

PATENT SPECIFICATION (11)

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(54) MULTIPACKAGING DEVICES

(71) We, ILLINOIS TOOL WORKS INC., a corporation organized under the laws of the State of Delaware, United States of America, of 8501 West Higgins Road, Chicago, Illinois 60631, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Plastics-material strips of integrally interconnected bands have been used in the prior art to form packages of selected numbers of containers, and various machines and methods have been developed for application of the strips to groups or rows of containers with the bands of the strips encircling the containers. In the prior art there are many more plastics-material multipackaging devices or carriers than there are applying machine developments or designs for applying the carriers to containers. Thus, while the configuration of a particular prior art carrier device may be meritorious, more often than not it has added little to the art or science of multipackaging because of the absence in the art of a method and machine for applying such a carrier device. Those skilled in this art will understand that the multipackaging devices or carriers that have made the greatest contribution to the art have been those carrier designs which have been the impetus for successful applying machine and packaging system developments. A series of such carrier designs began with the original developments of a Mr. Ougljesa Jules Poupitch, see our British Patent No. 914 202. Mr. Poupitch's developments were assigned to us, and various engineers in our employ have continued his work. That series of carrier designs led to the successful development of two basic types of now commercially successful applying machines, one which is described in British Patent No. 1 145 672 and the other being described in British Patents No. 974 619 and No. 998 736. The present commercial models of those carriers and ma-

chines which are being used on a worldwide basis, primarily for the multipackaging of cans into six-packs, represent the present state of the subject art. In those machines, a plurality of pins or jaw elements positively control the stretching and application of each band of the carrier to the individual containers.

Against the foregoing background, the subject invention represents a unique advance in the art. That advance is unique because the invention is a radical departure from known carrier designs wherein the bands must be substantially individually stretched and applied to the containers. Because of the configuration of devices according to the present invention, stretching forces need only be applied transversely outwardly in the vicinity of the side marginal edges of the devices.

This invention concerns apertured carrier strip stock for machine application to at least three rows of containers wherein said strip stock is stretched transversely within the opposed longitudinal side margins of said stock for application to said containers.

According to the present invention, a carrier strip stock is formed from a resiliently deformable sheet of a plastics material, and comprises at least three contiguous longitudinal rows of transversely and longitudinally integrally interconnected, flat, container-encircling bands, said bands being elongated in a direction longitudinally of said stock and being configured and integrally interconnected to provide that upon transverse stretching of said strip stock within the portions of said bands at the opposed longitudinal side margins of said strip all of said rows of bands are stretched to define apertures all of the same size and shape.

There is at least one intermediate band between each transversely disposed pair of side bands. That is to say, there may be three bands in all, or there may be more than one intermediate band between a pair of side bands.

The accompanying drawings illustrate the invention. In these drawings:—

Figure 1 is an isometric view of a container package made with one embodiment of the present invention;

Figure 2 is a plan view of a section of a strip constructed according to the invention in an embodiment for making packages of twelve containers;

Figure 3 is a plan view of another embodiment of the invention showing a strip from which packages, such as the package of Figure 1, may be made;

Figure 4 is a top plan view of a package made with one of the devices of the strip of Figure 2;

Figure 5 is a side elevational view of a portion of an applying machine for stretching and applying one embodiment of the invention to containers, and particularly showing the strip of Figure 2; and

Figure 6 is a view of a portion of a machine such as shown in Figure 5, but viewed substantially from beneath the stretching and applying mechanism to show the general configuration of the strip of Figure 3 substantially at the position of application.

The strip sections shown in the drawings (10 in Figure 2 and 11 in Figure 3) are both for multipackaging three rows of adjacent containers. Further, the disclosed containers are substantially cylindrical containers (cans 12 of Figure 1, cans 13 of Figure 4). It is believed that, upon an understanding of the two embodiments shown and described, those skilled in the art will understand how to make strips according to the invention for application to more than three rows of containers. It will be further understood that while Figures 1 and 4 show packages where a single carrier device has been applied to the upper end portions of the containers, such devices may be applied about some other portion of the containers such, for example, as the lower end portions of the containers. An understanding of the invention will further teach one skilled in the art how to make a strip according to the invention for other than circular containers, and that the handle elements or finger gripping means shown at 14 in Figures 2 and 4 and at 15 in Figures 1 and 3 may be formed within the strip at other than the locations shown, or completely omitted if unnecessary for any particular multipackaging arrangement.

