

[54] **METHOD OF AND DEVICE FOR REMOVING A SHRINKABLE PLASTIC WRAPPING FROM A NUMBER OF UNITS, E.G. BOTTLES, FORMING A SUBSTANTIALLY PARALLELEPIPEDICAL BODY**

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[58] **Field of Search**..... 53/3, 50, 152, 381 R;
214/304, 305, 309, 311; 83/425, 433, 407,
428; 30/2; 222/352; 198/185, 230

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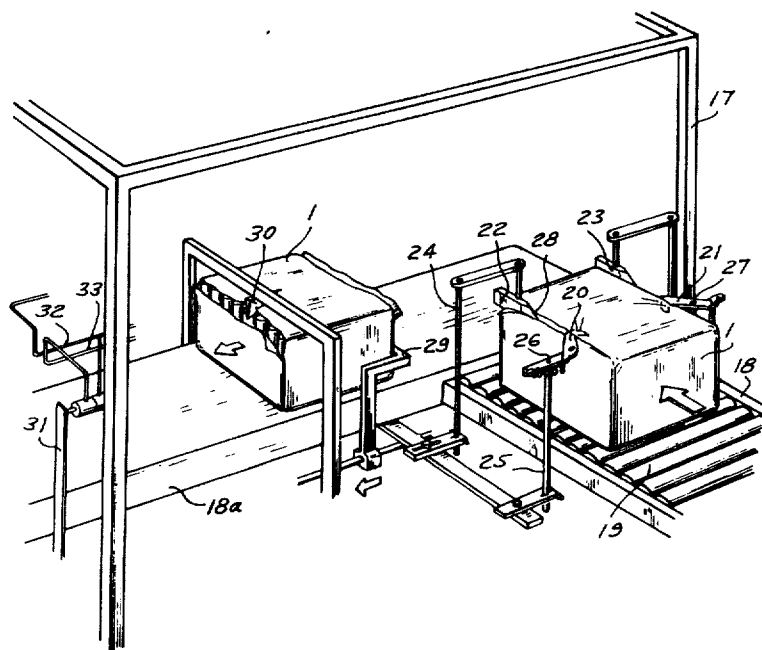
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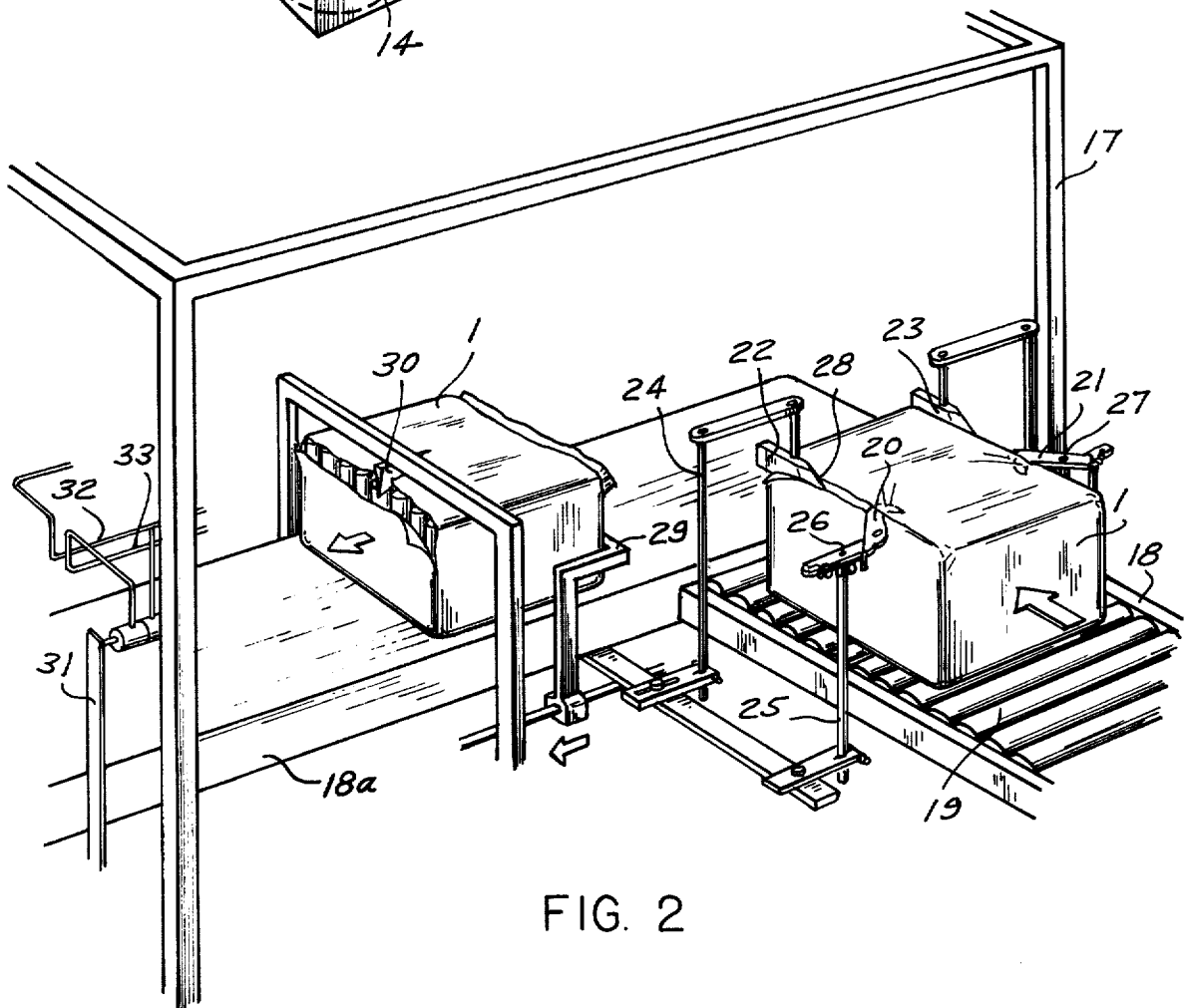
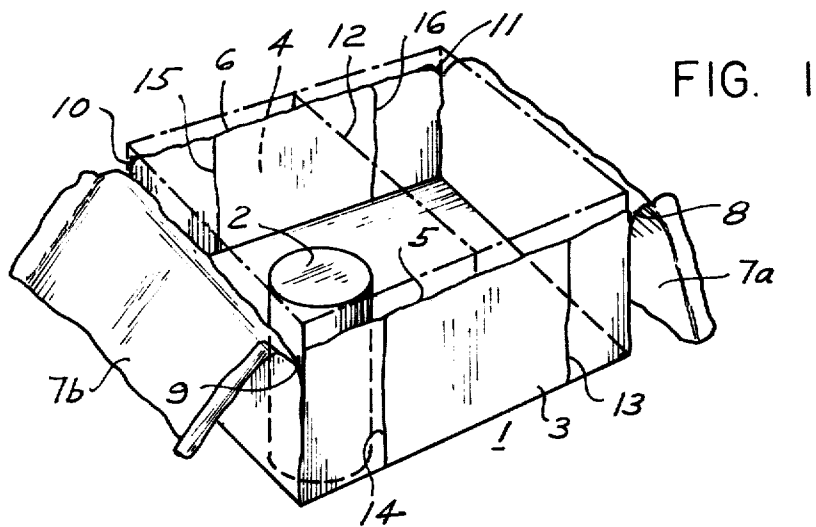
[57] **ABSTRACT**

