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Packaging

This invention relates to improvements to packaging, more particularly, but not exclusively for, electronic components such as electronic connectors.

Electronic devices are generally made of several components assembled together. Such components are usually manufactured at different locations from where they are assembled, and transporting the components between locations can present difficulties. Furthermore, components used in the manufacture of electronic devices are often delicate, and it is essential to keep them generally free from dirt and dust. It is also necessary to avoid bending any connecting pins present on the components.

The use of packaging tubes has been proposed as a solution to the problems of transporting electronic components. Packaging tubes allow electronic components, such as electronic connectors, to be packed to a high density. The tube protects the electronic components from dirt and dust, and from mechanical damage during transport. The tube is filled with the components and one or two removable stoppers are inserted into the open end of the tube to prevent the components from falling out. The two stopper design is preferred since it requires less material and is thus cheaper. The opposed end of the tube includes immovable stoppers formed by punched in sections of the tube. The removable stopper(s) have to be removed before the packaging tube is loaded into an assembly machine, the tube guiding the components into the machine in the manner of a magazine. Great care has to be taken in removing the stopper(s), however, as once removed, support of the electronic components is lost. This is particularly so with the stopper design since once the first stopper has been

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removed, support for one side of the components is lost allowing shifting of the components in the tube before the second stopper can be removed. Since the electronic components are no longer prevented from shifting within the tube, jamming can occur. Productivity is thus decreased by the time spent in unjamming the tubes.

It is therefore an object of the invention to provide packaging which alleviates the above difficulties.

According to this invention there is provided packaging comprising a container fillable with items to be packaged through a first opening, at least one second opening being formed in the container proximate the first opening; and a stopper formed of elastic material, the stopper being deformable for insertion through the second opening to form an obstruction in the container.

In a preferred embodiment of the invention, the container comprises an elongate hollow tube, which has a groove or slot for receiving complementary slots or grooves in the components to be stored, and a third opening formed in a face of the container opposite the second opening for supporting the inserted stopper and holding the stopper in position. Further, the stopper is preferably formed of elastomeric material in an elongate shape. The stopper includes at least one enlarged section spaced from the ends and a means for engagement with the second opening. The engagement means may comprise at least one notch, the side of which is formed from a leg extending from the end of the stopper, and which receives an edge of the opening when the stopper is inserted. In another embodiment of the invention two third openings are included,



spaced one from the other, for receiving the inserted stopper.

The invention also extends to an elastic stopper for use with the abovementioned packaging.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an embodiment of a packaging tube of the invention.

Figures 2a, 2b and 2c show a plan view, a side view and end view respectively of a stopper for use in the embodiment of Figure 1.

Figure 3 shows a plan view of the stopper of Figure 2 bent into a U-shape.

Figure 4 shows the manner of insertion of the stopper of Figure 3 into a slot of the packaging tube of Figure 1.

Figure 5 is a sectional view along line A-A of Figure 1, showing the stopper in place.

Figure 6 is a sectional view similar to Figure 5, showing a modification of the embodiment of the packaging tube.

Figure 7 is a sectional view similar to Figure 5, showing the method of removal of the stopper.

A packaging container in the form of a hollow tube being an embodiment of the invention will now be described with reference to the figures. As shown in Figure 1, the packaging tube 1 is an elongated hollow tube having a generally rectangular cross

section. The packaging tube 1 has openings formed at both ends 15 and 16. The electrical components 2 to be packed are inserted into the tube from end 16, and are prevented from falling out from end 15 by punched in sections 11 of the tube. The packaging tube 1 has longitudinal grooves 14, which match corresponding notches 21 on the electrical components 2. The grooves 14 and notches 21 guide the electronic components as they move within the tube, and help prevent slipping and jamming when the components are packed and unpacked. The packaging tube 1 also has a generally rectangular transverse opening or slot 12 situated adjacent to end 16 of the tube. One or more transverse openings or slots 13 are situated on the opposed side of the tube 1 to slot 12. Slots 13 are of similar width to, but are generally shorter than slot 12.

A stopper of the desired embodiment will now be described with reference to Figures 2 and 3. Stopper 3 is an elastic member of generally elongated shape, and is formed with engagement means at each end. Each engagement means comprises a leg 32, a notch 31 formed adjacent to the leg 32 and an enlarged section 33 being thicker than the middle of the stopper 3, formed adjacent to the notch 31. The width W of the stopper 3 is slightly smaller than the width W of the slots 12 and 13. Stopper 3 is formed from elastomeric material, although other semi-rigid materials of an appropriate elasticity may be used.

