

# SYSTEM FOR CARGO TRANSPORT

## Technical Field

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My present disclosure is directed to a *system for cargo transport* in the field of intermodal logistics.

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## Background Art

### Ports:

15 The current state of cargo transport relies heavily on container shipping for finished and semi-finished goods using purpose-built container ships. Feeder ships, general cargo vessels, tankers, dry-bulk carriers, multi-purpose vessels, reefer ships, and roll-on/roll-off vessels also play vital roles for their respective cargoes.

20 Ports receiving cargo ships have massive cranes that generally lift containers one or two at a time from the starboard side of a ship. Some of the largest cargo ships have a capacity of 20,000 TEU (twenty-foot long container equivalents).

25 It takes 3,000 people working three days in shifts around the clock to load and unload a giant ship with capacity for 20,000 containers when it stops at one of the world's biggest ports. (Wall Street Journal, 2018)

Ports receiving tankers, dry-bulk carriers, reefer ships, and roll-on, roll off vessels require special equipment enabling loading and unloading of their respective cargoes.

30 Though tankers can pump and fill their holds at a rate of 75,000 gallons per minute, they must sit at dock for eight to nine hours. Similarly, dry-bulk carriers use conveyor belts, buckets, and in some cases, lower bulldozers into the hold to move material around. These processes are inherently dangerous as overloading one side or area of the

ship causes stress points. Ships have split in two at-dock, as well as capsized due to  
35 uneven loading or unloading.

Due to the Covid-19 pandemic and related disruptions, extensive backlogs currently  
plague the world's busiest ports with scores of ships waiting to be loaded or unloaded.

40 A typical Panamax containership call requires about 1.7 hectares of yard space,  
assuming the use of standard rubber-tired gantry cranes, enabling a stacking  
density of 1,000 TEU per hectare. Larger ports tend to have higher stacking  
density with equipment such as rail-mounted gantry cranes (1,500-2,000 TEU  
per hectare), requiring less yard space. Smaller ports have less equipment and  
45 lower stacking density levels (500 TEU per hectare or less). (Notteboom, 2022)

What stands out to me during the pandemic is the apparent lack of coordination in the  
transfer of goods. Yes, products do get to where they are going, but at what cost? If  
ships carrying billions of dollars of goods sit at sea for three to four weeks, they lose at  
50 least one Asian / North American route each time this occurs. That is an unbelievable  
amount of lost revenue for the shipping lines. This can have no small influence on the  
inflation the world is experiencing in 2022.

The imbalance of trade also causes insurmountable issues when timely trade routes are  
55 considered.

U.S. goods and services trade with China totaled an estimated \$615.2 billion in 2020.  
Exports were \$164.9 billion; imports were \$450.4 billion. The U.S. goods and services  
trade deficit with China was \$285.5 billion in 2020." (Office of the United States Trade  
Representative, 2021)

60 With a trade deficit of \$285.5 billion, one can imagine that there are a lot of empty  
containers which must be returned to China—and of course, empty containers are not as  
valuable as filled ones. During the pandemic, ships returned to Asia without empty  
containers, further causing snags in supply chain deliveries and cost increases.

65 However, trade deficits are not wholly to blame. The **basic** design of the United States' ports is flawed. The **basic** design of the world's ports is flawed. As the *Port Economics, Management and Policy* book points out above, ports simply cannot hold that many containers, causing them to be held inland where they are not handy when a ship *could* take them.

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As we will see below, not only is the **basic** design of the world's ports flawed, the means, methods, and apparatus used in conveying freight are flawed as well.

75 WE have entered an era where the equipment of old will not absorb the pressure of modern commerce.

### **Cranes, Barges & Ships:**

80 Cargo container ships have grown to larger and larger sizes over the past seven decades, starting with a modified World War II oil tanker named the "Ideal-X" by Malcom Mclean. The Ideal-X carried 58 containers on its maiden voyage (approximately 116 TEU – Mclean's containers were 35' long, not 40' as are modern *series 1 freight containers*). Compare that to the Ever Ace, built in 2021, which carries 23,992 TEU!

85 Astonishing.

The current state of the art utilizes gantry cranes. These cranes are mounted port-side and roll on rails, which enable the crane to reach every spot on a ship. A spreader is lowered down to the ship and can retrieve up to two *series 1 freight containers* per pick.  
90 These are then lowered for a longshoreman to remove twist locks at the base of the containers. This is highly dangerous and repetitive work. The containers may be placed on wheeled carts, trucks, or placed for later retrieval.

Some military cargo ships such as the USNS Shughart (T-AKR-295) have two 110-ton  
95 on-board cranes, port, and starboard ramps and a stern ramp. These logistic maneuvers are limited physically to the loading and unloading cycle of the cranes at sea. Certainly, the faster cargoes can be exchanged the greater the chances for survivability of the cargoes and two interchanging ships.

To install and maintain oil rigs and wind turbines, double platform cranes on a barge  
100 slink up elongated columns like an inch-worm. This works well for this purpose but is  
not useful in large cargo transfers at sea.

The roll-on, roll-off features of purpose-built ships require a dock and are limited to the  
width of the door for vehicles and the speed they may enter or exit the ship. The height  
105 of each floor on the ship is generally higher than many of the vehicles and remains  
inefficient as a transport volume.

What an absolute waste—every trip.

110 What has grabbed my attention is that the focus of ship design has been primarily on  
larger ships, engine efficiency, greater carrying capacity, and large port side cranes. It  
appears very little thought has been placed on loading and removing the containers in an  
exacting, coordinated manner.

115 If a ship grows in length, it appears that ports simply add a new crane. Ship designers do  
not design new ways of loading or unloading cargo. I did find some prior art below  
which addressed this issue, but from all accounts that I can see, starboard *encargoing*  
and *decargoing* prevails.

120 Dry-bulk carriers have large hatches, whereby the seal degrades over time. Degraded  
seals have caused ships to fill with seawater and subsequently sink. Extensive cleaning  
processes need to be carried out at each stop, further adding to the time a dry-bulk  
carrier is in port.

125 Given the cost of these port-side dry-bulk operations, ship owners lose many sea-going  
hours at port without improving the loading and unloading capabilities (other than to  
use a “bigger” bucket, a “larger” conveyor belt, and similar efficiency tactics).

Dry-bulk ships have another disadvantage. They mostly return empty.

130 First, satellite data of ships' movements reveal that most countries are either large  
net importers or large net exporters and that, related to this, at any point in time a

staggering 42% of ships are traveling without cargo (termed “ballast”). This natural trade imbalance is a key driver of trade costs. (Brancaccio , 2018)

That is a tough pill to swallow. While the design of the dry-bulk ship is an asset, it is  
135 also a liability.

What these ship designs lack is fundamental reimagination.

Fueling adds considerably to port-side turnaround time. With a capacity of 18,000 TEU,  
140 the CMA CGM Benjamin Franklin carries approximately 4.5 million gallons of fuel oil. Careful attention must be paid to bunkering a ship. The transfer of fuel is carried out with large hoses that humans can carry. The speed of this fuel transfer is limited to the speed of the pump and the diameter of the hose.

145 *Series 1 freight containers* are tied down on the deck with twist locks at the bottom corner castings and with lashing rods. Lashing rods provide necessary lateral bracing from port to starboard side of ships and vice versa. Without lashing, the containers could not safely be stacked as high as currently practiced.

150 Lashing rods are remarkably dangerous for stevedores. They are strewn about the lashing bridge in pits and are loose. I can only imagine the number of twisted ankles, falls, and worse caused by these loose devices. Because the rods are not tied to anything, they must be lifted high above the head to secure the loads which provide great risk on a daily basis. Rods can miss the corner casting or slip in someone’s glove  
155 and fall.

Falling 16-foot steel rods 1 inch thick will put a dent in your day!

It is amazing to me how haphazard the lashing bridge is when docked in port.  
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Lashing is the cause of over 60% of injuries for cargo handlers. (YouTube, 2020)

Yet for some reason, OSHA has not addressed this in the United States. *The United States Coast Guard Regulation: Cargo Securing Manual* does not have a section on  
165 lashing rods.

My sense is that, like many industries, governance can only be as good as the tools available. With that in mind, it does not appear the maritime industry recognizes this danger; the maritime industry has not invented a solution to the problem.

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**Trains:**

In terms of productivity, freight trains have remained largely unchanged during the same period which began with the *series 1 freight container*. Malcom Mclean again  
175 made improvements in the intermodal shipping industry with a collaboration with Southern Pacific Railroad in 1977, leading to what became known as the “well” car or a double-stacked intermodal train car. (TR News, 2006)

***Series 1 Freight Containers:***

180 Malcom McClean revolutionized global trade when he introduced the shipping container. The innovation was not immediately adopted, but in 1968, twelve years after he introduced the container, an international standard was finally agreed upon. It was known as an ISO 668 – *series 1 freight container*.

185 They cannot continue to be stacked, as they eventually crush the bottom containers.

The latest generation of mega vessels can load 11-12 tiers of containers under deck. You can extend this but then you start to run into problems that were discovered when Nedlloyd built hatches vessels in the 1990's. No longer were the stowage  
190 planners limited by the stack weight limit that the vessel could handle, **the limiting factor became the amount of weight that the container at the bottom of the stack could support.** (Bebbington, 2017)

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**PRIOR ART CITED** (where reference signs are shown in this section they pertain to that patent or patent application)

**Cargo Frames in Detail:**

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**US 9,637,305 B2** contemplates specially designed cargo containers which interlock at the sides and corners, depending on the embodiment. It is a clever system but is not capable of interlocking large items as it is restricted to a common forklift for maneuverability.

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**WO 2011/094835 A1** contemplates a fastening assembly, which connects containers with convenient pins. The pins allow for use in frigid temperatures.

It is not clear from the disclosure how the containers are moved. For example, there are no slots for a forklift or similar movement machine. There are no wheels. It appears that once the containers are connected, they do not move.

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**US 2021/0380339 A1 / US 2021/0339943 A1** utilizes *series 1 freight containers* as a small, mobile warehouses. The interior of the *series 1 freight container* has an orthogonal grid of columns, allowing a retrieving device to lower small boxes of goods in the slots created by these columns.

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A considerable amount of space is wasted at the top of the columns as the retrieving device rolls atop the columns.

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The *series 1 freight containers* can be aligned next to each other to allow a greater area to be covered. In effect, this allows say four containers side-by-side to create a 40' x 36' area for storage.

Given that the z-axis tolerance is 1/10 of a millimeter, it is not clear how such crude pins, which align the containers, will enable that tolerance. However, there are corner height adjusters. Given the tolerances, it appears to me that a single container is more practical.

225

230 The invention seems predisposed to items that can fit into boxes and then moved by hand, as opposed to large cargoes such as a *series 1 freight container* itself.

US 9,359,129 B1 is an automated twist lock device that reduces wear and tear with a unique pin system. The device is a certain improvement over prior art twist lock  
235 versions.

It does not appear to allow two *series 1 freight containers* to be lifted together.

This means lifting two *series 1 freight containers* that are connected by the device is not  
240 possible because of its tension release mechanism. The applicant did not appear to desire lifting more containers in one action.

VS & B Containers Group's (<https://www.vsnb.com/container-twist-lock>) array of Standard Intermediate Twist Lock, Semi-automatic Twist Lock, and Fully Automatic  
245 Twist lock have served the intermodal shipping industry for many years. They are trusted, standard devices and have been around since the 1960's. VS&B have several flavors as alluded to in the previous patent: manual, semi-manual, and automatic. These devices are the backbone of the maritime *series 1 freight container* trade. When things work, they just work.

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What they don't do is allow multiple containers to be bound together when being lifted to or from a crane. They are not designed for much other than keeping *series 1 freight containers* tied down on deck during maritime transit, trucking transit, or rail transit.

255 Additionally, they do not provide lateral bracing. This is why lashing rods are so prominent on a cargo ship.

US 4,599,829 is a unique building system utilizing *series 1 freight containers*. The patent primary embodiment focuses on a correctional facility or prison, as well as an  
260 apartment-type building embodiment.

What remains pertinent here are the connectors in which the containers are held together horizontally and vertically. While the connectors will level and stabilize the containers as a building structure, they are not intended for movement in trade.

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**US 6,363,586 B1** provides a kit for connecting two 20-foot *series 1 freight containers* so that they may be moved as a larger 40-foot *series 1 freight containers*. The kit binds two ends of the smaller containers together at the corners and provides a spacer, allowing the bound containers to match the 40-foot container in length.

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While this does provide a reduction of steps when encargoing or decargoing a ship where 20-foot *series 1 freight containers* are employed, it does not reduce steps for 40-foot *12*.

275 The other major disadvantage of this kit is that it does not address lateral loads caused by winds or wave ocean which could topple stacked containers. This is clearly not a part of the invention.

**CN 112027378 A** provides for a foldable container-sized frame. This type of apparatus is well-trodden in the prior art where tanks and other cargoes must be accommodated. While it would expand the types of cargoes it could contain since the frame could be built around, it the concept does not improve the rate at which ships, ports, and trucks can encargo or decargo.

285 **DE 2154274 A1** utilizes a strap-based connection means and purpose-built recessed grooves in plastic barrels that form a battery, enabling many barrels to be bound together. A further object of the recessed grooves and connection means is to enable battery lines to be linked without the barrels moving or the strap protruding. In one embodiment, pipes with bolted connections ensure the straps do not deform.

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The connection means is not meant to enable large scale movements.

**US 6,276,550 B1** is a unique stacking system of storage boxes whose interlocking castellated edges are wholly formed and create larger aggregated storage units. The

295 invention primarily aims to solve stacking compact discs for music and movies. At this point in time, the use is moot, but the system is still useful for other things.

While the interlocking nature is novel, the application is for standstill storage and not useful in the movements of cargoes.

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### **Cargo Hoist in Detail:**

US 11,272,984 is a newly minted patent which provides a storage and retrieval system of racks for cargo containers. The patent does specifically point out *series 1 freight containers*.

While the general principle is compelling considering that the apparatus is intended for use in a warehouse, an extraordinary amount of space is dedicated to the hoist. For example, the lift is as long as a shipping container. At eight feet plus structure on both sides, the hoist could take up as much as 12 feet and is as long as the racks. At eight feet plus rack structure, the racks could easily be 10 feet deep.

If the warehouse was one acre in plan view (208.7 feet x 208.7 feet = 43,560 square feet), then:

$$208.7 \text{ feet} / 22 \text{ feet} = 9.48 \text{ rows per acre}$$

$$12 \text{ feet (hoist)} / 10 \text{ feet (racks)} = 1.2 \text{ times more space is allotted to the hoist than the racks for storage}$$

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$$43,560 \text{ square feet} / 1.2 = 36,300 \text{ square feet is dedicated to hoists}$$

It is not an efficient apparatus.

325 The racks are claimed to hold containers in only at the corners. Looking at their corner supports 5, in a seismic event, the containers can be thrown off the corner supports 5, fall, and become stuck or worse.

330 The inventors never considered seismic events. By nature of focusing on a warehoused apparatus, wind constraints were never considered.

US 10, 913,641 B1 is an ecommerce fulfillment center three-dimensional rack, storage and retrieval system. The retrieval robot occupies a vertical column and may rotate a retrieval arm to one of four adjacent slots in adjacent vertical columns.

335

Because the retrieval robot must vertically traverse a column to store or retrieve storage units 16 entire columns are left unusable.

WO 2021148657 is an application for a storage and retrieval system for ecommerce sized items, not large items such as *series 1 freight containers*. The system utilizes a set of orthogonally arranged racks that form vertical columns. There does not appear to be positions in the y-axis wherein a container may be stationed and independently supported.

345 The containers of items are stored vertically and retrieved vertically. The application does not state how high the containers may be stacked before the weight of the column crushes the lowest or lower containers.

350 These limitations prevent the system from reaching heights beyond what weight the individual container may bear. If a container is at the second position from the warehouse floor and the column is full of containers, then all containers above the second position would need to be removed.

355 This is clearly inefficient.

US 5,707,199 presents a multi-level storage and retrieval structure for shipping containers or vehicles. While the displacing module 32 provides X and Y axis movements, vertical movements are confined to the elevating members 20. This means that vertical lifting does not happen in the field area of the structure.

360

Because of this, the elevating members 20 are not usable for storage. In my view, this is a waste of structure.

**EP 0898033 B1** is a multi-level elevator and display for the smart car. I have never seen one, but more recently the Carvana concept seems to borrow heavily from this arrangement.

Like many of the other aforementioned hoists, the central column for y-axis movements is not a storage-capable volume of space.

A turntable is used to spin a car around to the appropriate location and a telescoping apparatus moves the car to position on a load carrier 7.

**US 7,729,797 B2** provides a storage and retrieval system of vertically disposed racks oriented in an orthogonal pattern, such that the stored items appear in a grid-like pattern. The method allows for correcting vertical and horizontal distances where a hoisting device 9 may reach a destination storage location.

Like the other patents cited with a storage and retrieval system, this one requires that floor plan space be dedicated to the hoist. Large amounts of space are lost to the necessary function.

**US 10,596,229 B2** stores and retrieves biological test tubes with a unique two-carriage system. The two carriages traverse in the z direction and are able to separate to the x and y directions in order to store or retrieve test tubes at a specific location.

The carriages utilize rack and pinion and a series of covered bearings to reduce contamination of test tube material. One issue I see with the carriages as designed is that they can become long and stretched out, which means the storage is not being conducted in as an efficient a manner as is possible.

While the carriage is highly specific to clean work, like the other storage and retrieval devices, an entire column is dedicated to the z-axis. The z-axis portion of the apparatus appears to be entirely separate from the racks which does not take advantage of the structure already built. In essence, they built a structure for the racks, and then another structure for storage and retrieval. It seems like they could have utilized the structure better to reduce redundancy. I did not find a specific reason for redundancy.

US 20220041374 A1 presents a storage and retrieval system built around a set of orthogonal racks. The loading good lifting device 13a provides movement of goods in a singular direction. Only bays adjacent to either side of the rollers are enabled for storage and retrieval.

I was not able to ascertain what moves the goods from the rollers to the racks.

Like the other hoists mentioned, valuable floor plan space is allotted to vertical lifting and not capable of being used as storage.

US 10,926,950 B2 is a telescopically driven storage and retrieval system in a high bay warehouse. The products intended to be stored are things that a human being could pick up. Notably, the inventor says in reference to a toothed belt 232 and toothed rack 211, “Therefore, comparatively high force transmission is allowed without any damage to the toothed belt 232 or the toothed rack 211 occurring. It is thus possible for even comparatively heavy storage items 4 such as components to be moved by means of the telescopic drive 2.”

By the inventor’s own admission, this device is not suitable for industrial loading.

US 9,181,067 B1 is a charming little patent. Represented by the Secretary of the Army, this cargo lifting device is coupled with wind deflecting members that aid in stabilizing the cargo when being transported by crane or helicopter in high wind conditions.

While the patent does not specifically state *series 1 freight container*, the drawings do depict perhaps a 10-foot or 20-foot container of that type.

The device is designed to lift one cargo at a time and does not appear capable of binding more than one cargo together.

US 2,456,104 is a creative gantry-type crane mounted on a ship nearly 75 years ago. This crane has two runways 3, or rails, that enable the gantry to roll lengthwise with the ship and *encargo* or *decargo* to adjacent ships or piers.

To reduce wind drag, bad sight lines and more, the crane pivots in its center and lowers itself in opposite directions on the runways so that the crane may be laid down on the deck.

435 While the crane certainly takes up a lot of space and can be quite useful at sea, it is not fundamentally faster or more productive than a port-side gantry crane.

**<https://morallift.en.made-in-china.com/product/dMZQpyYPfjak/China-Vertical-3-Axis-Movement-Man-Lift.html>** is selling a 3-axis lift useful for painting and other  
440 related labor tasks. The apparatus runs on a rail along a wall. It is mounted at the floor and upper portion of the wall, enabling the user to traverse the wall and expand out away from the wall.

It could be useful in painting boats, aircraft, cars and other things, where a regular  
445 ladder would not provide useful results. While this apparatus would not be useful for storing and retrieving heavy items, it certainly has its place.

#### **Cranes, Barges & Ships in Detail:**

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**US 9,359,047** utilizes a dual platform barge with cranes which enable the vessel to raise or lower the cranes and working areas for tall structures at sea. It is primarily a construction or maintenance platform and not designed to add or remove cargoes from a vessel.

455

**WO 2014015385** contemplates a new ship design with ship mounted gantry cranes, three moveable decks, a ballast control system and rail access. There are no fundamentally new aspects to this arrangement.

460 Considerable effort is spent balancing the ship with the extreme loads contemplated from rail access at the loading ramp.

The inventor writes, "The ship may comprise a ballast control system for adjusting the height of the first deck relative to the waterline and/or for adjusting the ship's trim to

465 cater for load imbalance within the hold. The ballast control system may be adapted to  
adjust the waterline of the ship to maintain the gradient of the loading ramp, when  
deployed, to be less than  $\pm 15$  degrees from horizontal.”

The movable gantries are interesting but as designed, they are tied up with the access  
470 points of the rail. It is not clear if the ship mounted cranes would fundamentally lessen  
port side time.

The patent was never granted.

475 **US 10,308,327** is designed to retrieve horizontally laid caissons or foundations  
(monopiles) from a deck and jack them up slowly utilizing one or more raising  
platforms and a crane. The invention aims to prevent a caisson slipping into the sea or  
hit one of the vessels and swing in an out-of-control manner.

480 Dynamic positioning systems and spud poles with a jack-up platform achieve  
stabilization of the lifting vessel.

**WO 2001054968** is a floating pontoon-supported crane. While this seems like it would  
work to lift items at sea the patent was not granted.

485

**US 5,832,856** provides a monohull fast ship equipped with rail pairs running parallel to  
the centerline. These rail pairs enable loading rail cars quickly onto the cargo decks.  
The rail pairs have a single-entry point and do not differ much from a railroad track in  
that they can only carry one car at a time.

490

In **US 6,537,009** the patentee has created a vessel with an adjustable bridge and gantry  
crane-like hoist. The loading of cargoes is limited to the stern of the ship. While the  
patent claims to balance the vessel while loading or unloading, it is not clear from the  
specification that the bridge would accomplish this, especially from a ship-to-ship  
495 transfer as waves could volley the interconnected vessels up and down.

The adjustable cell guides for a container ship in **CN 107776829 A** & **CN 207617921 U**  
allow for 20 TEU, 40 TEU, and 45 TEU containers. An adjustable flap-like device

allows the longer container to be accepted onto the ship's hold. This makes the ship  
500 more flexible in the containers it can handle, but it does not speed up the rate of cargo  
loading and unloading.

In **CN 113525601 A** a telescopic guide rail system forms a new cell guide. The system  
enables multiple sized shipping containers to be utilized in the cargo hold.  
505

From my assessment of the drawings (which are hard to understand), it appears  
substantial amounts of space will be lost in the transverse bulkhead to allow for the  
telescopic guide rails to push in or out as required by differing-sized cargoes.

510 It seems like a ship dedicated to the odd-sized cargo container would make more sense.

In **CN 108466676 A** the same applicant sought a different arrangement of twist locks  
capable of holding down the containers. However, like the aforementioned system, a  
fair amount of space can be lost to the smaller container.

515 Again, it seems like a ship dedicated to the odd sized cargo container would make more  
sense.

While I can appreciate that the aim of **US 2006/0104748 A1** is to increase the  
520 productivity of port side operations, there is nothing substantially new about this  
apparatus or method for doing so. Adding more prior art cranes on both sides of a ship  
is not invention.

**US 7,665,945** adds to the art and is commendable for offloading cargoes from a ship  
525 directly into a warehouse.

The disadvantage is that the apparatus only handles one container per movement action.  
While distinct from a gantry crane in removing a number of steps to load a warehouse,  
it is not wholly transformative. It is not clear how many containers could be stacked in a  
530 warehouse.

US 7,686,558 is rather hard to fully understand. There are tracks and a rotating means which allow cargo containers to be removed from a ship and rotated. Supposedly rotating in long perpendicular lanes is desirable.

535

I fail to see how this helps loading the containers onto trucks in a substantially more efficient manner.

The transportation carrier has a larger floor plan area than the *series 1 freight container* and would not be space-saving. This prevents the transportation carrier from being utilized for anything other than a transportation carrier.

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CN 111252693A is an exterior elevator mounted to a ship side. The lift device allows for adjusting the height of the platform to meet any loads desired.

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I am not sure it is fundamentally more useful than a crane.

The aerodynamic drag caused by the protruding elevator will be substantial on the vessel at sea.

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US 2008/0213067 A1 is a system for cargo transfer at a port. The inventor has the right idea of improving efficiency. The idea is marred in that while moving containers to another smaller boat may enable more containers to be unloaded at their eventual mooring locations, they are still removed from the ships or barges from a conventional gantry crane.

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The gantry crane is limited to two containers per action.

This does not fundamentally improve the encargoing or decargoing of ships.

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Likewise, the rail-driven cranes in the port yard only move a container at a time. The idea has the right seed but not the inspiration to transform a port as the inventor intended.

565 The application was not granted letters patent.

**WO 2022/069087 A1** is a vertical lift hoist on wheels made for inserting containers and cargoes into a side or mission bay of a ship. Floor-mounted twist locks limit how far the cargoes may enter the hold because there are no further tracks or means to put more than a few containers at the mission bay.

570

The device requires a stable quay and does not seem suitable for encargoing or decargoing at sea.

**US 7,004,707 B2** is a bulk charging and discharging conveyor and elevator that enables cargoes to be lifted into a hold. The apparatus allows for operation during the rain. While it is a unique application it seems to only moderately improve the ability to fill a cargo hold. It seems to contemplate only one elevator and one transport path.

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A quick internet search shows that the company no longer has a web presence. It does not appear to have been a commercially successful patent.

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**US 8,523,490 B2** is an interesting temporary platform which can clip on to at-sea structures, enabling maintenance and construction without a specialized ship at sea.

While it does have great utility on at-sea structures, it is not made to be a high-volume cargo transfer apparatus.

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## Summary

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### TECHNICAL PROBLEM

It's important to address the global supply chain and intermodal trade in a broader sense than described above.

There is an underlying problem causing lack of truckers, trucks, and intermodal chassis at the Port of Los Angeles.

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There is an underlying problem causing one-hundred ships to wait for berthing at the Port of Los Angeles.

600 There is an underlying problem causing Berkshire Hathaway to ask BNSF Railroad to  
keep containers at the Port of Los Angeles longer than usual so that the Chicago transit  
hub can clear.

[https://www.reuters.com/business/autos-transportation/railroad-cargo-backups-threaten-](https://www.reuters.com/business/autos-transportation/railroad-cargo-backups-threaten-new-logjam-los-angeles-port-chief-2022-07-13/)  
605 [new-logjam-los-angeles-port-chief-2022-07-13/](https://www.reuters.com/business/autos-transportation/railroad-cargo-backups-threaten-new-logjam-los-angeles-port-chief-2022-07-13/)

I am listing American companies because I am an American and read about these  
happenings in the business papers daily. However, I have also read the same issues are  
experienced in varying degrees in Europe, Asia, and beyond. For that, I hope not to  
610 smash the toes of those who work at the companies listed, but simply use these pertinent  
examples to illustrate the broader technical problem this disclosure solves.

If the problems affect the largest companies and organizations in the world in the  
intermodal logistics industries, then it is fair to state these issues are not unique.

