US012384595B2

(12) **United States Patent**
Martin

(10) **Patent No.: US 12,384,595 B2**
(45) **Date of Patent: Aug. 12, 2025**

(54) **RE-USABLE CRATE SYSTEM**

(71) Applicant: **William Dee Martin**, Phoenix, AZ (US)

(72) Inventor: **William Dee Martin**, Phoenix, AZ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 115 days.

(21) Appl. No.: **18/349,542**

(22) Filed: **Jul. 10, 2023**

(65) **Prior Publication Data**

US 2024/0017881 A1 Jan. 18, 2024

Related U.S. Application Data

(60) Provisional application No. 63/388,413, filed on Jul. 12, 2022.

(51) **Int. Cl.**

B65D 19/16	(2006.01)
B65D 19/00	(2006.01)
B65D 19/06	(2006.01)
B65D 19/38	(2006.01)

(52) **U.S. Cl.**

CPC ***B65D 19/385*** (2013.01); ***B65D 19/0095*** (2013.01); ***B65D 19/06*** (2013.01); *B65D 2519/00273* (2013.01); *B65D 2519/00293* (2013.01); *B65D 2519/00323* (2013.01); *B65D 2519/00373* (2013.01); *B65D 2519/00497* (2013.01); *B65D 2519/00532* (2013.01); *B65D 2519/00542* (2013.01); *B65D 2519/00606* (2013.01); *B65D 2519/00671* (2013.01); *B65D 2519/0098* (2013.01)

(58) **Field of Classification Search**

CPC B65D 19/12; B65D 19/16; B65D 19/38; B65D 19/385; B65D 2519/00029; B65D 2519/00064; B65D 2519/00099

USPC 206/386, 599, 600; 108/53.5

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,686,645	A *	8/1954	Whitehurst	B65D 19/385 211/49.1
2,828,933	A *	4/1958	De Pew	B65D 19/385 211/49.1
3,159,116	A	12/1964	Skubic	
3,289,613	A *	12/1966	Evans	B65D 19/385 108/53.5
3,500,770	A	3/1970	Skubic	
3,576,169	A *	4/1971	DePew	B65D 19/385 108/53.5
3,855,944	A *	12/1974	Skubic	B65D 19/385 108/53.5
3,994,241	A *	11/1976	Evans	B65D 19/385 108/53.5

(Continued)

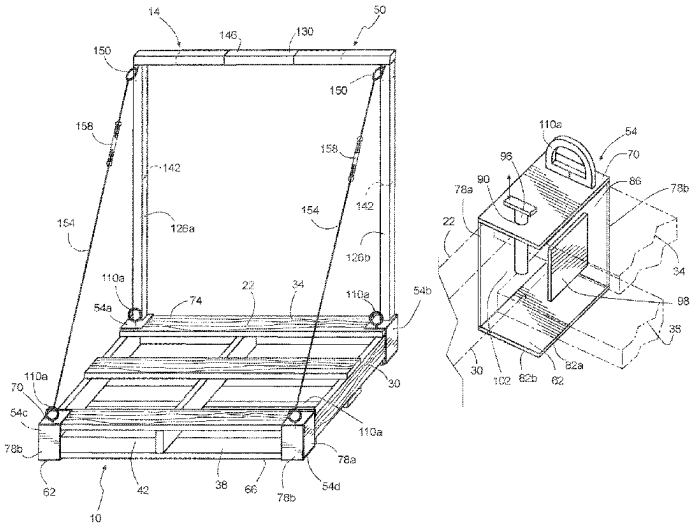
Primary Examiner — Luan K Bui

(74) *Attorney, Agent, or Firm* — Thorpe North & Western, LLP

(57) **ABSTRACT**

A re-usable crate system has a frame removably coupled to a pallet and extending above the pallet to form a crate to receive cargo over the pallet and at least partially between the frame. The frame has corner brackets at each corner of the pallet. Each corner bracket comprises a bottom plate proximate a bottom of the pallet, a top plate proximate a top of the pallet, and a pair of contiguous side walls extending between the top and bottom plates. The pair of side walls adjoin one another and forms a box with a pair of contiguous side openings opposite the pair of contiguous side walls. Each corner bracket has a pocket to receive a respective corner of the pallet.

20 Claims, 10 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

4,756,138	A *	7/1988	Karpisek	B65B 9/135 108/53.5
8,499,700	B2	8/2013	Schumacher	
2003/0038052	A1	2/2003	Hahn	
2018/0340368	A1	11/2018	Zwierzykowski	

* cited by examiner

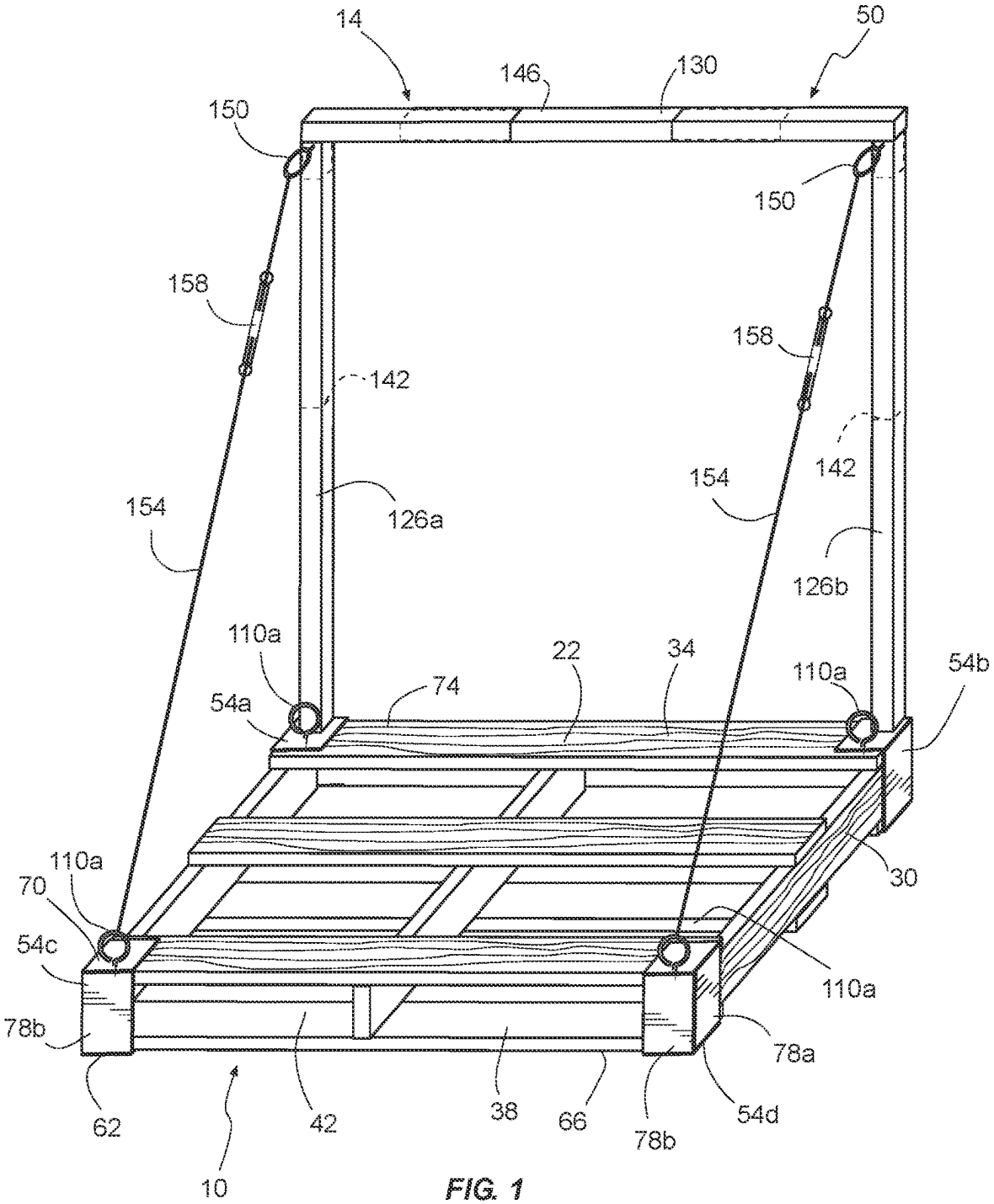

14
50
146
130
150
150
158
158
142
142
154
154
126a
126b
110a
110a
22
34
54b
54a
74
110a
70
30
54c
110a
78b
78a
62
42
38
66
78b
54d
10

