

CRATES FOR TRANSPORTING RUBBER BLOCKS OR SHEETS

This invention relates to crates for transporting rubber blocks or sheets.

The traditional method of transporting, in particular by sea, rubber sheets or blocks involves packing the sheets or blocks into wooden crates. These crates have to be large enough to accommodate rubber blocks or sheets made according to an international packing standard determined by the International Standard Organisation (ISO), or to rectangular dimensions of approximately 700 mm long x 355 mm wide x 180 mm thick. Since one such block or sheet weighs about 33 to 35 kg, each wooden crate is required to withstand a packing load of 1 to 1.26 tonnes. This is because, in order to be economical, each crate is required to carry about 30 to 36 blocks or sheets.

Crates suitable for transporting rubber blocks or sheets preferably, therefore, have overall dimensions of approximately 1100 mm high x 1130 mm wide x 1447 mm long. That is to say, crates for transporting rubber blocks or sheets have dimensions of the order of 0.75 to 2 metres.

A wooden crate sufficiently robust to carry the above load and to withstand the forces of sea transport and numerous rugged port handling requires a substantial quantity of timber. This in turn means that the volume of the timber itself substantially increases the total volume required in the hold of the ship, to accommodate the crate and its load, over and above the volume of the load itself. Clearly, this leads to the disadvantage that the timber crates puts a restriction on the quantity of cargo which can be shipped at any given time.

This is not the only problem associated with wooden crates. Wooden crates must be disposed of at their destination port, such disposal being expensive. The size of the crates is such that it is not economic to return empty crates from the destination port. This is because the crates would take up the same space in the hold of the ship on their return journey as they would on their outgoing journey.

When the crates are initially loaded, there is space around the rubber blocks or sheets. Since the rubber slowly creeps, it takes up this space during the course of time. To ensure that as much rubber is carried by the crate at any one time, it is necessary initially to load the crate so that the level of rubber blocks

protrudes above the top of the crate. Placement of dunnage is achieved by loading the crate with 1 to 3 tons and leaving the load in position for about 8 to 12 hours. Spaces then fill owing to flow or creeping of the rubber blocks. This process acts as dunnage for the wooden crates and serves to steady the load during shipping as well as to improve load capacity of the wooden crates. When dunnage is complete, the level of the rubber in the crate is not higher than the top of the crate. This allows the wooden crates to be stacked.

Other types of crate or container are known. However, particular crates are designed with a particular purpose in mind. For example many different containers are known for storing or carrying food.

British patent specification 1 439 064 describes a nestable or stackable container for storing food in a refrigerator. The container comprises handles for enabling the container to be carried when in one position, and for enabling the container to be stacked when in another position. The container has support ribs for limiting the depth to which one container can rest in another. The containers are made of polyethylene.

These stackable containers are totally unsuitable for use in transporting bulk quantities of rubber sheets or blocks having ISO dimensions or dimensions of that order of magnitude. First, they are only suitable for carrying much smaller loads and even if scaled up in size would not be strong enough to withstand the requirements of transporting rubber blocks or sheets. The handles would be too cumbersome weak, and unsteady to enable loaded containers to be stacked. In addition, the handles must be removed to enable nesting. In the event where thousands of crates are to be nested and transported, there is a problem that not only must the handles be removed which involves considerable expenditure of flow, but the handles must be transported and accounted for separately. Another problem with this design is that the containers sit partially within one another when stacked, thereby reducing the useable capacity of the container. The container of GB 1 439 064 is specifically intended to be picked up by hand. No provisions are made for the handling of the container by heavy duty lifting machinery, such as fork lift trucks.

Another known container is described in United States patent specification 3,759,416. This container is of a moulded construction, has solid walls and a solid lid to

enable stacking. This container is designed to store food and would be totally unsuitable for transporting rubber sheets or blocks having the aforesaid dimensions. One problem with this container is that it is too small and if scaled up in size, it would be too weak if made from a plastics material and too heavy if made from metal. Moreover, the need to use a seperable lid would also be problematic if used in containers for transporting such rubber blocks or sheets.