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My own friend who recently drove an intermodal route for the logistics company  
Schneider spoke of having nowhere to park at the Port of Los Angeles. He was often by  
the port to come back later, causing him to drive an hour and a half or more to find a  
parking space. This is extremely frustrating and does not keep consumer prices down.  
620 Instead, it raises prices because Schneider and others must put out that money for gas  
and hotels. They must also deal with upset employees who often are not paid during  
these lull periods, increasing the likelihood of strikes and other disruptions.

How could any reasonable person disagree with truck driving professionals who must  
625 do this?

This is not exclusive to truck logistics companies; it has to do with the fundamental  
design of the Port of Los Angeles itself.

630 It is not efficient.

[https://kentico.portoflosangeles.org/getmedia/07e1377d-b452-4ecb-a629-](https://kentico.portoflosangeles.org/getmedia/07e1377d-b452-4ecb-a629-9a0c69410805/pola-facilities-map)  
[9a0c69410805/pola-facilities-map](https://kentico.portoflosangeles.org/getmedia/07e1377d-b452-4ecb-a629-9a0c69410805/pola-facilities-map)

There are no large semi-truck queuing areas that would allow truckers like my friend to  
635 pass a few hours while cargoes are retrieved from ships. Instead, truck driving  
professionals must suffer the indignity of leaving the port only to be called at a later  
time.

After reviewing the map above, there is no room for large semi-truck queuing areas.  
640

Neighbor Port of Long Beach currently stacks their containers six-high. But  
surrounding zoning limits container stacking at warehouses to two-high. This further  
complicates storage and the ability to take on new ships for berthing.

645 During the Covid-19 pandemic, the logistics publication FreightWaves reported how the  
City of Long Beach temporarily alleviated the lack of space for *series 1 freight*  
*containers* in properties near the port:

“Given this current national emergency and [California Gov. Gavin Newsome’s]  
executive order to take necessary steps to alleviate the impacts on the system, the  
650 city manager will temporarily waive enforcement of current shipping container  
stacking and height limits,” the city said in a statement. (FreightWaves, 2021)

In the above case, if the Port of Long Beach could stack more containers, they would  
place less pressure on the hinterland properties in the supply chain. However, the Port  
of Long Beach is currently capped at stacking *series 1 freight containers* six-high.

655 What both the Ports of Los Angeles and Long Beach are missing is the ability to stack  
*series 1 freight containers* sky-high.

There is another advantage not recognized by the named institutions. Space would clear  
660 up for semi-truck queueing areas, directly helping semi-truck logistic firms.

It might seem unrelated, but the railroad transshipment hubs in Chicago and other areas  
of the United States need greater ability to store *series 1 freight containers*. As the  
current art shows, rail yards remain, well, on the rails. There is a tragic failure to see  
665 other means to accomplish their goals of handling more freight. If the railroads could  
stack containers conveniently, they could generate more revenues.

In short, the ports could be alleviated from their freight back logs, further allowing the ships waiting at sea to berth.

670

When viewing these transshipment hubs and ports through an architectural lens, there is a failure to use space efficiently, imaginatively, or gracefully.

As a high-level registered architect, these are a few of my high-level conclusions.

675

Over the past year, when I looked at ships, docks, gantry cranes, and handling areas, I also noticed tedious inefficiencies. Why do gantry cranes pick one or two containers at a time? It looks to me like picking beans out of a jar—one or two at a time. There are so many containers on a modern cargo ship!

680

After they are picked, they must be handled individually by longshoremen who pull twist locks from the bottom of the containers—by the tens of thousands—while hanging from a gantry crane. Then the containers are lifted yet again to be put on a cart or truck, or to be stacked again for another round of picking and stacking at a later time. Not only is this repetitious, the longshoremen are also constantly in danger from falling freight or twist locks.

685

What happens when a truck driving professional arrives and needs a *series 1 freight container* from the bottom of a stack of six? They pick and pluck. If the containers could be moved in a 3-axis manner getting to the right container would require less steps.

690

The industry is due for innovation—not incremental niceties, but wholesale reimagination.

695

Gantry cranes and modern cargo ships have gotten bigger, but they have not changed *encargoing* or *decargoing* in the past sixty-six years since the *series 1 freight container* was standardized.

700 Cargo ships themselves are marvels on one hand. It is amazing how much freight can be moved by a vessel. This capacity is nullified by inefficient port layouts, rail networks, and transshipment hubs.

What good is a 24,000 TEU ship sitting full of cargo for four weeks off the coast of  
705 California?

It is an extreme example of waste by the ship owners. It must be painful when a ship costs hundreds of millions of dollars sitting for several weeks to get a berth. This is what in part drives up the cost of freight.

710

It also frustrates consumers.

Cargo containerships are not the only unfortunate vessels. Dry-bulk and wet-bulk tanker ships also experience inefficient utilization rates. Because of these vessels' design, they  
715 do not accept empty *series 1 freight containers* for their return trips. They generally return empty.

What I found interesting is that containerships do not readily accept grains and other dry-bulk cargoes. There are cases of grains being shipped in containers, but these were  
720 from what I found in bags and ready for sale. They were not bulk commodities.

From my research, it appears bulk commodities are not rate-favorable in *series 1 freight containers*.

725 Both bulk ships and container ships do not readily access the other cargo type customers. If ships were more flexible, their utilization rates would improve. But as mentioned above, the handling of even a *series 1 freight container* full of grain is not rate-favorable. This leads to my observation that larger containers of bulk commodities could pass the rate-favorable threshold.

730

From my research, I found that bunkering a ship, or loading it with fuel, can take six or eight hours! Surely there is room for improvement when filling up the ol' tank. Eight

hours multiplied by twenty stops per year works out to 160 hours—just sitting at berth waiting for fuel. There has to be a better way.

735

I would now like to address safety on container ships in more detail. These vessels are quite dangerous for longshoreman to *encargo* and decargo since the design of the *series 1 freight container* does not adequately provide lateral bracing. There are moment welds that keep the *series 1 freight container* vertical but under the stress of large wave events, they crumple like tin cans.

740

Lashing rods are currently used to reduce the loss of cargoes at sea and to prevent structural failure. As mentioned in the Background Art section, they are quite dangerous.

745

Watching the video by Lyttleton Port Company (YouTube, 2020), I learned 60% of injuries are caused by lashing.

If the number of lashing rods required was reduced, then it stands to reason that injuries would follow suit. From all accounts, I have found that no one has suggested to remove lashing rods entirely. This naturally would reduce lashing rod related injuries.

750

Furthermore, ship owners are concerned about the cost of insurance. If they could prove that their loads are not likely to spill overboard, they would save on insurance costs.

755

I have also observed that ports are generally selected for their natural environment. Areas with deep and calm waters are preferred. However, this does not always coincide with where economic activity occurs.

760

The Yangshan Deep-Water Port near Shanghai, China is a great example of the lengths humans will go to achieve their goals. From one perspective, it is an engineering marvel, but it's also a great example of much wasted time, money and material.

In fact, it was this epic port that inspired me to observe that moving millions of tons of earth to create a foundation and berth for a deep-water port some twenty miles offshore

765

is not necessary. If cargoes could be transferred at sea, then docks could be used along with barges.

770 There is precedent for transferring cargoes at sea, but it fares no better in throughput than port-side gantry cranes. What both Yangshan Deep-Water Port and the Port of Los Angeles have shown during the Covid-19 pandemic is that containerhips simply do not unload fast enough.

775 What would happen if ports were no longer restricted by natural features? How would this affect undeveloped places in the world? How many lives could be transformed by tapping into global trade?

I would also like to address the limitations of canals such as the Panama Canal. These  
780 infrastructure projects have inspired countless engineers (and with good reason). Yet, they do not accommodate the world's largest containerhips. So-called Neopanamax ships may traverse the canal after it was expanded in 2016. These ships have a capacity of 14,424 TEU. This is about 10,000 TEU smaller than the biggest ships of today.

785 Freight becomes less expensive the larger the ship becomes as a factor of scale. From the above example we can see the world's most efficient ships are limited by land bottlenecks. In particular, the Panama Canal, the Suez Canal, the route around Singapore through the Strait of Malacca and the Bosphorus passageway in Türkiye all provide opportunities for newly imagined infrastructure projects.

790

## **SOLUTION TO PROBLEM**

I propose both a preferable set of solutions to the technical problems outlined above and  
795 a transitional set of solutions.

This is why my invention is called *system for cargo transport*.

Because intermodal logistics is capital-intensive, it is not wise to put forth a preferable  
800 set of solutions without a transitional set of solutions. In this way, I am able to help the

intermodal logistics industry make the transition to what I consider 21<sup>st</sup>-century global trade standards—the pinnacle of intermodal freight conveyance.

805 But the pinnacle is not convenient for the vast majority of ports, ships, trucks, and trains.

Because of this, I would like to start with the transitional set of solutions. These solutions will enable the transition to the pinnacle. In this regard, I propose a realistic pathway.

810

At the heart of the *system for cargo transport* is the *cargo frame*. The *cargo frame* binds a *plurality* of cargoes together and resists lateral gravity and uplift loads so that cargoes are conveyed with fewer steps and may transit more safely. It makes retrieving freight more efficient as a fully loaded *cargo frame* forms a *bundle* of cargo. *Bundling* allows  
815 for sorting. One *bundle* can be bound for Chicago and another can be bound for Las Vegas. This also makes retrieving cargoes more effective as the *bundle* represents a town, a city, or a region.

The *cargo frame* is a genus.

820

The *x-clip* is a species of *cargo frame*.

While twist locks may secure a *series 1 freight container* to a ship deck, they are not good at resisting lateral loads. This is why lashing rods are critical for any container  
825 ship that stacks *series 1 freight containers* above deck. Twist locks and corner castings are not designed to lift two stacked *series 1 freight containers*.

The *x-clip* overcomes this major limitation by binding two *series 1 freight containers* together in a *bundle* as a structural frame. Because the *x-clip* binds each container  
830 individually, the twist lock may be employed. Some experimentation may be required to ensure there is little slop between the so-called shield slots and the other corner casting slots. It is conceivable the twist lock head and shaft itself will need to be enlarged to reduce the slack.

835 Aside from this minor technicality, the *x-clip* allows two containers to be picked with an enhanced gantry crane and spreader frame. Where previous spreaders may pick two *series 1 freight containers* end to end, the *x-clip* allows four containers to be picked. This doubles the capacity of a prior art gantry crane. The crane will need to be strengthened for twice the load. Factors such as additional counterweight, strengthened  
840 cables and pulleys, modified structural members, and modified foundations will be required, enabling \$150M USD gantry cranes to remain at the existing quays.

This demonstrates how my transitional set of solutions bridges the technology gap while doubling the throughput capacity, while also remaining financially practical.

845

The *x-clip* utilizes purpose-built structural heads and slots with a lengthened spreader frame and strengthened twist lock mechanisms.

Doubling the amount of cargo lifted with each pick is nothing to sneeze at. But the *x-clip* does more. As mentioned in the Technical Problem section, lashing rods are disproportionately the cause of injury to stevedores. I find this unacceptable. My goal is to improve the lives of stevedores. I would like to make their voyages more rewarding with less toil.

855 My great grandfather was a merchant marine captain who sailed around the world 27 times in the 1920's. It will be a mark of pride to help this profession.

When two *series 1 freight containers* are stacked on a ship's deck, the bottom container is held down with twist locks. The immediately above container is also held with twist  
860 locks. In each upper corner of the lower container and all four of the upper container, corner castings receive a lashing rod. That is six lashing rods.

The *x-clip* reduces the number of lashing rods required to hold down two *series 1 freight containers* by one-third! This represents hundreds of operations eliminated  
865 simply because lashing rods are combined with and structurally attached to an *x-clip*.

It is even conceivable the lower lashing rods are not necessary because the *x-clip* braces top corner casting of the upper container to lower corner casting of the lower container.

What would govern here is the strength of the thickness of the steel. For example, a less  
870 expensive *x-clip* may require four lashing rods and a premium model may require two.

The *x-clip* enhances the resistance to waves and high winds on the high seas. There's no  
doubt that this will lower insurance premiums.

875 Not only does the *x-clip* help on ships, it also allows a train well-car to be loaded twice  
as fast! Removing all these steps at both ships and rail transshipment yards improves  
efficiency.

This is an embodiment of what I call the transitional set of solutions.

880

Another species of a *cargo frame* is the *cargo clip*. The *cargo clip* bundles four *series 1*  
*freight containers*. Like the *x-clip*, the amount of freight picked by a gantry crane is  
vastly improved. With structural modifications to the gantry crane and a new lengthened  
spreader frame with enhanced structural twist lock mechanisms, the purpose-built *cargo*  
885 *clip* enables the picking of eight *series 1 freight containers*.

There are numerous embodiments of the *cargo clip* which will be described in detail  
later. But I would like to point to the embodiment which also has structurally attached  
lashing rods.

890

Where 12 lashing rods are required to tie down four *series 1 freight containers* to a  
ship's deck, the *cargo clip* only needs four! This reduces the time needed even more so  
than the *x-clip*. The reason less time is required is related to the size of the bundle. Four  
containers may be moved in one action, whereas the *x-clip* moves two.

895

As we see here, the *x-clip* doubles that of the prior art gantry crane and the *cargo clip*  
doubles that of the *x-clip*. In both these cases, true to the genus of cargo frame, these  
embodiments bundle cargoes effectively and with added lateral bracing, lifting capacity,  
and stability on a ship's deck.

900

Structurally attaching the lashing rods to the *x-clip* and *cargo clip* not only reduces the number of rods needed, but it also greatly improves the safety of stevedores. The rods are not strewn about the lashing bridge; they are neatly attached to the clips.

905 Loose, falling rods are a thing of the past. Just imagine the insurance savings!

While I currently contemplate the port-side *bundle* as a land-based species of the *cargo frame*, I believe it could also be used on ships. I could simply attach twist lock flaps at the top of the frame to the corner castings. This has the advantage of only needing six  
910 twist lock flaps to secure four *series 1 freight containers versus* 16 twist lock flaps on the larger embodiment of the *cargo frame*.

As we will soon see, the larger *cargo frame* utilizes electrically-actuated twist lock flaps, which enable eight containers to roll out on rail carts on two levels in seconds,  
915 whereas the port-side *bundle* lifts the containers out with prior art spreader frames. When looking at the port-side bundle, you can see I utilized a cell guide, which is a new use for the technology outside of a ship.

Each species of the *cargo frame* is carefully considered for the respective technological  
920 status of a given port, logistics firm, ship, or rail firm.

The port-side *bundle* is not a one-trick pony. It can attach to a rail cart as the cargo clip is, or it can be lowered onto autonomous wheeled carts. Unlike prior art carts, my carts are sized in plan view the same as the *bundle*, *x-clip*, or *cargo clip*. In other words, the  
925 cart does not protrude beyond the plan view dimensions. In this way, the carts may wheel themselves into tower slots, preserving precious space as mentioned above in the Technical Problem section.

Stepping away briefly from the *cargo frame*, I would like to address the transitional set  
930 of solutions regarding ports, warehouses, rail yards, etc. to improve their storage capacity. This is not the *cargo frame* tower but a species of it.

Where port-side *bundles* are contemplated, a port-side *bundle* structure may be employed. This structure uses hydraulic elevator lift platforms to double or triple the

935 stacking capacity of a given piece of property; even higher heights can be reached with  
other hoist mechanisms. We will cover sky-high stacking abilities later in the *cargo*  
*frame* tower.

Autonomous carts wheel the port-side *bundle* into a hydraulic elevator lift platform by  
940 communicating with a wireless control bollard & signal light. The wireless control  
bollard & signal lights are further controlled by a central, and/or location-specific server  
where instruction sets are sent to the various bollards employed.

These bollards are placed in strategic locations to communicate with the autonomous  
945 carts, rail carts, trucks, freight trains, *cargo frames*, and other elements of the *system for*  
*cargo transport*.

The port-side *bundle* structure could also utilize *3-axis hoists* versus hydraulic elevator  
lift platforms. It is all a matter of customer needs.

950 Depending on whether the port-side *bundle* structure is in a seismic zone, twist lock  
flaps or corner twist lock rack mechanisms can be employed to tie down the port-side  
*bundles* in their bays. Where there is low seismicity, the safety rail may be all that is  
needed.

955 The port-side *bundle* structure need not only use the port-side *bundle*, but it is entirely  
feasible that individual *series 1 freight containers* on autonomous rail carts can roll in  
on rails with a modified hydraulic elevator lift platform. Even the *cargo clip* on an  
autonomous rail cart can roll in on rails in a similar fashion.

960 The transitional set of solutions are designed to be flexible.

With the aforementioned embodiments of the *cargo frame* and port-side *bundle*  
structure, *series 1 freight containers* can be stacked several levels. Ports with substantial  
965 infrastructure in place can reorganize without a wholesale scrapping of equipment. This  
clearing of land provides more space for semi-truck queueing.

Extra dollars are earned with easily retrievable *series 1 freight containers*. This can benefit port terminal operators, railroad organizations, and warehousing firms.

970

The first movers on the transitional set of solutions will gain favorable business loyalty from truck driving professionals as these improved terminals will be more pleasurable to work with. Ships will be able to call without delay. Rail yards will not be pressured to keep *series 1 freight containers* at port but gladly send them to their new facilities.

975

Moving on to the preferable set of solutions, I propose wholesale change to global trade and the manner freight is conveyed. It will require new ships, new ports, new barges, new bulk siloes, new railroad configurations, and of course, the largest *cargo frame* of all.

980

While I believe 16 *series 1 freight containers* bound in a *bundle* represent the practical physical limits of working with large quantities of containers, a five-by-five *cargo frame* can also be possible. From my preliminary calculations, this exceeds the ability of two sets of rails and eight bogies to support the weight of such a *bundle* of cargo. It requires more than welding filler steel to the rails and widening the flange. New, heavier duty wheel sets, bogies and more are also required.

985

A possible work around for the five-by-five bundle utilizes a third set of rails. This adds four more bogies to alleviate the added weight. But rotating the center bogie requires the bogies to be modified again to allow for turning clearance. This likely removes one bogie per side and would negatively affect the carrying capacity.

990

I do teach how this could be done, but my gut sense is that while possible, a five-by-five would be a bit impractical and would not overcome the added expense.

995

The 16 *series 1 freight container cargo frame* is a species of cargo frame that enables containers on autonomous rail carts to load four at a time per level. In a two-level port platform, eight containers are swiftly loaded and locked in place at the rear of the *cargo frame*. As the *3-axis hoist* lowers the *cargo frame*, the remaining eight containers on autonomous rail carts roll into position and are locked at the stationary twist lock flaps.

1000

When you multiply this over 20 *bundles*, 320 *series 1 freight containers* may be loaded in one operation! The two sets of rails that serve these cargo frames are doubly loaded such that there is a matching number of 3-axis hoists on the other side of the tracks.

1005 This enables 640 *series 1 freight containers* to be loaded in minutes.

If a port had two terminals, 1,280 *series 1 freight containers* could be loaded in the same fashion.

1010 As mentioned above, this species of *cargo frame* requires two sets of rails to carry the weight. Special rail turntables have been designed to accommodate these behemoths to enable 90-degree turns.

Another feature of this species of *cargo frame* is that the frame structurally isolates  
1015 *series 1 freight containers* from the weight above. Only eleven fully loaded containers may be safely stacked on top of each other before the bottom one crushes. In contrast, the *cargo frame* enables sky-high stacking by diverting loads to a purpose-built structure—not to the container below.

1020 Conveying *series 1 freight containers* is not all this *cargo frame* can do.

The same spaces used for *series 1 freight containers* can be slightly modified from utilizing cargo frame joists with wheels to utilizing cargo frame joists with a platform, allowing wheels to roll and thus accept vehicles. Measures for chain tie-downs can be  
1025 accommodated. There is no need to wait for a roll-on, roll-off ship. With this embodiment 32 cars could be shipped (and even more if they are compact cars)!

The *cargo frame* standardizes the shipment of *series 1 freight containers* and more. With a current maximum gross weight rating of 36,000 kg, or 79,370 lbs., this species of cargo  
1030 frame can hold 576,000 kg, or 1,269,920 lbs. A unique feature with this manner or rating is that as long as a bay in the cargo frame remains under the maximum weight of one *series 1 freight container*, it can carry freight other than containers.

Another way to visualize this is that when shipping tractors (which are larger in height  
1035 than a *series 1 freight container*), two *cargo frame* bays can be reduced to one for added

height. So long as the tractor weighs less than two *series 1 freight containers*' maximum gross weight, the tractor may ship in that bay. If it exceeds that, more *cargo frame* bays can merge into that bay until it complies with the weight restriction.

- 1040 For even larger cargoes such as military hardware, bays can be reduced to six. This enables six A1M1 Abrams tanks to be shipped all without breaching the design loads of the *cargo frame* tower on land or on ship.

- 1045 The largest of cargoes are characterized as bulk cargoes. Imagine 576,000 kg, or 1,269,920 lbs., of grain are desired to be shipped. One bay may be defined by the exterior portion of the *cargo frame* and a bulk silo may be installed inside the one bay *cargo frame*. This level of standardization and increased weight carrying capacity make shipping dry-bulk goods with *cargo frames* economically viable.

- 1050 Like the vehicles above not needing to wait for a roll-on, roll-off ship, farmers can make sure at least a portion of their goods are shipped with every ship leaving port. This will have a marked effect. In the example of the United States and China trade where there is a trade imbalance, dry-bulk *cargo frames* will improve the utilization rate of returning ships.

- 1055 The *cargo frame* is simply more versatile than prior art ships and their means to convey cargo.

- 1060 A *bulk-cargo cargo frame* effectively compartmentalizes the bulk-cargo within the *cargo frame cargo ship* and prevents dangerous shifting and liquefaction effects that are prevalent in large bulk-cargo holds. In this manner, even if all the cargo contained in the *bulk-cargo cargo frames* transition to a liquified state, they are prevented from listing the ship. The *cargo frame cargo ship* structure prevents these dangerous movements.

- 1065 As a result of this discovery, I imagine that the International Maritime Organization will seriously consider changing the standards of design for bulk-cargo ships.

How, after seeing these advantages, could you desire to keep dangerous vessels?

1070 Commercial agendas also play a role. For example, pressure to load vessels quickly leads to more hard loading even though it risks raising the water pressure in the cargoes. And pressure to deliver the same tonnage of cargo as was loaded may discourage the crew of the vessel draining cargoes during the voyage. (The Conversation, 2018)

1075

With the *bulk-cargo cargo frame*, cargoes may be loaded hours or even days prior and stored safely in the *cargo frame towers*. Again, the *system for cargo transport* displays its rich flexibility. If cargoes are stored long before a ship arrives, the economic pressure to cut corners is lessened. As such, the orders of magnitude faster loading  
1080 capability of a *cargo frame cargo ship* will reduce, if not eliminate, the corner cutting.

While bulk-cargo represents both dry-bulk and liquid bulk goods, I would like to turn to liquid bulk. As mentioned in the Technical Problem section, loading a ship with fuel is a long process—but not with the *bulk-cargo cargo frame* designed for fuels. The lengthy  
1085 process of certifying fuels can be done hours or days ahead of time!

Depending on the ship's needs, these special purpose embodiments make fueling up a cinch. Simply load the fuel tanks into the ship and connect them to rerouted fuel lines. Even one connected fuel-equipped *bulk-cargo cargo frame* will do. Stevedores can  
1090 connect the others once the ship is in route. Seriously, what can beat the *cargo frame*?

Moving such enormous *cargo frames* is no mean feat. It requires two sets of rails; depending on the gauge of the rails and the country they are purchased from, they may require structural enhancement. With four rail bogies per set of rails, the *cargo frame*  
1095 has twelve rail bogies in total. They comprise two shortened axle rail bogies in the center of each side and four *pivoting rail bogies* at the corners. Some of the rail bogies may be mechanized to enable autonomous movement.

The *pivoting rail bogies* enable 3-axis movements within a *cargo frame* tower, or *cargo*  
1100 *frame cargo ship*.

Another embodiment of this *cargo frame* may remove bogies on two sides.

Another embodiment of this *cargo frame* may create a new type of rail car, the *cargo frame* rail car. These rail cars have coupling attached so that two train engines can pull them—one engine per set of rails. They can be dedicated to rail routes as outlined in some Figs. below. This embodiment is well suited for the *cargo frame cargo ship* that carries 10,000 *bundles*, or 160,000 TEU is employed. These monster ships are nearly seven times larger than the world's largest container ships.

1110

They will deliver colossal amounts of cargo at a price too good to refuse.

Because of canal sizes, these monster ships cannot pass the world's current infrastructure. This provides little resistance. *Cargo frames* are unloaded on one side of the canal, or an unfavorable maritime route, or a geologic restriction, and pulled via train engines to the other side where another matching *cargo frame cargo ship* picks them up without skipping a beat.

1115

Let this sink in.

1120

No longer will the intermodal logistics industry speak in terms of TEU, they will speak in terms of *bundles*. This is a factor of 32 as one TEU is a twenty-foot equivalent, and 16 forty-foot containers are 32 TEU.

1125 Storing *bundles* is a breeze.

I would like to introduce the *3-axis structure and 3-axis hoist*. This structure enables ports, rail yards, warehouses, and other similar establishments to stack *bundles* of cargo sky-high.

1130

As mentioned previously, the *cargo frame* prevents the weight of upper *series 1 freight containers* from being imposed on lower *series 1 freight containers*. As such, the only height limitations of such a tower I can see stem from available capital, geotechnical conditions, seismicity, wind, and other weather events.

1135

The positions in a *cargo frame* tower may be programmed with software code. As the cargo frame has *pivoting rail bogies* and the *3-axis hoist* enables the rotation of the bogies, these towers are now 3-axis capable.

1140 They are not the only towers in the *system for cargo transport*.

*Semi-truck queueing towers* allow the precise injection of semi-trucks to retrieve available cargoes delivered in *cargo frames*. For example, in Fig. 1 there are six semi-truck queueing towers. 1, 3, and 6 may service terminal A and 2, 4, and 6 may service  
1145 Terminal B. This happens in coordinated fashion wherein a server or computer stores, retrieves, and executes software code, telling truckers which bay to go to and what *cargo frame* and container goes where via wired and wireless control boxes and hand-held devices such as smart phones. Smart phones are convenient places to deploy computer software code, but other purpose-built devices could also be employed.

1150

Each batch of *cargo frames* will take some time for semi-trucks and rail carts to clear out their cargoes or unload their cargoes—depending on whether they are *encarguing* or *decarguing*.

1155 The tower may have a rest and recreation floor including but not limited to: a café, a convenience store, a bathroom, a medical professional, a game room, a reading area, a work-out area, a dental professional, a laundromat, and a massage therapist.

*Series 1 freight containers* coming in via rail may enter the port and *decargo* at the rail  
1160 transshipment yard. Where *x-clips* are employed on well cars, wireless control boxes may be added such that they link up with an *autonomous rail cart* and are pre-programmed on where to go rather than having a person read each container and direct it in that fashion.

1165 Once a rail cart is loaded from an incoming freight train, it may proceed to the semi-truck transshipment yard and be loaded as previously discussed.

Once these *cargo frames* are fully loaded, the *bundle* exits the *3-axis hoist* and rolls to the *cargo frame turntable* as it receives instructions from the wireless control bollard

1170 and signal lights. After making its turn, the *cargo frame* heads to the *cargo frame dock* to the proper bay where it waits for a *cargo frame barge*.

As the *cargo frame barge* makes its way between the *cargo frame dock pilings*, it extends its *lobster claws* and clamps onto *lobster claw clamping rods*, forming a part of  
1175 the *cargo frame dock pilings*. Once clamped and firmly held, a platform raises to the level of the *cargo frame dock* with optical and distance sensors. The platform then rolls towards the dock and aligns with the two sets of rails the *cargo frame* is conveyed upon.

