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3,344,917

PACKAGING MEANS AND METHOD

Filed Sept. 23, 1966

2 Sheets-Sheet 1

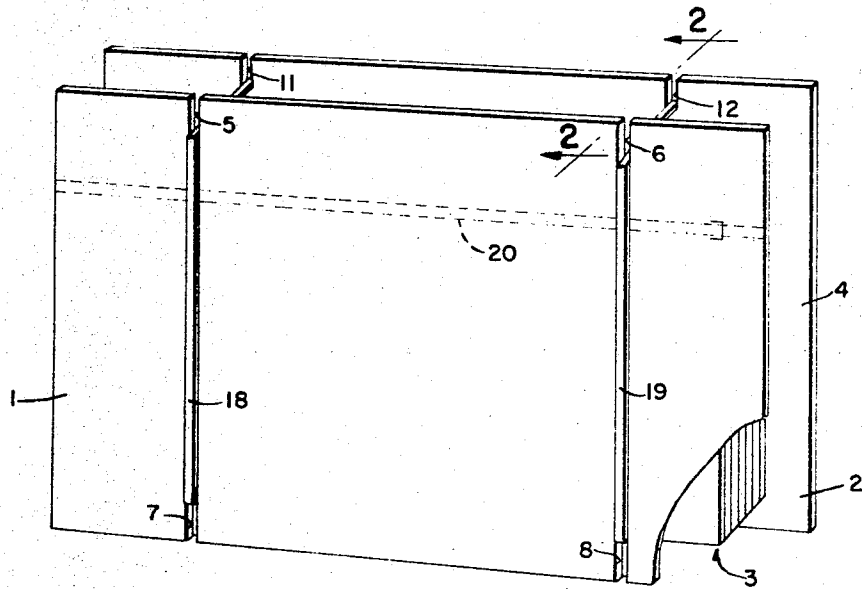


FIG. 1.

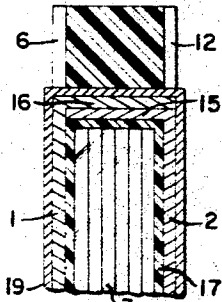


FIG. 2.

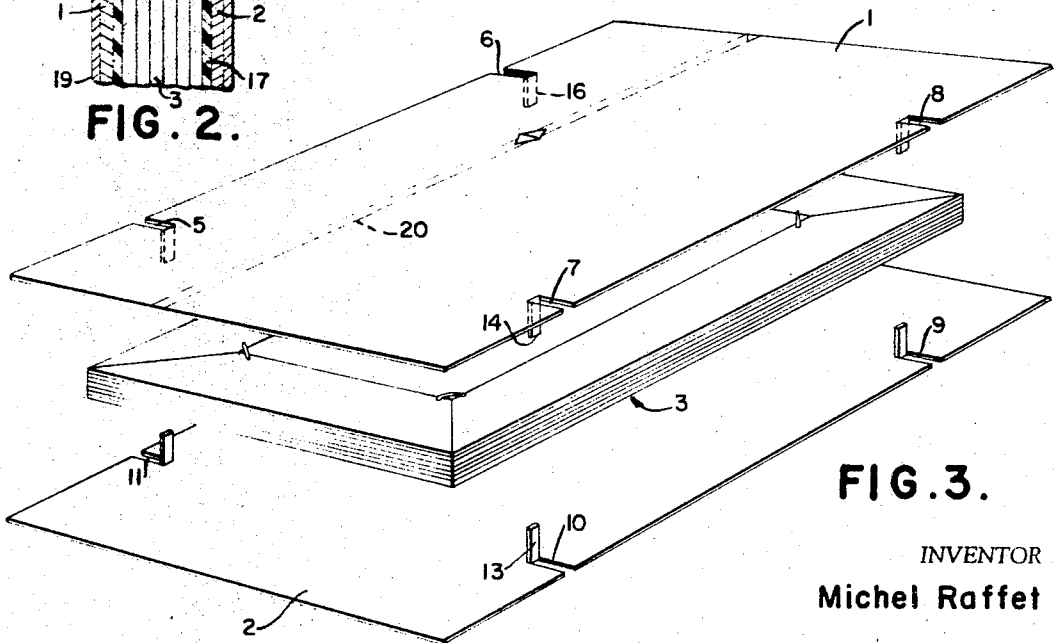


FIG. 3.

