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Vandiveer

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[54] **CLOSURE MEANS FOR PNEUMATIC CARRIER**

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[52] **U.S. Cl.**.....**243/35,** 243/39

[51] **Int. Cl.**.....**B65g 51/06**

[58] **Field of Search**.....243/32–35, 39; 220/17, 24; 206/3

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[57] **ABSTRACT**

A closure assembly for pneumatic tube carriers that enables quick attachment and release of a liner therein for both closing the carrier and permitting easy withdrawal of the contents thereof.

7 Claims, 8 Drawing Figures

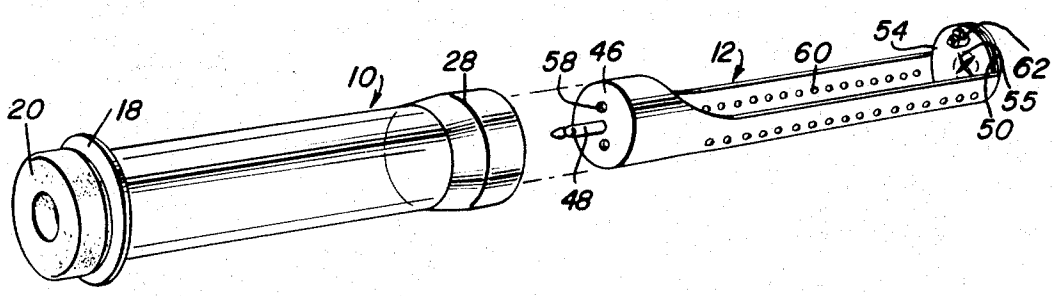


Fig. 1

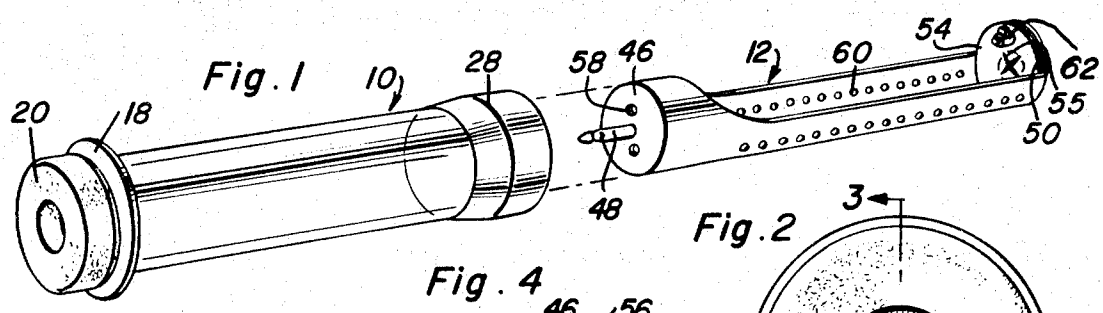


Fig. 2

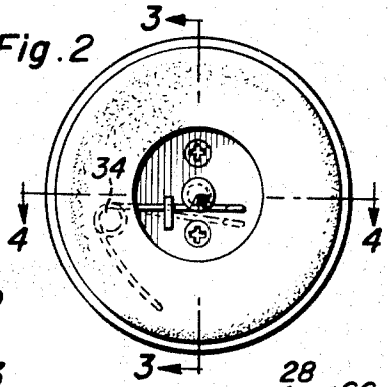


Fig. 4

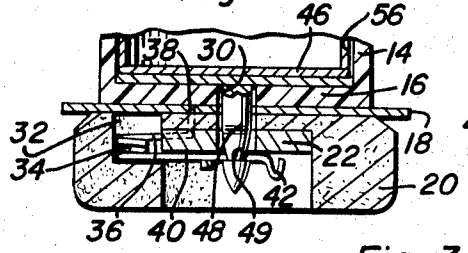


Fig. 3

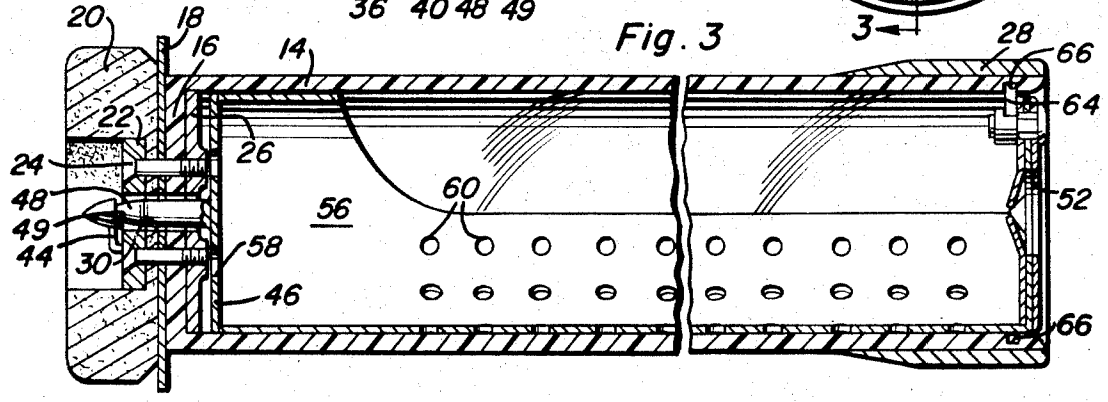


Fig. 5

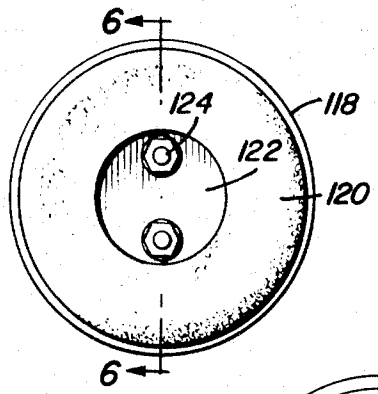


Fig. 6

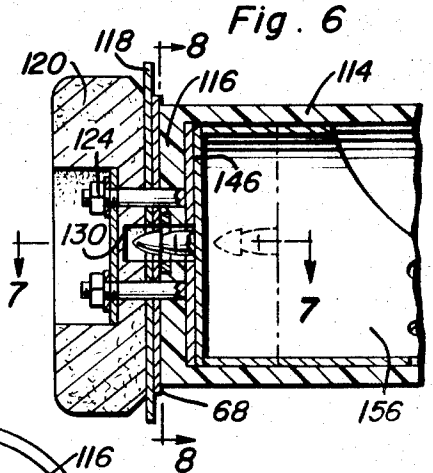


Fig. 7

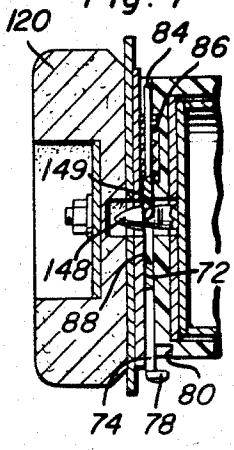
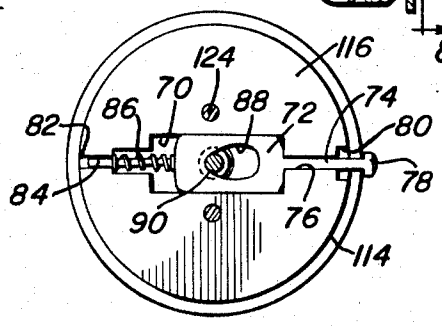


Fig. 8



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CLOSURE MEANS FOR PNEUMATIC CARRIER

With the increased use of pneumatic tube distribution systems in stores, hospitals and other such organizations where rapid transmittal of small parts, money or supplies is necessary, and the subsequent improvements thereof, drawbacks yet remain, particularly with regard to the difficulties associated with the closing of the tube carriers as well as the opening thereof and the withdrawal of the contents thereof. Conventionally, a tube carrier is a cylindrical container with a releasable closure means at one end and appropriate sealing means to produce the vacuum in the tube in which it is carried to propel it therealong. This closure means is usually a snap or buckle-type arrangement which secures a plug in the end of the cylinder. This then requires an unfastening of the snap or other closure means and withdrawal of the plug, after which the contents, particularly if paper or other expandible material, must be fished out from the interior. Obviously, this is an inefficient and time-consuming procedure.

The present invention relates to a device combining the functions of effectively closing a pneumatic tube carrier and at the same time facilitating the removal of the contents of the carrier. The device comprises an article receiving liner with an end cap sufficient to close the end of the carrier when the liner is detachably locked into position within the carrier. This end cap incorporates a liner gripping finger hole or bore for manipulating the liner, while a pin-type fastener projects centrally from a plate at the second end of the liner for quick-release spring-locked retention by the carrier itself to retain the liner within the carrier. With the liner thus forming the closure, the quick release of the liner and the withdrawal of it both opens the carrier and removes the contents therefrom. The liner closure device is easily adapted to existing pneumatic tube carriers as well as for incorporation in new manufacture thereof.

