Sept. 6, 1960 L. DAVIDSON 2,951,669

FOLDING INDUSTRIAL PALLET

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Fig. 1

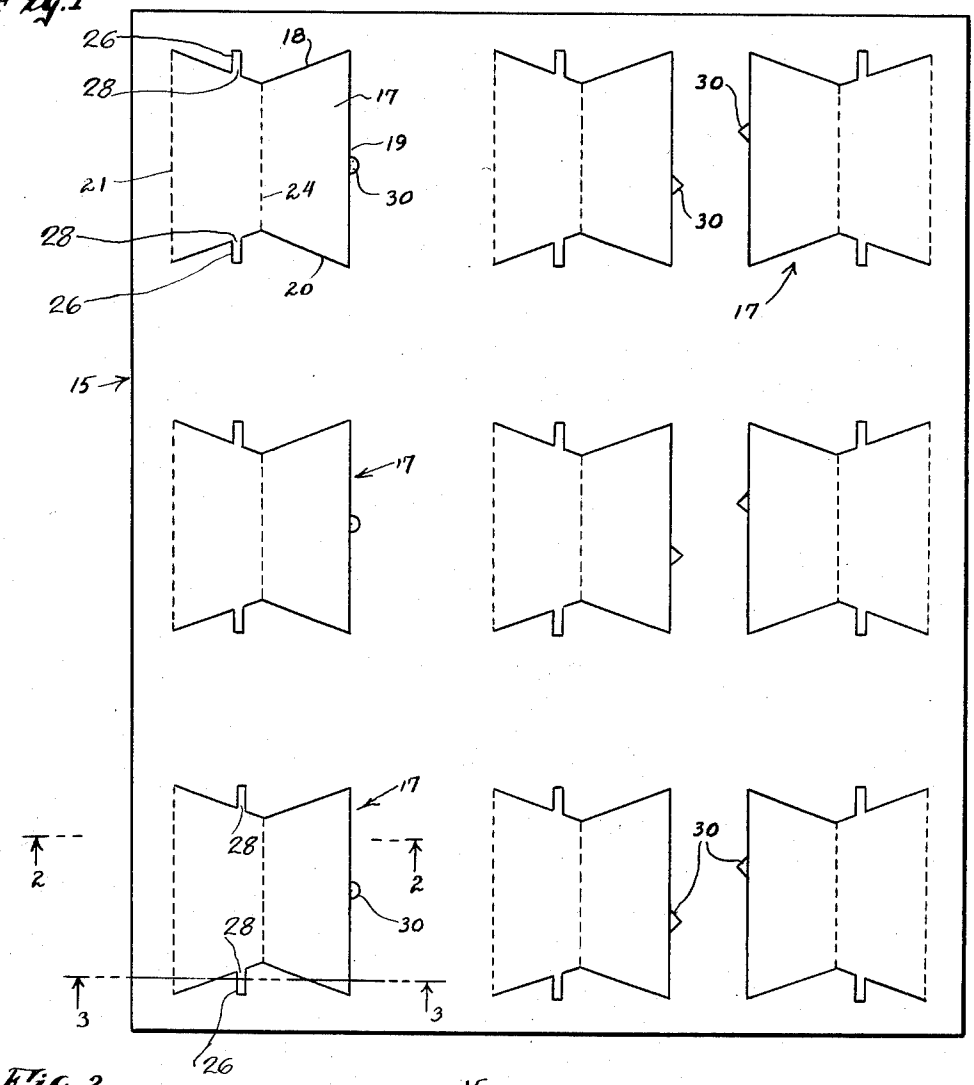


Fig. 2

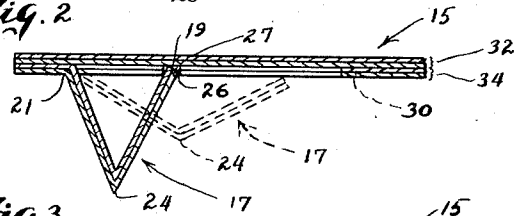
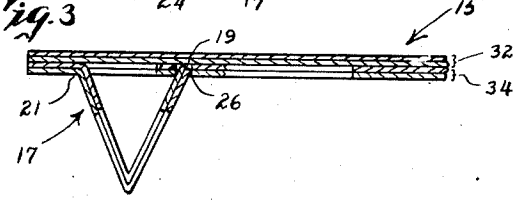


