

Article

After They Fell Silent: The Nature and Fate of the Ship Bells Associated with the Vessels Scrapped for the Washington Arms Limitation Treaty of 1922

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Abstract: The Washington Arms Limitation Treaty 1922 was arguably one of the most significant disarmament treaties of the first half of the 20th century. It can be shown that the heritage items associated with this treaty are still extant. Ship's bells are one of the few moveable objects that are specific to the operational life of a ship and are therefore highly symbolic in representing a vessel. This paper surveys which bells of the ships scrapped under conditions of the Washington Arms Limitation Treaty are known to exist. A typology of ship's bells has been developed to understand the nature of bell provisioning to vessels newly commissioned into the U.S. Navy. Each of the countries associated with the Washington Treaty have divergent disposal practices with respect to navy property, and this is reflected in both the prevalence and nature of custodianship of ship's bells from this period. Such procedures range from the U.S. requirement commanding all surplus Navy property to be deemed government property upon ship deactivation, to the British practice of vending ship's bells to private parties at public sales. However, ship's bells, like many obsolete functional items, can be regarded as iconic in terms of heritage and therefore warrant attention for future preservation and presentation in the public domain.

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1. Introduction

In the past decade, the field of conflict archaeology has moved from being a fringe aspect of heritage management to becoming a sub-discipline in its own right. Much of the work on conflict heritage of the 20th century focusses on a range of military installations and battlefields primarily associated with World War I [1–3] and World War II [4–11], as well as associated objects such as ships [12], aircraft [13,14], tanks [15], and gun installations [16,17]. There is also an extensive body of research that deals with submerged shipwrecks, both individual wrecks [18] and of groups of sunken vessels, either derived from single military operations [19–21] or as part of organized denial through scuttling [22]. Yet little research has been carried out into the whereabouts of ships that were associated with specific events but that were not sunk in action and thus were disposed of in the normal course of action due to their obsolescence [23].

Such specific events include arms limitation treaties, which are bi-lateral or multi-lateral agreements designed to prevent an escalation of an arms race and thus defuse conditions that could lead to an open military conflict. Most treaties are designed to limit new construction to mutually agreed levels, such as the Anglo-German Naval Agreement of 1935 [24]. A few treaties are designed not only to limit arms to agreed levels, but also to *reduce* the overall number of arms in the signatories' arsenals, such as the Washington

Arms Limitation Treaty 1922. Despite consensual agreements limiting military assets such as naval tonnage and the make-up of large ships through acts of scrapping or scuttling, there is evidence that heritage items associated with such treaties are still extant [25]. Guns removed from such ships, for example, were re-installed as part of coastal defence systems in areas including the Pacific Coast of the U.S., Micronesia, Aleutian Islands (Alaska), and Banaba (Kiribati) [25]. However, to date, limited research has investigated the fate of vessels and associated items with limitation treaties, and this study is one of the few that do so.

Alongside tangible objects such as armaments existing despite arms limitation treaties, other objects existed that have both tangible and intangible heritage dimensions, the intangible component existing due to a sound being purposefully emanated through the object's functional use [26,27]. Such an example is a ship's bell, an object legally required to be provided on all vessels of 12 m or more in length [28].

Traditionally, ship's bells fulfilled two functions, one operational and one navigational. On an operational level, the bell audibly signalled the passing of time on a ship. Crew duties, in particular of naval vessels, were divided into watches of four hours' duration, with the bell signalling the passage of each half hour (with eight bells signalling the end of watch) [29]. In addition, for vessels at anchor in areas of restricted visibility such as fog, the bell would act as a navigational warning aid, being rung rapidly for about five seconds at intervals of no less than one minute to alert other ships of one's presence [28]. Any vessel aground in similar weather was required to follow the same bell directive, with the addition of three separate and distinct strokes on the bell immediately before and after the rapid ringing of the bell. Land-based fog bells as well as those located on light vessels served a directional navigational purpose, with the pattern of bell ringing at each location having a distinctive number of strokes within a given period [30,31].

At least among larger ships, the ship's bell carries the name of the vessel, either in relief or more commonly engraved in large letters, with the engraving blackened to make the name stand out. If a ship's bell is inscribed also with a year, that date reflects the year the ship was formally commissioned rather than the year it was launched.

The bells of naval vessels hold special significance for the men and women who served on them:

"A warship's bell is something that all onboard are familiar with. In days gone by they were the 'heart-beat' of a ship's routine, marking the passing of watches and other important ceremonies such as the raising of morning colours when in port or at anchor. Every member of a ship's company is familiar with its ring and as such these bells are important artefacts which, long after a ship is lost in action or decommissioned, form a 'touchstone' for former shipmates and relatives of those who served, fought and died in them" (John Perryman) [32].

Ship's bells, apart from builder's plates, are the only (re-)moveable object specific to any given ship¹ and therefore are highly sought after by collectors of maritime memorabilia [33–35]. The bells are generally removed once a ship is decommissioned and scrapped, with the bells retained or disposed as the owners deem appropriate. Among shipwrecked and sunken vessels, especially in situations where damage to the vessel is extensive due to environmental decay or due to wartime or collision impact, bells can provide conclusive proof of the identity of a shipwrecked vessel [36–40]. Not surprisingly, they are highly sought after by wreck divers [40,41] specifically because they are a single iconic item and therefore endowed with a "trophy" status [42,43]. Consequently, bells are

¹ There are a number of other items that may carry the name of the vessel, such as bands for sailor's hats carrying the name of the vessel or mess items where the vessel's name is shown on the décor or engraved on utility as well as decorative tableware. Examples of the latter are listed in Table 9. These are items that constitute part of the moveable cultural heritage associated with a vessel. They do not exist for every vessel and are in a "lesser league" than builder's plates and ships' bells. Builder's plates carry the hull construction number and represent the formal registration of the vessel, whereas the ship's bell is the sole item that is associated with the operational history of the vessel, from commissioning to decommissioning.

salvaged for personal collections or for profit, even though they are frequently acquired illegally from protected shipwrecks [38,44–46].

This paper describes the fate of the ships that each of the signatory powers agreed to disarm and scrap as a result of the Washington Arms Limitation Treaty 1922. It also explores specifications, characteristics, and current locations, custodianships, and dispositions of any surviving ship's bells associated with these vessels. In doing so, it provides a classification of U.S. Navy and Lighthouse Service bells to create a novel working typology for ship's bells of this period.

2. The Washington Naval Conference of 1922

During World War I, Imperial Germany lost all of its possessions in the Pacific region: German New Guinea and Nauru was occupied by Australia, Samoa by New Zealand and Jiaozhou (China), and the German possessions in Micronesia, comprising the Mariana, Palau, Caroline, and Marshall Islands, by Japan [47,48]. In 1919 the newly founded League of Nations established a system of mandated territories to administer the colonies and overseas possessions that Imperial Germany lost as stipulated by the Peace Treaty of Versailles [49], with §119 noting that these territories were “best administered under the laws of the Mandatory as integral portions of its territory” (ibid). This had the potential to dramatically change the geopolitical realities in the Pacific as Japan now controlled a major sector of the Western Pacific, effectively separating the U.S. possessions of Guam and the Philippines from Hawai'i and the mainland USA. To achieve a political and contractual understanding of the new order that developed after the conclusion of World War I, representatives of nine nations from Belgium, the British Empire, China, France, Italy, Japan, the Netherlands, Portugal, and the United States of America met in Washington, D.C., between 12 November 1921, and 6 February 1922 [50–54]. Of particular concern were the future power relations in the Pacific region.

During the Washington conference an array of treaties was agreed upon. Central to this paper is the Arms Limitation Treaty in which France, Italy, Japan, the United Kingdom, and the United States “contribute to the maintenance of the general peace, and to reduce the burdens of competition in armament” [55]. The most readily visible effect of the Arms Limitation Treaty related to the capital ships. It was widely recognized that the naval arms race between the United Kingdom and German Empire in the decade leading up to World War I caused other nations to also heavily invest in their battle fleets if they wished to maintain the balance of power. Although the Imperial German Navy effectively ceased to exist after World War I, the other nations were still able to put sizeable battle fleets to sea. The Washington Treaty instituted a 10-year moratorium on new capital ships (ibid Part 3 § 1), reduced the overall total tonnage of capital ships afloat (ibid §4), limited the size of replacement ships that could be built (ibid §5), including their maximum armament (ibid §6), and fixed the overall tonnage ratio between the five powers (ibid §4). The formal ratio of capital ships and aircraft carriers (measure in tons of displacement) agreed between the five nations was as follows:

	British Empire	United States	Empire of Japan	France	Italy
Capital ships	533,000	533,000	320,000	178,000	178,000
Aircraft carriers	137,000	137,000	82,000	61,000	61,000

3. The Fate of the Washington Ships

To comply with the conditions, each of the signatory powers agreed to disarm and scrap within 18 months a large number of capital ships based on a scrapping and replacement schedule (Washington Arms Limitation Treaty 1922 Part 3 § 2). Onwards sale of these ships was not permitted. Not surprisingly, of course, it was the old and outdated ships that were struck off the active lists as well as ships that were under construction but were not completed (Table 1, Figures 1 and 2). Although the specific scrapping of existing

vessels without replacement (in order to reduce existing tonnage to agreed limits) was restricted to the British Empire, the United States, and Japan, both Italy and France also decommissioned warships that otherwise would have been retained for several years. As they were essentially obsolete, however, they were scrapped in order to free up tonnage for new construction. These vessels, such as the formerly Austrian and later Italian SMS *Tegethoff* (1912), were excluded from this study.

Table 1. The details and fate of the warships disposed of under the terms of the Washington Arms Limitation Treaty (for details of shipyards).

Ship	Shipyard	Launched	Commissioned	Fate of Ship
<i>Aki</i> (安芸)	Kure	1907	1911	Sunk as target 1924
<i>Amagi</i> (天城)	Mitsubishi	incomplete	—	Scrapped 1924
<i>Asahi</i> (朝日)	John Brown & Co	1899	1900	Retained, depot ship
<i>Hizen</i> (肥前) *	William Cramp	1900	1908 **	Sunk as target 1924
<i>Ibuki</i> (伊吹)	Kure	1907	1907	Scrapped 1923
<i>Ikoma</i> (生駒)	Kure	1906	1908	Scrapped 1923
<i>Iwami</i> (生駒) ***	Galerniy	1904	1907 **	Sunk as target 1924
<i>Kashima</i> (鹿島)	Elswick	1905	1906	Scrapped 1924
<i>Katori</i> (香取)	Vickers, Barrow	1905	1906	Scrapped 1925
<i>Kurama</i> (鞍馬)	Yokosuka	1907	1911	Scrapped 1923
<i>Mikasa</i> (三笠)	Vickers	1900	1902	Retained, memorial
<i>Satsuma</i> (薩摩)	Yokosuka	1910	1910	Sunk as target 1924
<i>Settsu</i> (摂津)	Kure	1911	1912	Used as target ship
<i>Shikishima</i> (敷島)	Thames Iron Works	1898	1900	Retained, training hulk
<i>Tosa</i> (土佐)	Mitsubishi	1921	—	Scuttled 1925
<i>HMAS Australia</i>	John Brown & Co	1911	1913	Scuttled 1924
<i>HMS Agamemnon</i>	Beardmore	1906	1908	Used as target ship
<i>HMS Agincourt</i>	Armstrong	1913	1914	Scrapped 1922
<i>HMS Bellerophon</i>	Portsmouth	1907	1909	Scrapped 1921/1922
<i>HMS Collingwood</i>	Devonport	1908	1910	Scrapped 1922
<i>HMS Colossus</i>	Scotts	1910	1911	Retained
<i>HMS Commonwealth</i>	Fairfield	1903	1905	Scrapped 1921/1922
<i>HMS Conqueror</i>	Beardmore	1911	1912	Scrapped 1922
<i>HMS Dreadnought</i>	Portsmouth	1906	1906	Scrapped 1921/1922
<i>HMS Erin</i> ****	Vickers	1913	1914	Scrapped 1922
<i>HMS Hercules</i>	Palmers	1910	1911	Scrapped 1921/1922
<i>HMS Indomitable</i>	Fairfield	1907	1908	Scrapped 1921/1922
<i>HMS Inflexible</i>	John Brown & Co	1907	1908	Scrapped 1922
<i>HMS Lion</i>	Portsmouth	1910	1912	Scrapped 1924
<i>HMS Monarch</i>	Elswick	1911	1912	Sunk as target 1925
<i>HMS Neptune</i>	Portsmouth	1909	1911	Scrapped 1922
<i>HMS New Zealand</i>	Fairfield	1911	1912	Scrapped 1922
<i>HMS Orion</i>	Portsmouth	1910	1912	Scrapped 1922
<i>HMS St. Vincent</i>	Portsmouth	1908	1910	Scrapped 1921/1922
<i>HMS Superb</i>	Elswick	1907	1909	Scrapped 1922
<i>HMS Temeraire</i>	Devonport	1907	1909	Scrapped 1921/1922
<i>USS Connecticut</i>	New York YD	1904	1906	Scrapped 1923/1924
<i>USS Delaware</i>	Newport News	1909	1910	Scrapped 1924
<i>USS Georgia</i>	Bath Iron Works	1904	1906	Scrapped 1923/1924
<i>USS Illinois</i>	Newport News	1898	1901	Retained, armoury