There is disclosed a method of partly removing a wrapping such as a wrapping of pliable plastics material and shrunk about a plurality of units such as cans or bottles arranged in the form of a substantially rectangular package. According to the method a lengthwise cut is made in each of two opposite side walls of the wrapping below the level of the top wall thereof. A cut is then made along each of the four corners of the wrapping extending from the top wall of the wrapping towards the bottom wall thereof. A further cut is made across the top wall of the wrapping and extending into the side wall cuts. As a result of this combination of cuts, two flaps are formed, each consisting of part of the top wall and continued by a portion of the two other opposite side walls of the wrapping. The flaps are then gripped and folded back in opposite directions thereby uncovering the wrapped units so that the same can be conveniently lifted by a lifting device. The wrappings are conveyed successively past the knives effecting the afore-referred to cuts and the gripping and folding device.

There is also disclosed a device for carrying out the afore-described method.

11 Claims, 13 Drawing Figures





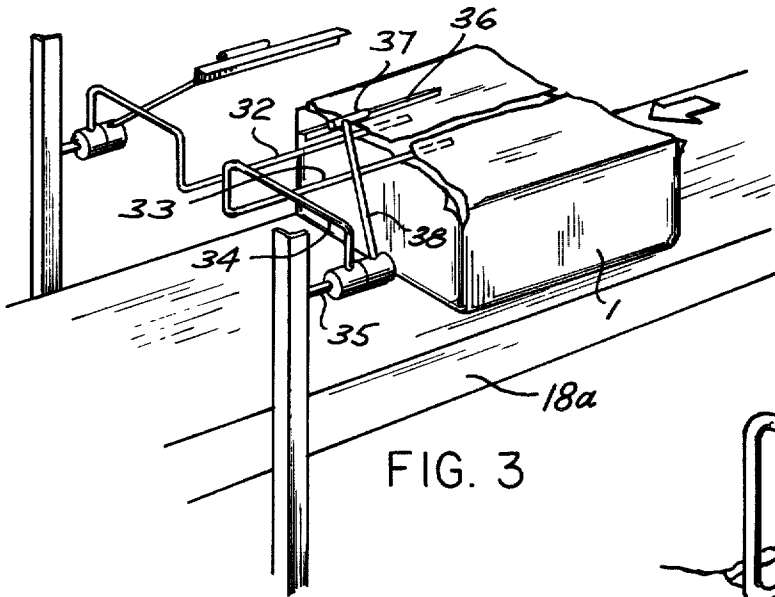


FIG. 3

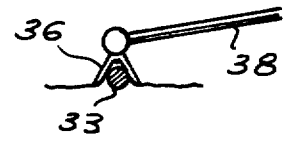


FIG. 5

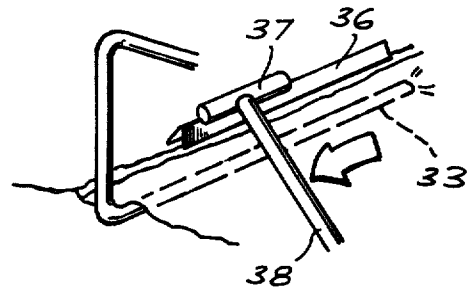


FIG. 4

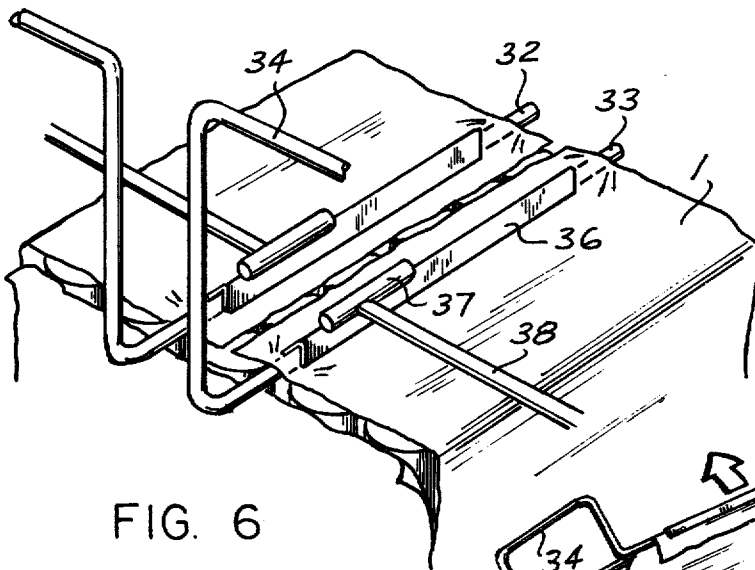


FIG. 6

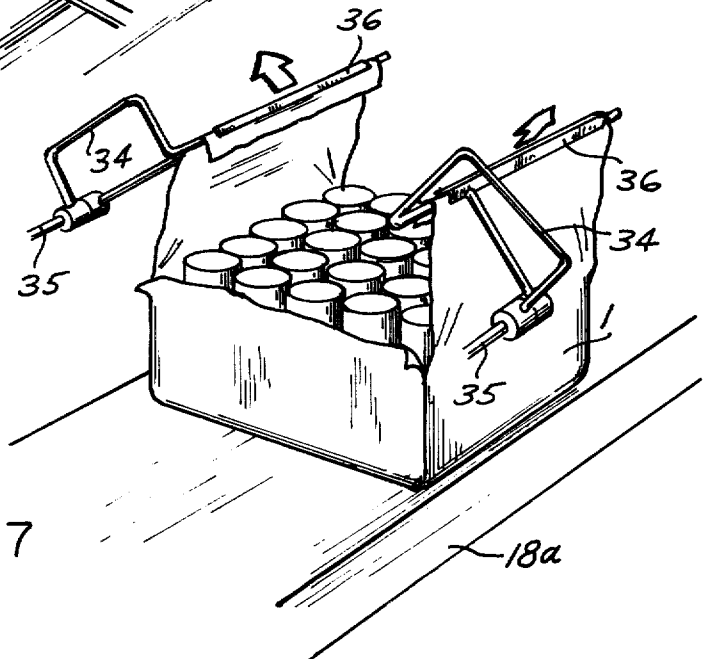


FIG. 7

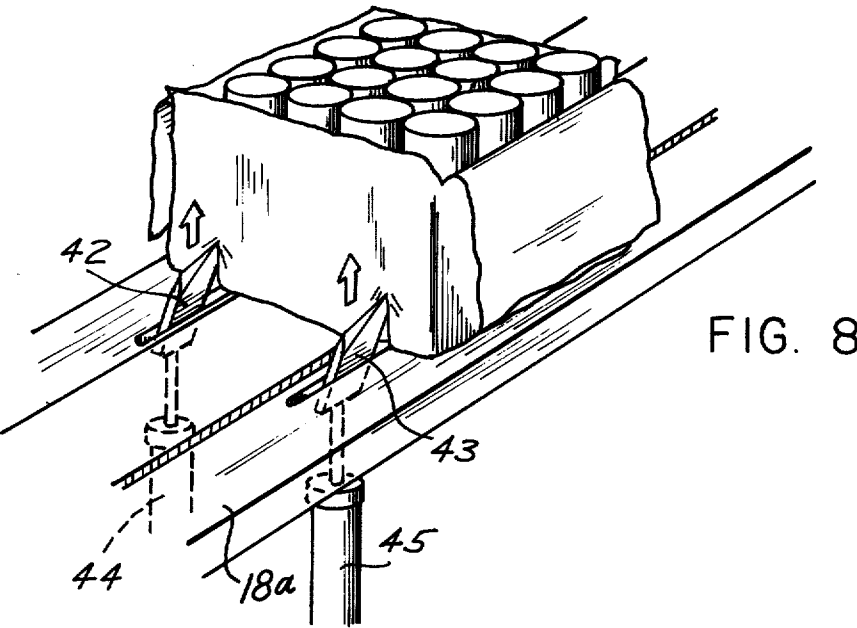


FIG. 8

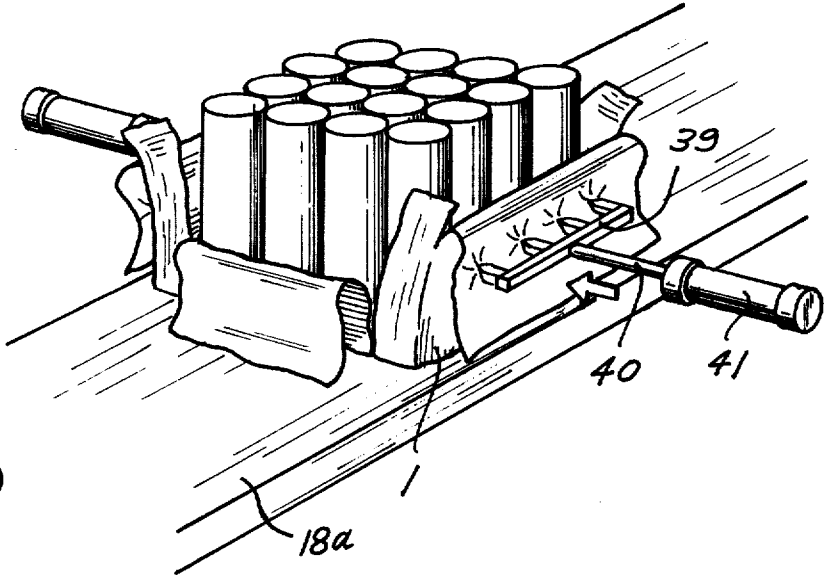
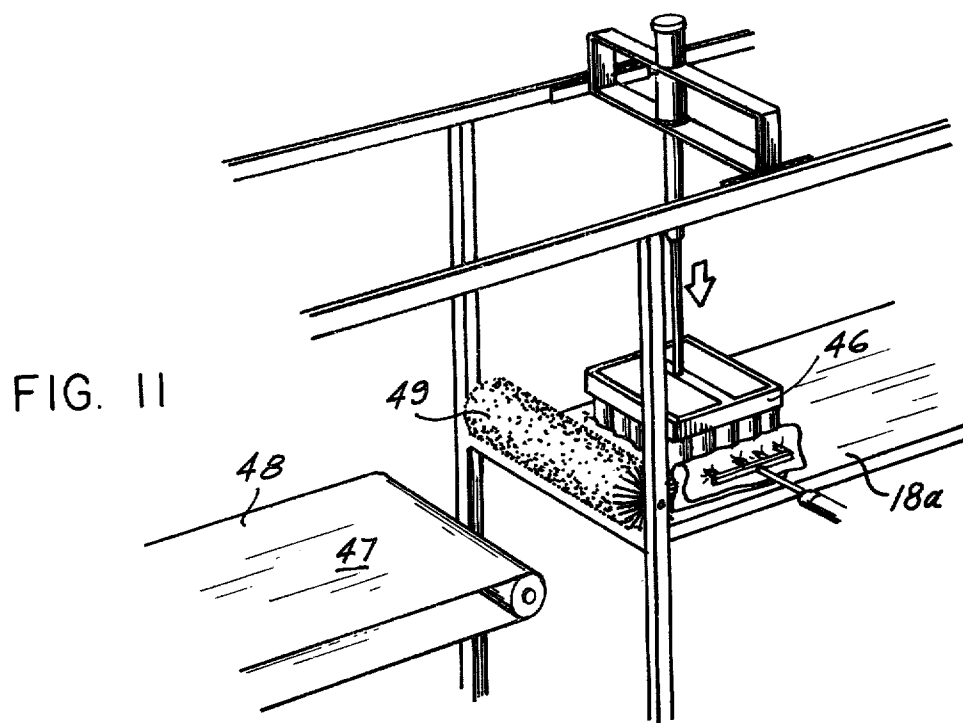
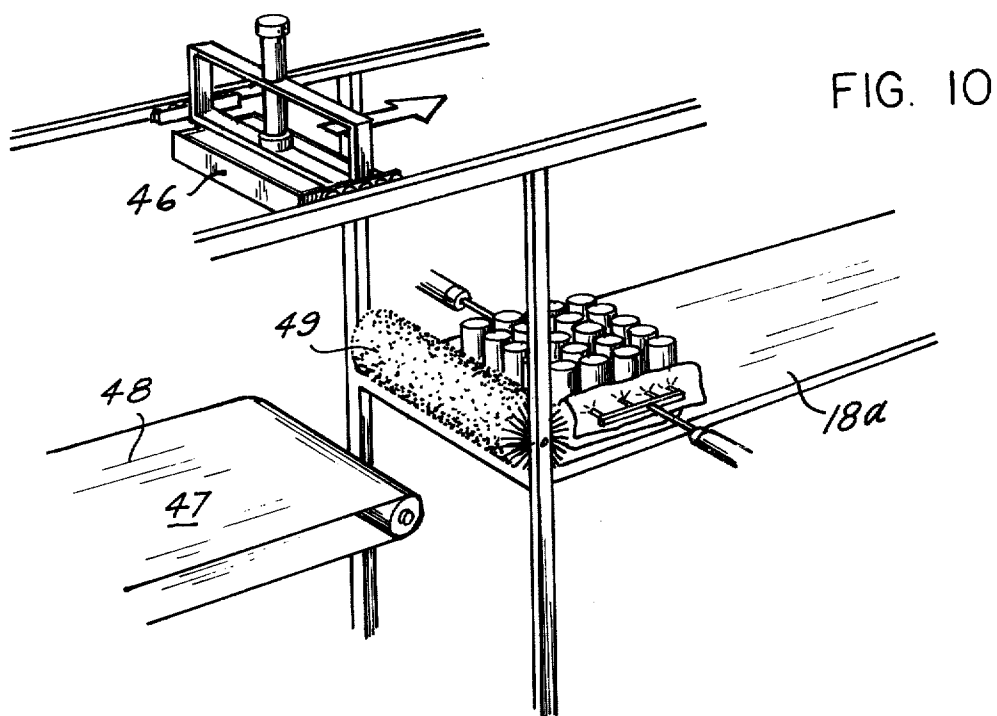


