Unit ***16***

CARGO-HANDLING EQUIPMENT ON BOARD AND IN PORT

Basic terms

cargo-handling equipment	***front/side loader***
cargo gear	***van carrier***
handling facilities	***transtainer***
lifting gear	***container crane / portainer***
conveyor belt	***transit shed***
elevator	***warehouse***
pumping equipment	***cranes:***
derrick	***dockside crane,***
fork lift truck	***quay crane,***
mobile crane	***container crane***
straddle carrier	***gantry crane,***
tractor	***deck crane***
tug-master	***(ship's) cargo gear***

The form of cargo-handling equipment employed is basically determined by the nature of the actual cargo and the type of packing used. The subject of handling facilities raises the important question of mechanization.

BULK CARGO HANDLING EQUIPMENT

So far as **dry bulk cargoes** are concerned, handling facilities may be in the form of power-propelled conveyor belts, usually fed at the landward end by a hopper (a very large container on legs) or grabs, which may be magnetic for handling ores, fixed to a high capacity travelling crane or travelling gantries. These gantries move not only parallel to the quay, but also run back for considerable distances, and so cover a large stacking area, and are able to plumb the ship's hold. These two types of equipment are suitable for handling coal and ores. In the case of bulk sugar or when the grab is also used, the sugar would be discharged into a hopper, feeding by gravity a railway wagon or road vehicle below.

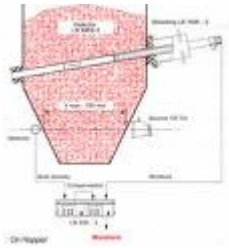
Elevators (US) or silos are normally associated with grain. They may be operated by pneumatic suction which sucks the grain out of the ship's hold.

SHIP UNLOADERS

FRONT LOADER

BELT CONVEYOR

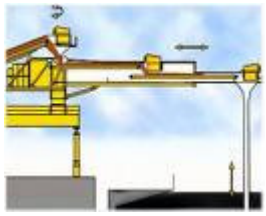
HOPPER



HOPPER

SILO / ELEVATOR

GRAB TYPE UNLOADERS



LOADING BOOM

LIQUID CARGO HANDLING EQUIPMENT

The movement of **liquid bulk cargo**, crude oil and derivatives, from the tanker is undertaken by means of pipelines connected to the shore-based storage tanks. Pumping equipment is provided in the tanker storage plant or refinery ashore, but not on the quayside. In view of the dangerous nature of such cargo, it is common practice to build the special berths a small distance from the main dock system on the seaward side. Oil cargo is discharged from the ship's tanks, via the cargo piping system to the main ship's manifold usually situated amidships, on either port or starboard side. From there by means of shore-based loading arms oil is transferred to the shore manifold and is then distributed to shore-based storage tanks on the oil terminal. The loading arm hose must be flanged oil-tight to the ship's manifold so that oil spills can be avoided.

TERMINAL MANIFOLD

SHIP'S MANIFOLD

LOADING ARMS

GENERAL CARGO HANDLING EQUIPMENT

With regard to **general cargo** (goods, merchandise, commodities), also referred to as break bulk cargo, almost 90 percent of all such cargo in most liner cargo trades today is containerized. Meanwhile the system of dockers handling cargo will continue, but doubtless every effort will be made to expand the a1ready extensive use of various types of mechanized cargo-hand1ing equipment.

General cargo is handled by cranes on the quay, floating cranes or by the ship's own cargo gear (deck cranes, derricks, etc.). Attached to such lifting gear is a shackle which links the crane or derrick with the form of cargo-handling equipment being used. For most lifts a hook is used.

There are numerous types of tools or **loose gear** that can be attached to the shipboard or shore-based lifting gear. They include the sling or strop, which is probably the most common form of loose gear. Such equipment, generally made of rope, is ideal for hoisting strong packages, such as wooden cases or bagged cargo, which is not likely to sag or be damaged when raised. Similarly, snotters

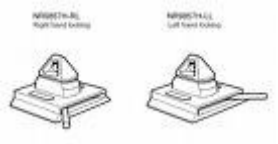
or canvas slings are suitable for bagged cargo. Chain slings, however, are used for heavy slender cargoes, such as timber or steel rails. Can or barrel hooks are suitable for hoisting barrels or drums. Cargo nets are suitable for mail bags and similar cargoes that are not liable to be crushed when hoisted. Heavy lifting beams are suitable for heavy and long articles such as locomotives, boilers or railway passenger coaches. Cargo trays and pallets, the latter being wooden or of steel construction, are ideal for cargo of moderate dimensions, which can be conveniently stacked, such as cartons, bags, or small wooden crates or cases.

