

**The San Francisco Waterfront:
Other Technological Change on Shore and at Sea
in the First Two Decades of "The Container Revolution."**

**by
Herb Mills**

c. 2004

The San Francisco Waterfront: Other Technological Change

Change Ashore

Conventional Break - Bulk Operation -- c. 1977

Larger and heavier sling loads 1 -- 8
Two hold gang members as lift drivers in the hold 9 -- 10

Hoisting gear add-ons for car and like -sized vehicles 11 --13

From strongback and hatch board to hydraulic hatch cove 14 --15

Ship mounted whirlybird cranes 16 --18

Matson's "Mouse Trap" Container Conveyor

-- a patented device introduced during the second M & M . . 19 - 23

Change at Sea

The Linked Evolution of

"Pure Car" carriers and "RO /RO "Vessels". 1 -- 30

Pacific Far East Lines (PFEL):

The West Coast Introduction of LASH

-- "Lighter Aboard Ship"

and the Bankrupt Disappearance of PFEL. 1 -- 11

CHABGE ON SHORE

Conventional Break - Bulk Operations -- c. 1977 **

As earlier papers have shown at length, it was in August of 1958 that Matson Navigation began what soon would be called "the container revolution" in the West Coast maritime industry. Since container technology clearly promised to be far more productive than the then employed break-bulk technology, "conventional" operators who -- at least for a time would lack the capital needed to join in that revolution - shortly thereafter began to introduce less costly technological changes into their operations. And by the early sixties, those operators had made four rather sweeping and important such changes. ** As surely might be suspected, the first of these -- and the easiest and less costly of all -- were larger and heavier sling loads of cargo than in the past had been worked. *** The second was the use of fork lifts to move sling loads to and from their shipboard place of stow. ^ The third was a far greater use of shipboard "whirlybird" cranes. Such cranes could more safely and rapidly hoist the larger sling loads. And, unlike the conventional shipboard burtioned gear, they could reach the entire "square" of every hatch without a loss of time by having to be re-spotted by the dockers working under them. ^^ The final such change was greater use of hydraulic hatch covers to end the recurrent and the time consuming need to have the shipboard dockers - and often those dockside - move hatch boards and strongbacks (cross beams) to or from a safe place of rest on the ship or dock.

Larger and heavier sling loads.

For many year -- and to the early sixties - the most common break -bulk sling load was a "stevedore" pallet board on which rested a symmetric pattern of cardboard boxed or crated pieces of the same cargo, e.g., a "five block, five high" or a "six block, sic high" as in Figure 1 and 2 on the following page.

* This section of this paper was drafted in 1977 - 78 , while those which follow it were drafted at various times thereafter. As time went on, of course, "conventional" break - bulk work in the ports of San Francisco Bay , as with the gangs which did that work, increasingly disappeared. And, that, of course, too, also occurred as such jobs as still remained were increasingly "modernized" by reducing the number of dockers employed when it was also affected by the tyes oc changed here discussed.

** With respect to the subject at hand, virtually all of the visuals presented in the 14 entry of this web site may be viewed with profit.

*** It will be recalled that the historic Sling Load Agreement of the ILWU,, which limited the size and weight of virtually every cargo worked, was basically ended when the parties signed the first five year M & M agreement. Thus, with it signed it was only when the technological manner of working a cargo had not been changed from what it had been in 1937 that the limits secured in that year still obtained.

^ As will be noted shortly, the second M & M provided for the training of two hold men of each longshore gang to be trained to drive lift in the hold. It should, perhaps, be noted, too, that the author - prior to and after being elected as a Local 10 Business Agent, so drove a lift for a gang. See p. 8 below.

^^ It perhaps should be recalled that the "square" of a hatch is that part of each succeeding lower deck which can be directly reached by the hoisting gear being used. In any event, the driver of a ship-mounted whirlybird, unlike the driver of the "conventional" burtioned gear, could begin and finish a shift without those working in the hold having "to rig and re-rig the gear."

Figure 1

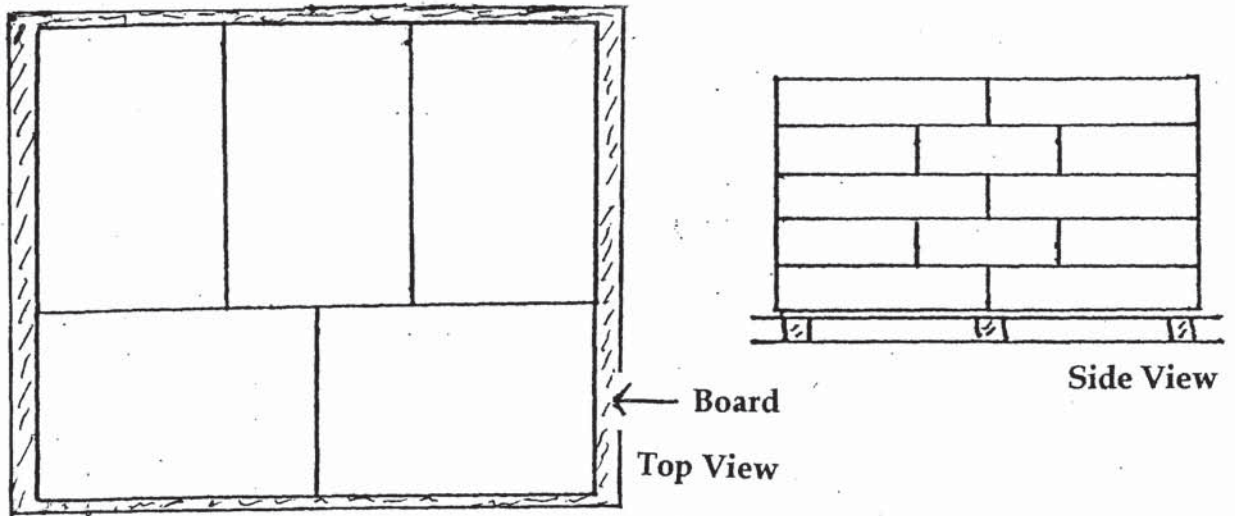
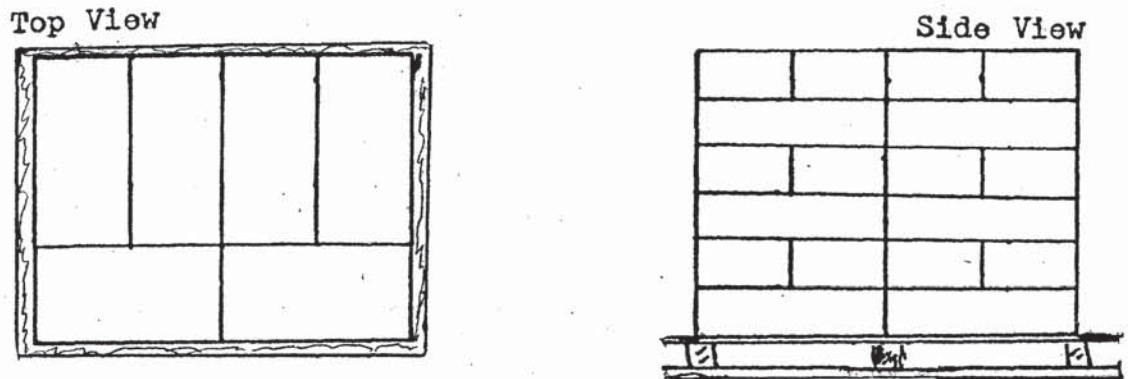
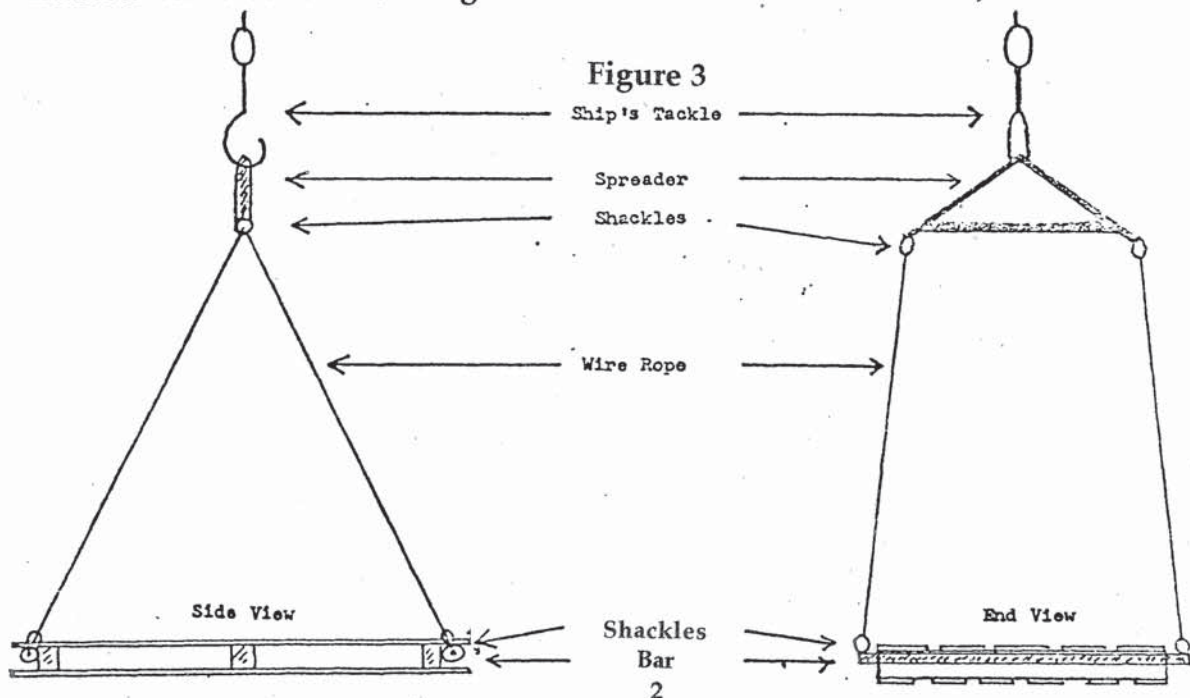


Figure 2



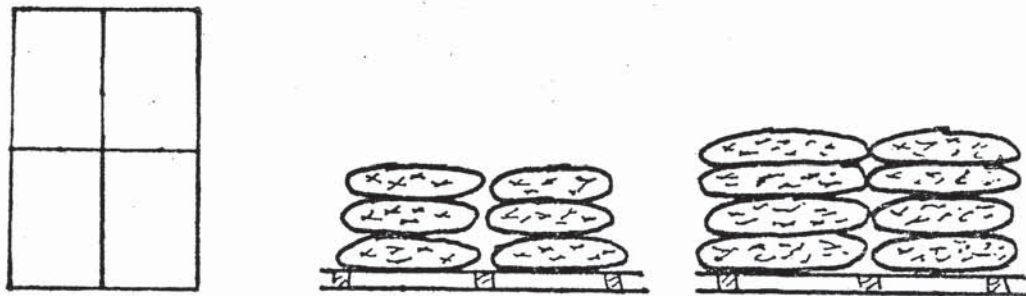
The stevedore pallet board in these figures was heavily constructed and hence fairly costly and hence, of course, too, intended for repeated use by its stevedore company owner. Conventional cargo sling loads on such boards were routinely hoisted with a bar bridle -- Figure 3. The two bars of this bridle, each of which was



slightly longer than the width of a stevedore board, were of tempered bar stock. The ends of each of bar was individually attached to a spreader bar of a slightly shorter length than the width of the board by wire ropes and shackles. In slinging a stevedore board, each of these hoisting bars was placed at an end of the board so as to rest between its upper and lower planked surfaces and against its outer cross member. This work was performed by the two "slingmen" or "front men" of a conventional gang who for that and other purposes were "stationed beneath the hook." Having thus been hoisted into the hold the load would be hand-stowed, piece-by-piece, by the dockers stationed there. And with that accomplished, the empty board was sometimes hoisted back to the dock, unslung by the front men, and removed by the gang's lift driver to a stack of empty boards in the cargo shed. Since, however, hoisting a single board by itself surely had its dangers, empties were virtually always hand-stacked in the hold until there were eight or so ready to go the dock.

This order of events would also be reversed, of course, for the discharge of most conventional cargoes. Thus, the holdmen then would build the sling loads on an empty stevedore board, which with seven others or so had been hoisted into the hold. And, thus, too, for example, when coffee was being discharged prior to when it began to arrive pre-slung, the holdmen would palletize twelve or sixteen bags in a four block on a stevedore board. And, once built, the board would be slung by them with a bar bridle and hoisted to the dock - Figure 4. And having been landed and

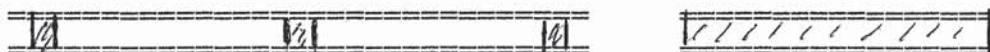
Figure 4



unslung by the front men, it would be delivered by fork-lift to the cargo shed at the direction of the clerk assigned to the gang. Often, however, and having set a load aside, the lift driver on the dock, would stack the next load on top of it and then deliver both of them as he was directed.

While such break-bulk sling loads were frequently still being loaded as of the summer of 1963, shipments of "unitized" loads or what were also called "shipper" loads, i.e., loads of identical cargoes which were strapped together and thereafter moved as a unit by a fork-lift, were by then also being increasing loaded and also discharged to a lesser extent. In either case, such might be built and strapped by their shipper, by a freight forwarding firm, or by a dock gang of longshoremen. As might be supposed, the use of fork-lifts to move such both on the dock and aboard ship was facilitated by the fact that the "shipper's pallet board" could be so lifted from any side. Thus, and unlike the stevedore board, it had two cuts in its cross-members so that forks could be placed beneath its load -- as here in Figure 5.

Stevedore Board -- Side and End Views

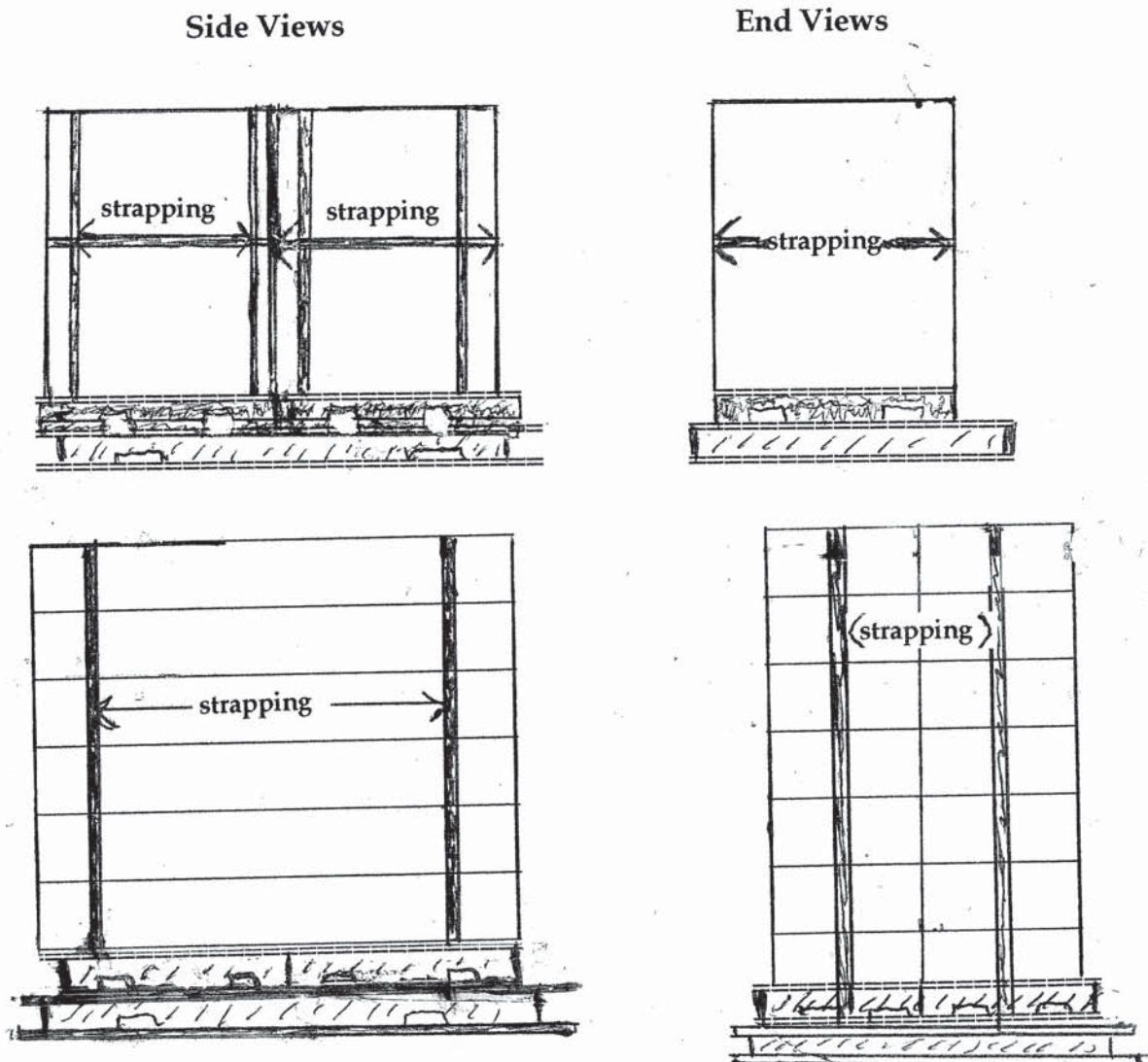


Shipper Board -- Side and End Views



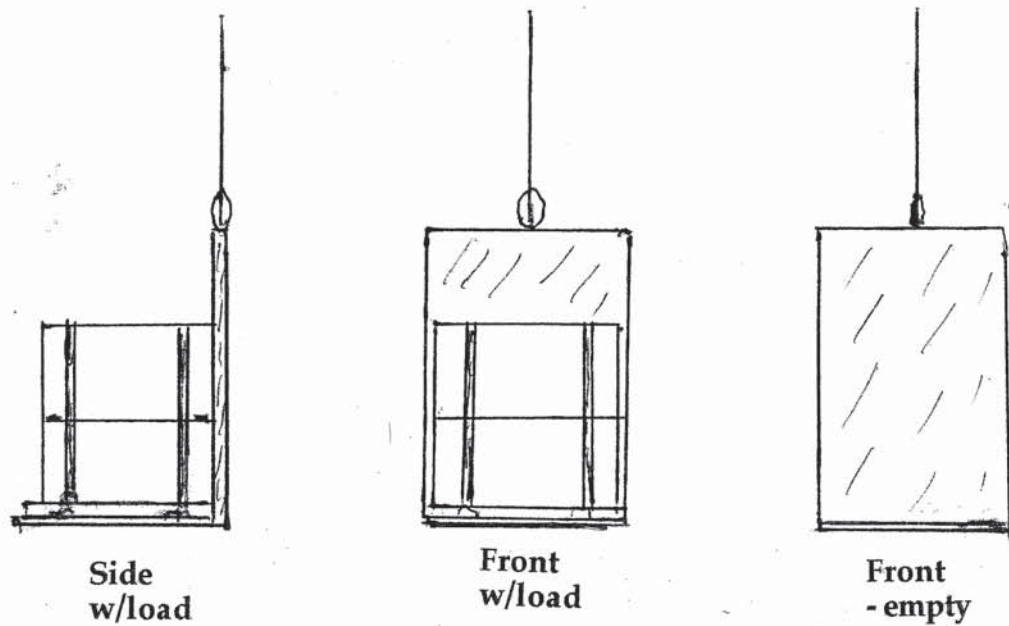
And with it thus intended to be a "one-way" board which would be stowed with its load of cargo intact, it was also unlike the stevedore board in it being always built square in its many different and smaller dimensions and it being of a much lighter construction. And since it was also built without a set of opposing and overhanging "lips", its hoist from dock and ship when first introduced was made with it placed on a stevedore board which then was lifted by a bar bridle or by being directly slung by rope or nylon slings. And hence the hoist of such sling loads might look as is shown in Figure 6. By the mid-winter of 1963, such sling loads also began to be loaded and

Figure 6



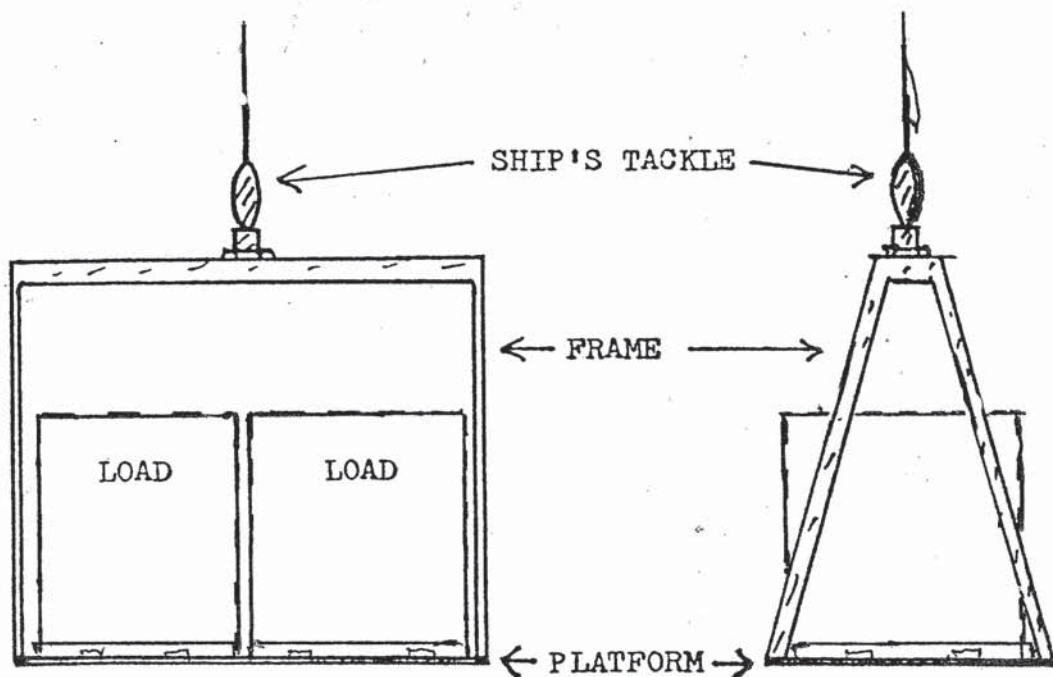
discharged by having been placed on a "hoisting platform" -- such as is pictured in Figure 7 -- by a fork-lift. And, as might be supposed, of course, such platforms were

Figure 7 - a "robot".

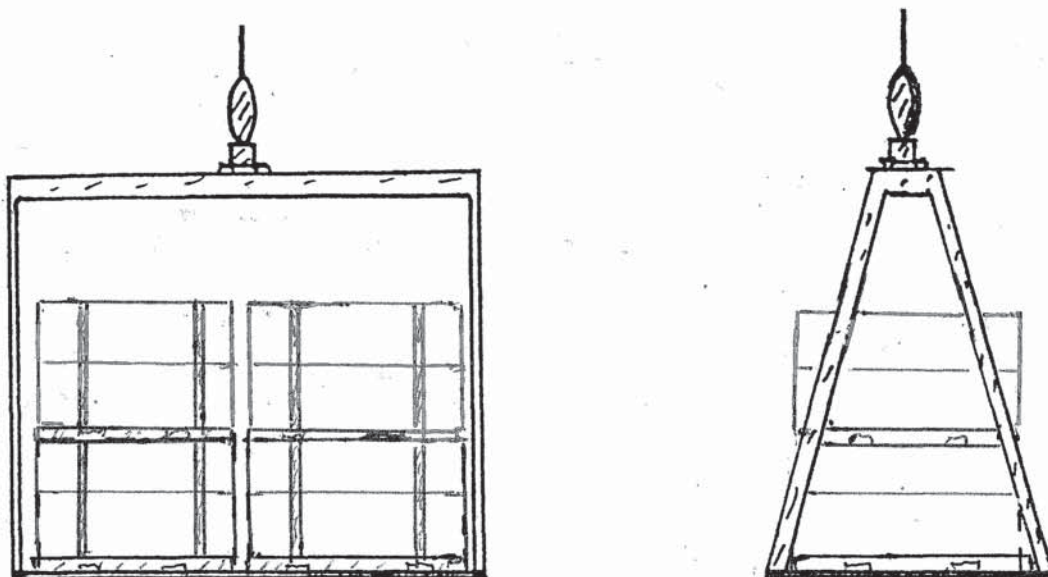
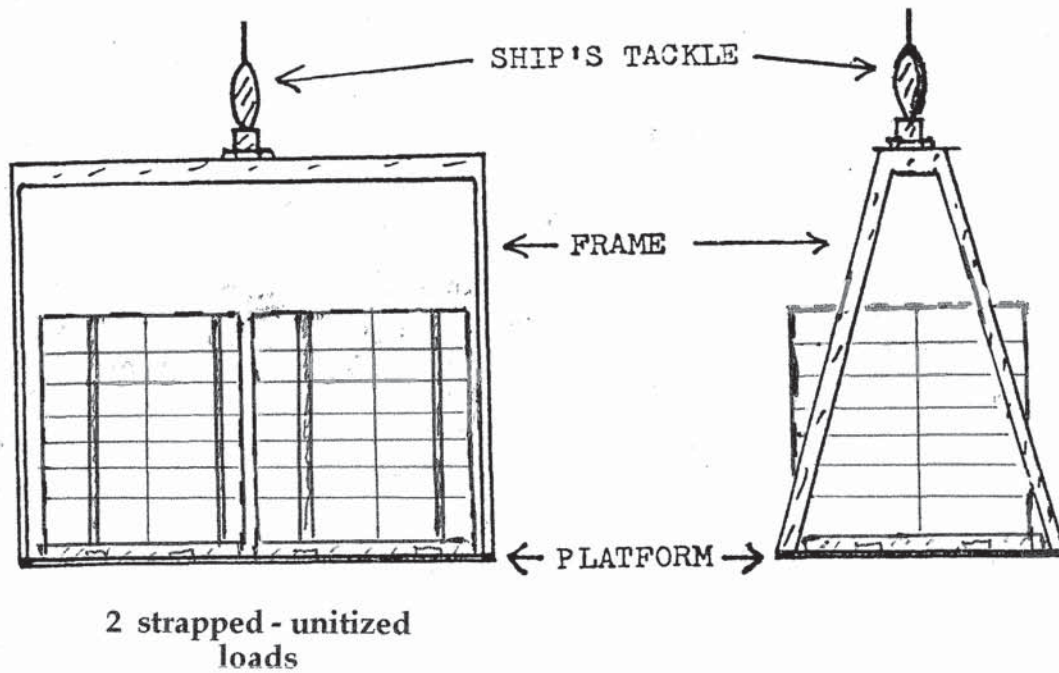


soon called "robots". And as might also be supposed, they soon were enlarged - as pictured in Figure 8 --so as to accommodate a number of shipper loads and to also be soon known as "cages".

