DUEL BETWEEN THE FIRST IRONCLADS

William C. Davis

Doubleday

THE BATTLE OF NEW MARKET

BRECKINRIDGE: Statesman, Soldier, Symbol

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DOUBLEDAY & COMPANY, INC.
GARDEN CITY, NEW YORK

eISBN: 978-0-307-81750-1

v3.1

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ACKNOWLEDGMENTS

Special thanks are always due to those who assist the historian at his task, and this wor hardly provides an exception. Many friends and colleagues lent their aid in the research an presentation of this book. It would be difficult to name them all; I hope that all of them named or not, realize how very much I value their contribution. For most, this is neither th first time nor the last that their assistance has been asked. One must marvel at their patience

Some require special mention, and none more so than those connected with the manuscri collections that provided most of the basic stuff of which this book is made. Winifred Pop Henry E. Huntington Library, San Marino, California; Joseph E. Suppiger, Lincoln Memori University, Harrogate, Tennessee; J. Isaac Copeland, Director of the Southern Historic Collection, University of North Carolina, Chapel Hill; Colonel James Agnew and Dr. Richar J. Sommers, U. S. Army Military History Research Collection, Carlisle Barrack Pennsylvania; and Howson Cole, Virginia Historical Society, Richmond, were particular helpful in providing access to the rich holdings in their collections. I am much indebted.

Additionally, many people and presses graciously allowed me to use quotations fro published works still under copyright, a boon greatly appreciated. Lilla M. Hawes, Director the *Georgia Historical Quarterly;* Pearl Ann Reeder, Editor of *Hobbies* magazine; Agnes Mora of Macmillan, Inc.; Mary Ryan of W. W. Norton & Company, Inc.; Clayton R. Barrow, edito of the *United States Naval Institute Proceedings;* and William M. E. Rachal, editor of the *Virgin Magazine of History and Biography,* all kindly granted their permission for quotations draw from books or articles. A particular word of thanks is due Thomas F. Epley, Editorial Direct of the Naval Institute Press, for permission to use quotations from the invaluable book wartime letters by Paymaster William F. Keeler, *Aboard the U.S.S. Monitor.*

Descendants of some of the chief actors in the drama of the ironclads lent their aid as wel Dr. George R. Brooke, of Lexington, Virginia, not only allowed me to quote briefly from h excellent doctoral dissertation done at the University of North Carolina, but also provided hitherto unpublished photograph of his distinguished ancestor John M. Brooke. Mr. Alva Macauley, of Grosse Pointe Farms, Michigan, kindly allowed me to publish photos of h ancestor Hardin B. Littlepage and of the pennant of the *Virginia;* and Jon Nielson, Oron Maine, very graciously allowed me the full use of Littlepage's postwar reminiscences an other papers.

It is customary for historians to bring their acknowledgments to a close with an obligator compliment to their spouses, in most cases so unimaginatively worded that the lines could b interchanged with those in a hundred books with no one noticing much difference. Ho unfortunate! To be sure, our helpmates may read, type, even correct or edit, our manuscript but their real trials on our behalf go unsung. While we cloister ourselves for months research and writing, it is they who run the house, keep the children quiet and out of th way, tend the pets, and all the while urge us to continue. Their reward is untold hours aloneness, boredom, solitude. They deserve better, certainly much better than a fleetin dedication or a tiresome acknowledgment between the table of contents and the tex Certainly one wife and friend, Pamela Davis, is entitled to more. Yet when all was done sh

paid me the compliment of reading this finished book, not to edit or criticize but simply t
read. It was a gesture difficult to equal; it would be futile even to try to do so here.

“To Bury Us Forever”

Chance dearly loves to toy with history: A missed moment, unexpected delay, a storm inefficiency, and of course that most frightening specter of all, bureaucracy, can and c combine to foil even seemingly inevitable appointments with destiny. And yet at the sam time, through some inscrutable perversity, all the machinations of Chance often serve only heighten the drama, to punctuate the inescapability of an event that would not be denied i place in time.

Chance seldom toiled harder at the task than on March 7, 1862. America was at war wi itself. For nearly a year, the conflict between Union and Confederacy had raged indecisivel For a much longer time, far older antagonists sparred with each other. Tradition an Technology had met on a thousand battlegrounds since the Dark Ages. In this first of th “modern” wars, however, they faced each other almost daily, their fateful encounte becoming commonplace. On this day, though, something far out of the ordinary seeme imminent. An epic rendezvous was in the making, if only Chance would leave things alone.

The meeting place was settled and secure: Hampton Roads, Virginia. Here, where th James, Nansemond, and Elizabeth rivers join to flow into the Chesapeake, the flower of th Union’s North Atlantic Blockading Squadron sat at anchor. These great, tall ships, rockin gently in the tidal swell, would be essential in the anticipated moment to come. They wou be here, ready. Yet they were largely supporting players in what was to be essentially a ca of two. And Chance was doing her best this March 7 to keep both of them from making th curtain.

At her berth at the old Gosport Navy Yard the CSS *Virginia* was still a ship unfinished. Da and night, the workmen swarmed over her iron and fittings, her engines and machinery. Eve as they worked, the vessel’s stores were being carried aboard. Stumbling over the mechani and laborers, her crewmen vainly tried to train at their tasks. Yet with all this turmoil, th ship stood essentially ready, though untried. Only one essential element was lacking to sen her to that meeting in Hampton Roads. She could not get enough powder for her guns.[1]

For weeks the *Virginia*’s officers sought to find the powder they needed. The Navy coul not supply it to them. Private suppliers were contracted to the limits of their capabilities an had none not already committed elsewhere. Finally, in desperation, the seamen turned to th Army. Could it not find a few hundred pounds somewhere?

