Jan. 5, 1965 R. A. EASTER ETAL 3,164,251

TIGHTLY BUNDLED PACKAGE ASSEMBLAGE AND METHOD OF PACKAGING

Filed Oct. 18, 1960

FIG. 1

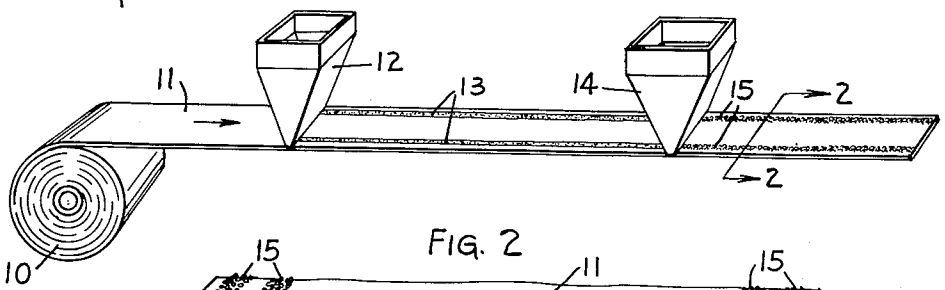


FIG. 2

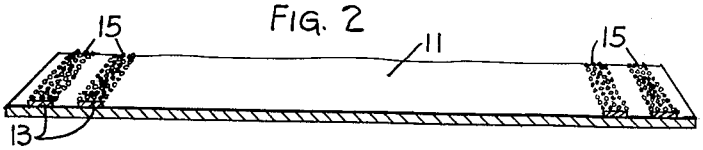


FIG. 3

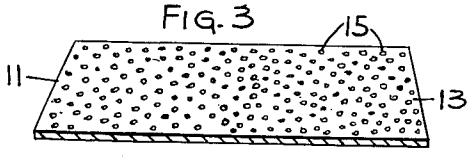


FIG. 4

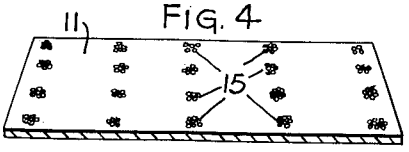


FIG. 5

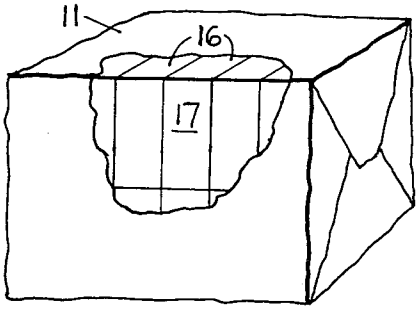


FIG. 6

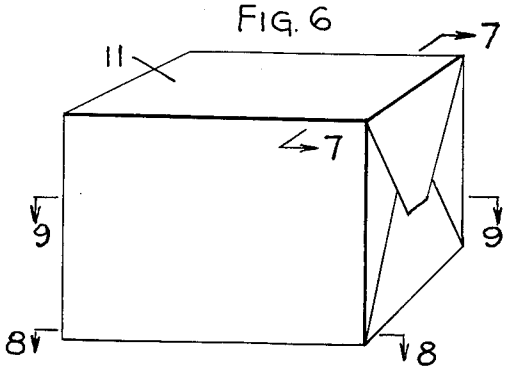


FIG. 7

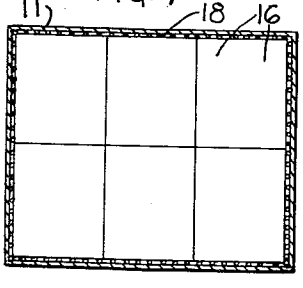


FIG. 8

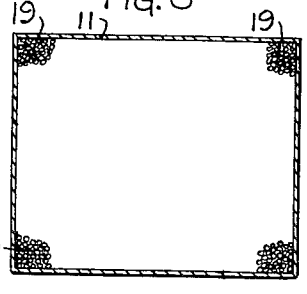


FIG. 9

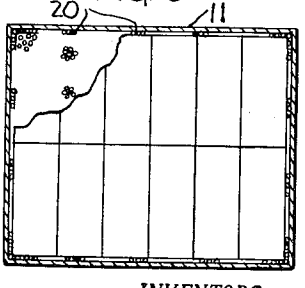
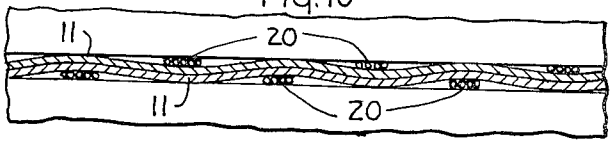


FIG. 10



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3,164,251

TIGHTLY BUNDLED PACKAGE ASSEMBLAGE AND METHOD OF PACKAGING

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4 Claims. (Cl. 206—65)

This invention relates to packaging and more particularly to a sheet-wrapped package assemblage and a method for tightly forming the same.

