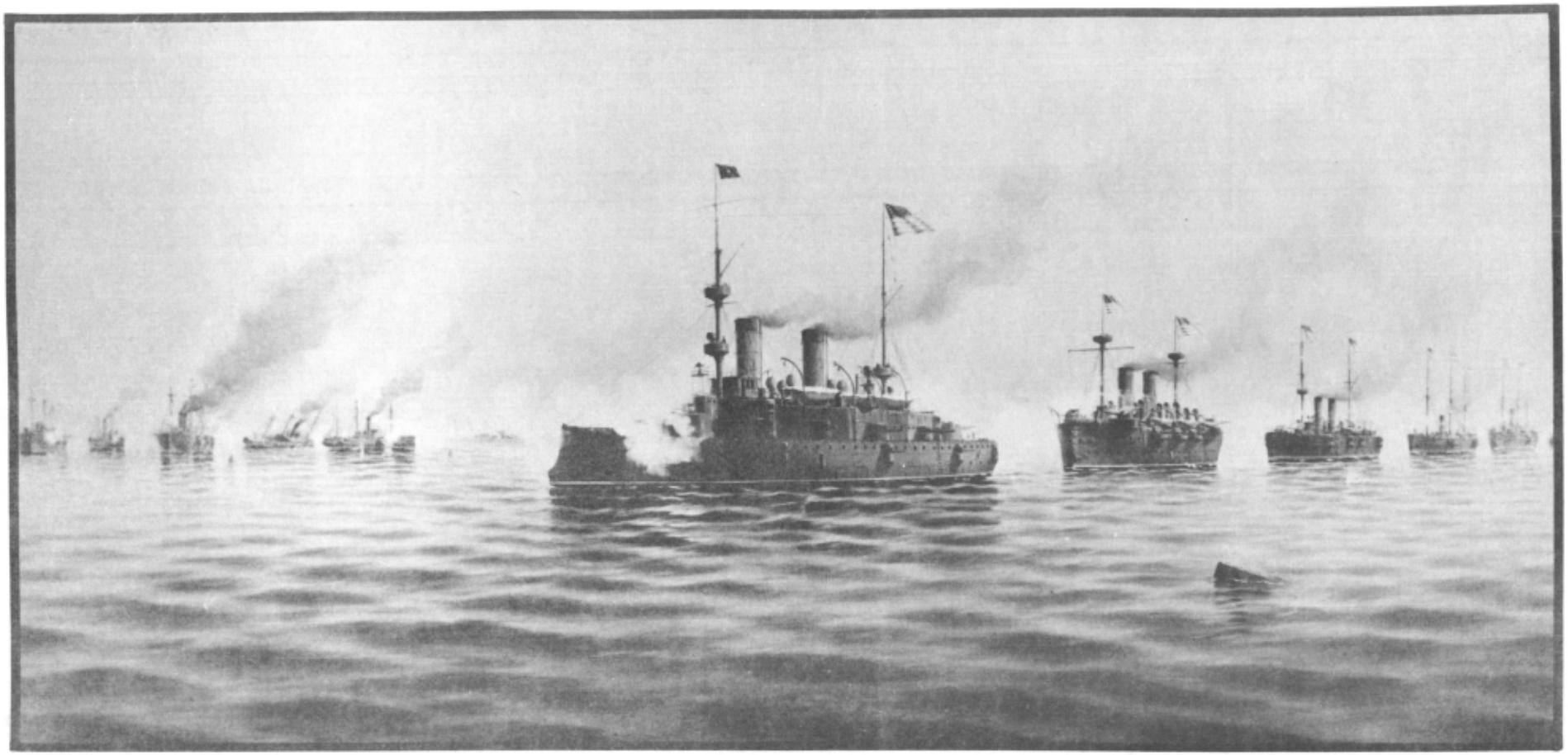

The Olympia, under the command of Commodore George Dewey, leads six ships into Manila Bay, the Philippines, and engages the Spanish squadron. U.S. Navy Photo of a painting by Dr. Alfonso Saemz.

NATIONAL HISTORIC MECHANICAL ENGINEERING LANDMARK

Vertical Reciprocating Steam Engines – U.S.S. Olympia

Penn's Landing, Philadelphia, Pennsylvania

March 30, 1977

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

DEDICATION CEREMONY

U.S.S. OLYMPIA

Philadelphia, Pennsylvania

March 30, 2:30 p.m.

