

TUG HERCULES
SAN FRANCISCO MARITIME NATIONAL HISTORICAL PARK
SAN FRANCISCO
SAN FRANCISCO COUNTY
CALIFORNIA

HAER No. CA-62

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PHOTOGRAPHS

HISTORIC AMERICAN ENGINEERING RECORD
NATIONAL PARK SERVICE
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SAN FRANCISCO, CALIFORNIA 94123

ADDENDUM TO
STEAM TUG HERCULES
San Francisco Maritime National Historical Park, Hyde Street Pier
San Francisco
San Francisco County
California

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Historic American Engineering Record
National Park Service
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HISTORIC AMERICAN ENGINEERING RECORD

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ADDENDUM TO
STEAM TUG HERCULES

HAER CA-62

Location: Hyde Street Pier, San Francisco Maritime National Historical Park

Type of Vessel: Ocean-going Steam Tug

Trade: Commercial Towing

Date Constructed: 1907

Builder: John Dialogue and Son of Camden, New Jersey

Official Number: 204801

Specifications: LENGTH: 134.9; BEAM: 26.1; DEPTH OF HOLD: 15.5; GROSS TONNAGE: 414.0; NET: 221.0; HULL MATERIALS: Riveted Steel; ENGINE: 500 Horsepower triple expansion steam engines; PROPULSION: Single screw

Original Owner: The Shipowners and Merchants Towboat Company, San Francisco

Original Use: Ocean-going tug pulling cargoes of logs, ships, and barges

Present Owner: San Francisco Maritime National Historical Park, National Park Service

Present Use: Museum Ship (operational)

Significance: The Steam Tug HERCULES is a National Historic Landmark, significant as the only oceangoing steam tug on the West Coast. Typical in the early 20th century, this steam tug hauled log floats, large ships and other disabled vessels. Her triple expansion steam engine is in operating condition and she steams San Francisco Bay as a floating exhibition.

Project Information: This documentation was begun completed in 1998 under a memorandum of agreement between the HABS/HAER, E. Blaine Cliver - Chief, and the San Francisco Maritime National Historical Park, William Thomas - Superintendent. The project was managed by Todd Croteau (HAER) and Fred Sheppard (SAFR). The HAER field team included Dana Lockett, Thomas Behrens and Edward Lupyak. Markham Starr, of Mystic Seaport, prepared drawings of the Half-Hull Model. Ted Miles (SAFR) prepared historical descriptions.

Steam Tugboat HERCULES

In 1907 a San Francisco firm called The Shipowners and Merchants Towboat Company ordered a pair of ocean going tugs from John Dialogue and Son of Camden, New Jersey. They were builders of high quality tugs, pilot boats and small government steamers. At the turn of the century, many harbor tugs were built with wooden hulls and powered by a compound (two cylinder) steam engine of about 500 horsepower. However, with the Hercules and her sister Goliah, they built a 150 foot long riveted steel hull that was powered by a triple expansion (three cylinder) steam engine of 1000 horsepower. In addition the vessel was equipped with a steam powered deck capstan, a steam anchor windlass and a steam towing winch designed to handle 1200 feet of 1 3/4 inch steel wire towing cable.

Completed in 1907, Hercules started her career with a record setting tow by steaming to San Francisco, by way of the Strait of Magellan with her sister, Goliah in tow. They made one stop at Punta Arenas for fuel, water and provisions. The ocean going period for the tug lasted until 1922. HERCULES towed oil tank barges, rafts of lumber from the Columbia River, disabled steamers into port and sailing vessels out to sea. She towed lock gates during the building of the Panama Canal and even steamed through the canal to deliver the dredge San Diego to Jacksonville, Florida. This was her only voyage to the East Coast.

HERCULES was purchased by the Western Pacific Railroad in 1922 for harbor towing around San Francisco. She was used to push car floats around the Bay to the various railroad freight terminals. This work lasted until 1962 when the tugs and barges were replaced by a Diesel powered rail car ferry.

After languishing for some years in the Oakland Estuary, HERCULES joined the historic fleet at the Hyde Street Pier in 1975. Since that time a work force composed of staff and volunteers have brought the steam plant back to full operation and restored other parts of the vessel.

Today the HERCULES was operated several times a year by a volunteer crew. She is the only oceangoing steam tug on the West Coast and was designated a National Historic Landmark in 1986.

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ADDENDUM TO:
STEAM TUG HERCULES
San Francisco Maritime National Historical Park
Hyde Street Pier
San Francisco
San Francisco County
California

HAER No. CA-62

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
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ADDENDUM TO
STEAM TUG HERCULES

(PAGE 3)

HAER No. CA-62

This report is an addendum to a two-page report previously transmitted to the Library of Congress.

Rig/Type

of Craft: Steam tug

Trade: Commercial towing

Principal

Dimensions: Length: 150' Gross Tonnage: 414
Beam: 27' Net Tonnage: 221
Depth: 17'

(NOTE: The variations in dimensions between this report and the previous one are due to differences in the way measurements are taken.)

Location: San Francisco Maritime National Historical
Park
Hyde Street Pier, San Francisco, California

Date of
Construction: 1907

Designer: John Dialogue and Son
Camden, New Jersey

Builder: John Dialogue and Son
Camden, New Jersey

Present Owner: United States Department of the Interior
National Park Service

Present Use: Historic ship exhibit

Significance: At the time of her construction in 1907,
HERCULES represented the state of the art in
the construction of steam powered tugboats.
The vessel currently tied to Hyde Street Pier

is little different from when she was launched and stands as a well-preserved model of early twentieth century maritime technology. Beyond her significance as representative of a technological age, Hercules is important because she and the vessels she towed were a crucial part of the nation's West Coast development.

Researcher: Marc R. Porter, 2001

Project

Information: This project is part of the Historic American Engineering Record (HAER) Eric DeLony, Chief, a long-range program to document historically significant engineering and industrial works in the United States. The HAER program is administered by the Historic American Buildings Survey/Historic American Engineering Record Division (HABS/HAER) of the National Park Service, U.S. Department of the Interior, E. Blaine Cliver, Chief.

The project was prepared under the direction of HAER Maritime Program Manager Todd Croteau. The historical report was produced by Marc Porter, and edited by Richard O'Connor and Justine Christianson, HAER Historians.

Significance

At the time of her construction in 1907, HERCULES represented the state of the art in the design and construction of steam powered tugboats. The vessel currently tied to Hyde Street Pier is little different from when she was launched and thus stands as a well-preserved model of early twentieth century maritime technology. The tug is a working model and can steam under her own power using technology from the early twentieth century. Beyond her significance as representative of an earlier technological age, Hercules is important because she and the vessels she towed were a crucial part of the nation's West Coast development.

