

Loading Cargo Ships in WWII by David Gray

During World War II, cargo ships were loaded using a manual, labour-intensive process known as **break-bulk shipping**, as modern intermodal containers had not yet been invented. Ships were often in port for two weeks to a month for a single loading and unloading cycle, using nets to transfer supplies before storing them in holds.

Key Loading Techniques and Equipment

- **Ship's Derricks (Booms):** Liberty ships (*right*), had specialized masts supporting pivoting booms. Steam-powered winches, controlled by operators following signalmen, managed the pulleys to raise and lower cargo into the holds.
- **Union Purchase:** A common technique using two derricks together—one over the hold and one over the dock—to swing cargo efficiently.
- **Manual Labor (Stevedores):** Longshoremen or stevedores manually loaded goods into sacks, wooden barrels, and crates. For warships or in smaller ports, "sailor-power" and human chains were used to move stores through hatches.
- **Cargo Nets and Palletisation:** Goods were stacked on the dock in large fibre or rope nets (*right*), then hoisted and lowered through deck openings. The U.S. Army also began unitizing cargo by lashing items of uniform size onto **wooden pallets** to speed up the process.
- **Heavy Lifting:** Specialized booms and heavy-duty winches were used for large items like tanks, aircraft, or heavy machinery.
- **Port Cranes:** Large, land-based cranes were utilized in major ports to assist in loading before ships left for their journeys.



Loading Process

Loading usually occurred through large hatchways from the deck, starting with the lowest holds and filling up to the deck level. Due to the manual nature of the work, it was typical for a ship to spend up to a month in port for unloading and reloading. Proper loading was critical, as poor stowage (like putting heavy loads in the wrong spot) could cause ships to be unstable in heavy seas.



A colored diagram of compartments on a Liberty ship, from the right side, front to the right

 Machinery spaces	 Engine room
 Command and control	 Misc
 Liquid stores	 Dry stores
 Dry cargo	 Habitation

Stowage and Ship Design

- **Multi-Deck Holds:** Cargo ships like the Liberty Ship had five main cargo holds. Loading began at the lowest deck; once filled, the hatch cover was replaced, and the next deck was filled.
- **Hatches and Covers:** Holds were accessed through large deck hatches. These were secured with a multi-layered system including steel combings, wooden boards, and tarpaulins.
- **Ballast and Weight Distribution:** Critical to stability, heavy weights were placed low in the ship. Improper ballasting (a common issue for some British fleets) could lead to "stiff" ships that rolled violently in heavy seas.
- **Specialised Vessels:**
 - o **Tankers:** Moved over 64 million tons of petroleum products in liquid form.
 - o **LSTs (Landing Ship, Tank):** Designed to beach themselves, they featured large **bow doors and ramps** to allow tanks and vehicles to drive directly on or off.
 - o **Attack Transports (APA/AKA):** Converted freighters that carried their own fleet of smaller landing craft on deck, launched via davits or cranes.

Logistics at Sea

- **Lighterage:** In ports without docks or after assault landings, ships anchored offshore and transferred cargo into smaller boats, rafts, or **Ramped Cargo Lighters (RCLs)** using their own cranes.

Loading high-stakes cargo like explosives or heavy machinery required specialized—and often dangerous—techniques to ensure the ship didn't blow up or capsize mid-transit.

1. Ammunition and Explosives

This was the most meticulous loading process due to the risk of sympathetic detonation.

- **Dunnage:** Stevedores lined the steel holds with massive amounts of **dunnage** (cheap wood scraps). This prevented metal-on-metal contact (*right, loading ammunition*), which could cause a spark.
- **Shifting Boards:** Heavy wooden partitions were built to "lock" the shells and crates in place, ensuring the cargo wouldn't slide when the ship tilted in rough seas.
- **The "Magazine":** For mixed-cargo ships, explosives were kept in a specially constructed wooden "magazine" in the centre of the ship, furthest from the hull and engine heat.



2. Aircraft (Deck Cargo)

Because planes took up too much internal volume, they were often treated as **deck cargo**.

- **Meccano Decking:** Engineers would build temporary steel trestles (like a giant Erector set) over the main deck. This allowed the ship to carry its standard cargo below while planes were lashed on top.
- **Cocooning:** To protect them from salt spray, planes were often "cocooned" in a thick, spray-on plastic or heavy waxed paper.
- **Crating:** Many fighters (like Spitfires) were partially disassembled, packed into massive wooden crates, and stacked like building blocks.

3. Tanks and Heavy Vehicles

- **Combat Loading:** Unlike standard shipping where you pack as much as possible, "combat loading" placed the most essential gear (like tanks and Jeeps) on top so they were the first things off during an invasion.
- **Lashing:** Vehicles were secured using heavy steel chains and turnbuckles. If a 30-ton Sherman tank broke loose in a storm, it could act like a wrecking ball, punching a hole through the side of the ship from the inside.