Welcome	Joseph P. Santoleri, Chairman, Philadelphia Section, ASME
Introduction of Honored Guests	George Kotnick, Vice President, Region III, ASME
ASME National Landmark Program	Dr. Donald E. Marlowe, Chairman, National History and Heritage Committee, ASME
History of U.S.S. Olympia	Dr. Donald E. Marlowe, Chairman, National History and Heritage Committee, ASME
Plaque Presentation	Stothe P. Kezios, President-elect, ASME
Plaque Acceptance	Casper J. Knight, Chairman of the Board, Cruiser Olympia Association

ACKNOWLEDGEMENTS

The Philadelphia Section of The American Society of Mechanical Engineers gratefully acknowledges the efforts of all the individuals whose cooperation and assistance made the dedication of the U.S.S. Olympia as a National Historic Mechanical Engineering Landmark a success.

The American Society of Mechanical Engineers

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Stothe P. Kezios	President-elect, 1977-78
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Charles P. Howard	History and Heritage Chairman, Region III

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Cruiser Olympia Association, Inc.

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Admiral William F. Rae	Commander, Third Coast Guard District
Chief Warrant Officer George F. Allen	Public Information
Ensign Denise Wike	Public Affairs

Penns Landing Corporation

Richard Magee	Managing Director

Original proposal and research by Colin Carmichael.
Brochure authored and designed by Peter Serratore, ASME Public Relations Administrator.
The article "Olympian Legacy" by Commander John D. Alden, U.S. Navy (Retired), supplied most of the recent information on the Olympia. It was first printed in the U.S. Naval Institute Proceedings.

Introduction

The U.S.S. Olympia is one of the two surviving ships of the era of the vertical reciprocating steam engine. The Cruiser Olympia, launched in 1892, was one of the first naval ships to be built with these engines. The other survivor, the Battleship Texas, one of the last, has already been dedicated as a National Historic Mechanical Engineering Landmark.

The Olympia's historical significance far from ends there, though, for it was the Olympia that commanded the first action of the Spanish-American War. On May 1, 1898, the Olympia led the Navy's Asiatic Squadron into Manila Bay, the Philippines, in search of the Spanish squadron. From the Olympia's bridge, Commodore George Dewey said, "You may fire when you are ready, Gridley." Eight hours later, the entire Spanish squadron had been destroyed.

For these reasons, ASME proudly dedicates the U.S.S. Olympia and its engines as a National Historic Mechanical Engineering Landmark.

STEAM POWER, WARSHIPS, AND THE U.S.S. OLYMPIA

In a world swept by the Industrial Age, it is surprising to note that the steam engine -- perhaps the quintessence of those times -- was not considered acceptable power for capitol ships by naval authorities until the late 1870's. Although by 1850, fully one quarter of all naval ships were steam powered, they were small ships and auxiliary craft; the man-o-war was still sail powered. Because of the maneuverability of steam-powered craft regardless of wind, however, they were regarded as highly valuable for positioning large warships during engagements. The British Navy operated in this manner during naval engagements of the Crimean War (1853-56).

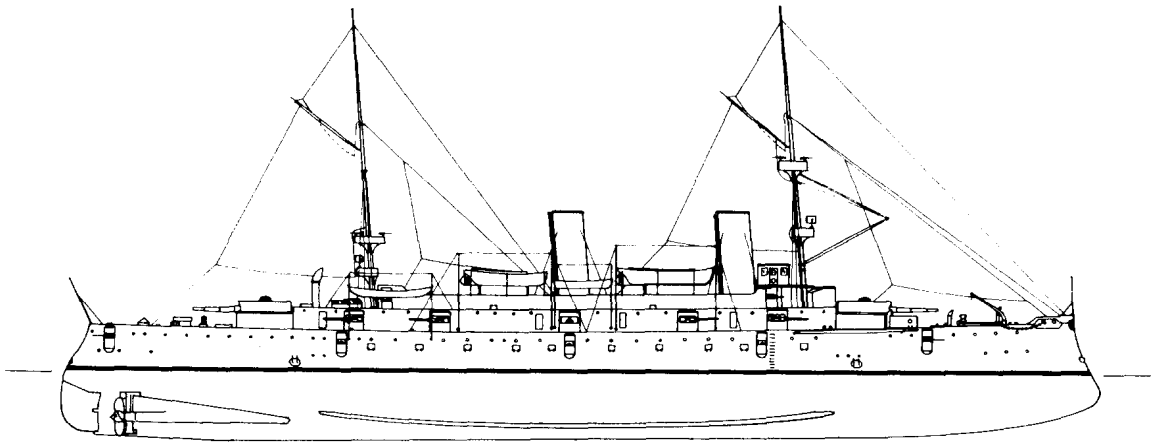
Although steam's advantages in battle were recognized and exploited, the big warships were still sail-powered. In as late as 1860, the English Seamanship Manual, official training textbook for British naval officers, carried the following passage: "Engines and machinery, liable to many accidents, may fail at any moment and there is no greater fallacy than to suppose that ships can be navigated on long voyages without masts and sails." This prevalent view held by the navies of the industrial world at that time was not groundless, Propelling machinery was still excessively heavy and bulky, and consumed enormous amounts of fuel, Coupled with these factors was a power-weight ratio of about one ton per horsepower (the propelling machinery of post-World War II battleships weighed less than 50 pounds per horsepower).