FIG. 9



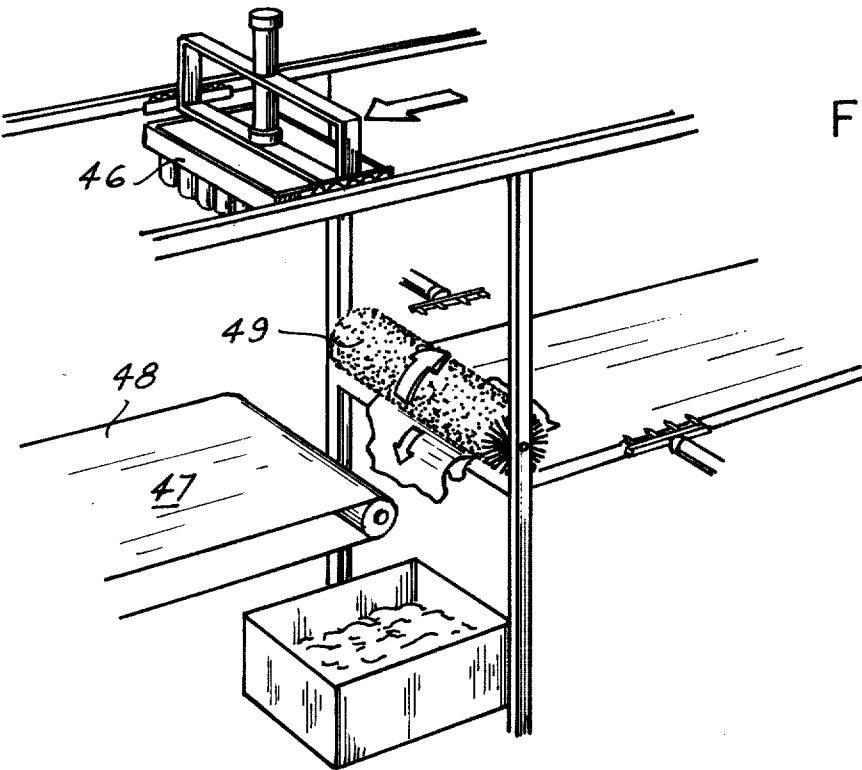


FIG. 12

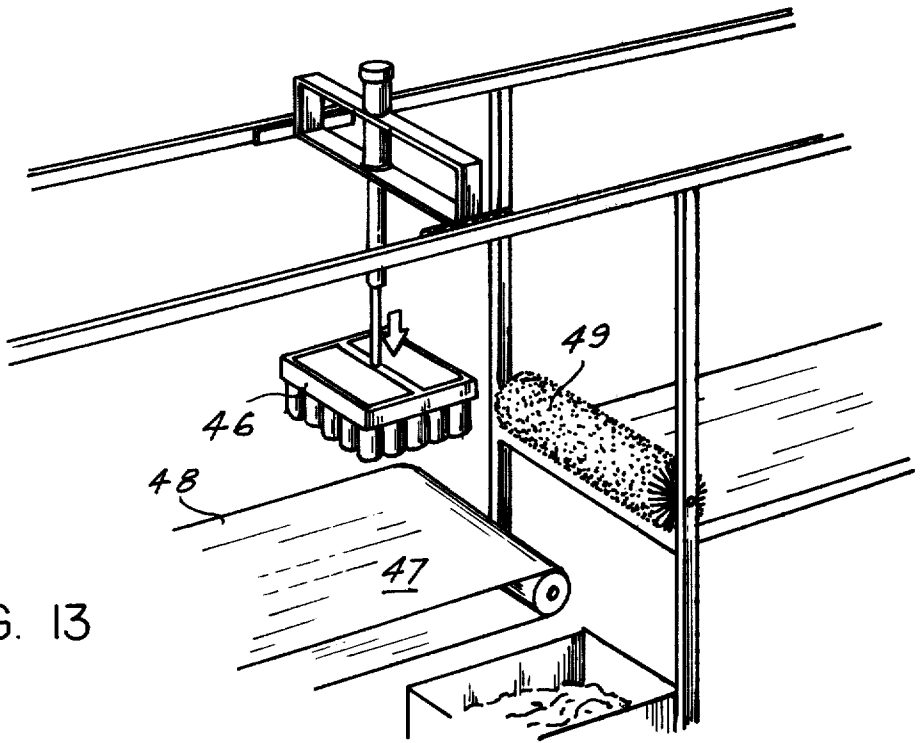


FIG. 13

METHOD OF AND DEVICE FOR REMOVING A SHRINKABLE PLASTIC WRAPPING FROM A NUMBER OF UNITS, E.G. BOTTLES, FORMING A SUBSTANTIALLY PARALLELEPIPEDICAL BODY

The present invention relates to a method of and a device for removing a shrinkable plastic wrapping from a number of units, e.g. bottles, beer cans, other beverage cans and the like, forming a substantially parallelepipedical body. Shrinkable plastic has gained very much ground, and is widely used for wrapping various objects, whereafter the wrapped object is put into a shrinking oven, where the plastic is caused to shrink, and fit closely around the object. It has also been found that shrinkable plastic is extremely suitable for wrapping a quantity of containers, such as bottles. Before the wrapping, these containers are arranged so that they form a substantially parallelepipedical body. After wrapping and shrinking, the wrapped unit or body, due to the shrinking, which presses the bottles together, will be like one single body, which can be stacked and handled without falling into its components, i.e. the bottles. Certain problems have arisen with containers or bottles wrapped in this way, in that the shrunk-on plastic wrapping, which is tough and fits tightly around the containers or bottles is very difficult to remove. Various devices for removing the plastic wrapping have been made, but they have not functioned satisfactorily.

