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#### Uncle Sam's Webfeet: The Union Navy in the Civil War

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The United States Navy expanded from 89 to some 670 vessels during the Civil War, and grew in personnel from some 9,000 officers and men in 1861 until more than 118,000 had been in naval service by 1865. USS <u>Constellation</u> was but one unit of the Navy during the Civil War, but a look at her crew gives us a glimpse of how the Union Navy organized and trained its crews to fight.

To meet the need for manpower, the U.S. Navy accepted men of all backgrounds. A recruit had to stand at least four feet, eight inches in height, and pass a brief physical examination at the Recruiting Rendezvous before signing his "shipping article," or enlistment papers. Those under the age of 18 had to have consent of parents or guardian, and the average sailor was 25 years of age. The usual term of enlistment was three years or one cruise, and a "Jack Tar" could expect to be at sea much of that time.

Landsman was the rate a naval recruit. Sixty–nine of these greenhorns were on <u>Constellation</u>'s muster roll in 1863. They performed the dirtiest, heaviest, and most menial tasks, and endured the harassment of their more seasoned shipmates. With at least three years' experience, or upon re–enlisting, a Landsman could be promoted to Ordinary Seaman. The duties of an O.S. included those that required more skill and knowledge than that of a Landsman, such as handling and splicing lines, and working aloft on the lower mast stages and yards. There were 82 Ordinary Seamen listed in the crew in March 1863. When fully rigged, a ship of <u>Constellation</u>'s size had some five miles of running and standing rigging. Promotion to Seaman meant the sailor had at least six years' experience and "knew all the ropes" by name and use instinctively. The ship's March 1862 muster return lists the names of 57 Seamen.<sup>1</sup>

The Captain rated the most reliable and experienced sailors as Petty Officers to occupy positions of intermediate authority. Leading Petty Officers, such as the Master–at–Arms, Yeoman, the various Mates ("rated" Master's Mates were petty officers, "shipped" Master's Mates were warrant officers), and Stewards were the Navy equivalent to Army and Marine sergeants. The lesser petty officer ratings, equal to corporals in the Army and Marines, were the Quarter Masters, Quarter Gunners, Captains of the Forecastle, Tops, Afterguard and Hold, boat Coxswains, Armorers, Coopers, Painters, Cooks and Master–at–Arms' Corporals. The line petty officers were relied on for their advice on safety and maintenance by the captain and officers. Others were appointed based on previously acquired skills or training to perform special duties in the various staff departments. When the crew went to battle stations, the crew of every gun had at least one petty

Volume 1 Number 1 April 2002 officer, regardless of rating, to act as the Gun Captain. The March 1863 Muster Roll listed a total of 59 petty officers appointed from among the <u>Constellation</u>'s 283 crew members.<sup>2</sup>

Moses A. Safford, a Kittery, Maine attorney when the war began, accepted the appointment as ship's Yeoman on 26 December 1861. A Yeoman in the old Navy had charge of the material and equipment necessary for the maintenance and operation of the vessel, maintained the accounts of the various departments, and was the ranking staff petty officer. Safford kept a very detailed diary of his experience aboard Constellation from 11 March 1862 to 27 January 1865 that provides us a petty officer's perspective of life aboard a Union man–of–war.<sup>3</sup>

The Master-at-Arms, as the ranking enlisted member, was primarily responsible for discipline among the crew. John Glenn of Troy, New York, who was said to have once been a prizefighter, was appointed <u>Constellation</u>'s Master-at-Arms in November 1861. His messmate Yeoman Safford described him as a "very jolly, good-natured man although he has a reputation of having been 'on his muscle,'" due to his tendency to resort to brute strength.<sup>4</sup>