Technical improvements in the 1870's relieved steam of most of its deficiencies, however, and by the 1880's sail power had been relegated to an auxiliary role, or had been done away with, on warships then under construction, Despite this, the Olympia carried a seldom-used two-masted schooner auxiliary sail rig.

Steam power in U.S. warships then underwent a relatively rapid evolution. The first naval steam engines had a horizontal stroke, this because naval authorities wanted a low-profile engine. Such an engine could be positioned very low in the ship, well protected by deck armor. By the time of the Olympia's construction, the vertical-stroke reciprocating engine had been accepted, and the Olympia was one of the first ships to be equipped with them. With their short stroke, the engines barely exceeded water-level height. Over the next twenty years, the vertical reciprocating engine's power and efficiency was increased substantially, reaching a design peak in the ships Texas and New York. These ships were the last naval vessels to be so powered.

The steam turbine, more efficient than the reciprocating engine, came into use in all naval vessels after 1912. It, too, underwent efficiency and power improvements, and was the prevailing propulsive power for naval ships until well after World War II.

Of all the ships built with vertical reciprocating steam engines, only two survive. The U.S.S. Olympia is an example of the beginning of that era.



Olympia	
Length on Load Waterline:	340 feet
Extreme Breadth:	53 feet, 5/8 inches
Mean Draft:	21 feet, 6 inches
Normal Displacement:	5,870 tons
Armament:	4 8-inch, 35-caliber breech-loading rifles 10 5-inch, 40-caliber rapid-fire guns 14 6-pounders; 6 1-pounders; 4 Gatlings
Torpedo Tubes:	6 18-inch, Whitehead a bove-surface tubes
Protective Deck:	4 3/4 inches (slopes); 2 inches (flats)
Auxiliary Sail Rig:	two-masted schooner
Engines:	twin-screw, vertical triple-expansion
Performance:	21.69 knots; 17,313 indicated horsepower
Complement:	33 officers; 395 enlisted men

U.S.S. Olympia Cruiser No. 6

Built by Union Iron Works, San Francisco, Cal.
Authorized 7 September 1888.
Commissioned 5 February 1895
Reclassified CA-15 17 July 1920.
Reclassified CL-15 8 August 1921.
Reclassified IX-40 June 1931, and thereafter maintained as a naval relic.
Released to Cruiser Olympia Association 11 September 1957.
Restored and maintained as a naval shrine and museum at Philadelphia.

General Ship Information and History

As part of the new American steel Navy, the construction of the Olympia was authorized in 1888 as cruiser number 6. As part of a Congressionally-mandated program to establish complete domestic capability for warship construction, the ship's contract was awarded to the Union Iron Works of San Francisco. At that time, the Navy had difficulties in obtaining heavy steel armor plate and gun forgings; these shortages compounded the usual difficulties of obtaining naval equipment and machinery on the West Coast. For these reasons the ship's keel was not laid until June 1891.

Construction of the hull proceeded rapidly, and the Olympia was launched on November 5, 1892. Further construction and fitting lagged, however, and the Olympia's colors were not hoisted until February 5, 1895. The ship's first captain was J. J. Read.

At the time of the Olympia's construction, the mission and characteristics of the cruiser were in a period of transition. Two main types emerged from this: the protected cruiser, which was a ship of moderate size, with large numbers of medium-caliber, rapid-fire guns, and a curved protective plate of armor over the ship's vitals just above the waterline; and the armored cruiser, which was a larger, faster vessel, with 8-inch or 10-inch guns, and a belt of side armor in addition to the protective deck.

Although the Olympia was built as a protected cruiser, it incorporated some features of an armored cruiser. The ship's size (see specifications) made it one of the larger of the protected cruisers, and its engines gave it a top speed of almost 21.7 knots -- very high for that day. The ship's armament consisted of both medium-caliber, rapid-fire guns, and 8-inch guns in armored turrets on the main deck. The ship's protective deck of armor was 4 3/4 inches thick at the curved portions, and 2 inches thick at the flat. This was quite formidable and well-armored a ship for a protected cruiser.

For its intended role as flagship of the Asiatic Squadron, the Olympia had spacious accomodations for a flag officer and staff. The ship's normal complement was 33 officers and 395 enlisted men.