At last the Army agreed and slowly began sending through the meager allotments. By th dawn of March 7 the ship’s magazine was not as empty as before, but still more was neede If it did not come, she could still meet her appointment well enough, but her guns would b mute. In the greatest naval drama of the century, in the test for which she was destined fro birth, without that powder she would be silent.[2]

If the *Virginia* was having her problems, however, the other principal in the predestine appointment at Hampton Roads faced possible destruction this March 7. The USS *Monit* stood in imminent danger of sinking.

“Our decks are constantly covered with a sea of foam pouring from one side to the other a
the deck is inclined,” her paymaster laboriously wrote in a letter that he might never live t
post, “while at short intervals a dense green sea rolls across with terrible force, breaking int
foam at every obstruction offered to its passage.”

This ungainly, unlikely warship, whose deck stood barely inches above the water in calm
seas, was tossing and bobbing at the mercy of an intemperate gale. Six-foot waves crashed
across her deck, even breaking over her smokestacks to send gallons of salt water hissing and
popping onto her boiler fires. She was riding it out better than expected, but no one knew
how long she could last against the storm. “Now we scoop up a huge volume of water on one
side,” the paymaster bravely wrote on, “&, as it rolls to the other with the motion of the
vessel, is met by a sea coming from the opposite direction, the accumulative weight seeming
sufficient to bury us forever.”

Then came a threat infinitely more terrible than the sea around her. Up from the engine
room were brought men apparently dead. Following close behind them came odorless
“carbonic-acid gas”—carbon dioxide. Imperiled by the sea around them, the men of the
Monitor must now face invisible death within the very heart of their ship.[3]

Hampton Roads, the *Virginia,* and a rendezvous with destiny could not have seemed more
remote. Chance was doing her best to foil this much anticipated appointment. But would he
luck hold?

“Iron Against Wood”

There was nothing at all revolutionary about the idea of an ironclad warship in 1861. In or form or another, the protection of a ship’s decks or sides by metal armor went back centurie In the third century B.C. the King of Syracuse supposedly built a merchant ship sheathed wi lead. The first *iron*clads were the long ships of the Norsemen of the eighth through eleven centuries. When rowing, they lined the sides of their ships with their ironbound and studde shields, indirectly providing themselves with an enhanced defense against enemy missiles.

More lead-sheathed ships followed. Then, in 1592, the Korean admiral Yi-sun repelled Japanese naval attack with an iron-covered “tortoise ship,” its hull shaped like a turtle. I success was astonishing. With increasing frequency, variant forms of ironclad ships we proposed, and sometimes built. The Spanish built floating gun batteries in the 1780s, the gu protected by slanting bulwarks covered with iron. The Napoleonic Wars and the War of 181 spawned even more plans. In the 1840s, British and American iron-hulled ships were buil some intended for war service, though none were supposed to repel enemy fire. This wa deemed by some to be impossible, though experiments toward finding the right mode making impenetrable ships’ armor began in Europe and the United States, continuing into th 1850s.

It was a radical development in naval ordnance that forced the ironclad to fruition. In 182 a French artillerist, General Henri J. Paixhans, introduced the shell gun. Instead of firing solid-iron ball at an antagonist, it sent a hollow shell filled with powder, which could explo on or after impact. The result upon wooden warships was dramatic. No longer would canno balls simply bounce off their sides or bury themselves harmlessly in the timbers. Now the could explode and dash the wood to splinters, though it took almost thirty years before th world had a dramatic display of their power. Barely weeks after the beginning of the Crimea War, on November 30, 1853, a squadron of Turkish warships and transports en route to th front met a Russian fleet at Sinope. The Russians, armed with Paixhans’s shells, completel destroyed the Turks’ wooden vessels. The day of the timber ship was done. Clearly, all th could protect a ship from iron thenceforth was iron.

The lesson learned was applied somewhat even during that war, as a few thinly cla floating batteries were put into service and performed well. It remained for postwar Franc to undertake serious efforts to produce an ironclad warship, however. In 1859 Stanisla Dupuy de Lôme constructed the *Gloire,* a 253-foot wooden steamer of conventional desig whose sides he protected with plates of iron armor four and one half inches thick. Napoleo III and his ministers so approved of the design that by 1861 another twenty such vessels we completed or under construction.[1]

Hardly content to follow the French, the British Admiralty made plans of its own. In 185 they began work on the *Warrior,* a 9210-ton “iron-cased” ship. An identical sister ship, th *Black Prince,* followed shortly. By some, these warships were regarded as “the admiration the naval world.” Unlike the *Gloire,* their frames and hulls were of iron, a radical departu

from the French design. Still, Edward, Duke of Somerset, First Lord of the Admiralty, was n satisfied. Another, smaller class of warships were modeled after the *Defense,* and then y another, the *Resistance* class. By 1861 the British had ten ironclads built or und construction, some sheathed in six and one half inches of iron plating.[2]

With all of this going on, the United States had been surprisingly unenterprising. Th closest thing to an ironclad was the unwieldy "Stevens Battery," a 420-foot, 6000-ton monst that carried seven guns. Begun in 1854, it was still incomplete in 1861, with no prospect f the future. Its sides were partially protected by armor on iron ribbing, but not sufficiently withstand heavy guns. Its builders were offering to finish the ship at their own expense if th government would purchase it from them when completed, but a board of naval examine declined.