The purpose of the present invention is to provide a method according to which the plastic wrapping can easily be removed from enclosed containers, such as bottles. The method comprises several steps. In the first step, a horizontal cut is made in each of two opposite sides of the parallelepipedical package, along the entire length of the wrapping. In the second step, a cut is made at right angles to said cuts, between said two cuts, over the top of the wrapping. In the third step, the two upper parts are folded out, so that the upper parts of the containers are uncovered. In the fourth step, one or several vertical cuts are made in each side wall from the horizontal cut in the wall to the lower edge of the wall. In the fifth step, a member is brought into contact with the wrapping, to secure same. In the sixth step, a lifting device is brought into contact with uncovered containers, to lift the containers.

For the method according to the present invention, it can also be appropriate, in connection with the horizontal cuts, also to arrange for cuts in the corners of the parallelepipedical body, from the upper part and down to said horizontal cuts, or from said horizontal cuts part of the way downwards towards the bottom of the wrapping.

A device according to the invention, for carrying out said method, consists of three stations, which can have fixed positions. The wrapped body is moved relative to each of said stations, and the wrapping is opened up according to the above-mentioned method. It is, of course, also conceivable to have the wrapped body stationary, and then to move each of the stations relative to the body, while the wrapping is opened up according to the above-mentioned method.

The first of the three stations makes the two horizontal cuts in the side walls by means of two knives with horizontal edges, which are installed in such a way that they will always be arranged on either side of a wrapped body that passes by. The knives can be movable around vertical axes, and can be spring actuated.

They can also be provided with limiting devices which determine their range of movement.

The second station has a vertical cutting member which is arranged in such a way that it achieves a cut in the wrapping of a wrapped body, over the top of the wrapping, between said horizontal cuts and at right angles to these.

The third station has members which, during the relative movement between the wrapped body and the station, comes into contact with the two cut up upper parts and, when the contact is complete, folds out the two upper parts, so that the upper parts of the enclosed containers are uncovered. A lifting device coacts with this station, which can be put into contact with the upper parts of the wrapped containers. The station also has two or more knives, which can achieve one or several vertical cuts running from each of the horizontal cuts down to the lower edge of the relevant side of the wrapping. The station also has members for securing the wrapping when the lifting device lifts up the containers. At this station there are also devices for removing cut up plastic after the containers have been lifted out.

The first station can also be provided with a pair of knives with vertical edges, which can make a cut in each corner of the wrapping, from the upper part of the wrapping down to said horizontal cuts, or a cut in said corners from said horizontal cuts part of the way down towards the bottom of the wrapping.

In the foregoing, it has been mentioned that the packages have been wrapped in shrinkable plastic. It should be obvious, however, that the wrapping can consist of other material, such as paper, metal foil or the like.

The present invention will be described in more detail with reference to the attached drawings, in which FIG. 1 shows a parallelepipedical body wrapped in a covering of e.g. shrinkable plastic, it being indicated on the wrapping how it is to be opened up,

FIG. 2 shows the right part of a machine for cutting open the wrapping of the body according to FIG. 1,

FIGS. 3, 6 and 7 show the uncovering device indicated in FIG. 2,

FIGS. 4 and 5 show parts comprised in the uncovering device,

FIG. 8 shows further cutting devices,

FIG. 9 shows members for securing the cut up wrapping, and FIGS. 10-13 show the left part of said machine, with a lifting device and a device for removing cut up wrapping, in four different operational stages.

FIG. 1 shows a parallelepipedical or rectangular body wrapping 1, of shrinkable plastic. The wrapping encloses a number of cans 2. The wrapping has two side walls 3 and 4. In the wrapping, in the side walls 3 and 4, two horizontal cuts 5 and 6 are made, which are located slightly below the upper part of the wrapping. The cuts can, of course, also be made directly adjacent to the edge at the upper part or else nearer the edge at the bottom of the wrapping. At each of the vertical edges 8, 9, 10 and 11 of the wrapping a cut is made, extending from the horizontal cuts 5 and 6. These cuts run a certain distance downwards towards the bottom of the wrapping. The cuts can also be positioned from the upper part of the wrapping down towards the cuts 5 and 6. At right angles to the cuts 5 and 6 a transversal cut 12 is made, which runs at right angles between said two cuts via the upper part of the wrapping, so that two upper parts 7a and 7b are formed. It is appropriate to

position the cut 12 in the middle between the front and rear sides of the wrapping, but it should be obvious that said cut can be positioned arbitrarily between the front and rear ends. Further, two vertical cuts 13, 14 and 15, 16 are made in each of the side walls of the wrapping, which cuts run from said horizontal cuts 5 and 6 to the bottom of the wrapping. The two cuts in each side wall are symmetrically arranged, but it should be obvious that it can be sufficient to have one vertical cut in each side wall.

