

Description

Pallet for transportation

Technical Field

The present invention relates to a pallet for transportation which is light-weighted, excellent in durability and capable of being assembled easily.

Background Art

According to a conventional pallet for transportation, a pallet made of wood has frequently been used since the material is easy to obtain and fabrication thereof is facilitated. The pallet made of wood is liable to deform or damage by repeatedly loading heavy weight articles and from the view point of an environmental problem or the like, in recent times, use of a pallet made of a metal such as a steel plate has been spreading. Although such a pallet made of a metal is provided with a strength, the pallet is heavy and fabrication thereof is liable to be complicated. Conventionally, various schemes have been carried out in view of cost, weight and strength and there have been known constitutions by technologies, for example, described below.

(i) According to a conventional pallet made of a metal, as shown in Fig. 7, a pallet 50 for transportation is constituted

by arranging pluralities of longitudinal members 41 and cross members 43 made of steel each having a section in a channel-like shape into a shape of a frame

and fixedly welding portions of the longitudinal members 41 and the cross members 43 which are brought into contact each other to thereby constitute a frame body 49.

(ii)According to Japanese Patent Laid-Open No.157540/1999, there is described a pallet for transportation in which a plurality of leg portions in each of which an upper face side thereof constitutes a recessed portion opened upwardly and a lower face side thereof is projected downwardly to be able to be fitted to the recessed portion, are provided to hang from a face plate integrally formed by polypropylene or reproduced polypropylene having a square shape by an injection molding process or a press-forming process, there are formed fork inserting portions which are opened at both end portions of the face plate in a direction of inserting and retracting forks and downwardly between the leg portions on the lower face side of the face plate, and which are laminated to align in an up and down direction.

(iii)According to Japanese Utility Model No.3053964, there is described a pallet having a face plate which is formed in a shape of three projections and two recesses by an iron plate and both side edges of which are folded to bend inwardly into an L-like shape to constitute tight ends, and a square

prism which is integrally formed to provide a notched port on one side thereof and which is formed with recess fitting notched ports both on upper and lower sides of a face thereof corresponding to the notched port and by the recess fitting notched port, two sheets of the face plates corresponding in parallel are fitted to the square prism to combine and bonded together by spot welding.

The above-described conventional pallets for transportation pose following problems.

(1) The conventional pallet for transportation made of a metal shown in Fig.7, poses a problem that the pallet is deficient in strength despite its heavy weight, a number of welded portions is large and enormous fabrication labor or a large welding apparatus is needed.

(2) The pallet for transportation described in Japanese Patent Laid-Open No.157540/1999, poses a problem that the pallet is devoid of durability, the pallet comprises synthetic resin such as polypropylene and generates poisonous gas in case of fire since the pallet is flammable and a special fire extinguishing apparatus is needed.

(3) The pallet described in Japanese Utility Model No.3053964, poses a problem that since load applied between the two sheets of face plates is supported by the square prism having a complicated shape formed with the recess fitting notched ports on the upper and lower sides, stress is liable

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to concentrate to the notched port portion or the like, the pallet is devoid of durability and further, in fabricating the square prism, a number of steps are needed, which is devoid of economic performance.

The invention has been carried out in order to resolve the above-described problems and it is an object thereof to provide a pallet for transportation which is light-weighted and having necessary durability, excellent in safety in handling or in fire or the like and facilitated in fabrication and assembling thereof.

Disclosure of the Invention

According to a pallet for transportation described in Claim 1, there is provided

A pallet for transportation characterized in a pallet comprising :

(a) an upper face plate comprising a strip-like face plate made of a metal formed by constituting a sectional shape alternately arranged with $(n+1)$ pieces of projected portions and n pieces (n is a natural number) of recessed portions; and

(b) a rectangular support member a side face of which is formed substantially in a square shape by being turned around to fold to bend to an inner side at four portions thereof in a longitudinal direction of the strip-like face plate and in which a reinforcement member having a section in a channel-like

shape is fitted to the projected portion between upper and lower ones of the strip-like face plates at both end portions and at least one portion of middle portions thereof in the longitudinal direction:

(c) wherein a plurality of the upper face plates are bonded orthogonally to upper portions or upper portions and lower portions of a plurality of the support members.

