Nov. 5, 1957 R. A. MULLER 2,812,096

BEAM SUPPORT TYPE BOX STRUCTURE

Filed Jan. 22, 1954 2 Sheets-Sheet 1

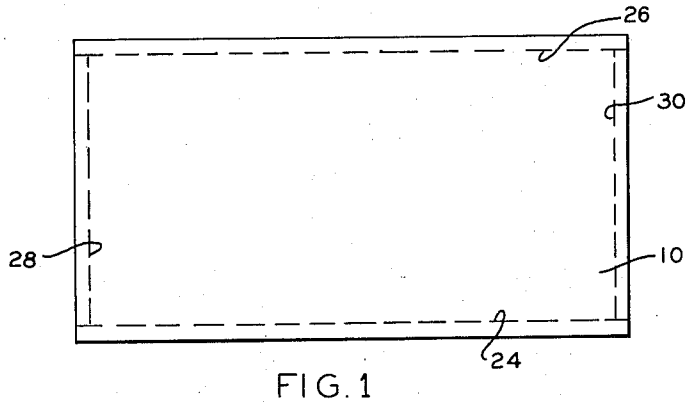


FIG. 1

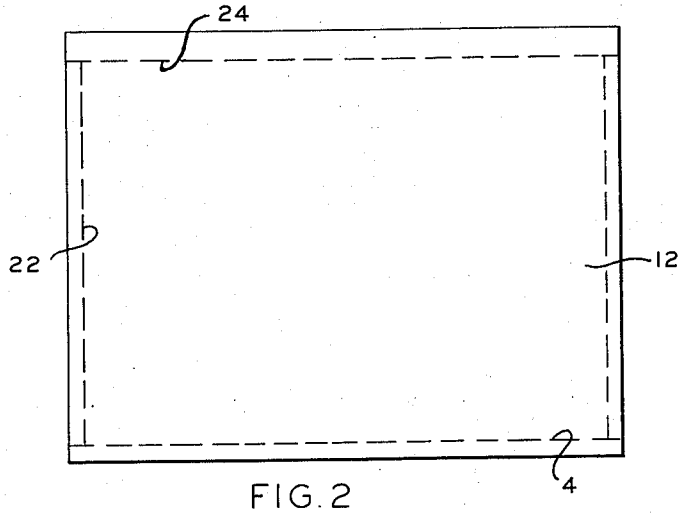


FIG. 2

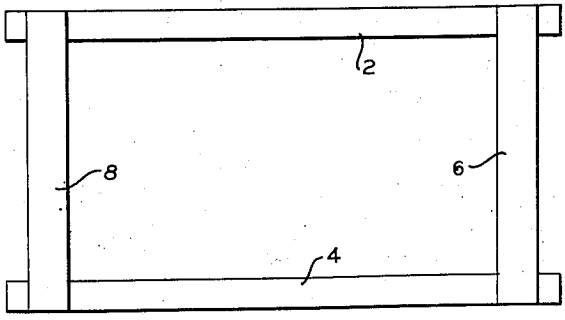


FIG. 3

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BEAM SUPPORT TYPE BOX STRUCTURE

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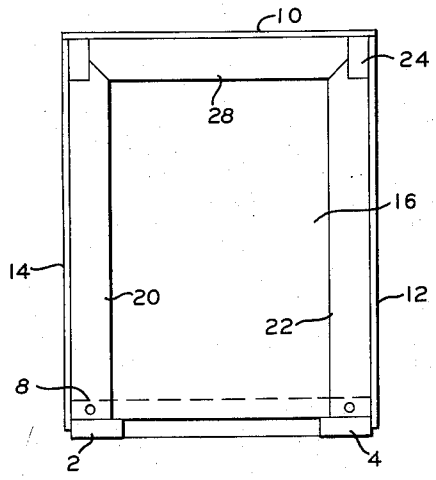