FIG. 1

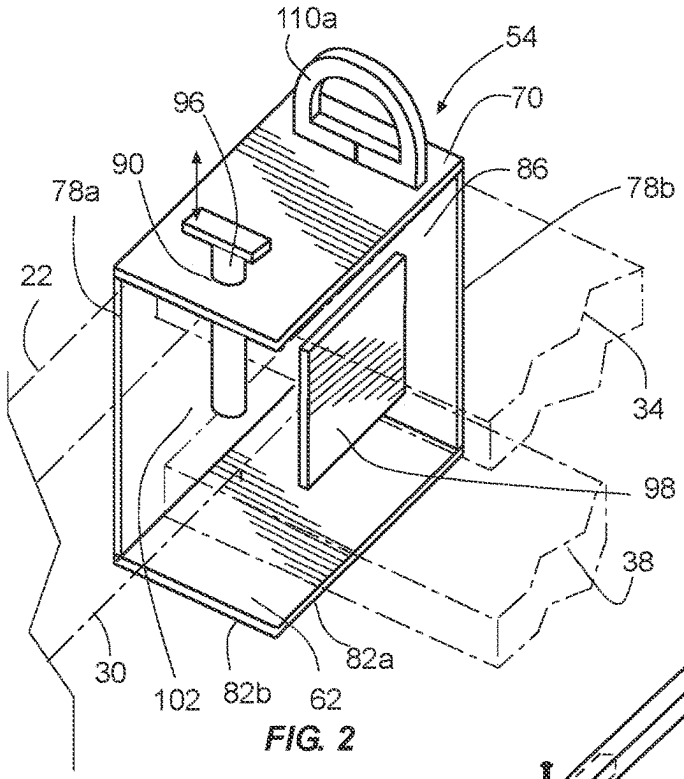


FIG. 2

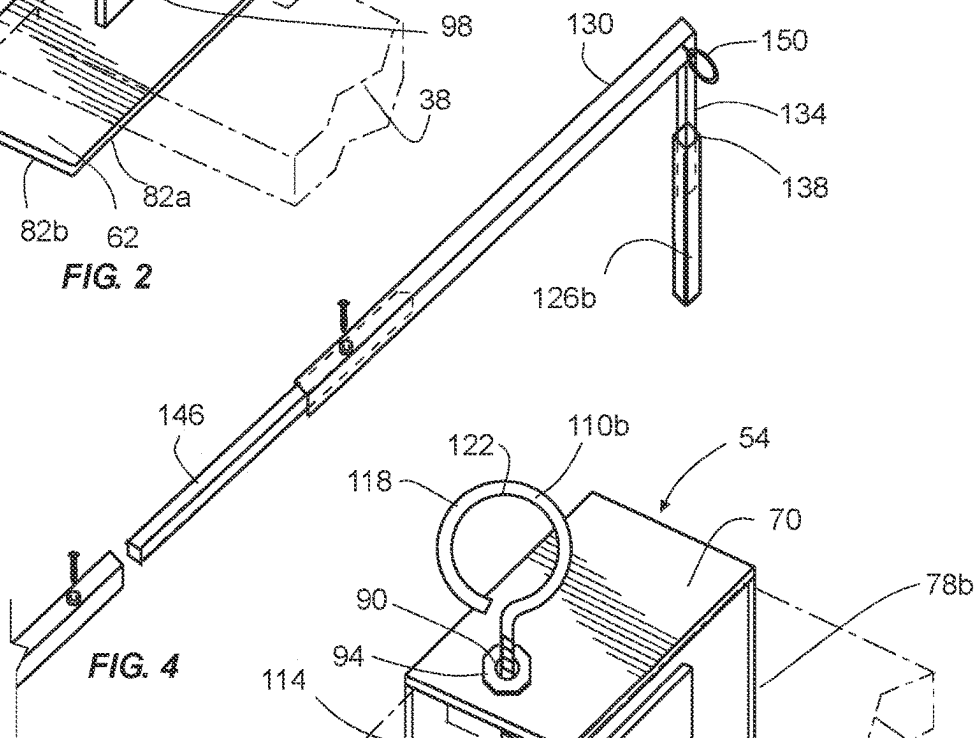


FIG. 4

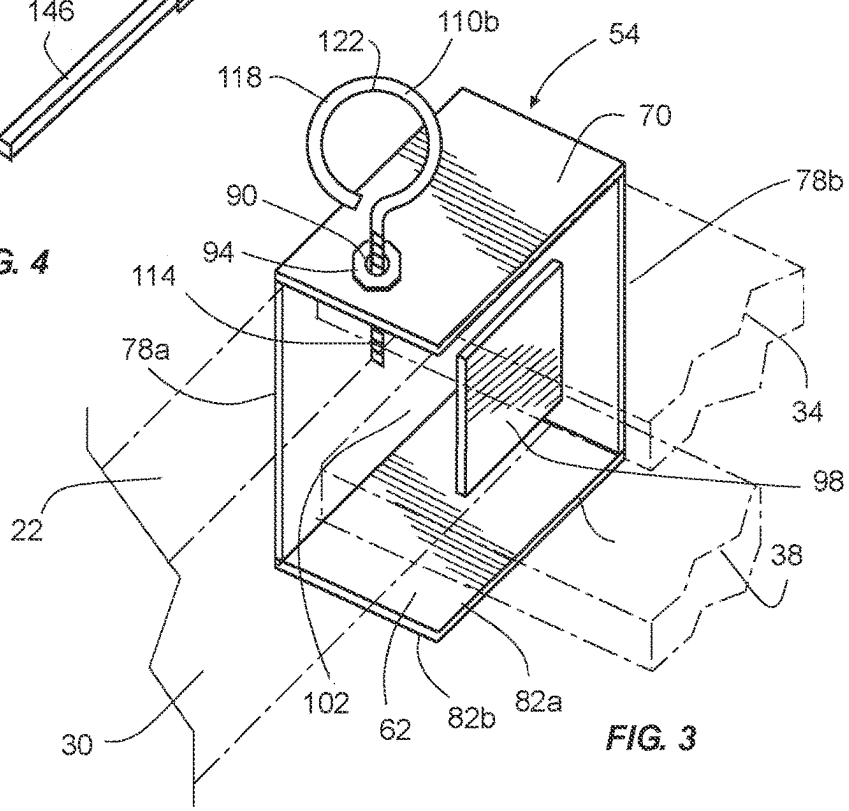


FIG. 3

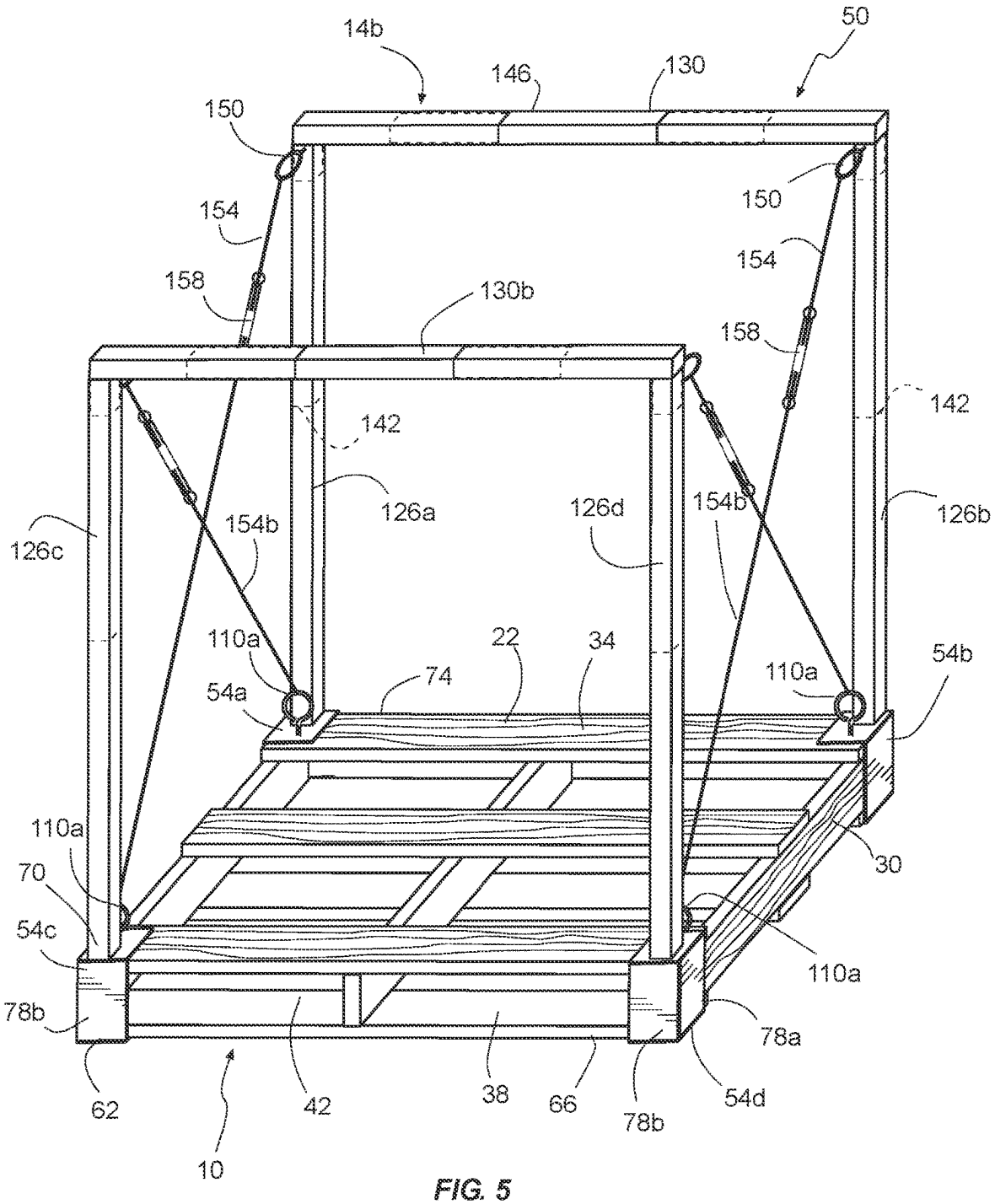

14b
50
146
130
150
150
154
154
158
158
130b
142
142
126a
126d
154b
154b
126b
126c
110a
22
34
110a
54b
54a
74
110a
70
30
54c
110a
78b
78a
62
42
38
66
78b
54d
10