Principal Dimensions

Length: 150'-0"	Gross tonnage: 414
Beam: 27'-0"	Net tonnage: 221
Depth: 17'-0"	

Designer

No separate designer is listed in any documents associated with the vessel. Presumably, design work was handled by the builder in consultation with the first owner, Shipowners and Merchants Towboat Company. This is supported by the presence of Shipowners and Merchant's representatives, Captain William J. Gray and Chief Engineer W. Hanell, at the builder's yard and their reported involvement in the building process.¹

Builder and Location

¹ "Two New Dialogue-Built Tugs for Service on the Pacific Coast" *The Nautical Gazette* LXXIV, no. 6 (1908): 95-96.

HERCULES was built by John H. Dialogue and Son of Camden, New Jersey. Shipowners and Merchants Towboat Company of San Francisco contracted Dialogue to build two oceangoing tugs for service on the Pacific coast, because it had a reputation for producing high quality tugboats. Moreover, the two companies had done business in the past. Dialogue and Sons built the tug SEA ROVER for Merchants and Shipowners in 1884. At the time of the 1907 order SEA ROVER was still in service and reported to be in good condition.²

The builder's yard was well established by 1907 and is believed to have opened in 1858. The exact number of tugs built by Dialogue is unknown; as early as 1882, however, the yard was producing four or five tugs per year. Its business was not limited to tugs alone. The yard participated in the building and repair of various types of vessels. Repairing the U.S.S. CONSTITUTION in 1876 was one of Dialogue's more famous projects.³

The two sister ships, HERCULES and GOLIAH, were almost identical and were built at the same time. The sole difference between the tugs was a result of action requested by the purchaser's agent, Capt. William J. Gray. HERCULES was nearing completion when Gray began to worry about a possible flaw in the design. He visited the yard to study the two tugs. After a period of contemplation he entered John Dialogue's office and told the builder: "You know a vessel looks different in the drawings and the model than when you see the real thing starting to take shape. These tugs are a little too narrow, too deep. I am going to be losing men off them when a sea comes aboard."⁴ Dialogue did not have any strong objections to Gray's assessment but as HERCULES was already plated he could do nothing in her

² "Two New Dialogue-Built Tugs," 96.

³ Stephen A. Haller, "Hercules: "she was the best we had!" Sea Letter no. 41 (1989): 11.

⁴ Stephen Haller, *National Register of Historic Places Inventory Nomination Form: Hercules* (San Francisco: National Park Service, 1984), section 8, page 3.

case. The GOLIAH had been framed but not yet plated so Dialogue ordered the frames heated and bent outward, telling Captain Gray that this, "...will give you a foot more beam at the deck, and a foot more molded depth amidships."⁵

As a result of Captain Gray's observation and Dialogue's action, the GOLIAH was slightly beamier than her sister. Capt. Gray's prophecy was not entirely born out, as the HERCULES did not lose men overboard every time a sea broke over the main deck. She was, however, a very wet boat and life, "...could be quite uncomfortable for the crew because the deep, narrow hull rode so low in the water that the main deck was likely to be awash much of the time."⁶

Date of Construction

Construction took place in 1907; exact dates are unavailable but HERCULES and GOLIAH were completed during the winter of 1907 and embarked on their maiden voyage on January 31, 1908.⁷

Original Price

There is no definitive record citing the original price for this vessel. According to a corporate newspaper, *The Johnson and Joseph Company Clipper*, "In 1907 she cost less than \$90,000."⁸ No source is cited for this figure so its validity is difficult to assess. If the anonymous author

⁵ Haller, *National Register of Historic Places Inventory Nomination Form: Hercules*, 8/5

⁶ Haller, *National Register of Historic Places Inventory Nomination Form: Hercules*.

⁷ Daniel Thomsen, "Captain's Log: Tugboat Hercules" (Edited by Ted Miles, J. Porter Shaw Library, San Francisco, 1994. Photocopy).

⁸ "Save the Hercules: The Last of the Steam Powered Tugs on the Pacific Coast," *The Johnson and Joseph Company Clipper* 1, no. 38 (1975): 1.

writing for the Clipper used reliable sources, we have an upper limit for what the vessel cost but no lower limit.

Any papers belonging to the Dialogue and Sons shipbuilding operation might serve to shed light on the tug's original price, as well as provide other details about the tug. Unfortunately, the yard and its records apparently burned in a fire.⁹

A second source of historical information regarding price would be the papers of the Shipowners and Merchants Towboat Company. No papers belonging to this company have been located and it is unknown whether they still exist.¹⁰

Original Construction

The HERCULES and GOLIAH generated significant interest when launched. This was, perhaps, due to their lengthy maiden voyage as much as anything else. Whatever the motivations, that contemporary interest in the two tugs is a boon to modern researchers. *The Nautical Gazette*, an illustrated journal of navigation, shipbuilding, marine engineering, naval architecture and commerce published in New York, ran an article shortly after the two tugs left the East Coast. The article provides an excellent description of their construction and outfitting (see Appendix A for full text). A second source of detailed information concerning the construction and outfitting of HERCULES is the Historic Structure Report authored by Tri-Coastal Marine Inc. for the National Park Service.

The vessel described by the *Nautical Gazette* and Tri-Coastal Marine was of typical, all steel construction for the period. The vessel's skeleton or frame was fashioned using steel beams. Steel plates were riveted to the frame in order to

⁹ Haller, *National Register of Historic Places Inventory Nomination Form: Hercules*, 8/3.

¹⁰ Stephen Canright, Letter to author, 25 August 2001.

form the hull, decks, and superstructure. The tug's steel framing was set up on 21" centers and includes ironbar stem and stern posts.¹¹

The hull plating is divided into seven strakes on each side, but its original thickness is unknown. The main deck was formed with steel plating 5/16" or 3/8" thick. The bulwarks surrounding the vessel were constructed of 1/4" thick steel plates.¹²

Workers riveted steel plates to a steel frame, creating a superstructure built much like the hull. The top of the deckhouse used both wooden and steel beams to form the 'boat deck.' The deckhouse was arranged so that crewmembers could travel throughout the vessel without exiting onto the open deck and exposing themselves to the elements.¹³

A single steam engine was installed to drive HERCULES through the water. It was a triple expansion engine that relied on oil fired, scotch-type, boilers to produce the steam required to push the main piston through its 30" stroke. The whole system was designed to operate at a working pressure of 180 psi. Fuel for the boilers was stored in several tanks that, together, could carry 105,000 gallons of oil and give HERCULES an uninterrupted cruising range of 8,000 miles.¹⁴

HERCULES was a powerful and utilitarian work boat; that did not mean she was finished poorly or in any way lacking aesthetic touches. The officer's mess and the cabins are paneled with fine wood and present a handsome appearance.¹⁵

From the outside, HERCULES resembled her peers and has the classic lines of an ocean going tug of the period. The tug

¹¹ Tri-Coastal Marine Inc., *Tugboat Hercules: Historic Structure Report* (San Francisco: Tri-Coastal Marine, 1990), 87.