An old Navy adage said it took six years to make a seaman. At that rate, a typical recruit would be well into his mid-twenties before attaining the necessary proficiency. The Apprentice or Boy rank was a means for the Navy to develop fully trained sailors at a younger age. Young men between the ages of 13 and 18 could join with their parents' consent to serve in that rating, although every port had many orphans and runaways eager to volunteer, and some as young as 11 found their way aboard ships of war. By regulation, they could make up no more than 5% of a ship's crew, and Constellation's Muster Roll shows that 17 Boys shipped out in March 1862. They learned seamanship, and acted as messengers, cook's helpers, sick bay attendants, and officers' servants. In combat or during drill the boys carried powder cartridges from the passing scuttles to the guns. Because anything small in size aboard ship was referred to as a "monkey," this hazardous activity earned them the nickname "Powder Monkeys." They were boys who did a man–sized job.<sup>5</sup>

The Navy, unlike the Army, accepted blacks as regular members before the Emancipation Proclamation, although their numbers were restricted to no more than 5% of a ship's crew. Furthermore, unlike the first black soldiers, African American sailors received the same pay as their white shipmates. Those who enlisted at the war's start were mostly free men living in Northern port cities. As the war progressed, the need for manpower led Navy Secretary Gideon Welles to suggest to the North Atlantic Blockading Squadron commander that he open stations ashore for recruiting "contrabands," as blacks who fled slavery for the protection of Union forces were called. By the end of the war, African Americans accounted for more than 10% of the Navy's enlisted strength. Constellation's muster rolls show fifteen blacks served in the crew during the Civil War. The most

Volume 1 Number 1 April 2002 experienced was James Evans. A free man, he enlisted in Boston on 15 November 1861 as a Seaman, which indicated he had previous naval experience. By March 1863 he had been promoted to the petty officer rating of Coxswain, one of the seven authorized for the ship. <sup>6</sup>

Most ships and naval stations had marine detachments. During the Civil War the Marine Corps grew from 1,800 to about 4,100 officers and men. <u>Constellation</u>'s Muster Roll showed 45 members in the Marine Guard from 1862 to 1865, commanded by Second (later First) Lieutenant Robert O'Neil Ford. In descending order of rank, the detachment included one Lieutenant, one Orderly Sergeant, one Sergeant, three Corporals, thirty–six Privates, and three Musicians.<sup>7</sup>

The marines were drilled in manning all the guns. Orderly Sergeant William P. Schwartz wrote in a letter to his brother Charles that he "spent much of the time exercising the large guns and preparing everything for action in case of need." When the ship's company was called to quarters, some marines could be distributed among the gun divisions, or could comprise an entire gun crew. Schwartz was quick to point out that he "was particularly busy in making the marines perfect at large as well as small arms." The marines were usually formed into a single division under their lieutenant on the spar deck. From there, the captain could order them order them into the rigging as sharpshooters, to support boarding parties or repel enemy boarders on the spar deck, or conduct operations ashore.<sup>8</sup> Although they participated in few major land battles, marines from the blockading squadrons conducted numerous raids along the Confederate coast throughout the Civil War. To improve their readiness, Constellation's marines practiced launching these operations regularly while in the Mediterranean. Yeoman Safford recorded one such exercise in 1862 saying, "All our boats are put over and completely armed and equipped, and are landed through the surf. Everyone gets wet, but the imitation of landing an armed expedition was really very credibly done."9

When not training or engaged in battle, marines provided the officers with a force capable of stopping fights that resulted from the personality clashes that surely arose among large numbers of men confined in a small area. As Sergeant Schwartz explained in another letter, the marines were charged with "keeping order in the ship." They also guarded the captain's cabin, the spirit room and the brig. These police duties often raised the ire of their sailor—shipmates and fueled inter—service rivalry.

