

SPECIFICATION

Package for a stack of rectangular plate-shaped parts

5 The invention relates to a package for containing a stack of rectangular plate-shaped parts, such as electronic components, comprising a tube having four internal walls each extending the length of the
10 tube and which are arranged as two pairs of opposed parallel walls, the four walls lying in four planes which intersect one another at right angles to bound a space whose cross-section corresponds to the shape of the parts to be contained in the
15 package, and the package further comprising end caps for closing the ends of the tube. The rectangular plate-shaped parts may be square or oblong.

It is known to construct tubular packages for a large number of small parts so that the packages can be further used as magazines which can be placed, either individually or as an array of magazines which consists of a large number of separate magazines, in a machine which processes the parts, the parts stacked in each package being successively and
25 separately removed from the package.

Rectangular parts stacked in the packages impose problems in that they can tilt and subsequently jam during their travel through the package, because the interior space of the package in which the parts are
30 situated must provide a given clearance for easy insertion and subsequent easy sliding of the parts in the package.

An object of the invention is to provide a package for a stack of rectangular plate-shaped parts which
35 can also be arranged as a magazine in a machine for the further processing of the parts and whose interior space for accommodating the parts is constructed so that on the one hand the parts can be readily introduced into the package, in which they
40 are accurately stored and guided, whilst on the other hand they can move therein without tilting and jamming.

According to the invention there is provided a package for containing a stack of rectangular plate-shaped parts, such as electronic components, comprising a tube having four internal walls each extending the length of the tube and which are arranged as two pairs of opposed parallel walls, the four walls lying in four planes which intersect one
50 another at right angles to bound a space whose cross-section corresponds to the shape of the parts to be contained in the package, and the package further comprising end caps for closing the ends of the tube, wherein the tube is formed internally with a
55 cavity between every two adjacent internal walls of the tube, each cavity extending the length of the tube and having a uniform cross-section throughout this length.

The tilting of rectangular plate-shaped parts during travel along a space having a rectangular cross-section starts at the corners of the space. The provision of cavities at these corners mitigates the tendency of the parts to tilt.

In a preferred embodiment of the invention each
65 cavity is bounded by a part-cylindrical wall whose

longitudinal axis extends in the longitudinal direction of the tube.

In an embodiment of the invention which is very suitable for use as a magazine in a processing
70 machine, for which purpose it should be possible to arrange the magazine quickly with a predetermined orientation, the tube has first and second external walls lying in parallel first and second planes, third and fourth external walls lying in parallel third and
75 fourth planes which intersect the first and second planes at right angles, and a fifth external wall which extends between one of the first and second walls and one of the third and fourth walls and which lies in a fifth plane which is inclined to the first, second,
80 third and fourth planes, each of said five external walls extending the length of the tube. The fifth wall, which may be formed by an external bevel on the package, serves as a reference face for the positioning of the package and the parts contained therein.

On an external wall of the tube there may be provided a strip code and a mark which can be read forwards and backwards by the machine and which make the top and the bottom of the stack of parts accommodated in the package identifiable from the
90 outside.

The advantages achieved by means of the invention consist in that not only a package for a large number of rectangular parts is obtained but also a magazine for use in a machine for the further
95 processing of these parts, which machine allows smooth processing at a high production speed and the necessary fast transport of the parts in the magazine because tilting and jamming of parts in the interior of the magazine is avoided. The positioning
100 of a number of these magazines in a processing machine with the aid of the reference face on the outside of the package, and the provision of a strip code and a mark on an external wall of the package which can be read forwards and backwards by the
105 machine are further advantages, because positioning errors of the magazines in the machine and hence of the parts on elements on which they are to be further processed can be precluded with certainty.

In order to permit the positioning of a number of packages, each of which contains a stack of parts of a different type or different dimensions, in any desired pattern with respect to each other, the individual tubes may have the same outside dimensions and preferably a square external cross-section, whilst the dimensions of their interior spaces may differ to suit the dimensions of the parts contained therein.

Embodiments in accordance with the invention and their operation will be described in detail
120 hereinafter with reference to the accompanying diagrammatic drawings, in which

Figures 1a to 1c are plan views of packages having interior spaces of different cross-sectional shapes,

Figure 2 is a perspective view of a package in accordance with the invention,

Figure 3 is a perspective, partly sectional view of a package in accordance with the invention, and

Figure 4 is a plan view of a package which is externally bevelled at one corner.

