

SHIPBUILDING, MARKETS, AND TECHNOLOGICAL

CHANGE IN EAST BOSTON

by

George Michael O'Har

Submitted to the Program in Science, Technology and
Society in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy in
the History and Social Study of
Science, Technology and Society

at the

Massachusetts Institute of Technology

February, 1995

©1994 George Michael O'Har
All Rights Reserved

The author hereby grants to M.I.T. permission to
reproduce and to distribute publicly paper and
electronic copies of this thesis document in
whole or in part.

Signature of Author _____

Certified by _____
Leo Marx
Thesis Supervisor

Accepted by _____
Merritt Roe Smith
Director, Program in Science,
Technology and Society

ARCHIVES

MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

SEP 26 1994

LICENCHED

*SHIPBUILDING, MARKETS, AND TECHNOLOGICAL
CHANGE IN EAST BOSTON*

by

George Michael O'Har

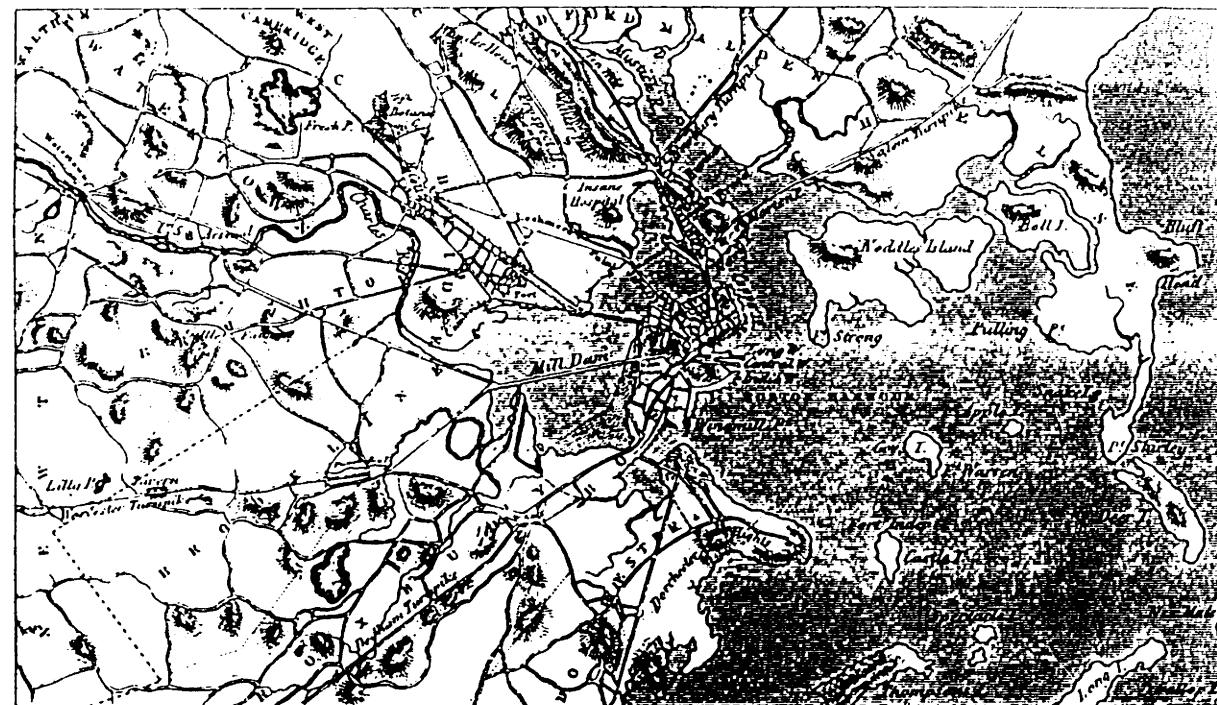
Submitted to the Program in Science, Technology
and Society in February, 1995, in partial
fulfillment of the requirements for the Degree
of Doctor of Philosophy in the History and
Social Study of Science, Technology and Society

ABSTRACT

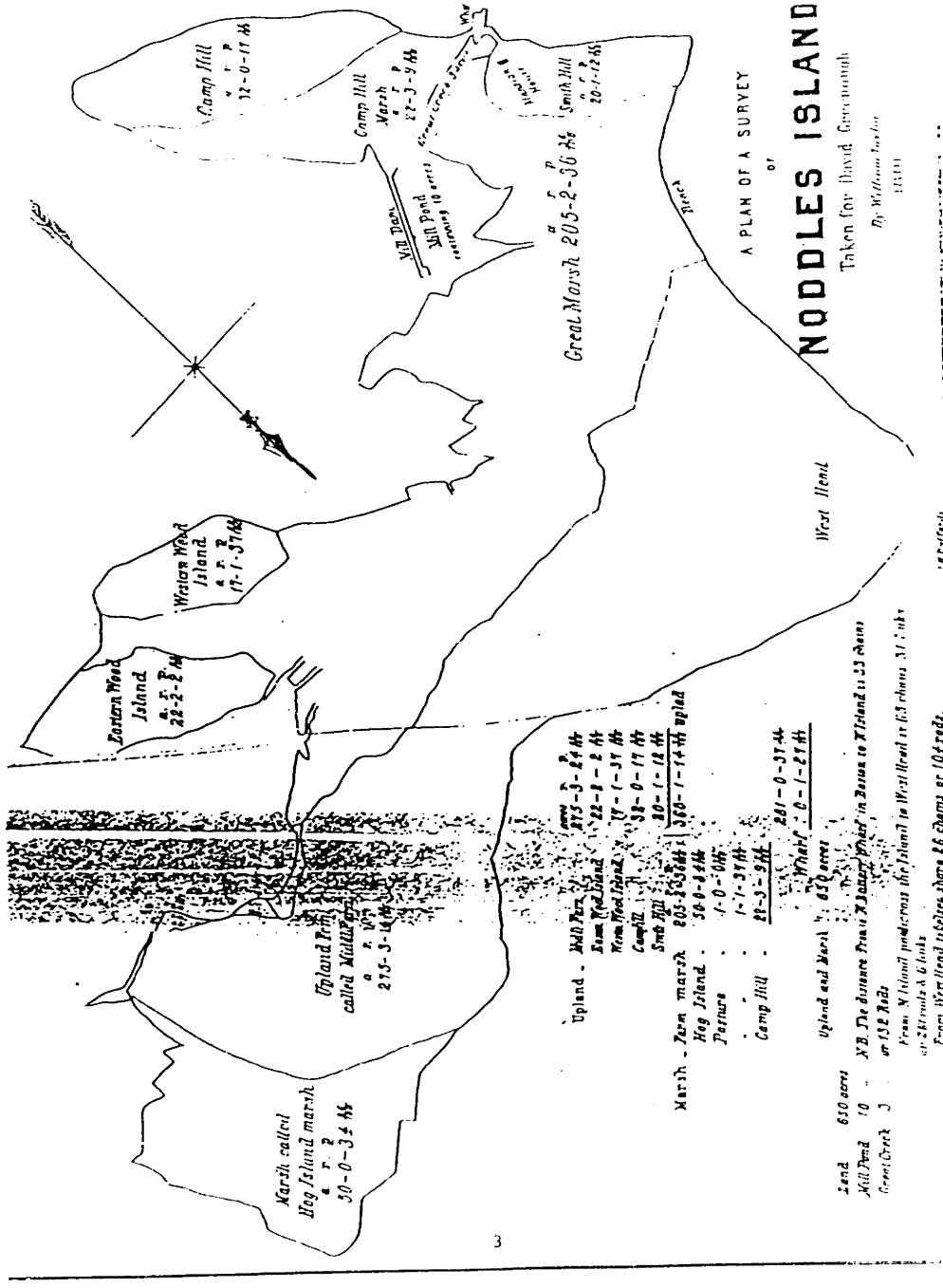
This thesis examines the effects of technological change on shipyard workers who lived in East Boston from 1840 to 1880. East Boston, an island in Boston Harbor, became a center for the construction of clipper ships when demand for fast wooden sailing vessels increased after the discovery of gold in California in 1848. Workers migrated to the island specifically to work in East Boston shipyards. When demand for clipper ships fell shortly before the Civil War, and remained weak after the war ended, workers in the East Boston shipbuilding experienced a crisis. This crisis was heightened when iron began to replace wood as a building material for ocean-going commercial vessels. The common belief among shipyard owners, that shipwrights and other craftsmen who worked in wooden shipyards would readily change skills and go to work in the small iron shipbuilding establishments in East and South Boston, did not hold true. This thesis demonstrates that the source for workers in iron shipyards was the machine shop, not the wooden shipyard, and that artisans who once worked in wooden shipyards in East Boston chose to work in completely unrelated trades rather than work in an iron shipbuilding establishment or machine shop.

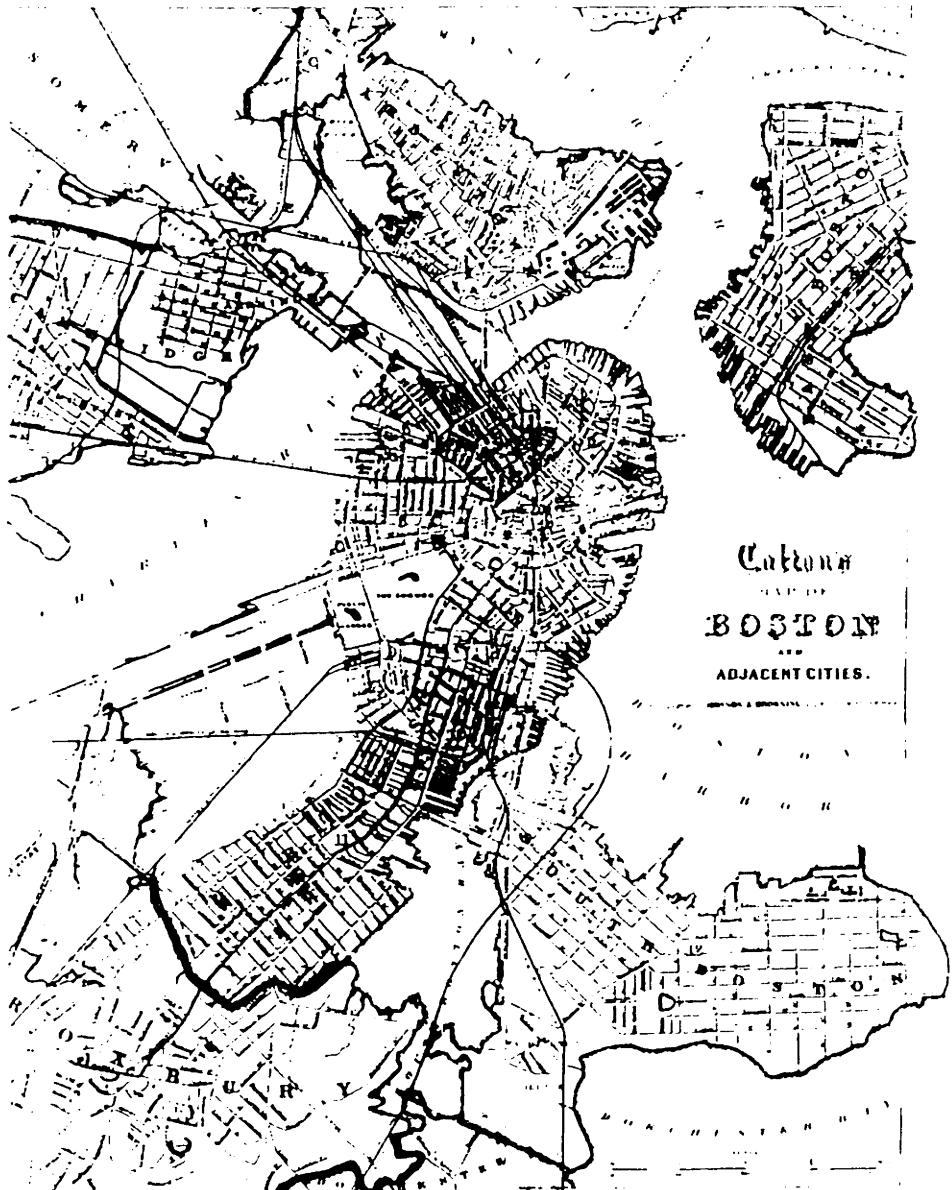
Thesis Supervisor: Dr. Leo Marx

Title: Senior Lecturer, Kenan Professor of American
Cultural History, Emeritus



BOSTON AND ENVIRONS.



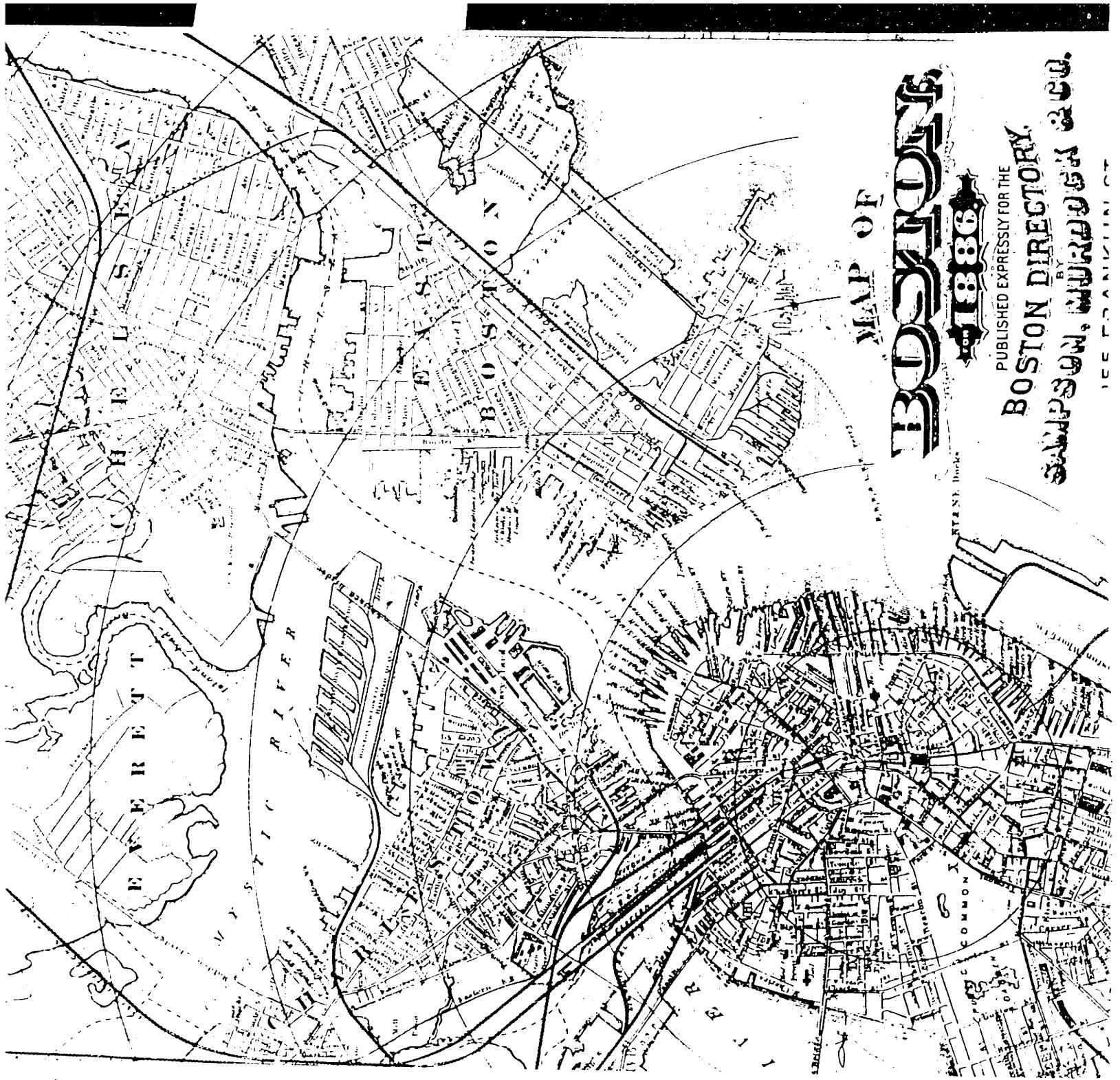


BOSTON

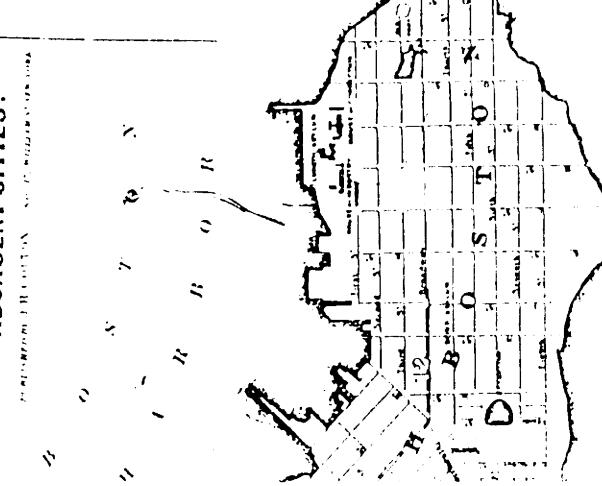
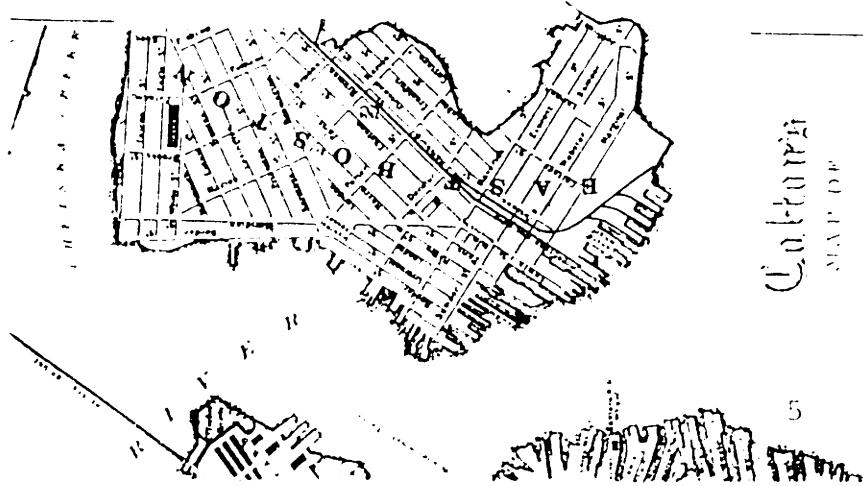
MAP OF

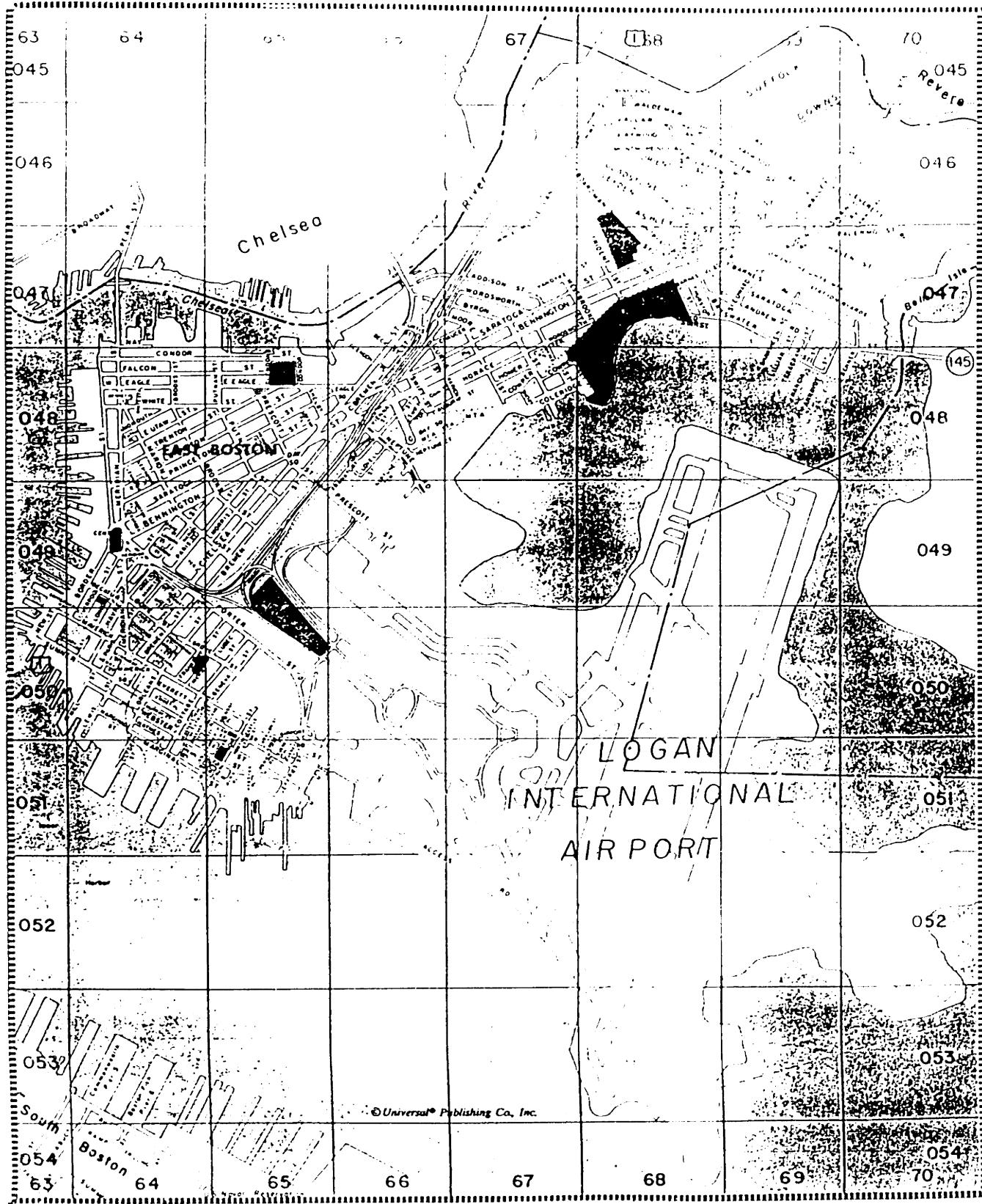
1886

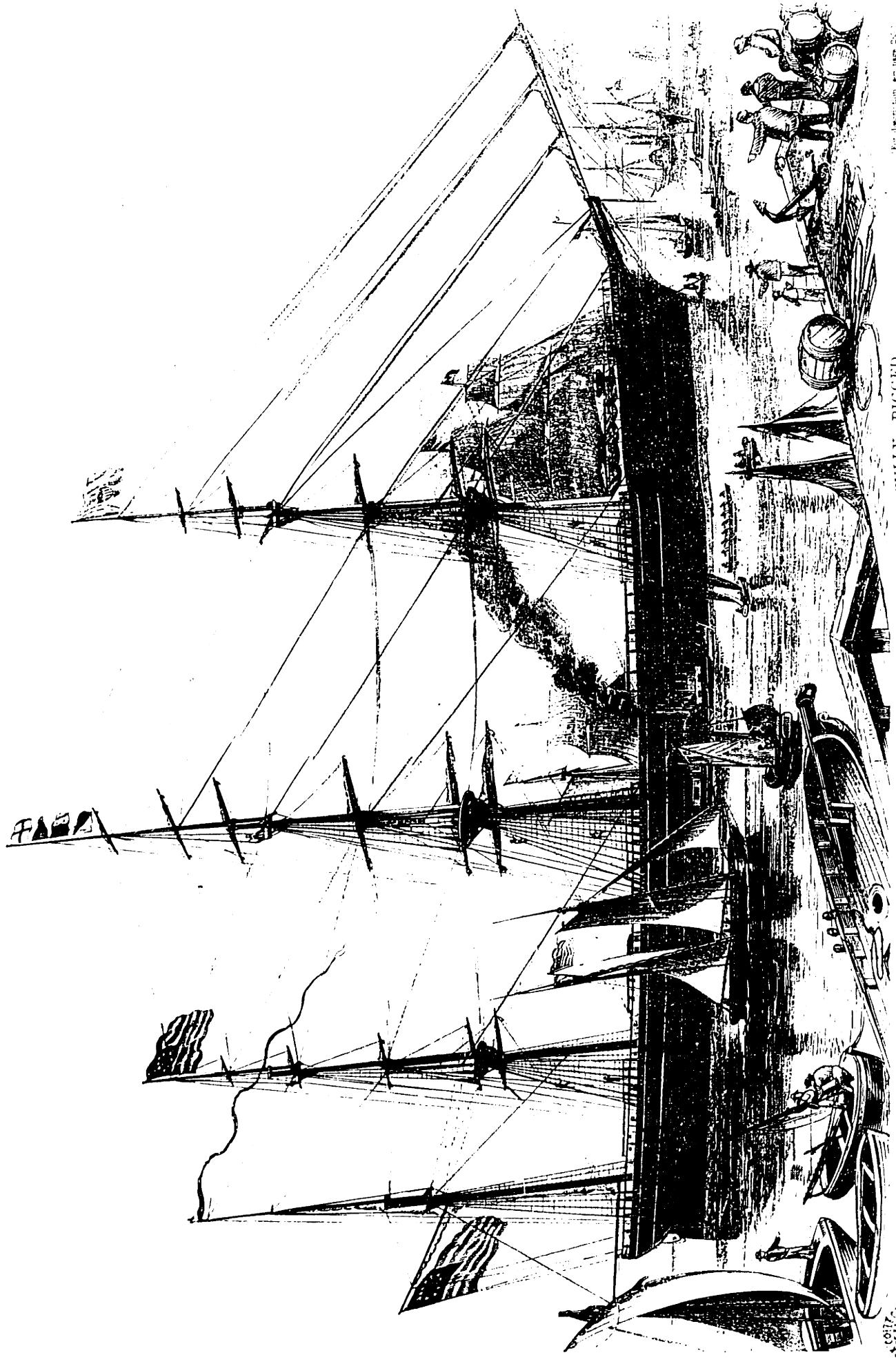
PUBLISHED EXPRESSLY FOR THE
BOSTON DIRECTORY,
BY
J. H. DODD & CO.



MAP OF
BOSTON
AND
ADJACENT CITIES.

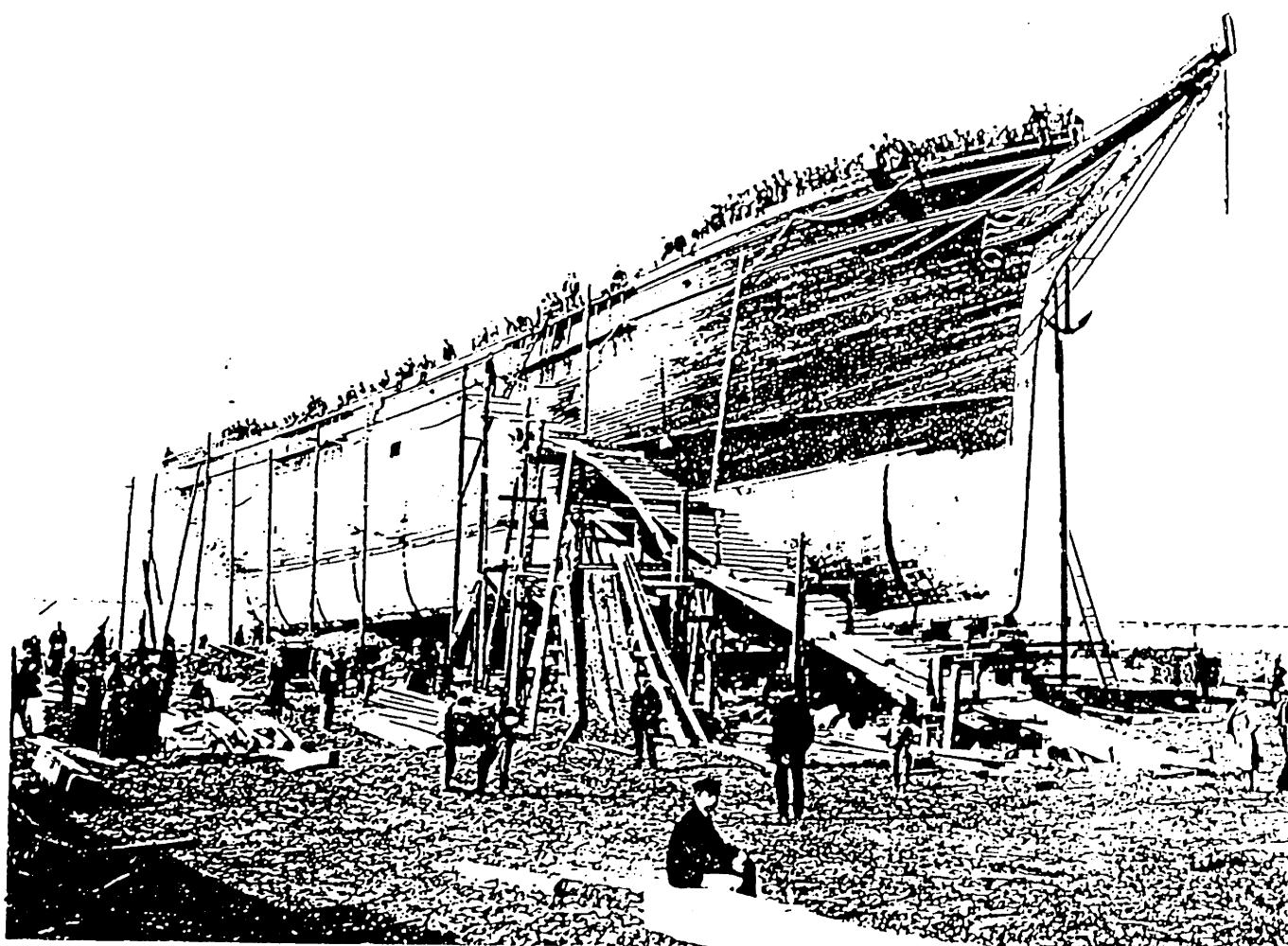






LEVIATHAN CLIPPER SHIP, THE "GREAT REPUBLIC" FULLY RIGGED.

For description, see page 28



Photograph of Donald McKay's Glory of the Seas, taken on launch day, in October, 1869. This was McKay's last clipper ship.



THE CLIPPER SHIP
FLYING CLOUD
J. P. GREEZY, Commander.

WILL HAVE QUICK DISPATCH FOR THE ABOVE PORT.

The Ship having repeatedly made the passage within 90 days, as well as the shortest on record, Shippers have an opportunity of placing their goods in San Francisco, with the chance of the early spring trade.