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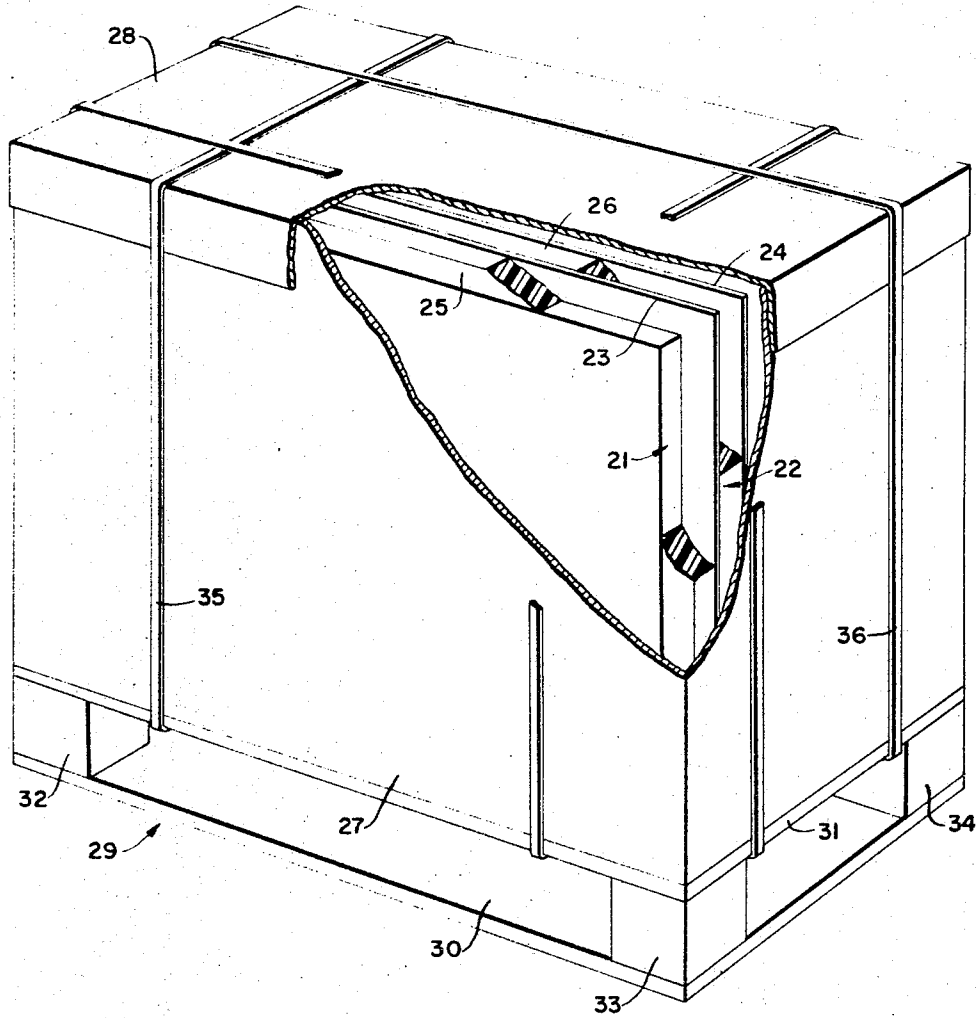


FIG. 4.

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3,344,917

PACKAGING MEANS AND METHOD

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21 Claims. (Cl. 206—62)

This invention relates to a method of packaging flat sheets of material such as panes of glass, and to the package formed thereby.

It is the principal object to provide a method of packaging a plurality of panes or plates, to form a package which effectively protects the faces of the plates, as well as the edges thereof, against chipping, breakage and damage from moisture, during transportation, storage, and until use.

