GENERAL PURPOSE PACKING MATERIAL

Joseph M. Pezely, Jr., Elmira, N.Y., and Victor Schleich, Williamstown, Pa., assignors to Corning Glass Works, Corning, N.Y., a corporation of New York

2 Claims. (Cl. 229—14)

ABSTRACT OF THE DISCLOSURE

Packaging modules of impact absorbing material having interlocking tongue and groove portions are provided for side, edge, and corner protective positionment about an article to be packaged.

Quite commonly fragile articles that are packed within outer boxes or containers are spaced from the walls of the outer container and cushioned from shock or impact by shock absorbing material, such as waste paper, excelsior, foam rubber, foam plastic, etc. The shock absorbing material may be in the form of individually constructed pieces, such as sheets, edge protecting channels, corner pads, special pads and combinations of these such as a sheet with an angle on an edge.

Such shock absorbing packing pieces are placed on appropriate edges, corners, sides, etc. of a fragile item to be shipped which is then placed within an outer corrugated box or shipping carton for shipment.

Different individual fragile items and different sized shipping cartons make it extremely difficult to stock and inventory sufficient packing pads of all different types at a reasonable cost.

The cost of the packaging pads or materials is escalated upwardly by several factors. First, the cost of making the different packaging pads or materials is increased by the use of expensive molding processes. Molding is particularly necessary for odd shaped corner and edge pieces. Secondly, the cost to the shipper of keeping many pieces of different sizes and shapes in inventory is excessive. This invention provides a solution to the problem through modular packing pieces which may be all identical but which can be assembled in the nature of a jigsaw puzzle to provide a number of required different shapes of packing pads.

It is the purpose of this invention to provide packaging pads assembled from modules which, because of their particular construction, are extremely versatile. The modules are so constructed and arranged that they may be combined with other identical modules to form packaging pads of various sizes and shapes.

For example, the modules can be assembled into sheets, edge protecting channels, edge protecting angles, corner pads and combinations of these such as a sheet with an angle on one side, and a corner at the end of the angle.

Each module has a unique relationship between its thickness and the size of the tongues and grooves which are employed for joining the modules together. The position of the tongues and the grooves on the edges of the module is also important. Each module has a specific relationship of one-to-one between the thickness of the module itself, and the length, width or depth of the tongue or groove. The tongues and the grooves are so positioned along the side of the module that the tongue of one module may be inserted into a groove of another identical module in a direction either parallel to or perpendicular to the planes of the parallel sides of the module so that the resulting pad will be either a sheet or a right angle piece respectively, wherein the modules form a neat aligned packaging pad of the desired shape.

Other objects and advantages of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principles of the invention and the best mode which has been contemplated of applying these principles.

In the drawings:
FIGURE 1 is a perspective view showing one embodiment of the invention.
FIGURE 1a through 1d show various applications of the embodiment shown in FIGURE 1.
FIGURE 2 is a perspective view showing a modification of the embodiment shown in FIGURE 1.
FIGURE 3 is a perspective view showing another embodiment of the invention.
FIGURE 4 is a perspective view showing a modification of the embodiment shown in FIGURE 3.
FIGURE 4a shows a sheet formed from modules of the modification shown in FIGURE 4.
FIGURE 5 shows a shipping container carrying a fragile article protected by packaging pads constructed from modules in accordance with this invention.

FIGURE 1 shows a preferred embodiment of the versatile module. The module A is formed of shock absorbing material and has two parallel flat sides 1. Four flat edges, 2, 3, 4 and 5, lie in planes perpendicular to the planes of the parallel flat sides 1. Extending from the edge 3 is a tongue 6. The size of the tongue 6 is determined by its length 7, its width 8 and its thickness 9. In order that the various shaped packaging pads may be formed from this versatile module, it is important that length 7 be equal to width 8 and thickness 9. Further, the thickness 9 of the tongue should be equal to the distance between the flat sides 1 of the module.

A groove 13 in the side 4 is of dimensions which are identical to those of the tongue 6. Thus, depth 10 of the groove 13 equals the length 7 of the tongue, width 11 of the groove equals the width 8 of the tongue, and thickness 12 of the groove equals the thickness 9 of the tongue.

The universal nature of the module shown in FIGURE 1 is provided not only by the relationship of the size of the tongue to the size of the groove, but also by the relationship of these two elements to the remaining portion of the module. It is important that the following dimensions all be equal to each other and be equal to the thickness of the module 1: edge portion 3a, tongue length 7, tongue width 8, edge portion 3b, edge portion 3c, edge portion 4a, edge portion 4b, groove depth 10 and groove width 11.

