San Diego Ship Modelers' Guild
1492 N. Harbor Drive San Diego, CA 92101

OCTOBER 2002 NEWSLETTER VOLUME 26, NO.10

September Meeting

By Bob McPhail

Don Bienvenue opened the meeting at 7:05 PM. The purser's report was made. As of 31 August, there was a balance of $/redacted/. This includes $/redacted/ which has been collected for nametags. The purser is forecasting expenses of $/redacted/. for the rest of the year.

Don mentioned that the agenda for the meeting would include duplicate magazine (from the model shop) review. If a member wanted any of the magazines, a $.25 per copy donation was requested. There would also be an auction of desktop tools, and a demonstration.

For old business, there was a discussion of the nametags. Members would have a choice of clips: either magnetic for $8.00 or the pin type for $7.00. There was a discussion on whether new members should be required to obtain nametags. A vote was taken and by a vote of fifteen yes, three no, and two abstentions, it was moved that new members would be required to obtain them. Robert Hewitt mentioned that he would not be able to give his demo next month since he will be all the NRG convention.

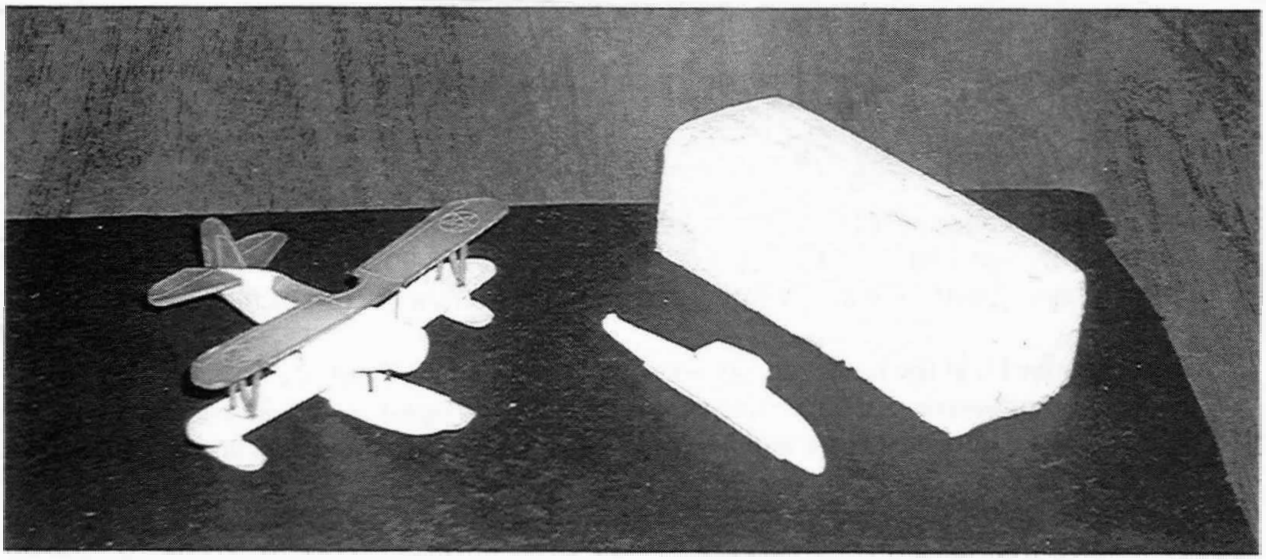
Don then asked for any new business. The Festival of Tall Ships will be held 12 – 15 Sept. Volunteers are needed for the model shop. Ernie Andrew asked about parking. A shuttle is supposed to be available. Volunteers who work this weekend were also asked to cut out about twelve cardboard ships profiles for the museum. Brochures and posters were also made available for members to take and distribute throughout the community for Festival of Tall Ships. Visitors and new members were then introduced. Pat Madden is interested in lighthouses, Kevin Sheehan is building a model of a French sailing vessel and Zack is building a model of HMS HOOD.

After the break an auction was held. A tool for converting a dremel drill into a vertical drill press was auctioned for $12.00. A work bench clamp went for $7.00, and a table saw was auctioned for $40.00.

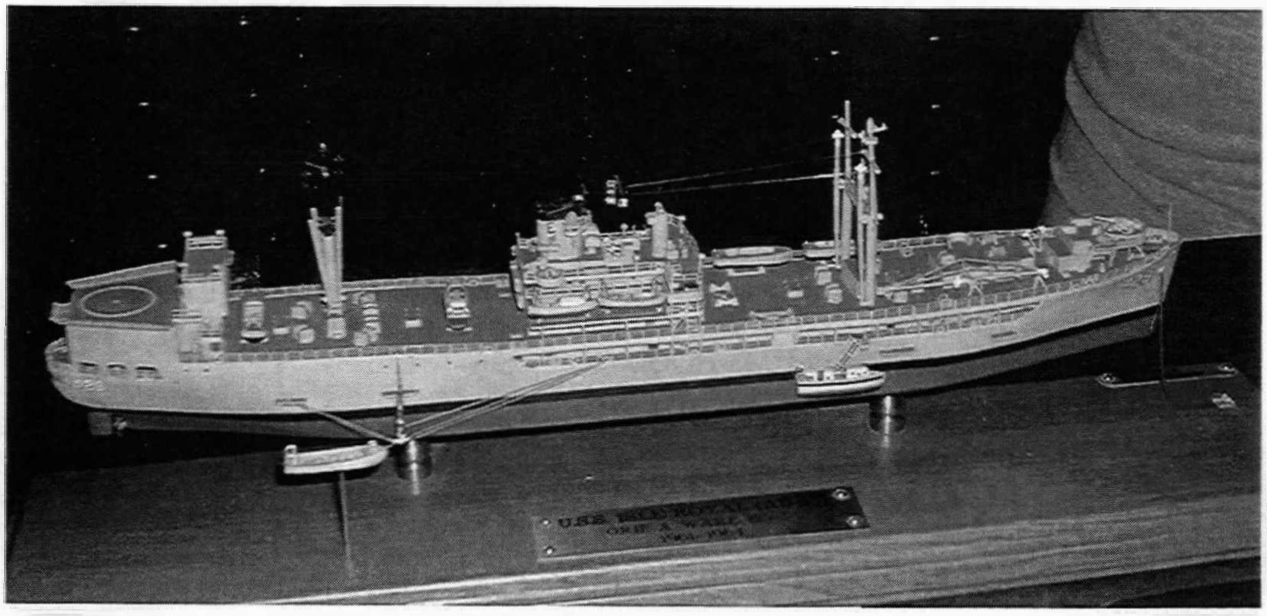
There were several presentations for Show and Tell. Chris Faddis talked about his work on USS OREGON BB-3. He also brought in a hull of what appeared to be a trawler and/ or merchant. He feels that the name on the stern "PEN ART" is not a real name. There was much discussion on what the real ship could have been used for, the scale of the model hull, and its present/possible configuration. Chris plans to make it a remote

controlled ship. Bill Luther discussed his model of USS ISLE ROYAL (AD-29). Robert Hewitt discussed his miniature model of NINA. Frank Dengler discussed a method he uses to make numerous copies of an object for his models (ex. Multiple aircraft, boats, cannon, weapons, etc.). He described the casting method, many of the chemicals involved, and results of the casting method. Frank's show and tell became an excellent demonstration so Bill Luther agreed to give his presentation of photoetching next month. Members then broke into small discussion groups and the meeting informally ended.