Another object is to provide a method by which any number of packets within practical limits, may be assembled into a single package and which may be subsequently opened to permit distribution or sale of individual packets while affording excellent protection for the remaining packets.

A further object is to provide a method by which the assembly of packets forming a single package, are adapted for palletization and safe expeditious handling, as by a lift truck.

A still further object is the provision of a method of packaging in which two individual sheets of protective material such as cardboard, rigid or semi-rigid, are first applied to and over the respective outside faces of a stack or packet of panes to be packaged, and the two sheets are subsequently firmly and rigidly united by material which is originally fluid but which rapidly expands and sets into foam encasing and protecting the edges of the packet. Another object is to provide a method as in the preceding paragraph, wherein the sheets of protective material are bound together over the surfaces conjointly formed by the edges of the packet of plates, prior to completion of the package by the application of the expansible and hardenable fluid.

Yet another object is the provision of a package for shipping packets of panes of material assembled in face-to-face relation, or groups of such packets, which is relatively light in weight, simple to fabricate, and which affords a high degree of protection to the panes, against damage by breakage, chipping of the edges, moisture, etc.

A further object is to provide a package of the type aforesaid, wherein the hardened foam material, at one and the same time, connects the outer protective facing sheets of cardboard or the like, while effectively protecting the edges of the packet or packets of panes.

Another object is to provide a package as aforesaid, which is easily opened and, when opened, enables individual panes, or packets to be removed for sale or use while effectively protecting those remaining in the package.

Other objects and advantages of the invention will become obvious to those skilled in the art, after a study of the following detailed description in connection with the accompanying drawing.

In the drawing:

FIGURE 1 is a perspective view of two planar packaging elements or sheets, with a packet of panes emplaced between them, and bound together by strapping, prior to application of the encasing foam material, a corner of one of the sheets being broken away to show the packet of panes;

FIGURE 2 is a detail cross section of a portion of the completed package, that is, after the encasing foam ma-

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terial has been emplaced, as it would appear in a plane identified by line 2—2, FIGURE 1;

FIGURE 3 is an exploded perspective view showing how the two facing sheets of cardboard are applied to opposite sides of an assemblage or stack of panes to be packaged, and guided into proper registration with the panes and with each other; and

FIGURE 4 shows how a number of discrete packets may be assembled into a single unitary package, fixed to a pallet for ease in handling and shipment.

In order to facilitate a clear and accurate understanding of the invention, the individual items to be packaged will be called "panes," the discrete groups of panes will be termed "packets," and the items used to enclose the packet or group of packets, will be called "sheets." However, it is understood that while the invention is of particular utility in the packaging of glass, it is equally useful in packaging other sheet materials such as metal plates, tiles, paperboard, wallboard, plastics and many other materials.

Referring in detail to the drawing, 1 and 2 identify rigid or semi-rigid sheets of packing material such as cardboard, corrugated paperboard, etc., in superposed registration and in face-to-face contact with respective outer ones of a stack of panes 3 to be packaged and protected. Sheets 1 and 2 are of greater length and width than the stack or packet of panes so that when the items are in assembled relation with the panes symmetrically disposed between and with relation to the sheets, there is formed a channel 4 extending about the perimeter of the packet. For example, if the packet has a length of 61 cm., a width of 40 cm., and a thickness of 8.4 cm., and if the sheets 1 and 2 are each 69 cm. long and 48 cm. wide, the channel formed by the assembled panes and sheets will be 4 cm. deep, 8.4 cm. wide. Referring more particularly to FIGURE 1 and in conformance with the dimensions just given, each longitudinal edge of sheet 1 has two pairs of parallel cuts therein, normal to the edges. The two pairs of cuts in one edge define slots 5 and 6, respectively. Likewise the two pairs of cuts define slots 7 and 8 in the other edge. Sheet 2 has similar cuts therein defining slots 9 and 10 along one longitudinal edge, and 11 and 12 along the other longitudinal edge. As clearly shown upon FIGURE 3, the tongues such as 13, formed by the cuts defining a slot 10, are turned inwardly. The slots are symmetrically disposed and of a depth which, in the example given, would be 4 cm. for each slot. Thus when the packet and sheets are assembled as in FIGURE 1, each pair of slots such as 7 and 10 are in registration and, for example, tongue 13 of slot 10 fits over tongue 14 of slot 7. The tongues thus operate to properly centralize the sheets with respect to the packet and, conversely, the packet of panes fits smoothly between the pairs of tongues.