Fig. 3



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Fig. 4

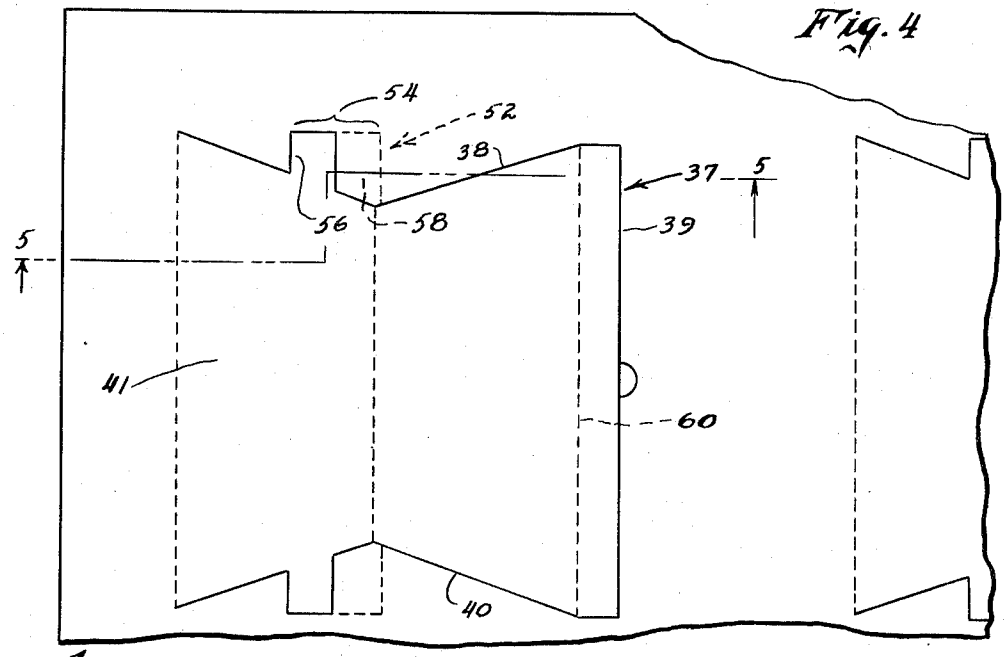


Fig. 5

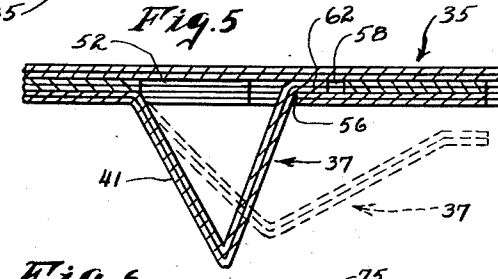


Fig. 8

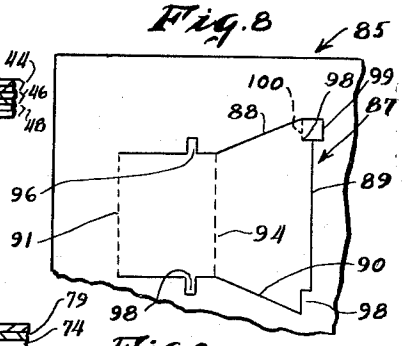


Fig. 6

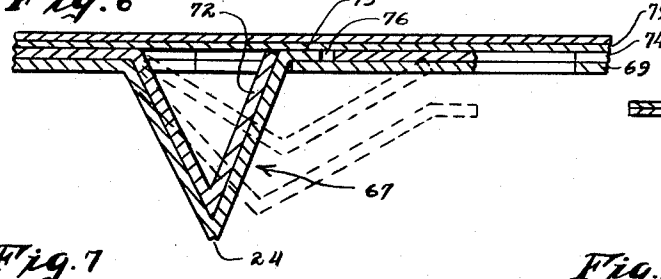


Fig. 9

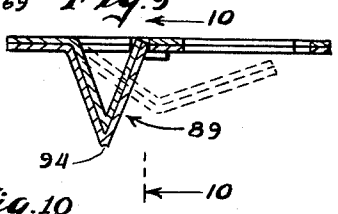


Fig. 7

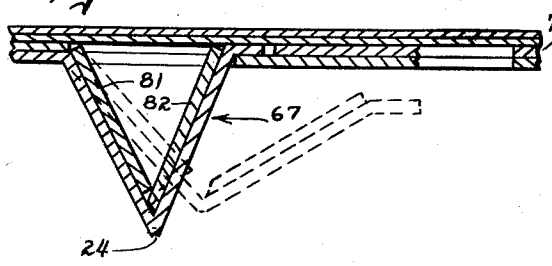
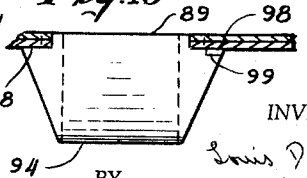