FIGURES 1a through 1d illustrate the manner in which the module may be combined with other similar modules to provide packaging pads of various sizes and shapes. FIGURE 1a is a plan view of a sheet 14 formed by four of the modules illustrated in FIGURE 1. The tongue 6 of upper lefthand module 15 is shown projecting into the groove of next adjacent, identical module 16. The groove 13 in the module 15 is shown receiving the tongue of the next adjacent, identical module 17.

FIGURE 1b shows a corner protecting pad formed by three of the modules shown in FIGURE 1. In this arrangement the tongue of module 18 projects downward into the groove of module 19. The tongue of module 19 then projects into the groove of module 30.
The tongue of module 30 then projects into the groove of the module 18. The edge protecting pad shown in FIGURE 1c is formed by turning the modules 15 and 16 of FIGURE 1a to 90 degrees out of the plane of the drawing. FIGURE 1d shows an edge protecting pad formed by only the two modules 15 and 17 of FIGURE 1a.

FIGURE 2 shows a modification of the embodiment shown in FIGURE 1. The line 1a indicates the plane of the second flat side opposite the first flat side 1. The relationships of the tongue and groove dimensions of the module shown in FIGURE 1 to the distance between the flat sides 1a and 1c are identical to those between the tongue and groove dimensions of the module shown in FIGURE 1 to the distance between the flat sides 1. It follows then that the module of FIGURE 2 can be combined to form packaging pads of various sizes and shapes substantially similar to those described above using the module of FIGURE 1.

The module shown in FIGURE 2, however, is provided with portions 35 which are raised from the plane of flat side 1a and separated by indentations 36. These raised portions are intended to enhance the shock absorbing characteristics of the pad. When a shock is imparted to the module in a direction perpendicular to the plane of the flat sides, the raised portions 35 and the indentations 36 will allow the module to yield to a certain extent. This movement will tend to spread the shock out upon the item being shipped.

In forming the packaging pads from this module the raised portions 35 will normally be placed on the side of the pad away from the object being protected. If, however, it is desired to place the raised portions on the side of the pad adjacent the fragile objects the corners of the pad may be pushed together neatly by forcefitting the modules together.

The module shown in FIGURE 2 would be made by a molding process.

FIGURES 3 and 4 illustrate another embodiment of the invention. Although the primary purpose of this embodiment is to form a packaging sheet, it is apparent that the module of this embodiment can also be combined with other identical modules or with the module of FIGURE 1 to form packaging pads of various sizes and shapes. For example, they may form a right-angle piece similar to that shown in FIGURES 1c and 1d, or they may form an angle piece, one side of which extends outwardly to form a packaging sheet of indeterminate length. Other obvious combinations are clearly within the scope of this invention.

For a module to be used along with other identical modules to form a sheet of indeterminate size, it is important that the module be in the form of a regular polygon having an even number of sides wherein opposite sides of the polygon are complementary. Thus, in the embodiment shown in FIGURE 3, top edge 25 is complementary to bottom edge 25'. Edge portion 20 equals edge portion 20'. Depth 21 of the groove equals edge length 21' of the tongue. Depth 23 of the groove equals length 23' of the tongue. And finally, edge portion 24 equals edge portion 24'. Similarly, the edge 28 is complementary to the edge 29.

In the embodiment of FIGURE 3, as in the embodiment of FIGURE 1, the dimensions of the tongue—that is, the length, the width and the thickness—and the dimensions of the groove—that is, the depth, the width and the thickness—are all equal to each other and equal to the thickness of the module itself. This relationship allows the module shown in FIGURE 3 to be combined with other modules to form packaging pads of various sizes and shapes. For example, with two rows of modules of the type shown in FIGURE 3, each row being of indeterminate length, an edge protecting piece similar to that shown in FIGURES 1c and 1d, but of indeterminate length, can be formed. In addition, one of the rows can be extended sideways, thus providing a sheet with an edge angle. Further, one of the rows can be joined at a right-angle to a third row to form a packaging pad having a U-shaped or a Z-shaped cross-section. The U-shaped pad can be closed off on the fourth side and/or at either end or both ends to form a rectangular channel, and open box or a closed box respectively. It is apparent that in any one of the above packaging pads the sides may be of any area, depending only on the number of modules used to form the side.

It is also apparent that the above examples are intended merely to illustrate some of the almost infinite possible packaging pads that may be formed from the module of this embodiment, and in no way are they intended to be a limitation on its application.

The modification of FIGURES 4 and 4a illustrate that any regular polygon having an even number of sides may be combined to form a packaging sheet. In FIGURES 4 and 4a, a six-sided polygon is shown. Consistent with the basic concept of this invention, it would only be necessary that the opposite sides of the polygon be complementary. Thus, as shown in FIGURE 4, edge 31 would be equal to edge 31', tongue 32 would fit into groove 32', and edge portion 33 would equal edge portion 33'.