FIG. 5

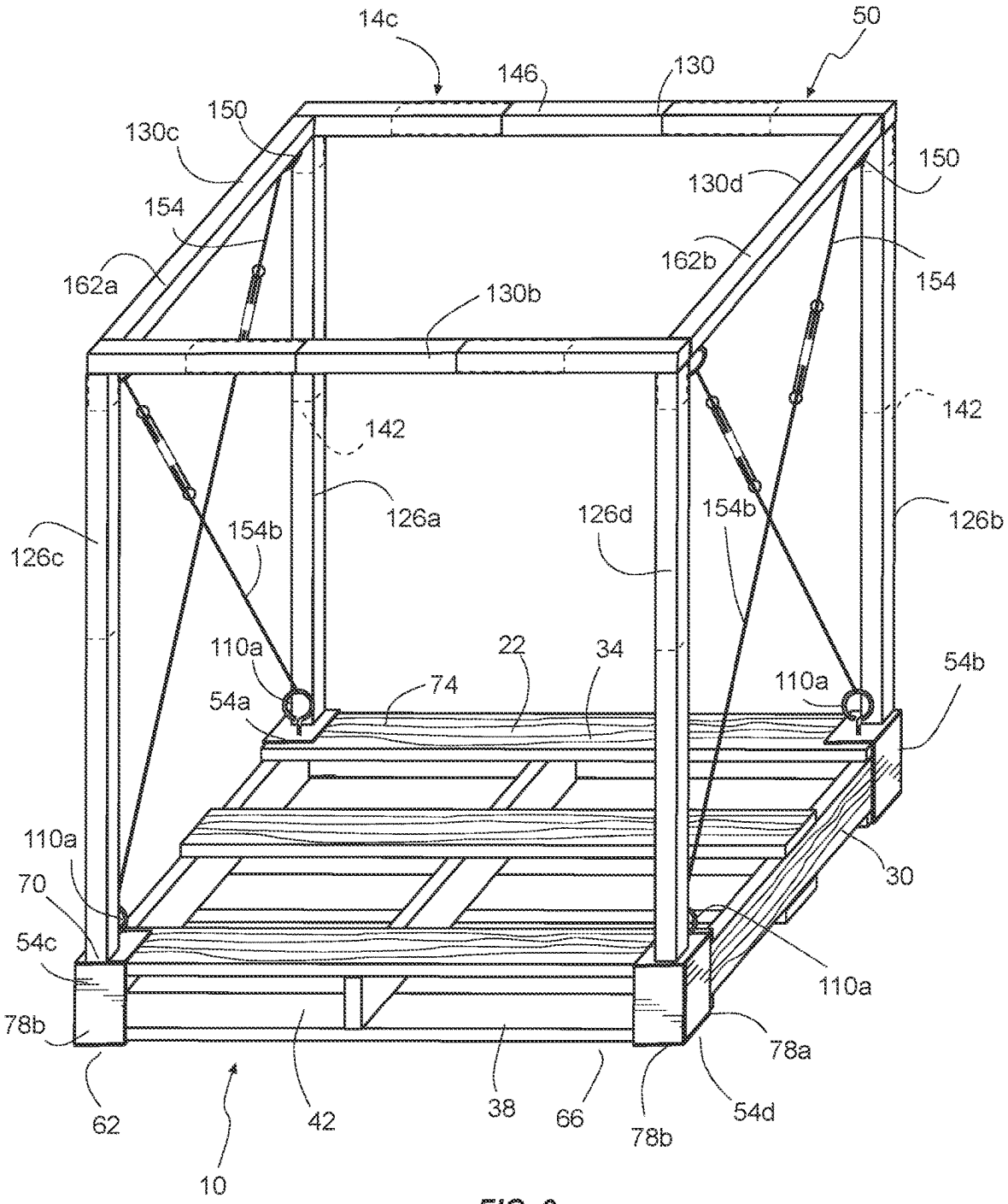

14c
50
146
130
150
130c
150
130d
154
162b
162a
154
130b
142
142
126a
126d
154b
126b
126c
154b
110a
22
34
54b
110a
54a
74
110a
70
30
54c
110a
78b
78a
62
42
38
66
78b
54d
10

FIG. 6

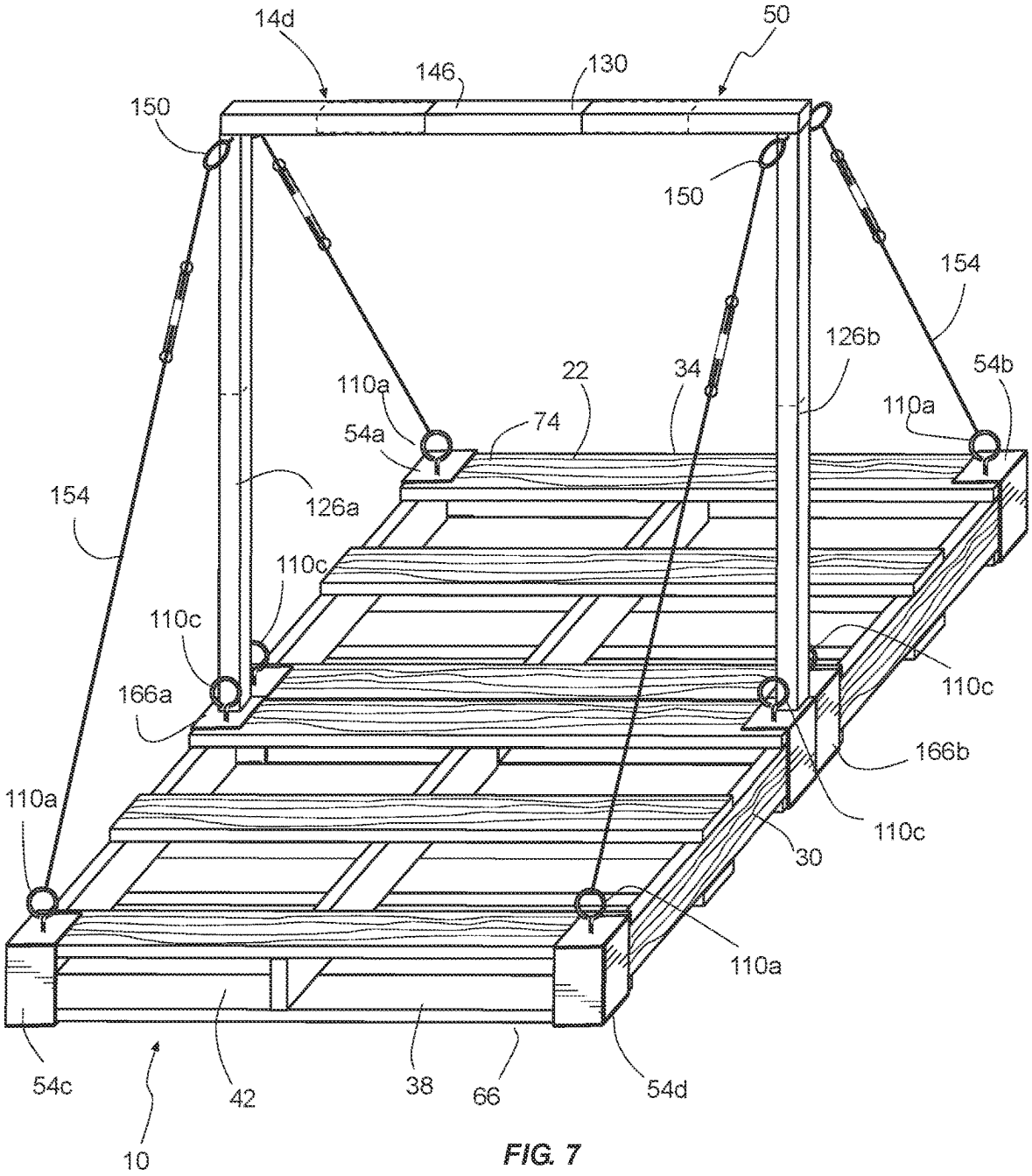

14d
50
146
130
150
150
154
126b
54b
110a
22
34
110a
110a
74
54a
154
126a
110c
110c
110c
166a
166b
110a
110c
30
110a
54c
42
38
66
54d
10