Further, there is provided:

a pallet for transportation characterized in a pallet comprising:

(a) an upper face plate comprising a strip-like face plate made of a metal formed by constituting a sectional shape alternately arranged with $(n+1)$ pieces of projected portions and n pieces (n is a natural number) of recessed portions; and

(b) a support member in which a reinforcement member having a section in a channel-like shape is fitted to the projected portion between upper and lower strip-like face plates at both end portions and at least one portion of middle portions thereof in a longitudinal direction at each of the strip-like face plates arranged to be opposed to each other on upper and lower sides thereof:

(c) wherein a plurality of the upper face plates are bonded orthogonally to upper portions or upper portion and lower portions of a plurality of the support members.

By the above-described constitution, following operation is achieved.

(1) The strip-like face plate is provided with a section in a zigzag shape alternately arranged with a plurality($n+1$ (n is a natural number)) of the projected portions and a plurality(n) of the recessed portions and therefore, a resistance force against folding to bend the strip-like face plate formed by the projected portions and recessed portions in the longitudinal direction, is increased and a rigidity by which the pallet is prevented from being flexed even when the pallet is loaded with a heavy weight article, is provided and safety in pallet transportation can be promoted.

(2) Since the section in the zigzag shape is provided, the pallet can be light-weighted in comparison with a volume of the total and when a vacant pallet is moved, disassembling or the like of the pallet is facilitated and the pallet is excellent in handling performance.

(3) The strip-like face plates constituting the upper face plate and the support member are formed by metal plates and therefore, poisonous gas is not generated in fire or the like and the pallet is excellent in safety.

(4) The strip-like face plate can be formed integrally from a metal plate by press-forming, roll forming or the like and therefore, fabrication and assembling thereof can easily be carried out and the pallet for transportation can be

fabricated inexpensively.

(5) Since there is constructed the constitution in which the reinforcement members are fitted to combine respectively with a pair of the projected portions at both ends of the support member in a plurality of the projected portions constituted by being formed in parallel with the upper and lower strip-like face plates opposed to each other of the support member and therefore, the both end sides of the reinforcement members may only be fitted to the projected portions of the strip-like face plates constituting the support member and the pallet can be assembled and disassembled extremely easily.

(6) The support member reinforced by the reinforcement member can also be attached to the upper face plate for constituting a pallet mounting face by welding and therefore, assembling of the pallet can easily be carried out.

(7) When the support member is fixedly arranged orthogonally to lower portions of the plurality of upper face plates by welding or the like, strength of the pallet for transportation can be increased, heavy weight articles can safely be transported and service life of the pallet can be prolonged.

(8) According to the pallet of Claim 1, there can be constituted the solid pallet reducing the reinforcement members to be fitted by using the formed support member constituted by folding to bend the strip-like face plate at

the four portions in the longitudinal direction and assembling of the members is facilitated. Further, since a cut face is not exposed at an end portion thereof in the longitudinal direction, the pallet is excellent in safety.

A plate material made of a metal integrally formed into the strip-like face plate, may be formed by using a plated steel plate coated with zinc plating or the like, a stainless steel plate or the like when corrosion resistance is requested other than a steel plate or the like. Further, an aluminum alloy such as duralumin or the like may be used when it is necessary to be light-weighted.

The reinforcement member is formed by folding to bend, for example, a metal plate in a strip-like shape into a channel-like shape and a pair of upper and lower strip-like face plates are arranged in parallel at a predetermined interval therebetween via the reinforcement member to support to couple, thereby, the support member can be reinforced without being crushed.