The Olympia became flagship of the Asiatic Squadron after launching. Shortly after the arrival of Commodore Dewey, the Squadron's period of peace ended with the Battle of Manila Bay, previously described in detail. Following the Spanish-American War, the Olympia returned to the United States for a triumphal reception, followed by a refit and overhaul between 1899 and 1902.

After recommissioning, the Olympia was assigned to the North Atlantic Squadron as flagship of the small Caribbean Division. For four years, the Squadron showed the flag at Caribbean and Central American ports. The ship then was made the summer cruise ship for the Naval Academy at Annapolis, and, in 1912, a humble barracks ship in Charleston, South Carolina.

With the approach of World War I, the Olympia was rearmed with twelve 4-inch, 40-caliber guns and assigned to patrol duty off New York. In January 1917, the ship was drydocked for major repairs after hitting a shoal in Long Island Sound. The ship's armament was again replaced with ten 5-inch, 51-caliber guns, and the Olympia went on North Atlantic patrol duty. In 1918, the Olympia was sent to Murmansk, Russia, as part of the Allied anti-Bolshevik intervention force, then shifted to the Mediterranean, Adriatic, and Black Seas at the end of World War I.

The Olympia's last major mission was that of transporting the remains of America's "unknown soldier" from Le Havre to Arlington National Cemetery in 1921. One final midshipmen's cruise followed. The Olympia was decommissioned for the last time in Philadelphia on September 1, 1922.

The Vertical Reciprocating Engines

The Olympia was propelled by twin screws driven by three-cylinder triple expansion engines, together delivering 16,850 indicated horsepower at 139 rpm. The engines were designed to produce 6,750 indicated horsepower apiece at 129 rpm. Each propeller was 14' 9" in diameter.

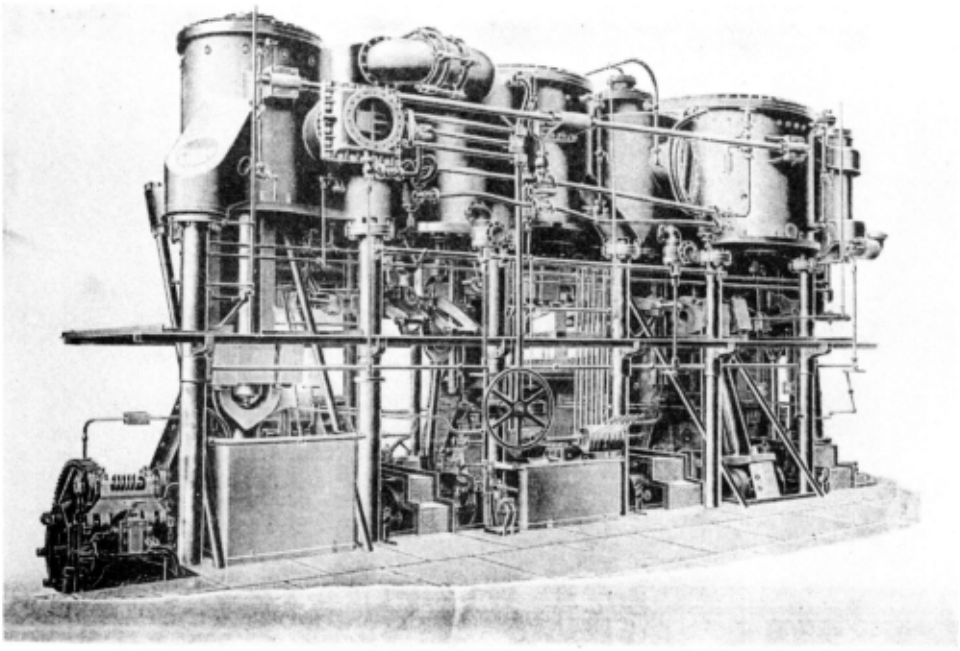
Each of the three cylinders is supported at the back on an inverted Y frame of wrought iron, and at the front on two forged steel cylindrical columns. The original design called for cast steel columns both front and back, but difficulties in obtaining cast steel castings at the time made it necessary to change this detail while retaining strength and light weight.

The main pistons are of cast steel, and the bedplates manganese bronze. Intermediate and low-pressure cylinders are steam-jacketed. Cylinder bores are 42, 59, and 92 inches, and the stroke of each piston is 42 inches.

Steam, at 160 psi, was supplied by six Scotch boilers, four double-ended and two single-ended. The boilers had 40 furnaces working under forced draft on a closed-stokehold system. Total machinery weight was 1,239 tons, and the coal consumption rate was 2.19 pounds per ihp-hour. On speed trials, the Olympia reached 21.686 knots, fast for that time.