As this is set in place, *3-axis hoists* descend down to connect with the *cargo frame* and  
1180 lift it off the tracks so the *pivoting rail bogies* may turn. Once placed back on the rails, the *cargo frames* roll onto the barge. Electric power is supplied for these short maneuvers with an electric third rail or battery power.

Optical, motion and distance sensors on the *cargo frame* alert the control box as to the  
1185 distance needed to arrive at a central resting place on the barge. Once in place, *twist lock racks* are pushed via hydraulic pistons into place with the *corner twist lock rack slots*. The electrically actuated twist locks tie down all four corners of the *cargo frame*. After the *cargo frames* are secured, the *lobster claws* slowly release their grip so that the barge may descend to its final displacement. The claws then release and retract  
1190 towards the center hull so the barge may exit the dock.

Now the *cargo frame barges* motor towards the *cargo frame cargo ship* and wirelessly communicate positions and the side to which the barge will dock with the ship.

1195 Doors open up from the *cargo frame cargo ship* as the barges near the ship and barge bumpers are tossed out so the ships do not collide. Longshoremen throw ropes to ease the barge in place and opened *lobster claws* grip the *lobster claw clamping rods* on the side of the ship.

1200 As the barges becomes secure, the *cargo frame* platform raises up as required to meet the level of the ship's rails. Using optical sensors, the barge comes to its completed operation, *twist lock racks* unlock, and the *bundles* roll into the *cargo frame cargo ship*.

From there, the ship *control boxes* communicate with the *cargo frame* to roll and/or lift  
1205 into its voyage position.

The *cargo frame cargo ship* travels to its next port and reverses the operations.

~ ~ ~

1210

To recap, I propose a preferable set of solutions to the Technical Problem section outlined above which are the pinnacle of intermodal freight conveyance, as well as a set of transitional set of solutions including apparatus, infrastructure, and port layouts that allow my customers to come up to 21<sup>st</sup> century global trade standards over time.

1215

#### **ADVANTAGES**

While the ultimate goal of the preferred embodiment is entirely revamping the manner in which global intermodal trade is conducted, numerous other embodiments provide  
1220 the opportunity for existing intermodal logistics firms to transition. This is necessary because ships, ports, trucks, and railroads are capital-intensive.

I believe the following drawings and descriptions will show that entirely revamping global intermodal trade is possible and will need all the various embodiments shown to  
1225 accomplish this.

It is no mean feat.

Existing infrastructure, ports, and ships may be improved with more efficient apparatus.  
1230 As time goes by, these transitional apparatus will begin to reap financial rewards for my customers. When the financial time is right, they could then upgrade to more aggressive machines, port layouts, ships, barges, and infrastructure—all part of my grand solution.

Those with the ability and freedom to start a port from scratch will have the ability to  
1235 choose from a good, better, or best set of machines, ships, barges, apparatus, port layouts, and infrastructure.

Just as the United States of America cannot be without Arizona, neither can the *system for cargo transport* be without its constituent parts. Like Arizona, however, the *system for cargo transport* constituent parts can exist and function without the totality of the system—albeit having a lesser impact on global trade, if isolated. In that sense, the *system for cargo transport* is an invention all itself and is why I have created a single application and not 50 or so individual applications.

Every following embodiment or invention is unified by the *cargo frame*.

### Brief Description of Drawings

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- Fig. 53** An enlarged world plan view of Türkiye and Egypt wherein a schematic route is planned according to Fig. 30 as an alternative to the Istanbul Canal, and next to the Suez Canal respectively (sheet 56/73)
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- 1370      **Fig. 57**      An perspective view of a sea bluff utilizing the best mode of invention in a unique setting (sheet 60/73)

Additional embodiments:

- 1375      **Fig. 58**      An exploded perspective view of a port-side *bundle* sized to house 4 *series 1 freight containers* wherein two vertical bays are formed by a pair of cell guides and a separate autonomous cart is used to transport said *cargo frame* (sheet 61/73)
- 1380      **Fig. 59**      A perspective view of a port-side *bundle tower and hydraulic lift* sized to house a plurality of *cargo frames* which are further sized to house 4 *series 1 freight containers* (sheet 62/73)
- 1385      **Fig. 60**      A perspective front view of a *cargo clip* with castellations (sheet 63/73)
- 1385      **Fig. 61**      A perspective rear view of a *cargo clip* with castellations (sheet 63/73)
- 1385      **Fig. 62**      A perspective rear view of a *cargo clip* with a plurality of arced slots for modified, bent, structurally attached twist lock open & closing arms for hand use (sheet 64/73)
- 1390      **Fig. 62A**      An enlarged perspective front view of a *cargo clip* a plurality of arced slots for modified, bent, structurally attached twist lock open & closing arms for hand use (sheet 64/73)
- 1390      **Fig. 63**      A perspective front view of a *cargo clip* with a plurality of arced slots for modified, bent, structurally attached twist lock open & closing arms for hand use (sheet 65/73)
- 1395      **Fig. 63A**      An enlarged perspective rear view of a *cargo clip* with a plurality of arced slots for modified, bent, structurally attached twist lock open & closing arms for hand use (sheet 65/73)
- 1400      **Fig. 64**      A perspective front view of a *cargo clip* wherein a plurality of structurally attached lashing rods are in closed position, and a plurality of slotted pipes to allow a plurality of rods to push left or right, enabling open and closing arms to maneuver (sheet 66/73)
- 1400      **Fig. 64A**      An enlarged perspective front view of a top portion of a *cargo clip* wherein a plurality of structurally attached lashing rods are in closed

- position, and a plurality of slotted pipes to allow a plurality of rods to push left or right, enabling open and closing arms to maneuver (sheet 67/73)
- 1405     **Fig. 64B**     An enlarged perspective front view of a middle portion of a *cargo clip* wherein a plurality of structurally attached lashing rods are in closed position, and a plurality of slotted pipes to allow a plurality of rods to push left or right, enabling open and closing arms to maneuver (sheet 67/73)
- 1410     **Fig. 64C**     An enlarged perspective front view of a lower portion of a *cargo clip* wherein a plurality of structurally attached lashing rods are in closed position, and a plurality of slotted pipes to allow a plurality of rods to push left or right, enabling open and closing arms to maneuver (sheet 67/73)
- 1415     **Fig. 65**     A perspective front view of a *cargo clip* wherein a plurality of structurally attached lashing rods are in open position structurally attached to a ship deck, and a plurality of slotted pipes to allow a plurality of rods to push left or right, enabling open and closing arms to maneuver are shown attached to four *series 1 freight containers* (sheet 68/73)
- 1420     **Fig. 66**     A perspective underside view of a pair of *cargo clips* with castellations shown locked to four *series 1 freight containers*, and an autonomous rail cart (sheet 69/73)
- 1425     **Fig. 66A**     An enlarged perspective underside view of a *cargo clip* with castellations shown locked to four *series 1 freight containers*, and an autonomous, motorized rail cart (sheet 69/73)
- Fig. 67**     An exploded perspective view of a *cargo clip* with castellations shown in relation to a set of four *series 1 freight containers*, and an autonomous, motorized rail cart (sheet 70/73)
- 1430     **Fig. 68**     A plan view of a *cargo clip* locked to a set of four *series 1 freight containers* in a ship's modified cell guide (sheet 71/73)
- Fig. 69**     A perspective view of an *x-clip* with structurally attached lashing rods binding a set of two *series 1 freight containers* (sheet 72/73)

1435 **Fig. 70** A perspective view of an *x-clip* with structurally attached lashing rods wherein a horizontal beam with a punched slot provides for forklift access (sheet 73/73)

1440 **Best Mode for Carrying Out the Invention**

I will first describe these new concepts by giving a high-level tour of how the *system for cargo transport* operates when taking into account **Fig. 1**. Then I will describe in further detail in the next **Figs.**

1445 ~ ~ ~

**The collection of port apparatus shown here comprises one “repeatable” terminal.**

It is entirely probable that a port would wish to have numerous terminals while on a real site. It is unlikely that you could simply copy and paste as shown in this restriction-free disclosure. The gist is that repeatable terminals are possible and can be done when considering normal architectural and engineering considerations such as: rock outcroppings, water bodies, bounding real estate, codes, setbacks, and other site-specific features.

1455 As such, it is expected that an existing port marked for demolition will have a lot of  
“baggage” from prior art layouts such as old quays, rail lines, and the like. Despite these  
and other potential innumerable restrictions, this *system for cargo transport* can take on  
infinite variation to meet site-specific features and still shine.

1460 ~ ~ ~

Empty semi-trucks **220** enter the port **48** at the access road for trucks **42**. The truck drivers are instructed by the app to arrive at the ground-level **17** or the second-level **18**. They are then instructed to navigate to one of six semi-truck towers **22**. Here, they will have further instructions to pull into a lane and subsequent elevator and find a destination slot in the semi-truck tower **22**.

The drivers will park their semi-truck **220** for a period of time prescribed by the app while awaiting the fully loaded *cargo frames* **40**. During this time, they may walk  
1470 around the semi-truck tower **22** or visit the café.

While the semi-truck towers **22** fill up in anticipation of retrieving *bundles* of cargo, longshoremen are awaiting the *cargo frame cargo ship* **24** at the *cargo frame dock* **20**. When a ship radios in that they are arriving, the *cargo frame barges* **26** are readied by  
1475 longshoremen, and they begin the process of motoring towards the *cargo frame cargo ship* **24**.

Ship stevedores await and are ready for the longshoremen and their *cargo frame barges* **26**. The ship stevedores lower barge bumpers **510** at each bay in the *cargo frame cargo ship* **24**. Ropes are thrown and tightened to cleats to enable the *cargo frame barges* **26** to  
1480 be drawn into position at the *cargo frame ship* **24**. Once in position, flaps open so *lobster claw* clamping rods **504** on the *cargo frame cargo ship* **24** may receive *lobster claws* **500** on the *cargo frame barges* **26**.

1485 With *lobster claws* **500** in place, the ship lowers and extends a collapsible *3-axis hoist* **14** to connect with the *cargo frame barges* **26** and begin the process of *decargoing*.

When the *cargo frame barges* **26** have been filled with *cargo frames* **40**, they begin motoring to return to the *cargo frame dock* **20**. Here, longshoremen throw ropes as  
1490 required and moor the *cargo frame barges* **26**. *Lobster claws* **500** grab onto *lobster claw dock pilings* **502** on both sides of the *cargo frame barges* **26**. This allows a stable conveyance of *cargo frames* **40**. Once conveyed to the *cargo frame dock* **20**, a corresponding number of *3-axis hoists* **14** lift the *cargo frames* **40**, enabling the perpendicular rotation of a pivoting rail bogie **308** so that the *cargo frames* may travel  
1495 to their proper positions along the two sets of rails for a *cargo frame*, (an electric third rail is not shown for clarity) **218** to their *cargo frame turntable* **38**. After rotating 90 degrees, the cargo frames **40** approach a 3-axis hoist **14**.

Autonomous rail carts loaded with *series 1 freight containers* **222** roll out of their cargo  
1500 frames **40** on both the ground-level **17** and second-level port platform **18**. After

advancing to the semi-truck and rail transshipment area **202**, the *3-axis hoist 14* lowers and enables the next batch of autonomous rail carts loaded with *series 1 freight containers 222* to enter the rail cart queueing area free from semi-trucks **212**.

1505 While the semi-truck spreader frames **208** load *series 1 freight containers 226* onto semi-trucks **220**, some autonomous rail carts loaded with *series 1 freight containers 222* continue on rails to the freight car transshipment yard **34**. Here, *series 1 freight containers 226* are unloaded via freight car spreader frames **35** on outbound freight well cars **37**.

1510 Once unloaded, empty rail carts **306** motor towards the access rails from outside the port **46** and loop back towards the semi-truck transshipment yard **224**. Here they wait until all semi-trucks **220** have retrieved their *series 1 freight containers 226* and left the semi-truck transshipment yard **36**.

1515 Undoubtedly, a few truckers will get a flat tire, sleep in, get sick, or for some other reason, miss their appointment. In these scenarios, all remaining autonomous rail carts loaded with *series 1 freight containers 222* scuttle to freight purgatory **28**.

1520 As the name implies, these unclaimed cargoes remain in an abandoned state until claimed and paid for. If the cargoes exceed a certain time period prescribed by the port administration, they may return to the semi-truck transshipment yard **36** and load back into fresh cargo frames **40** via the *3-axis hoists 14*. Here, the loaded *cargo frames 40* maneuver to the *cargo frame turntables 38*, orient themselves to the two sets of rails for  
1525 a *cargo frame 218*, and motor towards the *3-axis structure and 3-axis hoists 10*.

Upon arriving at the proper *cargo frame* turntable **38**, the *cargo frame 40* turns and enters the *cargo frame* tower and hoist **10** for longer term storage. While the present  
1530 **Fig. 1** shows four *3-axis structure and 3-axis hoists 10*, no doubt a port will need additional storage capacity and so it is likely that more *3-axis structure and 3-axis hoists 10* will be found at future ports. There are limitations to a patent disclosure that utilizes A4 paper size, especially when the subject material is physically huge.

- 1535 The advantages are staggering if a port has 100 hectares, or 250 acres, and builds 10-level *3-axis structure and 3-axis hoists 10*. For interest, let us imagine 50 hectares, or 125 acres, are used as storage in this scenario. That would give this modest sized port 500 hectares of storage, or 1,250 acres of storage. No doubt this would alleviate the world's ports and provide substantial monies in new forms of revenue streams.
- 1540 As we will see shortly in another embodiment, the *3-axis structure and 3-axis hoists 10* can be built without needing all the bells and whistles of this preferred embodiment. The storage can enable the port to earn monies needed for the eventual upgrade to the preferred embodiment.
- 1545 For those with dry-bulk or liquid-bulk cargoes, the sequence starts at the access road for semi-trucks **42**. The semi-trucks maneuver up to the second-level port platform **18**, and the truckers motor to the third-level bulk platform **30** to drop off bulk-cargo at the bulk drop **68**. After dropping of their cargoes, they may leave the third-level bulk platform **30** and descend to the exit road for trucks **44**.
- 1550 Truckers who need to pick up dry-bulk cargoes continue past the third-level bulk platform **30** to the semi-truck transshipment yard where they pass the semi-truck spreader frames **208**, drive under a bulk-cargo silo, and hoist **12** to retrieve their cargoes. After they have filled their trucks, they leave via the exit road for trucks **44**.
- 1555 It is the *cargo frame 40* that enables near limitless stacking as the structural nature of *cargo frame 40* transmits loads to the columns for 3-axis hoist structure **11**, without crushing the lower containers.
- 1560 As I see it now, the limitations that affect the height of the *3-axis structure and 3-axis hoists 10* stem from issues of this nature: seismic zone, propensity for typhoons and similar storms, weak or limited load bearing capacity of the soil at the port, or more simply ... money. If money is an issue that restricts height for a port, the structural engineers could design the *3-axis structure and 3-axis hoists 10* to later add additional
- 1565 stories.

This approach does require foresight.

Hopefully, this gives you a taste of what is to come in more detail below.

1570

**Fig. 2** is an aerial view which largely shows the same elements of the port **48** as in **Fig. 1**. However, greater detail is shown at the *cargo frame* maintenance yard **32** and how it relates to the central axis of the port **48**. Also seen is the truck driving loop that is formed for the third-level bulk platform **30**.

1575

**Fig. 3** is an aerial view which largely shows the same elements of the port **48** as in **Fig. 1**. The clear relationship of the semi-truck queueing towers **22** as they sit primed to unleash the proper amount of trucks per terminal, level, and location. Each tower is designed to match the number of truck bays at the semi-truck transshipment yard **36**. In this manner the six towers shown would accommodate three cargo turnovers on both the ground level **17** and second-level port platform **18**.

1580

The *cargo frame* cargo ship **24** is shown closer to shore than would be the case in some ports, but because of the limitations of the size of a sheet of A4 paper, it is shown close to the shoreline **54**.

1585

**Fig. 4** is an aerial view which largely shows the same elements of the port **48** as in **Fig. 1**. Here a clearer view is depicted which shows how a semi-truck 220 would enter the port **48**.

1590

All movements of the road infrastructure are smooth to facilitate a pleasurable experience. Note the soft round corners, nice transitions, and general tidiness of the port **48**.

1595

**Fig. 5** is an aerial view which largely shows the same elements of the port **48** as in **Fig. 1**. Here, you may see a more frontal view than that of **Fig. 1**.

1600

**Fig. 6** depicts a site plan view of a port **48**.

**Fig. 6A** is an enlarged site plan view of an upper portion of **Fig. 6**. Truckers enter at  
1605 the access road for semi-trucks **42** and may continue to either a third-level bulk platform  
**30** or semi-truck queueing tower **22**; three of these towers are shown.

At the top portion of the view is an exit road for semi-trucks **44**, as well as a return loop  
for semi-trucks **43**. Also shown are access rails from outside the port **46**. At the top right  
1610 a freight train **47** is shown.

Towards the upper middle portion of the view are freight car transshipment yards **34**  
and cargo frame maintenance yard **32**. Return loops for rail carts **56** are shown.

1615 Along the central spine **21**, two sets of rails for a cargo frame **218** enable conveyance of  
*Cargo frames* to *3-axis structure* and *3-axis hoist 10*, and the *cargo frame* maintenance  
yard **32**. Four *3-axis structures* and *3-axis hoists 10* are shown with six cargo frame  
turntables **38**.

1620

**Fig. 6B** is an enlarged site plan view of a middle portion of **Fig. 6**. At left are three  
semi-truck queueing towers **22**.

To the right is a freight purgatory **28** where stray rail carts loaded with *series 1 freight*  
1625 *containers 222* may be stored for later retrieval.

At the upper middle portion of the view is a third-level bulk platform **30**. Six bulk silo  
& hoists **12** are shown along with **12** bulk drops **68**.

1630 In the middle portion of the drawing two semi-truck transshipment yards **36** are shown  
flanked to the central spine **21**. Cargo frame turntables **38** are spaced to match *3-axis*  
*structures* and *3-axis hoists 10*.

**Fig. 6C** shows an enlarged site plan view of a lower portion of **Fig. 6**. At the upper  
1635 portion of the view, two truck transshipment yards **36** are shown flanked along the  
central spine **21**. A plurality of *cargo frame* turntables **38** and *3-axis structures* and *3-axis hoists* **10** also flank the central spine **21**.

At the lower mid-section, a *cargo frame* dock **20** and *cargo frame* barge **26** is shown  
1640 flanking each side of the dock.

At lower right a *cargo frame* cargo ship **24** is shown with two *cargo frame* barges  
flanking both sides of the ship.

1645 **Fig. 7** is a low-aerial perspective view of two *semi-truck queueing tower* **22** entrances  
For context, in the center of the view we see a full *semi-truck queueing tower* **22**. An  
alpha-numeric character for semi-truck queueing tower designation **112** is shown with  
smaller sized alpha-numeric characters for *semi-truck queueing tower* column bays **114**  
1650 below.

In the upper portion of the view, you see an entire rest and recreation floor 106 where  
truckers may cool off, stay warm, get a bite to eat, purchase a snack, see a doctor, get a  
massage, use the restroom, play a game, read, and more. This amenity will greatly  
1655 improve the lives of truck driving professionals and ease their stress. In addition, the  
view is fantastic and allows the truckers to gain familiarity with the port layout **48**. At  
the top of each column of semi-truck bays **132**, we see an embodiment of the 3-axis  
hoist **14**.

1660 This occurs at both the ground level **17** and the second-level port platform **18**.

To the right and rear we see a *cargo frame* cargo ship **24** and a *cargo frame* barge **26** on  
a body of water **50**.

1665 To the very right, the access road for semi-trucks **42** leads your eye up to the *cargo*  
*frame* dock **20** and *cargo frame* barge **26** that are shown just beyond the shoreline **54**.

**Fig. 8** shows a perspective view of a *semi-truck queueing tower 22* on the exit side.

At the left rear portion of the view, an alpha-numeric character for terminal designation  
1670 **213** is seen at the entrance of the semi-truck transshipment yard **36**. You may see a  
semi-truck **220** leaving the semi-truck exit from a semi-truck queueing tower **118** in the  
middle section.

In the middle, you may see the *semi-truck queueing tower 22* and a plurality of semi-  
1675 truck bays **132** along with semi-trucks **220**.

To the right is a human fire exit stairs for *semi-truck queueing tower 122* and a human  
elevator for *semi-truck queueing tower 120*.

1680

**Fig. 9** features a low aerial perspective view of a semi-truck transshipment yard **36**  
entrance where semi-trucks **220** arrive at the semi-truck queueing area **200**, having  
turned the corner and driven past the freight purgatory **28**. Due to the height of the  
*cargo frame*, a draw bridge **16** is needed to pass through. A *cargo frame turntable 38* is  
1685 shown in the middle of the view. Just to the left of the turntable is a rail cart queueing  
area free from semi-trucks **212**.

Alpha-numeric characters for terminal designations **213** are large and easily viewed. In  
addition to signals from the wireless control bollard and signal light **33** (shown in  
1690 closeup view), truckers may use these designations for visual cueing. Painted alpha-  
numeric characters near semi-truck loading bay **204** also accomplish this task.

As the truckers await for their space to open up, semi-truck spreader frames **208** unload  
*series 1 freight containers 226* (shown in closeup view). Lane striping **210** keeps the  
1695 semi-trucks **220** organized.

This occurs at both the ground level **17** and second-level port platform **18**.

1700 **Fig. 10** shows an eye-level perspective view of four autonomous rail carts loaded with *series 1 freight containers 226*. They are leaving a *cargo frame 40* from a *3-axis hoist 14* in the rail cart queueing area **212** at a semi-truck transshipment yard **36**.

The rail carts are guided and receive software instructions by wireless control bollards and signal lights **33**. They roll on four sets of tracks **214** towards the semi-truck transshipment yard **36**, which is behind this view.

1705

1710 **Fig. 11** is an eye-level perspective view on the opposite side of **Fig. 17** showing four autonomous rail carts loaded with *series 1 freight containers 226* leaving a *cargo frame 40* in a *3-axis hoist 14* towards a semi-truck transshipment yard **36**. To the upper right, a *semi-truck queueing tower 22* is seen. Four sets of rails **214** lead the autonomous rail carts loaded with *series 1 freight containers 226* beneath a semi-truck spreader frame

1715 **208** where the wireless control bollards and signal lights **33** direct the autonomous rail cart loaded with *series 1 freight container 226* to arrive at a position relative to the semi-truck **220** with optical, motion, and distance sensors **311**.

Instructions are then sent from the wireless control bollards and signal lights **33** to a control box **424** in the autonomous rail cart loaded with *series 1 freight container 222* to release the electrically actuated twist locks **330**. Then instructions are sent to each spreader for one *series 1 freight container 209* to move to position with optical, motion and distance sensors **311** to lower and engage the *series 1 freight container 226* corner castings. Then the spreader for one *series 1 freight container 209* lifts the container and

1725 utilizes optical, motion, and distance sensors **311** to arrive at position at the intermodal chassis on the semi-truck **220** to lower the container on the chassis.

A trucker may then tighten the twist locks on the intermodal chassis. At this point, the truck driving professional may leave with their cargo after speaking with customs

1730 agents. The agents will clear the trucks by sending instructions via hand-held devices or smart phones to the wireless control bollards and signal lights **33** which in turn, send coordinated instructions to a hand-held device or smart phone held by the trucker.

In this way, the semi-truck transshipment yard **36** may be vacated with cargoes in a coordinated manner. Depending on the situation, the autonomous rail carts loaded with *series 1 freight containers 222* may receive instructions to return to the *cargo frame 40*, continue on to a maintenance yard, go to the rail freight transshipment yard **34**, or remain in place for further instructions.

1740

**Fig. 12** is an eye-level perspective view of a *cargo frame dock 20* with an empty *cargo frame barge 26*. At left are two sets of rails for a cargo frame **218** where cargo frames **40** (not shown) roll onto the *cargo frame dock 20*. Also seen are *lobster claws 500* gripping the *lobster claw clamping rods 502*.

1745

Utilizing wireless control bollards and signal lights **33**, the cargo frames **40** receive instructions via the control box **424** which communicate when and where to stop along the dock. Wireless control bollards and signal lights **33** are also receiving information from the *cargo frame barge 26* control box **424**.

1750

At the appropriate time, instructions are sent to the *3-axis hoist 14* to lower and lift the cargo frame **40** so that the *pivoting rail bogies 308* may turn. Wireless control bollards and signal lights **33** send instructions to the *cargo frame 40* control box **424** to turn the bogies. Once complete, the *cargo frame 40* control box **424** sends completion status to **the** wireless control bollards and signal lights **33**, which in turn, send instructions to the *3-axis hoist 14* to lower the *cargo frame 40*.

1755

The *cargo frame 40*, having been lowered and given instructions to proceed, rolls onto the *cargo frame barge 26* mechanized platform **518**.

1760

At this point, success status is sent from the *cargo frame 40* control box **424** to the wireless control bollards and signal lights **33**.

The reverse is true when cargoes are being loaded from the *cargo frame barge 26* to the *cargo frame dock 20*.

1765

**Fig. 13** shares an eye-level perspective view of a *cargo frame cargo ship 24* on a body of water transferring cargo to a pair of *cargo frame barges 26*. The ship's hull **516** is shown for reference.

At the top of the view is a *3-axis structure* and *3-axis hoist 10* in combination with a cargo ship. A counterweight **130** is shown to orient you to Fig. 42.

Two barges are used to keep the *cargo frame cargo ship 24* from listing. This is my method to enable larger than normal cargo transfers at sea or another body of water. Each *cargo frame 40* which stows 16 *series 1 freight containers 226 moves* 576,000 kg, or 1,269,920 lbs worth of freight—not including the weight of the frame itself.

With a 20 bundle cargo frame barge, 26 that works out to 11,520,000 kg, or 25,398,400 lbs!!!

It would be very sad to see such cargoes go to the bottom of the sea.

Having two barges flank a vessel and move their cargoes in concerted fashion prevents the fiasco just mentioned.

This is why, and where, the lobster claws 500 shine. With 40 claws per barge, they can get the job done. By grabbing hold of the lobster claw clamping rods 504 two barges may convey such incredible amounts of cargo—all in one concerted action!

While this method of stabilizing a ship is presently concerned with the above problem, it works for nearly any size vessel, so long as all three vessels are positively, structurally attached.

There is another problem with moving this magnitude of weight. If left to roll off the *cargo frame cargo ship 24* without easing the gravity loads, the barge would capsize—no questions asked. However, the design of the lobster claw clamping rods 504 has greater utility than just something to grab and hold on to.

To borrow from our first responder friends, firefighters are always at the ready. In an instant, they'll drop a bowl of beans, grab the fire pole, and descend down to the engine floor and rush to save you.

1805 But what is going on here?

Friction from their hands prevents their free fall. Similarly, lobster claws 500 have thumbs 536 and fingers 538. They can grip the lobster claw clamping rods 504 just as a firefighter descends a fire pole.

1810

In this way, the *cargo frame* barges **26** may slowly descend into the water, finding their final displacement. After the barge is settled, the *cargo frame cargo ship* **24** extendable and retractable structural outriggers **526** begin pushing away from the ship until they are fully stretched out.

1815

Now, both outer hulls **506** are extended and provide added stability to the barge. Reference Fig. 40.

1820 **Fig. 14** shows a low-aerial perspective view of a truck transshipment yard **34** at lower left and middle, several semi-truck queueing towers **22** in the left rear, a bulk silo and *3 axis hoist* **12** in the middle of the view, with the *3-axis hoist structure* and *3-axis hoist* **10** in the middle right. A freight car transshipment yard **34** is shown off to the lower right. In the right foreground, a freight purgatory **28** is shown.