In bonding the upper face plate, the support member, the reinforcement member and the like, described above, these can be bonded by publicly-known means of welding, bolt fastening, rivetting or the like.

In another embodiment of the pallet for transportation, L-like portions provided at both ends in a width direction of the strip-like face plate are formed by being

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folded back to an inner side, thereby, a sharpened end portion is prevented from being projected to an outer side to thereby promote safety and a resistance force against external force in a direction of folding to bend the strip-like face plate can be promoted.

In another embodiment of the invention, there is provided:

the pallet for transportation,

(a) an upper face plate comprising a strip-like face plate made of a metal formed by constituting a sectional shape alternately arranged with $(n+1)$ pieces of projected portions and n pieces (n is a natural number) of recessed portions; and

(b) a support member in which a reinforcement member having a section in a channel-like shape is fitted to the projected portion between upper and lower strip-like face plates at both end portions and at least one portion of middle portions thereof in a longitudinal direction at each of the strip-like face plates arranged to be opposed to each other on upper and lower sides thereof:

(c) wherein a plurality of the upper face plates are bonded orthogonally to upper portions or upper portion and lower portions of a plurality of the support members,

in which an end portion in the longitudinal direction of the upper face plate includes a protection portion bent to crush downwardly in an L-like shape.

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By the above-described constitution, the following operation is achieved.

(1) The upper face plate for constituting the pallet mounting face, is provided with the protection portion formed by bending to crush the end portion of the strip-like face plate in the L-like shape and therefore, even when a person or a mounted article is brought into contact with the pallet for transportation, the damage can be restricted to a minimum limit and safety in handling or in transporting the pallet can be ensured.

(2) The protection portion can simply be formed only by bending to crush the end portion of the strip-like face plate to the inner side in the L-like shape and therefore, the pallet for transportation can be fabricated extremely easily, which

is excellent in economic performance.

Brief Description of the Drawings

Fig.1 is a perspective view of a pallet for transportation according to Embodiment 1 of the invention. Fig.2 is a perspective view of a strip-like face plate in the pallet for transportation according to Embodiment 1. Fig.3 is a perspective view of a support member in the pallet for transportation according to Embodiment 1. Fig.4 is a perspective view of a reinforcement member in the pallet for transportation according to Embodiment 1. Fig.5 is a perspective view of an essential portion of a pallet for transportation according to Embodiment 2. Fig.6 is an outline view showing a structure of a support member according to Embodiment 2. Fig.7 is a perspective view of a pallet for transportation according to a conventional example.

Best Mode for Carrying Out the Invention

(Embodiment 1)

A detailed explanation will be given of a first embodiment constituting a mode for carrying out the invention in reference to the drawings as follows.

Fig.1 is a perspective view of a pallet for transportation according to Embodiment 1.

In Fig.1, numeral 10 designates the pallet for

transportation according to Embodiment 1, numeral 11 designates an upper face plate comprising a strip-like face plate having a section in a zigzag shape alternately arranged with projected portions 11a and recessed portion 11b, numeral 12 designates L-like portions formed by bending end portions of the projected portions 11a on both sides of the strip-like face plate to inner sides, numeral 13 designates a support member which is arranged by welding an upper face side thereof to a predetermined portion on a rear face side of the recessed portion 11b and in which a total thereof comprising faces 13a to 13e constituted by turning around a strip-like face plate to an inner side at four portions thereof in the longitudinal direction, is formed in a flame-like shape (state in which a side face thereof is formed substantially in a square shape) and numeral 14 designates a reinforcement member arranged between the two faces 13a and 13c or between the faces 13e and 13c of the support member 13 opposed to each other in an up and down direction.

The pallet 10 for transportation is constructed by a constitution in which a plurality of pieces (three pieces in this case) of the support members 13 are arranged to align in parallel, a plurality of pieces (five pieces in this case) of the upper face plates 11 are mounted on upper portions of the support members 13, 13, 13 to ride over and respective contact points are fixedly bonded. In the fixed bonding,

publicly-known means of spot or seam welding, bolt fastening, rivetting or the like can be used.