Fig. 10



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FOLDING INDUSTRIAL PALLET

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Fig. 11

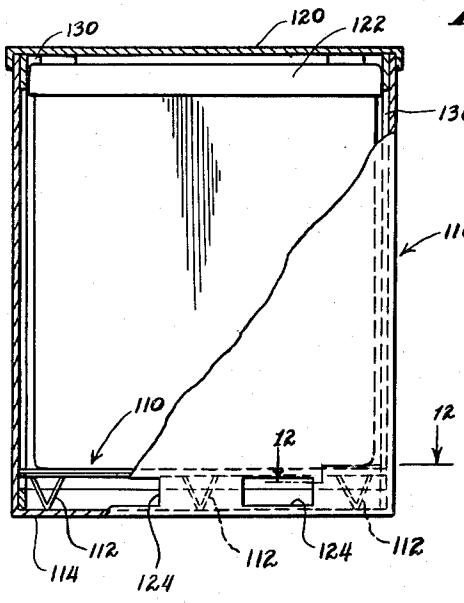


Fig. 12

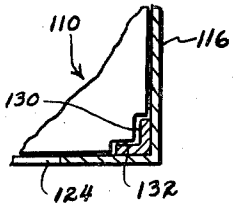
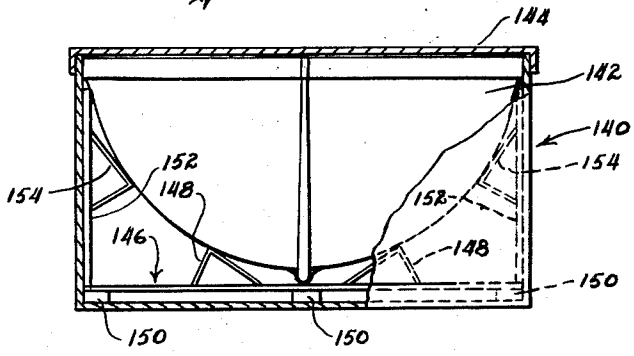


Fig. 13



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United States Patent Office

2,951,669

Patented Sept. 6, 1960

2,951,669

FOLDING INDUSTRIAL PALLET

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Filed Apr. 17, 1957, Ser. No. 653,392

13 Claims. (Cl. 248—120)

This invention relates to folding industrial pallets which are of low cost and can be disposed of after shipping in loaded condition to a customer. The preferred embodiments of the invention relate to corrugated paper board pallets of the type in which leg panels are severed from the pallet along three sides and adapted to hinge downwardly along the fourth side and then fold back to form a pallet leg.

It is an object of the invention to provide an improved pallet of the character indicated and more especially to provide pallets in which the sides of the leg panels converge toward their mid regions to form legs which are wider at their upper ends. This construction permits the edges of the pallet, from which the leg panels are displaced, to be notched or recessed to receive the wide top edge at the free end of panel leg.

Another object of the invention is to provide a pallet construtcion in which leg panels are severed from the platform of a pallet and the leg panels are displaced from the full thickness of the pallet platform with the free end of the leg panel broader than the opening through the pallet at about a mid region of the opening so that part of the free end of the leg panel rests against the bottom of the pallet when the leg panel is folded into operative position.

Other features of the invention relate to constructions of the pallet platform and the leg panels by which the upper ends of the leg panels extend into horizontal recesses under the pallet platform, and by which the pallet legs are formed of several layers of corrugated paper board for stiffening them when folded into operative position.

With the constructions of this invention, the corrugated paper board pallets are more economical to manufacture and are brought to such a low cost that they can be treated as disposable units, thus eliminating the inconvenience and cost of returning pallets after they have been used for the delivery of sheet material or other objects which are supplied on pallets.