FIG. 7

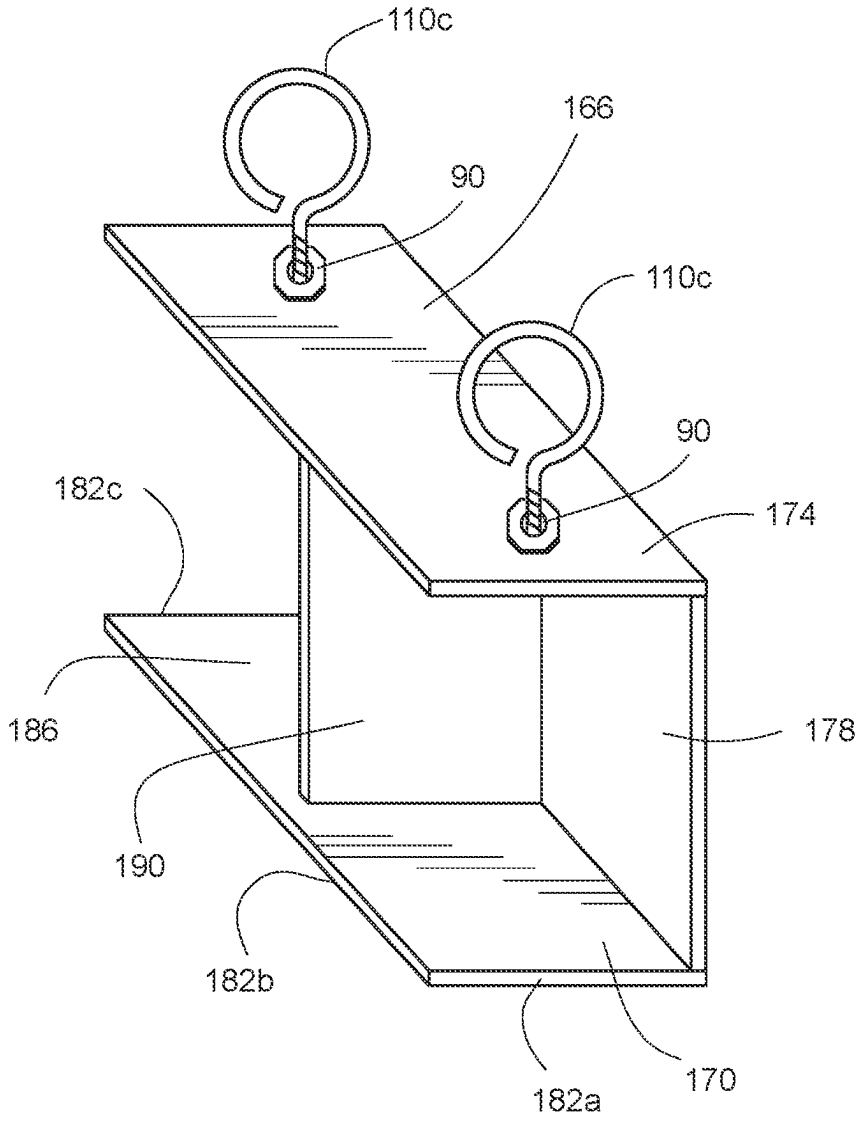


FIG. 8

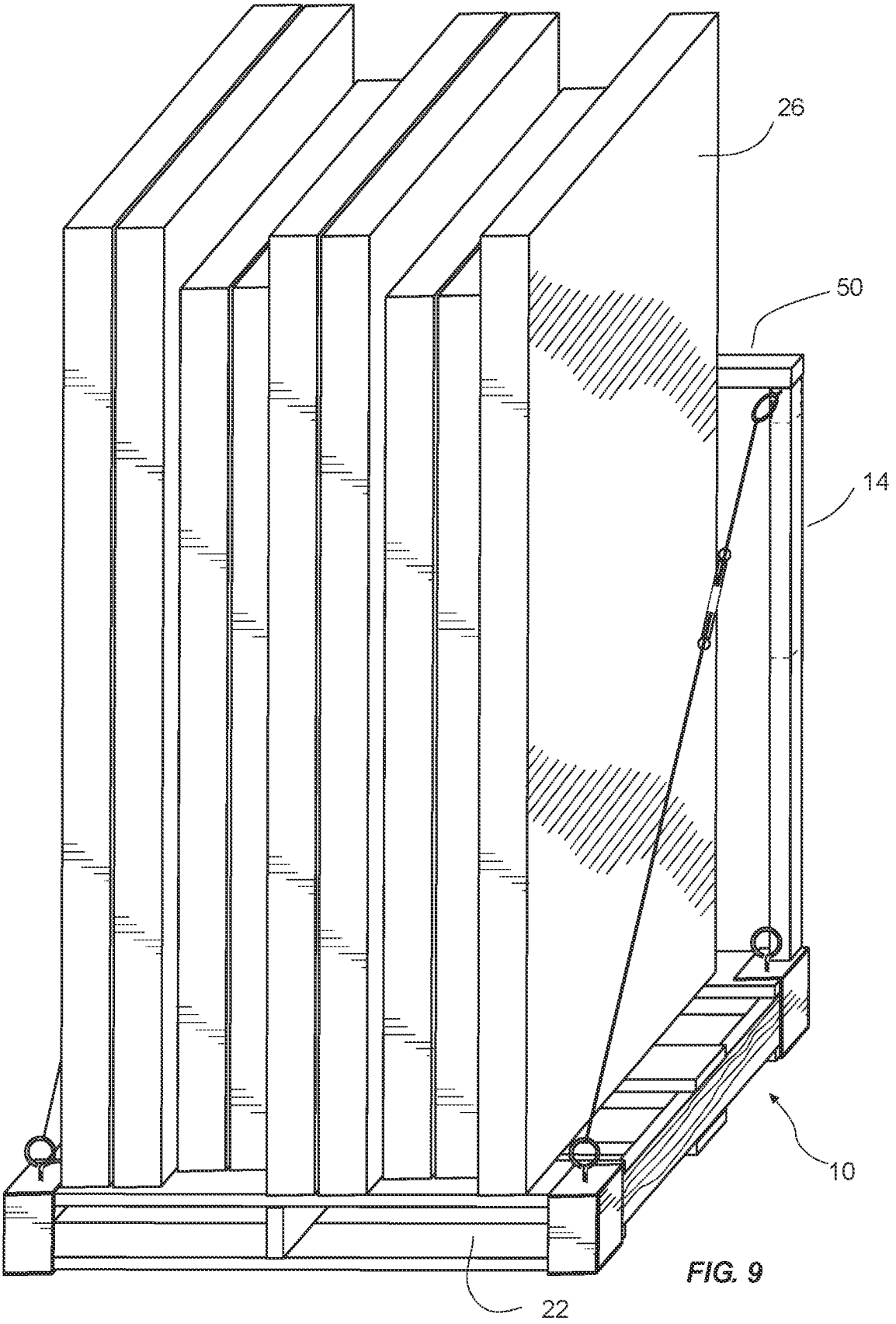


FIG. 9

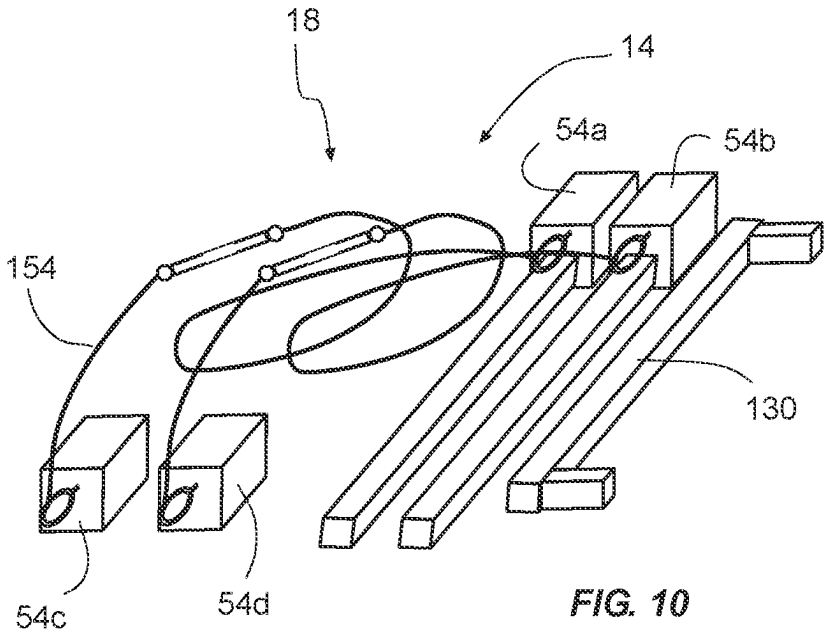

18
14
54a
54b
154
130
54c
54d

FIG. 10

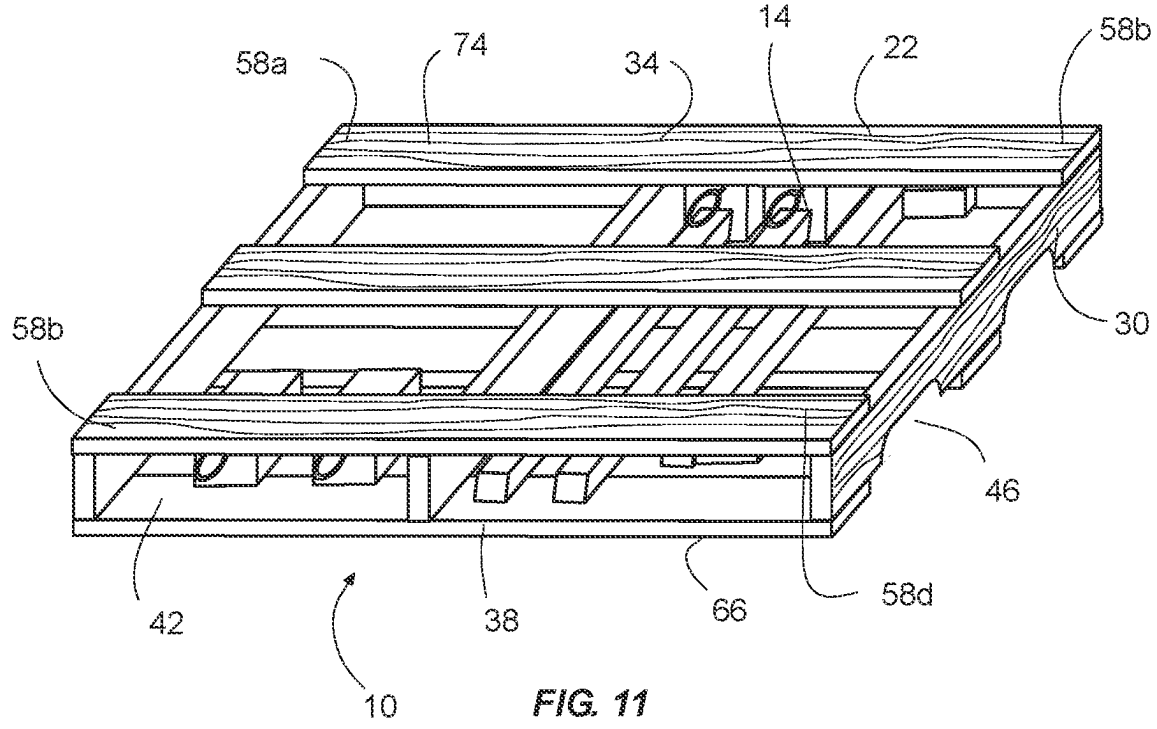

14
58a
74
34
22
58b
58b
30
46
42
38
66
58d
10

FIG. 11

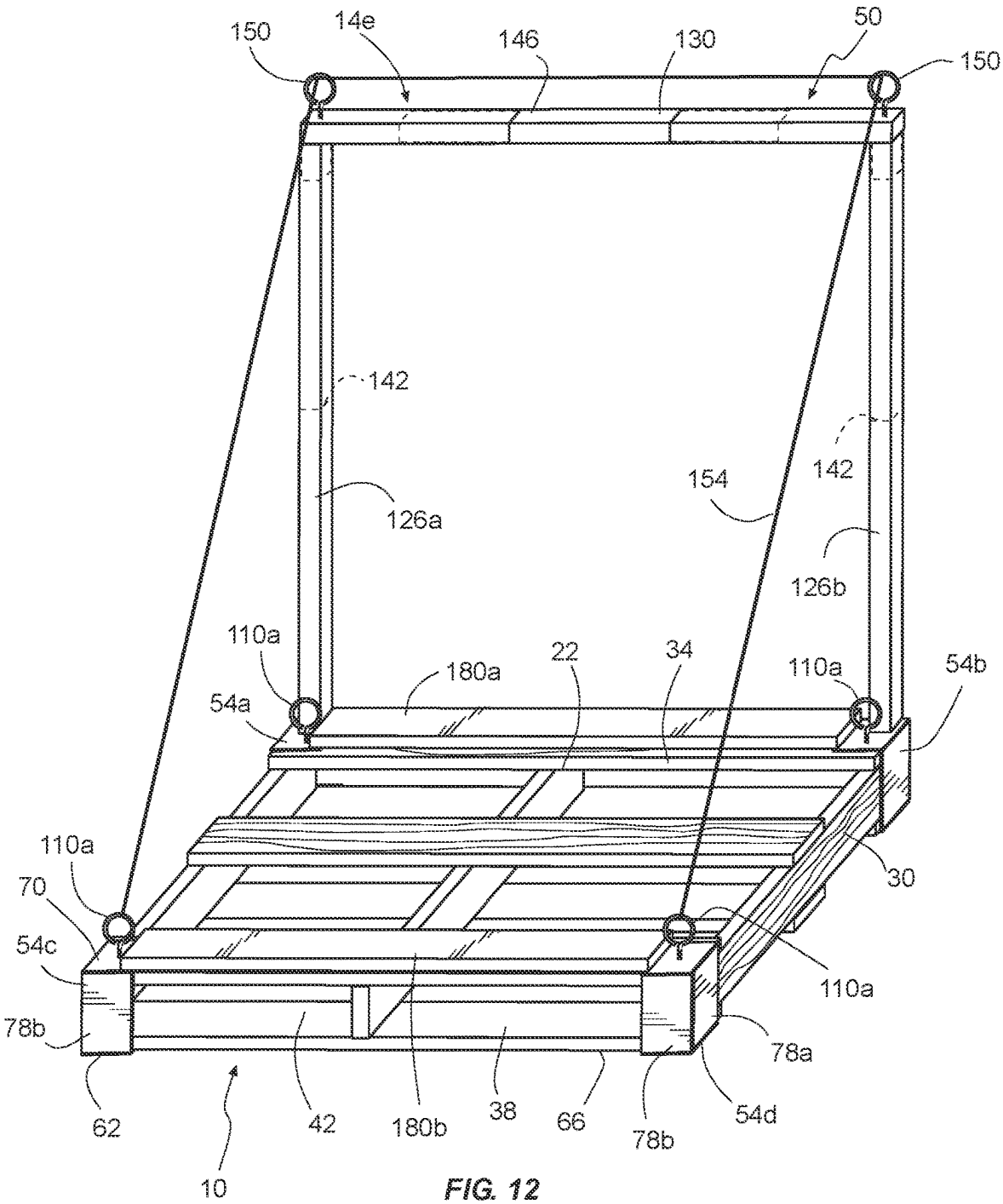

150
14e
146
130
50
150
142
126a
154
142
126b
110a
180a
22
34
110a
54b
54a
110a
70
30
54c
110a
78b
78a
62
42
180b
38
66
78b
54d
10