Each of the Figures 1a, 1b and 1c is a plan view of a

tubular package 1 comprising an interior space 5 in which rectangular plate-shaped parts 3 are accommodated. This interior space 5 of the tubular package 1 is bounded mainly by two pairs of opposed parallel internal walls 6 of the package, the walls 6 extending the length of the package and lying in planes which intersect one another at right angles to give the interior space 5 a cross-section which corresponds to but is slightly larger than the outer circumference of the plate-shaped parts 3 to be packed therein, thus ensuring that these parts can readily slide in the package.

In order to prevent the parts 3 from jamming at their corners 7 as they slide in the interior space 5, a cavity 9 is provided inside the package between every two adjacent walls 6 of the interior space 5 to impart a given freedom of movement to the corners 7 of the stacked parts 3. Each cavity extends the length of the package and has a uniform cross-section throughout this length. In the embodiment shown, the cavities have a part-circular cross-section. The parts 3 are thus guided only by the walls 6 of the interior space 5 of the package 1.

Figure 2 is a perspective view of the package 1, but without any plate-shaped parts in the interior space 5.

Figure 3 shows the package 1 provided with a strip code 13 on an external wall 11 of the package, which code can be read forwards and backwards by a machine, and with a mark 15. The machine-readable strip code 13 provides information concerning the contents of the package, such as type indications, number of parts etc.; the mark 15 indicates the direction in which the parts 3 should be removed from the package 1 or the stacking of the parts 3 in the package 1 as regards their top and bottom. The open ends of the package are closed by insertable caps 17.

Two hundred rectangular plate-shaped electronic components 3, dimensioned $3.2 \times 1.6 \times 1$ mm, were stacked in the interior space 5 of a package of the construction shown in Figure 3. The transverse dimensions of the space 5 amount to 3.3×1.7 mm; the dimensions of the external cross-section of the package 1 amounted to 4.5×4.5 mm.

The package should be made of a comparatively rigid material in order to ensure that the parts stacked therein are suitably guided when the package is used as a magazine. Thermoplastic synthetic materials such as polystyrene or polyamide are particularly suitable for this purpose.

Figure 4 is a plan view of a package 1 having a square external cross-section except for a bevel 2 which is provided at one external corner of the package. The bevel 2 extends the length of the package and serves, if necessary, to ensure a given position of the package when the package is arranged in the processing machine, for example, in a holder containing several packages. This may be of importance, for example, when the package parts 3 are electrically polarized parts, for example, diodes and transistors comprising contact faces 18 and 19. It should then be ensured that the package containing the polarized parts is arranged in the processing machine so that the polarized parts are mounted

with the correct polarity, for example, on a printed circuit. This is achieved by bevelling one corner 2 of the package at an angle of, for example, 45° . In a bevelled package having the dimensions given above, the length of each of the sides 10 of the imaginary right-angled equilateral triangle of which the hypotenuse is formed by the bevel 2 amount to 1 mm and the width of each of the two external walls of the package which adjoin the bevel was 3.5 mm. the width of each of the other two external walls being 4.5 mm. The bevel 2 may be regarded as constituting a fifth external wall of the package.

When several bevelled packages 1 are to be combined in a holder 4, the holder 4 should comprise a cavity 16 for each separate bevelled package 1, said cavity having one filled corner 8 to mate with the bevel 2 of the package 1. It is thus ensured that pole reversal due to incorrect positioning of the packages 1 used as magazines is precluded. Preferably, all packages have the same external dimensions although their internal dimensions may be different.

CLAIMS

1. A package for containing a stack of rectangular plate-shaped parts, such as electronic components, comprising a tube having four internal walls each extending the length of the tube and which are arranged as two pairs of opposed parallel walls, the four walls lying in four planes which intersect one another at right angles to bound a space whose cross-section corresponds to the shape of the parts to be contained in the package, and the package further comprising end caps for closing the ends of the tube, wherein the tube is formed internally with a cavity between every two adjacent internal walls of the tube, each cavity extending the length of the tube and having a uniform cross-section throughout this length.

2. A package as claimed in Claim 1, wherein each cavity is bounded by a part-cylindrical wall whose longitudinal axis extends in the longitudinal direction of the tube.

3. A package as claimed in Claim 1 or 2, wherein the tube has a square external cross-section.

4. A package as claimed in Claim 1 or 2, wherein the tube has first and second external walls lying in parallel first and second planes, third and fourth external walls lying in parallel third and fourth planes which intersect the first and second planes at right angles, and a fifth external wall which extends between one of the first and second walls and one of the third and fourth walls and which lies in a fifth plane which is inclined to the first, second, third and fourth planes, each of said five external walls extending the length of the tube.

5. A package as claimed in any of the preceding claims, wherein a strip code is provided on an external wall of the tube.

6. A package substantially as herein described with reference to any one of the accompanying drawings.



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