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 indicate corresponding parts in all the views:

Figure 1 is a bottom plan view of a pallet made in accordance with this invention;

Figs. 2 and 3 are enlarged sectional views taken on the lines 2—2 and 3—3, respectively, of Fig. 1, but with the leg panels folded into operative position;

Fig. 4 is an enlarged, fragmentary, bottom plan view, of a modified form of the invention shown in Fig. 1;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4, but with the leg panel folded into operative position;

Figs. 6 and 7 are sectional views, similar to Fig. 5, but showing other modified forms of the invention;

Fig. 8 is a fragmentary, bottom plan view of another modified form of the invention; in which the leg panel is displaced from the full thickness of the pallet platform;

Fig. 9 is a sectional view on the line 9—9 of Fig. 8, but with the leg panel folded into operative position;

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 9;

Fig. 11 shows a novel combination of a pallet with a shipping container enclosing the merchandise above the pallet and having lift fork openings in the container under the pallet platform;

Fig. 12 is an enlarged, fragmentary sectional view on the line 12—12 of Fig. 11; and

Fig. 13 shows another combination of pallets with a shipping container enclosing a row boat, the pallet being reversed to provide a cradle for the boat.

Figure 1 shows a pallet 15 having a plurality of leg panels 17 severed from the material of the pallet along three sides 18, 19 and 20. Each leg panel remains connected to the pallet along a line 21 and the leg panel is adapted to hinge along the line 21. This line 21 is a score line in the preferred construction of the invention.

The opposite side edges 18 and 20 of the leg panel converge as they extend away from the side 19 which forms the free end of the leg panel. There is a score line 24 at a mid region of the leg panel 17 and the leg panel is folded back along this score line 24 after being hinged downwardly along the score line 21 in the manner illustrated in Fig. 2.

This construction provides a leg panel in which the free end 19 (Fig. 1) is wider than the mid portion of the panel. The side edges of the space in the pallet from which the leg panel is displaced is formed with recesses 26 into which the free end 19 of the leg panel is inserted when the panel is folded into operative position. When a pallet is to be set up permanently, greater strength, and more rigidity when handling, can be obtained by applying glue or other adhesive to secure the upper edge of leg panel 17 in the recess 26. Such adhesive is indicated by the reference character 27 in Fig. 2. The other modifications of the invention can be similarly treated if set up for permanent service.

In the preferred construction, material displaced from the recesses 26 may be left on the edges 18 and 20 as outwardly extending lugs 28. The advantage of this construction is that there is no waste material to be disposed of in the manufacture of the pallets, and the lugs 28 left on the edges of the panel 17 are not objectionable, although they perform no function. It will be understood that the panels 17 can be made without the lugs 28 if manufactured by a process where disposal of waste punchings presents no problem; and it will be understood further that the side edges of the panel 17 can be different in other ways from the shape of the openings from which they are displaced if other waste material is punched from the pallet between the edges of the panel and the confronting edges of the space from which material is displaced.

As the pallets are originally supplied by the manufacturer, the leg panels 17 are flush with the bottom surface of the panel 15. In order to make it easier to hinge the panels 17 away from the bottom surface of the pallet 15, notches 30 are provided along the free edge 19. A screwdriver or other implement can be inserted into the notch 30 in order to get behind the leg panel 17 to pry the free end out from the bottom surface of the pallet.

The number of leg panels 17 depends upon the size of the pallet and upon the size of the legs. It is a feature of the invention that the leg panels are located in rows and spaced from one another. The rows must be located so as to leave the bottom of the pallet unobstructed, when the legs are in operative position, for contact with the forks of a lift truck. The pallet 15, shown in Fig. 1, is a "four-way" pallet because the leg panels 17 are in

rows which extend not only lengthwise of the pallet but also crosswise. The forks of lift trucks can, therefore, be inserted under pallet **15** from any one of the four sides of the pallet.

Fig. 2 shows the leg panel **17**, in dotted lines, in the process of being folded along the score line **24** to form a leg for the pallet **15**. The panel **17** is shown in full lines in its operative position with the free edge **19** of the pallet inserted into the notches **26** to prevent transverse displacement of the free end of the leg panel. Adhesive can be used in the recess **26** to connect the free end **19** to the pallet, but in the preferred construction this is not necessary because the panel thrusts against the side of the recess **26** with sufficient force to provide enough friction to hold the free end **19** in the recesses **26**.

