Dec. 16, 1947. D. D. ADAMS ET AL 2,432,849

MATERIAL CARRYING PLATFORM

Filed Sept. 4, 1945 2 Sheets-Sheet 1

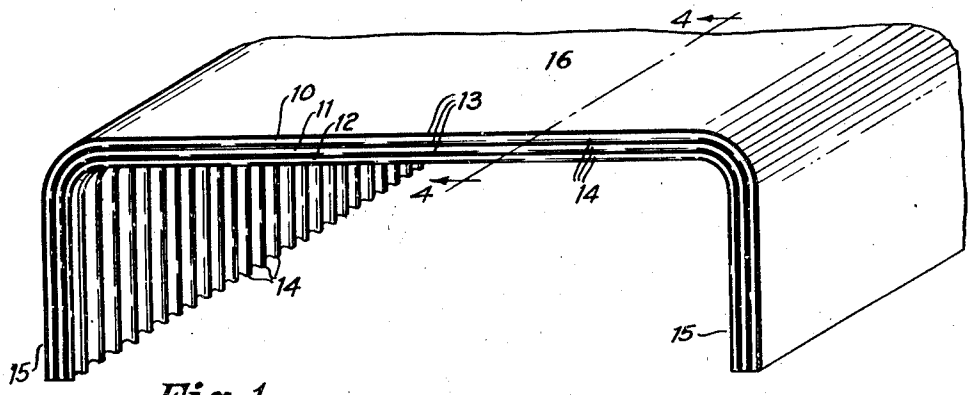


Fig. 1

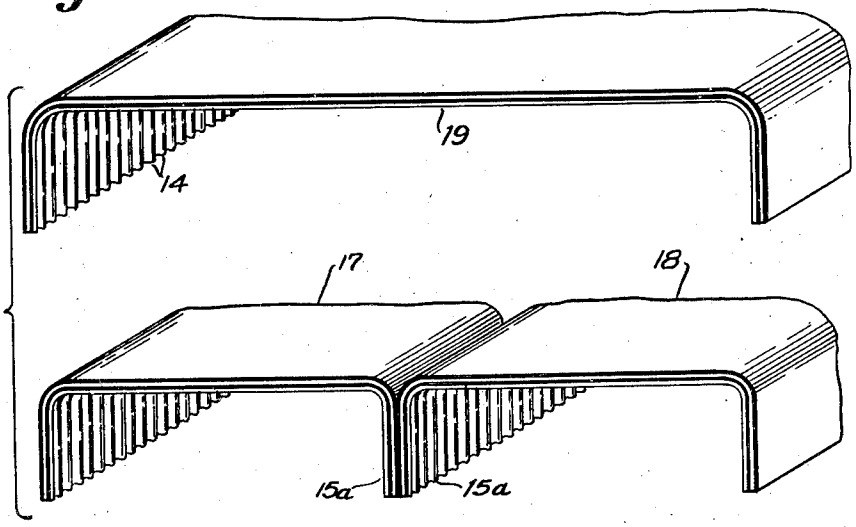


Fig. 2

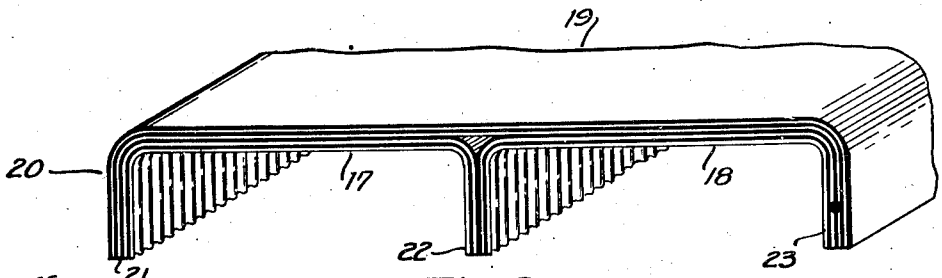


Fig. 3

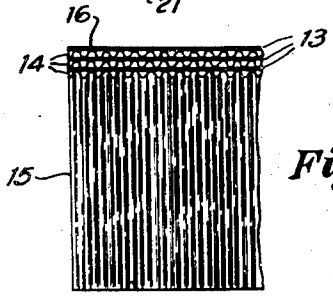


Fig. 4

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MATERIAL CARRYING PLATFORM

