SELF-SUSTAINING PACKAGE OF BUILDING PANEL UNITS

ABSTRACT OF THE DISCLOSURE

A self-sustaining package of building panel units comprising at least one group of panel units arranged in face-to-face relation and presenting opposite side edges. A plurality of frames are spaced along the length of the group of panel units. The frames include upper and lower horizontal elements, and vertical elements. Compressible members are compressed between the opposite side edges and the upper and lower horizontal elements of the frames. The panel units are thereby resiliently clamped in the aforesaid face-to-face relation. The frames are connected together solely by the group of panel units.

This invention relates to the art of packaging, and more particularly to a self-sustaining package of building panel units and method of packaging said panel units. One of the major problems facing manufacturers is how to package warehouse materials so that the packages arrive at their destination in an undamaged condition. Modern packaging techniques provide sturdy packages which, though expensive, offer good protection for the wares being shipped.

Manufacturers of building construction materials have long been plagued with the problem of packaging their products in a manner which is economical and which minimizes the chance of damaging the product. Of special interest in this connection, are those construction materials known generically as panel units and known specifically as facing sheets and liner sheets. These panel units are made from various gauge flat metal sheets and are formed into various profiles. Modern roll-forming equipment has now made it possible to produce these panel units in lengths up to forty feet. Such long panel units present packaging problems not only because of their length, but also because of their narrow width, their profiles and their decorative surface coating or texture, if any. These panel units cannot, for example, be stacked one on top of the other and then banded together. Such packaging distorts the panel units and hinders their erection, and mars the decorative surface coat or texture, thereby detracting from their intended attractive appearance, as well as producing other undesirable defects.

Objects

As an overall object, the present invention seeks to provide a self-sustaining package of panel units which avoids the problems described above.

Another object of the present invention is to provide means for packaging panel units which is economical and which may be assembled in a rapid and easy manner.

Still another object of the present invention is to provide a novel package wherein the panel units are resiliently clamped without distorting the same.

A further object of the present invention is to provide a novel package wherein the panel units are maintained in spaced-apart, substantially parallel relation so as to avoid marring the decorative surface coating or texture thereof.

Yet another object of the present invention is to provide means for packaging panel units of various profiles.

A further object of the present invention is to provide a method for bundling panel units into a self-sustaining package.

Statement of invention

In accordance with the present invention, a self-sustaining package of building panel units is provided wherein the panel units are resiliently clamped in a fixed position without distorting the panel units. Basically, the present self-sustaining package of building panel units comprises sets of upper and lower horizontal elements. Means is provided for maintaining the upper and lower horizontal elements in a fixed, vertically spaced-apart, substantially parallel relation. At least one group of panel units is positioned between all of the upper and lower horizontal elements. The panel units are arranged on edge in face-to-face relation and present upper and lower longitudinal side edges adjacent to the upper and lower horizontal elements. Compressible members are arranged between the upper and lower longitudinal side edges and the upper and lower horizontal elements whereby the panel units are resiliently clamped and maintained in the aforesaid face-to-face relation. The compressible members are preferably provided with spaced-apart grooves which receive the side edges of the panel units and maintain the same space from each other. Engagement of adjacent panel units and marring of their surface which could result from such engagement, is effectively prevented.

Further in accordance with the present invention, the means for maintaining the horizontal elements in the desired fixed, vertically spaced-apart, substantially parallel relation comprises (1) vertical elements spanning between and engaging corresponding ends of the upper and lower horizontal elements and (2) means, preferably in the form of a metal strap under tension, surrounding the horizontal and vertical elements of each set for securing the same together as a unit—said means also serving to maintain the compressible elements in a compressed condition.

The present self-sustaining package may also be used to pack edge groups of panel units which are positioned one above the other and which are arranged on edge in face-to-face relation. In this arrangement, the groups of panel units present adjacent inner side edges between which are compressed additional compressible members. To further rigidify the present package, intermediate horizontal elements are positioned between the adjacent inner edges and, in this instance, the additional compressible members are compressed between the opposite faces of the intermediate horizontal element and the adjacent inner edges.

The present invention also provides a novel method of bundling panel units into a self-sustaining package. In its broadest aspects, the present method comprises the steps of arranging at least one group of panel units on edge and in face-to-face, substantially parallel relation such that the panel units present upper and lower longitudinal side edges; positioning sets of upper and lower horizontal elements adjacent to the upper and lower side edges, at spaced locations along the length of the panel units and in a fixed, vertically spaced-apart relation; compressing compressible members between the upper and lower side edges and the upper and lower horizontal elements; and maintaining the upper and lower horizontal elements in the aforesaid fixed, vertically spaced relation throughout the life of the self-sustaining package whereby the compressible members are held in compressed condition and resiliently clamp the panel units in the aforesaid face-to-face, substantially parallel relation.