4. Bulk Liquids (Oil and Fuel)

- **Tankers:** These didn't use crates. Instead, the entire hull was divided into "tanks." Fuel was pumped in through flexible hoses.

- **The Danger:** The most dangerous time was when a tanker was *empty* because the fumes were more explosive than the liquid itself.

The standard WWII Liberty Ship was divided into five main cargo holds, which were further split into horizontal layers called **decks**. This design allowed a single ship to carry roughly 10,000 tons of diverse supplies, from grain to tanks. (*Below*), Ammunition being unloaded from a Liberty Ship.



Internal Layout of a Liberty Ship

- **The Tank Top:** The very bottom level, resting just above the fuel and ballast tanks. This area held the heaviest cargo like locomotives, tanks, or bulk ore to keep the ship stable.
- **The Lower Hold:** The large open space between the Tank Top and the Second Deck.
- **The Second Deck (Tween Deck):** A middle level used for general cargo in crates, sacks, or barrels. In troop-ship conversions, this deck was often outfitted with bunks for soldiers.
- **Deep Tanks:** Located near the bottom of the ship, these could hold either liquid cargo (like fuel or water) or dry bulk goods.

Breaking the 'Stranglehold'

Before containers, in the early to mid-20th century, ocean freight, called “break bulk”, was carried in ships that had huge hatches in the fore and aft decks. Under that hatch cover, on the deck below was a slightly smaller one, and on the deck below that, one smaller still, and so forth to the lowest deck.

The ship was loaded with a crane that might have been part of the ship's rigging in smaller ports or, in larger ports, would be landslide-based, especially in the port of NY where the International Longshoremen's Union held a death grip control of all of the loading and unloading of ships.

A larger cargo ship of the day might be in port for two weeks to a month to unload and reload every box and item by hand. The goods were stacked in a pile on the dock on top of a net that was then hoisted onto the ship and lowered through the deck openings to the lowest deck. When that deck was filled, the minor hatch cover was replaced, and the next deck was filled, and so forth, until all five or more decks were complete.

One of the problems with break bulk was that where the net landed on a lower deck, it may have been 100 ft or more to the spot where a piece of cargo would be stowed. It was the same, of course, when the cargo was unloaded. It was not unusual for a ship to spend nearly a month in port getting unloaded and reloaded.

There were many stories told why ship owners were very anxious to abandon break bulk and move on to the next big thing. It was said that some Long Shoremen became very wealthy from things that seemed to stick to their clothes when they left work at night.

The handling of cargo piece by piece began to taper off rapidly in about 1955 when a trucker named Malcolm McLean invented the ocean container. Shrinkage in the ports went from huge to zero almost overnight with the introduction of the Ocean Container that could be stacked 9 high on ships and then be handled as a truck trailer on land.

Box Boats, as they were called in the early years, grew several orders of magnitude from the ships they replaced, and theft losses virtually vanished. Beyond this, with highly automated gantry cranes for handling the boxes, the dwell times in port were measured in hours rather than weeks.

Key Aspects of WWII Palletization:



Palletization revolutionized WWII logistics by enabling the rapid, mechanized handling of supplies, drastically reducing loading times, and minimizing cargo damage. Adopted heavily by the US military around 1942, wooden pallets paired with forklifts efficiently moved ammunition and goods, mitigating the threat of U-boats by limiting ship time in port.

The use of pallets allowed cargo to be loaded in hours rather than days, significantly improving the speed at which supplies reached the frontline. The need to move cargo in confined ship spaces led to the invention of the four-way pallet (accessible by forklifts from all sides) during the war. The U.S. Army and Navy shifted from various custom depot sizes to standardized pallets to optimize "cube" utilization (shipping space).

The rise of palletization was directly tied to the development and deployment of forklifts at military arsenals and depots, particularly within the U.S. Army Quartermaster Corps. Millions of U.S. Navy

pallets were left in Australia after the war, forming the basis for the Commonwealth Handling Equipment Pool (CHEP), a major pallet pooling organization.

Challenges and Adoption:

Early in the war, some depots resisted the change due to fears of losing 10% of shipping capacity to pallet weight, and there was a shortage of forklifts. While the U.S. Army adopted them rapidly, some Marine divisions were slow to adopt them, sometimes breaking down pallets due to lack of space or lifting equipment. However, by the end of the war, palletization was firmly established as an essential logistical practice for modern warfare.

The largest modern Container ships can now carry 24,000 twenty-foot containers.



Sources

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- Reddit.
- Associated Pallets.
- Reusable Packaging News.
- Wikipedia.