CONTAINER FITTINGS

CHAIN SLING

TWISTLOCK

CONTAINER FITTINGS AND LASHING

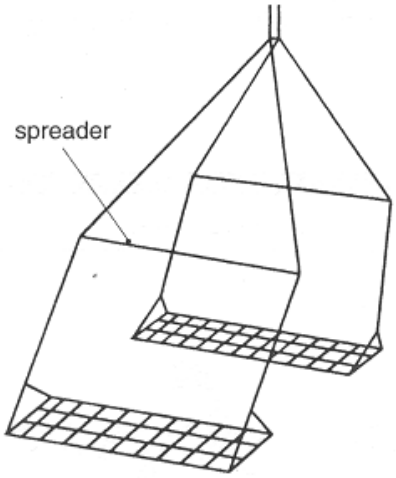


CORNER CASTING

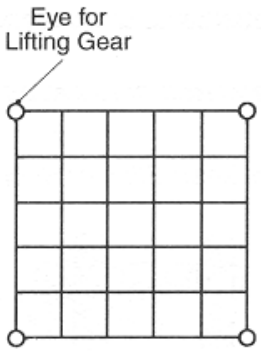
CARGO NET

HOOKS

LIFTING BEAM

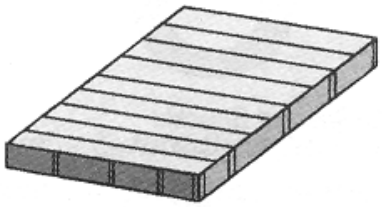


Vehicle Sling



Cargo Net

Canvas Sling



Pallet

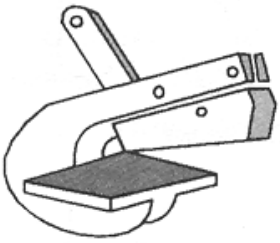
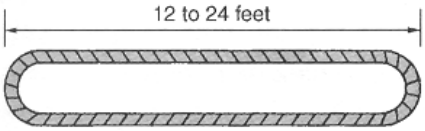
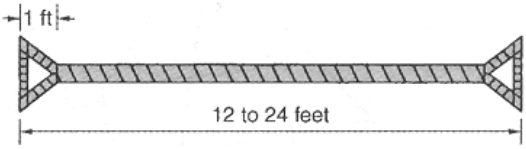


Plate Lifting Clamp

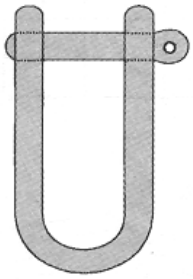
Cargo Handling Equipment or Lifting Gear (loose gear & cargo tools)



