

- [54] **PNEUMATIC TUBE CARRIER CLOSURE CONSTRUCTION**
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- [73] Assignee: **Diebold Incorporated, Canton, Ohio**
- [22] Filed: **Dec. 10, 1971**
- [21] Appl. No.: **206,676**
- [52] U.S. Cl. **243/35, 220/38**
- [51] Int. Cl. **B65g 51/06**
- [58] Field of Search..... **243/38, 41, 33;**
220/38, 41

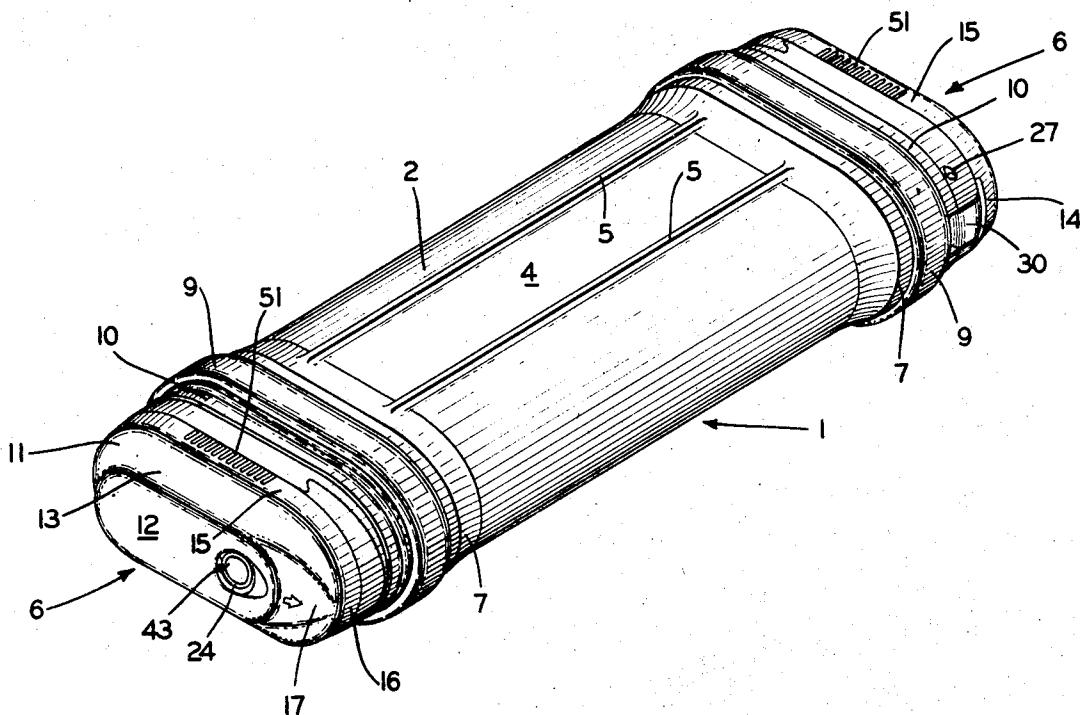
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[57] **ABSTRACT**
 A closure construction for an open end of an elongated

tubular material-conveying pneumatic tube system carrier, generally oval in cross-section, and particularly adapted for conveying all kinds of objects, articles or materials. A spring loaded carrier head forms the closure and is slidably mounted for linear movement on a hinge member which is pivotally mounted on the carrier body. The head and body have latch components which are interengaged when the head is in closed position. The head is biased slidably toward and is held in a position unengageable with the body latch component when the latch components are disengaged, visually indicating that the closure is unlatched, and structurally preventing the carrier with an unlatched head from being inserted into a pneumatic tube. The unlatched head may be pivotally moved to an open position fully exposing the full open end of the body for access to the compartment formed by the body. The head in unlatched or full open position interferes with carrier insertion into a pneumatic tube system. The head in latched position is unaffected by forces, which may be centrifugal in nature, to which the carrier is subjected during movement through a pneumatic tube system. The closure may include lock means for locking the head in latched position.