¹² Tri-Coastal Marine Inc., 92

¹³ Tri-Coastal Marine Inc., 94-95

¹⁴ "Two New Dialogue-Built Tugs," 95-96.

¹⁵ Evelyn McCormick, "Old Steam Tug Being Restored by Volunteers," *The Humboldt Historian*, September/October 1988: 21.

is marked by, "...a high sheer with straight stem and rounded transom."¹⁶ Two masts and a tall stack complete her silhouette. The masts were built to actually carry sails, and during her lengthy maiden voyage, the tug used sail power as an auxiliary to her steam plant. Her paint scheme and insignia changed slightly with subsequent owners but hull and bulwarks were always black and the cabin red.

The propulsion systems and auxiliary machinery on HERCULES were, for the most part, typical of other contemporary steam powered vessels, regardless of trade. One system, however, was common only to vessels engaged in towing. As noted in the Gazette's description of the tug, HERCULES was outfitted with steam towing engines. This device, also referred to as a steam towing machine, had been developed to overcome a weakness in ocean towing systems.

The traditional material used for towing hawsers was manila, a natural fiber spun into cable. The advantage of manila is its elasticity. A manila cable will stretch when put under a load. This meant that a cable between tug and tow would stretch to absorb shock when used in rough weather. In addition to the advantage of being a natural shock absorber, manila was characterized by certain inherent weaknesses. Manila cables strong enough for oceangoing work were very thick and bulky; their bulk made hawsers hard to handle and impractical to stow on a drum. Manila was prone to damage from chafing and thus had a relatively short working life span.¹⁷

A readily available alternative to manila existed in the form of wire hawsers; these were constructed by weaving or braiding many thin wires to form a single cable. Pound for

¹⁶ Hull and Cargo Surveyors Inc, *Survey of the Tug Hercules* (Richmond, CA: Hull and Cargo Surveyors, 1982), 2.

¹⁷ *International Library of Technology*, (Scranton, PA: International Textbook Company, 1906), 50-51

¹⁸ *International Library of Technology*, 50-51.

¹⁹ *International Library of Technology*, 50-51.

pound, wire hawser is significantly stronger than manila. It is less cumbersome and can easily be stored on a drum. Wire hawser is also much more durable than natural fiber hawsers. The problem with wire hawser is that it lacks elasticity and will snap when stressed under sudden loads, such as the strain introduced by rising and falling ocean waves.¹⁸

To make use of wire hawser's advantages, while overcoming its weakness, tug boats were fitted with automatic steam towing machines. This machine, "...supplies the elasticity the wire hawser lacks, and permits the rapid shortening or lengthening of the tow line while the two vessels are underway." It was described as:

a strongly constructed double-cylinder reversible steam winch, and is so arranged that the steam pressure in the cylinders serves as a cushion to absorb shocks due to wave motion or other causes, and permits the unwinding of the tow line from the drum when the stress on the tow line approaches the breaking strength of the hawser; the machine automatically winds up the tow line again when the stress is relieved...¹⁹

The steam towing machine served HERCULES well throughout her oceangoing service. It is unlikely that HERCULES could have accomplished several of its longer tows, especially the maiden voyage, with so little difficulty had she lacked a steam towing machine.

Alterations and Additions

Sometime between 1908 and 1918 the square yard on the tug's foremast was removed. The purpose of the yard was to carry sail and it was probably only intended to be utilized on the

long delivery trip from the builder's yard to San Francisco.²⁰

In 1918, wireless (radio) equipment was installed on HERCULES. The equipment was housed in small shacks on the main deck; the antennae wires were rigged between the two masts.²¹

The Coen Company manufactured replacement boilers for the tug. The new boilers replaced the originals in 1924.²²

The foremast, wireless equipment, and anchor davit were removed sometime after 1923. A new radio communication system was installed in 1950. The original wooden mainmast was replaced with a steel mast sometime between 1934-1939.²³

While under Western Pacific Railroad ownership HERCULES towed barges by lashing them to the tug's side or on the "hip." This differed from her previous mode of towing which was generally astern. Certain changes were required to make HERCULES suitable for this new service. Towing on the hip was hard on the tug's hull and to minimize damage a fender rail was installed on the starboard fore quarter during this period. The bow chocks were enlarged, presumably to accommodate the large hawsers used in towing alongside.²⁴ Finally, the rudder was enlarged to improve the vessel's steering capabilities, more critical in inland rail ferry service than in ocean towing.²⁵

Towing alongside, especially towing barges loaded with rail cars, made it difficult for the helmsman to see over the tow. To remedy this blind spot the low "bootheel" type pilothouse, designed to offer a low profile in ocean service, was

²⁰ Tri-Coastal Marine Inc., 19.

²¹ Tri-Coastal Marine Inc., 21.

²² Tri-Coastal Marine Inc., 23.

²³ Tri-Coastal Marine Inc., 24, 30.

²⁴ Tri-Coastal Marine Inc., 24-28.

²⁵ Haller, "Hercules," 16; Tri-Coastal Marine Inc., 30.

replaced with a raised pilothouse in 1941, providing a more unobstructed view. This major modification was preceded in the 1930s by the construction of a 'doghouse' atop the original pilothouse.²⁶

The original donkey boiler was removed at some point in the tug's career. There is no hard evidence for the date of the removal and the boiler's fate is unknown. The removal occurred between 1935 and 1961. The donkey boiler was not replaced.²⁷

An alteration recorded in an article about the restoration of HERCULES involved changes to the interior layout of the forecastle. The article is nonspecific about the type of alterations but the present layout apparently differs from the original configuration.²⁸

Not always mentioned in documents pertaining to HERCULES but ongoing nonetheless was work on the powerplant. The boiler was refurbished for certain in 1920 and again in 1924.²⁹ Replacement and overhaul of the tug's machinery probably occurred at other times as well.

Once HERCULES came under state control in the mid-1970s the tug underwent a series of restorations aimed at preserving the vessel and returning it to its historic appearance.

Original and Subsequent Owners and Masters

After Dialogue and Son finished construction of the tugs, Shipowners and Merchants Towboat Company sent HERCULES and GOLIAH to California via Cape Horn. During the delivery

²⁶ "Hercules: King of American Steam Tugs" *Tugbits: The Quarterly Journal of the Tugboat Enthusiasts Society of the Americas* 8, no. 3 (1997): 4; Haller, "Hercules", 15.

²⁷ Tri-Coastal Marine Inc., 29.

²⁸ McCormick.

