends 42 and 44 of the end wall 14 permanently together. A pin 76 extends downwardly from the web 68 of the member 48 and lies within elongated slot 54 in the tongue 52. The pin 76 cooperates with the end 58 of the slot 54 to limit withdrawal of the tongue from the member 48.

The sides of the members 46 and 48 are coplanar with the side edges 34 and 40 of the end wall 14, while the tongue 52 is somewhat narrower, and just fits within the slot 66. The beads 62 and 64 on the upper and lower surfaces of the tongue reduce the frictional contact between the tongue and the slot.

While the connector 18 permanently secures the ends 42 and 44 of the end wall 14 together to form the wall into a ring, it nevertheless permits the diameter of the ring to be varied. Particularly it enables the diameter of the ring to be enlarged sufficiently to allow a reel to be placed within the end wall as shown in FIG. 2. The maximum diameter of the ring is of course limited by the pin 76 and the end 58 of the slot 54 in the tongue. The base flange 16 is provided with a number of radially oriented slots 78 which extend from the inner edge 80 of the flange to approximately the plane of the inner edges of the ribs 32, 36 and 38. The slots 78 enable the annular flange 16 to flex with flexure of the end wall 14 so as not to inhibit in any way the variability of the closure diameter.

To mount the closure 10 on the reel 12, the ring formed by the end wall 14 is opened to its maximum diameter as suggested in FIGS. 1 and 2 and the reel is dropped within the end wall onto the base flange 16. The base flange 16 automatically aligns the edges 28 and 30 of the reel flanges with the channels 22 and 24, respectively, as the flange 16 itself defines one side of the channel 22. Consequently no careful manipulation is required to align the reel flange edges with the channels. To close the closure 10 tightly about the periphery of the reel the ends 42 and 44 of the end wall are drawn together in abutting relationship, and the tongue 52 slides fully into the slot 66. This condition is shown in FIG. 3. The latching device 20 is provided to facilitate moving of the ends 42 and 44 of the end wall together and to releasably hold the ends in that position so as to releasably lock the closure about the reel.

The latching device 20 is of the toggle-type and comprises a pivotally mounted arm 82 and a link 84. The pivotally mounted arm 82 serves as the toggle actuator and is hinged to the upper surface of the tongue member adjacent the outer edge of the base portion 50 by means of the hinge sleeve 86 on the edge of the upper surface of base portion 50 and the hinge ears 88 formed as an integral part of the arm 82. A hinge pin 89 is connected to the ears 88 and passes through the sleeve 86 to conform to the shape of the base portion 50 of the member 46 so that when the latching device 20 is closed

as in FIG. 3, the arm 82 lies flat upon the upper surface of the base portion 50. The arm 82 is the same length as the base portion 50 so that the two parts are contiguous.

The link 84 is pivotally connected at its end 90 to the inner edge of the member 48, and the other end 92 of the link 84 is pivotally connected to the mid-portion of the arm 82. The pivotal connection of the end 90 of the link is formed by a hinge sleeve 94 on the link, ears 96 on the inner end of the slot member 48 and a pin 98. The pivotal connection of the end 92 of the link is formed by a pair of ears 100 on the link, opening 102 which extends through the arm 82 and a pin 104. The link 84 includes a pair of ribs 106 which lie along the sides of the narrowed portion 108 of the actuating arm 82, and the ribs 106 are joined over a substantial portion of their length by a web 110 which overlies the narrow portion 108 of the arm when the latch is in its closed position.

When the latching device 20 is moved from the position shown in FIGS. 1 and 2 to the position shown in FIG. 3, arm 82 and link 84 pull the ends 42 and 44 of the end wall 14 together. The link 84 itself serves as a spring to bias the actuating arm 82 into the extreme positions shown in FIGS. 2 and 3. This spring action of the link is best illustrated in FIGS. 6 and 7. As the arm 82 moves toward its closed position against the upper surface of the base portion 50 of the tongue member 46, and before it reaches that position, the ends 42 and 44 of the end wall 14 contact one another so that the end wall is in its condition of minimum diameter (see FIG. 6). This occurs before the arm 82 reaches the center position of the toggle action. Accordingly, continued movement of the arm 82 toward the center position (from A to B in FIG. 7) applies tension to the link and causes it to flex and assume a more nearly straight condition as it elongates (shown in full lines in FIG. 7), and the link in this way allows the arm to pass through the center position of the toggle. After the arm passes through the center position the tension on the link 84 is relaxed, and it again assumes its normal arcuate shape (position C in FIG. 7). This action serves to bias the arm 82 to the closed position once that position has been assumed by the arm, and similarly the link 84 tends to prevent the arm from moving to the closed position when the arm is in the open position of FIGS. 1 and 2.

