

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 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 two stopper design since once the first stopper has been 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 the 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, the stopper including means for engagement with the second opening comprising at least one notch for receiving an edge of the second opening when in engagement therewith, a leg forming a side of the notch and an arm portion extending from the leg, the arm portion being engageable with the container adjacent to the second opening.

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 two third openings 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. The arm portion preferably engages an aperture in the container.

The invention also extends to an elastic stopper for use with the above-mentioned 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.

Figure 2 is a side view of a stopper for use in the embodiment of Figure 1.

Figure 3 is a cross-sectional view of the tube of Figure 1 showing the stopper of Figure 2 inserted.

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. Two 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. The tube 1 also has two parallel slots 46, one at each end of the slot 12.

A stopper of the described embodiment will now be described with reference to Figure 2. 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. An arm portion 42 extends from leg 32. The arm portion 42 is formed at approximately right angles to leg 32 and the arm portions at each end of the stopper 3 point towards each other. A protrusion 48 is provided on each arm portion 42 adjacent the connection of the arm portion 42 to leg 32. The stopper 3 is of a constant width 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 by squeezing the ends of the stopper with the fingers, for example. The resulting U-shaped stopper is inserted into slot 12 of packaging tube 1, as indicated by arrow I in Figure 3, 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 edges 121 of the slot 12. Complete engagement of the notches 31 with edges 121 is then obtained by adjusting the position of the notches 31.

The arm portions 42 are then inserted into respective slots 46. This arrangement has the advantage of helping to hold the stopper 3 in place in the tube 1 and helps to prevent the stopper from being dislodged during transportation by contact with an external object such as another tube. As shown in Figure 3, when engaged, slots 13 receive portions of the stopper 3 thus causing the stopper to adopt a 'W' shape in the tube 1. This configuration prevents the stopper from extending outside the packaging tube to any great degree thus avoiding the possibility of the stopper accidentally popping out by contact of the protruding part with an external object such as another tube. The configuration also provides for more secure retention of the stopper in the tube.

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.

The stopper 3 is removed from the packaging tube 1 by application of force to

the ends of the stopper, by engaging protrusions 48, removing arm portions 42 from slots 46 and notches 31 from edges 121, the stopper being pulled from the tube once these formations have been disengaged.

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 with the fingers using the protrusions 48 to gain a better purchase on the stopper. 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 reduced. As the stopper is inserted and removed from the side of the tube, as opposed to the end, the packaging tube can 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 herein 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. For example, the stopper may also engage only a single opening 13 in a 'U' shape and may be pre-moulded into a U- or W-shape.



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, the stopper including means for engagement with the second opening comprising at least one notch for receiving an edge of the second opening when in engagement therewith, a leg forming a side of the notch and an arm portion extending from the leg, the arm portion being engagable with the container adjacent to the second opening.
2. Packaging as claimed in claim 1, wherein the arm portion engages an aperture formed in the container.
3. Packaging as claimed in Claim 1 or Claim 2, in which the container comprises an elongate hollow tube.
4. 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.
5. Packaging as claimed in any preceding claim, in which the stopper is formed of elastomeric material.



6. **Packaging as claimed in any preceding claim wherein the stopper is elongate.**
7. **Packaging as claimed in claim 6, in which the stopper includes at least one enlarged section spaced from an end thereof.**
8. **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.**
9. **Packaging as claimed in claim 8, having two third openings spaced one from the other.**
10. **Packaging as claimed in any one of the preceding claims wherein a protrusion extends from the arm portion adjacent the connection of the arm portion to the leg.**
11. **An elastic stopper for use with packaging as claimed in any of the preceding claims.**