²⁹ Haller, "Hercules," 15.

voyage Capt. Daniel C. Thomsen commanded HERCULES.³⁰ GOLIAH was commanded by a Captain Hanson during the long trip.³¹

At the time the two tugs were purchased from Dialogue and Sons, Merchants and Shipowners, also known as the "Redstack Line," owned and operated eleven tugs in West Coast service.

The tugs Owned by Merchants and Shipowners in 1908 were: SEA ROVER, SEA LION, SEA KING, SEA QUEEN, SEA WITCH, SEA PRINCE, SEA FOX, SEA LARK, MONARCH, RESCUE, LIBERTY, HERCULES, and GOLIAH.³²

HERCULES began her Pacific coast career with Shipowners and Merchants in the service for which she was designed, as an ocean-going or "outside" tug. Crowley Tug and Launch Company acquired Shipowners and Merchants in 1918. Crowley sold HERCULES to Rolph Navigation and Coal Company later the same year. Rolph retained ownership of HERCULES until 1923 when the tug was acquired by Moore Drydock Company. The drydock company did not hold HERCULES for very long, selling her in April 1924 to Western Pacific Railroad Company.³³ Throughout the period 1908-1924, HERCULES operated as an ocean-going tug along the Pacific coast of North America and as far afield as French Polynesia and Florida.³⁴

The Western Pacific Railroad entered HERCULES in a new service. From 1924 to 1961 HERCULES hauled railroad cars atop barges between railheads in San Francisco, Oakland, and Alameda.

The railroad sold HERCULES to the Thomas and Brown Shipbuilding Company in partnership with the Alaska Aggregate Corporation in 1961. The new owners apparently planned on

³⁰ Thomsen.

³¹ "Two New Dialogue-Built Tugs," 95-96.

³² "Two New Dialogue-Built Tugs."

³³ The Western Pacific Railroad Company, Bill For Voucher, 28 April 1924.

³⁴ Haller, National Register of Historic Places Inventory Nomination Form: Hercules, 8/5-7.

converting the tug to diesel power. For unknown reasons the conversion plans did not proceed and the tug was sold to John Seaborn in 1962.³⁵

Seaborn does not appear to have operated HERCULES in any commercial capacity. The San Francisco Maritime State Historic Park, with money collected by a fund-raising drive, purchased HERCULES from Seaborn in 1975; he had placed the vessel on loan to the state in 1972. Under state ownership and later ownership by the National Park Service, HERCULES has been operated as a historic attraction.

Other than the tug's first master, Capt. Daniel C. Thomsen, HERCULES' masters remain anonymous. Their names and particulars could, in most cases, be discovered through a careful examination of relevant government records, particularly those relating to the U.S. Coast Guard and its predecessors.

Source of Original Name

HERCULES is a name taken from classical Greek mythology. It implies extraordinary strength. The specific impetus for giving the tug that name is unknown but it is not surprising that a vessel engaged in commercial towing was given a name evocative of strength.

History of Vessel Type

The development of the early twentieth century oceangoing tugboats resulted from a confluence of events beginning in the late eighteenth century. Towing one vessel with another is an ancient idea, but it was an idea that was limited by

³⁵ Tri-Coastal Marine Inc., 30-31.

the vagaries of wind or the strength of men wielding oars until technological advances replaced the wooden rowing galley or sail tug with a more efficient towboat.

The first technological development leading to the existence of HERCULES was a new source of propulsive power. Pioneering work by inventors in Great Britain and America, men such as James Watt, Robert Fulton, and James Rumsey, resulted in the development of a revolutionary motive force: steam. Inventors and engineers in the late 1700s produced prototypes of machinery that functioned using compressed steam. This was a radical departure from existing technology, all of which relied on animal labor or natural forces like wind and running water to do work. The first steam engines fitted to ships were relatively weak and inefficient but they did offer a source of power that operated independent of environmental conditions and beyond the bounds of human or animal endurance.

Not long after the earliest steps were taken to adapt steam power to maritime pursuits an attempt was made to operate a steam driven vessel in a towing capacity. In 1802, CHARLOTTE DUNDAS, commissioned by Lord Dundas, made her maiden voyage on the Forth and Clyde Canal in Scotland. The trip was a success. The 56' long vessel towed two 70 ton barges for a distance of almost twenty miles on a day when strong headwinds hampered the movement of other vessels. Despite the towboat's auspicious maiden voyage, it did not enjoy a lengthy career. Lord Dundas died shortly after the historic tow and his order for nine more towboats was cancelled by the company in charge of managing the canal. The CHARLOTTE DUNDAS was laid up due to concern that her wake might damage the canal banks and the progress of steam towing temporarily halted.³⁶

Despite initial setbacks, the application of steam power to maritime commerce progressed rapidly, with technological

³⁶ P.N. Thomas, *British Steam Tugs* (Wolverhampton, England: Waine Research Publications, 1983), 11-12.

innovations close upon the heels of those that preceded. The earliest single cylinder steam engines were replaced by compound engines, which were then superseded by triple expansion engines and even quadruple expansion engines. Not only the design and engineering of the engines changed but so did their fuel. The earliest steam engines burned wood or coal. Eventually, as coal reserves grew low or steamships spread to areas where coal was not locally available, new engines built to burn oil or other petroleum products began to appear.

A steamship's engine is not the only part of its machinery that determines how powerful, fast, or efficient the vessel will be. The energy generated by the engine must be transmitted to a device that will generate movement through the water. The early steam vessels were propelled by paddle wheels. Some had a paddlewheel mounted at the stern while others mounted twin wheels on either side of the hull. The paddlewheel was an excellent drive mechanism for harbor tugs. Paddle wheelers, especially side-wheelers, were extremely maneuverable in close quarters and could stop in a short distance. They could also be quite fast.

On the open ocean paddle wheels have certain drawbacks. They are prone to what is known as variable immersion. This means that as the vessel rolls or pitches, different amounts of the wheel are submerged and generating propulsion at any given time. The problem can be exacerbated on long voyages when decreasing fuel supplies change a vessel's waterline and more of the wheel turns through air and less through water.

Col. John Stevens invented an alternative to paddle wheels in 1804. He designed and built the first screw propeller. John Ericsson, builder of the MONITOR, perfected the screw propeller in the 1830s. The gradual shift from paddle wheels to propellers took many decades and progressed at different rates in different industries. Oceangoing cargo carriers were among the first to adopt propellers. As the propeller was continually refined and made more efficient it was

adopted in the passenger carrying trade and on inland waters.