Figure 8 - a "cage"

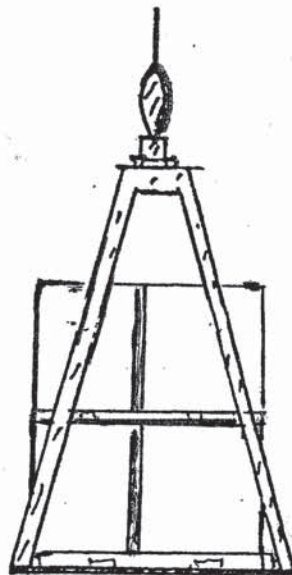
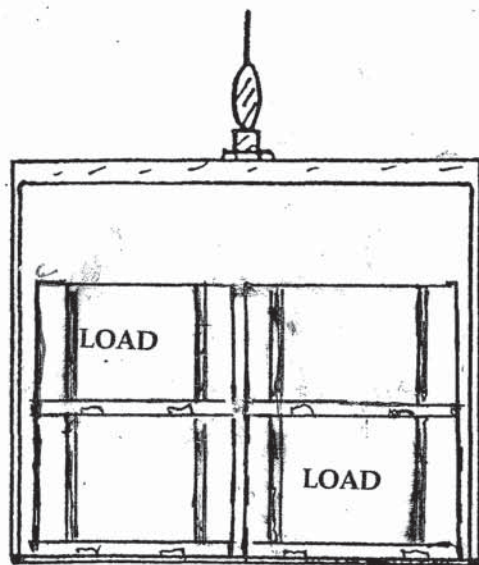


Figures 8a and 8b



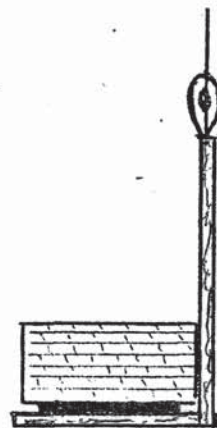
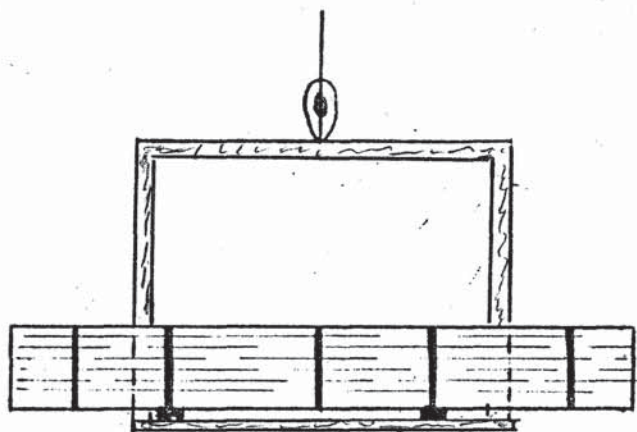
4 strapped - unitized

* It will come as no surprise, but as such sling loads came to be both loaded and discharged by ship-mounted hoisting gear and by rubber-tired and road-approved land based whirlybird cranes, pallet strapped and unitized cargo loads were also soon to be loaded and discharged to 20, 24, 30, 35, and 40 foot containers throughout the entire nation.



And, then, by the summer of 1964, robots began to be introduced which - having far wider platforms - such as shown in Figure 9 - could accommodate shipper loads of

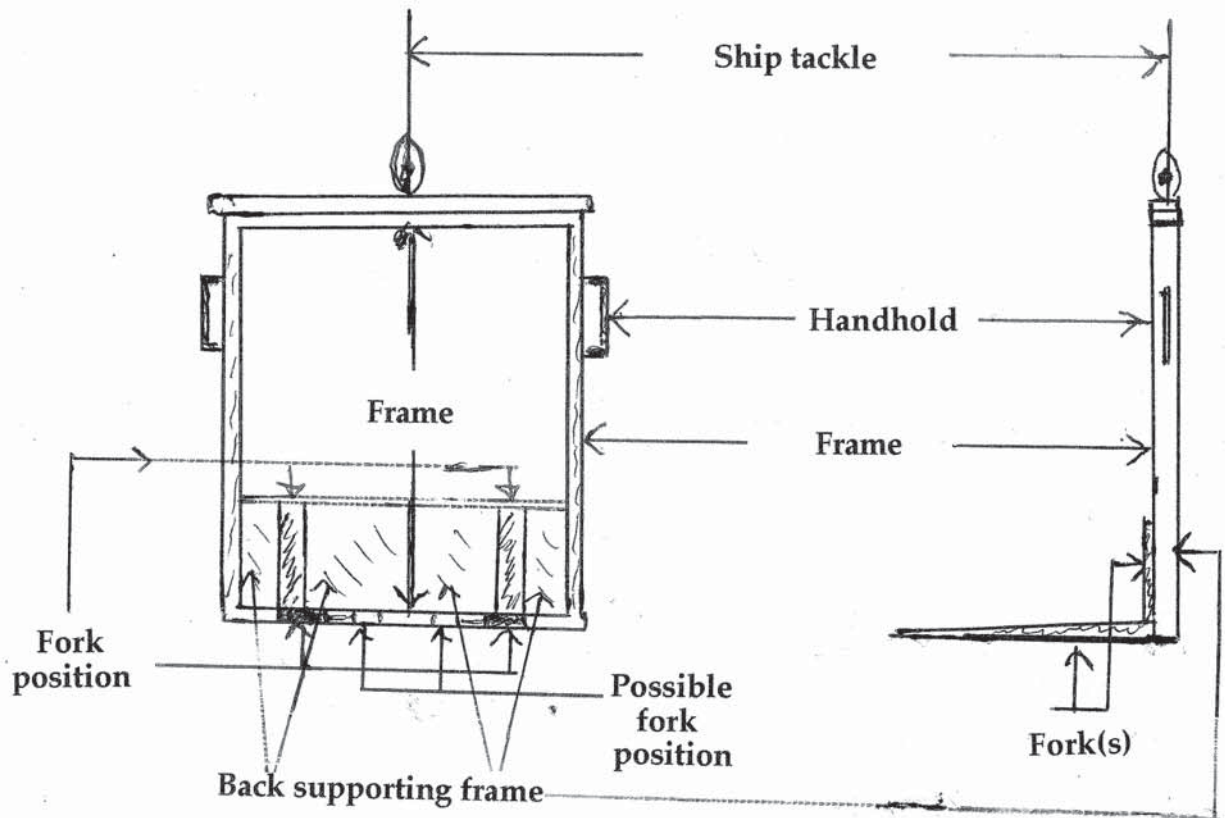
Figure 9



lumber, pipe or bar stock or heavily-crated items of up to twenty- five feet in length. And to facilitate the fork-lift movement of such loads to their place of rest on dock or ship, they were unitized by being strapped to supporting cross-members of wood.

Figure 10

As might well be supposed, this gear "add - on" could also come in handy for large and heavy items of cargo.



As for the sling loads in today's few remaining break-bulk loading and discharge operations it should also finally be noted that, as in the past, the safety of those working such cargoes -- and especially those in the hold -- largely depends on every sling load being properly and sensibly built. On the other hand, employers on such operations now have a stock defense for every sling load and, of course, too, for any resulting speedup: We've really got to produce on this or it sure will go container" -- We're trying to hold this business, but containers are ready to gobble us up."

Two gang members as lift drivers in the hold.

The introduction of larger and heavier sling loads and, of course, strapped unitized sling loads -- built by both docker and shipper -- and the consequent need to have lift drivers in the hold had thus been anticipated in the first M & M:

10.211 On loading operations: when the loads are being landed in the vessel at their place of rest, the basic gang can be used; when the loads are being stowed by mechanical equipment after landing, the basic gang shall be supplemented by the necessary driver(s).

10.212 On discharge operations, this basic gang can be used when the loads are being moved to the point of removal from the vessel by mechanical equipment plus driver(s) or are ready for slinging without additional work except the placement of slings or similar devices.

The increasing need to have "basic gangs" which had in their complement 2 holdmen who were jointly qualified to drive a forklift in the hold prompted the parties to add the following language as an addendum to their second M & M. This they did by the use of their joint Coast Labor Relations Committee (CLRC) on August 5, 1966.

**SKILLED HOLDMEN
HOLDMEN CAPABLE OF DRIVING LIFTS**

CLRC No. 11, August 5, 1966 (Item 2(e))

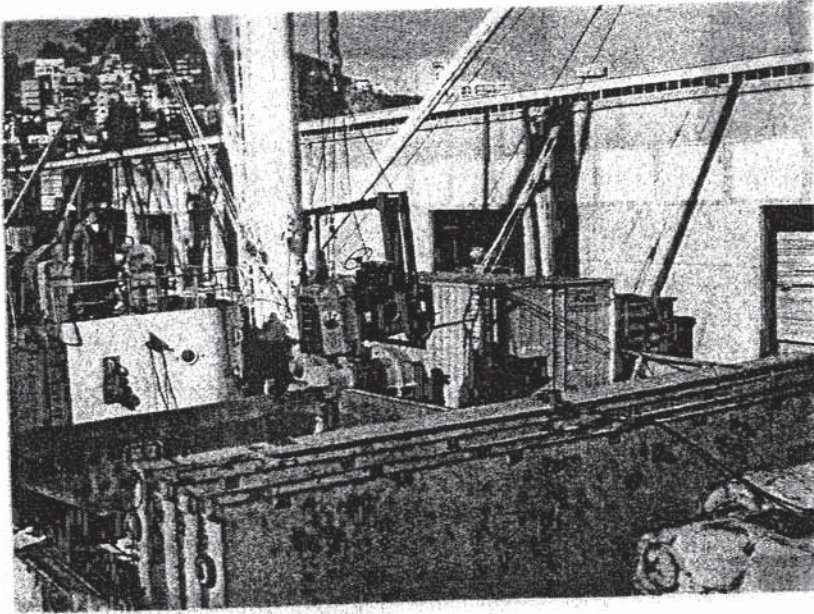
The Employers stated they will not pay the skill differential to men until they are capable of driving lifts.

The Union suggested the approach that where it is recognized at the local level that a gang does not have qualified machine operators therein, then prior to the two men receiving the differential, holdmen capable of driving lifts will replace them in the gang.

It is the dispatchers' obligation to make up gangs properly, and this now includes providing two holdmen capable of driving lifts.

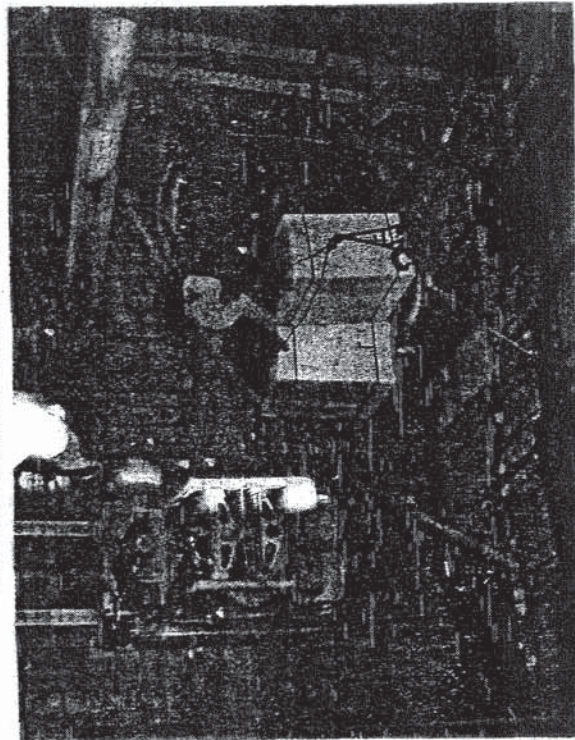
In response to this and the increasing need for forklifts and dockers to drive them in the hold on a regular and jointly understood basis the San Francisco Joint Labor Relations Committee quickly established a volunteer training program for two hold men of each gang who would also volunteer to drive either one or two lifts as might be required for the loading or discharge of cargo. *

* And, with this, it should be noted that -- at the urging of the gang which he had joined when in 1966 that was made possible for a 1963 "new hire" by the San Francisco Joint Labor Relations Committee - the author became one of Lo*cal 10's newly fashioned and jointly promoted "skilled" hold men.



A gasoline-powered forklift
being hoisted into the hold - late 1963.

From the author's photo collection.



Stowing a strapped, wood-crated cargo
with a butane-powered lift - late 1963.

www. Smithsonian Institute
National Museum of American History
"America on the Move"
Explore Transportation - Work and Industry - Conntainer Back Story.

"Local 10 longshoreman Herb Mills (left) and Peter H. Brown
working in the hold of a ship, 1960's."

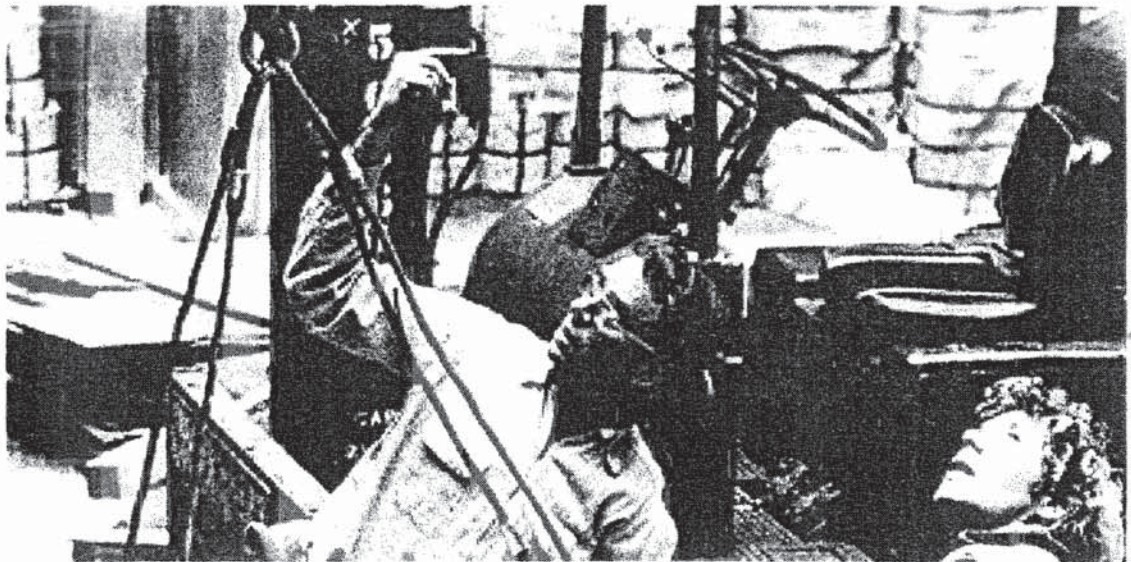
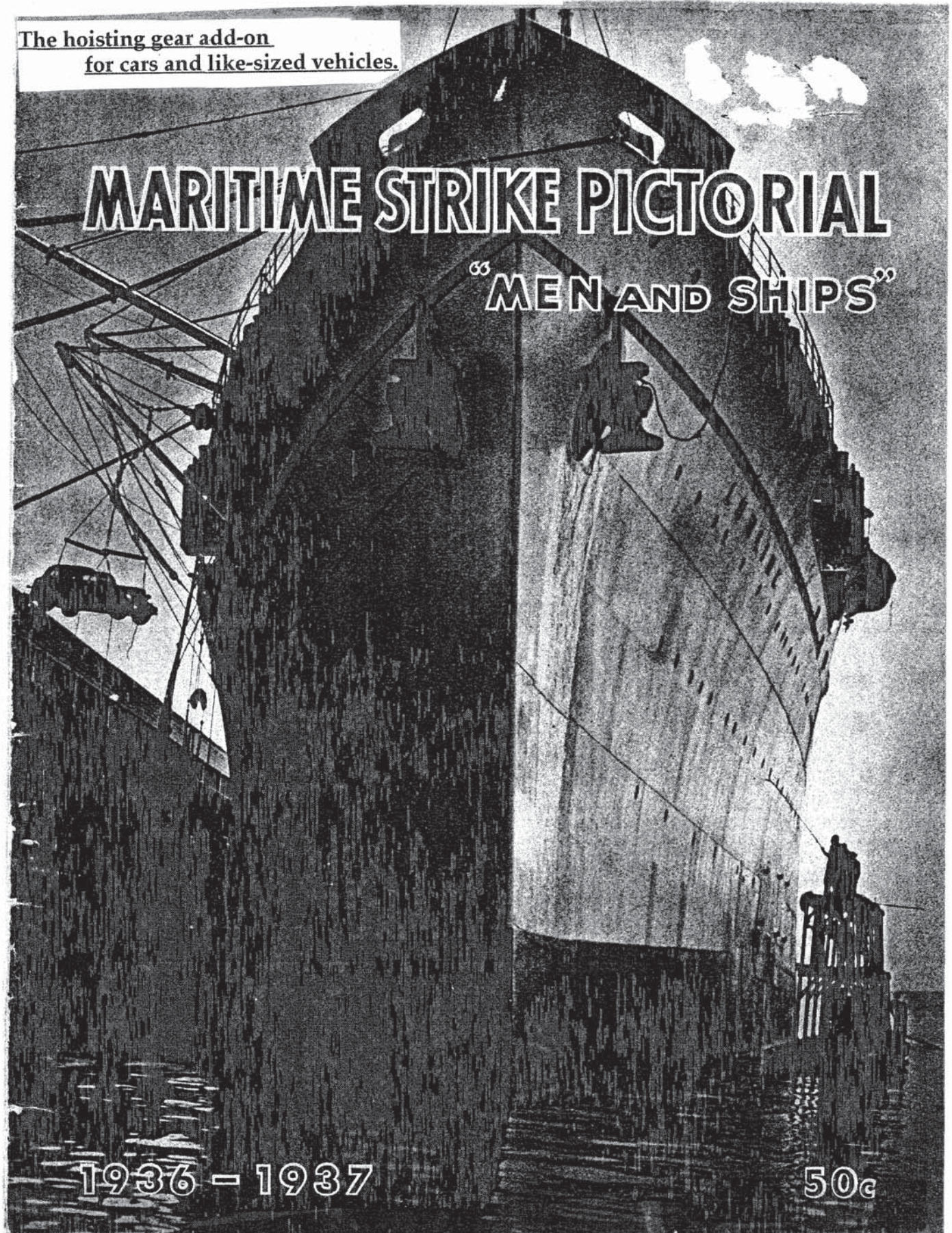


Photo by Mike Vauter - also a Local brother -- and please note the lift.

The hoisting gear add-on
for cars and like-sized vehicles.

MARITIME STRIKE PICTORIAL

"MEN AND SHIPS"



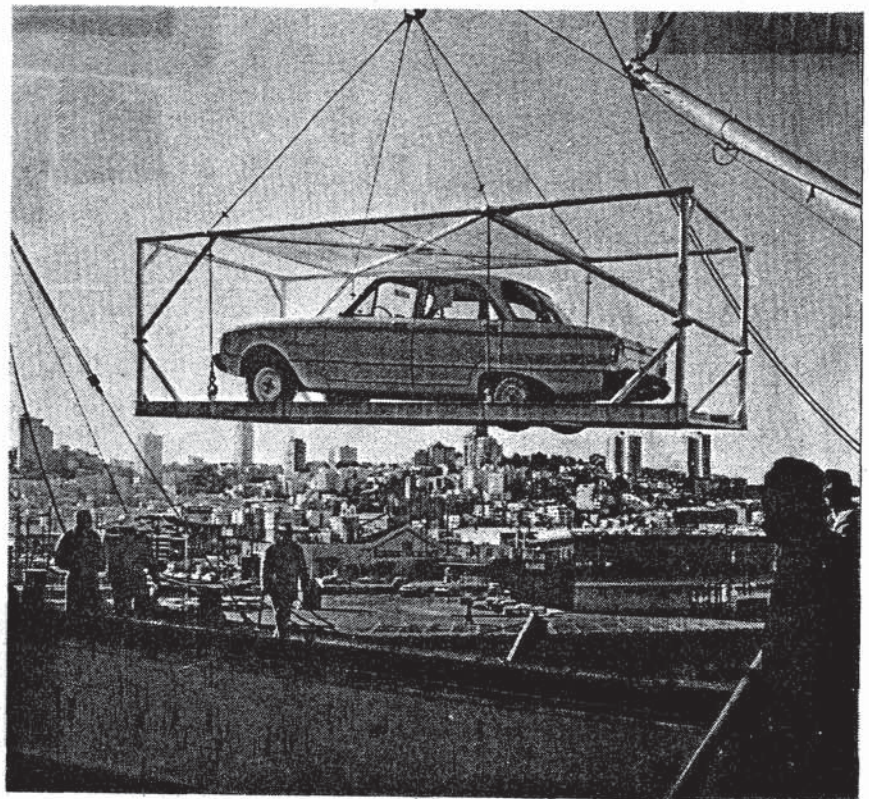
This historic publication here pictures the hoisting bridle used to the early sixties to load and discharge cars with burtoned hoisting gear.

For many years the only automobiles loaded or discharged by San Francisco dockers were privately own and privately shipped. And, as might be supposed, such also was fairly rare. As a result, cars -- as well as, of course, the even more rare pick-up or truck -- were commonly hoisted from the dock or hold by having been rolled on top of two special cargo nets so both of their front wheels and both of their rear ones, too, would be caught and held by them. By the early sixties, such nets had been replaced by a four-legged bridle, each leg of which was fitted with a two-pronged hook device which could easily be placed so as to cradle each wheel. And with the vehicle hoisted and landed, those cradling hooks were also easy to remove. In any event, such work had always been done by regular longshore gangs. But by that time, private vehicles were increasingly shipped by container. And by the mid-sixties - and with by then a long-standing boom in foreign car imports, the so-called "RO / RO" vessels (i.e., "Roll-on / Roll-off") -- which were fitted with ship-mounted and powered vehicle ramps which from their stern and midship could easily reach the dock, very quickly cornered that market. And, indeed, virtually every foreign car-maker soon owned and operated their own multi-deck, parking lot fleet of RO / RO - vessels. And, of course, with that and containers, too, the conventional longshore gang seldom, if ever, worked a car after the mid-sixties.

In any event, this is a photo of what became the most "modern" car - hoisting add-on for burtoned gear.

A car cage
-- with burtoned gear. *

The SS Hawaiian Fisherman is a floating garage. The autos are driven onto a cradle, hoisted and lowered, and driven to parking spaces between decks for shipment to Hawaii.



And to briefly suggest the nature of the last such hoist made by a San Francisco gang the following check list which would have been filled out by the employer rep to supervise the job may be usefully cited.

* Such add-ons were also used for such hoists as whirlybird cranes replaced burdened gear.

START	SHIFT	PIER
GEAR	QUANTITY	SPECIFICS
DRINKING CUPS		
WATER CANS		
FIRST AID & TOOL BOX		
FIRE EXTINGUISHERS		
SAVE ALL LIFE-RING-LADDERS		
SAFETY NET		
HAMMERS		
HACKSAWS		
CROWBARS		
SCISSORS GEAR		
WHEEL NET & BRIDLE		
SINGLE ADJ. CAGES w/BLOCKS		
DOUBLE CAGES		
HONDA BREAKOUT GEAR		
VW BREAKOUT ROPE SLINGS		
SHACKLES		
MULES		
BUSES		
ORDER GEARMEN		

* This hard to make out word is "Specifics".