All embodiments of the invention are intended to be made of a resiliently deformable sheet of a plastics material, such, for example, as low density polyethylene. Such a plastics material is relatively low in cost and has suitable properties of resiliency, elasticity and deformability. The thickness of the plastics material may be varied depending upon the actual size of the containers to be multipackaged and the weight

or loads which the device must handle or absorb in use. One well-known common use for such devices is, of course, to provide a package which enables a consumer to buy and carry home a plurality of containers of a packaged product. In some other uses, the packages formed may not be intended for transport by a person carrying the same, but may form part of a shipping and distribution system for large numbers of containers. Thus, the thickness of the plastics material may vary over a wide range. However, for a well-known consumer "6-pack", a plastics-material having a thickness of about 18 mils or less is suitable.

In the embodiments shown in the drawings, the strips 10 and 11 are formed to have a series of integrally interconnected bands 16 along one side marginal edge portion thereof and what amounts to a mirror image series of integrally interconnected bands 17 along the other side of the strip. Each of the bands 16 and 17 is substantially elongated longitudinally of the strip and the inner periphery of each band is circumferentially continuous. The outer periphery of each band 16 and 17 may be generally described as approximating parallelism with the inner periphery thereof. The outer peripheries of adjacent bands 16 are integrally interconnected by webs 18, and in a comparable manner the bands 17 are integrally interconnected by webs 20.

In further detail, see Figure 2, each band 16 may be described as having an outer band portion 16a, an inner band portion 16b, and end portions 16c and 16d. The band portions 16a and 16b are substantially straight segments longitudinally of the strip with the band portion 16a being longer than the band portion 16b. The end portions 16c and 16d are curved band portions which interconnect the ends of the band portions 16a and 16b. The various band portions 17a, 17b, 17c and 17d of the bands 17 are respectively substantially mirror images of the band portions 16a, 16b, 16c and 16d.

Each of the strip embodiments 10 and 11 of the invention further comprises intermediate band segments 22 and 23. One band segment 22 and one band segment 23 are formed as an integral intersecting pair of band segments. In the embodiments shown, the angle of intersection is approximately a 90° angle, although the invention contemplates that other angles may be used. Each pair of intersecting band segments 22 and 23 is integrally formed in the strip so that its intersection 24 straddles a transverse line through the webs 18 and 20 on opposite sides of the strip. One end of each band segment 23 is integrally connected to the band portion 16b of a band 16, and the other end of that band segment 23 is integrally connected to the inner band portion 130

(11) (15) 3

17b of the band 17 which is longitudinally adjacent to the band 17 transversely opposite the band 16 to which the one end of the band segment 23 is connected. In a similar manner, one end of each band segment 22 is connected to the inner band portion 17b of a band 17, and the other end of that band segment 22 is integrally connected to the inner band portion 16b of the band 16 which is longitudinally adjacent to the band 16 which is transversely opposite the band 17 to which the one end of the band segment 22 is connected.

While the band segments 22 and 23 have been described as substantially straight-line band segments, the four corners of each intersection 24 are curvilinear as shown, and the ends of the band segments 22 and 23 merge along curvilinear lines into the bands 16 and 17.

The longitudinally adjacent pairs of intersecting band segments 22 and 23 define intermediate apertures 26. The shape of each aperture 26 in the present disclosure may be described as generally lemon-shaped, and the opposite ends of each aperture 26 in a longitudinal direction lie on transverse lines drawn through the longitudinally disposed ends of the end portions 16c and 17c of the bands 16 and 17 and the ends of the end portions 16d and 17d of the bands 16 and 17. Further, the peripheral margin of each aperture 26 is circumferentially continuous and is of a length substantially equal to the length of the inner peripheral margin of the bands 16 and 17. In one reduction to practice of the invention, the length of the periphery of the apertures 26 measured 6.016 inches (15.281 cm) while the length of the inner peripheral margin of the bands 16 and 17 measured 6.160 inches (15.646 cm). The lengths of the inner peripheral margins of the apertures 26 and the bands 16 and 17 are less than the circumferential dimension of the containers, such as containers 12 and 13, intended to be packaged with either strip 10 or 11.