FIG. 12

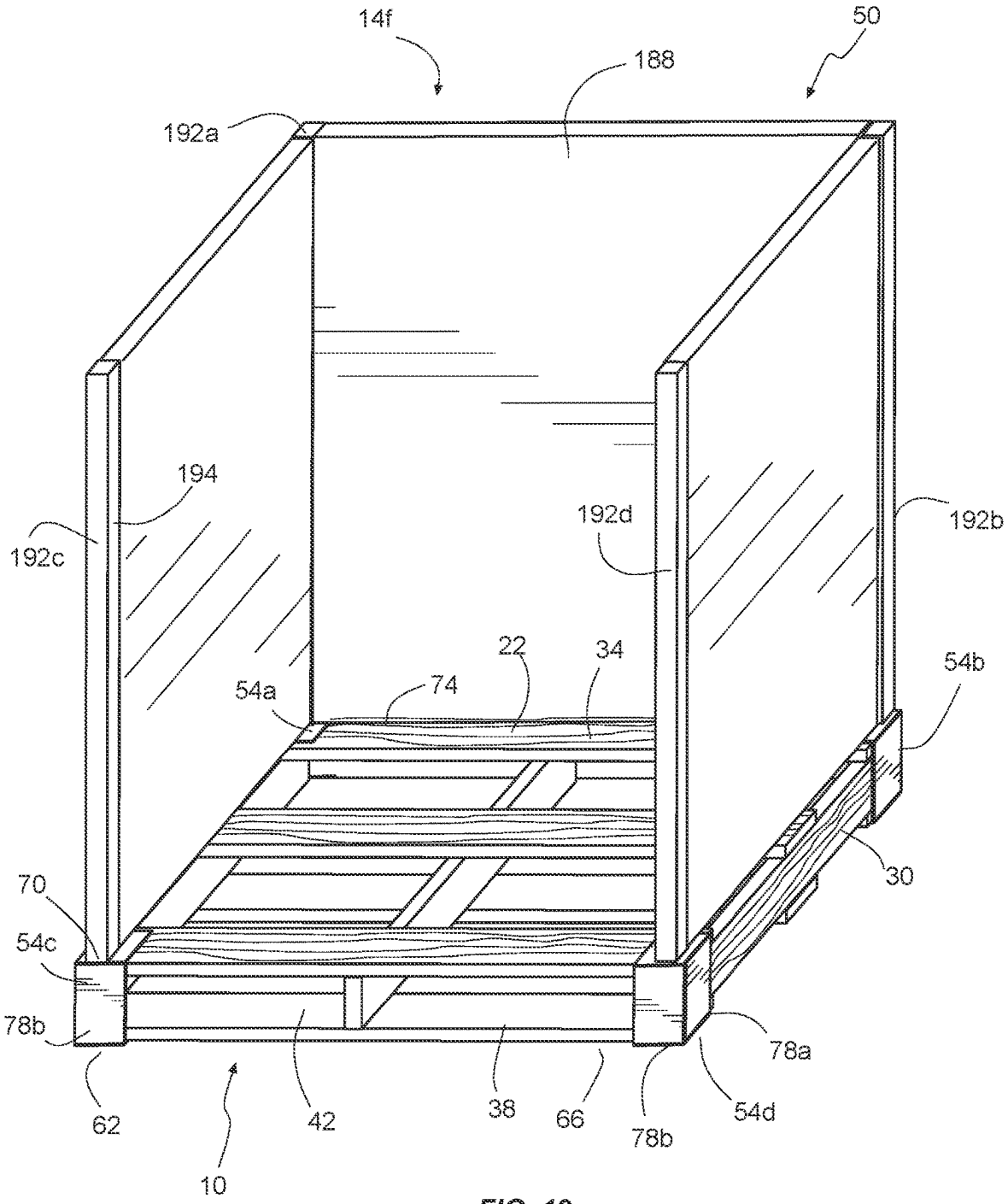

14f
50
188
192a
194
192c
192d
192b
22
34
54a
74
54b
70
30
54c
78b
78a
62
42
38
66
78b
54d
10

FIG. 13

RE-USABLE CRATE SYSTEM

PRIORITY CLAIM

Priority is claimed to U.S. Provisional Patent Application Ser. No. 63/388,413, filed Jul. 12, 2022, which hereby incorporated herein by reference.

BACKGROUND

Shipping cost can be based on size and weight. The size can be determined by the footprint in the truck. Large items, such as doors, are often laid flat during shipping which increases the size and thus the cost. Sometimes, special crates are used that are expensive to fabricate. In addition, the wood from the crate is often wasted because the crates are not re-usable because it can be too costly to return ship an empty crate. The development of improved shipping containers and methods is an ongoing endeavor.

BRIEF DESCRIPTION OF THE DRAWINGS

Features and advantages of the invention will be apparent from the detailed description which follows, taken in conjunction with the accompanying drawings, which together illustrate, by way of example, features of the invention; and, wherein:

FIG. **1** is a perspective view of a re-usable crate system in accordance with one embodiment, shown with a frame in an expanded use configuration and mounted to a pallet.

FIG. **2** is a perspective view of a corner bracket of the re-usable crate system of FIG. **1**.

FIG. **3** is a perspective view of another corner bracket of the re-usable crate system of FIG. **1** in accordance with another embodiment.

FIG. **4** is a partial detailed perspective view of the frame of the re-usable crate system of FIG. **1**.

FIG. **5** is a perspective view of another re-usable crate system in accordance with another embodiment.

FIG. **6** is a perspective view of another re-usable crate system in accordance with another embodiment.

FIG. **7** is a perspective view of another re-usable crate system in accordance with another embodiment.

FIG. **8** is a perspective view of a joiner of the re-usable crate system of FIG. **8**.

FIG. **9** is a perspective view of the re-usable crate system of FIG. **1**, shown with cargo.

FIG. **10** is a perspective view of the frame of the re-usable crate system of FIG. **1**, shown in a collapsed configuration.

FIG. **11** is a perspective view of the re-usable crate system of FIG. **1**, shown with the frame in the collapsed configuration and received in an interior volume of the pallet.

FIG. **12** is a perspective view of another re-usable crate system in accordance with another embodiment.

FIG. **13** is a perspective view of another re-usable crate system in accordance with another embodiment.

Reference will now be made to the exemplary embodiments illustrated, and specific language will be used herein to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended.

DETAILED DESCRIPTION

Before invention embodiments are disclosed and described, it is to be understood that no limitation to the particular structures, process steps, or materials disclosed herein is intended, but also includes equivalents thereof as would be recognized by those ordinarily skilled in the relevant arts. It should also be understood that terminology employed herein is used for the purpose of describing particular examples only and is not intended to be limiting. The same reference numerals in different drawings represent the same element. Numbers provided in flow charts and processes are provided for clarity in illustrating steps and operations and do not necessarily indicate a particular order or sequence. Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure belongs.

An initial overview of the inventive concepts are provided below and then specific examples are described in further detail later. This initial summary is intended to aid readers in understanding the examples more quickly, but is not intended to identify key features or essential features of the examples, nor is it intended to limit the scope of the claimed subject matter.

The invention provides a kit with a re-usable frame of upright braces that can be secured to an existing pallet to allow large cargo, such as doors, to be placed upright on the pallet, reducing the shipping footprint and shipping costs. The frame can be removed from the pallet and shipped back for re-use with minimal expense. In addition, the entire kit or frame can be packaged inside the structure of the pallet for return.

The pallet can be a standard wood pallet. The pallet can have a standard size, such as 48"×48"; 48"×40"; 42"×42"; etc. The pallet can also have a standard height or thickness, such as 4¾" or 5¾". Thus, the pallet can have a width and a length both greater than a height. The dimensions can be approximate. For example, a 48" pallet may actually be 47¼". In one aspect, the pallet can have a wood construction with three stringers or stringer boards, six top deck boards, and three to five bottom deck boards. In one aspect, the stringer boards can have cutout notches. The pallet can be a 2-way entry pallet where a forklift can lift the pallet from only two sides, or a partial 4-way pallet where a forklift can lift the pallet from all four sides, and a pallet jack from two sides.

The frame or braces can include a set (such as 4) of corner brackets that can fit over the corners of the pallet. The corner brackets can have top and bottom plates, and two contiguous side walls leaving two contiguous sides open to receive the corner of the pallet into an interior pocket.

In one aspect, the top plate can have an aperture. A retaining pin can extend through the aperture and engage the pallet to retain the corner bracket on the pallet. For example, the retaining pin can engage a side of the top deck board opposite an outer side of the corner bracket.

A ring can be carried by the corner bracket. The ring can be secured to the corner bracket.

In another aspect, the top plate can have a threaded aperture, such as a threaded nut welded to the top. A threaded eye-bolt can be threaded into the threaded aperture to secure the eye-bolt to the bracket. The eye-bolt can also extend through the top plate and into the pocket to act as a set screw by engaging a top of the pallet, thus securing the corner bracket to the corner of the pallet. The eye-bolt can provide the ring.

At least some of the corner brackets can have a post extending upward from the corner bracket. For example, there can be two back brackets with posts. Atop rail can extend between two proximal posts. The top rail can have fingers that can insert into open top ends of the posts. The

rail can telescope and be secured with a set screw. Similarly, the posts can telescope. The ends of the top rail or the posts can have eyelets.

The rings and the eyelets can receive a cable or strap. The eye-bolts can have two purposes. First, the eye-bolts can be a place to attach a cable or strap. Second, the eye-bolts can screw into the pallet to secure the bracket to the pallet.

In one aspect, a cable or strap can extend between proximal front and back brackets. For example, a cable or strap can extend from a front bracket to the top rail of the back bracket. In one aspect, there can be a single cable or strap extending from a first ring of a first corner bracket to a first eyelet of back bracket, to a second eyelet of the back bracket, and to a second ring of a second corner bracket. In another aspect, a pair of cables can be on opposite sides of the pallet. The cables can be tightened with a turnbuckle. As another example, a strap can extend from the front bracket to the top rail of the back bracket. The strap can have a ratchet to tighten the strap.

