United States Patent

[11] 3,524,415

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[54] **PLASTIC SHIPPING TRAY**
3 Claims, 13 Drawing Figs.

[52] **U.S. Cl.** **108/53,** 108/55
[51] **Int. Cl.** **B65d 19/38**
[50] **Field of Search** ..... 108/51 to 58

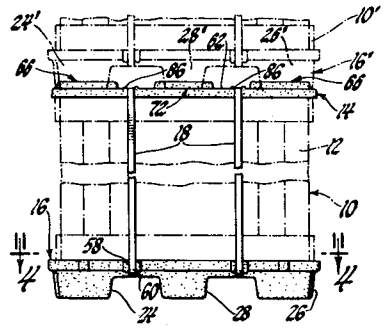
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ABSTRACT: A nestable shipping tray formed from a single sheet of plastic material includes a generally rectangular base having an upwardly extending peripheral wall for horizontally restraining a load supported thereon and a series of downwardly extending support legs formed along the longitudinal sides thereof which are arranged to permit four-way entry of a fork lift truck and an unobstructed passageway for longitudinal entry of a lifting platform. Reinforcing means are formed in the base to permit the tray and load to be supported at the edges of the legs and banding ribs are formed on the wall to locate and retain banding means used to fasten the load to the base. In storage, stacking lugs formed on the wall limit wedging between the support legs of the nested trays thereby facilitating easy separation of the trays for reuse.