The pallet **15**, shown in Figs. 2 and 3, has an upper layer **32** and a lower layer **34**. Each of these layers is made of two-ply (double flute) corrugated paper board, and each of the leg panels **17** is severed on lines **18**, **19** and **20**, from the bottom layer **34** before the layers **32** and **34** are connected together during the manufacture of the pallet. Since the upper layer **32** is imperforate, it provides an end wall in the recesses **26**, and support across the entire space between the recesses, against which the free end **19** of the leg panel abuts to support the weight of the panel. It will be understood that the pallet **15** can be made with single flute corrugated board for both layers, or with any combination of single and double flute or other multiple flute board depending upon the strength required; and this is true also of the modified forms of the invention shown in the other figures.

Figs. 4 and 5 show a modified construction which is similar to that described in Figs. 1–3 except that the free end of the leg panel is held in position by a different construction. In Figs. 4 and 5 a pallet **35** has leg panels **37** severed from the material of the pallet along sides **38**, **39** and **40**. A fourth side **41** of the leg panel remains connected to the pallet and has a score line along which the leg panel **37** hinges to swing away from the bottom of the pallet **35** in the same way as already described in the previous figures.

The pallet **35** is made with three layers including a top layer **44** which is preferably imperforate, a middle layer **46** and a bottom layer **48**. Each of the layers **44**–**48** is shown as made of two-ply (double flute) corrugated paper board. The leg panel **37** is displaced from the bottom layer **48** only; but there is a similar opening in panel **46** with notches **52** in its opposite side edges, the length of these recesses or notches **52** being indicated by a brace marked with the reference character **54**. The bottom layer **48** has recesses **56** along the opposite edges of the space from which the leg panel **37** is displaced, but these recesses **56** are not as long as the recesses **54**, thus leaving a portion of each notch **52** which is beyond the lower and shorter notches **56** forming, in effect, an undercut region **58**, best shown in Fig. 5.

The free end **39**, of the leg panel **37**, has a score line **60** along which the leg panel is folded to obtain a horizontally extending portion **62** (Fig. 5) which fits snugly into the undercut region **58** to hold the leg panel in operative position.

Fig. 6 shows a construction similar to Fig. 5, but Fig. 6 has a leg panel **67**, displaced from a bottom layer **69** of the pallet, reinforced by an inner leg **72** displaced from an intermediate layer **74** of the pallet. In the construction illustrated, the pallet is made with a double flute top layer **79**, and single flute layers **69** and **74** for the bottom and intermediate layers, respectively; but it will be understood that the top layer can be single flute board and the other layer, double flute or any desired combinations depending upon the required strength, as previously explained. The leg panel **72** may be secured to the panel **67**, or not, as desired, and it is preferably made shorter than the leg panel **67** so that only the panel **67** has a horizontally extending portion **75** fitting into an undercut region **76** between the lower layer **69** and a top layer **79** of the pallet shown in Fig. 6.

Fig. 7 shows a construction similar to Fig. 6 except that the reinforcing on the leg panel **67** is formed by separate strips **81** and **82** connected to the portions of the panel **67** on opposite sides of its score line **24**. The strips **81** and **82** are attached to the leg panel **67** by adhesive, but they are not attached to the intermediate layer **74** of the panel.

Figs. 8–10 show another modified construction of the invention in which the pallet can be made from a single layer of corrugated paper board; and the leg panels are displaced from the pallet, leaving openings through the top surface of the pallet. This construction shown in Figs. 8–10 is most economical of all those illustrated and is useful for pallets that support sheet material or cartons substantially larger than the openings left by displacement of the leg panels from the pallet.

Figs. 8–10 show a pallet **85** made of a single layer of one or two-ply corrugated paperboard. A leg panel **87** is severed from the pallet along sides **88**, **89** and **90**. The leg panel **87** remains connected to the pallet **85** along a line **91** which is preferably a score line. The opposite sides **88** and **90** converge toward one another as they extend away from the side **89** which forms the free end of the leg panel **87**. There is a score line **94** extending between the opposite sides **88** and **90** and substantially parallel to the hinge line **91** for folding the leg panel **87** back on itself to form a leg for the pallet in the same manner as in the other modifications, and as shown in Fig. 9.

There are notches or recesses **96** in the edges of the space from which the leg panel **87** is displaced, and the free end **89** of the leg panel **87** is inserted into these recesses **96** to prevent its transverse displacement in the same manner as already described in connection with Figs. 1–3. However, in the construction shown in Figs. 8–10, there is no overlying layer of the pallet above the recesses **96** but one or more layers can be added for additional strength, if desired. The free end **89** of the leg panel **87**, is made substantially wider than the distance between the ends of the opposite recesses **96**. The portions of the free end **89** which are located beyond the recesses **96** are designated by the reference character **98** and they are notched out so that the free end **89** between them can extend into the recesses **96** and up to the top level of the pallet platform while the edge portions **98** abut against the bottom face of the pallet **85**.