USS <i>Indiana</i>	New York NY	incomplete	—	Scrapped 1923
USS <i>Iowa</i>	Newport News	incomplete	—	Scrapped 1923
USS <i>Kansas</i>	New York SC	1905	1907	Scrapped 1924
USS <i>Louisiana</i>	Newport News	1904	1906	Scrapped 1923/1924
USS <i>Maine</i>	William Cramp	1901	1902	Scrapped 1922
USS <i>Massachusetts</i>	William Cramp	incomplete	—	Scrapped 1923
USS <i>Michigan</i>	New York SC	1908	1910	Scrapped 1923/1924
USS <i>Minnesota</i>	Newport News	1905	1907	Scrapped 1924
USS <i>Missouri</i>	Newport News	1901	1903	Scrapped 1921/1922
USS <i>Montana</i>	Mare Island	incomplete	—	Scrapped 1923
USS <i>Nebraska</i>	Moran Brothers	1904	1907	Scrapped 1922/1923
USS <i>New Hampshire</i>	New York SC	1906	1908	Scrapped 1923
USS <i>New Jersey</i>	Fore River	1904	1906	Sunk as target 1923
USS <i>North Carolina</i>	Norfolk NY	incomplete	—	Scrapped 1923
USS <i>North Dakota</i>	Fore River	1908	1910	Retained, target ship
USS <i>Ohio</i>	Union Iron Works	1901	1904	Scrapped 1923
USS <i>Oregon</i>	Union Iron Works	1893	1896	Retained, memorial
USS <i>Rhode Island</i>	Fore River	1904	1906	Scrapped 1923
USS <i>South Carolina</i>	William Cramp	1908	1910	Scrapped 1924
USS <i>South Dakota</i>	New York NY	incomplete	—	Scrapped 1923
USS <i>Vermont</i>	Fore River	1905	1907	Scrapped 1923/1924
USS <i>Virginia</i>	Newport News	1904	1906	Sunk as target 1923
USS <i>Washington</i>	New York SC	1921	—	Sunk as target 1924

Shipyards: Armstrong—Armstrong, Newcastle upon Tyne, UK; Bath Iron Works—Bath Iron Works, Bath, Maine, USA; Beardmore—William Beardmore and Company, Dalmuir, UK; Devonport—HM Royal Dockyard, Devonport, UK; Elswick—Armstrong Whitworth, Elswick, UK; Fairfield—Fairfield Shipbuilding and Engineering, Govan, UK; Fore River, MA—Fore River Shipyard, Quincy MA, USA; Galerniy—Galerniy Island Shipyards, Saint Petersburg, Russia; John Brown—John Brown & Co, Clydebank, UK; Kure—Kure Naval Arsenal, Kure, Japan; Mitsubishi—Mitsubishi, Nagasaki, Japan; Mare Island YD—U.S. Naval Yard, Mare Island, Vallejo, CA, USA; Moran Brothers, WA—Seattle Dry Dock & Ship Building Company, Moran Brothers, Seattle, WA, USA; New York YD—U.S. Naval Yard, New York, NY, USA; New York SC, NY—New York Shipbuilding Corporation, New York, NY, USA; Newport News, VA—Newport News Shipbuilding & Drydock Company, USA; Norfolk YD—U.S. Naval Yard, Norfolk, VA, USA; Palmers—Palmers, Jarrow, UK; Portsmouth—HM Royal Dockyard, Portsmouth, UK; Scotts—Scotts, Greenock (Clyde), UK; Thames Iron Works—Thames Iron Works, Blackwall, London, UK; Union Iron Works, CA—Union Iron Works, San Francisco, CA, USA; Vickers—Vickers, Barrow-in-Furness, UK; William Cramp—William Cramp & Sons Shipbuilding, Philadelphia, PA, USA, Yokosuka—Yokosuka Naval Arsenal, Yokosuka, Japan. * ex Retvizan, Ретвизан; ** year commissioned into the Japanese Navy; *** ex Oryol, Орёл; **** ex Reşadiye.

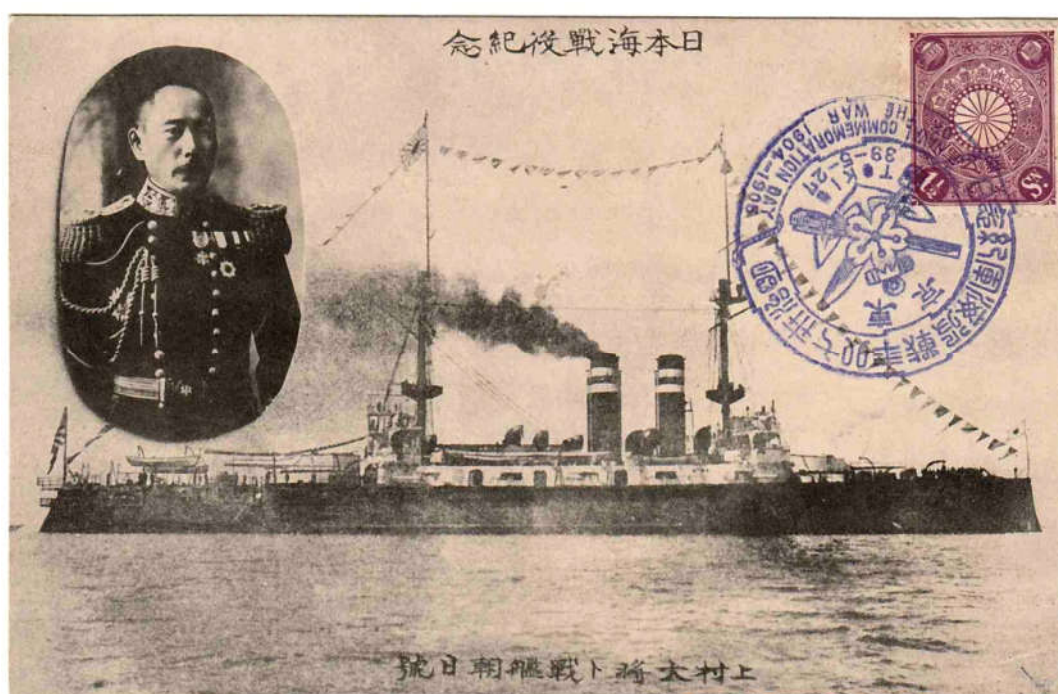


Figure 1. The Japanese battleship *Asahi* (朝日) as shown on a contemporary postcard (source: author). (The captions on the card read 日本海戦役記念 / Sea of Japan Campaign Memorial and 上村大將と戦艦朝日号/ General Uemura and Battleship *Asahi*).

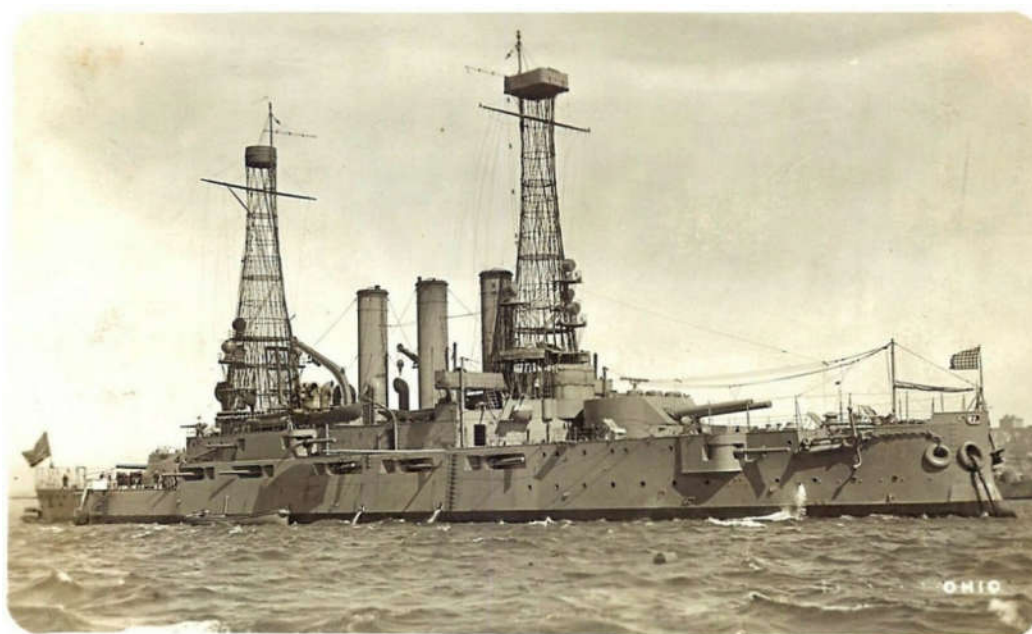


Figure 2. The U.S. battleship USS *Ohio* (BB-12) as shown on a contemporary real photo postcard (source: author).

The cultural heritage assets related to the development and signature of the Washington Arms Limitation Treaty, in particular the fate of the vessels and their armament, have been discussed elsewhere [25], so a brief summary may suffice. In principle, the signatory nation was at liberty to dispose of its ships via three options: breaking up the vessel for scrap, scuttling and sinking it, or using it for target practice, with subsequent scrapping or scuttling. In addition, and subject to the acquiescence of the other signatories, a small

number of ships could be disarmed and retained for non-combatant purposes, such as training hulks. In the process of disposal, the armament of most vessels was landed and placed in storage for later use as coastal defence guns or on merchant vessels during WWII [25,56–59]. Given the adjustment in tonnage needed, the scrapping or scuttling only affected the fleets of the Empire of Japan, the United Kingdom, and the United States of America (Table 1).

4. Bells of U.S. Navy Vessels

During the late nineteenth and early twentieth centuries, U.S. Navy vessels had two bells, both inscribed with the ship's name: the ship's main bell, usually mounted or near the bridge, and a bell mounted at the quarter deck.

4.1. Specifications

The United States Navy issued general specifications for the manufacture of bells used on ships (Figure 3) [60]. The size and pitch of the bronze bells depended on the size of the vessel. For the U.S. battleships under discussion here, two size classes apply, class C for battleships under 12,000 tons (Indiana class) and class D for battleships over 12,000 tons displacement (Maine class, Connecticut class, Virginia class, South Dakota class). Class C bells were 600 lb (approximately 270 kg) bells of 27 1/8" (689 mm) height with a 31" (787 mm) swing, whereas class D bells were 800 lb (approximately 360 kg) bells of 29 3/4" (756 mm) height with a swing of 34" (864 mm). Class C bells were to be tuned to B natural, whereas class D bells were tuned to B flat [60]. The bell weights (without clapper and fittings) of 600 lbs and 800 Lbs had permissible tolerances $\pm 2\%$. The U.S. Navy required that the bells be made from "about 78 per cent of best new Lake Superior copper and about 22 per cent of new block tin" and be plain with a bright finish on the outside. The layout and size of the letters (1 1/2" high) was also specified [60].

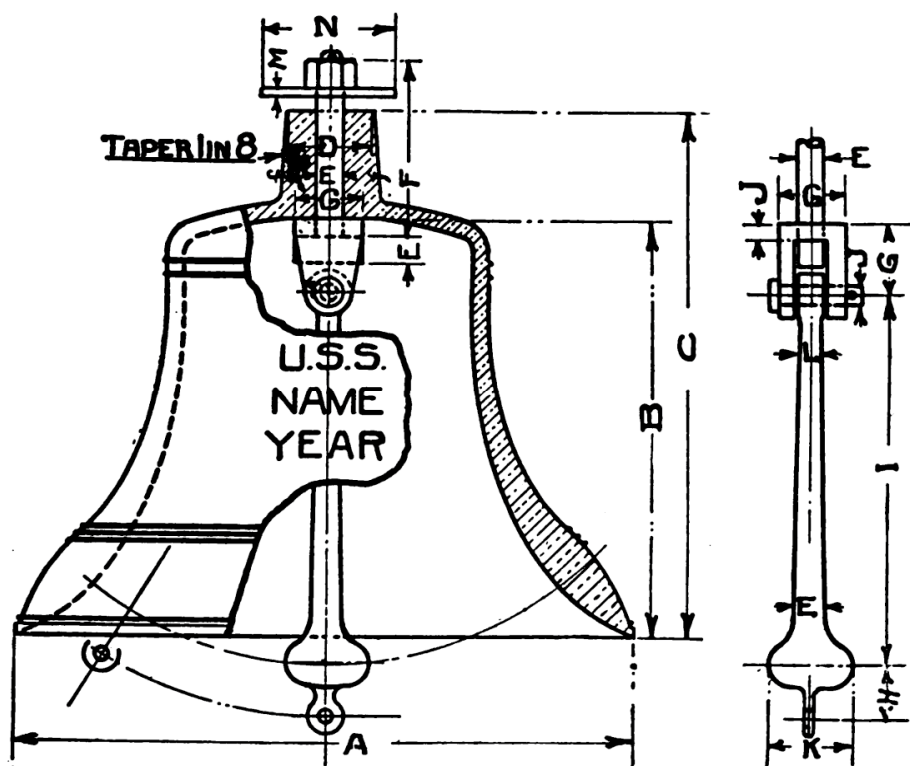


Figure 3. The U.S. Navy specifications for the manufacture of bells used on ships [60].

Additional, more restrictive specifications could be issued for the construction of specific ships. The U.S. Navy specification for the construction of USS *Connecticut* (BB-18), for example, clearly stipulated that the watch bell should be “[a] clear sounding bell of composition, weighing not less than 800lb and engraved with name of vessel and date only, to be provided and suitably hung” [61]. A similar specification was issued for the construction of the cruiser USS *Washington* (ACR-11) [62]. As the actual bell cast for USS *Connecticut* shows, the specifications were not always followed to the letter (see below).

4.2. Type and Origin of the Bells

A number of bell foundries operated in the United States during the late 19th and early 20th centuries. Although churches and schools were their main clients for larger bells (see, for example, the list of castings in the ledgers of the Meneely Bell Company, Troy, NY, USA) [63], the foundries also cast bells for shipyards and for U.S. government agencies, such as the U.S. Navy and the U.S. Lighthouse Service (for use as fog bells). Major bell foundries were William Blake & Co (Boston, MA, USA), Meneely & Co. (West Troy/Watervliet, NY, USA), Meneely Bell Company (Troy, NY, USA), McShane Bell Foundry Co (Baltimore, MD, USA), Vanduzen & Tiet (Cincinnati, OH, USA), and E.A. Williams (Jersey City, NJ, USA). In the ideal world, it would be easy to correlate the bell of a given ship with the foundry where it was cast, either via records or via inscriptions on the bell itself. This proved not to be the case, as detailed records are hard to come by and most U.S. Navy bells lack foundry marks.