Photos and captions by Chuck Seiler

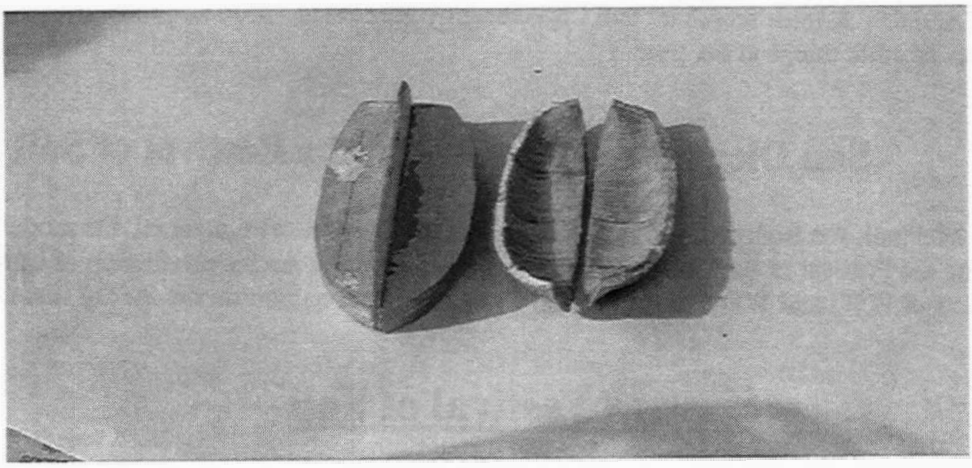


CASTING: Frank Dengler gave us a presentation in casting small parts. This floatplane, which will be used on Frank's WW2 cruiser, was made using this technique. Unfortunately the other pictures showing his technique were out of focus.



BILL LUTHER: A model with photo etched parts included.

HEWITT-NINA: Robert Hewitt's model of the Santa Clara in 1491. We know it by its nickname "NINA". This is how it appeared when Columbus first acquired it. While stopping over in the Canary Islands, enroute to the New World, Columbus had it converted to a square rigged vessel in order to take advantage of the trade winds.

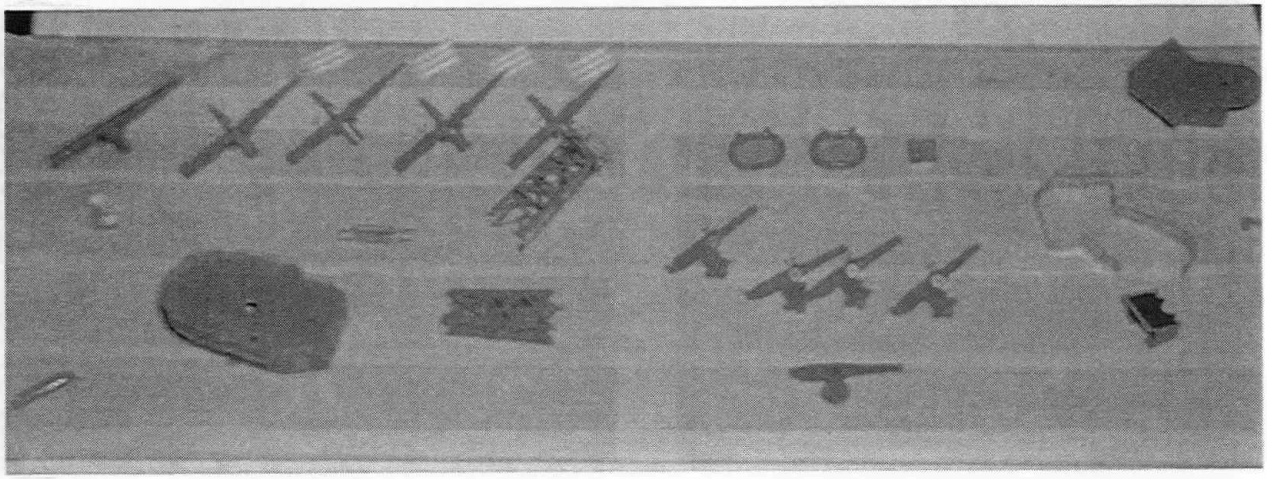


HEWITT-FLY: Another Hewitt project take shape.

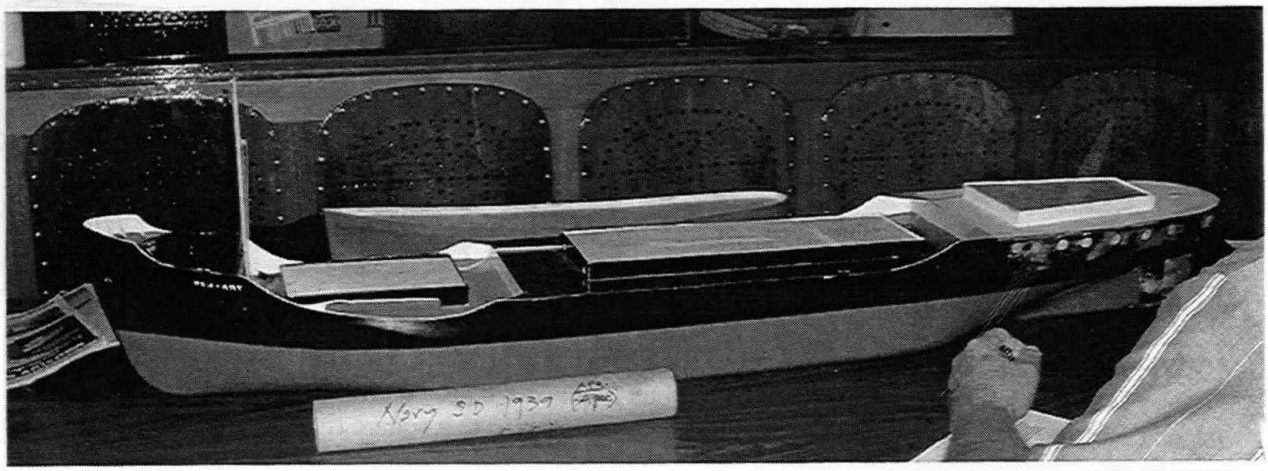
Congratulations to Robert Hewitt

Robert Hewitt was honored with the following awards at the Manitowoc Contest.