The assembled arrangement is shown upon FIGURE 2, wherein tongue 15 formed by the cuts in sheet 2 and defining slot 12, fits over the edge of the packet, while tongue 16 formed by the cuts defining slot 6 in sheet 1, fits over tongue 15. Of course the completely superposed relation of the tongues shown upon FIGURE 2 is not essential and the overlap thereof will depend upon the thickness of the packet, that is, the number of panes therein. Thus in case the packet 3 has a thickness, for example, twice that shown, the tongues may be in alignment with their ends in contact or spaced an appreciable distance. FIGURE 2 shows the packet enclosed within a protective film 17 of polyethylene which in the figure has an exaggerated thickness and which in actual practice will be of the order of 0.05 mm.

In addition to forming tongues as described in the preceding paragraph, slots 5, 6, etc. have a width to receive with a smooth fit, tightenable straps or bands 18 and

19. These bands may be of metal or plastic such as polyvinyl chloride, to provide the double advantage of uniform tension and easy opening of the package by cutting with a pair of scissors. Where the package is large and heavy, metal strapping may be used. Each strap passes in contact with the outer face of each of the sheets 1 and 2 and through the slots therein so that they act to bind the sheets and packet together and at the same time effectively hold the packet of panes centralized with respect to the sheets, maintain the sheets in registration, and prevent shifting of the packet relatively to the sheets.

The channel 4 formed conjointly by the packet and sheets, may be filled with polyurethane or other foam material which expands and hardens rapidly and adheres to the sheets without, however, adhering to the polyethylene enclosure 17 of the packet. As subsequently explained, a hardenable phenolic foam may be used instead of the polyurethane.

The procedure in filling the channel with protective foam is conveniently carried out in the following manner. The two sheets with a packet of panes enclosed in polyethylene, are bound together with straps, by assembly upon a table. In certain cases the straps may be omitted. The channel conjointly formed by the packet and sheets is covered temporarily with a mold. This mold may consist of four strips or lengths of material each corresponding in length with the edges of the sheets to be covered thereby, and of a width overlapping the edges. Where strapping has been used these strips are also formed with side edges which depend and extend over and effectively cover the slots in the edges of the sheets, through which the straps extend. The four lengths forming the mold are conveniently held in place by an encircling band or hoop, or in any other suitable way.

Alternatively the temporary mold may be in the form of a single length or strip of material having a length equal to the perimeter of the sheets, and hinged or articulated at points along its length corresponding to the locations of the corners of the sheets. The ends of this strip are releasably connected together by suitable clasp or hasp means.

Whichever means are used to form the temporary mold, all surfaces thereof which are to be in contact with the foam mix, are coated with a substance which will not adhere to the foam, thereby facilitating ready and complete separation from the hardened foam. Each strip or section is formed with sprue holes so that when emplaced about the sheets there will be at least one such hole over each respective one of the four sides or portions of the channel, and through which the liquid foam mix is forced into the channel.

It will be understood that the foregoing procedure and means for carrying it into practice, are illustrative only, and that numerous other arrangements and procedures will readily occur to those skilled in the art. The quantity of mix introduced will, of course, depend upon the desired final density of the foam, and the total volume of the channel defined.

Introduction of the mix is facilitated by injection nozzles or other means in communication each with a respective one of the charging orifices or sprue holes. After the required amount of mix has been introduced the holes are temporarily sealed for a time, for example, for 15 to 20 minutes, to permit the mix to expand and harden. Afterwards the mold is removed and the package is complete.

Where the sheets are of corrugated paperboard, consisting of a core of corrugated sheet having flat outer sheets adhesively secured to each side, it may be desirable to so form the temporary mold that the edges of these sheets are covered with a light covering of the foam so that the openings formed in the edges of the sheets by the corrugated core, are thereby obturated.