1 Claim, 13 Drawing Figures



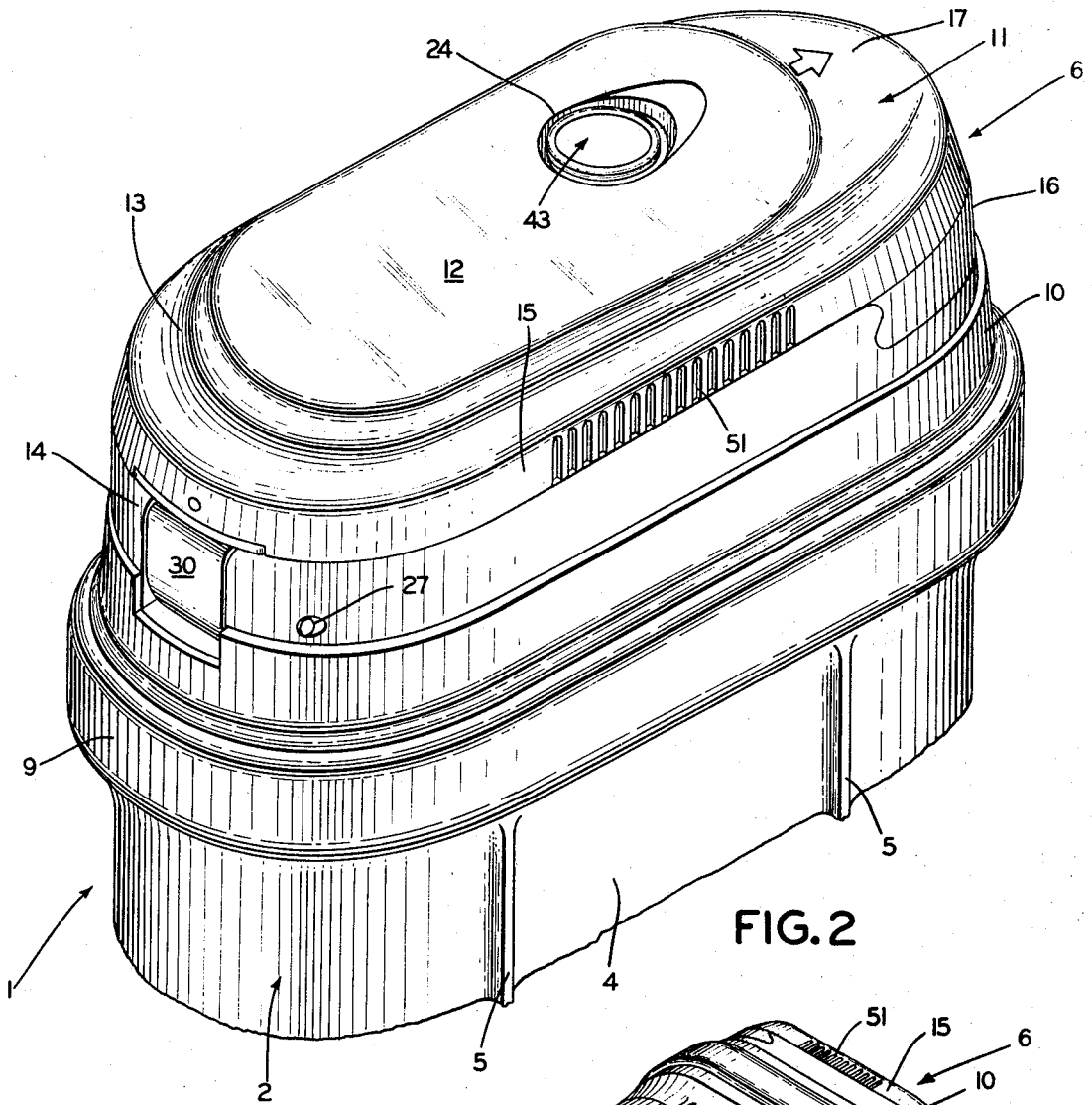


FIG. 2

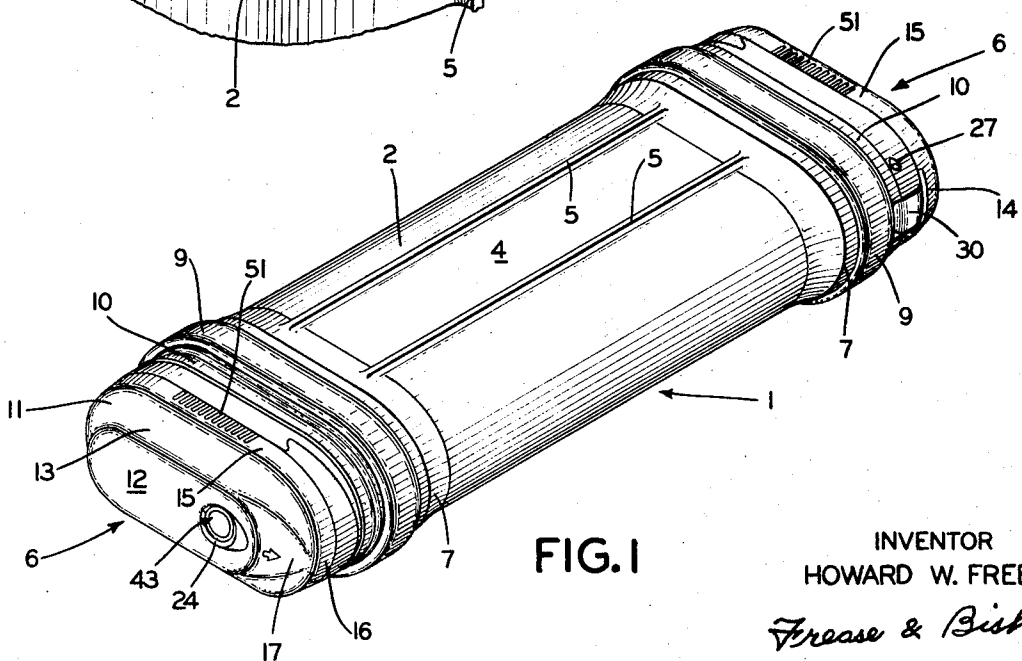
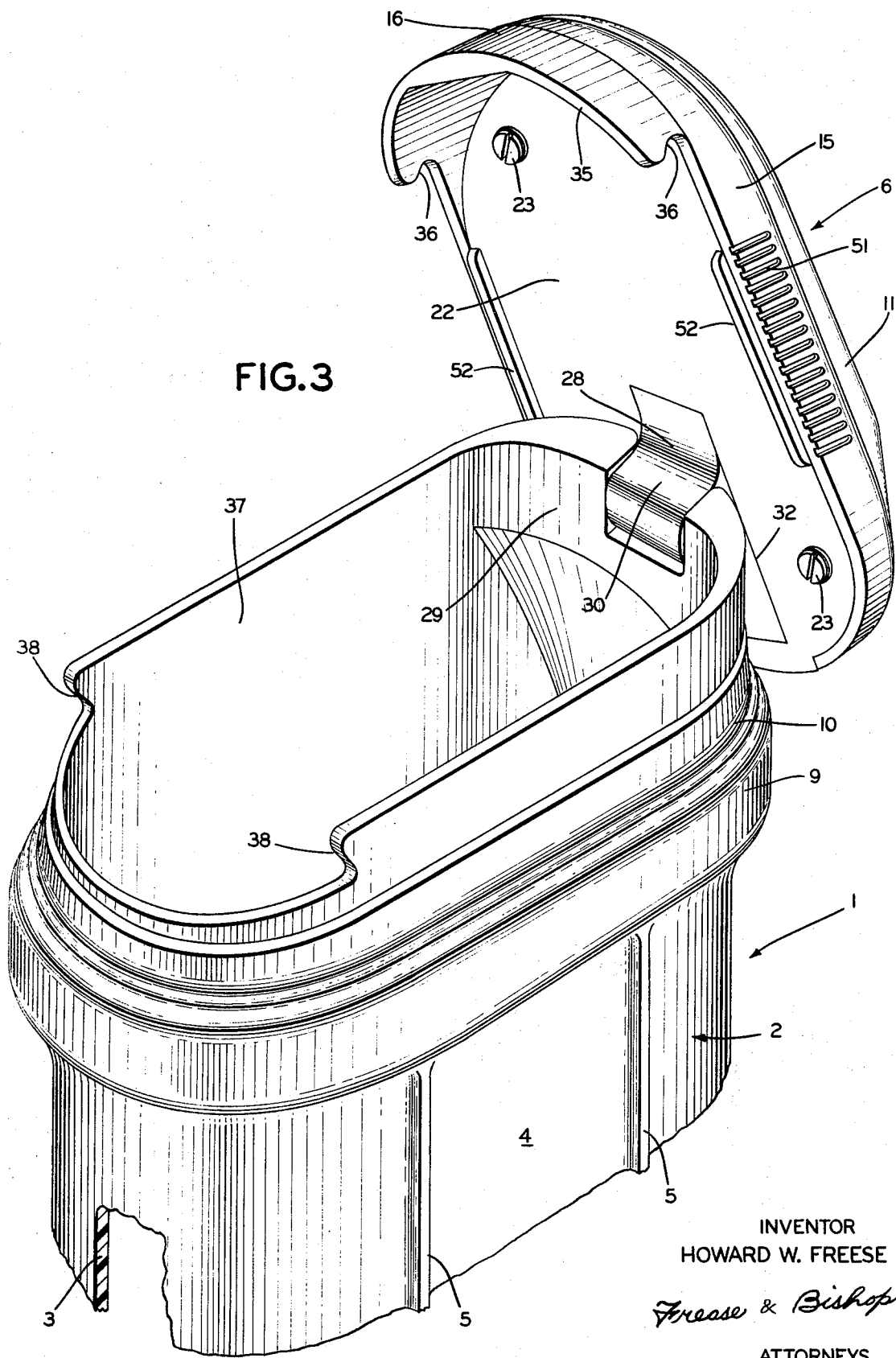