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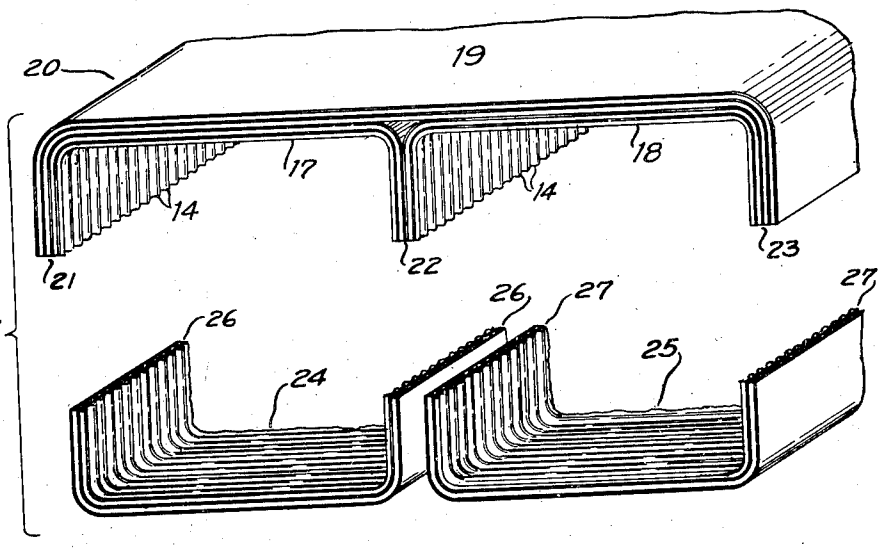


Fig. 5

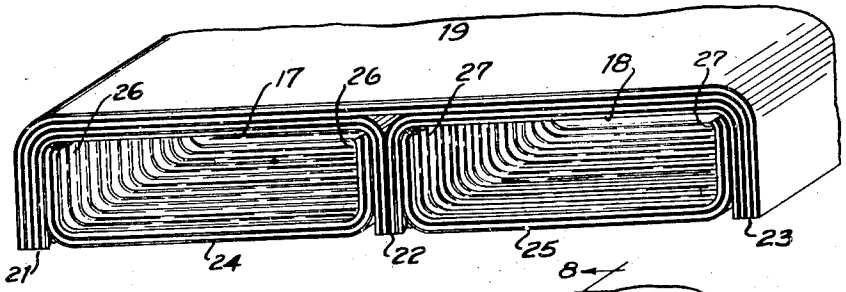


Fig. 6

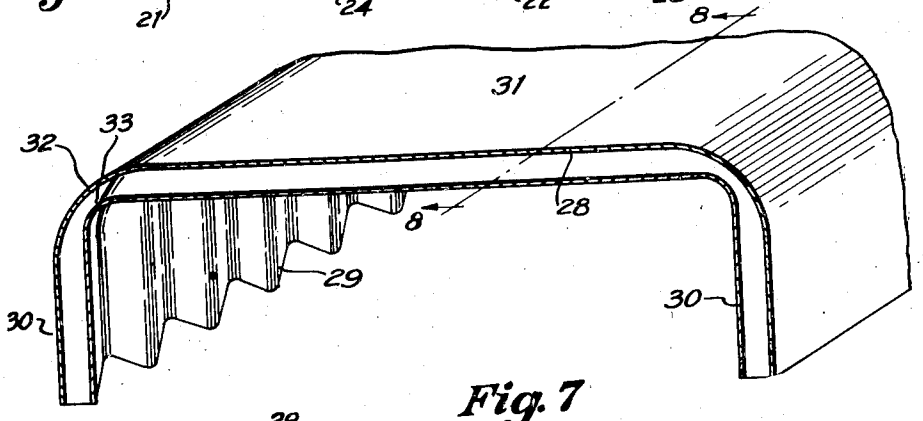


Fig. 7

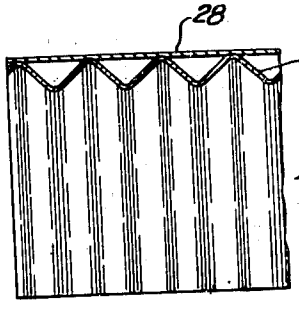


Fig. 8

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UNITED STATES PATENT OFFICE

2,432,849

MATERIAL CARRYING PLATFORM

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Application September 4, 1945, Serial No. 614,300