The above and other objects and advantages of the present invention will become apparent from the follow-
ing detailed description by reference to the accompanying drawings, in which:

FIGURE 1 is an isometric view of the present self-sustaining package containing two groups of panel units; FIGS. 2A–2F are views schematically illustrating the profile of typical panel units which may be packaged in accordance with the present invention;

FIG. 3 is an end view, in partially assembled form, of the present self-sustaining package;

FIG. 4 is a fragmentary isometric view of a compressible member employed in the present self-sustaining package;

FIG. 5 is an end view, similar to FIG. 3, illustrating the positions of the various components of the present package after banding;

FIGS. 6 and 7 are fragmentary end views of a panel unit disposed between a pair of compressible members and illustrating certain principles of the present method; and

FIG. 8 is an end view, similar to FIG. 5, illustrating an alternative arrangement of the present self-sustaining package containing only one group of panel units.

General description

Referring now to FIG. 1, there is illustrated a self-sustaining package 10 containing first and second groups of panel units 12, 14. Spacer means 16 cushion and separate the first and second groups of panel units 12, 14. Associated with each of the spacer members 16 and surrounding the first and second groups of panel units 12, 14 are frames 18 which rigidify the entire self-sustaining package 10 into the generally rectangular configuration. An end plate 20 extends across the ends of the first and second groups of panel units 12, 14 and is secured to the end frames 18. The end plate 20 prevents the panel units 12, 14 from sliding in a longitudinal direction relative to the package 10 and prevents the package 10 from parallelogramming or collapsing. A banding strap 22 surrounds each of the frames 18 and connects its components into a rigid unit. As will be described, the banding straps 22 provide compressive forces acting on the horizontal components of the frames 18 which result in a resilient clamping of the first and second groups of panel units 12, 14 to maintain the panel units in a predetermined orientation one to the other.

The present self-sustaining package 10 may be employed to bundle panel units having a great variety of profiles. Although not limited thereto, the panel units of the first and second groups 12, 14 may comprise one or a mixture of the panel units 24–34 whose profiles are illustrated in FIGS. 2A–2F. The panel units 24–34 have similar portions and differ only in their profiles. For example, the panel unit 24 of FIG. 2A, includes a central web 36 terminating in longitudinal side edges 38, 40 which include a male lip 42 and a female lip 44 respectively. For the purpose of the present invention, the panel unit 24 will be shown bundled in the self-sustaining package 10. It should be understood, however, that the package 10 may be employed to bundle any one or a mixture of the panel units 24–34. Panel units having profiles other than those illustrated in FIGS. 2A–2F may also be bundled in the self-sustaining package 10.

Arrangement of panel units

In accordance with the present packaging technique and as shown in FIGS. 1 and 3, the panel units are arranged face-to-face and stand on edge in spaced-apart, substantially parallel relation. The second group of panel units 14 is positioned above the first group of panel units 12, the overall arrangement being such that the first and second groups of panel units 12, 14 present adjacent inner side edges 46 and remote outer side edges 48. The inner side edges 46 and the outer side edges 48 may consist of either of the side edges 38, 40 of the panel units 24–34 as will be discovered when comparing the panel units 24 as arranged in FIG. 3 with the panel unit 24 illustrated in FIG. 2A.

Each of the panel units 24–34 of FIGS. 2A–2F has an outer or flat surface 49 which normally has a decorative finish or is provided with a decorative surface coating. The exposed surface must be protected so as to avoid damaging the decorative finish or decorative surface coating. As can be seen in FIG. 5, an end panel unit 24A of each set of panel units 12, 14 is inverted such that its outer surface 49 faces inwardly toward the adjacent panel unit 24. The remaining panel units 24 of each set 12, 14, face the end panel unit 24A. Consequently, at each side of the package 10, only the inner surfaces of the panel units 24, 24A are exposed and the outer surfaces 49 of all panel units are protected.

Spacer means

Referring again to FIG. 3, the spacer means 16 comprises an intermediate horizontal member 50 and first compressible members 52 engaged with the upper and lower faces of the intermediate horizontal member 50 and secured thereto, for example, by any suitable fastener or adhesives. The intermediate horizontal member 50 preferably comprises a scrap metal strip of from 12–14 gauge thickness. The spacer means 16 separates the first and second groups of panel units and extends transversely thereof with the compressible members 52 engaged across the inner side edges 46 of the panel units 24. The preferred configuration and material of construction of the compressible members 52 will be hereinafter described in connection with FIG. 4.

Frames 18

Referring still to FIG. 3, the frame 18 comprises a set of upper and lower horizontal frame elements 54, 56, each having a second compressible member 58 secured thereto and positioned to be engaged across the outer side edges 48 of the panel units 24. Vertical frame elements 60 are provided on each side of the frame 18. In the preferred construction, a first L-shaped support 62 is formed by securing one of the vertical frame elements 60 to the lower horizontal frame element 56. Similarly, a second L-shaped support 64 is formed by securing the other vertical frame element 60 to the upper horizontal frame element 54.