Silver Award for Scratch built model 3/32"=1" or less, Novice level: **HMS Vicotry**
Silver Award for a Diorama: **Mocha Dick**
Gold Award for Scratch built model 3/32"=1" or less, Novice Level: **King Chow River Junk**
Dana McCalip Best Miniature Award: **King Chow River Junk**



BILL LUTHER-BRASS: Bill Luther gave us a presentation about photo etched brass parts. Here are some of the parts.



CHRIS FADDIS: A resin merchant hull Chris recently purchased. (I do not know the details since I was taking pics of other things at the time.)

San Diego Ship Modelers at the Festival of Sail

Bob McPhail, Joe Bompensiero, Ron Zeunges and Robert Hewitt manned the model shop during the Festival of Sail. They concentrated their attention on the production of cardboard cutouts of WWI and WWII ships for Bob Crawford's next exhibit on the *Star of India.*

Festival of Sail

By Chuck Sieler

Sail Ho! There be tall ships in San Diego Bay!! Those lunching on or near San Diego Bay on 12 September witnessed a parade of tall sailing ship, an unusual event not seen in these parts since 1999 and seldom seen anywhere in the world these days. Our very own San Diego Maritime Museum sponsored the 2002 Festival of Sail on 12 to 15 September. It involved 14 class A and B sailing vessels of various rigs from the United States and three other countries.

Continued on the next page.....

The Festival stretched from the *Star of India* north to the Chevron pier (near Grape Street) where *Californian* and *Medea* (an honorary tall ship perhaps) anchored the other end. The Chevron pier also featured little *Quissett* (formerly Coaster II), *Argus*, *Pilgrim*, *Bat'kivshchyna* (a free hardy handshake to whoever can pronounce that one three times in a row), *R. Tucker Thopmson* and *Bill of Rights.* Along the quaywall *Europa* and *Thole Mour* dominated the skyline. The little *Spike Africa* (featured in the movie "Joe versus the Volcano") was tucked in next to the *Berkeley* in *Medea*'s normal berth. Meanwhile, "the battle fleet" made up of *Lynx*, *Hawaiian Chieftain* and *Spirit of Dana Point* was moored south of the *Berkeley* where *Californian* normally resides. The festival atmosphere was enhanced by the numerous vendor booths, food areas, beer gardens and other entertainment venues in the parking area, which ran from the *Star* to just north of the Chevron pier.

The weather was perfect! The morning of 12 September dawned on a beehive of activity along the Festival venue. As the morning marine layer burned off, the viewer was greeted with the first sail rounding North Island; the *Europa.* The Star was supposed to be first in but *Europa* was anxious to get in and sample San Diego. Ship after ship came into view and passed by enroute to the Coronado Bridge, then back to Festival site. There were photo ops aplenty. By 5PM the ships were moored, the crews settled in and the vessels open to the public. The Festival was off to a great start!

Friday the 13th began ominously...the *Europa* was missing! (insert spooky organ music here) Apparently *Europa* has its own agenda and as part of this, had set up an early morning "sail" with (presumably) some of its large contributors. We were rewarded later in the day with the *Europa*'s return under full sail. Friday's crowd was entertained with gun battles in the harbor by the "battle fleet" at 10AM and 1:30PM. Some of the ships on the Chevron Pier returned fire. Argh matey! Friday was wrapped up with the arrival of the *Thole Mour* under full sail. Ship visits and gun battles continued through Saturday and Sunday. We were also honored by a cruise-by of a small steam boat from the Ancient Mariners. The crowds were heavier the last two days but there were no significant problems. The biggest complaint was that the lines were too long. Better too long than too short, eh?