13 Claims. (Cl. 248—120)

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The invention relates generally to material carrying platforms, and more particularly to platforms known as skids or pallets adapted for use with lift trucks. Such platforms are used for handling, storing and transporting relatively large amounts of materials, which may be loose or in boxed or packaged form.

Thus, the platforms may be stacked with a plurality of relatively small boxes of goods, and then lifted bodily by means of a lift truck and moved into a box car, ship or trucking vehicle, for transportation over long distances; and on arriving at their destination, the loaded platforms are removed bodily by means of a lift truck and transported to a warehouse or loading dock, as desired.

Where the material carrying platforms are double faced pallets, that is, are provided with top and bottom decks, one loaded pallet may be stacked on top of the material carried by another pallet so as to transport or store a maximum amount of material on a given amount of floor space.

Prior material carrying platforms, of which we are aware, have all been made of wood or metal or a combination of both. Such platforms have been relatively heavy and expensive, especially in the case of double decked pallets, and consequently some metal platforms have been made of aluminum in order to obtain lighter platform weight and hence greater net loads.

However, the manufacturing cost of all such wood or metal platforms requires that when the materials transported thereon have reached their destination, the platforms or pallet must be returned to their source, or at least to a shipping point. This return trip involves considerable time, trouble and expense, and represents a substantial item to be added to the cost of shipping.

Moreover, the edges of wood or metal platforms become splintered or burred in use, particularly where said platforms are returned to be used over and over again, and such splintered or burred edges are dangerous because they are likely to cause serious injury to workmen handling or loading the platforms.

It is a general object of the present invention to provide a novel material carrying platform which is so inexpensive that it may be disposed of when the goods carried thereby have reached their destination.

A more specific object is to provide a novel material carrying platform constructed of laminated corrugated paper board.

Another object is to provide a novel material

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carrying platform made of standard corrugated paper, and constructed and treated in such a way as to produce a platform having sufficient strength and rigidity to carry substantial loads.

A further object is to provide a novel method of making a material carrying platform out of corrugated paper, whereby said platform has substantial load bearing strength.

A still further object is to provide a novel method of making an inexpensive and light weight material carrying platform, whereby the manufacturing cost is substantially equal to the cost of returning empty wood or metal pallets from distant points.

Finally, it is an object of the present invention to provide a novel and improved material carrying platform which overcomes the disadvantages of prior constructions.

These and other objects are accomplished by the parts, elements, constructions, arrangements, combinations, methods, and steps which comprise the present invention, the nature of which is set forth in the following general statements, preferred embodiments of which are set forth in the following description and illustrated in the accompanying drawings, and which is particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

In general terms, the nature of the novel material carrying platform may be stated as including one or more channels each having at least one lamination of corrugated paper, with the corrugations running transversely of the channel and the legs of the channel being bent across the corrugations, said channel or channels being thoroughly impregnated with sulphur compound to impart greatly increased strength and rigidity thereto; the preferred form including two small channels in side-by-side relation nested into a double width master channel, with all of said channels secured together and impregnated.

In general terms, the nature of the improved method may be stated as including the steps of forming one or more laminations of corrugated paper into a channel shape by applying plastic adhesive between abutting laminations and shaping said laminations while the adhesive is plastic, then holding said laminations in said channel shape until the adhesive has set, and then impregnating all of said formed laminations with sulphur compound to impart added strength and rigidity to said laminated channel; and the method includes nesting two of such channels in side-by-side relation into a master channel of double width, with plastic adhesive between the abutting

surfaces of said channels, holding said channels in nested position until the adhesive has set, and then impregnating all the channels with sulphur compound.

In the accompanying drawings, preferred embodiments of the invention are shown by way of example.