It is to be understood, at this time, that in FIG. 3 the compressible members 52, 58 are in an uncompressed condition. Accordingly, the overall height of the frame 18, as illustrated in FIG. 3, is greater than the overall height of the frame 18, as illustrated in FIG. 5, wherein the compressible members 52, 58 have been compressed. Also to be noted is the fact that the overall length of the vertical frame elements 60 is less than, for example, the distance between the opposed inner faces 66 of the horizontal frame elements 54, 56 when the compressible members 52, 58 are in an uncompressed condition. This relation is illustrated in FIG. 3 by the space shown between the remote ends 68 of the vertical frame elements 60 and the inner face 66 adjacent thereto. This space has been exaggerated in FIG. 3 for the purpose of clearly illustrating this initial position of the first and second L-shaped supports 62, 64 and the uncompressed condition of the compressible members 52, 58.

Compressible members

The compressible members 52, 58 have identical configurations and, as illustrated in FIG. 4, comprise a generally rectangular body 70 having uniformly spaced, first coplanar surfaces 72, second coplanar surfaces 73 spaced below the surfaces 72 and intermediate grooves 74. An end recess 76 is provided at each end of the generally rectangular body 70. Projecting above the coplanar surfaces 72 and positioned adjacent the intermediate grooves 74 are ribs 78. With this configuration, the inter-
mediate grooves 74 and the end recesses 76 are adapted to receive the male lips 42 of adjacent panel units. Furthermore, the coplanar surfaces 72 are positioned to be engaged by either of the side edges 38, 40 of the panel units 24, such materials include a variety of foamable resin compositions of which the preferred material is known as expanded polystyrene. Alternatively, the compressible members 52, 58 could, instead, be formed from foamed polyurethane, foamed polyethylene, foamed phenolic resins, foamed urea-formaldehyde resins, and the like.

Assembly of frames

Referring again to FIG. 3, because the compressible members 52, 58 are in an uncompressed condition, the first and second L-shaped supports 62, 64 are in a spaced-apart relation. However, the first and second L-shaped supports 62, 64 will be forcibly moved toward each other and united into the frame 18, as shown in FIG. 5. During forced movement of the first and second L-shaped supports 62, 64, the compressible member 52, 58 will be compressed such that the first and second groups of panel units 12, 14 are resiliently clamped between the compressible members 52, 58 and relatively rigidly maintained in the desired face-to-face, spaced-apart relation shown in FIG. 1.

It is preferred, in the present invention to employ the banding strap 22 for securing the L-shaped supports 62, 64 together as a unit to form the frame 18. As is conventional, a connector 89 is provided which receives the ends of the strap 22. Use of conventional banding equipment, permits the strap 22 to be placed under sufficient tension such that the L-shaped supports 62, 64 are forcibly displaced toward each other until such time as the remote ends 68 of the vertical elements engage the opposed inner faces 66 of the horizontal frame elements 54, 56.

It is to be noted, at this time, that the vertical frame elements 60 and the banding strap 22 cooperate to provide means for maintaining the upper and lower horizontal frame elements 54, 56 in a fixed, vertically spaced-apart, substantially parallel relation. This is necessary in order that the compressible members 52, 58 may be placed in their compressed condition as described in FIG. 5. To better understand the manner in which the panel units are resiliently clamped, reference is now directed to FIG. 6 wherein the horizontal elements 50 and 56 are shown separated by a distance indicated by the dimension line labeled L. Prior to tensioning the banding strap 22, the panel unit 24 has its opposite side edges 38, 40 engaged with the surfaces 72, 73 of the compressible members 52, 58. The male lip 42, herein provided with a U-gasket 88, is engaged in a bottom surface 90 of the groove 74. The panel units 24 are maintained in this "on-edge" position by engagement of the horizontal elements 50 with the L-shaped supports 62, 64 as illustrated in FIG. 3.

After the banding strap 22 has been placed under tension, the horizontal elements 50, 56 will be forcibly displaced toward each other and are now separated, as shown in FIG. 7, by a distance indicated at M which is less than the spacing L. The compressible forces acting on the horizontal elements 50, 56, provided by tensioning the banding strap 22, are schematically shown in FIG. 7 by groups of force lines labeled F. At this time, those regions of the compressible members 52, 58 which are engaged by the adjacent inner side edges 46 and 70 remote outer side edges 48 are compressed, that is, their thickness is reduced. The panel units 24 of the first and second groups of panel units 12, 14 are thus resiliently clamped between the compressible members 52, 58 and thereby maintained in the desired face-to-face spaced-apart substantially parallel relation, best shown in FIG. 5. It is to be noted that the panel units 24 are resiliently clamped without being distorted. Furthermore, inasmuch as the panel units 24 are maintained in spaced-apart relation, water cannot have trapped between the panels and, hence, corrosion of the panel units attributed to trapped water is prevented.