The bells of several U.S. Navy vessels included in the list (Table 2), as well as those of ships of the same vintage, could be examined, but do not exhibit any foundry marks: USS *Georgia* (BB-15) (commissioned 1906) [64], USS *New Jersey* (BB-16) (1906) [65], USS *North Dakota* (BB-29) (1910) [66], USS *Rhode Island* (BB-17) (1906) [67], USS *South Carolina* (BB-26) (1910) [68], and USS *Vermont* (BB-20) (1907) [69].

The absence or removal of foundry marks seems to have been a practice for bells of other U.S. capital ships of similar vintage, such as USS *Maryland* (ACR-8) (1905) (Figure 4), USS *Montana* (ACR-13) (1908) [70], USS *North Carolina* (ACR-12) (1908) [71], USS *Ohio* (BB-12) (1904) (Figure 2) [72], and USS *Texas* (BB-35) (1914) [73].

Given that some of the bells supplied to the U.S. Lighthouse Service are of the same weight (500 lbs to 1000 lbs) as those supplied to the U.S. Navy, it is worth assessing whether there are foundry-specific patterns in the decoration of bells, in particular whether the placing and nature of decorative belts might aid in the identification of bell foundries on bells that lack a foundry mark. A survey of large bells used by the U.S. Navy and the U.S. Lighthouse Service, drawing on images accessible on the world-wide web (WWW), allowed us to develop a typology (Table 2) based on decoration patterns as well as mounting types (for terminology see Figure 5; for dichotomous key for the identification see Table 3. The principal arrangement of the types is by the number of bands: first those of the shoulder, then those of the waist and sound bow, and finally of the neck. Some of types, as far as they relate to capital ships of the U.S. Navy, are illustrated in Figure 6. It should be noted that the age ranges and foundries are only indicative, as most bells do not carry foundry marks or years of casting. Thus some of the data in Table 3 have to be considered a work in progress.

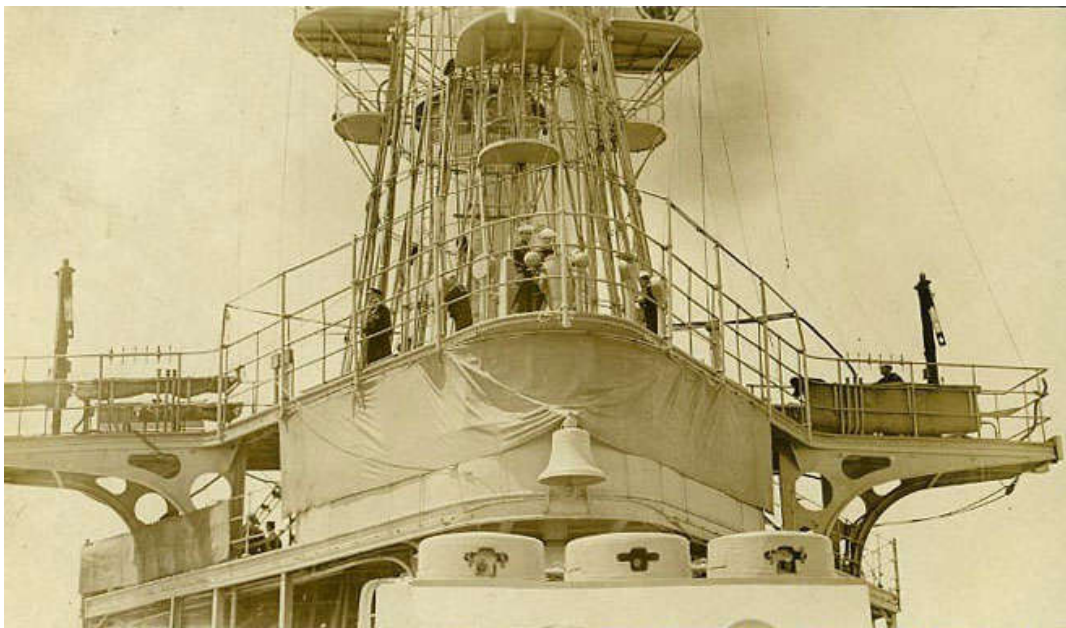


Figure 4. The bridge of USS *Maryland* (ACR-8) in 1912, showing the mounting of the bell on a Pennsylvania-class armoured cruiser. The bell is mounted externally on the bridge [74].

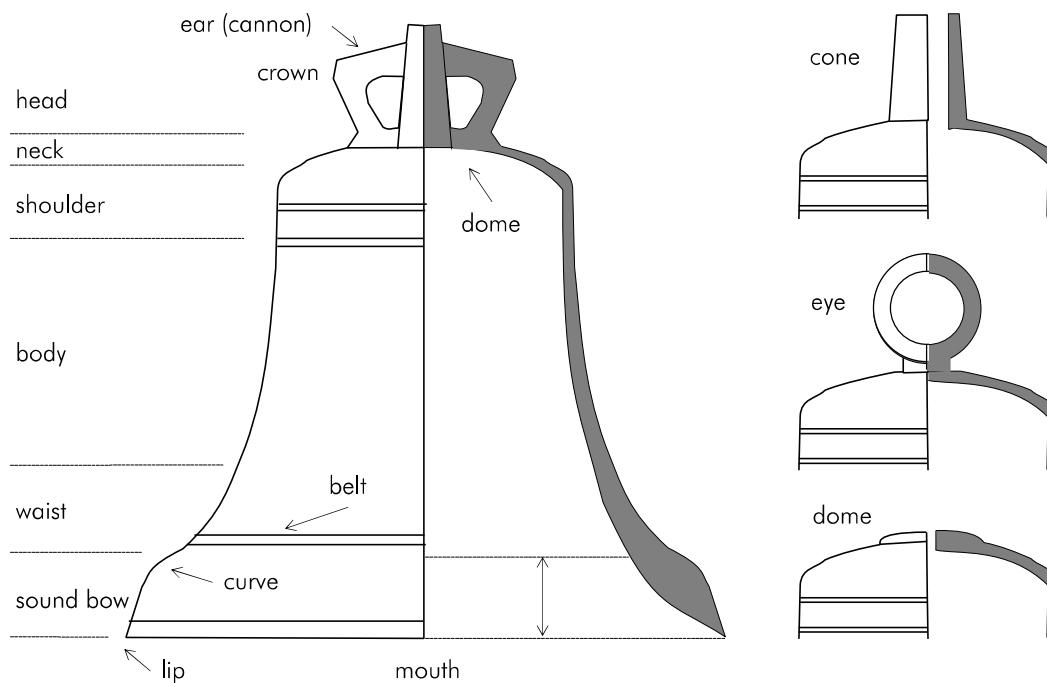


Figure 5. The terminology of the bells and bell parts used in this paper.



Figure 6. The types of bells deployed on large U.S. Navy warships (1893–1921) (for typology see Table 3).

Table 2. The functional and decorative characteristics of the types of 500 lb–4000 lb bells used by the U.S. Navy (USN) and the U.S. Lighthouse Service (USLS) (1885–1926) (see Figure 6).

U.S. Type	Variant	Head	Lettering	Shoulder		Lower Waist		Sound Bow		Neck		Period	Service	Foundries
				1 Belt(s)	Spacing	2 Belt(s)	Spacing	3 Belt(s)	Spacing	Belt(s)	Spacing			
I		short cone	engraved	2 beads		1 bead		blank		2 beads		1893–1908	USN	
II	a	flat	raised	2 beads		2 beads		1 bead		2 beads		<1904–1911>	USLS	Meneely & Co
	b	eye	raised	2 beads		2 beads		1 bead		2 beads		<1912>	USLS	Meneely & Co
III		flat	raised	2 beads		2 beads		2 beads		3 beads	even	<1904>	USLS	Williams
IV		flat	engraved	2 beads		2 beads		blank		blank		<1855>	USLS	
V		flat	engraved	2 beads		3 beads	even	1 bead		3 beads	even	<1855>	USLS	Bernhardt
VI	a	long cone	engraved	2 beads		3 beads	even	1 bead		blank		<1918–1920>	USN	
	b	long cone	raised	2 beads		3 beads	even	1 bead		blank		<1915>	USN	
VII		long cone	engraved	2 beads		3 beads	even	2 beads		blank		<1914>	USN	
VIII		flat	raised	2 beads		3 beads	even	2 beads		3 beads	even	<1901–1914>	USLS	Garratt, Meneely & Co
IX		flat	engraved	2 beads		3 beads	even	3 beads	even	2 beads		<1907>	USLS	Williams
X		flat	none	2 beads		3 beads	even	blank		blank		<1898>	USLS	White & Deronn
XI		flat dome	raised	2 beads		3 beads	pair + 1	1 bead		1 belt		<1893>	USLS	Vanduzen
XII		eye	engraved	2 beads		blank		blank		2 steps		<1895>	USN	
XIII		long cone	engraved	3 beads	even	blank		blank		blank		<1904>	USN	Meneely & Co
XIV		long cone	engraved	3 beads	even	2 beads		1 bead		2 beads		1912–1917	USN	
XV		long cone	raised	3 beads	even	3 beads	even	blank		blank		<1906>	USN	
XVI		long cone	engraved	3 beads	even	3 beads	even	1 bead		3 beads	even	1916–1921	USN	
XVII		long cone	none	3 beads	even	3 beads	even	2 beads		2 beads		<1902>	USLS	Meneely Bell Co
XVIII		flat	engraved	3 beads	even	3 beads	even	blank		1 bead		<1922>	USLS	Williams
XIX	a	long cone	engraved	3 beads	even	3 beads	even	blank		2 beads		1905–1910	USN	
	b	flat	engraved	3 beads	even	3 beads	even	blank		2 beads		<1911>	USLS	Williams
XX		long cone	engraved	3 grooves	even	3 grooves	even	blank		blank		<1904>	USN	
XXI	a	flat	raised	4 beads	even	3 beads	even	2 beads		1 bead		<1858>	USLS	McShane
	b	eye	raised	4 beads	even	3 beads	even	2 beads		1 bead		<1896>	USLS	Blake
XXII	a	flat	raised	4 beads	even	3 beads	even	2 beads		2 beads		<1890>	USLS	Blake
	b	long cone	engraved	4 beads	even	3 beads	even	2 beads		2 beads		<1904–1908>	USN	New York Navy Yard
	c	eye	engraved	4 beads	even	3 beads	even	2 beads		2 beads		<1891>	USLS	Blake
XXIII		flat	raised	4 beads	pairs	3 beads	even	blank		2 beads		<1877>	USLS	Blake
XXIV	a	flat	raised	4 beads	pairs	3 beads	even	2 beads		blank		1885–1897	USLS	Blake, Hooper, McShane
	b	low dome	raised	4 beads	pairs	3 beads	even	2 beads		blank		1888–1900	USLS	McShane
	c	crown (4)	raised	4 beads	pairs	3 beads	even	2 beads		blank		<1858>	USLS	Meneely & Co

	d	eye	raised	4 beads	pairs	3 beads	even	2 beads	blank	1885–1896	USLS	Blake, McShane	
	e	long cone	raised	4 beads	pairs	3 beads	even	2 beads	blank	1896–1912	USN		
XXV		low dome	raised	4 beads	pairs	3 beads	even	2 beads	1 bead, 2 steps	<1909>	USLS	McShane	
XXVI	a	flat	blank	4 beads	pairs	3 beads	even	2 beads	2 beads	1855–1910	USLS	Hooper, Regester, McShane	
	b	low dome	blank	4 beads	pairs	3 beads	even	2 beads	2 beads	<1903>	USLS		McShane
	c	flat dome	raised	4 beads	pairs	3 beads	even	2 beads	2 beads	<1882 >	USLS		Blake
XXVII		long cone	engraved	4 beads	pairs	3 beads	even	2 beads	2 bead, 2 steps	<1911>	USN		
XXVIII		long cone	engraved	4 beads	pairs	3 beads	even	2 beads	2 steps	1889	USLS	Williams	
XXIX		short cone	blank	4 beads	pairs	3 beads	even	2 beads	3 beads	even	<1875–1894>	USLS	
XXX		flat	raised	4 beads	pairs	4 beads	even	2 beads	5 beads	even	<1867>	USLS	Jones & Hitchcock
XXXI		flat	raised	5 beads	2 pairs + 1	5 beads	even	2 beads	1 bead		<1897>	USLS	Buckeye
XXXII		flat dome	raised	6 beads	2 × 3 beads	3 beads	even	2 beads	3 beads	even		USLS	Garratt
XXXIII	a	long cone	engraved	blank		blank		blank	blank	<1909>	USN		
	b	flat	engraved	blank		blank		blank	blank	<1927–1933>	USLS		
XXXIV		flat	raised	blank		blank		blank	blank	<1923–1926>	USLS		
XXXV		long cone	engraved	Blank		3 beads	pair+1	1 bead	2 beads	<1898–1899>	USN	Meneely Bell Co	

Foundries: *Bernhardt*—J. Bernhardt, Philadelphia, PA, USA; *Blake*—William Blake & Co, Boston, MA, USA; *Buckeye*—Buckeye Bell Foundry, Cincinnati, OH, USA; *Garratt*—W.T. Garratt & Co, San Francisco, CA, USA; *Hooper*—Henry N Hooper & Co., Boston, MA, USA; *Jones & Hitchcock*—Jones & Hitchcock Bell Foundry, Troy, NY, USA; *Meneely*—Meneely & Co., West Troy/Watervliet, NY, USA; *Meneely Bell Co*—Meneely Bell Company, Troy, NY, USA; *McShane*—McShane Bell Foundry Co, Baltimore, MD, USA; *Regester*—J. Regester & Son, Baltimore, MD, USA; *Stevens*—George M. Stevens, Boston, MA, USA; *White & Deronn*—White & Deronn Bell Foundry, San Francisco, CA, USA; *Vanduzen*—Vanduzen & Tiet, Cincinnati, OH, USA; *Williams*—E.A. Williams, Jersey City, NJ, USA.

