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(54) **COMBINATION PLASTIC PALLET**

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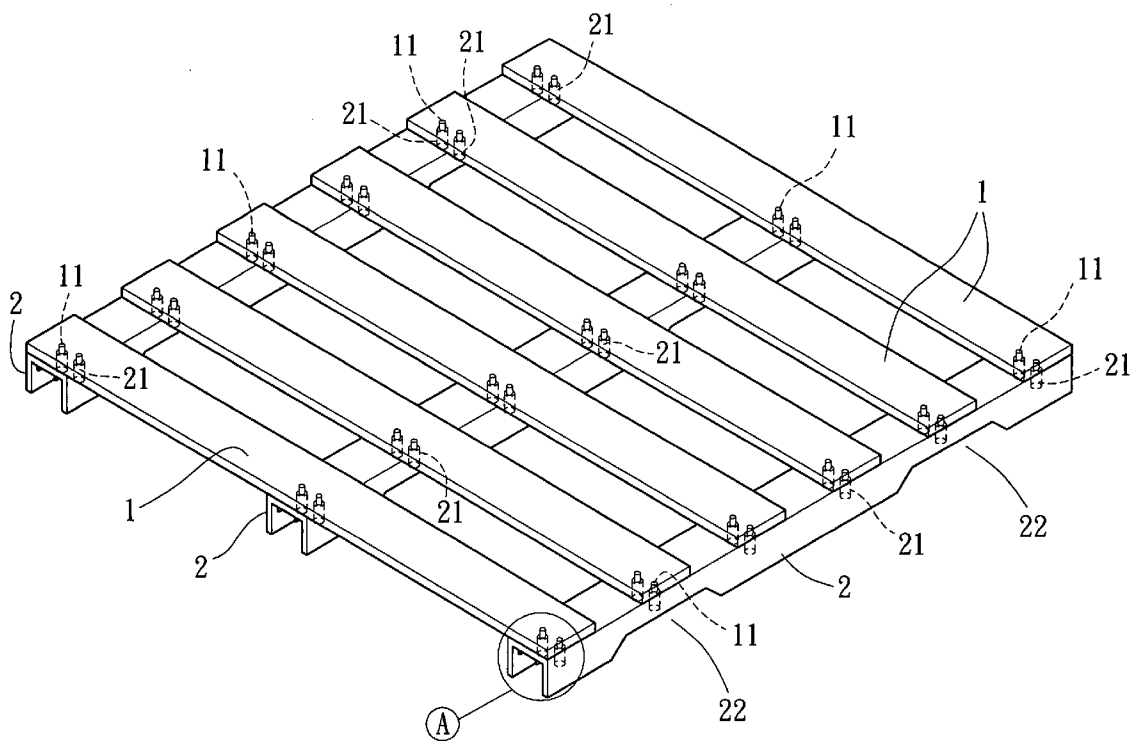
(57) **ABSTRACT**

A combination plastic pallet includes a plurality of top deckboards each having a plurality of bottom plug rods, and a plurality of stringers each having a plurality of hollow columns that receive the. bottom plugs of the top deckboards respectively to have said top deckboards be supported on the stringers. Each bottom plug of each top deckboard has a split bottom tip and a barbed portion extending around the periphery of the split bottom tip. Each hollow column of each stringer has a stepped annular edge extending around the inside wall for engagement with the barbed portion of the associating bottom plug rod.



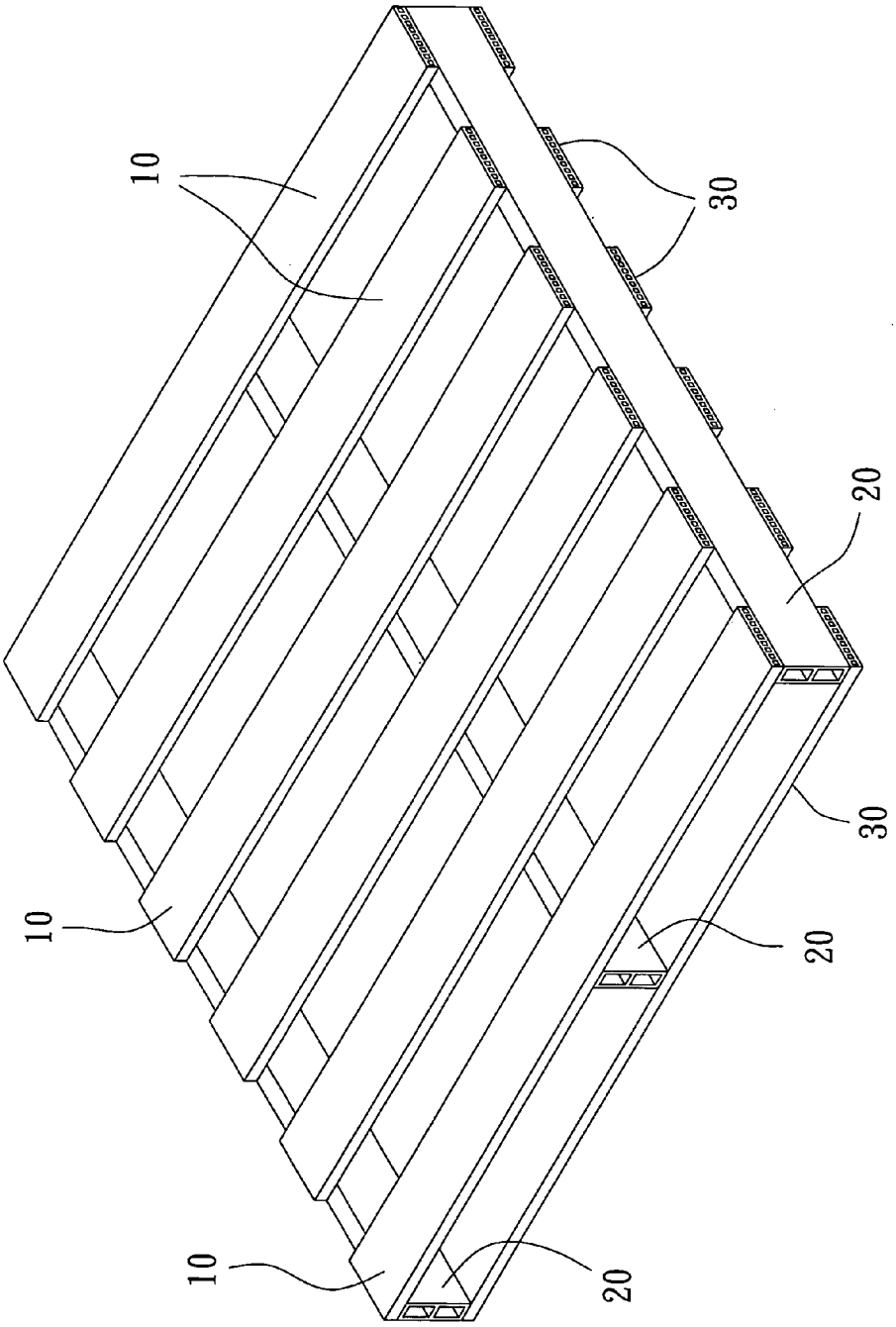


Fig. 1(Prior Art)