In one aspect, both the rear length and height are adjustable, as well as the length of the cable or strap, for depth.

The brackets can be added to an existing pallet to form a crate to receive larger upright cargo, such as doors, between the cables and against the top rail. The brackets can be removed from the pallet after shipping and re-used by shipping the brackets back. In one aspect, the brackets, posts, bars and cable/strap can weigh around 22 Lbs. Thus, freight return can be reasonably priced. In addition, the brackets can be located in the structure of the pallets, i.e. under the top of the pallet, for return shipping.

The frame and the brackets can have different configurations for other shipping items. The configuration can be one-sided, two-sided or four sided. The brackets can also have a center column configuration coupling two pallets together. The brackets can have vertical channels to receive panels to form enclosed sides. The brackets can also be interconnected. The brackets can have two opposite pockets to joint two standard 4-foot pallets together to form an 8-foot pallet. Thus, the pallets can be sold back to recoup at least part of the cost of the pallets. Shipping pallets back to the distributor can be much more than the cost of the pallet itself.

In one aspect, the rear bar and riser can be formed of 16-gauge tube. In another aspect, the rear bar and rise alone cannot handle the weight of the cargo leaning against them. The cable or strap connect to the front and rear of the pallet can distribute the weight on to the corner brackets, making the crate extremely strong but light weight.

In another aspect, the kit, and the brackets, posts, rails and cable/strap can be broken down to a size or length not exceeding 48". Thus, one or multiple kits can be returned to the shipper on a single 4-foot square pallet, reducing the cost of return shipping.

Referring to FIGS. **1-4**, a re-usable crate system **10** with a frame **14** and a kit **18** (FIG. **10**) of braces and a pallet **22** are shown to receive cargo **26** (FIG. **9**). The pallet **22** can have a wood construction with a pair of lateral outer sides **30** formed by outer stringer boards, an array of upper slats **34** or top deck boards carried by and fastened to tops of the pair of lateral outer sides **30** or stringer boards and extending between the pair of lateral outer sides **30** or stringer boards, and an array of lower slats **38** or bottom deck boards fastened to bottoms of the pair of lateral outer sides **30** or stringer boards. The pallet **22** can have a width, a length and a height; with the width and the length being greater than the height. The pallet **22** can also have an interior volume **42** defined by the pair of lateral outer sides **30** or stringer boards, the array of upper slats **34** or top deck boards, and the array of lower slats **38** or bottom deck boards. The interior volume **42** of the pallet **22** can be substantially void. As described herein, the pallet **22** can have lateral openings **46** (FIG. **11**) configured to receive the fork of a fork lift and/or pallet jack.

The system **10** and the kit **18** can comprise a frame **14** removably coupled to the pallet **22**. The frame **14** can extend above the pallet **22** to form a crate **50** to receive cargo **26** (FIG. **9**) over the pallet **22** and at least partially between the frame **14**. Thus, the frame **14** of the kit **18** and the system **10** can be secured to the pallet **22** and used to convert a standard pallet **22** into a shipping crate **50**. Cargo **26** can be placed on the deck of the pallet **22**, and between the frame **14** (FIG. **9**). For example, doors or long windows can be place upright on the pallet **22**, and against the frame **14** so that the frame **14** maintains them upright on the pallet **22**. Thus, the cargo **26** can occupy a smaller footprint during shipping, rather than a longer crate. In addition, the frame **14** can be removed (FIG. **10**) after shipping so that the pallet **22** and/or the frame **14** can be reused/recycled. The frame **14** can collapse when removed from the pallet **22** to form a smaller package for return shipping, as shown in FIG. **10**.

The frame **14** can comprise a plurality of corner brackets **54***a-d* that can be positioned at each corner **58***a-d* (FIG. **11**) of the pallet **22**. The corner brackets **54***a-d* can engage and be secured to the corners of the pallet **22**. Each corner bracket **54** (FIG. **2**) can comprise: a bottom plate **62** proximate a bottom **66** of the pallet **22**; a top plate **70** spaced-apart from the bottom plate **62** and proximate a top **74** of the pallet **22**; and a pair of contiguous side walls **78***a-b* extending between the top and bottom plates **70** and **62**. The pair of side walls **78***a-b* can adjoin one another and can be oriented at a right angle with respect to one another. Thus, each corner bracket **54** can form a box with a pair of contiguous side openings **82***a-b* opposite the pair of contiguous side walls **78***a-b*. Each corner bracket **54** can have a pocket **86** to receive the respective corner of the pallet **22**. Each corner bracket **54** can surround the corner of the pallet **22** to form a secure connection. In one aspect, the corner bracket **54** can be formed by metal plate welded together.

In one aspect, each top plate **70** can have an aperture **90**. In another aspect, each top plate **70** can have a threaded aperture **90**. In one aspect, the top plate **70** can have an aperture **90** with a threaded nut **94** welded over the aperture.

In one aspect, a retaining pin **96** can extend through the aperture **90** and engage the pallet **22** to retain the corner bracket **54** on the pallet **22**. For example, the retaining pin **96** can engage a side and inside edge of the upper slat **34** opposite an outer side (such as wall **78***b*) of the corner bracket **22**. In addition, the retaining pin **96** can engage a side an inside edge of the lateral outer side **30** opposite an outer side (such as wall **78***a*) of the corner bracket **22**. The pin **96** can have an enlarged head abutting to the top plate **70** when inserted.

In another aspect, referring to FIG. **2**, each corner bracket **54** can further comprise a plate receiver **98** in the pocket **86** and extending from one of the walls **78***b* to define a gap **102** between the plate receiver **98** and the other wall **78***a*. The plate receiver **98** can be positioned, and the gap **102** can be sized, to receive an end of one of the lateral outer sides **30** or stringer boards of the pallet **22**, as shown in FIG. **3**. Spaces **106** can be formed between the top and bottom of the plate receiver **98** and the top and bottom plates **70** and **62** to accommodate the upper and lower slates **34** and **38**, as

shown in FIG. **3**. Thus, the plate receiver **98** can resist movement between the corner bracket **54** and the pallet **22** in at least one direction.

In one aspect, referring again to FIGS. **1** and **2**, each corner bracket **54** can have a ring **110***a* carried by the corner bracket **54**. The ring **110***a* can be welded to the top plate **70**. The ring **110***a* can be a shackle. Thus, the ring **110***a* can be fixed with respect to the top plate **70** and the corner bracket **54**. In another aspect, the ring **110***a* can be pivotally coupled to the top plate **70** and pivotal with respect to the corner bracket **54**. The rings **110***a* can be loops or hooks. The rings **110***a* can allow the multiple corner brackets **54***a-d* to be coupled together to further form the crate **50** and to further strengthen the pallet **22**.

In another aspect, referring to FIG. **3**, each corner bracket **54** can have an eye-bolt **110***b* carried by the corner bracket **54**. Each eye-bolt **110***b* can have a threaded shank **114** threaded into the threaded aperture **90** to secure the eye-bolt **110***b* to the respective corner bracket **54**. In addition, the eye-bolt **110***b* and the shank **114** can extend through the top plate **70** and into the pocket **86** to engage the top **38** of the pallet **22** to secure the corner bracket **54** to the corner of the pallet **22**. The eye-bolt **110***b* can be rotatable with respect to the corner bracket **54** to secure and release the corner bracket **54** and the pallet **22**. In one aspect, each eye-bolt **110***b* can have a head **118** with an aperture **122** to form the hook or loop. The eye-bolts **110***b* can allow the multiple corner brackets **54***a-d* to be coupled together to further form the crate **50** and to further strengthen the pallet **22**.

The frame **14** can also comprise posts **126** carried by and extending from the corner brackets. In one aspect, a pair of posts **126***a-b* can carried by a pair of proximate corner brackets **54***a-b*. In another aspect, posts **12***a-d* can extend from all four corner brackets **54***a-d*, as described herein and shown in FIGS. **5** and **6**. Each post **126** can extend upward from the respective corner bracket **54**.

A top rail or bar **130** can be carried by and can extend between a pair of proximal posts **126***a-b*. In one aspect, the top rail or bar **130** can have fingers **134** that insert into open top ends **138** of the pair of posts **126***a-b*. In another aspect, the fingers **134** can be elongated and the top rail or bar **130** can be selectively elevated with respect to the posts **126***a-b* so that the top rail or bar **130**, and thus the posts **126***a-b*, have a selective height to match the cargo **26**. Thus, the posts **126***a-b* can have a pair of telescoping sections **142**. In another aspect, the top rail or bar **130** can have a pair of telescoping sections **146**. Thus, the length of the top rail or bar **130** can be selected to match the length of the pallet **22**.

In one aspect, the ends of the top rail or bar **130** can have hooks or loops, such as eyelets **150**. In another aspect the tops of the posts **126***a-b* can have hooks or loops, such as eyelets **150**. The frame **14** can have at least one cable or strap **154** that can extend between the eyelets **150** of the top rail or bar **130** or the posts **126***a-b*, and the rings **110***a* or eye-bolts **110***b* of opposite corner brackets **54***c-d*. For example, a single cable or strap **154** can extend diagonally through the eyelets **150** and the rings **110***a* or eye-bolts **110***b*. As another example, a pair of cables **154** can be positioned on opposite sides of the pallet **22** and can extend diagonally from the eyelets **150** of the top rail or bar **130** to the eye-bolts **110** of the proximal and opposite corner brackets **54***c-d*. In one aspect, each cable **154** can have a turnbuckle **158** to tighten the cable **154**. In another aspect, each strap can have a ratchet to tighten the cable **154**.

The frame **14**, and the corner brackets **54***a-d*, and the posts **126***a-b* and top rails **130**, can have multiple configurations. In one aspect, as shown in FIG. **1**, the frame **14** can be a one-sided crate **50** and can have: four corner brackets **54***a-d* at each corner of the pallet **22**; a pair of posts **126***a-b* carried by a pair of proximate corner brackets **54***a-b*; a top rail or bar **130** carried by and extending between the pair of posts **126***a-b*; and at least one cable or strap **154** extending diagonally from the eyelets **150** of the top rail or bar **130** to the rings **110***a* or eye-bolts **110***b* of the proximal and opposite corner brackets **54***c-d*.