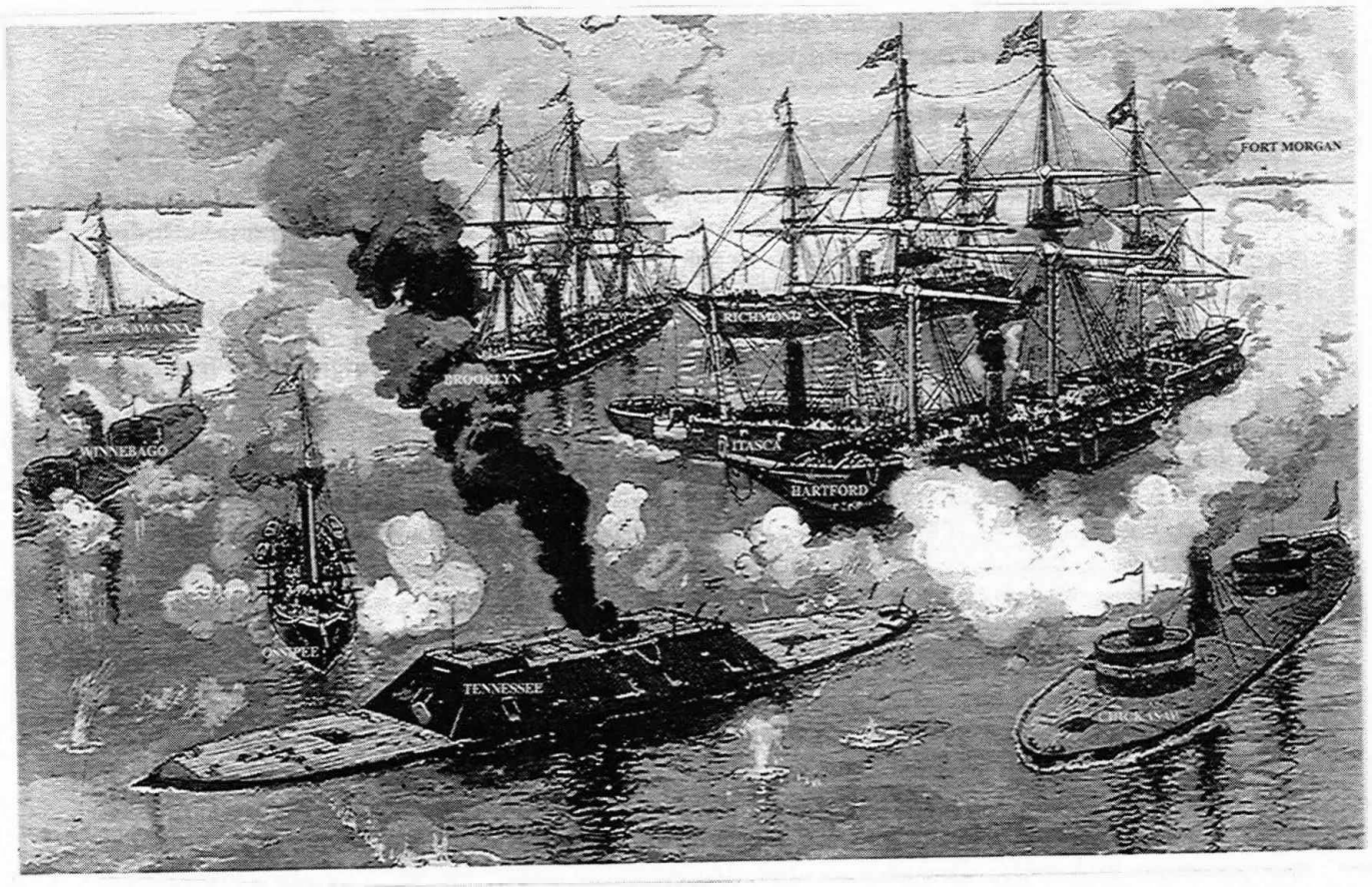
The Museum staff put forth a Herculean effort to make this work, but it would not be possible without the help of some 400 volunteers. The Ship Modeler's Guild was lightly represented but those who participated did so with great gusto. This roving reporter was quite literally roving the whole weekend. As a rover, I was assigned to fill in any of the watch positions that were either short handed or required a break. This included the grueling gangway crowd control, not so grueling but hectic passport stamping, passport sales, drink sales, Museum store sales, general traffic control and basic cheerleading/question answering. Saturday was a "family reunion" when Dick Camfield and I stamped passports on the same pier Nick Rugen was providing crowd control. Sunday, after a tough morning on the piers, I retired to one of the drink sale booths where I sacrificed my hands by pulling soda and water out of freezing ice water while K. C. Edwards took customer's money....hey that doesn't seem fair! I had to chase away Robert Hewitt who was trying to scam my piece-of-cake job after having been relieved at the model shop. He later went off to provide gangway support and, as rumor has it, actually completed a model of the ship he was working with. Fellow modeler Bob Crawford, although not a volunteer, was seen scurrying around throughout the fair. At the end of the day, the above listed Modelers were present for duty at least three and usually all of the four days.

On Sunday, the sun set on a group of tired but happy workers. Some ships had already left, the rest would leave on the morrow. As I write this, the total numbers are not known but it appears the Festival was a huge success. The crowds were respectable on Thursday and Friday. They were large on Saturday and Sunday. Despite the numbers, there were no major incidents (except I blew the knee out of my pants on Sunday) or accidents. The booths had not yet been disassembled, but many were talking about the NEXT Festival of Sail. I, for one cannot wait.

Continued from last month

Diary of Ensign William Starr Dana Aboard Flagship "Hartford" at Mobile Bay

Edited by San Diego Ship Modelers' Guild Member
David T. Dana



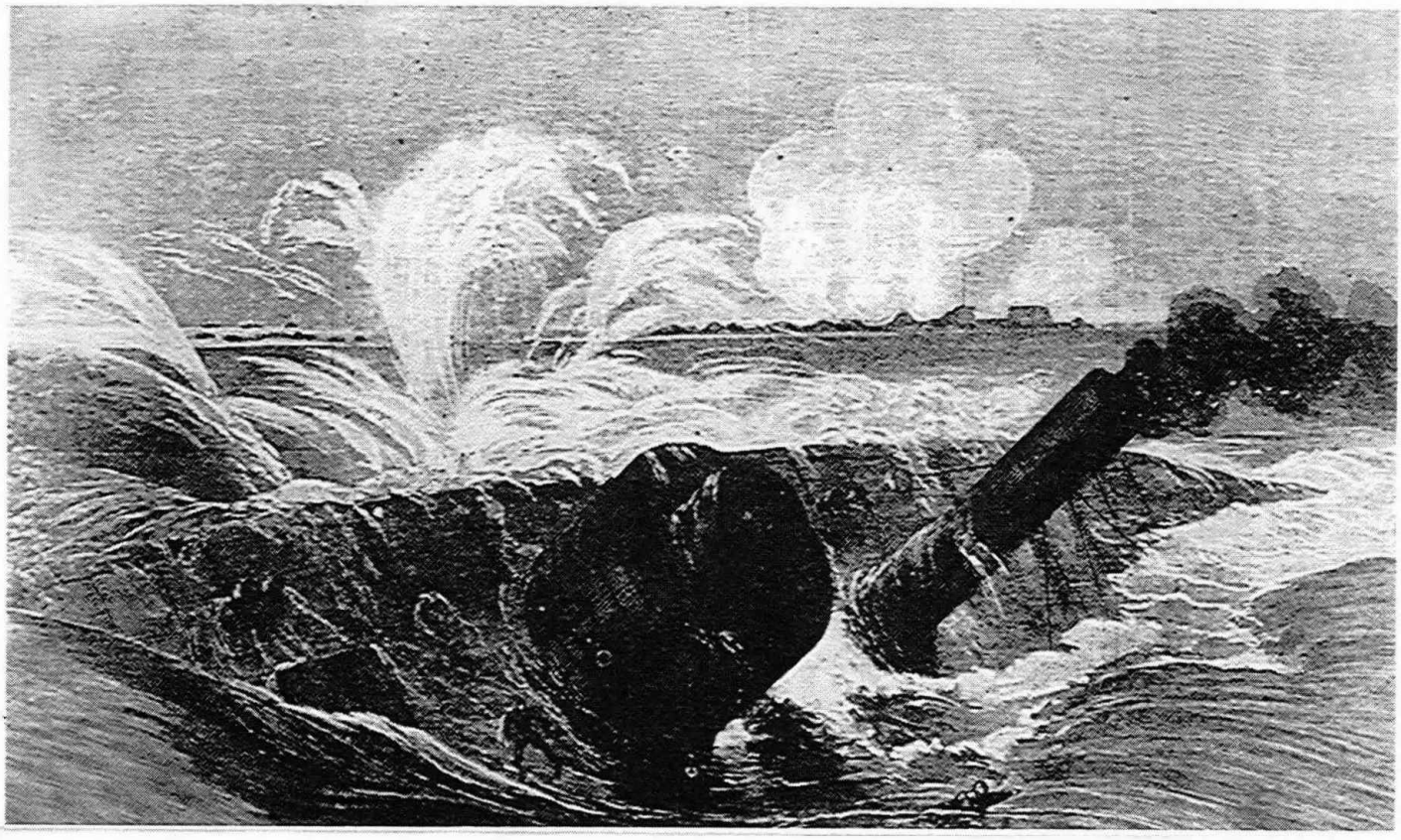
Farragut's fleet battles the Confederate ironclad *Tennessee* in Mobile Bay, August 5, 1864.