** Rule 307 of the ILWU - PMA enforceable safety code then read as follows: At all places where operations are being carried on, drinking water in covered clean utensils or devices with sanitary drinking cups or sanitary drinking fountains, shall be conveniently available. When, however, such fountains were not so available -- as, for example, to those who were working in the hold-- and since the water cans provided by the San Francisco employers had virtually never been clean, the San Francisco dockers by arbitration won the right to have water which had been bottled, sealed, and commercially bought by their employer.

*** Such cages could be adjusted for vehicles of different length and width, The blocks would be placed so as to prevent a car rolling from the cage when hoisted.

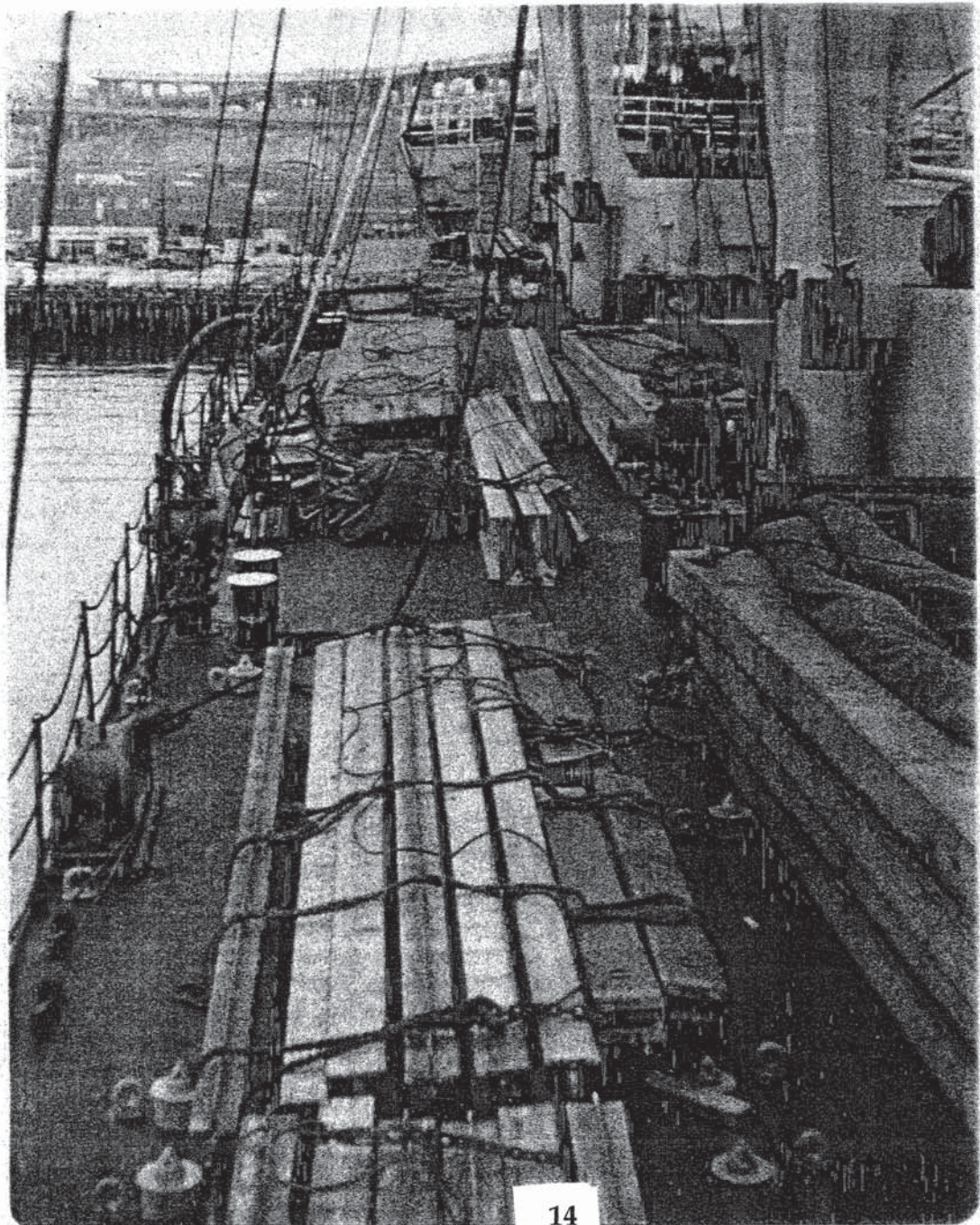
^ A mule was a towing vehicle. See article 14, p. 35 on the author's web site.

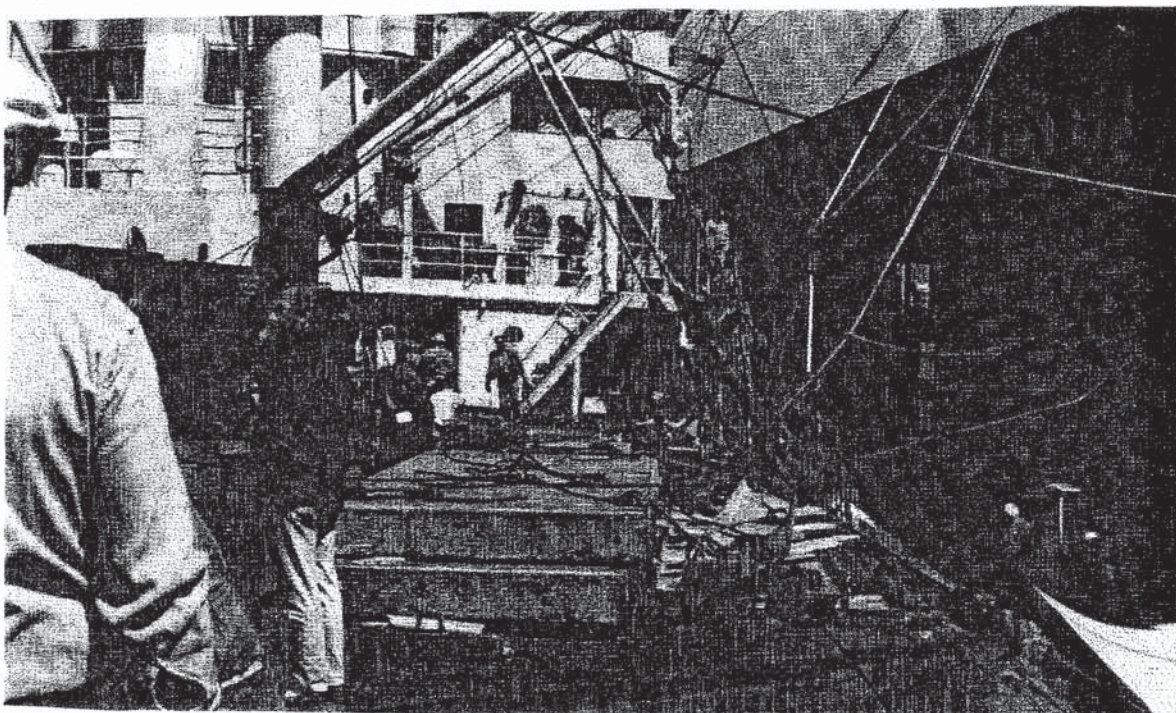
^^ Extension forks could be fitted, of course, to those of a forklift so as to their reach.

ORDER MECHANIC	
FORK-LIFTS	
WHEELER HAMMERS	
EXTENSION FORKS	
LOW ROPES WITH HOOKS	

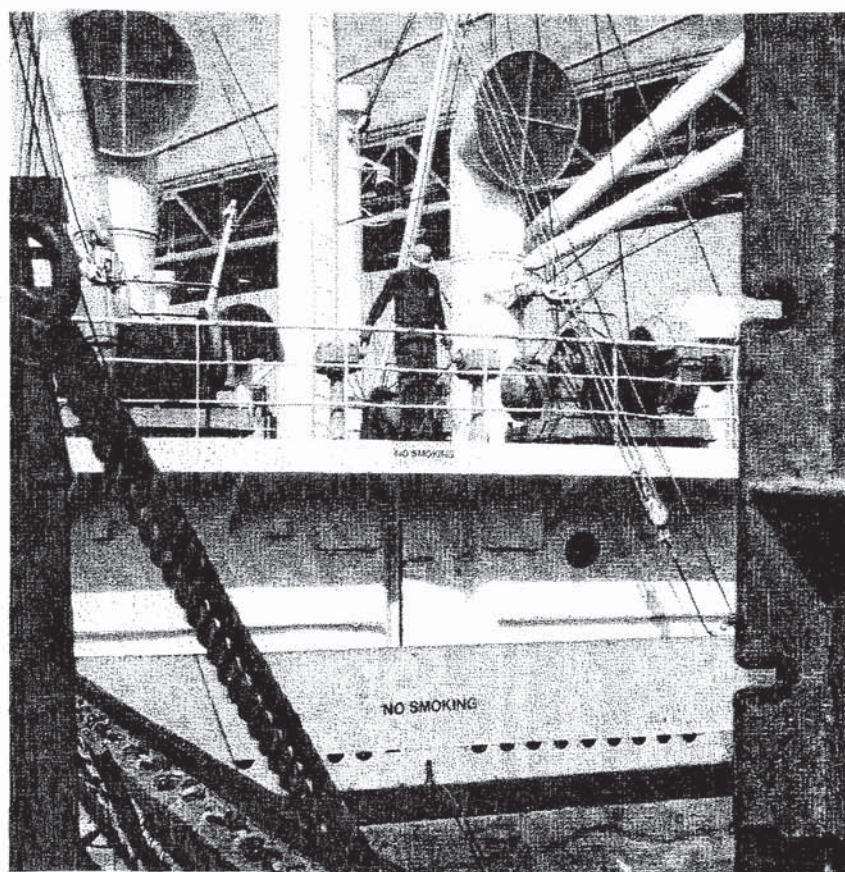
Strongbacks and hatch boards

... first replaced -- as pictured here ---by strongbacks and hatch covers.



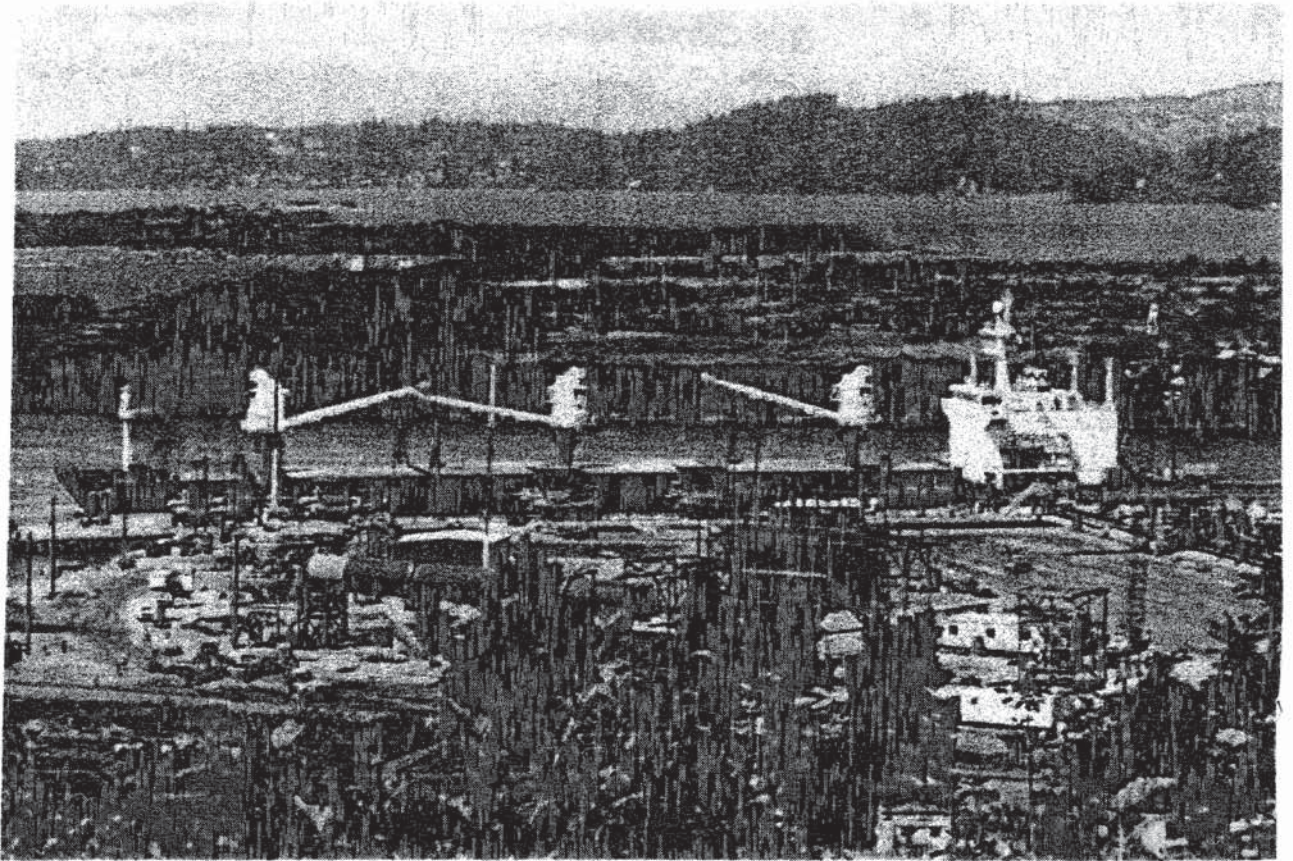


Two hatch covers stowed on the inshore weather deck.

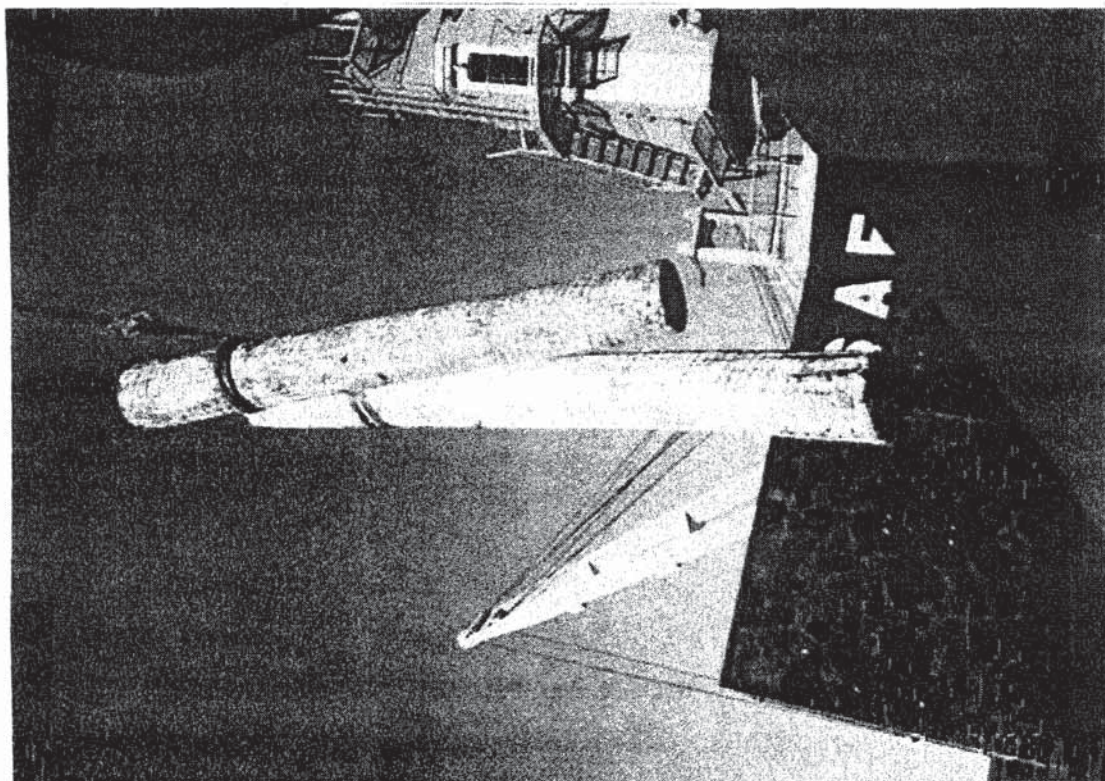


... And, finally, too, strongbacks and hatch covers were replaced - as here to the right - by hydraulically raised and folded hatch covers secured upright by chains.
The visuals on p. 18 of the author's website entry 14.

Whirlybird cranes and offshore log rafts . . .



. . . and raised and secured hydraulic hatchcovers.

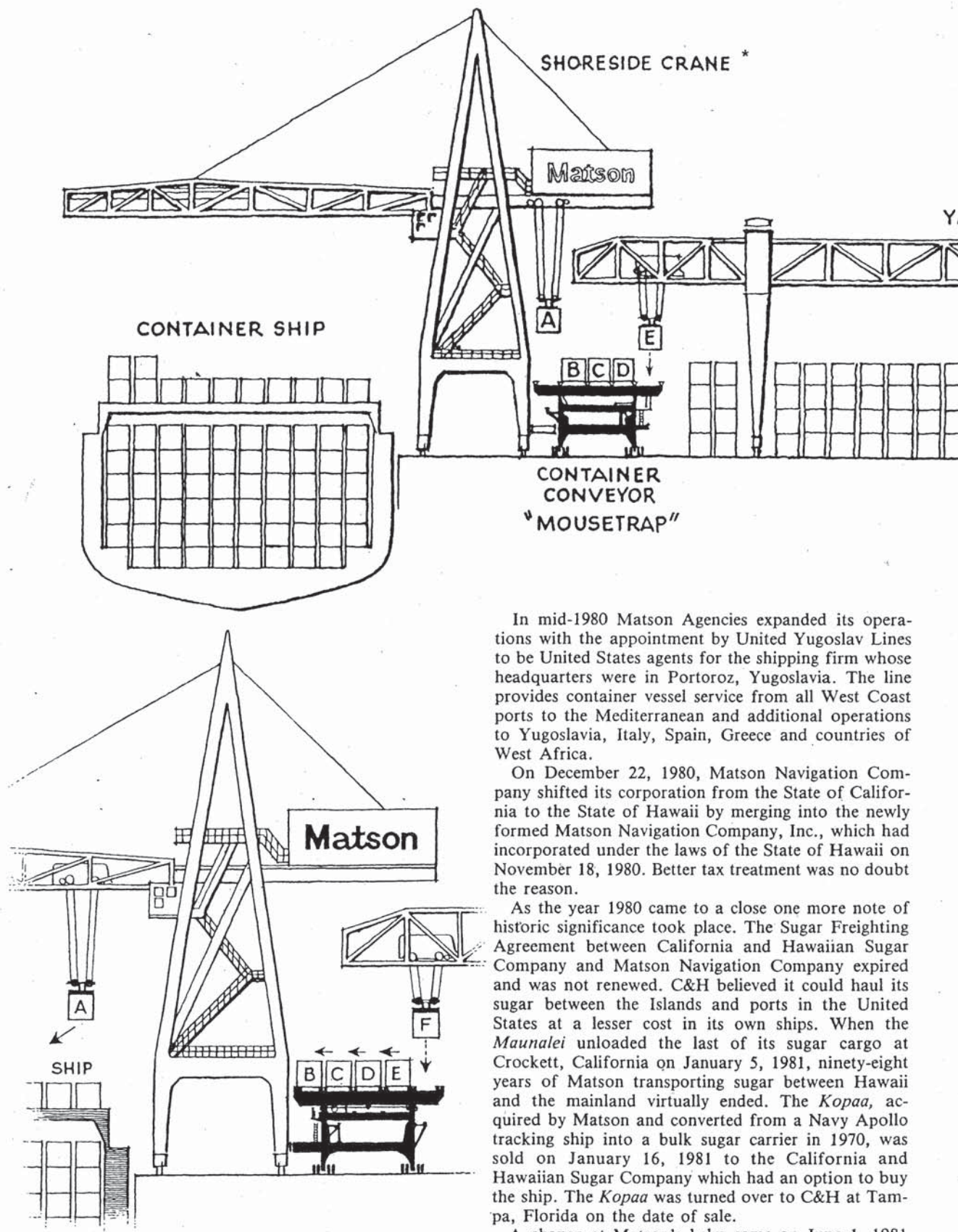


This photo is on p. 50 of the International Longshore and Warehouse booklet "The ILWU Story - Six Decades of Militant Trade Unionism."



ongshore workers load logs in British Columbia, 1968.

**Matson Navigation: the "Mouse Trap" Container Conveyor
-- a patented device introduced during the second M & M.**



In mid-1980 Matson Agencies expanded its operations with the appointment by United Yugoslav Lines to be United States agents for the shipping firm whose headquarters were in Portoroz, Yugoslavia. The line provides container vessel service from all West Coast ports to the Mediterranean and additional operations to Yugoslavia, Italy, Spain, Greece and countries of West Africa.

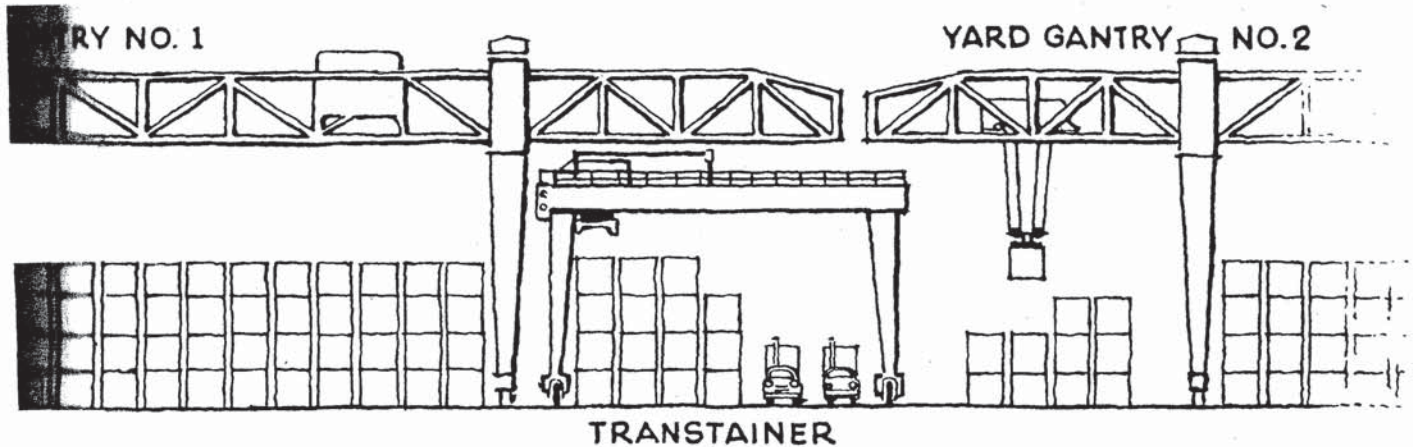
On December 22, 1980, Matson Navigation Company shifted its corporation from the State of California to the State of Hawaii by merging into the newly formed Matson Navigation Company, Inc., which had incorporated under the laws of the State of Hawaii on November 18, 1980. Better tax treatment was no doubt the reason.

As the year 1980 came to a close one more note of historic significance took place. The Sugar Freight Agreement between California and Hawaiian Sugar Company and Matson Navigation Company expired and was not renewed. C&H believed it could haul its sugar between the Islands and ports in the United States at a lesser cost in its own ships. When the *Maunalei* unloaded the last of its sugar cargo at Crockett, California on January 5, 1981, ninety-eight years of Matson transporting sugar between Hawaii and the mainland virtually ended. The *Kopaa*, acquired by Matson and converted from a Navy Apollo tracking ship into a bulk sugar carrier in 1970, was sold on January 16, 1981 to the California and Hawaiian Sugar Company which had an option to buy the ship. The *Kopaa* was turned over to C&H at Tampa, Florida on the date of sale.

A change at Matson's helm came on June 1, 1981

After a three year study, Matson Terminals produced the innovative overhead container handling system sketched below. While shoreside crane picks up container (A), yard gantry stockpiles containers (B, C, D, E) on container conveyor ("mousetrap"). Straddle carriers are eliminated from wharf area and containers never touch ground at

dockside. LOWER LEFT: While shoreside crane loads container (A) on ship, "mousetrap" moves B. C. D. E successfully into pick-up position, and yard gantry can add (F). Shoreside crane thus has "work bank" of containers. Both cranes are kept fully occupied, eliminating idle time.