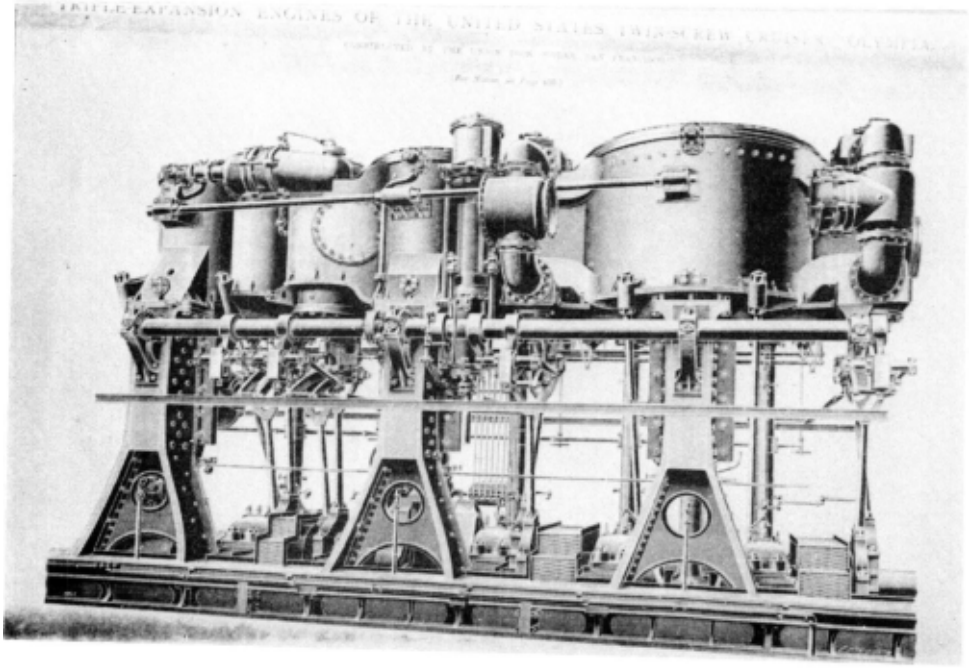
Having described the engines' specifications, a description of reciprocating engines in operation, drawn from The Man-of-War, would be appropriate: "The scene in the engine room of a pre-Dreadnought* battleship at speed was like an inferno. As the great piston rods leapt wildly up and down and the connecting rods whirled the massive cranks round, hot oil and water spurted everywhere. Seawater from hoses playing on hot bearings sloshed in the bilges. In an atmosphere murky with steam from dozens of small leaks, the engine officers would stand on the greasy deck plates, oilskins buttoned to the neck, their faces black and their clothes soaked in oil and water. All over would be a noise so deafening that telephones could not be used. Breakdowns from overheated bearings or broken steam joints were common, and were always expected. After any prolonged period of high-speed running there would be work for the dockyard engineers."

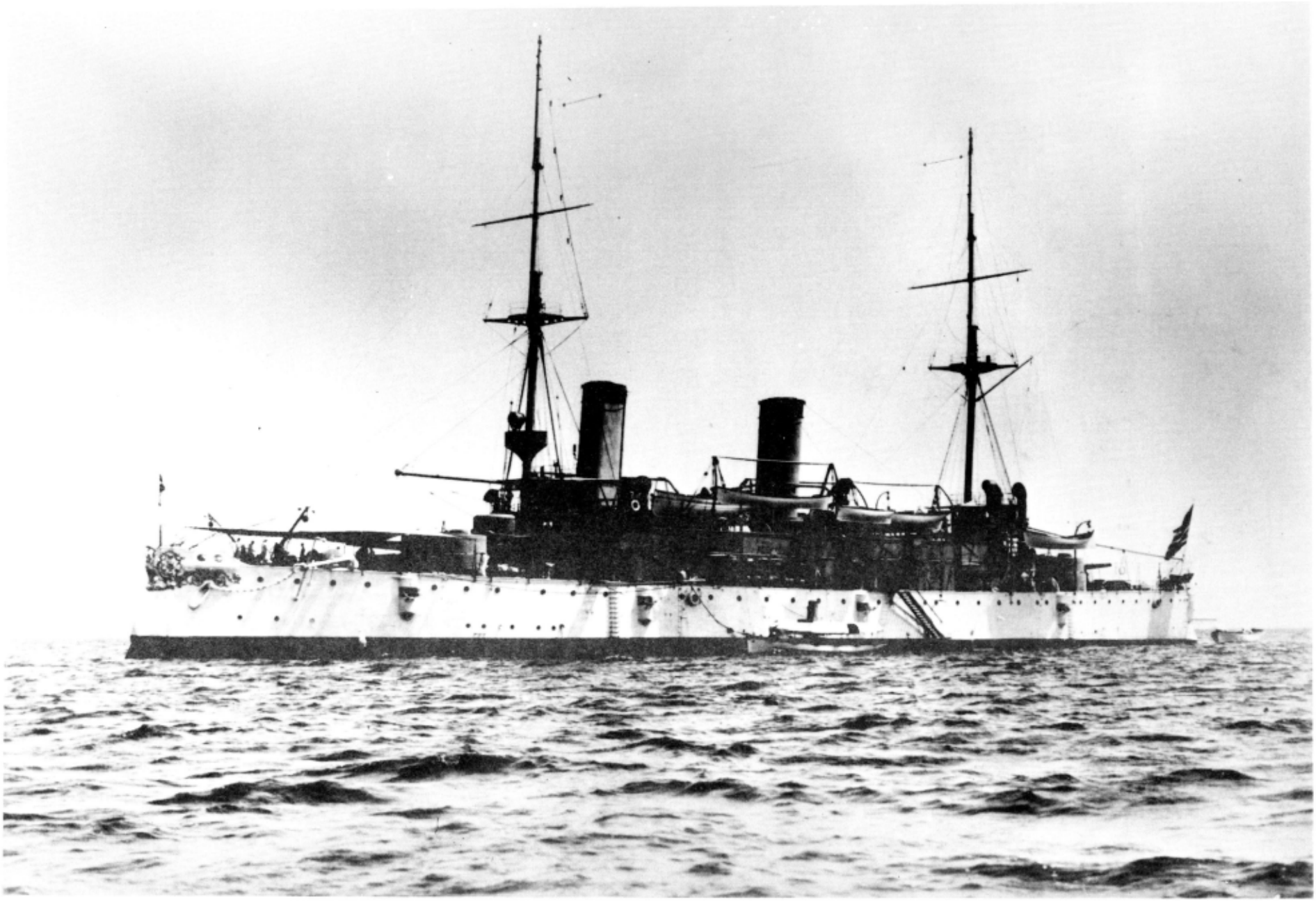
*The H.M.S. Dreadnought was the first turbine-powered battleship, built in 1906.