<u>Constellation</u>'s complement of officers, aside from the Captain, usually numbered about twenty. First came the line officers, who were responsible for sailing and fighting the ship, and commanding the various divisions of the crew when at quarters. The First Lieutenant, being the most senior, was the second in command until the Navy created the rank of Lieutenant Commander in July 1862; it then became the rank for <u>Constellation</u>'s Executive Officer. The civil, or staff, officers were in charge of the specialized departments. The Surgeon managed the medical department. The Paymaster, formerly

Volume 1 Number 1 April 2002 called the Purser, accounted for the crew's payroll, purchased supplies and equipment, and sold comfort items and sundries to the crew while at sea. The Master, formerly called the Sailing Master, was responsible for navigation. Master was also the title of the transitional rank for line officers between Passed Midshipman and Lieutenant. The Captain's Secretary was the ship's administrative officer.<sup>10</sup>

The Navy's <u>Tables of Allowances</u> for <u>Constellation</u> included billets for four Superior Warrant Officers. These watch standing officers could be either Midshipmen or "shipped" Master's Mates. The Midshipmen, who had completed their academic course work at the Naval Academy, functioned as junior line officers while waiting to take their final examinations for graduation. If they attained qualifying scores on those tests, they became Passed Midshipmen until promoted to Master or Lieutenant. In 1862 the Navy created the rank of Ensign to replace the grade of Passed Midshipman. Midshipman Charles F. Blake was assigned to <u>Constellation</u> from 5 March 1862 to 14 June 1863, when he was ordered home for examination. His journal gives us a junior officer's view of duty, and life in the wardroom during the Civil War.<sup>11</sup>

Master's Mates and Clerks were warrant officers who assisted the civil officers, and were the staff equivalents in grade to Midshipmen. The four Inferior Warrant Officers, the Boatswain and Gunner on the line side and the Carpenter and Sail Maker on the staff side, represented the lowest link in the officer chain. They were the technical experts of long experience in the ranks who were responsible for sailing, fighting and maintaining the ship and its equipment. To ease the shortage of officers and midshipmen created by wartime expansion, captains could appoint deserving petty officers to Acting warrant officer billets.<sup>12</sup>

No one exerted more influence on the men's lives and morale than the Captain, who sat at the top of the ship's chain—of—command did. The commanding officer was ultimately responsible for the training, health, welfare, and discipline of the crew, and the ship. As a result, ships and their crews often reflected the personalities of their captains, and <a href="Constellation">Constellation</a> was no exception. One of the captain's duties was to transform the collection of veterans and recruits of the ship's company into an efficient team.

Although there were some seasoned hands aboard when <u>Constellation</u> left Portsmouth (New Hampshire) Navy Yard in March 1862, her crew was not yet fully trained. Yeoman Safford observed shortly after the ship had its first call to quarters, "We were not in readiness for action. We demonstrated the lack of drill." The scene was probably repeated on almost every ship in the fleet at least once during the war. The ship's captain, Commander Henry K. Thatcher, initiated a regimen of formal instruction, regular exercises, and surprise practices in which the men learned what was required. They had to be proficient in executing tactics that would enable them to fight, as the naval manuals said, "by land and sea," by exercising the guns, handling small arms, pikes and cutlasses, and manning the boats. They also had to be ready to execute hasty repairs of battle

Volume 1 Number 1 April 2002 damage, fight fires, and keep the ship afloat while continuing to sail. Every man had to know his assigned duty, as well as those of several comrades, should they become causalities. The survival of the ship and men depended on it.<sup>13</sup>

Training the crew was no easy task. Midshipman Blake wrote in his journal, "I have been quite busy all day, drilling the gun crews. Rather up hill work." One can almost feel the frustration in his words, but the sailors were not all that was green. Yeoman Safford, referring to Blake, probably expressed the opinion of many "old salts" when he wrote, "What a bore to be drilled by one like the midshipman in command of our Division, whose proficiency is acquired entirely from reading a book just prior to the drill." Both officers and men had a lot to learn about their new professions. 14

To prevent monotony and improve readiness for action, the captain would vary the training sequences, so no two days' schedules were alike. Drills could be called at any time. Midshipman Blake recalled one surprise drill saying, "Last night we had general quarters. The captain went himself and called the music, and not a soul but himself knew that we were to have them before the drum beat." General Quarters was the alarm to man battle stations and prepare the ship to fight. With the sound of the drum roll and alarm rattles, boatswains' whistles, and the shouted order for "all hands prepare ship for action," men ceased routine activity or sprang from their sleep to perform those duties that their training had made second nature to them. Safford described the scene from a petty officer's perspective. "General Quarters. At the roll of the drum out of their hammocks came the watch below; then begins the general scramble." Each man knew his station, and reported there immediately, as Safford commented, "I was the first man to report to the officer of my station being in the 5<sup>th</sup> Division at the Starboard Shell Room."