FIG. 2 shows a main frame 17, which coacts with a feed table 18. The table 18 has a surface 19, consisting of rotatable transversal rollers. The surface can also be formed by an endless belt. On either side of the belt a first pair of knives 20 and 21 is arranged, and forward in the conveying direction a second pair of knives 22 and 23. The knives 20 and 21 have horizontal edges facing an axial vertical plane through the surface 19. The knives are pivotally supported, each on its pivot pin 26 and 27, and can coact with a stopping member provided for each of them, so they they can pivot between two limit positions. Further, the knives are spring actuated so that their free ends are biased to move towards each other. The free ends of the knives have concave edges, so that the knives will obtain a good grip. The knives 20 and 21 are arranged on bars 25. The bars for the knives 20 and 21 can be set at different distances from the lengthwise center line of the table 18, and can also be set at different heights in relation to the table surface 19. The same applies to the vertical knives 22 and 23. These knives are also supported on a bar or a column-like member. The one for the left knife 22 has been given the reference designation 24. The location of the edge of the knife 22 is clearly shown in the figure. This edge has been given the reference designation 28. In the main frame 17 there is a longitudinally positioned table 18a, which can consist of rollers or an endless belt, or of guide rails or some other suitable member along which a body enclosed in a wrapping can be displaced from right to left. Package 1 are hand loaded on conveyor table 18 and moved toward knives 20 to 23 and after passage of these knives upon conveyor table 18a. In the event the cutting resistance experienced by the knives causes stoppage of a package the next succeeding package will push forward the stopped package. The main frame contains one or several carriers 29, for displacing the wrapped body 1 to a point near the part 31. The main frame has a knife 30 with an obliquely set cutting edge, intended for making the cut 12. At the left end of the main frame, two prong-like or spear-like members 32 and 33 are arranged. The two spear-like members are each, at their left ends, fastened at right angles to the free end of a U-formed bent member, the other free end of which is fastened to an axle, which is parallel with the spear-like member. Referring to FIGS. 3 to 9, the U-formed member for the spear-like member 33 has been given the reference designation 34, and the axle on which the U-formed member 34 can turn has been given the reference designation 35. On the same axle 35 there is also a pivotally suspended bar 36, which has a V-formed profile and which is parallel with the spear-like member 32. The bar 36 is fastened to a rod 37, which is fastened to an arm 38. The stick or spear-like member 32 coacts with corresponding members 34-38. In the main frame 17, adjacent to the members 32 and 33, there are two fork-like members which can move to and from the

wrapping 1. One of the two fork-like members has been given the reference designation 39, and the shank of the fork has been given the reference designation 40. The shank can be given axial movement by means of a cylinder 41. The other fork-like member has an identical embodiment. Adjacent to the members 32 and 33, two pairs of knives 42, 43 with oblique edges are arranged. These knives are intended to move more or less vertically up and down. Further, the knives are arranged in such a way that they can make the cuts 13-16. In FIG. 8, two knives are shown, each controlled by its hydraulic cylinder 44 and 45. The other two knives have similar properties. The up and down movements of the knives as effected by servo cylinders 44, 45 and the movement of carriers 29 are so correlated that the knives are moved out of the way before they can come in contact with the containers within the package. As shown in FIGS. 10 to 13, the main frame also has a lifting device 46, which can move along the frame to a position directly above the members 32 and 33 and can thereafter go down and grasp and lift up the pack contained in the wrapping, and move it to a table 47, appropriately provided with an endless belt 48. Adjacent to the members there is also a brushing device 49, for removing cut up wrapping.

The device described above functions in the following way. FIG. 2 shows how a wrapped body is placed on feed table 18 and is moved forwards. The knives 20 and 21 are set in such a way that the distance between their front ends is slightly less than the width of the body. This involves that the knives reach the wrapping and effect the cuts 5 and 6. The vertical knives 22 and 23 are arranged in such a way that they effect cuts downwards from the horizontal cuts 5 and 6 in the vertical edges of the wrapping. The knives 20-23 and the feeding table 18 form the first station. After having passed by the knives - the wrapping then has the cuts 5 and 6 and 8-11 - the wrapping with enclosed body is placed in front of the carrier 29. The carrier 29 moves the enclosed body towards the knife 30. The knife 30 is set so that it makes a cut from the cut 5 across the upper part to the cut 6. The knife 30 thus effects the cut 12 in the upper part, so that this part is divided into two parts 7a and 7b. The two stick or spear-like members 32 and 33 are set so that they pass under the upper parts 7a and 7b during the continued movement of the wrapping 1 towards the part 31 (see FIG. 3). When the wrapping with the enclosed body is at the part 31 and when the bar 36 and the corresponding part at the stick or spear-like member 32 has come into the position shown in FIG. 6, the arm 34 with the bar 36 and the corresponding part is caused to swing in such a way that the upper parts 7a and 7b will be squeezed between the stick or spear-like members and their corresponding bars. One of the upper parts will thus be squeezed between the stick or spear-like member 33 and the bar 36. When the two upper parts are squeezed in this way, the upper parts are moved to the position shown in FIG. 7. In this situation the lifting device 46 (see FIG. 10) is moved to the right, over the uncovered containers and is lowered to their upper parts (see FIG. 10) and obtains a grip on the upper parts of these containers, either by means of mechanical devices or suction devices. When this has taken place, or prior to this, the knives 42 and 43 and the other two corresponding knives are given a movement upwards, with the aid of the hydraulic cylinders, and the cuts

13-16 are thereby made (see FIG. 8). When this has taken place, the knives return to their original positions. The two transversally movable forks, one of which has been given the reference designation 39, are moved towards the wrapping (see FIG. 9). The lifting device 46 can now lift up the containers and transfer them to the transport table 47 (see FIG. 12) and place the containers on the endless belt 48 (see FIG. 13). Because of the two fork-like members the wrapping 1 in which the containers have been enclosed is held fast. The two fork-like members are moved back to their original positions, and the remaining wrapping is removed with the aid of a rotating brush 49 (see FIG. 12).