The Battle

The monitors *Winnebago* and *Chickasaw* arrived August 3rd in the evening. Admiral Farragut wasted no time. "Thurs. Aug. 4th ... This morning the captains of all the ships in the harbor came on board to get their orders from the Admiral as to the attack. We are only waiting now for the 'Tecumsah' to come from Pensacola, and if she should come in before the morning we will go in tomorrow morning. We sent the 'Bienville' off this afternoon to tow the 'Tecumsah' around here, and we expect her early tomorrow morning. We want to go in at daylight on the flood tide, as then it will be easier for the ships, and whatever torpedoes there are will have their points heading up stream."

Friday August 5th, the Union fleet was ready. The captains had persuaded Farragut that the *Brooklyn* should lead past the fort. Behind *Brooklyn* came *Hartford* with *MetaComet* lashed to her port side.[3] Iron clad *Tecumseh,* to *Hartford's* starboard, led the four monitors. In the bay, Fort Morgan and the Confederate fleet were ready also. Powerful *Tennessee* and the wooden gunboats, *Morgan, Gaines* and *Selma* hid below Fort Morgan, waiting to blast when the Union ships filed past.

Firing began as *Brooklyn* and *Hartford* entered Fort Morgan's range. All Morgan's guns concentrated on them. Iron clad *Tecumseh,* in the lead, hit a torpedo and sank quickly in the channel. *Brooklyn,* terribly bombarded, hesitated and backed,



A Harper's Weekly depiction of the *Tecumseh* sinking near Fort Morgan.

afraid of torpedoes.[4] She threatened to stall the entire fleet directly under Fort Morgan. Farragut decided to take the lead and charge on: "Damn the torpedoes! Full speed ahead!"

"At 7.23 we received our first shot in the foremast; very great delay from the monitors not taking their positions. At 7.35 the action became sharp and general. Received the second shot in our port netting, and the 'Metacomet' in her wheel. At 7.40 the iron clad 'Tecumsah' sunk, almost immediately on our starboard bow from a torpedo a little to Swd of Fort. Our gig received a shot and the engagement now very general, and rapid firing on all sides.

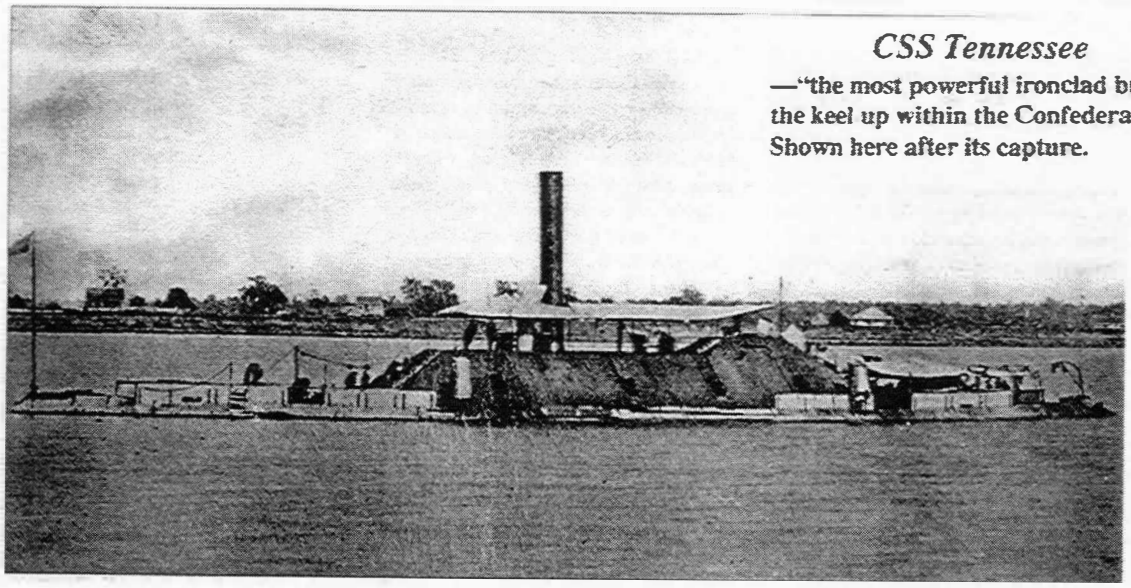
"The 'Tennessee' (rebel ram) heads for 'Hartford' and with the three gunboats opens fire on the 'Hartford' exclusively. When within a third of a mile ports her helm a starboard and runs down the fleet, which was a long way astern. Very sharp engagement of the "Hartford" with the 'Morgan', 'Ganes' and 'Selma.' 'Hartford' nearly a mile ahead of everything. Came to anchor at 8.35 in the fleet anchorage."

The rest of the fleet charged up, past the Fort, amid heavy gunfire from ship and shore. The *Tennessee*, on determined course to ram the *Hartford*, ran back into the bay under Fort Morgan's protection.

"The ram alters her course and makes for the 'Hartford' to engage her before the monitors and fleet can come up – most of the fleet come up but the monitors outside and far to the Eastward. We get underway and prepare to ram the 'Tennessee.'

[3] The larger ships were on the right or starboard side nearest Fort Morgan.

[4] "The prisoners we captured [later] on the ram tell us that there are over 250 torpedoes laid down in the channel through which we passed yesterday, but that most of them have been in the water so long as to have become useless. The one on which the 'Tecumsah' struck and was lost with her whole crew on board had only been laid down they say, a few days. We could hear, while coming through, the crocks of the caps on the torpedoes, but they were useless as before stated, been in the water too long."



CSS Tennessee
—"the most powerful ironclad built from the keel up within the Confederacy." Shown here after its capture.