Patented Aug. 18, 1970 3,524,415

Sheet 1 of 2

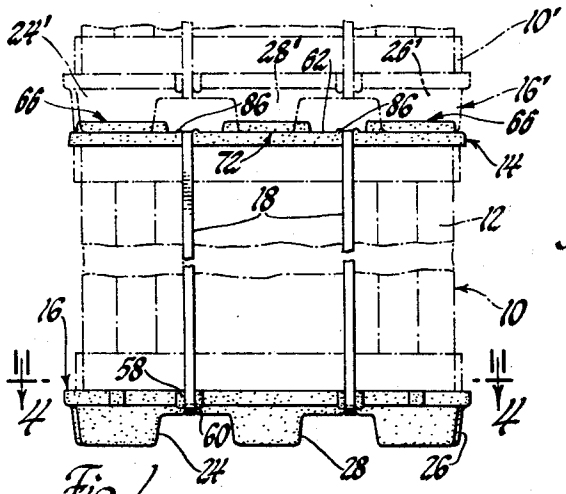


Fig. 1

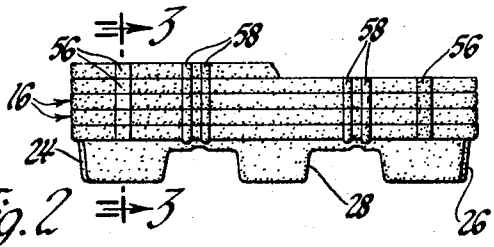


Fig. 2

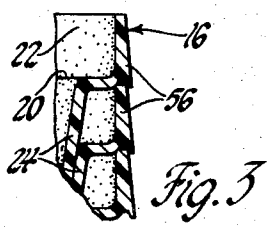


Fig. 3

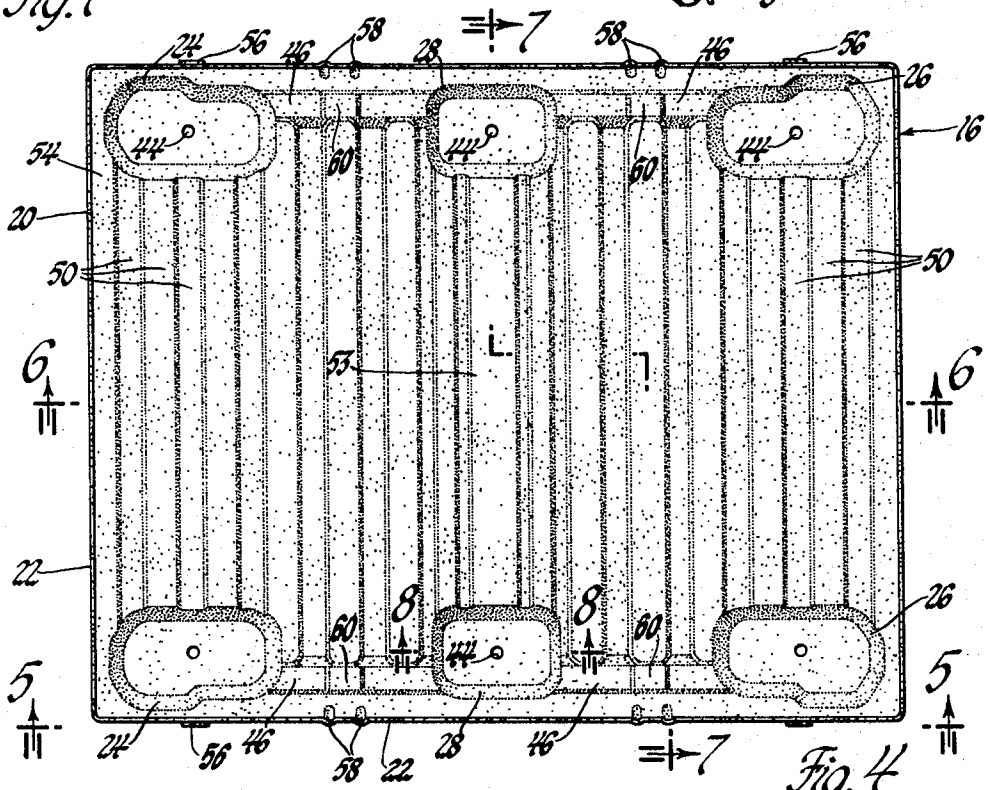


Fig. 4

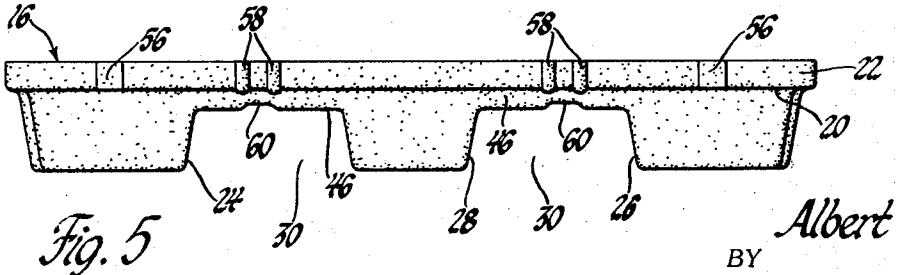


Fig. 5

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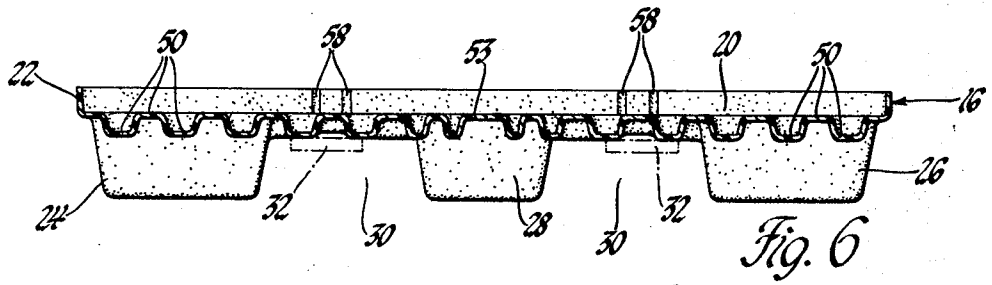