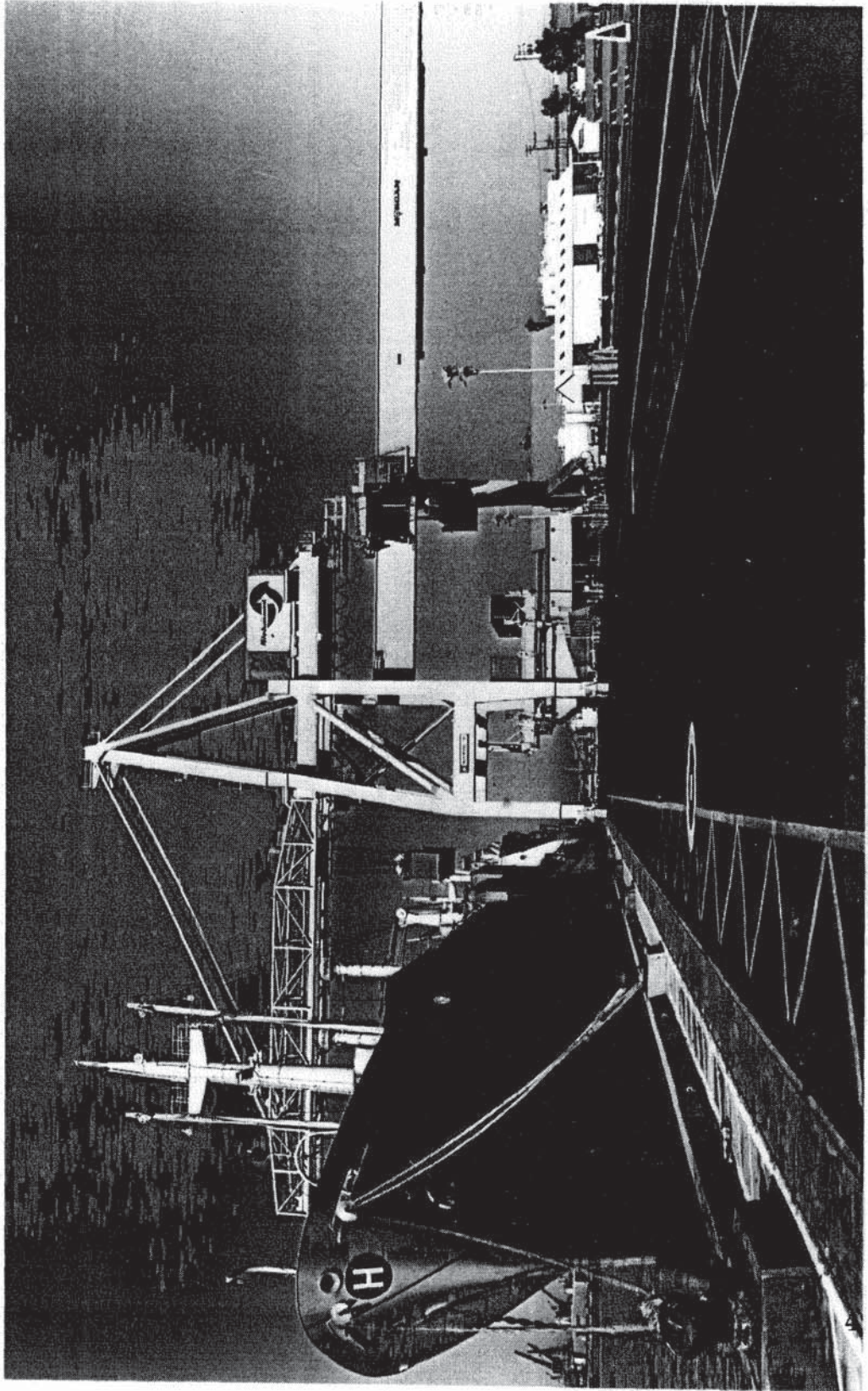


when Michael S. Wasacz became Matson's thirteenth president replacing James P. Gray, who retired after 45 years of service. Wasacz joined Matson in 1959 as a freight clerk in the New York office. He worked his way up through the ranks, serving in virtually all areas in which Matson maintains offices. He was appointed executive vice president in November, 1980. Before that, he served as president of Matson Terminals, Inc., and as a senior vice president of Matson Navigation Company in addition to area manager assignments in Hawaii, Southern California and Northern California.

In 1977, after a three year study, Matson Terminals Inc. came up with an innovative overhead container handling system which in effect would replace the straddle carrier. The function of the straddle carrier is to take a container from a truck, trailer or rail car in the terminal yard and store it until vessel arrival. Upon ship arrival the container is brought to shipside by the straddle carrier for loading by dock gantry. The straddle carrier was becoming expensive to maintain; and new ones had gone to four times the original cost. Design work began for the new terminal system at Los Angeles and the development of a smaller operation for the Port of Richmond, California. The Port of Los Angeles cooperated with the installation of the new overhead container handling system and allotted an additional 17 acres of land to make a total of 85 acres for the massive terminal. The work of reconstructing the huge facility started in August 1979.

Basically, under the new overhead system, the route of a container from arrival at the yard to ship would be as follows; arriving at the terminal the container would be lifted off the truck, trailer or rail car by a Transtainer, which in effect is a large four-wheel-mobile crane. The Transtainer would move the container to the Yard Gantry. This 550-ton device,

336-feet long, mounted on rails parallel to the wharf would place the containers in rows up to four high. Upon arrival of the ship, the Yard Gantry with its 37-ton lift capacity would again be used to lift the container from the stacked row and bring it to a mobile container conveyor invented and patented by Matson. The "mousetrap," as it is affectionately known, has a capacity of five containers (see sketch). The dockside gantry would then lift and place the container on the ship. Meanwhile, the "mousetrap" would automatically put another container in its place for the dockside gantry. Four yard gantries, each costing \$2 million were constructed at the Los Angeles terminal along with a fourth dockside gantry also costing \$2 million. Several Transtainers, which totaled over \$2 million were also purchased. The Los Angeles wharf was extended so that three ships could load or unload at one time. Finally, the entire operation is tracked by computer, which means that each container at the terminal can be located and identified in seconds. With the elimination of the straddle carriers, the new system relieves yard congestion, reduces container damage, provides cleaner working atmosphere and is a more economical operation. The first of the new four massive yard gantries along with the "mousetrap" operation went into service on February 27, 1981 working the *Pacific Express*, operated by the Korea Marine Transport Company, Ltd., a customer of Matson Terminals, Inc. The first Matson vessel using the new overhead container handling system was the *Manukai* on August 17, 1981. When the entire operation of four huge yard gantries and four dockside gantries are in full operation in early 1982, the facility, at a cost of \$32 million, is expected to be acclaimed as one of the most efficient and advanced terminals in the world.



Courtesy of Matson Lines.
Print No. 467 - Richmond Terminal - December, 1979.

CHANGE AT SEA

"Pure Car" Carriers and "RO / RO" Vessel.

The distinctive and interrelated technological evolution of the ship-to-shore ramp of the car carrier and the RO / RO vessel of today began with the landing craft of World War II and the then existing vehicular ferry boats. After the war, the concept of a ship with a bow or stern mounted ramp which would permit self-powered vehicles to be driven to and from their place of shipboard stow began to be slowly adopted for merchantmen and ferry boats. In time, the concept also led to a wide variety of a new types of vessels. Thus, for example, the following lengthy passage may be cited from Google - MV (Motor Vessel - HM) - p. 1 - "Variations of the Ro - Ro Theme."

Today the world ro-ro fleet can be subdivided into a number of different types. They include ships designed to carry freight vehicles only; to carry a combination of containers and freight vehicles and to transport cars without passengers. There are various other types and freight-only ro-ro ships form about two thirds of the world ro-ro fleet at present. However, the best known ro-ro ships are ferries designed to transport commercial vehicles and private cars, together with large numbers of passengers, usually on short voyages.

Most ships of the Ro-Ro type, i.e. ships for the transportation of wheeled vehicles which may be driven into, and out of the ship, respectively, or which are adapted to take care of containers or other standardized cargo units which are handled by fork lift trucks or similar transportation means, are usually provided with a single deck only. Ships having two or more decks are provided with lifts for transferring the cargo vertically between the decks, or has built-in inclined ramps, making it possible to drive from one deck to an other. Both arrangements require a considerable amount of space, and especially the lift arrangements are expensive. The handling of the cargo in the vertical direction will further take more time than the driving on-board.

Sto-Ro (Stowable Ro-Ro) -- Contrary to the Ro-Ro, no cargo remains on wheels but is directly loaded onto vessel decks. The stowage is similar to an open Load-on/Load-off (Lo-Lo) vessel; however, the cargo is brought on board either over a stern/bow quarter ramp or through a side port door. Vessel operations can turn to this concept of cargo handling as a means of combining the undoubted handling advantages of the Ro-Ro (improved turnaround times) with the efficiency of a Lo-Lo (increased utilization of a ship's cubic capacity).

Float-On/Float-Off -- A heavy deck semi-submersible vessel designed to permit oversized indivisible cargo being floated into position for deck stowage. The reverse procedure is used at the destination port where the load is floated from the submerged deck that is ballasted down for the outturn. The vessel travels with its deck and load above the water.

Trot-On/Trot-Off -- Ro-Ro conversion or version in which vessel trailer decks are transformed into modern cattle pens capable of accommodating in excess of 2,000 animals. New installations include provision of fresh water through evaporation and increased tankage "barns" for 1,600 cubic meters of hay or straw and an air circulation plant.

Combination Container and Ro-Ro Vessels -- This design allows for flexibility of operation by incorporating container and other wheeled cargo handling capability. These vessels carry containers on and under deck forward and have a stem ramp with tween decks for the carriage of Roll-on/Roll-off cargo in the aft underdeck area. The Ro-Ro cargo may consist of over-sized pieces such as construction equipment, i.e., bulldozers and excavators, which are driven onto the vessel via the ramp. Containers can also be stowed on the Ro-Ro decks but are brought aboard on chassis and removed with forklift machines. If space and equipment is available the container can be left on its chassis during transport.

A ferry is any vessel used to provide transportation only between places that are no more than 300 miles apart, and to transport only - passengers, or vehicles, or railroad cars, which are being used, or have been used, in transporting passengers or goods. The fundamental objective of ferry terminal design is to enable passengers and vehicles to proceed from the ferry to access a mode of continued travel. The internal layout of facilities reflects this concern for the convenience of passengers and their vehicles by providing simple and direct passenger/vehicle flow routes through the facilities. A tractor-trailer carried on a ferry with a container either loaded with cargo or empty will classify the vessel as a ferry and the goods within the trailer or container are looked upon as having arrived in the Customs territory by ferry.

Some current designs of roll-on/roll-off ferries for relatively short sea passages are twin-hulled designs. The engines are housed in the base of the hulls near the waterline, with power offtake shafts extending sternwards to the propellers, which may comprise waterjets. These vessels are designed for high speeds, with small wetted hull areas to minimise drag from the water. Their loading decks are arranged to span the distance between the two hulls at as low a level as is possible compatible with the seagoing ability required by the vessel and the rest of their superstructures are designed as far as possible with long low continuous lines to minimise aerodynamic drag and susceptibility to cross winds and to obtain the great-est possible stability for the vessel. A further design aim is to maximise cargo capacity.

RO-RO ships have also been developed to handle multicargoes, whereby they are enabled to transport different vehicles as a part of the cargo. In these ship types the cargo is transferred aboard by means of waggon and carriage pallets, which are carried along with the cargo to the port of destination. This method is applied particularly to transporting forest products. To increase loading flexibility, containers are also loaded on these pallets. Straddle carriers and trucks are also used for container handling. A high cargo space can be divided vertically in two or three sections by means of so-called hoistable car decks. The loading and unloading capacity of the ship is satisfactory. All in all, this method is, however, expensive on account of terminal facilities and special ship equipment. Space utilization and stowage efficiency are not good.

In 1992, the Washington State Ferry System decided three new Jumbo Mark II Ro-Ro Ferries were needed for its Bremerton and Bainbridge Island runs. The Jumbo Mark II was the first new auto ferries built for Washington State Ferries [WSF] in 20 years. While the name didn't show much imagination, it isn't entirely unjustified. The ferries are modern versions of the Jumbo Class ferries Spokane and Walla Walla. The Jumbo Mark II boats are designed to separate walk-on and auto traffic. The Mark II's

hold 2,500 passengers, 500 more passengers than the Jumbos. The increase bumped their size up 20 feet. At 460 feet, they are the largest double-ended auto ferries in the world. While carrying 500 more passengers, the auto capacity only went up by about 12, to 218. Passenger capacity was more important on the Bainbridge run, where the 2,000 passenger Jumbos were filling to capacity on the morning and evening commuter runs.

As of early 2006 the largest PCC in service was the MV Mignon, owned and operated by Wallenius Wilhelmsen Lines of Sweden, it can carry some 7,200 car equivalent unite [CEU]. The Mignon was the first of five Wallenius Boheme-class vessels to be stretched by 28 metres to 228 metres LOA. The lengthening results in making these the biggest car carriers in the world. The Mignon unloads cars, pleasure craft, etc and load export cars, trucks and haulers, predominantly for the US, at Port of Göteborg's Car Terminal. In addition to the five vessels stretched or to be stretched, Wallenius Lines have a newbuilding program of six pure car/truck carriers, three of 6,500 and three of 8,000 cars capacity.

Five of the ships will be built at the Daewoo Shipyard in Korea. The first two new vessels will have a cargo capacity of 6,700 cars and will be delivered at the end of 2006. The other three, each with a cargo capacity of 8,000 cars, will be delivered in late 2007 and early 2008. The ships will be operated by the subsidiary Wallenius Wilhelmsen Lines. The sixth ship, with a capacity of 6,400 vehicles, is being built at Hyundai Heavy Industries in Korea and will be operated by the Wallenius Korean subsidiary, EUKOR.

Wallenius Lines reached an agreement in early 2006 with Wilh. Wilhelmsen ASA regarding the sale of two LCTC newbuildings at Daewoo Shipbuilding & Marine Engineering. Each vessel has a capacity of 8,000 cars and is due for delivery in 2009. The Wallenius Lines newbuilding program now comprises eight vessels to be delivered between 2006 and 2008.

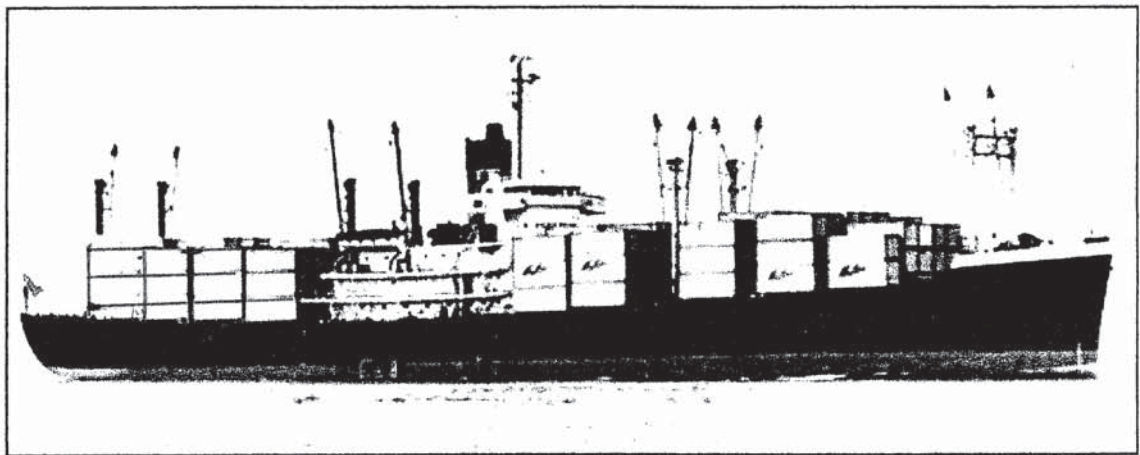
The First Historic Steps:

-- the USS Comet, Matson's Hawaiian Motorist,
and a Recounting and Photograph
of an Early Ship-to-Shore Auto Ramp.

In 1957 the Sun Shipbuilding and Dry Dock Company of Chester, PA was contracted by the US Department of Defense to build "a new type of motorized vehicle Carrier. This was the Comet, a vessel with a stern ramp and interior ramps

* As will have been noticed by now, the terminology used to speak of the types of vessels now being discussed has not been settled upon. Given these circumstances, it perhaps should be suggested that a "PCC" - "Pure Car Carrier" may best be defined today as "a large, ocean going vessel for the exclusive transport of several thousand newly made cars to be sold in a foreign market" and a "RO/RO" vessel as "a large, ocean going vessel fitted with ship-to-shore ramps on its stern (and / or sometimes its bow) and on its port and starboard sides and also fitted with internal ramps or car elevators between all cargo decks which permit the movement of cargoes both self-propelled and not to and from their place of shipboard stow.

which allowed cars to be driven to and from their place of shipboard stow. It also had what many such vessels later had, too: an adjustable choking system for securing all cars to their place of stow and a ventilating system to prevent the buildup of exhaust gases. As might be supposed, when such vessels began to be built they had automatic fire fighting and sprinkler systems. Since, however, the international market for newly manufactured cars only began to very slowly emerge during the early sixties, newly fashioned car carriers were initially limited to an ever-growing number of C - 3's and 4's which had been rebuilt with ramp-connected RO / RO decks beneath their weather deck, but still employed their conventional hoisting gear to load and dis-charge the cars which they carried. And thus as already noted in part, this innovation -- as with containerization - had been pioneered by Matson Navigation when in 1961 it rebuilt its HAWAIIAN FISHERMAN with ramp connected decks beneath its weather deck, as it also refitted that deck for the transport of 3-high stacks of 24 -foot containers. And with that, the C - 3 which Matson then rightly called "the first 'ocean going' automobile ship" was proudly renamed the HAWAIIAN MOTORIST. *



The Hawaiian Motorist is developed as the first "ocean going automobile ship" with a specially designed auto lifting cage to help minimize the handling of cars between dock and ship. **

It was not until the late sixties, however -- by which time the U. S. market for foreign built cars had very greatly expanded - that the San Francisco dockers began to drive cars and vans and pick-ups over stern and / or side port ramps mounted on fully converted C - 3's and C - 4's or ship-to-shore ramps carried on the weather deck prior to docking and discharge. And, thus, for example, this may be cited from "MAN ALONG THE SHORE! -- The Story of the Vancouver Waterfront -- As Told by Themselves -- 1960 -- 1975." ***

* Google - Hawaiian Motorist - p. 3 - MNC (Matson Navigation Company - HM) -- The Birth of a Ship -- History - From Conventional to Containerized Vessels.

** It will be recalled that this "cage", as a newly developed hoisting device, is pictured, as is, of course, the MOTORIST, too, on p. 69 above.

*** This very unique and always very valuable and interesting work should be cited thusly: "Published and Copywrited by ILWU Local 500 Pensioners, 1685 Franklin, Vancouver 6, B. C."

... Automobiles ... used to come in on conventional ships and the ships were never kept as clean as they are today. They took them off with nets, racks, and so forth. And then we got a little more sophisticated, especially for Volkswagens. We made a flat rack to run the Volkswagens on and this did away with the nets and eliminated some of the damage to the sides of the cars. Then the Japanese came up the "Roll on and Roll off" automobile ship. They had ramps which came out of the side of the ships and elevators inside the ships. Today it has become such a sophisticated operation that about 35 men can discharge 2000 automo-



"Drive off vessel" discharging automobiles at Centennial Dock 1971. Courtesy Leonard Frank Photos.

biles from a Roll-on Roll - off ship in 8 hours. Our production before that was about 16 to 29 hours.

New Docker Auto Work and Its Safety Concerns

These matters were thus very briefly described and discussed by the present author in remarks delivered in 1972 at UC - Berkeley's Institute for the Study of Social Change.

Once the ship-to-shore or shore-to-ship ramps are in place and secured, the dockers can go aboard over the gangways affixed to them. As some begin to cut the rope lashings or otherwise release the wrie-rope lashing which have secured the cars while the vessel was at sea, others begin to drive them to the dock and then to a large storage and maintenance area which of necessity is some distance away. The drivers

are returned shipside in groups of six to eight by a docker driven van or minibus. And while, of course, they can and do converse as they are thus transported, there is nothing in their work which requires them to communicate. And the nature and structure of their work is so routine and repetitive that it also creates for them no need or opportunity for innovation of any kind. And, so, too, they are virtually never required by an operational circumstance to in any way "take the initiative". These operations, however, are also often distinguished by a self-imposed speed-up, i.e., there is some inclination on the part of the drivers to begin to drive too fast. And, as might be supposed, such seems to be occasioned by the boredom induced by the routine and a sheer liking of speed -- *especially in the Porches!* In any event: "There's always a few who start to think they're in 'the 500' ... and they'll start to tool around as if they Andretti."

On the other hand, of course, there are a great many dangers intrinsic to every such operations. And, thus, for example, the reader may be "economically" referred to the RO - RO safety rules first pub-
were Mario Andretti.



U.S. Department of Labor
Occupational Safety & Health Administration

www.osha.gov

MyOSHA [skip navigational
links]

Search Index



Regulations (Standards - 29 CFR)

Roll-on roll-off (Ro-Ro) operations (see also ? 1918.2, Ro-Ro operations, and ? 1918.25). - 1918.86

[Regulations \(Standards - 29 CFR\) - Table of Contents](#)

• Part Number:	1918
• Part Title:	Safety and Health Regulations for Longshoring
• Subpart:	H
• Subpart Title:	Handling Cargo
• Standard Number:	1918.86
• Title:	Roll-on roll-off (Ro-Ro) operations (see also ? 1918.2, Ro-Ro operations, and ? 1918.25).

..1918.86

1918.86(a)

Traffic control system. An organized system of vehicular and pedestrian traffic control shall be established and maintained at each entrance/exit ramp and on ramps within the vessel as traffic flow warrants.

* Google - RO / RO - p. 3 -- Roll-on -- Roll-off (RO - RO) operations. This referral is "economic" in that the PMA - ILWU contractually enforceable health and safety rules governing such operations are much broader in scope and also far more detailed.

1918.86(b)

Ramp load limit. Each ramp shall be plainly marked with its load capacity. The marked capacity shall not be exceeded.

1918.86(c)

Pedestrian traffic. Bow, stern, and side port ramps also used for pedestrian access shall meet the requirements of § 1918.25. Such ramps shall provide a physical separation between pedestrian and vehicular routes. When the design of the ramp prevents physical separation, a positive means shall be established to prevent simultaneous use of the ramp by vehicles and pedestrians.

1918.86(d)

* **Ramp maintenance.** Ramps shall be properly maintained and secured.

1918.86(e)

Hazardous routes. Before the start of Ro-Ro operations, the employer shall identify any hazardous routes or areas that could be mistaken for normal drive-on/drive-off routes. Such hazardous routes shall be clearly marked and barricaded.

1918.86(f)

Air brake connections. Each tractor shall have all air lines connected when pulling trailers equipped with air brakes and shall have the brakes tested before commencing operations.

1918.86(g)

Trailer load limits. After July 27, 1998, flat bed and low boy trailers shall be marked with their cargo capacities and shall not be overloaded.

1918.86(h)

Cargo weights. Cargo to be handled via a Ro-Ro ramp shall be plainly marked with its weight in pounds (kilograms). Alternatively, the cargo stow plan or equivalent record containing the actual gross weight of the load may be used to determine the weight of the cargo.

1918.86(i)

* **Tractors.** Tractors used in Ro-Ro operations shall have:

1918.86(i)(1)

* Sufficient power to ascend ramp inclines safely; and

1918.86(i)(2)

* Sufficient braking capacity to descend ramp inclines safely.

1918.86(j)

* **Safe speeds.** Power driven vehicles used in Ro-Ro operations shall be operated at speeds that are safe for prevailing conditions.

1918.86(k)

* **Ventilation.** Internal combustion engine-driven vehicles shall be operated only where adequate ventilation exists or is provided. (Air contaminant requirements are found in 1918.94 and part 1910, subpart Z, of this chapter.)

1918.86(l)

Securing cargo. Cargo loaded or discharged during Ro-Ro operations shall be secured to prevent sliding loads.

1918.86(m)

Authorized personnel. Only authorized persons shall be permitted on any deck while loading or discharging operations are being conducted. Such authorized persons shall be equipped with high visibility vests (or equivalent protection ⁽¹⁰⁾)

Note To Paragraph (m): High visibility vests or equivalent protection means high visibility/retro-reflective materials which are intended to make the user clearly visible by day through the use of high visibility (fluorescent) material and in the dark by vehicle headlights through the use of retro-reflective material. For example, an acceptable area of material for a vest or equivalent protection is .5 m² (760 in.²) for fluorescent (background) material and .13m² (197 in.²) for retro-reflective material. Vests or equivalent protection, such as high visibility/retro-reflective coveralls, that are available for industrial use, may also be acceptable.

1918.86(n)

Vehicle stowage positioning. Drivers shall not drive vehicles, either forward or backward, while any personnel are in positions where they could be struck.

The First of the "Pure Car Carriers" Constructed "from the keel up"

-- K - Lines EUROPEAN HIGHWAY.

While many partially or fully converted C - 3 and C - 4 car carriers remained in service into the 1980's, Japan's K - Line was the first to construct -- "from the keel up" -- a "pure car carrier". And as may be learned from K - Line's website -- which now will be quoted -- it thereafter continued to be much involved in the global transport of newly made automobiles. *

Car Carrier Service.

"K" Line commenced maritime car transport by specialized car carriers earlier than any other shipping line...