The adoption of propellers among towboats was, initially, retarded by a basic incompatibility between tug design and propeller propulsion:

The screw really comes into its own when a vessel is properly under way so that it can "munch" through the water. Given enough draught, it also has the great advantage that its power is unaffected by rolling. This meant that for towing barges, lighters, large sailing ships on long runs, and salvage work where free running speed might be critical, the screw would be demonstrably superior if the question of pitching could be addressed.³⁷

Pitching as a detriment to the adoption of propellers in the towing industry was the result of hull shape. Towing vessels of the mid-nineteenth century had long, narrow bow sections and a relatively shallow draft. This meant tugs pitched considerably in a head sea. Pitching lifted the propeller out of the water and caused a loss of traction. This flaw kept propellers out of favor with tug owners until the 1880s when a design change opened the way for the adoption of propellers in the towing industry:

The matter was irrevocably settled by the Gamecock Steam Company in 1884 when their new WOODCOCK came out with the generous forward sections and steep foredeck sheer that has become the trademark of the tugboat. The shape that is beloved the world over was now established, serving the screw tug perfectly by ensuring that the bow will resist plunging.³⁸

³⁷ Tom Cunliffe, "Fair Wind Ahead: The Developing World of the British Tugboat" *Maritime Life and Traditions* no. 11. (Summer 2001): 63.

³⁸ Cunliffe, 63.

The first steamships, notwithstanding their specific occupation, were built of wood. As timber reserves dwindled, in Western Europe in general and Great Britain specifically, an alternate construction material was required. Fortunately, for the shipbuilding industry, the depletion of timber stocks coincided with the advent of the industrial revolution. In the late 1700s and early 1800s new ways were developed to refine and work iron. This meant ships of increasing size could be constructed without wood. It also meant naval architects, engineers, and ship owners could take advantage of the benefits inherent to iron construction. Iron is stronger and more rigid than wood when the same weight of material is used. It tends to be more durable and requires less maintenance. The size of available timbers or the strength of connections between timbers limits construction using wood. Iron scantlings can be fashioned to whatever size is required.

By the late nineteenth century metallurgy had advanced to the point where ships could be built out of steel instead of iron. Steel is an iron alloy, meaning iron with various amounts of other metals added to imbue it with desirable characteristics. Generally, steel is lighter and stronger than iron.

In the early decades of iron construction most shipyards in North America continued to use wood. Timber supplies remained plentiful in America and the benefits of iron construction were outweighed by the cost of retooling to work with metals. Simple economics made it unnecessary for American shipbuilders to move away from wood as quickly as their European counterparts. By the time HERCULES was built, however, American yards, cognizant of the advantages offered by the new materials and faced with rising timber prices, were working with iron and steel. As a result HERCULES was built using steel, a material so suitable for shipbuilding that it remains the primary building material used in shipyards into the twenty-first century.

Thus, by the time Dialogue and Son built HERCULES, new building materials, propulsion technology, and design innovations had combined to produce large steel tugboats capable of successfully operating on the open ocean. During the eighteenth century, ships, sail and steam, continued to grow in size as owners sought to capitalize on the economic efficiency of larger vessels. This growth in size meant tugs were needed to help ships maneuver while in harbors or narrow channels.

A second factor that made tugs of vital importance in the maritime economy was the continued existence of sailing ships. As sailing ships, viable competitors on certain shipping routes well into the twentieth century, vied with each other for business they began using tugs to assist them in and out of harbors and even during calms or against contrary winds.

Beyond the growth in size of ships and the survival of trade under sail, a final factor secured the tug's importance during the late nineteenth and early twentieth centuries. Maritime commerce was growing at an exponential rate. As the colonial system reached its fullest expansion, immigration to the New World reached its peak, and the United States spread across an entire continent to the Pacific Ocean, the number of ships upon the world's waterways grew. Many of these ships, not to mention the barges, rafts, and other craft associated with maritime pursuits, regularly found themselves in need of a tow.

Nowhere was this trend of maritime growth more apparent than in the San Francisco Bay and along the adjacent Pacific Coast. At the midpoint of the nineteenth century, San Francisco Bay was a quiet and sparsely populated area perched at the edge of an ocean and part of a nation centered thousands of miles away. Inhabitants numbered only in the hundreds and were spread among scattered settlements. Oceangoing ships visited the bay only infrequently and in low

numbers. Word of the gold found at Sutter's Mill reverberated around the world and sparked a metamorphosis that forever transformed the California coastline. San Francisco Bay became, in a few decades, a thriving harbor with cities and towns along its shores. The anchorages that once hosted an occasional whaling ship or lone merchantmen filled with the ships that brought thousands of immigrants and later carried Western America's bounty to the world. The Golden Gate, heretofore seen by few, became the gateway to the Pacific, the gateway to much of North America's interior, and the guardian of several bustling ports.

Tugboats were present from the early years of San Francisco's growth. In the earliest years, their importance as towing platforms was minimal but this changed as the regional economy stabilized and diversified.

The first tugboat to ply the waters of San Francisco Bay arrived in 1851; the vessel was named the GOLIAH and had been built in 1849 as a side wheel tug. GOLIAH's owners fled creditors in New York and set out for the West Coast, undoubtedly to seek their share of the economic boom. GOLIAH was the first tugboat on San Francisco Bay but was not immediately employed in towing. Upon arrival the tug was renamed DEFENDER and retrofitted as a passenger and freight vessel for river service. In the early days of the Gold Rush more money was to be made carrying people and supplies to the gold fields than towing ships. The GOLIAH did eventually see service as a tug for a period in the late 1850s and again after a rebuild in 1864.³⁹

The GOLIAH was followed by other vessels built on the East Coast. They were generally hybrid sailing and steam vessels that made most of the trip around Cape Horn under sail. With the launching of MERRIMACK in 1861, the first locally built tug entered into service on San Francisco Bay. The region's towing industry started to thrive as large vessels that

³⁹ Stephen Canright, "100 Years of San Francisco Tugboating: 1860-1960" *Sea Letter* no. 41 (1989): 3.

required maneuvering assistance began to make port calls in the area.⁴⁰

Captain Charles Goodall and Chris Nelson began hauling fresh water on barges from Sausalito to San Francisco in 1855. This venture proved successful and the partners parlayed it into the Pacific Coast Steamship Company which, by the 1870s, dominated passenger and freight trade in the region. In addition to their other ventures, the two entrepreneurs remained involved in the towing business and their fleet of tugs under the management and partial ownership of Captain Millen Griffith dominated the trade until the 1880s.⁴¹

Captain Griffith came to San Francisco as a sailor in the early days of the Gold Rush. He apparently chose to work in the burgeoning marine industry rather than search for gold, and by 1860, he was working as master aboard one of the Goodall and Nelson tugs. Within a few years, Griffith had been elevated to manager and part owner of the entire fleet of tugs. The towing company under Griffith's able, and reportedly ruthless, leadership thrived and enjoyed a long reign as the region's preeminent towing operation.⁴²

In 1882 a group of businessmen with shipping interests formed a company that could compete with the Griffith managed fleet. The resulting company was named Shipowners and Merchants Tugboat Company. The new company acquired vessels from the California Tug Boat Company and ordered new wooden tugs from builders in California and iron hulled tugs from New Jersey. The Shipowners and Merchants Fleet color scheme included red painted stacks on every tug, thus their unofficial label as the Red Stack Line.⁴³

Competition in the steam tug industry became three-way when the Spreckels family added steam tugs to the family's already

⁴⁰ Canright, 3.