Fig. 6

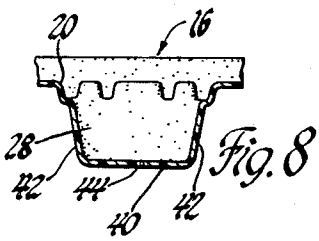


Fig. 8

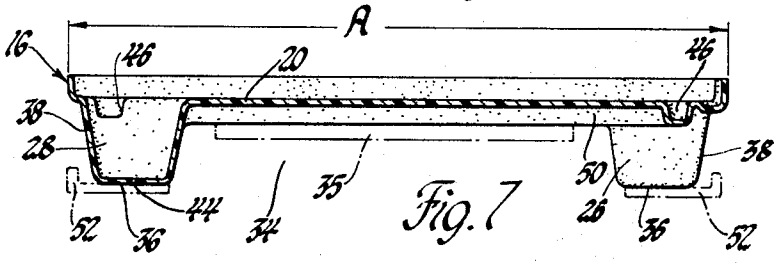


Fig. 7

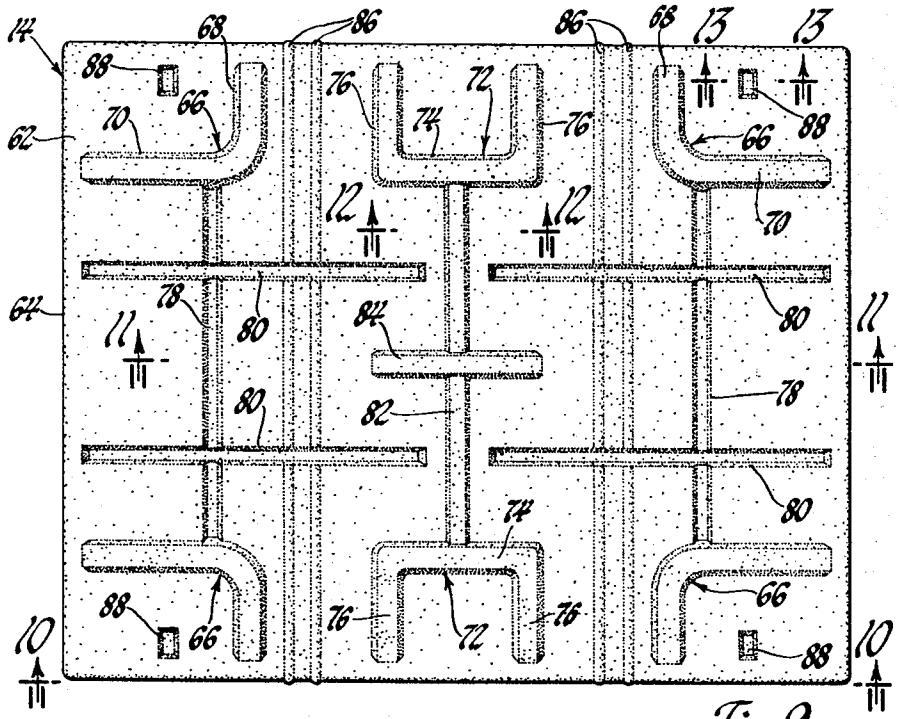


Fig. 9

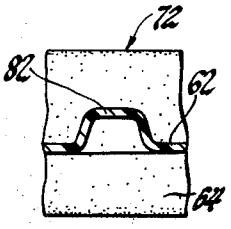


Fig. 12

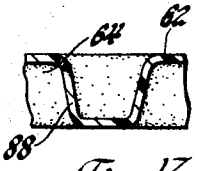


Fig. 13

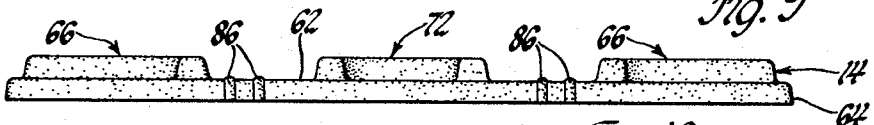


Fig. 10

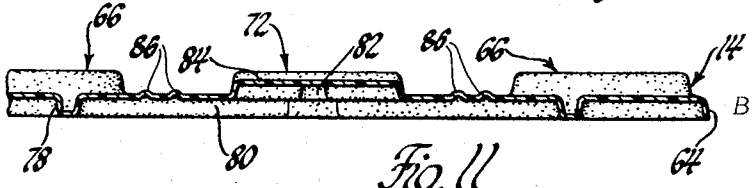


Fig. 11

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PLASTIC SHIPPING TRAY

Shipping trays are material handling devices used in the transporting of storage and shipping containers. These trays typically include a marginal rim for horizontally retaining the container and are provided with spaced support members which facilitate entry for the forks of a lift truck in order that the tray and shipping container can be conveniently moved as a unit to a desired location. However, all of the known commercially available shipping trays require a central support structure to adequately carry the weight of a loaded container. In many designs, the central support structure carries approximately fifty percent (50%) of the load.