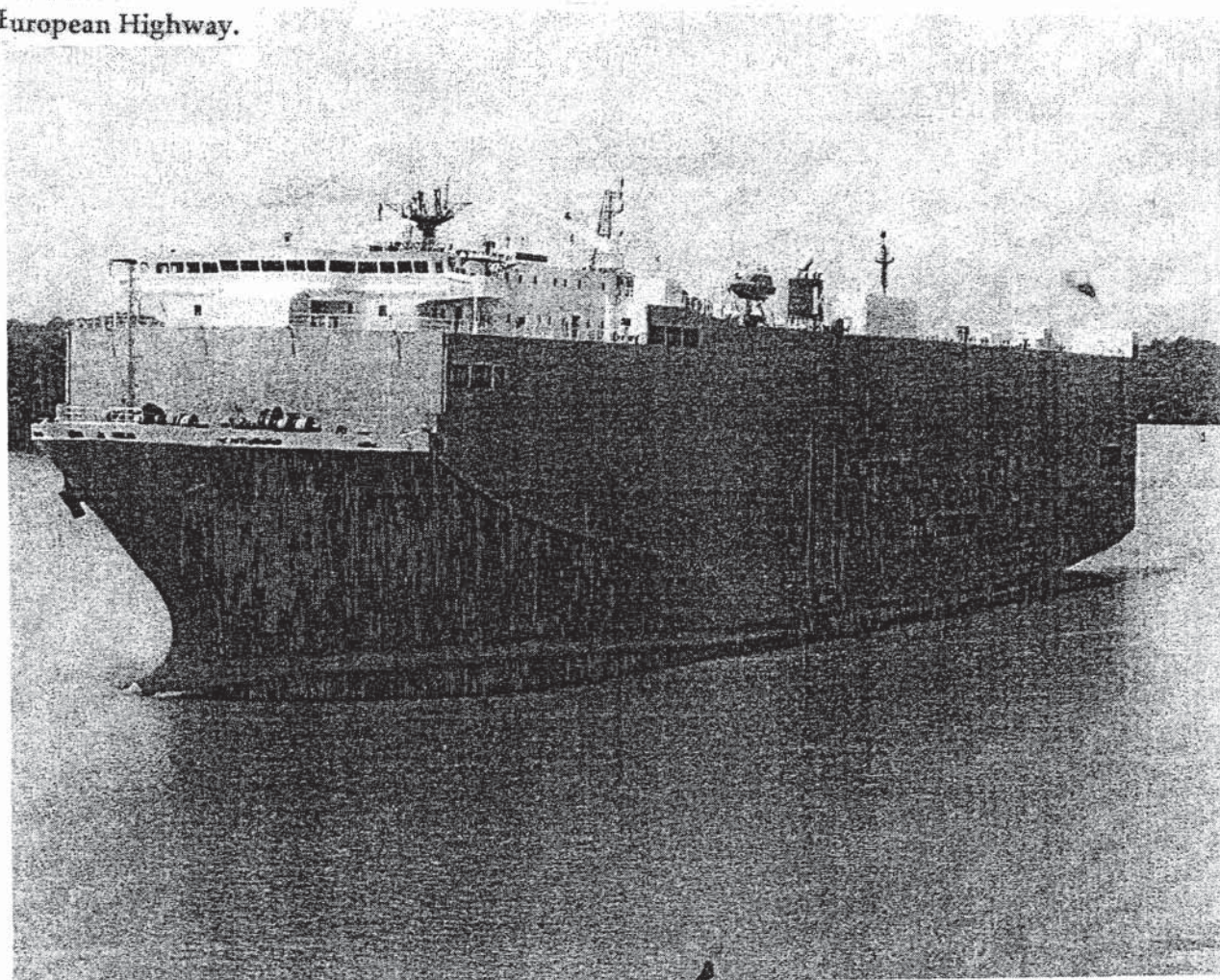
Start of "K" Line's Car Carriers.

Back in 1968, delivery was taken of our first Car Bulker, the Toyota Maru No. 1...

* See Google - K Line - p. 1 - K - Line Europe - Car Carriers.

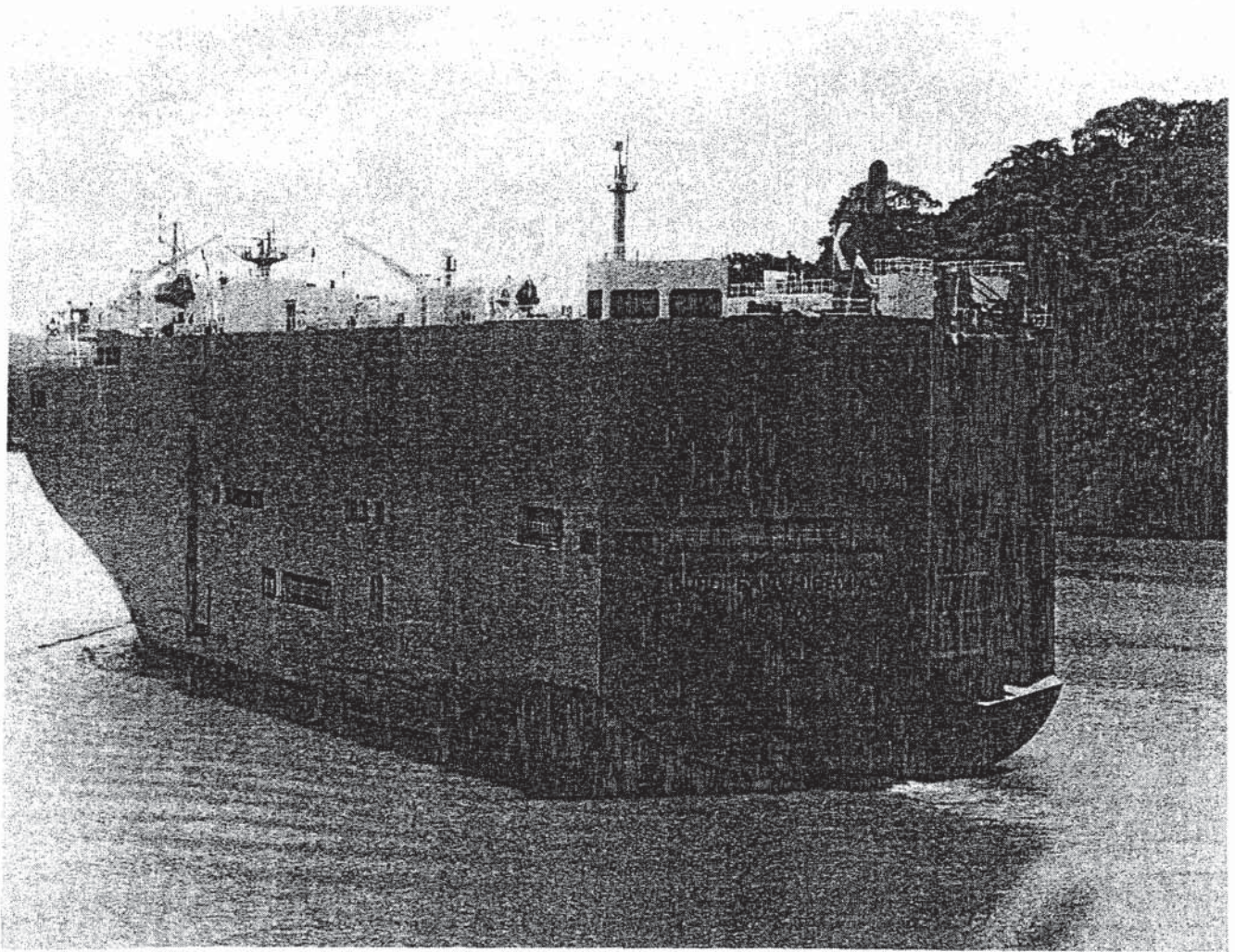
Japan's first Pure Car Carrier ("PCC"), the Toyota Maru N. 10, * was put in service in 1970. Since 1970 the market for exporting and importing cars has increased dramatically and the number and type of RO / RO s has also so increased. In 1973, Japan's K Line built the European Highway (i.e., she was the first such carrier to be constructed as she was delivered, rather than being converted by a major rebuilding - HM), the first Pure Car Carrier, which carried 4,200 automobiles. Today's pure car carriers and their close cousins, the Pure Car / Truck Carrier -(i.e., pick-up truck - HM) are distinctive looking ships with a box-like superstructure running the entire length and breadth of the hull, fully enclosing and protecting the cargo. They typically have a stern ramp and a side ramp for dual loading of many thousands of vehicles, as well as extensive automatic fire control systems.

European Highway.



* A search of Google and Yahoo produced no photographs of the Toyota Maru No. 1, nor of the Toyota Maru No. 10.

** Yahoo - European Highway - p. 1 - european highway in panama Canal
-- 08 . 09 . 2003.



Loa/Bm/Dft:	179.99 x 32.20 x 9.41
Builder:	Kawasaki Heavy Industries, Ltd. Sakaide Shipyard
Yard number:	1494
Year:	1999
GT:	48039
NT:	14412
DWT:	15075
Eng make:	MAN B&W
Power:	18002 hp / 13240 kW
Speed:	20.0

It should also be noted here that the "Pure Car/ Truck Carrier" (i.e. the "PCTC"- HM) "... has liftable decks to increase vertical clearance as well as heavier decks for 'high and heavy' cargo. A 6,500 unit car ship with 12 decks can have three decks which can take cargo up to 150 tons with liftable 'panels' to increase clearance from 1.7 meters to 6.7 meters on some decks. Lifting decks to accommodate higher cargo reduces the total capacity. (Google - MV Mignon - p. 1 - Roll-on / Roll - off Ships). This entry then also notes what was earlier noted here: "The largest PCC currently in service is the MV Mignon, which can carry up to 7,200 cars."

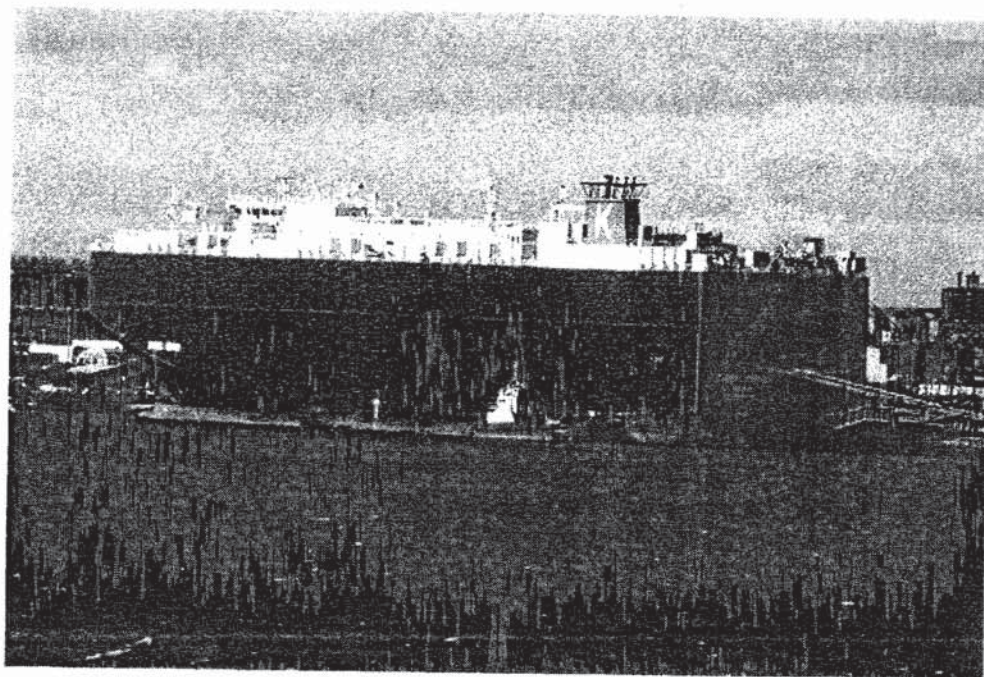
"K" Lines Present Fleet (2004 - HM) and the Latest of its Two Sister Ships
-- the Amber Arrow and Ivory Arrow,

As of June, 2004, we operate 75 car carriers and annually carry as many as 1.75 million units, equivalent to 15% of the total of all transported units per annum on a global basis. Our fleet ranges from super-speed and large-sized 6,000-unit carriers with a speed of 20 knots to 800-unit small size carriers for short-sea transport in Europe . . .

. . . In May and June of that year (2004 - HM) we also took delivery of two new 6,600 unit vessels, the AMBER ARROW and the IVORY ARROW, following 2 6,000-unit vessels during 2003. * We had by then also adapted a ramp with a capacity of 150 tons and a ship-board trailer system for heavy and large construction equipment.

And thus with respect to these sister ships, the following photographs and the ship data sheet will perhaps suffice.


Amber Maritime Limited's "Amber Arrow"



Google - Amber Arrow - p. 23 - Flickr - Photo tagged New York Harbor
- by Tom Hoboken - January 10, 2007.

* See Google - K - Line - Wikipedia - p. 1 for the following: "Unlike elsewhere in the shipping industry where cargo is normally measured by the metric tonne, RO / RO cargo will typically be measured in the more convenient unit of lanes in meters (LIMs). This is calculated by multiplying cargo length in meters by its width in lanes (lane width differs from vessel to vessel and there are a number of industry standards). Aboard PCCs cargo capacity is often measured in RT or RT43 units which is based on a 1966 Toyota or by car equivalent units (CEU



Type	car carrier	Hull number	8168/6
Vessel's name	AMBER ARROW	Flag	Bahamas 
Shipowner	Amber Maritime Limited, Isle of Man		
Classification	DNV +1A1,CAR CARRIER RO/RO,+MCDK,pwdk,EO,W1-OC,PET,TMON		

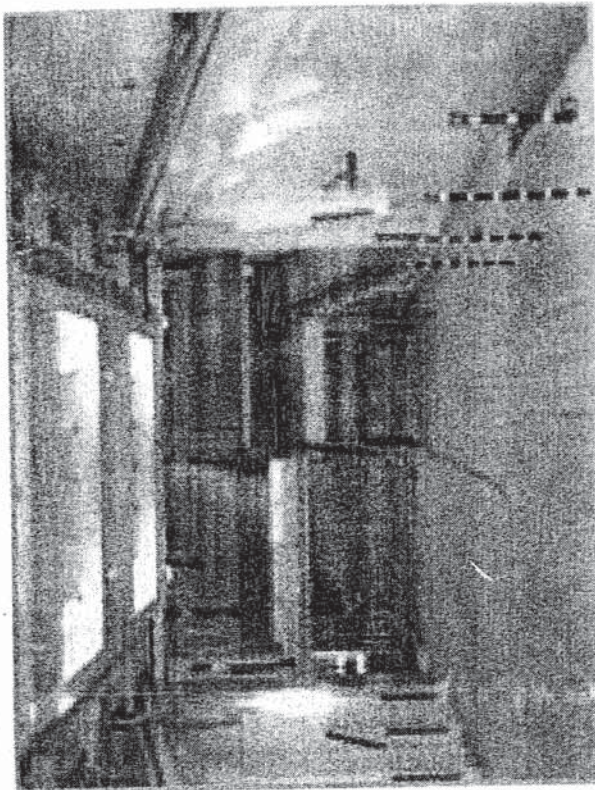
MAIN DIMENSIONS (moulded)		PROPULSION		BUILT			
	Number	1	Shipbuilder	STOCZNIA GDYNIA			
Length o.a.	199.90 m	Make	Cegielski/Wartsila	H. Designer	Stoczniowe Biuro		
Length b.p.	188.00 m	Type	7RTA 62U	NSD	Projektowe - Stocznia Gdynia		
Breadth mld	32.26 m	MCR	15540 kW	Delivery date	4/27/04		
Depth to main deck	14.00 m	rpm	113	MANOEUVRING GEAR			
Depth to deck 12	32.74 m	FOC	59.60 t/day	Number	Output [kW]	Thrusters type	
Design draught	9.00 m	SPEED		1	1300	bow thruster	
Design draught	9.00 m	Service speed		20 knots			
Design draught	9.00 m	at: draught T = 9.00 m,		90.00% MCR, 15% sea margin			
Scantling draught	10.00 m	TANKS CAPACITIES (100%)					
		ballast water	7380 m ³				
TONNAGE		lub oil	150 m ³				
Gross	57718 GT	fuel oil	3350 m ³				
Net	NT	potable water	260 m ³				
Deadweight at:		diesel oil	130 m ³				
Design draught	15700 t						
Scantling draught	21214 t	RANGE					
		cruising range	24000 Nm				
VEHICLES CAPACITY		COMPLEMENT					
number of vehicle decks	13	Suez Canal crew	6				
number of hoistable		pilot	2				
Car deck areas:		officers and crew	29				
total	54500 m ²	CARGO HANDLING GEAR					
hoistable	17000 m ²	Lifting	Outreach				
		Type No Drive capacity [t]	[m]				
Vehicles:		1	5				
cars	6000 pcs						
Length of lanes:							

ADDITIONAL DATA

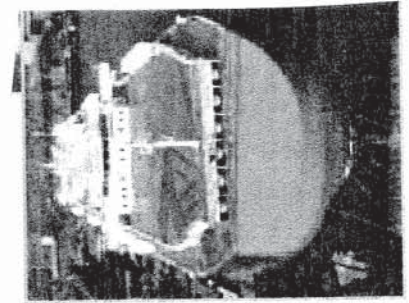
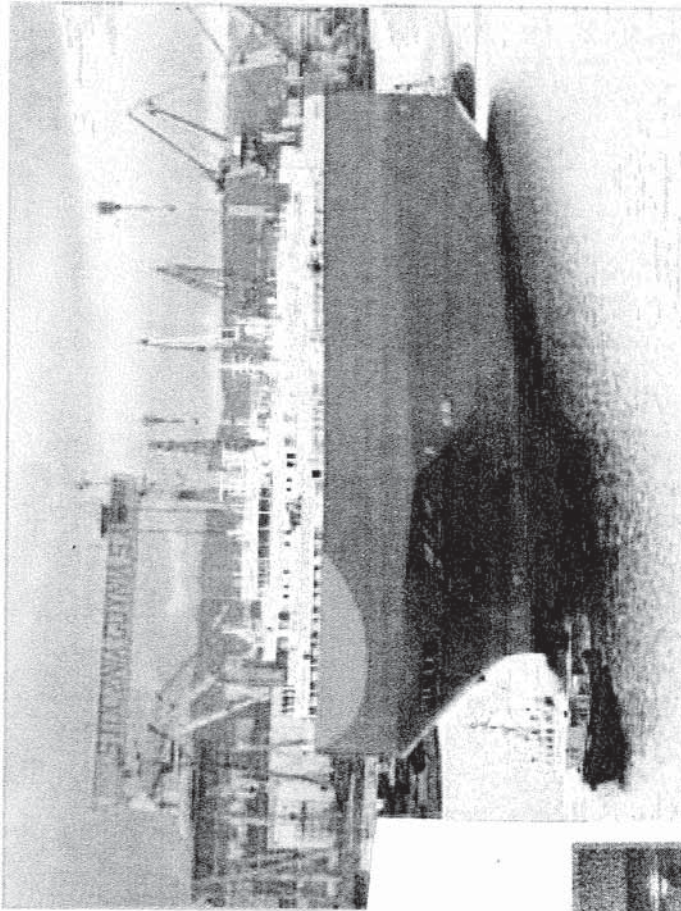
The ship is chartered by Japanese company K-Line.

Google - Amber Arrow - p. 1 - Polship - Information About Ship.

Amber Arrow & Ivory Arrow *
2 newbuildings for Gdynia Shipyard



ramps



Car decks

* Google - Amber Arrow - p. 1 - Marine Products Line - Amber Arrow & Ivory Arrow - pp. 1 and 2.

The MV Mignon, the largest PCC as of early 2006 *
-- and Still Other Related Dimensions to its Historic Technology.



The vessel can carry up to 7,200 cars. **

Other technologies related to those of the Mignon.

The first three of these were introduced at their Internet site by the following paragraph. ***

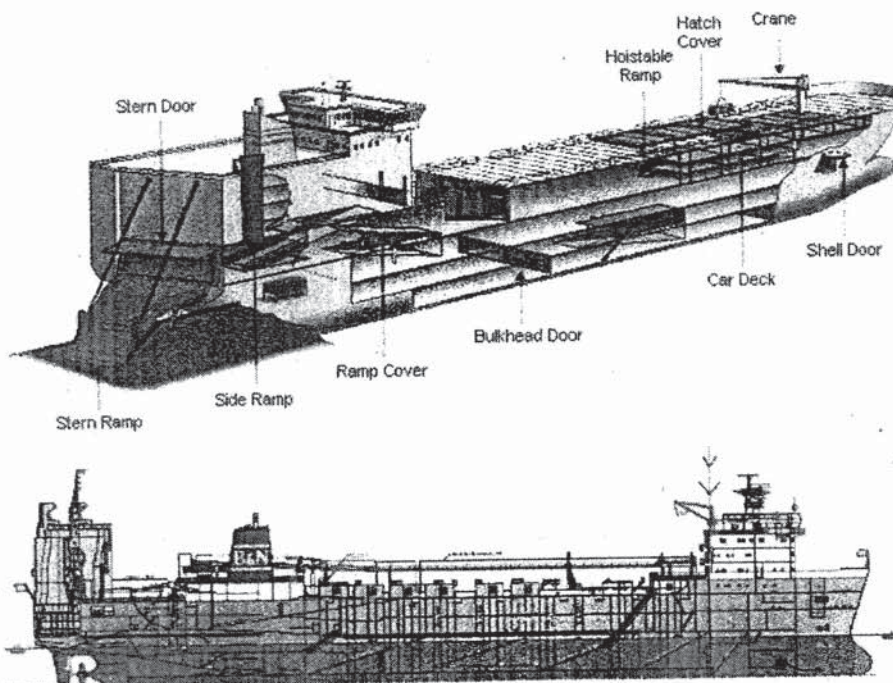
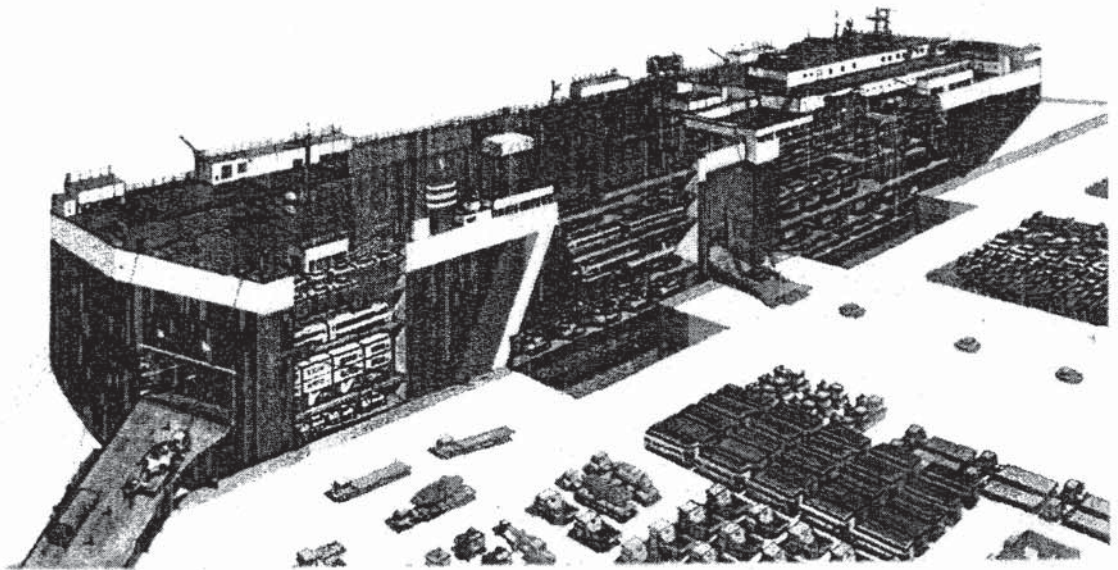
In the 1960's and early 70's, conventional vehicle carriers of the Lift-On Lift Off (LOLO) type were used extensively in connection with the transportation of factory new cars. The vessels would rig hoistable car decks and load anything from 500 up to 3000 cars depending on the size of the vessel. The LOLO was soon replaced by the Roll On Roll Off (RORO) car carrier. As the 70's developed, the Pure Car Carrier (PCC) started to replace the conventional vessels. The PCC was then developed into the Pure Car Truck Carrier (PCTC) in order to meet the

* Google - MV Mignon - Index of /krevne / images - 03 . 09 . 2006.