⁴¹ Canright, 3.

⁴² Canright, 3.

⁴³ Canright, 4.

extensive marine transportation interests. The Spreckels fleet began with a wooden tug built locally and an iron tug ordered from a yard in Pennsylvania. The Spreckels tugs mounted black stacks and, in counterpoint to the Red Stack Line, were called the Black Stacks.⁴⁴

Three-way competition for tows on San Francisco Bay was short-lived. The Griffith managed fleet was acquired by Shipowners and Merchants in an 1889 buyout deal. The trade was not as lucrative for Goodall, Nelson, and Griffith now that they no longer dominated the industry. Moreover, by this point Griffith was an elderly man who had become wealthy over the years. Presumably the lure of selling out was greater than any incentive to stay in the business.⁴⁵

From 1889 to 1910 the two remaining competitors, the Red Stacks and the Black Stacks, engaged in a fierce competition for business. The two fleets were mainly involved in inbound or coastwise towing. This meant that tugs from the two companies were often pitted in head to head races as the first tug to reach an approaching ship was generally awarded the towing contract.

As the two giants of San Francisco towing vied for business outside the Golden Gate a number of small companies grew up to handle the demand for work around the harbor. Included in this general milieu of inside tugs were vessels owned by railroads and shipping companies and employed to service the company's specific transportation needs within San Francisco Bay.⁴⁶

The battle for dominance in outside towing came to a temporary halt in 1910 when J.D. Spreckels sold its tug operation to Shipowners and Merchants. The days of monopoly returned with the sale and for a number of years the Red

⁴⁴ Canright, 4

⁴⁵ Canright, 4.

⁴⁶ Canright, 4.

Stack Line was unchallenged.⁴⁷

In 1918 Thomas Crowley purchased enough of the Red Stack Line to command operational control of the company. Crowley was an astute businessman; he purchased his first boat at the age of seventeen and managed to keep his company in the top position until his death in 1973. Over the years Crowley purchased tugs whenever they became available, in order to expand his own operation or simply to deny vessels to competitors. He even bought existing tugs and had them scrapped simply to ensure no one else could use them. Crowley's Red Stacks forced numerous competitors out of business, notably the New Black Stack Line in the early 1920s and The California Towing Company in the mid 1930s.⁴⁸

More impressive perhaps than Crowley's dominance of erstwhile rivals was his flexibility in the face of changing technology. During Crowley's tenure at the helm, The Red Stack Line successfully made the transition from steam power to internal combustion engines powered by gasoline and diesel fuel.

The Shipowners and Merchants Tugboat Company officially dissolved in 1983; Red Stack tugs, however, continue to ply San Francisco Bay as a division of Crowley Maritime. Though the Red Stacks remain a powerful force in the regional towing industry, no one enjoys the monopoly held by one company or another for almost a century.⁴⁹

History

The route HERCULES and GOLIAH took from the builder's yard in New Jersey to their base in San Francisco was a long one. In the days before the opening of the Panama Canal a voyage between the Atlantic and Pacific Coasts of North America

⁴⁷ Canright, 5-7.

⁴⁸ Canright, 9.

⁴⁹ Canright, 9.

meant a trip around the southern tip of South America and covering approximately 14,000 sea miles along the way. What made the voyage impressive was that the tugs completed the journey without refueling. To accomplish this, both tugs were loaded with 105,000 gallons of oil.

HERCULES towed GOLIAH all the way from New Jersey to the San Francisco waterfront. GOLIAH transferred fuel oil to HERCULES as needed during the voyage to California. This arrangement, where one tug became a tanker for the other, increased the duo's individual cruising ranges of 8,000 miles to the point where a 14,000 mile nonstop journey could be made. By all accounts the maiden voyage of the two tugs was, at that time, the longest nonstop tow in history.⁵⁰

The tanker/tug arrangement was combined with a much older technology to ensure the pair would arrive at their destination. Each tug was built with a pair of masts and before they departed New Jersey crewmembers rigged sails on the masts. As they made their way south to the Straits of Magellan and then north to San Francisco, the crew on both vessels set the sails to augment the revolutions of HERCULES' single propeller with wind power.⁵¹

On April 11, 1908, the two tugs arrived at San Francisco's Fisherman's Wharf. The epic maiden voyage had taken just over sixty-eight days. The voyage was completed without serious mishap or casualty and after a short maintenance period HERCULES went to work as an ocean going tug.

One item of note from the maiden voyage was the performance of the steam towing machine. The tugs experienced two periods of particularly bad weather during the voyage. Waves during the second stretch were so severe that, in the words of her captain, the vessel, "...stood up on end at times, and had it not been for the automatic towing machines on the

⁵⁰ Haller, "Hercules", 12; Thomsen.

⁵¹ Thomsen.

whipping hawser we would have parted."⁵²

As an ocean going tug, HERCULES carried a crew of sixteen; including a captain, two mates, a chief engineer, two assistant engineers, three firemen, three oilers, three deckhands, and a cook. These men worked together in three watches to carry out the tug's mission of towing objects of all descriptions from point to point in any weather.

HERCULES towed a number of historically significant vessels and objects during the oceangoing portion of her career. In 1908, she towed the broken down steamer ABERDEEN from Eureka to San Francisco (ABERDEEN later wrecked off the Golden Gate). When the first drydock was constructed at Pearl Harbor in 1912, HERCULES towed a caisson used in the construction from San Francisco to Hawaii. The tug also moved a caisson from San Francisco to Panama for use in the lock system of the Panama Canal. HERCULES later used the canal to tow a dredge from California to Florida. The tug towed the National Historic Landmark vessel C.A. THAYER between San Francisco and Port Townsend in 1916. Shortly thereafter, the tug helped move FALLS OF CLYDE to Oleum, California to pick up a load of crude oil (FALLS OF CLYDE is currently a museum ship in Hawaii). In the 1930s, while under the ownership of the Rolph Navigation Company, HERCULES towed the battleship U.S.S. CALIFORNIA from Vallejo to San Francisco. U.S.S. CALIFORNIA was later among the ships docked at battleship row during the Japanese attack on Pearl Harbor.⁵³

HERCULES' brushes with fame were not limited to towing ships that would become well known in the future. In 1916, while visiting Seattle, Washington, she participated in a unique test:

The Hyde Automatic Brake, a device for bringing vessels to a sudden stop, was tried on the tug HERCULES in the

⁵² Haller, "Hercules," 12.