FIG. 4

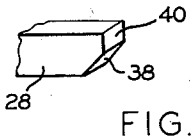


FIG. 7

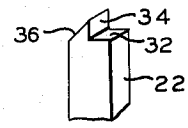


FIG. 8

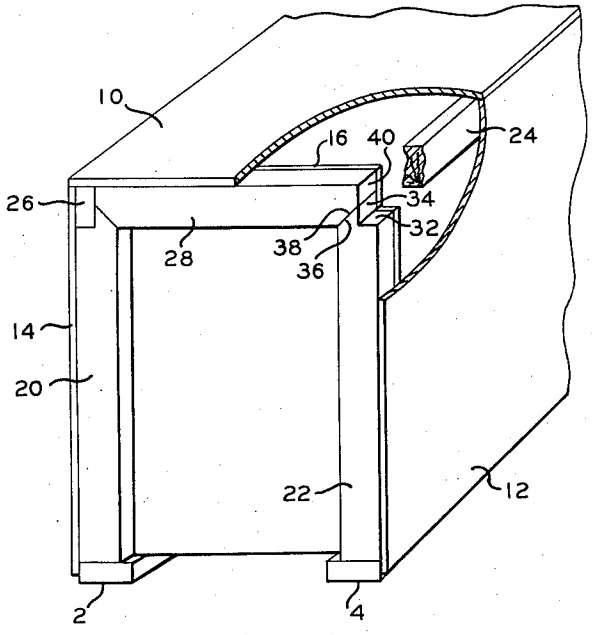


FIG. 5

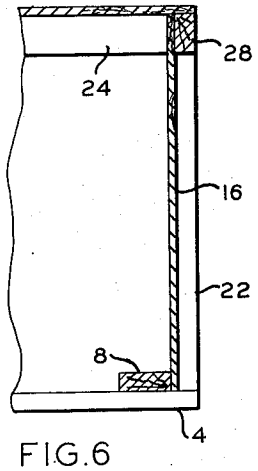


FIG. 6

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BEAM SUPPORT TYPE BOX STRUCTURE

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Application January 22, 1954, Serial No. 405,606

1 Claim. (Cl. 217—65)

This invention relates to an improved packing case construction and more particularly to a special enclosure body for use with a pre-palletized production assembly wherein an article of mechandise is put together while secured on a pallet structure. At the point of crating, the enclosure body of the invention is mounted over the entire palletized unit and secured to the pallet structure so that the latter member constitutes an integral part of the packing case.

In crating or packaging certain types of heavy merchandise, such as electric stoves, for example, it has been found that the general shape and size of a packing case designed to fit around such an article of merchandise lends itself to handling with lift trucks. Especially it is found that a number of cases may be stacked upon one another, as well as being arranged in tiers in closely compacted relationship.

Difficulty has been experienced in building a suitable packing case in which an adequate degree of stacking strength is achieved without excessively increasing the weight or cost of the container and also without having projecting cleat edges or other irregularities at the external surfaces of such crates so as to impede sliding movement of one case against another in the course of stacking operations.

It is an object of the invention to improve packing cases and to provide an enclosure body which can be secured to a pre-palletized unit to comprise an improved shipping container. Another object is to devise a case wherein there is provided a special reinforcing frame work for imparting high stacking strength and resistance to vertically directed load forces so that the case will be able to undergo heavy stacking stresses, such as develop in connection with storing a number of cases in stacked relationship. Another object of the invention is to devise a special reinforcing frame work in which the component parts are arranged to cooperate with one another and with the panel sections of the box so as to produce a high degree of strength and stability without unduly increasing the weight of the shipping case as a whole. Still another object is to devise a unique frame work and covering panel combination which is characterized by smooth uninterrupted panel surfaces on at least three sides of the box so that sliding movement of one against another can be achieved very readily.

These and other objects and novel features will be more fully understood and appreciated from the following description of a preferred embodiment of the invention selected for purposes of illustration and shown in the accompanying drawings, in which:

Fig. 1 is a plan view of the packing case of the invention;

Fig. 2 is a view in side elevation of the case shown in Fig. 1;

Fig. 3 is a plan view of a pallet or base structure with which may be combined the panel sections of the box;

Fig. 4 is an end elevation of the packing case;

Fig. 5 is a fragmentary perspective view showing parts of the bottom frame work broken away;

Fig. 6 is a fragmentary elevational view in partial cross-section of one end of the box;

Fig. 7 is a fragmentary perspective view of one end of a horizontal beam; and

Fig. 8 is a perspective view of an upper end of a column member.

Having in mind the specific objectives noted above and with due regard for limitations as to weight and surface continuity, I have discovered that I may combine a limited number of frame pieces in a novel manner so that an unusually high degree of stacking strength is achieved and so that minimum weight requirements may be satisfactorily preserved.