For freight or passage, apply to the captain on board, pier 49 East River, or to

JOHN I. EARLE, 106 Wall-St.

Nash & Co., Printers.

Charter'd to the Society for Saving Seamen, New York.

"Oh, to be back in the fine days of my youth, ochone! Oh, there was fine beautiful ships them days--clippers wid tall masts touching the sky--fine strong men in them--men that was sons of the sea as if'twas the mother that bore them...Oh, to be scudding south again wid the power of the Trade Wind driving her on steady through the nights and the days! Full sail on her! Nights and days! Nights when the foam of the wake would be flaming wid fire, when the sky'd be blazing and winking wid stars...And there was days, too. A warm sun on the clean decks. Sun warming the blood of you, and wind over the miles of shiny green ocean like strong drink to your lungs. Work--aye, hard work--but who'd mind that at all?..'Twas them days men belonged to ships, not now. 'Twas them days a ship was part of the sea, and a man was part of a ship, and the sea joined all together and made it one. Is it one wid this you'd be, Yank--black smoke from the funnels smudging the sea, smudging the decks--the bloody engines pounding and throbbing and shaking--wid devil a sight of sun or a breath of clean air--choking our lungs wid coal dust--breaking our backs in the hell of the stokehole--feeding the bloody furnace--feeding our lives along wid the coal, I'm thinking--caged in by steel from a sight of the sky like bloody apes in the Zoo! Ho-hc, devil mend you! Is it to belong to that you're wishing? Is it a flesh and blood wheel of the engines you'd be?"

Eugene O'Neill
The Hairy Ape,
Scene One

TABLE OF CONTENTS

Introduction

- I Noddle's Island, 1620-1833
- II The East Boston Company, 1833-1845
- III The Rise of East Boston, 1842-1860
- IV The Building of the Ship, 1845-1856
- V Worker Community, 1846-1870
- VI Iron Comes of Age, 1856-1880
- VII Conclusion

Appendices

- I East Boston Shipbuilding Industries
- II Boston City Directory Worker Data Base
- IIIA Data Base Comparison I
- IIIB Data Base Comparison II
- IV East Boston Shipbuilders

Introduction

"Do the builders of wooden ships adapt themselves readily to the building of iron ships?"

"Yes, sir. The change is very simple. My opinion is, that when iron ships come to be made here, it will be found that the builders are those who have been building wooden ships."¹

These comments by A.C. Stimmers, a New York shipbuilder testifying before a Congressional Committee examining the status of American shipbuilding in 1869, typified American thinking on the subject. In what appears to have been an industry-wide assumption, all shipbuilders testifying before the Lynch Committee made claims similar to those expressed by Stimmers. Not a single expert witness said a word to the contrary. Each insisted that the change from wood to iron in American shipyards would come about painlessly. Everyone seemed to believe that shipwrights would become iron workers, that they would trade in one set of skills for another, and that yards which had formerly constructed wooden sailing ships would begin making iron vessels. But that is not what happened.

When iron began to replace wood as a building material in American shipyards in the late 1870s, those iron ships were made by workers who had been trained as machinists and mechanics. The iron ship was not a product of the wooden shipyard. It was a product of the machine shop. The source of the iron steamship was located in the world of the

boilermaker, not the wooden shipyard. Yet experts repeatedly testified that the wooden shipyard and its workers would evolve into the iron shipyard. Since in the United States machine shops had been involved in building early iron vessels and later in constructing iron clads during the Civil War, this belief in a transition from wood to iron in which the wooden shipyard would begin doing the work that was already being done in the machine shop is puzzling, but not surprising. There were enough similarities in making iron and wooden ships for such a belief to have taken hold. During the Civil War a few wooden shipyards had become involved in making iron clads for the government. There were thus grounds for the illusion.

The experts testifying before the Lynch Committee in 1869 appeared before Congress at a time when shipyards were at a complete standstill, when men were out of work, and capital was being shifted away from their industry, in some cases to the railroads. To a man, they advocated a national investment in iron ship construction as a way out of the depression in the shipyards. Shipbuilders and owners spoke as proponents of technological change, a position that encouraged them to ignore the costs of the transformation they proposed. They seemed almost to deliberately misunderstand the difficulty a worker might experience in moving from a wooden shipyard to one where iron ships were produced. Some of them believed that an iron ship was easier to build than a wooden ship, that the task required less skill, and that workers would therefore experience little difficulty in making a change when wood was replaced by iron. They were also optimistic. Workers, however, did not respond as expected. When the wooden shipyards closed, and artisans were compelled to learn other trades, those new skills rarely entailed their leaving a wooden shipyard to go and work in a yard that produced iron

steamers.

This study examines the impact of the change from wood to iron on the island community of East Boston, which held a world leadership role in a mode of shipbuilding that was displaced. East Boston, virtually unsettled at the start of the wooden shipbuilding boom, was settled in part because of the resurgence in wooden shipbuilding that began in 1830. Wooden shipbuilding was the central industry on the island from 1845 to 1857, the year the panic slowed shipbuilding to a halt. The industry remained dormant during the Civil War, and although some ships were built in East Boston yards between 1866 and 1870, the industry was unable to return to pre-war levels. After 1870, the full impact of the collapse in the market for wooden ships began to be felt on the island.

During the shipbuilding boom, more clipper ships were launched from East Boston shipyards than from all the yards in New York, Philadelphia, Baltimore or London. East Boston, in some surveys, was the clipper ship capital of America.² Historians argue about the importance of the clipper ship, and some, like Howard I. Chapelle, even go so far as to call it "the most over-advertised type in maritime history."³ The truth falls somewhere in-between. The clipper ship was an example of a technology approaching its limit. These ships were large, heavy, fast sailing vessels with sharp lines, unlike the squarish, slow, bluff-bowed East-Indiamen that helped enrich members of the East India Company, but very much like the packet ships which more immediately preceded them. The *Great Republic*, built in East Boston by Donald McKay in 1855, was 334 1/2 feet long, with a 53 1/2 foot beam and a mainmast of 131 feet.⁴ With the addition of the bowsprit, this ship was 50 feet longer than a football field. Its hull was as tall as a 5 story building.

The clipper ship incorporated the best in naval

architecture and wooden ship design, and was a market-specific technological advance on sailing ships that preceded it. Since clipper ships used sails and not steam for propulsion, they could not be said to have utilized the most modern propulsion technology. But clipper ships were faster than the steam ships of the 1850s and 1860s. Steam vessels had been in use in America since the 1840s, and Great Britain had begun to use iron-ships powered by steam to cross the Atlantic at the time of the packet ships in the late 1830s and early 1840s. The use or iron in England was brought about by a chronic shortage of wood, a shortage that was not a factor when ship hulls in America began to be built of iron. In the new world, wood was a resource to be squandered, and clipper ships wasted as much as they used: a 2,000 ton clipper ship actually used twice that amount in construction. But for a time in several coastal cities in the United States, because of the ready availability of wood, and the sudden opening of the California market, these costly vessels enjoyed a competitive advantage. They were built because they made their owners rich.

The effect of the construction of clipper ships was to extend the age of wood and sail into the age of iron and steam. The men who built these ships in East Boston, Donald McKay, Samuel Hall, Paul Curtis and others who established yards on the island, were among the most imaginative and talented designers of their age, and the men who worked in their yards some of the best shipwrights this nation has ever seen. Workers came to East Boston to work for these shipbuilders and while there found themselves caught up in the great surge in wooden shipbuilding of the 1840s and 50s. But the boom was temporary. When demand for their product dropped, workers and yard owners in East Boston experienced a crisis. While the initial cause of the collapse of the market for clipper ships was not technological, toward the end of the

1860s and throughout the 1870s, when the crisis worsened, technological change began to play a dominant role.

During the 1870s, iron shipyards were established in the Delaware River Valley, and by the time the 1870s came to a close, it was clear that wooden sailing ships would never again dominate commercial markets as they had during the reign of the clippers. A crisis that began with a market fluctuation became transformed over time into a threat to the livelihood of members of the community who worked in the wooden shipbuilding industry. Although this crisis might lead some to believe that technology itself acted as the primary driving force in bringing on the change from wood to iron and from sail to steam, an examination of the factors involved suggests the demise of the East Boston shipbuilding industry came about because of an intersection of several events that did not encourage the building of wooden ships.

This study begins with a brief history of the island, which was unsettled until the 1830s. Chapters I and II discuss the early years of East Boston, before wooden shipbuilding became the dominant industry. Chapters III and IV elaborate on the gradual rise of the shipbuilding industry, and on the increasingly important role of artisans in the community. In Chapter V, the story of the shipyard continues with a discussion of labor activity on the parts of East Boston shipwrights and caulkers. There is also some discussion of Irish immigrants, who found occasional shipyard work as laborers, but whose exclusion from the skilled trades provides information on the nature of the apprentice system in East Boston shipyards. The final chapter describes the gradual triumph of iron over wood as a building material for ocean-going commercial vessels.

The written historical record concerning this industry is sparse. Nineteenth-century shipbuilders kept few

records, and very little documentation has come down to us. I have been forced to concentrate on two builders, Donald McKay and Samuel Hall, because more is known about them. Hall himself kept some records. McKay did not, but unlike Hall, he has been the subject of numerous articles and a single attempt at biography. There were other shipbuilders in East Boston, but Hall and McKay were the two largest. They have therefore been chosen to represent their part of the shipbuilding community on the island.

If shipbuilders left few accounts of themselves, the men who worked in their yards left even fewer. Shipwrights and ship carpenters wrote no journals and kept no diaries. But they do manage to speak to us. I used Boston city directories from the years 1846, 1852, 1860, 1870 and 1880 in this study of shipyard workers. This source proved very useful. The 1860, 1870 and 1880 manuscript population census returns for East Boston were also examined, but proved less-useful than Boston city directories in most respects. The *East Boston Argus* was a source of much valuable information on the years of decline, 1870-1880. If the first few chapters strike the reader as having been written from a "top down" point of view, such a perception is understandable. I was a prisoner of my sources. Later chapters, when workers begin to move toward center stage, should alter such a perception. Had the workers who paved the first streets and cleared the lots for later island settlers left journals or other records, they would have been as much a part of the chapters on the early history of the island as their more well-known and wealthy contemporaries.

Traditional histories on the subject of shipbuilding suffer from several shortcomings, one of which is a tendency to be overly-romantic in recounting the exploits of wooden ships and their builders. There is also an almost complete

absence of discussion of workers--what they did, where they lived, the crucial role they played in the building of the ship. An overly-romantic account can be avoided if the historian refuses to limit his study to a scrutiny of "great men" and their exploits. While there were great men involved in the design and construction of sailing vessels, especially clipper ships, they were not the only people involved in their construction. Thankfully, the failure of maritime historians to examine the lives of shipyard workers is not impossible to correct. All one has to do is look at some of the sources these earlier historians tended to ignore because their emphasis was on politics, economics, and the actions of nation states.

While the lack of a paper trail makes this correction harder than it might have been had shipyard workers kept diaries, journals and ledgers, it is not impossible to provide a more accurate glimpse of the past which includes workers as well as the men who employed them. The present study is an attempt to redress, to some extent, this historical oversight, at least as it pertains to East Boston. It is hoped that in doing so, this story captures more realistically the nuts and bolts of the historical past of East Boston, the clipper ships that were built there, and the men who built them, yard worker and yard owner alike.

A ship is a technological artifact, whether it is made from wood or from iron, powered by sail or by steam. Maritime historians like Samuel Eliot Morison, Robert G. Albion, Carl C. Cutler and John G.B. Hutchins, while they have not ignored the role played by technology in transforming the maritime world, have nonetheless not given the subject its due. Technology, conceived as artifact, played a vital role in the construction of clipper ships, from the tools in the hands of workers to the steam-powered derrick in Donald

McKay's East Boston shipyard. In later years, technology, more broadly understood as both artifact and as mechanically doing something that was once done manually, played a further critical role in the lives of East Boston shipyard artisans when it helped make impossible their return to the wooden shipyard. But a changing technology was one factor among many that helped usher in the iron age of shipbuilding in America. Each factor had its moment. An examination of how this change came about illustrates the relationship which then existed between technology, the productive process and the community in which it occurred. The following description of the island, and its shipyards, has been written with that in mind.

1. *Causes of the Reduction in American Tonnage and the Decline of Navigation Interests*, Report of a Select Committee to the House of Representatives on 17th February, 1870 (Washington: Government Printing Office), p. 21. Testimony of A.C. Stimmers to John Lynch, Committee Chair. [Hereafter *The Lynch Report*]
2. Arthur H. Clark, *The Clipper Ship Era* (New York: G.P. Putnam's Sons, 1911). Carl C. Cutler, *Greyhounds of the Sea; The Story of the American Clipper Ship* (New York: G.P. Putnam's Sons, 1930). Clark gives a number of 172 vessels, but he includes only extreme clippers. Cutler shows an output of 444 vessels, but he includes any fast ship built between 1850-1859 in his calculations. If the Clark figure is accepted, then East Boston, which launched more than 38 clipper ships between 1850-1857, was the clipper ship capital of America. If the Cutler figure is used, then New York, which outpaced East Boston in both tonnage and total vessel output, would have launched the most clipper ships.
3. Howard I. Chapelle, *The History of American Sailing Ships* (New York: Bonanza books, 1935), p. 281. Chapelle may well be correct in his view, but his opinion of clipper ships is at least partially informed by his dislike of what could be called boosterism on the part of Samuel Eliot Morison. See Morison's *Maritime History of Massachusetts* (Boston: Houghton Mifflin, 1921) for the opposing side of the argument.

4. Henry Hall, *Report on the Ship-Building Industry in the United States* (U.S. Census, 1880), p. 89.

I

Noddle's Island

1620-1833

East Boston today is a peninsula, a two square mile section of Boston connected by an isthmus to the town of Revere on the northeast. Before the shallow water, lowlands and marshes were filled in, physically linking East Boston to the mainland, East Boston was an island almost a square mile in size, a third of a mile east of Boston proper. The west side of the island faced Charlestown, and the southwest portion of the island, where the harbor was deep, and where many shipbuilders would set up their yards, stood directly across the water from Boston's North End. The island was largely unsettled until the 1830s, when it was purchased by the East Boston Company, a group of wealthy Bostonians interested in real estate speculation.

Before the 1830s, East Boston was known as Noddle's Island. It received this name because William Noddle, who drowned in 1632 "carrying wood in his canoe" from the island, had made it a habit to hunt and fish on and near the island.¹ John Winthrop calls him an "honest man of Salem" and mentions his drowning in the South River.² Little is known of Mr. Noddle, although he is suspected of having been a settler in the employ of Sir William Brereton, who had received proprietorship of the island from John Gorges in January, 1628.³

Fernando Gorges, father of Robert and John, was very involved in the early colonization of New England. He was the guiding force behind the Plymouth group, which had been given

proprietary and governmental rights to the entire land area from the fortieth to the forty-eighth parallels and from the Atlantic to the Pacific by James I.⁴ In 1622, Robert Gorges received from the Plymouth Council all of Massachusetts, which at that time included Maine and New Hampshire. At his death in 1628, Robert passed his lands along to his brother, who in turn conveyed them to Brereton. East Boston, part of this inheritance, became briefly known as Brereton Island, after its new owner.

Sir William did not long hold possession of the island. According to William Sumner, "no regard seems to have been given to the grant of the Plymouth Company to Robert Gorges, or to the title of Sir William Brereton, who held under him."⁵ Sumner gives no reason for this refusal to acknowledge the grant, but there was resentment in the Puritan community at the power of the Gorges family, who were members of the Church of England.⁶ The Gorges Company was organized on a "very grandiose scale." The presence in Massachusetts at that time of Rev. William Morell, a representative of the Gorges, was sufficient in itself to show that in organizing the company, Sir Fernando Gorges had uppermost in his mind his "favorite scheme of establishing episcopacy in New England."⁷

On the 10th of February, 1629, the "grant to Sir William Brereton...was directly disowned by the Massachusetts Company."⁸ "Motion was made on behalf of Sir William Brewerton, who, by virtue of a late patent, pretends right and title to some part of the land within the company's privileges and plantation in New England."⁹ The court rejected Brereton's claim, refusing even to acknowledge anything was due him in recompense. Brereton, however, was given assurance that any servants he should send over would receive "courteous respect, and be accommodated with the land and what else shall be necessary, as other servants of the company."¹⁰ The company here

is the Massachusetts Company, not the company in the Gorges grant from the Plymouth Council in 1622. Brereton did not further press his claim, and in 1633, the General Court made a grant of the island to Samuel Maverick under the title of Noddle Island.¹¹

At the time of the Maverick Grant, and up until the Revolution, Noddle's Island, like other islands in the harbor, was a favorite pasture ground, and well-stocked with domestic animals. Forest growth was a good source of wood for housing and fuel.¹² Prior to the Maverick Grant, the island was under close supervision of the General Court, which tried, on several occasions, to limit the number of cattle permitted to graze and the amount of wood allowed to be felled.¹³ Sumner remarks that the island, then, was "frequented by waterfowl, pigeons, and other edible birds, and on this account proved so attractive to hunters that it was very soon found necessary to pass a law to protect the game which flocked thither in great numbers."¹⁴

On the first of April, 1633, Noddle's Island was granted to "Mr. Samuel Maverick, to enjoy to him and his heirs forever, yielding and paying yearly at the General Court to the governor for the time being, either a fat wether, a fat hog, or 40s in money, and shall give leave to Boston and Charlestown to fetch wood continually, as their need requires from the southern part of the said island."¹⁵ This would prove to be a most generous stipulation to the residents of those two communities. On December 7th, 1636, "the jurisdiction of the island was laid to Boston."¹⁶

At that time, the island was estimated to be 633 acres, approximately a square mile, beside the "contiguous flats to low water mark."¹⁷ Noddle's Island was also surrounded by deep water, a natural fact that would prove useful when the size of wooden ships increased and shipbuilders, unable to

launch such ships into the shoal Mystic River, found themselves compelled to look for deeper water. The island, topographically, was said to have looked like a great bear. The back of the bear, "fronting on Mystic River, was the most elevated part of the island."¹⁸ This section of East Boston, later called Eagle Hill, was where Donald McKay would build his house.

Samuel Maverick, the island's new grantee, was a reverend's son.¹⁹ He was a complex, conspicuous and important man, much talked about in the Massachusetts of his day. His hospitality was legendary, and he entertained Governor Winthrop and other notables at a home he had in Winnisimet.²⁰ John Josselyn, an Englishman who journeyed to America in 1638, visited Maverick on Noddle's Island, and described him as "the only hospitable man in all the country, giving entertainment to all comers gratis."²¹ Others have written of similar courtesy and kindness.²²

Yet Maverick was no stranger to controversy, and he played a significant role in the political-religious disputes of his day. According to Joseph Felt, a nineteenth-century historian, the first instance in the Commonwealth of a white man buying blacks to be used as slaves occurred on Noddle's Island. Samuel Maverick was the purchaser.²³ Josselyn himself, who speaks well of Maverick in every other instance, recounts an odd tale in which a female slave came up to his chamber window, and conveyed to him her sense of grief and outrage at having been forced by Maverick to mate with another slave she considered beneath her station.²⁴

Maverick was "an Episcopalian and a royalist, evidently a good liver, a whole-souled, jovial Englishman, generous and kind, but not sympathizing with the Puritans in their peculiarities."²⁵ He was, accordingly, not much liked by the authorities. He was equally suspicious of them. His

religion excluded him from office, and Maverick, not one to suffer in silence, decided, in a major challenge to the authorities, to fight against the intolerance.²⁶ He and six others addressed a petition to the General Court in which they demanded for themselves rights that routinely were granted only to Puritans.²⁷ Ironically enough, one of the complaints in the petition made the claim that they were held in slavery and bondage by their Puritan brethren. The analogy was exaggerated, but not without pertinence, since the religious animosities that divided England had become transported to the colony.

The petition was widely circulated. Copies "were rapidly spread into the adjoining governments of Plymouth, Connecticut, and New Haven, and even in the Dutch Plantations, Virginia, and the Bermudas; and it seems to have been well understood that it was expected to reach English ears, and that it was to be forwarded to parliament."²⁸ Maverick and his cohorts were fined. In March of 1647, in order to bring the matter of the petition to a close, Maverick, along with William Clark, a member of the Salem church, was arraigned by the General Court "for... active exertions in obtaining signatures to the non-freeman's petition".²⁹ He was treated very harshly.

On the 26th of May, 1647, Maverick was sentenced to pay 100 pounds for being party to a conspiracy. This was an extremely large fine, so large in fact, that it was probably levied to drive Maverick out of the Massachusetts colony. He was fined another 50 pounds and jailed for breaking his oath.³⁰ Maverick appealed. The magistrates refused. Maverick persisted, and in June of 1650, the fine was reduced by one half.³¹ Maverick, a man of character and no small integrity, was punished as much for his boldness as for his crime. Several of his fellow petitioners departed immediately for

England, to press their case. He stayed behind, but shortly after the controversy, in July, 1650, Maverick, "conjointly" with his wife and son, Nathaniel, sold Noddle's Island to Captain George Briggs of Barbados.³² He then left the island.

Eventually, Maverick returned to England. He came back to the colonies, in 1664, as a royal commissioner, one of four appointed by Charles II. As commissioner, Maverick was zealous, but not without discretion. When the commission was recalled by the king in 1666, Maverick did not go back. He can be placed in Massachusetts in 1667, although he seems to have spent more time in New York than elsewhere; there are letters from New York to England as late as 1669.³³ After that year, Maverick, a well-known, public man, disappears from the historical record. His death remains a mystery, although it is supposed he died in the colonies.³⁴

The proprietorship of Captain Briggs was of short duration. On October 28th, 1650, Briggs "conveyed the island" back to Nathaniel Maverick, who on that very day sold the island to Colonel John Burch, also of Barbados.³⁵ At this point, Samuel Maverick claimed the island again as his own on the ground that the conditions under which he had sold it had been circumvented. The matter ended up in court, where it was decided against Maverick.³⁶ In 1656, Thomas Broughton, through an intermediary, purchased the island from Burch.

Shortly thereafter, Broughton met with financial difficulties. To address these, he attempted to convey the island to Walter Price of Salem, and to Henry Shrimpton and Richard Cooke of Boston, in trust for his creditors. Shrimpton declined the trust, since full possession of the island had already been given to Price. In 1664, Sir Thomas Temple purchased Cooke's interest, and three years later purchased that of Newbold (as Broughton's creditor). Temple thus took complete ownership of Noddle's Island.³⁷

In 1670, Temple sold the island to Samuel Shrimpton, one of the wealthiest men of his time, who paid him 6000 pounds for it.³⁸ At his death, in 1698, ownership of the island was transferred to his wife, Elizabeth. The widow married a second time, to Richard Stoddard. Her son, Samuel Shrimpton, Jr., died before her. His wife, Elizabeth Richardson, also married into the Stoddard family. It is through these three daughters of Elizabeth Stoddard, Mary, Sarah, and Mehitable, that ownership of Noddle's Island passed to William Hyslop Sumner, founder of the East Boston Company, and author of a history of the island.³⁹

When Elizabeth Shrimpton Stoddard died, in 1713, ownership of the island was transferred to her granddaughter, Elizabeth.⁴⁰ This granddaughter married John Yeamans, and had a son by him, Shute Shrimpton Yeamans, on August 20, 1721. When an adult, Yeamans was the first person since Samuel Maverick had lived on the island to begin to consider developing the land. In 1762, Henry Howell Williams leased the island from Shute Shrimpton Yeamans. Williams, and his large family, were model tenants. Williams remained on this island until 1800, at which time he moved to Chelsea. The tenancy passed to his son, Thomas, who remained there until a year or two after Noddle's Island was purchased by the East Boston Company.⁴¹

Shute Shrimpton Yeamans had three children, two daughters who died in infancy, a son who died young, and another son, Shute, who died at 20. Yeamans's will, which had left the land to his sons, provided for the transfer of the island to the three aunts, should default of his will occur. When the direct heirs, the two sons, died, ownership of Noddle's Island, one-third each, passed to his aunts, Mary, Sarah, and Mehitable, in 1774.⁴² Sumner's mother, Elizabeth, was Mehitable's daughter. Her share of the island passed

directly to her son, a transfer of property that would prove to be the first step toward the formation of the East Boston Company.⁴³

William Hyslop Sumner was born on July 4, 1780. He grew up and spent his youth at Auchmuthy house, a mansion on the corner of Washington and Cliff Streets in Roxbury, built about 1761, which was confiscated by the British during the Revolution. Sumner went to Phillips Academy, Andover, in 1793. He attended Harvard College, graduating in 1799. He was admitted to the Massachusetts Bar in 1802, and practiced law at the firm headed by John Davis, then district-attorney.⁴⁴ Sumner, however, appeared to have been less interested in the practice of law than in a political career.

In 1806, he served as aide-de-camp to Governor Strong, and again from 1813 to 1816. In 1808, and for the next eleven years, he represented Boston in the State Legislature. He was aide-de-camp to Governor Brooks from 1816-1818. In 1818, Governor Brooks appointed Sumner Adjutant-General. He retained this position for sixteen years, resigning in 1834, at which time he became president of the East Boston Company. Sumner was an ambitious and successful man. His father, Increase, was a deeply-admired, popular three-term governor, who died in office in 1799; his mother was the daughter of William Hyslop, a prominent and successful Boston merchant. From early in life, William Hyslop Sumner moved in an enclave of power, wealth and status. He was part of the ruling oligarchy. He went to the right schools, he was elected to public office, he was involved with the military. He knew and associated with Nathan and Samuel Appleton, Harrison Gray Otis, T. H. Perkins, Amos and Abbott Lawrence, men who helped develop the mill cities of Waltham, Lowell, and Lawrence.⁴⁵

In November, 1826, when he was forty-six, Sumner was

"appointed by the Secretary of War as a member of a board of army and militia officers, to report a plan of militia organization for the whole country."⁴⁶ Major-General Winfield Scott, and Lieutenant-Colonel Zachary Taylor, among others, sat on the board with Sumner.⁴⁷ In 1834, upon resigning the office of Quartermaster-General, Sumner left his home on Mount Vernon Street, and purchased the "fine estate overlooking large portions of Jamaica Plain," which he occupied until his death on October 24, 1861. He never lived in East Boston, although he did own a house there.⁴⁸ "It was the project of his life," Quint informs us, "to build a city where he had seen mere pasture."⁴⁹

Sumner visited the island often. There was no direct ferry service to Noddle's Island, so visitors had to take the ferry to Winnisimet (now Chelsea), which would stop to let people off on request. One of the most striking features of the island was that there were very few trees, all the lumber having been taken from the island by residents of Boston and Charlestown. Sumner found Noddle's Island entirely denuded, without a tree upon the hills or in the orchards. On the island, he enjoyed watching members of the Williams family load livestock aboard outward bound ships. There was a wonderful panorama of Boston and the surrounding towns. Standing on top of Eagle Hill, Sumner could see, "in full view, Lynn, Chelsea, Marblehead, Nahant, Medford, situated on the beautiful Mystic River," and "Charlestown, at the junction of the Mystic and Charles."⁵⁰

Sumner took away from these annual visits to Noddle's Island a dream. Since he was twenty-one, he had set his heart on owning and developing the island. However, he had two sisters, Mehitable and Elizabeth. When the time came for him and his sisters to inherit their portion of the island, they agreed to draw lots, with the winner receiving

the entire third of the island. Sumner lost. But he did not give up, hoping for an opportunity to present itself. On several occasions, he tried to buy out his sister and the other heirs, who still held two-thirds of the island. He met with no success. The dream of building a new city seemed more and more "a vain imagination."⁵¹

Nonetheless, he embarked on a plan to build a railroad that would connect the island to the north, via a ferry or bridge to Chelsea, and from there by railroad all the way to Salem. To do this, he had to own the entire island. Since Sumner had no experience with railroads, other than to know they were complicated, costly and risky undertakings, he knew he could not embark upon the project alone. As a lawyer, he had drawn up several acts of incorporation, and it was clear to him from his involvement in such corporate matters that large enterprises required sufficient capital. "Men of money as well as men of influence were needed for...direct support in so large a purchase as Noddle's Island."⁵² He was certain that if he offered enough money, his sister and the other heirs would listen to reason and let him proceed with his plans for development.

Sumner approached Stephen White, an influential and wealthy businessman, a close friend of Daniel Webster, and Francis J. Oliver, president of the American Insurance Office in Boston, an associate of Samuel Appleton. The two men were greatly interested in his proposal, although Sumner drove a hard bargain. He would not allow his partners to possess more than half the shares of the proposed enterprise. Moreover, White and Oliver had to advance all the money Sumner would need for his part of the purchase and also to put up additional funds for other improvements to the island until one year after the railroad to Salem was finished. They accepted his terms, and put up the necessary capital. On

February 21, 1832, Sumner's sister sold her third of the island to the newly-formed corporation.⁵³

Sumner spent the remainder of that year and part of the next negotiating with his relatives and buying from them the portions of land that remained in their hands. An act of the general court on April 18, 1833, confirmed the sale that launched the East Boston Company.⁵⁴ The modern history of the island begins at that moment. This transfer of land, occurring when it did, insured the island's future as a shipbuilding center. As ships grew in size, the deep water near East Boston would doubtless have proved attractive. But without wood, an infrastructure, a place to live and a regular way to travel back and forth from the island, no large wooden ships would have been launched there. In the first decade of its existence, the East Boston Company, under the leadership of William Sumner, developed the island so that when a market opened up for clipper ships, East Boston was capable of providing the facilities to build them.

1. *Winthrop's Journal, 1630-1649*, James Kendell Hosmer, editor. (New York: Charles Scribner's Sons, 1908). Vol. I., p. 83. All references are to this edition. [Hereafter, *Winthrop's Journal*] Edward Rowe Snow repeats this in *The Romance of Boston Bay* (Boston: The Yankee Publishing Company, 1944), p. 94.

2. *Winthrop's Journal*, p. 83.

3. Communication on "Old Planters," read by Charles Francis Adams, concerning the "pre-historic settlement of Boston and its immediate vicinity" by parties sent by Robert Gorges and others to establish "episcopacy." *Massachusetts Historical Society, Proceedings*. 2nd Series, Vol. 16, pp. 194-206. [Hereafter, *MHS Proceedings*]

4. *Ibid.*, pp. 194-206.