To be sure, there was interest in the construction of American ironclads. Donald McKa the nation's foremost shipbuilder, father of her finest clipper ships, issued a call for a fleet armored ships after seeing the European progress. "It would be easy for us to build in o year, a fleet of 500 to 600 men-of-war ships, from a gunboat to the largest class of iron-case frigates," he declared. He suggested that as an interim emergency measure, the Navy existing battle frigates could be cut down a deck or two and cased in iron to protect the g decks.[3]

As is often the case, events forced action. In early 1861, with war between North and Sou seemingly inevitable, President Abraham Lincoln's administration faced a touchy situati with those states, such as Virginia, which had not yet taken steps to secede from the Unio The Old Dominion held valuable Federal property, particularly the Gosport Navy Yard Portsmouth on the Elizabeth River, and the naval shops at nearby Norfolk. In berth Norfolk sat several warships, chief among them the *Cumberland* and the pride of the Nav the powerful new *Merrimack*. Through March and early April 1861 Lincoln and his hig command feared to send troops to Norfolk to protect Federal property lest such an a provoke Virginia into secession. Yet some measures were needed to avoid losing those shi and shops should the state join the Confederacy.

Secretary of the Navy Gideon Welles desperately hoped to get the *Merrimack* in particul to safety. She was largely dismantled, her machinery out of order. When Welles asked th navy yard's commander, Commodore C. S. McCauley, how long it would take to get h ready to leave, he said a month at least. This was on April 11, with the outbreak of hostiliti at Fort Sumter, South Carolina, expected almost hourly. Thinking McCauley "feeble an incompetent for the crisis," Welles sent his chief engineer, Benjamin Isherwood, to Norfolk get the *Merrimack* ready.

Isherwood had estimated that he would have the situation in hand within a week. actually took him only four days to get the *Merrimack*'s machinery in working order. B McCauley began to interfere at every turn. Isherwood reported that the commodore w drinking heavily; he was suspicious, meddlesome, creating delays. Partly to circumvent thi Welles had sent with Isherwood Commander James Alden to take command of the ship an bring her to Philadelphia if evacuation of Norfolk was necessary. Not entirely decided on course of action, Welles wanted the navy yard held if possible. Whatever happened, thoug the *Merrimack* must be ready.

Firing broke out at Fort Sumter on April 12. Five days later Virginia seceded. A contest f

Norfolk was inevitable within a matter of days. On April 16 Alden had reported to Welle that the *Merrimack*'s machinery was working and that she could steam out the next evenin but McCauley, perhaps in his cups, refused to let her go. Desperate to protect the navy yar or at least buy time to get the ships to safety, Welles persuaded army commander Lieutena General Winfield Scott to send a regiment of infantry to Norfolk. From other navy yards h gathered recruits. Looking ahead to the worst, he made arrangements for Commander Joh A. Dahlgren to take a ship loaded with explosives to Norfolk to destroy everything that cou not be gotten away. Unfortunately, Welles failed to notify timorous old McCauley that reli was on the way. Panicking in the face of the surge of events, the commodore ordered the fe loyal seamen at his command to scuttle the ships in the navy yard. On Saturday mornin April 20, they sent them to the bottom. Just three hours later, one of Welles's relief shi arrived.

The commander of the relief, Captain Hiram Paulding, now decided that the navy ya must be destroyed, despite the fact that he had enough men to defend it creditably. Parti went to the task of burning the buildings and shops. The job was badly done, and som facilities, such as the graving dock for the cleaning and care of ships' hulls, were le untouched. As for the ships, some of them still sinking, Paulding ordered them fired. Th wooden warships burned spectacularly, the flames in their spars flickering like candles over scene of grotesque conflagration. Ordnance shells and tons of explosives boomed for hou around a column of hissing, rising steam as the burning ships settled ever deeper into th river. Within hours the Federals were gone, escaping with only three of the twelve vesse that had been berthed there. Only a few hours more brought Major General William Taliaferro's command of Virginians into Norfolk, Portsmouth, and the Gosport Navy Yar One of the finest naval facilities in the country was theirs without a fight.[4]

The Confederates soon found that the work of destruction had been shoddily done. Ov one thousand cannon were left behind unharmed. Valuable stores, ships' parts, equipmen and machinery were virtually intact. Many of the shops and their tools showed only sligh damage from the fires. The graving dock was intact, and with it much of the rest of the ship berths. Foundries and forges were unharmed. The Confederate authorities were elated b their good fortune. Few were slow to realize the importance of the capture. Two days aft Taliaferro marched in, the Richmond press exulted that in the capture of Gosport "we hav material enough to build a Navy of iron-plated ships." And resting on her bottom in the rive her machinery and hull saved from the fire by her sinking, they had the *Merrimack*.[5]

It was fortunate for the infant Confederacy that in Secretary of the Navy Stephen Mallory the South had a man well aware of the value of ironclad warships. As senator fro Florida in the 1850s, he had taken a keen interest in the early stages of the Stevens Batter being one of very few public men to evidence much concern with this new mode of warshi He followed closely the progress of the French and British with their iron-sheathed frigat and, upon taking office in Jefferson Davis' administration, one of his first concerns was t send an agent abroad to purchase armored ships based on the European designs.

Only days after the fall of Norfolk, Mallory declared,

> I regard the possession of an iron-armored ship as a matter of the first necessity. Such a vessel at this time could traverse the entire coast of the United States, prevent all blockades, and encounter, with a fair prospect of success, their entire Navy.