In order to facilitate opening of the package after serving of the strapping, if these are used, the sheets may be provided with tear strips as indicated at 20, FIGURES 1 and 3. A tear strip, located as shown, enables the package to be stood on edge, the top portions of the sheets and foam removed like a cover, and the packet or individual panes thereof, removed as desired. The cover may be replaced for protection of the panes remaining.

Of course the exact location of the tear strips may be varied as desired. For example, they may be located in the sheets in position extending over and along the channel filled with hardened foam, that is, between the edges of the packet and the contiguous edges of the sheets. In such a location, after tearing out the strips and removing the portions of the sheets thus separated, the foam material is exposed and readily removed from along the contiguous edge, so that the panes may be removed individually or as a unit.

FIGURE 4 shows a package embodying the invention, comprising a number of separate packets or groups of panes, and palletized for convenient handling by a lift truck, for example. At 21, 22 there are identified two packets of panes, or individual panes each, of a plurality of such packets. Each contiguous pair of packets is separated by a respective one of a plurality of sheets of cardboard or paperboard 23, 24, etc., having as in the case of sheets 1 and 2, FIGURE 1, a size greater than that of the packets, to define channels which are filled with expanded rigidified foam material 25, 26, as subsequently described, and adherent to the sheets. Where straps such as 18, 19 are used as previously described in connection with FIGURE 1 to 3, each packet may have its own two sheets bound with straps about an interposed group or packet of panes. In such a construction the foam will flow into and fill the aligned slots between each pair of contiguous packets and thus form "bridges" interconnecting them for encasement within a container 27 of conventional form and construction, having a cover 28.

A pallet generally identified at 29 comprises a base 30, upper platform 31, and corner blocks 32, 33, 34, etc. rigidly attached to the base and platform and holding them in spaced relation for ready insertion therebetween of the fork of a lift truck. Strapping 35, 36, etc. passes over and about container 27 and its cover 28, and beneath platform 31, to thus rigidly unite the parts.

The following example is of a suitable polyurethane foaming material, parts being by weight:

| | |
|--|------|
| (1) Polyether | 100 |
| (2) Water | 2 |
| (3) Surfactant, active tension agent | 1.5 |
| (4) Triethylene diamine | 0.2 |
| (5) 2-ethyl hexoate tin dibutyl | 0.01 |
| (6) Monofluorotrichloromethane | 10.0 |
| (7) Toluenediisocyanate polyisocyanite | 130 |

Ingredients 1 through 6 are mixed in the order given and the mixture is kept at not more than 20° C. When ready for use, ingredient 7 is introduced and rapidly and energetically mixed into the mixture of ingredients 1 through 6, by means of a rotating blade mixer. There is obtained a creamy liquid which is immediately introduced into the channel formed by the two sheets, the edge surface of the packet, and the temporary mold. Expansion begins within about 45 seconds and the channel is filled in about 2 minutes. Hardening is complete in about 15 minutes at ambient temperature. After hardening the foam has a density of about 50 kg./m.³.

The following example is for a suitable phenolic foam, values being by weight:

| | |
|--------------------------------|-----|
| (1) Resin | 100 |
| (2) Surfactant | 1.5 |
| (3) Talc | 5 |
| (4) Monofluorotrichloromethane | 5 |
| (5) Hydrochloric acid (35%) | 15 |

The resin used is a phenol-formaldehyde catalyzed by soda, specifically:

| | Moles |
|---|-------|
| Formol ----- | 2.3 |
| Phenol ----- | 1 |
| Soda (50%), 3.6% of the weight of phenol. | |

The resin is concentrated to about 72%.

In use, ingredients 1 through 4 are mixed in the order given and the mixture maintained at a temperature of not over 20° C. When ready for use, ingredient 5 is added and the mixture is violently and rapidly agitated as in the preceding example. The resulting cream-like fluid is quickly introduced into the channels, because the setting time is very brief—on the order of 5 seconds maximum. Expansion and hardening occur as in the previous example. The final density is about the same as in the case of polyurethane.