5. William H. Sumner, *A History of East Boston* (Boston: J.E. Tilton and Company, 1858), p. 47.

Sumner, who founded the East Boston Company, wrote a history of the island. The history, although antiquarian, is not without merit, especially since Sumner was an eyewitness and participant in the development of the island. In *Commonwealth: A Study of the Role of Government in the Economy, Massachusetts 1774-1861* (New York: New York University Press, 1947), on page 291, Oscar Handlin admits that while "Sumner knew how to make Clio serve the purposes of real estate speculation and other practical ends," he nonetheless "labored hard in his sources, and left much of value" in his work.

6. There were disagreements over land boundaries and the legality of the title itself, but the real concern seems to have been the religion of the grant-holders and the colonists they sent forth. Consider the matter of William Jeffrey, 'gentleman.' "In the first place, he was, in no respect, an ordinary man. His presence in the peninsula of Shawmut, in 1630, was made additionally inexplicable from the fact that he was about the last person one would ever have expected to find there. He was not a fisherman, nor a trader, nor a refugee: he was a student, an observer, and a recluse. A graduate of Emanuel College, Cambridge, he had received *episcopal ordination in England.*" *MHS Proceedings, 2nd Series.* Vol. 16, pp. 194-198.

7. Ibid., p. 195-196.

8. Sumner, *A History of East Boston*, p. 48.

9. *Records of Massachusetts Bay*, Vol. I, pp. 68-69. [Hereafter Mass Records]

10. *Mass Records*, Vol I, pp. 68-69.

11. *East Boston Argus-Advocate*, "Noddle Island Illustrated," May, 1897, p. 3. [Hereafter Argus-Advocate]

12. Ibid., p. 3.

13. Ibid., p. 3. Orders were passed in 1631 and 1632 restraining citizens from exploiting without limit island resources.

14. Sumner, *A History of East Boston*, p. 53.

15. *Mass Records*, Vol. I, p. 104.

16. Sumner, *A History of East Boston*, p. 56.

17. *Argus-Advocate*, May, 1897, p. 3.

18. Ibid., p. 3.

19. Ibid., p. 3.

20. Much has been made of this visit by Winthrop, and Sumner himself is confused about it. Before moving to Noddle's Island, Maverick built and fortified a house at Winnisimmet (now Chelsea) in 1625. It is this house Governor Winthrop visited. Sumner associates Maverick with Noddle's Island as early as 1628, five years before his grant. He knew Maverick owned land at Winnisimmet, but believed Winthrop to be mistaken when he has Maverick burying 30 people at Winnisimmet because of a smallpox epidemic in 1633 (*Winthrop's Journal*, Vol. I., p. 115). At this point in time, Sumner suggests that the Maverick of Winnisimmet was Elias Maverick, "probably a brother of Samuel" (*A History of East Boston*, p. 84.). Sumner has a tendency to place Maverick at one house or the other. He tends not to consider the possibility that Maverick might for a time have maintained both houses. Maverick's *Briefe Description of New England*, written in 1660, after he had returned to England, clarifies this matter because he writes of the house and the visit at Winnisimmet. The existence of this document was not known in America until after Sumner's death. His account of Maverick is otherwise correct and scrupulous.

Another and perhaps definitive account on the placement of the various Maverick residences is the one supplied by Judge Chamberlain in *MHS Proceedings*, 2nd. Series, Vol. I., pp. 364-373. This too is based on a reading of the "recent discovery" of the 1660 Maverick manuscript in England. The author insists that no one had a house on Noddle's Island prior to 1630. He does credit Maverick with a singular accomplishment: "that not later than 1625 he erected at Winnisimmet the first permanent house in the Bay Colony, and that the same was standing as late as 1660." Maverick arrived in the colonies in 1624.

21. *Massachusetts Historical Society Collections*. Vol III, 3rd Series, p. 231. [Hereafter *MHS Collections*]

22. On the "12th of July or thereabout, 1630, these Souldiers of Christ first set foote on this Westerne end of the World; where arriveing in safety, both Men, Women, and Children, on the north side of the Charles River, they landed neare a small Island, called Noddells Island, where one Mr. Samuel Maverick then living, a man of a very loving and curteous behavior, very ready to entertain strangers, yet an enemy to the Reformation in hand, being strong for the Lordly Prelaticall power one [on] this Island he had built a small Fort with the helpe of one Mr. David

Thompson, placing therein four Murtherers [guns] to protect him from the Indians." Johnson, *Wonder-Working Providence*, 1628-1651 (London: Nathaniel Brooke, 1654). All references are to the Charles Scribner's Sons edition of 1910.

Thompson was in all likelihood an agent of the Gorges.

23. Joseph B. Felt, *Annals of Salem* (Boston: James Munroe and Company, 1849), Vol II, p. 414. "The first notice we have of this disfranchised class, is in 1637, when Capt. Wm. Pierce was employed to carry out, to the West Indies, some Pequods, lately captured, and sell them there for slaves. On his return from Tortugas, Feb. 26, 1638, he had, as part of his cargo, a number of negroes. These appear to have been purchased by Samuel Maverick, of Noddle's Island, and others."

24. "1639. The 2nd of October, about 9 of the clock in the morning, Mr. Maverick's negro woman came to my chamber window, and in her own country's language and tune sang very loud and shrill; going out to her, she used a great deal of respect towards me, and willingly would have expressed her grief in English; but I apprehended it by her countenance and deportment, whereupon I repaired to my host, to learn of him the cause, and resolved to entreat him in her behalf, for that I understood before that she had been a queen in her own country, and observed a very humble and dutiful garb used toward her by another negro who was her maid. Mr. Maverick was desirous to have a breed of negroes, and therefore seeing she would not yield by persuasions to company with a negro young man he had in his house, he commanded him, nill'd he, nill'd she, to go to bed to her, which was no sooner done than she kicked him out again. This she took in high disdain beyond her slavery, and this was the cause of her grief." *MHS Collections*, Vol. III, 3rd Series, p. 231.

25. Sumner, *A History of East Boston*, p. 94.

26. *Winthrop's Journal*. Winthrop devotes considerable time to this important controversy in his entries for the years 1645-1647.

27. Sumner, *A History of East Boston*, p. 100. The others were Robert Child, Thom Burton, John Smith, John Dand, Thomas Fowle and David Yale. These were not imagined grievances on the part of the petitioners. Members of the Church of Scotland and the Church of England, and they were thus, were not admitted to the communion of New England Churches, were debarred from suffrage, and not permitted to hold office. See Johnson, *Wonder-Working Providence*, pp. 240-241.

28. Ibid., p. 102.

29. *Ibid.*, p. 108.
30. *Mass Records*, Vol. III, p. 113.
31. Sumner, *A History of Boston*, p. 200.
32. *Suffolk Registry of Deeds*, 26 July, 1650.
33. Thomas Hutchinson, *The History of the Colony and Province of Massachusetts Bay*, Vol. I., p. 250.
34. Snow, *The Islands of Boston Harbor*, p. 95.
35. Sumner, *A History of East Boston*, p. 179.
36. *Mass Records*, Vol. III, p. 309.
37. "Sir Thomas Temple...first came to New England in 1657. He was a man of position in society [always of interest to Sumner, a man of no small ambition himself], and of generous public spirit. In 1672, he gave 100 pounds towards rebuilding Harvard College, which was one eighth of the whole sum contributed by the inhabitants of Boston. Dr. Increase Mather said of him, he was 'as true a gentleman as ever set foot on American soil.'" Temple was also given land in Nova Scotia, "of which he was made governor." Sumner, *A History of East Boston*, pp. 182-186. Also, *Argus-Advocate*, May 1897, p. 4
38. Shrimpton owned all of Beacon Hill, and more. For an account of his wealth, and real estate holdings, see N. I. Bowditch, "Gleaner," in the *Boston Transcript*, Sept. 13, 1855.
39. *Argus-Advocate*, May, 1897, p. 4.
40. Sumner, *A History of East Boston*, pp. 217-254.
41. *Ibid.*, pp. 322-327.
42. This was a complicated legal matter, and John Adams, future president and family friend, was asked for his opinion. *Ibid.*, pp. 249-254.
Sumner includes the opinion in an appendix. "The question is," wrote Adams, "upon the death of both sons without issue, whether the aunts can obtain possession of this real estate?" Adams, citing precedent, found that the land should be held in trust by them. In other words, the "three aunts" could "receive the rents, issues, and profits, and pay, apply, and dispose of them according to the will," which is exactly what Shute Shrimpton Yeamans wanted for them. *Ibid.*, pp. 731-732.

The aunts' married names were Mary Chauncy, Sarah Greenough, and Mehitable Hyslop. Sumner divides thirds into sixths to better render subsequent calculations regarding the inheritance of the land. Thus, Mary Chauncy's two-sixths were divided between the Rev. William Greenough and Elizabeth (Hyslop) Sumner [W.H. Sumner's mother]; Sarah Greenough's share went to her two children, David S. and William, and Mehitable Hyslop's portion went to her two children David and Elizabeth. Subsequent alterations left the island in the hands of David S. Greenough (three sixths), Elizabeth H. Sumner (two sixths), and David Hyslop (one sixth). *Ibid.*, pp. 253-258.

43. *Ibid.*, pp. 217-254.

44. This account of Sumner's life is taken from a memoir written by Alonzo H. Quint, published in the *MHS Proceedings*, Vol. XVIII, pp. 282-286. It is interesting to note that while Sumner was married three times, there is no mention of his wives in this account. There were no children from any of the marriages.

45. A dinner at the Exchange Coffee House celebrating the settlement of Boston was held on September 17, 1830, at the behest of the Massachusetts Historical Society. Some of those invited to attend were: Daniel Webster, H.G. Otis, Nathan and Samuel Appleton, George Ticknor, Josiah Quincy, Jr., Leverett Saltonstall, Isaac Danforth, Francis Parkman, Edward Everett, Amos and Abbott Lawrence, and William H. Sumner. *MHS Proceedings*, 2nd Series, Vol. 6, p. 341.

46. *Ibid.*, p. 284.

47. *Ibid.*, p. 284.

48. Sumner, *A History of East Boston*, p. 452.

49. *MHS Proceedings*, Vol. XVIII, p. 285.

50. Sumner, *A History of East Boston*, pp. 6-10.

51. *Ibid.*, pp. 25-28.

52. *Ibid.*, pp. 28-34.

53. *Ibid.*, pp. 30-34.

54. *Massachusetts Acts and Resolves*, 1833.

II

The East Boston Company
1833-1845

The first great boom in the building of wooden ships had just begun when the East Boston Company was formed in 1833 by William Sumner, Stephen White, F.J. Oliver, Amos Binney and others they invited to become part of the corporation. At that time, the Williams family were the only inhabitants of Noddle's Island, possessing a mansion and two barns, which were the only existing buildings. The house built by Samuel Maverick early in the 1630s had long since fallen into ruin. There was a single well. There were no roads of any kind. No regular ferry served the island. Sumner and his associates faced a formidable task: they had to construct an infrastructure. This was the first order of business, and to their credit, they succeeded admirably.

The primary goal of the East Boston Company was to profit from real estate speculation. Once an infrastructure was in place, and the island had its own ferry service from Boston, instead of having to rely on unscheduled stops by the Winnisimet ferry, the company planned to sell lots to any person willing to move to the island and make it a home. A street plan was drawn up, and the company hired laborers to level hills, fill in lowlands and marshes, and to clear paths and turn them into packed dirt roads. When it was possible, and less expensive than hiring laborers, the company used steam engines, especially to dig wells. A willingness to use the latest technology, in fact, characterized the settlement of East Boston from the outset.

The construction of docks and wharves was a critical

element in the company's plans for the island, and work on the waterfront was begun at the same time as the leveling of hills and the clearing of land for streets, roads and lots. Sumner and his associates were also committed to bringing industry to the island and in that they met with significant early success. Moreover, the companies that came to the island tended to employ the latest technology. Two of the earliest companies to establish themselves on the island, the Boyden Malleable Iron and Steel Company, and the Boston Sugar Refinery, both in 1834, used steam engines to drive pulleys. As late as 1836, there were no more than 19 steam engines in the Boston area, the majority of which were rated at less than 20 horsepower.¹ The steam engine in the sugar refinery was slightly larger, 25 horsepower, and the 40 horsepower steam engine in the iron company twice as large as most steam engines then being used in Boston and vicinity.

East Boston was directly east, across the harbor, from the commercial district of Boston, from which it was separated by a distance of half a mile, a half mile that would later be shortened by the construction of wharves. The island was thought to be larger, about equal to Boston's thousand acres, but either the estimate was wrong, or the action of severe storms, especially on the northeast, caused erosion.² Members of the East Boston Company arranged this land into lots, created common stock, which was divided into 1,320 shares, each share representing a half acre. Stockholders voted on April 22, 1833, to amend the by-laws so that the corporate stock could be further divided, into 5,280 shares. Subsequent stock offerings, over a period of years, raised the number of shares to 20,000.³

The company immediately began to sell those lots, initially to farmers. Sumner himself offered an acre of land to Thomas Williams, heir to his father's farm. Williams

refused, telling Sumner he did not believe anyone would come to live on the island. Others shared these doubts. Only a few people had ever lived on the island, and because of that, many believed the island would remain just as it was--virtually uninhabited. East Boston, or Noddle's Island as it was still called, was nothing but a pasture, the ramshackle Williams family mansion and two barns. In a few months, however, the company sold land to several families of farmers, who promptly moved out to the island.⁴

On May 4, 1833, Charles Wells, the mayor of Boston, the aldermen of the city, and the directors of the company visited the island to select land to be set apart for the construction of a school, engine houses, and burial grounds.⁵ The visit went well and the mayor returned to Boston, pleased that development was taking place on the island. The company planned more land auctions, the primary object of which was to attract to the island citizens of wealth and position who would induce others to follow. To get them to move to East Boston, these people were offered prime lots in what would become the best sections on the island, many of them on Camp Hill, one of East Boston's highest elevations, which had a clear, unobstructed view of Boston and several communities to the north and west.⁶

This first auction of lots took place on October 25, 1833. The initial offering went very well, boosting confidence among members of the fledgling company. Offerings in other parts of the island brought total sales to \$86,000, or \$6,000 more than the whole cost of the island. In August of 1833, Mr. Guy C. Haynes, a farmer who had become an early resident, raised on the corner of Webster and Cottage streets the first new house on the island. Haynes, his wife and her sister, moved into the two story wooden structure, with a porch on each floor, two fireplaces and a small front yard.

There were shutters on the windows.⁷

At least a third of the land on the island was marsh and shallows, which the company planned to fill, using dirt from two prominent hills that were to be leveled. An agreement was made with H. Cumminskey and P. McManus, two Irish contractors who had recently become members of the company, to do the work of leveling the hills and conveying the soil to the lowlands. Some of the fill from the two hills was to be used in making a hard dirt road from what would be called Maverick Square to the waterfront, where construction could begin on a much needed ferry.⁸ S.P. Fuller, surveyor for the island, drew up a street plan, naming streets after island notables, like Maverick, ports of call, such as Liverpool and Havre, famous revolutionary war battles, European cities, and prominent Bostonians, like Webster, Everett and Sumner. Streets on the island were well laid-out. The crooked, narrow streets of Boston were the model to be avoided.⁹

In all sections, the packed earth streets were straight and wide. "A systematic arrangement of streets, squares, and lots on the Island," wrote Sumner, "would secure immediate advantages, and make provision for future wants".¹⁰ On November 21, 1833, at the southeast point of the island that presently bears his name, Dr. John Jeffries erected the second new house in East Boston. The plan seemed blessed. Lots were offered for sale, sold quickly, fetching ever higher prices, and a steady stream of workers, using the Williams family house as a base of operations until housing could be constructed for them, busily surveyed, leveled hills, filled in swamps, flattened earth to make roads and cleared lots to make room for buildings. The company, with good credit, was able to borrow what it needed to further the enterprise.¹¹

On December 2, 1833, a petition was presented by the company to the legislature for permission to build a free

bridge from East Boston to Chelsea, its neighbor to the northwest. Sumner was convinced that the most direct route from Salem, still an important city, to Boston, passed directly over Noddle's Island. But he and his associates needed a bridge to make that a reality. In March, 1834, an act of incorporation was granted, making Benjamin Reed, Amos Binney, John Henshaw, among others, the proprietors of the free bridge. All but Henshaw were members of the East Boston Company. By October of 1834, a graveled bridge had been finished. On the other side, in Chelsea, a road was commenced to connect the free bridge to the Salem turnpike. When this road was graded, graveled and fenced in, East Boston was at last linked to the north.¹²

In 1831, when he was negotiating with relatives for possession of Noddle's Island, Sumner had commissioned a survey by Francis Vinton, an Army engineer. "The project was entertained of constructing a railroad from Boston to Salem over Noddle's Island."¹³ It was clear to Sumner, and others, "that such a road would be greatly advantageous to both places; that passing through enterprising and business towns, it offered strong inducements for investment, and that, in the process of time, it could be with profit extended further to the east."¹⁴ But there were obstacles. Years before the incorporation of the East Boston Company, Sumner had argued that the shortest route from Salem to Boston passed over Noddle's Island and not through Charlestown. A bridge taking the Charlestown route had nonetheless been constructed.¹⁵

Sumner knew he would receive "opposition from the turnpike company, which would vigorously object to being deprived of their accustomed travel."¹⁶ Nonetheless, he went ahead with his plan. Vinton conducted the survey of the proposed route over Noddle's Island and sent his report back on February 13, 1832. It was most favorable, and contained no

surprises.¹⁷ Sumner finished his negotiations with his family, and entered into his agreement with Stephen White and Francis J. Oliver for the development of Noddle's Island. The fourth provision of that agreement read as follows:

That they will use all their endeavors and exertions to procure the location of a railroad from Boston to Salem over the island aforesaid...and inasmuch as it may be found necessary or convenient, in order to carry into effect this object, to associate other persons in the purchase aforesaid.¹⁸

The next step was to formulate a proposal to Salem capitalists, "other persons" in the agreement, to elicit their approval, since resistance from them could doom the proposed northern rail link. Early in 1833 they had their approval. Sumner and his associates then took their request for a charter to the legislature, but in March of that same year were turned down.¹⁹

Nonetheless, it was clear by the end of that year the company would soon show a profit. "In many respects the most difficult point had been passed, a systematic plan of operations had been commenced, and an energetic and executive management controlled the whole."²⁰ Lots had been laid out for dwellings, public purposes, mechanical establishments and wharves. At the end of that first year, the island had a ferry, a free bridge to Chelsea was in the discussion stage, and the East Boston Wharf Company, the first chartered company on the island, had been incorporated.²¹

The construction of the wharf was a major undertaking. What was left of Smith Hill would be leveled and used to fill in swamp land that separated Camp Hill and Eagle Hill. The ferry connection, the wharves, were of signal importance in these early days because in Sumner's initial vision, East Boston was imagined as an extension of Boston.

Linking up with the mainland, therefore, was critical. And it made perfect sense. At this stage, East Boston was an importer--of skills, personnel, building materials, machinery. What the island had was the basic stuff of which it was made: rock, hills, heights, shoreline, all of which was being molded according to plan by the East Boston Company.

The first manufactory, a sugar refinery, was built in 1834 on land purchased from the East Boston Wharf Company. The director of the enterprise, John Brown, Esq., had visited Europe the year before to acquire information on the refining process. When he returned from England, after meeting with some initial resistance, he came back with plans and specifications that made it possible for him to construct in East Boston a replica of a British sugar refinery. The building, completed in 1836, was brick, eight stories high with a five foot thick stone foundation resting on a bed of clay forty feet deep. The walls, which were three feet thick at the base, successively diminished in width in the upper stories. Walls above the sixth floor were sixteen inches thick.²²

Eighty men worked in the sugar refinery, processing sugar cane. They produced, annually, 25,000 boxes of sugar, working only by day. When they worked night and day, that figure doubled. Almost all the workers came from Boston by ferry, which in October of 1834 was temporarily canceled for want of patronage. This greatly inconvenienced workers, since row boats and small sail boats were then the only means of conveyance. Operations at the refinery suffered too, since the men could not make the trip across the harbor in stormy weather. On such days, the refinery shut down. To correct the problem, a dwelling house was attached to the refinery, along with sheds and an outbuilding. When a regular ferry began crossing the harbor again, in May, 1835, staffing

problems came to an end.²³

The sugar refinery from the start had difficulty obtaining sufficient water, and several deep wells had to be dug to remedy shortages. The final well, dug with four-inch bore Artesian augers to penetrate the rock, found water at a depth of two-hundred sixty feet. The water was conducted to the refinery from the well on the corner of Sumner Street by pipes. This supply sufficed for plant operations until water from Lake Cochituate was piped out to East Boston in 1850 to a reservoir on Eagle Hill.²⁴

In July, 1835, the East Boston Company again tried to get legislative approval for an East Boston to Salem railroad. A committee of five was appointed to take the matter up with the turnpike company and to acquire subscriptions from towns in the immediate vicinity. The committee reported back that a charter could not be obtained for a road from Boston to Salem. An expanded committee was then appointed to survey a route for a railroad from Boston to Newburyport. This committee selected Colonel John Fessenden, an engineer, to undertake the task. In early 1836, when Fessenden reported back, he informed the committee the island route was best. Sumner and his associates were very pleased, feeling themselves vindicated.²⁵

On April 11, 1836, a bill incorporating the Eastern Railroad Company passed the house of representatives by a vote of 159 to 20, having previously passed the senate by a vote of 20 to 3. Stockholders accepted the charter in May the same year and voted to proceed with "all possible dispatch." Ground was broken on July 22, 1836. The railroad would pass on the southwest side of Chelsea Street to an intersection with Decatur Street. From there it would extend to the high water mark on Webster Street, an area of more than twelve acres. Two years after groundbreaking, in August, 1838, the road to

Salem and towns north was opened with "appropriate ceremonies" in honor of the occasion.²⁶

Stephen White, the "gentleman of fortune and influence" Sumner had earlier approached when he first decided to seek associates and financial support, suggested that Grand Island in the Niagara River be purchased as a timber resource. White proposed to build saw-mills, "and cut and prepare the timber for transportation; and, bringing it by the Erie Canal to tide water, dock it at East Boston."²⁷ It was White's position that a ready and sufficient supply of lumber would "bring thither a great many workmen, and, on account of the convenience of obtaining lumber of all kinds with little or no transportation, manufacturing establishments would be erected upon the island."²⁸ The wood might also serve as an inducement for shipbuilding on the island.

The East Boston Company authorized the sale of 80,000 feet of marsh land between Border and Liverpool streets to the East Boston Timber Company on October 5, 1833 for setting up a timber and lumber yard. The East Boston Timber Company was incorporated on March 28, 1834, to saw and prepare at East Boston "by steam or water power or otherwise, and of vending ship and other timber, plank, boards, staves, joist, scantling, and all and every other article prepared and manufactured from wood."²⁹ The charter was petitioned by James W. Paige, Francis J. Oliver, the second man Sumner approached to begin his company, and Gideon Barstow. The name of Stephen White, future company president and largest stockholder, does not appear on the charter, although his name was listed among the associates.³⁰

Great quantities of oak timber and plank were shipped through the Erie Canal to the Hudson River, down the river to the Atlantic, and up the coast to East Boston. This timber, for the most part, was of excellent quality and

furnished abundant material for the ship carpenters of the towns, such as Medford and Chelsea, already engaged in shipbuilding. The East Boston Timber Company was successful, and lived up to both White and Sumner's expectations, until the panic of 1837. After that, the company remained in business until 1840, at which time it was forced into bankruptcy by an accumulation of financial misfortunes that had begun during the panic. "The stoppage of specie payments, which undoubtedly will be general throughout the United States," wrote White to his superintendent, Jedediah H. Lathrop, on May 5, 1837, when the crisis was at its worst, "gives a new aspect to everything."³¹ White did his best, but given the state of the economy and the company's financial problems, bankruptcy was almost inevitable.

The wharf property of the East Boston Timber Company was sold to Ozias Goodwin, of Boston, for \$10,000, considerably less than the company had paid for it. Subsequently, the property was divided into lots, the largest of which was purchased by Samuel Hall, shipbuilder. Other lots were bought by Richard Soule, John Clifton, and R.B. Forbes, among others.³² When Samuel Hall and Stephen White had met for the first time in 1836, White had written of the encounter to Lewis Allen. "A Mr. Hall, a first rate master builder from Duxbury had been to me to arrange for him to go to the Island to get out with his own men and on his own account two ships frames. He is excellent well-informed about ship plank and the nature of their survey and can give valuable hints on all those subjects, he having been Weston's head builder for eight years."³³ Hall was the first well-known shipbuilder to move to East Boston, setting up shop on Border Street, at the foot of Decatur, very close to the original timber company yard, in 1839.

In 1842, the Cunard Steam Ship Line, looking for an

entrepot on the east coast, established East Boston as a port of call. This was of great significance for the island, since East Boston, although not yet a producer of goods, would nonetheless be able to send products from the Boston area directly to international markets. The island would also receive, and be a distribution center, for European merchandise. As was the case with the Eastern Railroad, negotiations between the East Boston Company and the Cunard Line were long and complex. It took years before everyone was satisfied. On April 13, 1844, a seventeen year lease was signed. When in 1845 wharf accommodations proved insufficient for the increased business of the steamship line, the initial contract was modified. Additional modifications, in 1848, resulted in an extension of two piers fifty feet further into the channel.³⁴

The docks for the Cunard ships were able to handle two steamers at a time. Rails were laid to the side of the ships, and cargoes discharged onto railway trucks, which were then towed by horses to bonded warehouses. This was for its day an advanced method of cargo distribution. The wharves were connected by railroad track to roads radiating from Boston and from there carried to any town in the northeast, as long as the road itself went that far. Every two weeks a ship arrived at East Boston; two ships were always at sea, one inward, one outward bound.

On July 4, 1840, Sumner's sixtieth birthday, the *Britannia*, "the first ship of the line," arrived in Boston, sailing from Liverpool via Halifax in fourteen days, eight hours. On July 21 there was a celebration in East Boston:

A beautiful and elegantly decorated pavilion was erected in front of the Maverick House; there was a magnificent public dinner, at which two thousand persons were seated, while from the balconies of the hotel...crowds of ladies

witnessed the ceremonies and festivities...and listened to eloquent speeches.

There were speeches from Daniel Webster, Edward Everett, Judge Story and George Bancroft. It was a high and notable occasion, punctuated at night by a fireworks display and by rockets fired from the deck of a "revenue cutter, lying at anchor opposite East Boston, beautifully decorated with variegated lamps hung in her rigging."³⁵

Not every enterprise was a success. The East Boston Timber Company, the second company incorporated on the island, was a major failure. Sumner claimed to have lost thirty thousand dollars when that company went bankrupt. The Boyden Malleable Iron and Steel Company, incorporated on March 6, 1835, went bankrupt in 1839. This company, authorized to manufacture iron and steel ware, and "to plate, paint and enamel the same," would have succeeded, but its officers, like the officers of the Timber Company, became involved in speculation, and lost at it. During its brief tenure, the company erected ten houses, constructed a wharf with granite walls, and the island's first foundry.³⁶

"The hammer and the trowel were not allowed to rest on the Sabbath, such was the haste of the company to occupy their new building," Sumner wrote.³⁷ The brick foundry building was 200 feet long, 50 feet wide, two stories high, with an attic. The engine house, eighty feet by forty, was also brick, and contained a forty horse power steam engine of forty horse power. Between 1835 and the time the company went bankrupt, as many as 300 workmen worked on any given day, making, in some weeks, fifteen tons of malleable iron castings. During the first year in business, the company built between thirty and forty houses for its workers. When the company was dissolved, all the assets, from steam engine to worker housing, were sold at auction.³⁸

The Maverick House, the hotel Sumner and his associates hoped would lure vacationers to the island, was finished in 1835. It was six stories high and contained more than eighty rooms. Its halls, parlors, dining rooms and chambers were elegantly furnished, the equal of any hotel in the country. A garden, a row of stables, and several carriage houses were connected to the hotel at the rear. There was a bathing house and a bowling alley. In May, 1835, after the ferryboats "Maverick" and "East Boston" had begun regular trips between Boston and the island, a celebration was held at the Maverick House. But there were few such celebrations. Too much money was spent in building the hotel, and it was too grandiose for the island. The hotel constantly ran at a loss. In 1837, during the panic, the Maverick House all but closed its doors. Finally, in 1841, the hotel and all its furnishings were sold at less than a third of the original cost. The hotel continued as a business enterprise until it was finally torn down in 1845, a victim of economic hardship and excess.³⁹

Success for the East Boston Company was tied to luring investors aboard and in being able to borrow money when the need arose. From the start, the East Boston Company was sufficiently capitalized, and when lots began to sell quickly and at good prices, running short of money was never an issue. Sumner and his associates had planned well. They knew what had to be done, and they experienced great fortune, with few exceptions, like the Timber Company, the Iron Company and the hotel, in getting it done. East Boston was a boom town from its inception.

At the end of 1833, only eight people lived on the island.⁴⁰ In 1840, there were 1,455; in 1845, 5,018.⁴¹ For centuries, East Boston had been nothing but empty marshes and pastures and a few hills. There had been trees, but they were

gone long before the East Boston Company arrived. In order to make the island suitable for industrial development, and for a population, the hills were leveled and used for fill. Paths were scraped clear of brush and other small obstacles and turned into primitive roads. But nothing man-made had to be modified to bring East Boston to life, which was an advantage, since tearing down buildings, acquiring rights of way, and correcting the mistakes of the past was more time-consuming and expensive than filling in an empty space.