In the art of packing and shipping, it is generally recognized that it is desirable not only to have fragile articles properly cushioned against shock, but also to prevent them from shifting and exerting point forces which can damage both the container and the content. If a box or crate is strong and rigid, the packed articles are usually separated from the interior walls thereof by means of a light and resilient packing material. Very often, however, it is desirable to package a number of sub-packaged units such as dry and granular food stuffs which are contained in cardboard boxes, commonly of rectilinear dimension. Since the cardboard boxes are inherently protective of their contents, it is not economical to crate them or otherwise provide expensive and duplicative outer boxing or crating. As a consequence, it has become a common practice to stack the packaged units, preferably in a solid rectangular pile, which is then wrapped in a tough paper sheath capable of holding the boxes together. If the sheath is not tight, the packaged units will shift during transportation. Displacement from the ideal alignment of the rectangular boxes causes sharp corners to protrude and to gouge other boxes or to puncture the encasing paper. Once the paper begins to tear, the condition is aggravated and the entire assemblage may break loose. While the obvious answer to the foregoing problem is to wrap the assemblage more tightly, no existing equipment known to the inventors is capable of consistently applying a tight paper sheet wrap about stacked packages and securing the wrap while maintaining its taut condition.

Another problem which arises in the sheet wrapping of stacked articles is the tendency for the wrapped assemblage to slide when piled upon other similar assemblages. The articles in stacked condition present planar walls and the sheet wrapping material is generally of smooth character which promotes slipping of the assemblages with respect to each other. Thus, during transporation, and particularly when handled on utility trucks where the packages are stacked in open and unsupported condition, the upper packages may slip and fall. Since the paper outer wrap is not intended to withstand shocks of such nature, the entire assemblage may burst apart.

It is within the contemplation of the present invention and a general object thereof to overcome the foregoing difficulties and to provide an economical and reliable package assemblage and a method of forming the same which will tightly hold together the individual subpackage units.

More specifically, it is an object of the invention to provide a package assembly wherein the sheet overwrap is applied and secured conventionally about articles to be wrapped and subsequently is tightened through the expansion of material previously interposed between the overwrap and the articles.

Another object of the invention is to provide a package assembly in which a sheet wrap becomes self-tightening and at the same time produces a sufficient corrugated effect at the outer surface thereof to minimize the tendency of superposed assemblages to slip and fall.

A still further object of the invention is to provide a

self-tightening sheet wrap for stacked package units which will, during the tightening step, also produce a thermal insulating layer encasing the entire assemblage.

These and other objects and advantages of the invention will more fully appear from the following description made in connection with the accompanying drawings, wherein the same references apply to the same or similar parts throughout the several views, and in which:

FIGURE 1 is a diagrammatic representation of the steps of applying adhesive and expandable material to wrapping sheet material.

FIGURE 2 is an enlarged cross section taken on the line 2—2 of FIGURE 1 showing the sheet material with strips of heat expandable material applied thereto.

FIGURE 3 is an enlarged view siimlar to that of FIGURE 2 showing the heat expandable material applied continuously over a surface of the wrapping sheet.

FIGURE 4 is a view similar to that of FIGURES 2 and 3 showing the heat expandable material applied at discrete areas.

FIGURE 5 is a perspective view of a stack of subpackages which have been wrapped with sheet material according to the invention, an area of the sheet material being cut away to show the position of the subpackages.

FIGURE 6 is a perspective view of a packaged assemblage after heat has been applied thereto.

FIGURE 7 is a vertical section taken on the line 7—7 of FIGURE 6 and showing the appearance of the finished package when heat expandable material has been applied continuously over the sheet surface.

FIGURE 8 is a horizontal section taken on the line 8—8 of FIGURE 6 and showing the inner surface of the bottom portion of the wrap with heat expanded material being applied in discrete areas in the corners of the stack.

