This invention relates to load-carrying pallets and more especially to improved leg constructions for pallets which have the legs formed of material displaced from the platform of the pallet. These pallets also can be made from fibre board, plastics, or light metals. If made of corrugated paper, the pallets can be made of single, double, triple, quadruple or more thickness. The invention permits the making of an industrial load carrying pallet from a flat sheet with a simple die cut. These pallets are stored as flat sheets after being die cut, and when required for use, the legs are bent down by hand, without the use of tools or jigs.

These pallets have the advantage of low cost and can be used for shipping certain types of merchandise without requiring the inconvenience and expense of returning the pallets to the shipper. In addition to the advantage of being made of low-cost material, such pallets can be manufactured more economically by displacing from the pallet blank portions of materials which can be folded to form the pallet legs. It is an object of this invention to provide an improved pallet construction, and especially for pallets where the leg is made of a panel displaced from the pallet platform.

It is another object of the invention to provide a folding leg, for a pallet of the character indicated, having tabs which hold the legs in their working position and with the tab held against the platform by the weight of the load on the platform. This has the advantage of eliminating the necessity for adhesive or other securing means for holding the legs in place, and thus reduces the set-up time required when preparing pallets for use. By using the load on the platform to hold the tabs, the force for holding the tabs is automatically increased as the strain on the legs is increased by additional loads placed upon the platform.

Posters of the invention relate to the shape of the area displaced from the platform to form the legs, to the provision of upper edges of the legs which bear against the load through the opening cut in the platform and to expedients for providing hinge connections between different panels of the displaced material from which the legs are made.

This invention is an improvement on the constructions shown in my co-pending application Serial No. 653,392 filed April 17, 1957, now Patent No. 2,951,669.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawing, forming a part hereof, in which like reference characters correspond parts in all the views:

FIGURE 1 is a fragmentary end view of a pallet showing several different kinds of legs made in accordance with this invention;

FIGURES 2, 3 and 4 are enlarged, fragmentary views showing the various legs of FIGURE 1 before the material is folded to form the bottom of the leg;

FIGURE 5 is an enlarged end view showing a modified form of the left-hand leg of FIGURE 1;

FIGURE 6 is a sectional view showing the way in which a leg is formed from the material displaced from the platform;

FIGURE 7 is a fragmentary, top plan view of a pallet showing the area of material displaced to form one of the legs.

FIGURES 8 and 9 are fragmentary views, similar to FIGURE 7, showing modifications of the structure of FIGURE 7; and FIGURES 10, 11 and 12 are enlarged sectional views taken on the lines 10—10, 11—11 and 12—12, respectively, of FIGURE 7 but showing the legs in working positions.

FIGURE 13 is a top plan view of the hinge shown in FIGURE 2.

FIGURE 1 shows part of a pallet 29 having a platform 22 supported by a number of different legs 24, 25 and 26. Each of these legs is preferably constructed of material displaced from the platform 22 at angles to the platform along a hinge line. In the construction illustration, the platform 22 is made of four laminations of corrugated paperboard with the outer laminations thinner than the inner laminations, but it will be understood that this is merely illustrative of the laminated construction. Although intended for corrugated paper, other materials can be used to make equivalent constructions. Each lamination consists of upper and lower liners bonded to the corrugated medium between them in accordance with conventional practice.

The leg 24 has a first panel 28 which is connected to the platform along a hinge line having a score 30. At its lower end, the panel 32 along a score area 34 which extends across the width of the leg. This score area 34 is formed by crushing the edges of the panels 28 and 32 to a thinner section at the score area 34, as best shown in FIGURE 2.

 Crushed material may be removed but prefer to leave it in place. The upper plies of the panels 28 and 32 are cut along planes 36, shown in FIGURE 2, so that the material over the area 34 can be compressed without pulling down adjacent material of the panels 28 and 32. The panel may have similar cuts at right angles to the cuts 36 and at spaced regions along these cuts to prevent the ends of crushed laminations from moving beyond the leg areas during the crushing operation. The depth to which the material is cut along the planes 36 depends upon the thickness of the laminations, the number of laminations and the angle to which the panels 28 and 32 must be moved with relation to one another in setting up the leg 24. At last the lower liner should not be cut.