Figure 1 is a fragmentary perspective view of a channel shaped material carrying platform constructed according to the present invention;

Fig. 2 is an expanded view on a reduced scale, showing two channels similar to the channel of Fig. 1 in side-by-side relation, and a master channel of double width for fitting over the two smaller channels;

Fig. 3 is a fragmentary view showing the channels of Fig. 2 in assembled relation;

Fig. 4 is a fragmentary sectional view as on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary expanded perspective view showing the assembled channel of Fig. 3 in position to receive two small channels in inverted side-by-side relation;

Fig. 6 is a fragmentary perspective view showing the channels of Fig. 5 in assembled relation;

Fig. 7 is a fragmentary perspective view of a material carrying platform of channel shape similar to the platform of Fig. 1, and constructed of jumbo single face corrugated paper; and

Fig. 8 is a fragmentary sectional view as on line 8—8, Fig. 7.

Similar numerals refer to similar parts throughout the drawings.

Referring first to Fig. 1, the material carrying platform shown therein is a load bearing structure of channel shape and may be called a skid or a single faced pallet. The pallet is constructed according to the invention, and has three plies or laminations 10, 11 and 12 of standard single face corrugated paper glued together, each ply or lamination consisting of a flat sheet or liner 13 to which is adhesively secured a corrugated sheet 14. This single face corrugated paper is furnished by the manufacturer with different sizes of corrugations or flutes, called A, B, or C flutes, depending upon the size thereof. Single ply single face corrugated paper comes in large rolls and is pliable so as to be easily bent or curved.

In making the channel shaped platform shown in Fig. 1 the several plies in flat condition are superposed upon each other with a coat of plastic adhesive between the plies, and are then placed between suitable dies to shape the laminated article into channel form, in accordance with the method disclosed in our copending application Serial No. 608,028, filed July 31, 1945, and entitled Laminated articles and method of making same.

In accordance with the method of said copending application, the laminations are held in the dies until the plastic adhesive or glue has set, and the article then has a permanently bent or curved shape in a desired contour. As the dies for bending or curving the plies are brought together while the glue is plastic, the laminations slip laterally one upon the other to conform to the desired contour. Thus, in forming the channel shown in Fig. 1, the middle lamination 11 would be shorter at the bottom ends of the channel legs 15 than the inner lamination 12, and the outer lamination 10 would be shorter than the middle lamination 11, due to the lateral displacement of the laminations during forming. In the channel shown in Fig. 1, the laminations 11 and 12 have been trimmed even with the outer lamination 10.

As shown in Fig. 1, the legs 15 of the channel have been bent downwardly from the web 16 substantially at right angles thereto, and the corrugations 14 of each of the laminations run transversely of the channel so that the legs 15 are bent or curved across or transversely of the corrugations. While single face corrugated paper bends more easily with the corrugations, it can be bent across the corrugations by slightly crushing the same at the bends, and in this case by having the corrugations run transversely of the channel a much stronger structure is obtained because each corrugation acts substantially like a beam which spans the two legs 15 of the channel.

After the channel shown in Fig. 1 has been removed from the dies and is permanently formed, the next step is to impregnate the pores of the several paper laminations thoroughly with a substance which will impart strength and rigidity, and particularly load bearing strength. We have found that this can be accomplished by using a solution which is principally molten sulphur. Preferably, the impregnating is done by dipping the channel in a molten solution of sulphur and a suitable plasticizer which may be a synthetic resin such as Thiokol. The impregnating bath may consist of 90 per cent sulphur, 5 per cent Thiokol and about 5 per cent Halowax. Thiokol may be described as a complex combination of organic polysulphides, and halowax is a chlorinated naphthalene.

The time required in the bath to obtain thorough impregnation of all the laminations may vary from about six to twenty minutes, depending upon the size of the flutes of the corrugated paper and upon the number of laminations of paper. Obviously, the channel of Fig. 1 may have more than two or three laminations if desired, and the inner lamination may be a flat liner sheet. In order to speed up the impregnating treatment, the channel may be immersed in the sulphur compound bath under pressure if desired.