As described above, the strips 10 and 11 are intended for machine application to containers, and thus the strip sections shown in Figures 2 and 3 merely represent small longitudinal sections of much longer strips which, for example, could include one thousand, or several thousand, or more carrier devices in the strip. Such strips are generally wound upon reels and in that condition delivered to the applying apparatus for machine application to the containers. A suitable machine for applying the strips 10 or 11 of the subject invention is shown and described in our co-pending British Patent Application No. 20591/76 (Serial No. 1543993).

The applying drum of the machine of that application is partially shown in Figures 5 and 6, and those Figures are an attempt to

visually display how the strips 10 and 11 are configured when they are stretched by transversely opposite stretching forces applied within the strip against the portions 16a and 17a respectively, of the bands 16 and 17. It is important to note in the showing of Figures 5 and 6 that the apertures 26 of the intermediate bands are enlarged by the transversely applied stretching forces without a serious distortion of the apertures 26. Comparative tests have been made on sample carrier strips which were made in shapes in accordance with the prior art except that, instead of consisting of only two bands side by side, the strips were made of three or more similar bands side by side. It was found that, when these strips of prior art shape were stretched by opposed transversely directed stretching forces on the side bands, the centre bands and their apertures invariably distorted into shapes unsuitable for projection over containers such as cans. It was often found that the longitudinally disposed ends of the centre bands would stretch into substantially straight lines which would interfere with attempted applications of such carriers to cylindrical containers. In contrast, with the strips 10 and 11, it is important that the curvilinear shapes of the longitudinally disposed ends of the apertures 26 are substantially maintained during the application of transversely opposed stretching forces. Any attempted analysis of why the longitudinally disposed ends of the apertures 26 maintain such excellent curvilinear configurations, with good stretching configurations of the bands 16 and 17, for application to containers such as cans 12 and 13, has led to the belief that the intersection area 24 of each intersecting pair of straight-line band segments 22 and 23 is an isotropic area. In other words, upon application of transversely opposed stretching forces, the intersection areas 24 exhibit a tendency to grow substantially equally in all directions and thus the curvilinear configuration of the ends of the apertures 26 is maintained during such stretching.

For a complete understanding of how the applying drum shown in Figures 5 and 6 operates, reference is made to British Application No. 20591/76 (Serial No. 1543993), mentioned above. A brief description of the drum assembly will be given herein to explain the stretching of the strips 10 and 11 shown in Figures 5 and 6. The drum assembly, which is partially shown in Figure 5, is substantially cylindrical in general configuration, and comprises a hub or spider rotating about a horizontal axis and carrying a plurality of jaw stations 30 circumferentially thereabout. As shown in Figure 5, the jaw stations 30 are rotated in the direction of the arrow 31. Each jaw station 30 comprises a pair of jaws 32. Each jaw 32 com-

prises a pair of radially extending jaw elements 32a and 32b. The jaws 32 are carried on four rods 33, and each jaw 32 is fixed to two of the four rods 33. The rods 33 are appropriately connected to cam rollers 35 so that, as the drum assembly rotates in the direction of the arrow 31, the cam rollers 35 are moved in a direction axially of the drum assembly by the annular cam plates 36 and 37, to move the jaws 32 of each jaw station 30 apart.

As shown in Figure 5, the strip 10 is fed onto the jaw stations 30 rearwardly of the top of the drum assembly, with the jaw elements 32a and 32b of the jaws entering the apertures of the bands 16 and 17. At that application position, the jaws 32 of each jaw station 30 are in their closed position or position of minimum spacing therebetween. As the drum assembly rotates, a strip guide assembly 38, partially shown at the top of Figure 5, folds the portions 16a and 17a of the bands 16 and 17 to be substantially aligned in a direction radially of the drum assembly. As the rotating drum assembly carries the strip 10 from the guide assembly 38, the jaws 32 gradually move apart to transversely stretch the strip 10. When the bands of the strip reach the substantially vertically downward position they are moved into encircling cooperation with the containers, such as the cans 13 shown in Figure 5. The encircling engagement of the carrier bands with the containers 13 may be described as a snap-on action. The three containers 13, shown in Figure 5, represent three adjacent rows of containers 13 which are moving in a direction perpendicular to Figure 5 and into the drawing. The view in Figure 6 is taken from a position below the drum assembly and looking vertically upwardly at the drum assembly. Thus, the jaw stations 30 are moving in the direction of the arrow 40 in Figure 6. In Figure 6 the carrier bands indicated at 16x, 26x and 17x are the bands which would be applied to the containers 13 shown in Figure 5. In viewing Figures 5 and 6 it should be kept in mind that one is viewing elements arranged about a cylinder which have been projected onto a flat sheet. It is believed clear from the showing of Figures 5 and 6 that the carrier strips 10 or 11 are substantially ideally stretched merely by the transversely opposed stretching forces as described, for projected application onto containers, such as cans 12 or 13.