When the panels 28 and 32 are moved from the position shown in FIGURE 2 to that shown in FIGURE 1, there is some further crushing of the upper edge portions of the top laminations and to a lesser extent the lower laminations are crushed to form the angular leg 24. This produces a strong leg because the panels 28 and 32 are in contact with one another over a large extent at the area 34; and the lower ends of the panels 28 and 32 are securely held together by the portion of the original material which was not cut along the planes 36.

The panel 32 extends upwardly to the platform 22, and in the construction shown it extends through the opening in the platform from which the material for the leg was displaced. At its upper end, the panel 32 has a tab 38 extending across a portion of the top surface of the platform 22. This tab 38 is formed by crushing all of the laminations of tab 38 to produce a relatively thin tab but without removing any material and thereby retaining the strength of the tab 38.

When a load is placed on the pallet 20, the load clamps the tab 38 against the top surface of the platform 22 and thereby holds the panel 32 from folding and thus maintains the leg 24 in its working relation to the platform. If the load consists of sheet material stacked upon the pallet, then a substantial portion of the weight will rest upon the tab 38 for holding the tab clamped against the platform. If the load consists of small pieces contained within a box, then the bottom of the box will rest upon the tab 38. In those cases where the load is made up of a number of
stacks of substantially smaller size than the platform, or for any other reason the tab 38 may have no weight upon it, then a flat panel, such as a loose sheet of corrugated paperboard, is placed on the platform 22 to insure a pressure on the tab 38 when the platform is loaded as a rule, most loads are strapped to pallets.

The leg 25 is similar to the leg 24 except at the bottom of the leg where the panels are connected. In the leg 25, there are panels 41 and 42 corresponding to the panels 38 and 39 of the leg 24. When the pallet is manufactured, a cut 44 is made at the juncture of the panels 41 and 42, the cut being made from the underside of the pallet. This cut 44 is shown extending through three laminations of the material, but the depth of the cut will depend upon the thickness of the laminations and upon how sharply the leg is to be bent.

When the leg 25 is set up, the panels 41 and 42 are bent along the line of material remaining above the cut 44 to form a leg with the bottom shape shown in FIGURE 1. When the leg 25 is loaded, however, the laminations in contact with the ground or floor will crush to some extent and thus provide larger areas of contact with the floor or ground. Because of the angular relation of the panels 41 and 42, the pallet load tends to push the lower ends of these panels together, and it is not necessary, therefore, for them to have a strong lugged connection between them.

The upper end of the panel 42 has a tab 38 similar to the tab on the panel 32 of the leg 24.

The leg 26 is similar to the leg 24, though facing in the opposite direction from its score line 30, except that the lower end of the leg has a score area 48 which is provided by crushing the laminations at the juncture of the panels 51 and 52. This score area 48 differs from the score area 34 of FIGURE 2 in that no cuts are made through the laminations and this results in some pulling down of the top laminations on both sides of the score area 48. Although shown on platform having four laminations, the construction of FIGURE 4 is more suitable for pallets made of thinner material, such as pallets with three or fewer laminations. The leg 26 has a tab 38 at its upper end.

FIGURE 5 shows a leg construction which is similar to the leg 24, the panels being indicated by the same reference characters with a prime appended. This leg 24' has its panels extending vertically, and it has the other panel 32' at an acute angle. All of the panels 41' of FIGURE 5 can be constructed in this way with one panel vertical, if desired.

FIGURE 6 shows the way in which the legs are displaced from the platform 22 and folded into working position. The construction shown in FIGURE 6 has panels 56 and 57 joined together along a score area 60. These panels fold into the positions shown in solid lines to form a leg 62. The panel 56 has tabs 64 at its upper end in contact with the top surface of the platform 22.

FIGURE 7 is a top view of the platform 22 and shows the shape of the panels 56 and 57, and the location and shape of the tabs 64. The material for the leg 62 is cut from platform 22 along the solid lines shown in FIGURE 7, but remains attached to the platform along the score line 30 which is indicated in dotted lines. Score 30 may be made as shown in FIGURE 2. The score area 60 will be wide or narrow, depending upon the thickness of the panels and whether the panels are to be folded according to the different expedients illustrated in FIGURES 2-4. The expression "score area" is used herein to indicate a score which may be a region partially cut through and of narrow extent as shown in FIGURE 3, or of very wide extent, as shown in FIGURES 2 and 4. Various other kinds of score areas can be used with some features of this invention.