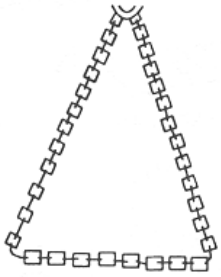
Loose Gear: *Sling or Strop*



Snotter

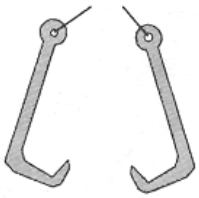


U-Shaped Shackle



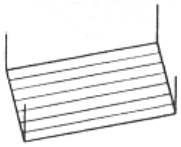
Chain Sling

Hooks: *Timber hooks*

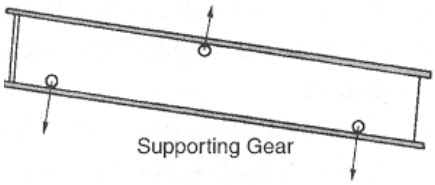


Hooks: *Box hooks*

Hooks: *Can hooks*



Cargo Tray



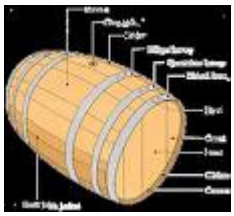
Heavy Lifting Beam: *Lifting Gear*

TYPES OF PACKING AND LIFTING EQUIPMENT/GEAR

WIRE SLING

DRUM/BARREL

KEG

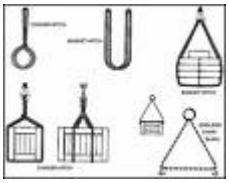


CASKS

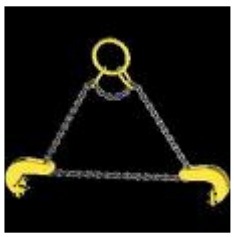
CARGO HOOKS

CRATES

BOX / CASE

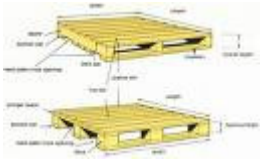


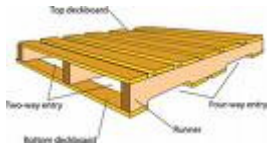
CARGO SLINGS



BOX HOOK

PLATE CLAMP



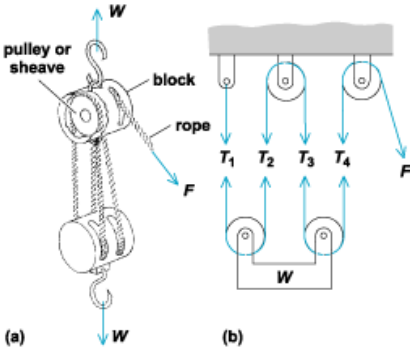


PALLET

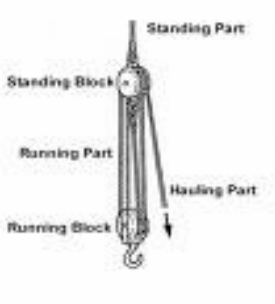
LIFTING GEAR

MODERN CARGO HANDLING

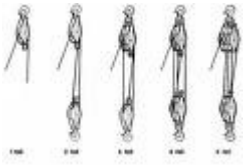
BLOCK AND TACKLE SYSTEMS



TACKLE: BLOCK AND SHEAVE



TACKLE



LIFTING GEAR

Additionally, dog or case hooks and case and plate clamps are suitable for transhipping cargo to railway wagons or road vehicles, but not to or from the ship, except to facilitate trans-shipping the cargo in the hold to enable suitable cargo-handling gear to be attached. Plate clamps are used for lifting metal plates. Dockers working in the ship's holds also use pinch or crowbars for moving heavy packages, and band books for manoeuvring packages into position.

PORT/TERMINAL CARGO HANDLING EQUIPMENT

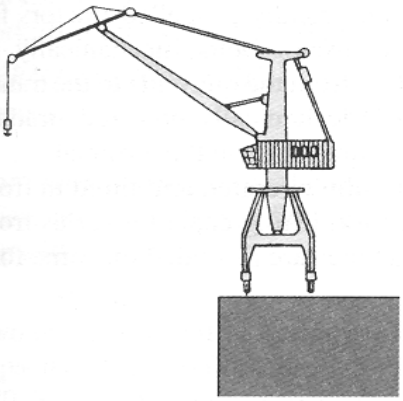
A lot of terminal or port **cargo handling equipment** is provided to facilitate movement of the cargo to and from the ship's side and the transit shed, warehouse, barge, railway wagon or road vehicle. These include two-wheeled hand barrows and four-wheeled trucks either manually or mechanica1ly propelled, and mechanically or electrica1ly propelled tractors for hauling four-wheeled trailers. Ro-ro trailers are moved by tug-masters or ro-ro tractors. There are also belt conveyors mechanically or electrically operated, or rollers, all perhaps extending from the quayside to the transit shed, warehouse, railway wagon or road vehicle. Containers are loaded and unloaded by means of the quayside container cranes, i.e. container gantries also called shiptainers.

Transtainers or stacking cranes, straddle carriers, van carriers, front and side loading fork-lift trucks are used for moving and stacking containers within the terminal up to five-high, i.e. five containers one above the other. Mechanically powered straddle carriers are designed to distribute containers on the quay and on the terminal.

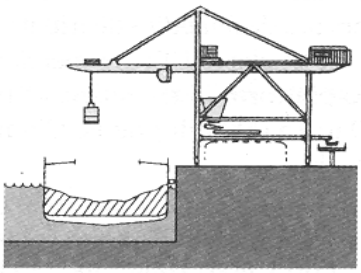
Fork lift trucks (FLT) are mechanically or electrically operated and fitted in front with a platform in the shape of two prongs of a fork; lifting capacity varies from 1 to 45 tons. Clamps for reels and bales are provided on some fork lift trucks.

On the docks various types of dockside cranes, level-luffing cranes, mobile cranes etc. are used for moving and lifting packages. All the vertical cargo movements are conducted by the lifting gear (lift-on/lift-off equipment).

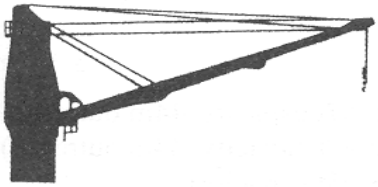
Roll-on/roll-off cargoes, i.e. containers and heavy loads on trailers, roll on and off the ro-ro ship via stern, bow or quarter ramps. They are lifted to various decks on board by means of scissor-supported platforms.