Table 3. A dichotomous key for the identification of bell types (for terminology see Figure 5, for typology see Table 2).

Q1 How many beads are on the shoulder belt?	Q13 How many beads are on the sound bow?
None Go to Q2	None Go to Q14
Two Go to Q5	One The bell is type XVI
Three beads Go to Q12	Two The bell is type XVII
Three grooves The bell is type XX	Q14 How many beads are on the neck?
Four (evenly spaced) Go to Q16	None The bell is type XI
Four (in pairs) Go to Q19	One The bell is type XVIII
Five The bell is type XXXI	Two Go to Q15
Six The bell is type XXXII	Q15 What kind of head is used?
Q2 How many beads are on the waist belt?	Long cone The bell is type XIXa
None Go to Q3	Flat The bell is type XIXb
Three The bell is type XXXIV	Q16 How many beads are on the neck?
Q3 What is the appearance of the lettering?	One Go to Q17
The lettering is raised (cast) The bell is type XXXIV	Two Go to Q18
The lettering is engraved Go to Q4	Q17 What kind of head is used?
Q4 What kind of head is used?	Flat The bell is type XXIa
Long cone The bell is type XXXIIIa	Eye The bell is type XXIb
Flat The bell is type XXXIIIb	Q18 What kind of head is used?
Q5 How many beads are on the waist belt?	Flat The bell is type XXIIa
None The bell is type I	Long cone The bell is type XXIIb
One The bell is type XII	Eye The bell is type XXIIc
Two Go to Q6	Q19 How many beads are on the waist belt?
Three (evenly spaced) Go to Q8	Three Go to Q20
Three (one pair and a single) The bell is type XI	Four The bell is type XXX
Q6 How many beads are on the sound bow?	Q20 How many beads are on the sound bow?
None The bell is type IV	None The bell is type XXIII
One Go to Q7	Two Go to Q21
Two The bell is type III	Q21 How many beads are on the neck?
Q7 What kind of head is used?	None Go to Q22
Flat The bell is type IIa	No beads, two steps The bell is type XXVIII
Eye The bell is type IIb	One bead, two steps The bell is type XXV
Q8 How many beads are on the sound bow?	Two beads Go to Q23
None The bell is type X	Two beads, two steps The bell is type XXVI
One Go to Q9	Three The bell is type XXIX
Two Go to Q11	Q22 What kind of head is used?
Three The bell is type IX	Flat The bell is type XXIVa
Q9 How many beads are on the neck?	Low dome The bell is type XXIVb
None Go to Q10	Crown The bell is type XXIVc
Three The bell is type V	Eye The bell is type XXIVd
Q10 What is the appearance of the lettering?	long cone The bell is type XXIVe
The lettering is engraved The bell is type VIa	Q22 What kind of head is used?
The lettering is raised (cast) The bell is type VIb	Flat The bell is type XXVa
Q11 How many beads are on the neck?	Low dome The bell is type XXVb
None The bell is type VII	Flat dome The bell is type XXVc
Three The bell is type VIII	
Q12 How many beads are on the waist belt?	
None The bell is type XIII	
Two The bell is type XIV	
Three Go to Q13	

Although some of the age ranges included in Table 3 are well outside the range of the World War I-era warships considered in this paper, these bells are included in Table 3 because they were on occasion rehung as fog bells in different lighthouse establishments.

U.S. Type XXXIII units are plain bells without any decorative belt lines. They come in three profile shapes, which can be distinguished by the steepness of the waist as well as the curvature of the shoulder (Figure 7). Of these, subtype A bells have been used by the U.S. Navy, for example on USS *North Carolina* (ACR-12) (Figure 7), whereas subtype B and C bells seem to have been employed by the U.S. Lighthouse Service. Bells with the profile of subtype B are more common, either with engraved or raised lettering. The latter seem to primarily date to 1926, with the lettering as well as the foundry information executed as a template pressed into the form prior to casting (Figure 8).

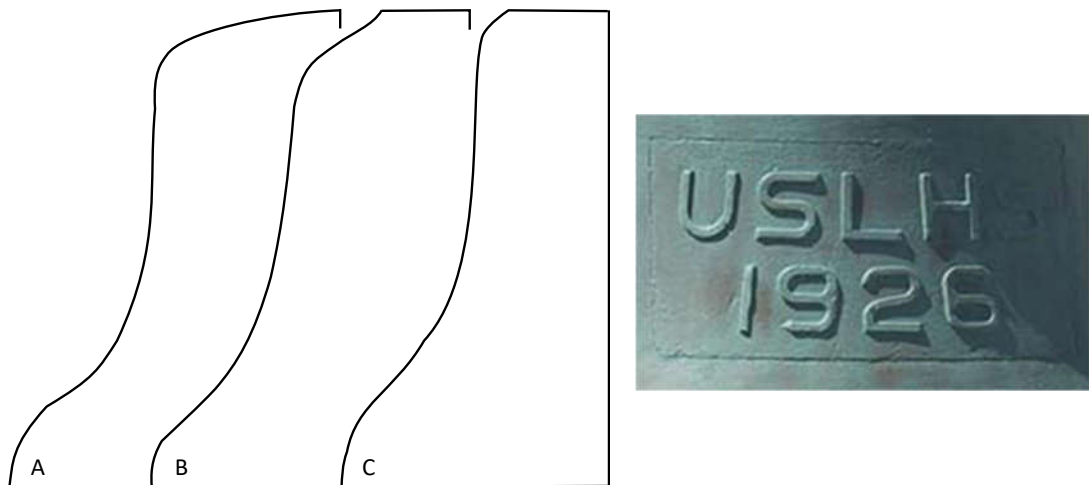


Figure 7. Type XXXIII bells. Profile shapes of subtypes A,B and C (**left**) and example of lettering template (**right**).

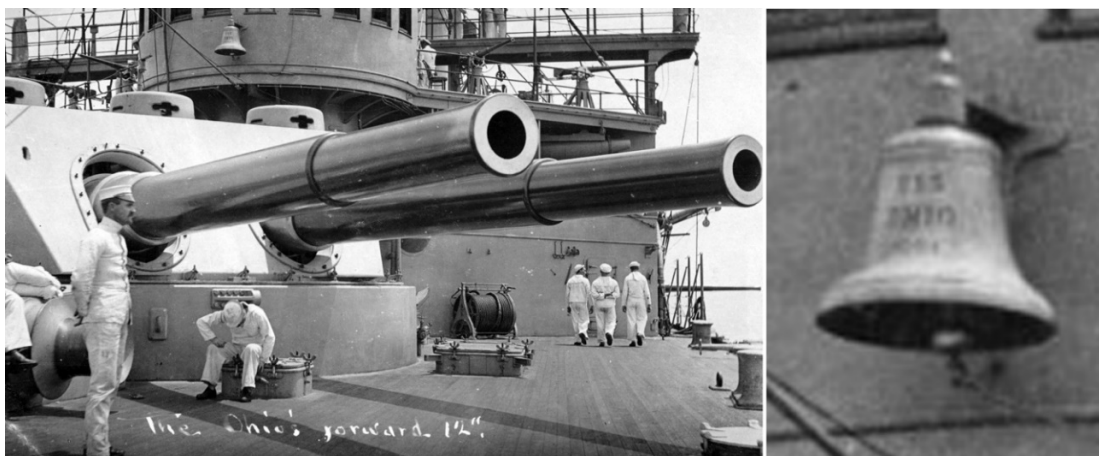


Figure 8. The bridge of USS *Ohio* (BB-12) in 1907-1908, showing the mounting of the bell on a Maine-class battleship. The bell is mounted externally on the bridge. Right: detail (U.S. Navy Photo NH 101467).

Ship bells were manufactured by various U.S. foundries, such as McShane Bell Foundry of Baltimore, MD [75], and Meneely Bell Co of Troy, NY [76]. The Meneely Bell Co of West Troy, NY, supplied a range of fog bells to the U.S. Lighthouse Service [76] and bells to shipyards such as Fore River Shipbuilding [76] and William Cramp & Co [63]. In its publicity material, the company reproduced an unnamed U.S. warship, with its flag darkened (possibly to avoid conflicts of interest in advertising), as one of “the kinds of

vessels [they had] supplied with bells”² [76]. The ship appeared to be either the USS *Delaware* (BB-28), launched in 1908 by the shipyard Newport News in Virginia or, more likely, the USS *North Dakota* (BB-29), launched by Fore River Shipbuilding in 1908. The Fore River Shipyard also constructed the USS *Nevada* (BB-36) (1915), which exhibited a Type VI bell comprising raised lettering, although this ship did continue service post-Washington Treaty (Table 4).

Based on available imagery, there were at least seven different forms of U.S. Navy bells (Figure 6). Surveying the surviving bells originally mounted on the vessels eventually scrapped as part of the Washington Arms Limitation Treaty and augmented by other data, we correlated the types of bells with the shipyards where the vessels were built. In all cases, the name of the vessel and the year of commissioning were engraved onto the bell’s surface. This suggests that the bells were supplied by a foundry as a generic casting, with the customisation (naming) most likely carried out by the foundry, as the bell had to be tuned to B natural or B flat as per specifications (see above).³

Type I bells all seemed to stem from vessels built by Union Iron Works, Mare Island, CA, such as the cruisers USS *Milwaukee*, USS *Olympia*, USS *South Dakota*, USS *Tacoma*, and the battleship USS *Ohio* (Figures 2 and 8).

Table 4. The details of the U.S. Navy bells associated with warships disposed of under the terms of the Washington Arms Limitation Treaty (all bells are made of bronze).

Ship	Bell Type (Location)	Date on Bell	Bell Type (Shape)	Foundry Mark?	Ø (in)	Weight (lbs)
USS <i>Connecticut</i>	Main	1904 *	U.S. Type XX			
USS <i>Connecticut</i>	Quarterdeck	1905		Meneely **		838
USS <i>Delaware</i>	Main	1910	U.S. Type XXIIe	no mark		
USS <i>Georgia</i>	Main	1906	U.S. Type XXIIe			
USS <i>Illinois</i>	Main	1893	U.S. Type XXIIe			
USS <i>Kansas</i>	Main					
USS <i>Louisiana</i>	Main			Meneely **		754
USS <i>Maine</i>	Main					
USS <i>Michigan</i>	Main	1910?	Unknown	??	??	??
USS <i>Minnesota</i>	Main	1906	U.S. Type XXIIe			
USS <i>Missouri</i>	Main	1903	U.S. Type XXIIe			
USS <i>Nebraska</i>						
USS <i>New Hampshire</i>	Main	1908	U.S. Type XXII	Williams		
USS <i>New Jersey</i>	Main	1906	U.S. Type XIX	no mark		
USS <i>North Dakota</i>	Main	1910	U.S. Type XIX	no mark		850
USS <i>Ohio</i>	Main	1904	U.S. Type I			
USS <i>Oregon</i>	Main	1896?				
USS <i>Rhode Island</i>	Main	1906	U.S. Type XIX	no mark		
USS <i>South Carolina</i>	Main	1909	U.S. Type XXXIII	no mark	36"	550
USS <i>Vermont</i>	Main	1907	U.S. Type XIX			
USS <i>Virginia</i>	Main	1906	U.S. Type XXIIe			
USS <i>Washington</i>	Main					

* The bell carries the additional inscription “Navy Yard, New York” below the year; ** identified in the ledger.

² Among the other vessels depicted is the Great Lakes steamer SS *Huron*, launched in 1901 by the Collingwood Shipbuilding Company (Collingwood, Canada).

³ It needs to be noted that the bell typology advanced in this paper is purely based on visual physical characteristics. The bell profile, and in particular the thickness of the sound bow, has direct effects on the pitch [77]. As shown by Audy & Audy, the nature and admixture rates of the alloys used for bell casting, as well as the purity of the raw metals used for the alloys, will influence the hardness of the bell metal and thus also affect the sound the bell gives [78]. None of the acoustic signatures of the bells examined here were assessed.

Other bell foundries also supplied the U.S. Navy with manufactured bells. The Type XXII bell of USS *New Hampshire* (BB-25) (Figure 9), launched in 1906 by the New York Shipbuilding Corporation, in New York, carries a foundry inscription on the back: “E.A. WILLIAMS & SON | BELL FOUNDERS JERSEY CITY N.J. | 1907.” The ship was commissioned in 1908. Williams & Son also provided the Type XVI bells for USS *Arizona*, built by the Brooklyn Naval Yard in New York (commissioned 1916).