The extent to which the end portions **98** are notched out is preferably equal to the thickness of the pallet, as measured along the slope of the leg panel **87** when in operative position, so that the free end **89** is flush with the top surface of the pallet when the leg panel is in operative position. This has the advantage of transmitting part of the load on the pallet directly to the leg panel **87** by contact of the load with the portion of the free end **89** which is located between the notched-out end portions **98**. This construction with the free end **89** flush with the top surface of the pallet between the notched-out end portions **98** is best shown in Fig. 10.

On one side of the panel **87**, the notched-out end portion **98** is formed by severing the panel from the pallet platform, as shown at the lower notched-out end portion in Fig. 8. At the other side of the free end **89**, the notched-out end portion **98** is formed by bending over a tab **99** which is hinged to the leg panel along a score line **100**. This tab **99** contacts with the bottom face of the platform of the pallet **85** and it can be glued or otherwise secured to the bottom face of the platform when the pallet is to be set up for greatest strength and repeated use.

The sides of the leg panel **87**, to the left of the score line **94** in Fig. 8, are shown parallel. This construction reduces the distance between the ends of the opposite notches **96** and thus reduces the necessary width of the free end **89** of the leg panel, but it will be understood that

the sides of the leg panel **87** near the hinge line **91** can diverge toward the hinge plane if desired, and it will be understood further than the other modifications of the invention can have parallel sides near their hinge lines, if desired.

Fig. 11 shows a pallet **110** with legs **112** resting on the bottom **114** of a box or container **116**. The container **116**, which is preferably imperforate above the platform of the pallet **110** and closed at the top by a cover **120**, encloses merchandise **122** which may be a refrigerator, stove, or other article. Below the platform of the pallet **110** there are openings **124** through the front and back walls of the box or container **116**. These openings **124** are for the admission of lift truck forks into the space under the platform of the pallet **110** when the container **116** and its contents are to be lifted.

Figures 11 and 12 show a reinforcing brace **130** extending downwardly in a corner of the container **116**. There are similar braces **130** in each corner. These braces permit loaded containers to be piled on one another because they transmit the load of a superimposed container to the supporting surface on which a bottom container rests without putting this extra load on the merchandize in the bottom container or on the pallet **110** on which the merchandize **122** in the bottom container rests. The corners of the pallet **110** are cut out at **132** to provide clearance for the braces **130**.

The pallet **110** may be of any desired construction, but for the purposes of Figures 11 and 12, it is desirable to employ one of the pallet constructions of this invention because of the low cost and expendible nature of these pallets.

Fig. 13 shows a box or container **140** for shipping a row boat **142**. The box **140** is closed by a cover **144**. Ordinarily, built-up packing or bilge blocks would be used to stabilize the boat **142** in the shipping box **140**. In Fig. 13 a pallet **146** is placed in the bottom of the box **140** with the pallet upside down and with legs **148** of the pallet set up to serve as bilge blocks and provide a cradle for the boat **142**. The pallet **146** can be placed directly on the bottom of the box **140**, but in the construction illustrated, there are stiffening strips **150** extending lengthwise of the box **140** beneath the pallet **146**.

For still further stabilizing the boat **142** in the box **140**, there are two other pallets **152** with their top surfaces placed against the sides of the box **140**, and with one row of legs **154** set up along each of the pallets **152** and in contact with the hull of the boat. The box **140** can be made with openings for the forks of a lift truck, but ordinarily boats are of large bulk for their weight and are not handled with lift trucks.

Other changes and modifications in the invention can be made, and some features can be used in different combinations without departing from the invention as defined in the claims.