Other types of container are known which can be stacked only in particular orientations. This limitation would be totally unsatisfactory if applied to crates or containers for transporting the rubber sheets or blocks. This is because it is essential to be able to stack crates without the need to turn it round to a particular orientation. Re-orientating crates containing the rubber would considerably increase loading and unloading times.

Another problem with these prior art containers is that their nesting depth is relatively shallow. Consequently, such nested containers therefore require more space than would be the case if their nesting depth were greater.

It is an aim of the present invention to provide a crate for transporting rubber sheets or blocks having the aforesaid dimensions which does not possess the limitations described above. In particular, it is an aim of the present invention to provide a crate which is so designed that the loading and unloading time of the crates into the hold of a ship or land vehicle can be substantially improved, the crates are sufficiently robust to be reused, and to withstand port handling, the crates can be nested to a high packaging density, thereby making return shipment of empty crates economical, and the crates can be conveniently and stably stacked without the need for separate crate lids or orientation readjustment.

According to the present invention there is provided a crate for transporting rubber blocks or sheets, wherein the crate has the shape of a rectangular or square frusto-pyramid so as to allow one crate to be nested inside another, the crate has a rim running along the free edges of the open side of the crate, and a hinged support member is hingedly attached to or formed integrally with the rim of the crate in the vicinity of each corner of the crate, the hinged support members each comprising a pair of hinge supports having a cross-section which corresponds to the cross-section of the rim in a plane perpendicular to the longitudinal axis of the rim, a rest formed between the hinge supports and a lateral support hingedly supported between the

hinge supports; and arranged so that in one position when one crate is superimposed on another the lateral supports rest on the rest so that the lateral supports provide support to the base of the superimposed crate, the lateral support being hinged about an axis parallel to the longitudinal axis of the rim, the axis being positioned relative to the rest such that in another position the lateral support can lie substantially vertically and extend through a recess defined by the hinged supports and the rest so that the lateral support does not, or does not substantially, extend laterally outwardly from the side of the crate.

Feet may be positioned in the vicinity of each corner of the base, the spacing between each of the feet being such that forks of a fork lift truck can be received between them.

The height of the rim is preferably substantially equal to the height of the feet, the thickness of the metal from which the crate is constructed is preferably between 2 and 4 mm so that when one crate is nested within another, the nested crate protrudes from the nesting crate by a distance substantially equal to the height of the rim.

Embodiments of the invention are advantageous in that the hinged support members can very easily be flipped from one position which conveniently enables stacking of the crates, and another position which allows nesting of the crates to an optimally high packing density. The achievement of a high packing density enables more crates to be packed into a given volume of space in the hold of a ship, thereby making the cost of returning empty crates more economic.

Provision of the hinged support members therefore enables the crates to be prepared quickly for stacking after they are loaded. The support members can be hinged away from obstructing nesting of the crates when empty crates are to be returned from the destination port.

The construction of hinged support members is particularly advantageous as even when crates are nested, the lateral support extends outwardly from the side of the crate by a relatively small amount, thereby enabling adjacent crates to be positioned close together in the hold of a ship.

Embodiments of the present invention also have the advantage that they comprise features which combine to provide a reusable crate which is particularly suited for transporting about 30 to 40 rubber blocks or sheets having the aforesaid magnitude of dimensions.

The particular construction of crate embodying the invention is also particularly suitable for transporting the rubber blocks or sheets because they are sufficiently strong to withstand forces which occur during transit, particularly through the shipping ports.

Crates embodying the invention are also very advantageous for the transporting of the rubber blocks or sheets because they facilitate faster loading and unloading of the rubber.

This is particularly so when it is considered that for a crate embodying the invention which has similar outside

dimensions as a prior art wooden crate, there is a greater degree of internal space which allows for the dunnage of the rubber to occur within 2 to 3 hours instead of 8 to 12 hours as is the case with wooden crates.