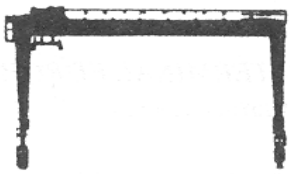
Level-Luffing Crane: *Dockside Crane*



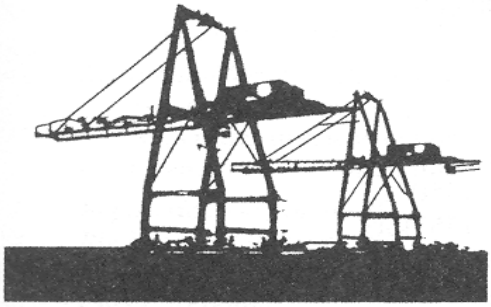
Ship Unloader Gantry



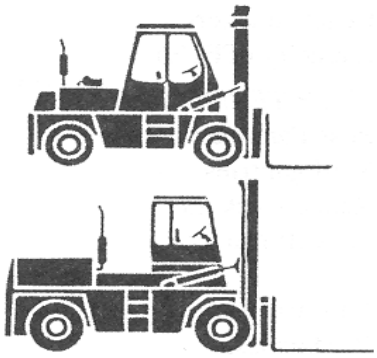
Shipboard Crane: *Deck Crane*



Transtainer Stacking Crane:
Straddle Carrier



Container Crane (Portainer)



For more port cargo handling equipment see also Supplement (End of Unit 16)!!!

IMO STANDARD MARINE COMMUNICATION PHRASES
IV-C - CARGO AND CARGO HANDLING

1.1.4 - Operating cargo handling equipment and hatches

Are cranes/derricks operational?
- *Yes, cranes/derricks operational.*
- *No, cranes/derricks not operational (yet).*
- *Cranes/derricks operational in ... minutes.*

Rig derrick(s)/crane(s) of no. ... hold.
Rig heavy lift derrick.
Shift derrick(s) of no. ... hold to ... side.
Check preventers.
Top derrick(s) over hatch/pier.
Lower derrick(s) over hatch/pier.
Swing derrick(s)/crane(s) outboard.
Keep safe working load of derrick(s)/crane(s).
Instruct winchman/craneman.

1.1.5 - Maintaining/repairing cargo handling equipment

Check hold(s)/hatch cover(s)/derrick(s) for damage and report.
- *Cargo battens damaged.*
- *Rubber seals of hatch cover(s) damaged.*
- *(Container) lashings damaged.*

Are hold ventilators operational?
- *Yes, hold ventilators operational.*
- *No, hold ventilators not operational.*
- *Hold ventilators operational in ... minutes.*

Are winch motors operational?
- *Winch motor of no. ... derrick operational in ... minutes.*

Check repair of crane/winch / ... personally.
Lubricate blocks of crane(s)/derrick(s).

A Comprehension & vocabulary

A.1 *Fill in the appropriate term:*

- ***straddle carriers*** • ***container gantries*** • ***tug-masters***
- ***fork lift trucks*** • ***trailers***

The Auckland Container Terminal

The Auckland Container Terminal is equipped with three Paceco 1._____. The terminal equipment also includes 20 2. _____ to move and stack the containers on the terminal. 3. _____ and 4._____ are used for moving containers into and off the ro-ro vessels. For empty containers more than thirty l8-ton 5. _____ are used.

A.2 *State the kind of loose gear (see p.* 119 - *120) you would use for handling the following types of cargo:*

1. steel plates _____
2. eggs in cartons _____
3. barrels or drums _____
4. heavy machinery _____
5. raw oil _____
6. iron ore _____
7. steel rails _____

8. bagged cargo _____
9. containers _____

A.3 *Classify the following terms under the four headings as appropriate:*

• ship unloader • transtainer • dockside crane • straddle carrier
• mobile crane • FLT • hopper • floating crane • bucket elevator
• conveyor belt • deck crane • derrick • pumping equipment
• tug-master • level-luffing crane • trailer • pneumatic unloader
• grab unloader • loading arm

conventional or general cargo	*containers and ro-ro units*	*bulk cargo*	*liquid cargo*

A.4 *State which of the following sentences are true or false:*

TRUE	*FALSE*

1. Hand books are used with bagged-cargo.
2. Conveyor belts move bulk cargoes.
3. Transtainers are quay container cranes.
4. Straddle carriers are used to load containers on board ship.
5. Tug-masters move co-co cargo info co-co ships.
6. Chain slings are used with lightweight cargo.
7. Cargo nets are suitable for cartons and bags.
8. Fork lift trucks are not used to handle paper rolls.
9. Drums are stowed onto the pallet to facilitate handling.

A.5 *Complete me text below with the appropriate words:*

• boom • officers and crew • cargo handling • ship's gear
• lifting gear • cargo handling equipment • dockers • winch

Handling General Cargo in the US

General cargo used to be handled in the United States chiefly by means of 1._____ . Today the greatest proportion of general merchandise is carried in containers and worked with the terminal 2. _____ . The speed loading and discharging and the adequacy of stowage is highly dependent upon

the skill and experience of 3. _____ and the ship's 4. _____ . However, these must be quite familiar with the methods of 5. _____ . The term ship's gear is used to describe the ship's deck 6. _____, its cargo 7._____ attached either to mast or kingposts. Shore 8. _____ is usually used for handling conventional general cargo in most European ports.