After the material carrying platform has been thoroughly impregnated with sulphur, it has been found by actual test that its load bearing strength has increased about six times that of its strength before impregnation, and consequently, a channel constructed in accordance with Fig. 1 and thoroughly impregnated in the manner described has sufficient load bearing strength to carry a substantial load of material on its upper surface. The channel form provides an opening into which the lifting bar of a lift truck can be inserted for lifting and transporting the loaded platform.

In order to provide a material carrying platform or pallet constructed of laminated corrugated paper, which has a capacity substantially equal to a light weight metal or wood pallet of channel shape, we have constructed a multiple or composite pallet, using laminated corrugated paper channels, in the manner shown in Figs. 2 and 3. In such case, we first construct two channels of two ply single face corrugated paper in the same manner as described in connection with the channel of Fig. 1, and said two channels are indicated generally at 17 and 18 in Fig. 2. We also construct in the same manner a master channel indicated at 19 of two ply corrugated paper, and the channel 19 has substantially twice the width of each of the channels 17 or 18, so that when the channels 17 and 18 are placed

in side-by-side relation they will fit or nest closely within the master channel 19 with their webs abutting the web of the channel 19 and their outer legs abutting the legs of the channel 19, as shown in Fig. 3.

Thus, after the channels 17, 18 and 19 have been separately formed in the manner previously described, a layer of adhesive is applied between the inner legs 15a of the channels 17 and 18 and they are placed in side-by-side relation as shown in Fig. 2. Then a layer of adhesive is applied either to the outer surfaces of the channels 17 and 18 or to the faces of the flutes of the corrugations 14 on the inner side of the master channel 19. The channels 17 and 18 are then nested within the channel 19 as shown in Fig. 3, and the channels 17, 18, and 19 are held between suitable dies in such assembled relation until the plastic adhesive is set. If desired, a flat sheet or liner can be applied to the inner surfaces of the channels 17 and 18 to cover the corrugations thereof.

The single face pallet or platform indicated generally at 20 in Fig. 3 is adapted for use with a fork lift truck of standard construction, and after being thoroughly impregnated with sulphur compound in the manner previously described, is very strong and rigid and adapted for carrying and transporting relatively heavy loads. It will be observed that the single face pallet 20 has four plies or laminations of single face corrugated paper throughout, that is, each of the legs 21, 22 and 23 has four plies, and the web 19 also has four plies, with all of the corrugations running across or transversely of the channels so as to give maximum load bearing strength.

A pallet such as the pallet 20, constructed and impregnated in accordance with the present invention, and having the dimensions 30 inches wide by 40 inches long, with all four laminations being standard A flute single face corrugated paper, has by actual test supported a static load of 5,000 pounds without failure. Such static load represents a working load of about 2,250 pounds, so that the pallet can carry a working load of 2,000 pounds with a factor of safety.

Referring to Figs. 5 and 6, a double faced pallet constructed according to the present invention is shown, the finished or assembled pallet being shown in Fig. 6 and having a top and bottom deck. Such double decked pallet is suitable for carrying boxed or packaged goods and for being stacked when loaded upon the load carried by another pallet, so that a maximum amount of material may be transported or stored in a given amount of floor space.

Referring to Fig. 5, the single face pallet indicated at 20 is identical with the pallet shown in Fig. 3 and includes a pair of channels 17 and 18 nested within a master channel 19, the assembled pallet having the legs 21, 22 and 23. In constructing the double decked pallet, a pair of channels 24 and 25 are formed of preferably two ply single face corrugated paper in the same manner as the channels 17 and 18. The channels 24 and 25 however, are slightly narrower so that their legs 26 and 27 will nest or fit closely within the legs of the pallet 20. The channels 24 and 25 are inserted in inverted side-by-side relation as shown, between the legs of the pallet 20, with the legs 26 of channel 24 abutting the insides of legs 21 and 22 respectively, and the legs 27 of channel 25 abutting the insides of legs 22 and 23 respectively. Prior to inserting the channels 24 and 25 between the legs of pallet 20, a layer of plastic glue is applied either to the outsides of the legs 26 and 27 of the channels 24 and 25, or to the inner faces of the corrugations 14 on the legs 21, 22 and 23 of the pallet 20.