Use of the open sided flat bar and angled corner structure enables embodiments of the invention to be sufficiently strong to withstand stacking, for example, 6 loaded crates one on top of another. That is to say, embodiments of the invention may be capable of withstanding up to 6 tonnes of load. The bar structure is sufficiently strong to withstand sideways movement of the rubber within the crate, which may occur due to stress flow of the rubber.

Embodiments of the invention may be approximately 1447 mm long, 1130 mm wide, and 1100 mm high. Naturally, these dimensions may be varied to suit rubber sheets or blocks of different sizes or to suit the packing of different numbers of sheets. The metal forming the corners of the crate is preferably 3 mm in thickness.

Embodiments of the invention have the advantage that they are sufficiently strong to withstand the forces which occur of carrying loads of rubber up to 1 to 1.2 tonnes for shipping times of, for example, 50 days.

Constructing the sides of the crate with flat bar members has the advantage that even if the bars become slightly damaged or crooked through use, the nesting of the crates would not be impeded.

The open sided structure helps to reduce the overall weight of the crates. Consequently, embodiments of the invention may weigh something in the region of 80 kg. This weight is comparable to the weight of prior art wooden crates. However, embodiments of the inventions afford substantial advantages over the prior art wooden crate as indicated above.

Embodiments of the invention also have the significant advantage that they are easy to manufacture, and therefore relatively low in cost.

The invention will now be further described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a side view of an embodiment of the present invention;

Fig. 2 is an end view of the embodiment of Figure 1;

Fig. 3 is a plan view of the embodiment of Figure 1;

Fig. 4 is a cross sectional view along the line X-X of Figure 3;

Fig. 5 is a view of the base of the crate taken from the underside;

Figs. 6a and 6b are enlarged fragmentary views of a hinged support member in 'stacking' and 'nesting' positions respectively;

Fig. 7 is an enlarged fragmentary view of a foot of the crate taken in the direction of arrow A of Figure 2; and

Fig. 8 shows a crate nested within another crate.

Figure 1 shows a side view of a crate 1 embodying the present invention. The container 1 is formed by a framework of generally L cross-section members comprising uprights 2 and base members 3 with a rim 4 joining the upper ends of the upright 2. The rim 4 may be in the form of a tubular rail, and may be approximately 60 mm in height.

Gussets 5 are provided between the uprights 2 and the rim 4 for providing additional strength.

As illustrated in Figures 1 to 5 and 8, the shape of the crate is rectangular and frusto-pyramidal. That is, tapering towards the base so that one crate will nest inside another (see Figure 8).

The crate has a base 7 which is substantially flat, and constructed from approximately 2 mm thick metal, for example, or possibly a strong plastics material.

At each corner of crate 1 is provided a foot 8, described in detail below with reference to Figure 7.

Forks of a fork lift truck may pass under the base 7 and between pairs of feet 8 from any side of the crate. Consequently, the crate 1 can be lifted, by a fork lift truck, without the need to consider the orientation of the crate.

The sides of the crate are filled with a mesh structure 9 which is formed from two horizontal rows of substantially vertically orientated flat bars.

The rows are separated by a horizontal bar 10 which extends between the upright members 2 of each side of the crate 1.

The upper row of bars are narrower than the lower row. The purpose of this is to save weight and cost. The lower rows of bars are wider in order to withstand greater sideways forces due to the weight of the rubber blocks or sheets within the crate. The thickness of the bars is preferably 3 mm, but may be less, i.e. 2 mm.

The top row of bars may be approximately 25 mm in width and the lower row of bars and the horizontal bar may be approximately 43 mm in width.

The vertically orientated bars may taper, that is reduce in width towards the base of the crate. This tapering would have the effect of reducing interference, particularly if some bars are buckled, between the bars of respective crates when one crate is nested within another.

The upright members 2 are formed from a metal of 3 mm thickness. A thickness which is significantly less than this (say 1 mm) may not be suitable as the uprights 2 may then not be strong enough to support several stacked crates. If the uprights are significantly thicker than 3 mm, i.e. 6 mm say, then the nesting depth of a nested crate may be less, which may lead to a reduction in the packing density of nested crates.