** It will be recalled that other vessel particulars were reported on p. 140 above.

*** Google - MV Mignon - p. 1 - Roll-on / Roll-off - Wikipedia - References - Cut-away of PCC.

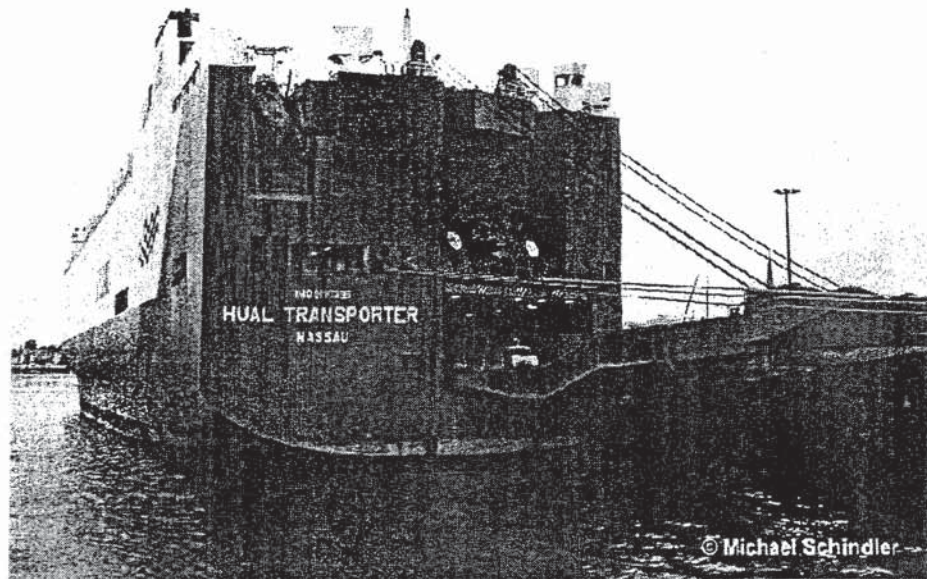
demands for high and heavy cargo. The introduction of the PCC / PCTC resulted in radical reduction of transportation damages. A PCC with 9 - 10 decks can usually carry 2,000 - 3,000 cars. Large carriers with 12-tier decks and a cargo capacity of 6,000 cars have been built in recent years. Although essentially a vehicle carrier, breakbulk and containers are carried on bolsters, lift trailers, roll trailers and cassettes. Pictures of these are in the loading section of this site. Ro-ro ferries are detailed in the Ferries section of this site.



Google - MV Mignon - p. 1 -- Roll - on / Roll - off / Wikipedia
- References - Cut-away of PCC.

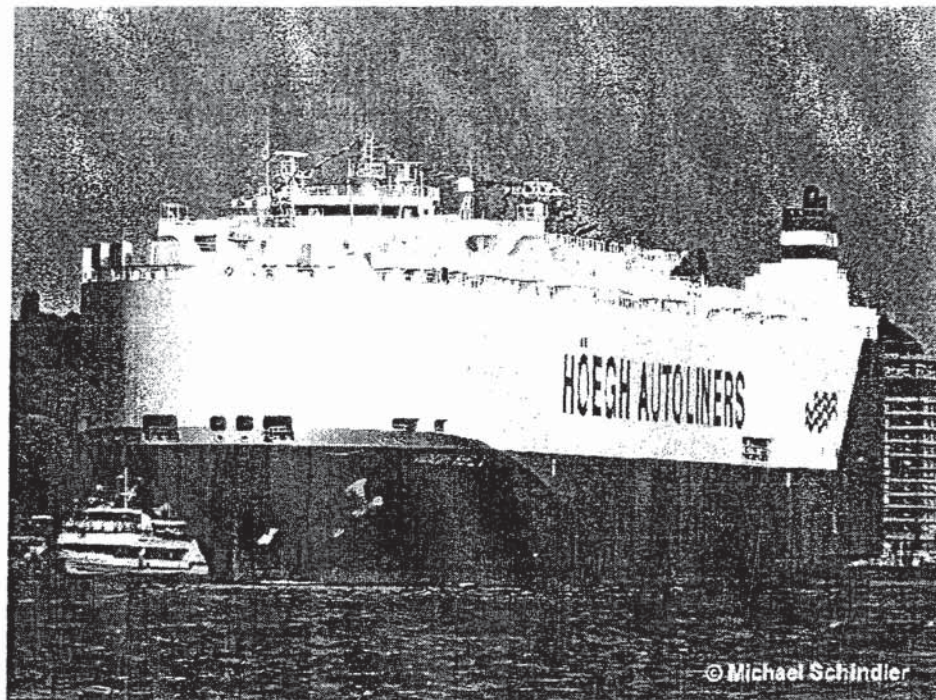
Google - MV Mignon - p. 1 - Roll - on / Roll - off - Wikipedia
- Pictures of ships - Enter Gallery - Vehicle carriers and RO - RO.

Hual Transporter



Google - MV Mignon - p. 1 -- Roll - on / Roll - off / Wikipedia
- Pictures of ships - Enter Gallery - Vehicle carriers and Ro - Ro.

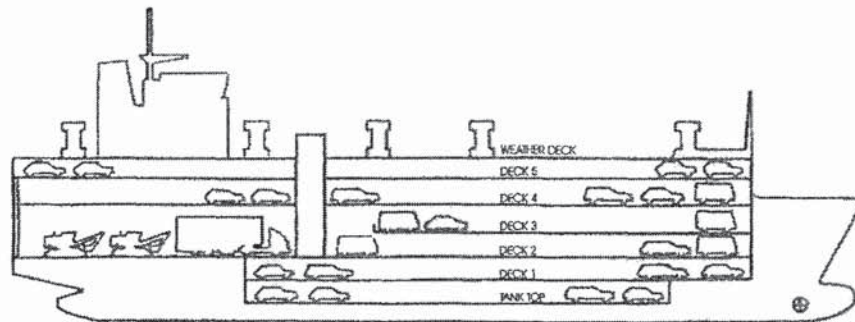
Hoegh Herlin



M/V AUTOCARRIER

Built 1982 Lübeck (Germany)

Class LR; * 100A1, Ro/Ro cargoship, mov. deck, *LMC, UMS



PRINCIPAL PARTICULARS

Length over all	89.52 m
Breadth moulded	18.00 m
Dead-weight maximum	1472 T
Draft at DW maximum	4.26 m
Service speed	13.5 knots
GT/GRT	6421/985.42
NT/NRT	1926/481.88
Air draft	29.51 m
Main engine	1 x Mak 6M551, 2940 kW
Aux. engine	2 x Caterpillar D353TAU
Bow thruster	Jastram BU 601, 478 kW, Becker rudder
Shaft alternator	Anton piller GMBH & Co, NKT 600-4 Three phase-synchrns alternator, 530kW

LOADING CAPACITY

	FREE HEIGHTS	STOW AREA	STRENGTH
Weather deck		755 m ²	0.25 T/m ²
Deck 5	1.70 m	1205 m ²	0.50 T/m ²
Deck 4	2.30 m	1200 m ²	0.40 T/m ²
Deck 3	2.20/1.60/ 0 m	1130 m ²	0.40 T/m ²
Deck 2	2.30/2.90/4.50 m	1085 m ²	4.50 T/m ²
Deck 1	1.70 m	740 m ²	0.25 T/m ²
Tank top	1.70 m	525 m ²	0.25 T/m ²
Sum ex. Weather deck		5885 m ²	
Sum, total		6640 m ²	

RAMP PARTICULARS

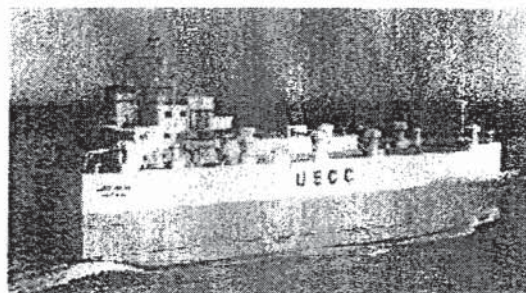
STERN RAMP: Height of ramp pivot: 6.6 m above the keel

Length: 8.00 m + 2.00 m flaps Width: 8.00 m Strength: 4.5 T/m².

STARBOARD SIDE RAMP: Height of side ramp variable I.E. available for main deck/car deck/upper deck

Length: 11.00 m + flaps 2.00 m Width: 3.00 m Strength: 0.4 T/m² or 0.9T/m²

Ventilation: 35 air changes per hour.



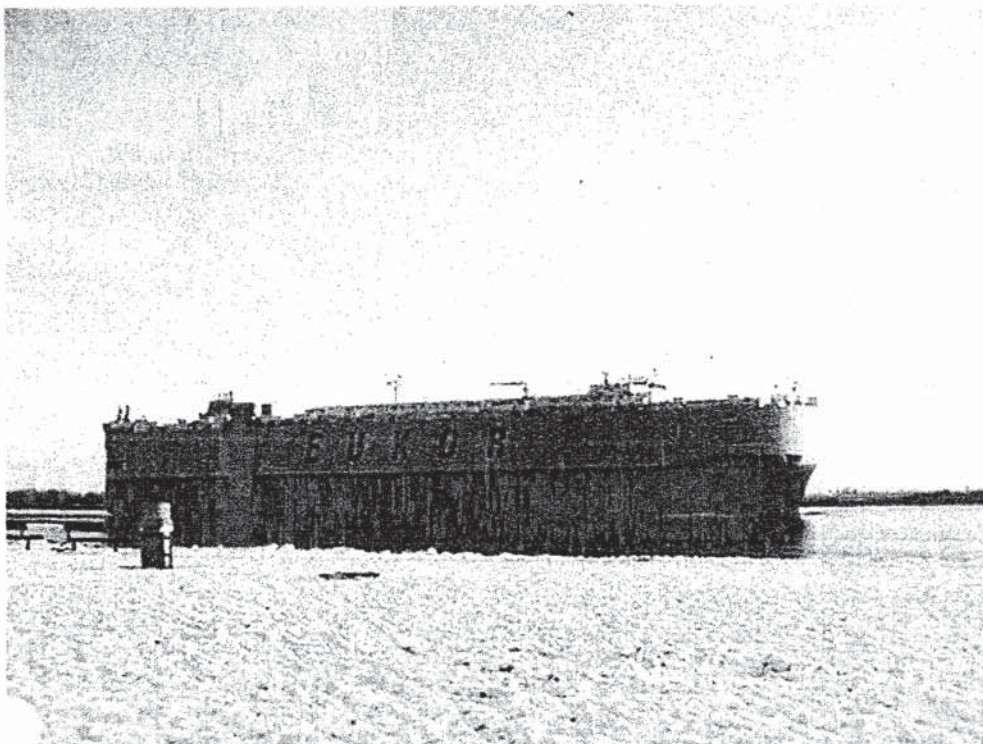
MV AUTOCARRIER

Car capacity	650
Length overall	89,52 m
Breadth moulded	18 m
Deadweight max	1472 T
Draft DW maximum	4,26 m
Service speed	13,5 knots
Built	1982

Wallenius Wilhelmsen, Tamerlane



Darling Harbour



One of the many ships that travels up the South Arm of the Fraser River. This ship carries automobiles for distribution across the continent.

A final note on working a "pure car" vessel.

Since discharging autos and vans and pickups from RO /RO ships constitutes a fair amount of the work routinely available to those who are also dispatched to first unlash and thereafter lash the deck load on containerships, some detail is in order. And as this detail is briefly set out -- and boredom induced by the drivers' work is especially remarked upon -- it should also be kept in mind that the largest and most modern of today's RO / RO ships transport on their eight or nine decks as many as 7200 vehicles . In any event, however, and with ramps in place and secured at the side and after ports of a RO / RO vessel, dockers can go aboard over a gangway affixed to them. And as some men proceed to let-go the specially designed and reusable lashings which have secured the vehicle's against any shifting while the ship was underway (which they continue to do so as to stay ahead of the drivers), others begin to drive them to the dock and thence to a large maintenance and storage area which of necessity, of course, is some distance away. The drivers are then returned to shipside in groups of eight to twelve by a minibus or van. And having boarded the vessel again, they also proceed to drive another vehicle to the "holding lot". And while, of course, they can the converse as they are brought back to the vessel, there is nothing in the drivers' work which requires any communication between them. And, by the same token, the nature and structure of their work is so routine that it affords them virtually no opportunity for innovation or any call for initiative. And thus if there is - as there sometimes seems to be - an inclination on the part of some drivers to begin to drive too fast, such seems to be occasioned by the boredom induced by the routine and, perhaps, a heightened liking of speed as a kind of "counter- balance" to that - and, especially, of course, in the Porsches. In any event, there are always a few who begin to drive as though they were in "the 500". It thus should also be noted that this driving is no way restricted to those who have been trained and promoted and thereafter dispatched from the hiring hall to operate dock equipment. And that, of course, is because contractually speaking such driving is not defined as a "skill", but rather as "unskilled hold work" And, indeed, there is no checking of drivers for even a license to drive. And, thus, too, this work is very largely performed by those who are regularly dispatched for hold work.

And finally, too, a brief PS on the owner and operator of the MV Mignon -- an update on the new building program of Wallenius Lines. *

Wallenius orders four more 8,000 vehicle LCTC;s.

Wallenius Lines continues its new building program. It has ordered a further four 8,000 vehicle capacity LCT - vessels (Large Car and Truck Carriers) from DaewooShipbuilding and Marine Engineering (DAME) in Korea for deliveries in 2008 and 2009.

The vessels will be 228 meters long and capable of carry 8,000 vehicles.

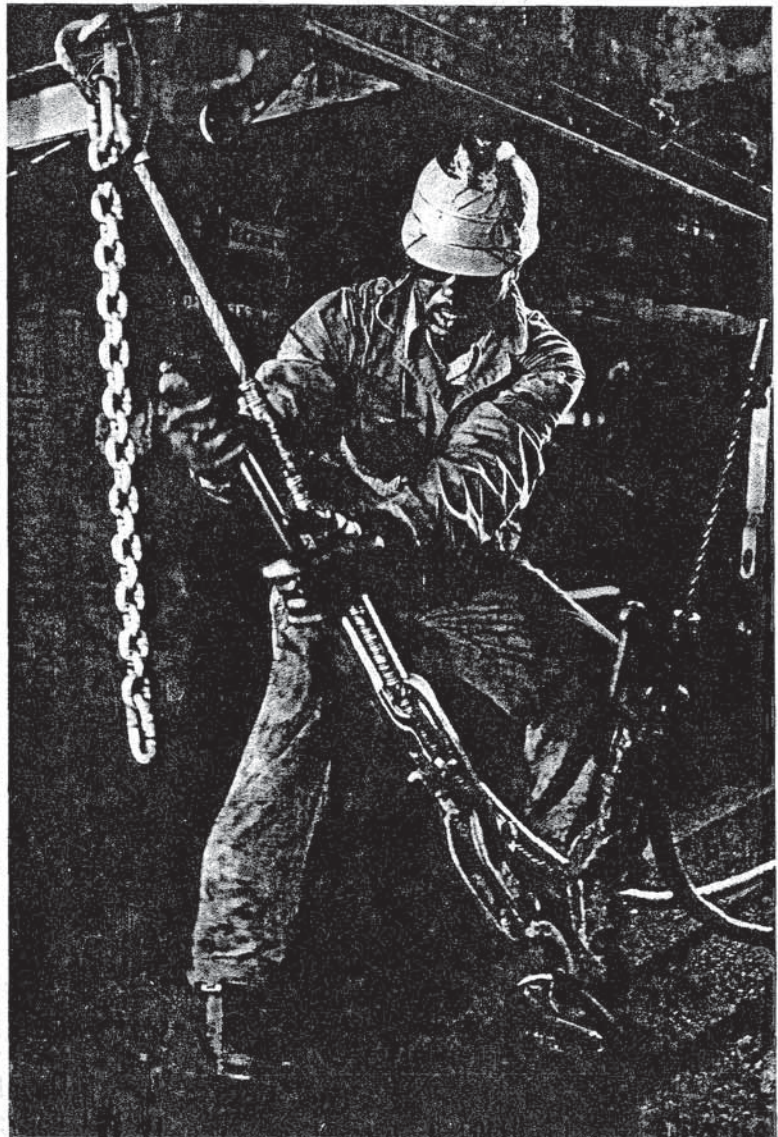
With these four new contracts, Wallenius Lines order book now includes ten new buildings, of which nine vessels are being built at DAME and one is being built at Hyundai Heavy Industries.

During the year, five of the existing vessels in the Deanna -series (built in the late 1990's) have been elongated at Hyundai -Venation Shipyard in Vietnam, increasing capacity of each vessel by 20 percent. The LCT vessels will be deployed in the Wallenius - Wilhelmsen fleet. The total investment in the Wallenius Lines new building program adds up to \$800 million.

* Goggle - LCT - p. 3 Shipping - Shipbuilding - Offshore News - Marine Log - December 6, 2005.

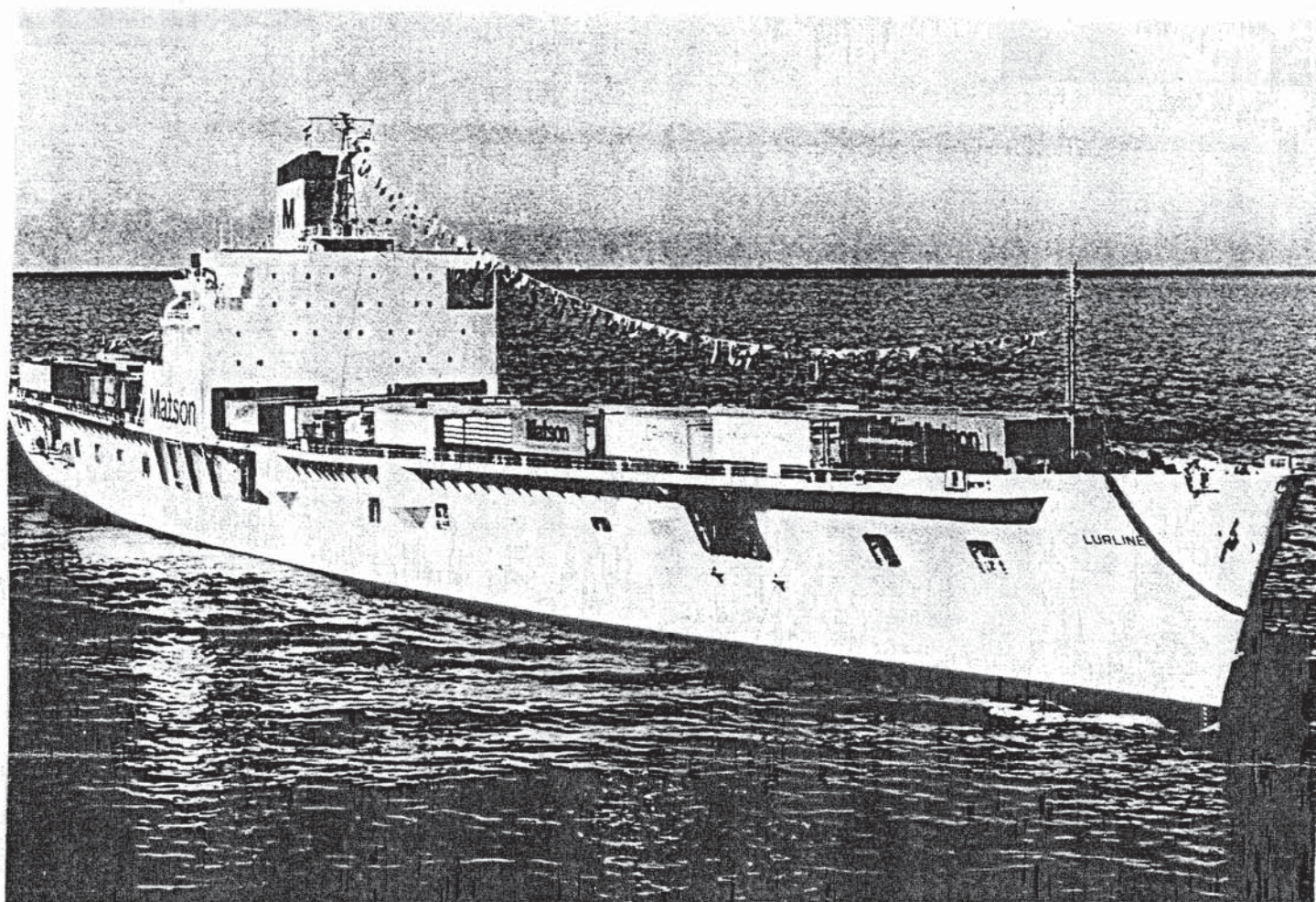
A concluding note: The evolution of Matson Navigation's transport of car - van - and pick-up and its RO / RO capabilities.

Containerized trade was introduced in the Pacific by Matson Navigation with the sailing of its Hawaiian Merchant on August 31, 1958.* Shortly thereafter, it also began to convert its fleet of C - 3's and C - 4's for the transport of containers. And by 1969, it had also placed into service the first full containership to ply the Pacific trade routes, the Hawaiian Enterprise. And having shortly thereafter begun the building of another four such vessel, it had by 1973 also placed into service the Lurline, a roll-on / roll-off (RO / RO) vessel with seven ramp-connected decks. And in a short time it also placed into service its new Matsonia, a so-called "container ship hybrid" which with the containers it carried forward and aft of its "house" - i.e., its superstructure - and its engine space, also had on her stern a multi-decked, ro / ro garage for 422 cars. But as regards the details of these very important "spin-offs" of the containerization of West Coast trade and the details of the longshore work which they required, such by now can best be made clear simply by the following photographs.



Lashing aboard the Lurline
Photo by
Ms. Pat Goudvis.

* For the role Matson played in the containerization of Pacific trade, see Article 14, pp. 43 - 50 on the author's website. The photographs which follow, excepting for the first three, are courtesy of Matson Navigation.

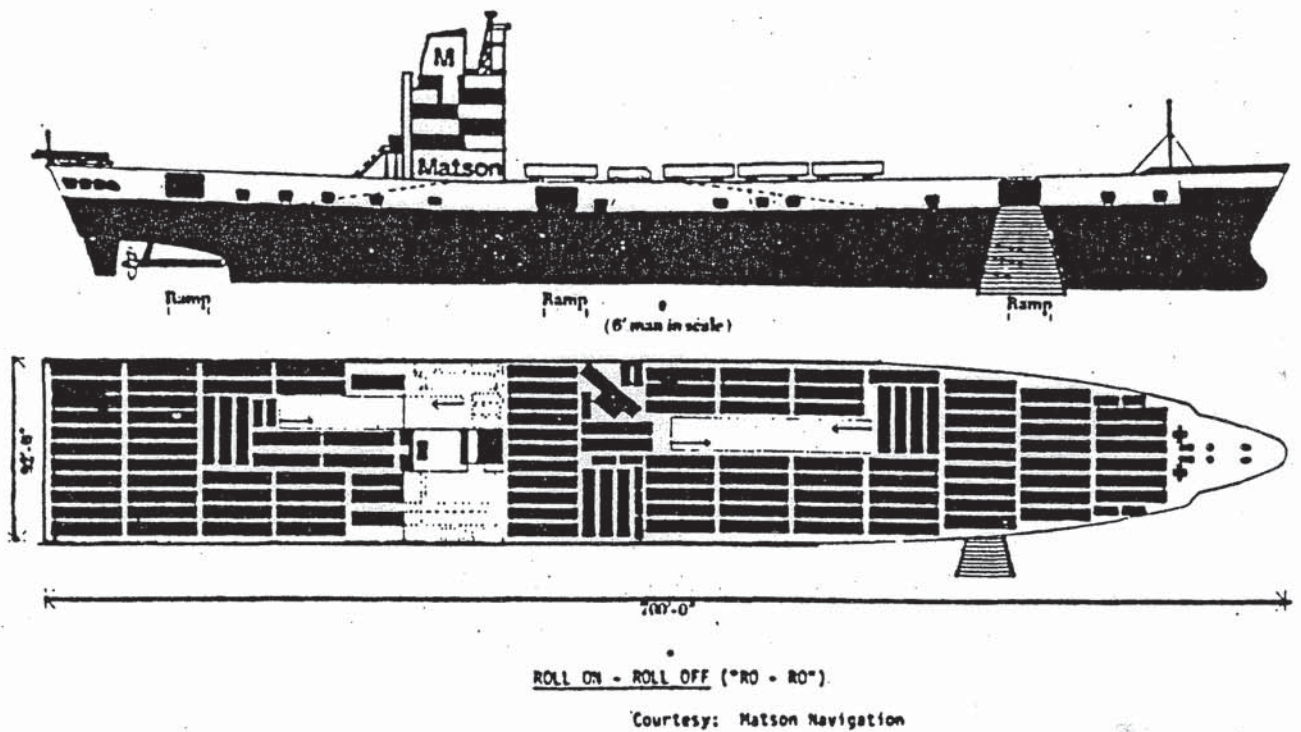


LURLINE (FIFTH)

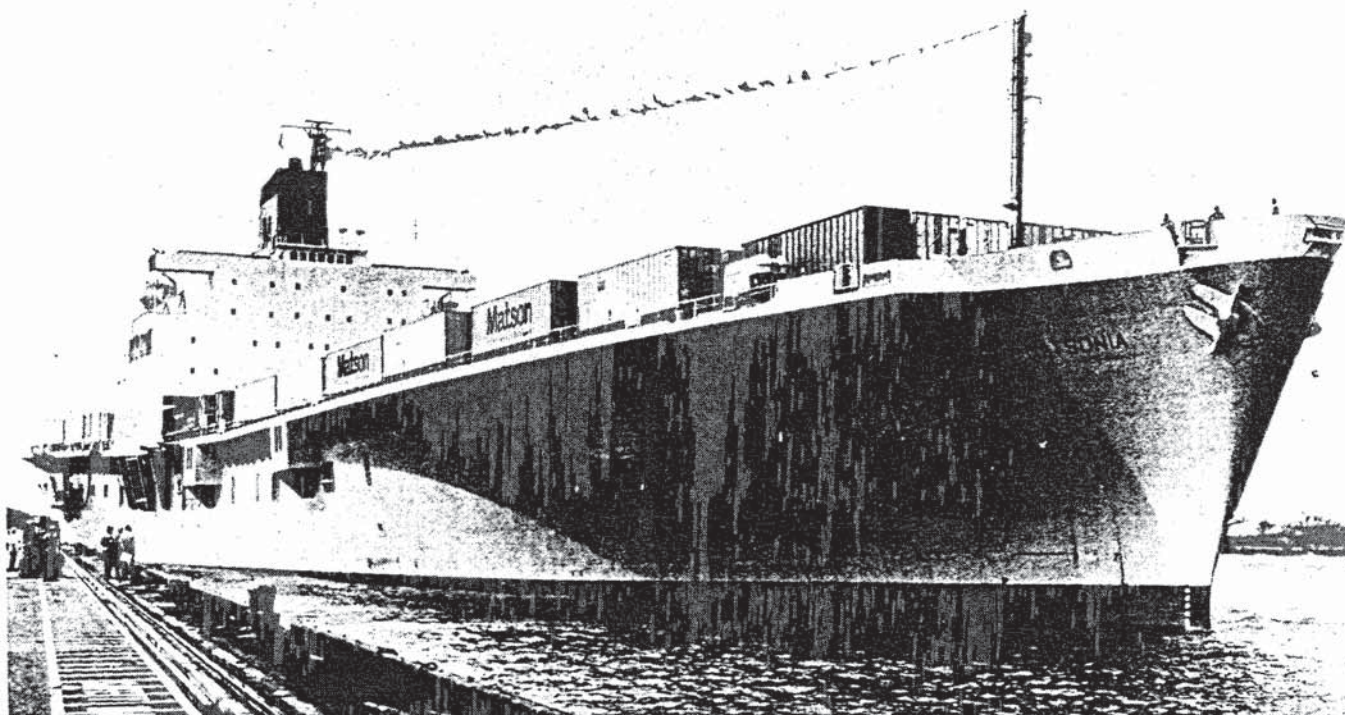
Built by Sun Shipbuilding & Drydock Co., Chester, Penna., at a cost of \$30,600,000. Christened *Lurline*, when launched, June 7, 1973, by Mrs. Maryanna Gerbode Shaw, great-granddaughter of Samuel T. Alexander, one of the founders of Alexander & Baldwin, Inc., parent company of Matson Navigation Company. Vessel jointly owned by two banks and chartered to Matson under long-term agreement. Delivered to Matson, August 24, 1973, and sailed the following day from Philadelphia to Los Angeles. Maiden voyage from Los Angeles, September 9, 1973, inaugurating first roll-on, roll-off service to Hawaii. Vessel capacity 293 40-foot trailers to 343 27-foot trailers. After 187 voyages to Hawaii, vessel departed San Francisco, October 22, 1980 for Chester, Penna., where it arrived on November 10, 1980 to have a 126½-foot midbody section installed to increase cargo capacity; containers and trailer units to 1,175; autos, 179; and refrigerated units to 204. Vessel to return to West Coast-Hawaii service in early 1982.