⁵³ Haller, "Hercules," 13-15.

harbor yesterday. The tug was crossing the bay at an 8-knot clip when J.H. Hyde of Tacoma, the inventor of the brake, gave the signal...a number of other mariners who were aboard as Hyde's guests, forgot to hold on to something solid. The tug came to a dead stop in 10 feet, sending Lounsberry sprawling over the deck, while several of the other mariners capsized completely. The brake consists of steel plates attached to the bottom of the hull of the ship in such a way that they can be opened outward.⁵⁴

The Hyde Automatic Brake appears to have worked quite well, but it seems that the test aboard HERCULES did not convince other mariners to outfit their vessels with this new and violently effective invention.

In 1920, HERCULES broke a record for the longest distance tow, which she had held once before. HERCULES was hired to move a broken down British motorship, LAUREL WHALEN, to a port where it could be repaired. This would have been a simple job except the crippled ship was in Tahiti, the repair facility was in Vancouver, and the tug was in San Francisco. HERCULES rendezvoused with British ship in Tahiti and towed her to Canada, by way of a fueling stop in Hawaii, without incident.⁵⁵

From launching to the end of her oceangoing career HERCULES had a number of brushes with history and fame. Those incidents, however, were not the day to day experience of the men serving as the crew. The vast majority of HERCULES' tows were anonymous sailing ships seeking assistance in the face of contrary winds, broken down steamships, and barges loaded with wholly unremarkable cargoes. On other occasions the tug was hired to tow vast log rafts from the Pacific Northwest to markets in California. Towing log rafts was a slow process,

⁵⁴ Haller, "Hercules," 14.

⁵⁵ Haller, "Hercules," 14.

boring in the minds of some crew, but a process that delivered millions of board feet of lumber at a time.⁵⁶

Most of the tows pulled behind HERCULES while the tug was owned by the Red Stack Line and later by Rolph Navigation were not famous; instead they were unremarkable and mostly unrecorded. They were, however, of great importance. During that period HERCULES and the vessels she towed linked important economic centers on the West Coast and contributed to the region's overall development. Towing the LAUREL WHALEN set records but the contents of a log raft built cities.

Moore Dry Dock Company acquired HERCULES from Rolph Navigation in 1923. It is unclear why a drydock company wanted an oceangoing tug nor are there extant records outlining the details of the transaction. In any case, Moore Dry Dock did not hold onto the tug for long. HERCULES was sold to the Western Pacific Railroad Company in 1924; the purchase price was \$62,500.⁵⁷

Acquisition by a railroad meant a drastic change in occupation. The days of long, open ocean tows had come to an end. Under Western Pacific ownership HERCULES shuttled barges carrying train cars between terminals on San Francisco Bay.

The manning of HERCULES changed with the change in occupation. The live-aboard crew that operated as three watches gave way to two separate crews that each covered a twelve-hour shift. At the end of a shift the off-duty crew headed for homes on shore rather than bunks in the forecandle or cabins. Before World War II, the manning system was altered to eight hour watches with three separate crews serving on the tug.

It would seem, upon first glance, that life should have been

⁵⁶ Haller, "Hercules," 13.

⁵⁷ Western Pacific Railroad Company, Bill for Voucher, 28 April 1924.

less dangerous for the crews serving under Western Pacific ownership. The tug was limited to steaming across the protected bay and did not venture into the open ocean. Help, should it be needed, was minutes or hours away rather than days. There was, however, one major danger present that HERCULES rarely encountered on the open ocean and that was traffic. San Francisco Bay was a busy place and accidents were bound to occur among the multitude of vessels making their way across the waters.

HERCULES survived epic voyages across stormy oceans without mishap. Years of coastwise service on a rugged coast never saw a major accident. The tug even threaded her way through busy bay traffic without incident for almost a decade. In 1933 her luck ran out. When steaming in heavy fog, HERCULES and the steamer POINT SAN PEDRO collided after a mix-up with their fog signals. The tug rammed POINT SAN PEDRO and sustained serious damage in the bow, especially on the starboard side. The steamer was undoubtedly damaged as well. There is no mention of death or injury resulting from the collision. Neither vessel was mortally wounded and both returned to service after repairs. Though the incident was serious, it was not fatal, for ships or men, and remains the only major mishap in a working career that lasted fifty-four years.⁵⁸

The tug's career began slowly winding down in the years after World War II. The three shifts per day dwindled to one or two by the late 1940s. By the final years, the tug regularly sat unused for days at a time. By the early 1960s the time had come for Western Pacific to retire the vessel from service. Hercules was a victim of old age and changing times. The tug was built in the opening decade of the century and by 1962 her machinery was approaching the point where major overhaul would become necessary. This coincided with a drop in railroad traffic as Americans increasingly embraced highways as a way of traveling and transporting goods. Finally, HERCULES was yesterday's technology. State of the

⁵⁸ Haller, "Hercules," 15.

art in 1908 translated to outmoded in the 1960s. The old tug was replaced with LAS PLUMAS, a self-propelled, diesel powered car float.⁵⁹

Ownership of the tug passed to John Seaborn in 1962 after a brief period of ownership by a joint venture partnership. When her boiler failed inspection, the new owner considered converting HERCULES to a diesel boat. A determined campaign by local citizens interested in preserving a piece of San Francisco maritime history convinced Seaborn to abandon the engine conversion plans. He was also kind enough to lend the tug to the San Francisco Maritime Park until a fund-raising drive gathered enough funds to purchase the tug for the state.

The years of state ownership have been good to HERCULES. The tug benefited from a careful overhaul and restoration by a group of professional shipwrights and dedicated volunteers. The care and work show. The tug sports a gleaming paint job and the interior woodwork is finished in bright coats of varnish. Most impressive of all, the machinery itself has received a great deal of attention. Today, the vessel is capable of steaming under her own power and does so on special occasions. All that needs to be done to return the tug to its 1908 appearance is replace the foremast and lower the pilothouse to its original, low-profile, level.

As with all the vessels preserved at the San Francisco National Maritime Park, a professional staff maintains HERCULES. The tug is subject to ongoing preventive maintenance and cyclical drydocking periods.

⁵⁹ Haller, "Hercules," 15.

APPENDIX A

Construction Description from Nautical Gazette

They are constructed of steel throughout, with complete steel decks, steel bulkheads for oil tanks (with necessary subdivisions), high coamings, and steel deck houses. Both boats have, in addition to the transverse oil-tight bulkheads, longitudinal bulkheads to prevent the movement of the oil, the stern as well as both the forward and after bitts being especially constructed for this particular service. They are fitted with a complete railing around the upper deck as well as around the roof of the pilot house. The deck house is arranged so that it will be possible to go from one end of the boat to the other without going outside. The crew accommodations are, as usual, located in the forecastle, with a special dining room for their use, the senior officers being located in the forward end of the deck house, and the junior officers housed just behind the fire room.