As in the embodiment shown in FIGURE 3, the modification of FIGURES 4 and 4a may be combined to form packaging pads of an almost infinite number of sizes and shapes. For example, tongues 43 and 44 of modules 41 and 42 lying along line 40, may both be joined at a ninety degree angle with other similar modules to form an edge protecting piece similar to that shown in FIGURES 1c or 1d. This pad is then capable of being extended to form pads of the same sizes and shapes discussed above with respect to the embodiment of FIGURE 3. And, similarly, the possible variations are almost infinite.

The possibility of employing the instant invention in a module of more than four sides is important and extremely useful. In the event that two unattached objects are placed side by side, for shipping or handling, on one packaging sheet, it would be preferred that the space between the objects not lie in a plane coincident to the plane of a line joining any two rows of the packaging sheet. In shipping or handling, one of the two objects may slip with respect to the other. If the plane along which they slip is coincident with a plane joining some of the modules, the packaging sheet may separate at that plane. This may be avoided, however, by choosing the module with the appropriate number of sides.

For example, if two objects placed on the sheet of FIGURE 4a met along line 45 or any line parallel there to, the possibility of the joining edge of the two objects running coincident with a joining edge of two rows of modules would be eliminated by using a six sided module. Similarly, for two objects joined on zig-zag line 46, the four sided module of FIGURE 3 would be employed to avoid pad separation.

FIGURE 5 shows a fragile article being carried in a container 50 and protected against damage by several shock absorbing pads formed by modules of the instant invention. Pad 51, protecting a lower corner, is identical to the pad shown in FIGURE 1b. Pad 52, which is protecting the top and an upper edge of the fragile article, is formed by a series of modules of FIGURE 3. A series of modules 54, adjacent edge 53 of the fragile article, is joined at a ninety degree angle with the flat portion of the pad 52. In this manner a pad 52 is formed which protects both the top and an upper edge of the fragile article. A pad similar to that shown in FIGURE 1c is shown at 55 protecting one side of the fragile article.

For several reasons, the packaging module provided by this invention will enable packaging costs to be significantly reduced. First, the versatility of the module...
will allow one confronted with many varied packaging problems to keep in stock only the packaging module of the instant invention. Most, if not all, of the packaging pads that he will need, regardless of size or shape, can be formed by various combinations of the module disclosed herein. Thus, he need keep in inventory only a single size and shape module. This uniformity of parts will significantly reduce his inventory costs. Secondly, this module is capable of being produced by extrusion and casting techniques. These are considerably cheaper than the present molding process.

The module is capable of being produced by various methods. First, the module can be molded into the desired shape. This is not considered to be the best method, however, since, as noted above, this method is expensive. A second method would be by the extrusion process. Here the material would be extruded in the shape of the outline of the plan view of the module and would be sliced to the desired thickness. A third method would be to employ casting. By this method, large sheets of material of the desired thickness would be cast. A cutter similar to a "cookie cutter" would then be used to cut the sheet into modules of the desired shape.

The material employed to form the module must have superior shock damping characteristics and must be bulky. The bulkiness is necessary because of the relationship of the size of the various edge dimensions to the thickness of the module. Accordingly, at present it appears that expandable polystyrene foam is the best all-around material to produce this product. Due to the need for bulkiness, the low density characteristics of expandable polystyrene foam makes this material particularly suitable.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to the preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In the packaging of frangible articles, a plurality of interlocking packaging modules positioned about said frangible article to maintain the same in spaced-apart relationship from an enclosing container wherein the improved packaging module construction comprises, a plurality of identical modular bodies of shock absorbing material, each said body comprising a first flat side, a second flat side parallel to said first flat side, and an even number of edges perpendicular to said first and second flat sides, said edges forming a regular polygon, each pair of edges on opposite sides of said polygon being parallel to each other and forming a set of edges, a tongue projecting from one of said set of edges, a groove formed in the other of said set of edges, said tongue and said groove both being cubical in shape, the edge dimension of said cubical tongue and groove being equal to the distance between the two flat sides; a tongue of one such module is positioned within a groove of an adjacent module, with the groove of the adjacent module corresponding to the groove of said first module which is located on the edge opposite from the tongue of said first module, wherein a plurality of said interlocked modules are positioned about a frangible article to maintain it in spaced-apart impact relationship from an enclosing container.

2. In the packaging of frangible articles as defined in claim 1, the improvement comprising a plurality of raised portions projecting outwardly from said first flat side of each said packaging module, and indentation portions separating said raised portions, so as to enhance the shock absorbing characteristics of each said packaging module.

References Cited
UNITED STATES PATENTS
1,894,651 1/1933 Sanders .................. 46—25
2,057,942 10/1936 Fay ..................... 46—31
3,166,227 1/1965 Ragnow ................ 229—14

HERON E. CONDON, Primary Examiner.
WILLIAM T. DIXSON, Jr., Examiner.