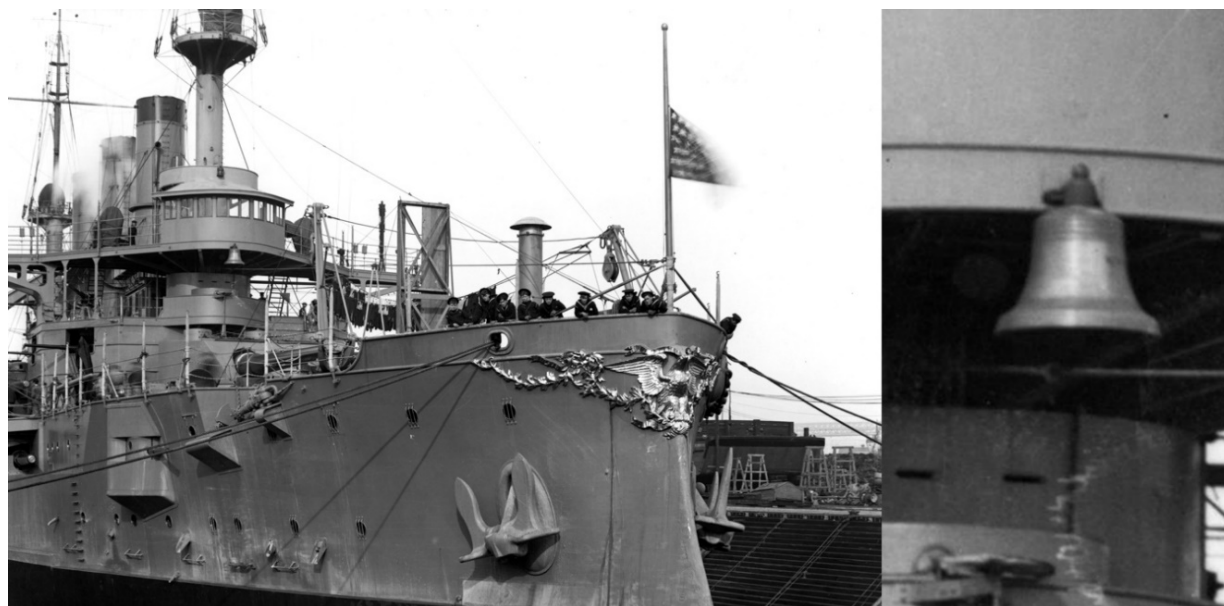


Figure 9. The Connecticut-class battleship USS *New Hampshire* (BB-25) photographed on 6 January 1895. The bell is mounted just below the bridge. Right: detail (USN Photo 19-N-4-8-21).

Given that both Type XVI bells of the USS *Arizona* were marked “E.A. Williams & Son, Jersey City, NJ, USA” one might assume that the other Type XVI pattern bells were also made by the same foundry. Such bells were cast for USS *Maryland* (BB-46) (1921), USS *Mississippi* (BB-41) (1917), and USS *Pennsylvania* (BB-38) (1916), all vessels built at Newport News in Virginia, as well as for USS *New Mexico* (BB-40) (1918) and USS *Tennessee* (BB-43) (1920), built at the Brooklyn Naval Yard in New York.

The shipbuilding company of Philadelphia, William Cramp & Sons, launched both USS *Minneapolis* (C-13) (1894) and USS *Sacramento* (PG-19) (1914), which harboured bell types XXIX and VIII, respectively. Despite neither of these ships being decommissioned due to the Washington Limitation Treaty, it is interesting to note that the typologies are synonymous with bells used in the USLS, and it is plausible that foundries simultaneously supplied bells to the USLS and the U.S. Navy.

The Lighthouse Service used a wide range of bell manufacturers [79] with weights from 700 lbs to 4000 lbs [80]. The most common manufacturers for USLS fog bells installed over the period ending with the Washington Treaty (1911–1922) were Gamewell Fire Alarm Telegraph Co., NY; Geo. M. Stevens, Boston, MA; McShane Bell Foundry Co., Baltimore, MD, USA; and William Blake & Co., formerly Hooper & Co., Boston, MA, AD [79]. However, as the dates indicated on a large number of these bells do not correlate to the commissioning date of their associated fog signals and precede them by up to four decades in some cases, it would appear that the majority of these bells were initially constructed for another purpose.

4.3. Bell Date Complications

Care needs to be exercised, however, to not generalise from the limited number of documented observations, and there are numerous examples where dates inscribed on

the bell run contrary to the expected actuality of the bell. A perusal of the transcribed ledgers of Meneely Bell Co in Troy, NY, USA, showed that the company cast the bells for some of the vessels under discussion. The foundry made the as yet unlocated bell for USS *Louisiana* (BB-19) (1906), built by Newport News Shipbuilding, which was cast on 8 February, 1907 [63], well after the commissioning of the vessel (2 June 1906) [81]. The post-commissioning date is somewhat confusing, but appears to be connected with later work on the vessel not originally contracted, with this work being undertaken at the navy yard in New York in February 1907 [82]. The reverse is true for the bell of USS *Kentucky* (BB-6), also built by Newport News Shipbuilding. Although the vessel was launched on 24 March 1898, and commissioned 15 May 1900 [83], the type XXXV bell bears an engraved date of 1898 but was cast by Meneely Bell Co on 29 November 1899 [63].

Some bells were seemingly reused. Meneely Bell Co also cast bells for a number of armoured cruisers, such as with a 670 lb bell cast on 24 March 1893, for USS *New York* (ACR-2) (1893), a 916 lb bell cast on 17 June 1904, for USS *Pennsylvania* (ACR-4) (1906), and a 927 lb bell cast on the same day for USS *Colorado* (ACR-7) (1905), all built by William Cramp & Co [63]. The latter bell was refurbished on 20 June 1907, for use on USS *Tennessee* (ACR-10) (1906) (also built by Cramp & Co) and in the process of polishing off the vessel's name, the bell weight was reduced to 870 lb [63].

Of particular peculiarity is the bell of USS *Illinois*, currently located at Navy Pier in Chicago (Figure 10). Originally created as part of the Columbian Exposition in Chicago in 1893, the bell serviced the replica battleship USS *Illinois* (made of brick, wood, stucco, cement, and metals to support the illusion of being a floating vessel) (Figure 11) [84]. After the conclusion of the exhibition, when the replica ship was being dismantled, the bell acquired by antique collector Benjamin P. Cheney Jr., who subsequently bequeathed the bell to the operational battleship USS *Illinois* (BB-7) before its commissioning in 1901 [85]. The bell still bore the original 1893 inscription but with added inscriptions bearing both the name of the new vessel, and references to both Benjamin and Julia Cheney on the opposing face [85]. Because of its display location, the bell is also sometimes erroneously attributed to the USS *Chicago* [86].



Figure 10. The type XXIX bell of USS *Illinois*, initially created for the replica Indiana-class battleship shown at the Columbian Exposition in Chicago in 1893 (source: Metro2).

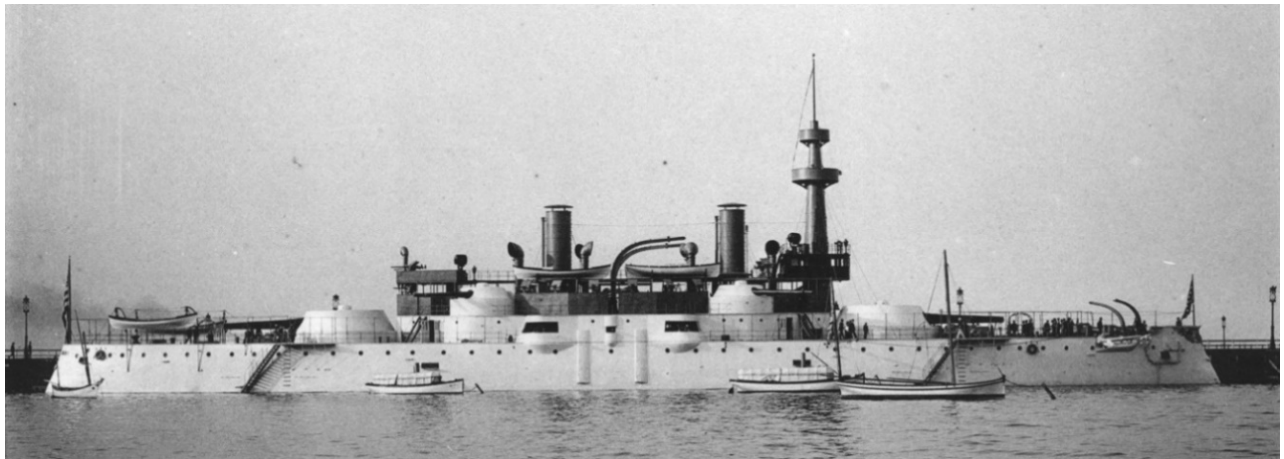


Figure 11. The replica battleship USS *Illinois* at its “berth” at the Columbian Exposition (Chicago 1893) [84].

Complications can also be found in some of the U.S. Navy yards that had the capacity to cast their own bells, and care needs to be exercised not to generalise. This is apparent at least for the Philadelphia Navy Yard in 1922, as the case of the Type XX bell of USS *Connecticut* attests [87]. A surviving bell, held by the museum at Mystic Seaport, is engraved with the four-line inscription “U.S.S. | CONNECTICUT | 1904 | NAVY YARD NEW YORK” (Figure 12). That bell carries not only the vessel and date, but, contrary to issued specifications [61], also the Navy Yard inscription. Other bells show similar inconsistencies (e.g., the bell of USS *Vestal* (AR-4) (1908), which carries the additional text “NAVY YARD, N.Y.”) [88]. The ledgers of Meneely Bell Co show that a single 838 lb bell was cast by Meneely Bell Co on 13 April, 1905 [63]. The *Connecticut* was launched on 29 September 1904, and commissioned on the same day two years later [89,90].



Figure 12. The type XX bell cast for USS *Connecticut* (BB-18) (source: Wikimedia, edited by DHRS).

4.4. Current Location and Custodianship of the Bells

The disposal of U.S. Navy property surplus to requirements is governed by the Navy Property Redistribution and Disposal Regulation [91], with revisions and integrations into subsequent policy [92–95]. The 1949 regulation gave the Curator for the Department of the Navy the authority to retain objects of historic interest, including but not limited to ship's bells, trophies, and other relics and materials. U.S. Naval Instruction 4770.5B (1964) asserted that commands on deactivation were to keep and send all ship's bells (as well as other items) to the Curator for the Department of the Navy (now Naval History and Heritage Command (NHHC)). Instruction 4770.5B placed ship, turret, and quarterdeck bells on the top of the list of items to be passed on to the Curator. If the vessel was to be transferred to another U.S. government agency, or a foreign government, then only the ship's bell had to be transferred to the Curator "[i]f replaceable locally" [93]. Under current provisions, bells "may be provided on loan to new namesake ships; naval commands with an historical mission or functional connection; and to museums and other institutions that are interpreting specific historical themes and displays of naval history" [96].

Prior to 1949 no formal regulation seems to have existed that specifically governed the disposal of a vessel's main and quarterdeck bells. The NHHC maintains that the bells taken off decommissioned U.S. Navy vessels "remain the permanent property of the US Government and the Department of the Navy" [96] irrespective of how and when they may have been acquired [97]. The NHHC asserts ownership of bells of U.S. Navy vessels in private hands when they appear on the market [33,98]. In the case of the bell of USS *Vestal* (AR-4), the bell was legitimately acquired at an official surplus sale after the vessel was stripped in 1949 and scrapped in 1950, but the NHHC argued on occasion of an on-wards sale in 2016 that the original sale was in error, that the original sale was in contravention of the Navy Property Redistribution and Disposal Regulation of 1949 [91], and that the NHHC therefore retained title over the bell [88,99]. This claiming process, however, is not carried out consistently, as attested by the quarterdeck bell of USS *Shangri-La* (CV-38), which is privately owned by a school principal in Kaohsiung (Taiwan) who acquired it when the vessel was scrapped at a Taiwanese breaking yard in 1989 [100,101]. The facts that USS *Vestal*, albeit severely damaged, was a survivor in the Pearl Harbor attack, played a role in the recovery of trapped crew from USS *Oklahoma* (BB-37) sunk in the same attack, and was the recipient of a Presidential Unit Citation and two battle stars, may have played a role in the persistence and determination displayed by the NHHC to reclaim that vessel's bell.

Currently, the NHHC has over 1500 bells and bell-related artefacts in its collection [102]. It would appear, however, that the Naval History and Heritage Command has no record of the location of the bells of several vessels scrapped as part of the implementation of the Washington Arms Limitations Treaty: USS *Kansas* (BB-21), USS *Louisiana* (BB-19), USS *Maine* (BB-10), USS *Michigan* (BB-27), USS *Montana* (BB-51), and USS *Nebraska* (BB-14) (Figure 13) [103].

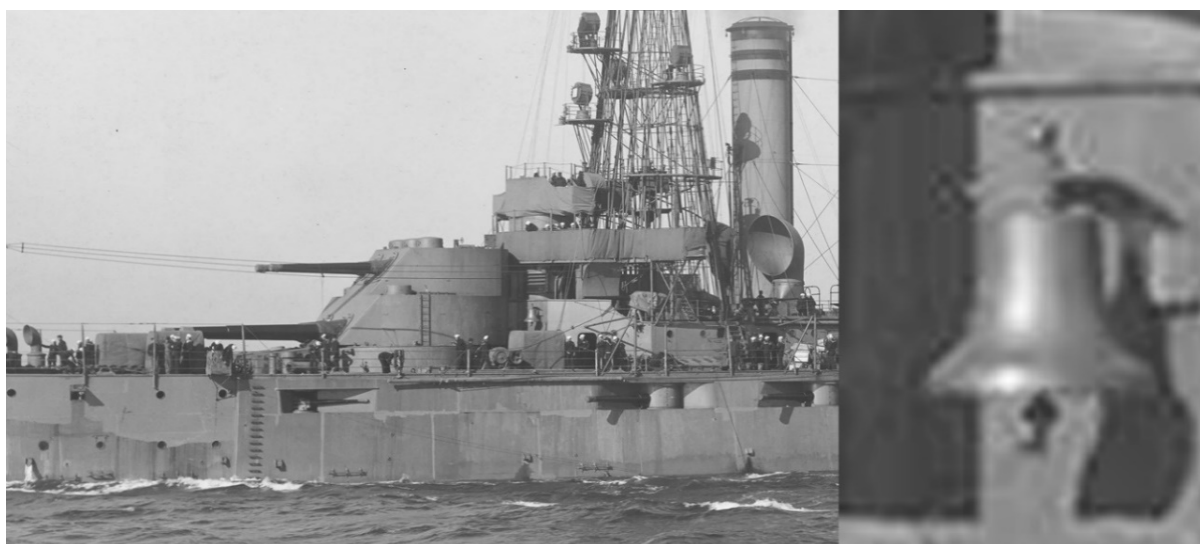


Figure 13. The Virginia-class battleship USS *Nebraska* (BB-14) photographed in April 1918. The bell is mounted well below the bridge on the port side, just aft of the forward turret. Right: detail (USN Photo 19-N-4-8-21).