Hinged support members 12 are positioned on the rim 4 close to each of the four corners of crate 1. The particular construction of the hinged support members will be discussed below with reference to Figures 6a and 6b.

Figure 3 illustrates the hinged support members 12 when they are extending towards one another within the crate 1. When in this position, the hinged support members 12 can support the base of another crate to be stacked on top of the crate 1.

The hinged support members 12 may be flipped to be directed away from another as illustrated in Figure 8. When in this position, nesting of crates is possible.

Provision of the hinged support members 12 enables the crates to be adapted from stacking to nesting modes with ease. This greatly enhances the efficiency of loading crates into the hold of a ship or onto a land vehicle.

In Figures 6a and 6b, a detailed view of a hinged support member 12 is shown.

Figure 6a shows the hinged support member 12 lying in a horizontal orientation. In this orientation, crates may

be stacked one on top of another, the underside of respective feet 8 of the stacked crate being support by respective support members 12. In order to rest the crates 1, the support member may be flipped over in the direction of the arrows shown in Figure 6a.

Figure 6b shows one of the hinged support members 12 flipped over so as to drop, in a substantially vertical orientation, down the outside of the crate 1. When in this orientation, crates may be nested within one another. For stacking, the support member may be flipped over (in the direction of the arrows) so that it lies horizontally.

Each hinged support member 12 comprises a lateral support 14 which is 12 mm in thickness so as to be strong enough to take the weight of stacked crates. The support 14 may be approximately 88 mm wide.

The lateral support 14 hinges about a pin 17 (shown as hidden detail in Figure 6a only) which passes through or adjacent to one end of the support 14 and into a pair of hinge supports 18. The lateral support rests on a rest 19 which is formed integrally with the hinge supports 18.

The hinged support member is constructed as follows.

The hinge supports 18 and rest 19 are cast so as to form a single piece, through holes being provided in the hinge supports 18 for receiving the pin 17. The single piece is cast such that the outside ends of the piece can be welded onto cut ends of the rim 4. Welding points 20 are illustrated in Figures 6a and 6b.

The lateral support 14 and pin 17 are assembled with the single piece as illustrated. This may be done by welding the support 14 to the pin 17, or alternatively, first placing the support 14 in position, with respect to the supports 18, and passing the pin 17 through a hole (previously formed in the support 14) and through the supports 18.

The rest 19 and the hinge supports 18 are positioned such that, a recess 24 is formed on the outwardly facing side of the rest 19 between the hinge supports 18. The inwardly facing side of the rest 19 protrudes inwardly into the crate in order to provide extra strength for the support 14. The relative proportions of the rest 19 and hinge supports 18 are such that, when in the position of Figure 6b, the lateral support 14 passes through the recess 24 without extending laterally outwardly of the rim 4.

Consequently, the hinged support member 12 offers the minimum of obstruction, if any, to nested crates or to adjacent crates. When in the horizontal position, the upper surface 21 of the support 14 is about 36 mm below the upper surface 22 of the rim 4. This difference enables the rim 4 to provide lateral support for stacked crates. In this position, the hinged support member 12 does not extend beyond the outer edge 23 of the rim 4. This enables the rims of adjacent crates to butt up against each other without interference from the hinged support members 12. This feature is significant when it is considered that hundreds or thousands of crates may be loaded in a ship's hold container or rail car at any one time. The above described construction of hinged support member 12 not only provides sufficient strength for stacking loaded crates, but enables optimal loading in the hold of the ship, container or rail car.

The crate of this embodiment is intended for transporting 30 to 40 rubber blocks or sheets having sizes of the order of magnitude 700 mm long x 355 mm wide x 180 mm thick, and consequently, is preferably of dimensions corresponding approximately to a height of 1100 mm, a width of 1130 mm and a length of 1447 mm. The construction of crate is such that it can withstand not only a load of rubber of approximately 1 to 1.26

tonnes, but also 6 stacked loaded crates one on top of another.