A.6 *For each group of crane types find the type of cargo they handle: dry bulk cargo, containers, or general cargo*

CRANE TYPES	*CARGO TYPES*
dockside crane	
gantry crane	
level-luffing crane	
overhead crane	
ship crane	
derrick	
floating crane	
slewing crane	
portal crane	
semi-portal crane	
quayside crane	
mobile crane	
jumbo (Scotch) derrick	
shiploader	
ship unloader	
stockyard crane	
stacking gantry	
portainer	
container gantry	
transtainer	
shiptainer	
straddle carrier	
front loader	
side loader	

A.7 Underline the cargo-handling equipment in the description of the Amsterdam Westhaven bulk cargo terminal:

The terminal has a quay of 800 m in length and 15 m in depth. Maximum draught of vessels to be accommodated is 13.5 m. Maximum outreach of loading/discharging equipment over water is 45 m. Four gantry cranes, lifting capacity 3 x 30 tons and 1 x 50 tons, are used for handling ore and coal. The material is transported to storage by a conveyor belt system. Grab bridge cranes are used for ore and floating cranes are also available.

A.8 Port of Cork Container Services

Our Services

The Port of Cork offers a wide choice of fast, scheduled lift-on lift-off and roll-on roll-off services to continental Europe. The Port offers a scheduled ro-ro shortsea service to Swansea and Cork is the only Irish port providing a deepsea ro-ro service to Scandinavia, and the Mediterranean, and West Africia. At both the Tivoli Container Terminal and the Ringaskiddy Ro-Ro Terminal, modern port facilites and cargo handling equipment, high productivity levels, competitive pricing and twenty four hour working, seven days per week have contributed greatly to increased unitised throughput.

Lift – on Lift – Off Services

The Tivoli Container Terminal is situated 2 miles / 3 kilometres downriver from Cork city at the junction of two of Ireland's four Euroroutes, the N8 Cork – Dublin and the N25 Cork – Waterford – Rosslare. The terminal is adjacent to the Lee Tunnel and enjoys ready access to the N20 Cork-Limerick- Galway primary route.

Handling equipment includes two modern gantry container cranes and six straddle carriers. The terminal is equipped with a bank of reefer/heater points. The approach channel to Tivoli has been dredged to a depth of 6.5m C.D. to allow fully laden 700/800 teu vessels to access or depart the Terminal at all stages of the tide.

Competitive high frequency sailings have led to increased containerised throughput, thus enabling the Port of Cork to increase its market share of the Irish container market. The wide range of door to door services permit fast and frequent delivery of containers throughout Europe while feeder services allow Irish exporters to service deepsea markets speedily and efficiently.

Modern facilities are available at both Ringaskiddy and Tivoli to cater for the port's increasingly important roll-on roll-off traffic. The Ringaskiddy Ferry Terminal accommodates car ferry services to Britain and continental Europe together with regular shipments of trade vehicles.

The Grimaldi Euro-Med service is Ireland's only deepsea ro-ro service offering weekly connections to Scandinavian and Mediterranean ports. It is operated from the Ringaskiddy Deepwater Terminal which also services the port's considerable trade in deepsea trade vehicles. The Grimaldi West Africa service also calls to the Ringaskiddy Deepwater Terminal on a regular basis. Much of Cork's traffic in trade vehicles is handled at the Tivoli Ro-Ro terminal where regular shipments are discharged from British and mainland European ports. Extensive vehicle storage compounds are situated at Ringaskiddy and Tivoli.

There are four distinct public port facilities situated at the City Quays, the Tivoli Industrial and Dock Estate, the Ringaskiddy Deepwater and Ferry Terminals and the Cobh Cruise Terminal. For centuries the City Quays have handled most of the trade of the port and, while much of that traffic has now moved downriver, this area continues to account for approximately 1 million tonnes of cargo ranging from cereals, animal feedstuffs, fertilisers and coal to timber, acids and salt. In addition, a small number of medium size cruise ships continue to call to the City Quays.

The Port's lift-on lift-off container traffic – door – to – door and feeder – is handled at the Tivoli Container Terminal from where at least ten sailings per week are operated to European ports. Much of the Port's trade in trade vehicles is handled at this location as is the entire output of zinc and lead concentrates from the Lisheen Mine situated in County Tipperary. Other traffic handled at Tivoli includes refined oils, chemicals, LPG, salt, magnesite and livestock.