FIG. 1

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FIG. 3



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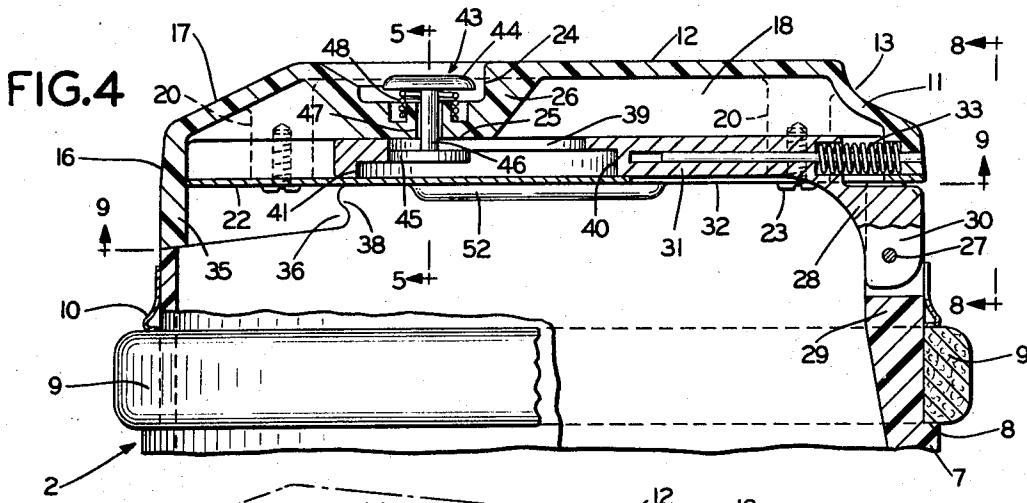