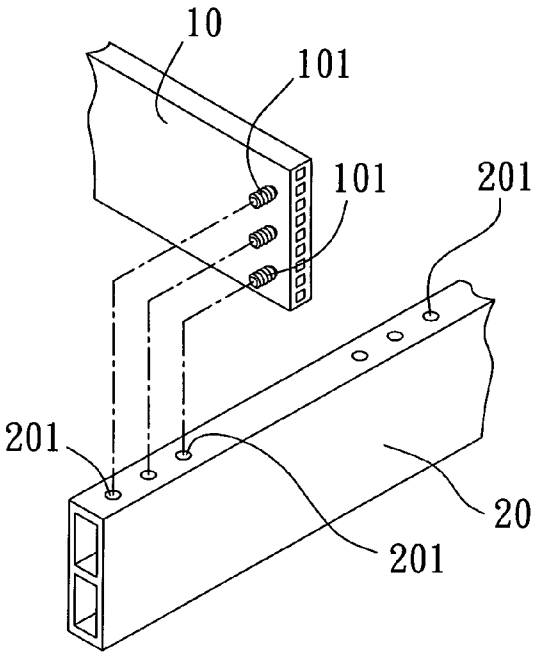


Fig. 2(Prior Art)

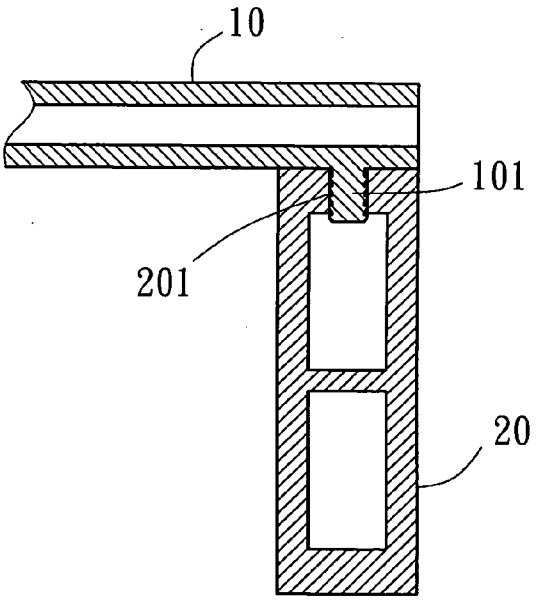


Fig. 3(Prior Art)

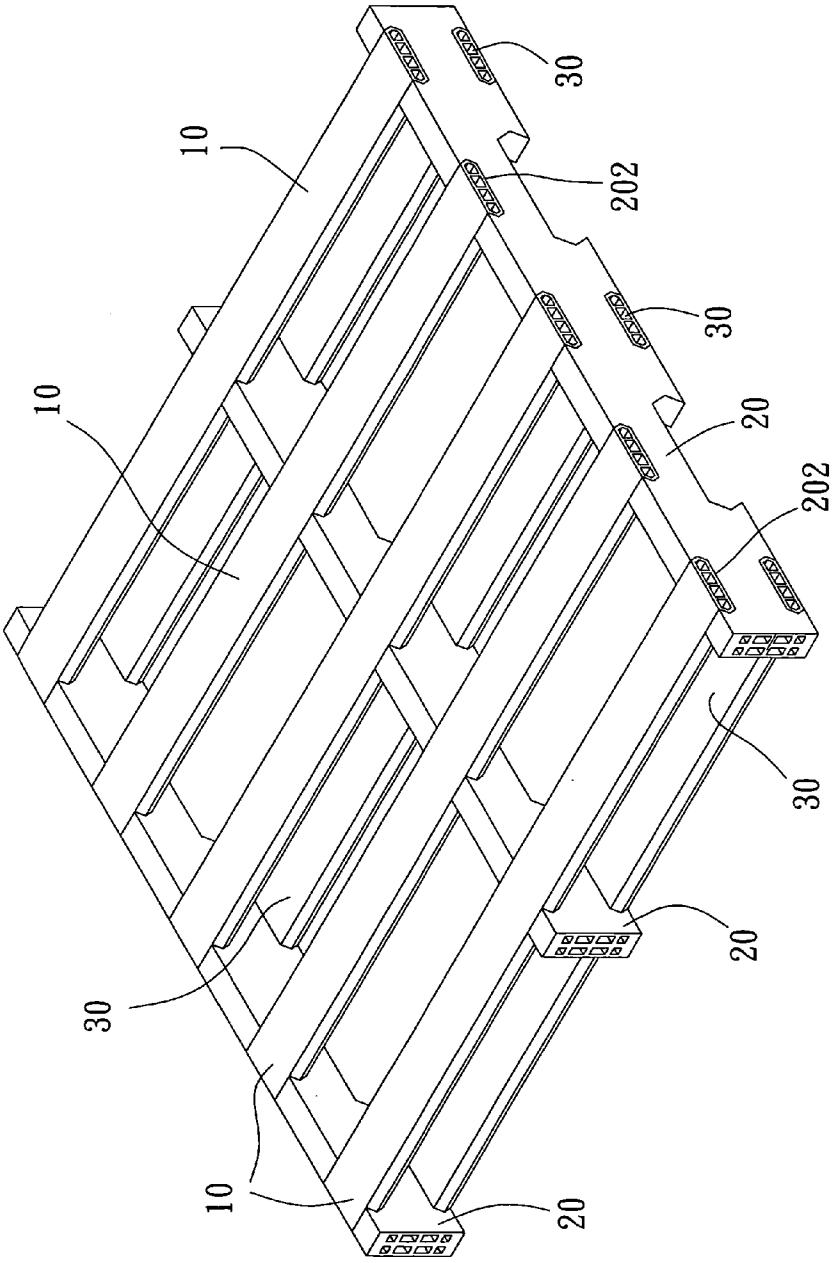


Fig. 4(Prior Art)