Figure 7 illustrates a perspective view of one of the feet 8. The height H of the foot 8 is preferably a little greater than the thickness of a fork of a fork lift truck. The width W of the foot 8 is such that it can rest upon the surface 21 of a corresponding support 14.

Figure 8 illustrates a pair of nested crates 1. The thickness of material used to construct the crate, and the relative dimensions of the feet 8 and rim 4 are such as to provide optimal nesting of the crates. That is to say, the nested crate protrudes from the top of the receiving crate by a height substantially equal to the thickness of the rim 4. Angled members 2 should preferably be 3 mm to ensure optimal nesting depth of nested crates.

The lateral supports 14 of the stacked crate protrude a little from the side of the crate 1 owing to the relative positions of the respective rims 4 of the nested and nesting crates 1. This extent of outward lateral protrusion is minimized by virtue of the configuration of hinged support members 12. The extent

of protrusion can be made as low as, for example, 15 mm thereby enabling optimal packing of nested crates in the hold of a ship, container or rail car.

Embodiments of the invention may have dimensions such as to accommodate rubber blocks or sheets having different sizes from the precise ISO standards. It is envisaged that modifications may be made to embodiments without departing from the scope of the present invention. Variations to the crate dimensions referred to above of 20% are envisaged.

CLAIMS

1. A crate for transporting rubber blocks or sheets, wherein the crate has the shape of a rectangular or square frusto-pyramid so as to allow one crate to be nested inside another, the crate has a rim running along the free edges of the open side of the crate, and a hinged support member is hingedly attached to or formed integrally with the rim of the crate in the vicinity of each corner of the crate, the hinged support members each comprising a pair of hinge supports having a cross-section which corresponds to the cross-section of the rim in a plane perpendicular to the longitudinal axis of the rim, a rest formed between the hinge supports and a lateral support hingedly supported between the hinge supports and arranged so that in one position, when one crate is superimposed on another the lateral supports rest on the rest so that the lateral supports provide support to the base of the superimposed crate, the lateral support being hinged about an axis parallel to the longitudinal axis of the rim, the axis being positioned relative to the rest such that in another position the lateral support, can lie substantially vertically and extend through a recess defined by the hinged



supports and the rest so that the lateral support does not, or does not substantially, extend laterally outwardly from the side of the crate.

2. A crate according to Claim 1, wherein feet are positioned substantially at each corner of the base, the spacing between each of the feet being such that forks of a fork lift truck can be received between them from any side of the crate, and the height of the feet is a little greater than the thickness of the fork of a fork lift truck.
3. A crate according to Claim 2, wherein the height of the rim is substantially equal to the height of the feet, the thickness of the metal from which the crate is constructed being such that when one crate is nested within another, the nested crate protrudes from the nesting crate by a distance substantially equal to the height of the rim.
4. A crate according to any preceding Claim, wherein the hing supports and the rest of each hinged support member are cast as a single piece, and the hing supports are each provided with a through hole for receiving a pin about which the lateral support is hinged.
5. A crate according to Claim 4, wherein the pin passes through a hole formed in the lateral support.



6. A crate according to Claim 4 or 5, wherein the lateral support is welded to the pin.
7. A crate according to any preceding Claim, wherein the hinge supports are welded to the rim of the crate.
8. A crate according to any preceding Claim, having a height of substantially 1100 mm, a length of substantially 1447 mm, a width of substantially 1130 mm.
9. A crate according to any one of the preceding Claims, wherein the corners of the crate are constructed from generally L-shaped cross-section uprights formed from a metal substantially 3 mm in thickness.
10. A crate according to any one of the preceding Claims, wherein the base of the crate is constructed from a substantially 2 mm thick piece of metal.
11. A crate according to any one of the preceding Claims, wherein the sides of the crate are in the form of an open sided framework of flat bars.
12. A crate according to Claim 11, wherein the framework includes substantially vertically oriented bars which taper



so as to reduce in width towards the base of the container.

13. A crate substantially as hereinbefore described with reference to Figures 1 to 8 of the accompanying drawings.

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