Essentially I have devised a jointed frame work and covering panel structure in which four vertical column members or corner supports are arranged to support four horizontal beam elements and each column member is formed to provide at its upper extremities two bearing surfaces, upon which surfaces abutting ends of horizontal beam elements are received and supported in a novel manner.

I have further devised a jointed frame work secured in such a manner that all of the external surfaces of the horizontal beam elements lie in common planes with respective external surfaces of the vertical columns, an arrangement which provides for covering the frame work with panel sections whose edges also lie in common planes with respective exposed surfaces of both the horizontal beam elements and vertical column elements.

Considering these structural features more in detail, as shown in the accompanying drawing, attention is directed to Figs. 1 to 3, inclusive, wherein there is illustrated the enclosure body B of the invention in plan view and side elevation in Figs. 1 and 2, respectively. In Fig. 3 there is illustrated a palletized structure P of the type commonly employed in assembling articles of merchandise, such as electric stoves, for example.

The pallet structure includes base cleats **2** and **4** of wood or other suitable material, upon which cleats are secured transverse cleats **6** and **8**. This arrangement provides for the cleats **6** and **8** being spaced away from a floor or other supporting surface and thus affords room for the fork elements of a lift truck to be engaged thereunder.

The principal parts of the enclosure body B include the special jointed frame work already referred to, and a plurality of covering sections, including a top panel section **10**, two side panel sections **12** and **14**, and two end panel sections **16**, as may be more clearly seen from an inspection of Figs. 4, 5 and 6.

In a preferred embodiment of the invention these several panel sections are formed of plywood and the invention will be further described in detail, having in mind the use of plywood, but it should be understood that the invention is not necessarily limited to the use of this material and I may desire to employ various other well known rigid plane media, such as fibrous sheet materials, and other substances.

The special frame work I have devised for supporting the panel sections and for positioning and securing them to the pallet structure P is made up of four vertical column members, two of which have been clearly shown in Figs. 4 and 5 and denoted by the numerals **20** and **22**; and four horizontal beam elements, as **24**, **26**, **28** and **30**.

In accordance with the invention I form the upper extremities of each of the column members with a rabbeted portion which is defined by a horizontal bearing surface **32** and a vertical bearing surface **34**. The horizontal bearing surface **32** extends in one direction throughout a distance corresponding to the thickness of the bottom element **24**, as shown in Fig. 4.

I also form each of the column elements with a bevelled surface **36** which extends upwardly to intersect the vertical surface **34**, as illustrated in Fig. 5, and thus there is provided an inclined bearing area which terminates along a line well below the top of the adjacent beam element **24**.

Such an arrangement makes possible a compound mitered and butt joint of very desirable character from the standpoint of developing high stacking strength. To take advantage of this support structure I form two end beams with complementary bevelled surfaces **38** and intersecting square cut surfaces **40**, in the manner indicated in Fig. 7.

As will be observed from an inspection of Fig. 4, the square cut surfaces **40** are of a size such that they snugly fit against adjacent surfaces of the side beams without extending above these members.

By means of the special mitered and butt joint construction described I find that I am enabled to obtain a very high stacking strength indeed in this shipping container. This high stacking strength is, in part, realized from the fact that each of the horizontal side beam members, as **24** and **26**, are supported between pairs of column members.

At the same time the horizontal end beams are supported on the two pairs of columns occurring at either end of the box by means of the bevelled surfaces, such as **36**. There is achieved in this way a double supporting action in which each column supports both a side beam and an end beam, and neither beam element is allowed to project beyond the other.

An important feature of this structure is the arrangement of the beam elements in a compacted relationship and in recessed relationship with respect to the columns so that a flush arrangement of the panel sections may be carried out. That is, the edges of both the side panels **14** and **16**, as well as the top panel section **16** may all be arranged to occur so that they fall in a common plane with the plane of the surfaces of the columns and end beams at points where these members are exposed.

It will be appreciated from an inspection of Fig. 4 that the two side panel sections when abutted against the columns and side beam elements **24**, for example, may also exert a strong column supporting action with respect to the top panel section **10** which overlaps these side panels. Similarly, the end panel sections, as **16**, are locked between the column members **20** and **22** on one side and the base cleat member **8** on the other side at the bottom of the box and at the top of the box by the adjacent surface of the side beams **24**. It will be observed also that the end panel sections **16** are notched out at their upper corner sections to receive the side beams, as **24**, thereon, and thus the panel sections **16** also exert a strong supporting action with respect to the side beam members **24**.