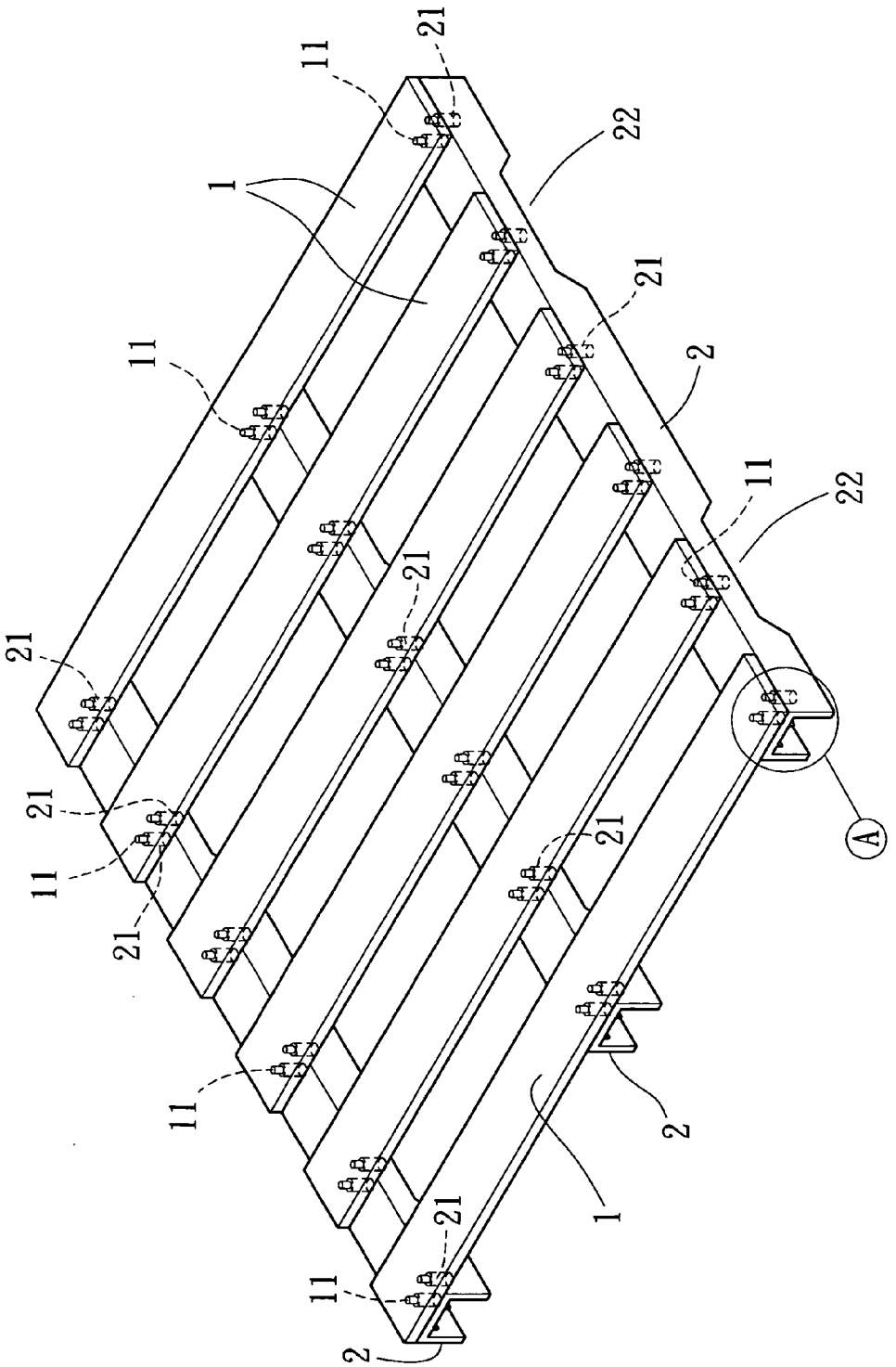


Fig. 5

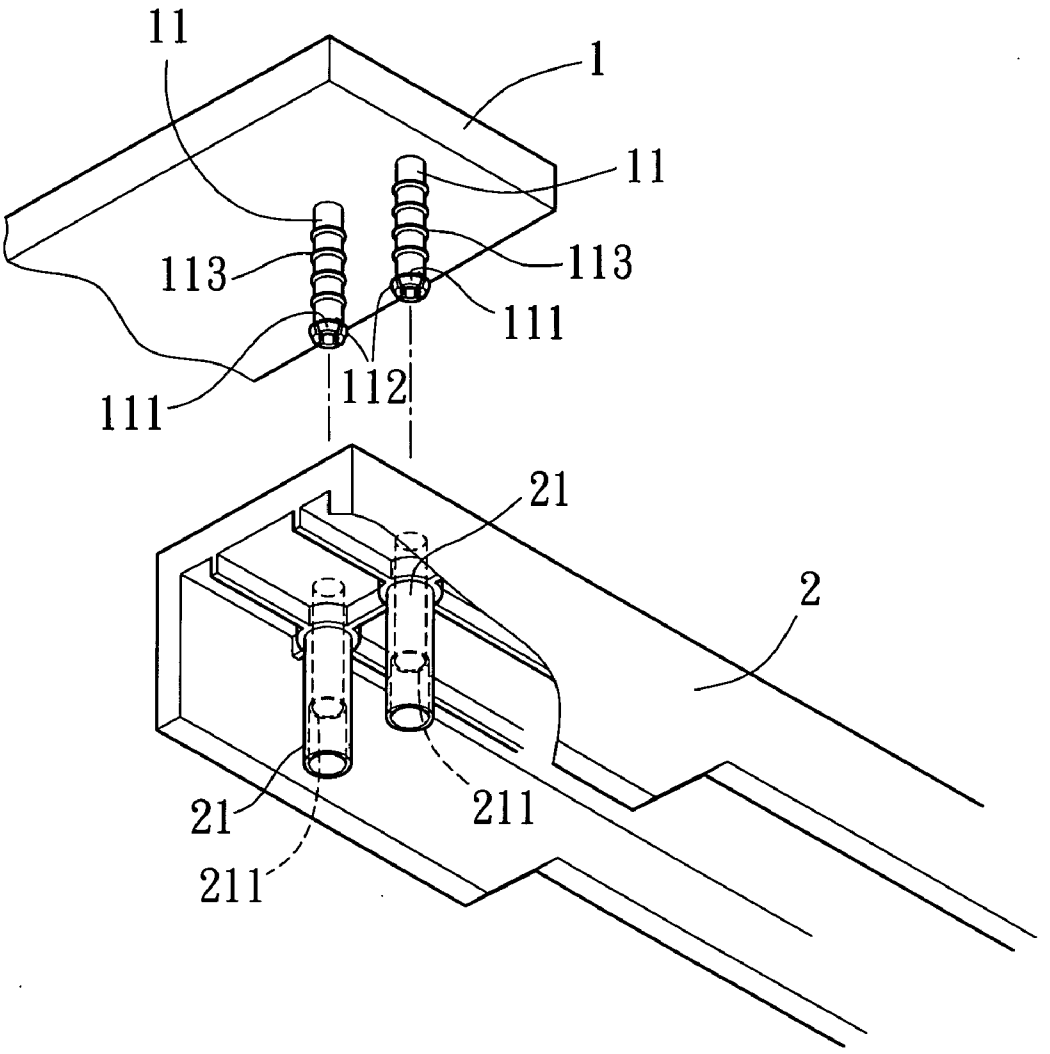


Fig. 6

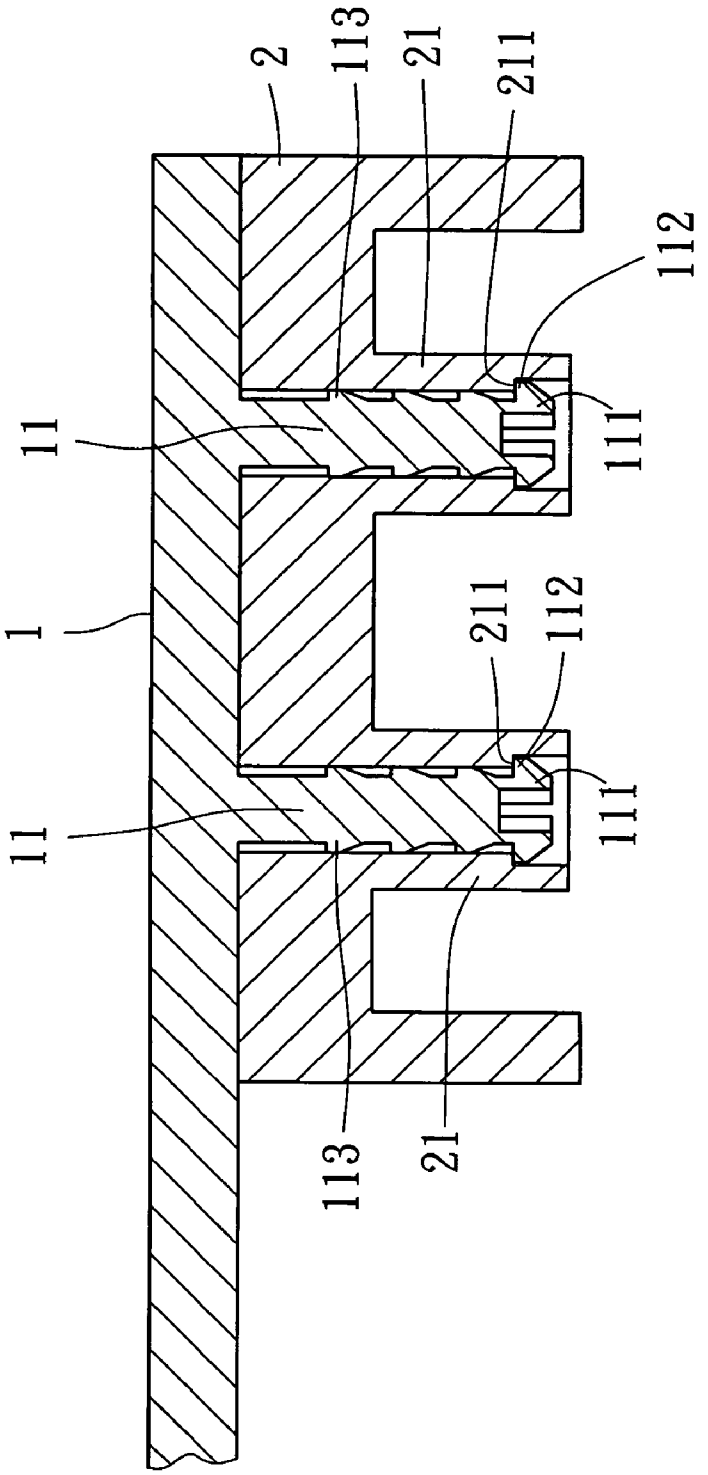


Fig. 7

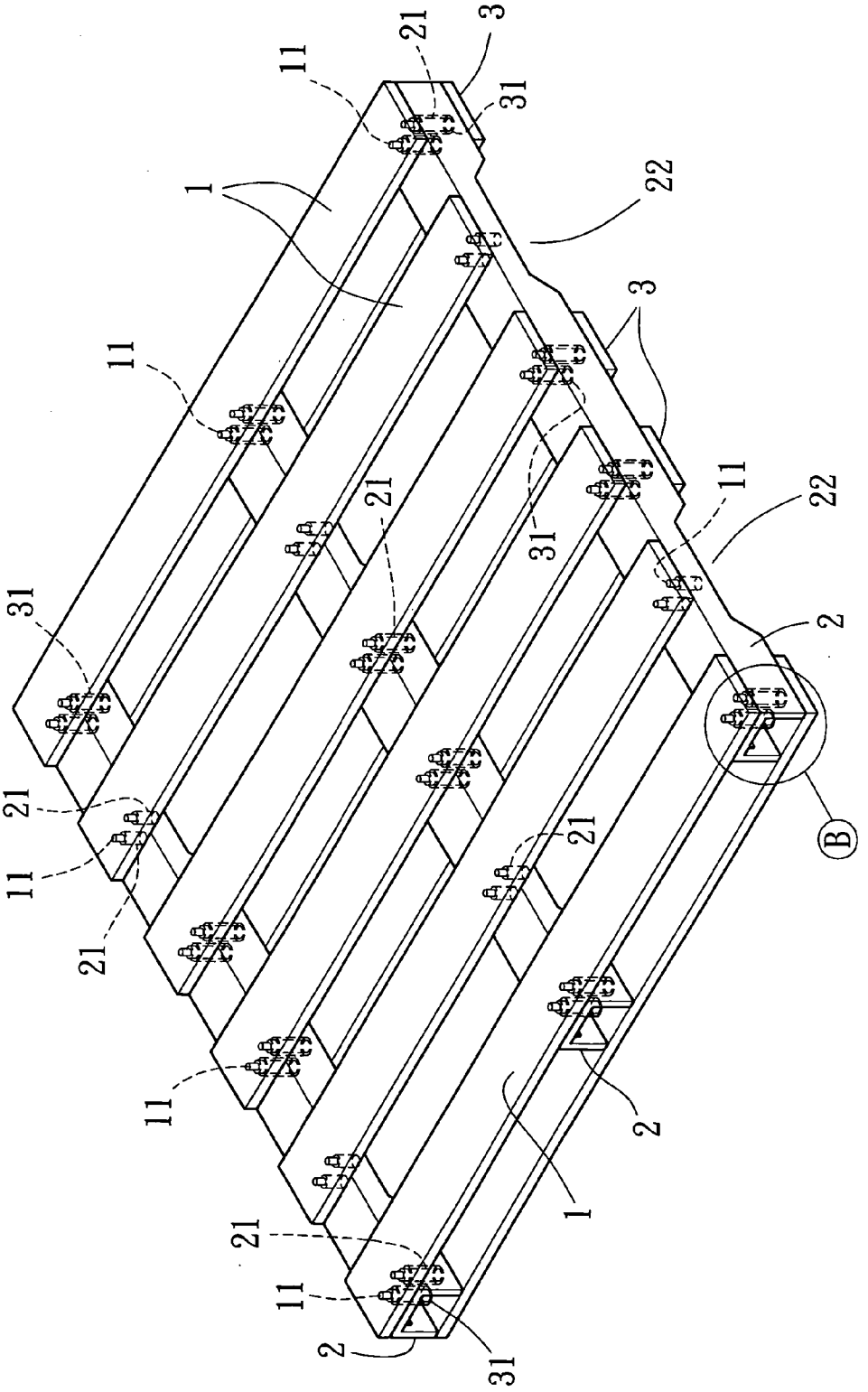


Fig. 8

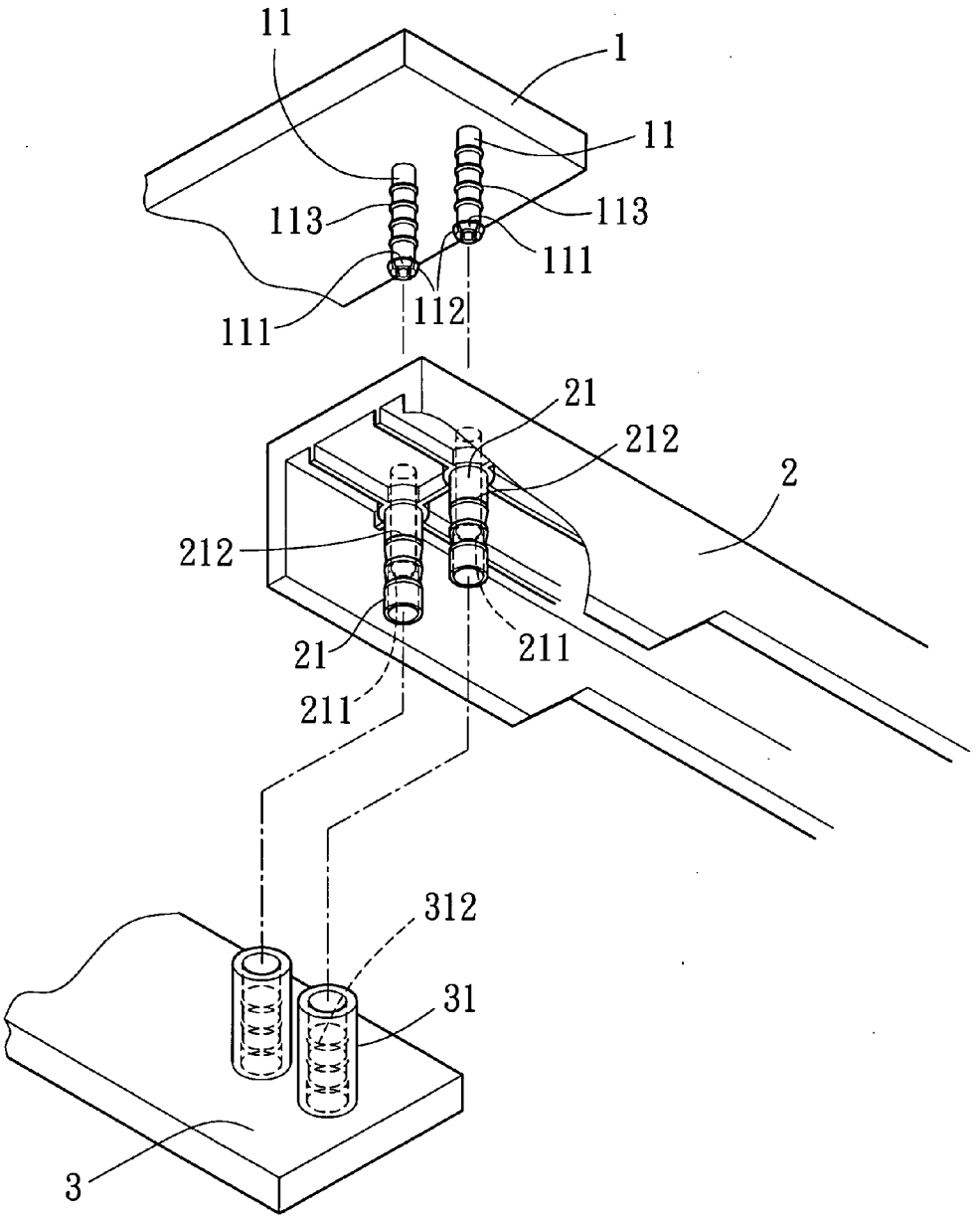


Fig. 9

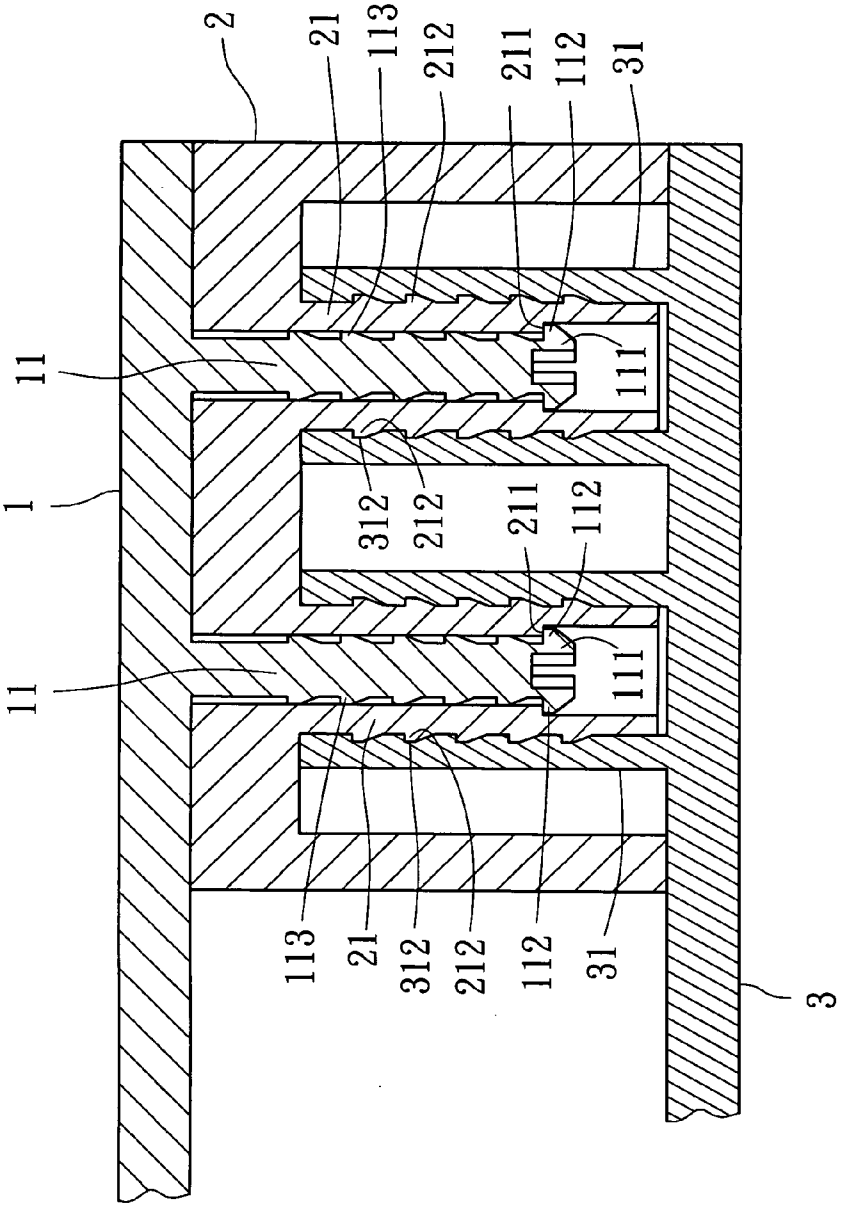

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Fig. 10

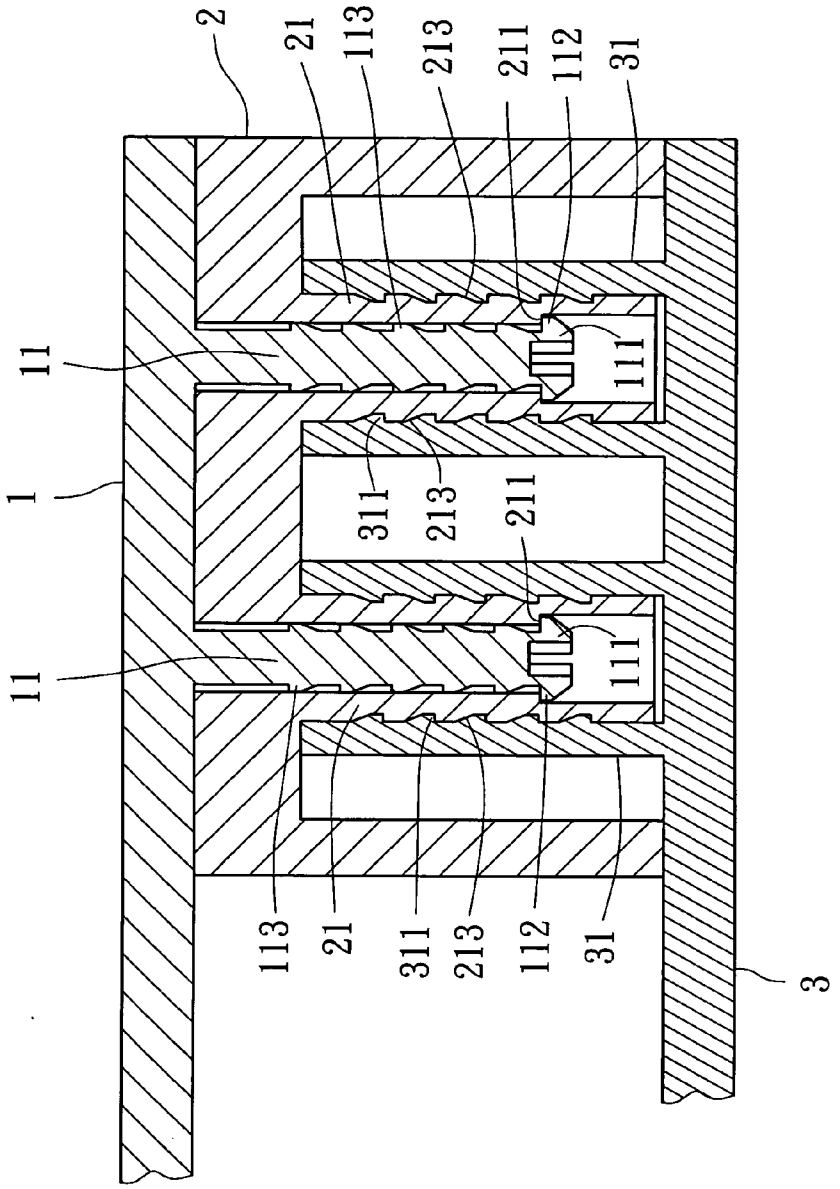
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Fig. 11

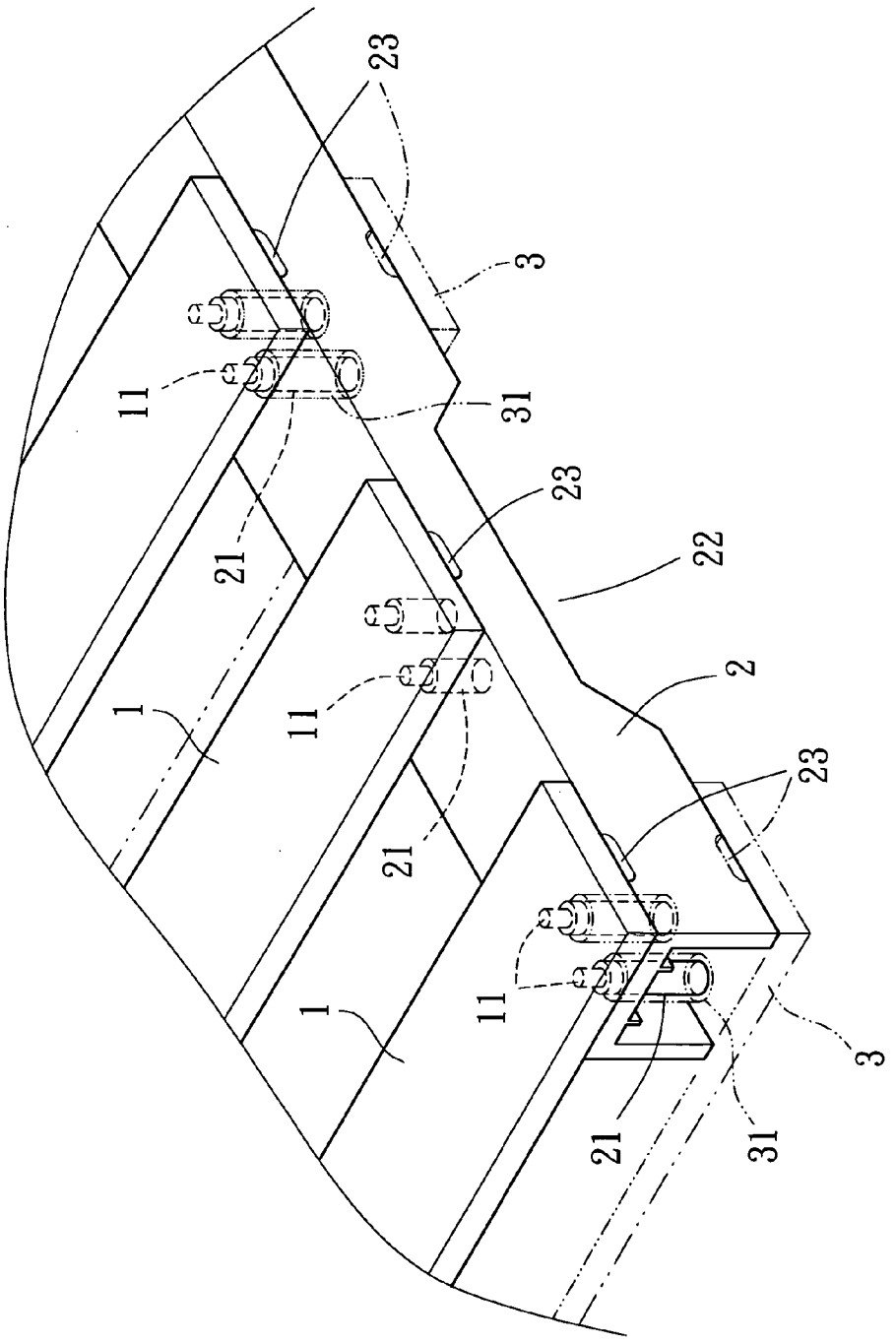

Fig. 12

COMBINATION PLASTIC PALLET

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a pallet and more particularly, to a combination plastic pallet formed of plastic top deckboards, plastic