During the packaging process, electrical connectors 2 are inserted into end 16 of the packaging tube 1. When a sufficient number of electrical connectors has been packed, the packaging tube is sealed by the stopper 3. The stopper 3 is bent into the U-shape shown in Figure 3, by the application of force generally indicated by the arrows F

in Figure 2 (for example, by squeezing the ends of the stopper with the fingers). The resulting U-shaped stopper is inserted into slot 12 of packaging tube 1, as indicated by arrow I in Figure 4, until legs 32 rest on the outer surface of the tube 1. When the stopper 3 is released, the U-shaped stopper 3 will extend causing the notches 31 of the stopper 3 to move towards the edges 121 of the slot 12, as shown in Figure 5.

Complete engagement of the notches 31 with edges 121 is then obtained by adjusting the position of the notches 31. The stopper 3 is therefore prevented from slipping out of slot 12. When engaged, slot 13 receives the bottom of the U-shaped stopper 3 as shown in Figure 5. The electronic components, being packed tightly into the packaging tube, are prevented from falling out of the end 16 of the tube by the presence of the stopper 3. The presence of the enlarged sections 33 on stopper 3 increases the rigidity of the stopper 3, particularly of the notches 31.

Figure 6 shows an alternative embodiment of the packaging tube in which the single slot 13 described earlier is divided into two portions 13' separated by a rib 15. The presence of two portions 13' is preferred when the slot 13 is wide so that extension of a part of the stopper through slot 13 and outside the packaging tube is prevented, this avoiding the possibility of the stopper accidentally popping out by contact of the protruding part with an external object such as another tube. The two slot portions also provide for more secure retention of the stopper in the tube to prevent the stopper from being dislodged.

Figure 7 shows how the stopper is removed from the packaging tube. Application of opposing forces along the general direction of the arrows R shown

causes deformation of the stopper 3, and disengagement of the notches 31 from the edges 121 of the slot 12. The stopper 3 can now be pulled away from the slot 12.

Alternatively, application of a single force along the direction of one of the arrows R causes disengagement of one notch 31 from one edge 121 of the slot 12, and the stopper can similarly be pulled away from the slot 12.

In practice, the operator of the assembly machine can use his or her fingers to remove the stopper from the packaging tube with a single action, using either method described. Productivity is increased compared to packaging tubes of the prior art because the removal of the stopper is simple and rapid. As the obstruction provided by the stopper is removed in one go, shifting and jamming of the electrical components within the packaging tube is prevented. As the stopper is inserted and removed from the side of the tube, as opposed to the end, the packaging tube can therefore be inserted into an assembly machine prior to the removal of the stopper, further reducing the risk of jamming in comparison with the prior art.

It should be understood that the form of the invention described here is to be taken as a preferred example and that various changes and modifications may be made without departing from the scope of the invention. Other stoppers formed of elastic material of a suitable size and shape may also be used. One example is a stopper already moulded into a U- or W-shape. Another example is a slab of elastic material, which can be inserted through the slot and into the tube in the manner of a bung. In fact, any stopper which is deformable by pressure so as to be insertable through an opening into the container and which provides a sufficient cross sectional area to obstruct the components being stored therein, can be used.



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Claims

1. Packaging comprising a container fillable with items to be packaged through a first opening, at least one second opening being formed in the container proximate the first opening; and a stopper formed of elastic material, the stopper being deformable for insertion through the second opening to form an obstruction in the container.
2. Packaging as claimed in Claim 1, in which the container comprises an elongate hollow tube.
3. Packaging as claimed in any preceding claim, in which the container has a groove or slot for receiving complementary slots or grooves in the components to be stored.
4. Packaging as claimed in any preceding claim, in which the stopper is formed of elastomeric material.
5. Packaging as claimed in any preceding claim, wherein the stopper includes means for engagement with the second opening.
6. Packaging as claimed in claim 5, in which the engagement means comprises at least one notch for receiving an edge of the second opening when in engagement therewith.
7. Packaging as claimed in claim 6, in which the engagement means further comprises a leg extending from an end of the stopper and forming a side of the notch.
8. Packaging as claimed in any preceding claim wherein the stopper is elongate.
9. Packaging as claimed in claim 8, in which the stopper includes at least one enlarged section spaced from an end thereof.

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10. Packaging as claimed in any preceding claim, which has at least one third opening formed in a face of the container opposite the second opening for receiving the inserted stopper.
11. Packaging as claimed in claim 10, having two third openings spaced one from the other.
12. An elastic stopper for use with packaging as claimed in any of the preceding claims.

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