While I have disclosed the invention in the form presently preferred by me, numerous changes in construction and modes of procedure will readily occur to those skilled in the art, after a study of the foregoing disclosure. Hence this disclosure is to be taken in a purely illustrative rather than a limiting sense; and all changes within the scope of the subjoined claims are reserved.

Having fully disclosed the invention, what I desire to secure by Letters Patent is:

1. An article of manufacture comprising a flat object to be packaged, first and second sheets of stiff material at like size and shape and of larger transverse dimensions than said object, said sheets being disposed with their edges substantially in registration and with said object between them, with its edges spaced inwardly from the edges of the sheets, to define a channel conjointly with the edge of said object, and a self-hardening material disposed within said channel continuously therealong and adherent to the surfaces of the sheets contacted thereby.

2. The article of claim 1, said self-hardening material being polyurethane foam.

3. The article of claim 1, said self-hardening material being phenolic foam.

4. The article of claim 1, said sheets being cardboard.

5. The article of claim 1, said self-hardening material having an exterior surface substantially flush with the contiguous edges of said sheets.

6. The article of claim 1, and means securing said sheets and object in the positions aforesaid, independently of said self-hardening material.

7. The article of claim 6, each said sheet having a plurality of peripherally-spaced pairs of parallel cuts extending inwardly from its edge, to the edge of said object, to thereby define a plurality of slots, said means comprising a plurality of tensioned straps each encircling said sheets and object, and passing through a respective set of said slots.

8. The article of claim 6, said sheets having pairs of parallel cuts extending inwardly from their edges, to the edge of said object, to form slots, said means comprising a tensioned strap encircling said sheets and said object, and passing through said slots, inwardly of said self-hardening material.

9. The article of claim 8, each pair of said parallel cuts also forming a tongue, all said tongues being folded in-

wardly across the edge of said object and encompassed by said strap to be held thereby in substantially contacting relation with the edge of said object.

10. The article of claim 8, said strap being of polyvinyl chloride.

11. The article of claim 1, said object and sheets being of like regular geometrical contour and conjointly defining a continuous channel about the periphery of said object, said material filling said channel in a continuous enclosure of said object.

12. The article of claim 11, said object and sheets being rectangular.

13. The article of claim 1, said object comprising a plurality of stacked panes, and a protective film of material encasing said panes in surface contact therewith, to seal the same.

14. The article of claim 13, said protective film being polyethylene.

15. The method of forming a package encasing a flat object, comprising, applying to respective outer faces of the object a respective one of two sheets of stiff packing material each larger than the object, assembling said sheets and object together, with the edges of the sheets projecting outwardly beyond the perimeter of the object, and filling the channel formed conjointly by the projecting edges of the sheets and the edges of the object, with a fluent self-hardening plastic material.

16. The method of claim 15, said plastic material being polyurethane foam.

17. The method of claim 15, said material being phenolic foam.

18. The method of claim 15, and prior to filling the channel, applying a mold form to and about the edges of the sheets to temporarily enclose the channel and confine the filling material therewithin, and removing the mold form after the material has hardened.

19. The method of claim 18, said form having sprue holes spaced along its length, said filling of the channel being effected by simultaneously forcing the plastic material through all said holes, into the channel.

20. A package comprising a plurality of sets of stacked rectangular plates, a plurality of rectangular sheets of stiff packing material of larger size than said plates, there being at least one said sheet between and separating each contiguous pair of sets of plates, and a respective one of two of said sheets over the outer face of the two outer sets of plates, all said sheets being in registration and projecting outwardly beyond the perimeter of the sets of plates to define therewith a plurality of channels each extending about the perimeter of a respective set of plates, and a self-hardening plastic foam material disposed in a continuous band in and along each said channel and adherent to the surfaces of the sheets contacted thereby.

21. The package of claim 20, each said sheet having a plurality of pairs of parallel cuts in each edge, each pair of cuts defining a slot, said foam material extending through said slots to interconnect all said bands.

No references cited.

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