Once the three rows of containers 13 have passed beneath the applying drum, the jaw elements 32a and 32b of the jaws 32 are withdrawn from the side marginal portions of the strip by virtue of the straight-line movement of the three rows of cans and the upwardly rotating movement of the jaws 32 about the drum and away from the straight-

line movement of the cans. The strip 10 or 11 is thus applied in a continuing manner to the three rows of containers. The side margin bands 16, 17 and the intermediate bands 22, 23 have sufficient width and elasticity to produce a general frusto-conical to cylindrical container-gripping configuration in said bands when said bands are stretched and circumferentially applied to the containers.

Thereafter, selective transverse severance of the strip 10 or 11, though webs 18 and 20 and through the intersection areas 24, enables one to produce packages in multiples of three containers. If the strip has no handle means, such as handle means 15 of Figure 1 or 14 of Figure 4, transverse severance may be provided through each of the webs 18 and 20 and the intersection areas 24 to produce 3-packs. Further, if the packages produced are not intended to be carried by a person, but are, for example, to be part of a pallet load of packages, transverse severance might be made after, for example, every twentieth container in each row.

The handle means 15 of Figure 1 and 14 of Figure 4 are provided to enable a person to carry each of the packages shown in Figures 1 and 4. The package of Figure 1 has been made from strip 11 of Figure 3. In that embodiment the handle means 15 provide finger gripping means, and a pair of finger gripping means 15 is provided between every other pair of straight-line segments 22 and 23 longitudinally of the strip. It is obvious from Figure 3 that transverse severance through the webs 18 and 20 and the intersecting areas 24 at the strip positions where the straight-line band segments 22 and 23 are void of finger gripping means 15 will produce packages of six containers, as shown in Figure 1, with a pair of finger gripping means 15 conveniently positioned within the package for gripping thereof by a person's fingers.

The package of twelve containers, shown in Figure 4, is made from the strip of Figure 2 where every fourth pair of straight-line segments 22 and 23 in the strip 10 is provided with the handle elements 14. Thus, transverse severance of the strip 10 through the webs 18 and 20 and the intersecting areas 24 which are two positions longitudinally of the strip 10 from the handle elements 14 will produce the packages of twelve containers, as shown in the top plane view in Figure 4. Again, two handle elements 14 are disposed conveniently substantially at the centre of the package for carrying of the package by those elements. Where packages such as shown in Figure 4 are made with relatively heavy containers 13, such that gripping of the handle elements 14 by a person's fingers is uncomfortable, 130

the invention contemplates that a simple U-shaped bail member (not shown, but generally as described in our British Patent No. 914 202) with hook portions on the ends of the legs thereof may be hooked beneath the handle elements 14 to provide a more comfortable carrying arrangement for such heavy packages by a person.

In making the strips according to the invention, handle elements 14 or finger gripping means 15 must be so formed as to avoid any interference with the stretching of the straight-line band segments 22 and 23 as previously described. Reductions to practice of the strips 10 and 11 have established that, when the finger gripping means 15 or the handle elements 14 are formed as curved strap elements extending between the straight-line band segments 22 and 23 as shown, substantially no interference with the stretching of those straight-line band segments 22 and 23 is produced.

WHAT WE CLAIM IS:—

1. An apertured carrier strip stock for machine application to at least three rows of containers wherein said strip stock is stretched transversely within the opposed longitudinal side margins of said stock for application to said containers, said stock being formed from a resiliently deformable sheet of a plastics material and comprising at least three contiguous longitudinal rows of transversely and longitudinally integrally interconnected, flat, container-encircling bands, said bands being elongated in a direction longitudinally of said stock and being configured and integrally interconnected to provide that upon transverse stretching of said strip stock within the portions of said bands at the opposed longitudinal side margins of said strip all of said rows of bands are stretched to define apertures all of the same size and shape.