It is therefore an object of this invention to provide a simple but unique manner of closing a pneumatic tube carrier.

It is a further object of this invention to provide a simple but unique device to remove the contents of a pneumatic tube carrier.

It is a still further object of this invention to provide a quick but positive locking and closure means for a pneumatic tube carrier.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is an exploded perspective view of a pneumatic tube carrier and the liner prior to insertion therein.

FIG. 2 is an end view of the fastener end of the liner inserted in the pneumatic tube carrier.

FIG. 3 is a sectional view taken substantially along the line 3—3 of FIG. 2.

FIG. 4 is a sectional view taken substantially along the line 4—4 of FIG. 2.

FIG. 5 is an end view of a carrier incorporating a variation of the liner.

FIG. 6 is a sectional view taken substantially along the line 6—6 of FIG. 5.

FIG. 7 is a sectional view taken substantially along the line 7—7 of FIG. 6.

FIG. 8 is a sectional view taken substantially along the line 8—8 of FIG. 6.

Referring now to the drawings, numeral 10 generally designates a conventional pneumatic tube carrier modified to accept the subject device, and numeral 12 generally designates the subject closure means. The conventional pneumatic tube carrier 10 is readily available and does not form a part of this invention, and it should be understood that any size or configuration pneumatic tube carrier will lend itself to the modifications necessary to utilize the instant device. The pneumatic tube carrier 10 shown herein has the conventional cylindrical body 14 closed at one end 16 and is equipped with an appropriate pneumatic seal 18 that is held in place by a bumper structure 20 positioned by a plate 22 in a recess of the bumper structure 20. Screws 24 are received through openings in the plate 22, the bumper 20, the pneumatic seal 18 and the closed end of the cylinder 16 to be received in appropriate threaded openings in a plate 26 at the bottom of the cylinder. The other end of the pneumatic cylinder has the usual bumper or skid unit 28 attached therearound.

The modifications necessary to the basic tube carrier include a bore 30 extending through the plate 22, the seal 18, the body end 16 and the plate 26 in the bottom of the cylinder. Mounted in a recess 32 in the bumper structure 20 adjacent the bore 30, is a hairpin-type torsion spring 34. The anchor or base leg 36 of the hairpin spring 34 extends through the bumper structure 20 and an upturned end thereof 38 is embedded in the bumper to anchor it therein. The free leg 40 of the spring extends through an opening adjacent the surface of the plate 22 to extend thereacross to the bore 30 to end in a loop 42 thereon which is easily engaged by a person's finger to disengage the lock. A U-shaped limiting bumper 44 is attached over the free leg 40 of the spring between the bore 30 and the inner circumference of the bumper structure 20 to prevent the spring being overextended or pulled free of its mounting. As discussed herein, the modifications necessary to be made to the conventional tube carriers 10 are comparatively simple in nature and easy to accomplish.

The locking tray or liner assembly 12 has a circular end plate 46 with a projecting headed, pin-type rigid fastener 48 attached at the center thereof, and a similar circular rear end cap 50 with an enlarged circular bore 52 therethrough. The outer end or head of fastener 48 is tapered and generally bullet-shaped in configuration for camming engagement with the free leg 40 of spring 34. A peripheral recess or groove 49 is provided in the fastener 48 inward of the head to receive the spring to lock the fastener in place. The inner surface of the rear end cap 50 has a covering of resilient rubberized canvas or other such resilient material with two crossed diagonal cuts 55 forming flexible normally closed flaps aligned with the bore 52, whose function will be disclosed hereinafter. The caps 46 and 50 are configured and sized to fit snugly within the pneumatic tube carrier 10. The caps are connected by a partial cylindrical section 56 extending therebetween. The cylindrical section 56 completely surrounds and encloses the cap 46 at the front end thereof, and changes to a semi-cylindrical section at the rear cap thereof. There are perforations 58 in the cap 46 and perforations 60 in the cylindrical section 56 to prevent the formation of pressure upon insertion of the device 12 and vacuum behind the cap 46 upon removal thereof. The length of