'Monongahela' rams first, then the 'Lackawana.'" These efforts to run up on Tennessee's low hull to swamp her were ineffective. *Tennessee* headed for *Hartford.*

"The 'Hartford' and 'Tennessee' head on, both ram, both helms astarboard. Our port anchor not being catted[5] catches on the gunwhale of the 'Tennessee' and the shank bent so as to bring the flukes nearly parallel with the stock. This cants the Tennessee and the concussion is comparatively slight. She passes rapidly astern, the port sides of the vessels grazing each other, and when just abreast we deliver our port broadside of seven IX-inch guns with their utmost depression, 13lb charges and solid shot."

Then, more Union monitors and gunboats turned on the damaged, exhausted *Tennessee* and she surrendered. The *Metacomet* captured *Selma. Gaines* ran aground to avoid sinking and *Morgan* fled up river to Mobile. Three hours after the first shot, the battle for Mobile Bay was over.

"Now came the most disagreeable part of all, that of tending the wounded, and sewing up the killed in bags. We[6] had all together 56 men killed and wounded; 23 were killed and the remainder almost to a man mortally wounded – the most frightful wounds imaginable; one man lost both legs and both arms; one man lost his stomach, and one poor fellow in my division, after being struck down by a splinter, which carried away his left arm, was dreadfully mangled by a shell which came in before he could be attended to by the surgeons. All the afternoon the surgeons having been at work amputating limbs and many of the men that were wounded in the morning died before the end of the day; and in the evening we sent all the dead sewed up in the bags aboard the prize 'Selma' and sent her off to bury them well in shore.

"I had the first watch this evening from 5 to 12, and I was engaged all the time until 11 in hoisting the wounded out of the ship and sending them aboard the Meta Comet which was to carry them to the Hospital at Pensacola. In my division I lost 10 men. There were but fourteen men, counting myself on the berth deck forward at the commencement of the fight and when we got through there were but 5, having lost nine by splinters and shell exploding. One shell from the ram 'Tennessee' exploded on the berth deck, which killed three and dreadfully mangled two; fragments of the shell flew over my head and I was covered by the brains and blood of the man next to me. Two of my officers were lost, one killed (Mr. Higgenbottom an ensign) and the other one dreadfully mangled (Mr. Kerricks, a master's mate) but I could relate thousands of dreadful sights seen this day and I hope never to see such butchery again. All over the decks you would see, here a leg, there an arm or head, and on some parts of the deck blood was nearly an inch deep.

"I went to bed, thanked God for my escape and felt very faint and weak from the sights and work I had gone through during the day."

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[5] The anchor was loose, not secured to the cathead.

[6] The *Hartford.* Admiral Farragut wept when viewing the lines of dead sailors laid out on the deck.

The Birth of the American Navy: Part 1

From Invention and Technology, Fall 1997
Written by Roger Archibald
Contributed by Bill Luther

"AMERICA certainly can not pretend to wage war with us," a London newspaper declared on June 10, 1812. "She has no navy to do it with." Such was the disdain for American sea power on the eve of the War of 1812 that the British politician George Canning dismissed the infant U.S. Navy as "a few fir-built frigates with bits of bunting at the top."

Yet within a year the British Admiralty would order its captains to avoid individual contact with the enemy's formidable new vessels and to attack only when in squadron strength. In reporting the loss of HMS *Guerrière* to "a new enemy, an enemy unaccustomed to such triumphs, and likely to be rendered insolent and confident by them," the *Times* of London concluded that, "never before in the history of the world did an English frigate strike [its colors] to an American."

The progression of the United States from a country with an odd assortment of warships in 1783 and with no navy at all in 1794 to a world sea power in 1815 constitutes one of the most impressive examples of strategic power growth in history. At the focal point of this accomplishment was the creation of a handful of warships that put a distinct American stamp on naval warfare around the world. Their influence is still being felt. One of these ships —the USS *Constitution*—survives as the world's oldest commissioned naval vessel, maintained by the Navy at the decommissioned Charlestown Navy Yard not far from the site on the old Boston waterfront where she was launched almost two centuries ago on October 21, 1797.

Today we take for granted the United States' role as the pre-eminent world power. But two hundred years ago in post-Revolutionary America, debate about the new nation's place in the world was wide open.

During the war for American independence, the Continental Navy, despite several well-publicized triumphs, had not contributed substantially to the final victory. A varied collection of vessels that were either bought or hurriedly built, it was never a match for the Royal Navy and usually resorted to raiding Britain's merchantmen rather than taking on her capital ships. The naval balance of power did not tip in America's favor until the French navy entered the conflict following the Franco-American Alliance of 1778.

OF FISCAL NECESSITY, WHAT remained of the Continental Navy following the war had been sold off by 1785, and when all the sailors were discharged, the country was left with no seagoing armed forces whatsoever. The Jeffersonian Republicans (not to be confused with today's party) identified with the agrarian South and the frontier. They distrusted large, centralized government with its high taxes and believed that a standing navy, through its efforts to protect American merchant shipping, would lead the country into the wars still raging abroad. The breadth of the Atlantic Ocean and the preoccupation of European navies with troubles at home were defense enough, they reasoned. As early as 1781 Thomas Jefferson had commented, "They can attack us by detachment only, and it will suffice to make ourselves equal to what they may detach." More than a century later the naval historian Alfred Thayer Mahan described distance as "a factor equal to a certain number of ships."

Of the opposite belief were merchants, traders, financiers, and people from New England and seaport cities associated with maritime interests. They embraced the Federalist views expounded by Alexander Hamilton. They believed that the only way the United States—and especially its merchant ships trading abroad—would be respected in the world was if the nation demonstrated its power, symbolized by warships flying the American flag. "A nation despicable by its weakness," Hamilton exclaimed in 1787, "forfeits even the privilege of being neutral."

As with many great issues in American history, both sides had their strong points. And in what has come to be a pattern in American politics, resolution was reached not so much through debate as through the influence of subsequent events. When Britain seriously dishonored the treaty ending the Revolutionary War by ignoring American sovereignty on the high seas, the framers of the U.S. Constitution in 1787 granted the new government the power and taxing authority "to provide and maintain a Navy."

During the next seven years, American merchant ships not only were harassed and interdicted by the warring powers of Europe—principally Britain and France—but were also plundered and confiscated, their crews held for ransom by North African pirates from the Barbary States of the Mediterranean. Political pressure to build a navy grew steadily in Congress. It culminated with passage of the Naval Act of 1794, which provided for the construction of six warships. President George Washington signed the bill into law on March 27, and the United States Navy was created.