Referring to FIG. **5**, the frame can be a two-sided frame **14***b* and can have: four corner brackets **54***a-d* at each corner of the pallet **22**; a first pair of posts **126***a-b* carried by a first pair of proximate corner brackets **54***a-b*; a first top rail or bar **130** carried by and extending between the first pair of posts **126***a-b*; a first cables or strap **154** extending diagonally from the eyelets **150** of the first top rail or bar **130** to the rings **110***a* or the eye-bolts **110***b* of the first proximal and opposite corner brackets or shoes **54***c-d*; a second pair of posts **126***c-d* carried by a second pair of proximate corner brackets **54***c-d*; a second top rail or bar **130***b* carried by and extending between the second pair of posts **126***c-d*; and a second cable or strap **154***b* extending diagonally from the eyelets **150** of the second top rail or bar **130***b* to the rings **110***a* or the eye-bolts **110***b* of the first proximal and opposite corner brackets **54***a-b*.

Referring to FIG. **6**, the frame can be a four-sided frame **14***c* and can be configured as described with respect to the two-sided frame **14***b*, but also have four top rails or bars **130***a-d*. For example, a pair of cross-bars **162***a-b* can be located on opposite sides of the pallet **22** and can extend between the first and second pairs of posts **126***a-b* and **126***c-d*

Referring to FIGS. **7** and **8**, the frame **14***d* can comprise a pair of joiners **166***a-b*. In one aspect, the joiners **166***a-b* can be coupled between a pair of pallets **22***a-b* to removably join the pair of pallets together end-to-end to form a single, long pallet. Each joiner **166** can comprise: a bottom plate **170** proximate bottoms **60** of the pallets **22***a-b*; a top plate **174** spaced-apart from the bottom plate **170** and proximate tops **74** of the pallets **22***a-b*; and a side wall **178** extending between the top and bottom plates **174** and **170**. Each joiner **166** can form a box with three contiguous side openings **182***a-c*. Each joiner **166** can have a pocket **186** to receive proximate corners of the pair of pallets **22***a-b*. In addition, each joiner **166** can have a septum **190** extending between the top and bottom plates **174** and **170** and separating the pocket **186** into a pair of pockets. The proximate corners of the pair of pallets **22***a-b* can abut to the septum **190**. The top plate **174** can have a pair of threaded apertures **90** spaced-apart from one another. A pair of bolts **110***c* can be carried by each joiner **166**. Each bolt **110***c* can have a threaded shank **114** threaded into the threaded aperture **90** to secure the bolt **110** to the respective joiner **166**. The bolt **110***c* can extend through the top plate **174** and into the pocket **186** to engage a top of the pallet **22***a-b* to secure the joiner **166** to the corner of the pallets **22***a-b*. The bolt **110***c* is rotatable with respect to the joiner **166** to secure and release the joiner **166** and the pallets **22***a-b*. In addition, each bolt **110***c* can have a head **118** with an aperture **122**.

In one aspect, the pair of joiners **166***a-b* can have a pair of posts **126***a-b* carried by and extending from the pair of joiners **166***a-b*. Each post **126***a-b* can extend upward from the respective joiner **166***a-b*. A top rail or bar **130** can be carried by and can extend between a pair of posts **126***a-b*.

In another aspect, the frame can be a center column frame **14***d* used with a pair of pallets **22***a-b*. The pallets **22***a-b* can be joined by the joiners **166**. The frame **14***d* can comprise: four corner brackets **54***a-d* at each corner of the pallets

22*a-b*; the pair of joiners **166***a-b*; a pair of posts **126***a-b* carried by the pair of joiners **166***a-b*; a top rail or bar **130** carried by and extending between the pair of posts **126***a-b*; and four cables **154** extending diagonally from the eyelets **150** of the top rail or bar **130** to the eye-bolts **110** of the four corner brackets **54***a-d*. Thus, cargo **26** can be stacked on both pallets **22***a-b* and leaned against the top rail or bar **130**.

As described herein, the frame **14***a-d* can have an expanded use configuration with the corner brackets **54***a-d* mounted to the corners of the pallet **22** and configured to receive cargo **26** therein, as shown in FIGS. **1-5-7** and **9**. In addition, the frame **14***a-d* can have a collapsed configuration with the corner brackets **54***a-d* removed from the corners of the pallet **22**, as shown in FIG. **10**. In another aspect, the frame **14***a-d* can be received in the interior volume **42** of the pallet **22** in the collapsed configuration, as shown in FIG. **11**.

Referring to FIG. **12**, the frame **14***e* can also comprise lower bars **180***a-b* secured to and extending between proximate lateral corner brackets **54***a-b* and **54***c-d* for form end brackets. In addition, the eyelets **150** can be positioned atop the top rail **130** and a single cable **154** can extend between the eye bolts **110** and the eyelets **150**.

Referring to FIG. **13**, the frame **14***f* can also comprise at least one panel **188** between proximate posts **192***a-d*. The posts **192***a-d* can have channels **194** facing towards proximate posts **192***a-d* to receive the panel **188** therebetween. The panel **188** can be solid or mostly solid to help retain cargo **26** in the crate **50** and on the pallet **22**. The panels **188** can extend wholly or partially around a lateral perimeter of the frame **14***f*.

As used in this specification and the appended claims, the singular forms ("a," "an" and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to "a layer" includes a plurality of such layers.

In this disclosure, "comprises," "comprising," "containing" and "having" and the like can have the meaning ascribed to them in U.S. Patent law and can mean "includes," "including," and the like, and are generally interpreted to be open ended terms. The terms "consisting of" or "consists of" are closed terms, and include only the components, structures, steps, or the like specifically listed in conjunction with such terms, as well as that which is in accordance with U.S. Patent law. "Consisting essentially of" or "consists essentially of" have the meaning generally ascribed to them by U.S. Patent law. In particular, such terms are generally closed terms, with the exception of allowing inclusion of additional items, materials, components, steps, or elements, that do not materially affect the basic and novel characteristics or function of the item(s) used in connection therewith. For example, trace elements present in a composition, but not affecting the composition's nature or characteristics would be permissible if present under the "consisting essentially of" language, even though not expressly recited in a list of items following such terminology. When using an open ended term in the specification, like "comprising" or "including," it is understood that direct support should be afforded also to "consisting essentially of" language as well as "consisting of" language as if stated explicitly and vice versa.

The terms "first," "second," "third," "fourth," and the like in the description and in the claims, if any, are used for distinguishing between similar elements and not necessarily for describing a particular sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances such that the embodiments described herein are, for example, capable of operation in sequences other than those illustrated or otherwise described herein. Similarly, if a method is described herein as comprising a series of steps, the order of such steps as presented herein is not necessarily the only order in which such steps may be performed, and certain of the stated steps may possibly be omitted and/or certain other steps not described herein may possibly be added to the method.

The terms "left," "right," "front," "back," "top," "bottom," "over," "under," and the like in the description and in the claims, if any, are used for descriptive purposes and not necessarily for describing permanent relative positions. It is to be understood that the terms so used are interchangeable under appropriate circumstances such that the embodiments described herein are, for example, capable of operation in other orientations than those illustrated or otherwise described herein.

The term "coupled," as used herein, is defined as directly or indirectly connected in an electrical or nonelectrical manner. Objects described herein as being "adjacent to" each other may be in physical contact with each other, in close proximity to each other, or in the same general region or area as each other, as appropriate for the context in which the phrase is used. Occurrences of the phrase "in one embodiment," or "in one aspect," herein do not necessarily all refer to the same embodiment or aspect.

As used herein, the term "substantially" refers to the complete or nearly complete extent or degree of an action, characteristic, property, state, structure, item, or result. For example, an object that is "substantially" enclosed would mean that the object is either completely enclosed or nearly completely enclosed. The exact allowable degree of deviation from absolute completeness may in some cases depend on the specific context. However, generally speaking the nearness of completion will be so as to have the same overall result as if absolute and total completion were obtained. The use of "substantially" is equally applicable when used in a negative connotation to refer to the complete or near complete lack of an action, characteristic, property, state, structure, item, or result. For example, a composition that is "substantially free of" particles would either completely lack particles, or so nearly completely lack particles that the effect would be the same as if it completely lacked particles. In other words, a composition that is "substantially free of" an ingredient or element may still actually contain such item as long as there is no measurable effect thereof.

As used herein, "adjacent" refers to the proximity of two structures or elements. Particularly, elements that are identified as being "adjacent" may be either abutting or connected. Such elements may also be near or close to each other without necessarily contacting each other. The exact degree of proximity may in some cases depend on the specific context.

As used herein, the term "about" is used to provide flexibility to a numerical range endpoint by providing that a given value may be "a little above" or "a little below" the endpoint. It is understood that express support is intended for exact numerical values in this specification, even when the term "about" is used in connection therewith.

The terms "interference fit" and "friction fit" and "press-fit" are terms of art used interchangeably herein to refer to deliberately causing, increasing and/or using friction to deliberately resist movement. An interference fit or friction fit is different than and great than the existence of friction. While friction may exist between any two surfaces, is often desirable to do all one can to reduce this friction. An interference fit or friction fit can be distinguished from naturally occurring friction by being actually deliberately

caused and increased. An interference fit can be created by dimensioning engaging parts so that their surfaces tightly bear against one another. A friction fit can be created by surface roughness that is rougher.

It is to be understood that the examples set forth herein are not limited to the particular structures, process steps, or materials disclosed, but are extended to equivalents thereof as would be recognized by those ordinarily skilled in the relevant arts. It should also be understood that terminology employed herein is used for the purpose of describing particular examples only and is not intended to be limiting.

Furthermore, the described features, structures, or characteristics may be combined in any suitable manner in one or more examples. In the description, numerous specific details are provided, such as examples of lengths, widths, shapes, etc., to provide a thorough understanding of the technology being described. One skilled in the relevant art will recognize, however, that the invention can be practiced without one or more of the specific details, or with other methods, components, materials, etc. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the invention.

While the foregoing examples are illustrative of the principles of the invention in one or more particular applications, it will be apparent to those of ordinary skill in the art that numerous modifications in form, usage and details of implementation can be made without the exercise of inventive faculty, and without departing from the principles and concepts described herein. Accordingly, it is not intended that the invention be limited, except as by the claims set forth below.