the partial cylindrical section **56** is such that when the front circular plate **46** engages the plate **26** in the pneumatic tube carrier the rear cylindrical end cap **50** will be substantially coplanar with the open end of the tube carrier. As can be readily seen from the structure disclosed herein, the liner **12** can have the contents desired to be transported first inserted in the tray thereof, and the liner **12** then inserted into the tube carrier **10.** By firmly inserting the liner **12** into the carrier the headed pin-type fastener **48** will extend through the bore **30** at the end of the tube carrier and the free leg **40** of the spring **34** will engage in the groove **49** in the fastener **48** as illustrated in FIGS. **2–4.** No rotational alignment is necessary due to the central location of the fastener **48** and bore **30.** Further when engaged, the fastener **48** cannot be accidently released. The user will then insert his finger into the bore **52** and into gripped engagement by the cutout flaps to enable him to exert a slight outward pull on the liner, thereby checking to see that the fastener **48** has been firmly engaged. The loaded tube carrier is then ready to be sent to whatever destination desirable in the vacuum tube system. When arriving at the destination, the person receiving the tube carrier will insert his finger into the **52** bore and into gripped engagement by the cutouts so as to enable him to exert an outward pull on the liner while releasing the free leg **40** of the spring, thereby withdrawing the tray and the contents therein from the tube carrier. As can be seen from this description, the operation of the pneumatic tube system is not changed, but the insertion of the contents into the tube carrier and securing it therein is greatly simplified and speeded up.

Oftentimes valuable items such as jewelry or money, or narcotics are shipped in pneumatic tube systems, such as the device set forth herein is intended for. In such applications, it would be desirable if the tube carrier could be safeguarded against pilferage or tampering. The device as set forth herein lends itself to such security measures. A simple tumbler lock **62** can be mounted adjacent the circumference of the rear end cap **50,** so that the locking tongue **64** thereof could be turned into a position to engage a groove **66** cut into the inner circumference of the tube body **14.** With such an arrangement only qualified personnel at selected stations on the pneumatic system would have keys to unlock the tube carriers. With such a locking device available for use in pneumatic tube carriers, they would be appropriate for even broader applications where security is mandatory.

The modification of the device shown in FIGS. **5** through **8** uses the same tray or liner structure as the device of FIGS. **1** through **4,** but incorporates a different type latching mechanism. Where components are substantially alike **100** is added to the reference numeral. The modification set forth herein has a metal disk **68** mounted between the base **116** of the cylindrical tube carrier and the pneumatic sealing assembly **118.** The bore **130** of the modification extends from the interior of the cylindrical body **114** through the plate **126,** the metal disk **68,** the pneumatic sealing assembly **118** and part way into the bumper structure **120.** The diameter of the bore **130** is of a size to receive the headed, pin-type fastener **148** attached to the end cap **146** of the liner. A rectangular recess **70** is cut into the outside surface of the base **116** to open against the metal disk **68.** A substantially rectangular plate **72** has a width to be received in the opening **70** and has a length shorter than the opening **70** to permit sliding therealong. A shaft **74** is attached to one end of the plate **72** and extends outwardly through an opening **76** in the base **116** to extend beyond the periphery thereof. The shaft **74** has a knob **78** or other convenient abutment to facilitate the pushing thereon to move the rectangular plate **72** along the opening **70.** A recess **80** is cut into the outside circumference of the base **116** concentric with the opening **76** to accommodate the head **78** to ensure that sufficient movement thereof can be accomplished. Diametrically opposite the opening **76** is a similar opening **82** which receives a shaft **84** attached to the other end of the plate **72.** A coil spring **86** is mounted on the shaft **84** between the end of the rectangular opening **70** and the plate **72.** Thus the plate is biased into a position to the right as shown in FIG. **8.** This extends the shaft **74** and knob **78** thereon outside the circumference of the base **116.** At this point it should be noted that the abutment or knob **78** does not extend beyond the circumference of the bumper structure **120** as shown in FIG. **7,** thus avoiding inadvertent release by contact with the tubes of the vacuum system. Cut into the plate **72** is a pear-shaped opening **88** whose one end has a diameter substantially the same as the reduced diameter of the groove **149** of the fastener. Thus when the plate **72** is biased into its at rest position as shown in FIG. **8,** the circumference **90** at the small end of opening **88** aligns with bore **130** and will engage the groove **149** of the headed pin-type fastener to hold it therein. When it is desired to release the liner, the knob **78** is pushed moving the plate **72** to align the enlarged portion of the cutout **88** with bore **130** which will release the fastener **148** therefrom. The tray or liner structure used with this variation is substantially the same as the tray of the first modification herein, with the only change being a shorter length fastener required herein. Similarly, the locking device **62,** if required by the installation, can be utilized with this modification as well. The use of the modification disclosed herein is substantially the same as the first modification. The person desiring to send an article will deposit it in the tray **112** and insert the tray or liner into the tube carrier where the headed, pin-type fastener **148** will force the plate **72** against the coil spring and the reduced circumference end of the opening **88** will engage the groove **149** in the fastener **148** regardless of the rotational orientation of the liner relative to the carrier, thereby securing the liner in the carrier. The tube carrier and liner will then be sent through the system to wherever desired. The person receiving the tube carrier will then simply depress the knob **78,** thereby releasing the fastener from the plate **72** and enabling a removal of the liner by a slight pull exerted on the gripped finger engaged with the other end of the liner.