1825

Semi-trucks **226** enter the semi-truck queueing area **200** and wait for instructions to enter the proper semi-truck spreader frame **208**. In this view, the semi-trucks will turn left and await a spreader to load their truck. Customs may visit each truck for their papers.

1830

For containers not truck-bound, sets of rails lead to the rail transshipment yard **34** at right. Rail carts loaded with *series 1 freight containers* **222** that missed a pickup are bound for freight purgatory **28**. Several containers on carts are shown motoring to or from purgatory. Wireless control bollards and signal lights **33** communicate with

1835 the rail cart **206** control box **424**.

Slicing through the view is the third level bulk platform **30**. This shows how easy dropping off bulk goods can be. The goods are dropped directly into the bulk-cargo silo

cargo frame **128**. Also see Fig. 15.

1840

This view clearly shows the massive throughput of cargo possible with the *system for cargo transport*.

It is a multi-level port.

1845

**Fig. 15** shows an eye-level perspective view of a truck transshipment yard **34** at lower right, six bulk silos and *3-axis hoists 12* in the middle of the view, and a *3-axis hoist structure* and *3-axis hoist 10* on the left.

1850

The bulk drop **68** and semi-truck guide bumpers **133** are shown on the third level bulk platform **30**. Wireless control bollards and signal lights **33** communicate with semi-truck **226** drivers.

1855

**Fig. 16** shows an eye-level perspective from the second-level port platform **18** looking up to six bulk silos and *3-axis hoists 12* in the middle.

At lower right, a *series 1 freight container 226* is being hoisted onto a semi-truck **220**, under spreader frame **208**. Third-level bulk platform **30** cuts through the middle of the view where bulk-cargo silo *cargo frame 128* is being lifted to the top of the bulk silo and hoist **12**. There it will use retractable, extendable roller beams **706** to motor over the silo and drop its load.

1860

1865 Counterweights **130** are shown, easing the load on the hoist.

**Fig. 17** depicts an eye-level perspective view of a sky-high *3-axis structure* and *3-axis hoist 10*. Just imagine the storage potential.

1870

At the bottom of the view, a rail cart loaded with *series 1 freight container 222* motors

to a freight car transshipment yard **34**. One set of rails **206** below shown below going in two directions; one goes to the freight car transshipment yard **34** and the other is the return loop to the semi-truck transshipment yard **36**.

1875

**Fig. 18** shows a perspective view of an empty *cargo frame* turntable **38**. The central spine **21** runs right between the two sets of rails **218**.

1880 At the foreground, a motorized pivot **60** enables a fully loaded *cargo frame* **40** to turn 90 degrees. Because there is space between the *3-axis hoists* **14**, pivoting rail bogies **308** are not required. Two connected bridges **70** support two sets of rails **218**. They are braced with brace beams **58**.

1885 At center, a pit rail **62** is shown in pit **66**.

At left, wireless control bollards and signal lights **33** are placed to receive information from control boxes **424** in *cargo frames* **40**.

1890 At far right, an elevator pit **482** is shown for the *3-axis hoist structure* and *3-axis hoist* **10** below ground level **17**. This allows the second and fourth level of *cargo frame* **40** to be reached.

1895 **Fig. 19** shows an eye-level perspective view of a loaded *cargo frame* turntable **38**.

At center, a pit rail **62** is shown in pit **66**.

To the level we can view how the bulk drop **68** operates with a bulk-cargo silo cargo frame **128** waiting for cargo.

1900

**Fig. 20** shows a perspective view of a *cargo frame* maintenance yard **32** and freight car transshipment yard **34**. The maintenance yard is aligned to the central spine **21** and is

1905 doubly loaded as elsewhere in the port **48**.

At right, we see a freight car spreader frame **35** and a fully loaded freight well car **37**.  
The return loop **56** for rail carts **306** is shown with several carts on their way back to the  
semi-truck transshipment yard **36**.

1910

*3-axis hoist structures* and *3-axis hoists* **10** are located in the rear for context.

In the foreground, access rails from outside the port **46** enable hinterland freight  
dispersal via rail.

1915

**Fig. 21** A perspective entrance view of a fully loaded 16 *series 1 freight container* **226**  
*cargo frame* **40**. A *cargo frame* enlarged corner column **315** provides space for  
specialized corner castings with corner twist lock rack slots **317** to fit and provide  
sufficient structural strength to lift with *3-axis* hoists **14**. At the entrance, enlarged *cargo*  
1920 *frame* columns **321** are utilized to accommodate motorized twist lock flaps **300**. The  
remainder of *cargo frame* columns **316** are similar to each other in size. Cargo frame  
beams **314** connect columns and utilize cargo frame joists for each cargo frame bay **303**.  
*Cargo frame* bracing **318** provides a resilient and stable structure.

1925

Each *series 1 freight container* **226** rolls in on a rail cart **306** and has its own *cargo*  
*frame* bay **303**. One set of rails **304** is set in each *cargo frame* bay **303**.

An electric motor **302** powers the motorized twist lock flaps **300** so that they may open  
1930 and close.

At the base of the *cargo frame* is a *cargo frame* bottom beam **320** where optical,  
motion, and distance sensors **311** are placed. Below the *cargo frame* bottom beams **320**  
are structurally mounted pivoting rail bogies **308**, shortened axle rail bogies **309**, and  
1935 motorized shortened rail bogies **313**.

**Fig. 22** A perspective rear view of a fully loaded 16 *series 1 freight container* **226**

*Cargo frame 40* that is substantially similar in description to **Fig. 32**, except that stationary twist lock flaps **322** are employed and mounted slightly different.

**Fig. 23** An elevation front view of a fully loaded 16 *series 1 freight container 226 cargo frame 40* that is substantially similar in description to **Fig. 21**.

1945

**Fig. 24** An elevation side view of a fully loaded *series 1 freight container 226 cargo frame 40* that is substantially similar in description to **Fig. 21**. A electric motor for twist lock flaps 302 is shown at both the first and third levels of the cargo frame.

1950

**Fig. 25** An elevation rear view of a fully loaded *series 1 freight container 226 cargo frame 40* that is substantially similar in description to **Fig. 21**. The rear side of the cargo frame utilizes stationary twist lock flaps **322**.

1955

**Fig. 26** An enlarged plan detail view of a motorized twist lock flap **300** at the entry of a 16 *series 1 freight container 226 cargo frame 40*.

At the top of the view is a cargo frame column **316** that provides welding support for structural gusset plates **324**. Structurally attached to the stationary twist lock flap **322** is a twist lock **330**. This twist lock may be electrically actuated. Either way, the twist lock will engage with the corner casting of *series 1 freight container 226* to lock in place.

In the center of the view is an electric motor **302** that operates the motorized twist lock flaps **300** via a drive shaft **338** and bevel gear **340** to transfer the rotation to the twist lock flaps **300**. The motor driven vertical axle **336** also has a bevel gear **340** to match and receive such rotation. A control box **424** may be placed in a convenient location to drive the electric motor **302**.

1970

The vertical hinges and integral gears at motorized twist lock flaps **334** engage with the motor driven vertical axle **336**. A counter rotating gear **342** is provided for coordinated opening and closing.

1975 Clearance of twist lock **330** and *series 1 freight container 226* and motorized twist lock flap **300** is dashed and shown in open position **332** for clarity.

**Fig. 27** A plan view of a 16 *series 1 freight container 226 cargo frame 40* structural  
1980 framing and rail bogie arrangements.

A *cargo frame* enlarged corner column **315** provides space for specialized corner castings with corner twist lock rack slots **317** to fit and provide sufficient structural strength to lift with 3-axis hoists **14**. At the entrance, enlarged *cargo frame* columns **321**  
1985 are utilized to accommodate motorized twist lock flaps **300**. The remainder of *cargo frame* columns **316** are similar to each other in size. Cargo frame beams **314** connect columns. *Cargo frame* bracing **318** is utilized to provide a resilient and stable structure.

Structurally mounted pivoting rail bogies **308**, shortened axle rail bogies **309**, and  
1990 motorized shortened rail bogies **313** are shown in their relative positions. The extent of radius **310** for pivoting rail bogie **308** demonstrates that the rotating operation is possible.

Electric motors **302** are shown here where the specialized corner castings with corner  
1995 twist lock rack slots **317** block motor driven vertical axle **336** and must be mounted here for that reason.

**Fig. 27A** shows an enlarged plan view of a upper portion of a *pivoting rail bogie 308*  
2000 is substantially similar to **Fig. 27** except that the orientation of the electric motor and driveshaft **636** is more clear, as well as the angled crossbeam bearing plates **626** in relation to the main cross beam **622**.

2005 **Fig. 27B** shows an enlarged plan view of a lower portion of a *pivoting rail bogie 308* is substantially similar to **Fig. 27** except that the orientation of the drive gear **634** and gear **630** is more clear.

2010 **Fig. 28** shows a perspective view of a *pivoting rail bogie 308*. The bogie pivots along the central pin **612**. A locking nut **614** binds an *orange slice chassis* upper portion **606** to an *orange slice chassis* lower portion **608**.

The *orange slice chassis* upper portion **606** is structurally mounted to the *cargo frame*  
2015 bottom beams **320**. The *orange slice chassis* lower portion **608** is structurally attached to the rail wheel set **618**.

When a *3-axis hoist 14* lifts a *cargo frame 40*, the rail bogie is free to receive instructions to the control box **424** to actuate the electric motor and drive shaft **636**.  
2020 Take note that one slice of the *orange slice chassis* upper portion **606** is enlarged for the electric motor and drive shaft **636**.

Bearings between the *orange slice chassis* upper portion **606** and *orange slice chassis* lower portion **608** reduce friction. In this manner, the entire rail bogie rotates with  
2025 guide rollers **624** by radiused slots **638** in the radiused guide plate **600**. Angled crossbeam bearing plates **626** make the movements smooth by sharing the center point of the central pin with threaded rod **612**.

Suspension is provided via springs and guide rods **610** between the *orange slice chassis*  
2030 upper portion **606** and *orange slice chassis* lower portion **608**. For the other rail wheel set **618**, suspension is provided via the main crossbeam **622** and suspension springs **616**.

**Fig. 29** shows an exploded perspective view from above of a *pivoting rail bogie 308*  
2035 that is substantially similar to **Fig. 28**, except that a control box **424** and electric motor and driveshaft **636** are shown with a drive gear **634**, a gear **630**, and a semi-gear ring **628** while demonstrating the pivoting rail bogie's **308** ability to rotate.

Also seen is a slot for a gear bolt **632**.

2040 At left bearings in radiused layout **604** are shown.

**Fig. 30** An exploded perspective view of a *pivoting rail bogie 308* from below that is substantially similar to **Fig. 38** except that the *orange slice chassis* upper portion **606** has a semi-gear ring cutout **642** to receive the semi-gear ring **628**. A control box **424** and electric motor and driveshaft **636** are shown and demonstrate the pivoting rail bogie's **308** ability to rotate.

2050 **Fig. 31** A perspective view of a *cargo frame* sized to match a 16 *series 1 freight container cargo frame* wherein the bays are resized to accommodate military hardware. *Cargo frame* beams **314**, *cargo frame* columns **316**, *cargo frame* columns **315**, *cargo frame* bracing **318**, *cargo frame* joists **319**, and *cargo frame* bottom beam **320** form the basis of this *cargo frame 40*.

2055

As with all the embodiments shown in this disclosure, you are free to mix and match components to achieve different things. Specialized corner castings with corner twist lock rack slots **317** also could be added.

2060 It is up to my customers how they wish to use the *cargo frame 40*.

An M1A1 Abrams tank **326** sits in one of six cargo frame bays **303**. With a current maximum gross weight rating of 36,000 kg, or 79,370 lbs., a series 1 freight container 226 weighs a little more than half of the tank. The M1A1 Abrams tank weighs 2065 57,152.34 kg, or 126,000 lbs. Therefore, two bays may be swapped out for a tank bay. While embodiment shows six cargo frame bays 303, more could be added if tanks were the only cargo intended for this cargo frame.

2070 **Fig. 32** shows an elevation side view of a *cargo frame* sized to match a 16 *series 1*

*freight container 226 cargo frame* substantially similar to Fig. 31.

**Fig. 33** shows an elevation rear view of a *cargo frame* sized to match a 16 *series 1 freight container 226 cargo frame* substantially similar to Fig. 31.

**Fig. 34** shows a perspective view of a *cargo frame 40* sized to match a 16 *series 1 freight container 226 cargo frame* wherein the bay is resized to accommodate a bulk-  
cargo *cargo frame 128*.

These containers could house grains, fuel, ore and more.

**Fig. 35** shows a perspective view of a *cargo frame 40* sized to match a 16 *series 1 freight container 226 cargo frame* wherein the bays are used to transport vehicles **221**.

Here, is another example of the *cargo frame's flexibility 40*.

2090

**Fig. 36** paints a scene in perspective view with a pair of train engines **49** pulling a plurality of fully loaded 16 *series 1 freight container cargo frame* rail cars **41**. The rail cars are coupled together with bogies as shown in Fig. 37. Two sets of rails **218** are required.

2095

**Fig. 37** shows a perspective view of a 16 *series 1 freight container cargo frame* rail car **41** with coupling **327**, for use over two sets of rails **218**.

2100

**Fig. 38** shows a detail section view of a structurally modified rail **646**. Filler steel **644** is scribed and cut to fit the rail profile. This is cheaper than retooling a rail manufacturing assembly line.

2105 Where greater loads are required, the rails can be strengthened as required by following the outline of additional steel **656**. Rail ties **648** can be widened and lengthened to meet a great bearing capacity.

The rail tie **648** may rest on an upper ballast **650**, which rests on a lower ballast **652**,  
2110 which then bears on compacted subgrade **654**.

**Fig. 39** depicts a perspective view of a *cargo frame* barge **26**. This is largely the same as Fig. 40 but with a 3-dimensional perspective of this industrial piece of equipment.

2115

**Fig. 40** shows a section view of a *cargo frame* barge **26** shows the versatility of an independent, three-hull barge. One outer hull **506** may extend for stability of large freight loads on the barge. The opposing outer hull **506** may retract close to the inner hull **508** to enable *encargoing* or *decargoing*. *Cargo frame* barge columns **524** provide  
2120 support for upper *lobster claws* **500**.

*Lobster claws* **500** may be manually adjusted with adjustment holes **522** in *cargo frame* barge columns **524**. As an alternative, it is perfectly prudent to have a mechanized lifting and lowering capability for both the upper and lower *lobster claws* **500**.

2125

As is seen here, when two *lobster claws* **500** grip a *lobster claw* clamping rod **504** there is enough distance between the claws to provide a rigid connection. This will be advantageous for at-sea cargo transfers.

2130 Bracing **520** is shown as required.

**Fig. 41** depicts a perspective view of a *lobster claw* **500**. At left, a lower structural

guide beam **534** is outfitted with at least one electric motor and pinion **532**. This enables  
2135 the extendable and retractable structural outrigger **526** to reach out to a *lobster claw*  
clamping rod **504**. Geared rollers **528** prevent fast movements of the outrigger.

The geared rollers **528** are arranged so that an upper set engages the top flange of the  
extendable and retractable structural outrigger **526**. A lower set of geared rollers **528**  
2140 engages the bottom flange of the outrigger. In this manner, the outrigger will experience  
very little slop.

At the right, in this particular embodiment, the *lobster claw* **500** is angled relative to the  
extendable and retractable structural outrigger **526**. This occurs because the columns on  
2145 the *cargo frame* barge **26** align with the centerline of the cargo frame cargo ship **24**  
columns.

By angling as shown, the *lobster claw* **500** may grip a *lobster claw* clamping rod **504** on  
a *cargo frame cargo ship* **24**.

2150

Bearings and pin **546** enable the claw portion to mechanically rotate via a hydraulic  
piston **540**. An armature with pivot rod **544** provides structure for the hydraulic piston  
**540** and *lobster claw* finger **538** and *lobster claw* thumb **536** to operate.

2155 This may be guided by a longshoreman or a by a control box **454**.

Because this embodiment has an angled armature **544** and *lobster claw* thumb **536** is  
shorter than the *lobster claw* finger **538**. This allows a *lobster claw* **500** to grip a *lobster*  
*claw* clamping rod **504** without damaging the lobster claw clamping rod recess **505**. Or  
2160 a *lobster claw* dock piling **502**.

Both the *lobster claw* finger **538** and *lobster claw* thumb **536** pivot the armature **544**  
with a *lobster claw* pivot section **542**. The pivot section looks similar to a door hinge.

2165

**Fig. 42** depicts a perspective view of a freestanding *3-axis structure* and *3-axis hoist*  
**10**. At the top of the view is a *3-axis hoist* **14** which moves on a platform to be

interlocked with four corner hoist mechanisms at each column for 3-axis hoist structure 11. A counterweight 130 creates a smoother hoisting action.

2170

The counterweight 130 may be used for each vertical bay of the *3-axis structure* and *3-axis hoist 10*; in this simplified example, two bays could be accessed. This reduces the number of counterweights commonly found on other hoists and elevators. It could be said that the counterweight ought to move like the rolling platform for cargo frame hoist 734.

2175

Having given great consideration to this, it negates the effect of 20 *bundles* of *decargoing* at the same time on both sides of a ship.

2180 To put it plainly, saving weight on counterweights adds time to *decargoing*.

While manually threading of hoist cables 712 is shown here, mechanical threading is also contemplated. Stevedores may walk along a catwalk between flanking *3-axis structures* and *3-axis hoists 10* to access the rolling platform for cargo frame

2185 Hoist 734.

**Fig. 43** presents a lower plan view of a *3-axis structure* and *3-axis hoist 10*. The top portion shows a notch in structural rolling plates 738 for the corner hoist lift mechanism 714. This enables the corner hoist lift mechanism 714 to traverse the y-axis with a load.

2190

Collapsible braces and bearings 702 keep the retracting and extending beams 706 stable, Upright, and parallel to each other. By doing so, one set of rails 206, which is mounted to the beams, may align to the matching pair of rails in the next bay.

2195

At the lower portion of the plan, a guide structure 774 is shown. This structure keeps the counterweight 130 in place.

2200 **Fig. 44** shows a lower perspective view of a *3-axis structure* and *3-axis hoist 10* for orientation purposes. Please see the following Figs.

One item that is well-seen here is the structural rolling plate **718** that enables the retracting and extending beams **706** to perform their desired function.

2205 The corner hoist lift mechanisms **714** are shown in a lowering state.

**Fig. 45** is a lower perspective view of a *3-axis structure* and *3-axis hoist 10* where the retracting and extending beams **706** are in open position.

2210

Starting at the top of the view, we see a corner hoist lift mechanism **714** with hoist cable stops **712** at the base. This is the lower corner hoist lift mechanism. You can see the twist lock rack **784** and how it may extend out from the center of the column **11** towards the bay. Reference Fig. 47.

2215

Structural stiffeners **720** are shown dashed so we may view beyond.

My experience as an architect has proven the value of the phrase “field verify.”

2220 The adjust to fit slot **794** is a good example of where this applies. The ends of the retracting and extending beams **706** stop at the face of the corner column **11** for a *3-axis structure 23*. This leaves a gap. The gap should be field verified and welded to the transverse retracting and extending beams **706** retracting and extending beams **706**. Structural stiffeners should be employed.

2225

The electric motor and pinion **716** enable the retracting and extending beams **706** to move to position to align with one set of rails **206**. Reference the pivoting rail bogie in Fig. 28. Both the pivoting rail bogie **308** and the corner hoist mechanism **714** work together to enable x, y, and z-axis movements.

2230

If instructions are sent from the control box **494** for a *cargo frame 40* to change direction from an x-axis to the y-axis, the corner hoist lift mechanism **714** will engage the specialized corner castings with corner twist lock slots **317**, lift the cargo frame, and send further instructions to pivot the rail bogies to the appropriate direction.

2235

The *cargo frame 40* can then move to a different bay, enabling a higher or lower *cargo frame 40* to reach its destination.

WE now have a *3-axis structure* and *3-axis hoist 10*!

2240

One interesting feature is that the *cargo frame 40* can remain in place on the retracting and extending beams **706**, and the corner hoist lift mechanisms can disengage the specialized corner castings with corner twist lock slots **317** and attend to a different bay.

2245 To lock the *cargo frame 40* in place, column mounted an extendable, pivoting twist lock rack **784** engages the cargo frame (not shown). This would happen at each specialized corner castings with corner twist lock slots **317**.

2250 **Fig. 46** shows a lower perspective view of a *3-axis structure* and *3-axis hoist 10* where the retracting and extending beams **706** are in closed position.

Racks **710** are mounted on c-shaped structural channels **722**. This enables the retracting, extending mechanized roller beams **706** to roll out from a closed position via an electric  
2255 motor and pinion **716**. A slot in structural rolling plates **738** must be bridged so that a *cargo frame* may traverse in the x-axis or y-axis. If a call for the z-axis occurs to the control box **424**, the retracting, extending mechanized roller beams **706** will retract when possible.

2260 For example, if a cargo frame **40** is sitting on the retracting, extending mechanized roller beams **706**, this will not occur. But if the corner hoist lift mechanisms **714** engage the *cargo frame* and begin to lift the *cargo frame 40*, the roller beams will retract after receiving instructions from the control box **424**.

2265

**Fig. 47** shows a perspective view of an isolated corner hoist lift mechanism **714**.

Starting at the top we see hoist cables **712** which thread through the chassis **772**. An optical, motion, and distance sensor **311** is utilized to identify a *cargo frame 40* the specialized corner castings with twist lock rack slots **317**.

2270 A twist lock rack **784** is pushed or pulled via a hydraulic piston **kg**. Mounted to the chassis **772** is a control box **424** for sending instructions to the various components of the corner hoist lift mechanism **714**. Sliding structural arms **727** guide the twist lock rack. Roller pins in a notch in chassis **782** enable this function. Structural guide plates **768** are mounted to the chassis **772**. The twist lock rack extends to a *cargo frame 40*.

2275

A reserve structural length **764** is shown to provide shear capacity when the corner hoist lift mechanism **714** rises or lowers.

2280 Depending on whether the corner hoist lift mechanism **714** serves the upper specialized corner castings with twist lock rack slots **317** of a *cargo frame 40* or the lower corner castings, hoist cables may continue to the next corner hoist lift mechanism or end with cable stops.

2285 **Fig. 48** illustrates a plan view of a corner column **11** for a *3-axis structure 23*. The column shape is like two wide flange columns were welded together in a transverse manner.

2290 Having four quadrants each with an open corner, and each serving one bay the corner hoist mechanism **714** has a free and clear shaft to hoist *cargo frames*. Each quadrant has an insulated electric power line **780** where an electric power rail **778** may derive power. While the overall corner hoist mechanism is controlled by the *3-axis hoist 14*, the electrically actuated twist locks **728** and overall twist lock racks **784** require a separate power source for the control box **424**.

2295

A chassis **772** of the corner hoist mechanism **714** fills each quadrant of the column **11**. The open corners of each quadrant enable the corner hoist lift mechanism to traverse in the z-axis while lifting or lowering a *cargo frame 40*. Corner guide rail rollers **730** mate with corner guide rails **731**.

2300

Hoist cables are shown in the center of the chassis **772**. The optical, motion, and distance sensor **311** is pointed to, but is below the cut plane. Refer to Fig. 47 for more information.

**Fig. 49** shows an upper perspective view of a *3-axis structure* and *3-axis hoist 10*. You  
2305 may see that the rolling platform **734** enables a lot of possibilities where many bays are  
desired.

For example, the sea bluff embodiment in Fig. 57 is shown with one bay. If more bays  
were required, then the counterweight **130** could be moved to either side in that example  
2310 and allow more bays to be added. A rolling platform **734** such as the one shown in this  
Fig. 49 could roll along the shoreline **54**.

Likewise, on a ship, bays may be added.

2315 Pulleys **754** are shown peeking behind the structural side plates **734** in all four corners  
of each bay. These pulleys enable the hoist cables **712** to transfer to the spindles **790** in  
a neat manner.

2320 **Fig. 50** illustrates an upper plan view of a *3-axis structure* and *3-axis hoist 10*. The  
rolling platform **734** is shown in a moving state—that is, it is not connected to four  
corner hoist mechanisms **714**.

2325 Corner hoist cables **712** have thickened ends **792** that prevent the corner hoist lift  
mechanism from falling after a stevedore unsets the cables from a corresponding  
spindle **790**. Holes for the hoist cables **712** in the structural side plates provide this  
function. Stevedores may access the rolling platform **734** via a catwalk  
adjacent to the counterweight **130**. An arched ladder **760** enables movement on the  
platform.

2330 A mechanized setting and unsetting of hoist cables **712** to spindles **790** is perfectly  
possible.

2335 Similar to the description in Fig. 5 this plan view helps orient you to the apparatus.

From this view, the rack **710** is shown as a means to access each individual bay of the *3-  
axis structure 23*.

Intermediary geared axle **748** enables all four corner hoists **714** to raise or lower in the same direction at the same time. The drive belts **762** are driven by beveled gears **744**  
2340 which share a common axis. This arrangement enables the corner hoist lift mechanism **714** and corresponding hoist cables **712** to meet perpendicular to a spindle **790**. This prevents strange coiling behavior.

The *3-axis structure* and *3-axis hoist* **10** are comprised of a number of components such  
2345 as beams **13** and columns **11**. This structure provides a means to lift *16 series 1 freight containers* with ease.

Because the *cargo frames* **40** are lifted at the corners of the frame, each bay may be utilized for storage. While *cargo frames* of this size are contemplated, nothing would  
2350 prevent the use of this *3-axis structure* and *3-axis hoist* **10** from use in a warehouse with smaller *cargo frames* **40** or other apparatus.

**Fig. 51** shows a frontal perspective view of a *3-axis hoist*, which is similar in operation  
2355 to its land-based counterparts shown in Figs. 1, 45 and 57. The main difference is that this hoist rolls on rolling platform **734**.

Electric motor and pinion move back and forth between bays of a *3-axis structure* **23** on racks **710** which are mounted on *3-axis structure* beams **13**. The enables the use of one  
2360 counterweight **130** for as many bays as there are deep on a *cargo frame cargo ship* **24** (reference Fig. 42).

Driven by a suitably sized electric motor **732** the drive axle **750** makes rotations through a gear box **742**. A governor **788** prevents freefall accidents. The enormous loads of a  
2365 *cargo frame* **40** sized for 16 series 1 freight containers is offset by the counterweight **130**. To take up slack when the rolling platform **734** moves to a different bay the counterweight spindle and clutch **786** disengage the drive axle **750** and roll up or down as is fit. This feature allows the counterweight **130** to reset according to the bay and level the corner hoist mechanism **714** is located at in the *3-axis structure* **23**.

2370 To transfer the rotations to the four corner hoist lift mechanisms **714**, drive belts **762**  
turn spindles **790** which are sized to hold the proper length of hoist cable **712** as is  
required.

2375 **Fig. 52** shows an angled perspective view of a *3-axis hoist* substantially similar to Fig.  
51, from a different view.

**Fig. 53** depicts a world map focusing on Egypt **86** and Türkiye **93**. The grounding of  
2380 the Ever Given in the Suez Canal in 2021 shows the dangers of utilizing the largest  
class of vessels in a canal.

This would be a perfect application for a proposed two sets of rails **73** utilizing *cargo*  
*frames*. The canal could be straddled to enable large container ships to swiftly *decargo*  
2385 and have a matching ship on the other side of Egypt **86**.