To complete the present self-sustaining package 10, the end plates 20 (FIG. 1) are applied to the end frames 18. The end plates 20 extend across the ends of the panel units 24 and prevent the same from sliding longitudinally of the package 10.

Referring again to FIG. 1, the intermediate frames 18 may be provided with grooves 82 positioned below the horizontal frame elements 54. The grooves 82 are formed by cutting a central portion of the compressible members 58. The grooves 82 are aligned and receive a hoisting strap, illustrated in dotted outline at 84, which is attached to a cable, illustrated in dotted outline at 86, for the purpose of lowering or raising the self-sustaining package 10.

Although it is preferred from an economic standpoint to package two groups of panel units in one package, it is sometimes necessary to package only one group of panel units. In this connection, reference is made to FIG. 8 wherein there is illustrated a self-sustaining package 10' containing one group of panel units 12.

The package 10' includes upper and lower horizontal elements 54, 56 each having a compressible member 58 secured thereto. Vertical elements 60' are engaged between the corresponding ends of the horizontal elements 54. The horizontal and vertical elements 54, 56, 60' are secured together to form a frame 18' by a banding strap 22. The self-sustaining package 10' is similar in construction to and is assembled in the same manner as the self-sustaining package 10. In this respect, end plates, not shown here, would be secured to the end ones of the frames 18'.

Summary

From the foregoing detailed description, it should be readily apparent that the present invention provides a self-sustaining package of building panel units which is economical and which may be assembled in a rapid and easy manner. The present self-sustaining package incorporates compressible members which (1) resiliently but firmly clamp the panel units without distorting the same; and (2) maintains the panel units in spaced-apart relation so as to avoid contact between panel units and the damage caused by such contact; and so as to avoid the accumulation of trapped water and the corrosion caused by the water. The present self-sustaining package may be raised and lowered in a manner which avoids damage to the panel units. All-in-all, the present self-sustaining package avoids substantially all of the problems encountered in prior art packaging techniques. Finally, the present invention provides a novel method of bundling panel units into a self-sustaining package.

I claim as my invention:
1. A self-sustaining package of building panel units, comprising:
   a plurality of spaced-apart frames, each of said frames comprising upper and lower horizontal elements and vertical elements maintaining the upper and lower horizontal elements in fixed, vertically spaced, generally parallel relation;
   at least one group of panel units residing between the upper and lower horizontal elements and between the vertical elements of said plurality of spaced-apart frames, said panel units being arranged in a face-to-face relation and having opposite side edges adjacent to the upper and lower horizontal elements of said frames;
   means for securing the upper and lower horizontal elements of each of said frames together as a unit; and
   compressible members compressed between said opposite side edges and the upper and lower horizontal
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elements of said frames, said group of panel units being resiliently clamped in said face-to-face relation; said plurality of spaced-apart frames being connected together solely by said group of panel units.

2. The self-sustaining package defined in claim 1 wherein said compressible members have spaced grooves which receive said side edges and maintain said panel units in spaced-apart relation.

3. The self-sustaining package defined in claim 1 wherein said compressible members are formed from foamed polystyrene.

4. The self-sustaining package defined in claim 1 wherein one end of said vertical elements is secured to one of said upper and lower horizontal elements.

5. The self-sustaining package defined in claim 1 wherein said means for securing comprises: a tensioned metal strap surrounding the upper and lower horizontal elements and the vertical elements of each of said frames.

6. The self-sustaining package defined in claim 1 wherein:

one of said frames including compressible members is positioned at each end of said group of panel units, and including end plates spanning across the ends of said panel units and secured to said frames.

7. A self-sustaining package of building panel units, comprising:

sets of upper and lower horizontal elements; means for maintaining the upper and lower horizontal elements of said sets in fixed, vertically spaced, generally parallel relation;

two groups of panel units positioned one above the other and residing between the upper and lower horizontal elements of said sets, the panel units of each of said groups being arranged in a face-to-face relation, one of said groups presenting opposite side edges adjacent to the said upper horizontal elements and the other of said groups presenting opposite side edges adjacent to the said lower horizontal elements, the said two groups presenting inner side edges which are adjacent to each other; compressible members compressed between said opposite side edges and the upper and lower horizontal elements of said sets; and additional compressible members compressed between the said inner side edges of said groups of panel units; said panel units being resiliently clamped in said face-to-face relation.

8. The self-sustaining package defined in claim 7 wherein said additional compressible members are positioned directly beneath said upper horizontal elements.

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