Referring again to FIGURE 7, the side edges of the panel 57 are cut to provide notches 66 in the platform 22. The panel 56 diverges toward an upper edge 70 so that the upper edge of this panel 56 is wide enough to extend into the notches 68.

When the leg 63 is folded into a working position, the notches 68 are engaged by the upper edge 70 and they hold the upper edge of the panel 56 against movement parallel to the platform 22. Since the pallet is originally unloaded, means are also provided for preventing the upper edge 70 from moving upward through the opening in the pallet and this means consists of depressed portions 72 at opposite ends of the upper edge 70 and in position to contact with the bottom of the pallet just beyond the notches 68.

Openings 74 are punched through the platform 22 for receiving the tabs 64. These tabs 64 are substantially longer than the remainder of the panel 56 and they are crushed at the time that the panels are cut from the platform 22 so as to leave only thin obstructions on the top surface of the platform 22. Although it is preferable to have the tab 64 bent outwardly across the platform 22 beyond the openings 74, as shown in FIGURE 1, the tab 64 can be bent the other way so as to form an acute angle with the panel 56 when the leg is set up. It is apparent from FIGURE 7 that there is a solid area of the platform 22 extending in both directions from the opening 74 for contact with the tab 64 regardless of which way the tab is bent.

FIGURE 8 shows a construction which differs from FIGURE 7 in the notch construction, and similar parts are indicated by the same reference characters as in FIGURE 7 with a prime appended. FIGURE 8 has a notch 68' at each side of a panel 57' and this notch 68' is long enough to receive the tabs 64'. Thus, in the construction shown in FIGURE 8, the longer notch 68' takes the place of both the notch 68 and the opening 74 of FIGURE 7.

FIGURE 9 shows another modification of the construction shown in FIGURE 7. In this second modified construction, a panel 57a is displaced from the platform 22 along a line which leaves a notch 68a similar to the notch 68 of FIGURE 7, but instead of having an opening 74 in line with the notch 68, as in FIGURE 7, the construction shown in FIGURE 9 has an opening 74a offset from the notch 68a in one direction, but preferably with the outer limit of the notch 68a in substantial alignment with the inner limit of the opening 74a. An upper edge 70a extending in FIGURE 9 engages in the notch 68a and a tab 64a has to be long enough to extend first across the bottom of the platform and then upwardly through the opening 74a and then across the top of the platform as with the other tabs previously described.

There is a cut 77 increasing the length of the tab 64a so that the upper edge 70a of the panel 56a can extend through the notch 68a to the top level of the pallet platform and still permit the tab 64a to be bent across the bottom of the platform to reach the opening 74a. It will be understood that the construction shown in FIGURES 7 and 8 are preferably symmetrical and that only one side of the panels is shown in order to simplify the drawing.

FIGURE 10 is a sectional view, on the line 10-10 of FIGURE 7, but showing the leg in set-up position. This figure shows the way in which the tab 64 extends through the opening 74a.

FIGURE 11 shows the way in which one of the depressed portions 72 bears against the top surface of the pallet platform 22; and FIGURE 12 shows the way, in which the upper edge 70 extends through the opening in the platform 22 to a level approximately flush with the top surface of the platform so as to have direct contact with the load upon the pallet.

FIGURE 13 shows the hinge area 34 with four cuts 36 extending along the length of the hinge line to permit some movement and realignment of the severed plies as the panels of the leg are folded into angular relation with one another to bring the leg into working position.
under the pallet. Other cults 79 are similar in depth to the cuts 36, but these other cuts extend transversely of the length of the hinge line and permit some readjustment of the positions of the crushed areas of the laminations lengthwise of the hinge line.

The preferred embodiments of the invention have been illustrated and described, but changes and modifications can be made and some features of the invention can be used in different combinations without departing from the invention as defined in the claims.

