This invention relates to carriers or containers especially for use in pneumatic tube transport systems, and in particular it relates to novel closure and locking lids for such carriers.

A principal object of the invention relates to a closure lid for carriers used in pneumatic tube systems, which lid is capable of operating to both open in the carrier for loading, and in closing the carrier after it has been loaded.

Another object is to provide an improved closure lid for a pneumatic tube carrier, which is positive in operation and is safer against accidental opening while the carrier is proceeding through the pneumatic tube system.

A feature of the invention relates to an improved carrier for pneumatic tube transporting systems, which has a closure lid that is captively attached to the body of the carrier and which automatically locks itself in a predetermined closure relation with the carrier under control of a tensioning member such as a rubber strip, coiled spring or the like.

Another feature relates to an improved automatic locking arrangement for the closure lid of a pneumatic tube carrier employing shiftable detent locking means carried by a captively attached closure lid to insure the lid being automatically locked, while requiring only a relatively small manual turning of the said lid for unlocking.

Other features and advantages will be apparent after a consideration of the following detailed descriptions and the appended claims.

The invention will be explained in connection with certain preferred embodiments which are illustrated merely by way of example in the drawing, wherein

Fig. 1 shows a pneumatic carrier with contact ring control and a locking mechanism designed in accordance with the invention,

Fig. 2 shows the lid end of the pneumatic carrier of Fig. 1 at the moment the lid is tilted off,

Fig. 3 shows the locking end of Fig. 2 with the lid fully opened,

Fig. 4 shows the opened lid of Fig. 3 in a front view,

Fig. 5 shows schematically the durability of the rubber straps,

Fig. 6 shows the locking mechanism with felt cap, partially in a cross-sectional view,

Fig. 7 shows the felt cap in a top view, partially cut away to show the detent mechanism,

Fig. 8 shows a cross section of the detent mechanism,

Fig. 9 shows the mechanism of Fig. 8 in a top view.

In general, the device according to the invention comprises a closure lid 3 which is captively attached to the tubular carrier receptacle 1 by means of resilient and extensible attaching means such as rubber straps 2 or other suitable resilient material. The lid is provided with spring-pressed detents 4 or pins which, in the process of closing the lid, lock the latter at a predetermined rotary position with respect to the body of the carrier. This locking action is automatically effected by the pull of the rubber straps or other suitable resilient elements to cause the detents to enter a corresponding pair of ring-sector grooves 5 in the inner wall of the carrier end.

Referring to Fig. 1 of the drawing, there is shown in generalized plan view, a tubular carrier or receptacle 1 such as is conventionally used in pneumatic transporting systems. The left-hand end of the carrier may be provided with a permanent or semi-permanent cap 13, and the right-hand end is provided with a removable lid 3 according to the invention. The lid 3 may consist of a dish-shaped metal body 14 (Fig. 6) to which is attached, for example by suitable fastening screws 15 or the like, a rounded felt head 11. The felt head 11 has an aperture 10 extending diametrically therethrough and threaded through this aperture is a rubber strap 2. The ends of strap 2 are provided with suitable slots or openings through which pass respective fastening buttons 8 attached to the carrier 1. The length of the rubber strap 2 is such that it holds the lid under tension against the end of carrier 1, as shown in Figs. 1 and 6. In other words, in order to remove the lid so as to gain access to the carrier, it is necessary to pull the lid against the tension of the rubber strap 2.

Fig. 2 shows the lid partially tilted away from the open end of the carrier, and Figs. 3 and 4 show the lid completely tilted away from the open end of the carrier where it is held by the tension in the strap 2 against the periphery of the carrier permitting completely clear access to the interior of the carrier. Fig. 5 shows the normal or unstretched length of the rubber strap 2, while the dot-dash outline in Fig. 5 shows the extent to which the rubber band is stretched when it is attached to the carrier.