> If to cope with them upon the sea we follow their example and build wooden ships, we shall have to construct several at one time; for one or two ships would fall an easy prey to her comparatively numerous steam frigates. But inequality of numbers may be compensated by invulnerability; and thus not only does economy but naval success dictate the wisdom and expediency of fighting with iron against wood, without regard to first cost.

Mallory was emphatic. If the Confederacy was to construct such a ship, "not a mome should be lost."[6]

Since February 1861 at the latest, Mallory had been urged to look into the building ironclads by various Confederates, but he was dismayed by his investigations into th capabilities of southern industry to do so. It appeared that none of the rolling mills in th infant nation could produce armor plating thick enough to protect a vessel. It was on th basis of this, and advice from such Confederate naval experts as Lieutenant John M. Brook that the Secretary at first pinned his hopes upon foreign acquisition of ironclads.[7]

In May and June 1861 the Confederate capital was transferred from Montgomer Alabama, to Richmond, Virginia. Mallory himself arrived to set up his department on June That very same night, after a most tiring day, Mallory met with Lieutenant Brooke. The discussed ironclads. Hopeful, Mallory pressed the point of whether or not the Confederac could, after all, build its own armored ships. Brooke believed it possible, and now Mallor asked him to put together some figures, estimates, and rough plans "in regard to floatin batteries." On June 7, Brooke went to work.[8]

The thirty-five-year-old Brooke was already a man of wide experience and reputation. A 1847 graduate of Annapolis, he had invented sounding apparatus for topographical mappin of the ocean bottoms, charted the little explored North Pacific, and traveled to Japan wi Matthew C. Perry. Like Mallory a Floridian, Brooke was blessed with an inventive min tempered with a mature sense of practicality. His designs were always simple, yet sound.

Within a few days he completed his preliminary studies. What they produced were bod sheer, and deck plans of an ironclad which, with no basic alterations, would eventually serv as the prototype for virtually every ironclad the Confederacy would build.

What Brooke proposed was a shallow-draft vessel, sharply pointed at the bow and rounde astern, whose deck would sit only slightly above the water line. Midway between bow an stern he placed a casemate, or iron-enclosed structure, rounded front and rear with its sid sloping upward roughly at a 45° angle. On port and starboard the sides were to slope down the very outside edges of the deck. Ports in the casemate would allow the running out an firing of guns from within, while pivot guns in the forward and after sections would swivel fire from ports on either side and in their front. In action, all of the machinery and vital par of the ship would be below the water line, safe from enemy shells. The only portions of th ship exposed to enemy fire would be the deck—itself probably slightly awash in all but th calmest water—and the casemate, whose iron-covered, sloping sides would deflect almo anything thrown against it. Brooke himself described the casemate as "a shield of timber, tw feet thick, plated with three or more inches of iron, inclined to the horizontal plane at th least angle that would permit working the guns." For protection, the sides, or "eaves," of th shield were to be submerged two feet. Those submerged portions of the hull extendin beyond the casemate fore and aft were to give the ship stability, greater speed, and mo

buoyancy. The decks, like the shield, were to be protected by several inches of iron.[9]

There was nothing revolutionary in this armored, slope-sided casemate. The idea went bac at least eighty years, to Europe. Nevertheless, Brooke's design presaged a future fleet Confederate armored warships.

When shown the plans, Mallory approved heartily. Lieutenant Brooke then suggested th John L. Porter, constructor at the Norfolk yard, and Confederate Chief Engineer William Williamson, be brought to Richmond to help in putting the plans into execution. Mallor however, decided to send for a "practical mechanic" from Norfolk, instead. The man was ab to help in providing some details on the kinds of timbers to use, but proved wholly useless the matter of preparing more detailed drawings and specifications for the ship. Brooke als found him "lacking in confidence and energy, and … averse to performing unusual duty Mallory sent him back to Norfolk quickly, and then did as Brooke originally suggested an sent for Porter and Williamson, on June 22.[10]

Porter did not know the purpose of the proposed meeting when he received the order bu just in case, he took something along with him. Porter, a fifty-eight-year-old native Portsmouth, had been a naval constructor for many years in the United States Navy. As fa back as 1846, while working on the USS *Alleghany,* his mind had turned to ironclads. Then- he claims—he conceived of a seagoing vessel of nineteen feet draft, covered with three-inc armor on an inclined casemate much similar to Brooke's 1861 design. The idea went to th Navy Department in Washington, where nothing was done with it—and where no record of exists—and Porter shelved his plans until 1861.

He was working at Gosport as a constructor when the Federals evacuated the place, an promptly offered his services to the Confederacy.

The outbreak of war brought Porter's mind back to his supposed 1846 ironclad plans. H went to work on them, adapting the design to fit the limitations of Confederate industry an what he saw as a primary need for harbor-defense vessels. His new plans called for a fla bottomed vessel 150 feet long and forty feet wide. The casemate—as in a discarded Brook design—covered the entire length of the vessel, with no projecting bow or stern, and its eave were to extend below the water line by two feet. With the facilities at the navy yard, Porte had constructed a small-scale model of his ironclad. When Mallory's unexplained call came o June 22, Porter decided to take his model to Richmond with him.[11]

Mallory, Brooke, Porter, and North Carolinian Williamson gathered in Brooke's office o June 23. Here they first discussed the model submitted by Porter. All were impressed by th casemate design, which called for a 40° incline instead of the 45° proposed by Brooke. Th would be more effective against the powerful shells now being used. "It was considered good shield," Brooke declared, "and, for ordinary purposes, a good boat for harbor defense Brooke and Porter were in almost perfect agreement on the salient features of the casemat the thickness of the wood backing, the amount of iron plating, and the angle of inclin Consequently, this meeting adopted a plan for a casemate "nearly identical" to Porter model, and including the idea independently arrived at by both him and Brooke of having th eaves extend two feet below the water line.