A snap 112 is mounted on the surface of the base portion 50 of the tongue member 46 and the underside of the arm 82 to assist the link 84 to lock the arm in the closed position flush against the upper surface of the base portion. The snap includes an upstanding flange 114 on the base portion 50 having a forwardly extending shoulder 116 at its upper end and recess 118 in the arm 82 having an undercut 120. When the arm 82 lies flush against the top of the upper surface of the base portion 50, the flange 114 enters the recess 118 and the shoulder 116 snaps into the undercut 120 of the recess.

Some small force is required to raise the arm 82 off the upper surface of the base portion 50 and release the snap. To facilitate raising of the actuating arm 82, a V-shaped groove 122 is provided in the adjacent ends 124 and 126 of the base portion 50 and arm 82 respectively. The groove is defined by a pair of converging beveled surfaces 128 and 130 provided on those ends and which terminate inwardly of the side edges of the base portion and arm. It is evident in FIG. 5 that the groove 122 enables the user to easily apply a lifting force to the arm 82 to pivot the arm to the raised position shown in FIG. 1.

In FIG. 8, the manner in which reels enclosed in the closures 10 may be stacked conveniently one upon the other is shown. To lend particular stability to the stack, a stacking bead 132 is provided on the lower surface of the base flange 16, which bead has a height somewhat less than the thickness of the rib 36 that defines one side of the upper channel 24. The diameter of the circular bead 132 is substantially equal to the diameter of

the inner edge of the rib 36 so that when the reel closures are stacked one upon the other, the stacking bead 132 on one closure bears against the inner edge of the rib 36 of the next lower closure. Consequently the bead 132 prevents sliding of one reel and closure upon another.

In FIG. 9, a modification of the closure is shown. The modification includes a spring 134 disposed within the slots 66 of the slot member 48, which bears against the panel 72 and the end 60 of the tongue 52. The spring 134 acts in compression to urge the tongue 52 out of the slot so that the closure 10 is biased to an expanded condition wherein its diameter is maximum. In order to close the closure it is necessary to overcome the bias created by the spring as well as the spring action of the link 84 of the latching device. Thus, the need of conscious action to enlarge the closure sufficient to receive the reel is eliminated. So long as the latching device 20 is released the spring 134 assures that the diameter of the closure is maximum.

The modification shown in FIG. 10 also serves as an aid in placing the reel within the closure. In accordance with this modification, several ribs 136 are provided at spaced locations on the inner surface 26 of the end wall 14 and extend between the channel defining ribs 32 and 38. The ribs 136 prevent the lower reel flange from slipping into the space between the channels 22 and 24 with the upper reel flange disposed above the rib 36 as the latching device is closed. The ribs 136 facilitate the alignment of the edges 28 and 30 of the reel flanges with the channels 22 and 24. If the edge 28 of the lower reel flange 29 is in contact with the ribs 136 the user will be unable to close the latching device 20 because the reel flange 29 will prevent the wall 14 from assuming the small diameter required to close the latching device.

From the foregoing description it will be appreciated that the reel closure of this invention avoids the disadvantages inherent in the more conventional reel containers and the band-type closures of the prior art. Because numerous modifications of this invention will occur to those skilled in the art upon reading the foregoing description, it is not intended that the breadth of this invention be limited to the specific embodiments illustrated and described. Rather, it is intended that the scope of this invention be determined by the appended claims and their equivalents.

What is claimed is:

1. A closure for a reel having a pair of parallel circular flanges comprising
 - an end wall having a width slightly greater than the width of a reel measured between the outer surfaces of the two reel flanges and substantially equal in length to the perimeter of the flanges and adapted to cover the edge of the reel about the edges of the flanges,
 - means defining a slot secured to one end of the end wall and a tongue secured to the other end of said end wall and slidable in the slot and together forming the end wall into a continuous ring,
 - means operatively connected to the tongue and slot preventing withdrawal of the tongue from the slot for limiting enlargement of the ring,
 - a base flange forming part of the closure and connected to one side edge of the end wall and normal to the end wall and extending radially inwardly from the end wall for bearing against the outside of one of the flanges of the reel when the reel is disposed within the closure, said base flange preventing entry of the reel within the end wall from its side of the end wall,
 - a rib mounted on the end wall and spaced from and parallel to the base flange and extending radially inwardly from the wall and defining a first channel with the base flange for receiving the edge of the one