The stacking strength of shipping cases constructed with the particular frame work and panel section assembly described have been extensively tested on a machine of the so-called "compression" type using a heavy metal compression beam which is resiliently forced downwardly against the top of a packing case solidly supported below the beam. In a series of tests to which boxes of the invention were subjected, it was found that in a size suitable for containing an electric range, for example, the boxes withstood failure and breaking up to loads of as high as from 6,000 to 8,000 pounds. In comparison with this, standard types of packing cases were tested and found to break at pressures of as low as 700 or 800 pounds, running up to perhaps 1,000 or 2,000 pounds.

In assembling the box of the invention several different methods may be employed. Ordinarily the beams and column members, together with the panel sections, may be separately assembled and secured together to form an enclosure body open on one side only. This enclosure body may then be placed over a prepalletized article of merchandise and secured to the pallet structure. In other cases the end panel sections may be separately combined with two column members and respective end beam elements, and the assembly thus produced may be fastened on a pallet structure and the remaining beams and panels mounted thereon. If desired, however, the end panel sections **16** may be located on the pallet **4** and stapled directly to the bottom cleats **8**. Thereafter the column members **20** and **22** can be secured externally of the panel sections **16** and the end beam element **28** placed in position, and, finally, the two side beam elements **24** can be brought into position on the recessed surfaces **32** and the frame work may then be nailed or stapled together. As soon as the complete frame work has been assembled the two side panel sections **12** and **14** may be secured along either side of the frame work in the manner shown in Fig. 4 and, finally, the top panel section **10** is located in overlapping relationship with respect to these side panel sections.

It is pointed out that the several parts of my packing case may be very conveniently secured together by using either hand stapling machines or larger automatic machines, or by ordinary nailing methods. The end beams, as well as the cleats **8**, provide transversely disposed bearing means at both the top and bottom of the case against which the stapling heads may bear in driving fastenings through opposite sides of the panel sections, and particularly into the side beam elements, such as **24** and **26**. All of this is accomplished without there occurring any break in the continuity of the sides of the packing case or the top of the packing case and while the end panels **16** actually occur in recessed relationship with respect to the columns and beam elements, it should be realized that the edges of the panel sections very definitely are caused to lie in a common plane with the exposed surfaces of these columns and beam members. The net result of this flush arrangement is to provide packing cases having surfaces which are convenient to slide, one upon another, and the pallet base of one case may very conveniently be placed upon the top panel section of another case to facilitate stacking and there is no opportunity for jamming or interference to occur, particularly in stacking operations which are to be carried out by means of lifting trucks. Similarly, cases in adjacent stacks can be stored very compactly and there is nothing to impede sliding movement of one case against another case.

While I have shown and described a preferred embodiment of my invention, it should be understood that various modifications may be resorted to within the scope of the appended claim.

Having thus described my invention, what I desire to claim as new is:

In a beam support type box including a base formed by a pair of transversely spaced longitudinally extending base members having their upper and lower faces lying in common planes, and frame members including spaced uprights of less width than the base members, and an upper connecting member between each pair of spaced uprights, the upright members having their bottoms supported at the ends of said longitudinally extending base members with their outer faces flush with the outer edges of said base members and their upper ends formed with outwardly facing recesses defined by horizontal wall portions and vertical wall portions, the vertical wall portions being generally medial of the uprights, beveled faces extending outwardly from the inner walls of the uprights to provide inwardly facing beveled walls, said transverse connecting members having associated beveled lower faces at their outer extremities supported upon the inner beveled faces of the uprights and vertical end wall portions vertically aligned with the vertical walls of the outwardly facing notches of the uprights, panels for said end wall frames having their upper outer corners notched to conform to the laterally facing notches of the end framing, a longitudinally extending upper connecting

member for each side of said frames of generally rectangular cross section and having dimensions for permitting their lower faces to seat in the bottom wall of said notches and their inner side faces to extend across the vertical wall defined by the upper ends of the uprights and the outer ends of the connecting member, side panels overlying the end frames and the longitudinal upper frames and the base members and providing plate girders for increasing the strength of the frame and simultaneously closures for the side walls, and a top plate member

overlying the end and side frames and outer walls and secured thereto.

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