For Türkiye **93** a currently proposed Istanbul Canal has drawn fierce critics. This would  
be a perfect application for a proposed two sets of rails **73** utilizing *cargo frames*  
because laying railroad rails takes less effort than canals, removes the need to dispose of  
2390 the earth, removes the ecological danger of mixing two bodies of water. While a draw  
bridge may need to be installed in some locations this is far more easily accomplished.

Here again the cargo frame shines.

2395 Bulgaria **94**, Greece **90**, the Mediterranean Sea **88**, and the Black Sea **92** are shown for  
context.

**Fig. 54** depicts a world map focusing on Panama **81**. Panama recently widened the  
2400 Panama Canal at great expense. It still does not allow 24,000 TEU ships transit.

This would be a perfect application for a proposed two sets of rails **73** utilizing *cargo frames*. The canal could be straddled to enable large container ships to swiftly decargoed and have a matching ship on the other side of Panama **81**.

2405

Here again the cargo frame shines.

The United States of America **76**, Mexico **80**, Nicaragua **87**, Costa Rica **85**, Columbia **83**, the Pacific Ocean **82** and the Gulf of Mexico **79** are shown for context.

2410

**Fig. 55** depicts a world map focusing on Thailand **96**. It is currently contemplated by the Thai government to build a railroad at this location to remove two days of ocean transit time. This would be a perfect application for a proposed two sets of rails **73** utilizing *cargo frames*. As currently proposed a lot of time is lost loading and unloading trains.

2415

Here again the cargo frame shines.

The Andaman Sea **99**, Malaysia **97**, Singapore **98** and the Gulf of Thailand are shown for context.

2420

**Fig. 56** depicts a world map focusing on Puerto Peñasco, Mexico **72** and Yuma, Arizona **74**. The United States of America **76**, Mexico **80**, Pacific Ocean **82** and the Gulf of California **78** are shown for context.

2425

Here, there is a low sea hill and little infrastructure. Two sets of rails **74** could easily traverse the distance to Yuma, Arizona **74** without building an enormous port. A modest dock such as that shown in Fig. 57 would be ideal.

2430

**Fig. 57** depicts a scene where a town or city wishes to build a port but does not have what the prior art would call a good port site. Imagine such a place where there is a large sea bluff **51**. The body of water **50** crashes upon the shoreline **54**—until now, this would just be a nice thing to look at.

2435 A *cargo frame* barge 26 motors close to a *cargo frame* dock 20. Also shown are requisite *lobster claw* dock pilings 502. A 3-axis hoist structure and 3-axis hoist 10 lift *cargo frames* 40 with ease up to the top of the sea bluff 51, where the *cargo frames* 40 motor to an inland port.

2440 Just imagine the unlocked trade!

This is a further example of how the parts of the *system for cargo transport* may be joined endlessly. Even a reversed 3-axis hoist structure and 3-axis hoist 10 make an old, ugly gravel pit turn into a warehouse of the future.

2445

While it presently seems like a port would determine height required and set the *lobster claw* 500, at those heights it is conceivable a twist lock rack could be set with a rack and pinion whereby a *lobster claw* 500 may be adjusted on demand versus manual bolts.

2450

There are two independent, outer hulls 506 and one inner hull 508. Cargos are conveyed onto the inner hull 508 where they are centrally balanced.

2455 The *cargo frame* barge 26 is shown in both an open and closed state to demonstrate that the outer hulls 506 are retractable, as well as extendable. A motorized platform 518 may slide to either outer hull 506.

### Description of embodiments

2460 **Fig. 58** shows an exploded perspective view of a *cargo frame* sized to house four *series 1 freight containers* 226 called a port-side *bundle* wherein two vertical *cargo frame* bays 303 are formed by a pair of cell guides 305 and a separate autonomous cart for port-side *bundle* 460 that is used to transport the port-side *bundle* 460.

2465 At the top of the view is a spreader frame for four *series 1 freight containers* 478. This frame supports a spreader for one *series 1 freight container* 209.

The port-side *bundle* 490 is comprised of *cargo frame* beams 314, *cargo frame* columns 315, two cell guides 305, *cargo frame* braces 318, and a *cargo frame* bottom beam 320.

2470 At the lower portion of the view, the autonomous cart for port-side *bundle* 460 is comprised of a structural frame for autonomous cart 470, wheels and tires 466, recesses for optical, motion and distance sensors 464, optical, motion and distance sensors 311, electric motor for autonomous cart 472, gear box for autonomous cart 474, battery for autonomous cart 476, guide bumpers for port-side bundle 462, and rotating wheel sets  
2475 468.

**Fig. 59** shows perspective view of a port-side *bundle* structure 492 and hydraulic elevator 494 sized to house a plurality of port-side *bundles* 490 which are further sized  
2480 to house four *series 1 freight containers* 226.

The port-side *bundle* structure 492 is made with columns 495, beams 496, braces 497, and a structural floor platform 498. Safety rails 488 are provided as a precaution. As with all of the structures in the *system for cargo transport*, adequate foundations are  
2485 required.

It should be noted there are no tie-downs in this embodiment. It would be perfect for a low seismic site. If a seismic site was required, then adding a twist lock rack lock mechanism would be required. It is expected the autonomous, wheeled carts 460 have a  
2490 locking mechanism for safety.

Ellipsoid column guide bumpers 484 correct errors from autonomous, wheeled carts 460.

Port-side bundles 492 are wheeled onto the elevator lift platform 486 after receiving  
2495 instructions from the wireless control bollard and signal lights 33. The autonomous, wheeled cart 460 is equipped with a control box 424.

**Fig. 60** depicts a perspective front view of a *cargo clip 400* with castellations **399**.

2500 Thickened structural members **364** transfer forces from the twist lock heads **350** designed to lift four *series 1 freight containers 226*. Enlarged slots for twist lock and spreader designed to lift four *series 1 freight containers 352* are shown adjacent structural gusset plates **354**.

2505 An elevator pit **482** is seen at lower right as well as six hydraulic rams **480**.

Structural stiffeners for *cargo clips 398* are placed at structurally mandated intervals and sized accordingly. Structural flanges **365** are further used to stiffen the cargo clip **400**.

2510

Twist locks **330** are mounted at the upper portion of the twist lock base such that the levers do not require bending.

2515 **Fig. 61** depicts a perspective rear view of a *cargo clip 400* with castellations **399**.

Thickened structural members **364** transfer forces from the twist lock heads **350** designed to lift four *series 1 freight containers 226*. Enlarged slots for twist lock and spreader designed to lift four *series 1 freight containers 352* are shown adjacent to structural gusset plates **354**.

2520

Structural flanges **365** are used to stiffen the cargo clip **400**.

Twist locks **330** are mounted at the upper portion of the twist lock base such that the levers do not require bending.

2525

**Fig. 61** is a perspective front view of a *cargo clip 400* with a plurality of arced slots **412** for modified, bent, and structurally attached twist lock open & closing arms for hand use **410**. As can be seen, twist locks **330** are arranged to match the corner castings of a *series 1 freight container 226*. Holes are scribed in the structural frame of the *cargo*

2530

*clip 400*, enabling the twist lock **330** to transfer loads to the structural frame and the binding of four *series 1 freight containers 226*.

At the top of the *cargo clip 400* are twist lock heads designed to lift four *series 1 freight containers 226*. The weight of four containers exceeds the corner casting rating of a *series 1 freight container 226*. Specialized twist locks are utilized to engage the enlarged slot for twist lock and spreader designed to lift four *series 1 freight containers 352* which is cut in a twist lock head **350** designed to lift four *series 1 freight containers 226*.

2540

To help distribute loads and provide stiffness, two structural gusset plates for *cargo clip 354* are structurally attached. These gussets are structurally connected to thickened structural members **364** which then transfer these loads further down the *cargo clip 400*.

2545

Structural stiffeners for *cargo clips 398* are placed at structurally mandated intervals and sized accordingly. Structural flanges **365** are further used to stiffen the cargo clip **400**.

2550

**Fig. 61A** displays an enlarged perspective front view of a middle portion of a *cargo clip 400* where arced slots **412** for modified, bent, and structurally attached twist lock open & closing arms for hand use **410** are cut.

2555 Twist lock **330** profiles are shown scribed to fit. Structural flanges **365** run the edges of the *cargo clip 400*.

**Fig. 62** shows a perspective rear view of a *cargo clip 400* with a plurality of arced slots **412** for modified, bent, and structurally attached twist lock open & closing arms **410** for hand use. As shown, twist locks **330** are arranged to match the corner castings of a *series 1 freight container 226*. Holes are scribed in the structural frame of the *cargo clip 400*, enabling the twist lock **330** to transfer loads to the structural frame and the binding of four *series 1 freight containers 226*.

2560

2565 At the top of the *cargo clip 400* are twist lock heads designed to lift four *series 1 freight containers 226*. The weight of four containers exceeds the corner casting rating of a *series 1 freight container 226*. Specialized twist locks are utilized to engage the enlarged slot for twist lock and spreader designed to lift four *series 1 freight containers 352*. The slot is cut in a twist lock head **350** designed to lift four *series 1 freight*  
2570 *containers 226*.

To help distribute loads and provide stiffness, two structural gusset plates for *cargo clip 354* are structurally attached. These gussets are structurally connected to thickened structural members **364** which then transfer these loads further down the *cargo clip 400*.  
2575

**Fig. 62A** is an enlarged perspective rear view of a *cargo clip 400* with a plurality of arced slots **412** for modified, bent, and structurally attached twist lock open & closing arms **410**.

2580

It can be seen here that the twist lock's **330** back face is flush with the front face of the *cargo clip 400*. In this embodiment, it may be desired for the twist locks **330** to protrude further from the rear face of the *cargo clip 400*. Because of this, the twist locks **330** must have the arced slots for modified, bent, and structurally attached twist lock open & closing arms for hand use **412**. Otherwise, the open and closing arms could not be easily reached.  
2585

**Fig. 63** shows a perspective front view of a *cargo clip 400* which is the opposite side of Fig. 62 and Fig. 62A.  
2590

As with the other embodiments of the *cargo clip 400*, thickened structural members **364** provide necessary rigidity and enable the safe transfer of loads imposed upon the clip. Structural gusset plates **354** stiffen up the twist lock head **350**. Enlarged slots **352** are designed to lift four *series 1 freight containers 226* with a margin of safety.  
2595

Purpose-built spreaders are required to lift a *cargo clip 400*, as mentioned above in the description.

2600 Structural flanges **365** and structural stiffeners **398** further stiffen the clip, and may be welded or bent, depending on the application. For example, some *series 1 freight containers 226* are 10 feet long, some are 20 feet long and the most common is 40 feet long, among other sizes. These differences naturally change the structural requirements of the *cargo clip 400*.

2605 **Fig. 63A** shows an enlarged perspective rear view of a *cargo clip 400* and offers more detail of Fig. 63.

2610 **Fig. 64** A perspective front view of a *cargo clip 400* wherein a plurality of structurally attached lashing rods **362** are in closed position.

2615 Structurally attached lashing rods **362** may clip into lashing rod tension clips **376** while stowed away in closed position. Bent portion of lashing rod **374** enables neat stowage without interfering with the structurally attached lashing rods **362** in the middle portion of the *cargo clip 400*.

To maintain structural rigidity, structural stiffeners for *cargo clip 398* are placed at structurally mandated intervals and sized accordingly.

2620 It is entirely feasible and likely that electrically actuated twist locks could be employed in this embodiment.

**Fig. 64A** shows an enlarged perspective front view of a top portion of **Fig. 52**.

2625 Ends of slotted pipes **372** are where a longshoreman may use a tool to push the rods **367** left or right in an open or closed position, thereby unlocking or locking the twist locks **330**. Structurally attached structural rings **356** at twist locks **330** enable the free movement of structurally attached lashing rods **362** via a structural ring **358**.

2630 Thickened structural members **364** transfer forces from the twist lock heads **350** designed to lift four *series 1 freight containers 226*. Enlarged slots for twist lock and

spreader designed to lift four *series 1 freight containers* **352** are shown adjacent structural gusset plates **354**.

2635 **Fig. 64B** shows an enlarged perspective front view of a middle portion of **Fig. 52**. Modified, bent, and structurally attached twist lock open and closing arms for tool use **366** slide left or right and are driven by a ring **368** attached to rod **367** in slotted pipe **370** structurally attached to *cargo clip* **400** structural flanges **365**. Ends of slotted pipes **372** are where longshoreman may use a tool to push the rods **367**.

2640

As at the upper portion of **Fig. 52**, structurally attached structural rings **356** at twist locks **330** enable the free movement of structurally attached lashing rods **362** via a structural ring **358**.

2645 Bent portion of lashing rod **374** allows for neat stowage of all structurally attached lashing rods **362**.

**Fig. 64C** shows an enlarged perspective front view of a lower portion of **Fig. 52**  
2650 where a pivoting end of lashing rod **388** is shown. Removable rods and cotter pins **382** enable quick length adjustments via holes **384** in a U-shaped termination of structurally attached lashing rod **380**. Anchor shackle screws pins, and/or bolts could be substituted for removable rods and cotter pins **382**.

2655 The pivoting end of lashing rod **388** has threads **390** enabling fine-tuned adjustments with the elongated O-shaped, threaded tightening section of pivoting end of lashing rod **392**.

The bent portion of pivoting end of lashing rod **386** allows for neat stowage.

2660

Towards the end of the O-shaped, threaded tightening section of pivoting end of lashing rod **392** is a thickened end of rod **394** which enables an O-shaped tightening section to rotate while a U-shaped end of a pivoting end of a lashing rod **396** remains in place on the ship's deck.

2665 Lastly, a wire tie **378** is used to keep pivoting end of lashing rod **388** upright and neatly  
stowed away when not in use.

**Fig. 65** a perspective front view of a *cargo clip* **400** wherein a plurality of structurally  
2670 attached lashing rods **362** are in open position structurally attached to ship deck tie  
downs **397**.

*Four series 1 freight containers* **226** are shown. The reduction in lashing rods went from  
12 to 4!

2675

**Fig. 66** shows a perspective underside view of a pair of *cargo clips* **400** with  
castellations **399** shown locked to *series 1 freight containers* **226**, and an autonomous,  
motorized rail cart autonomous *cargo clip* rail cart **422**. The optical sensor, motion, and  
distance sensors **311** allow for traversing without running into things.

2680

**Fig. 66A** shows an enlarged perspective underside view of **Fig. 54**. The autonomous  
*cargo clip* rail cart **422** boasts six rail wheelsets **432** which enable the cart to use rails.  
The wheelsets are reinforced with gusset plates **430** and are driven by electric motors  
**426** which drive a gear box **428**. Motors are given instructions via the wireless control  
2685 bollards & signal lights **33** and a control box **424**.

**Fig. 67** shows an exploded perspective view of a *cargo clip* **400** with castellations  
shown in relation to a set of four *series 1 freight containers* **226**, and an autonomous,  
2690 motorized, *cargo clip* rail cart **422**. The optical sensor, motion, and distance sensors **311**  
allow for traversing without running into things.

**Fig. 68** depicts plan view of a pair of *cargo clips* **400** bound to a set of four *series 1*  
2695 *freight containers* **226** in a prior art ship's modified hold. The outline of cell guide end  
walls **402** of a prior art cargo ship hold.

Removed cell guide and old position provides space for *cargo clip 400*.

2700 Cell guides to remain in place **406**, enabling the *cargo clip 400* to lower into the hold. The dashed outline shows a removed cell guide **404** which provides space for the *cargo clip 400*.

2705 **Fig. 69** displays a perspective view of an *x-clip 434* with structurally attached lashing rods **362** binding a set of two *series 1 freight containers 226*.

To help distribute loads and provide stiffness, two structural gusset plates for *cargo clip 354* are structurally attached. These gussets are structurally connected to thickened  
2710 structural members **364** and transfer forces from the twist lock **350** heads designed to lift four *series 1 freight containers 226*.

Take note that the twist lock heads are toward the vertical centerline of the *x-clip 434*. This allows adjacent *x-clip 434* bundles to be stacked tightly; the *x-clip 434* does not  
2715 protrude beyond the sides of the *series 1 freight containers 226*.

To maintain structural rigidity, structural stiffeners for cargo clip **398** are placed at structurally mandated intervals and sized accordingly.

2720 Structurally attached lashing rods **362** may clip into lashing rod tension clips **376** while stowed away in closed position. Bent portion of lashing rod **374** enabling neat stowage without interfering with the structurally attached lashing rods **362** in the middle portion of the *x-clip 434*.

2725 Modified, bent, and structurally attached twist lock open and closing arms for tool use **366** slide left or right and are driven by a ring **368** attached to rod **367** in slotted pipe **370** structurally attached to *x-clip 434* structural flanges **365**. Ends of slotted pipes **372** are where longshoreman may use a tool to push the rods **367**.

2730 Structurally attached structural rings **356** at twist locks **330** enable the free movement of structurally attached lashing rods **362** via a structural ring **358**.

A pivoting end of lashing rod **388** is shown. Removable rods and cotter pins **382** enable quick length adjustments via holes **384** in a U-shaped termination of structurally attached lashing rod **380**. Anchor shackle screws pins, and/or bolts could be substituted  
2735 for removable rods and cotter pins **382**.

The pivoting end of lashing rod **388** has threads **390** that enable fine-tuned adjustments with the elongated O-shaped, threaded tightening section of pivoting end of lashing rod **392**.  
2740

The bent portion of pivoting end of lashing rod **386** allows for neat stowage.

Towards the end of the O-shaped, threaded tightening section of pivoting end of lashing rod **392** is a thickened end of rod **394** which enables an O-shaped tightening section to rotate while a U-shaped end of a pivoting end of a lashing rod **396** remains in place on  
2745 the ship's deck.

Lastly, a wire tie **378** is used to keep pivoting end of lashing rod **388** upright and neatly stowed away when not in use.  
2750

**Fig. 70** displays a perspective view of an *x-clip* **434** with structurally attached lashing rods **362**.

2755 To help distribute loads and provide stiffness two, structural gusset plates for *cargo clip* **354** are structurally attached. These gussets are structurally connected to thickened structural members **364** and transfer forces from the twist lock heads **350** designed to lift four *series 1 freight containers* **226**.

2760 Take note that the twist lock heads are toward the vertical centerline of the *x-clip* **434**. This allows adjacent *x-clip* **434** bundles to be stacked tightly; the *x-clip* **434** does not protrude beyond the sides of the *series 1 freight containers* **226**.

To maintain structural rigidity, structural stiffeners for cargo clip **398** are placed at  
2765 structurally mandated intervals and sized accordingly.

Structurally attached lashing rods **362** may clip into lashing rod tension clips **376** while stowed away in closed position. Bent portion of lashing rod **374** enables neat stowage without interfering with the structurally attached lashing rods **362** in the middle portion of the *x-clip* **434**.

2770

Modified, bent, and structurally attached twist lock open and closing arms for tool use **366** slide left or right and are driven by a ring **368** attached to rod **367** in slotted pipe **370** structurally attached to *x-clip* **434** structural flanges **365**. Ends of slotted pipes **372** are where longshoreman may use a tool to push the rods **367**.

2775

Structurally attached structural rings **356** at twist locks **330** enable the free movement of structurally attached lashing rods **362** via a structural ring **358**.

2780 A pivoting end of lashing rod **388** is shown. Removable rods and cotter pins **382** enable quick length adjustments via holes **384** in a U-shaped termination of structurally attached lashing rod **380**. Anchor shackle screws pins, and/or bolts could be substituted for removable rods and cotter pins **382**.

2785 The pivoting end of lashing rod **388** has threads **390**, enabling fine-tuned adjustments with the elongated O-shaped, threaded tightening section of pivoting end of lashing rod **392**.

The bent portion of pivoting end of lashing rod **386** allows for neat stowage.

2790 Towards the end of the O-shaped, threaded tightening section of pivoting end of lashing rod **392** is a thickened end of rod **394** which enables an O-shaped tightening section to rotate while a U-shaped end of a pivoting end of a lashing rod **396** remains in place on the ship's deck.

2795 This embodiment utilizes a horizontal structural member **439** with bent tabs **442** which enable a forklift to pick up the *x-clip* **434** and guide it to two stacked *series 1 freight containers* **226** to match the two forklift openings at the upper container.

2800 Lastly, a wire tie **378** is used to keep pivoting end of lashing rod **388** upright and neatly stowed away when not in use.

**SEND OFF TO THE UNIVERSE:**

2805 There is no doubt about the experimental and pioneering nature of this work. Prior to filing this disclosure, naturally I could not consult the world's ports for worldwide patent reasons.

2810 Due to the massive capital expenditures and land ownership needed to make even one *cargo frame* and multi-level *encargo* and *decargo* structure, this has been a somewhat intellectual exercise.

2815 However, as an experienced registered architect, I am confident in the structures, teachings, and explicit drawings that depict my inventions. They will no doubt enable skilled persons to new lines of thinking and new dimensions to achieve 21<sup>st</sup> century global trade.

2820 I fully expect that the ultimate commercial *cargo frame*, port layout, *truck resort*, *truck tower*, barges, and ship structures will all need refinement and feedback from a myriad of users as they begin to be used and abused daily.

2825 Will the ultimate commercial *cargo frame* hold sixteen *series 1 freight containers* or will it hold four? Will the *cargo frame* have wheels affixed as shown in the preferred embodiment or will they be wheel-free to be used with port-side movement means? Will the wheeled embodiment weight outweigh the disadvantages due to a heavier ship? Will the heavier ship be a cost but the immense productivity of a ship that moves 100,000 TEU (roughly a four-fold increase in carrying capacity over the world's largest ships) outweigh those considerations?

2830 Only with my *cargo frame*, barges, ship hoist structure, docks, and two sets of rails could such a set of ships be used at the Panama Canal, slice through Thailand, bridge Türkiye, or make groundings like the Ever Given a thing of the past. One behemoth

vessel on one end of the rails and one on the other end. Can you IMAGINE seeing a train with sixteen *series 1 freight containers* in my new *cargo frame* freight car rolling  
2835 down the tracks? It will be a sight to see!

Will the International Organization for Standardization and International Maritime Organization prefer the *X-Clip cargo frame* because making tens of thousands of existing ships irrelevant might be too great a cost for the industry to bear? I just cannot  
2840 say. Or will modifications of existing cargo ships for the *cargo clip* be a cost worth bearing?

I expect the debate to be lively.

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**REFERENCE SIGNS LIST** (numbers are **bolded** in description)

|      |           |                                                       |
|------|-----------|-------------------------------------------------------|
|      | <b>10</b> | <i>3-axis hoist structure</i> and <i>3-axis hoist</i> |
|      | <b>11</b> | <i>columns</i> (for <i>3-axis hoist structure</i> )   |
| 2870 | <b>12</b> | bulk silo & <i>3-axis hoist</i>                       |
|      | <b>13</b> | <i>3-axis hoist structure</i>                         |
|      | <b>14</b> | <i>3-axis hoist</i>                                   |
|      | <b>15</b> | <i>cargo frame</i> tower bracing                      |
|      | <b>16</b> | draw bridge                                           |
| 2875 | <b>17</b> | ground-level                                          |
|      | <b>18</b> | second-level port platform                            |
|      | <b>20</b> | <i>cargo frame</i> dock                               |
|      | <b>22</b> | semi-truck queueing tower                             |
|      | <b>23</b> | <i>3-axis structure</i>                               |
| 2880 | <b>24</b> | <i>cargo frame cargo ship</i>                         |
|      | <b>26</b> | <i>cargo frame</i> barge                              |
|      | <b>28</b> | freight purgatory                                     |
|      | <b>30</b> | third-level bulk platform                             |
|      | <b>32</b> | <i>cargo frame</i> maintenance yard                   |
| 2885 | <b>33</b> | wireless control bollard & signal lights              |
|      | <b>34</b> | freight car transshipment yard                        |
|      | <b>35</b> | freight car spreader frame                            |
|      | <b>36</b> | semi-truck transshipment yard                         |
|      | <b>37</b> | freight well car                                      |
| 2890 | <b>38</b> | <i>cargo frame</i> turntable                          |
|      | <b>40</b> | <i>cargo frame</i>                                    |
|      | <b>41</b> | <i>cargo frame</i> rail car                           |
|      | <b>42</b> | access road for semi-trucks                           |
|      | <b>43</b> | return loop for semi-trucks                           |
| 2895 | <b>44</b> | exit road for semi-trucks                             |
|      | <b>46</b> | access rails from outside the port                    |
|      | <b>47</b> | freight train                                         |
|      | <b>48</b> | port                                                  |
|      | <b>49</b> | freight train engine                                  |
| 2900 | <b>50</b> | body of water                                         |

**REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

|      |           |                                             |
|------|-----------|---------------------------------------------|
|      | <b>51</b> | sea bluff                                   |
|      | <b>52</b> | land                                        |
|      | <b>54</b> | shoreline                                   |
| 2905 | <b>56</b> | return loop (for rail carts)                |
|      | <b>58</b> | brace beams at <i>cargo frame</i> turntable |
|      | <b>60</b> | motorized pivot                             |
|      | <b>62</b> | pit rail (for <i>cargo frame</i> turntable) |
|      | <b>64</b> | pit wall                                    |
| 2910 | <b>66</b> | pit (at <i>cargo frame</i> turntable)       |
|      | <b>68</b> | bulk drop                                   |
|      | <b>70</b> | bridge                                      |
|      | <b>72</b> | Puerto Peñasco, Mexico                      |
|      | <b>73</b> | proposed two sets of rails                  |
| 2915 | <b>74</b> | Yuma, Arizona                               |
|      | <b>76</b> | United States of America                    |
|      | <b>78</b> | Gulf of California                          |
|      | <b>79</b> | Caribbean Sea                               |
|      | <b>80</b> | Mexico                                      |
| 2920 | <b>81</b> | Panama                                      |
|      | <b>82</b> | Pacific Ocean                               |
|      | <b>83</b> | Columbia                                    |
|      | <b>84</b> | Great Bitter Lake                           |
|      | <b>85</b> | Costa Rica                                  |
| 2925 | <b>86</b> | Egypt                                       |
|      | <b>87</b> | Nicaragua                                   |
|      | <b>88</b> | Mediterranean Sea                           |
|      | <b>90</b> | Greece                                      |
|      | <b>92</b> | Black Sea                                   |
| 2930 | <b>93</b> | Türkiye                                     |
|      | <b>94</b> | Bulgaria                                    |
|      | <b>95</b> | Gulf of Thailand                            |
|      | <b>96</b> | Thailand                                    |
|      | <b>97</b> | Malaysia                                    |

- 2935 **REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)
- 98** Singapore
- 99** Andaman Sea
- 100** semi-truck tower loading area
- 2940 **102** semi-truck hoist
- 104** semi-truck tower position
- 106** rest and recreation floor
- 108** entry to semi-truck tower
- 110** semi-truck tower exit area
- 2945 **112** alpha-numeric characters for *semi-truck queueing tower* designation
- 114** alpha-numeric characters for *semi-truck queueing tower* column bays
- 116** embodiment of a 3-axis hoist
- 118** semi-truck exit from a *semi-truck queueing tower*
- 120** human elevator for *semi-truck queueing tower*
- 2950 **122** human fire exit stairs for *semi-truck queueing tower*
- 124** human safety railing for *semi-truck queueing tower*
- 128** bulk-cargo silo *cargo frame*
- 130** counterweight
- 132** semi-truck bays
- 2955 **133** semi-truck guide bumper
- 200** semi-truck queuing area
- 202** semi-truck and rail transshipment area
- 204** painted alpha-numeric characters near semi-truck loading bay
- 2960 **206** one set of rails
- 208** semi-truck spreader frame
- 209** spreader for (1) *series 1 freight container*
- 210** lane striping
- 212** rail cart queueing area (free from semi-trucks)
- 2965 **213** alpha-numeric character for terminal designation
- 214** four sets of rails for rail carts
- 216** passing lane for semi-trucks
- 218** two sets of rails for a *cargo frame*, (an electric third rail is not shown for clarity)

**REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

|      |            |                                                               |
|------|------------|---------------------------------------------------------------|
| 2970 | <b>220</b> | semi-truck                                                    |
|      | <b>221</b> | vehicle                                                       |
|      | <b>222</b> | rail cart loaded with <i>series 1 freight container</i>       |
|      | <b>224</b> | painted alpha-numeric characters at semi-truck loading bay    |
|      | <b>226</b> | <i>series 1 freight container</i>                             |
| 2975 |            |                                                               |
|      | <b>300</b> | motorized twist lock flap                                     |
|      | <b>302</b> | electric motor for twist lock flaps                           |
|      | <b>303</b> | <i>cargo frame</i> bay                                        |
|      | <b>304</b> | one set of rails in <i>cargo frame</i> bay                    |
| 2980 | <b>306</b> | rail cart                                                     |
|      | <b>305</b> | cell guide                                                    |
|      | <b>308</b> | pivoting rail bogie                                           |
|      | <b>309</b> | shortened axle rail bogie                                     |
|      | <b>310</b> | Extent of radius for pivoting rail bogie                      |
| 2985 | <b>311</b> | <b>optical</b> , motion & distance sensor                     |
|      | <b>313</b> | motorized shortened axle rail bogie                           |
|      | <b>314</b> | <i>cargo frame</i> beam                                       |
|      | <b>315</b> | <i>cargo frame</i> enlarged corner column                     |
|      | <b>316</b> | <i>cargo frame</i> column                                     |
| 2990 | <b>317</b> | specialized corner castings with corner twist lock rack slots |
|      | <b>318</b> | <i>cargo frame</i> brace                                      |
|      | <b>319</b> | <i>cargo frame</i> joist                                      |
|      | <b>320</b> | <i>cargo frame bottom beam</i>                                |
|      | <b>321</b> | enlarged <i>cargo frame</i> column (for twist lock mechanism) |
| 2995 | <b>322</b> | stationary twist lock flap                                    |
|      | <b>323</b> | gusset plates at stationary twist lock flap                   |
|      | <b>324</b> | structural gusset plate                                       |
|      | <b>326</b> | M1A1 Abrams tank                                              |
|      | <b>327</b> | rail coupling                                                 |
| 3000 | <b>328</b> | corner casting of <i>series 1 freight container</i>           |
|      | <b>330</b> | twist lock                                                    |
|      | <b>332</b> | motorized twist lock flap in open position                    |

**REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

- 334** vertical hinge and integral gear at twist lock flap
- 3005 **336** motor driven vertical axle that drives twist lock flaps at that particular column
- 338** drive shaft (for twist lock flap electric motor)
- 340** bevel gear
- 342** counter rotating gear (so both flaps open in opposite direction towards the centerline of the column)
- 3010 **344** clearance of twist lock and *series 1 freight container*
- 346** notch at larger entry columns and filler steel plates
- 350** twist lock head (designed to lift four *series 1 freight containers* when 2 *cargo clips* are employed)
- 352** enlarged slot (for twist lock & spreader designed to lift 4 *series 1 freight containers* when two *cargo clips* are employed)
- 3015 **354** structural gusset plate (for cargo clip)
- 356** structurally attached ring (at twist lock)
- 358** structural ring (to enable movement of lashing rod)
- 3020 **362** structurally attached lashing rod
- 364** thickened structural member (as required)
- 365** structural flanges
- 366** modified, bent and structurally attached twist lock open & closing arm for tool use
- 3025 **367** rod
- 368** ring attached to rod in slotted pipe to enable twist lock open & closing arms to maneuver while twist lock is fixed
- 370** slotted pipe structurally attached to *cargo clip* side walls
- 372** end of slotted pipe (to allow a rod to push left or right, enabling open & closing arms to maneuver)
- 3030 **374** bent portion of lashing rod
- 376** lashing rod tension clip
- 378** lashing rod wire tie to keep bent portion of lashing rod upright and neatly stowed away
- 3035 **380** u-shaped termination of lashing rod where holes enable the pivoting portion to adjust to length

**REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

- 382** removable rods and cotter pins
- 384** holes (in U-shaped termination of lashing rod)
- 3040 **386** bent portion of pivoting end of lashing rod
- 388** pivoting end of lashing rod
- 390** threaded end of lashing rod
- 392** elongated O-shaped, threaded tightening section (of pivoting end of lashing rod)
- 394** thickened end of rod (which enables a tightening O-shaped tightening section to
- 3045 pivot while a U-shaped end of a pivoting end of a lashing rod remains in place on the ship's deck)
- 396** U-shaped portion of pivoting end of lashing rod
- 398** structural stiffener (for *cargo clip*)
- 399** castellations for (*cargo clip*)
- 3050 **400** *cargo clip*
- 402** outline of cell guide end walls of prior art cargo ship hold
- 404** dashed outline shows a removed cell guide (which provides space for the *cargo clip*)
- 406** cell guide to remain in place
- 3055 **408** removed cell guide & old position provides space for *cargo clip*
- 410** modified, bent and structurally attached twist lock open & closing arm for hand use
- 412** arced slot (for modified & bent, structurally attached twist lock open & closing arm for hand use)
- 3060 **414** enlarged twist lock heads ensure positive connection at “shield” opening in *series 1 freight container* corner casting
- 416** cut profile opening in *cargo clip* enables tight fitting twist locks which are welded in place
- 418** bent edge of *cargo clip*
- 3065 **420** twist lock flush with *series 1 freight container* face enables prior art opening & closing arms to remain
- 422** **autonomous** *cargo clip* rail cart

3070

**REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

- 3075 **424** *control box* (comprising: wireless receiver, microcontroller further comprising: a central processing unit, random access memory, read only memory, internal oscillator, i/o ports, peripheral controller chips, analogue to digital converters, digital to analogue converters, numerous data capture & modules, flash program memory, program code, and more)
- 426** electric motor for *cargo clip* rail cart gear box
- 428** gear box for *cargo clip* rail cart
- 430** gusset plate at *cargo clip* rail cart
- 3080 **432** rail wheelset
- 434** *x-clip*
- 436** modified twist lock head designed to lift 2 *series 1 freight containers* (when 2*x-clips* are used)
- 438** structurally attached x-bracing
- 3085 **439** **horizontal** structural member
- 440** structural stiffener for *x-clip*
- 442** bent tab (for opening forklift at *x-clip*)
- 460** autonomous, wheeled cart (for port-side *bundle*)
- 462** guide bumpers (for cargo frame)
- 3090 **464** recess for motion & distance sensor
- 466** wheel & tire
- 468** rotating wheel sets
- 470** structural frame for autonomous cart
- 472** electric motor for autonomous cart
- 3095 **474** gear box for autonomous cart
- 476** battery for autonomous cart
- 478** spreader frame for 4 *series 1 freight container cargo frame*
- 480** hydraulic ram
- 482** elevator pit
- 3100 **484** ellipsoid column guide bumper
- 486** elevator lift platform
- 488** safety rail
- 490** port-side *bundle*
- 492** port-side *bundle* structure

3105 **REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

- 494** hydraulic elevator
- 495** column
- 496** beam
- 497** brace
- 3110 **498** structural floor platform
- 500** *lobster claw*
- 502** *lobster claw* dock piling
- 504** *lobster claw* clamping rod
- 3115 **505** *lobster claw* clamping rod recess
- 506** outer hull of three-hull *cargo frame* barge
- 508** inner hull of three-hull *cargo frame* barge
- 510** barge bumper
- 511** ellipsoid outrigger
- 3120 **512** lifting deck for *cargo frame* barge
- 514** *cargo frame* cargo ship structure
- 516** *cargo frame cargo ship* hull shown underwater
- 518** motorized platform
- 520** *cargo frame* barge bracing
- 3125 **522** adjustment holes
- 524** *cargo frame* barge column
- 526** extendable and retractable structural outrigger
- 528** geared rollers
- 530** rack
- 3130 **532** electric motor and pinion
- 534** structural guide beam
- 536** *lobster claw* thumb
- 538** *lobster claw* finger
- 540** *hydraulic piston*
- 3135 **542** *lobster claw* pivot section
- 544** armature with pivot rod
- 546** bearings and pin
- 548** structural flange with pin hole

**REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

- |      |            |                                                          |
|------|------------|----------------------------------------------------------|
| 3140 | <b>600</b> | radiused guide plate                                     |
|      | <b>602</b> | electric motor for pivoting rail bogie                   |
|      | <b>604</b> | bearings in radiused configuration                       |
|      | <b>606</b> | <i>orange slice chassis</i> upper portion                |
|      | <b>608</b> | <i>orange slice chassis</i> lower portion                |
| 3145 | <b>610</b> | spring and guide rods                                    |
|      | <b>612</b> | central structural pin with threaded end                 |
|      | <b>614</b> | locking nut                                              |
|      | <b>616</b> | suspension springs                                       |
|      | <b>618</b> | rail wheel set                                           |
| 3150 | <b>620</b> | side frame                                               |
|      | <b>622</b> | main crossbeam                                           |
|      | <b>624</b> | guide rollers                                            |
|      | <b>626</b> | angled crossbeam bearing plates                          |
|      | <b>628</b> | semi-geared ring                                         |
| 3155 | <b>630</b> | gear                                                     |
|      | <b>632</b> | slot for gear bolt                                       |
|      | <b>634</b> | drive gear                                               |
|      | <b>636</b> | electric motor and driveshaft                            |
|      | <b>638</b> | radiused slots                                           |
| 3160 | <b>640</b> | roller plate                                             |
|      | <b>642</b> | semi-geared ring cutout                                  |
|      | <b>644</b> | filler steel                                             |
|      | <b>646</b> | rail                                                     |
|      | <b>648</b> | rail tie                                                 |
| 3165 | <b>650</b> | upper ballast                                            |
|      | <b>652</b> | lower ballast                                            |
|      | <b>654</b> | earth                                                    |
|      | <b>656</b> | outline of additional steel                              |
| 3170 | <b>700</b> | electric cable track                                     |
|      | <b>702</b> | collapsible braces and bearings                          |
|      | <b>704</b> | structural guide for collapsible braces & bearings beams |

**REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

- 706** retracting, extending roller beams
- 3175 **708** structural outriggers
- 710** rack
- 712** hoist cables
- 714** corner hoist lift mechanism
- 716** electric motor, and pinion
- 3180 **718** structural rolling plate
- 720** structural stiffeners (shown dashed)
- 722** c-shaped structural channel, and roller bearings
- 724** guide track for c-shaped structural channel
- 726** hydraulic piston
- 3185 **727** sliding structural arms (for electrically actuated twist locks)
- 728** electrically actuated twist lock
- 729** structural mounting plate for electrically actuated twist locks
- 730** corner guide rail rollers
- 731** corner guide rail
- 3190 **732** electric motor for *cargo frame* hoist
- 734** rolling platform for *cargo frame* hoist
- 736** structural arched framing members
- 738** notch in structural rolling plates for corner hoist lift mechanism to extend to
- 739** notch in chassis for sliding structural arms for electrically actuated twist locks
- 3195 **740** electric motor and pinion for rolling platform for cargo hoist
- 742** gear box for *cargo frame* hoist drive axle
- 744** beveled gears which drive the corner hoist lift mechanism
- 748** intermediary geared axle to reverse gear direction so all four corner hoist lift mechanisms lift in same direction
- 3200 **750** drive axle for main *cargo frame* hoist
- 752** bearings for *cargo frame* hoist drive axle
- 754** pulleys at top of *cargo frame* hoist column
- 756** structural side plates for pulleys at *cargo frame* hoist column
- 758** counterweight roller axle for *cargo frame* hoist
- 3205 **760** arched ladder for stevedores (not shown for clarity)
- 762** drive belts at corner arched *cargo frame* hoist rolling platform

**REFERENCE SIGNS LIST – continued** (numbers are **bolded** in description)

- 764** reserve structural length of sliding structural arms for electrically actuated twist locks
- 3210 **766** gear housing, and motor for electrically actuated twist locks
- 768** structural guide plate for sliding structural arms
- 770** structural plates for corner guide rail rollers
- 772** chassis for corner hoist lift mechanism
- 774** guide structure for counterweight
- 3215 **778** electric power rail
- 780** insulated electric power line
- 782** roller pins in notch in chassis for sliding structural arms for electrically actuated twist locks
- 784** twist lock rack
- 3220 **786** counterweight spindle and clutch
- 788** governor
- 790** spindle
- 794** adjust to fit slot
- 796** hoist cable stops
- 3225
- 3230

**CLAIMS GLOSSARY**

(Specific claim terms are in *italics* throughout this disclosure. These claim terms represent an overview; for a richer understanding of these consistent terms consult the description and drawings.)

3235    *autonomous rail cart*    A cart for conveying *series 1 freight containers*, and/or cargo frames via rail. The cart is mechanized with an electric motor and wireless *control box*. The cart is sized so that it does not protrude beyond the container or *cargo frame* in plan view such that it does not consume space beyond that which it carries.

3240

It may utilize an electric third rail, or be battery operated.

The cart may have twist locks in corresponding places to the containers, or utilize *guide bumpers* for *cargo frames*.

3245

*bundle (ed, ing)*    A fully loaded *cargo frame*.

3250

The act of binding a *plurality* of cargo together wherein the *bundle* can be moved in one action versus the equivalent number of actions required to move the bound cargoes individually.

*bulk-cargo (es)*    A species of *cargo frame* which houses a vessel suitable for *cargo frames* holding dry-bulk or liquid bulk cargoes

3255

*cargo frame (s)*    A structural frame with means for *bundling* a *plurality* of cargo greater than what is contained in one *series 1 freight container* to said structural frame wherein the frame resists gravity, uplift, lateral, tension, and compression loads. The *cargo frame* is a

3260

genus.

*cargo frame*    A railroad turntable with two sets of rails to accommodate a

- 3265     *turntable (s)*     *cargo frame* outfitted with rail bogies. The two sets of rails are structurally connected with bracing to ensure the two sets of rails remain parallel.
- 3270     *cargo clip (s)*     A species of *cargo frame* that binds four *series 1 freight containers* along a central axis, at each end, and provides a plurality of slots at the top of the *cargo clip* for specialized crane attachments to lift the *bundle* of cargo. The lifting slots are separate from the corner castings and together are designed to lift the equivalent of four fully loaded *series 1 freight containers* along with a reasonable margin of safety.
- 3275     *control box (es)*     An encased receiver which may be wired, and/or wireless, a microcontroller further comprising: a central processing unit, random access memory, read only memory, internal oscillator, i/o ports, peripheral controller chips, analogue to digital converters, digital to analogue converters, numerous data capture & modules, flash program memory, program code, and more.
- 3280     *control box (es)*     The *control box* is used to coordinate the movements of the following, but not limited to: *cargo frames*, *autonomous rail carts*, *cargo frame barges*, *cargo frame cargo ships*, hand-held devices, smart phones, *3-axis hoists*, *cargo frame towers*, *cargo frame turntables*, *independent three-hull barges* and other apparatus part of the *system for cargo transport*.
- 3285     *encargo (ed, ing)*     To load cargo.
- 3290     *decargo (ed, ing)*     To unload cargo.
- 3295     *guide bumper (s)*     A structural angled guide which is used to accommodate error when aligning a *cargo frame to an autonomous cart*, or an *autonomous cart* to a *port-side bundle structure*, or a semi-truck bulk-cargo trailer to a bulk-cargo deposit hole.

3300     *independent*     A barge with three independent hulls. The larger, wider center  
                 *three-hull barge (s)* hull is where cargoes are carried. The two outer hulls are  
                 extendable and retractable. The barge has two states, extended  
                 and retracted, which allow the barge to get close to vessels,  
                 and/or docks, convey cargoes to the center hull and then extend  
3305     the hull from retracted state to extended state. In this manner, a  
                 barge can achieve higher stability for heavy loads of cargo where  
                 a single hull would prove less stable.

                 This barge may be outfitted with columns, bracing, and *lobster*  
3310     *claws*.

*lobster claw (s)*     An extendable and retractable mechanical arm with two curved  
                 opposing claws which mechanically grip vertically disposed  
                 *lobster claw clamping rods* or *lobster claw dock pilings* and  
3315     enable a vessel to lock to a dock or other vessel, convey cargoes  
                 to a dock, and/or from one vessel to another and when the time is  
                 appropriate begin loosening the grip of the claws, similar to a  
                 firefighter descending a firefighter's pole, where the loaded  
                 vessel may be lowered into the water to smoothly find its final  
3320     displacement. The arm may be structurally attached to an outer  
                 hull of an *independent three-hull barge*.

                 There are two currently contemplated scenarios for the  
                 extendable, and retractable mechanical arm:

3325     First, the extendable, and retractable mechanical arm pushes one  
                 vessel apart from the other such that an *independent three-hull*  
                 *barge* may transition from a retracted state to an extended state  
                 thereby providing equal stabilization from the opposing outer  
                 hull. The in-use *lobster claw* may then release as mentioned  
3330     above. In this manner, the outer hulls may provide a wider area  
                 of stability but also retract and enable close conveyance of cargo.

|      |                                      |                                                                                                                                                                                                                                                                                                                                                                                                       |
|------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                      | This is useful for in-water transfers where the barge does not have stability from the opposing side of vessel it clamps to.                                                                                                                                                                                                                                                                          |
| 3335 |                                      | Second, the extendable and retractable mechanical arms may grip <i>lobster claw dock pilings</i> on both sides of the <i>independent three-hull barge</i> for conveyance of cargoes. This is useful for in-water transfers where the dock does not have a <i>lobster claw clamping rod</i> at the upper portion of the <i>independent three-hull barge</i> where a <i>lobster claw</i> may be placed. |
| 3340 |                                      |                                                                                                                                                                                                                                                                                                                                                                                                       |
|      |                                      | <i>Lobster claws</i> are mounted to columns on the <i>independent three-hull barge</i> and may be manually adjusted vertically with slotted holes and bolts, or through mechanized means using rack and pinion, or <i>3-axis hoists</i> .                                                                                                                                                             |
| 3345 |                                      |                                                                                                                                                                                                                                                                                                                                                                                                       |
|      | <i>lobster claw clamping rod (s)</i> | A vertically disposed structural rod meant to be clamped by a <i>lobster claw</i> . The rod is designed to withstand moment loads, torsion and other forces related to wave events acting on two vessels attached to each other in a body of water.                                                                                                                                                   |
| 3350 |                                      |                                                                                                                                                                                                                                                                                                                                                                                                       |
|      |                                      | The <i>lobster claw clamping rod</i> may be attached to a vessel, or a dock piling, quay or other structure capable of withstanding the forces contemplated.                                                                                                                                                                                                                                          |
| 3355 |                                      |                                                                                                                                                                                                                                                                                                                                                                                                       |
|      | <i>lobster claw dock piling (s)</i>  | A species of <i>lobster claw clamping rods</i> which are structurally attached to the dock piling and form an integral part of the dock piling.                                                                                                                                                                                                                                                       |
| 3360 |                                      |                                                                                                                                                                                                                                                                                                                                                                                                       |
|      | <i>orange slice chassis</i>          | A structural chassis for a <i>pivoting rail bogie</i> that has a circular exterior plan profile and is divided in pie slice-like parts, similar to an orange slice. These slices are structural and provide areas for motors and other apparatus.                                                                                                                                                     |
| 3365 |                                      |                                                                                                                                                                                                                                                                                                                                                                                                       |

- 3370 *pivoting rail bogie (s)* A rail bogie comprising a control box, a mechanized means for rotation, a pair of wheelsets and a pivoting means wherein, when lifting by a *3-axis hoist* the rail bogie may pivot to change direction when conveying in a *cargo frame cargo ship* or a *cargo frame dock* or other situations where a *cargo frame* turntable is too large for practicality.
- plurality* Two or more.
- 3375 *semi-truck queueing tower (s)* A structural tower with hoists and platforms capable of lifting a fully loaded semi-truck. The tower is arranged in a fashion that flows with traffic and may have two-level connections such that a ground floor and a second floor may service the tower. This enables rapid deployment of semi-trucks. The exit for the semi-trucks is in the same direction as the semi-truck entered, thereby eliminating the space required to back up.
- 3380
- 3385 The tower may have a rest and recreation floor including but not limited to: a café, a convenience store, a bathroom, a medical professional, a game room, a reading area, a work-out area, a dental professional, a laundromat, and a massage therapist.
- 3390 *x-clip (s)* A species of *cargo frame* that binds two *series 1 freight containers*, at each end, and provides a plurality of slots at the top of the *x-clip* for specialized crane attachments to lift the *bundle* of cargo. Having an “x” shape in elevation view and outfitted with lifting slots that are separate from the corner castings of the containers and together are designed to withstand the equivalent of two fully loaded *series 1 freight containers* along with a reasonable margin of safety.
- 3395
- 3-axis hoist (s)* A means to lift or descend *cargo frames* in the z-axis in a *3-axis hoist structure*.

3400 Starting at the top the hoist utilizes a central motorized axle that drives four corner hoist lift mechanisms. Pulleys and gears are used to transfer the axle rotation to the corners of the *3-axis hoist structure* so that a *cargo frame* may be moved from one level to the another. The *corner hoist lift mechanism* utilizes a motion, optical, and distance sensor to communicate with the motorized axle so that the motor stops at the appropriate bay in the 3-axis hoist. Then the *corner hoist lift mechanism* deploys the twist lock rack to engage the *corner twist lock rack slots*.

3410 Once engaged and locked the hoist continues with its instructions to move up or down in a given column bay.

*3-axis hoist structure* A structure that enables 3-axis movements of *cargo frames*.

3415 It comprises structural beams, columns, collapsible beams, rack and pinion, an orthogonal layout of two sets or rails.

The x and y axis movements are achieved by the motorized rail bogies of the *cargo frame*. Batteries may be onboard the cargo frame, or an electric third rail may be employed for power requirements.

3420 If it is desired to change from the x to the y, or vice versa direction, a *corner hoist lift mechanism* engages, locks and lifts a *cargo frame* up off the rails, and the *pivoting rail bogies* turn to the desired axis.

3430 These instructions may be set in pre-coded software or a stevedore may direct the *cargo frame*. Both the *cargo frame* and *corner hoist lift mechanism* communicate via a *control box* on each device.

**CITATION LIST**

3435 The following is a tabulation of some prior art that presently appears relevant.

| <b>U.S. Patents</b> |                                     |                  |                   |                 |
|---------------------|-------------------------------------|------------------|-------------------|-----------------|
|                     | <b>Patent Number</b>                | <b>Kind Code</b> | <b>Issue Date</b> | <b>Patentee</b> |
|                     | <b>(Cargo Frames)</b>               |                  |                   |                 |
| 3440                | US 9,637,305                        | B2               | 2017-05-02        | Fredette et al. |
|                     | US 9,359,129                        | B1               | 2016-06-07        | Royt            |
|                     | US 6,363,586                        | B1               | 2002-04-02        | Neufingerl      |
|                     | <b>(Cranes, Barges &amp; Ships)</b> |                  |                   |                 |
| 3445                | US 9,359,047                        | B2               | 2016-06-07        | Steven et al.   |
|                     | US 10,308,327                       | B1               | 2019-06-04        | Van Loon et al. |
|                     | US 5,8332,856                       |                  | 1998-11-10        | Giles           |
|                     | US 6,537,009                        | B1               | 2003-03-25        | Le Lan et al.   |
|                     | US 7,665,945                        | B2               | 2010-02-23        | Di Rosa         |
| 3450                | US 7,686,558                        | B2               | 2010-03-30        | Tian et al.     |
|                     | US 7,004,707                        | B2               | 2006-02-28        | Suksi           |
|                     | US 8,523,490                        | B2               | 2013-09-03        | Wilkinson, Jr.  |
|                     | <b>(Cargo Hoist)</b>                |                  |                   |                 |
| 3455                | US 11,273,984                       | B2               | 2022-03-15        | Heide et al.    |
|                     | US 10,913,641                       | B2               | 2021-02-09        | Gravelle et al. |
|                     | US 5,707,199                        |                  | 1998-01-13        | Faller          |
|                     | US 7,729,797                        | B2               | 2010-0601         | Akamatsu et al. |
|                     | US 10,597,229                       | B2               | 2020-03-24        | Pedrazzini      |
| 3460                | US 10,926,950                       | B2               | 2021-02-23        | Goetz           |
|                     | US 9,181,067                        | B1               | 2015-11-15        | Nyren et al.    |
|                     | US 2,456,104                        |                  | 1948-12-14        | Andersen        |

**U.S. Patent Application Publications**

|      | <b>Patent Number</b>  | <b>Kind Code</b> | <b>Issue Date</b> | <b>Patentee</b>  |
|------|-----------------------|------------------|-------------------|------------------|
|      | <b>(Cargo Frames)</b> |                  |                   |                  |
| 3465 | US 2021/0380339       | A1               | 2021-12-04        | Austrheim et al. |



3500 EP 0 898 033 B1 2003-06-11 Nussbaum

### Nonpatent Literature Documents

(Cargo frames)

<https://www.vsnb.com/container-twist-lock>

3505 <https://www.claimsjournal.com/news/international/2021/04/27/303404.htm>

(Cranes, Barges & Ships)

Tom Bebbington, November 9, 2017, "50,000 TEU... the Future or Not?"

<https://www.maritime-executive.com/editorials/50000-teu-the-future-or-not>

3510 <https://www.maritime-executive.com/article/video-china-s-first-24-000-teu-containership-delivered-to-evergreen>

<https://www.wsj.com/articles/suez-canal-traffic-resumes-slowly-as-some-ships-weigh-anchor-others-wait-11617100102>

3515 Levinson, Marc, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger*, (Princeton, NJ), pp. 68, 191.

<https://www.wsj.com/articles/with-container-ships-getting-bigger-maersk-focuses-on-getting-faster-11545301800>

<https://www.cnn.com/2021/12/04/how-amazon-beats-supply-chain-chaos-with-ships-and-long-haul-planes.html>

3520 <https://theconversation.com/mystery-of-the-cargo-ships-that-sink-when-their-cargo-suddenly-liquefies-101158>

[https://www.nber.org/system/files/working\\_papers/w23581/w23581.pdf](https://www.nber.org/system/files/working_papers/w23581/w23581.pdf)

(Cargo Hoist)

3525 <https://morallift.en.made-in-china.com/product/dMZQpyYPfjak/China-Vertical-3-Axis-Movement-Man-Lift.html>

(Autonomous vehicles)

<https://autonomous-driving.org/2019/01/25/positioning-sensors-for-autonomous-vehicles/>

3530 vehicles/

(General trade)

<https://ustr.gov/countries-regions/china-mongolia-taiwan/peoples-republic-china>

(Lashing rods)

3535 <https://www.youtube.com/watch?v=jlF5fJKcigQ>

(Ports)

<https://www.cbsnews.com/losangeles/news/long-beach-eases-rules-on-container-stacking-to-ease-the-backlog-of-cargo-ships-waiting-to-unload/>

3540 Notteboom, Theo and Pallis, Athanasios and Rodrigue, Jean-Paul (2022). Port Economics, Management and Policy, Abingdon, United Kingdom: Routledge, pp. 119.