Above -- Front view, from high-pressure end, of starboard engine of U.S.S. Olympia, showing control station. Valves (all piston) were actuated by Stephenson link motion

Below -- Back view, from low-pressure end, of port engine of U.S.S. Olympia, showing reversing shaft and built-up wrought iron columns supporting the cylinders and cross-head guides





Taken when the Olympia was quite new, date unknown
-- U.S. Navy photo

The Olympia and the Spanish-American War

On April 20, 1898, shortly after the destruction of the Battleship Maine in Havana Harbor, the U.S. Congress demanded that Spain recognize the independence of Cuba. Spain's refusal to do so was followed by a U.S. declaration of war on April 21.

Although the Atlantic Squadron was mobilizing for a blockade of Havana Harbor, the first action of the Spanish-American War occurred in the Philippines, at that time a Spanish possession. The American action was led by the Olympia, the flagship of the Navy's Asiatic Squadron.

On April 30, 1898, the six-ship Asiatic Dquadron, under the command of Commodore (later Admiral) George Dewey, arrived at Subic Bay, the Philippines, in search of the Spanish squadron. Spanish Admiral Patricio Montojo y Pasaron had planned to engage the Americans at Subic Bay, but returned to Manila Bay when he found that shore batteries were not yet operating. That night, Dewey's squadron steamed the 50 miles to Manila Bay. Under cover of darkness, the Asiatic Squadron slipped past shore batteries on the Island of Corregidor, which sits near the middle of the 12-mile-wide channel into the bay.

At 5:15 a.m., Dewey's squadron steamed into Manila Bay at slow speed, and was fired on. As soon as the Spanish squadron was sighted, Dewey made his famous statement on the Olympia's bridge, "You may fire when you are ready, Gridley." Captain Gridley was ready, and so, too, were the Olympia's guns.

Fire was exchanged intensely until 7:30 a.m., when Dewey signaled to haul off. At 11:16 a.m., the American attack was renewed. At 12:40 p.m., the American squadron, virtually unscratched, withdrew to anchor off Manila. Three Spanish ships, including the flagship, had been sunk, and the remaining four burned by boarding parties after resistance had ceased.

Although Manila was at Dewey's mercy, he could not occupy it because of a lack of ground forces. Manila surrendered to American ground forces upon their arrival on August 13. On December 10, 1898, a peace treaty signed in Paris ended the Spanish-American War. The Philippine Islands were ceded to the U.S. for $20 million.

The Olympia, badly in need of an overhaul after the Asiatic tour, returned to the United States for a triumphal reception. This was followed by a general refit between 1899 and 1902.