In 1834, more than 15 houses were built, and 12 more families moved to the island. Among the establishments set up that year were the mast and spar shop of Allen, Pigeon and Poole, on Sumner Street, Brown and Bates and Delano's shipcarpenters' workshop in Central Square and James Barber's smith shop at the corner of Maverick and Border streets. Some of these early houses were wood, but many were brick and stone, one or two stories in height.⁴² By 1837, just three years later, there were 110 houses on the island. About 20 wharves had been constructed.⁴³

Yet there was almost no housing for the laborers who came to East Boston to level hills, fill in swamps, clear roadways and lots and construct docks and wharves. Although the Sugar Refinery and the Boyden Malleable Iron and Steel Company constructed worker housing, the majority of their workers were skilled artisans. Unskilled laborers were expected to take the ferry back to Boston at the end of the day. Some laborers, insisting on staying where they worked, cobbled together ramshackle houses, "little shanties" in Sumner's eyes, where they lived and raised families. As industry grew, and as the labor force increased to support it, housing for laborers, many of whom were "immigrants," became more readily available.⁴⁴ In 1835, however, with a population of only 607, housing was not the problem it would be in the

1840s and 1850s, when packet ships brought thousands of Irish laborers and domestics to East Boston to escape the famine resulting from the potato rot.⁴⁵

Most of those 607 citizens living on the island in 1835 were mechanics and artisans. They lived in neat brick and wood one and two story homes, mostly near the wharves. Of the 663 initial acres, 48 had been sold by the end of 1845. Total sales amounted to \$253,260, and dividends of \$92,316 had been made to investors. Two years later, in 1837, the population had increased to almost 1,000. Houses were in great demand, and builders had trouble keeping pace with the island's growing population.⁴⁶

Seven churches were established on the island between 1835 and 1844, and more were added in later years.⁴⁷ All the early churches were Protestant, indicative of the religious beliefs of both Brahmin and artisan. Yet Catholics were not excluded. "In the settlement of East Boston, many adopted citizens, for the most part from Ireland, held a conspicuous place. They were among the first, who, with strong arms and willing hearts, came to level the hills, drain the marshes, erect docks and map the island with its...wide and spacious streets and pleasant squares."⁴⁸ The third house erected on the island was built by a Catholic, Mr. Daniel Crowley. Because of the inconvenience of returning to Boston for church services, Catholics banded together and purchased from the Maverick Congregational Church a meeting house, which had become too small for them. By the end of 1844, every denomination on the island had its own place of worship.

The first primary school in East Boston was opened in January, 1836, in a room of one of the houses of the Malleable Iron Company. The Lyman School, named after the fifth mayor of Boston, was established in 1837. The original building, destroyed by fire, was replaced by another in 1846

at a cost of \$13,596. The school initially taught both sexes together, but later the sexes were separated. This change occurred the year the new building was constructed. Four rooms on the first floor were each occupied by 52 students, and three rooms in an adjoining building were used when needed.⁴⁹

In 1843, in a letter to Larkin Thorndike, a man who considered moving to the island, Sumner wrote, "East Boston is becoming a second Brooklyn...Yet New York has the whole Manhattan island, eight miles long with navigable waters on each side, to settle up the North and East rivers, while the peninsula of Boston is almost circumscribed by the water and flats around it, and the whole land is occupied. The increasing population must find room suited to their commercial pursuits, and where shall they look for it?"⁵⁰ Sumner insisted it was East Boston. Boston was filled up; every wharf was occupied. "Where shall the great commercial capital of New England, Nova Scotia, New Brunswick, receiving daily more and more of the produce of the great North and West--where shall it extend its accommodations for this great and increasing trade and navigation, and the population which is its natural consequence?"⁵¹ Sumner recommended the view, the pure water, inexpensive land and the chance to make money.

At this time, Sumner believed East Boston would have its greatest success in commerce, in providing docks and wharves for trading ships. "The aspect for ships is better at East Boston than in Boston proper. In a north-east gale they lie safe, while at Boston they are thumping against the wharves and one another."⁵² He was also aware that virtually all of the early profits for investors in the company had come from real estate speculation. But because of the deep water, which he had noted before the East Boston Company had even been incorporated, shipbuilding was never far from his mind

when he ruminated on the future prosperity of the island. Large ships needed deep water to be launched, and East Boston had the deepest water in the harbor.

When East Boston was being settled, during the 1830s, there was little reason for shipbuilders, successful elsewhere in eastern Massachusetts, to consider moving to the island. There was no virgin forest on the island, nor any timber within easy reach by water. There was the wood from the East Boston Timber Company, but in itself this was no reason to move, since the first business of the timber company was to supply local shipbuilders.⁵³ In Medford, East-Indiamen were being constructed, and the Mystic River was deep enough to launch the largest of them. Shipbuilding technology had yet to provide a product that needed the deep water of East Boston to be launched along a slipway.

The first vessels built in East Boston were the steam ferry boats used to inaugurate regular ferry service between the island and Boston.⁵⁴ Stephen White had a square rigger, the *Niagara*, built at the Central Square yard of shipcarpenters Brown, Bates, and Delano, in 1835, when he was president of the East Boston Timber Company. He used his own wood, white oak timber and plank, sent down from Grand Island via the Erie Canal and tidewater. This first ship was not soon followed by others. If White's square rigger was an attempt on his part to inaugurate at East Boston a shipbuilding industry, he failed. The situation began to change, however, when Samuel Hall, shipbuilder from Duxbury, set up his yard at the foot of Decatur Street.

Samuel Hall was the most eminent shipbuilder in Massachusetts. From an old Marshfield family, he had served his apprenticeship on the North River, and when he was twenty-one, he left for Medford, with "a capital consisting of a broad-axe and twenty-five cents."⁵⁵ He worked for a time on the

Mystic, went up to the Penobscot, and returned to Massachusetts to refine his craft at Duxbury. Hall had a habit of getting the wood himself, and when he was in eastern Maine, he would lead crews into the woods and come out with ship frames.⁵⁶ His first East Boston ship, the *Akbar*, "built for Forbes's China fleet," was "unusually fast."⁵⁷ It weighed 650 tons and was "the last word of the Medford type."⁵⁸ Hall is believed to have modeled the *Akbar* after a Baltimore clipper, small ships with an extreme deadrise, a large drag to the keel, and little "carrying capacity in comparison to their length and cost."⁵⁹ Baltimore clippers had a "reputation for speed," but the basic model was not suitable for ships of a thousand tons.⁶⁰ The ship designer had a choice. He could build a fast ship that carried a small cargo, or he could build a slow ship with a large carrying capacity. As long as markets for fast ships and ships with large carrying capacity remained separate, there was no need to try and achieve both, speed and burden, in a single vessel.

The discovery of gold at Sutter's Mill by James W. Marshall in 1848 changed this dramatically by creating a market for ships that could carry goods quickly to the west coast, where prospectors, in desperate need of them, paid top dollar. Parcels of gold sent east by way of the isthmus of Panama "created a rush of emigration and trade wholly unparalleled in the history of the New World."⁶¹ At the time of the gold rush, California was unsettled. There was no industry, nor were there living quarters or farms to supply the thousands racing toward the gold fields. All the goods had to come from the settled areas of the country, most of them far to the east. The freighting tonnage of the eastern states was called upon at once to sail to and from the isthmus of Panama on both sides of the continent, and also to sail directly to San Francisco around Cape Horn. Ships were

sailing for California as quickly as they could be slid down the ways, rigged, and loaded with cargo.

The market was the driving force behind the development of the clipper ship. Great demand was created because of the gold rush, and ships were built in direct response to it. In fact, so many ships were built in such a short time that it was not long before the market became glutted. In the interim, however, the boom gave rise to an industry in East Boston. Before the clipper ship, there was no large concentrated demand that could not be met by packet ships or other large schooner type vessels. Although ships had been increasing in size since the war of 1812, there was no reason for them to be much larger than packet ships. The market could be satisfied by the ships already on hand at seaports along the coast.

When the gold rush created a demand that could not be met by existing ships, either in carrying capacity or in speed, technological evolution hastened in the direction of the clipper ship. But the market, and the profit motive, not a technological imperative, was the driving force.⁶² A clipper ship was not a marvel of innovation. Its development proceeded along more or less tried and true lines, and in the lines of clipper ships can be traced the steady advance from packet ships and from the small Baltimore clippers of the late 1820s. Yet the clipper ship was different, in size, in tonnage, in the amount of sail it could carry. Some clippers were twice the size of the packets from which they evolved, and heavier by more than 1200 tons.

A ship took the shape which best fitted it for the goods it had to carry. Accordingly, clipper ships had long sharp bows for speed, and full bottoms, to maximize carrying capacity. They were no wider than most packet ships, usually not more than 30 or 40 feet. The signal feature of the

clipper ship was its speed. Clippers sailed at an average speed of 9 miles an hour and could reach 13 miles an hour with a good wind. For a clipper ship to sail 300 miles in a single day was not unusual.⁶³ Their speed made them very competitive, and it was not until the late 1870s that steamships approached the speed of the clippers.

By 1848, the year of the gold rush, the East Boston Company had finished putting an infrastructure in place. There were sewers, water piped in from Lake Cochituate, streets laid out in a grid pattern, docks and wharves, and a growing supply of housing for workers and artisans. The industrial base of the island was steadily expanding, and more and more skilled workers, following developments in shipbuilding, were taking up residence in East Boston. There was little shipbuilding on the island before the arrival of Samuel Hall in 1839, and not very much in the five years following, although Hall himself functioned as an industry, launching in that time no less than eight ships from his yard. In 1844, reflecting the upward turn in the industry, Hall built five more ships. In 1845, Donald McKay moved from Newburyport to East Boston. The two premier shipbuilders in New England were then living on the island.⁶⁴

1. Louis C. Hunter, *A History of Steam Power in the United States 1780-1930* (Charlottesville: Published by the Hagley Museum and Library by the University Press of Virginia, 1985), Vol. II, *Steam Power*, pp. 100-101.
2. This part of the island has since been filled in, connecting East Boston to Revere.
3. William H. Sumner, *A History of East Boston* (Boston: J.E. Tilton and Company, 1858), p. 452.
4. Ibid., p. 453.

5. Ibid., p. 454. The directors were William H. Sumner, Stephen White, F.J. Oliver, Samuel S. Lewis, Daniel D. Brodhead, Amos Binney, Gardner Greenleaf. Functions were divided among them. Sumner was chosen president in 1834. Until 1850, this position was shared among the original directors. Membership on the board of directors was in constant flux. Ibid., pp. 751-753.

6. Ibid., pp. 454-459.

7. Description from sketch of house. If the scale of the drawing is accurate, this first house was actually quite large. There is no way of knowing the number of rooms. The house is no longer standing. Ibid., pp. 459-464.

8. Even before the East Boston Company was incorporated on March 8, 1833, Sumner, along with Stephen White and Francis Oliver, had petitioned the city of Boston to grant them a license to run a ferry from the island to the mainland. The trustees of the Winnisimet Ferry Company filed a remonstrance against this, but Sumner and his group prevailed and were granted a ferry license. The first ferry boat, a small wheel boat that could carry 25 people, was used on May 1, 1833.

9. Ibid., p. 459.

10. Ibid., p. 459.

11. "The company commenced, as many other companies do, by borrowing. Its property was large and available, and it had a good credit with the business community. This credit was a natural consequence of the character and standing of the gentlemen engaged in the enterprise." Ibid., pp. 453, 466.

12. Ibid., pp. 570-574.

13. Ibid., p. 602. Sumner is ahead of his time in thinking about establishing a railroad. In the 1830s and 1840s, the Boston Associates, ever ready to marry the latest in science and technology with sharp business practice, built the first long lines in New England to transport output from their mills to Boston. They built the Western Railroad in 1838 to compete with New York, and exerted power and influence over the Boston & Worcester and Old Colony railroads. At the time of the Irish immigration, Boston, not New York or Philadelphia, was the major source of capital for railroad expansion in America. Jaher, *The Urban Establishment*, pp. 53-54.

14. Sumner, *A History of East Boston*, p. 602.

15. Ibid., pp. 421-428. Sumner fought hard for this earlier bridge, but in the end lost out to politics. "The prospect of connecting Noddle's Island with the city proper, and of making it a valuable addition to the metropolis of New England, was early entertained by the writer, and to the accomplishment of this desirable end he directed his thoughts and endeavors for a long course of years." This was in 1801, when Sumner was 21. That the project took another 30 years testifies both to his character and to the resistance he had to overcome to get the Chelsea Bridge built.

16. Ibid., p. 603.

17. "It appears clearly that the proposed route is practicable, at least as far as Lynn; that the hills on Noddle's and on Belle island are the chief obstacles; that the former may be entirely avoided, and the portion of the latter which it would be necessary to excavate would be useful and necessary for the construction of embankments; and that a straight route very nearly can be obtained between the terminus in Boston and Lynn." *Report to Messrs. Sumner, White and Oliver*, February 13, 1832. Sumner, pp. 604-605.

18. Ibid., p. 606.

19. Ibid., p. 609. "Four petitions were presented for a road to Salem across the Island, and five petitions for a road to Salem over the Winnisimet ferry. Against the Island route there were five distinct remonstrances...and the Salem Turnpike and the Chelsea Bridge Corporation [not the Chelsea Free Bridge Corporation, which was an East Boston company] remonstrated against the construction of the railroad on either route. The bridge had been built at a cost of between \$55,000 and \$56,000 and the turnpike at an expense of over \$182,000; and it was contended that the contemplated railroad would divert the travel from these thoroughfares, and thus the income be reduced." Sumner, p. 609.

20. Ibid., p. 467.

21. Ibid., p. 467. "Notice. The petitioners for the incorporation of the East Boston Wharf Company, and all persons interested therein, are hereby notified that a meeting will be held on Saturday, April 6, 1833 next...for the purposes of organizing said company." This was signed by Samuel S. Lewis, Robert G. Shaw, and A.C. Lombard. From the *Minute Book* of the East Boston Wharf Company at the Baker Library, Harvard University. Lewis and Shaw would later become presidents of the East Boston Company. In

1833, Lewis was Treasurer and Superintendent; Shaw and Lombard were not yet members. Two other "principal corporators," Amos Binney and Daniel D. Brodhead, were on both company boards.

22. "About 2,200,000 bricks were used in its construction. Hiram Bosworth was the master carpenter, Gardner Greenleaf master mason, George Hallett and Richard Soule building committee... Mr. Charles W. Woolsey, of Connecticut, [superintended] the refining operations. It is a singular fact, that both Mr. Brown and Mr. Woolsey perished during the burning of the steamboat Lexington on Long Island Sound, January 13, 1840." Sumner, *A History of East Boston*, p. 680, 679. Also *Massachusetts Acts and Resolves*, March 25, 1834.

23. Sumner, *A History of East Boston*, pp. 679-680.

24. Ibid., pp. 682-683; 586-589.

The introduction of Boston city water to East Boston was a significant accomplishment. It made stronger the connection between the island and the city to its west, a subject always on Sumner's mind. More importantly, it demonstrates what might be called "progressive" thinking on the part of the East Boston Company. The *Report of the Sanitary Commission*, by Lemuel Shattuck and others, did not come out until 1850. By that time the Cochituate water was already on its way to the island.

Concerns about public health were increasingly voiced in these years when civil engineering was moving out from the wings to center stage, and playing its role in the urbanization of America. And while health officials did not sufficiently understand many disease vectors, they knew how to stop the spread of certain diseases, like cholera. For a discussion of this, see Barbara Gutmann Rosenkrantz, *Public Health and the State: Changing Views in Massachusetts, 1842-1936* (Cambridge: Harvard University Press, 1972).

25. Sumner, *A History of East Boston*, pp. 609-617.

26. *Massachusetts, Acts and Resolves*, April 14, 1836. Sumner, *Op. Cit.*, pp. 612-618. On January 25, 1842, the first railroad depot burned down when sparks from an engine chimney came in contact with exposed wood overhead. The depot was rebuilt.

27. Ibid., p. 670.

28. Ibid., p. 670.

29. *Massachusetts, Acts and Resolves*, March 28, 1834.

30. "A precedent was established in this case, which was frequently followed in subsequent petitions, that is, to withhold the name of the person or persons most interested, and thus to prevent the impression, which otherwise would be given, that the different plans and improvements were supported by the same individuals." Sumner, p. 671.

The principal stockholders were White, Sumner, Oliver, L.F. Allen of Buffalo, and Dr. Barstow of Salem. They were also the company directors. *Massachusetts, Acts and Resolves*, March 28, 1834.

31. East Boston Timber Company, *Letters*, at the Baker Library.

While Sumner blames White for fiduciary errors in the collapse of the company, it is equally clear from reading White's letters to Messrs. Allen and Lathrop that the company suffered from more than mismanagement and economic misfortune. "We have met so much loss in our timber operations by the felony of some and by the carelessness of our own people that I feel mortified whenever I reflect upon it and am anxious in future to prevent such wasteful occurrences which throw a shade over the management of the concern in the mind of thinking people," he wrote to Allen on January 4, 1838. White was ahead of his time in his concerns. "Accuracy is a great object in all such operations as ours, besides which...the keeping of an account of the sawing has created competition between the several gangs." He lamented the "disastrous times" and "needless publicity" in another letter to Allen in March of that year. *East Boston Timber Company, Letters*, at the Baker Library.

Sumner himself admits the company operated in the "stringent years of 1837, 1838, and 1839." During the "hard times" from 1837-1840, the timber company had been forced to borrow money from banks and insurance companies and to put up Grand Island as collateral. In 1837, White, in an effort to right the troubled company, tried to buy controlling interest in the City Bank of Buffalo, one of his creditors. Sumner protested strongly, but was outvoted by other stockholders. When the City Bank of Buffalo failed in 1840, it took the East Boston Timber Company with it. William L. Marcy, secretary of state under President Pierce, was appointed receiver. Sumner, p. 671-676.

32. Sumner, *A History of East Boston*, p. 672.

Robert Bennet Forbes was a nephew of Thomas Handasyd Perkins, a grand panjandrum in the Boston Associates. Forbes got his start working for his uncle, who made a fortune in textiles and in trade, some of which consisted of selling opium to the Chinese. See Dalzell, *Enterprising Elite*, p. 62. Also Frederick Cople Jaher, *The Urban Establishment*, pp. 23, 46. Jaher's description of Boston's Brahmin class is good reading for those interested in following their exploits.

In 1845, an iron steam tug, the *R. B. Forbes*, was built for the Steam Tow & Relief Boat Company by Otis Tufts at his yard on Webster Street. This particular tug pulled many clipper ships over to Boston or down to New York to be rigged. Forbes had several other ships constructed at East Boston yards, including 11 at the yard of Samuel Hall, and 7 at the Atlantic Works. He himself was never a member of the East Boston Company, although his brother, John Murray Forbes, was in 1840 a company director.

33. East Boston Timber Company, *Letters*, Baker Library.
34. Sumner, *A History of East Boston*, p. 624.
35. Ibid., pp. 623-624.
36. Ibid., p. 689.
37. Ibid., p. 689.
38. Ibid., pp. 688-689.
39. Ibid., p. 478, pp. 512-513.
40. Ibid., p. 468. Those people were Guy. C. Haynes, his wife and sister; Mr. and Mrs. Haley, and Charles M. Taft, his housekeeper and daughter.
41. Carroll D. Wright, *Census of Massachusetts in 1875*. Lemuel Shattuck, *The Vital Statistics of Boston, 1845*.
42. Maverick Mutual Fire Insurance Company, *Receipts, 1849-1851*, show that many houses on the island were brick and stone. Fires in 1864 and 1870 destroyed many early edifices.
43. Sumner, *a History of East Boston*, p. 471, pp. 543-544.
44. In the nineteenth-century, the word *immigrant* had an expanded meaning, since it referred to people who came to America directly from Europe and also to others who had been in the country for decades, but who were not "native born." Such distinctions were of great importance to Brahmins, who could trace their roots to the earliest days of Colonial America.
45. Shattuck, *The Vital Statistics of Boston, 1845*.
46. Sumner, *A History of East Boston*, pp. 518-521.
47. Ibid., pp. 643-658. Maverick Congregationalist, 1836-1837; Universalist, 1839; Central Square Baptist Church, 1843-1844;

Methodist, 1839-1843; St. John's Episcopalian, 1845; Unitarian, 1845-1847; Presbyterian, 1846-1847. More were added later, including a Catholic Church in 1847, and Union Chapel in 1851.

48. *Ibid.*, pp. 654-655.

49. *Ibid.*, p. 666.

50. *Ibid.*, pp. 529-531.

51. *Ibid.*, pp. 530-531.

52. *Ibid.*, p. 530.

53. Arthur H. Clark, *The Clipper Ship Era* (New York: G.P. Putnam's Sons, 1911), pp. 49-52.

54. Sumner, *A History of East Boston*, p. 690. The three ferry boats were the *East Boston*, in 1834, and the *Maverick* and the *Essex*, in 1835. The latter two were built at the yard of Brown, Bates and Delano. The *East Boston* was built on the island by Clock and Upton from New York.

55. Samuel Eliot Morison, *The Maritime History of Massachusetts 1783-1860* (Boston: Houghton Mifflin, 1921), p. 339.

56. John G. B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914* (Cambridge: Harvard University Press, 1941), p. 104.

57. Morison, *Maritime History*, p. 329.

58. *Ibid.*, p. 329.

59. Hutchins, *The American Maritime Industries*, p. 294.

60. Morison, *A Maritime History*, p. 329.

61. Henry Hall, *Report on the Ship-Building Industry of the United States* (Washington, D.C.: U.S. Bureau of the Census, 1880), p. 73.

62. *Ibid.*, p. 70.

63. *Ibid.*, pp. 69-74.

64. William H. Sumner, *A History of East Boston*, pp. 691-697. Boston Board of Trade, *Annual Reports*, 1843, 1844.

III
The Rise of East Boston
1846-1860

East Boston was settled during a manufacturing revolution in New England that was characterized by the establishment of textile mills, boot, shoe and sewing machine factories, and the growth of the machine shop.¹ During this time, in those industries affected by technological advances which made it possible to move work out of the home, the small shop and family-owned business gave way to the factory. Wooden shipbuilding, a craft based on highly-valued individual skills that could not be transferred to machines or moved indoors, existed outside the burgeoning factory movement, although East Boston itself was very much a part of the steady process of industrialization taking place in pre-Civil War America.

There were factories on the island, some of them large, like the sugar mill, and several smaller iron foundries, but the shipbuilding industry, which became the dominant industry on the island in the 1850s, owed more to forms of ownership and capitalization that were being almost systematically replaced than it did to the corporate model transforming the landscape in the years when East Boston was being populated first by artisans, and then by immigrants from Ireland. Some craftsmen, while they worked for hire, nonetheless owned their own shipyards. They were what would today be called "small businessmen," owner-operators of usually small yards employing less than a dozen workers.

At the time of the clipper ship, the United States was undergoing a transportation revolution as profound in its effects as the communications revolution of today. Before the

establishment of the railroads, getting anywhere in America west of the Appalachians was virtually impossible. The Roads were terrible, if there were roads, and the country more a series of loosely connected discrete localities than a nation. The population was peripatetic, ready to move if given reason or opportunity, but for the most part people lacked adequate means of transporting themselves significant distances by land. When possible, water transportation was the preferred method of moving goods and people, given the deplorable state of the roads.

In the interior, riverboats and flat-bottomed rafts moved goods and people, and in the east, a vibrant coastal trade carried goods, like cotton, from the deep south to textile mills in the north. It was much less difficult, and faster, for traders and people to travel by water from Maine to Boston, or from Boston to New York and Philadelphia. There was little settlement at this time in the west, and virtually none in California when gold was discovered. The gold rush set in motion the wagons and ships that ferried pioneers to California. It was more dangerous to travel by land, but less expensive than going by sea, even in the terrible ships settlers rented or bought to carry themselves, their families and their possessions, to San Francisco. The time it took to get to California, by land especially, but also by sea, is unimaginable by twentieth-century standards. This changed when clipper ships began to carry goods to the California markets. In an age when steam ships were unable to carry enough coal to get around Cape Horn, clipper ships soon established a virtual monopoly on the California carrying trade.

Clipper ship designers and builders did all they could to make their ships faster and less expensive to build. Advances in practical, mechanical and industrial arts that

could be applied to ship construction were utilized in the most progressive yards, like those of Samuel Hall and Donald McKay in East Boston. Constructing a clipper ship was a complicated, intricate task, and most probably would have been impossible using the old "rule of thumb" method that typified shipbuilding in the United States from the seventeenth to the nineteenth-centuries. At the time of the clipper ships, "rule of thumb" shipbuilding was rapidly giving way to a science of naval architecture, and it was this new science of naval architecture that made clipper ships possible.

"Rule of thumb" was being transformed into naval architecture. Some designers, Hall, McKay and S.H. Pook in East Boston, and Griffiths, Brown and Bell, and Isaac Webb in New York, understood better than their predecessors the mathematics of proportion, and possessed a knowledge of the properties of wood as scientific as it was practical. For a long time, shipbuilding had been a delicate balance between luck and skill, trial and error. There was no way to predict if a ship would sail well, or in some cases stay afloat, until the vessel was actually in the water. Building a good ship, like building a cathedral that would stay up, was a gamble.² Crowds were attracted to ship launches precisely because of the danger. Would the ship make it down the ways? Would it fall on its side at the water's edge? Would it sink from sight in deeper water? The developing science of naval architecture lowered the risks, improved the product, and gave crowds new reasons to observe launches.

Until 1794, ships had been built using skeleton models that showed keel, frames, stern and stern post, but were of little value in accurately transferring a vessel from model to full-sized ship. The models were not exact, and were insufficiently detailed. The mathematical relationship between their component parts and the eventual ship was

problematic, and worst of all, there was no mock-up of the hull. Getting the lines of the ship from the lines of the model was a time-consuming and inexact process for men in the mould loft. In 1794, Orlando Merrill, a young shipwright in Newburyport, invented a tool, the water line model, "which was composed of lifts joined together, originally by dowels and later by screws. These could be taken apart and the sheer, body, and half-breadth plans easily transferred to paper, from which the working plans were laid down in the mould loft."³ The water line, or half-model as it has come to be known, was "an elegantly simple device for rendering an idea in three dimensions without placing paraphernalia between the imagination and the creation."⁴

The half-model occupies the middle ground between a past in which vessels were built without design aids, but by "hazard and by eye," and the modern era in which architectural plans and studies of materials have replaced the rule of thumb. It was an enormous leap forward. If a sailing vessel was an "expression of a rapport between the works of man and the ways of nature,"⁵ then Orlando Merrill, in creating a tool that more closely approximated that relationship, single-handedly moved shipbuilding closer to a time when that rapport could be more scientifically demonstrated. Merrill was still alive when Donald McKay moved to Newburyport from New York, and the two were said to have known each other. McKay's models, a few of which can be found in the Boston Museum of Fine Arts, are regarded as masterpieces of the form.⁶

In 1842, as the science of naval architecture was emerging, Lieutenant Matthew F. Maury was placed in charge of the Depot of Charts and Instruments at Washington. While there, he collected and converted "into systematic tables the valuable data contained in the old log books of United States warships, which he found stowed away as so much rubbish."⁷

Maury recommended that merchant ships be provided with charts of sailing directions to make it possible for seamen to register observable facts pertaining to winds, currents, and other phenomena of importance and interest, so that a science of oceanography could be established.⁸ In 1856, captains and officers of a fleet of more than a thousand merchant ships, sailing under the United States flag, recorded daily and almost hourly observations of the winds and currents.⁹ Maury published his findings in periodicals and then in 1853 published *Physical Geography of the Sea*. This was the first work to treat clouds, winds, and currents scientifically. His charts were invaluable, especially for clipper ship captains and navigators, and had the practical effect of saving time, money, and more importantly lives.

Robert B. Forbes, an able and well-known captain, demonstrated the application of both practical and mechanical art to naval outfitting when he designed his "Forbes's Rig for Ships," which was based on his experience as a sailor. Forbes was the first to

divide the enormously large and high old-fashioned topsail and make the lower topsail yard stationary at the cap of the lower mast-head. He made the mast-heads long, to suit the rig. The upper topsail yard kept the place occupied by the original yard, and was raised and lowered in the same manner.¹⁰

The purpose of his rig was to combine economy and safety with constant progress, and his work provides another example of empirical observation and experience being cobbled together into a rudimentary science that would find eventual and expanded use in the shipyard.¹¹ But there was resistance to change. Shipbuilders of the old school refused to adapt to new ways, and continued to design ships using the rule of thumb method. As late as 1851, in his *Treatise on Naval*

Architecture, J.W. Griffiths, the noted New York designer, "was forced to complain that few vessels were built from plans and that few builders understood their use."¹²

Twenty years earlier, at the start of his career as a draughtsman at the firm of Smith and Dimon, one of three New York firms engaged in the construction of the Liverpool, London and Havre packets, Griffiths had created a sensation:

when he attacked the predominating theory that it did not matter how roughly a vessel entered the water so long as she left it smoothly behind her--the theory exemplified in the Baltimore clipper's full round bows, practically flat forward floor and narrow stern. [Griffiths] proposed a model of a knifelike, concave entrance, melting into an easy run to the midship section, where, instead of forward, he located the extreme breadth of beam. This fullness of breadth melted again into the after end in lines almost as fine as those forward. In place of the codfish underbody, he gave his innovation a dead rise amidships.¹³

These sound like plans for a clipper ship, and it should come as no surprise that Griffiths exerted a profound influence on Donald McKay, then a shipwright at Brown and Bell, another shipbuilding concern involved in the construction of packet ships.¹⁴

In working for Webb, and in forming a friendship with Griffiths and later with Jacob Bell, McKay was exposing himself to the most advanced ship designers and builders of his time. The New York shipbuilding community was very much like the community McKay would enter when he moved to East Boston. It was a small, tightly-knit group of men with democratic tastes and simple habits, who had little connection with the world outside their own neighborhood. The job itself was physically difficult, the hours intolerably long, and workers too tired to do anything but eat and sleep at the end

of the work day. Once an apprenticeship was fulfilled, and the aspiring mechanic became a full-fledged shipwright or ship-carpenter, his life did not get any easier. He labored from sunrise to sunset, "that is to say, from half-past four o'clock a.m. in summer till half-past seven o'clock p.m., a period of fifteen hours, for \$1.25 per day. At eight o'clock in the morning he was allowed an hour for breakfast. At twelve o'clock he had two hours for dinner. The heaviest beams...he carried on his shoulders, his bosses working with him."¹⁵ These were onerous working conditions, and McKay recalled them when he made his shipyard in East Boston one of the most mechanized in the world.

In part because of the chronic labor shortage, terms of apprenticeship in America were less arduous than what was experienced by a young man entering the shipbuilding trades in Great Britain. There an apprenticeship lasted seven years. In America, yards would indenture from two to twelve boys, who "were expected to study assiduously, work hard, and behave properly."¹⁶ In smaller yards, one or two apprentices were taken in, and they were frequently sons or relatives of the builder. "In this way family participation in the shipbuilding industry was sometimes perpetuated for several generations. Sons often succeeded fathers in American yards during this period."¹⁷ As a way of passing on knowledge, however, the system was only adequate, and not a substitute for higher education in the principles of design and construction. But such a system, grudgingly, was taking shape.