Although the opponents of a standing navy had failed to block the legislation, they had succeeded in attaching an amendment providing that should the United States reach "peace" with the Barbary States before construction of the new ships was complete, there would be "no farther proceeding . . . under this act." This provision would prove to be problematical.

FOR MORE THAN A YEAR BEFORE the passage of the Naval Act, a Philadelphia ship designer and builder of some note had been quietly but persistently lobbying the new federal government to expedite warship construction (conveniently for him, Philadelphia was the national capital at the time). Joshua Humphreys wrote to his influential friend Robert Morris, a senator from Pennsylvania, that the United States "should take the lead in a class of ships not in use in Europe, which would be the only means of making our little navy of any importance. It would oblige other Powers to follow us intact, instead of our following them."

On the eve of the nineteenth century, the great navies of the era—the British, French, Spanish, and Dutch—had evolved a number of different vessel classes, similar to weight classes in boxing. On top were the ships of the line, the heavy hitters in any naval encoun-

ter. Packing somewhere around seventy-four guns on three different decks, they would simply get in line opposite one another and battle it out until one side or the other prevailed. They could fire a broadside capable of stopping any lesser vessel in its tracks but were sluggish under sail, averaging perhaps five knots.

Next came the frigate, perhaps the most versatile of all sailing warships. It usually carried thirty to forty somewhat lighter guns on two decks and was faster, reaching speeds of eight to ten knots, with greater maneuverability than ships of the line. Frigates were more likely to be used for patrol, blockade, convoy duty, and harassment of enemy merchant shipping rather than major fleet encounters. If involved in the latter, they would usually duel with one another.

At the bottom of the hierarchy was everything else mounting guns on only one deck: sloops of war (which, like ships of the line and frigates, were three-masted) and brigs, schooners, gunboats, and other auxiliaries, all of which had no more than two masts and considerably lighter armament. While slower than a frigate, they were significantly more maneuverable. Nevertheless, they rarely played a decisive role in any fleet action unless they were sacrificed in some way, as a decoy or a fire ship.

Joshua Humphreys was soberly aware of what could happen when a lighter vessel went up against one of a heavier class. During the Revolutionary War the *Randolph*, a frigate he had designed and built, was blown out of the water with a loss of all but four hands in action against a British ship of the line off Barbados in 1778.

STILL, FRIGATES WERE Humphreys's first choice for the new U.S. Navy, but not the standard type. What he envisioned became known as superfrigates. "None ought to be built less than 150 feet keel," he continued in his letter to Robert Morris, and they should "carry twenty-eight 32-pounders or thirty 24-pounders on the gun deck. . . . These ships should have scantlings [measurements] equal to 74's [seventy-four-gun ships of the line], and . . . may be built of red cedar and live oak."

Humphreys's conclusions about what these vessels could achieve have proved prescient. At the time, however, they sounded farfetched: "Ships built on these principles will render those of an enemy in a degree useless, or require a greater number before they dare attack our ships. . . . Their great length gives them the advantage of sailing. . . . They are superior to any European frigate, and . . . [will] never be obliged to go into action, but on their own terms."

What Humphreys was proposing, on the basis of the prevailing knowledge of naval architecture at the time, simply couldn't be done. The warship designer of that period was faced with an intractable dilemma: You could have speed, or you could have firepower, but you couldn't have that much of both.

For a ship to remain afloat, a force equal to her weight has to be exerted up against the entire submerged portion of the hull. Over a long time a vessel built of wood, with its characteristic flexibility, will experience a natural bowing up of its keel amidships as a result of the constant hydrostatic pressure on its bottom. The phenomenon is known as "hogging," since the resulting curvature in the keel resembles the arch of a hog's back.

This upward pressure of buoyancy is constantly at work on a ship afloat, year in, year out. It is greatest at the deepest part of the vessel, the keel. And the keel is weakest where the ship is widest, generally in the midsection. Left unchecked, a vessel will hog until her timbers can flex no more; then they will break, and the ship will sink.

Long before it reaches this dire state, however, hogging produces a detrimental effect on a ship's performance. An upward concavity in the bottom of a vessel interferes with the flow of water past it, trapping some, slowing the ship down. The greater the hog, the greater the amount of water trapped, and the more slowly the vessel will go.

The greater a ship's displacement (weight), the greater the hogging pressure. And the one thing that can make a light vessel very heavy is the installation of a large gun battery like those aboard eighteenth-century warships. Not only did the guns' immense weight (two to three tons each) exacerbate a vessel's hogging, but their location did as well.

Unlike a heavy cargo, which would be stowed deep in the hold and directly over the keel (and thus help alleviate hogging), a ship's armaments were of necessity placed on the periphery of the vessel and high enough above the water line so as to be of use even when rolling in high seas. This location gave their weight an added leverage that worked to hog the vessel all the more.

The other factor affecting hogging is a ship's length. Just like the limb of a tree, the longer it is, the easier it is to bend. But any tendency to design shorter ships was more than offset by a simple fact of naval architecture well known even in the eighteenth century: The maximum hull speed of any vessel (whether it's an eight-oared racing shell or an aircraft carrier) is directly proportional to its length.

Throughout the era of wooden ships, hogging was the bane of shipbuilders. The longer a vessel was, the faster it could theoretically go. But very quickly the added hogging generated by the extra length and weight of additional armament would cancel out any speed benefits.

For all these reasons Joshua Humphreys's 1794 superfrigate proposal, with its provisions for both great length and heavy armament, should have been dismissed outright. Had he submitted it to a competent naval authority (like the U.S. Navy's current Bureau of Ships), it probably would have been. But to his great good fortune—as well as the Navy's and the country's—his plan landed on the desk of Secretary of War Henry Knox.

As a former Revolutionary War general, Knox was not particularly knowledgeable about marine science. Since there was no Navy Department at the time, he referred the matter to a committee. It found Humphreys's ideas appealing and asked him to submit a detailed design. Up to this point apparently no one reviewing the proposal knew it couldn't be done.

After Humphreys provided the War Department with his frigate design, Henry Knox wanted to make sure it was reviewed by a competent authority, and as luck would have it, such a person had recently arrived from England. Following a long apprenticeship in the shipwright and shipbuilding trades, Josiah Fox had traveled extensively throughout Europe studying various ship designs. Independently wealthy, he had come to America to learn about shipbuilding woods and subsequently met Secretary Knox in Philadelphia, where Fox had relatives.