In battle, a warship's main strength was found in her "great guns." <u>Constellation</u>'s main battery consisted of twenty cannon mounted on naval four-truck carriages located on the gun deck. This gave her a broadside of ten guns each to port and starboard: eight 8-inch Navy Chambered Shell Guns flanked by two 32-pounder Long Guns. An 8-inch shell gun, serviced by a crew of 14 men and a powder boy, could fire a 51.5-pound exploding shell to a range of 2,300 yards. The 32-pounders were each served by a crew of 12 men and a powder boy, and fired a 32-pound solid shot cannon ball for 2,731 yards. <sup>17</sup>

Each gun crew was responsible for a pair of guns: one on the port side, and its opposite number on the starboard. The gun crews grouped into two divisions. Commanded by a lieutenant, each division had four 8–inch and one 32–pounder gun crews. A quarter gunner, who constantly saw to the readiness and maintenance of the guns and their paraphernalia, assisted the division officer. The First Division, located on the forward gun deck, was commanded by the First Lieutenant, followed aft by the Second Division, commanded by the next ranking line officer, the Second Lieutenant. Each gun crew had an even number of men, designated 1<sup>st</sup> and 2<sup>nd</sup> for each position, with titles reflective of

Volume 1 Number 1 April 2002 their duties, plus a powder boy. Each gun crew had at least one petty officer who served as the gun captain. The Captains of guns gave the commands, primed, aimed and fired the weapons. The Spongers swabbed the tubes to extinguish burning embers, and rammed home the new cartridges and projectiles. The Loaders placed the cartridges and projectiles in the muzzle, and assisted the spongers. The Shot—or Shellmen procured the projectiles and wadding, and passed them to the loaders. The Handspikemen raised the breach of the gun so the quoin could be moved to adjust the range, or elevation of the muzzle. The Train and Side Tacklemen hauled on the ropes that ran the guns in and out, and trained, or adjusted the direction left and right. If the "first" crewman became disabled, the "second" would assume his duties. If the ship had to fight on both sides, the first captains, spongers and loaders would man one gun, while their seconds served its opposite number, and the remaining "shifting men" moved between the two, and helped to serve both. 18

A secondary battery of two rifled cannon mounted on pivot carriages located on the spar, or top, deck formed the Third Division. The pivot mounts permitted these rifles to fire at greater elevations and on a wider arc than those on the gun deck did, and with fewer crewmen. A 30–pounder Parrott Rifle was located on the forecastle, near the bow. Serviced by a crew of nine, including a powder boy, it fired a 29–pound shell to a maximum range of 6,700 yards. A 20–pounder Parrott Rifle was located at the stern. Serviced by a crew of seven, including a powder boy, it could fire its 19–pound shell 4,400 yards. <sup>19</sup>

Constellation had additional armament in three 12–pound Dahlgren Bronze Boat Howitzers, two heavy one light. These weapons were used in the ship's boats to pursue and attack enemy vessels in shallow water, attack other small boats, cover the landing of troops, or disembark with seamen and marines for shore operations. Each had a crew of eight men, and was mounted in the bow of a launch on a boat carriage that allowed 120° traverse without changing the vessel's course. Upon landing, the crew could mount the piece on its wrought iron field carriage. Sailors using a drag rope hauled the field carriage. A small wheel at the end of the trail eased movement, and was turned up when firing. The howitzers were primarily anti–personnel weapons for close combat, and could fire exploding shell, shrapnel or spherical case, and canister munitions. The weapons could fire a 10–pound shell for 1,085 yards, or a 13–pound shrapnel shell 1,150 yards. A well–drilled crew that could fire 3 or 4 rounds per minute was considered adequate. The field carriage also allowed the howitzers to be used on the spar deck. <sup>20</sup>