It should be obvious that the folding out of the upper parts 7a and 7b can be accomplished with means other than those shown. Thus, suction devices of a known kind can also be used.

It should also be obvious that the sequence in which the cuts are made can be varied in all conceivable ways that are practical, and it should moreover be obvious from the foregoing description that each cut commences at a place where the plastic is taut, which to an extremely high degree facilitates the cutting.

We claim:

1. A method of partly removing a wrapping of shrinkable plastics material shrunk about a plurality of units arranged in the form of a substantially rectangular package, said method comprising the steps of:

first making intermediate the top wall and the bottom wall of the wrapping in each of two opposite side walls a horizontal first cut extending the entire length of the respective two side walls and parallel to the top and bottom wall of the wrapping;

then making along each of the four corners of the wrapping a second cut extending from the top of each corner to the horizontal cuts in the side walls; and

finally making a third cut across the top wall about midway between the other two uncut side walls and continued to said side wall cuts crosswise thereto thereby dividing the top wall of the wrapping into two flaps each continued by a portion of said two opposite side walls and a wall portion of the side wall from which it extends;

whereby upon folding back of said flaps and said wall portions the upper part of the units is exposed.

2. The method according to claim 1 and comprising the further step of making in the two lengthwise slotted opposite side walls of the wrapping two spaced apart parallel cuts extending between said lengthwise side wall cuts and the bottom wall to permit the folding back of said side walls.

3. A device for partly removing in continuous operation a wrapping of shrinkable plastics material shrunk upon a plurality of units arranged in the form of a substantial rectangular package, said device comprising in combination:

a first cutting station including first cutting means for horizontally cutting in each of two opposite side walls of the wrapping a horizontal cut extending the length of the respective side wall and being disposed intermediate the top wall and the bottom wall of said wrapping and parallel to said top and bottom walls;

a second cutting station including second cutting means for cutting along each of the four corners of

the wrapping a second cut extending from the top of the respective corner to at least the lengthwise cuts in said two opposite side walls;

a third cutting station including third cutting means for cutting into the top wall of the wrapping a cut extending transversely across said top wall and perpendicularly to said two horizontally cut opposite side walls, said transverse cut being continued into the cuts in said two opposite side walls, said side wall cuts, said top wall cut and said corner cuts forming two flaps at the top of the wrapping;

a gripping and folding means for gripping said two flaps and folding the same back in opposite directions, thereby exposing the upper part of the wrapped units; and

conveying means for conveying wrapped packages successively past said cutting stations and said gripping and holding means for coacting of said cutting means and said gripping and holding means with each passing wrapping.

4. The device according to claim 3 wherein the first cutting means comprise a pair of knives having a horizontally disposed cutting edge, each of said knives being disposed adjacent to one of said two opposite side walls of the wrapping, and mounting means for each of said knives, each of said mounting means supporting the respective knife pivotal in a horizontal plane for moving the same into and out of cutting engagement with the respective side wall of the wrapping for cutting said lengthwise cuts as a wrapping is conveyed past said knives.

5. The device according to claim 3 wherein the second cutting means comprise a pair of knives having a vertically disposed cutting edge, each of said knives being disposed adjacent to one of said opposite side walls of the wrapping, and a mounting means for each of said knives, each of said mounting means supporting one of said knives movable in a vertical plane for cutting engagement with a wrapping conveyed past said knives.

6. The device according to claim 3 wherein the third cutting means comprise a knife having a vertical cutting edge and being mounted in a position in which the knife is in cutting engagement with the top wall of the wrapping and the side wall portions between said lengthwise cuts therein and the top wall when and while said conveying means moves a wrapping past said knife.

7. The device according to claim 3 wherein said gripping and said holding means comprise a pair of gripping members each for gripping one of said flaps, and a mounting means for each of said gripper members, each of said mounting means supporting the respective gripper member pivotal between a position in which the gripper member grips the respective flap and a position in which the gripper member holds the gripped flap clear of the wrapped units, thereby unwrapping the upper part thereof.

8. The device according to claim 7 wherein said gripper members comprise suction means for holding the respective flap by suction force.

9. The device according to claim 3 and comprising fourth cutting means for making a further vertical cut in each of said two opposite side walls of the wrapping, each of said fourth cutting means including a knife having a cutting edge and being disposed adjacent to the respective one of said two opposite side walls of the

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wrapping, and a mounting means for each of said knives, each of said mounting means including a knife moving means for vertically moving the respective knife between a lower position juxtaposed to the plane of the bottom wall of the wrapping and an upper position relative to said lower position when and while the knives are in cutting engagement with said other two opposite side walls.

10. The device according to claim 3 and comprising

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lifting means engageable with units the upper part of which is exposed due to folding back of said flaps, said lifting means including gripper means engageable with said units for lifting the same out of the cut-open wrapping.

11. The device according to claim 10 and comprising brush means for removing cut-apart wrappings from said conveying means.

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