What is claimed is:

1. A load-carrying board pallet comprising a platform having a top surface on which a load is to be rest and legs formed of material displaced from the platform at various areas spaced from one another both longitudinally and transversely of the total area of the platform, each of the legs comprising two main panels including a first panel connected to the platform along a hinge line, and a second panel connected to the first panel along another hinge line at one end of the second panel, a tab extending from the other end of the second panel, the platform having an opening through which the tab passes, the portion of the tab beyond the opening extending across an area of the top surface of the platform on which the load rests whereby the tab is held in friction contact with the top surface of the platform by the weight of the load on the platform.

2. The load-carrying board pallet described in claim 1 and in which there are two tabs and they are at near opposite sides of the upper end of the second panel and they are similarly held in friction contact with the top surface of the platform by the weight of the load on the pallet.

3. The load-carrying board pallet described in claim 1 and in which there is an opening through the pallet platform separate from the area of the platform from which each of the legs was displaced but adjacent to said area, and the tab of the leg displaced from that area passes through said opening and then extends across the top surface of the pallet immediately beyond one edge of said opening.

4. The load-carrying board pallet described in claim 1 and in which the material for the legs is displaced from the full thickness of the platform so as to leave an opening in the platform, and the top of the second panel across most of the width of said second panel extends through the opening left by the displacement of the leg material from the platform and up to the level of the top surface of the platform for contact with a load carried by the platform.

5. The load-carrying board pallet described in claim 4 and in which the side edges of the second panel diverge from one another as they extend away from the connection of the first and second panels, and the upper end of the second panel has a midportion that extends through the platform opening from which the leg was displaced, said midportion having an upper edge as high as the level of the top surface of the platform for support of the load the upper edge of the second panel being lower beyond the ends of said midportion and contacting with the bottom surface of the platform beyond the opening from which the leg was displaced, and there are two tabs extending from the upper end of the second panel beyond the lower parts of said upper end, and the tabs extend through other openings in the platform separate from the opening from which the leg was displaced.

6. The load-carrying board pallet described in claim 1 and in which the pallet is made of a plurality of laminations of corrugated paper board, and the panels of each leg are connected to one another along lines, and the material is thinner along said lines than elsewhere over the panel areas.

7. The load-carrying board pallet described in claim 1 and in which the pallet is made of a plurality of laminations of corrugated paper board, and the tab is of much less thickness than the load supporting portions of the legs.

8. The load-carrying board pallet described in claim 1 and in which the pallet is made of a plurality of laminations of corrugated paper board, and each leg is of reduced thickness both at the connection of the panels to one another and over the area of the tab which overlies the top surface of the platform.

9. The load-carrying board pallet described in claim 8 and in which the reduced thickness of the leg at the connection of the panels, and the reduced thickness of the tab consist of portions of the legs where the laminations are closer together with at least some of the corrugations flattened out but with the material continuous so that the tensile strength of the leg is maintained across the portions of reduced thickness.

10. A leg structure made of a plurality of corrugated laminations and comprising panels connected together along a hinge line and in which some of the laminations are slit along the hinge line but the severance extends only partway through the thickness of the leg at said hinge line, the confronting faces on opposite sides of the slit consisting of material split apart without removal of any intervening material.

11. The leg structure described in claim 10, and in which the hinge line is of substantial transverse widths and it has two parallel lines of severance at its opposite sides, and the laminations on the hinge line between the two lines of severance have the laminations still in place but at least some of the laminations flattened out to reduce the thickness of the material at the hinge line.

12. The leg structure described in claim 10, and in which the hinge line is of substantial transverse widths and it has two parallel lines of severance at its opposite sides, and material between said lines of severance is displaced from at least some of the laminations and into at least one of the other laminations.

13. A load-carrying board pallet comprising a platform having a top surface on which a load is to rest, and having also a bottom surface and folding legs formed of material displaced from the platform and with each leg hinged at one end to the platform and with another end of each leg partly in contact with the bottom surface of the platform when the legs are in set-up condition, a tab extending from an upper end of each leg and through an opening in the platform and across a load-supporting area of the platform whereby the tab is held in place by the load resting on the platform and the tab.

14. The load-carrying board pallet described in claim 13 and in which there is adhesive also holding the tab in place on the platform.

15. The load-carrying board pallet described in claim 13 and in which parts of the legs extend through openings in the platform and have their upper edges flush with the top surface of the platform, said parts of the legs being held against transverse displacement by the sides of the opening through which they extend.

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