The use of such trays, therefore, is limited to stacking and storing operations wherein the center as well as the edges of the tray are supported on a planar surface. Otherwise, the trays must be placed on slave pallets with a consequent increase in the costs of material handling. Similarly, these designs have an added disadvantage of not being directly usable in automated storage and retrieval systems of the type using only longitudinal side supports. Additionally, it has been found that in a large number of instances the central support structure is damaged or pierced by the forks of the lift trucks thereby greatly reducing the required center support strength and ruining the tray for further usage. Moreover, it has been found that the forks tend to shear or otherwise damage the exposed bands customarily used to retain the container on the tray thereby increasing the possibility that the components may separate during shipment.

The present invention contemplates overcoming the above-noted problems by providing a one-piece plastic shipping tray having support members solely along the longitudinal sides thereof, a feature which permits the trays and associated containers to be stacked and stored without the necessity of slave pallets and used in automatic storage and retrieving systems of the type described above. In the accomplishment of this objective, the shipping tray is formed from a single sheet of plastic material and includes a generally rectangular base having rows of laterally spaced hollow downwardly depending support legs formed at the longitudinal sides thereof. An upwardly extending wall is formed integrally at the edges of the base and serves to horizontally restrain a shipping container supported by the base. The legs are arranged to provide four-way entry for the forks of the lift truck and an unobstructed central passageway to permit transporting by material handling devices having a single relatively wide lifting platform. Lateral and longitudinal reinforcing ribs formed in the base provide sufficient bending strength for the tray to enable the latter to be supported at the edges of the support legs or along the base.

The shipping tray of the present invention also incorporates banding ribs and grooves in the wall and base, respectively, that serve to locate and retain the shipping bands used to securely fasten the container to the tray, and, additionally, to protect the bands from damage by the forks of the lift truck. The present invention also provides a number of stacking lugs on the wall to prevent wedging and locking between stacked trays in storage. Whereas previous designs have concentrated the weight of the stacked trays at the nested legs, the stacking lugs concentrate the weight of the trays at the walls thereby limiting the engagement between the nested support legs and facilitating easy removal of the trays for reuse. Additionally, the shipping tray is sized to be located in even multiples across the width of a standard truck or freight car thereby eliminating the need for spacers and insulators during shipment.

Accordingly, it is an object of the present invention to provide a one-piece shipping tray having structural support members only along the longitudinal sides thereof, the tray having sufficient banding strength to permit storage and stacking of the tray and an associated container at the bases of the support members.

A further object of the present invention is to provide a shipping tray having integral means for retaining and protecting a banding member used to fasten a load to the tray.

It is a further object of the present invention to provide a one-piece nestable shipping tray having integral stacking lugs formed thereon which limit wedging between mating surfaces of the trays in storage.

Still another object of the present invention is to provide a nestable one-piece shipping tray having support legs formed along the longitudinal sides thereof which are arranged to permit four-way entry of a fork lift truck and an unobstructed longitudinal passageway to permit entry of a lifting platform, the tray having lateral and longitudinal reinforcing ribs providing sufficient bending strength to enable the tray and an associated shipping container to be supported solely at the edges of the support legs or at the base of the tray.

These and other objects of the present invention will be apparent to one skilled in the art upon reading the following detailed description, reference being made to the accompanying drawings in which:

FIGURE 1 is a side elevational view of a shipping container incorporating a shipping tray made in accordance with the present invention;

FIGURE 2 is a side elevational view showing the nesting in storage of the shipping trays shown in **FIGURE** 1;

FIGURE 3 is an enlarged fragmentary view taken along line **3-3** of **FIGURE** 2;

FIGURE 4 is an enlarged view taken along line **4-4** of **FIGURE** 1;

FIGURE 5 is a view taken along line **5-5** of **FIGURE** 4;