There is thus provided a captive attachment for the lid which, because of the stretched character of the strap 2, always holds the lid 3 firmly in place either when the said lid is in its closed position or when it is in either a partial open position (Fig. 2) or in a completely open position (Figs. 3 and 4). In the event that the rubber strap 2 tears at one point of attachment to the carrier, it will not pull through the aperture 10 in the felt head 11 but will be held together with the lid by the detent mechanism to be explained hereinafter, which mechanism prevents the contents from becoming lost in the pneumatic tube.

The detent mechanism is shown more clearly in Figs. 6 through 9. It consists essentially of two detent pins or slides 4 whose outer ends are arranged to enter into locking registry with corresponding grooves 5 formed in the ring 7 which is welded to the end of the carrier 1. These two grooves 5 in the ring 7 are displaced by 180° and, as shown more clearly in Fig. 9, the ends of each groove are tapered at 5° to function with the detents tor both directions of turning of the lid with respect to the carrier. As shown more clearly in Figs. 8 and 9, the lid 3 has attached to the bottom thereof a box 12 which houses the two detent pins 4 which are in alignment or, in other words, displaced angularly by 180° and which, by means of a suitable spring 6, are forced outwardly through corresponding aligned apertures in the wall of lid 3 so as to project outwardly therefrom and to permit the outwardly extending portion of each pin to register with the corresponding locking groove 5.

The action of the lid unlocking mechanism is as follows. When the lid is in an angular deviation of about 15° from its locked position it is slipped on the end of the carrier and, because of the relation between the rubber strap 7 and the groove 5 and because of the tension on the rubber strap, the strap will rotate the lid automatically so that the detents 4 are in registry with the respective grooves 5. The tension on the rubber strap also at the same time firmly holds the lid against the end of the carrier and the ends of the detents 4 engage the inwardly beveled edge of the carrier and are forced inwardly.
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3. Against the tension of the spring 6, in the turning of the lid to the locking position the detent pins 4 are forced outwardly in the respective grooves by the force of spring 6, to the locking position as shown in Fig. 9 in which they engage the deepest region of the grooves 5.

In opening the lid 3 it is rotated to about 15° in either direction along the longitudinal axis of the carrier and because of the tapered ends 5a of the locking grooves the pins 4 will be pushed back toward each other, thus enabling the lid to be pulled off the end of the carrier against the tension of the rubber strap. This permits the lid to be tilted off sideways over the grooved ring 7, as illustrated in Fig. 2.

The rubber strap or straps 2 can be replaced by a corresponding helical spring or springs. Likewise the detent pins 4 can be replaced by detent springs. Other changes and modifications may be made in the disclosed embodiment without departing from the spirit and scope of the invention.

What is claimed is:

1. A locking lid structure for a cylindrical container comprising a closure lid, resilient means extending from diametrically opposite points on said lid, means for securing the depending ends of said resilient means to diametrically opposite points on the wall of said container, said resilient means being of such length that they are under tension when said lid is in closed locked position with respect to said container, at least one spring-pressed detent extending radially from said lid, a co-operating detent-receiving sector-shaped groove in the inner wall of the end of said container the depth of said groove being a maximum at its center and decreasing towards its ends, and the deepest region of said groove being so located that when said detent is in locking position in said region said resilient means extend parallel to the axis of said cylindrical container.

2. A locking lid structure according to claim 1 in which a pair of oppositely directed detents are carried by said lid, and said container has a corresponding pair of oppositely arranged locking recesses.

3. A locking lid structure according to claim 2 in which said recesses are located at the open end of the container which end has an inwardly bevelled edge for engagement with said detents to cause the detents to be snapped into their respective locking recesses under the tension of said resilient means.

4. A locking lid structure according to claim 3 in which said recesses are formed in a metal ring which is welded to the open end of said container.

5. A locking lid structure according to claim 1 in which said resilient means comprises a rubber strap attached at opposite ends to diametrically opposite knobs on said container, said closure lid having a through passageway through which said strap passes and said strap having sufficient stretchability to permit the lid to be tilted away from the open end of the container for loading thereof.

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