With a minimum depth alongside of 13.4 metres at low water, the Ringaskiddy Deepwater Terminal handles fully laden Panamax size vessels (60,000 tons deadweight), the only public port facility capable of so doing in any part of Ireland, north or south. Most of the Port's considerable trade in animal feedstuffs is discharged here where there is large – scale private sector investment in specialist warehousing. It is here also that Grimaldi Euro-Med Line's weekly roll-on roll-off service to and from the Mediterranean and Northern Europe is handled. In addition, the Deepwater Terminal handles other dry bulk cargoes, such as molasses, cement and steel scrap. Trade vehicles are discharged at both the Deepwater Terminal and the adjoining Ringaskiddy Ferry Terminal where Swansea Cork Ferries' service to Swansea and Brittany Ferries' service to Roscoff are accommodated. The Terminal's excellent passenger and freight facilities ensure smooth and efficient movement of passengers and freight through the port and onwards to their ultimate destinations – so important for the economic welfare of the region.

The Cobh Cruise Terminal is the only dedicated cruise terminal in Ireland. Situated within a few hundred metres of the centre of the picturesque town of Cobh, it is capable of accommodating cruise ships up to 320 metres in overall length.

B. Grammar

B.1 *Supply the right form of the verb in brackets info the right place in the sentence:*

Loading a Tanker

It now 15.00 hrs *(be).* The loading of cargo on time *(finish).* The personnel from the shore the loading arms *(disconnect).* Same deck hands the tank openings *(batten down).* They the va1ves *(close and sea/).* Under the Bosun's control they various equipments such as dip stick, ullage tapes, sample cans and thermometers *(stow away).* The Chief Officer just his calculations of the quantity of oil loaded *(complete).* He already the draught marks *(check),* and now for shore officia1s to complete the cargo documents *(wait for).*

B.2 *Supply the right article where necessary:*

The Union Purchase

1. _____ union purchase or married-fa11 system is one of 2. _____ most commonly employed systems for 3. _____ both loading and 4. _____ unloading 5. _____ cargo with 6. _____ ship's gear. It is sometimes ca1led 7. _____ union purchase system in 8. _____ UK or burtoning in 9. _____ US. 10. _____ two cargo booms and two winches are employed. One boom extends over 11._____ hatch opening and 12. ____other is swung out so that its peak is over 13. _____ quay apron or edge of 14. _____ pier. The ends of 15. _____ two fa1ls are brought together and terminate in 16. _____ single book.

B.3 *Rewrite the underlined phrases using the following adjectives:*

• ***likely*** • ***liable*** • ***subject*** • ***suitable*** • ***able***

1. Grab unloaders <u>can plumb</u> the whole width of the ship's hold.
2. Chain slings <u>are used for handling</u> heavy slender cargo.
3. Slings made of rope are used with the cargo which <u>does not sag</u> or get damaged when lifted.

4. Pinch or crowbars should not be used with cartons or with cargo which can be damaged by mechanical pressure.
5. Lightweight cargo can get crushed if overstowed by heavy packages.
6. A cargo of citrus fruit deteriorates easily if not carried under the appropriate temperature.

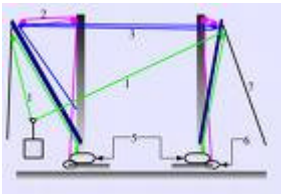
C. Writing skills

C.1 *Answer the following questions:*

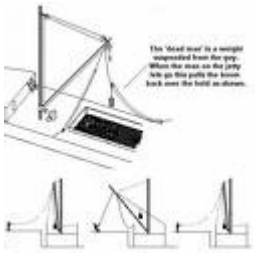
1. What is the cargo-handling equipment determined by?
2. What are bulk cargoes handled with?
3. How is oil moved on and off the ship?
4. What are the basic pieces of lifting gear for general cargo?
5. Which attachments are used with the lifting gear?
6. What are slings, books and lifting beams used for?
7. When do dockers use crowbars?
8. How are goods moved into and out of sheds, storages and warehouses?
9. What are fork lift trucks used for?
10. What equipment is used for hand1ing containers and co-co trailers?

SUPPLEMENT: Port and Terminal Cargo Handling Equipment

SHIP'S GEAR

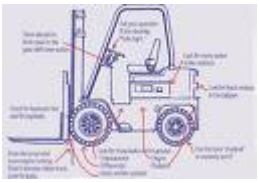


Union purchase (derrick)



