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INJECTION MOULDED PALLETS

This invention relates to knock-down plastic pallets, more especially similar pallets made from injection mould which are strong and lightweight.

Background of the invention

Pallets, which are used for stacking and transport of many materials, have been made from a variety of materials and in a variety of forms. Pallets have, for example, been made from wood, paper and plastics materials. One form of pallet comprises a plurality of spaced stringers with a plurality of deck boards extending transversely of and perpendicular to the stringers. In addition to the deck boards, one or more strengthening members may extend transversely between the stringers on the opposite side from the deck members to provide extra rigidity to the pallets.

Such pallets are preferably designed to be assembled easily so that they can be shipped to a site at which they are to be used in unassembled form thereby occupying less space than an already assembled pallet and then assembled on site using a minimum of tools.

One example of such pallet is illustrated in international application published under the PCT with application number

PCT/LA94/00114. According to said document, it described a knock-down plastic pallet that is made of hollow plastic stringers and deck board for strengthening purposes without adding any significant quantity of material. Although the strength of the stringers and deck boards of said is improved compared to the conventional pallets, but it would be impossible to make such pallets using injection moulding method.

Therefore, it is an object of the present invention to provide a pallet with stronger stringers and deck board yet being light in weight and said pallet made by injection molding method which is more economical compared to the other methods, the stringer and deck board are joined together without the use of screws.

SUMMARY OF THE INVENTION

This invention provides an injection moulded pallet comprising stringers, deck boards, and optionally strengthening members, of plastics materials which can be readily assembled on site with a minimum of tools and without metal fittings, wherein the deck boards and any strengthening members are formed with a first, substantially planar, surface and a second surface provided with a single row of a plurality of aligned upstanding projections having a head portion and a neck portion by which said projections are attached to the second surface, each projection being enclosed within walls extending laterally and transversely of the deck board and standing higher than the portion of the second surface surrounding the projection, and the stringers are

each formed with a plurality of aligned apertures to receive the projections on the deck boards in interlocking relation, adjacent apertures being separated by grooves transverse to the stringers, which grooves are spaced and dimensioned to receive the lateral walls that surround a projection, the walls extending transversely of the deck board being spaced by the width of the stringer such that when a projection on a deck board is fully engaged in an aperture on a stringer a rectangular region of the stringer is received between the walls surrounding the projection on the deck board whereby pivoting movement of the deck board relative to the stringer is prevented, said head portion of said projections having at least one axial slot to enable the head portion to be resiliently compressed or expanded when inserted into an aperture or a pair of adjacent apertures respectively, and to return to its original shape after passage through the aperture by interaction of a surface on the head portion against a surface bounding the aperture.

In one arrangement accordingly to the invention, the head portion is larger than the neck portion and the projections have a step portion at the junction of head and neck portions. The head portion is preferably tapered towards its free end to allow easy insertion into the aperture. On passage through a tubular aperture of length substantially the same as the length of the neck portion, the head portion is compressed to the extent allowed by the width of the slots and on exiting the aperture the head expands resiliently so that the step engages against the rim of the aperture thus locking the head portion in the aperture.

In an alternative arrangement the head is formed with a median axial slot with an internal step on each side such that when a web separating a pair of apertures in the stringer is inserted into the slot, the head portion is resiliently expanded by the web passing between the steps. When the entire depth of the web has entered the slot, the head portion snaps back to its original configuration with the steps engaged beneath the web to lock the head portion in position. In this case the head portion may, if desired, be narrower than the neck portion.

DESCRIPTION OF PREFERRED EMBODIMENT

The invention will now be described in greater detail by way of example with reference to the drawings, in which:-

Fig. 1 is a perspective view of a pallet according to the invention;

Fig. 2 is a exploded partial view of the pallet of Fig. 1;

Fig. 3 is a section on line A-A in Fig 1;

Fig. 4-7 shows alternative forms of means for fixing the pallet together.

As shown in Figs. 1 to 3, the pallet comprises elongate, generally rectangular deck boards (1), stringers (2) and strengthening members (3). As shown there are four deck boards (1), three stringers (2) and three strengthening boards (3) but these numbers may be altered as desired depending on the size and strength of pallet required. The deck boards (1) and strengthening member (3) are generally planar on one surface and

on the other surface have a line of spaced circular section projections (4). Each projection (4) is enclosed by four walls, two walls (16) extending laterally of the deck board (1) and two (6) extending transversely of the deck board (1). Walls (6) and (16) stand higher than the region (19) enclosed thereby. Outside of walls (6) the surface of the deck board (1) between extensions of lateral walls (16) has reinforcing ribs (5) which extend to the level of the top of walls (16). The projections (4) are hollow and each comprise a cylindrical neck portion (7) and a head portion (17) which is of generally larger diameter and which has axial slots (18) which extend from its free end slightly into the neck portion (7). A horizontal step (19) is formed at the junction of neck portion (7) with head portion (17). Head portion (17) is slightly tapered towards its free end.