Admiral Dewey aboard the Olympia -- U.S. Navy photo

The Olympia as a Relic

After service in World War I, the Olympia was decommissioned for the last time in Philadelphia on September 1, 1922. For the next twenty years, the ship was to lay berthed at the Philadelphia Navy Yard, subject to the ravages of time, vandalism, and souvenir hunting. Finally, too decrepit and unsafe for visiting, the ship sat forgotten as many of its contemporaries were taken for scrap.

With the beginning of World War II, obsolete battleships became a target of scrap metal drives. The battleship Oregon, a contemporary of the Olympia, had been taken from Philadelphia in 1925 and berthed in Portland as a visitors' attraction. The War Production Board pressed for the Oregon as scrap metal, and President Roosevelt acquiesced in October 1942. In the letter authorizing the disposal of the Oregon, he stated that it was his understanding that the War Department take steps toward the immediate preservation of the Olympia as a naval relic of the Spanish-American War period.

Despite President Roosevelt's action, the Olympia was to continue to lie berthed at Philadelphia without maintenance until 1954. At that time, the Navy requested from Congress permission to dispose of all historical relics except the Constitution. Those not taken over by private organizations would be scrapped.

For the next three years, committees of historically-minded Philadelphians tried to raise funds for the restoration of the Olympia. The Keystone Dry Dock and Ship Repair Company offered to undertake $168,000 of repairs without immediate repayment, and title to the ship was delivered to the Cruiser Olympia Association on September 11, 1957.

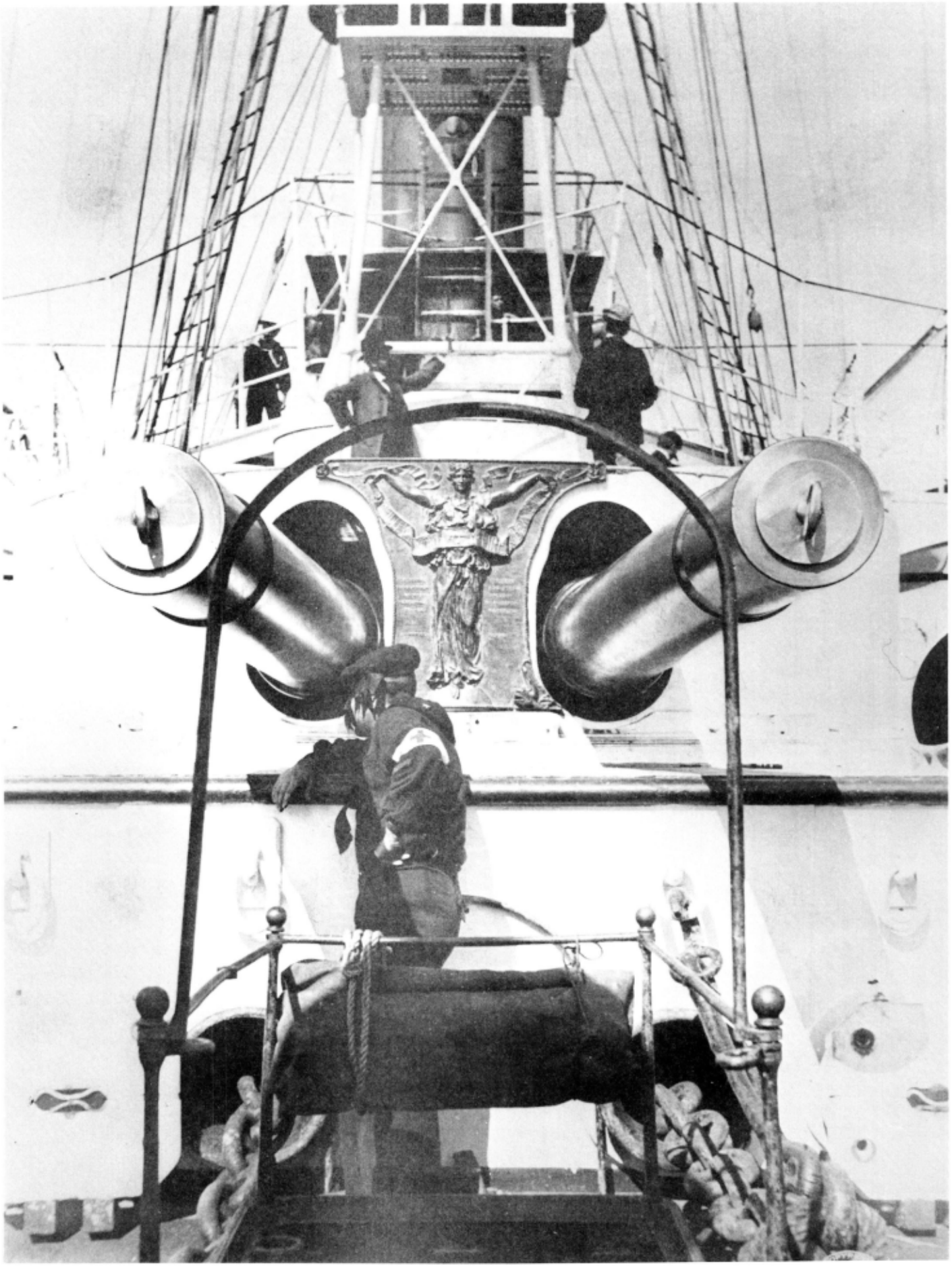
Unfortunately, the shipyard ran into financial trouble, later going bankrupt. The "repair work" turned out to be, mostly, the application of paint over rusted plates and corroded machinery, and a large portion of the port engine disappeared while this was being carried out. After the shipyard's bankruptcy, its creditors sued the Olympia's owners for unpaid repairs. A sympathetic judge, however, told the creditors that he would throw the Olympia into bankruptcy when he did the same for Independence Hall, and forded a compromise settlement.