FIGURE 6 is a view taken along line **6-6** of **FIGURE** 4;

FIGURE 7 is a view taken along line **7-7** of **FIGURE** 4;

FIGURE 8 is a view taken along line **8-8** of **FIGURE** 4;

FIGURE 9 is an enlarged top view of the shipping lid shown in **FIGURE** 1;

FIGURE 10 is a view taken along line **10-10** of **FIGURE** 9;

FIGURE 11 is a view taken along line **11-11** of **FIGURE** 9;

FIGURE 12 is an enlarged view taken along line **12-12** of **FIGURE** 9; and

FIGURE 13 is an enlarged view taken along line **13-13** of **FIGURE** 9.

Referring to **FIGURE** 1, there is shown a shipping container **10** comprising a container or load **12**, a shipping lid **14**, and a shipping tray **16**. The shipping lid **14** and the container **12** are fastened to the shipping tray **16** by vertical bands **18**.

As shown in **FIGURE** 4, the shipping tray **16** made in accordance with the present invention is formed from a single sheet of plastic material such as polyethylene by a suitable process such as vacuum forming. More specifically, the shipping tray **16** comprises a generally rectangular base **20** having an upwardly extending continuous peripheral wall **22** and identical rows of downwardly depending hollow support legs formed at the longitudinal sides thereof. One row of legs includes end legs **24** and **26** and a central leg **28**. The other row of legs are laterally spaced from and longitudinally aligned with the first set and include corresponding end legs **24** and **26** and a center leg **28**. As shown in **FIGURE** 6, the support legs define two lateral passageways **30** which accommodate lateral entry of forks **32** of a conventional lift truck for lifting and transporting the shipping container **10** at the base **20**. As shown in **FIGURE** 7, the spaced rows of support legs define an uninterrupted longitudinal passageway **34** which accommodates entry of a lifting platform **35** of a material handling device such as a hand truck.

Referring to **FIGURES** 6 and 7, the end legs **24** and **26** include a base **36** circumscribed by overlapping rectangles and side walls **38** tapering upwardly and outwardly toward the base **20**. Similarly and as shown in **FIGURE** 8, the center legs **28** have rectangular bases **40** and side walls **42** tapering upwardly and outwardly toward the base **20**. Additionally, each support leg is provided with a drain hole **44** to prevent accumulation of moisture in the tray **16**.

Referring to **FIGURE** 4, longitudinally extending reinforcing ribs **46** in the form of upwardly opening channels are formed in the base **20** between the legs **24**, **26** and **28**. The ribs **46** are designed to provide sufficient longitudinal bending

strength for the tray **16** to enable the latter and the container **12** to be laterally or longitudinally supported at the base **20**. A plurality of lateral reinforcing ribs **50** in the form of a series of alternately upwardly and downwardly opening channels are formed in the base **20** and extend transversely between the support legs **24**, **26**, **28** and the longitudinal reinforcing ribs **46**. An enlarged central rib **53** serves as a central edge support surface in the event a pair of half-size containers are carried by the tray **16**. As shown in **FIGURE** 7, the reinforcing ribs **50** are designed to provide sufficient bending strength for the tray to enable the latter and the container **12** to be vertically supported by members **52** at the bases of the support legs. As shown in **FIGURE** 4, the walls **22**, the support legs **24**, **26**, and **28**, and the reinforcing ribs **46** and **50** define a peripheral horizontal rim **54**. The rim **54** serves to continuously support the edges of the container **12** and thereby reduce the center loads on the tray **16**. This feature is particularly important when a corrugated container is being transported.

Referring to **FIGURES** 2 and 3, the hollow taper or draft angle of the support legs permit nesting of individual trays in storage. In other words, the support legs of one tray telescope within the cavity defined by the legs of the vertically adjacent tray and thereby reduce the space required for storage. It has been found that if the weight of the stacked trays is localized at the support legs, a wedging might occur at the mating surfaces thereby preventing separation of adjacent trays for reuse. To overcome this difficulty, a plurality of stacking lugs **56** are integrally formed along the longitudinal sides of the wall **22**. As shown in **FIGURE** 3, the base of each stacking lug **56** is provided with a groove which registers the top surface of a lower tray. By appropriate sizing of the stacking lugs **56**, the engagement between the support legs will be limited in storage. If desired, the stacking lugs can be sized to slightly space the support legs **24**, **26**, **28** in storage. In either case, the weight of the stacked trays will be localized at the support lugs **56** and the wall **22** and any wedging between mating surfaces will be substantially eliminated.