Length oa	700'
Beam	92'
Depth	60'-1½"
Net tons	9,230
Gross tons	15,257
Speed	25
Crew	39
Official No.	549,000

* Matson's Century of Ships, Fred A. Stindt, Modesto, CA, 1982, p. 279.



This is the Lurline with one of three ramps in place - HM

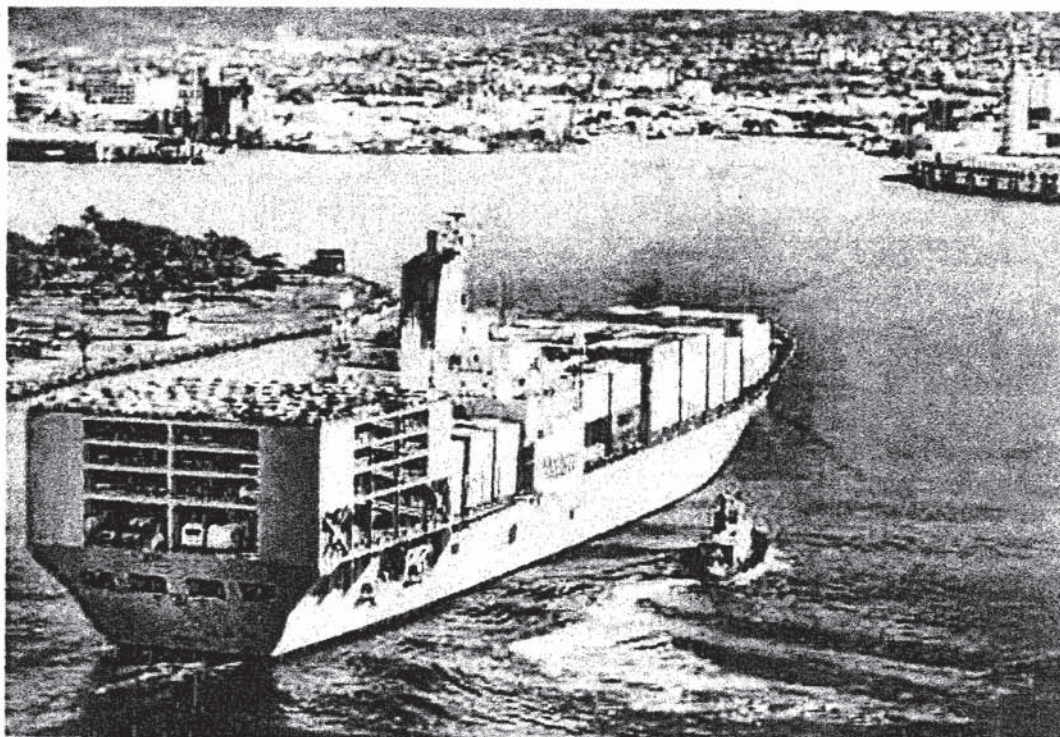


MATSONIA (FOURTH)

Built by Sun Shipbuilding & Drydock Co., Chester, Penna., at a cost of \$31,100,000. Christened *Matsonia*, when launched, October 11, 1973, by Mrs. Jane Baldwin King, great-granddaughter of both H. P. Baldwin, co-founder of Alexander & Baldwin, Inc., and Emily Alexander, sister of S. T. Alexander, the other founder. Vessel jointly owned by two banks and chartered to Matson under long-term agreement. Delivered to Matson, December 11, 1973, and sailed the following day from Philadelphia for San Francisco. Maiden voyage from San Francisco, January 9, 1974. Vessel capacity 293 40-foot trailers to 343 27-foot trailers. Laid up July, 1981. Available for service.

Length oa	700'
Beam	92'
Depth	60'-1½"
Net tons	9,230
Gross tons	15,257
Speed	25
Crew	39
Official No.	553,090

PHOTO
MATSON COLLECTION



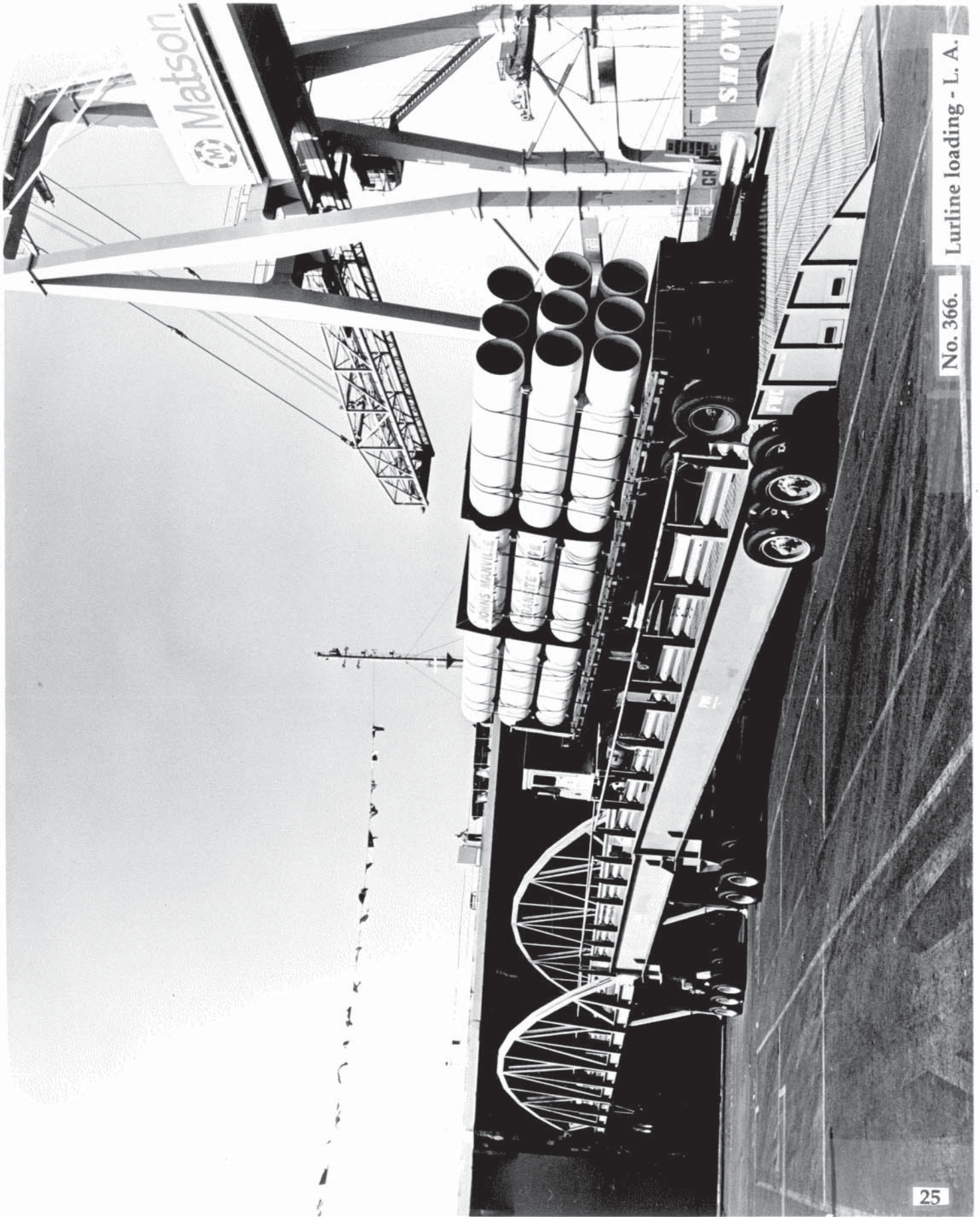
Google - Matsonia - p. 4 - Sailors' Union of the Pacific - entering Hono harbor.

* Ibid., p. 280.



The Lurline - L.A.

Courtesy of Matson Lines - reverse: Print No. 363.



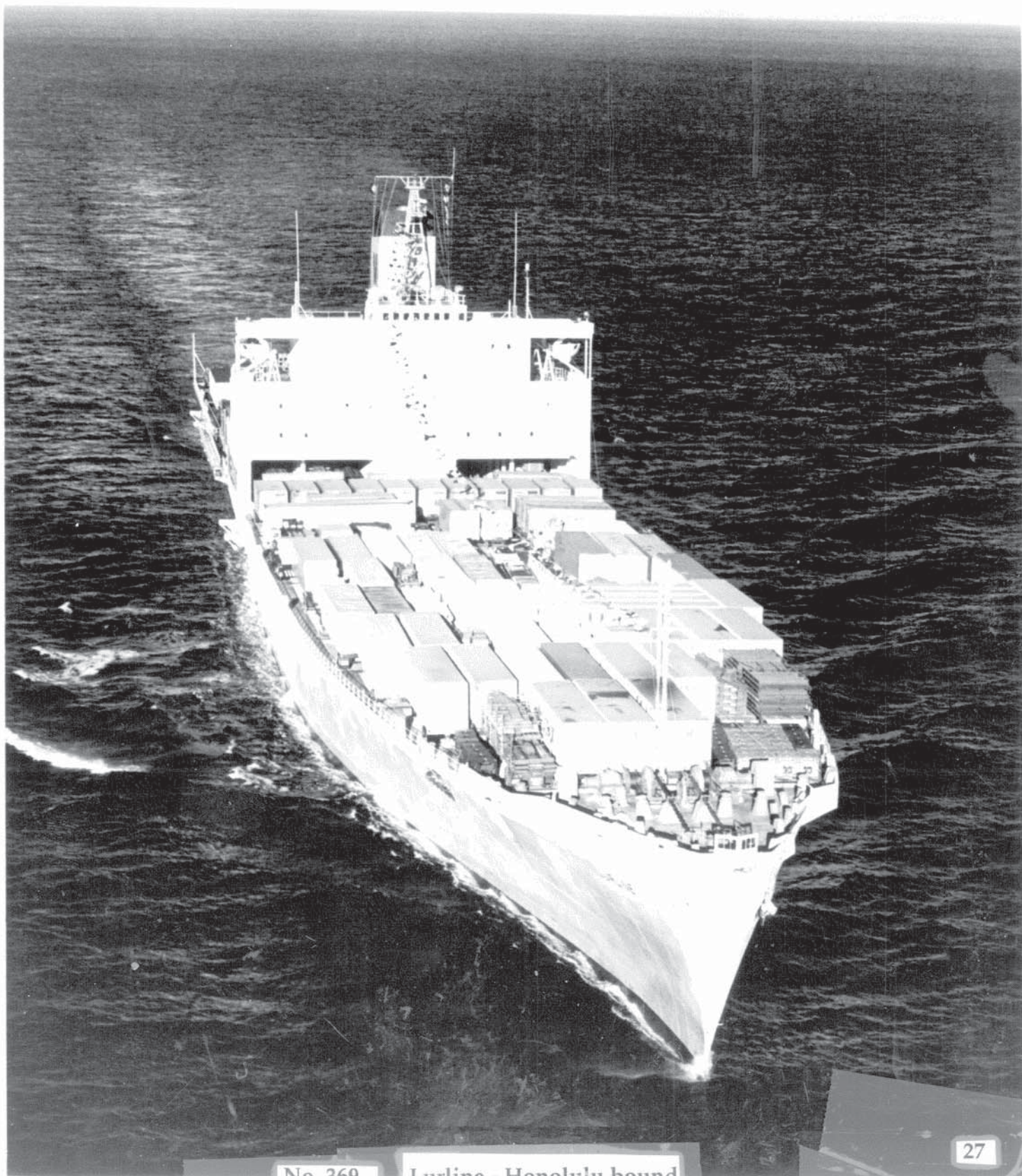
Lurline loading - L. A.

No. 366.



No. 417.

Redwood lumber on Lurline

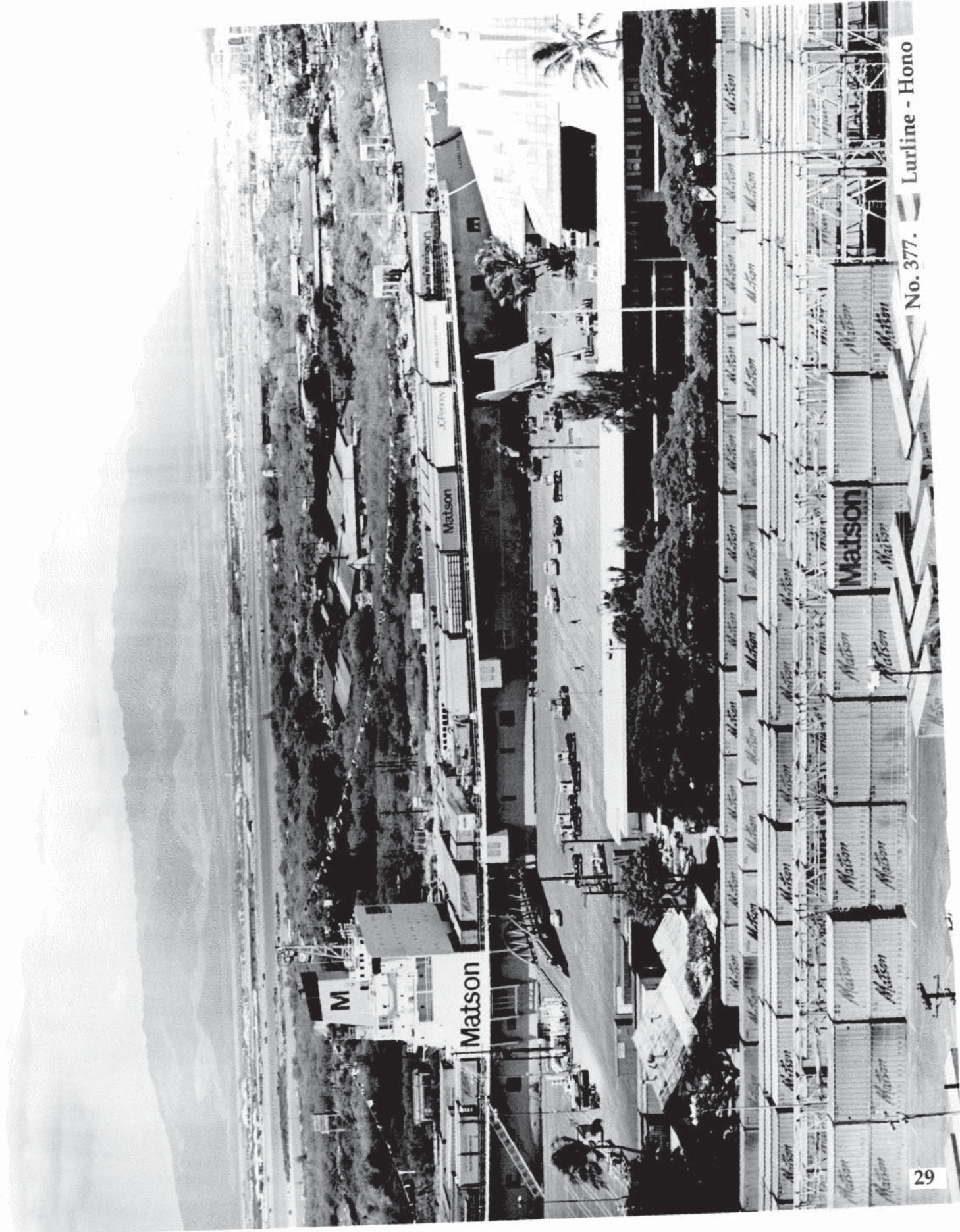


No. 369. Lurline - Honolulu bound



Lurline sailing from L. A.

No. 368



No. 377. Lurline - Hono



Lurline unloading - Hono

No. 378

Pacific Far East Lines (PFEL)

The West Coast Introduction of LASH
-- "Lighter Aboard Ship" -
and the Bankrupt Disappearance of PFEL

This ancient form of cargo transport has occasionally been adopted when the port(s) of call of a vessel are routinely crowded with anchored vessels of like size waiting for an open berth. It is thus distinguished by a hoisting of lighters (barges) loaded with cargo to the decks of a much larger vessel and their discharge and movement to suitable berthing when it arrives at the port to which they are destined. In a word, this form of cargo transport may be adopted so as to reduce the "turn-around" time of a larger vessel. And, by the same token, it may also greatly reduce the loading time of that vessel in its home port and all of its ports of call.

Google - Lash vessel - p. 1 - Shipping, Logistics, etc.
-- LASH (Lighter Aboard Ship).

The lighter aboard ship or LASH---barge-carrier or barge-carrying vessel---is designed to carry lighters (barges), where they are lifted by crane over the stern (rear) of the vessel.

The LASH and barge come in different configurations. Some LASHes can accommodate over 24 barges. Each barge may carry 600 to 1,000 metric tons of cargo, which is much bigger than the ocean freight container, and can float and be towed up and down a river or canal, thus the barge is often referred to as the floating container.

The LASH is useful in moving a relatively large volume of cargo in the short-sea trade and to and from sites on rivers and canals, such as Rhine Canal in Europe, that cannot be used by the larger ocean-going vessels. The LASH keeps the load in the same vessel for the entire trip, thus reduces cargo handling, transport costs and time.

The LASH is popular in Europe, taking advantage of the extensive inland waterway systems which are the cheapest means of inland transport. The export goods from landlocked European countries like Switzerland may move by LASH or other inland waterway transports to the port of Rotterdam (Netherlands) or Antwerp (Belgium), and transfer to the ocean going vessel for the deep-sea voyage.

Yahoo - PFEL - p. 7 - Houe Flags (shows PFEL house flag, but does not copy - HM).

Pacific Far East Line, San Francisco (1946-1978)<us~\$pfel.gif>

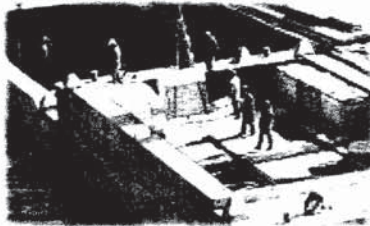
The Pacific Far East Line was created by Thomas E. Cuffe after World War II to take advantage of the availability of surplus wartime cargo ships. The line was exceptionally successful for its first decade, operating across the Pacific with 31 ships by 1949 and an especially strong position in shipping US military cargoes. However, after Cuffe suddenly died in 1959, the standard of management declined and the company repeatedly missed opportunities to upgrade to the new container technology. It finally went bankrupt in 1978. All PFEL ships had names ending with the word "Bear," and the flag was blue with a golden bear below the script letters PFEL.

Source: US Navy's 1961 H.O.

Joe McMillan, 8 November 2001

THE LASH SYSTEM

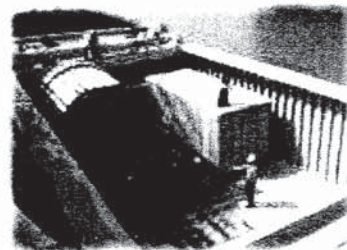
1. Cargo Loading



LASH, an acronym for **L**ighter **A**board **S**hip vessels each carry about 82 LASH barges. The barges, all of a standard size with cargo capacity of 385 tons, are towed in ports and on inland waterways to various shipping points where they are loaded with cargo and then returned to the oceangoing vessel. They are hoisted aboard by a special shipboard gantry-type crane and transported overseas where the process is reversed. LASH ships do not require special docks or terminals. LASH cargo rarely requires transshipment, moving from origin to destination with a single bill of lading.

A wide variety of commodities and manufactured goods are handled by LASH. These include pipe, vehicles, pallets, bagged cargo, forest products, and bulk. If required, forced air ventilation is available.

Heavy lift shippers enjoy considerable savings. Cargo such as machinery and construction equipment can often be stowed in one piece, eliminating costly disassembly, boxing, and reassembly.



Once loaded, LASH barges are water tight with hatch covers for each barge secured. LASH barges are considered vessels. Thus, once your cargo is loaded, an on-board bill of lading may be issued.

2. Ocean Port and Inland Capability

Cargo may be loaded into LASH barges at inland waterway points, ocean ports, and shallow draft terminals. In the United States, inland waterway points include the Alabama, Arkansas, Mississippi and Ohio Rivers.



Barges are then towed to port fleeting areas to await the arrival of the LASH mother vessel. The LASH mother vessel does not require special docks or terminals and is often worked at anchor in rivers, roadsteads and light traffic port areas.

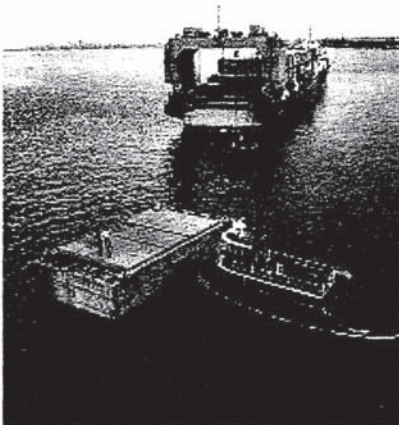


Another advantage is the ability of LASH ships to load and discharge cargo from anchorage. So your shipment is never delayed by a lack of dock facilities or port congestion. In fact, LASH ships spend far less time in port, compared to other vessels.

US River Ports include Baton Rouge, Birmingham, Catoosa, Cincinnati, Little Rock, Louisville, Memphis, Peoria, Pittsburgh and St. Louis. [View inland river chart.](#)



3. Barges Lifted Onboard



On arrival, the LASH mother vessel's 481 metric ton capacity gantry crane moves the LASH barges from positions onboard over the stern sponsons into the water to be towed to destinations. In succession, the same onboard gantry crane lifts the outbound loaded LASH barges from the water and places them in the holds and on deck of the mother vessel.

The LASH mother vessel proceeds to an overseas destination where the process is reversed.