FIG. 4

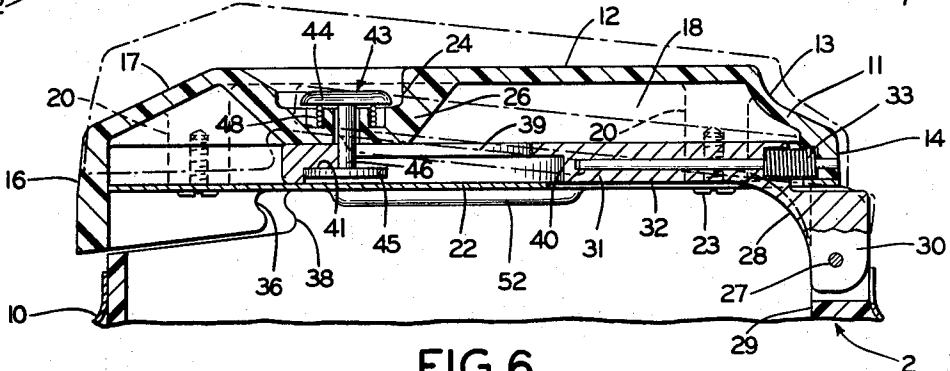


FIG. 6

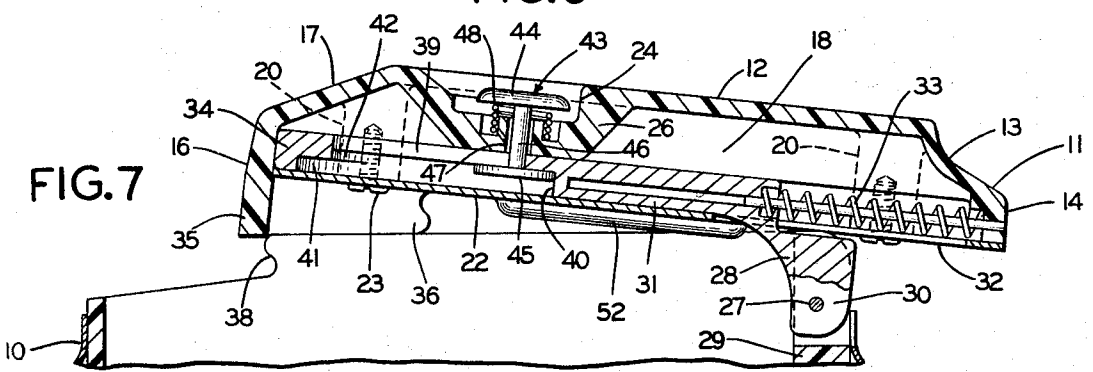


FIG. 7

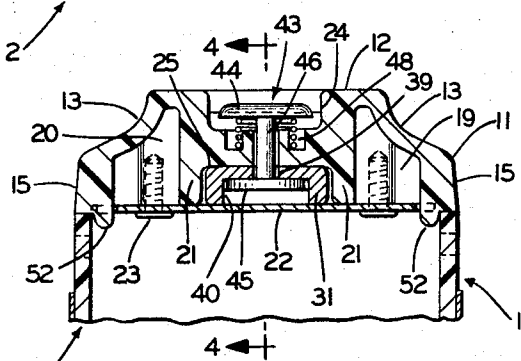


FIG. 5

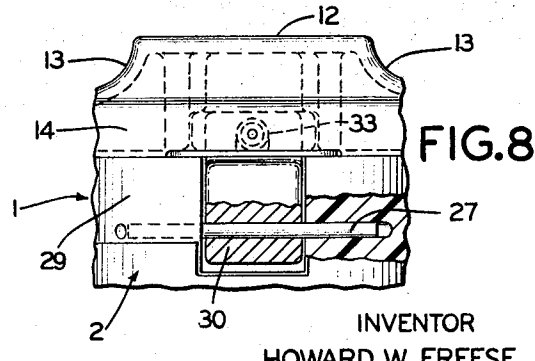
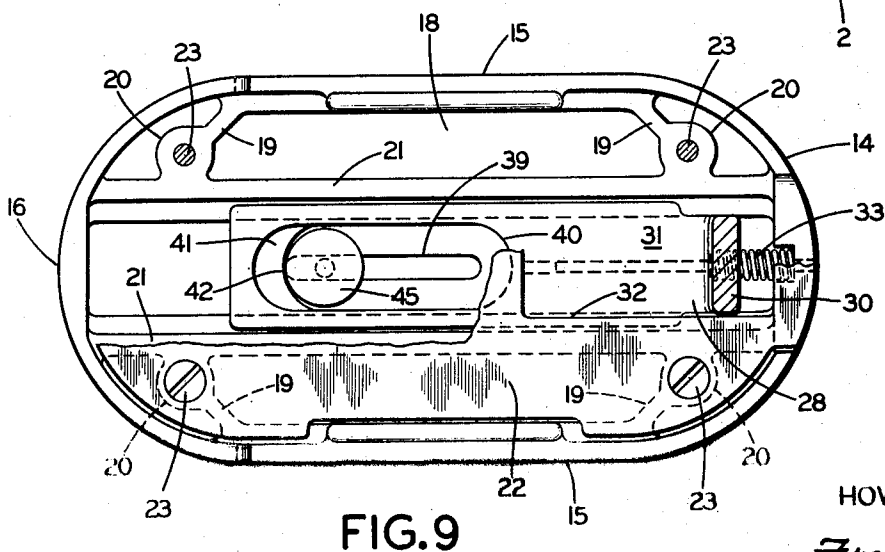
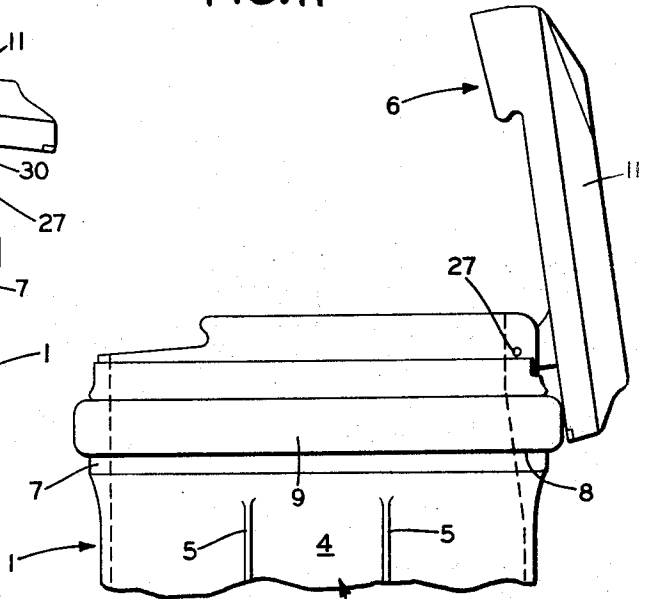
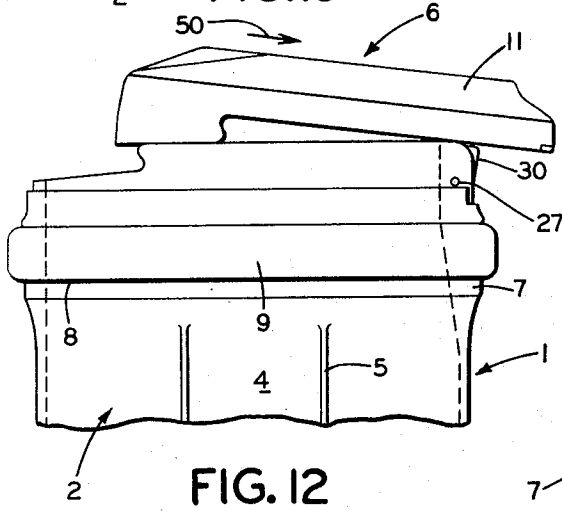
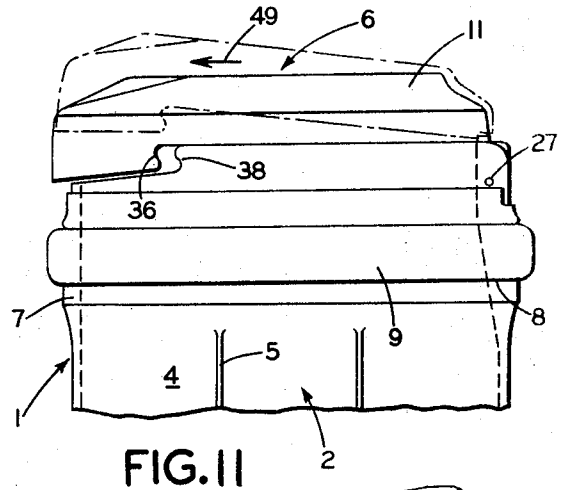
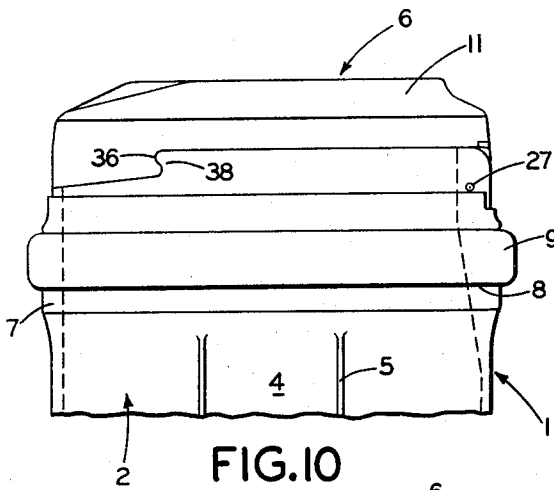


FIG. 8

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PNEUMATIC TUBE CARRIER CLOSURE CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a carrier for conveying objects or materials through a pneumatic tube system. The carrier body is hollow or tubular and has at least one open end for access into its interior. The open end normally is covered by a closure member readily movable between fully open and fully closed positions. The closure member should be held immovably and securely in closed position. The interior of the carrier should be capable of quick and accessible loading and unloading when the closure member is in open position.

More particularly the invention relates to an elongated carrier body having an oval cross-section with substantial internal capacity for materials handling. For example such a carrier commonly is identified as a 4 × 7 carrier having at least one open end with an oval opening 4 × 7 inches. The compartment in the carrier body and the size of the open end must be as large as possible, and the open end should not be restricted by the construction and mounting of the closure member.

Such carriers usually are non-captive carriers and are removed from or introduced into a pneumatic tube system by an individual who may be unacquainted with or may not pay attention to the necessity of being sure that the carrier closure is properly closed and latched before placing the carrier into the tube system.

The invention thus more particularly relates to a construction which renders it extremely difficult, if not impossible, by structural interference between carrier and tube elements, to introduce the carrier into the tube system if the carrier is unlatched or open.

2. Description of the Prior Art

Many closure arrangements for pneumatic tube system carrier access openings have been used. Prior carrier closure mounting and latching mechanisms have been subject to injury, wear and malfunctioning in use. For example, prior carrier closure latch mechanisms have become unlatched in traveling at high speed through pneumatic tubes due to the action of forces, primarily centrifugal forces, affecting the carrier components.

In other instances, a user, unacquainted with the necessity of being certain that the carrier closure is latched, has introduced a carrier with an unlatched closure into a tube system.

In either instance, the carrier can become jammed at a relatively unaccessible location in the tube system. Such jamming may require the system to be shut down and great difficulties may be encountered in removing the jammed carrier and reestablishing pneumatic tube system operation.