KNOX ASKED FOX, WHO HAD become a War Department employee and submitted a frigate design of his own, to comment on the Humphreys design. Fox met Humphreys, and the two men entered into a collaboration that largely remains a mystery to this day. Historians differ somewhat about the extent of Fox's contribution to the final design. But if the fruit of their combined labors—the *Constitution*-class frigates—is any indication of the success of their partnership, it was a whole far greater than the sum of its parts. Their accomplishment in creating some of the most successful sailing warships that ever went to sea is all the more ironic since both these men were Quakers.

The final design they achieved delivered on every promise Humphreys had made in his original proposal. At 175 feet on the water line, and capable of setting almost an acre of sail, the superfrigate had the speed to outrun any other man-of-war in the world, up to thirteen knots. With a main battery of long twenty-four-pound guns that could fire broadsides more than seven hundred pounds to distances of up to 800 yards, it could easily overpower other frigates, which customarily carried only eighteen-pounders.

What made this all possible, what gave the design both speed and firepower, was the brilliant way Humphreys overcame shipbuilding's most intractable dilemma of the eighteenth century. He solved the hogging problem with an innovative system of internal structural supports that significantly reduced hull distortion by effectively transferring the weight of the guns on the upper decks down to the ship's keel.

THE PRINCIPAL COMPONENT OF this system was a set of diagonal riders, massive live oak beams two feet wide and as much as a foot thick, deep in the vessel's interior. Parallel neither to the ship's backbone (her keel) nor to the ribs (her frames), which ascend perpendicularly from the keel to curve up and give the hull its shape (just like a human rib cage), these timbers rise along the internal curvature of the hull but at a forty-five-degree angle forward or aft, from the area of the keel amidships toward either far end of the deck above. There are eight of them on each side of the vessel, three sloping forward, five aft. Radiating upward and outward from the point in the hull most prone to hogging, the diagonal riders act like the buttresses of a great cathedral—only upside down. Instead of holding the roof of a building up, they keep the bottom of a ship down.

In addition to this revolutionary innovation, which one recent *Constitution* captain called "the stealth technology of its day," the Humphreys design included several other unique features intended to prevent the hull from distorting under the tremendous weights and forces exerted on it. One was a series of "locked strakes," two pairs of special deck planks on either side of both the gun and berthing decks (located immediately beneath the ship's uppermost, or spar, deck). They run the full length of the vessel and tie into structures at either end. Rather than being just fastened down like regular planks, these are cut to lock in with one another and with each deck beam they cross. There was also a system of twelve pairs of "knees" (support timbers that bend at a ninety-degree angle), located along each side of the berth deck, that transfer the load of the main gun battery on the gun deck above down to the diagonal riders below.

Humphreys's innovations did not stop with preventing hull distortion. For protection against enemy fire, the design called for a three-layered hull. At the center were the frames (ribs) curving up vertically from the keel. Over these, thick planks were laid horizontally on both the inside and outside. Unlike merchant ships, where frames only six inches wide might be separated by a foot or more, Humphreys's frigates had twelve-inch-wide frames that were "sistered" together in pairs to result in a combination that was two feet wide. The separation between each pair was on average less than two inches. The enemy was thus presented with a virtually solid wall of wooden armor up to twenty-five inches thick in places.

And not just any wood. The design specified live oak. With that choice the resulting ships (and Navy) were doubly blessed. Not only was live oak the most prized wood in the world for building warships, but it was also to be found only in America.

Growing in coastal areas of the southeastern United States between Virginia and Texas (a little also grows in western Cuba), live oak (*Quercus virginiana*) gets its name from the fact that it does not lose its leaves in winter. Known for its slow growth, massive gnarled trunk, and long, expansive limbs that can reach out horizontally forty feet or more, the tree produces one of the densest and hardest woods in the world. Unless dried in a kiln, it is heavier than water and will sink. Most important for shipbuilding, milled live oak lumber gets even harder when left out in the weather.

Humphreys's original plan called for live oak in the keel, the frames, the diagonal riders, and many other structures throughout the vessel, while the planks on either side of the frames were to be made of only slightly less dense white oak. (This combination would prove so protective for the *Constitution* that in forty-two actions throughout her fighting life, her hull was never once penetrated by enemy fire. After seeing cannonballs bounce harmlessly off the frigate's topsides during the first of her four major victories in the War of 1812, a sailor is reported to have exclaimed, "Huzzah! Her sides are made of iron!" Thus was born her nickname, "Old Ironsides.")

ONCE THE WAR DEPARTMENT accepted the design, contracts were awarded to construct the six frigates. Rather than build them all at the same yard, which might have better assured quality control and kept the price down by eliminating unnecessary duplication, the government chose the politically expedient alternative. To benefit as many local communities as possible from public spending, and to encourage popular support for the Navy as well, the work was spread among six port cities along the East Coast.

To be continued in the next issue...

1492 N. Harbor Drive San Diego, CA 92101

San Diego Ship Modelers' Guild

Compiled by Chuck Seiler

Tall and Small Ships at the Festival				
Name	**Length**	**Rig**	**Built**	**Homeport**
ARGUS	92 ft	Topsail Ketch	1905	Newport Beach
BAT'KIVSHCHYNA	97 ft	Gaff rigged schooner	1991	Ukraine
BILL OF RIGHTS	136 ft	gaff rigged topsail schooner	1971	Los Angeles
CALIFORNIAN	145 ft	Topsail Schooner	1984	San Diego
EUROPA	185 ft	Bark	1911	Netherlands
HAWAIIAN CHIEFTAN	103 ft	Topsail Ketch	1988	Maui
LYNX	122 ft	Topsail Schooner	2001	Portsmouth, NH
MEDEA		Honorary tall ship	1905	San Diego
PILGRIM	130 ft	Snow brig	1945	Dana Point
QUISSETT				
R. TUCKER THOMPSON	85 ft	gaff rigged topsail schooner	1985	New Zealand
SPIKE AFRICA	70	Gaff rigged schooner	1977	San Diego
SPIRIT OF DANA POINT	118	gaff rigged topsail schooner	1983	Costa Mesa
STAR OF INDIA	278 ft	Bark	1863	San Diego
TOLE MOUR	156 ft	Topsail Schooner	1988	Long Beach

San Diego Ship Modelers Guild Officers

Guild Master Don Bienvenue
First Mate K.C. Edwards
Purser Richard Strange
Editor Jacki Jones
Logkeeper Bob McPhail

Next Meeting on the *Berkeley* Bring a ship Model! Wednesday October 9
6:30 pm social, 7 pm meeting