It appears that no bells were issued for the following units, all of which were broken up on their slipways: USS *Indiana* (BB-50), USS *Iowa* (BB-53), USS *Massachusetts* (BB-54), USS *North Carolina* (BB-52), and USS *South Dakota* (BB-49). The same applies to the battleship USS *Washington* (BB-47), which was launched but not completed [103].

At least four of the bells were melted down, with the metal used for other bells owned by the U.S. Navy. When USS *Michigan* (BB-27) was decommissioned in February 1922, its bell was melted down together with the bells of three decommissioned Indiana-class battleships⁴ to cast a new bell.

"Bell, in tower of Mahan Hall, U.S.N.A. Cast at Philadelphia Navy Yard from metal of ship's bells of the USS "Michigan", "Alabama", "Indiana" and "Massachusetts," "U.S.N.A. Rear Admiral Henry B. Wilson, Superintendent, 1922. Cast from metals of, etc." Installed in tower, April, 1923" [87].

Whilst it is known that four bells were melted down to be re-cast, it is plausible that other bells were melted down for scrap. Anecdotal evidence suggests that the bell of USS *Arizona* was scheduled to be disposed in this manner in 1944 until its reputed protection by a college graduate [104,105]. This indicates that despite the requirement of the U.S. government to retain U.S. Navy bells, this may not precisely have been the case in the period during WWII, and some bells may have been subsequently lost in this process.

However, it is known that seven vessels were scrapped while under construction: USS *Indiana*, USS *Iowa*, USS *Massachusetts*, USS *Montana*, USS *North Carolina*, USS *South Dakota*, and USS *Washington*. Of these, only USS *Washington* was launched. The others were broken up on the slipways. As the units were never commissioned, it can be surmised that bells had not yet been cast or engraved for them, or if they were, they would have been melted down for other bells.

Of the 21 bells that should be extant since the Washington Arms Limitation Treaty 1922, only 15 have any available record of their current whereabouts (Table 5). There is no knowledge of the whereabouts of any of the bells from USS *Kansas*, USS *Louisiana*, USS *Maine*, USS *Nebraska*, or USS *Washington*, with the latter being intriguing, especially as its namesake reflects the Arms Treaty under discussion, nor the bell of USS *Oregon*, which has since been lost. Of those that remain, 12 are on display, yet only two are known to

⁴ Also melted down were the bells of USS *Indiana* (BB-1) (commissioned 1895, decommissioned 1919); USS *Massachusetts* (BB-2) (commissioned 1896, decommissioned 1919); USS *Alabama* (BB-8) (commissioned 1900, decommissioned 1920).

exist in an actual “ringable” form. Two of the bells have been exhibited for much of their lives since their ship’s decommissioning: The bell of USS *North Dakota* has been on display since 1930 [66] and the bell of USS *Ohio* since 1924 [72].

Table 5. The disposition of U.S. Navy bells associated with warships disposed of under the terms of the Washington Arms Limitation Treaty.

Ship	Bell Kept	Curation Location	On Display	Can It Be Rung?	Ref.
USS <i>Connecticut</i>	yes	Mystic Seaport, Mystic, CT ⁵	storage	no	[106]
USS <i>Delaware</i>	yes	Delaware Public Archives, Dover, DE	outdoor	no	[107]
USS <i>Georgia</i>	yes	ROTC, Georgia Tech, Atlanta, GA	outdoor	yes	[64,108,109]
USS <i>Illinois</i>	yes	Navy Pier, Chicago, IL	indoor	no	[85,86]
USS <i>Michigan</i>	no	Melted down for bell at Mahan Hall, U.S. Naval Academy	—	—	[87]
USS <i>Minnesota</i>	yes	Grant Street, Minneapolis, MN	outdoor	yes	[110,111]
USS <i>Missouri</i>	yes	Naval Museum, Hampton Roads, VA	storage	no	[112]
USS <i>New Hampshire</i>	yes	Portsmouth Naval Shipyard, Kittery, MN	outdoor	no	[113,114]
USS <i>New Jersey</i>	yes	City Hall, Elizabeth, NJ	outdoor	no	[115–117]
USS <i>North Dakota</i>	yes	Bismarck, ND	indoor	no ⁶	[66]
USS <i>Ohio</i>	yes	Ohio Historical Society, Columbus, OH	indoor	no	[72]
USS <i>Oregon</i>	yes	Oregon Historical Society, Portland, OR	no ⁷	?	[117]
USS <i>Rhode Island</i>	yes	State House, Providence, RI	indoor	no	[118,119]
USS <i>South Carolina</i>	yes	Veteran’s Park, Florence, SD	outdoor	no	[120]
USS <i>Vermont</i>	yes	Pavilion Office Building, State Capitol, Montpelier, VT	indoor	no	[121,122]
USS <i>Virginia</i>	yes	Naval History and Heritage Command, Naval Station, Norfolk, VA	indoor	no	[123]

5. Bells of British Navy Vessels

Bells mounted on warships of the Royal Navy tended to follow traditional late eighteenth- and early 19th-century church patterns, with the bell head of the bell comprising a crown staple that was usually cast in. The staple had six cannons into which an argent was inserted that allowed suspension from a headstock (in churches) or a fixed bell mount (on ships). Two Admiralty patterns (8a and 10a) are referenced in the literature, apparently referring to overall bell weight and shape and size of the crown staple.

On occasion, ship’s bells were also cast from trophy material, such as a new bell cast in 1917 for the British Faulknor-class destroyer HMS *Broke* (1914). The bell was cast from brass salvaged from the torpedo tube of the German destroyer G42, which the *Broke* sunk by ramming during the Battle of Dover Strait on 21 April 1917 [124].

For ship’s bells cast in the period leading up to the Washington Treaty, there are several typologies. For example, a bell with pattern 8a exhibits the typical crown suspension head, alongside beading on the neck (two), sound bow (one), and lower waist (2), but does not display beading on the shoulder region [125]. This form of patterning is visible on the main bell of HMS *Valiant* (1914) (not associated with the Treaty (Figure 14)); the maker’s name, “G. CLARK & SONS HULL,” is inscribed on the top section, and has measurements of 410 mm height, 440 mm diameter, and a weight of 77 kg [125]. One can readily assume that other bells of similar patterning were also cast by the same foundry.

5.1. Royal Navy Bell Disposal Practices

When a ship was decommissioned, the bell was removed for storage, reuse, or, in most cases, onwards sale.⁸ Even if the ship was not scrapped, but rather transferred to

⁵ At one point on display in the visitor information area of the Amtrak station Mystic, on loan from Mystic Seaport.

⁶ The clapper was removed and is stored separately [66].

⁷ Bell is in the inventory of the Oregon Historical Society in Portland but has not been seen since 1959 [118].

⁸ It would appear that in some instances a bell was removed upon decommissioning, but not reissued to the vessel when it was recommissioned under its original name. A case in point is the C-class light cruiser HMS *Canterbury*, which spent much of her service career in and out of fleet reserve. She was originally commissioned in April or May 1916, decommissioned in 1922, recommissioned in May 1924, decommissioned in about June 1925, recommissioned in November 1926, decommissioned in March 1931, recommissioned in about August 1932, and decommissioned for the last time in December 1933 and then sold for

another navy, the bell was removed and upon transfer the ship issued with a new bell. There seems to have been no regular practice of “turning” the bell and providing it with a fresh inscription on the obverse side. A case in point is the Leander-class light cruiser HMS *Apollo* (1934), which was transferred to the Royal Australian Navy in 1938 and re-named HMAS *Hobart*. Her two bells were placed almost immediately for public sale in December 1938 [128]. On the other hand, the bell of the modified Leander-class cruiser HMS *Amphion* (1935) was turned and re-inscribed “HMAS Perth 1939” when the vessel was transferred to the Royal Australian Navy [46].



Figure 14. The main and quarterdeck bells of HMS *Valiant* (1914) (sources: Royal Maritime Museum Greenwich [EQA0490, left) and Royal Navy (right).

In comparison with ship's bells of the U.S. Navy, there is scant information available pertaining to bells of British Navy vessels. This is in part due to divergent disposal practices of each service, and also in part likely due to differing public perception of military relics. Unlike the U.S. Navy, which retains the ownership of the bells of all major combatant vessels, the Royal Navy has been amenable to the disposal of ship's bells to private parties. The bells were sold at nominal prices between GBP 1 and GBP 10 to officers associated with the decommissioned vessel, other ships, or naval establishments. Although preference was given, basically anyone could acquire them, often via a public sale:

“Most of the bells do not retire from active service when the Admiralty dispense with them. They just change their jobs and become a dinner gong in the houses of retired officers who served on the ships from which the bells were taken. ...It is only since the cutting own of the Fleet began that ship's bells have been sold [publicly]” [129].

That 1929 sale was the third bell sale since the end of WWI [130–132]. Thirty years later, bells were still being disposed of in the same fashion [133] and the prices were still low, ranging from GBP 1 to GBP 10 [133]. Consequently, most bells of decommissioned

scrap in July 1934 [126]. Even though her final commission ran from August 1932 to December 1933, one of her bells was for public sale in September 1931 [127].

Royal Navy vessels are now in the public hand, complicating the tracing of their whereabouts. The sheer number of naval bells for sale in Britain is illustrated in Figure 15, and although the bells shown here do not specifically pertain to vessels associated with the Washington Treaty, the image does highlight 20th-century British Navy disposal practices. The image also shows the distinctive crown suspension head, which is characteristic of all bells of the Royal Navy. Numerous typologies can also be observed, such as the similarity of the bells of HMS *Liverpool* (1938), HMS *Warrior* (1945), and HMS *Theseus* (1946), and between the bell of HMS *Concord* (1946) and HMS *Peacock* (1946), however, as these ships fall outside the period of the Washington Treaty, it is beyond the scope of this paper to discuss them in detail.



Figure 15. The sale of British Navy bells ca. 1959 (source: Press Association, via Alamy, with permission).

Despite systematic searches on the WWW as well as specific targeted enquiries to the Royal Navy, the National Maritime Museum, and veteran's associations of successor vessels with the same name, only three bells pertaining to vessels associated with the Washington Treaty could be located: those of HMS *Superb*, HMS *Australia*, and HMS *New Zealand*, which are discussed in detail below. Information pertaining to the accounts of bells from four other ships was available, namely, the HMS *Hercules*, HMS *Colossus*, HMS *Dreadnought*, and HMS *Erin*, although their current whereabouts are unknown (Table 6). The pattern 8a bell that had been on board HMS *Hercules* was ordered to be retained in store at Chatham and was not to be issued without prior Admiralty authority [133]. It was eventually sold to the public in 1934 [134]. However, the pattern 10a bell from the same ship and the pattern 8a bell from HMS *Colossus* (Figure 16) were available for re-issue to serving ships in priority to new uninscribed bells in stock, under the direction that "where possible, the inscription now on these bells should be erased before issue, but otherwise the inscription is to remain" [133]. Finally, the pattern 8a bell from HMS *Erin* was described as cracked and without a clear tone, but available for GBP 5 from Portsmouth Dockyard in 1928 [133,135]. In 1934, the Royal Navy disposed of another stock of ship's bells for sale to the public, including one of the bells from HMS *Hercules* [134]. One of the bells from HMS *Colossus* was listed at a price of GBP 10 (it is unknown which one), with priority given to those with "special claims of consideration" due to high levels of sentimental interest attached to the bells [134]. After decommissioning, the bells seem to have been retained in the naval stores for some time before they were eventually offered for sale. The bell from HMS *Hercules*, for example, was on the sales list in April 1934 [134], even though the vessel had been listed for disposal in October 1921 and physically broken up in 1922 [136]. In the same sale were bells from the cruiser HMS *Bacchante*, which had been sold for scrap in July 1920, from the battleship HMS *Mars* (May 1921) and from the battlecruiser HMS *Dominion* (May 1921) [136].



Figure 16. The quarterdeck bell of HMS *Colossus* (left) and a British sailor posing next to the bell ca. 1917 (right) (sources: bell photo via Carmen Gunter, card via eBay).

The fate of the bells, once in private hands, is beyond formal control. While some bells are mounted on premises and are sold as fixtures with the premises (e.g., HMS *Superb*, see below), others stay with the original purchasers and are passed on through generations and may even be exported (e.g., the quarterdeck bell of HMS *Valiant*) [137]. Other bells, such as the quarterdeck bell from HMS *Tiger* (1913), were melted down to create a series of smaller commemorative bells. Although the main bell of HMS *Tiger* is in the Imperial War Museum in London [138], examples of commemorative bells are frequently offered by auction houses [139–141].

Table 6. The details of the bells associated with warships disposed of under the terms of the Washington Arms Limitation Treaty (all bells are made of bronze).

Ship	Bell Type (Location)	Date on Bell	Bell Type (Shape)	Foundry Mark?	Ø (in)	Weight (lbs)
<i>Mikasa</i> (三笠)	Main					
HMAS <i>Australia</i>	Main	1913		no mark		
HMS <i>New Zealand</i>	Main	1905				
HMS <i>Superb</i>	Main	1909			12¼	
HMS <i>Dreadnought</i>	Main	none				
HMS <i>Colossus</i>	Main	none				

5.2. Current Location and Custodianship of the Bells

As discussed earlier, of the 21 Royal Navy vessels associated with the Washington Treaty, only three bells could be located: those from HMS *Superb*, HMS *Australia*, and HMS *New Zealand*. The bell of HMS *Superb* has since been transferred to private ownership, and is currently known to be set upon an external wall of Manor House in Upton Lovell, Wilts [142], whereby it remains as an asset connected with the property, being recently transferred as part of the sale of the estate [143,144]. The bells of both HMS *Colossus* and HMS *Dreadnought* are known to be in private hands, but little other information is available, except that the *Colossus* bell is located in Scotland.