Derrick work

TERMINAL EQUIPMENT

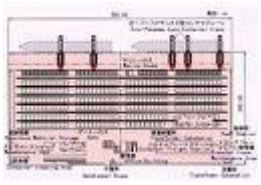


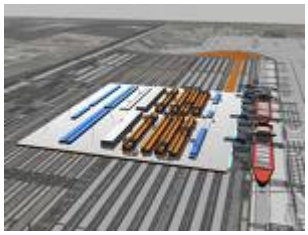
Fork-lift trucks

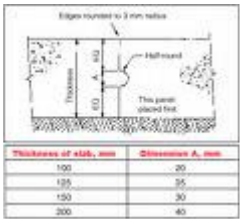
Mobile crane

CONTAINER TERMINALS


AUTOMATIC CONT.TERMINAL



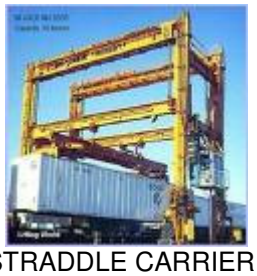

FACILITIES AT CONT. TERMINAL

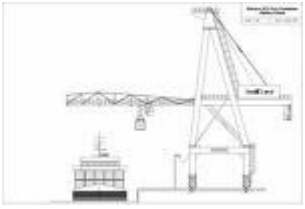


CONTAINER CRANES – PORTAINERS STACKING AREA


CONTAINER GANTRY

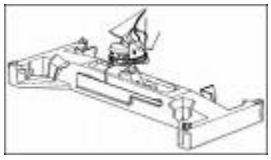

STACKING CRANE


STRADDLE CARRIER




CONTAINER GANTRY (PORTAINER)