As shown in Fig.2, in each of the strip-like face plates constituting the upper face plate 11 and the support member 13, a plurality($n+1$, three pieces in the drawing)of the projected portions 11a and a plurality(n , two pieces in the drawing)of the recessed portions 11b are alternately aligned, there are further provided the L-like portions 12 formed by bending the end portions on outer sides of the projected portion 11a at both ends in the width direction to the inner side in an L-like shape and a total thereof is formed integrally from a metal sheet in a strip-like shape or the like.

By constituting such a structure having the strip-like face plates having the section in the zigzag shape and the support members 13 reinforced by the reinforcement members 14, there is achieved a rigidity which is not bent even when heavy weight articles are loaded on the pallet 10 for transportation. Further, the above-described natural number n can be set in a range of 2 to 10.

As shown in Fig.3, the support member 13 is formed with the faces 13a to 13e by folding to bend the strip-like face plate to the inner side at the four portions in the longitudinal direction and formed in a rectangular frame shape having the side face in the square shape surrounded by these. The folding operation can easily be carried out by bending to crush folding

line portions thereof by using a press brake or the like. Further, as shown in Fig.3(b), there may be constructed a constitution in which there are notched portions of recessed portions 17 of the support member, side face portions 16a of the support member and end portions 18 of the support member for constituting a side portion of the support member in the folding operation, and projected portions 16 of the support member for constituting bottom portions of the support member are folded to bend along a folding line A to thereby fold to bend the support member without providing crushed portions.

As shown in Fig.4(a), a sectional shape of the reinforcement member 14 may be formed in a channel-like shape surrounded by faces 14a to 14c or may be constituted by a square shape. The reinforcement member 14 is formed by being folded to bend to provide the above-described sectional structure. The face 14a having a width of the folded portion is made to constitute a width of the projected portion 11a and when the reinforcement member 14 is fitted to the projected portions 11a at the both end portions, the width of the face 14a is made to constitute a width narrowed further by an amount of a width of an end portion thereof.

Further, there can be constructed a constitution in which the reinforcement member 14 is arranged such that a direction of the channel-like shape is directed in a direction different from that in the drawing by 90 degrees (refer to Fig.4(b)), or

there can also be constructed a constitution in which the reinforcement member 14 is provided with a section in a C-like shape constituted by folding to bend end portions thereof to an inner side(refer to Fig.4(c)). According to the invention, all of the channel-like shape, the square shape and the C-like shape, are referred to as channel-like shape.

As shown in Fig.1, at both end portions and at least one portion of middle portions of the support member 13, the reinforcement member 14 is arranged between two upper and lower faces of the strip-like face plates of the support member 13 opposed to each other. Further, there can also be constructed a constitution in which an end portion of the strip-like face plate of the upper face plate 11 is folded to bend and welded to the support member 13 or fastened thereto by screws or a reinforcement plate of a metal piece or the like in an L-like shape is attached thereto and welded thereto or fastened thereto by screws to combine to thereby reinforce a total thereof as necessary.

The pallet 10 for transportation according to Embodiment 1 is constituted as described above and therefore, following excellent operation is achieved.

(1)Each of the strip-like face plates for constituting the upper face plate 11 and the support member 13, is provided with the section alternately aligned with the projected portions and the recessed portions and therefore, a resistance

force against bending in a direction of extending the section is increased and durability and stability can be maintained.

(2)The pallet 10 for transportation can be light-weighted in comparison with a volume of a total thereof and handling of the pallet 10 for transportation in disassembling and assembling in moving a vacant pallet or the like can be facilitated.

(3)The pallet 10 for transportation is formed by a metal plate material and therefore, poisonous gas is not generated in the case of fire or the like and the pallet 10 for transportation is excellent in safety.