Lauchlan McKay followed his older brother, Donald, from Nova Scotia to New York, moved in with him during his own apprenticeship and during that time took notes for what would become the first American treatise on naval architecture. In 1839, he wrote that "accurate knowledge" was "the copartner of

genius."¹⁸ He believed in the existence of formal principles that governed all works of art, the mechanical, industrial, and practical, and that these principles, once ascertained, would lead to a science of design. "The shipbuilder has labored, in the larger portion of our country, under the necessity of working by guess. The publications of other countries have been large and extensive, full of intricacy, scientific rather than practical, and consequently of little use to the uneducated mechanic."¹⁹ In his book, McKay tried to lead the shipbuilder through a "course of instruction as if he were in the shipyard."²⁰ His purpose was not "to exhibit learning, by the use of scientific terms...but to afford necessary information, in conformity with common practice."²¹ McKay emphasized the practical, and hoped his work would reach a large enough audience to be effective in correcting the problems he had found in the industry. His book was a formidable, but much-needed first step.²²

In 1851, Griffiths was still lamenting the state of affairs McKay tried to rectify. But the gifted few raised America to prominence. While naval architecture as generally practiced was unscientific, "the majority of builders merely laying down vessels from models which they shaped by eye to more or less standard forms," a position of technical leadership had been created "primarily by the genius and ability of a limited number of builders and designers," among them McKay, Hall, Pook and Webb.²³ These men, ambitious, intelligent, imaginative and far-sighted, took the measure of the market and realized they could meet its demands. Because of them, America developed a "position of notable leadership in the design and construction of wooden sailing ships."²⁴ This superiority of design, conjoined with the impetus provided by the gold rush, propelled American shipbuilding into international prominence.

In 1843, the firm of McKay and Pickett was formed, and the New York packet ships *St. George*, 845 tons, in 1843, and the *John R. Skiddy*, 930 tons, in 1844, were built by them at Newburyport. The purpose of these packet ships was to carry mail, and at the time of their construction in the 1840s, they were the only regular means of communication between Europe and the United States. Packets were small, from 300 to 500 tons, colorfully painted from the waterline up, and carried plenty of sail. Occasionally, these ships would race across the Atlantic. They were fast, but nowhere near as fast as clipper ships, which were significantly larger and carried, on average, more than an acre of sail.²⁵

In 1844, Enoch Train, ship-owner and merchant of Boston, decided to construct his own packet ships to run between Liverpool and Boston. Train did not want to have his ships built in New York, but he was unwilling to risk failure by employing a local Boston builder, most of whom where thought to be too inexperienced in building a vessel of the class Train wanted constructed for his transoceanic line. An acquaintance, Dennis Condry, familiar with Donald McKay's work in Newburyport, and greatly impressed by the young shipbuilder, encountered Train aboard ship and encouraged him to contact McKay at his yard on the north shore. Train promised to do so.²⁶

Train journeyed to Newburyport, where he met McKay, and "within an hour a contract had been signed for the building of the *Joshua Bates*, the pioneer ship of Train's famous Liverpool Line."²⁷ Train is said to have been so impressed by McKay's work that he grasped the shipwright's hand and declared, "You must come to Boston; we need you; if you wish financial assistance to establish a shipyard, let me know the amount and you shall have it."²⁸ In 1845, McKay, aided and encouraged by Enoch Train, established a yard on Border

Street, East Boston, six blocks north of where Samuel Hall had in 1839 set up his own yard. McKay was thirty-five, and Hall ten years older at the time.

Shipbuilding had been picking up in East Boston since 1841, although the boom in the construction of large, fast clipper ships was still some years away.²⁹ Samuel Hall had kept active, gradually increasing his production from three ships between the years 1839 and 1841 to three ships in 1842 and then to five in 1844. None of these were clippers, although the *Akbar*, with its sharp bow and concave lines, was exactly the sort of ship J. W. Griffiths would be advocating in 1851. Hall had formed a relationship with R. B. Forbes and had constructed for him, at East Boston, the steam schooner *Midas*, the brig *Antelope*, the bark *Coquette*, the steam bark *Edith* and in 1845, the 750 ton steamship *Massachusetts*, an auxiliary screw ship later sold to the government.³⁰

After McKay's arrival, other noted Massachusetts and New England shipbuilders shifted operations to East Boston, among them Daniel D. Kelly and Paul Curtis, the latter a well-known Medford ship builder and designer.³¹ The majority of these shipbuilding concerns were small, artisan-run shops, and most of them did not remain in business for more than five or six years. These small businesses flourished and were caught up in the great boom in wooden shipbuilding, and when that boom faded, most of these firms went quickly out of business. The lion's share of wooden shipbuilding in East Boston was controlled by a handful of family firms: Samuel Hall, and his son; Donald McKay, for a time with his brother, Nathaniel; Daniel D. Kelly, and his son, William, and Paul Curtis, who had simply shifted his operations from Medford to East Boston. These firms dominated the wooden shipbuilding industry, accounting for more than 75% of the total output on the island during a fifteen year period that began in 1845.³²

A single firm, the Atlantic Works, exercised an even more pronounced dominance in the production of steam engines and boilers both for use in ships and in factories.³³ This firm also built iron-clad, wooden-hulled vessels, and later, ships for the government during the Civil War. When R. B. Forbes wanted steam propelled, iron vessels, he relied on the Atlantic Works, which was capitalized at \$200,000, not a large amount given the scope of its planned operations.³⁴ In 1844, however, nine years before the incorporation of the Atlantic Works, Otis Tufts moved his boiler department from Boston to East Boston, and shortly afterwards, pleased with the reception he had received on the island, purchased an entire wharf. At this wharf, in 1845, Tufts constructed the iron hull for the steam tug, *R. B. Forbes*.³⁵ Tufts must be given credit for building the first iron vessel in East Boston, a twin iron-screw tug boat that towed clipper hulls to Boston or New York to be rigged. It was one of the first tugs to use a propeller and not a paddle wheel.

In 1845, Tufts moved his entire Boston plant to East Boston, where he began making heavy machinery, stationary and marine steam engines, and boilers. There was great demand for his products, and Tufts expanded to meet this demand, "anticipating a still greater demand. He decided to go on enlarging his works and be prepared to build as large machinery as could be made by any establishment in the country."³⁶ He incorporated under the name of the Boston Steam Engine Company, capitalized at \$1,000,000, in 1853, the very year the Atlantic Works was incorporated.³⁷ Tufts was the principal owner in the company, which included L.A. Bigelow as treasurer, A.R. Turner as clerk, and Louis D. Bartlett, a machinist, as superintendent.³⁸

Encouraged by the market, the company increased the size of its lot, and purchased expensive plant equipment. In

1854, they received large orders for sugar processing machinery from Louisiana and Texas, but were unable to deliver the machines in time for the harvest. Contractual difficulties followed, and there was a slump in the market in 1855, which worsened in 1856. The steady demand for stationary steam engines suddenly dropped, and continued to drop. The company found itself without a cash flow. In July, 1856, The Boston Steam Engine Company was forced out of business. At its peak, the company employed 135 men, whose pay amounted to nearly \$4,000 each month. In a single year, 1855, the amount of bar and forged iron consumed was about 110 tons, boiler iron 250 tons, cast-iron nearly 600 tons, steel 250 tons, composition 10 tons, copper-work 3 tons, along with 675 tons of coal.³⁹

Tufts continued for a time on his own, but he was never able to reestablish his position. In 1858, he built the iron brig, *Nankin*, for Cushing Brothers and R. B. Forbes.⁴⁰ Forbes was pleased with the performance of this ship in the China trade "and particularly with the manner in which she survived a standing in Yokohama during a typhoon in 1859, but her cost was evidently excessive, for the order was not repeated."⁴¹ Few iron vessels were being built in the United States in these years. The average annual output for the decade of the 1840s was but 455 gross tons, and for that of the 1850s, only 1515 gross tons.⁴² The Atlantic Works was able to survive because it was in business during the Civil War, when demand for iron-clad vessels and steam engines sharply, if momentarily, increased. Tufts had no such luck. There is no record of his being in East Boston after building the *Nankin*.

After the failure of Tuft's Boston Steam Engine Company, the Atlantic Works became the premier East Boston heavy manufacturing concern. R. B. Forbes alone had eight

vessels constructed at their plant and dry dock, which faced the guns of the Charlestown Navy Yard.⁴³ The first ship constructed for Forbes was a 100 ton, iron paddle steamer, *Argentina*, in 1858, the same year Tufts built the *Nankin*. This was followed by three barges and several iron paddle steamers, the last of which, the *Niphon*, a 300 ton propeller steamer, was built in 1865, just after the Civil War.⁴⁴ During the war, the Atlantic Works built iron tugs and armored gunboats for which the government paid high prices.⁴⁵ The demand was temporary, however, and "shipbuilders had little opportunity to secure experience, develop their equipment, and obtain economies from large-scale, continuous operation."⁴⁶

In 1847, Ephraim Parker and John Dunbar formed the East Boston Dry Dock Company, a corporation that helped to make East Boston as much a place for ship repair as it was a locus of ship production.⁴⁷ Samuel Hall became president and director, a position he resigned in 1858, when the economy had still not rebounded from the panic of the previous year.⁴⁸ In 1853, the East Boston Dry Dock company received legislative approval to construct a marine railway on "land bought by them of Samuel Hall," but the engineer who supervised the job, "although highly recommended," miscalculated, causing "much extra expense and delay." As late as 1855, the job remained unfinished.⁴⁹ But business was good. In the first year of operation, ninety-five vessels had been repaired; in the second, fifty-five more.⁵⁰

By 1857, the year of the panic, prospects changed. A precipitate drop in ship repairs, coupled with an extremely cold winter that left docks ice-covered for weeks, drove revenues down.⁵¹ The company had fallen into debt. "It will be evident to all in a moment's consideration," wrote Briggs Thomas, Treasurer, in his report for 1858, "that the general and almost unprecedented depression of business under which we

have recently and are now labouring must have greatly affected the business of the docks, making their earnings less than may usually be anticipated."⁵² There was a third consideration. "Besides this," continued Thomas, "competition with other docks has necessarily reduced the rates of docking vessels and has thus been another cause of the smallness of the receipts."⁵³

The competition Thomas alluded to was Simpson's Dry Dock Company, the first timber dry dock in the country, which had been incorporated in 1854.⁵⁴ Simpson's Dry Dock was large, 254 feet in length inside the turning gates, 70 feet wide at the top, and 50 feet wide at the bottom. Ample room was provided for a full set of sliding bilge docks, something government docks did not even have. A second dock was commenced in 1855, and completed in eighty days. That dock was 153 feet in length, 33 feet between the abutments, and 46 feet wide at the top. There were two centrifugal pumps, powered by a steam engine, that could pump from either or both docks at once. This steam engine was capable of pumping the large dock dry in less than ninety minutes. This dock contained eighteen feet of water.⁵⁵

It was clear to the two companies, operating in close proximity in East Boston, in a highly competitive industry, that an agreement had to be worked out if both were to stay in business. In the 1859 Treasurer's Report, Thomas bleakly mentioned "the great depression of business for vessels of all descriptions," but then went on to discuss the "arrangement" on rates that had been reached "March last with Simpson's Dry Dock Company."⁵⁶ Prospects for "the coming spring months" looked "favorable."⁵⁷ But in his report of the following year, Thomas bemoaned "another year of continued depression of business. A smaller number of the Cargo Class ships (especially clipper ships) have entered the Port of

Boston during the last year than any year since the docks were built."⁵⁸ Thomas, like Hall before him, took business matters personally. When the company failed to turn around the following year, he resigned his position as Treasurer on April 1, 1861.⁵⁹

Despite these signs that all was not well with the shipbuilding industry, settlement continued to expand. In 1860, there were 18,356 residents in East Boston. After that year, the population continued to increase, but at a slower rate, since by then the downturn in the wooden shipbuilding industry was well underway and was beginning to act as a discouragement to would-be artisan immigrants.⁶⁰ Shipbuilding was not the only industry on the island, and there were enough firms to continue to attract residents to the island. Several mechanic and machine shops, stables, steam saw mills, and warehouses had been opened for business near the waterfront. There were 2,055 houses on the island in 1860, a quadrupling of what existed fifteen years earlier. About 200 of these houses were brick, two and three stories tall. In 1845, in wet weather, the streets of East Boston were all but impassable. Many houses were without water. By 1860, three-and-a-half miles of island streets were paved with packed dirt, and Cochituate water was available to all who wanted it piped into their homes.⁶¹

Most East Boston residents believed that the shipbuilding industry would revive, once the crisis passed. East Boston was the "great work-shop" for shipbuilding in Massachusetts. In 1856 alone, an aggregate tonnage of 30,380 tons had been constructed in island yards. In 1857, despite the depression caused by the panic, another 28,403 tons of wooden ships slid down East Boston ways into the harbor. Why shouldn't residents believe the downturn would pass? East Boston possessed many advantages, natural and man-made, that

boosted the confidence of its working population: deep water, long wharves, sectional and dry docks, marine railways and machine shops, and more shipyards than any of the surrounding communities. When the economy returned to normal, "East Boston would be one of the first places, if not the first place, to feel its beneficial effects."⁶²

The migration of hundreds of artisans to East Boston to find employment in shipbuilding and in ancillary trades helped turn the island into a small republic of artisans. Most early development of East Boston, during the 1830s, was the direct result of decisions made by the powerful directors of the East Boston Company. They owned or were represented by substantial stock holdings in several important companies chartered in East Boston before 1844. After 1844, when shipbuilding became the dominant industry on the island, and other industries moved to the island to take advantage of that fact, this was no longer the case. Ownership of companies on the island became open to artisans and others in the community who were not members of the East Boston Company. The Atlantic Works, founded by a group of machinists and mechanics, is perhaps the best example of this.

Artisans also entered politics. Samuel Hall became an alderman for East Boston, and then in 1848, helped charter the East Boston Savings Bank, providing evidence that artisans, given the opportunity, could play a role in society more usually allotted to members of the ruling class. Few artisans, however, entered politics or became part of the financial structure of the community. For most artisans, work was life. Usually, that work was physically hard, whether an individual worked in a factory, or in a shipyard, at what remained essentially a pre-industrial task, despite the recent introduction of steam engines and derricks in some of the bigger yards. And while it was true that these artisans were

rightly proud of what they did, there were few among them who would not have opted for a life better than the one lived by a wage earner in the early days of the industrial revolution in America. Whether he worked in a shipyard or a factory, used brute force or was aided by a machine, toil for most artisans resulted only in poverty and poor health, no matter how grand or profitable the product of their labor.

1. Douglass C. North, *The Economic Growth of the United States: 1790-1860* (New York: W.W. Norton & Company, 1961), p. 159.
2. Samuel Eliot Morison makes this connection in his *Maritime History*. A clipper ship was a grandiloquent statement, and not simply a means of transportation. In the clipper, form was married to function. So too in cathedrals, if one considers earthly manifestations of God's grandeur their purpose. Clipper ships, whose purpose was not to glorify God, were not as ornate as cathedrals, but were nonetheless splendid creations. "Economy of line, lightness, strength, and freedom from meaningless ornament made Donald McKay's *Flying Cloud* and *Sovereign of the Seas* not only two of the swiftest sailing ships of their time but also two of the most beautiful vessels that ever sailed the ocean seas." John Kouwenhoven, *Made in America* (New York: Octagon Books, 1975), pp. 32-33. The Brooklyn Bridge, designed and built by the father and son team of J.A. and W.A. Roebling between 1869-1883, justly elicited a similar response from its admirers, for the same reasons. See David McCullough, *The Great Bridge*.
3. Arthur H. Clark, *The Clipper Ship Era*, p. 18.
4. "Half-Modelling" (The Apprenticeshop of the Bath Marine Museum, Bath, Maine), pp. 10-11. Unattributed.
5. Ibid., p. 4.
6. Richard C. McKay, *Some Famous Sailing Ships*, p. 19.
7. Clark, *The Clipper Ship Era*, p. 147.
8. Ibid., p. 147.

9. Ibid., p. 148. Maury used colors in his charts. For example, "In those parts of the ocean which are not colored, the logs show that a gale has been encountered as often on the average as once a fortnight. It should, however, be born in mind, that the absence of those colors does not necessarily indicate a tranquil sea; many and probably stormy parts are left blank for want of observations." Matthew F. Maury, *U.S. Nautical Magazine*, July, 1857, p. 308. Maury, like Darwin, had a wonderfully empirical cast of mind, and had he not fought for the south in the Civil War, more would be known of him. An earlier work, *Treatise on Navigation*, was made a textbook at the Naval Academy.

10. Henry Hall, *Report on the Ship-Building Industry in the United States*, p. 86.

11. Robert B. Forbes, "The Forbes's Rig for Ships," *U.S. Nautical Magazine*, April 1855, pp. 13-30. See also R.B. Forbes, *Personal Reminiscences* (New York: First Library, 1970). Reprint of the 1882 original.

12. John G.B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914* (Cambridge: Harvard University Press, 1941), p. 113.

13. McKay, *Some Famous Sailing Ships*, pp. 11-12.

14. The third famous shipyard belonged to Isaac Webb, at whose firm McKay had begun his apprenticeship in 1827. That contract, in great part, reads as follows:

This Indenture Witnesseth, That Donald McKay, now aged sixteen years, five months and twenty days, and with the consent of Hugh McKay, his father, hath put himself, and by these presents doth voluntarily and of his own free will and accord put himself, apprentice to Isaac Webb, of the city of New York, ship-carpenter, to learn the art, trade and mystery of a ship-carpenter, and after the manner of an apprentice to serve from the day of the date thereof, for and during and until the full end and term of four years, six months and eleven days next ensuing; during all of which time the said apprentice his master faithfully shall serve, his secrets keep, his lawful commands everywhere readily obey: he shall do no damage to his said master, nor see it done by others without telling or giving notice thereof to his said master; he shall not waste his master's goods, nor lend them unlawfully to any: he shall not contract matrimony within the said term: at cards, dice, or any other unlawful game he shall not play...he shall not absent himself day nor night frcm his master's service without his leave; nor haunt ale-houses, taverns, dance-houses or playhouses; but in all things behave himself as a faithful apprentice ought

to do during the said term. And the said master shall use the utmost of his endeavors to teach, or cause to be taught or instructed, the said apprentice in the trade or mystery of a ship-carpenter, and the said master shall pay to the said apprentice the sum of two dollars and fifty cents weekly for each and every week he shall faithfully serve him during the said term. And shall also pay to him, the said apprentice, the sum of forty dollars per year, payable quarterly, for each and every of the said years, which is in lieu of meat, drink, washing, lodging, clothing and other necessaries..

When McKay asked for an early release from the terms of the contract, Webb agreed and allowed McKay to go to work at Brown and Bell's shipyard. McKay, *Some Famous Ships*, pp. 5-9.

15. Ibid., pp. 5-9.

16. Hutchins, *American Maritime Industries*, p. 120.

17. Ibid., p. 120.

18. Lauchlan McKay, *The Practical Ship-Builder* (New York: Collins, Keesee and Co., 1839), p. vii. In 1836, McKay had been appointed carpenter in the United States Navy. He wrote the book during a leave of absence spent visiting his brother at his house in Newburyport.

19. Ibid., p. vii.

20. Ibid., p. vii.

21. Ibid., p. vii.

22. McKay's book, although less theoretical than it might have been, is not an easy read. It is doubtful his work was read by a large number of subscribers.

23. Hutchins, *American Maritime Industries*, pp. 287-288. Samuel Hart Pook (1827-1901) designed three of the eighteen California clippers that made a voyage of less than one hundred days from an Atlantic port to San Francisco before 1861. He was an early advocate of iron-clads, and like his father, Samuel More Pook, became a naval constructor. Morison, *Maritime History*, p. 339. Pook was also active in East Boston, building the models and doing much of the design work on the *Le Voyageur de la Mer*, an iron steam ship launched in 1857.

24. Ibid., p. 287.

25. Hall, *Report on the Ship-Building Industry in the United States*, pp. 69-72.

26. Clark, *The Clipper Ship Era*, pp. 54-56.

27. Ibid., p. 55.

28. Ibid., p. 55.

29. Number of ships and barks, 1815-1830: 57; 1831-1846: 93; 1847-1857: 259; Number of schooners, 1815-1830: 450; 1831-1846: 412; 1847-1857: 610. U.S. Commissioner of Navigation, *Annual Reports, 1884-1914*, pp. 194-195. The report, while not specific to East Boston, provides an accurate overall view of the industry.

30. R.B. Forbes, *Personal Reminiscences*, pp. 414-415.

31. See Appendix IV.

32. See Appendix IV.

33. Incorporated May 2, 1853, by Mark Googins, Abijah Miller, Oliver Edwards, William C. Hibbard, Gilman Joslin, James A. Maynard and others. *Massachusetts Acts and Resolves*, 1853.

34. *Massachusetts Acts and Resolves*, 1853.

35. Sumner, *A History of East Boston*, pp. 706-707. R. B. Forbes, *Personal Reminiscences*, p. 415.

36. Ibid., p. 707.

37. *Massachusetts Acts and Resolves*, 1853.

38. Sumner, *A History of East Boston*, p. 707. See also Data Base in Appendix II.

39. Ibid., pp. 707-708.

40. R. B. Forbes, *Personal Reminiscences*, p. 417. Tufts considered the ship unsinkable. [Tufts] has "proved to our satisfaction by figures, which never lie, that the cargo, the wooden deck, and frame are amply sufficient to buoy up the hull and passengers, even though fractured in every compartment; which, he says, is a moral impossibility." Ibid., p. 237.

Forbes was quite a seaman. He took his first voyage aboard the Canton Packet at age thirteen with a "quadrant, a Bowditch's navigator, [and] a log book." *Reminiscences*, p. 31. Morison says

Forbes had "the most original brain, and the most attractive personality of any Boston merchant of his generation." Morison, *Maritime History*, p. 241.

41. Hutchins, *American Maritime Industries*, p. 415.
42. Ibid., p. 449.
43. Ibid., pp. 414-417. Also, *Argus-Advocate*, May, 1897, p. 59.
44. R.B. Forbes, *Personal Reminiscences*, p. 316.

45. Hart Nautical Collections, *Bethlehem Shipbuilding Corporation Archives, 1856-1962*. Also Hutchins, *American Maritime Industries*, p. 451.

46. Ibid., p. 451.

47. *Massachusetts Acts and Resolves*, 1847.

48. "I tender to you my resignation as Director and President of the East Boston Dry Dock Company from and after this date. My communion with this Company as Director and President has been from its infancy. And at its commencement its success seemed almost sure, but circumstances have come into existence that no one had any reason to expect that have in a great degree blasted our fond hopes. In taking leave of you gentlemen, I do it with no unkind feelings but shall always feel grateful to the Stockholders and Directors for the confidence they have heretofore shown to me, which confidence I trust has not been misplaced. I ever shall feel a deep interest for the success of this company and hope that under different Direction the prosperity of the Company will be all the Stockholders could wish." June 25, 1858. *East Boston Dry Dock Company, 1824-1872*, Vol. I, Folder 3. Baker Library, Harvard University.

49. *Massachusetts Acts and Resolves*, 1854. *East Boston Dry Dock Company, 1824-1872*, Vol. I, Folder I, *Annual Report of the Treasurer*, March 5, 1855. Baker Library, Harvard University.

50. Ibid.

51. *East Boston Dry Dock Company, 1824-1872*, *Report of the Treasurer*, March 1, 1857. Vol. I, Folder I, Baker Library, Harvard University.

52. *East Boston Dry Dock Company, 1824-1872, Annual Report of the Treasurer*, March 1, 1858. Vol. I, Folder I, Baker Library, Harvard University.

53. Ibid.

54. W.H. Bunting, *Portrait of a Port: Boston, 1852-1914* (Cambridge: The Belknap Press of Harvard University, 1971), p. 104.

55. Sumner, *A History of East Boston*, p. 709.

56. *East Boston Dry Dock Company 1824-1872, Annual Report of the Treasurer*, March 1, 1859. Vol. I, Folder I, Baker Library, Harvard University.

57. Ibid.

58. *East Boston Dry Dock Company, 1824-1872, Annual Report of the Treasurer*, March 1, 1860. Vol. I, Folder I, Baker Library, Harvard University.

59. *East Boston Dry Dock Company*. 1824-1872, Vol. I, Folder 2, Briggs Thomas, letter of resignation, Baker Library, Harvard University.

60. Carroll D. Wright, *Analysis of the Population of the City of Boston as Shown...in the Census of May, 1885*.

61. *East Boston Company, Annual Reports*, 1857, 1860.

62. *East Boston Company, Annual Report*, 1857.

IV
The Building of the Ship
1845-1856

Despite some use of new technology, such as steam-powered saw mills and derricks in some of the larger East Boston shipyards, shipbuilding itself remained a highly competitive handicraft industry where expansion in production occurred as a result of an increase in the total number of yards constructing vessels.¹ In the 1850s, wooden ships also became faster, a development that was partially a function of a better understanding of physics and proportion. But these advances in knowledge, while taking place more quickly in the industry since the building of packet ships, when ship designers would cut open fast fish to understand how they were able to move so fast, nonetheless arrived at a slower pace in shipbuilding than changes taking place at the same time in industries that were a part of America's nascent factory system, such as textiles, sewing machines, and other industries where economies of scale and the interchangeability of parts would lead to higher profits and increased production.

Because shipbuilding did not lend itself to the factory method of production, shipbuilders were unable to take advantage of such cost reductions and productivity increases. Each wooden ship was unique, and therefore, only limited cost reductions were available to builders. A good yard manager did all he could to keep costs in line, and there is no doubt most shipbuilders knew down to the penny the cost of every item going into the hull of a ship. They economized by being just a little bit smarter than the builder in the next town,

or just a little bit better. Another way, used in East Boston by Donald McKay, was to reduce the high cost of labor--always a critical factor in constructing a vessel--by introducing labor-saving machinery. Manpower could in some instances be replaced by steam power, especially in some of the heavy lifting and carrying that occupied workers in the shipyard.

But shipbuilding was a craft industry, based on the individual skills of highly trained artisans. In wooden shipbuilding, the skills of the artisans could not be transferred to machines. And wood, the building material itself, was especially recalcitrant, unlike iron, or steel, metals that could be made to change form and were therefore easier to manipulate.⁷ An image of men grunting under the strain of lifting intolerably heavy frames lingers, despite help from shear legs and derricks. Until late in the nineteenth-century, when wood was replaced by iron, the building of a ship was essentially a preindustrial task, entirely dependent upon the artisan, his skill with tools, and his willingness to do unremittingly heavy work.

Between 1840 and 1860, the tools used in the construction of hulls in East Boston shipyards were in most respects the very same tools used two centuries earlier in the construction of sailing vessels. Tool technology remained unchanged. In East Boston shipyards, workmen supplied their own tools. Broad-axes, adzes, saws, bevels, chisels, caulking-irons, mallets, rulers and the like were the personal property of the workers. The yard owner made available to the men large augers for boring bolt and treenail holes, a cross-cut saw to be used over the saw pit, and perhaps a bolt cutter. Owners of larger yards, and there were only a few, like Donald McKay or Samuel Hall in East Boston, might supply a derrick or steam engine to cut back on some of the heavy labor. But since most yards were small, the average shipyard

persisted as a place of heavy, grinding labor.³

The predominant work in East Boston shipyards was the construction of large wooden hulls for clipper ships. Occasionally, a ship left a yard fully rigged, but the rigging of a vessel was more profitably done elsewhere, since this intricate operation could tie up a yard for weeks. Hulls were usually sent to be rigged in Boston or New York, often towed from East Boston to either location by the steam tug *R.B. Forbes*. In the 1840s and 1850s, most firms involved in the rigging of a wooden sailing ship in the Boston area had establishments on the Boston waterfront.⁴ East Boston shipyards concentrated on hull production. When ships were rigged on the island, it usually meant there was a drop in demand for hulls.

The Boston directories, which list workers by occupation, provide a ready inventory of what skills were most utilized in East Boston shipyards.⁵ Work in the yard, generally, was divided into three main categories: those of the shipwright, caulk or joiner. Some workers identified themselves as ship carpenters, a skilled trade, but not as skilled as that of the shipwright, who would often work in the mould loft, converting drawings into real frames, and making sure those frames were set up properly. These were by far the dominant trades in the industry. Caulkers used special mallets and chisels to force oakum into the seams of the hull and deck. When these seams were coated with tar, they became waterproof. Ship joiners built cabins, stairs, doors and furniture. Caulkers and joiners pursued specialized finishing trades, and were apt to move from one yard to another looking for ships near the finishing stage. A ship carpenter, or shipwright, tended to remain with a single yard while a ship was under construction. Once the work was done, however, he too would move along.

The distinction between the craft of the ship carpenter and that of the shipwright is not entirely clear. Before the time of the clipper ships, the job of the ship carpenter was diverse rather than specific, and often his work overlapped with that of the adze man, sawyer, and borer. He might even be required to help out the laborers. An analysis of the Boston directories indicates that the shipwright was the more highly-skilled craftsman, since some workers calling themselves ship carpenters in 1852 were listing themselves as shipwrights eight years later.⁶ Advancement in skill level, in almost every case, moved in the direction of the shipwright, and not in the direction of the ship carpenter. The majority of workers who changed skills, and stayed in the shipyard trades, show this to be true.

Wooden vessels required thousands of holes to be bored, both for iron rods to hold the knees, crooked timbers acting as braces, to the frame, and for treenails (pronounced "trunnels") to fasten planking to the exterior. Often, carpenters were called upon to do this. Carpenters might also be required to adze the exterior joints of the hull, or to act in the capacity of sawyers, hewing planks from logs. This was very heavy labor and the fact that the carpenter sometimes did work more often associated with workers of the lowest skill level in the yards suggests, again, that the ship carpenter ranked below a shipwright in skill level. Nevertheless, the ship carpenter was a skilled craftsman who had learned his trade through an apprenticeship over a period of several years.⁷

The caulkers, a man of critical importance in the construction of a sailing vessel, often worked on his back under the belly of the vessel. Hammer noise was an occupational hazard in getting oakum into a seam, and men who did this work often became deaf. The task of the caulkers was

perhaps the most repetitive job in the yard and it required a good deal of physical strength. But for those who had the aptitude, it was one of the most prized and highly paid jobs in the yard, no matter how occupationally risky, since in order for a ship to remain tight, caulkers had to do their jobs well. Lives depended upon them. But it was dreadful, tedious work.

In addition to the main categories of carpentry, joinery and caulking, ancillary crafts, not directly connected with the making of the hull, were associated with shipbuilding.⁸ Pump and block makers made pumps, apparatus fitted into the well of the ship which helped keep the hold dry. They also made blocks, pieces of wood with a hole for rope, which were part of the rigging. All their work was done by hand. Sparmaking was a business that required a slip or dock so that the spar could lie in salt water until it was ready to be used, and little of this sort of work was done in East Boston. Putting spars on a vessel was the task that preceded rigging, so most sparmakers had shops near the Boston waterfront.⁹ The average ship had thirty spars, rounded timber for masts, bowsprit, booms and yards, and the wood used in spars was heavy, cumbersome and dangerous to manipulate. For example, the mainmast of the *Great Republic* was 131 feet long and 44 inches in diameter, with a circumference of over 130 inches.