Mallory now turned the meeting to Brooke's design. It differed from Porter's chiefly in th extension of the bow and stern decks beyond the shield, submerged so that only the casema would be visible to the enemy. Curiously enough, Brooke thought this would increase such

vessel's speed. "By unanimous consent," wrote Brooke, the idea of extending and submergi the deck was adopted. Mallory directed Porter to prepare new structural drawings of th design agreed upon, and ordered Brooke and Williamson back to Norfolk to investigate th availability of the necessary engines and other machinery. The Confederacy had a plan, and good one. But now she must find a way to take it from the drafting board to the launchi ways.[12]

Brooke and Williamson first went to Richmond's Tredegar Iron Works, the foremost suc facility in the South. Nowhere in the Confederacy would they find suitable engines for suc an ironclad, they were told. They discussed their findings with Porter on June 25, whe Williamson remarked, "It will take at least twelve months to build her engines unless we ca utilize some of the machinery in the Merrimac." Here was an idea with possibilities. Th *Merrimack* had been raised from the river bottom on May 30 by the Baker Wreckin Company, and Porter himself had taken charge of moving her into dry dock. He was qui familiar with her present condition, and informed his colleagues of it. Then—there is som question as to whether Porter or Williamson first made the suggestion—the thought came u that their ironclad design, with only slight modifications, might be applied to the existing hu and works of the *Merrimack*. "I can adapt this model to the Merrimac," Porter declared, "an utilize her machinery in her." He and Brooke did feel that her draft was perhaps too muc but all agreed that this offered the best means of producing an ironclad in the least time.

This same day, June 25, 1861, they submitted a report to Mallory. Use the *Merrimack,* the said. She could be adapted to an ironclad mounting ten guns, four on each side, and two pivo guns, fore and aft. The hull, boilers, and most of the engine were little damaged, and th whole work of converting and finishing her could be done for around $110,000.[13]

Mallory approved almost immediately. Porter now began preparing new drawings for th *Merrimack*'s conversion. He returned to Gosport and, with the assistance of a laborer wh held the end of his tape line, he measured the raised vessel. Then began the calculations fo the weight of all the ship's components to determine how much she could carry. Porter foun that she could take everything and still have fifty tons' displacement to spare. This woul require the addition of extra weight to keep her eaves the proper two feet below the wate line. Then a problem over the size of the propeller forced him to change her draft at th stern, a modification that would require another two hundred tons of additional ballast. B July 10, the complete plans were finished, and the next day Porter himself delivered them t Mallory. There was another conference between them, with Brooke and Williamson, an Mallory ended by accepting the plans and issuing an order to Captain French Forres commandant of the Gosport Navy Yard, to proceed immediately with the ship's conversion.[1

Lying in the graving dock at Gosport, the object of all this effort, sat the remnant of th once proud *Merrimack*. She and five other ships like her had been authorized by the Thirt third Congress and President Franklin Pierce in 1854. The *Merrimack* was the first of the s to be completed. She was launched on June 14, 1855, at the Boston Navy Yard amid "th enthusiastic huzzas" of an estimated one hundred thousand spectators. It was "altogether th most beautiful and perfectly artistic" launch the people of Boston had ever witnessed.

The frigate was not officially completed until February 25, 1856, displacing 3200 tons an powered by a mighty steam screw, or propeller. Her first service was in the West Indies bu after only a year's service, she was decommissioned in 1857 for repairs. On September 1

1857, she went back into service as flagship of the Pacific Station and remained there unt
sent back to Norfolk, where, on February 16, 1860, she was decommissioned again for mo
extensive overhauling. And there she sat in April 1861. Her only travel since had been to th
bottom of the Elizabeth River and back up again.

Hers was a curious destiny. Once the pride of the United States Navy, now she faced
possible future as the object of the best naval hopes of the Confederacy. Her fate lay in th
hands of Porter, Williamson, Brooke, and Mallory for the present, but there were others
come. With them and with yet another, unborn iron monster would come the verdict on h
place in history.[15]

"There's Something in It"

Gideon Welles, Lincoln's Secretary of the Navy, was a farsighted, capable cabinet ministe Yet, perhaps because he was not nearly so experienced in naval matters and technology, h failed to grasp the necessity for an ironclad fleet as early as Mallory. In May 1861, just whe Mallory was applying to the Confederate Congress for authorization to proceed with a ironclad, Welles's Navy Department had no armored vessels in the works and very few plan under consideration.

Even so, information and rumors about enemy plans came into Washington with regularit and Welles felt compelled to bring himself up to date on the subject. His top naval advise were skeptical about immediate ironclad prospects—even though the Army was buildi ironclads on the Mississippi—but still he felt enough concern to personally author a bi asking Congress for $1.5 million for experimentation and development of three prototyp ironclads. He would constitute a three-member ironclad board to consider designs submitte and decide on those to be pursued. After a good deal of lobbying, the bill passed both house of Congress on August 3 and was signed by Lincoln. A curious footnote is that one of thos who voted for its passage, Kentucky Senator John C. Breckinridge, would three and one ha years thence sit in Richmond as Confederate Secretary of War.[1]

Immediately, Welles appointed Commodore Joseph Smith, Commodore Hiram Pauldin and Captain Charles H. Davis to man the examining board. This was on August 8. The da before, he had issued an advertisement soliciting designs for ironclad vessels to be submitte to the board within twenty-five days. Smith was an old friend of Welles and was possessed a sound mechanical mind receptive to new ideas, though he and the others all admitted th they knew little of ironclads. What they did not know, they soon would learn.