<https://www.bloomberg.com/news/articles/2021-09-23/containers-piling-up-at-u-s-rail-yards-add-to-port-strains>

3545 <https://www.seanews.com.tr/24-000-teu-boxships-would-weigh-heavily-on-infrastructure-costs/136140/>

<https://www.ars.usda.gov/research/publications/publication/?seqNo115=328459>

<https://kentico.portoflosangeles.org/getmedia/07e1377d-b452-4ecb-a629-9a0c69410805/pola-facilities-map>

3550 <https://www.freightwaves.com/news/city-of-long-beach-allows-logistics-companies-to-stack-containers-higher>

<https://www.reuters.com/business/autos-transportation/railroad-cargo-backups-threaten-new-logjam-los-angeles-port-chief-2022-07-13/>

(Freight trains)

3555 <https://onlinepubs.trb.org/onlinepubs/trnews/trnews246.pdf>

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**Claims**

3570 I claim:

1) In the field of intermodal shipping an apparatus called a *cargo frame* used to form a *bundle* of cargo comprising:

3575 a structural frame designed resist gravity, lateral, tension and compression loads;  
a means for *bundling* a *plurality* of cargo to said structural frame.

2) The *cargo frame* of claim 1 wherein said structural frame is made of steel.

3580 3) The *cargo frame* of claim 1 wherein said structural frame is made of  
composite material.

4) The *cargo frame* of claim 1 wherein said structural frame is made of carbon  
fiber.

3585 5) The *cargo frame* of claim 1 wherein said means for *bundling* are twist locks.

6) The *cargo frame* of claim 1 wherein said means for *bundling* are semi-  
automatic twist locks.

3590 7) The *cargo frame* of claim 1 wherein said means for *bundling* are automatic  
twist locks.

8) The *cargo frame* of claim 1 wherein said means for *bundling* are electrically  
actuated twist locks.

3595 9) The *cargo frame* of claim 1 wherein said means for *bundling* are a slot  
comprising:

3600 a *plurality* of upright structural columns, and bracing mounted to said  
structural frame having a *plurality* of reentrant corners wherein a  
*plurality* of *series 1 freight containers* may be aligned and stacked  
forming a tier.

- 10) The *cargo frame* of claim 1 wherein said structural frame is comprised of:  
a *plurality* of beams;  
3605 a *plurality* of columns;  
a *plurality* of joists;  
said *plurality* of beams, columns, and joists form a stackable level  
wherein each said level may be further divided into orthogonal *cargo*  
*frame* bays sized for the tight stowage of *series 1 freight containers*.  
3610
- 11) The *cargo frame* of claim 1 wherein said structural frame is comprised of:  
a *plurality* of beams;  
a *plurality* of columns;  
3615 a *plurality* of joists;  
said *plurality* of beams, columns, and joists form a level wherein each  
said level may be further divided into orthogonal *cargo frame* bays for  
the tight stowage of *series 1 freight containers*.
- 12) The *cargo frame* of claim 1 wherein said structural frame is comprised of:  
3620 a *plurality* of *cargo frame* bays sized for the tight stowage of *series 1*  
*freight containers*;  
said structural frame is designed to accommodate a gross weight  
maximum for each said *plurality* of *cargo frame* bays enabling said  
structural frame to be rated to carry a corresponding multiple of weight;  
3625 said *cargo frame* bays may be sized according to cargoes carried so long  
as the equivalent number of *cargo frame* bays do not exceed the rated  
weight capacity of said *plurality* of *cargo frame* bays.
- 13) The *cargo frame* of claim 1 wherein said structural frame is comprised of:  
3630 a *plurality* of beams oriented in a substantially planar manner having a  
top side, a *plurality* of sides and a bottom side, wherein said top side  
provides structure for a *plurality* of *series 1 freight containers* to be  
stacked in a *plurality* of *tiers*.

- 3635 14) The *cargo frame* of claim 1 wherein said structural frame is a modular,  
standardized *cargo frame* comprised of:  
a first *plurality* of *cargo frame* bays sized for the tight stowage of *series 1 freight containers* wherein it could be said the *cargo frame* carries a  
predetermined number of *series 1 freight containers*, and a first outer  
3640 standardized set of dimensions;  
said predetermined number of *series 1 freight containers* further having a  
gross weight rating set by ISO 668 wherein an overall weight rating of  
said *cargo frame* would be a multiple of the predetermined number of  
*series 1 freight containers*.
- 3645 15) The *cargo frame* of claim 13 wherein said structural frame utilizes  
differently sized *cargo frame* bays comprised of:  
a corresponding second outer standardized set of dimensions that  
matches said first outer standardized set of dimensions wherein a second  
3650 plurality of *cargo frame* bays are resized to accommodate cargoes other  
than *series 1 freight containers*, and do not exceed a gross weight  
multiple of said predetermined number of *series 1 freight containers*.
- 3655 16) The *cargo frame* of claim 1 wherein said structural frame is a modular,  
standardized *cargo frame* comprised of:  
a *plurality* of *cargo frame* bays sized for the tight stowage of *series 1 freight containers* wherein it could be said the *cargo frame* carries four  
*series 1 freight containers*, and an outer standardized set of dimensions;  
said predetermined number of *series 1 freight containers* further having a  
3660 gross weight rating set by ISO 668 wherein an overall weight rating of  
said *cargo frame* would be a multiple of four *series 1 freight containers*.
- 3665 17) The *cargo frame* of claim 1 wherein said structural frame is a modular,  
standardized *cargo frame* comprised of:  
a *plurality* of *cargo frame* bays sized for the tight stowage of *series 1 freight containers* wherein it could be said the *cargo frame* carries six  
*series 1 freight containers*, and an outer standardized set of dimensions;

3670 said predetermined number of *series 1 freight containers* further having a gross weight rating set by ISO 668 wherein an overall weight rating of said *cargo frame* would be a multiple of six *series 1 freight containers*.

18) The *cargo frame* of claim 1 wherein said structural frame is a modular, standardized *cargo frame* comprised of:

3675 a plurality of *cargo frame* bays sized for the tight stowage of *series 1 freight containers* wherein it could be said the *cargo frame* carries eight *series 1 freight containers*, and an outer standardized set of dimensions; said predetermined number of *series 1 freight containers* further having a gross weight rating set by ISO 668 wherein an overall weight rating of said *cargo frame* would be a multiple of eight *series 1 freight containers*.

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19) The *cargo frame* of claim 1 wherein said structural frame is a modular, standardized *cargo frame* comprised of:

3685 a plurality of *cargo frame* bays sized for the tight stowage of *series 1 freight containers* wherein it could be said the *cargo frame* carries nine *series 1 freight containers*, and an outer standardized set of dimensions; said predetermined number of *series 1 freight containers* further having a gross weight rating set by ISO 668 wherein an overall weight rating of said *cargo frame* would be a multiple of nine *series 1 freight containers*.

3690 20) The *cargo frame* of claim 1 wherein said structural frame is a modular, standardized *cargo frame* comprised of:

3695 a plurality of *cargo frame* bays sized for the tight stowage of *series 1 freight containers* wherein it could be said the *cargo frame* carries twelve *series 1 freight containers*, and an outer standardized set of dimensions; said predetermined number of *series 1 freight containers* further having a gross weight rating set by ISO 668 wherein an overall weight rating of said *cargo frame* would be a multiple of twelve *series 1 freight containers*.

3700 21) The *cargo frame* of claim 1 wherein said structural frame is a modular, standardized *cargo frame* comprised of:

3705 a plurality of *cargo frame* bays sized for the tight stowage of *series 1 freight containers* wherein it could be said the *cargo frame* carries sixteen *series 1 freight containers*, and an outer standardized set of dimensions;

3710 said predetermined number of *series 1 freight containers* further having a gross weight rating set by ISO 668 wherein an overall weight rating of said *cargo frame* would be a multiple of sixteen *series 1 freight containers*.

22) The *cargo frame* of claim 1 wherein said structural frame has a lifting means comprised of:

a specialized corner casting with a plurality of twist lock rack slots.

3715 23) The *cargo frame* of claim 1 wherein said structural frame has a lifting means comprised of:

3720 a specialized corner casting with a plurality of twist lock rack slots; said *cargo frame* having four corner columns wherein two said specialized corner castings with a plurality of twist lock rack slots are placed in an upper portion, and a lower portion of said four corner columns, enabling a hoist to lift said *cargo frame* in a stable manner.

24) The *cargo frame* of claim 1 wherein said structural frame has a locking means for *series 1 freight containers* comprised of:

3725 a twist lock flap.

25) The *cargo frame* of claim 1 wherein said structural frame has a locking means for *series 1 freight containers* comprised of:

3730 a motorized twist lock flap.

26) The *cargo frame* of claim 1 wherein said structural frame has a locking means for *series 1 freight containers* comprised of:

a pivoting, motorized twist lock flap.

- 3735 27) The *cargo frame* of claim 1 wherein said structural frame has a locking means for *series 1 freight containers* comprised of:  
a stationary twist lock flap.
- 3740 28) The *cargo frame* of claim 1 wherein said structural frame has a locking means for *series 1 freight containers* comprised of:  
an electrically actuated, stationary twist lock flap.
- 3745 29) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:  
a plurality of rail bogies.
- 3750 30) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:  
a plurality of motorized rail bogies.
- 3755 31) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:  
a plurality of motorized rail bogies;  
a control box.
- 3760 32) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:  
a plurality of motorized rail bogies;  
a motion sensor.
- 3765 32) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:  
a plurality of motorized rail bogies;  
an optical sensor.
- 3765 33) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:  
a plurality of motorized rail bogies;

a distance sensor;

3770

34) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:

a plurality of rail bogies having coupling enabling the chaining of one *cargo frame* to another.

3775

35) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:

an autonomous cart with a plurality of wheels with tires wherein said cart is sized to match the outer dimensions of said cargo frame when taken from a plan view orientation enabling said cargo frame to be tightly stored along with said movement means.

3780

36) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:

an autonomous cart wherein said cart is sized to match the outer dimensions of said *cargo frame* when taken from a plan view orientation enabling said *cargo frame* to be tightly stored along with said movement means;  
a control box.

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3790

37) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:

an autonomous cart wherein said cart is sized to match the outer dimensions of said *cargo frame* when taken from a plan view orientation enabling said *cargo frame* to be tightly stored along with said movement means;  
a motion sensor.

3795

38) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:

an autonomous cart wherein said cart is sized to match the outer dimensions of said *cargo frame* when taken from a plan view orientation

3800

enabling said *cargo frame* to be tightly stored along with said movement means;

3805 an optical sensor.

39) The *cargo frame* of claim 1 wherein said structural frame has a movement means comprised of:

3810 an autonomous cart wherein said cart is sized to match the outer dimensions of said *cargo frame* when taken from a plan view orientation enabling said *cargo frame* to be tightly stored along with said movement means;  
a distance sensor;

3815 40) The *cargo frame* of claim 1 wherein said structural frame has a means for easy stowage and removal of a *series 1 freight containers* comprising:  
a *cargo frame* bay sized to tightly accommodate a *series 1 freight container*;  
a set of rails structurally mounted in said *cargo frame* bay.

3820 41) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together comprising:  
a plurality of structurally mounted twist locks which correspond in placement to the corner castings of a *series 1 freight container*  
3825 wherein four *series 1 freight containers* are *bundled* together;  
a twist lock head engineered to lift four fully loaded *series one freight containers* where two *cargo clips* are employed;  
said twist lock head having an enlarged slot that enables a similarly engineered spreader to lift said *cargo clip*;  
3830 sized *cargo clip* having a rectangular shape.

42) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together comprising:  
a twist lock head engineered to lift four fully loaded *series one freight containers* where two *cargo clips* are employed;  
3835

said twist lock head being sized in plan view to enable the raising, and lowering into a prior art cargo ship hold wherein a cell guide end wall does not interfere with *encargoing* or *decargoing*.

3840

43) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together comprising:

a plurality of structurally mounted twist locks;

a *plurality* of castellations;

3845

a twist lock head engineered to lift four fully loaded *series one freight containers* where two cargo clips are employed;

said twist lock head having an enlarged slot that enables a similarly engineered spreader to lift said *cargo clip*.

3850

44) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together comprising:

a *plurality* of structural gusset plates.

45) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together comprising:

3855

a *plurality* of structural flanges.

46) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together comprising:

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a *plurality* of structural stiffeners.

47) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together comprising:

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a plurality of structurally mounted twist locks wherein a middle portion of said *plurality* of twist locks is flush with a rear side of the *cargo clip*,

wherein this arrangement allows the use of prior art twist locks open and closing arms to function without further modification.

- 3870 48) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip*  
that *bundles four series 1 freight containers* together comprising:  
a *plurality* of arced slots cut in said *cargo clip* and positioned to  
enable a modified, and bent, structurally attached twist lock open  
and closing arm for hand use to operate.
- 3875
- 49) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip*  
that *bundles four series 1 freight containers* together and lashes them to a  
ship deck comprising:  
a *plurality* of structurally mounted twist locks;  
3880 a *plurality* of structurally attached lashing rods.
- 50) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip*  
that *bundles four series 1 freight containers* together and lashes them to a  
ship deck comprising:  
3885 a *plurality* of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods with a means for  
movement by stevedores on a ship deck.
- 51) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip*  
3890 that *bundles four series 1 freight containers* together and lashes them to a  
ship deck comprising:  
a *plurality* of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods wherein an upper,  
bent portion of each said lashing rod enables stowage where a  
3895 remaining *plurality* of the rods would prevent neat stowage.
- 52) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip*  
that *bundles four series 1 freight containers* together and lashes them to a  
ship deck comprising:  
3900 a *plurality* of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods;  
a *plurality* of lashing rod tension clips.

- 3905 53) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:
- a *plurality* of structurally mounted twist locks;
  - a *plurality* of structurally attached lashing rods having an upper, free-moving portion and a pivoting lower portion.
- 3910
- 54) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:
- a *plurality* of structurally mounted twist locks;
  - 3915 a *plurality* of structurally attached lashing rods having an upper, free-moving portion, and a pivoting lower portion;
  - a structural ring welded to an end of each of the upper, free-moving portions enables movement by stevedores;
  - a *plurality* of structural rings welded to the back of one of said
  - 3920 plurality of twist locks, and a thickened structural member of said *cargo clip*, which correspond in number to said *plurality* of structurally attached lashing rods.
- 55) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip*
- 3925 that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:
- a *plurality* of structurally mounted twist locks;
  - a *plurality* of structurally attached lashing rods having an upper, free-moving portion, and a pivoting lower portion;
  - 3930 each said upper, free-moving portion further having a thickened end enabling rotation of a U-shaped termination having a corresponding slot which permits such rotation;
  - said U-shaped termination having a plurality of holes enables a stevedore to remove rods and pins to adjust the length of the
  - 3935 lashing rods as required.

56) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:

3940                   a *plurality* of structurally mounted twist locks;  
                      a *plurality* of structurally attached lashing rods having an upper,  
                      free-moving portion and a pivoting lower portion;  
                      each said pivoting lower portion further having a bent portion to  
                      allow for neat stowage where, in contrast, a straight pivoting  
3945                   portion would jut out beyond the neatly stowed upper, free-  
                      moving portion and cause harm to stevedores, in this manner, the  
                      overall *cargo clip* takes up precious little space.

3950                   57) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:

                      a *plurality* of structurally mounted twist locks;  
                      a *plurality* of structurally attached lashing rods having an upper,  
3955                   free-moving portion and a pivoting lower portion;  
                      each said pivoting lower portion further having a thickened end  
                      with a cylindrical slot for a rod and cotter pin which mates with a  
                      set of holes in a U-shaped termination of each said upper, free-  
                      moving portion.

3960

58) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:

                      a *plurality* of structurally mounted twist locks;  
3965                   a *plurality* of structurally attached lashing rods having an upper,  
                      free-moving portion and a pivoting lower portion;  
                      said pivoting lower portion further having a threaded end.

3970 59) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:

3975 a *plurality* of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods having an upper, free-moving portion and a pivoting lower portion;  
3975 said pivoting lower portion further having an elongated O-shaped threaded tightening section.

3980 60) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:

3985 a *plurality* of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods having an upper, free-moving portion and a pivoting lower portion;  
said pivoting lower portion further having an elongated O-shaped tightening section that is rotatably connected to a rod through a hole and held in place with a thickened end that enables rotation;  
further, said rod is connected to a rotating U-shaped portion and said thickened end;  
3990 said rotating U-shaped portion further has holes where a rod and cotter pin thread through said holes that enable stevedores to securely attach said plurality of lashing rods to a ship deck, in this manner, a *bundle* of four *series 1 freight containers*, bound by a *cargo clip*, are safely stowed away for the voyage at sea.

3995 61) The *cargo frame* of claim 1 wherein said structural frame forms a *cargo clip* that *bundles* four *series 1 freight containers* together and lashes them to a ship deck comprising:

4000 a *plurality* of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods having an upper, free-moving portion and a pivoting lower portion;

said pivoting lower portion further having an elongated O-shaped tightening section that is rotatably connected to a rod through a hole and held in place with a thickened end that enables rotation; further, said rod is connected to a rotating U-shaped portion and said thickened end;

4005 said rotating U-shaped portion further has an unthreaded hole and a threaded hole, in opposing sides of the U, where an anchor shackle slides through said unthreaded hole and threads into the threaded hole enabling stevedores to securely attach said plurality

4010 of lashing rods to a ship deck, in this manner, a *bundle* of four *series 1 freight containers*, bound by a *cargo clip*, are safely stowed away for the voyage at sea.

62) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip*

4015 that *bundles two series 1 freight containers* together and lashes them to a ship deck comprising:

a *plurality* of structurally mounted twist locks which correspond in placement to the corner castings of a *series 1 freight container* wherein two *series 1 freight containers* are *bundled* together;

4020 a twist lock head engineered to lift two fully loaded *series one freight containers* where two cargo clips are employed;

said twist lock head having an enlarged slot that enables a similarly engineered spreader to lift said *cargo clip*.

63) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip*

4025 that *bundles two series 1 freight containers* together and lashes them to a ship deck comprising:

a *plurality* of structurally mounted twist locks;

a *plurality* of structurally attached lashing rods wherein an upper, bent portion of each said lashing rod enables stowage where a

4030 remaining *plurality* of the rods would prevent neat stowage.

- 64) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip* that *bundles two series 1 freight containers* together and lashes them to a ship deck comprising:
- 4035                   a *plurality* of structurally mounted twist locks;  
                      a *plurality* of structurally attached lashing rods;  
                      a *plurality* of lashing rod tension clips.
- 4040                   65) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip* that *bundles two series 1 freight containers* together and lashes them to a ship deck comprising:
- a *plurality* of structurally mounted twist locks;  
                      a *plurality* of structurally attached lashing rods having an upper,  
4045                   free-moving portion, and a pivoting lower portion;  
                      a structural ring welded to an end of each of the upper, free-moving portions enables movement by stevedores;  
                      a *plurality* of structural rings welded to the back of one of said  
                      plurality of twist locks, and a thickened structural member of said  
4050                   *x-clip*, which correspond in number to said *plurality* of structurally attached lashing rods.
- 66) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip* that *bundles two series 1 freight containers* together and lashes them to a ship deck comprising:
- 4055                   a *plurality* of structurally mounted twist locks;  
                      a twist lock head engineered to lift two fully loaded *series one freight containers* where two cargo clips are employed;  
                      said twist lock head having an enlarged slot that enables a  
4060                   similarly engineered spreader to lift said *x-clip*.
- 67) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip* that *bundles two series 1 freight containers* together and lashes them to a ship deck comprising:
- 4065                   a *plurality* of structurally mounted twist locks;

a *plurality* of structurally attached lashing rods having an upper, free-moving portion and a pivoting lower portion.

4070 68) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip*  
that *bundles two series 1 freight containers* together and lashes them to a  
ship deck comprising:  
a *plurality* of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods having an upper,  
free-moving portion, and a pivoting lower portion;  
4075 a structural ring welded to an end of each of the upper, free-  
moving portions enables movement by stevedores;  
a *plurality* of structural rings welded to the back of one of said  
plurality of twist locks, and a thickened structural member of said  
*x-clip*, which correspond in number to said *plurality* of  
4080 structurally attached lashing rods.

4085 69) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip*  
that *bundles two series 1 freight containers* together and lashes them to a  
ship deck comprising:  
a *plurality* of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods having an upper,  
free-moving portion, and a pivoting lower portion;  
each said upper, free-moving portion further having a thickened  
end enabling rotation of a U-shaped termination having a  
4090 corresponding slot which permits such rotation;  
said U-shaped termination having a plurality of holes enables a  
stevedore to remove rods and pins to adjust the length of the  
lashing rods as required.

4095 70) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip*  
that *bundles two series 1 freight containers* together and lashes them to a  
ship deck comprising:  
a plurality of structurally mounted twist locks;

4100 a *plurality* of structurally attached lashing rods having an upper,  
free-moving portion and a pivoting lower portion;  
each said pivoting lower portion further having a bent portion to  
allow for neat stowage where, in contrast, a straight pivoting  
portion would jut out beyond the neatly stowed upper, free-  
moving portion and cause harm to stevedores, in this manner, the  
4105 overall *cargo clip* takes up precious little space.

71) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip*  
that *bundles two series 1 freight containers* together and lashes them to a  
ship deck comprising:

4110 a plurality of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods having an upper,  
free-moving portion and a pivoting lower portion;  
each said pivoting lower portion further having a thickened end  
with a cylindrical slot for a rod and cotter pin which mates with a  
4115 set of holes in a U-shaped termination of each said upper, free-  
moving portion.

72) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip*  
that *bundles two series 1 freight containers* together and lashes them to a  
ship deck comprising:

4120 a plurality of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods having an upper,  
free-moving portion and a pivoting lower portion;  
said pivoting lower portion further having a threaded end.

4125

73) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip*  
that *bundles two series 1 freight containers* together and lashes them to a  
ship deck comprising:

4130 a plurality of structurally mounted twist locks;  
a *plurality* of structurally attached lashing rods having an upper,  
free-moving portion and a pivoting lower portion;

said pivoting lower portion further having an elongated O-shaped threaded tightening section.

4135           74) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip* that *bundles two series 1 freight containers* together and lashes them to a ship deck comprising:

                  a plurality of structurally mounted twist locks;  
                  a *plurality* of structurally attached lashing rods having an upper,  
4140           free-moving portion and a pivoting lower portion;  
                  said pivoting lower portion further having an elongated O-shaped tightening section that is rotatably connected to a rod through a hole and held in place with a thickened end that enables rotation;  
                  further, said rod is connected to a rotating U-shaped portion and  
4145           said thickened end;  
                  said rotating U-shaped portion further has holes where a rod and cotter pin thread through said holes that enable stevedores to securely attach said plurality of lashing rods to a ship deck, in this manner, a *bundle* of two *series 1 freight containers*, bound by a *x-clip*,  
4150           are safely stowed away for the voyage at sea.

                  75) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip* having an x shape providing lateral resistance, with structural, vertical sides.

4155

                  76) The *cargo frame* of claim 1 wherein said structural frame forms an *x-clip* having an x shape with structural, vertical sides when viewed in elevation view, wherein a horizontal structural member has holes punched with bent tabs that enable forklift handling that corresponds to forklift holes in  
4160           a *series 1 freight container*.

                  77) In the maritime industry a method to prevent a vessel from listing when transferring cargo on a body of water comprising the following steps:

                  provide a center vessel;  
4165           provide a port side vessel;

provide a starboard side vessel;  
provide a means to structurally connect said port side vessel to said center vessel on a port side;  
provide a means to structurally connect said starboard side vessel to said center vessel on a starboard side;  
provide and transfer cargoes from said center vessel to both said port side vessel and said starboard side vessel in concerted fashion.

78) In the maritime industry a *lobster claw* comprising:

a structural guide beam;  
an extendable, retractable structural outrigger;  
a motorized means to extend, and retract said structural outrigger;  
a structural armature with means for pivoting;  
a *plurality* of hydraulic pistons;  
a *lobster claw* thumb for gripping;  
an opposed a *lobster claw* finger for gripping;  
where one of said *plurality* of hydraulic pistons each may cause both said *lobster claw* thumb, and *lobster claw* finger to mechanically squeeze, and/or release a *lobster claw* clamping rod;

79) The *lobster claw* of claim 78 wherein the structural armature with means for pivoting is angled, when viewed in plan, relative to the structural guide beam.

80) In the maritime industry a *lobster claw* thumb comprising:

a curved, extruded gripping apparatus that is mechanically driven to squeeze, and/or release in relation to an opposed *lobster claw* finger;  
further, said curved, extruded gripping apparatus has integral pivot sections which allow the curved, extruded apparatus to pivot.

81) The *lobster claw* thumb of claim 80 wherein the curved, extruded gripping apparatus is made of steel.

82) In the maritime industry a *lobster claw* finger comprising:

4200 a curved, extruded gripping apparatus that is mechanically driven to squeeze and/or release in relation to an opposed *lobster claw* thumb;  
further, said curved, extruded gripping apparatus has integral pivot sections which allow the curved, extruded apparatus to pivot.

4205 83) The *lobster claw* finger of claim 88 wherein the curved, extruded gripping apparatus is made of steel.

**84)** In the maritime industry a method to temporarily join a vessel to another vessel comprising the steps:

4210 provide a first vessel wherein a *plurality* of *lobster claw* clamping rods are structurally attached at predetermined intervals;  
provide a second vessel wherein a *plurality* of *lobster claws* are structurally attached at corresponding predetermined intervals;  
motor said second vessel to said first vessel;  
4215 extend said *plurality* of *lobster claws* of said second vessel towards said *plurality* of *lobster claw* clamping rods of said first vessel;  
actuate the *plurality* of *lobster claws* to grip the *lobster claw* clamping rods and leave in a squeezed state.

4220 **85)** In the maritime industry a method to temporarily join a vessel to a dock comprising the steps:

provide a dock wherein a *plurality* of *lobster claw* dock pilings are structurally attached at predetermined intervals;  
provide a vessel wherein a *plurality* of *lobster claws* are structurally  
4225 attached at corresponding predetermined intervals;  
motor said vessel to said dock;  
extend said *plurality* of *lobster claws* of said vessel towards said *plurality* of *lobster claw* dock pilings;  
actuate the *plurality* of *lobster claws* to grip the *lobster claw* dock pilings  
4230 and leave in a squeezed state.

**86)** In the maritime industry a method to release a receiving vessel from a giving vessel after cargoes have been transferred comprising the steps:

4235 provide a giving vessel wherein a *plurality of lobster claw* clamping rods are structurally attached at predetermined intervals;  
provide a receiving vessel having a *plurality of lobster claws*, each having both a *lobster claw* thumb, and a *lobster claw* finger, wherein said *lobster claws* are structurally attached at corresponding predetermined intervals of said giving vessel, so it can be observed that both the giving vessel and the  
4240 receiving vessel work in unison;  
actuate said *plurality of lobster claws* of said receiving vessel wherein said each said *lobster claw* thumb, and each said *lobster claw* finger loosen their grip on said *plurality of lobster claw* clamping rods of said giving vessel, similar to the way a firefighter descends a firefighter's pole, where the  
4245 receiving vessel may be lowered into the water to smoothly find its final displacement.