Clipper ships used a tremendous amount of sail, and in the mid-1850s, American cotton mills were producing more than thirteen million yards of sailcloth annually to meet this demand.¹⁰ The cotton used in American sails was a better, more durable material than the flax used in British sails, and because of this, there was a competitive advantage for ships using American cotton in their sails. Sail makers required a loft, the upper floor of a large building near the waterfront,

where the cloth could be laid out and cut. Ropemaking was another occupation that required a large enclosed building. Rope had to be stretched and kept taught for at least 24 hours before it was cut to length. Ropemakers supplied the rigging for a sailing vessel, and the average clipper ship used more than 2000 fathoms of line rope for her rig. The ropewalk at the Plymouth Cordage Company, which supplied standing and running rigging for McKay's *Great Republic*, was longer than three football fields.¹¹

Shipbuilders in East Boston utilized a system of subcontracting in constructing their vessels. Subcontracting is clearly in evidence in the assigning of ancillary tasks, such as sparmaking, mastmaking, sailmaking, and rigging since these jobs were not performed at island shipyards. In hull construction, a similar system was adopted, although under the watchful eye of the master builder. "Before 1846 the calking, painting, ironwork, and rigging were done by outside contractors, but after that date, framing, planking, decks, inside and outside joiner work were also let out."¹² The cause of these changes in the work place was the increasing complexity and size of ships, most especially clipper ships, until that time the largest wooden vessels ever built. The building of such ships required a much greater differentiation in labor than had hitherto been used in shipyards.

In the old system, a ship carpenter was required to be a man of all trades. He would aid in hewing out the frames and setting them up; would line out his streak of planking on the timbers of the ship, dub off the surface of the frames so that the plank might fit truly, put on the plank, bore the holes for the treenails and bolts, fasten the plank, and perhaps even caulk the seam.¹³

When the yard was busy, this plan would not do. The work would be divided, the separate parts allotted to different

gangs of men, and carpentry, calking, fastening, joining, painting, all became different trades. Under this new system time was saved, better work secured, and most importantly, profit margins improved. Yet despite these changes in organization, the essential craft nature of work in the wooden shipyard remained unchanged. Shipyards in the boom years produced more ships, but that was because more yards were producing them. There were three shipyards in East Boston in 1845. Eleven years later, at the height of the boom, in 1856, there were thirteen active shipyards.¹⁴

Some East Boston shipyards, especially the McKay yard on Border Street, were highly innovative. The shipbuilding boom caused occasional shortages in skilled labor, and there were but two ways to correct the problem. The first was to acquire machinery to alleviate some of the heavy work done in the yard. The second was to modify tools already in use by making them more efficient. The McKay yard did both. Before McKay's innovations, "all frame timbers were hewed out of the rough log or the flitch plank with broad-axes in the hands of the men, and timbers that needed to be cut lengthwise were sawed through by two men by hand."¹⁵ Donald McKay, remembering his backbreaking days as an apprentice in the New York yard of Isaac Webb, set up in his yard in East Boston a steam saw-mill to perform these operations.

The saw was hung so that it could be tilted while in motion, one way and then another, which made it possible for three men to saw the frames out to the proper bevel as fast as twelve men could put them together and set them up. Since all the heavy sawing was being done by steam in his yard, McKay was able to put a frame together for a hull in one-third the time it took when it was done entirely by brute force. Such gains in productivity made McKay the fastest ship builder in East Boston. McKay also set up a steam-powered derrick to

lift the heavy timbers and beams to their places in the ship, another task that had previously been done entirely by manual labor. Given what was going on in textile mills and in shoe and sewing machine factories, these technological improvements in the shipyard seem small, but they helped make the McKay yard the most efficient wooden shipbuilding yard in the country.¹⁶

Another time-consuming, difficult and laborious task was the manner in which heavy ceiling and planking had to be carried from the steam-box, where wood was being made malleable by steam, to the vessel. Everyone in the yard had to be called off from the work from time to time, often as much as once an hour, to spend twenty minutes or more in carrying about a huge plank or stick of timber. Instead of stopping the men, McKay used teams of oxen and horses to drag the pieces to a position where large derricks were set up to lift them into place. How important a step this was for the workers in the yard can be understood by considering the immense size of the lumber that had to be moved about the yard. The rock maple keels of some of these ships were longer than 50 feet, and as much as 16 by 32 inches on the sides. Deck planking could be thicker than 10 inches, and as wide as 14. McKay's gains in efficiency were impressive, but the real gain was the boost in morale laborers received when they realized it was no longer necessary to lift heavy beams up to the shoulder and carry them from one place in the yard to another. McKay's yard, however, was an exception.

Before the 1850s, treenails, 12 to 18 inch long wooden "nails" an inch or so in diameter with slots at the end, were made by hand in the shed on rainy days, and were chopped out of sticks of wood by workers using axes. Thousands of these wooden nails were used in the construction of every clipper ship; this was an oppressive, thankless and

time-consuming task. Not only that, but the workers, usually laborers, who hammered in these nails were among the least regarded men in the yard. In 1857, *The U.S. Nautical Magazine* made exactly that point in an article complaining about sloppy work. "Treenail borers--often the most worthless men in the yards--sometimes slight their portion of the work."¹⁷ If a treenail was not driven all the way in, it would work its way out. When that happened, the ship would enter a dry dock for re-treenailing.

The work of making treenails was tedious, and like most work done on a wooden ship, it had to be done carefully. The best treenails were square, not round, and a good treenail borer made certain the nail was driven all the way in with an expansion wedge firmly hammered into the slot at the end. Carving out treenails by hand was not work men volunteered to do, but in a wooden ship the job was essential. Sometime during the 1840s, a treenail lathe machine was invented. Many yards in the 1850s, including most in East Boston, used them. Workers heartily approved.¹⁸

Iron bolts were used to fasten floors and ceilings to timber in the frames. Thousands of these bolts, in various lengths and thicknesses, were required, and until a machine was devised that would make them, these bolts, like treenails, were cut by hand with a hammer and cold chisel. At the time of the clipper ship boom, during the late 1840s or early 1850s, a type of lathe worked by a hand lever was invented that would cut the round iron bars into suitable lengths. The auger, the machine that drilled the countless holes required in a wooden sailing vessel, was also improved at this time.¹⁹ These tool modifications, although not dramatic, made life easier for shipyard workers, in addition to enhancing productivity.

The labor saved by these improvements was worth

thousands of dollars to the builder of a large vessel, and helped bring down the cost of a large ship. Large ships, however, remained expensive. But American builders had been adroit at keeping costs in line. In 1825, a 300 ton ship cost between \$75 to \$80 per ton in the United States. Twenty years later, in part because of tool improvements and better use of the work force, a much larger ship still cost between \$75 and \$80 per ton to build. This was almost \$15 cheaper per ton than a wooden ship could be built in England. In a vessel of 3,000 tons, the difference in cost was substantial enough to give American builders a comfortable edge in wood.²⁰

How technologically advanced were the East Boston shipyards? Within the industry, these yards were the most advanced in the country. When Donald McKay closed his yard, in 1869, the bevel saw he had introduced years earlier was sent to a shipyard in Bath, Maine. It was the first bevel saw ever seen in that town. As late as 1880, many of the technological advances employed in East Boston shipyards--the bevel saw, derrick, and bolt-cutter, "were unknown in the majority of the ship yards of the Atlantic coast" outside the cities of Baltimore, New York, Philadelphia or Boston.²¹ As much as a spirit of innovation could be said to characterize wooden shipbuilding, the yards in East Boston, especially McKay's, were possessed of it. It was a major reason behind their success.

A hull could be completed in twelve to sixteen weeks, and since yards often had more than one slipway, more than one ship could be built at a time. Lumber was usually on hand in a working yard, like Hall or McKay's, but builders had been known to go into the woods themselves looking for timber for frames, as Samuel Hall had suggested he do in his conversation with Stephen White of the East Boston Timber Company in 1836, three years before he moved to East Boston.

In America, from the seventeenth to about the middle of the nineteenth-century, finding wood had presented little difficulty for builders, since wood was so plentiful. But by the late 1840s and early 1850s, what had happened on Noddle's Island, complete deforestation, was beginning to happen in adjacent wooded areas of New England. At the time of the clipper ships, wood was not as available as it had been.

Wood, the most ready fuel and building resource, had been squandered. Forests had been ravaged, first for rough houses, then finer homes, fuel, and ever larger, more wasteful ships. In the seventeenth-century, less than 200,000 feet of timber would build a large vessel, about 400 tons, for the pilgrims. In the 1850s, a single clipper ship might require 400,000 feet of lumber, and the felling of from 160 to 250 trees, many of which were old growth, between 100 and 250 years old. McKay's *Great Republic* consumed 1,500,000 board feet of pitch pine and 936,000 feet of white oak, an almost incomprehensible amount of wood. These trees could not be replaced, if they were replaced, in less than four generations. To make matters worse, for every tree a clipper ship used, another was wasted. No wonder East Boston shipbuilders had to go to the Canadian border, or to the oak forests of Delaware, Maryland or Virginia for wood.²²

The timber resources available for shipbuilding were much less than the total supply of timber in a region, and the amount of economically useful timber in each area depended on the nature of the forest and terrain, and on the ever-crucial cost of transportation. In building an ocean-going commercial vessel, shipbuilders were unfortunately limited to a relatively small number of tree species for each of the principal parts of a ship.²³ White oak was preferred for frames, tall pine was needed for masts. Yellow or long-leaf yellow pine, which was "heavy, strong and rigid, full of

turpentine, and held iron tenaciously was used principally in the planking, ceiling, keelsons, water-ways, rails and beams of vessels, and occasionally for decking and spars."²⁴

White pine, soft, clear, free from knots, capable of a beautiful polish when worked, and extremely buoyant when placed in the water, was used to make cabins, masts and spars, and sometimes decking. In the late 1850s and 1860s, hardwoods such as beech, birch, maple and chestnut, extensively used in early shipbuilding, were nearly exhausted. Spruce, pine, sugar maple and hackmatack were sought as substitutes. Only the best wood was used in high grade ships, like clipper ships, and the best wood was costly. "Live oak frame timbers...ranged between \$1.20 and \$1.50 per cubic foot, depending on size."²⁵ Live oak was very heavy and hard to work, and is the wood that made the *Constitution* "ironsides." Other frame timber was less expensive, and lighter. Curved white oak cost 85 cents a piece, and straight white oak was 48 cents.²⁶ In addition to the wood consumed by the vessels themselves, a great quantity was cut annually to build and repair rotting wharves, piers and docks.

The first actual step in the construction of a wooden ship was the crafting of the water line model. These models were 3 to 6 feet long, and very precisely made, although to the uninitiated, such models might appear to be only a scale-sized hull of a ship, cut in half lengthwise. What the model provided, in miniature, was every line on the hull of the ship. Once the model was finished, a naval architect, or shipbuilder, produced what was called the sheer drawing, essentially three separate views of the hull. [Figures 1-3] Construction drawings were based on sheer drawings, and the ship itself, by extension, based on construction drawings. Wood was cut according to the drawing, then numbered. When the time came to assemble the hull,

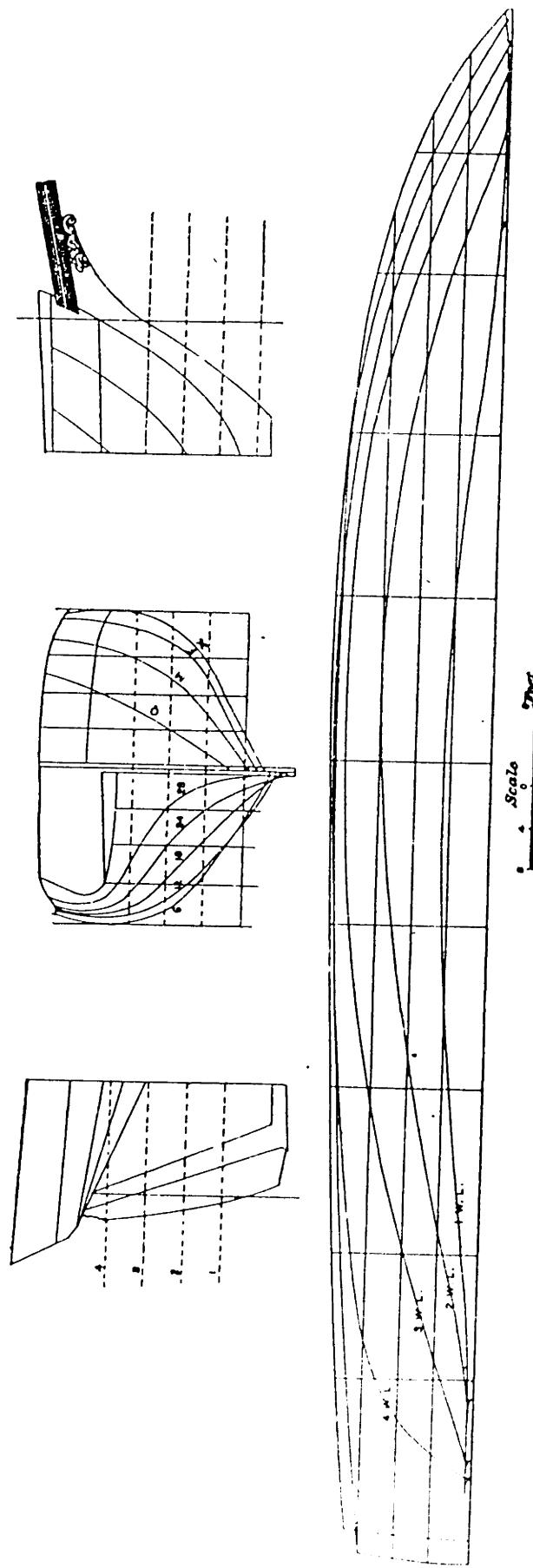


Fig. 41.—CLIPPER SHIP ANN MCKIM.
Built at Baltimore in 1832. Length, 113 feet; beam, 21 feet; depth, 14 feet.

[Figure 1]

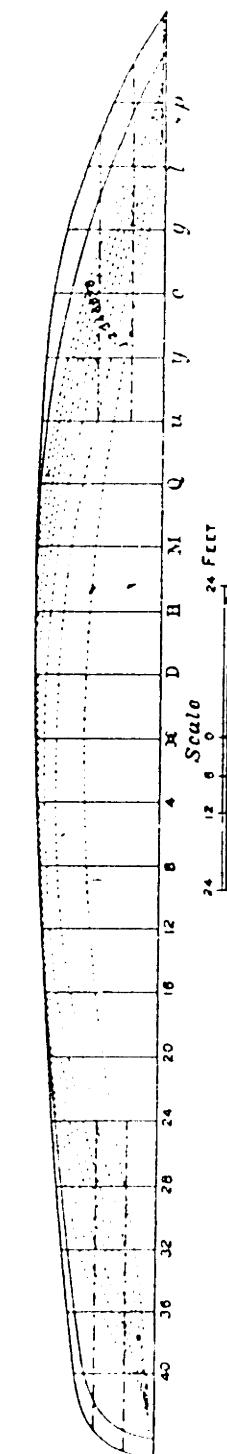
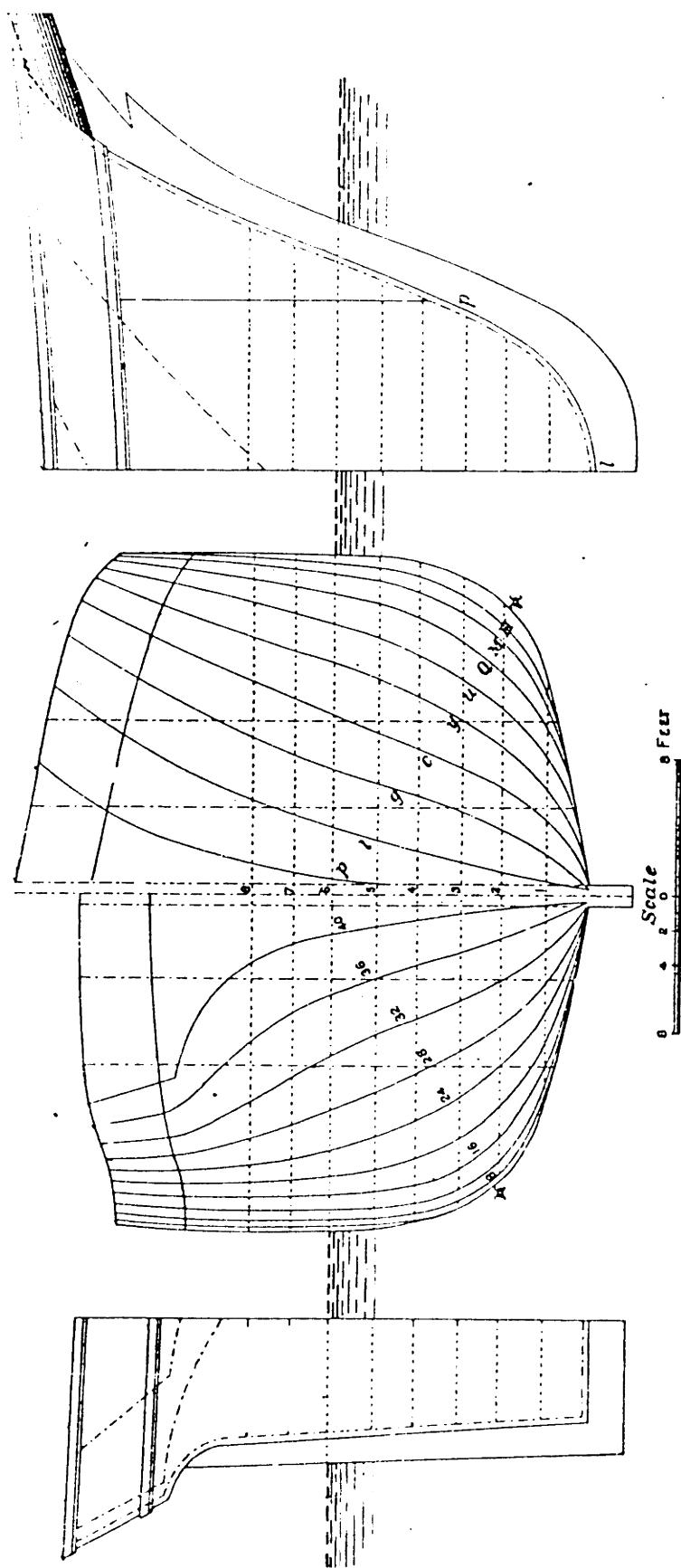
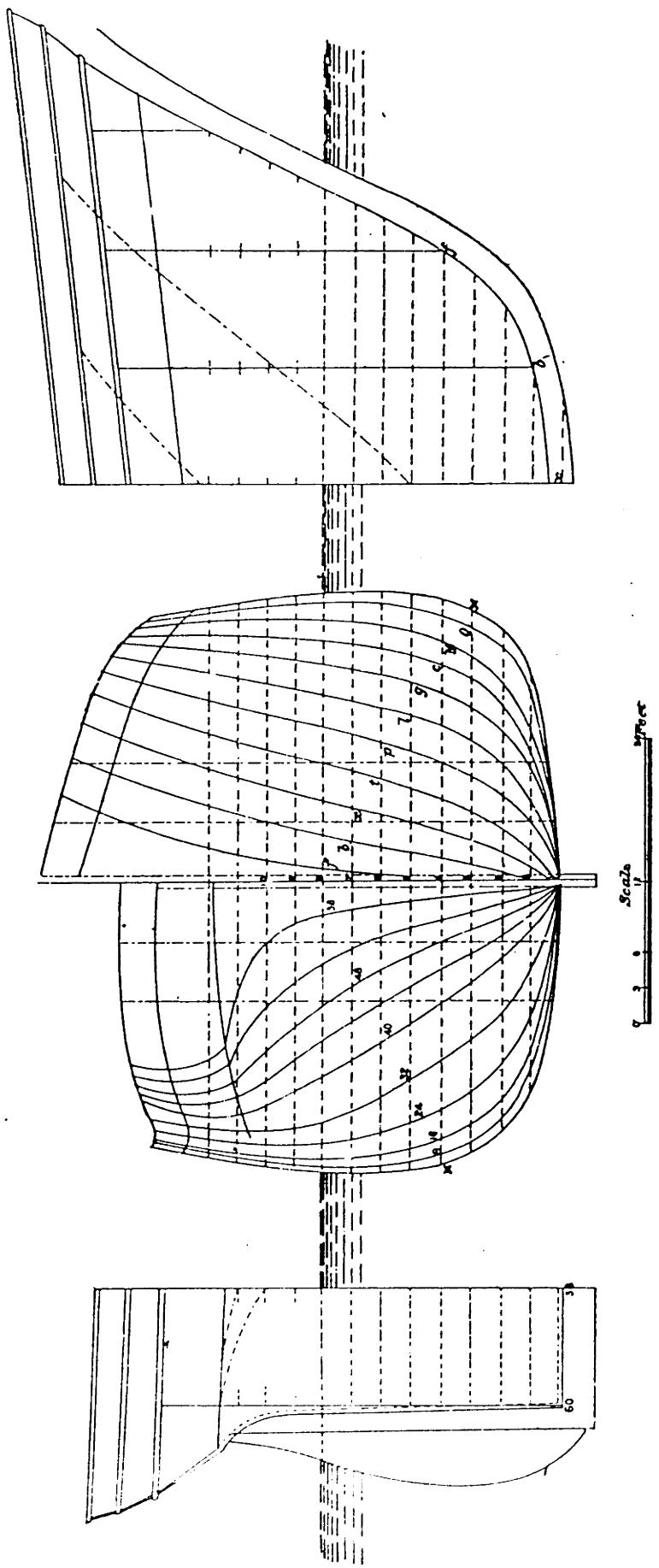


Fig. 34.—CLIPPER ship FLYING CLOUD.
Built at East Boston by Donald McKay in 1851. Registered 1,782 tons; displacement at 20 feet, 2,375 gross tons; displacement at 17½ feet, 1,051 gross tons; length on deck, 217½ feet; registered length, 220 feet; length on load line, 209 feet; beam, molded, 40 feet; beam, extreme, 40½ feet; depth, molded, 23½ feet; coefficient of load-line 0.62; coefficient of middle-section, 0.62.

[Figure 2]



99

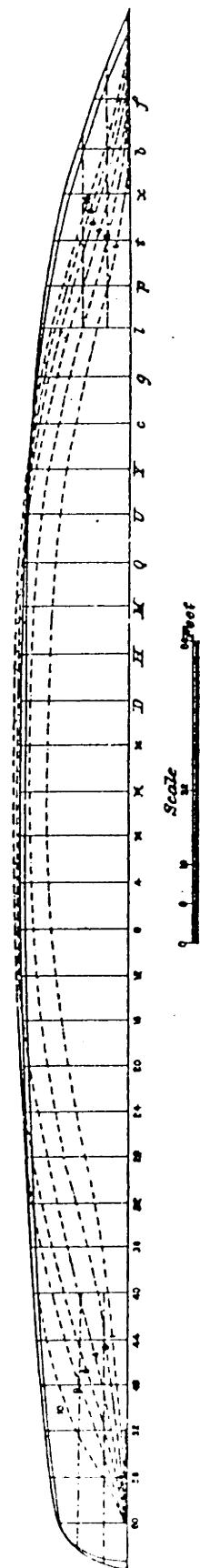


Fig. 30.—CLIPPER SHIP GREAT REPUBLIC.
Built by John McFarlan at Faneuil Dock in 1853. Register, 4,155 tons; displacement at 25 feet draught, 5,772 gross tons; displacement per inch at 22 feet water-line, 205 gross tons.
Length on deck, 224 feet; length on load-line, 214 feet; beam, molded, 49 feet; beam, extreme, 50 feet; depth, molded, 32 feet.

[Figure 3]

workers positioned timbers where the numbers told them they should be placed. The use of these drawings made it possible to construct a ship with great accuracy, and clipper ships, large and expensive, left little room for error in the highly competitive market in which they operated.²⁷

Ships were constructed on temporary structures called slips, an arrangement of piling, suitably capped, and decked over with heavy planks. The decking of the slip then served as a working platform beneath the ship. Keel blocks, which carried the weight of the ship while it was under construction, were then arranged on top of the slip, always directly above the piling that supported the slip. Keel blocks were 4 to 8 inches thick, as wide as the keel, usually elm that had been seasoned in water. A sliding cradle was then built on the slipway. This cradle would be forced up under the ship to take the weight before the keel and bilge blocks were knocked away. When these blocks were knocked away, the ship slid along the incline into the water.

The keel was made of two pieces of wood, oak or leaf pine or elm, scarfed together, with the end of one of the timbers lapped over the other to form an even surface.²⁸ The keel was then marked and numbered at the frame centers, across the top and down the sides. The numbers would correspond with the numbers laid out in the mould loft, where the construction drawings had been made. Once the keel was in position, the next step was to erect the stem and stern posts. Lumber was selected for this, taken to the saw mill, if there was no steam powered saw in the yard, sawn into shape and finished off with adzes. These two pieces of wood were then hauled back and positioned at either end of the keel with shearlegs, or by a derrick in the McKay yard, secured with props and pinned to the keel. When the stem and stern posts were standing in position, the profile of the finished vessel

became visible.²⁹

While the keel was being laid, frames, based on drawings done in the mould loft, were being sawn in another part of the yard. This task was often supervised by a craftsman like Hall or McKay, since these frames were a critical part of a ship's construction, and mistakes at this stage could add to expense, and worse, lead to delays. All ship frames were built double, made of two tiers of frames, arranged that the timbers of one tier overlapped the butts of the timbers in the other tier. Uppermost timbers were top timbers, and timbers placed between the floors and top timbers were called futtocks.³⁰ The frame was like a rib in the ship's skeleton, and functioned as did the frame in house construction.

After the frame was in place, the keelson, a single long piece of pine that sat directly above the keel, would be carried or lifted to the ship by derrick and placed in the hull. The keelson was bored, usually by hand augers, and iron securing bolts would be driven through to the keel underneath and fastened. The outside of the frames then had to be dubbed with an adze so that the planking, the external covering of the hull, would fit closely. This "dubbing," was the job of the shipwright, or ship carpenter, if his skills were up to the task. It required skill. The job had to be done very carefully, since a vessel's seaworthiness depended upon careful work at this stage of construction.³¹

At this point, planks were placed in a steam-chest, if a steam chest was in use in the shipyard for this purpose, to make the wood malleable when it was time to nail it to the frames. This work had to be done with great speed, before the planks cooled, dried and again became rigid. By the 1850s, use of the steam box was becoming less prevalent, since steaming as a process was more necessary for small ships,

where there was a need to bend wood into a shape fit for a frame or for part of the exterior of the hull. When the oblong steam chest was used, wood was saturated inside it for an hour or two. In the 1840s and 1850s, clipper ships, which were straighter and longer than their predecessors, required less use of malleable wood.³²

The next task was to fasten together the skeleton of keel, stem and stern post, and frames and keelson at the top of the sheer line of the vessel, to produce a stable structure that would not distort while the rest of the outside planking, as well as the decks and the internal planking were fixed into place by artisans. A rigid sheer would strengthen the hull, and prevent racking from the ship's inclination on the slipway. But lightness too was a value, and in building with wood, there existed a tension between strength, which was in part a function of weight, and the lightness required for speed and buoyancy. Once the stem, stern, and side timbers were up, fastened and steady, the ship was ready for the deck beams. The *Great Republic* had four decks, each of which was separated from the other by 8 feet.³³

Deck beams were curved, so that water would spill away and not puddle. Horizontal lodging knees, oak or hackmatack, bound the beams to the frame heads, and vertical iron hanging knees, made in the blacksmith's shop, tied the beams through their lower surfaces to the beam shelf and the planking within the vessel. At this point, the vessel was ready to be planked up, inside and out. The planks, which could be yellow or long-leaf yellow pine, and sometimes oak, were cut at the saw pit and carried over to the ship. The shaping of these planks required a high degree of skill, "since the linear distance around the frame from the keel to the deck level amidships was always very much greater than the same distance measured up the outer face of a frame three-

quarters of the way forward or aft; and it was greater again than the total height of the stem and the stern post, where each successive run of planking was terminated."³⁴

Some planks were hollowed on the inside to better take the curve of the frames. They were bevelled at their edges because they had to lie snugly together on the inside for the first few inches of thickness, and then present an open seam on the outside into which the caulking could be driven. Planks for a clipper ship were thick. The Great Republic had planks between 4 and 12 inches thick, and the Champion of the Seas, a smaller vessel, had 4 1/2 to 9 inch planks. These planks were also more than a foot wide. For reasons of ship strength, each run of planking from bow to stern had to be continuous, although each could be made up of a number of separate planks. The planks were wide amidships, and tapered progressively fore and aft. After the vessel was fully planked-up outside, the ship was ready for the next stage of construction, the ceiling.³⁵

The ceiling was the inner lining of planks, nearly as thick as the planks on the hull exterior. Great skill was required to do this job also. Putting on the ceiling was a wet weather job, since workers were protected from the elements when inside the ship at this stage of production. Pitch pine was the wood of choice for this task. What was left after this was to put in place the deck main-hatches, the forward hatch, and the crew's hatch. The decks would then be planed off to a smooth cambered surface, and planking would be finished on the outside with planes and adzes. The ship was now ready for caulking, the filling of the seams between the planks with oakum, hemp fiber sealed into position by hot tar on the outside. Caulking made the vessel watertight.³⁶

Pitch would be broken up, placed into a metal pot with a large bow handle, and heated on a grid by a wood and

shavings fire. Every caulk had such a pot at his position. Oakum in long skeins was removed from hundredweight bales, shaped into a thread of uniform thickness and rolled into a ball large enough for a morning's work. The caulk placed the oakum into the first streak, and then on up until he reached the turn of the bilge, usually working a shift of about seven or eight planks. Caulking the oakum itself was the job of the caulking-iron, but first the oakum had to be driven in by the caulk's mallet, one of the most interesting tools in arsenal of the shipyard worker.³⁷

Many caulking mallets were handmade. The mallets started with a 4 by 4 inch block of African oak, or sometimes even *lignum vitae*, about 15 inches long.