While the gun crews assembled at their guns and prepared them for firing, the rest of the ship's company were reporting to their stations. The Fourth Division, also known as the Master's Division, was composed of twenty–four enlisted men who were stationed in the tops, and those who attended the rigging, sails, steering the vessel and signals. The Executive Officer, the ship's second in command, controlled the division from the quarterdeck. This arrangement enabled him to assume command immediately in the

Volume 1 Number 1 April 2002 event the captain was wounded and prevented any confusion or delay in the passing of sailing orders. The master, who took station on the quarterdeck, and the boatswain, who positioned himself on the forecastle, assisted the executive officer. The assignment of the line officers to divisions by their descending order of seniority placed the least experienced lieutenants closest to quarterdeck, where they could be observed, supervised, and mentored by the ship's executive officer. The captain also posted himself on the quarterdeck, where he could best control the ship.<sup>21</sup>

A midshipman usually commanded the Fifth Division, also called the Powder Division. It supplied the gun crews with ammunition, and consisted mostly of men from departments whose routine duties were below deck. The gunner took charge of the large magazine and forward shell rooms. The gunner's mate supervised the smaller magazine aft. Three chains of sailors passed the powder cartridges in leather passing boxes upward through scuttles to the gun deck, where waiting powder boys carried them to their guns. The empty passing boxes were returned to the magazines through canvas chutes, where they were reloaded, and the process repeated. Shells and solid shot were placed in wooden boxes, and hoisted up through hatches using shell whips to the gun or spar deck, were they were unloaded. The projectiles were then placed in racks or boxes near the guns, while the empty boxes were returned below and reloaded in a continuous process. The officer in charge of the Powder Division also saw that the means for lowering the wounded to the hold and conveying them to the surgeon's station was in place and functioning. <sup>22</sup>

The carpenter's and sail maker's departments reported to the Powder Division, but worked under the direction of their respective warrant officers. They removed stanchions and bulkheads, and placed gratings over the hatches to facilitate handling the guns and minimize the effects of flying splinters. They then secured all portholes, prepared the pumps for controlling leaks, rigged the fire engine, and checked the flood cocks. During a fight, they stood by with plugs and patches to repair shot holes, clear wreckage and fight fires. The master—at—arms and his corporals extinguished galley fires and all unauthorized lights, and insured the safe use of lamps where they were required. They had loose gunpowder swept from the deck, or dumped from passing boxes over tubs of water, to prevent accidental ignition.<sup>23</sup>

The surgeon, along with his assistant surgeons, steward (petty officer) and nurses (lower enlisted men) of the Surgeon's Division established an aid station in the cockpit, a section of the hold below the waterline. They prepared tourniquets for controlling the bleeding of the wounded, and distributed them to the various divisions. The paymaster secured the cash, books, and stores in the wardroom, while his steward safeguarded the property in his custody in his compartment, and kept an eye on the spirit room.<sup>24</sup>

The Division of Marines formed ranks on the quarterdeck, loaded their muskets and fixed bayonets. Under the command of their lieutenant, they stood by to execute the captain's

Volume 1 Number 1 April 2002 orders to fire into the opposing ship, repel boarders, man cannons, or lead an assault that would take the fight to the enemy. <sup>25</sup>

Pistols, cutlasses, muskets, boarding pikes and battleaxes were distributed to sailors from the armory. Each man knew his position and function in the event of any contingency. In addition to their duties on the guns, each member of a gun crew was designated as members of either the First or Second Division of Boarders. In a close–in fight, the second half of the gun crew of each piece, and all petty officers on the spar deck except the quartermasters at the wheel and on the conn, were First Boarders, armed with pistols and cutlasses. The first halves of each gun crew were the Second Borders. When the order to "Board the Enemy" was given, the broadside guns continued to fire with depressed elevations to damage enemy's gun deck and hull. The spar deck guns were loaded with grapeshot and the howitzers with canister to sweep the enemy's deck. The marines and musket equipped seamen fired at visible enemy personnel. The borders then attacked to seize the opponent following a hail of gunfire.<sup>26</sup>