It is interesting to note that each of ships associated with the colonies of Australia and New Zealand returned their naval bells for display to the public, unlike those of strictly British origin. This could be in part due the importance placed on these ships as iconic figureheads of their respective emerging navies, and also due to the manner in which the bells were financed and created.

The HMS *New Zealand* bell was originally made for the King Edward VII-class battleship of the same name launched in 1904 and commissioned in 1905. That ship was renamed HMS *Zealandia* on 1 December, 1911, to make way for the Indefatigable-class battlecruiser HMS *New Zealand*, which formed part of the fleet disposed of under the terms of the Washington Arms Limitation Treaty. Upon the commissioning of the latter vessel, the bell was transferred to the new ship in 1912, partly due to the efforts of Commander R.C. Davenport, who was on board both vessels [143]. When the bell was originally cast, funds were encouraged to be raised by schoolchildren throughout the country, with penny trials taking place as a symbol of support of both the ship and its role in the colony [143]. With dimensions of around 430 × 450 mm (height × diameter) and a weight of 90.72 kg, it is reputed that the bell was cast using some of the metal from the pennies collected, evidenced by the bell being inscribed “TO HMS NEW ZEALAND BY THE SCHOOL CHILDREN OF HER NAMESAME COLONY—1905” [143]. When mounted aboard the ship, the original bell was “suspended from the carved head of a Maori who [held] between his teeth a decorated Maori ring, from [which] the bell [was] hung” [145]. The importance of this battlecruiser to the country, the manner in which its bell was created, and the uniquely New Zealand style of its suspension makes this bell somewhat of an icon for New Zealand military (and sociological) history, hence why the bell takes pride of place

on display at the National Museum of the Royal New Zealand Navy—Torpedo Bay Navy Museum in Auckland (Figure 17) [143].



Figure 17. The highly ornate main bell of HMS *New Zealand* (source: National Museum of the Royal New Zealand Navy) [146].

On the other hand, the ship's quarterdeck bell, which is not known to have survived, was a rather plain affair, marked with a large British military arrow. Judging from the grainy image, the bell, which was suspended from a crown head, had no decorative belts on the shoulder and one or two belts on the waist (Figure 18).



Figure 18. The quarterdeck of HMS *New Zealand* (ca. 1919) with detail at right (source: Library of South Australia PRG 280/1/15/316).

In a similar manner, in 1910 the Australian government ordered the construction of HMAS *Australia* by shipbuilders John Brown & Co Ltd., in Clydebank (Glasgow, Scotland), to defend the British Empire, with the ship not only being the flagship of the fleet, but the acquirement of such a vessel also signalling the Royal Australian Navy's emergence as a credible operational unit [147]. After operational duties primarily in the Pacific and the North Sea, she returned to Sydney and was paid off into reserve on 12 December, 1921, only one month after her return [147]. At the equivalent time of her scuttling in 1924 to comply with the Washington Treaty, the bell was transferred to Melbourne for inclusion in the Australian War Memorial collection, and by 1927 the bell was used to toll the commencement and conclusion of the traditional two minutes of silence mark of respect for Remembrance Day [148,149]. It is now placed on display at the Australian War Memorial in Canberra, in a "non-ringable" state [150]. The bell displays the typical crown suspension head (Figure 19), similar to other bells of vessels of the same period, such as HMAS *Sydney* and HMAS *Parramatta* [151,152], despite slightly different typological characteristics that are probably related to the shipyards of the vessels' construction (London and Glasgow Engineering Co, Govan, Glasgow, Scotland, and Fairfield Shipbuilding & Engineering Co Ltd., Govan, Glasgow, Scotland, respectively) [153,154]. Interestingly, bells associated with vessels constructed in Australia in a similar period (at Commonwealth Naval Dockyard, Cockatoo Island, Sydney), such as HMAS *Huon* and HMAS *Swan*, have a completely different suspension system, and with the bells appearing rather crude in their construction [155–158].



Figure 19. The bells of HMS *Superb* and HMAS *Australia* (source: R Southwell and Australian War Memorial [143,150]).

6. Japanese Bells

Data on the nature and fate of the bells associated with the Japanese ships are very limited and nothing has been formally published on the bells in general. The background of the 15 Japanese vessels scrapped under the treaty is complex. Five ships were built at British shipyards as part of the original battleship development of the Japanese Fleet [159]. These were the *Asahi* (朝日) (1900), built by John Brown & Co. at Clydebank (Figure 1); the *Shikishima* (敷島) (1900), built by Thames Iron Works, Blackwall, London; the *Kashima* (鹿島) (1906), built by Armstrong Whitworth, Elswick; and the *Mikasa* (三笠) (1902) and the *Katori* (香取) (1906), both built by Vickers, Barrow-in-Furness [159,160]. It can be surmised that these vessels, on commissioning, would have received bells from British castings.

Eight of the ships were built by Japanese yards, with the *Aki* (安芸) (1911), *Ibuki* (伊吹) (1907), *Ikoma* (生駒) (1908), and *Settsu* (摂津) (1912) built by the Kure Naval Arsenal; the *Kurama* (鞍馬) (1911) and the *Satsuma* (薩摩) (1910) built by the Yokosuka Naval Arsenal; and the *Amagi* (天城) and *Tosa* (土佐) (1921) built by the Mitsubishi shipyards in Nagasaki. It can be assumed that these Japanese-built vessels, on commissioning, would have received bells from Japanese castings. The construction of the battlecruiser *Amagi* was halted following the signing of the Washington Treaty, with subsequent conversion into an aircraft carrier. Damaged on the slipway during the Kanto earthquake (September 1923), the *Amagi* was never completed and was broken up as a part-build [161]. As it was never commissioned, no bells would have been issued.

The origin of the remaining two vessels is even more complex. The *Iwami* (生駒) was originally the Russian battleship *Oryol* (Орёл), built at the Galerniy Island Shipyards in Saint Petersburg (Russia) and commissioned in 1904. The vessel was disabled and captured in the Battle of Tsushima in May 1905. Repaired at the Kure Naval Yards, the *Oryol* was commissioned into the Japanese Navy as the *Iwami* in 1907 [160]. The *Hizen* (肥前) was also originally Russian battleship *Retvizan* (Ретвизан), built by William Cramp & Sons Shipbuilding in Philadelphia (Philadelphia, PA, USA) and commissioned in 1902. Sunk in December 1904 at Port Arthur, the *Retvizan* was likewise re-floated, repaired at Sasebo Naval Yard, and commissioned into the Japanese Navy as the *Hizen* in 1908 [160]. We can assume that the *Iwami* (ex-*Oryol*) would have been commissioned into the Imperial Russian Navy with a bell of Russian casting, and the *Hizen* (ex-*Retvizan*) with a bell of U.S. casting supplied by the shipyard. Given that the *Retvizan* was launched in October 1900 and commissioned in March 1902, the battleship is synchronous with USS *Maine* (BB-10), also built by William Cramp & Sons, which was launched in July 1901 and commissioned in December 1902. We can speculate that the bells of these two vessels would have been replaced with bells of Japanese castings once the vessels were repaired and commissioned into the Imperial Japanese Navy.

Surviving Bells of Japanese Vessels

Pre-World War II, HJMS *Mikasa* (三笠) held a special place in the minds of the Japanese government and people, because, as Japan's most modern battleship, she served as Admiral Togo Heihachiro's flagship in the 1904 attack on the Russian fleet at Port Arthur and in the Battle of Tsushima on 27/28 May 1905, when the Japanese Navy decisively defeated the Russian fleet. Soon after the implications of the Washington Arms Limitation Treaty became public, the threat of losing the *Mikasa* as a symbol of Japan's rise to a naval power gave rise to a popular movement [162,163] that succeeded in it being preserved as a historic vessel at Yokosuka and opened as a memorial ship in 1926 (Figure 20) [160].



Figure 20. The Memorial Battleship *Mikasa* (三笠) at Yokosuka Harbor (three-image composite by DHRS).

The exhibition on board the museum ship *Mikasa* contains the original bell that was slightly damaged during U.S. air raids on Yokosuka during World War II. The shape of the bell exhibits a strongly carinated, broad beading with two beads on the neck, two widely spaced beads on the waist, and an undecorated sound bow. The bell is suspended with a solidly cast eye with a rounded top. The profile and decoration of the bell do not resemble that of bells of British casting (see above), suggesting that this is Japanese cast. Why the original bell was removed is unclear. A second, undamaged bell is suspended at the quarterdeck and can be rung by visitors to the ship.

One of the bells of the battlecruiser *Ibuki* (伊吹) (1907), in addition to the ship's wheel [164] and a model of the vessel [165], were promised to the Australian government in 1923, after the acting Prime Minister, Earl Page, requested a memento of the vessel that was in the process of being broken up [166]. The vessel's relevance to Australia rests in the fact that in November 1914, in conjunction with HMAS *Sydney*, the *Ibuki* escorted the troopships carrying the Australian and New Zealand Auxiliary Corps (ANZAC) across the Indian Ocean to their staging post in Egypt [167]. The bell and wheel arrived in Australia in December 1925 and went on display in the temporary Australian War Memorial in Melbourne until 1935 [166]. The bell is of Japanese casting, possibly manufactured at Kure Naval Yard, where the vessel was built. The profile and decoration of the bell, with its strongly carinated, broad beading (Figure 21), is the same as that of the *Mikasa* (Figure 22). The bell of the *Ibuki* measures 480 mm in height and 450 mm in diameter. Its weight has not been documented [168].



Figure 21. The bell of the *Ibuki* (伊吹), held by the Australian War Memorial (RELAWM08239).



Figure 22. The bells of the *Mikasa* (三笠) at the Memorial Battleship museum at Yokosuka. (Left) damaged bell on display. (Right) quarterdeck bell for ringing by visitors (photo hawk26) [169].

There appears to have been no formal process of retention of ship's bells once vessels were decommissioned. Some of these seem to have been passed into private hands. In addition, there is an indication that bells did not stay with a ship from commissioning to final decommissioning but rather could be changed over mid-career. The bell of the *Asahi* (朝日) (Figure 1) is very illuminating in that regard. In October 2020 a bell 22 cm in diameter, 23 cm in height, and with an approximate weight of 3 kg was sold at auction on Yahoo Japan (Figure 23) [170]. The size of the bell suggests that this was the quarterdeck

bell. The bell carries two inscriptions on its sound bow: “本帝国海軍艦朝日” (i.e., “Imperial Navy Ship Asahi”) and “明治参拾七年調” (i.e., “Meiji 37” (1904)).⁹ The *Asahi*, which was laid down in August 1898, launched on 13 March, 1899, and commissioned on 28 April, 1900, was placed on the list of ships to be disposed of under the Washington Treaty. The vessel was reclassified as a training and submarine depot ship on 1 April 1923, and completely disarmed three month later [160]. Following a brief career as submarine tender and salvage and repaid ship, as well as a floatplane test ship, the *Asahi* was mothballed in reserve in 1928. In 1937 she was reactivated as a repair ship and torpedo depot ship, seeing limited service in the Pacific War. She was sunk on 25/26 May 1942, some 160 km southeast of Cape Padaran, Vietnam [160].

This now raises the question as to the nature of the bell, given that the *Asahi* was built by John Brown & Co and upon commissioning would have received a bell of British casting, which should have gone down with the ship in 1942.

The *Asahi* was damaged in the Battle of the Yellow Sea (August 1904) by a Russian shell as well as two of her own shells that exploded prematurely in barrels of the 12 in aft turret [172,173]. She was repaired and headed back to support the blockade of Port Arthur, where she was severely damaged by a Russian mine on 26 October, 1904. Repaired at the Sasebo Naval Arsenal from November 1904 to April 1905, the *Asahi* re-joined the fleet to participate in the Battle of Tsushima in May 1905 [174]. It would appear that on the occasion of the repair in November 1904, the British-cast bell was replaced by a Japanese cast. It should be noted that the profile and decoration of this bell deviates from the bells of the *Mikasa* and *Ibuki*.



Figure 23. The quarterdeck bell of the *Asahi* installed after the 1904 repair. (a) full bell; (b) detail of the inscription. For translation of inscription, see text (source: sutanisurao_0323).

⁹ If Japanese bells carry inscriptions, they tend to have been added after casting with a punch, essentially writing the Kanji characters stroke by stroke. See also: A Japanese ship's type bell (30cm tall, 20 cm diameter, unspecified weight) with an engraved inscription 大正十三年度 卒業記念 (Taisho 13 (or the year 1924), graduation commemoration) [171].

7. Discussion

As the preceding assessment has shown, the survival and preservation of bells from the warships disposed of under the terms of the Washington Arms Limitation Treaty varies significantly between the three nations: Japan, the United Kingdom, and the United States of America. Notwithstanding the small number of bells that cannot be located at this time, the majority of the bells derived from U.S. Navy vessels have survived. This can be attributed to the persistence and efforts of the Naval History and Heritage Command to collect these bells, which is exemplified by the great lengths that the U.S. Navy's Naval History and Heritage Command went to in order to claim title and possession of the bell of USS *Vestal* [99]. Another factor that should not be discounted, however, is the fact that U.S. Navy battleships were named after the states of the Union, and that the states took great pride in "their" ships, as is evidenced by the silver sets that were often given to the captain's mess, often accompanied by formal accounts of fundraising and details of the sets [175]. Not surprisingly, then, many of the bells are prominently displayed in or at public buildings in the respective states (see Table 7).

Table 7. The disposition of the bells associated with warships disposed of under the terms of the Washington Arms Limitation Treaty.