SUMMARY OF THE INVENTION

Objectives of the invention include providing a pneumatic tube system carrier, primarily of the 4 × 7 type, with a closure or head for its open end that may be moved readily between open and closed positions; which has a positive latch means that only can be unlatched by relative movement in one direction between the carrier head and body; which when unlatched is biased by relative movement between the head and body in the other direction to a position preventing latching;

which when unlatched permits pivotal movement of the head to a position fully exposing the entire open end of the body; which when in either unlatched or fully open position, provides interference between relatively projecting portions of the head and body to prevent insertion of the carrier in a pneumatic tube; which provides a visual indication of the unlatched condition of the head; which includes a closure construction and latch components unaffected by centrifugal forces as the carrier moves through a pneumatic tube system; which enables convenient loading and unloading of the carrier; and which eliminates difficulties heretofore encountered, achieves the stated objectives simply, effectively and inexpensively, and solves existing problems and satisfies existing needs in the art.

These objectives and advantages are obtained by the pneumatic tube system closure construction for a carrier access opening, the general nature of which may be stated as including a generally tubular preferably transparent, plastic material, oval cross-section carrier body having two ends at least one end of which is open; closure means for said open end including a head, a hinge member on which the head is slidably mounted for lineal movement in a direction along the long axis of the oval shape at the open end of the body; means pivotally mounting the hinge member on the upper end of the body; the head and the body walls at the open end having complementary latch formations interengaged when the head is in closed position; spring means biasing the head slidably in one direction to latch-engaged position; the head being slidable on the hinge member in the opposite direction to disengage the latch formations; the head when said latch formations are disengaged being pivotal on the pivotal mounting and slidable in said one direction to a biased disengaged position in which the head projects laterally of the open end of the carrier body; the head being pivotal on the pivotal mounting to a full open position exposing the full opening at the open carrier end; and the head when in disengaged or full open positions interfering with the insertion of the carrier into a pneumatic tube.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention — illustrative of the best mode in which applicant has contemplated applying the principles — is set forth in the following description and shown in the drawings, and is particularly and distinctly pointed out and set forth in the appended claims.

FIG. 1 is a perspective view of a carrier provided with the improved closure construction;

FIG. 2 is a perspective view on a larger scale of one end of the carrier shown in FIG. 1, with the carrier head or closure member in latched position, looking generally toward the hinged end of the head;

FIG. 3 is a perspective view similar to FIG. 2 but looking toward the latch end of the head and carrier body latch components, with the head in unlatched and partially open position;

FIG. 4 is a fragmentary section taken axially through the long axis of the generally oval shape of the upper end of the carrier body and head, looking in the direction of the arrows 4—4, FIG. 5;

FIG. 5 is a fragmentary sectional view taken on the line 5—5, FIG. 4;

FIG. 6 is a view similar to FIG. 4 but showing the head in full lines moved to a position to disengage the latch components of the head and body;

FIG. 7 is a view similar to FIGS. 4 and 6 but showing the head in the normally biased unlatched position, prior to being pivoted to open position;

FIG. 8 is a side view, with parts broken away and in section, looking in the direction of the arrows 8—8, FIG. 4;

FIG. 9 is a bottom plan — sectional view of the head, taken on the line 9—9, FIG. 4 looking upward at the underside of the head with parts broken away and removed;

FIG. 10 is a somewhat diagrammatic view of one end of a carrier with the improved closure head in latched position;

FIG. 11 is a view similar to FIG. 10 showing the head in full lines moved linearly in one direction to disengage the latch components of the head and body, and showing in dot-dash lines the head at the beginning of upward pivoted movement from latch disengaged position;

FIG. 12 is a view similar to FIGS. 10 and 11 showing the head biased to normal unlatched position after the latch components have been disengaged; and

FIG. 13 is a view similar to FIGS. 10, 11 and 12 illustrating the head pivotally moved to fully open position.

Similar numerals refer to similar parts throughout the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The improved pneumatic tube system carrier 1 has a carrier body generally indicated at 2 which is generally tubular in shape, and elongated, and is generally oval in cross-section. The body 2 may be formed of transparent plastic material having relatively thin walls, as indicated at 3 in FIG. 3 and in the sectional views of FIGS. 4, 5, 6 and 7. The flat sides 4 of the walls of body 2 preferably may be reinforced by wear ribs 5 formed integrally of the walls. Both ends of the body 2 may be open and provided with the improved closure means, or if desired only one end may be open with a closure therefor. In the carrier 1 illustrated, both ends are provided with the improved closure means generally indicated at 6.

The wall of body 2 may be annularly thickened at 7 adjacent each end to form a shoulder 8 against which a usual felt wear and sealing or accelerator ring 9 is seated. The wear rings 9 may be held assembled by retaining rings 10 secured in any suitable manner to the body 2. The wear and seal rings 9 perform the usual function of sealing of the carrier in a pneumatic tube as the carrier is propelled through the tube system by differential air pressure.

Each closure 6 has a head or cover member 11 which preferably may be formed or molded of plastic material. The head 11 preferably has a flat top wall 12, generally oval in configuration, with preferably concave rounded corners 13 at the rounded hinge end 14 and along the straight sides 15 of the head 11. The rounded latch end 16 of head 11 preferably is formed with a tapered corner wall portion 17 joining top wall 12 and rounded side wall 16.

The rounded hinge and latch ends 14 and 16 and the straight sides 15 of head 11 are formed as a continuous down-turned flange extending from the corner walls 13

and 17 as best shown in FIGS. 3, 4 and 5. This flange forms a recessed cavity 18 in the head beneath its flat top wall 12. A number of reinforcing ribs 19, bosses 20 and slide forming ribs 21 (FIG. 9) project downward from the head wall 12 into the cavity 18. The slide ribs 21 are spaced laterally of the head, are parallel, and extend axially of the oval.