After the channels 24 and 25 are placed in the assembled position shown in Fig. 6 within the legs of pallet 20, the channels are held in the position shown until the plastic adhesive between the abutting surfaces has set, and the assembled pallet is then thoroughly impregnated with sulphur compound in the manner previously described whereupon a very rigid and strong double decked pallet is provided.

Obviously, the arrangement of channels may be varied within the scope of the invention. For example, a double decked pallet may be provided by nesting two channels such as 17 and 18 in inverted side-by-side relation into a master channel 19, in which case it may be desirable to make each of the channels of three or more plies or laminations.

Referring to Figs. 7 and 8, a laminated paper material carrying platform of channel shape is shown constructed from a single ply or lamination of single face corrugated board of large size, sometimes known as "jumbo." Jumbo corrugated board has a relatively thick liner 28, to which is glued a corrugated sheet 29, also of relatively thick paper. As shown, the corrugations 29 have relatively large flutes.

The channel shown in Fig. 7 is formed between dies and has the legs 30 and the web 31, the legs 30 being formed across the corrugations 29 by bending on a relatively large radius, as indicated at 32, and causing a partial crushing of the corrugations 29 as indicated at 33.

If desired, another liner sheet may be placed under the corrugations 29 with a layer of plastic adhesive between the corrugations and the additional liner sheet, and the laminations held in the desired channel form until the adhesive has set. The channel is then thoroughly impregnated with sulphur compound in the manner previously described to impart increased strength and rigidity thereto.

Other variations may be made using the jumbo single face corrugated paper. For example, the channel shown in Fig. 7 may have a very thin sheet of metal secured to its outer surface and formed into the channel shape. Such metal covering would give added strength and durability without adding substantial weight.

The novel and improved laminated paper material carrying platform or pallet can be made with a plurality of laminations, and in the multiple or composite form of Fig. 3, at substantially the same cost as the cost of transporting empty metal or wood pallets back to their source or to a shipping point. Accordingly, once the novel pallet of the present invention has been unloaded, it may be disposed of, thus eliminating the trouble and delay incident to returning the empty pallet, and removing the danger from using pallets with splintered or burred edges.

The novel laminated paper pallet of the present invention is sufficiently strong to carry substantial loads equivalent to the loads carried by light weight metal pallets, and is so light in weight as to enable greater net loads.

For substantially the same capacity, the present improved laminated paper pallet weighs about one-half as much as an aluminum pallet, and about one-quarter as much as a steel pallet.

Due to the flexibility in design of the improved

pallet by using different arrangements of multiple channels, material carrying platforms can be cheaply and rapidly manufactured in a variety of sizes and styles adapted for a great variety of uses.

In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiments of the improved construction and method illustrated and described herein are by way of example, and the scope of the present invention is not limited to the exact details of construction or of the method.

Having now described the invention, the construction, the operation and use, and preferred embodiments thereof, and the advantageous new and useful results obtained thereby; the new and useful constructions and methods, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

We claim:

1. A material carrying platform including two channels secured together in side-by-side relation, a master channel, each channel being formed of laminated corrugated paper with the corrugations running transversely of said channel, said two channels being nested into and secured to said master channel in side-by-side relation with the webs of said two channels abutting the web of said master channel, and all of said channels being thoroughly impregnated with sulphur compound.

2. A material carrying platform including a first pair of channels, a second pair of channels, and a master channel, all said channels being constructed of laminated corrugated paper with the corrugations running transversely of the channels, said first pair of channels being nested into and secured to said master channel in side-by-side relation with the webs of said two channels abutting the web of said master channel, said second pair of channels being secured in inverted side-by-side relation within said first pair of channels to form a double decked pallet, and all of said channels being impregnated with sulphur compound.

3. A material carrying platform having a web member and integral leg members bent therefrom to form a channel, said channel being constructed of at least two laminations of paper glued together, at least one of said laminations being corrugated paper with the corrugations running transversely of said channel, said laminations being laterally displaced with respect to each other at said leg member bends, and all of said laminations being impregnated with sulphur compound.