Referring to **FIGURE** 5, pairs of longitudinally spaced outwardly projecting banding ribs **58** are formed in the wall **22** and the base **20**. Additionally, banding grooves **60** are formed in the reinforcing ribs **46**. As shown in **FIGURE** 1, the ribs **58** and the grooves **60** cooperate to locate and retain the bands **18**. Moreover, the ribs **58** and the grooves **60** protect the bands **18** from damage by the forks of a lift truck.

The shipping trays of the present invention are adapted to be loaded in an even number of units across the width of a truck or a freight car. In other words and as shown in **FIGURE** 7, the width A of the tray **16** will be evenly divisible into the width of a truck. As shown in **FIGURE** 6, the length of the tray will be evenly divisible into the width of a freight car.

Referring to **FIGURE** 9, the shipping lid **14** is formed from a single sheet of plastic material and comprises a generally rectangular deck **62** having an integrally formed downwardly depending peripheral side wall **64**. Four raised ribs **66** in the form of downwardly opening L-shaped channels are formed at the corners of the deck **62**. Each rib **66** has a laterally extending leg **68** and a longitudinally extending leg **70**. As shown in **FIGURE** 1, the ribs **66** serve to locate and horizontally restrain the end legs **26** and **24** of the shipping tray **16'** shown in phantom lines. A pair of raised U-shaped ribs **72** in the form of downwardly opening channels are formed on the top surface of the deck **62**. Each rib **72** includes a longitudinal base **74** and laterally outwardly extending legs **76**. As shown in **FIGURE** 1, the ribs **72** are adapted to locate and horizontally restrain the legs **28** of the shipping tray **16'**. As will be appreciated, the ribs **66** and **72** will coact with support legs **24**, **26** and **28** to prevent relative horizontal movement between the stacked shipping containers **10** during shipment.

An upwardly opening channel is formed in the deck **62** between the opposed ribs **66** and defines a transverse reinforcing rib **78** for the lid **14**. Opposed pairs of upwardly opening channels intersect the ribs **78** and define longitudinal reinforcing ribs **80**. The ribs **78** and **80** are adapted to contact the top surface of the container **12** and thereby evenly distribute the weight of the stacked shipping container **10'**. A raised lateral reinforcing rib **82** extends transversely between the channels **72** and is centrally intersected by a raised longitudinal rib **84**. The aforementioned ribs **78**, **80**, **82**, and **84** provide sufficient strength for the lid **14** to permit vertical stacking of a plurality of shipping containers **10**.

Longitudinally spaced pairs of banding ribs **86** are formed transversely across the deck **62** and vertically along the side wall **64**. In assembly, the banding ribs **86** are vertically aligned with the corresponding banding ribs **58** formed on the shipping tray **16**. As shown in **FIGURE** 1, the ribs **86** locate and retain the bands **18** and protect the latter from damage during shipment. As shown in **FIGURES** 9 and 13, four downwardly extending pads **88** are formed at the corners of the deck **62**. The pads **88** serve to distribute the weight of the stacked container **10'** at the outward edges and thereby reduce the central loading on the container **12** and the lower shipping tray **16**. It will be noted that the surfaces on the lids **14** have corresponding tapers or draft angles to permit nesting of a plurality of trays in the same manner as shown in **FIGURE** 2 with reference to the shipping trays **16**.

As previously stated, it is preferred to form the shipping tray **16** and the shipping lid **14** from a single sheet of plastic such as polyethylene which may contain an ultraviolet stabilizer to increase resistance to weathering. In the practice of this invention, it has been found that a **53"** x **42"** tray formed from a **.300** gauge sheet of polyethylene and having ribs **46** and **50** defined by **1-⅛"** x **1-⅛"** channels will provide sufficient strength to statically support a load of **20,000** pounds at the bases of support legs having an area of **220** square inches. It has also been found that a shipping lid **14** formed from a **.140** gauge sheet of polyethylene will provide sufficient dynamic strength to accommodate shipment of two vertically stacked shipping containers **10**. Results have indicated that trays and lids of the type described above will withstand repeated usage and handling without a decrease in strength and can be conveniently and inexpensively returned to the shipper.