FIGURE 9 is a cross-section of the packaged assemblage taken on the line 9—9 of FIGURE 6 with a corner portion of the package stack being broken away and showing the appearance of the assemblage when the heat expanded material is placed in spaced areas over the sheet.

FIGURE 10 is an enlarged segment of contacting walls of stacked assemblages showing the interfitting relation of corrugated areas.

With continued reference to the drawing, FIGURE 1 shows a diagrammatic representation of the steps by which our novel wrapping sheet is formed. A roll of sheet stock 10 supplies a continuous length of the wrapping material 11 which proceeds in the direction of the arrow as shown. An adhesive application 12 overlies the strip 11 and applies adhesive 13 to the sheet strip 11 in the manner desired, which can be continuously or in spaced relation, as the case may be.

Beyond the adhesive application 12 in the direction of travel of the sheet strip 11 is an applicator 14 for applying heat expandable material 15 to adhesive 13. The adhesive 13 may be of any suitable type and can even be applied hot provided the temperature is less than that which will expand the heat expandable material 15.

The expandable material 15 is conveniently applied in small pellets or granules and can be made of foamable polystyrene, polyvinylchloride, or polyethylene to name a few suitable materials. All of these materials are thermoplastic and can be so compounded as to expand with the formation of gas bubbles under the application of moderate temperatures to provide a compression resistant layer remaining adhered to the sheet strip 11.

Before using the sheet wrapping material, the appearance of a typical product is shown in cross section in FIGURE 2. The strips of material 13 are shown in

spaced parallel relation and granules of heat-expandable material **15** are adhered to the surface of the adhesive **13**.

In the event the material is applied continuously, then a coating **13** of adhesive will be applied to the entire surface of the strip sheet **11** and the granular expandable material **15** will likewise be spread over the entire surface and adhered thereto.

A saving of adhesive and thermoplastic expandable material can be effected where they are applied only in spaced discrete areas as in FIGURE 4.

The sheet wrapping strip **11** is applied to a stack of articles **16** as shown in FIGURE 5. The articles **16** present exterior side walls **17** when they are stacked together and the wrapping strip **11** is applied to and secured around the stack with the expandable material **15** lying at the inner face of the sheet as it encases the stack.

Heat is then applied to the entire assemblage to cause the thermoplastic expandable material **15** to expand and exert compressive force between the wrapping sheet **11** and the stacked articles **16**.

Where the expandable material is applied continuously as in FIGURE 3 the resulting packaged assemblage will have a continuous layer **18** surrounding the articles **16** as shown in FIGURE 7. The layer **18** thus may conveniently constitute a thermal insulation for the entire assemblage.

In FIGURE 8 a means is shown for tightening the wrapping sheet **11** only at corner areas **19** which will effect a saving of material.

Referring now to FIGURE 9, expanded material is placed in discrete areas **20** so as to produce a corrugated or pimpled surface exteriorly of wrapping sheet **11**.

The effect upon the sheets **11** is shown in FIGURE 10 wherein the corrugated or pimpled areas created by the expanded material at **20** will provide an interlocking and non-slipping engagement between the exterior surfaces of two contacting sheets **11** as where the wrapped and tightened assemblages are piled for transportation.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of the invention.

What is claimed is:

1. A package assemblage comprising, a stack of bundled articles having exteriorly facing side walls, a sheet overwrap extending around said stack closely adjacent said side walls, and spaced strips of expanded material lying between the sheet overwrap and the stack of articles and exerting compressive force therebetween whereby to place the sheet overwrap under tension and tightly retain the articles in their stacked condition, said sheet presenting an exterior corrugated surface corresponding to the interior spaced strips of material.

2. A package assemblage comprising, a stack of bundled articles presenting exteriorly facing side walls, a sheet overwrap extending around said stack closely adjacent said side walls, and a layer of heat expanded material adhered to the inner surface of said sheet overwrap and exerting compressive force against said stack of articles whereby to place the sheet overwrap under tension and tightly retain the articles in their stacked condition.

3. The method of tightly bundling a stack of articles with an overwrapping sheet which constitutes coating the sheet with an expandable material, wrapping and securing the sheet about the articles in contact therewith, then expanding the material and tightening the secured sheet about the articles.

4. The method of tightly bundling a stack of articles with an overwrapping sheet which constitutes coating the sheet with a heat expandable material, wrapping and securing the sheet about the articles in contact therewith, then heating and expanding the material and tightening the secured sheet about the articles.

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