If an enemy attempted to board <u>Constellation</u>, the order "Prepare to Repel Boarders" would be given to defend the ship. One fourth of the men in each gun crew, and the remainder of the master's division, except those designated as boarders or on the wheel, were assigned as Pikemen. The pikemen formed behind those crewmen armed with cutlasses. The marines, with bayonets fixed, formed behind the pikemen to cover them. At the command "Repel Boarders," grape and musketry was brought to bear upon the enemy as they prepared to attack. Men remaining on the broadside guns continued to fire, and stood by with pikes to repel enemy attempting to enter through gun ports or quarter galleries. The howitzers, charged with canister, stood ready should the enemy gain a foothold on the spar deck. When the emergency became desperate enough to call all hands from below, the pikemen took up muskets, and left their pikes for the members of the powder division to use as they came on deck.<sup>27</sup>

One member of each gun crew was designated a Fireman, and equipped with a fire—bucket and battleaxe to extinguish flames and clear wreckage. All members of the spar deck gun crews, except the 1<sup>st</sup> captains, 1<sup>st</sup> spongers, 1<sup>st</sup> loaders and powder boys, were also assigned as Sailtrimmers. Besides reinforcing the master's division in trimming sails, they also supplemented the firemen and pumpmen, or assembled to be armed with muskets for use as a landing force, and were usually crewmembers of the ship's boats. Each gun crew also furnished one Pumpman.<sup>28</sup>

The number, type and frequency of drills were vital to the ship's defense and the survival of the crew. The realism that went into the training enhanced the crew's motivation and learning ability. The constant drilling, day and night, molded the crew into a well—trained unit as it developed into an efficient fighting team. Yeoman Safford remarked, "Our men have been doing some really extraordinary work at target practice." As their proficiency grew, he added, "Both our Captain and Executive have the confidence of the

Volume 1 Number 1 April 2002 men." As an ultimate testament to their readiness, while recognizing the limitations of their vessel, Safford proudly proclaimed, "our men were very eager for a fight. I do not know what we could have done with a steam ship, but before she had finished us they would have known they were in a fight!"<sup>29</sup>

As the only surviving naval vessel of the American Civil War, USS <u>Constellation</u> recalls the often–overlooked contributions of the United States Navy and Marine Corps in that conflict. President Abraham Lincoln once said in a speech, "Nor must Uncle Sam's web feet be forgotten. At all the watery margins they have been present. Wherever the ground has been a little damp they have made their tracks." Today, their tracks remain indelibly printed on the decks of Constellation.

<sup>&</sup>lt;sup>1</sup> National Archives Records Administration (NARA), USS <u>Constellation</u> Muster Roll dated 1 March 1863, Muster Rolls, U.S. Navy Ships 1862–1865, RG 24.

<sup>&</sup>lt;sup>2</sup> Commodore Chas. S. McCauley and Commander G. S. Blake, USN, <u>Tables of Allowances of Equipment, Outfits, Stores &c., for the Vessels in the Navy of the United States</u> (Washington, DC: A.O.P Nicholson, 1854), 192–4; NARA, USS <u>Constellation Muster Roll dated 10 March 1862, RG 24.</u>

<sup>&</sup>lt;sup>3</sup> Moses A. Safford, "A Man–of–War Man's Diary: A Cruise in an Old Frigate Prefaced by an Autobiography of the Diarist," Diary (Safford Diary), Typewritten Manuscript (TMs), edited by Victor Safford in Boston, MA, 1933 (USS <u>Constellation</u> Archive Collection, Baltimore, MD), B–29–30.