What is claimed is:

1. An industrial pallet including a platform made of sheet material, a plurality of leg panels, each of which is made of material of the platform severed therefrom along three sides of the panel and adapted to hinge with respect to the platform along the fourth side which remains connected to the platform, each of the leg panels having a score line extending from one side to the other of the leg panel at a mid region thereof and along which the leg panel is folded to form a leg with the score line at the bottom of the leg, the side edges of the leg panel converging as they extend toward said mid region whereby the free end of each of the leg panels is wider than the mid region of the panel and wider than the opening left in the platform by the displacement of said mid region from the material of the platform, the opening in the platform from which each leg panel is displaced being unobstructed and the leg panel fitting therein parallel with the adjacent areas of the platform for flat stacking of a group of similar pallets, the side edges of said opening for each leg adjacent to the mid region of the opening having recesses therein giving the opening a localized increase in width into which the wide free end of the leg panel engages when the leg panel is folded along its score line and is in operating position for supporting the platform.

2. The industrial pallet described in claim 1 and in which the platform has a bottom layer and the leg panels are displaced from the bottom layer, and the platform has an upper layer which extends across the openings in the lower layer from which the leg panels are displaced.

3. The industrial pallet described in claim 1 and in which the platform is made with at least three layers, and the recesses for the free end of the leg panel are in the bottom layer and in the next layer above, and the recesses in said next layer above are longer than those in the bottom layer so that portions of the bottom layer overlap part of the recesses in the next layer above to form pockets, and there is an area of the leg panel along the free end of said leg panel which tucks into the pockets of the recesses when the leg panel is folded into operative position.

4. The industrial pallet described in claim 3 and in which there are openings of the same general outline as the leg panel in both the bottom layer and the next layer above, but the leg panel itself is formed of material of the bottom layer only.

5. The industrial pallet described in claim 3 and in which the leg panel is made of material displaced from both the bottom layer and the next layer above, but the area of the leg panel which tucks into the undercut of the recess is formed of material displaced from the bottom layer only.

6. The industrial pallet described in claim 3 and in which the leg panel is attached to the bottom layer only but is reinforced by separate strips of corrugated paper board secured to the leg panel on opposite sides of the score line which is at the bottom of the leg panel when said panel is in operative position.

7. A board pallet having a platform made of a flat sheet, legs made of material displaced from the sheet and leaving openings into which the legs fit in flat condition for shipping a stack of pallets, the legs having top surfaces that bear against the under side of the platform when the legs are folded out in operating position, and a tab on each leg with a surface parallel to a bottom surface of the platform and in position to contact with said bottom surface of the platform and to be connected thereto so as to assist in holding the leg in position on the pallet.

8. A board pallet made of a flat sheet, the sheet having cuts therein, with the cuts in such relation that cut parts are displaceable from the sheet and bent downwardly into position to form protruding legs to support the platform.

9. A board pallet made of a flat sheet, the sheet having cuts therein, with the cuts in such relation to permit parts of the sheet to be bent into position to form protruding legs when in working position, and means provided within the limits of this same sheet for holding the protruding legs in position.

10. A board pallet made of a flat sheet, the sheet having cuts therein, with the cuts in such relation to permit parts of the sheet to be bent into position to form protruding legs when in working position, means provided within the limits of this same sheet for holding the protruding legs in position, and one edge portion of the leg extending beyond the open part of said sheet and having its upper edge substantially flush with the top of the sheet.

11. A board pallet having a platform made of a flat sheet, the sheet having cuts therein, with the cuts in such relation to permit parts of the sheet to be bent into position to form protruding legs when in working po-

sition, means provided within the limits of this same sheet for holding the protruding legs in position, and one edge portion of the leg extending through an open part of said sheet and having its upper edge substantially flush with the top of the sheet and part of the leg extending beyond the open part of said sheet and having its upper end bearing against the underside of the pallet platform.

12. A board pallet having a platform made of a flat sheet, the sheet having cuts therein, with the cuts in such relation to permit part of the sheet to be bent into position to form protruding legs when in working position, means provided within the limits of this same sheet for holding the protruding legs in position, and one edge portion of the leg extending through an open part of said sheet and having its upper end substantially flush with the top of the sheet and part of the leg bearing against the underside of the pallet platform, and the part of the leg bearing against the underside of the pallet platform having an extension that forms a tab for holding the leg in working position.

13. A board pallet having a platform made of a flat sheet, the sheet having cuts therein, with the cuts in such relation to permit parts of the sheet to be bent into position to form protruding legs when in working position, means provided within the limits of this same sheet for holding the protruding legs in position, one edge portion of the leg, when held by said means, extending through an open part of said sheet and having its upper end substantially flush with the top of the sheet, and part of the leg bearing against the underside of the pallet, and a tab connected to the leg near said edge portion and having at least a part of its length extending parallel to a face of the platform.

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