TRANSTAINERS




SPREADERS


VAN CARRIER


STRADDLE CARRIER


SIDE LOADERS

ROLL-ON/ROLL-OFF EQUIPMENT

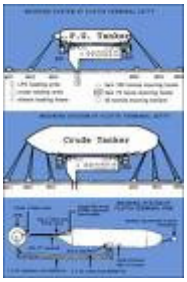

TUGMASTER RO-RO TRAILER

BULK CARGO TERMINALS



BULK CARGO TERMINAL GRAIN TERMINAL CATERPILLAR/BULLDOZER

OIL TERMINALS

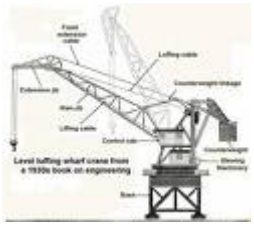




OIL TERMINAL

LNG & LPG TERMINALS

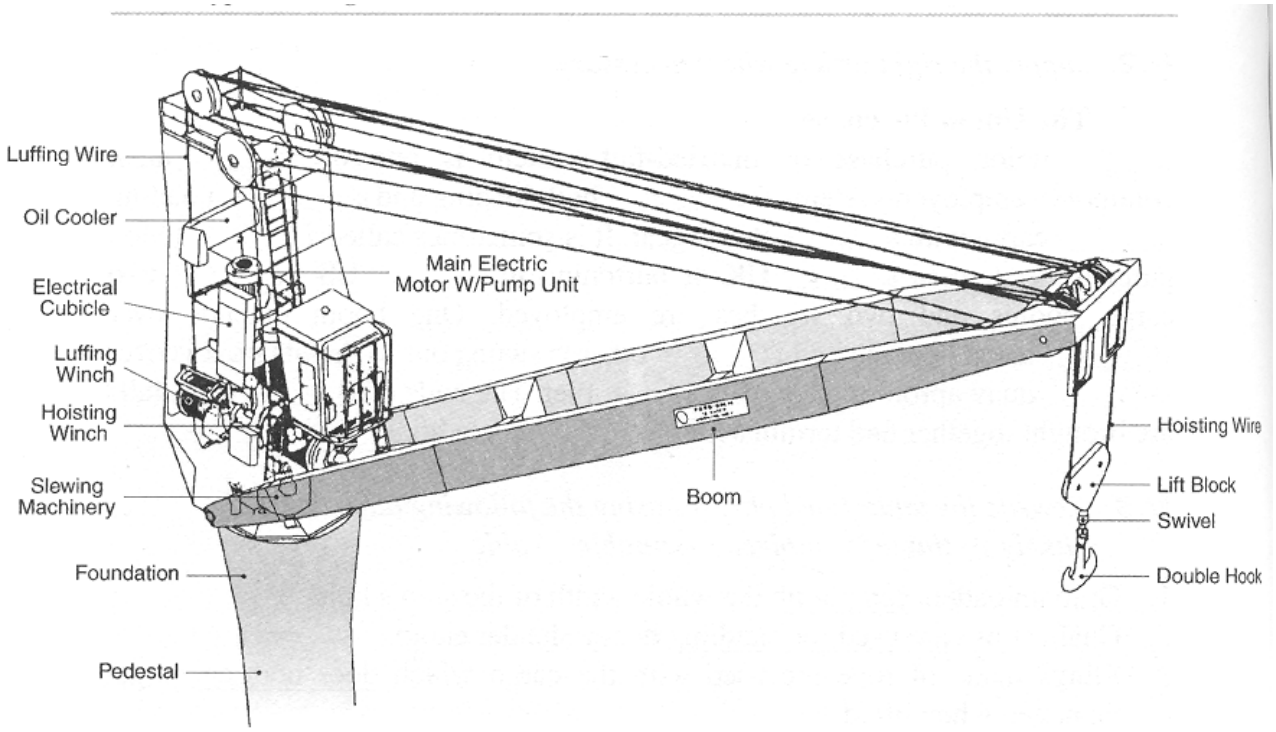

LPG TERMINAL LNG TERMINAL

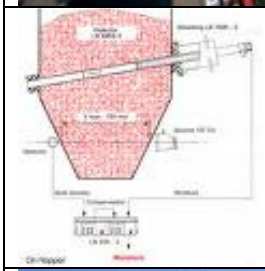
DOCKSIDE/QUAY/WHARF CRANES

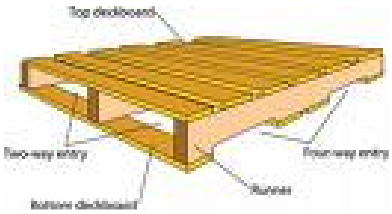
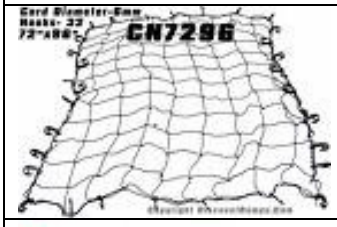


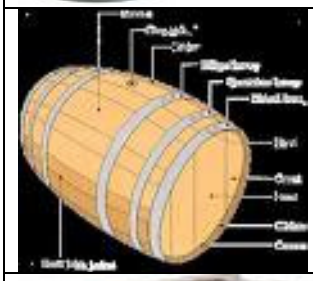
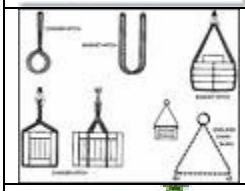


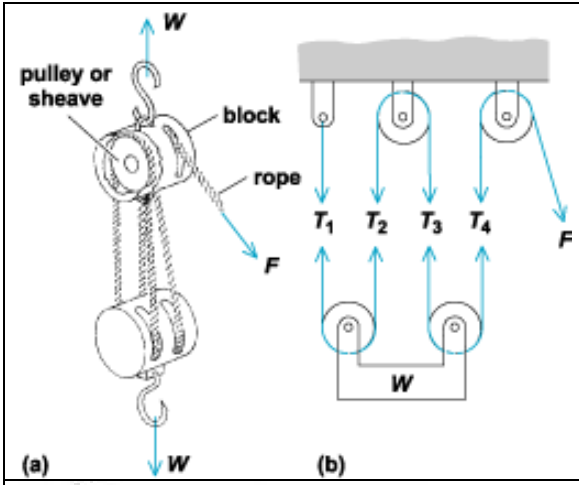
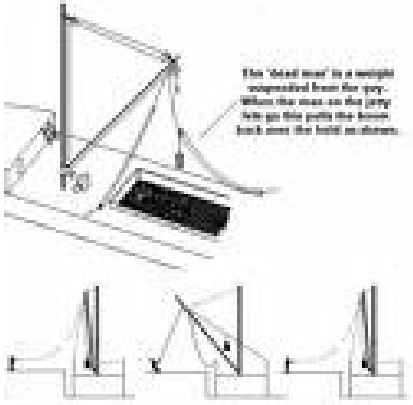

SHIP'S HEAVY MACHINERY

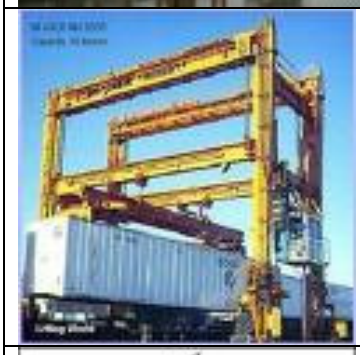
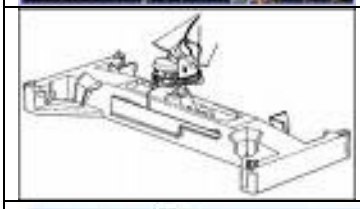
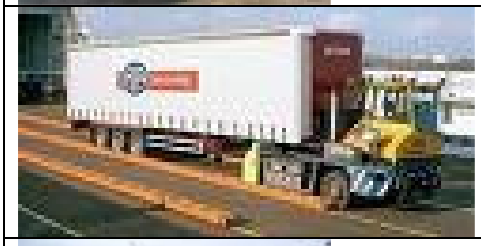


Supply the right term referring to the image in the left-hand column	
Equipment	**Name**
	
	
	
	
	

	
	
 Top deckboard Two-way entry Four-way entry Runner	
 CN7296	
	
	
	

 W pulley or sheave block rope F W (a) T_1 T_2 T_3 T_4 F W (b)	
	
	
	
	

		
 Level luffing wharf crane from a 1930s book on engineering