Stringers (2) are in the form of generally parallel sided, elongate blocks and have on two opposed surfaces a series of aligned spaced apertures (14) leading to tubular portions (8) for receiving projections (4) on the deck boards (1) and strengthening members (3). The apertures (14) are separated by grooves (10) transverse to the stringers (2) and spaced such that the adjacent edges of two grooves (10) can be received snugly between the walls (16) in the two sides of a projection (4) received in an aperture (14). The width of stringers (2) is such that its edges (11) can be snugly received between the walls (6) of a deck board (1).

The tubular portions (8) are of such length that when a

projection (4) has been fully inserted through a tubular portion (8) with the deck board (1) lower surface in contact with the surface of stringer (2), the step (19) between the head portion (17) and neck portion (7) abuts the free end of tubular portion (8) to form an interlock. Slots (18) and the taper of neck portion (17) allow the head portion (17) to pass easily through the tubular portion (18) even though the head portion (17) is of larger diameter than the aperture (14) and tubular portion (8).

In order to save weight without greatly detracting from strength the stringers may be formed with strategically positioned cut-out portions such (9). The area around tubular portions (8) may be generally open with the tubular portions (8) being supported by a spider arrangement (13) and strengthening ribs (15). As shown in Fig. 3, the strengthening members (3) fit to the stringers in the same manner as the deck boards (1).

The pallet as shown is preferably made from polypropylene, preferably from injection moulded units. Injection moulding method would enable units to be produced fast and at a moderate price. As will be appreciated, because there are no screws or other metal fixings used in the assembly of the pallet, recycling of the plastic material presents no difficulties in separation of different materials.

Fig. 4 to 6 show alternative forms of projection (4) and aperture (14) shape. In Fig. 4, the projections are of triangular section, in Fig. 5 of oval shape and in Fig. 6, of rectangular

shape.

In all other respects, the pallet is identical to that shown in Figs. 1 to 3. Fig. 7 shows a second form of interlock for a pallet.

In this case, the projections are in the form of webs (21) transverse to the deck boards. Webs (21) have an axial slot (22) which extends almost to the surface of the deck board (1). At the free end of slot (22) are inwardly facing step portions (23).

The stringers (2) are formed with rectangular, through apertures (24) separated by transverse webs (25) of depth equivalent to the length of web (21) between step portions (23) and the surface of deck board (1) and of width substantially equal to the width of slot (22). The outer ends of webs (25) have a slot (26) to receive the unslotted portion (27) of web (21).

In assembly of this form of pallet, the web (25) is inserted between step portions (23) of web (21) until the unslotted pattern (27) of web (21) lies in slot (26). At this point, step portions (23) snap back to their original position to lock under the inner end of web (25). Longitudinal movement of deck boards (1) is prevented by the engagement of unslotted portion (27) in slot (26) and lateral and pivoted movement is prevented by engagement of side walls (16) in transverse grooves (10) as in the arrangement of Figs. 1 to 3.



CLAIMS

1) An injection moulded pallet comprising stringers (2), deck boards (1) and optionally strengthening members (3), of plastics materials which can be readily assembled on site with a minimum of tools and without metal fittings, wherein the deck boards (1) and any strengthening members (3) are formed with a first, substantially planar, surface and a second surface provided with a single row of a plurality of aligned upstanding projections (4) having a head portion (17) and a neck portion (7) by which said projections (4) are attached to the second surface, each projection (4) being enclosed within walls (6, 16) extending laterally and transversely of the deck board (1) and standing higher than the portion of the second surface surrounding the projection (4), and the stringers (2) are each formed with a plurality of aligned apertures (14) to receive the projections (4) on the deck boards (1) in interlocking relation, adjacent apertures (14) being separated by grooves (10) transverse to the stringers (2), which grooves (10) are spaced and dimensioned to receive the lateral walls (6) that surround a projection (4), the walls (16) extending transversely of the deck board (1) being spaced by the width of the stringer (2) such that when a projection (4) on a deck board (1) is fully engaged in an aperture (14) on a stringer (2) a rectangular region of the stringer is received between the walls (6, 16) surrounding the projection (4) on the deck board (1) whereby pivoting movement of the deck board (1) relative to the stringer (2) is prevented, said head portion (17) of said projections (4) having at least



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one axial slot (18) to enable the head portion (17) to be resiliently compressed or expanded when inserted into an aperture (14) or a pair of adjacent apertures (14) respectively, and to return to its original shape after passage through the aperture (14) by interaction of a surface on the head portion (17) against a surface bounding the aperture.

2) A pallet according to claim 1, wherein the head portion (17) is larger than the neck portion (7) and the projections have a step portion (19) at the junction of head (17) and neck (7) portions.

3) A pallet according to claim 1 or claim 2, wherein the head portion (17) is tapered towards its free end to allow easy insertion into the aperture.

4) A pallet according to claim I, wherein formed with a median axial slot (22) with an internal step (23) on each side such that when a web (25) separating a pair of apertures (24) in the stringer (2) is inserted into the slot (22), the head portion (17) is resiliently expanded by the web (25) passing between the steps (23).

5) A pallet according to claim 4, wherein there is a smooth transition between the head portion (17) and the neck portion (7) and the head portion (17) is narrower than the neck portion (7).