The proposals came in quickly, seventeen of them. The board, in its examinatio winnowed them to two that showed definite possibilities. One, proposed by C. S. Bushne and Company of New Haven, Connecticut, called for a vessel 180 feet long, of convention design, and armored on the "rail and plate" principle, meaning simply that the iron armo was to be affixed to its sides much like the clapboard siding on a house. The board had fear however, that her great weight would not allow her to float high enough to be stable at sea, problem that remained for a short time unresolved. She was to cost $235,000 and eventuall would be named *Galena*.

The other likely prospect was equally unrevolutionary. Presented by the Philadelphia fir of Merrick and Sons, it was a steam frigate of wood and iron. There was little new to this or either, though the board felt it "the most practicable one for heavy armor." Measuring 22 feet with a 60-foot beam, it would displace 3296 tons and make nine and one half knots. Th as yet unnamed ship—she would come to be called *New Ironsides*—was projected to co $780,000.[2]

It was the board's reservations on the seaworthiness of Bushnell's design that led t something really new. In Washington, lobbying for his ironclad, Bushnell chanced to me

Cornelius H. Delamater of New York, a leading iron founder. When informed of the doub
held about the *Galena*'s stability, Delamater told Bushnell that it would do him well to vis
John Ericsson in New York. The internationally known inventor and engineer might be ab
to help him.

Bushnell took his problem to Ericsson, gave him all the pertinent data on the ironclad an
after some calculations were made, was rewarded with the reply, "She will easily carry th
load you propose, and stand a six-inch shot—if fired from a respectable distance." Then, th
matter settled, the inventor asked Bushnell a question. As he later recalled it, "Capta
Ericsson asked if I had time just then to examine the plan of a floating battery absolutel
impregnable to the heaviest shot or shell." Since that very problem had occupied Bushnell
waking moments for the past three months, the result being the *Galena,* he agreed to take
look.[3]

John Ericsson was an archetype genius, as uncompanionable and self-centered an egotist a
his profession ever produced. He was truly comfortable and at home only with his desig
and his machines. Fifty-eight now, he was born in Värmland, Sweden, and there received a
early education in engineering before going to London in 1826. In twelve years in England h
produced an endless succession of novel inventions, including a fire engine and the prototyp
for a screw propeller. In 1839 he crossed the Atlantic and adopted the United States. Th
productivity continued unabated, as did his reputation for being personally intolerable. H
designed the USS *Princeton,* the first American steam, screw-propelled man-of-war, sever
improved steam engines, and a variety of other military and domestic wonders. He was no
always spectacularly successful. In 1853, amid great public interest, he proclaimed the "Ag
of Caloric" with his new vessel named, modestly, the *Ericsson.* She was powered by—and h
opponents claimed was promoted by—hot air instead of steam. The principle was applicab
to small, stationary engines, but the great vessel herself proved a hopeless failure and a gre
embarrassment to Ericsson.[4]

But the inventor was not at all displeased with the design he now presented to Bushnel
Out from its musty storage came the blue-print of a naval revolution.

In September 1854, during the Crimean War, Ericsson had sent to France's Napoleon III th
plans for what he called an "iron-clad steam-battery," whose chief feature was
hemispherical revolving turret in its center, mounting one gun. France did nothing with th
design, but since then Ericsson had devoted no little time to refining it until he arrived at th
model now displayed to Bushnell.

It was in every way a peculiar vessel. The hull was in two parts: an upper, iron-plate
portion 172 feet long and 41 feet wide, tapered to a point fore and aft; and a lower section
wood, 122 feet long and 34 feet wide. The effect, when placing the one over the other, wa
an armored overhang of three and one half feet on either side and roughly twenty-five fe
fore and aft. Thus designed, this hull could be rammed from any direction, producing n
damage to the lower, vital hull until the ram had penetrated at least three feet of armore
upper hull.

The forward section—like all of the vessel—boasted a host of novel features. At its ver
front sat the anchor well, a covered cylindrical hole in the bow from and into which th
anchor could be lowered and raised without its ever being exposed to enemy fire. Th
machinery for operating it lay entirely inside the armored, upper hull. This improveme

alone eliminated the danger so prevalent in naval battle of losing a ship's anchor an associated gear, thereby losing its ability to remain perfectly stationary when necessary.

Immediately behind the anchor well sat the pilothouse. It stood three feet ten inches hig and was rectangular in form. Its sides were composed of blocks, or "logs," of solid wrough iron a foot wide and nine inches high, bolted at the corners. One block down from the to iron spacers five eighths of an inch thick were to be inserted between the logs, producing narrow aperture all around for the visibility of the captain and the helmsman. The top of th pilothouse was an iron plate two inches thick resting unfastened in inlet grooves in the to rectangle of logs. In an emergency, this plate could be pushed up and aside, allowing the cre to escape the vessel.