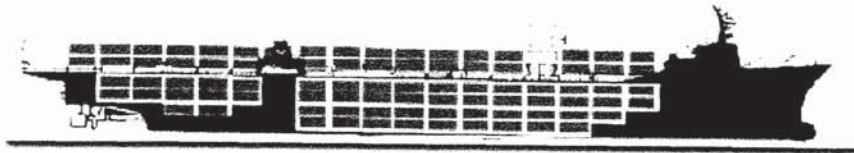


Lighter Aboard SHIP Specifications

SHIPS

Flag of Registry: U.S.A.
Classification Society: American Bureau of Shipping
Gross Tonnage: 37,460 (average)

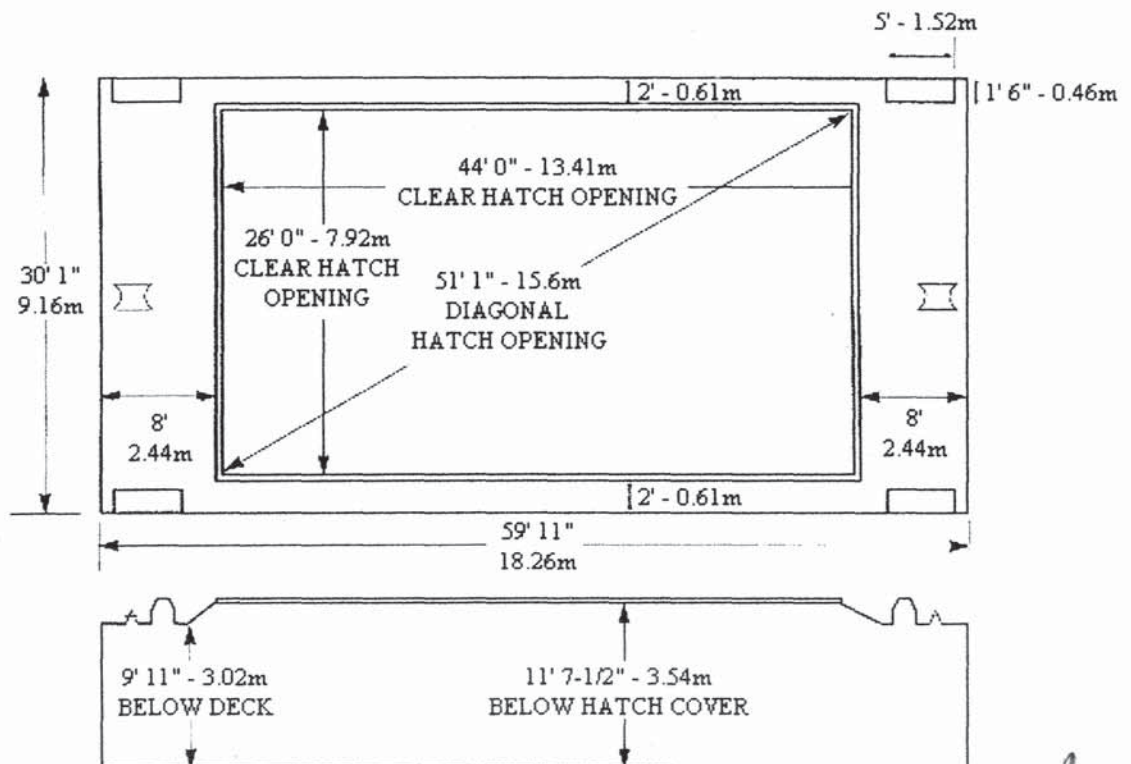
Capacity: 82 barges (Lighters)
 Length Over All: 237.4 m
 Draft: 12.7 m
 Beam: 32.2 m



BARGES

Class: ABS +A1 barge, river, bay & sound service
 Length: 18.75 m or 61.50 ft
 Breadth: 9.50 m or 31.17 ft
 Depth: 3.96 m or 13.00 ft
 Bale: 555 cbm or 19,600 cft capacity
 Grain: 569 cbm or 20,100 cft capacity
 Tonnage: Average 385 metric tons cargo capacity
 Ventilation: Forced air supply equipped
 Draft: Empty barge with hatch covers has a fresh water draft of about two feet. Ten metric tons of evenly distributed cargo increases draft by 2.2 inches.

Internal Dimensions:



The West Coast Introduction of LASH.

30 *San Francisco Chronicle* Fri., May 5, 1972

**Port of San Francisco will
open its mammoth new "Lashport"
to the public.**

Can you come?

**PORT OF
SAN FRANCISCO**

FERRY BUILDING, SAN FRANCISCO, CALIFORNIA 94111



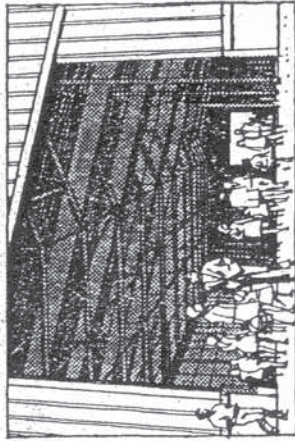
Sunday, May 7, 1972.

It's a great day for every San Franciscan.

It's your day to come see how mammoth new facilities are assuring the City's leadership in shipping. Lashport is a totally new kind of terminal. A "world's first," and another big step in San Francisco's voter-approved Multiport complex.

Here's your once-only chance to come inside. Walk around. And enjoy. Come yourself. Bring your family. The world's first Lash Terminal, Pier 96, will be open for inspection 11 a.m. to 4 p.m.

Sunday only, because after that, cargo starts moving!



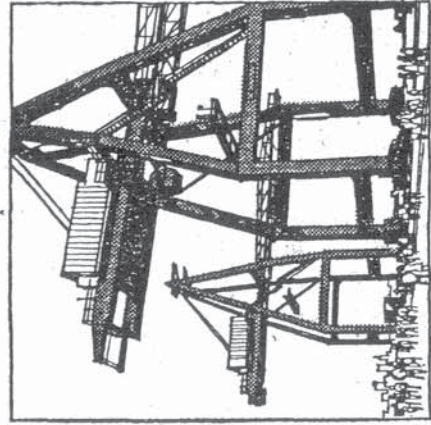
Walk inside the largest barge cargo building in the world.

You'll step into a building more than twice the size of the Cow Palace. The big Lash Lighter Terminal.

Here is 300,000 sq. ft.—floorspace and waterspace—under one roof, for transferring valuable shipments from trucks and railcars to Lash barges. You'll see where fifteen 61-ft. barges can float right in, out of the weather!

See cranes fifteen stories tall travel with 30-ton containers.

Lashport's 48 acres also includes space for handling more than 2500 modern seagoing cargo containers. You'll see how the largest, most sophisticated traveling container cranes hoist these



high. Can even turn a 20- or 40-foot container around mid-air for lowering it into the ship.

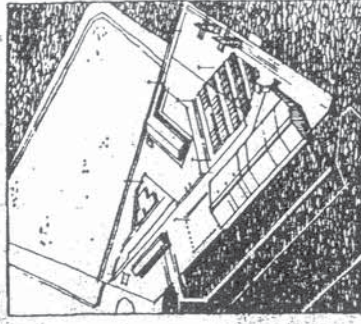
LASH (Lighter Aboard Ship) is a new shipping method using giant barges (called lighters) to carry cargo to, from and aboard the mothership.

Exhibits will show you how the new LASH ships of Pacific Far East Line will actually lift the barges over the stern and stack them aboard. 500 tons per barge. 49 barges, plus 334 standard containers, per ship.

These are the largest, fastest new class of freighters in the world.

Learn how the world's first LASH terminal will speed cargo.

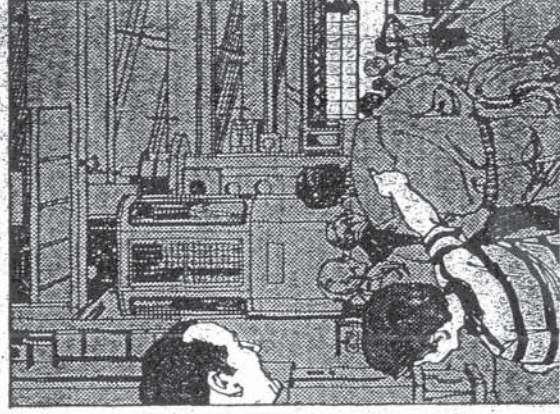
San Francisco—with Lashport—has the world's only complete LASH terminal. This will be the center of LASH shipping for the entire Pacific. And home port for PFEL's six new giant-LASH ships.



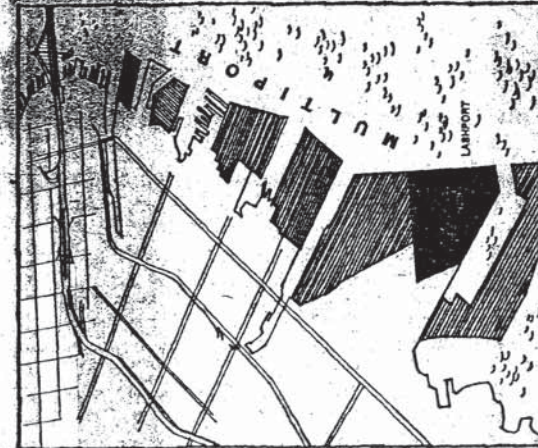
You'll see the modern methods of dockside truck and ship operations. Palletizing. Containerizing. An education in itself.

Watch as giant "flying forks" move cargo from dock to barge.

We'll demonstrate. It's dramatic to watch! These cranes look like monsters' arms reaching down from the Lighter Terminal ceiling. Telescoping. Lifting boxes or pallets. Trolleying out over floating barges, to gently stow them full. The longshoreman operator rides right along.



Enjoy a refreshing day by the Bay! Souvenirs and entertainment!



Get up-to-date
on other steps

San Francisco is taking
into the shipping future.

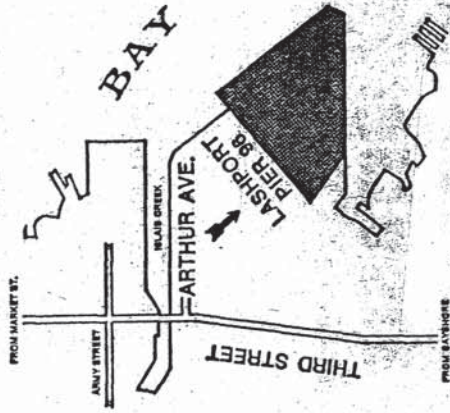
Lashport is just the beginning. Other big Port additions—to create a totally modern "Multiport" complex—won't overwhelm approval of San Francisco voters last fall.

Our 360-acre Multiport project (shaded area) is now well under way. It will centralize all methods of new-generation cargo handling. The largest concentration of intermodal facilities in the Pacific.

Shipping is San Francisco's biggest occupation. Sunday we will show you why.

And how.
Come and enjoy
your day!

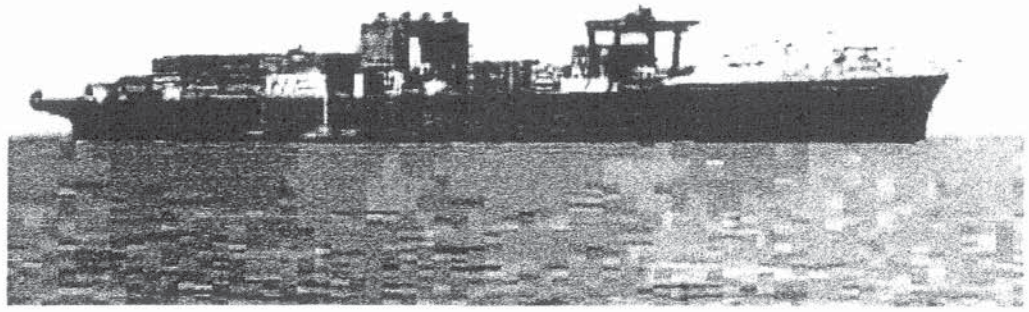
**Sunday, May 7,
11 a.m. to 4 p.m.**



Drive right in.
We've 30 acres of blacktop for your parking. Drive out Third Street—south from Market, or north from Bayshore. Immediately south of Islais Creek Bridge, turn toward the bay, on Arthur Ave. Then follow our signs.

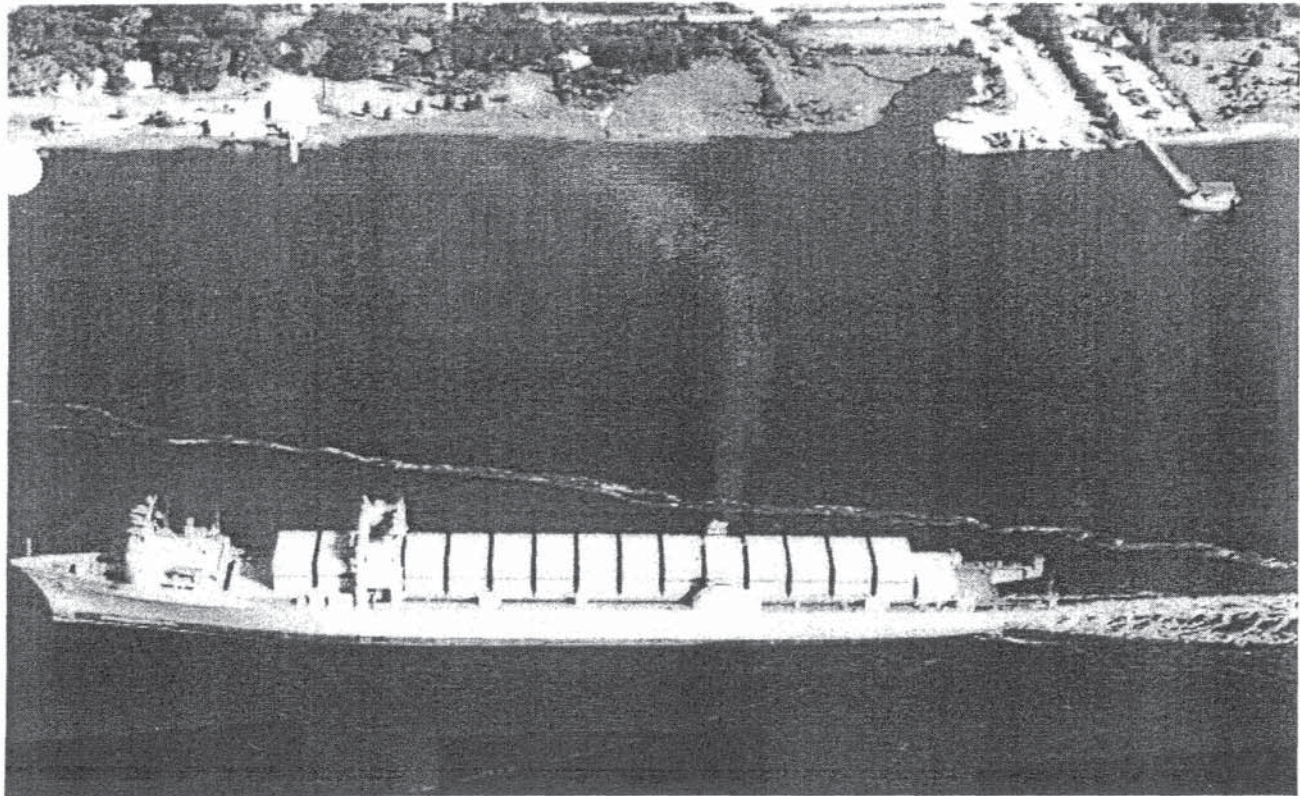
Or take the Muni.
Get to Army and Third Street, via Muni Bus No. 15, 42, or 35 (ask your Muni driver). Our shuttle bus will give you a free ride from Army and Third to and from Lashport. Admission is free.

From the author's photo collection.



The C-8 Thomas E. Cuffe, of the Pacific Far East Lines. Also known as LASH ships (Lighter Aboard Ship), the C-8's were designed to anchor offshore and load and unload floating barges off the stern. The idea was not commercially feasible and eventually they were converted into container ships. This one was sold to American President Lines and renamed the President Hoover, and subsequently sold to Matson Navigation Co. and renamed the Lihue. The Lihue is still in service today. *

photo from SUP archives **

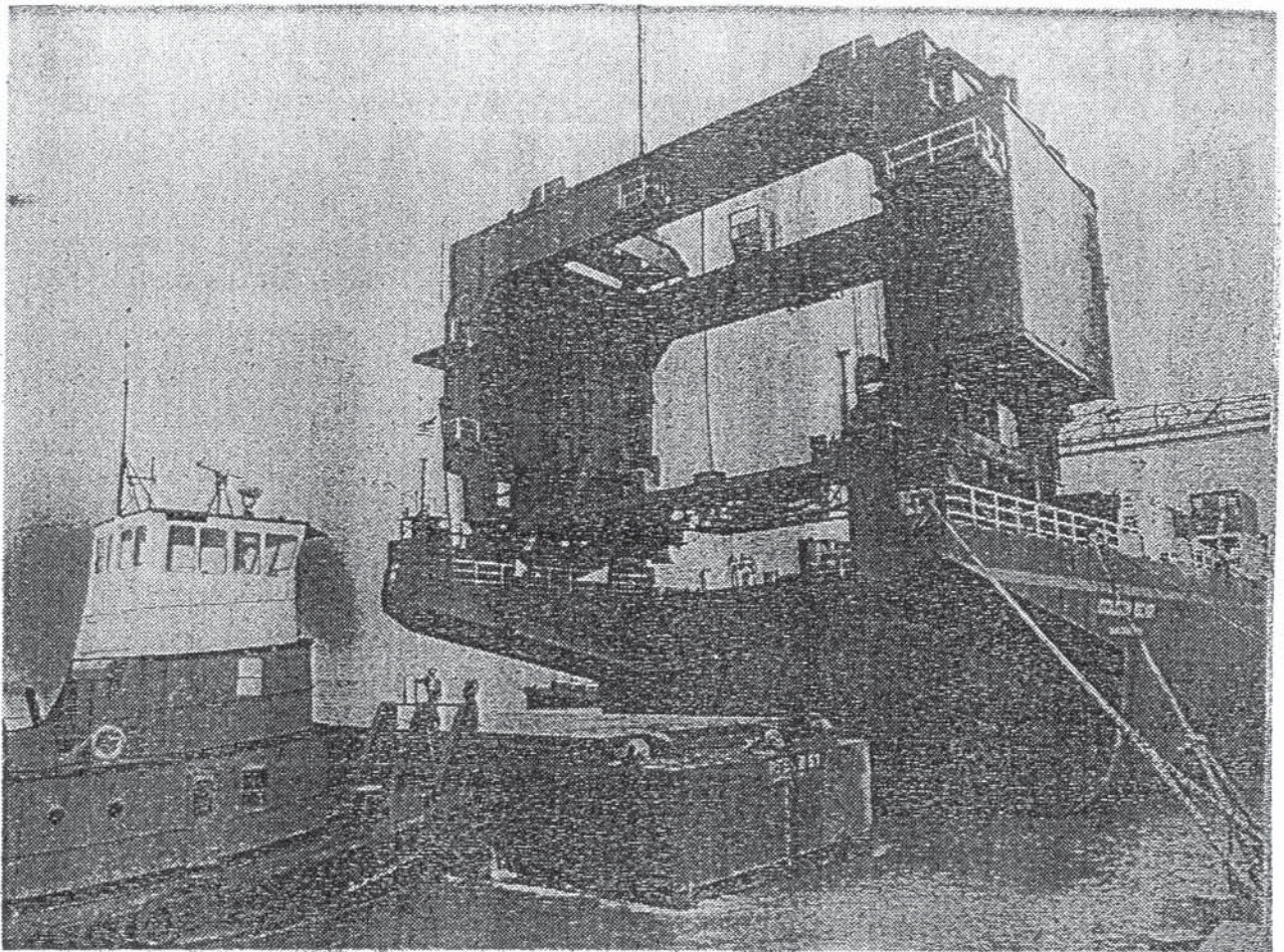


- Length: 893 feet
- Beam: 100 feet
- Draft: 38 feet
- Displacement: 32,543 long tons
- Speed: 18.7 knots
- Civilian: FOS 31
- Time to Activate: 10 days
- Owner/Operator: Government-owned, Contractor-operated

SS CAPE FAREWELL

* Matson now has the Lihue in reserve and moored at Pier 27 in San Francisco. With its barge crane having been long removed, it now is configured for 20 and 40-foot containers.

** SUP indicates Sailors' Union of the Pacific.



LASH Terminal Open to Public

What its operators call the finest marine terminal anywhere in the world, the new \$22 million LASH terminal at India Basin, will be open for public inspection on Sunday. Here is a 500-ton crane on the stern of the LASH (lighter aboard ship) vessel

Golden Bear after unloading a 60-foot long, 30-foot wide and 12-foot deep barge full of cargo. A push-type tug then secures to the barge and pushes it to a freight station adjacent to terminal.

—Examiner photo by Gordon Stone

S.F. Port Losing \$2 Million a Year

The Port of San Francisco will lose at least \$20 million in the next decade because of poor management, former chairman Richard Goldman of the Citizen's Waterfront Committee said yesterday.

Goldman made the charge in testimony before the Mayor's Port Committee at City Hall.

The committee is studying waterfront development and will make recommendations to Mayor Alioto this summer.

"Based on its own projections, the port contemplates a net loss in operation of \$2 million per year for the next 10 years," said Goldman.

Development

"This explains the indiscriminate effort to develop the northern waterfront to

avoid the obvious alternative of placing the Port on the tax rolls.

"The surplus of the port has already been reduced from over \$15 million to \$3 million as it struggles to meet its current obligations," he said.

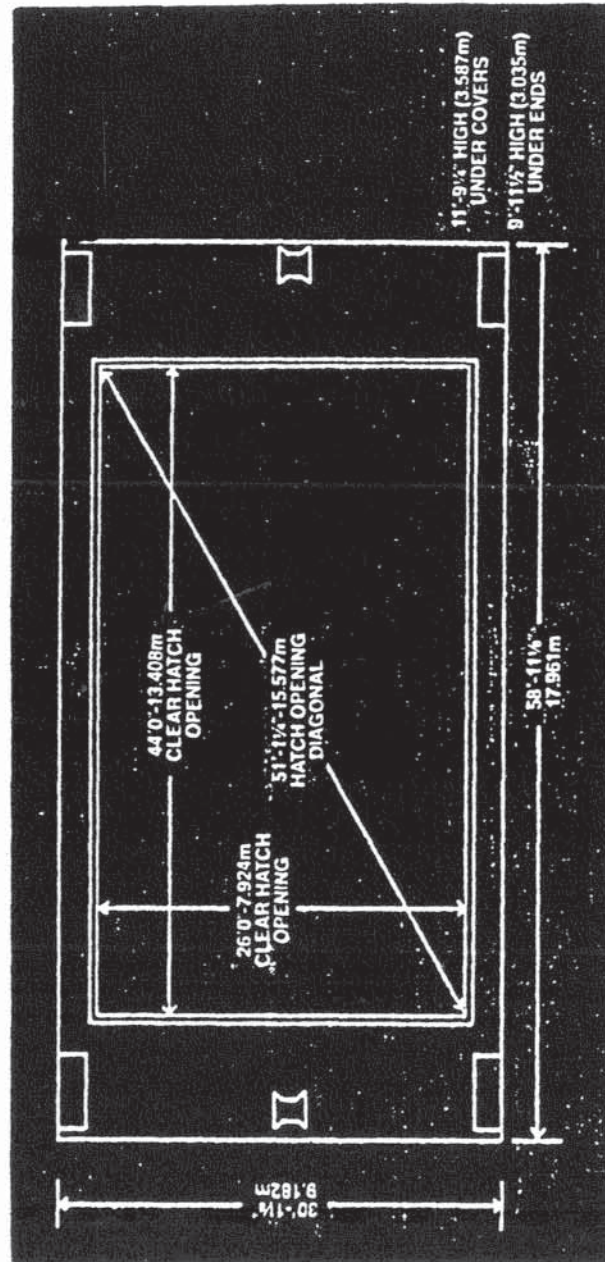
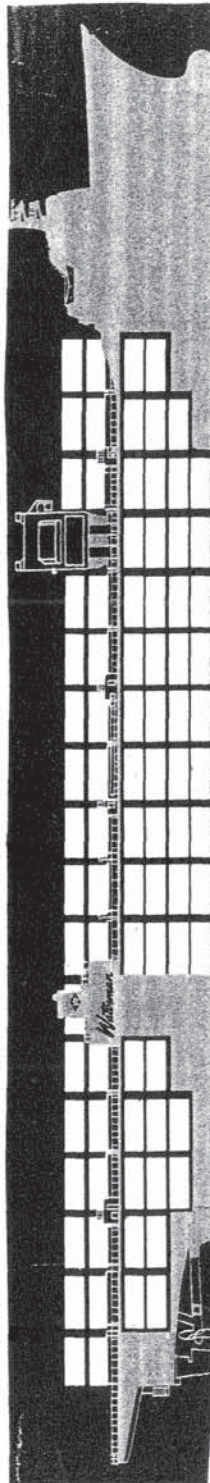
Goldman said the CWC raised \$20,000 to pay for a study on waterfront development.

The study contends the port can be made self supporting if one-third of its surplus land is developed commercially and the other two-thirds dedicated for public use.

Darkened area reads:

long, 30
of cargo
and push-
terminal.

by Gordon Stone



Courtesy of Pacific Far East Lines

Vessel Capacity: 49 Barges / 334 Containers *
 Barge Capacity: 410 tons
 Container Capacity: 30 tons

* The vessel could also be configured for 54 barges and 286 containers.