bottom deckboards, and plastic stringers connected between the top deckboards and the bottom deckboards, wherein the component parts are connected to one another by means of a plug joint.

[0003] 2. Description of the Related Art

[0004] Conventional pallets are made of wooden slats. In recent years, many government agencies have attempted to prohibit or to limit the felling of trees. Further, wooden pallets are neither strong enough nor durable in use. Therefore, wooden pallets are used for low weight application only. Nowadays, plastic materials are intensively used for making pallets. However, conventional plastic pallets are commonly heavy, and occupy much storage space before use. Therefore, combination plastic pallets are created.

[0005] FIG. **1** shows a combination plastic pallet according to the prior art. According to this design, the combination plastic pallet comprises a plurality of top deckboards **10**, a plurality of bottom deck boards **30**, and three stringers **20** connected between the top deckboards **10** and the bottom deckboards **30**. Referring to FIGS. **2** and **3**, the stringers **20** each have a plurality of mounting holes **201** symmetrically disposed at the top and bottom sides; the top deckboards **10** and the bottom deckboards **30** each have a plurality of mounting bolts **101** (the mounting bolts of the bottom deckboards **30** are not shown) respectively fastened to the mounting holes **201** of the stringers **20**.

[0006] FIG. **4** shows another design of combination plastic pallet according to the prior art. According to this design, the stringers **20** each have a plurality of dovetail grooves **202** symmetrically disposed at the top and bottom sides. The top deckboards **10** and the bottom deckboards **30** each have a dovetailed cross section respectively fitted into the dovetail grooves **202** of the stringers **20**.

[0007] The aforesaid two prior art designs are still not satisfactory in function because the component parts tend to be forced away from one another accidentally.