4. A material carrying platform including a pair of channels and a master channel all having at least two laminations of paper glued together, at least one of said laminations being single face corrugated paper with the corrugations running transversely of said channel, said pair of channels being nested into and secured to said master channel in side-by-side relation with the webs of said pair of channels abutting the web of said master channel and the outer legs of said pair of channels abutting the legs of said master channel, and all of said channels being thoroughly impregnated with sulphur compound.

5. The method of making a laminated paper, material carrying platform including the steps of forming two channels of laminated paper and a master channel of laminated paper having a width substantially equal to the combined width of said two channels, all of said channels having at least one lamination of corrugated paper with the corrugations running across the channels, nesting said two channels in side-by-side relation into said master channel with the webs of said two channels abutting the web of said master channel, applying plastic adhesive between all the abutting surfaces of the several channels, holding said channels in nested position until the adhesive has set, and then thoroughly impregnating all said channels with sulphur compound.

6. The method of making a laminated paper, material carrying platform including the steps of forming two channels of laminated paper and a master channel of laminated paper having a width substantially equal to the combined width of said two channels, all of said channels having at least two laminations of single face corrugated paper with the corrugations running across the channels, nesting said two channels in side-by-side relation into said master channel with the webs of said two channels abutting the web of said master channel, applying plastic adhesive between all the abutting surfaces of the several channels, holding said channels in nested position until the adhesive has set, and then thoroughly impregnating all said channels with sulphur compound.

7. The method of making a laminated paper, material carrying platform including the steps of forming two channels of laminated paper and a master channel of laminated paper having a width substantially equal to the combined width of said two channels, all of said channels having at least one lamination of corrugated paper with the corrugations running across the channels, nesting said two channels in side-by-side relation into the master channel, applying plastic adhesive between all the abutting surfaces of the several channels, holding said channels in nested position until the adhesive has set, and then thoroughly impregnating all said channels with sulphur compound.

8. The method of making a laminated paper, double decked pallet including the steps of forming a first pair of laminated paper channels, forming a second pair of laminated paper channels each having a width which will fit respectively into said first pair of channels, forming a laminated paper master channel having a width substantially equal to the combined width of said first pair of channels, all of said channels having at least one lamination of corrugated paper with the corrugations running across the channels, nesting said first pair of channels in side-by-side relation into said master channel with the webs of said pair abutting the web of said master channel, nesting said second pair of channels in inverted side-by-side relation into said first pair of channels, applying plastic adhesive between all the abutting surfaces of all of the channels, holding said channels in nested position until the adhesive has set, and then thoroughly impregnating all said channels with sulphur compound.

9. A load bearing structure having integral angularly disposed leg members forming a channel shape, said structure being constructed of laminated corrugated paper with the corrugations

running transversely of said channel, said leg members being bent across the corrugations, and the paper laminations of the channel being thoroughly impregnated with sulphur compound.

10. A load bearing structure having integral angularly disposed leg members forming a channel shape, said structure being constructed of laminated corrugated paper with the corrugations running transversely of said channel, said leg members being bent across the corrugations, and the paper laminations of the channel being thoroughly impregnated with a substance which increases their rigidity and strength.

11. A load bearing structure having integral angular leg members forming a channel shape, said channel being constructed of at least two laminations of paper glued together, at least one of said laminations being corrugated paper with the corrugations running transversely of said channel, said laminations being laterally displaced with respect to each other at said leg members, and all of said laminations being impregnated with a chemical compound which increases the rigidity and strength of said channel.

12. A load bearing panel member comprising a plurality of plies of fibrous material, said plies being angularly disposed with respect to the plane of the panel along opposite side edges of the panel to form integral edge flanges, some of the plies extending across substantially the entire area of the panel, other of the plies extending across a portion of the panel area and having edge portions angularly disposed with respect to the plane of the panel to form integral reinforcing flanges and central load bearing flanges.

13. A load bearing panel structure comprising a panel member, spaced opposed panel members, each of which includes a plurality of plies of impregnated fibrous material, the plies of each opposed panel member being of less extent than the first-mentioned panel member and having angularly disposed edge portions forming integral reinforcing flanges, with reinforcing flanges of opposite panels being overlapped, and means securing the first mentioned panel member and the opposed panel members together.

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