<sup>&</sup>lt;sup>4</sup> Ibid.

<sup>&</sup>lt;sup>5</sup> Ibid., B–30; NARA, <u>Constellation</u> Muster Roll dated 10 March 1862.

<sup>&</sup>lt;sup>6</sup> Ibid., Constellation Muster Roll dated 10 March 1862, and 1 March 1863.

<sup>&</sup>lt;sup>7</sup> Ibid.; McCauley and Blake, 193–4.

<sup>&</sup>lt;sup>8</sup> William P. Schwartz, alias Samuel P. Ramsey, letter (Schwartz letter) to his brother Charles, dated 8 July 1856, typewritten manuscript (TMs) transcribed by Dr. John F. Schwartz, his great grandson, and in his possession in Gettysburg, PA. Schwartz letter to his brother Charles, 8 July 1856; Department of the Navy, <u>Ordnance Instructions for the United States Navy Relating to the Preparation of Vessels of War for Battle (Ordnance Instructions)</u> (Washington, DC: George W. Bowman, 1860), 15, xxi, xxiv.

<sup>&</sup>lt;sup>9</sup> Safford Diary, D–18.

<sup>&</sup>lt;sup>10</sup> McCauley and Blake, 193–4.

<sup>&</sup>lt;sup>11</sup> Ibid., 193–4; Charles F. Blake, Journal 1862–1864, TMs, transcribed by Eleanor Cabot Lyford, his granddaughter (U.S. Naval Historical Center Library, Washington, DC), 1.

<sup>&</sup>lt;sup>12</sup> NARA, Captains Letters, E-37, 57, RG 45; Safford, D-121.

<sup>&</sup>lt;sup>13</sup> Safford Diary, D–10; Ordnance Instructions, 3–6.

<sup>&</sup>lt;sup>14</sup> Safford Diary, D–36; Blake Journal, 6.

<sup>&</sup>lt;sup>15</sup> Ibid.

<sup>&</sup>lt;sup>16</sup> Ordnance Instructions. 3: Safford. D–12, 90.

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 <sup>&</sup>lt;sup>17</sup> NARA, Record of Services, 10 March 1862, Bureau of Ships, RG 45; Edwin Olmstead, Wayne C. Stark, and Spencer Tucker, <u>The Big Guns: Civil War Siege,</u>
<u>Seacoast and Naval Cannon</u> (Bloomfield, Ontario: Museum Restoration Service, 1997), 38–48.

<sup>&</sup>lt;sup>18</sup> Ordnance Instructions, 22, 23, 57, 58.

<sup>&</sup>lt;sup>19</sup> A Treatise on Ordnance and Naval Gunnery, Compiled and Arranged as a Text Book for the U.S. Naval Academy (New York, NY: D. Van Nostrand, 1862), 137–142; Olmstead, Stark, and Tucker, 113–115; Ordnance Instruction, 68, xx.

<sup>&</sup>lt;sup>20</sup> Olmstead, Stark, and Tucker, 103–7; Ordnance Instruction, 77–78

<sup>&</sup>lt;sup>21</sup> Ordnance Instruction, 9, 15, 27–28, xxii.

<sup>&</sup>lt;sup>22</sup> Ibid., 15, 29–30, xxiii, xxiv.

<sup>&</sup>lt;sup>23</sup> Ibid., 12, 15, 29–31, xxiv.

<sup>&</sup>lt;sup>24</sup> Ibid., 14, 27, 32, 93, xxiv.

<sup>&</sup>lt;sup>25</sup> Ibid., 15, 79, xxiv.

<sup>&</sup>lt;sup>26</sup> Ibid., 5, 19, 21–24, 26, 38, 77–79, 160.

<sup>&</sup>lt;sup>27</sup> Ibid., 38, 38, 78.

<sup>&</sup>lt;sup>28</sup> Ibid., 20, 39.

<sup>&</sup>lt;sup>29</sup> Safford, D–119, D–125.