Behind the pilothouse and below the main deck lay the berths of men and officers—a cabi and stateroom for the captain, a wardroom, eight officers' staterooms, the main berth for th crew, and a number of store lockers. With a good sense of economy, Ericsson allowe quarters for only half the crew, since at all times half would be on and half off duty. Sinc these quarters were almost entirely below the water line—the main armored deck over the resting only a little over a foot above the water line—ventilation posed a problem. Ericsso solved it by allowing for blowers operated by separate steam engines and capable of bringin seven thousand cubic feet of air per minute in from pipes on deck. Ingeniously, it was force into the lower part of the hull so that it would force out the heated, fouled air above i thereby keeping the interior as cool and fresh as possible.

Some distance to the rear of these quarters, Ericsson placed the engines, single-cylindere steam power plants with two pistons, one at either side of a partition in the middle of th cylinder. An intricate system of cranks and connecting rods allowed both to act smoothly while the over-all construction using only one cylinder instead of the conventional two save much needed space within the not-oversize hull. From the engines, a propeller shaft extende through the rear of the lower hull to a four-bladed propeller. This vital part of the ship wa protected by a cavity in the overhanging rear upper deck, allowing the propeller to tur freely while still unexposed and protected from above by the iron deck. Just behind it h placed the ship's rudder, equally protected so that under even the heaviest fire or rammin the ironclad's locomotion would not be endangered.

Bushnell stood impressed by all he saw thus far, but nothing so captivated his attention a what Ericsson had placed in the middle of this already innovative vessel. Resting squarel amidships sat a cylindrical iron "cupola," or turret, a great, round, flat-topped tower of met with two ports in one side. Through them would fire two powerful naval guns. This turr alone would have made Ericsson immortal; it was the most successful innovation in nautic warfare of the century.

The idea of a turret, or armed, revolving gun tower, was, like the ironclad itself, not at a a new one. Its antecedents went back at least to the days of the French Directory. In 1798, "floating circular citadel" was proposed to them, forming in effect a small circular castl mounting guns on all sides and surrounded by a floating parade ground boasting windmil driven paddle wheels for locomotion, and drawbridges for passage to dry land.

In 1805, a Mr. Gillespie of Scotland devised a movable turret for land use, boastin impregnability and the ability to "take a sure aim at any object." It was also intended for us on the water, its machinery being "adapted to turn the most ponderous Mortars with th

greatest ease, according to the position of the enemy." Two years later, Abraham Bloodgo devised a floating revolving turret with guns ranged all around the inside so that, as th turret turned, each cannon could be discharged successively, keeping up a steady fire. 1843, this same feature was boasted of a revolving turret developed by an America Theodore Timby. In Syracuse, New York, he made a model and detailed plans at a cost himself of over five thousand dollars. President John Tyler himself examined the model, b two years later an army-navy commission recommended against its further development b the government.

The closest thing to a practical, working turreted warship was that introduced by Capta Cowper P. Coles, Royal Navy. In 1855, during the Crimean War, he built a model of an "iro clad raft, with revolving cupola" while stationed aboard his ship *Stromboli* in the Black Se This was at almost the same instant that Ericsson claims he presented his first ironcla proposal to Napoleon III. Though the Royal Navy did nothing with his invention, it was muc publicized in England and America during the next five years. Indeed, there were some wh would accuse Ericsson of pirating Coles's design. The Swede was certainly aware of it- despite his statements to the contrary—but there is no sound reason to suppose him guilty stealing Coles's invention. Many inventors were looking into turreted vessels. Ericsson's wa only one of six to be submitted to Commodore Smith's board.

Ericsson's design was a masterpiece. His turret consisted, he said, "simply of a sho cylinder resting on the deck, covered with a grated iron roof provided with sliding hatche This cylinder is composed of eight thicknesses of wrought-iron plates, each one inch thic firmly riveted together." The whole turret rested on a polished brass ring set in the deck, i weight upon the ring forming a watertight seal. When in battle, the turret would be raise slightly to turn freely.

A small steam engine below the deck powered the revolving turret, its controls being insid the gun tower so that, presumably, only one man would be needed to manage them. Th would also allow for good communication and co-ordination between him and the gunner The turret mounted two large-bore naval guns, to be run out and fired through ports on or side. When the guns were in and being loaded, heavy iron shutters, or stoppers, were swing into place, closing the ports until raised again.[5]

Ericsson could be most eloquent when describing this invention of his, and he kept th enrapt Bushnell for some time in explaining it. The ship could be built cheaply, and it cou be altered to meet the pressing necessities of the situation. It could be constructed quickly; could operate in shallow coastal waters like Hampton Roads; it could operate in narro channels, since only the turret—and not the ship—need be turned in battle.

Bushnell, despite the fact that an ironclad of his own stood before Welles's boar immediately asked Ericsson if he might advocate this novel design before the Secretary of th Navy, Ericsson himself not enjoying the best of relations with a department that, he felt, ha ignored his genius. The inventor agreed. He had already written to Lincoln on August 29 an submitted plans to the board on September 3. At once Bushnell traveled to Hartfor Connecticut, where Welles had gone to see to the moving of his family to Washington. Upo seeing the Secretary, he presented Ericsson's design with the immodest claim that he ha found "a battery which would make us master of the situation." Welles, too, found the pla impressive. "I was favorably impressed," he would write in his diary. The ironclad wa

"extraordinary and valuable."

Without delay, Welles asked Bushnell to take the model and plans to the naval board Washington. Bushnell, however, having had experience of his own in the difficulty of gettin anything new seriously considered, decided to make a stop in Troy, New York, on the wa Here he met with John A. Griswold and John F. Winslow, influential iron founders who wer working with him in armoring his *Galena.* All three were men with a quick eye for profit and all saw an opportunity in government adoption of the Ericsson plan. Since both of th manufacturers enjoyed friendly relations with the powerful Secretary of State, Willia Seward, they were able to get from him a letter of introduction to President Lincoln.