What is claimed is:

1. A re-usable crate system, comprising:

a pallet having a wood construction with a pair of lateral outer sides, an array of upper slats carried by and fastened to tops of the pair of lateral outer sides and extending between the pair of lateral outer sides, and an array of lower slats fastened to bottoms of the pair of lateral outer sides, the pallet having a width, a length and a height, the width and the length being greater than the height, the pallet having an interior volume defined by the pair of lateral outer sides, the array of upper slats and the array of lower slats that is substantially void, the pallet having lateral openings configured to receive a fork of a fork lift;

a frame removably coupled to the pallet and extending above the pallet to form a crate configured to receive cargo over the pallet and at least partially between the frame; the frame comprising:

corner brackets at each corner of the pallet, each corner bracket comprising a bottom plate proximate a bottom of the pallet, a top plate spaced-apart from the bottom plate and proximate a top of the pallet, and a pair of contiguous side walls extending between the top and bottom plates, the pair of side walls adjoining one another and being oriented at a right angle with respect to one another, each corner bracket forming a box with a pair of contiguous side openings opposite the pair of contiguous side walls, each corner bracket having a pocket to receive a respective corner of the pallet;

each corner bracket further comprises:

an aperture in the top plate;

a pin carried by the corner bracket and insertable through the aperture and engaging an upper slat of the pallet to secure the corner bracket to a respective corner of the pallet, the pin having an enlarged head abutting to the top plate; and

a ring carried by the corner bracket.

2. The re-usable crate system in accordance with claim **1**, further comprising:

a pair of posts carried by a pair of proximate corner brackets, the pair of posts extending upward from the pair of proximate corner brackets;

eyelets located adjacent ends of the pair of posts; and

at least one cable or strap extending diagonally on opposite sides of the pallet from the eyelets to the rings of opposite corner brackets.

3. The re-usable crate system in accordance with claim **2**, further comprising:

each cable or strap having a turnbuckle or ratchet, respectively, configured to tighten the cable or strap.

4. The re-usable crate system in accordance with claim **2**, further comprising:

a top rail carried by and extending between the pair of posts; and

the top rail having fingers that insert into open top ends of the pair of posts.

5. The re-usable crate system in accordance with claim **4**, further comprising:

the top rail having a pair of telescoping sections.

6. The re-usable crate system in accordance with claim **4**, wherein:

the eyelets are at ends of the top rail.

7. The re-usable crate system in accordance with claim **4**, further comprising:

the pair of posts being telescoping posts configured to vary an elevational height of the top rail with respect to the pallet.

8. The re-usable crate system in accordance with claim **4**, wherein the pair of posts is a first pair of posts, the top rail is a first top rail, and the at least one cable or strap is a first cable or strap; and further comprising:

a second pair of posts opposite the first pair of posts and carried by a pair of opposite proximate corner brackets;

a second top rail opposite the first top rail and carried by and extending between the second pair of posts;

second eyelets at ends of the second top rail or the second pair of posts; and

at least one second cable or strap extending diagonally on opposite sides of the pallet from the second eyelets to rings of the opposite corner brackets.

9. The re-usable crate system in accordance with claim **8**, further comprising:

a pair of cross-bars on opposite sides of the pallet and extending between the first and second pairs of posts.

10. The re-usable crate system in accordance with claim **1**, further comprising:

the frame having:

an expanded use configuration with the corner brackets mounted to the corners of the pallet and configured to receive cargo therein; and

a collapsed configuration with the corner brackets removed from the corners of the pallet.

11. The re-usable crate system in accordance with claim **10**, wherein the frame is received in the interior volume of the pallet in the collapsed configuration.

12. The re-usable crate system in accordance with claim **1**, further comprising:

a pair of pallets positioned proximate one another;

a pair of joiners coupled between the pair of pallets and removably joining the pair of pallets together to form a single, long pallet;

each joiner comprising a bottom plate proximate the bottom of the pallets, a top plate spaced-apart from the bottom plate and proximate the top of the pallets, and a side wall extending between the top and bottom plates, each joiner forming a box with three contiguous side openings, each joiner having a pocket to receive proximate corners of the pair of pallets, each top plate having a pair of threaded apertures spaced-apart from one another;

each joiner comprising a septum extending between the top and bottom plates and separating the pocket into a pair of pockets receiving the proximate corners of the pair of pallets; and

a pair of bolts carried by each joiner, each bolt threaded into the threaded aperture to secure the bolt to the respective joiner, the bolt extend through the top plate and into the pocket and engaging a top of the pallet to secure the joiner to the corner of the pallet, the bolt being rotatable with respect to the joiner to secure and release the joiner and the pallet.

13. The re-usable crate system in accordance with claim **12**, further comprising:

a pair of posts carried by the pair of joiners, the pair of posts extending upward from the pair of joiners;

a top rail carried by and extending between the pair of posts;

eyelets at ends of the top rail or the pair of posts; and

a cable or strap extending on opposite sides of the pallet and extending diagonally from the eyelets to the corner brackets.

14. The re-usable crate system in accordance with claim **1**, wherein each corner bracket further comprises:

a plate receiver in the pocket and extending from one of the walls and defining a gap between the plate receiver and the other wall, the gap sized to receive an end of one of the lateral outer sides of the pallet; and

the plate receiver configured to resist movement between the bracket and the pallet in at least one direction.

15. The re-usable crate system in accordance with claim **1**, further comprising:

each top plate having a threaded aperture; and

eye-bolts carried by the corner brackets, each eye-bolt having a threaded shank threaded into a respective threaded aperture to secure the eye-bolt to a respective corner bracket, the shank extend through the top plate and into the pocket and engaging the top of the pallet to secure the corner bracket to the corner of the pallet, the eye-bolt being rotatable with respect to the corner bracket to secure and release the corner bracket and the pallet, each eye-bolt having a head with an aperture.

16. A re-usable crate system, comprising:

a pallet having a wood construction with a pair of lateral outer sides, an array of upper slats carried by and fastened to tops of the pair of lateral outer sides and extending between the pair of lateral outer sides, and an array of lower slats fastened to bottoms of the pair of lateral outer sides, the pallet having a width, a length and a height, the width and the length being greater than a height, the pallet having an interior volume defined by the pair of lateral outer sides, the array of upper slats and the array of lower slats that is substantially void, the pallet having lateral openings configured to receive a fork of a fork lift;

a frame removably coupled to the pallet and extending above the pallet to form a crate configured to receive cargo over the pallet and at least partially between the frame; the frame comprising:

corner brackets at each corner of the pallet, each corner bracket comprising a bottom plate proximate a bottom of the pallet, a top plate spaced-apart from the bottom plate and proximate a top of the pallet, and a pair of contiguous side walls extending between the top and bottom plates, the pair of side walls adjoining one another and being oriented at a right angle with respect to one another, each corner bracket forming a box with a pair of contiguous side openings opposite the pair of contiguous side walls, each corner bracket having a pocket to receive a respective corner of the pallet, each top plate having an aperture;

rings carried by the corner brackets;

pins carried by the corner brackets and insertable through the apertures and engaging an upper slat to secure the corner brackets to respective corners of the pallet;

a pair of posts carried by a pair of proximate corner brackets, each post extending upward from a respective corner bracket;

a top rail carried by and extending between the pair of posts, the ends of the top rail having eyelets;

at least one cable or strap extending diagonally on opposite sides of the pallet from the eyelets of the top rail to the rings of the proximal and opposite corner brackets; and

the frame having:

an expanded use configuration with the corner brackets mounted to the corners of the pallet and configured to receive cargo therein, and

a collapsed configuration with the corner brackets removed from the corners of the pallet.

17. The re-usable crate system in accordance with claim **16**, wherein each corner bracket further comprises:

a plate receiver in the pocket and extending from one of the walls and defining a gap between the plate receiver and the other wall, the gap sized to receive an end of one of the lateral outer sides of the pallet; and

the plate receiver configured to resist movement between the bracket and the pallet in at least one direction.

18. The re-usable crate system in accordance with claim **17**, wherein the frame is received in the interior volume of the pallet in the collapsed configuration.

19. The re-usable crate system in accordance with claim **16**, further comprising:

a pair of pallets positioned end-to-end;

a pair of joiners coupled between the pair of pallets and removably joining the pair of pallets together to form a single, long pallet;

each joiner comprising a bottom plate proximate bottoms of the pallets, a top plate spaced-apart from the bottom plate and proximate tops of the pallets, and a side wall extending between the top and bottom plates, each joiner forming a box with three contiguous side openings, each joiner having a pocket to receive proximate corners of the pair of pallets, each top plate having a pair of threaded apertures spaced-apart from one another;

each joiner comprising a septum extending between the top and bottom plates and separating the pocket into a pair of pockets; and

a pair bolts carried by each joiner, each bolt threaded into the threaded aperture to secure the bolt to the respective joiner, the bolt extend through the top plate and into the

pocket and engaging the top of the pallet to secure the joiner to the corner of the pallet, the bolt being rotatable with respect to the joiner to secure and release the joiner and the pallets.

20. A re-usable crate system, comprising:

a pallet having a wood construction with a pair of lateral outer sides, an array of upper slats carried by and fastened to tops of the pair of lateral outer sides and extending between the pair of lateral outer sides, and an array of lower slats fastened to bottoms of the pair of lateral outer sides, the pallet having a width, a length and a height, the width and the length being greater than a height, the pallet having an interior volume defined by the pair of lateral outer sides, the array of upper slats and the array of lower slats that is substantially void, the pallet having lateral openings configured to receive a fork of a fork lift;

a frame removably coupled to the pallet and extending above the pallet to form a crate configured to receive cargo over the pallet and at least partially between the frame; the frame comprising:

corner brackets at each corner of the pallet, each corner bracket comprising a bottom plate proximate a bottom of the pallet, a top plate spaced-apart from the bottom plate and proximate a top of the pallet, and a pair of contiguous side walls extending between the top and bottom plates, the pair of side walls adjoining one another and being oriented at a right angle with respect to one another, each corner bracket forming a box with a pair of contiguous side openings opposite the pair of contiguous side walls, each corner bracket having a pocket to receive a respective corner of the pallet, each top plate having a threaded aperture;

each corner bracket having a plate receiver in the pocket and extending from one of the walls and defining a gap between the plate receiver and the other wall, the gap sized to receive an end of one of the lateral outer sides of the pallet, the plate receiver configured to resist movement between the bracket and the pallet in at least one direction;

rings carried by the corner brackets, each ring secured to a respective corner bracket, each ring having a head,

a pair of posts carried by a pair of proximate corner brackets, each post extending upward from a respective corner bracket;

a top rail carried by and extending between the pair of posts, the top rail having fingers that insert into open top ends of the pair of posts, the top rail having a pair of telescoping sections, the ends of the top rail having eyelets;

at least one cable or strap extending diagonally on opposite sides of the pallet from the eyelets of the top rail to the rings of the proximal and opposite corner brackets; and

the frame having:

an expanded use configuration with the corner brackets mounted to the corners of the pallet and configured to receive cargo therein, and

a collapsed configuration with the corner brackets removed from the corners of the pallet.

* * * * *