2. An apertured carrier strip stock as defined in claim 1, wherein the rows of bands between the bands along the longitudinal side margins of the strip stock comprise a plurality of intersecting and substantially straight-line flat band segments integrally connected between the side margin bands longitudinally of said strip with the longitudinal axis of said strip to define intermediate bands within said strip and in substantially transverse alignment with transverse pairs of said side margin bands.

3. An apertured carrier strip stock as defined in claim 2, wherein said intermediate bands comprise one row of intermediate bands extending longitudinally of said strip between said side margin bands.

4. An apertured carrier strip stock as defined in claim 2, wherein said side margin bands and said intermediate bands have sufficient width and elasticity to produce a

general frusto-conical to cylindrical container-gripping configuration in said bands when said bands are stretched and circumferentially applied to said containers.

5. An apertured carrier strip stock as defined in claim 3, including a pair of strip segments connected to every other intersecting pair of straight-line segments outwardly of the defined intermediate bands, said strip segments being shaped to form opposed finger gripping means for a package produced by transverse severance of said stock between longitudinally adjoining pairs of said transversely aligned pairs of side margin bands and through the intersecting pairs of straight-line segments which are void of a pair of said strip segments.

6. An apertured carrier strip stock as defined in claim 3, including a pair of strip segments connected to every fourth one of the intersecting pairs of straight-line segments outwardly of the defined intermediate bands, said strip segments being shaped to form opposed handle elements for a package produced by transverse severance of said stock between the longitudinally adjoining pairs of transversely aligned pairs of side margin bands and through the intersecting pairs of straight-line segments which are longitudinally midway between said intersecting pairs of straight-line segments having pairs of said strip segments connected thereto.

7. An apertured carrier strip stock as defined in claim 2, wherein the angle between the longitudinal axes of each intersecting pair of straight-line segments is an angle of substantially 90°.

8. An apertured carrier strip stock as defined in claim 2, said bands being elongated in shape with the longitudinal axes of the apertures of said bands aligned substantially longitudinally of said strip.

9. An apertured carrier strip stock as defined in claim 2, the inner periphery of each of said bands being continuous and circumferentially uninterrupted.

10. An apertured carrier strip stock as defined in claim 2, wherein said side margin bands and said bands segments are configured and integrally interconnected to produce a substantially circular pattern of expansion of the intermediate bands in response to transverse stretching of said strip stock within the transversely opposed longitudinal side marginal portions of the side margin bands.

11. Carrier stock substantially as described with reference to Figure 2 or Figure 3 of the accompanying drawings.

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(13) 5

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In making the strips according to the invention, handle elements 14 or finger gripping means 15 must be so formed as to avoid any interference with the stretching of the straight-line band segments 22 and 23 as previously described. Reductions to practice of the strips 10 and 11 have established that, when the finger gripping means 15 or the handle elements 14 are formed as curved strap elements extending between the straight-line band segments 22 and 23 as shown, substantially no interference with the stretching of those straight-line band segments 22 and 23 is produced.

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2. An apertured carrier strip stock as defined in claim 1, wherein the rows of bands between the bands along the longitudinal side margins of the strip stock comprise a plurality of intersecting and substantially straight-line flat band segments integrally connected between the side margin bands longitudinally of said strip with the longitudinal axis of said strip to define intermediate bands within said strip and in substantially transverse alignment with transverse pairs of said side margin bands.

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5. An apertured carrier strip stock as defined in claim 3, including a pair of strip segments connected to every other intersecting pair of straight-line segments outwardly of the defined intermediate bands, said strip segments being shaped to form opposed finger gripping means for a package produced by transverse severance of said stock between longitudinally adjoining pairs of said transversely aligned pairs of side margin bands and through the intersecting pairs of straight-line segments which are void of a pair of said strip segments.

6. An apertured carrier strip stock as defined in claim 3, including a pair of strip segments connected to every fourth one of the intersecting pairs of straight-line segments outwardly of the defined intermediate bands, said strip segments being shaped to form opposed handle elements for a package produced by transverse severance of said stock between the longitudinally adjoining pairs of transversely aligned pairs of side margin bands and through the intersecting pairs of straight-line segments which are longitudinally midway between said intersecting pairs of straight-line segments having pairs of said strip segments connected thereto.

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