[0008] There are also known other designs of combination plastic pallets that use screws to fasten the component parts. The use of screws to fasten component parts together requires much labor, and also increases the cost.

SUMMARY OF THE INVENTION

[0009] The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a combination pallet, which has the parts thereof fastened together by means of plugging. It is another object of the present invention to provide a combination plastic pallet, which inexpensive to manufacture and easy to assemble, and which has a high structural strength when assembled.

[0010] According to one aspect of the present invention, the combination plastic pallet comprises a plurality of plastic top deckboards horizontally arranged in parallel and a plurality of plastic stringers fastened to the top deckboards at the bottom side and arranged in parallel. Each stringer comprises a plurality of hollow columns. Each hollow column has a stepped annular edge extending around the inside wall. The top deckboards each comprise a plurality of bottom plug rods respectively tightly plugged into the hollow columns of the stringers. Each bottom plug rod has a bottom split tip, and a barbed portion extending around the periphery of the bottom split tip and forced into engagement with the stepped annular edge of the associating hollow column. Therefore, when the top deckboards and the stringers are fastened together, the barbed portions of the bottom plug rods of the top deckboards are respectively engaged with the stepped annular edges inside the hollow columns of the stringers, keeping the top deckboards and the stringers tightly secured together to support a heavy load. Further, the barbed portion of each bottom plug rod has a diameter gradually upwardly increased in direction from the bottom side thereof toward the respective top deckboard to facilitate insertion of the respective bottom plug rod into the associating hollow column.

[0011] According to another aspect of the present invention, the combination plastic pallet further comprises a plurality of bottom deckboards respectively fastened to the hollow columns of the stringers and arranged in parallel corresponding to the top deckboard. Each bottom deckboard comprises a plurality of cylindrical sockets that receive the associating hollow columns of the stringers.

[0012] According to another aspect of the present invention, each hollow column has a plurality of outside annular ribs extending around the periphery thereof at different elevations and stopped against the inside wall of the associating cylindrical socket. Each cylindrical socket has a plurality of inside annular ribs or inside annular grooves extending around the inside wall thereof at different elevations for engagement with the outside annular ribs of the associating hollow column. Alternatively each hollow column can be made having a plurality of outside annular grooves, and each cylindrical socket can be made having a plurality of inside annular ribs extending around the inside wall thereof at different elevations for engagement with the outside annular grooves of the associating hollow column.

[0013] According to still another aspect of the present invention, a bonding glue may be applied to the junction between each bottom plug rod and the associating hollow column and the junction between each hollow column and the associating cylindrical socket.

[0014] According to still another aspect of the present invention, the top deckboards, the stringers and the bottom deckboards may be made in different colors, showing a color combination.

[0015] According to still another aspect of the present invention, each stringer has a plurality of tool notches on the top side corresponding to the top deckboard and the bottom side corresponding to the bottom deckboard.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. **1** is an oblique elevation of a combination plastic pallet according to the prior art.

[0017] FIG. **2** is an exploded view of one top deckboard and one stringer of the combination plastic pallet shown in FIG. **1**.

[0018] FIG. **3** is a sectional assembly view of one top deckboard and one stringer of the combination plastic pallet shown in FIG. **1**.

[0019] FIG. **4** is an oblique elevation of another structure of combination plastic pallet according to the prior art.

[0020] FIG. **5** is a perspective view of a combination plastic pallet in accordance with a first embodiment of the present invention.

[0021] FIG. **6** is an exploded view of a part A of FIG. **5**.

[0022] FIG. **7** is a sectional view in an enlarged scale of part A of FIG. **5**.

[0023] FIG. **8** is a perspective view of a combination plastic pallet in accordance with a second embodiment of the present invention.

[0024] FIG. **9** is an exploded view of part B of FIG. **8**.

[0025] FIG. **10** is a sectional view in an enlarged scale of part B of FIG. **8**.

[0026] FIG. **11** is a sectional assembly view of a part of a combination plastic pallet in accordance with a third embodiment of the present invention.

[0027] FIG. **12** is a perspective view of a part of a combination plastic pallet in accordance with a fourth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0028] Referring to FIG. **5**, a combination plastic pallet in accordance with a first embodiment of the present invention is shown comprised of a plurality of top deckboards **1**, and a plurality of, for example, three stringers **2**. The top deckboards **1** are respectively arranged in parallel at the top of the stringers **2**. Further, the top deckboards **1** and the stringers **2** are respectively molded from plastics.

[0029] Referring to FIGS. **6** and **7**, each top deckboard **1** comprises pairs of bottom plug rods **11** downwardly extending from its bottom wall corresponding to the stringers **2**. Each plug rod **11** comprises a split tip **111**, a barbed portion **112** protruded from and extending around the periphery of the split tip **111**, and a plurality of outside annular ribs **113** extending around the periphery and spaced above the split tip **111** at different elevations. The barbed portion **112** has a diameter increasing gradually upwards (see FIG. **7**). The outside annular ribs **113** may be tapered, having an outer diameter increasing gradually upwards (see FIG. **7**).

[0030] Referring to FIGS. **6** and **7** again, each stringer **2** comprises pairs of hollow columns **21** for receiving corresponding bottom plug rods **11** of the top deckboards **1**. Each hollow column **21** has a stepped annular edge **211** extending around the inside wall near the bottom end for the engagement of the barbed portion **112** of the associating bottom plug rod **11**.

[0031] Referring to FIGS. **6** and **7** again, the bottom plug rods **11** of the top deckboards **1** are respectively plugged into the hollow columns **21** of the stringers **2** to force the respective stepped annular edges **211** into engagement with the respective barbed portions **112**. After installation, the outside annular ribs **113** of the bottom plug rods **11** are respectively forced against the inside walls of the respective hollow columns **21** of the stringers **2**, and therefore the top deckboards **1** are firmly secured to the stringers **2**. Further, a bonding glue may be applied to the junction between each bottom plug rod **11** and the associating hollow column **21** to enhance the engagement.

[0032] Further, each stringer **2** has a plurality of bottom notches **22** (see FIG. **5**) for the insertion of the forks of a forklift truck to lift the combination plastic pallet and the cargo loaded on the combination plastic pallet.

[0033] FIGS. **8**~**10** show a combination plastic pallet in accordance with a second embodiment of the present invention. According to this second embodiment, the combination plastic pallet is comprised of a plurality of top deckboards **1**, a plurality of, for example, three stringers **2**, and a plurality of bottom deckboards **3**. The top deckboards **1** and the bottom deckboards **3** are respectively arranged in parallel at the top and bottom sides of the stringers **2**. Further, the top deckboards **1**, the stringers **2**, and the bottom deckboards **3** are respectively molded from plastics.

[0034] According to this embodiment, each top deckboard **1** comprises a plurality of bottom plug rods **11** downwardly extending from its bottom wall corresponding to the stringers **2**. Each plug rod **11** comprises a split tip **111**, a barbed portion **112** protruded from and extending around the periphery of the split tip **111**, and a plurality of outside annular ribs **113** extending around the periphery and spaced above the split tip **111** at different elevations. Each stringer **2** comprises a plurality of hollow columns **21** for receiving corresponding bottom plug rods **11** of the top deckboards **1**. Each hollow column **21** has a stepped annular edge **211** extending around the inside wall near the bottom end for the engagement of the barbed portion **112** of the associating bottom plug rod **11**, and a plurality of outside annular ribs **212** extending around the periphery at different elevations. Each bottom deckboard **3** comprises a plurality of cylindrical sockets **31** upwardly extending from its top wall for receiving the hollow columns **21** of the stringers **2**. Each cylindrical socket **31** comprises a plurality of inside annular grooves **312** extending around the inside wall at different elevations (see FIG. **9**).