A cover plate 22 preferably is secured by screws 23 to the bosses 20 to enclose the cavity 18. A push button recess 24 is formed in head top wall 12 adjacent the latch end 16 of head 11. The undersurface 25 of the depressed portion 26 of top wall 12 which forms recess 24 is spaced above the cover plate 22.

The head 11 is pivotally mounted on the upper thickened wall portion 29 of body 2 by hinge pin 27 and L-shaped hinge member 28. The hinge pin is located at the hinge end of the open end of carrier 1 (FIGS. 3 and 4). Hinge member 28 has a short hinge leg 30 and an elongated slide leg 31. The slide leg 31 is slidably mounted within the cavity 18 of head 11 laterally between slide ribs 21 (FIG. 5) and above cover plate 22 and below the undersurface 25 of push button recess 24.

Cover plate 22 has a notch 32 (FIG. 3) through which the hinge leg 30 of hinge member 28 projects downward from the head cavity 18. A spring 33 is retained within the cavity 18 and reacts between the pivoted end of hinge plate slide leg 31 and the hinge end 14 of head 11 (FIGS. 4, 6 and 7). Spring 33 normally biases head 11 linearly in the direction of hinge pin 30 to an unlatched position shown in FIGS. 7 and 12. In this position, the outer end 34 of slide leg 31 abuts the inner surface of the rounded latch end flange 16 of head 11 (FIGS. 3 and 7).

A rod 53 extends through spring 33 (FIGS. 4, 6 and 7) with one end 54 fixed to member 14. The opposite end 55 of rod 53 is slidably located in an opening 56 formed in slide leg 31. Rod 53 prevents spring 33 from bowing outwards when compressed during closing of head 11, thus maintaining the full spring pressure between head 11 and slide leg 31.

The rounded latch end flange 16 of head 11 extends downward from top wall 12 further than flange portions 14 and 15, as indicated at 35 to form an extended latch flange connected by hook latch portions 36 with the side flanges 15 of head 11. The upper ends of the carrier body walls which define the upper open end 37 of the carrier have a shape complementary to the continuous side flange portions 14, 15, 16, 35 and 36 of the head 11 (FIGS. 3 and 4). Thus the body walls 2 at the upper open end 37 of the carrier 1 have hook latch portions 38 which interengage (FIG. 4) the head latch portions 36 when the head 11 is in closed position. The head 11 is held in such interengaged latched closed position by the action of the spring 33.

The slide leg 31 of hinge member 28 has a narrow slot 39 formed therein at its top surface extending longitudinally of the slide leg 31 intermediate its ends. A wider and longer lock slot 40 also is formed in the bottom surface of slide leg 31 below and communicating with slot 39. Slots 39 and 40 are centered in both directions with respect to one another. Slot 40 has a depth equal to about 1/3 of the thickness of the slide leg 31 at its outer end remote from the hinged end of member 28, as indicated at 41 (FIG. 7). Slot 39 similarly has a depth from the top surface of leg 31 equal to about one-third the thickness of slide leg 31, best shown in

FIGS. 4, 5, 6 and 7. At the left hand end (FIG. 7) of slide leg 31 the upper portion of slot 40 below slot 39 terminates short of the outer end 41 of slot 40 at a zone coinciding with the left hand end of slot 39 as indicated at 42 in FIGS. 7 and 9. The ends of slots 39 and 40 and of the portion 42 of slot 40 are semi-circular, as shown in FIG. 9.

A push button generally indicated at 43, having an actuating head 44, a control head 45 and a connecting spindle 46, is mounted on head 11 with its actuating head 44 located within the recess 24 and its control head extending into and movable in end slot 40 and slot portion 42. The push button spindle 46 extends through an opening 47 in the depressed wall 26 of head 11, and spindle 46 also extends through narrow slide leg slot 39.

Push button 43 is normally biased upward by spring 48. Thus push button control head 45 normally is movable in the deeper or right hand portion of slot 40 between the right hand end thereof as shown in FIG. 7, and the intermediate or stop portion 42 thereof as shown in FIGS. 4 and 9. When push button 43 is biased to its normal lock position shown in FIGS. 4 and 9, the control head 45 of push button 43 prevents carrier head 11 from being moved relative to slide leg 31 of hinge member 28 to the left to disengage the latch formations 36-38 on the head 11 and body 2. Thus push button 43 holds carrier head 11 locked in latched position as shown in FIG. 4.

When it is desired to open head 11, push button 43 must be depressed to the position shown in FIG. 6 from the position of FIG. 4. This movement depresses the control head 45 of push button 43 so that it can move into the shallower right hand end 41 of slot 40 permitting the head 11 to be moved to the left as shown in FIG. 6 so as to disengage latch formations 36 and 38 as illustrated in full lines in FIG. 6.

When the latch formations 36 and 38 are disengaged, the head 11 may be pivoted upward on hinge pin 27 and hinge member 28 to the position shown in dot-dash lines in FIG. 6. Thereupon, as the operator releases a grasp of head 11, spring 33 will move the head 11 to the position shown in FIG. 7 from that shown in dot-dash lines in FIG. 6. This position is termed herein as the "normal unlatched position."

The limit of relative movement of head 11 by spring 33 on hinge member 28 at the normal unlatched position is controlled by the rounded latch end flange 16 of head 11 engaging the outer end of slide leg 31, as shown in FIG. 7, and by spindle 46 engaging the right hand rounded end of narrow slot 39.