flange of the reel when the closure covers the edge of the reel,

an additional pair of ribs extending radially inwardly from and carried by the end wall and spaced from the first-named rib and defining a second channel for receiving the edge of the other flange of the reel when the edge of said one flange lies within the first channel,

and locking means secured to the ends of the end wall for releasably retaining the ends of the end wall together to reduce the size of the ring to a minimum diameter just sufficient to receive the edges of the reel flanges in the channels.

2. A closure for a reel having a pair of parallel circular flanges comprising

an end wall having a width substantially equal to the width of a reel and substantially equal in length to the perimeter of the flanges of said reel,

a tongue connected to one end of the end wall and means defining a slot connected to the other end of the end wall and slidably joining the ends of the end wall together so that the end wall forms a ring of variable diameter with a maximum diameter exceeding the diameter of the reel flanges,

channels provided on the side of the end wall for receiving the edges of the reel flanges,

means connected to and extending radially inwardly of the end wall for engaging the reel when a reel is placed within the end wall with said end wall in condition of maximum diameter and aligning the edges of the reel flanges with the channels,

and a toggle-type latching device joining the ends of the end wall for releasably locking the end wall in a condition of minimum diameter with the edges of the reel flanges disposed in the channels.

3. A closure for a reel having a pair of parallel circular flanges comprising

an end wall having a width at least as great as the width of the reel,

an expandable connector joining the ends of the end wall forming the end wall into a continuous expandable ring enabling the ring to be varied between a minimum and maximum diameter and preventing the ends of the end wall from displacing laterally with respect to one another,

means defining channels on the inside of the end wall for receiving edges of the flanges of a reel when the ring assumes its minimum diameter so that the end wall seals the periphery of the reel, said channels having a greater diameter than the flanges of the reel when the ring assumes its maximum diameter so that the edges of the flanges lie outside the channels when the ring is in condition of maximum diameter,

means secured to one side only of the end wall and extending radially inwardly therefrom and positioned to engage a reel placed within the end wall and align the edges of the reel flanges with the channels when the reel engages said means and the ring is in condition of maximum diameter,

and latching means operatively connected to the ends of the end wall for releasably locking the end wall in a condition of minimum diameter with the edges of the reel flanges in the channels.

4. A closure as defined in claim 3 further characterized by

said means secured to one side only of the end wall comprising an annular flange secured to one edge of the end wall and having an inner diameter which is smaller than the diameter of the reel flanges even when the ring assumes its maximum diameter, said annular flange preventing a reel from being introduced within the end wall from its side of the end wall.

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5. A closure as defined in claim 3 further characterized by said means secured to one side only of the end wall comprising an annular flange secured to one edge of the end wall and providing an inner surface substantially coplanar with the outer side of the channel closer to it for engaging the outer surface of one flange of the reel and aligning the reel flange edges with the channels. 5
6. A closure as defined in claim 3 further characterized by said means secured to one side only of the end wall comprising a flat annular flange secured to one side of the end wall and providing a support for a reel placed within the end wall when the end wall is oriented with the annular flange on the bottom so that a reel may be dropped into the closure upon the annular flange and the edges of the reel flanges automatically align with the channels. 10 15
7. A closure as defined in claim 3 further characterized by means operatively connected to the end wall for biasing the ring into its condition of maximum diameter. 20
8. A closure as defined in claim 3 further characterized by guide means disposed between the channels for preventing closing of the latching means when the edges of the flanges on a reel within the end wall are not disposed in the channels. 25
9. A closure for a reel having a pair of parallel circular flanges comprising an end wall having a width at least as great as the width of the reel, a latching device secured to the ends wall and when closed forming the end wall into a continuous ring, channel defining means on the inside of the end wall 30 35

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for receiving the edges of the flanges of a reel when the latching device is closed so that the end wall seals the periphery of the reel, and means secured to one side only of the end wall and extending radially inwardly therefrom and positioned to engage a reel placed within the end wall from the other side thereof when the latching device is open and align the edges of the reel flanges with the channel defining means when the reel lies against said means and causing the edges of the reel flanges to enter the channel defining means when the latching device is closed.

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