[0035] Referring to FIGS. **9** and **10** again, during installation, the stringers **2** are fastened to the bottom deckboards **3** by plugging the hollow columns **21** of the stringers **2** into the cylindrical sockets **31** of the bottom deckboards **3** to force the outside annular ribs **212** of the respective hollow columns **21** into engagement with the inside annular grooves **312** of the respective cylindrical sockets **31**, and then the top deckboards **1** are fastened to the stringers **2** by plugging the respective bottom plug rods **11** into the respective hollow columns **21** to force the respective barbed portions **112** into engagement with the respective stepped annular edges **211**. When assembled, the top deckboards **1** are kept in parallel to the bottom deckboards **3** in X-axis direction, and the stringers **2** are kept between the top deckboards **1** and the bottom deckboards **3** in Y-axis direction. Further, a bonding glue may be applied to the junction between each bottom plug rod **11** and the associating hollow column **21** and the junction between each hollow column **21** and the associating cylindrical socket **31**.

[0036] Further, each stringer **2** has a bottom notches **22** located between each two adjacent bottom deckboards **2** (see FIG. **8**) for the insertion of the forks of a forklift truck to lift the combination plastic pallet and the cargo loaded on the combination plastic pallet.

[0037] FIG. **11** is a sectional view of a part of a combination plastic pallet in accordance with a third embodiment of the present invention. According to this third embodiment, the combination plastic pallet is comprised of a plurality of top deckboards **1**, a plurality of, for example, three stringers **2**, and a plurality of bottom deckboards **3**. The top deckboards **1** according to this third embodiment are same as the top deckboards of the aforesaid first and second embodiments. According to this third embodiment, each stringer **2** comprises pairs of hollow columns **21** for receiving corresponding bottom plug rods **11** of the top deckboards **1**. Each hollow column **21** has a stepped annular edge **211** extending around the inside wall near the bottom end for the engagement of the barbed portion **112** of the associating bottom plug rod **11**, and a plurality of outside annular grooves **213** extending around

the periphery at different elevations. Each bottom deckboard **3** comprises pairs of cylindrical sockets **31** upwardly extending from its top wall for receiving the hollow columns **21** of the stringers **2**. Each cylindrical socket **31** comprises a plurality of inside annular ribs **313** extending around the inside wall at different elevations. During installation, the stringers **2** are fastened to the bottom deckboards **3** by plugging the hollow columns **21** of the stringers **2** into the cylindrical sockets **31** of the bottom deckboards **3** to force the outside annular grooves **213** of the respective hollow columns **21** into engagement with the inside annular ribs **313** of the respective cylindrical sockets **31**, and then the top deckboards **1** are fastened to the stringers **2** by plugging the respective bottom plug rods **11** into the respective hollow columns **21** to force the respective barbed portions **112** into engagement with the respective stepped annular edges **211**. When assembled, the top deckboards **1** are kept in parallel to the bottom deckboards **3** in X-axis direction, and the stringers **2** are kept between the top deckboards **1** and the bottom deckboards **3** in Y-axis direction. Further, a bonding glue may be applied to the junction between each bottom plug rod **11** and the associating hollow column **21** and the junction between each hollow column **21** and the associating cylindrical socket **31**.

[0038] FIG. **12** is a perspective view of a part of a combination plastic pallet in accordance with a fourth embodiment of the present invention. This embodiment is substantially similar to the embodiment shown in FIG. **5** or embodiment shown in FIG. **8** with the exception that each stringer **2** has tool notches **23** on the top and bottom sides corresponding to the top deckboards **1** and the bottom deckboards **3**. When one top deckboard **1** or bottom deckboard **3** is damaged, a prying tool can be inserted into the corresponding tool notch **23** to lift up the damaged deckboard of the combination plastic pallet. Further, the pairs of bottom plug rods **11** on each top deckboard **1** may be longitudinally arranged in one line (see FIGS. **5** and **8**) or two lines (see FIG. **12**).

[0039] Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. For example, each cylindrical socket can be made having a plurality of inside annular ribs extending around the inside wall at different elevations for engagement with the outside annular ribs of the inserted associating hollow column; each hollow column can be made having a plurality of outside annular grooves extending around the periphery at different elevations for engagement with the inside annular ribs of the associating cylindrical socket. Accordingly, the invention is not to be limited except as by the appended claims.

1. A combination plastic pallet comprising:

a plurality of plastic top deckboards horizontally arranged in parallel and each having a plurality of bottom plug rods continuous with and extending downward from a bottom surface of said top deckboard, each said bottom plug rod having a bottom split tip and a barbed portion extending around the periphery of said bottom split tip; and

a plurality of plastic stringers fastened to said top deckboards at a bottom side and arranged in parallel, each of said stringers comprising a plurality of hollow columns continuous with said stringers, each said hollow column having a stepped annular edge extending around an inside wall thereof;

wherein the bottom plug rods of said top deckboards are respectively tightly plugged into said hollow columns of said stringers, the barbed portion of said bottom split tip of each bottom plug rod being forced into engagement with the stepped annular edge of the associating hollow column, whereby each of said top deckboards is directly fixed to each of said stringers without intervening joints.

2. The combination plastic pallet as claimed in claim **1**, wherein said barbed portion has a diameter gradually upwardly increased in direction from a bottom side thereof toward the respective top deckboard.

3. The combination plastic pallet as claimed in claim **1**, wherein each said stringer has a plurality of tool notches on a top side thereof corresponding to said top deckboard.

4. The combination plastic pallet as claimed in claim **1**, further comprising a plurality of bottom deckboards respectively fastened to said hollow columns of said stringers and arranged in parallel corresponding to said top deckboards, each said bottom deckboard comprising a plurality of cylindrical sockets projecting upwardly and continuous with said bottom deckboard that receive the associating hollow columns of said stringers;

wherein when fastened said plug rods, said hollow columns, and said cylindrical sockets form a structure having three concentric cylinders joined together.

5. The combination plastic pallet as claimed in claim **4**, wherein each said hollow column has a plurality of outside annular ribs extending around the periphery thereof at different elevations and stopped against an inside wall of the associating cylindrical socket.

6. The combination plastic pallet as claimed in claim **5**, wherein each said cylindrical socket has a plurality of inside annular ribs extending around an inside wall thereof at different elevations for engagement with the outside annular ribs of the associating hollow column.

7. The combination plastic pallet as claimed in claim **5**, wherein each said cylindrical socket has a plurality of inside annular grooves extending around an inside wall thereof at different elevations for engagement with the outside annular ribs of the associating hollow column.

8. The combination plastic pallet as claimed in claim **4**, wherein each said hollow column has a plurality of outside annular grooves; each said cylindrical socket has a plurality of inside annular ribs extending around an inside wall thereof at different elevations for engagement with the outside annular grooves of the associating hollow column.

9. The combination plastic pallet as claimed in claim **4**, wherein each said stringer has a plurality of tool notches on a top side thereof corresponding to said top deckboard and a bottom side thereof corresponding to said bottom deckboard.

* * * * *