Ship	Curation Location	On Display	Can It Be Rung?	Ref.
<i>Mikasa</i> (三笠)	Mikasa Museum, Yokosuka	indoor	no	[176]
HMAS <i>Australia</i>	Australian War Memorial, Canberra	indoor	no	[150]
HMS <i>New Zealand</i>	Torpedo Bay Navy Museum, Auckland	indoor	no	[146]
HMS <i>Superb</i>	Held in private hands, Upton Lovell, Wilts	outdoor	yes	[142]
HMS <i>Colossus</i>	Held in private hands, Scotland	indoor		[177]
HMS <i>Dreadnought</i>	Held in private hands	indoor		[177]

This obsession with claiming ownership over every single main and quarterdeck bells of major U.S. Navy vessels stands in total contrast to the discard program run by the Royal Navy. Here, all bells of decommissioned vessels were sold to the public, with preference given to the officers and ratings who had served on the vessel in question. Consequently, the bells are scattered far and wide, with the overwhelming majority, if they still survive, held in unknown private hands. A few bells are held in public collections, such as the National Maritime Museum in Greenwich and the Imperial War Museum in London. Exceptions are the inscribed bells of HMAS *Australia* and HMS *New Zealand*, which are held in the military museums of the respective namesake countries. The preservation of the bells as mementoes of the battlecruisers is a manifestation of the national pride of the nascent nations to fund a battlecruiser each as an Empire contribution to the Royal Navy. As such, then, the preservation can be seen in the same light as the preservation of the bells of the U.S. battleships named after the states of the Union.

The preservation of HJMS *Mikasa* as a museum ship and national memorial was a matter of national pride, and a cause célèbre for the Japanese delegation when negotiating the terms of the Washington agreement. As noted, Australia and New Zealand retained the bells and their namesake vessels. No such patriotic sentiment extended to the bells of the other decommissioned British and Japanese battleships and battlecruisers.

That the Royal Navy placed so little emphasis on the protection and preservation of naval bells is exemplified in the iconic British warship HMS *Dreadnought*. Modern naval history uses the launching of the all big-gun HMS *Dreadnought* in 1906 as a watershed in naval design (Figure 24), noting that ships either belong to the pre-*Dreadnought* era or are classified as "modern" battleships [178,179]. During the early part of the 20th century, the term "dreadnought" was synonymous with, and a portmanteau for, a modern battleship, akin to "hoover" for a vacuum cleaner or "kleenex" for a paper tissue. Having made all earlier battleships essentially obsolete, the design of HMS *Dreadnought* sparked an arms

race among all major naval powers [178]. Although revolutionary, in the eyes of the British naval architects of the World War I era, HMS *Dreadnought* was already dated by 1911, when it lost its status as flagship of the Home Fleet, and quite outdated at the outbreak of the war, having been supplanted by “superdreadnoughts” such as HMS *Orion* (also scrapped as part of the Washington Treaty). As HMS *Dreadnought* was in refit at the time and saw no action in the major naval battle of World War I (the Battle of Jutland), its war-time service history was limited [136]. Consequently, there was at the time little desire to conserve any meaningful objects as part of the vessel’s heritage. Although the National Maritime Museum in Greenwich owns a bell of the 98-gun second-rate ship of the line HMS *Dreadnought* launched in 1801, it does not own the bell of the first “real” battleship of the modern era. The only object of the HMS *Dreadnought* in question known to have been preserved in collections in public hands is an unofficial gun tampion kept by the National Maritime Museum in Greenwich (Inv. N° AAA1696) [180].



Figure 24. HMS *Dreadnought* as depicted on a contemporary real photo postcard (source: author).

In the 1920s, when the vessels were decommissioned and scrapped, the concepts of heritage preservation and values-based significance assessment were unknown. With the benefit of hindsight, the bells of HMS *Dreadnought* would have been *the* bells to collect and preserve in public hands. It can only be hoped that it still exists safely in private hands and that its cultural significance is appreciated by its current owner.

When assessing the heritage significance of the bells of the other scrapped British battleships and battlecruisers, we need to consider their service history and involvement in the various naval engagements of World War I (Table 8). A large number of vessels, with the exception of HMS *Agamemnon*, which at the time was stationed in the Mediterranean, took an active part in the major naval battle of World War I, the Battle of Jutland (31 May–1 June 1916). In most cases, that was the only action they saw. Only four of the ships listed in Table 8 saw action in more than one battle. HMS *Lion*, Admiral David Beattie’s flagship, and HMS *New Zealand* were involved the Battle of Heligoland Bight (28 August

1914), the Battle of Dogger Bank (23 January 1915), and the Battle of Jutland. HMS *Indomitable* saw action in the Battle of Dogger Bank and the Battle of Jutland, and like HMS *Inflexible*, was also involved in the landings at the Dardanelles (Gallipoli) in the Eastern Mediterranean. The latter battlecruiser had already taken part in the Battle of the Falkland Islands (8 December 1914), where it was involved in annihilating Admiral von Spee's Pacific squadron.

From a cultural heritage and collections perspective, the bells of HMS *Lion*, for its role as Beattie's flagship and involvement in three major naval battles in the North Sea, and HMS *Inflexible*, for its involvement in three theatres of war (Mediterranean, North Sea, and South Atlantic), are the most significant. From a World War I service point of view, of least significance are the bells of HMS *Commonwealth*, HMAS *Australia*, and HMS *Dreadnought*. The latter two vessels have significance, of course, as being the first true modern battleship (HMS *Dreadnought*, see above) and being the first battlecruiser financed by the nascent Commonwealth of Australia (HMAS *Australia*).

It is of interest to note that with the exception of the already mentioned bells of HMS *New Zealand* and HMAS *Australia*, none of the bells are in public hands. The accessions of the National Maritime Museum in Greenwich and the Imperial War Museum seem to have been opportunistic without clear targeting of significant vessels. Thus, the main bell of HMS *Tiger*, the oldest battlecruiser retained by the Royal Navy after the fleet reduction subsequent to the Washington Arms Limitation Treaty, is held by the Imperial War Museum [138], but the bells of the significant vessels of World War I are not. It appears inexplicable why the bell of HMS *Lion* was not retained for public display.

Table 8. The combat service during World War I of the British vessels discussed in this paper.

Ship	Mediterranean			North Sea			Pacific	Atlantic
	Dardanelles	Imbros	Heligoland	Dogger Bank	Jutland	Heligoland 2	Coromel	Falklands
HMAS <i>Australia</i>	—	—	no	no	no	no	no	—
HMS <i>Agamemnon</i>	yes	no	—	—	—	—	—	—
HMS <i>Agincourt</i>	—	—	no	no	yes	no	—	—
HMS <i>Bellerophon</i>	—	—	no	no	yes	no	—	—
HMS <i>Collingwood</i>	—	—	no	no	yes	no	—	—
HMS <i>Colossus</i>	—	—	no	no	yes	no	—	—
HMS <i>Commonwealth</i>	—	—	no	no	no	no	—	—
HMS <i>Conqueror</i>	—	—	no	no	yes	no	—	—
HMS <i>Dreadnought</i>	—	—	no	no	no	no	—	—
HMS <i>Erin</i>	—	—	no	no	yes	no	—	—
HMS <i>Hercules</i>	—	—	no	no	yes	no	—	—
HMS <i>Indomitable</i>	yes	—	—	yes	yes	no	—	—
HMS <i>Inflexible</i>	yes	—	—	—	yes	no	—	yes
HMS <i>Lion</i>	—	—	yes	yes	yes	no	—	—
HMS <i>Monarch</i>	—	—	no	no	yes	no	—	—
HMS <i>Neptune</i>	—	—	no	no	yes	no	—	—
HMS <i>New Zealand</i>	—	—	yes	yes	yes	no	—	—
HMS <i>Orion</i>	—	—	no	no	yes	no	—	—
HMS <i>St. Vincent</i>	—	—	no	no	yes	no	—	—
HMS <i>Superb</i>	—	—	no	no	yes	no	—	—
HMS <i>Temeraire</i>	—	—	no	no	yes	no	—	—

—Indicates that the vessel was stationed in another theatre and could not have participated.

Irrespective of formal significance assessments, ship's bells may hold a high level of significance today for individuals associated with maritime history, as illustrated by the

case of the bell of USS *New Jersey* (BB-16). The Battleship New Jersey Museum (BB-62) wanted to develop an exhibit about its namesake predecessor. As the original bell of the USS *New Jersey* is on permanent display in front of City Hall in Elizabeth, NJ, the museum commissioned a 3D-printed full-size replica [181]. The significance of public engagement and ownership of maritime heritage is further exemplified in an account of the movement of the bell of USS *Montana*. Although referring to the earlier ACR-13 rather than the BB-51, which was scrapped under the Washington Limitation Treaty, the story of two rival fraternities engaging in a 43-year contest over a ship's bell speaks highly of the pride and significance placed on such objects [70]. This is especially the case here; the USS *Montana* was renamed USS *Missoula*, with the victor being a fraternity based in the city of the same name, despite the bell having the inscription of the original ship's name.

The trophy status of ship's bells alluded to in the introduction also manifests itself in bells taken off enemy vessels that were captured intact or as wrecks. These bells tend to be in public collections, and often placed on exhibition. An example from World War I are the bells of the Imperial German cruiser SMS *Emden*, which was destroyed by HMAS *Sydney* at the Cocos and Keeling Islands in November 1914, and which are now on display in the Australian War Memorial in Canberra [182] and the Imperial War Museum in London [183]. An example of World War II is the bell of the German WWII-era heavy cruiser *Prinz Eugen*, famous for its role in the Battle of the Demark Strait when the *Bismarck* sank the British battleship SMS *Hood*. The *Prinz Eugen* was surrendered to British Navy at the end of the war, passed to the USA as a war prize, and deployed by the U.S. Navy as a target ship for atomic bomb tests in Bikini Atoll in 1946 [88].

In addition to the bells, and setting aside the guns that had been landed and subsequently used in coastal defence [17,56–59], there are few other elements of the scrapped vessels that have survived (Table 9). These primarily comprise the celebratory silver service given by the namesake state to the officer's mess of U.S. battleships, but also include ships' wheels, a gun tampion, and a foremast (Figure 25).

Table 9. Some examples of other surviving items of the warships scrapped under the terms of the Washington Arms Limitation Treaty.

Ship	Other Items	Curation Location	Reference
IJN <i>Ibuki</i> (伊吹)	Ship's wheel	Australian War Memorial, Canberra	[166]
HMAS <i>Australia</i>	Steam pinasse	private	[184]
HMS <i>Dreadnought</i>	Gun tampion	National Maritime Museum, Greenwich	[180]
USS <i>Delaware</i>	22-piece silver service	Delaware Public Archives, Dover, DE	[107]
USS <i>New Hampshire</i>	72-piece silver service	New Hampshire Historical Society, Concord, NH	[113,114]
USS <i>New Jersey</i>	105-piece silver service	Battleship New Jersey Museum, Camden, NJ	[185]
USS <i>North Dakota</i>	48-piece silver service	North Dakota Heritage Center & State Museum	[186]
USS <i>Oregon</i>	Ship's wheel	Oregon Historical Society	[117]
USS <i>Oregon</i>	Foremast	Tom McCall Waterfront Park, Portland, OR	Figure 25
USS <i>South Carolina</i>	66-piece ship's silver service	South Carolina Governor's Mansion	[187]
USS <i>Louisiana</i>	Silver service set	Louisiana State Museum, New Orleans, LA	[188]



Figure 25. The foremast of USS *Oregon* erected in 1956 at Tom McCall Waterfront Park in Portland, OR (photo: Lia Brown).

8. Implications

That some individuals and even countries go to great lengths to retain and display naval bells greatly demonstrates the iconic nature of a ship's bell: being a trophy of a key battle, or a symbol of past histories or iconic moments, such as the beginnings of an emergence of a country unto its own. That a large number of (particularly British and Japanese) bells are unaccounted for does not suggest disinterest or indifference towards these items. On the contrary, the ownership of many such bells by ex-service personnel suggests a deep connection to past histories and practices. The central issue that presents itself here is the matter of public and private ownership of such items. To what extent should iconic heritage items be accepted exclusively into the private domain? One could be reminded of a Van Gogh or Monet being in the possession of a private collector, but this analogy is delusory—works of art are often commissioned and usually do not have the ability to be representative icons of a country's military prowess. Instigating retrospective governmental or public ownership of such items may not only impractical but may well also be disrespectful to any individual who obtained a ship's bell by legal means and where the custodial chain of legal ownership can be demonstrated. In particular, this applies to the British bells where, as shown above, the Royal Navy intentionally disinvested itself of ownership and irrevocably abandoned any claim to the bells. In the Japanese case the processes are less clear, but as the vessels were disposed of the 1920s, we can assume that illegal transmission in ownership would not have occurred. We may need to differentiate the legal from the moral dimension, however. Clearly, it would be preferable that bells associated with vessels that have a high level of cultural significance be held in public

hands. Although heritage value criteria have been developed for heritage structures [189,190], they do not exist for ship's bells.

In this paper we took some steps when assessing the significance of the bells of British vessels. The question then arises regarding the processes that should be developed to "re-claim" culturally significant bells in private hands. Although there is a body of literature dealing with the repatriation of objects acquired in colonial settings [191–193], this is conceptually different and thus has only limited informative value.

The implications of this paper are futures based. Careful thought and planned action needs to be undertaken for any item that may be indicative of being considered worthy as public heritage, representative in the naval domain, or otherwise. This may be critically so with reference to items that are at risk of, or are considered to be, redundant and therefore obsolete, as the scrapping of or cessation of action marks the finality of the item in working order.

Furthermore, the manner of exhibition and presentation of objects such as ship's bells in public spaces could also be amended to incorporate intangible heritage qualities such as emanated sound. With the history of ship's bells being utterly entwined as functioning items, fulfilling both operational and navigational functions as well as forming a touchstone for those who have associations, to have a naval bell silently resting as a museum piece misses the heartbeat of the history and presents a dehumanised form of a cold met-allurgic body.

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