The tray and fastener device as disclosed herein is simple in structure and lends itself to fabrication from any one of numerous materials. It is obvious that the liner could be readily molded in one piece from plastic, nylon or metal. Similarly, the basic parts thereof could be cut from sheet metal and assembled theretogether. The device disclosed herein has been adapted to a circular cross-section pneumatic system, but it is obvious that the system is readily adaptable to any cross-section pneumatic system. Also, the liner locking device can be made in any size to accommodate any conventional pneumatic tube system.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to.

What is claimed as new is as follows:

1. For use in a pneumatic tube system, an elongated hollow carrier, said carrier being open at one end thereof and having a closed second end, an article receiving liner slidably insertable into and removable from said carrier, said liner having an inner end and an outer end, fastening means having cooperating components on said liner and said carrier for effecting a releasable securing of said liner within said carrier upon a longitudinal sliding of said liner into said carrier and a positioning of the inner end of said liner juxtaposed the second end of said carrier, said fastening means including a spring loaded retainer on said second end of the carrier and pin-like projecting member means arranged on the inner end of said liner and extending in the elongated direction of the carrier for a selective snap locking of the retainer to the member, and manipulating means comprising a finger receiving hole surrounded by resiliently flexible flaps which engage and grip an inserted finger so as to releasably secure the liner to the finger.

2. The invention of claim 1 wherein said retainer and said member are centrally located and engageable regardless of the rotational position of the liner within the carrier.

3. The invention of claim 1 wherein said retainer is slidably releasable from said member.

4. The invention of claim 1 wherein said member includes a peripheral recess thereabout, said retainer engaging within said recess.

5. The invention of claim 1, wherein said spring loaded retainer includes a plate provided with a pear-shaped opening with one end having a diameter substantially the same as a mating portion of said member, and a spring normally biasing said plate toward engagement with said member.

6. For use in a pneumatic tube system, an elongated hollow carrier, said carrier being open at one end thereof and having a closed second end, an articles receiving liner slidably insertable into and removable from said carrier, said liner having an inner end and an outer end, fastening means having cooperating components on said liner and said carrier for effecting a releasable securing of said liner within said carrier upon a longitudinal sliding of said liner into said carrier and a positioning of the inner end of said liner juxtaposed the second end of said carrier, said fastening means including a spring loaded retainer on said second end of the carrier and pin-like projecting member means arranged on the inner end of said liner and extending in the elongated direction of the carrier for a selective snap locking of the retainer to the member, liner gripping and manipulating means at the outer end of the liner, said gripping and manipulating means being within the confines of said liner, said gripping and manipulating means comprising a finger receiving hole surrounded by resiliently flexible flaps which engage and grip an inserted finger so as to releasably secure the liner to the finger.

7. For use in a pneumatic tube system, a hollow carrier open at a one end thereof and closed at the other end, an article receiving liner clidably insertable into and removable from said carrier through the open end, said liner having an inner end, fastening means having cooperating components on the liner inner end and the carrier closed end for effecting a releasable securing of said liner within said carrier upon an insertion of said liner into said carrier, said liner having an outer end positionable in general alignment with the open end of the carrier upon an insertion of the liner into the carrier, said liner gripping and manipulating means separate from the fastening means and arranged on the outer end portion of the liner for selectively withdrawing same from said carrier, said gripping and manipulating means comprising a finger receiving hole surrounded by resiliently flexible flaps which engage and grip an inserted finger so as to releasably secure the liner to the finger.

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