On September 12, 1861, Bushnell saw the President. Lincoln, who had himself dabbled nautical invention some years before, found the proposed ironclad interesting—Bushne claimed he was "greatly pleased" by it—and agreed to go with Bushnell to present it to th naval board the next day.

At 11 A.M. Lincoln and Bushnell met with Assistant Secretary of the Navy Gustavus Fox an Commodores Smith and Paulding. Davis was absent, though a number of unofficial navy me came to look on. Bushnell exhibited the model and the plans, and found that "all wer surprised at the novelty" of it. Some of those present thought the idea possessed merit an advised its adoption. Others ridiculed it as another of Ericsson's follies. The discussion ende with nothing settled, when Lincoln finally looked at the model and remarked, "All I have t say is what the girl said when she stuck her foot into the stocking. It strikes me there something in it."

Welles, worried over Bushnell's mission, was back in Washington now, hoping to help. Th day following the meeting with Lincoln, Commodore Smith convened the entire board, wi Davis present, and Bushnell once again made his presentation. Carefully he weighed th remarks of each of the board members and went back to his hotel "quite sanguine of success The next day, however, he learned that Ericsson's chances were slim. And there was litt that Welles could do to help him. As Bushnell put it, "the air had been so thick with croakin that the Department was about to father another Ericsson failure."

Bushnell was a man of amazing tenacity. "Never was I more active than now," he wrot "in the effort to prove that Ericsson had *never* made a failure." After considerable difficult he managed to obtain Smith's and Paulding's endorsement of a recommendation to build trial Ericsson ironclad. They signed only on the condition that Davis also might be persuade to endorse the proposal. Davis proved immovable in his opposition. "Take the little thin home and worship it," he told Bushnell, "as it would not be idolatry, because it was in th image of nothing in the heaven above or on the earth beneath or in the waters under th earth." Davis could masterfully make a simple "no" into a biting refusal.

But this man Bushnell refused to quit. Knowing that Ericsson himself, when speaking on h own inventions, could be as charming and persuasive as he was otherwise abrasive an insufferable, Bushnell determined to get Ericsson to present the plan to the board once aga in person. Here was no easy task, for the engineer bore little love for the Navy Departme or those of its minions who scorned his ideas. Here, at least, Welles could help. Bushne spoke to him, and the Secretary agreed to arrange a meeting in his office between Ericsso and the board. Beyond this, Welles personally spoke to Smith and asked him to treat th sensitive Swede tenderly, to give him a full hearing. Smith happily agreed.

Now it remained to bring the mountain to Mahomet. Bushnell was no fool. He kne Ericsson would refuse to come to Washington if he knew the initial reception given h design, particularly by Davis. Consequently, Bushnell set out to deceive him. Travelin immediately back to New York, he appeared on Ericsson's doorstep at 9 A.M.

"Well! How is it?" asked the engineer.

"Glorious," lied Bushnell.

His interest, and his vanity, stimulated, Ericsson demanded impatiently, "Go on, go o What did they say?"

"Commodore Smith says it is worthy of the genius of an Ericsson." Bushnell saw th inventor's eyes gleam with pride.

"But Paulding—what did he say of it?"

"He said, 'It's just the thing to clear the Rebs out of Charleston with.' "

Here Bushnell hesitated, and Ericsson demanded, "How about Davis?"

"Oh, Davis." Bushnell could not stop now. "He wanted two or three explanations in deta which I couldn't give him, and so Secretary Welles proposed that I should come and get yo to come to Washington and explain these few points to the entire board in his room t morrow."

Ericsson had reportedly sworn he would never set foot in the capital again after his earli treatment by the Navy, but Bushnell had masterfully judged the engineer's ego and ambitio "Well, I'll go," said Ericsson. "I'll go to-night."

"From that moment," Bushnell recalled years later, "I knew that the success of the affa was assured."

They rode the train all night, arriving the next day, September 15, to an immedia audience with the board. Bushnell's whole ruse almost crumbled when the officers appeare to find his appearance not only unexpected but, to Davis and Paulding, unwelcome as wel As a matter of form, they stiffly asked a few questions, which he as stiffly answered, an then he prepared to leave when finally told that his plan had already been discussed an rejected. Ericsson asked why. Here Smith gave him his opportunity. It was feared, said th old commodore, that the ironclad was not possessed of sufficient stability.

At once Ericsson launched into an eloquent defense and explanation not only of the craft stability but of all its merits. As Bushnell later told Welles, "He thrilled every person prese in your room with his vivid description of what the little boat would be and what she cou do." He claimed he could build the ship in three months, less time than had already bee spent by the Confederates on their still unfinished ironclad at Gosport. Seeing that he wa winning the board to his plan, Ericsson concluded with the characteristically immode exclamation: "Gentlemen, after what I have said, I consider it to be your duty to the countr to give me an order to build the vessel before I leave this room."

The members of the board stepped to a corner of the room for hushed consultation. The asked Ericsson to call again that afternoon at one o'clock. He did so and at Welles's behe repeated the salient features of the morning's presentation. The Secretary asked him ho much his vessel would cost. The engineer showed no hesitation in replying that it would tak $275,000, and this time displayed a hastily prepared diagram, showing the vessel's stabilit which he had made between interviews. Welles then polled the board members individuall Davis and Smith were convinced. Paulding wanted still more explanation in the matter