87) In the maritime industry a method to stabilize a receiving vessel after cargoes have been transferred from a giving vessel and the receiving vessel has found its final  
4250 displacement comprising the steps:  
provide a giving vessel wherein a *plurality of lobster claw* clamping rods are structurally attached at predetermined intervals;  
provide a receiving vessel having a retractable and extendable port side hull, a central hull, and a retractable and extendable starboard side hull;  
4255 said retractable and extendable starboard side hull is structurally attached to a *plurality of lobster claws* each having both a *lobster claw* thumb, and a *lobster claw* finger, and an extendable and retractable outrigger with a reserve length, wherein said *plurality of lobster claws* are structurally attached at corresponding predetermined intervals of said *plurality of lobster*  
4260 *claw* clamping rods of said giving vessel on both said retractable and extendable starboard side hull and said central hull;  
said retractable and extendable port side hull is structurally attached to a *plurality of lobster claws* each having both a *lobster claw* thumb, and a *lobster claw* finger, and an extendable and retractable outrigger, wherein  
4265 said *plurality of lobster claws* are structurally attached at corresponding predetermined intervals of said *plurality of lobster claw* clamping rods of

said giving vessel on both said retractable and extendable port side hull and said central hull;  
provide said receiving vessel in a state of final displacement having just  
4270 received a load of cargo;  
for example only, as both said retractable and extendable starboard side hull and said retractable and extendable port side hulls may perform the same action, actuate a plurality of motors to begin extending said extendable and retractable outriggers of each said *plurality of lobster claws* of said  
4275 retractable and extendable starboard side hull until said reserve length is exhausted, so that the receiving vessel has pushed itself away from the giving vessel;  
given the example above, the retractable and extendable port side hull will have already been provided in an extended state, providing added stability,  
4280 where it can be said that both the retractable and extendable starboard side hull and said retractable and extendable port side hulls are in an extended state;  
actuate a plurality of hydraulic pistons to release said *plurality of lobster claws* from said *lobster claw* clamping rods.  
4285

**88)** In the maritime industry a *lobster claw* clamping rod comprising:

a cylindrical, vertically disposed structural rod engineered to resist moment forces caused by a vessel utilizing *lobster claws*.

4290 89) The *lobster claw* clamping rod of claim 88 wherein said cylindrical, vertically disposed structural rod engineered to resist moment forces caused by a dock utilizing *lobster claws* is integrally attached to a vessel; further, it can be said that the *lobster claw* clamping rod, and the vessel work in unison.

4295 90) The *lobster claw* clamping rod of claim 88 wherein said cylindrical, vertically disposed structural rod engineered to resist moment forces caused by a quay utilizing *lobster claws* is integrally attached to a vessel; further, it can be said that the *lobster claw* clamping rod, and the vessel  
4300 work in unison.

- 4305 91) The *lobster claw* clamping rod of claim **94** wherein said cylindrical, vertically disposed structural rod engineered to resist moment forces caused by a first vessel utilizing *lobster claws* is integrally attached to a second vessel;  
further, it can be said that the *lobster claw* clamping rod, and the second vessel work in unison.
- 4310 **92)** In the maritime industry a *lobster claw* dock piling comprising:  
a structural dock piling;  
an integrally formed *lobster claw* clamping rod comprising a cylindrical, vertically disposed structural rod engineered to resist moment forces caused by a vessel utilizing *lobster claws*;  
further, it can be said that the structural dock piling, and the *lobster claw*  
4315 clamping rod work in unison.
- 93)** In the maritime industry an independent, extendable and retractable three-hull barge comprising:  
a starboard side hull;  
4320 a port side hull;  
a center hull;  
a means to extend, and retract said first outer hull from said center hull;  
a means to extend, and retract said second outer hull from said center hull;  
4325 so that both said port side hull and said starboard side hull may provide greater stability to the overall vessel with loads prone to listing or capsizing a vessel.
- 4330 94) The independent, extendable and retractable three-hull barge of claim 93 wherein said center hull has a plurality of columns and bracing to structurally support a matching plurality of *lobster claws*.
- 95) The independent, extendable and retractable three-hull barge of claim 93 wherein said center hull has a plurality of columns and bracing to

4335                      structurally support a matching plurality of *lobster claws* at both a  
lower, and an upper level.

96) In the maritime industry a *cargo frame cargo ship* wherein the combination  
comprises:

4340                      a cargo ship;  
a 3-axis structure sized to suitably convey *cargo frames*;  
a 3-axis hoist sized to suitably hoist *cargo frames*.

97) The *cargo frame cargo ship* of claim 96 wherein a plurality of structurally  
4345                      attached *lobster claw* clamping rods at predetermined intervals suitably sized to  
serve a vessel equipped with a plurality of *lobster claws*.

98) In the maritime industry a *cargo frame* dock comprising:

4350                      a plurality of *lobster claw* dock pilings at predetermined intervals suitably sized  
to serve a vessel equipped with a plurality of *lobster claws*.  
a 3-axis structure sized to suitably convey *cargo frames*;  
a 3-axis hoist sized to suitably hoist *cargo frames*.

99) The *cargo frame* dock of claim 98 wherein a plurality of structurally attached  
4355                      *lobster claw* clamping rods at predetermined intervals are suitably sized to serve  
a vessel equipped with a plurality of *lobster claws*.

100) The *cargo frame* dock of claim 99 further comprising:

4360                      a platform;  
a pair of rails wherein each pair is further comprised of two rails.

101) The *cargo frame* dock of claim 99 further comprising a plurality of structural  
bracing between said plurality of *lobster claw* dock pilings.

4365                      102) The *cargo frame* dock of claim 99 further comprising:

a platform having a centerline in plan view;

said centerline of said platform matches a central spine which runs through a port, such that it can be said the *cargo frame* dock provides a water based entry point to an architectural organizational axis.

4370

**103)** In the intermodal logistics industry, a port comprising:

- a first level;
- a second level.

4375

104) The port of claim 103 wherein said second level substantially matches the architectural layout and functions of said first level thereby doubling the capacity of the port in its operations.

4380

105) The port of claim 103 wherein said second level utilizes draw bridges to enable *cargo frames* to pass.

4385

106) The port of claim 103 wherein both said first level and said second level are arranged by a central spine, which creates an architectural organizational axis.

4390

107) The port of claim 103 wherein both said first level and said second level are arranged by a central spine, and are served by a set of rails.

108) The port of claim 103 wherein both said first level and said second level are arranged by a central spine, and are served by a first set of rails and a second set of rails wherein a *cargo frame* may employed.

4395

109) The port of claim 103 further comprising a third-level bulk platform which enables a semi-truck to deliver bulk goods over a top side of a *cargo frame*.

110) The port of claim 103 wherein both said first level and said second level are arranged by a central spine, and are served by a set of rails.

4400

111) The port of claim 103 wherein both said first level and said second level are served by a semi-truck queueing tower.

112) The port of claim 103 wherein both said first level and said second level further comprise:

- a semi-truck queueing tower having a plurality of bays for the queueing of semi-trucks;
- 4405 a semi-truck transshipment yard having a *plurality* of bays for the transshipment of *series 1 freight containers*;
- said *plurality* of bays of said semi-truck queueing tower and said *plurality* of bays of semi-truck transshipment yard are matched in number so that the semi-truck queueing tower may efficiently serve the
- 4410 semi-truck transshipment yard.

113) In the intermodal logistics industry a port combination comprising:

- a semi-truck queueing tower;
- a semi-truck transshipment yard wherein a *plurality* of *cargo frames* may be
- 4415 unloaded in a single action.

114) In the intermodal logistics industry a port combination comprising:

- a semi-truck queueing tower;
- a semi-truck transshipment yard wherein a *plurality* of *cargo frames* may be
- 4420 unloaded in a single action;
- a freight purgatory.

115) In the intermodal logistics industry a port combination comprising:

- a semi-truck queueing tower;
- 4425 a semi-truck transshipment yard wherein a *plurality* of *cargo frames* may be unloaded in a single action;
- a freight purgatory;
- a *3-axis structure* sized to suitably convey *cargo frames*;
- a *3-axis hoist* sized to suitably hoist *cargo frames*.

4430

116) In the intermodal logistics industry a semi-truck queueing tower comprising:

- a plurality of bays to queue semi-trucks.

- 4435 117) The semi-truck queueing tower of claim 116 wherein said *plurality* of bays to queue semi-trucks corresponds with a matching number of semi-truck transshipment bays wherein *series 1 freight containers* are conveyed.
- 4440 118) The semi-truck queueing tower of claim 116 wherein said bays are served by a semi-truck hoist in a multi-level tower.
- 119) The semi-truck queueing tower of claim 116 wherein the orientation of said queueing tower is in the direction of traffic flow, such that a semi-truck enters in the flow of traffic, and may exit in the flow of traffic.
- 4445 120) The semi-truck queueing tower of claim 116 further comprising:  
an entry side;  
an exit side wherein a queued first semi-truck does not back up into a flow of queueing semi-trucks, said first semi-truck may exit the semi-truck queueing tower through said exit side in the flow of traffic.
- 4450 121) The semi-truck queueing tower of claim 116 further comprising:  
a rest and recreation floor.
- 4455 **122)** In the intermodal logistics industry a bulk-cargo platform wherein semi-trucks may deliver their bulk cargoes over a top side of a *cargo frame*.
- 4460 123) The bulk-cargo platform of claim 122 further comprising:  
a guide bumper integrally formed on a platform to prevent semi-trucks from driving into a bulk drop hole wherein the shape of the guide bumper is ellipsoid, and traversable by a semi-truck.
- 4465 **124)** In the intermodal logistics industry a freight car transshipment yard with a return loop for rail carts after a *series 1 freight container* has been transloaded to a well car.
- 125)** In the intermodal logistics industry a truck transshipment yard layout comprising:  
a set of four pairs of rails;

an orientation of said set of four pairs of rails matched in plan view wherein a *cargo frame* may be served to offload four *series 1 freight containers* on rail  
4470 carts, further, said four pairs of rails split and each merge to a single rail that  
serves a lane comprising two semi-truck bays.

126) The truck transshipment yard of claim 125 further comprising;  
a passing lane arranged between two said lanes.

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127) The truck transshipment yard of claim 125 further comprising;  
a custom designed spreader to lift *series 1 freight containers* off rail carts onto  
semi-trucks at the position of said semi-truck bays.

4480 128) The truck transshipment yard of claim 125 wherein said merged single rails  
continue on to a freight car transshipment yard.

**129)** In the freight rail industry a turntable comprising:

a first set of rails;  
4485 a second set of rails;  
where said first set of rails and said second set of rails work in unison to  
serve a *cargo frame*.

130) The turntable of claim 129 further comprising:  
4490 a bridge that supports said first set of rails;  
a bridge that supports said second set of rails;  
further, a plurality of brace beams provide structure to keep said first set  
of rails and said second set of rails parallel.

4495 131) The turntable of claim 129 further comprising:  
a pit rail;  
a motorized pivot.

**132)** A pivoting rail bogie comprising:  
4500 a pair of rail wheel sets;  
an *orange slice chassis* having an upper portion and a lower portion;

a main crossbeam;  
a motorized pivoting means.

4505        133) The pivoting rail bogie of claim 132 wherein a *plurality* of spring and  
guide rods provide suspension between the upper portion and the lower  
portion of said *orange slice chassis*.

4510        134) The pivoting rail bogie of claim 132 wherein said main crossbeam supports  
an angled crossbeam bearing plate.

135) The pivoting rail bogie of claim 133 further comprising:  
a radiused guide plate;  
a plurality of guide rollers;  
4515        a central structural pin with threaded end;  
an electric motor;  
a control box.

136) An *orange slice* chassis comprising:  
4520        a structural chassis, circular in plan view, and cylindrical in shape, wherein a  
plurality of pie-like sections are formed with structural walls so that a rotating  
object is structurally stable.

137) A *3-axis column* comprising:  
4525        a plus shaped column with transverse ends, it could be said the column  
appears to have merged two wide flange columns, leaving four quadrants with  
open corners, where said column with open corners is used to enable a *3-axis*  
*hoist* to operate a corner hoist lift mechanism.

4530        138) The *3-axis column* of claim 137 wherein said quadrants have a plurality of  
corner guide rails.

139) The *3-axis column* of claim 137 wherein said quadrants have an insulated  
electric rail.

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140) A corner hoist lift mechanism comprising:

- a means to secure hoist cables;
- a chassis;
- a twist lock rack;
- 4540 a plurality of hydraulic pistons;
- a plurality of guide rollers;
- a control box.

141) The corner hoist lift mechanism of claim 150 wherein said chassis  
4545 comprises:

- a plurality of notches enabling movement and storage of a *plurality* of  
sliding structural arms connected to said twist lock rack;
- said notches further having a plurality of roller pins.
- a plurality of structural guide plates to keep said *plurality* of sliding  
4550 structural arms in place.

142) The corner hoist lift mechanism of claim 150 wherein said twist lock rack  
comprises:

- a plurality of twist locks arranged in a linear manner;
- 4555 a plurality of sliding structural arms to facilitate movement;
- said plurality of twist lock racks are used to secure a cargo frame with  
a plurality of matching specialized corner castings with twist lock rack  
slots.

4560 143) A *3-axis beam* comprising:

- a structural wide flange shape;
- a *plurality* of structural outriggers welded to a bottom flange of said structural  
wide flange shape;
- a structural rolling plate welded to a bottom side of said plurality of outriggers  
4565 wherein said rolling plate provides a structure for retractable, extendable  
mechanized roller beams to operate, further wherein guide rails are welded to  
a top side edge of said rolling plate;
- said structural rolling plate having notches at reentrant corners to enable a corner  
hoist lift mechanism to traverse in the z-axis.

4570     **144)** A C-shaped channel comprising:

          a rack;

          a plurality of roller pins wherein said pins may roll on a top side of a rolling plate having a *plurality* of guide rails;

          where said roller pins are prevented from rolling off said rolling plate.

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          145) The C-shaped channel of claim 144 further comprising a hydraulic piston which enables the rack to bridge a reentrant corner notch in said rolling plate to enable a retractable, extendable rolling beam to operate when receiving instructions from a control box.

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**145)** A retractable, extendable rolling beam comprising:

          a plurality of collapsible and braces and bearings;

          a plurality of electric cable tracks;

          an electric motor and pinion;

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          a rail welded to a top side;

          a control box;

          where it can be said a rail supporting a *cargo frame* with a rail bogie may allow it to traverse in both the x and y axis, as the retractable, extendable rolling beam enables such movement, further when in a retracted state, a *plurality* of corner hoist mechanisms may enable the z-axis lifting of a cargo frame, in this way the retractable, extendable rolling beam enables *3-axis* movement.

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**146)** A *3-axis structure* comprising:

          a *plurality* of 3-axis columns;

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          a *plurality* of 3-axis beams;

**147)** A *3-axis hoist* comprising:

          a drive axle;

          an electric motor;

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          a gear box;

          a governor;

          a *plurality* of hoist cables;

          four corner hoist mechanisms;

- a counterweight;
- 4605 a counterweight spindle and clutch;
- a *plurality* of arched structural framing members;
- a *plurality* of beveled gears driven by said drive axle where said beveled gears further drive belts connected via a corresponding plurality of spindles that raise or lower a corner hoist mechanism;
- 4610 a *plurality* of spindles arranged at a top end of a 3-axis column wherein said spindle enable a smooth operation;
- a control box to give instructions for lowering, and/or raising said four corner hoist lift mechanisms.
- 4615 148) The *3-axis hoist* of claim 147 which rolls further comprising:
- a rolling platform;
- a rack structurally attached to a beam at an uppermost bay;
- a motorized pinion;
- a plurality of spindles which enable threading of hoist cables that are
- 4620 unthreaded by stevedores;
- where it can be said the hoist may serve more than one bay;
- further each bay served may take advantage of the same counterweight.
- 149)** In the field of intermodal logistics a port layout organized by a central spine.
- 4625
- 150) The port of claim 149 wherein said central spine curves.
- 151) The port of claim 149 wherein said central spine is angular.
- 4630 152) The port of claim 149 wherein the architectural layout is a repeatable terminal.
- 153)** A twist lock rack comprising:
- a *plurality* of twist locks;
- 4635 a structural mounting plate;
- said *plurality* of twist locks are arranged in a linear manner and mounted to said structural mounting plate so that said *plurality* of twist locks may act in unison

thereby increasing the loads that may be accommodated in a concentrated arrangement.

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154) The twist lock rack of claim 153 further comprising:

a structural plate;

a twist lock structurally mounted to said structural plate wherein said structural plate and said twist lock form a united locking device for *series 1 freight*

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*container* corner castings.

155) The twist lock rack of claim 153 wherein said structural plate pivots with a a means to open and close so that a *series 1 freight container* may pass into a *cargo frame* bay without damage and be locked in place by said structurally mounted twist lock.

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**156)** A combination enabling easy stowage and removal of a *series 1 freight container* comprising:

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a *cargo frame* bay to accommodate a *series 1 freight container*;

a set of rails structurally mounted in said *cargo frame* bay.

**157)** A method to enable a prior art cargo ship to stow four *series 1 freight containers* *bundled* with a *cargo clip* with the steps comprising:

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provide a prior art cargo ship;

provide a plurality of bays having cell guides in a said cargo ship hold having two ends;

remove a cell guide at every other said bay at both said ends, providing space for a *cargo clip* of *series 1 freight containers* to be lowered.

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**158) )** In the field of intermodal shipping a new combination for conveyance of cargo comprising:

a new type of train car comprising:

a *cargo frame* sized and configured for conveyance of greater than two *series 1 freight containers* worth of cargo;

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a *plurality* of freight car wheelsets firmly affixed to said *cargo frame* enabling the *cargo frame* to move along railroad rails, said new type of train car carries a load of cargo greater than what can be conveyed with a common double-stacked intermodal train car;

- 4675 a first set of two individual railroad rails sized, shaped and engineered to accommodate loads described herein, having a first centerline, and spaced substantially equal to the prevailing country's standard railroad width;
- a second set of two individual railroad rails sized, shaped and engineered to accommodate loads described herein, having a second centerline, and spaced
- 4680 substantially equal to the prevailing country's standard railroad width;
- a means to support each said first set of two individual railroad rails and said second set of two individual railroad rails wherein settlement caused from excessive weight from said new type of train car is mitigated;
- said first set of two individual railroad rails and said second set of two individual
- 4685 railroad rails are arranged in a substantially parallel manner and spaced from said first centerline to said second centerline at a distance which corresponds with said *plurality* of freight car wheelsets forming a pair of railroad rails.

- 159) The new combination of claim 158 wherein said means to support each
- 4690 said first individual railroad rail and said second individual railroad rail comprises:
- an engineered subbase;
  - a reinforced concrete slab wherein said first individual railroad rail and said second individual railroad rail are embedded into said reinforced
  - 4695 concrete slab at a height and with proper clearance for said *plurality* of freight car wheels to function as intended.

- 160) The new combination of claim 158 wherein said means to support each
- said first individual railroad rail and said second individual railroad rail
- 4700 comprises:
- an engineered subbase;
  - a first reinforced concrete slab wherein said first individual railroad rail is embedded into said reinforced concrete slab at a height and with

- 4705 proper clearance for said *plurality* of freight car wheels to function as intended;
- a second reinforced concrete slab wherein said second individual railroad rail is embedded into said reinforced concrete slab at a height and with proper clearance for said *plurality* of freight car wheels to function as intended.
- 4710 161) The new combination of claim 158 wherein said means to support each said first individual railroad rail and said second individual railroad rail comprises:
- an engineered subbase;
- 4715 a first reinforced concrete slab wherein said first individual railroad rail is embedded into said reinforced concrete slab at a height and with proper clearance for said *plurality* of freight car wheels to function as intended;
- a second reinforced concrete slab wherein said second individual railroad rail is embedded into said reinforced concrete slab at a height and with proper clearance for said *plurality* of freight car wheels to function as intended.
- 4720 162) The new combination of claim 158 wherein said means to support each said first set of two individual railroad rails and said second set of two individual railroad rails comprises:
- an engineered subbase;
- a plurality of engineered, reinforced concrete footings wherein each engineered, reinforced concrete footing has a top side and a bottom side;
- 4730 an engineered, structural frame comprising:
- a plurality of regularly spaced columns wherein each column has a top end, a bottom end and an interstitial length and is oriented substantially vertical forming a first row and a second row, both said first row and said first set of two individual railroad rails and said second row and said second set of two individual railroad rails correspond so that columns support beams;
- 4735

a plurality of regularly spaced beams wherein each beam has a first end, a second end and an interstitial length and is oriented substantially horizontal in both a parallel relation to both said first row and said second row forming a parallel group of beams, and in a transverse relation to both said first row and said second row forming a transverse group of beams, said parallel group of beams and said transverse group of beams form a generally orthogonal grid which conforms to terrain as required;

a plurality of braces wherein each brace has a third end, a fourth end and an interstitial length and is oriented in a substantially angled manner to the plane to which said third end and said fourth end are applied;

a plurality of railroad ties sized and shaped to accommodate intended loads of said new type of train car along both said first set of two individual railroad rails and second set of two individual railroad rails;

the bottom side of each said plurality of engineered, reinforced concrete footings makes contact with said engineered, subbase;

the bottom end of each said plurality of regularly spaced columns is structurally connected to a corresponding top side of said plurality of engineered, reinforced concrete footings so that one column is connected to one engineered, reinforced concrete footing and repeated as required;

the top end of each said plurality of regularly spaced columns in said first row are structurally joined, generally, to the corresponding interstitial lengths near the first end of said transverse group of beams and said second row are structurally joined, generally, to the corresponding interstitial lengths near the second end of said transverse group of beams;

the first end and second end of said parallel group of beams each connect, generally, to the interstitial lengths of said transverse group of beams providing necessary bracing and support for said plurality of railroad ties;

at structurally mandated intervals a first subset of said plurality of braces wherein the fourth end is structurally connected to the corresponding interstitial length of said plurality of regularly spaced columns and the third end of each said plurality of braces is structurally connected to the interstitial length of said plurality of regularly spaced beams so that one

brace may connect to a column and beam in the direction forces are required to be resisted with a single column and single beam having capacity to receive a plurality of braces;

4775 at structurally mandated intervals a second subset of said plurality of braces wherein the third end may be structurally connected to the corresponding interstitial length of both said parallel group of beams and said transverse group of beams with each beam having capacity to receive a plurality of braces;

4780 at structurally mandated intervals a third subset of said plurality of braces wherein the third end is structurally connected to the corresponding interstitial lengths near the bottom end of said plurality of columns and the fourth end of said third subset of said plurality of braces is structurally connected to one of the corresponding interstitial lengths near the top end of said plurality of columns so that two columns have an

4785 x-brace configuration;

so formed, the new combination works structurally in concert in any direction horizontal and vertical rail alignment dictates.

163) The new combination of claim 158 wherein said means to support each

4790 said first set of two individual railroad rails and said second set of two individual railroad rails comprises:

an engineered subbase;

a plurality of engineered, reinforced concrete footings wherein each engineered, reinforced concrete footing has a top side and a bottom side;

4795 a multi-level engineered, structural frame comprising:

a first plurality of regularly spaced columns wherein each column has a top end, a bottom end and an interstitial length and is oriented substantially vertical forming a first row and a second row, both said first row and said first set of two individual railroad rails, and said second

4800 row and said second set of two individual railroad rails correspond so that columns support beams forming a level, said level enables a remaining plurality of similar levels to be stacked directly above said first plurality of regularly spaced columns;

4805 a plurality of regularly spaced beams wherein each beam has a first end, a second end and an interstitial length and is oriented substantially horizontal in both a parallel relation to both said first row and said second row forming a parallel group of beams, and in a transverse relation to both said first row and said second row forming a transverse group of beams, said parallel group of beams and said transverse group of beams form a generally orthogonal grid which conforms to terrain as required;

4810 a plurality of braces wherein each brace has a third end, a fourth end and an interstitial length and is oriented in a substantially angled manner to the plane to which the third end and fourth end are applied;

4815 a plurality of railroad ties sized and shaped to accommodate intended loads of said new type of train car along both said first set of two individual railroad rails and said second set of two individual railroad rails;

4820 the bottom side of each said plurality of engineered, reinforced concrete footings makes contact with said engineered, subbase;

the bottom end of each said first plurality of regularly spaced columns is structurally connected to a corresponding top side of said plurality of engineered, reinforced concrete footings so that one column is connected to one engineered, reinforced concrete footing and repeated as required;

4825 the top end of each said first plurality of regularly spaced columns in said first row are structurally joined, generally, to the corresponding interstitial lengths near the first end of said transverse group of beams and said second row are structurally connected, generally, to the

4830 corresponding interstitial lengths near the second end of said transverse group of beams;

4835 the bottom end of each said remaining plurality of regularly spaced columns is structurally connected to a corresponding top end of said first plurality of regularly spaced columns so that one column is connected to one column and repeated as required creating a multi-level structural frame;

4840 the top end of each said first plurality of regularly spaced columns in said first row are structurally connected, generally, to the corresponding interstitial lengths near the first end of said transverse group of beams and said second row are structurally connected, generally, to the corresponding interstitial lengths near the second end of said transverse group of beams and is repeated at each said remaining plurality of  
4845 similar levels;

the first end and second end of said parallel group of beams each connect, generally, to the interstitial lengths between said transverse group of beams providing necessary bracing and support for said  
4850 plurality of railroad ties at said first plurality of regularly spaced columns and is repeated at each said remaining plurality of similar levels;

at structurally mandated intervals a first subset of said plurality of braces wherein the fourth end is structurally connected to the corresponding  
4855 interstitial length of said first plurality of regularly spaced columns and the third end of each said plurality of braces is structurally connected to the interstitial length of said plurality of regularly spaced beams so that one brace may connect to a column and a beam in the direction forces are required to be resisted with a single column and single beam having  
4860 capacity to receive a plurality of braces and is repeated at each said remaining plurality of similar levels;

at structurally mandated intervals a second subset of said plurality of braces wherein the third end may be structurally connected to the  
4865 corresponding interstitial length of both said parallel group of beams and said transverse group of beams with each beam having capacity to receive a plurality of braces and is repeated at each said remaining plurality of similar levels;

4870 at structurally mandated intervals a third subset of said plurality of braces wherein the third end is structurally connected to the corresponding

- 4875 interstitial lengths near the bottom end of said plurality of columns and the fourth end of said third subset of said plurality of braces is structurally connected to one of the corresponding interstitial lengths near the top end of said first plurality of columns so that two columns have an x-brace configuration and is repeated at each said remaining plurality of similar levels
- 4880 so formed, the new combination works structurally in concert in any direction horizontal and vertical rail alignment dictates in a multi-level capacity.
- 4885 164) The new combination of claim 158 wherein each of said *plurality* of freight car wheelsets are driven by a motor mounted on said *cargo frame*.
- 165) The new combination of claim 158 wherein said *plurality* of freight car wheelsets are driven by a single motor mounted on said *cargo frame*.
- 4890 166) The new combination of claim 158 wherein said pair of railroad rails each have a third rail providing an electric power source.
- 167) The new combination of claim 158 wherein said pair of railroad rails have an overhead line providing an electric power source.
- 4895 168) The new combination of claim 158 wherein said *cargo frame* has a mounted battery providing an electric power source.
- 4900 169) The new combination of claim 158 wherein said *cargo frame* has a pair of structurally attached couplers that are each substantially aligned with the first centerline of said first set of two individual rails and the second centerline of said second set of two individual rails providing a means to link a *plurality* of connected *cargo frames* along said pair of railroad rails.
- 4905 **170)** A method to strengthen a railroad rail comprising:

provide a prior art railroad rail having two sides;  
scribe and cut filler steel to fill the web of said prior art railroad rail on each said side.

- 4910    **171)** A method to strengthen a railroad rail comprising:  
provide a prior art railroad rail having two sides;  
scribe and cut filler steel to fill the web of said prior art railroad rail on each said side;  
add an extension to each said side of said prior art railroad rail flange as required  
4915    to enhance the strength of said prior art railroad rail.

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