The block was divided into three parts: two cylindrical striking-blocks or pods and a head that carried a handle 18 inches long and about 1 1/4 inches in diameter. The cylindrical striking-face was bound in an iron ring of external size about 2 inches; the head that took the handle was traditionally shaped; slots in the cylindrical striking-blocks were to give a musical swish to the mallet when used, and become resilient to a blow rather than dead when striking the caulking iron. The metal rings on the cylindrical parts were wrapped around with oakum to hold fast when driven on. Two clenched copper nails each side of the handle in the head prevented overall cleavage or splitting. Handles were tapered to allow knocking-up through the head, to be stowed at the day's end in the caulkers' boxes.³⁸

The caulking continued up the hull, oakum hammered in with mallet and irons, "a spike iron gauging the density by being driven into the seam, then the dressing iron to compact, and reeding iron to give a parallel appearance of dressed reeds."³⁹

Caulking was hard and monotonous, and hazardous when hammer noise and pitch burns were taken into consideration. Yet the hammer noise had a function. The tone of the mallet

told a good calker if he had driven the treenail "home," and whether there was enough oakum in the seam. A feel for how the mallet "behaved" was also important, since every handmade hammer was different. After the outside seams were filled with oakum, molten pitch was rolled on by mops or brushes to insure a good seal, and scraped clean when the pitch hardened. In the summer, working on the lower hull, caulking was a dreadful task, but probably not much worse than working in the sawyer's pit, where a rain of sawdust covered workers from dawn to dusk.

After caulking, it was time to cover the bottom of the hull with copper sheathing for protection against the predations of the sea worm and other hazards of the sea. This was another task not necessarily done in the yard, or even before the ship was launched. Many ships first made a few voyages, then were put into dry dock for coppering. Copper sheets measured about 4 feet by 14, weighed twenty ounces to the foot, and varied in thickness, with the thickest sheets being placed about the bows and near the water-line. A clipper ship required 5 or 6 thousand sheets, depending on the size of the hull. Several copperers migrated to East Boston to do this job on the clipper ships, and although this work was not generally done before a ship was launched, it was done in the two dry docks on the island, Simpson's Dry Dock and the East Boston Dry Dock Company.⁴⁰

The construction of a clipper ship was an enormous task that required thousands of hours of labor from an army of hundreds of workers. 50,000 days labor went into the hull of the *Great Republic*, roughly the concerted efforts of 250 men of various skills working 200 days each in the yard. The ship had 4 masts, all more than 100 feet long, and 4 decks. She had 4 anchors, the heaviest of which weighed 8500 pounds, and in her construction, in addition to the more than 2 million

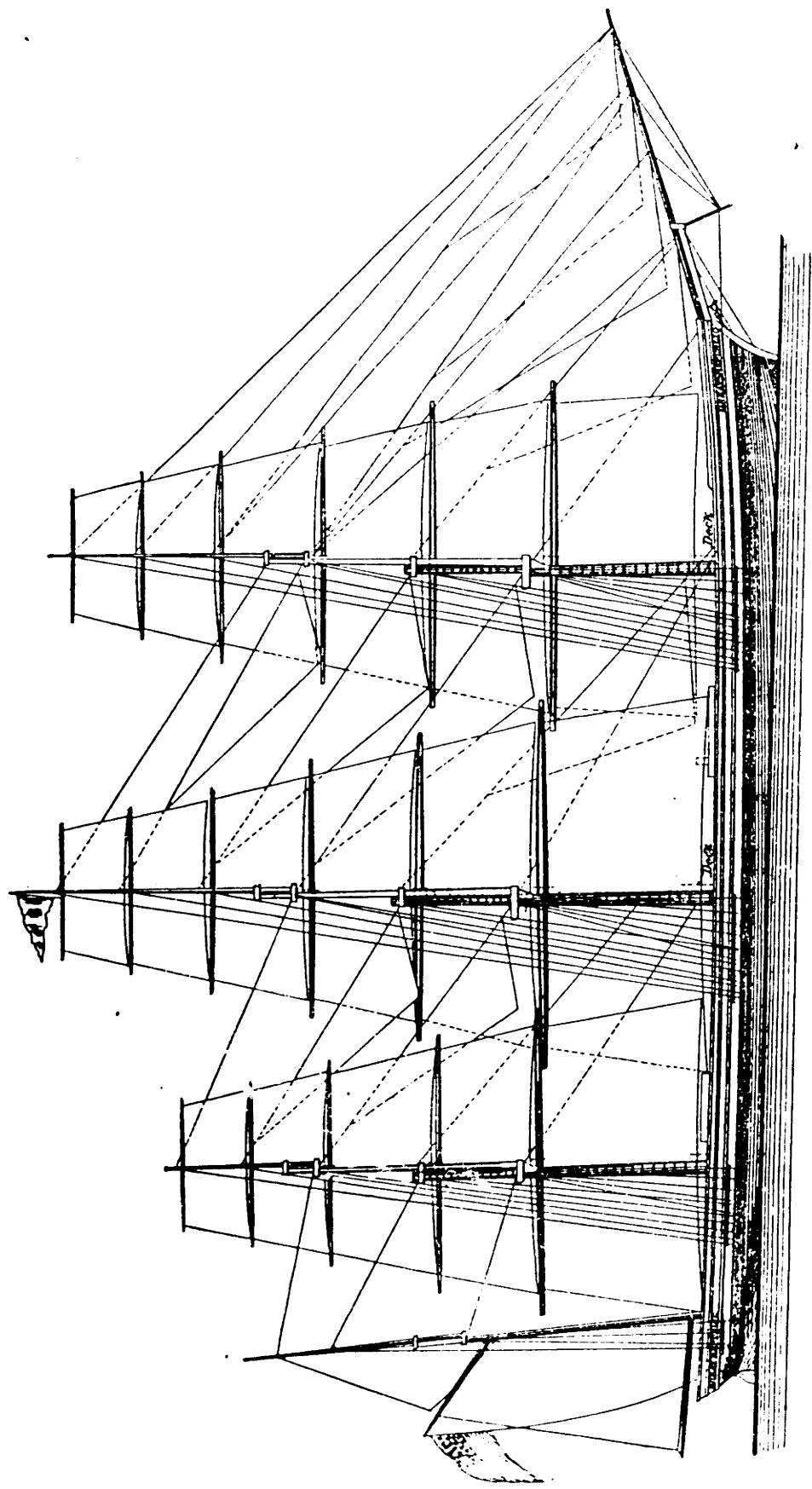


Fig. 42.—SAIL PLAN OF THE FOUR-MASTED SHIP GREAT REPUBLIC,
Showing the fashion now prevalent of dividing the topsail into upper and lower topsails.

[Figure 4]

pounds of wood, there were 326 tons of iron and 56 tons of copper, exclusive of sheathing. This ship carried 15,653 yards of duck sail, [Figure 4] and to hoist the sails and work the pumps, the *Great Republic* was provided with a 15 horsepower steam engine. She was 335 feet long, 53 feet high, from keel to deck, and 38 feet wide. The cabin was wainscoted with mahogany. Her figurehead was an eagle's head, and across the stern was an eagle with extended wings, holding a shield in his talons on which was inscribed the name of the ship and hailing port. The original *Great Republic* was the largest merchant sailing ship ever constructed in the United States, and she was registered at 4,555 tons. At today's wages, the cost of labor alone in such a ship would exceed five million dollars.⁴¹

Boston declared October 4, 1853, the launch day of the *Great Republic*, a public holiday. Schools were closed, business suspended, and industry forced to a halt. More than 30,000 citizens took the ferry or crossed the Chelsea bridge to find points of vantage near McKay's yard on Border Street where they could watch the magnificent ship be launched. Every artisan and most of the laborers who had worked on the ship had positions of prominence in the yard, as did many local politicians and dignitaries. In deference to the temperance movement, the usual bottle of champagne was replaced with a bottle of Cochituate water. After the bottle was smashed against the bow, there was a loud roar from the crowd. The ship slid gracefully into the harbor. Later in the afternoon, the vessel was towed to the Charlestown Navy Yard to receive above deck fittings, under the direct supervision of Donald McKay's brother, Lauchlan.⁴²

The great size of this ship made it difficult for her builder, Donald McKay, to interest investors. They worried it would sink, or that it would be too slow to provide

a good return on investment. McKay was compelled to invest more than \$300,000 of his own money to build the ship. After fitting, the *Great Republic* was towed by the R.B. Forbes to New York, where she was loaded with cargo for Liverpool. As in East Boston, the ship drew huge crowds of spectators, many of them government officials from neighboring states who had come to observe the vessel first hand. On the windy night of December 27, 1853, fire broke out at the Novelty Baking Company on Front Street in lower Manhattan, not far from where the *Great Republic* was docked. The wind carried sparks to the topsails, which immediately caught fire, and soon flames licked along the yards. A frantic Donald McKay rushed to the scene, offering \$1,000 to anyone who would go aloft and cut away the yards. He found no takers. Firemen managed to put out the above deck fire and were in the process of hauling away their horse-drawn pumps when the deck of the *Great Republic* burst into flames. A burning spar had plunged to the hold and set the ship afire from below. No one knew the fire was there. The ship was utterly ruined.⁴³

Mckay settled with his underwriters for \$235,000 and they in turn sold the scuttled vessel, "as is, where is" to A. A. Low & Brother, who had the ship razed and refitted by Sneeden & Whitlock at Greenpoint, Long Island, under the supervision of N. B. Palmer. The *Great Republic* sailed, but not as the ship designed and built in East Boston. McKay returned to East Boston, and in the seven years before the Civil War constructed some of his most famous vessels. Griefstricken at the loss of the *Great Republic*, he never built a vessel quite as large, nor did he ever put as much of his own money into one of his ships.⁴⁴

The art and craft of building a ship like the *Great Republic* did not lend itself to mass production methods. While increased efficiency and productivity were values in the

shipyards of East Boston, and served to set them apart from yards elsewhere in the country, efficiency and productivity were not the driving forces in the construction of a wooden sailing ship that such forces were in a factory. Work itself had value in a shipyard where wooden vessels were built. An artisan saw himself reflected in what he did. Was this something felt by factory workers? The relationship between an artisan and the product of his labor, as hard or tedious as that labor might have been, was qualitatively different from what workers in factories experienced when they evaluated their work. The shipyard worker practiced an industrial or mechanical art; the factory operative functioned inside a large system of production that diminished him.

Much of the impetus behind the factory system was the shifting of skills from workers to machines. This shift, the removal of the human element, or the enhancement of the function of the human element, insured greater productivity. In the wooden shipyard, skills remained in the hands of the artisans. Although like a factory worker, a shipyard worker was a wage earner, he owned his own tools and was skilled to the point of mystery in their use.¹⁵ Wooden shipyards, because of the artisans, the tools and the material they used in building those ships, remained within a craft system that would stay in place until wood ceased to be used as a building material.

1. John G.B. Hutchins, *American Maritime Industries*, p. 275.
2. It is interesting to note that trades in which lumber was used as the primary construction material remained resistant to methods of mass production and distribution. Wooden ships, of course, were never mass produced, but neither were houses and furniture, although there were some failed attempts. See David Hounshell's, *From the American System to Mass Production: 1800-*

1932 (Baltimore: The Johns Hopkins University Press, 1984) for a discussion of the furniture industry.

3. Henry Hall, *Report on the Ship-Building Industry*, p. 199. See also Merritt Roe Smith, "Industry, Technology, and the 'Labor Question' in 19th-Century America: Seeking Synthesis," on the importance of tool-ownership for workers in Technology and Culture, Vol. 32, No. 3, July 1991.

4. See Appendix I.

5. See Appendix II, a listing of East Boston shipyard workers drawn from Boston city directories from 1846, 1852 and 1860. While not as comprehensive as manuscript census returns, city directories nevertheless contain valuable information on workers. Between 1820 and 1846, Charles Stimson, a stationer, compiled and published the Boston city directory. After 1847, the directory was put out by George Adams, a professional canvasser. In the days before the telegraph, directories offered employers a way to locate workers, who could then be contacted by messenger. East Boston workers were included in listings for Boston. The 1846 and 1852 directories each contained over 20,000 names; the 1860 directory closer to 30,000. Workers in directories were listed by name, home address, skill, and rarely by work address.

6. Appendix II.

7. John V. Goff, "Traces of Shipyard Workers: shipbuilding in the Connecticut River Valley, 1800-1850," The Connecticut Historical Society Bulletin, January, 1981, pp. 1-23.

Goff mentions that in the nineteenth-century Connecticut valley, "record keepers grouped the ship carpenter with the adze man, sawyer and borer, rarely distinguishing between any of these skills. They were paid laborers, and as Stephen Thernstrom has observed, 'laborer' was a large 19th-century category for society's bottom rung workers whose tasks required physical strength and no particular skill."

8. See Appendix II. The skills breakdown shows the relationship between the numbers of shipwrights, ship carpenters, joiners and caulkers and riggers, sailmakers and sparmakers.

9. Robert K. Cheney, "Industries Allied to Shipbuilding in Newburyport," The American Neptune, January, 1957, p. 114.

10. Boston Board of Trade, *Annual Report*, 1856, p. 68.

11. Samuel Eliot Morison, *The Ropemakers of Plymouth* (Cambridge: The Plymouth Cordage Company, 1950), pp. 13, 49. Morison believes that this company supplied a goodly amount of the cordage for Boston area clipper ships, although the practice of selling through agents masked the process.
12. Cheney, "Industries Allied to Shipbuilding in Newburyport," The American Neptune, January, 1957, p. 114.
13. Henry Hall, "Report on the Ship-Building Industry in the United States," U.S. Census, 1880, p. 86. To complete his report, Hall "visited every ship yard, repair yard, boat yard and important establishment...from Maine to Virginia." Hall, who worked in the editorial department of the *New York Tribune*, had greatly looked forward to meeting Donald McKay, but the shipbuilder died of tuberculosis one month before Hall was appointed special agent for the Census. Hall did contact McKay's widow, who provided him with "data in relation to the famous clipper ships built by her husband during his lifetime." Bruce M. Lane and Gardner Lane, "New Information on Ships Built by Donald McKay," The American Neptune, April, 1982, pp. 118-137.
14. Baker, *Boston Marine Society*, p. 185.
15. Hall, *Report on the Shipbuilding Industry*, p. 87.
16. Ibid., p. 87.
17. On Tree-Nails and Tree-Nailing," The U.S.Nautical Magazine, February, 1857, pp. 354-357.
18. Hall, *Report on the Ship-Building Industry*, p. 87.
19. Ibid., p. 87.
20. Ibid., p. 87. The labor advantage enjoyed by American builders, in some ways, is surprising since higher labor costs were characteristic of the American market. It was one of the reasons immigrants came here. According to Habakkuk, chronic labor shortages, were a factor in technological innovation, and his argument about the connection between labor shortage, technological innovation and capital formation, while faulted in some particulars, remains persuasive. See, H.J. Habakkuk, *American and British Technology in the Nineteenth Century* (Cambridge: The Syndics of the Cambridge University Press, 1962).
21. Hall, *Report on the Ship-Building Industry*, p. 87.

22. Hall, *Report on the Ship-Building Industry*, pp. 87-92, 245.
23. Ibid., p. 75.
24. Ibid., p. 246.
25. Hutchins, *American Maritime Industries*, p. 93. Frame timbers were those timbers which had a natural shape. Wood had to be heated to be bent to shape, and there was a limit to ductility, so timber that could be used without shaping, or with minimal shaping, was valuable. It was also the most expensive timber in the ship.
26. Ibid., p. 247.
27. John W. Watson, "The Building of the Ship," Harper's New Monthly Magazine, April, 1862, pp. 608-611.
Figures 1-3 are from Henry Hall's, *Report on the Ship-Building Industry*.
28. Lauchlan McKay, *The Practical Ship-Builder* (New York: Collins, Keesee and Co., 1839), Glossary.
29. Basil Greenhill, *The Evolution of the Wooden Ship* (New York: Facts on File, 1988), pp. 100-104.
30. W.H. Curtis, *The Elements of Wooden Ship Construction* (New York: McGraw Hill, 1919), pp. 1-5, 32.
31. Greenhill, Op. Cit., pp. 126-132.
32. John W. Watson, "The Building of the Ship," Harper's New Monthly Magazine, April, 1862, pp. 608-610.
33. Ibid., pp. 611-613. Hall, *Report on the Ship-Building Industry*, pp. 89-91.
34. Greenhill, *The Evolution of the Wooden Ship*, p. 134.
35. Hall, *Report on the Ship-Building Industry*, pp. 88-92.
36. Greenhill, *The Evolution of the Wooden Ship*, pp. 149-153.
37. Watson, "The Building of the Ship," Harper's New Monthly Magazine, April, 1862, pp. 615.
38. Ibid., p. 156.
39. Ibid., p. 156.

40. McLean, Hall, *Ibid.* Also John J. McNamara, Jr., "Monuments of Snow," Sail Magazine, August, 1978, pp. 78-81.

41. Duncan McLean, *The Boston Atlas*, October 4, 1853. Henry Hall, *Report on the Ship-Building Industry*, pp. 89-92. Figure 4 also comes from Hall.

42. *Ibid.*

43. McNamara, "Monuments of Snow," Sail Magazine, August, 1973, pp. 78-18.

44. *Ibid.* Also, Octavius T. Howe and Frederick C. Matthews, *American Clipper Ships 1833-1858* (Salem, Massachusetts: Marine Research Society, 1926), pp. 253-257.

45. See Donald McKay's apprenticeship contract, where it was agreed he would be taught the "mystery" of the craft of ship carpenter.

V

Worker Community

1846-1870

Over the course of the nineteenth-century, invention and innovation in machinery and the growing use of a division of labor in the work place steadily pushed aside the craft system in America and replaced it with a factory system. As a specific industry, wooden shipbuilding in East Boston was removed from this process of modernization. Other industries, like arms-manufacturing, textiles, sewing machines, and boot and shoe manufacturing were transformed by industrialization, since they were directly affected by changes in the use of technology and the organization that went along with its application. Until the Civil War, the wooden shipbuilding industry remained untouched by the industrial revolution. A craft system continued to function in the shipyards. During the war, however, government demand for the construction of iron-clad naval vessels, like the *Monitor* and the *Merrimac*, gave wooden shipbuilders a glimpse of the future. If iron and steam had a place in the future of the American Navy, could commercial markets be far behind?

The railroads had forced a virtual revolution in the production of American iron, and while most iron produced in the United States found its way into rails, beginning in the 1870s more and more of it was showing up in the production of ships along the Delaware River Valley. This change to iron started an erosion in the craft system of production then still in existence in East Boston shipyards. To make matters worse for wooden shipbuilders, this materials revolution was

abetted by steady improvements in the size, efficiency and power of steam engines. Clipper shipbuilding had received a great boost from inefficient and expensive steam power in the 1840s. After the Civil War, the increased use of steam power in the factory system led to improvements in engine efficiency, and helped lower the cost of those engines. Metallurgical developments, which resulted in higher strength and more reliable metals, like steel, also affected steam engines by allowing for steady increases in pressure, from about 25 pounds per square inch in 1865 to over 180 pounds per square inch in 1870.¹

The English had been using steam ships to cross the Atlantic since the 1820s and 1830s, when American shipbuilders were building packet ships. But there was no reason, given the health of the wooden shipbuilding industry from the 1830s to the 1850s, for American shipbuilders to follow the British. American wooden sailing vessels were more than competitive with English steamers, and when the first clippers began to sail, English steamers were embarrassed at their speed and elegance. The British suffered from a shortage of wood. As a result, they had an incentive to use iron as a building material. When they made the change, English shipbuilders insured that iron would become, and remain, the cheaper building material for them. This was not the case in the United States in the 1840s and 1850s.

There were other reasons why iron was not as readily accepted in the United States. Doubts about which, iron or wood, was the safer and more technologically appropriate building material for ocean-going vessels provoked an extended debate, which served to blind wooden shipbuilders to the extent of eventual change that would occur in their industry. During this debate, the wooden shipbuilding industry was in its prime. In East Boston, between 1847 and 1857, the

industry reached its zenith, achieving in nautical design, technological excellence, and sheer beauty accomplishments that would never again be equalled in the construction of wooden sailing ships. Yet in spite of success, there were signs--market fluctuations, worker dissatisfaction, rising costs, and the ever-present nagging specter of iron ships--that continued good fortune would not be easy.

Even during this time, it would be a mistake to draw too sharp a line between iron and wood, especially in the construction of clipper ships, since their great size and weight demanded extensive use of metals. Tons of imported iron were used in the construction of these ships, and helped add to their high cost. In 1869, for example, Donald McKay, in a letter to Congress, maintained that in the building of a 1,000 ton wooden vessel, he would use 120,906 pounds of iron, 9,966 pounds of iron spikes, 2,409 pounds of galvanized spikes, 14,408 pounds of castings, 58,300 pounds of chain cables and rigging chains, and 10,700 pounds for anchors.² And this was for a small clipper ship.

The first iron ships in America were combinations of wood and iron, and sail and steam. An early iron ship was often a wooden ship with iron sides; most of them used sails for motive power. The basic principles involved in the construction of iron vessels were essentially the same as those used in the construction of wooden ships, a fact that helps explain the self-deception of those who believed the transition from wood to iron would be accomplished without dislocation among the shipyard workers.³ This similarity in construction principles was another reason shipbuilders, and workers, underestimated the nature and scope of change that would befall their industry.

In East Boston, the Boyden Malleable Iron and Steel Company was established in 1835, a year before the first ship

was launched, and steam power was used in both the foundry and the sugar mill. The two industries eventually coexisted, but the use of iron and steam preceded the use of wood as a building material for ships on the island. By the early 1840s, the machinist, the engineer, the shipwright, ship carpenter and caulkers lived side-by-side in the same community. In 1846, the artisan population of East Boston was comprised of an almost equal number of shipwrights and machinists. Shipwrights, however, functioned within a craft system of production, while factory workers on the island, no different from factory workers in Boston, Waltham or Lowell, were part of the factory system.⁴

Over the years, as wooden shipbuilding developed into a major industry on the island, the changing relationship between shipwrights and other workers in the shipyard, and machinists, boilermakers and iron workers, men who produced artifacts for use in the yards or on ships, was reflected by proportionate changes in their numbers as reported in Boston city directories, since worker skills were listed in the directories. The 1860 Boston directory, for example, lists six times as many shipwrights as machinists and boilermakers in East Boston, indicating that the construction of clipper ships, even after some slow years and the panic of 1857, remained the dominant industry on the island.⁵

In the wooden shipyards, relationships between shipyard owners and artisans have always been described as amicable.⁶ For the most part, this was true. The construction of wooden ships, even large ones like clipper ships, was an enterprise carried out by individual builders, Donald McKay, Samuel Hall and Paul Curtis in East Boston, for example, and their various subcontractors. The shipyards themselves were small. In East Boston, an island of roughly a square mile, a shipyard might contain a building, a shack of some kind with

a sign above the door, and one or two shipways. Workers in such small family-owned businesses developed a personal relationship with the "boss," often someone, like Donald McKay, who had undergone the same apprenticeship they had. Investors and ship owners, some of whom lived in New York or London, rarely came to the East Boston shipyards, so there is no question of a direct relationship developing between them and the workers who built their ships. As in the mills, the real owners stayed away. When troubles arrived, it was the shipbuilder who became the object of worker ire, not the men for whom he himself worked, although wage earners in the shipyards, like operatives in Lowell mills, were well-aware of who owned the means of production.⁷

The yards of McKay, Hall and Curtis, and several others in East Boston, the busiest in the country during the clipper boom, employed a substantial number of workers while ships were under construction. But shipbuilding was a small industry. A "large" yard was not even as large as a small factory, and the whole of East Boston's shipbuilding industry was comparable in size to the work force inside a single mill in Lowell. A typical busy yard might employ about 40 workers, in approximately these proportions: 13 ship carpenters; 10 joiners; 4 bolters; 4 or 5 painters, 5 caulkers and possibly a shipsmith.⁸ A large yard could employ more, a small yard even less, as few as 5 shipwrights for an entire work force. But such a yard would not be involved in the construction of clipper ships.

McKay, Hall and Curtis, over the course of their careers, employed thousands of workers and disbursed millions of dollars.⁹ These shipbuilders, and others like them, maintained good labor relations. Because of their success, the paternalistic model was the norm for builder-worker relationships in the wooden shipyards. But this model,

essentially accurate, has its shortcomings. East Boston shipyards did not remain strike free, even at the height of the boom. While the shipyards did not experience the high level of worker unrest that developed in the factories, there were nevertheless tensions in the work place. The communal nature of the work masked the problems, but under the mask was a gathering storm of worker dissatisfaction about hours, pay, safety, and problems caused by the building of clipper ships, whose size, complexity, and construction under deadline brought about changes in shipyard organization.

Men worked long hard hours, and were paid a weekly wage, although some work, such as hammering treenails into planks, was piece work. As Hall points out in his study of the shipyards, there was an increasing division of labor, and as ships became more complicated, greater specialization.¹⁰ Workers went along with these changes, but there was a price. Work was becoming more routinized, more mechanical, much like what it would be in the construction of iron ships. But wooden ship construction, even at its zenith in the late 1850s, was a different operation from the construction of a large steam-powered iron ship, which was the end result of a manufacturing process, and not the product of a shipyard where only a relative handful of artisans were employed.

During the boom in the construction of clipper ships, thousands of workers and laborers migrated to East Boston to work in the yards where these vessels were built. This influx of artisans was the primary reason for the island's steady population increase; they and their families constituted the bulk of the island's citizenry. An overwhelming majority of native-born migrants to East Boston came from Massachusetts, Maine, and New Hampshire, with a scattering from other states. Some came from Vermont, but Vermont workers tended to move west, to New York. In these

boom years, whole neighborhoods from these states migrated to the island.¹¹ Peter Knights, in his analysis of census returns in the 1820-1870 period, found that "entire streets in East Boston were the domains of particular towns or groups of towns in Maine or New Hampshire."¹² An examination of Boston city directories from the years 1846, 1852 and 1860 corroborates this finding.¹³

The directories provide a good sense of where workers lived in relation to the yards at which they worked. The shipyards were located near the water on Border, Sumner, and Marginal streets and at Jeffries Point. Workers lived as close as they could to the shipyards, but East Boston, a small, newly-developed island, did not offer workers extensive living options. In 1860, there were still only 2,000 houses on the island for a population of 20,000. This shows how difficult it was for the East Boston Company to keep up with the needs of a rapidly increasing citizenry.¹⁴ The limited number of houses, the ever-increasing population, and the smallness of the island, only half of which was developed at this time, also indicate living in close quarters was more and more common as East Boston approached industrial maturity.

For the most part, shipyard workers lived on streets that abutted those fronting the yards: Decatur, Liverpool, Maverick and Havre streets for yards on Border; Maverick, Meridian, Everett, Webster, Cottage and Paris streets for yards on Marginal and Sumner streets and at Jeffries Point.¹⁵ This residential area was about 200 acres, one third the size of the island. East Boston, according to an 1853 newspaper article, attracted "an active and influential class of citizens who have erected many beautiful private dwellings on the many pleasant streets with which that place abounds."¹⁶ By 1860, city directories, portraying as they do a less-idyllic, more crowded place, inform us that wage earners did not live

in such beautiful private dwellings, although wealthier citizens, shipbuilders like Samuel Hall and Donald McKay and members of the East Boston Company, certainly did.

Non-native immigrants, mostly laborers and domestic servants, arrived from Ireland after the potato famine of 1845, many of them on ships belonging to Enoch Train, the man who helped establish Donald McKay's East Boston shipyard and for whom McKay built several clippers. These two groups, native-born New England artisans, and Irish immigrants, were clustered together in those two and three story buildings near the East Boston waterfront, although the Irish immigrant tended to live almost exclusively in boarding houses. Most male Irish immigrants were unskilled men who did heavy work in the yards, at the docks or on the wharves. They did not compete directly with artisans, since they lacked the skills and were not part of the apprentice system that produced shipwrights, carpenters, caulkers, and others involved in constructing ships. As Handlin points out, a "single occupation accounted for 48 per cent of the total Irish laboring force."¹⁷ That single occupation was heavy labor.¹⁸ Immigrants whose "background had equipped them with an industrial skill or mercantile trade had little difficulty in adjusting to the economic conditions of their new world."¹⁹ But most of the Irish who came to East Boston were "peasants, rudely transposed" to a world vastly different from the farms they left behind.

After the potato famine in Ireland, Boston city directories reveal large successive increases in the number of Irish immigrants coming to East Boston, almost all of whom were listed as "laborers."²⁰ In the 1846 sample, the very beginning of the immigration, not a single Irish immigrant called himself a shipwright. There was little change in the 1852 directory. Irish were listed almost entirely as

laborers. In the 1860 directory, some workers formerly listed as laborers called themselves caulkers and shipwrights, but they remained exceptions. The few who "rose from the ranks of the unskilled by a gradual process of recruitment did not leaven the mass."²¹ An immigrant who came to East Boston as a laborer tended to remain in that category his entire working life. He had little choice in the matter.

By 1860, East Boston boardinghouses were homes to thousands of Irish immigrants, few of whom could count on steady employment. After the Cunard Line located its western terminus at East Boston in 1840, the company embarked upon an expansion of its piers and docking facilities, and many Irish laborers found temporary employment. Immigrants also worked as stevedores.²² But the Irish did not make inroads in the shipbuilding trades, and generally fared no better in East Boston than in Boston. When the yards were busy, "low-paid and transitory" work was available to them, but the Irish were unable to make steady economic progress. What Thernstrom, in *Poverty and Progress*, reveals about laborers in Newburyport was equally true of laborers in East Boston. There was little or no "upward mobility." A man who called himself a "laborer" lived at the very bottom of the economic pyramid.²³ A worker listing himself as a laborer in the 1852 Boston directory, if he remained in East Boston in 1860, invariably listed himself again under that same category.²⁴

The 1865 Massachusetts Census gives a good statistical picture of the East Boston work force. In that year, when shipbuilding had passed maturity and was beginning to decline, there were 10,124 males living on the island, of whom 4,266 were between the ages of 20 and 50, prime working years for men in the shipyards. There were slightly more females, 10,444. Of that total number, 20,568, 6,436 were foreign born, and of those who were foreign born, 3,568 came

from Ireland, roughly half from each gender. Twenty per-cent of the island's residents had been born in Ireland, which made East Boston second only to the North End as an Irish neighborhood. The 1,500 Irish adult males accounted for almost 40% of the island's workers.²⁵ Statistically, East Boston was a cauldron, but there is no record of hostility between skilled and unskilled workers. While this does not mean there was no animosity at all between Yankee artisans and their less-skilled neighbors, it does mean the island was spared the contention between skilled and unskilled workers that afflicted the American labor movement during the strife-ridden times of accelerated industrialization that occurred after the Civil War.