(4)The upper face plate 11, the support member 13 and the reinforcement member 14 can integrally be formed from a metal plate by press-forming, roll forming or the like and therefore, fabrication and assembling thereof can be facilitated and the pallet 10 for transportation can be fabricated inexpensively.

(5)When the L-like portions 12 formed by bending end portions in the width direction of the strip-like face plate, are formed, even in case in which a sharp end portion thereof is brought into contact with a person or other mounted article, the damage can be alleviated.

(6)The light-weighted support member 13 reinforced by the reinforcement member 14 is attached to the rear face side of the strip-like face plate and therefore, assembling and

disassembling of the pallet can easily be carried out.

(7) When the support member 13 is arranged to the lower portion of the upper face plate 11 by welding or fastening by bolts, thereby, a strength of the pallet 10 for transportation can be increased, heavy weighted articles can stably be transported and the service life of the pallet can be prolonged.

(8) The support member 13 formed by folding to turn around the strip-like face plate, is reinforced by the reinforcement member 14 and therefore, light-weighted formation can be achieved while maintaining structural strength necessary for the support member 13.

(9) The reinforcement member 14 having the section in the channel-like shape can easily be fabricated and inexpensive since the shape is not complicated and a pallet in accordance with weight of a mounted article can be constituted by arranging or removing a pertinent number of pieces of the reinforcement members 14.

(Embodiment 2)

An explanation will be given of a pallet for transportation according to Embodiment 2 of the invention.

Fig.5 is a perspective view enlarging an essential portion of a pallet for transportation according to Embodiment 2.

In Fig.5, numeral 20 designates a pallet for

transportation according to Embodiment 2, notations 21 and 21a designate an upper and lower pair of an upper support plate and a lower support plate each comprising a strip-like face plate constituted by reverting a surface and a rear face of the section in the zigzag shape alternately arranged with the projected portions 11a and the recessed portions 11b (refer to Fig. 2), numeral 22 designates L-like portions formed by bending end portions of the projected portions 11a on both end sides of the upper support plate 21 and lower support plate 21a respectively to inner sides, numeral 23 designates a reinforcement member having a section in a channel-like shape, upper and lower base end portions of which are respectively fitted to rear face sides of the respective projected portions 11a of the upper support plate 21 and the lower support plate 21a and fixed thereto by spot welding or the like, numeral 24 designates a support member comprising the upper support plate 21, the lower support plate 21a and the reinforcement member 23, numeral 25 designates an upper face plate fixedly arranged above the upper support plate 21 by welding or the like for constituting a pallet mounting face and numeral 26 designates a protection portion formed by bending to crush an end portion in the longitudinal direction of a strip-like face plate of the upper face plate 25 downwardly in an L-like shape.

Fig. 6 is a schematic sectional view showing a state of coupling the upper support plate 21 and the lower support plate

21a with the reinforcement member 23 in the support member 24.

As shown in Fig.6, the support member 24 according to Embodiment 2 is constituted by the upper support plate 21 and the lower support plate 21a comprising the strip-like face plates and the reinforcement member 23 for connecting these. Further, as shown in Fig.6(a), upper and lower end portions of the reinforcement member 23 are fitted to rear sides of the central projected portions 11a of the upper support plate 21 and the lower support plate 21a to thereby constitute to connect the upper support plate 21 and the lower support plate 21a.

Further, as shown in Fig.6(b), the upper and lower end portions of the reinforcement member 23 can also be fitted to twos of the projected portions 11a at both ends in the width directions of the upper support plate 21 and the lower support plate 21a to thereby connect to combine these. A number of pieces of the reinforcement members 23 can pertinently be determined in accordance with weight of a mounted article, thereby, a pallet for transportation which is difficult to deform can be constituted.