As the tugs will use oil for fuel on the Pacific Coast, they have been fitted in the East to use this kind of fuel instead of coal, so that on their arrival at San Francisco it will not be necessary to make any changes in their arrangements, and they may be put to work at once. They have a tank capacity of about 105,000 gallons of fuel each, which will give them a cruising radius of not less than 8,000 miles apiece.

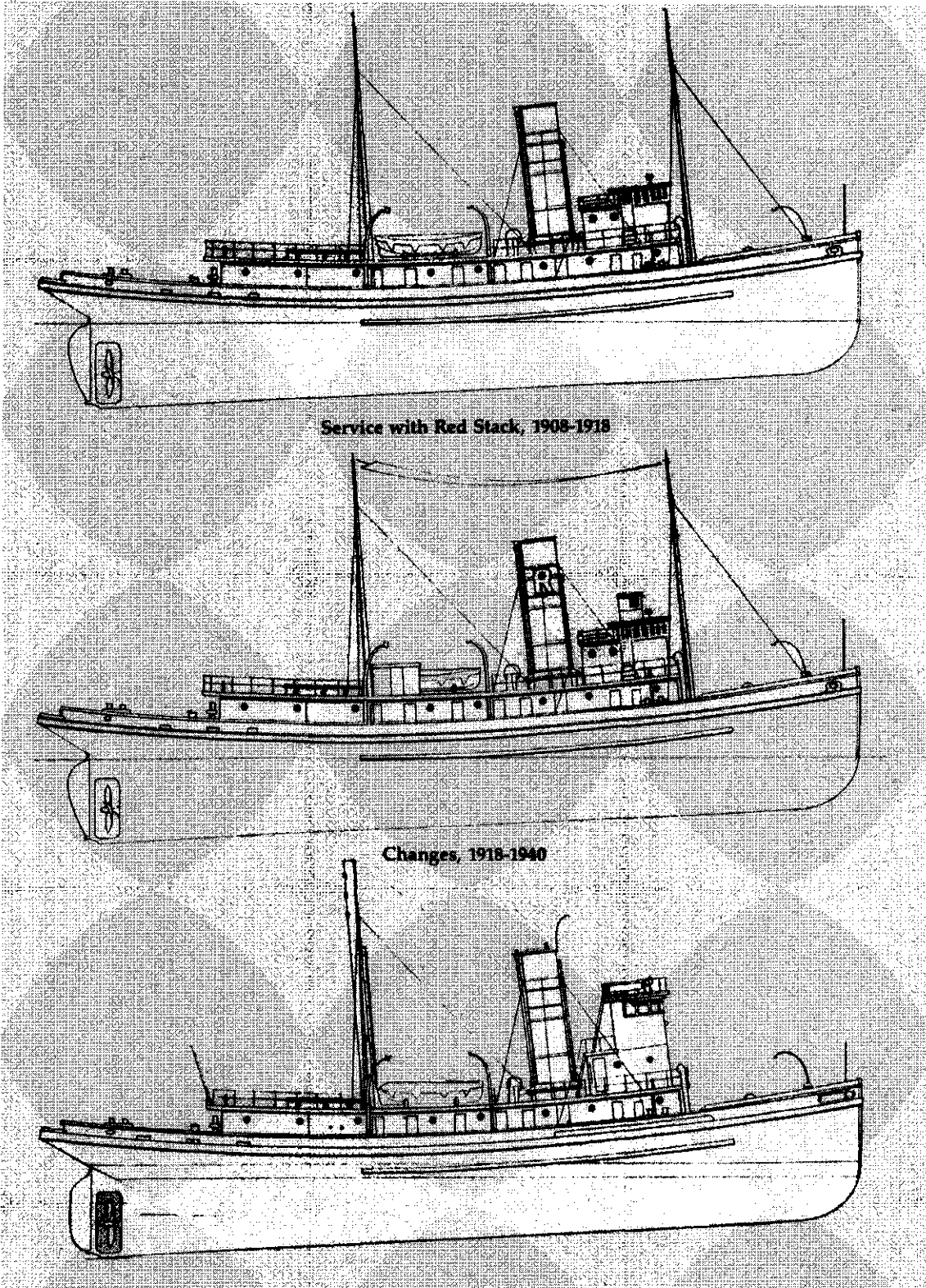
The engines are of the usual vertical, inverted, direct-acting, triple expansion type, having cylinders 17 in., 24 in., and 41 in., by 30-in. stroke, constructed for a working pressure of 180 lbs. (see illustration) The air and bilge pumps are connected to the main engine, and the circulating, donkey, fire, and sanitary pumps are independent.

All stuffing boxes are fitted with metallic packing. There is a special pump for circulating water in the boilers while getting steam. Two oil pumps with heaters are also provided for supplying the furnaces; also duplex compressing engines for supplying air for combustion. Steam towing engines suitable for taking care of 1 in. diameter of wire hawser have been fitted. There is also a complete electric light installation, including searchlight, of 7 1/2 K.W., made by the General Electric Co., all wires being run in iron pipe. Steam steering engine of the Williamson Bros. Co. type has been fitted. Steam windlass, suitable for 1 5/8-in. chain, made by the Hyde Windlass Co., of Bath, Maine, is included. Steam capstans have been supplied by the builders of the vessels, everything in them being of the latest improved type and thoroughly modern throughout.

The boilers are of the Scotch type, 15 ft. Diameter by 12 ft. Long, each having four furnaces, and constructed for a working pressure of 180 lbs. The furnaces are of the Fox type and are arranged for burning oil as fuel.

Each boat is provided with a steel hawser 200 fathoms long. In addition, one of the boats is provided with a manila hawser 200 fathoms long. Both boats are likewise provided with a donkey boiler arranged for burning coal or oil as fuel, as may be required.⁶⁰

⁶⁰ The Nautical Gazette, 95-96.



APPENDIX B

Ports Visited by HERCULES while in ocean service:⁶¹

Tacoma, Washington	South Bend, Washington
Port Townsend, Washington	Jacksonville, Florida
Acapulco, Mexico	Balboa, Panama
Vancouver, British Columbia	Honolulu, Hawaii
Port Ludlow, Washington	San Diego, California
Salina Cruz, Mexico	San Pedro, California
Ancon, Panama	Astoria, Oregon
Aberdeen, Washington	Coos Bay Washington
Eureka, California	Dutch Harbor, Alaska
Kahului, Hawaii	Bellingham, Washington
Seattle, Washington	Punta Arenas, Chile

⁶¹ San Francisco Maritime State Historic Park, *HERCULES FACT SHEET* (San Francisco 1975), 1.

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