The various positions of the improved carrier construction are illustrated somewhat diagrammatically in FIGS. 10 through 13. FIG. 10 illustrates the head 11 in latched or closed position. FIG. 11 illustrates the head 11 moved in the direction of the arrow 49 to the left to disengage the latch formations 36 and 38 from the latched position of FIG. 10 to the disengaged-unlatched position of FIG. 11. When the head 11 is in the disengaged-unlatched position shown in full lines in FIG. 11, it may be pivoted clockwise on pivot pin 27 to the dot-dash position shown in FIG. 11; whereupon if head 11 is released from the grasp of the operator or user, it will move automatically in the direction of the arrow 50 (FIG. 12) to the normal unlatched position illustrated in FIG. 12. The directions of movement of the head 11 indicated by the arrow 49 to disengage the

latch formations and by the arrow 50 for movement of the head 11 to normal unlatched position, are in opposite directions, generally axially of the long axis of the oval shape.

The head 11 may be pivoted from normal unlatched position of FIG. 12, clockwise on hinge pin 27 to the fully open position of FIG. 13. This fully open position also is illustrated in FIG. 3 wherein the upper open end of the carrier 1 is fully exposed and accessible to place articles in or remove them from the cavity in the carrier body 2.

The head 11 may be grasped readily by one hand of a user who may be holding body 2 in the other hand. To facilitate grasping of the head, the depending head flange may be serrated or formed with a series of grooves or indentations 51 (FIGS. 1, 2 and 3) to avoid finger slippage as the head is moved from latch-engaged to latch-disengaged position, or when the head is moved from open position to closed and latched position.

The locking mechanism including the push button 43 and its control head 45 have been illustrated and described as a lock for the latched head 11. However, it is not necessary for proper functioning of the latch mechanism to include a lock, and the lock push button 43 may be omitted if desired.

A pair of ribs 52 are illustrated particularly in FIGS. 3, 4 and 5 extending downward from the inside of the bottom edges of the head straight side flange portions 15. These ribs 52, as illustrated in FIG. 5, guide and center the head 11 as it is being moved to and latched in closed position, so that the flanges 15 and 16 and latch formations 36 on the head 11 match the complementary portions 37 and 38 at the upper open end of the carrier body 2 in the closed position illustrated in FIGS. 1, 2, 4 and 10.

The right hand or hinge end of head 11 overhangs or projects from the right hand edge of the body 2 when the head 11 is in normal unlatched or full open positions illustrated in FIGS. 12 and 13. This overhang provides a visual indication to the user that the closure is not in closed position. Further the overhang provides mechanical interference which prevents the user placing an open carrier into a pneumatic tube.

This is one of the important aspects of the invention since even if the user of the carrier may not be aware of the necessity for having the closure for the carrier closed and locked before depositing it in a tube system, and such user tries to make such a tube entry, the entry of the unclosed carrier will be prevented or rejected by the interference of the overhang.

Another important aspect of the invention is the simplicity of the closure mounting, hinge, and control mechanism, with relatively few rugged and sturdy parts which resist damage during rough use thereof.

A still further aspect of the invention is the ability to open the carrier closure to a position fully exposing the open end of the carrier for convenient access to its interior while still incorporating the other advantageous features in the carrier construction and operation.

Although the carrier illustrated is equipped with locking mechanism to lock the carrier closure in latched position, as indicated, this lock may be omitted if desired since the latch mechanism functions just as well without the related lock.

The improved carrier closure construction is very simple, sturdy and shock and fatigue resistant; it pro-

vides an effective and reliable end closure for a pneumatic tube system carrier particularly of the oval type which may be positively latched in closed position and which visually shows when it is unlatched and provides mechanical interference when unlatched to entry of the carrier into a pneumatic system; it is simple and convenient to load, unload, latch and unlatch by the most inexperienced person; and it provides a structure eliminating difficulties that have been encountered in the art, and achieving the stated objectives and solving existing problems in the art.

In the foregoing description, certain terms have been used for brevity, clearness, and understanding; but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art because such terms are used for descriptive purposes and are intended to be broadly construed.

Moreover the description and illustration of the invention is by way of example, and the scope of the invention is not limited to the exact details shown or described.

Having now described the features, discoveries, and principles of the invention, the manner in which the improved carrier closure construction is constructed and used, the characteristics of the new construction, and the advantageous, new and useful results obtained; the new and useful structures, devices, elements, arrangements, parts, and combinations are set forth in the appended claims.

I claim:

1. Closure construction for a pneumatic tube carrier

including a generally tubular carrier body wall having two ends at least one of which is open; closure means for said open end including a head, a hinge member, means pivotally mounting the hinge member on the upper end of the body, and means slidably mounting the head for lineal movement on the hinge member; the head and body walls at the open end having complementary latch formations engageable and disengageable on relative lineal movement of the head and hinge member between latched-closed and unlatched positions; spring means biasing the head slidably on the hinge member in one direction to latched-closed position; the head being slidable on the hinge member in the opposite direction to unlatched position; the hinge member and head when in unlatched position being pivotal on said pivotal mounting to a fully open position fully exposing the open end of the carrier; releasable lock means on the head, holding said head locked in latched-closed position; the lock means including a push button mounted on the head having an actuating head accessible exteriorly of the carrier head, and a control head engageable with slot means formed in the hinge member provided with an offset stop shoulder; the push button being biased normally to hold the control head engaged with the stop shoulder when the carrier head is in latched-closed position preventing unlatching of the carrier head; and the push button when actuated disengaging the control head from the stop shoulder permitting movement of the carrier head from latched-closed to unlatched position.

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