In 1964, a new Cruiser Olympia Association was formed, and began, slowly, to pay off debts and restore the ship to acceptable condition. No government funds have been provided for this purpose, even though the Olympia has been declared a National Historical Monument.

Over the years, volunteer groups have managed to restore a significant portion of the ship. The work continues, but undoing the effects of over 40 years of neglect is painstaking. At present, the boat deck and main deck are almost completely restored. Topside, the flag office and pilot house exteriors are finished, with work about to begin on their interiors. Below decks, the starboard engine room and one boiler room are completed, and work is now being done on the brig and laundry room. Because of missing parts from the port engine, it is doubtful if that engine room will ever be restored.

The Cruiser Olympia is the last representative of that time in naval history that saw steam power come of age. It also stands as the last naval relic of the Spanish-American War.

History is well served by the Olympia's preservation.



View of the Olympia's foreward guns, taken about 1902
-- U.S. Navy photo

National Historic Mechanical Engineering Landmark Program

In September 1971 the ASME Council reactivated the Society's History and Heritage program with the formation of a National History and Heritage Committee. The overall objective of the Committee is to promote a general awareness of our technological heritage among both engineers and the general public. A charge given the Committee is to gather data on all works and artifacts with a mechanical engineering connection which are historically significant to the profession. An ambitious goal, and one achieved largely through the volunteer efforts of the Section History and Heritage Committees and interested ASME members.

Accordingly, two major programs are carried out by the Sections under the direction of the National Committee: (1) a listing of industrial operations and related mechanical engineering artifacts in local Historic Engineering Records; and (2) a National Historic Mechanical Engineering Landmark program. The former is a record of detailed studies of sites in each local area; the latter is a demarcation of local sites which are of national significance -- people or events which have contributed to the general development of mankind.

In addition, the Society cooperates with the Smithsonian Institution on a joint project which provides contributions of historical material to the U.S. National Museum of History and Technology in Washington, D.C. The Institution's permanent exhibition of mechanical engineering memorabilia is under the direction of a curator, who also serves as an ex-officio member of the ASME National History and Heritage Committee.

The U.S.S. Olympia is the twentieth landmark to be designated since the program began in 1973. The others are:

Ferries and Cliff House Cable Railway Power House, San Francisco, CA - 1973
Leavitt Pumping Engine, Chestnut Hill Pumping Station, Brookline, MA - 1973
A. B. Wood Low-Head High-Volume Screw Pump, New Orleans, LA - 1974
Portsmouth-Kittery Naval Shipbuilding Activity, Portsmouth, NH - 1975
102-inch Boyden Hydraulic Turbines, Cohoes, NY - 1975
5000 KW Vertical Curtis Steam Turbine-Generator, Schenectady, NY - 1975
Saugus Iron Works, Saugus, MA - 1975
Pioneer Oil Refinery, Newhall, CA - 1975
Chesapeake 6 Delaware Canal, Scoop Wheel and Engines, Chesapeake City, MD - 1975
U.S.S. Texas, Reciprocating Steam Engines, Houston, TX - 1975
Childs-Irving Hydro Plant, Irving, AZ - 1976
Hanford B-Nuclear Reactor, Hanford, WA - 1976
First Air Conditioning, Magma Copper Mine, Superior, AZ - 1976
Manitou and Pike's Peak Cog Railway, Colorado Springs, CO - 1976
Edgar Steam-Electric Station, Weymouth, MA - 1976
Mt. Washington Cog Railway, Mt. Washington, NH - 1976
Folsom Power House #1, Folsom; CA - 1976
Crawler Transporters of Launch Complex 39, J.F.K. Space Center, FL - 1977
Fairmount Water Works, Philadelphia, PA - 1977