In this way, the pallet 20 for transportation according to Embodiment 2 is formed by arranging in parallel, a plurality of pieces of the support members 24 each constituted to connect to combine the upper support plate 21 and lower support plate 21a respectively comprising the strip-like face plates by the reinforcement member 23, mounting a plurality of pieces of the

upper face plates 25 on the support members 24 to laminate in orthogonal directions and welding by spot welding or fastening by screws, upper faces of the upper support plates 21 and the lower faces of the upper face plate 25 at respective contact points.

In this case, the protection portion 26 can be formed by bending to crush the end portion side of the upper plate 25 arranged above the upper support plate 21 for constituting a pallet mounting face and exposed with a sharp cut portion downwardly in an L-like shape. By forming the protection portion 26, a cut end face of the upper face plate 25 comprising the strip-like face plate can be prevented from being exposed and the body or clothing of an operator can be avoided from being impaired. Further, when a fabrication method of folding to bend the strip-like face plate to the inner side described in Embodiment 1, is applied to a fabrication method of folding to bend the strip-like face plate, the fabrication of folding to bend the strip-like face plate in the L-like shape is facilitated.

Since the pallet 20 for transportation according to Embodiment 2 is constituted as described above, following excellent operation is achieved.

(1) The upper face plates 25 are laminated on the support members 24 constituted by coupling the upper support plates 21 and the lower support plates 21a comprising pluralities of

pieces of the strip-like face plates to each other by the reinforcement members 23 and therefore, strength and rigidity of a total of the structure can be increased.

(2) The respective strip-like face plates of the support members 24 and the upper face plates 25 are arranged by shifting directions of the sections in the zigzag shape alternately by 90 degrees, thereby, a resistance force against a direction of twisting the face of the pallet 20 for transportation can be increased and safety in transporting the pallet 20 for transportation can be improved.

(3) By fitting the upper and lower end portions of the reinforcement members 23 respectively to the rear face sides of the projected portions 11a of the upper support plates 21 and the lower support plates 21a, the upper support plates 21 and the lower support plates 21a are laminated to connect and assembling and disassembling thereof can easily be carried out, which is excellent in the operability.

(4) By forming the protection portion 26, even when a person, a mounted article or the like is brought into contact with the pallet 20 for transportation, the damage can be restricted to a minimum limit and safety in handling the pallet or in transportation can be ensured.

(5) The protection portion 26 can simply be formed by only bending to crush the end portion of the strip-like face plate of the upper face plate 25 for constituting the pallet mounting

face to the inner side in the L-like shape and therefore, the pallet 20 for transportation having high safety can be fabricated extremely easily, which is excellent also in economic performance.

Industrial Applicability

According to the pallet for transportation of the invention, the upper face plate and the support member comprising the strip-like face plates made of a metal of a steel plate or the like integrally formed to provide the sectional shape alternately aligned with pluralities of the projected portions and the recessed portions, are connected to combine to reinforce by being fitted to the projected portions via the reinforcement member or the like made of a steel plate and having the shape easy to fabricate and therefore, the pallet can easily be assembled and disassembled and can be made light-weighted and solid.

Claim

1. A pallet for transportation characterized in a pallet comprising:

(a) an upper face plate comprising a strip-like face plate made of a metal formed by constituting a sectional shape alternately arranged with $(n+1)$ pieces of projected portions and n pieces (n is a natural number) of recessed portions; and

(b) a rectangular support member a side face of which is formed substantially in a square shape by being turned around to fold to bend to an inner side at four portions thereof in a longitudinal direction of the strip-like face plate and in which a reinforcement member having a section in a channel-like shape is fitted to the projected portion between upper and lower ones of the strip-like face plates at both end portions and at least one portion of middle portions thereof in the longitudinal direction;

(c) wherein a plurality of the upper face plates are bonded orthogonally to lower portions of a plurality of the support members.

(d) an end portion in the longitudinal direction of the upper face plate includes a protection portion bent to crush downwardly in an L-like shape.