Although only one form of this invention has been shown and described, other forms will be readily apparent to those skilled in the art. Therefore, it is not intended to limit the scope of this invention by the embodiment selected for the purpose of this disclosure but only by the claims which follow.

I claim:

1. A plastic shipping tray for use in transporting a load secured thereto by bands comprising: a rectangular base having an upwardly extending peripheral wall, said wall adapted to locate and horizontally restrain said load on said base; a plurality of tapered hollow support legs formed integrally with said base and depending downwardly therefrom, said support legs being arranged in opposed rows adjacent the longitudinal sides of said wall for permitting longitudinal and lateral entry for the forks of a lift truck and longitudinal entry of a lifting platform; longitudinal reinforcing ribs in the form of upwardly opening channels formed in said base and extending longitudinally between said support legs; a series of longitudinally spaced reinforcing ribs in the form of alternate upwardly and downwardly opening channels formed in said base and extending transversely between said first-mentioned reinforcing ribs and said legs, said first-mentioned and said second-mentioned reinforcing ribs providing bending strength for said tray to permit support of the latter and said load solely along the longitudinal edges of said support legs; banding ribs formed in said wall and banding grooves formed in said base for locating and retaining said bands and protecting the latter from damage during shipment.

2. A nestable plastic shipping tray, said shipping tray comprising: a rectangular base having a continuous peripheral wall formed integrally therearound that is adapted to horizontally locate and restrain a load supported by said base; laterally spaced rows of tapered hollow support legs formed integrally with said base and depending downwardly therefrom, said rows defining therebetween an uninterrupted central

passageway for accommodating longitudinal entry of a lifting platform and said support legs being arranged to permit lateral and longitudinal entry for the forks of a lift truck; a series of longitudinally spaced laterally extending reinforcing ribs formed in said base and providing sufficient lateral bending strength for said tray to enable the latter and said load to be longitudinally supported at said legs; longitudinal reinforcing ribs formed in said base between said legs and providing sufficient longitudinal bending strength for said tray to enable the latter and said load to be supported at said base, said first-mentioned and said second-mentioned ribs and said support legs having tapered walls to permit nesting and stacking of said trays in storage; and a plurality of stacking lugs formed on said wall for carrying at said wall the weight of the trays stacked thereabove and thereby limit wedging between the support legs of adjacent trays.

3. A plastic shipping tray for use in transporting a load secured thereto by bands, comprising: a rectangular base having a continuous upwardly extending peripheral wall that is adapted to locate and horizontally restrain said load on said base; laterally spaced rows of downwardly depending hollow support legs formed integrally with said base inwardly of said wall, said rows defining therebetween an uninterrupted central passageway for accommodating longitudinal entry of a lifting platform and said support legs having tapered walls for nesting and stacking of the trays in storage and being arranged to permit lateral and longitudinal entry of the forks of a lift truck; upwardly opening channels formed in said base and extending longitudinally between said support legs, said channels forming reinforcing ribs providing sufficient longitudinal bending strength for said tray to enable the latter and said load to be supported at said base; a series of longitudinally spaced alternate upwardly and downwardly opening channels formed on said base and extending transversely between said first-mentioned channels and said legs whereby said channels, said support legs, and said wall define a peripheral rim for supporting the load at the edges thereof and reducing the center loading on said base, said second-mentioned channels forming reinforcing ribs providing sufficient lateral bending strength for said tray to permit the latter and said load to be supported solely along the longitudinal edges of said support legs; outwardly projecting banding ribs formed in said wall and recessed banding grooves formed in said base for locating and retaining said bands and protecting the latter from damage during shipment; and a plurality of stacking lugs formed on said wall for carrying at said wall the weight of the trays stacked thereabove and thereby limit wedging between the support legs of adjacent trays.