But why, if they comprised such a large part of the island's adult male work force, were the Irish unable to make inroads in the East Boston shipbuilding trades? The Boston city directories provide valuable information about the East Boston work force, since workers are listed by name, skill, home, and occasionally, work address, although to list a work address was unusual among shipyard workers. The absence of work addresses for all but a few artisans supports a long-held belief about shipyard workers: they were itinerant, always moving from shipyard to shipyard. Employment in the industry was cyclical, and a worker rarely remained at a single yard throughout his career. Shipyards, relatively easy to establish because of low capital requirements, went in and out of business quickly, a volatility which suggests that, even in good times, the East Boston shipbuilding industry was unable to generate enough work to keep all skilled workers in East Boston continuously employed. This state of affairs did not bode well for immigrants who wanted to enter the skilled trades.

A longitudinal analysis of city directories shows

that the shipbuilding industry experienced a high turnover rate. Only 33 out of 137 names listed in the 1846 directory carry through to the 1860 directory, and of the 392 names listed in the 1852 directory, only 61, less than 20%, were still in East Boston in 1860. Successful artisans, and there were a good number of them on the island, managed to establish a foothold in the local economy, and were listed year after year.²⁶ However, nineteenth-century workers in any trade were notoriously itinerant, and would have needed no reason specific to the shipbuilding industry to leave East Boston.²⁷ It would not be surprising, though, to learn that artisans left East Boston because work in the shipyards was dismal and unattractive. "I served four years with my father," said one Boston ship carpenter. "My own three sons have no desire to learn the trade...nor would I desire them to do so."²⁸ Another ship carpenter noted that there was "little chance of a mechanic being anything but a drudge...What can be the encouragement for an aspiring man? He has nothing to hope for but a life of poverty and sometimes pinching want."²⁹ Work in the shipyards, even by nineteenth-century standards, was unremittingly hard.

City directories also indicate that skilled workers kept to themselves, living on the same streets, and in many instances, the same houses, as family, relatives, and co-workers.³⁰ For those workers who remained in the industry, trades were passed down, father to son, which was typical of how skills were transferred in a craft system. In some cases, all the adult males in a family practiced the same trade. In the 1846 directory, for example, Francis, William and Leonard Boole, all of Marion Street, are listed as shipbuilders. Paul and Henry Bailey, brothers living in the same house on Centre Street, are house carpenters. Samuel Hall and Samuel Hall, Jr., William Hall and William Hall, Jr. show up as

shipwrights in the 1860 Boston directory. Familial pressure, in addition to the high wages paid artisans in the shipbuilding trades, may well have made work in the yards more palatable to some than to others, but even for those who succeeded, the work was unbearably hard.

When an apprentice went to work for a shipbuilder, the young man, often only a boy of fifteen or sixteen, was expected to spend years learning the principles of shipbuilding as a trade. "It was usual for an apprentice to spend from five to six years of the last years of his minority in the acquisition of mechanical knowledge."³¹ Working in the yard under the tutelage of a master shipbuilder, an apprentice was exposed to every aspect of the shipbuilding craft, and during the period of this tutelage, he would acquire an understanding of the general principles involved in the construction of a wooden ship. In some cases, a boy who started out as an apprentice might end up as foreman of a ship-yard.³² But given the high turnover in the shipyard trades, such an outcome was undoubtedly rare.

The apprentice system worked well-enough to produce some shipbuilders of note in the nineteenth-century, Donald McKay, the Webb brothers, Paul Curtis and Samuel Hall among them. But McKay asked for and received from Isaac Webb an early release because indenturing had "palled upon him" and the "slavocratic conditions imposed by a shipyard apprenticeship on a young man of natural talent were too onerous to be long endured."³³ "Slavocratic" conditions began to trouble other young apprentices, since over time the term of apprenticeship was lowered, which was also an indication that the system was breaking down. By the 1850s, apprentices were working only a year or two to learn their trade and were then sent out into the ranks of mechanics with "but a smattering knowledge of the art."³⁴ At that time, they were

being narrowly trained, a consequence of subcontracting, or contracting out, the work in the yards.

An apprentice who worked for a subcontractor was taught only how to frame, plank, do ceilings or some other specific type of work. There was no need for a young man to work five or six years to learn how to put down planks. He could learn this in two years, or less. The subcontracting system, much like the subcontracting used in construction today, narrowed a worker's focus. The emphasis was on specialization, not on a general understanding of the craft or a knowledge of the principles, scientific and technological, upon which the craft was based. This reduction in what an apprentice was taught reduced mobility between trades.

During the building boom, a demand for clippers to bring goods to California, and then, after 1851, to Australia when gold was discovered there, kept several East Boston shipyards very busy. The Crimean War (1853-1856), with its urgent need for troop transports, sustained the demand for clipper ships after all the gold had run out.³⁵ Large yards, like Hall's and McKay's in East Boston, and others in New York and Philadelphia, were turning out ships very quickly. McKay signed a contract with shipowner George Upton to build a clipper in 100 days. It took workers in his shipyard 60 days to produce the hull of the *Stag Hound*, launched December 7, 1850.³⁶ An increase in specialization, and the introduction of new shipyard technologies, like steam-powered saws and derricks, made such rapid production possible in the shipyards of East Boston.

In East Boston yards that did not use steam power, there was some limited opportunity for Irish immigrants. But steam power was used in larger yards doing most of the work, so its introduction acted as a factor that made it more difficult for them to find work. In March, 1856, Irish

laborers, some of whom lived in East Boston, went on strike against the "introduction of a steam hoisting machine" at a Boston wharf. The strike, as one might expect, "accomplished nothing," and the men quickly returned to work.³⁷ The central problem faced by East Boston's Irish immigrants was the fact that the island's primary employer, the shipyards building clipper ships, excluded them because a craft system, albeit weakened, but closed to outsiders, remained in place.

There was a marked disparity in living conditions between laborers, many of them Irish immigrants, and artisans. In 1860, a laborer in the yards was paid a daily wage of \$1.25, which over a 260 day working year gave him an annual salary of \$325. A ship carpenter made \$24.00 a week, or \$1040 annually, and caulkers made even more. Blacksmiths, machinists, iron and brass moulders had weekly wages of about \$10.00. Rents fluctuated, but in 1860 a family of four could expect to pay \$100.00 per annum for a place to live and an additional \$500.00 for food, clothing and incidentals.³⁸ Artisans lived in better houses, in better sections of the island. But they did not live on Eagle Hill.

A number of Irish laborers and their families, for example, lived in a bad section of Liverpool Street, behind Border and New streets. These houses were slum-dwellings, "without proper drains."³⁹ Liverpool, a single block of poorly ventilated crowded tenements, was at the center of an outbreak of cholera in East Boston in 1849, the fatalities of which were largely confined to the Irish.⁴⁰ On the corner of Cove and East streets was a three story wooden building containing "9 tenement rooms, long, low and narrow," with "tumble-down plaster and paper, broken windows patched with old boards" and "stairs rickety and dangerous." The floor of the some rooms was "partly broken through and would give way under slight pressure; everything [was] filthy and rubbishy." In one room,

"the father, a laborer, lay dead drunk on the floor." Seven families lived at this location, two blocks east of Liverpool Street.⁴¹ Families in which a laborer was the primary wage earner were forced to seek other sources of income. This meant that the wife and children would have to find jobs, or that others, usually relatives, would be asked to move in and share expenses. No matter what a laborer did to meet his needs, it was all but impossible for him to catch up financially.

The situation for the skilled shipyard worker was not much better. Shipbuilding was a seasonal enterprise, and workers could count on about 240 working days a year in a good year. The industry was highly sensitive to shifts in demand and fluctuations in the economy. The panic of 1837 had a terrible effect on New England shipbuilding, but it was less severe in its impact than the depression of 1857, which was the beginning of the end for wooden shipbuilding in East Boston. Under any circumstances, artisans had little financial security. While not in constant jeopardy like Irish laborers, who spent many more hours unemployed, artisans were nonetheless wage-workers.

In an extensive examination on the purchasing power of wages, the Massachusetts Bureau of Statistics of Labor found that "wage-laborers" were poor, "have always been poor, and that the great determiner of the earnings of labor, under the wage-system," was and always has been, "the cost of living."⁴² In its study, which covered the years 1630 to 1870, the bureau traced an annual rise in the cost of living: in 1800, for a family of four, that cost was \$228.00; in 1830, it had gone up to \$431.00, and in 1860 it was approaching \$600.00. In trades relating to shipbuilding, wage increases equalled but never exceeded increases in the cost of living. This wage and price spiral caused tension in the shipyards,

despite otherwise good labor relations, and on March 17, 1853, caulkers and ship-carpenters in East Boston went out on strike, demanding higher wages.⁴³

Since the strike was not reported in the newspapers, and since shipyards kept no records, there is no way of knowing which, or how many East Boston yards were struck. In all probability, this first strike did not affect every East Boston shipyard. In the spring of 1853, ship joiners in Boston, engaged mostly in repair work, also struck. Other trades in Boston and East Boston shipyards went out in sympathy, including some mechanics. A journeyman mechanic, who worked mainly in shipyards, reflected that "so far as immediate results were concerned," the strike "was a failure."⁴⁴ It was. Because the market for shipbuilding experienced a brief downturn in 1853-1854, and demand for clipper ships had momentarily slackened, the March 17 strike was short-lived. Caulkers and ship carpenters returned to work, having failed in their effort to get a wage increase.⁴⁵

But the strike was successful in other ways. The 1853 caulkers and ship carpenter strike was a dramatic development in an industry in which conflict between workers and owners had rarely been reported. Few records of any kind exist in shipyard workers' own language on how they felt about conditions in their industry. Shipyard workers had no publications like *The Offering*, or *The Awl*, newspapers that kept factory operatives in Lowell mills and Lynn shoe factories informed and helped them to develop a class consciousness. This first East Boston strike in 1853, however, reveals that some shipyard workers believed strikes formed "an essential part of the great struggle in which labor was engaged," although how widely this belief was shared is hard to determine.⁴⁶ Many shipyard workers were skeptical about strikes, and refused to believe that in the long run walkouts

brought them better wages. But those who supported strikes as a mechanism for redressing wrongs indicated that a growing awareness of the common plight of workers was taking root in the shipyards.

The idealized image of a strike-free, classless industry where Booles, McKays, Kellys, Curtises, Pratts and Halls worked alongside men who worked for them, chanting encouragements, has been too easily accepted by maritime historians. It might not have been unusual for a shipbuilder like Samuel Hall to erect a pavilion for the mothers, wives, sisters and daughters of the men who had built the *Surprise* and to invite them all to a luxurious lunch served on long tables in the mould loft. Hall entertained his friends at his home.⁴⁷ Relations between yard owners and workers in the East Boston shipbuilding industry were unquestionably amicable when compared with labor relations in the textile and shoe factories in Massachusetts, where between 1850 and 1880 there were more than 100 strikes.⁴⁸ But they were hardly trouble-free, especially when in the late 1860s the industry began its attenuated decline.

As a trade, shipbuilding had its attributes, especially when work in the shipyard, no matter how difficult, was compared with work inside a mill or factory. Some workers believed there were

circumstances connected with the shipbuilding trades which [conspired] to give those working at them a larger liberty in industrial relations than [was] enjoyed by their operative brethren in other employments, especially those working upon iron and leather.⁴⁹

There were also countervailing factors: hard and dangerous work, long hours, seasonal employment, and an industry subject to sudden sharp fluctuations in demand that made it impossible to provide continuous employment to the work force. The

presence of these factors does not argue that the concept of essentially paternalistic relations between yard owners and artisans is invalid, since working conditions do not necessarily translate into poor labor relations. It does, however, argue that the concept needs to be modified to take into account exceptions, like this early shipyard strike in East Boston. One machinist went so far as to claim that in Boston and East Boston, "the pioneer work in the reduction of hours" had been done "almost entirely by ship carpenters, caulkers, and house plasterers."⁵⁰ This may stretch the truth, but it is not wrong.

In April, 1855, when the market had improved, caulkers and ship carpenters again struck for higher wages and this time they succeeded in getting daily wages increased to \$3.00 per day. Other issues, especially safety on the job, troubled workers, but the major issue in 1855 was wages. Shipwrights, caulkers and ship carpenters, who had been organized in Boston since March, 1834, were becoming a force in the labor movement.⁵¹ In East Boston, the second time artisans struck the yards on the island, owners capitulated, giving in to worker demands. 1855 was a much better year for clipper ships than 1853, so it was easier for builders to accede to what workers wanted than to lose a contract to yards in New York, Philadelphia or London.

On April 2, 1866, the day President Johnson signed a declaration ending the Civil War, caulkers, ship carpenters, drydock painters, and riggers went on strike against shipbuilders in New York, demanding an eight hour day. During the five months the strike lasted, New York builders on several occasions sent their ships to yards in other states in order to circumvent the strike. In June, 1866, the ship *Archer* was sent up to Brown and Lovell in East Boston. Earlier that month "Boston caulkers had voted to sustain their

New York brethren in their eight hour demand," so Brown and Lovell, realizing East Boston workers would refuse the job, communicated with caulkers from Mystic, Connecticut, inducing them to come to Boston by assuring them "there would be no opposition to them by Boston caulkers." According to a worker newspaper, the *Boston Weekly Voice*, this was a deliberate "misrepresentation."⁵²

At a meeting in Mark Fisk's "dining saloon" in East Boston, to which Mr. Lovell had been invited, caulkers from Boston and East Boston met with the Mystic caulkers. The Mystic caulkers took little convincing. "Three cheers with a tiger" were proposed for them, and a collection was taken up to help defray their expenses on the home trip.⁵³ Despite such solidarity, the strike did not succeed, and New York caulkers, who held out the longest, returned to the shipyards in August. But like the 1855 strike in East Boston, this strike was more important for what it demonstrated--worker solidarity--than for what it accomplished. Shipbuilders and owners in New York could find support for their goals among shipbuilders and owners in East Boston. Workers in the shipbuilding industry were not without their own resources.

Boston and East Boston workers knew that to work on the *Archer* was to "betray their fellow craftsmen in New York and defeat the common cause."⁵⁴ So they refused, and in refusing, again brought into the open underlying tensions in the shipbuilding industry that often lay hidden beneath the surface of paternalism. In East Boston, Brown and Lovell insisted that the *Archer* be the next ship worked on by caulkers. This insistence almost caused a strike, but workers stayed at their posts. And Brown and Lovell kept the yard open. Caulkers did refuse, however, to work on any ships coming up from New York. When given a choice between workers in their yard and fellow shipbuilders in New York, Messrs.

Brown and Lovell, two long-time members of the East Boston shipbuilding community, chose members of their own group.

According to the pro-labor *Boston Weekly Voice*, such a choice was part of a "determined effort by the owners, builders and underwriters of Boston to crush the Caulkers' Union."⁵⁵ There was sympathy in the Boston area for the strikers in New York, but there was no walkout. So the 1866 strike again demonstrated that enough workers in the shipyards were convinced they had to stand together in order to achieve their ends. Shipbuilders were able to exploit a worker's need to remain employed, but there were limits to that exploitation. Each side in the conflict faced constraints. Brown and Lovell allowed caulkers to refuse to work on the *Archer*, as long as they continued to work on their own ships. Workers agreed to the bargain, keeping their jobs, and at the same time showed support for New York shipyard workers.⁵⁶

This backing for the New York strikers is evidence of a growing class solidarity among shipyard workers in East Boston. Unquestionably, labor relations were changing. Paternalism was antiquated in an industrial world where workers in East Boston were connected with workers in New York and elsewhere. Paternalism, as a system, was ill-equipped to deal with striking workers. After all, paternalism was little more than the extension of a family moral code to the work place. In a small work place, paternalism was viable. In a larger, more modern work environment, with specialization and a division of labor, along with a degree of antipathy between workers and their employers, paternalism became ineffective. Labor activity among East Boston shipyard workers pushed paternalism to its limits, but before those limits could really be tested, the wooden shipbuilding industry went into an extended decline. An increase in the use of iron as a building material for ocean-going vessels during the 1870s was

a factor in this gradual deterioration in the market for wooden sailing ships, although more immediate causes, like the cessation of the California and Australia trade, and the panic of 1857, were of no small importance.

The debate over the use of iron as a building material for the hulls of ocean-going vessels was carried out in newspapers and magazines, and among shipbuilders themselves. The debate began at the time the British started using iron extensively to compete with American packet ships, in the 1830s, and continued into the Civil War. During the war, the employment of iron clads, and their success in battle, made conspicuous by the *Monitor* and the *Merrimac*, closed the debate. There would be iron ships, and they would be built in the United States. The question was how soon. Before that time, however, the argument was spirited and for the most part informed.

The U.S. Nautical Magazine, published by J. W. Griffiths in New York, often took a stand against iron as the sole building material for ships. In 1856, the magazine declared it had "no hesitation in...preferring wood to iron for the shell of all seaward vessels."⁵⁷ Since iron for shells, or hulls, was the primary use of the material in shipbuilding, this article gave readers the impression the *U.S. Nautical Magazine*, a very respected periodical, was against iron. Yet the previous year the magazine had argued that "while British ship-owners may find it to their interest to adopt an almost exclusive iron construction for home-built ships, American merchants will perhaps discover that a wise combination of wood and iron" was "best adapted to our wants."⁵⁸ For a period of several years, the magazine moved back and forth, but its final position was the middle ground: composite vessels. Here the magazine stayed the rest of the debate.

What were the reasons for opposition to the use of

iron? Supporters of wood claimed that wood was the more seaworthy building material, and that because of that, any move toward iron was premature, and risky. Iron did not float, like wood. Iron rusted. Franklin W. Smith and Nelson Curtis, Treasurer and Agent, respectively, of the Atlantic Works in East Boston maintained that "at the expiration of ten years the wooden ship would have depreciated not less than one-half. The iron ship would be then in perfect condition, and good for twenty years more."⁵⁹ Rust was not a problem, or so they insisted. The *U.S. Nautical Magazine* believed that "if wooden vessels received a greater amount of care, they would last as long as iron."⁶⁰ Proponents of iron claimed iron was free "from the decay to which wood" was "always liable. Where in the catalogue of objections, real or fancied, to iron ships is there one to be found equal to that scourge of wooden vessels, the dry rot?"⁶¹ There was none, save rust, which proponents of iron ships believed could be controlled.

Iron was certainly more ductile.

How often has the ship-builder the greatest difficulty in obtaining timber to suit the varied curves of our finest ships! How often is the country despoiled of its noblest ornaments by the tempting prices he is compelled to offer for its most magnificent oaks, the largest of which are frequently insufficient for his purpose!...But how stands the case when we turn to iron? Where is the frame, even of the most intricate form, that our smiths cannot mould?⁶²

There was no question that wood was the more troublesome material to work. Wood could only be had "just as it [was] grown by nature." Iron, on the other hand, could be used "immediately after" it was "manufactured."⁶³ Moreover, wood was heavy in relation to its strength, and as ships grew in size, became not simply more difficult to work with, but harder to find in the shrinking forests of the northeast and coastal

southern states.

Iron had great strength in relation to weight, and as a building material, since it could exist in liquid form, was preferable in that, unlike wood, it could be shaped. This was a quality of iron its supporters emphasized. Because of its strength, proponents insisted it was also safer. Opposition persisted. In an argument founded more on sentiment than science, a writer in the *U.S. Nautical Magazine* claimed that "iron never floats. It is a truth...that in a time of great danger from foundering, wooden vessels are found to be the lighter."⁶⁴ Iron was winning the debate. By the 1870s, if there were remaining doubts, they were removed by the steady advance of steam and its application as a power source for American ocean-going vessels.

Wooden ships, with some success, had used steam as a method of propulsion, but there were significant problems. The need to carry large amounts of coal for early, cumbersome steam engines that themselves took up too much space on the vessel cut into a ship's profits. The weight and constant vibration of the steam engines also shook and strained a wooden ship. Iron ships could better bear this strain. But unlike iron-cladding, which was a merging of wood and iron, the conjunction of steam and wooden ships was temporary. It was a halfway station. The combination of steam and sailing ship, no matter how attractive, was destined to fail.

By the late 1870s, "iron had supplanted wood almost entirely as a material for large ocean-going steam vessels."⁶⁵ Wooden ships, however, did not simply vanish. In the 1870s, a market remained for large medium clippers to carry grain from the farms of California to European ports, but since Boston did not have a grain producing region to rival that of California, few medium clippers were built there. Donald McKay constructed two of these ships in East Boston late in

his career, the *Helen Morris*, in 1868, and the *Glory of the Seas*, in 1869, but they were among the last ships built in his yard.⁶⁶ Medium clippers built on the east coast were built in Maine, where a shipbuilding industry, concentrating on medium clipper ships for the grain market, was taking root.

At the start of the 1870s, some artisans who had migrated to East Boston because it was the center of clipper ship building, and had struggled through the difficult times of the late 1860s, were leaving. Shipwrights who had moved from Nova Scotia, New Hampshire, Vermont, Maine, and other towns in Massachusetts to East Boston in the 1840s and 1850s, were following the trade. The center for wooden shipbuilding had shifted to Maine, to Bath and the surrounding area. Iron ships were beginning to be constructed in the iron-rich Delaware River Valley, near Philadelphia. Smith and Curtis at the Atlantic Works, ever the proponents of iron as a shipbuilding material, insisted the construction of iron vessels constituted "progress." They believed that as society advanced in "intelligence, social comfort and refinement," the use of iron served as a measure of the "material progress and comfort of a people."⁶⁷ But what was true for a machinist, a boilermaker, or foundry worker in East Boston was not true for the shipwright, who suddenly found his job part of the human cost of technological change, and an obstacle to progress in the bargain.

1. John Arrison, "*Report on Shipbuilding Technology*," Submitted to the Boston National Historical Park, Charlestown Navy Yard, November 22, 1988, Part II.

2. *Causes of the Reduction of American Tonnage and the Decline of Navigation Interests*, Report of a Select Committee to the House of Representatives, February 17, 1870 (Washington: Government Printing Office, 1870), pp. 203-205. Letter to the committee from

Donald McKay, December 1869. [Hereafter the *Lynch Report*].

3. John W. Watson, "The Building of the Ship," Harper's New Monthly Magazine, April, 1862, p. 619.

4. Appendix II. This discussion of East Boston workers is based on an analysis of Boston city directories from the years 1846, 1852 and 1860. [Hereafter, Appendix II, *BCD*]

5. Appendix II, *BCD*, 1846.

6. The few historians who address the issue, like Hutchins and occasionally Morison, invariably describe the wooden shipyard as conflict-free.

7. *The Boston Weekly Voice*, a labor newspaper published between 1864 and 1867, is a good source for finding out what workers in shipyards and other industries believed.

8. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1870-71, pp. 390-391. Shipwrights are mixed in with ship carpenters in this numerical breakdown.

9. Richard C. McKay, *Some Famous Sailing Ships and Their Builder*, p. 351.

10. Henry Hall, "Report on the Ship-Building Industry in the United States," p.86.

11. Peter R. Knights, *Yankee Destinies* (Chapel Hill: The University of North Carolina Press, 1991), p. 34.

12. Ibid., p. 34.

13. Appendix II, *BCD*, 1846, 1852, 1860.

14. East Boston Company, *Annual Report, 1860. Abstract of the Census of Massachusetts, 1865, Prepared Under the Direction of Oliver Warner, Secretary of the Commonwealth* (Boston: Wright and Potter, 1867). Most of these houses were multi-story, multiple-family dwellings.

15. See map.

16. *Boston Evening Transcript*, March 14, 1853.

17. Oscar Handlin, *Boston's Immigrants* (Cambridge: the Belknap Press of Harvard University, 1941), p. 57.

18. This was true, of course, for males. Thousands of female Irish immigrants found employment as domestics across the harbor in Boston.
19. Handlin, *Boston's Immigrants*, p. 55.
20. Appendix II, *BCD, 1846, 1852, 1860*.
21. Handlin, *Boston's Immigrants*, p. 62.
22. Ibid., p. 100.
23. Stephen Thernstrom, *Poverty and Progress* (Cambridge: Harvard University Press, 1964).
24. Appendix II, *BCD, 1846, 1852, 1860*.
25. *Massachusetts Census, 1865*, pp. 44-200.
26. See Appendix IIIA for a listing of artisans who worked in East Boston for as long as fifteen consecutive years.
27. Where workers went when they left a given location remains a challenge to labor historians who must use census data to track these migrants. Such workers could have gone anywhere in America, and using the census to find them is a hard business. How ready some workers were to leave is evidenced by the fact that one-third of New Bedford's voting population left for California during the gold rush. Samuel Eliot Morison, *Maritime History of Massachusetts*, pp. 332-333.
28. Massachusetts, *Report of the Bureau of Statistics of Labor, 1870*, p. 271.
29. Ibid., p. 333.
30. Appendix II, *BCD, 1846, 1852, 1860*.
31. "The Ship-Builder and the Apprentice," *U.S. Nautical Magazine*, April, 1856, pp. 15-16.
32. Ibid., p. 15.
33. Richard McKay, *Some Famous Sailing Ships and Their Builder*, p. 8.
34. "The Ship-Builder and the Apprentice," *U.S. Nautical Magazine*, April, 1856, p. 15.

35. Hutchins, *American Maritime Industries and Public Policy*, pp. 264-275.
36. John J. McNamara, Jr., *Monuments of Snow*, "Sail Magazine", August, 1978.
37. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1880, p. 15.
38. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1872, pp. 516-517. *Report of the Bureau of Statistics of Labor*, 1879, p. 75.
39. *Report of the Committee of Internal Health on the Asiatic Cholera...*, Boston City Documents, 1849, No. 66, p. 9.
40. Ibid., pp. 9, 180.
41. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1871, pp. 526-527.
42. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1872, pp. 468-520.
43. Ibid., pp. 514-520. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1880, pp. 14-22.
44. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1871, pp. 570-573.
45. "Boston Ship Stock Market," U.S. Monthly Nautical Magazine, October, 1854, p. 138.
46. Ibid., p. 571.
47. Arthur H. Clark, *The Clipper Ship Era*, pp. 135-139.
48. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1880, pp. 14-65.
49. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1871, p. 572.
50. Massachusetts, *Report of the Bureau of Statistics of Labor*, 1871, p. 572.
51. John R. Commons, et. al., *History of Labour in the United States* (New York: The Macmillan Company, 1936), Vol. I., pp. 472-474.

52. *Boston Weekly Voice*, June 6 - June 14, 1866. See also Earle R. Warren, "Shipyard Strike 1866: An Action for the Eight-Hour Day," Presented at the 14th Maritime symposium of the Maine Maritime Museum, May 4, 1986.
53. *Boston Weekly Voice*, June 14, 1866.
54. Ibid.
55. *Boston Weekly Voice*, June 21, 1866.
56. Eight hour legislation failed to pass the Massachusetts legislature in the summer of 1866. Although some states, New York among them, passed eight hour legislation before the turn of the century, shipyard workers did not get an eight hour day that pertained to both government and private yards until 1912.
57. "Iron Sea-Going Vessels Less Reliable Than Wood," U.S. Nautical Magazine, May, 1856, p. 1.
58. "Iron Versus Wooden Ships," U.S. Nautical Magazine, January, 1854, p. 267.
59. Franklin W. Smith, Nelson Curtis, *Wooden Ships Superseded by Iron. Cheap Iron Indispensable for the Revival of American Commerce. A Commercial Marine Essential to National Progress and Defence* (Boston: A. Mudge and Son, 1869), p. 6.
60. "Iron Sea-Going Vessels Less Reliable Than Wood," U.S. Nautical Magazine, May, 1856, p. 83.
61. Smith & Curtis, *Op. Cit.*, p. 24.
62. Ibid., p. 14.
63. Ibid., p. 17.
64. "Iron Sea-Going Vessels," U.S. Nautical Magazine, May, 1856, p. 82.
65. John G.B. Hutchins, *The American Maritime Industries and Public Policy*, p. 453.
66. Richard McKay, *Some Famous Sailing Ships*, pp. 374-375.
67. Smith and Curtis, *Op. Cit.*, p. 42.

VI

Iron Comes of Age

1856-1880

If in 1848 the discovery of gold in California gave the clipper shipbuilding industry in East Boston a heady start, then the end of the gold rush a few years later signalled its demise. But the end of the gold rush in the west, unlike the beginning, was not enough in itself to bring about the collapse of an industry it had virtually called into being. While it was true that the gold rush in California was the singular event which fueled the construction of East Boston clipper ships, there was no comparable singular event involved in the steady decline that began in the late 1860s and continued throughout the 1870s. Instead, there were a series of factors, each capable of bringing about the slow destruction of an industry, but when coupled together, these factors formed an all but insurmountable threat to the builders of wooden ships.

Since clipper ships were so expensive to build and to maintain, the high profits owners realized on the California carrying trade made it possible for them to absorb costs that otherwise might have proved unpalatable. When the California gold rush ended, the discovery of gold in Australia in 1851 kept the wooden shipbuilding boom going by opening yet another market for clipper ships, but this too was a short-lived opening, lasting only a few years. During these years, until the depression of 1857, high profits absorbed high labor costs and provided American builders with a competitive

advantage. When the sudden high profits brought about by the discovery of gold in California and Australia disappeared, normal economic factors began to take their toll on the industry. Hitherto managed costs, like the cost of wood and labor, in a tight market became difficult to support.

Wood, the basic shipbuilding material in America since the founding of the industry in the seventeenth-industry, still plentiful in the 1850s and 1860s, and comparatively cheap, nonetheless had to be brought great distances to most ship yards, which of necessity remained near the coast. Because of the great distances involved in getting lumber to the yards, the cost of wood was rising despite its relative availability on the east coast of the United States. When profits were high, the cost of transporting wood to shipyards in East Boston, and elsewhere, was hidden. When profits were decreased, lower cost shipbuilding centers in Canada and Maine began taking away business from East Boston, and other shipbuilding centers not as near to the forests. These new centers, because they were located closer to the building material, saved on transportation costs. Labor was also less expensive in Canada, and in Maine, than it was in the Boston area, where at the height of the boom shipyard workers were the most well-paid of all artisans. This new competition came about when the market was shrinking. It was especially unwelcome in East Boston, since after the gold rush, earlier overproduction meant that too many ships were already chasing too few goods.

Because of the excessive profits owners could gain from the successful completion of a single clipper ship voyage from New York to San Francisco to China and then back, fully-loaded, to Boston or New York, American builders had overbuilt for the market. When the boom ended, this overbuilding was reflected in a collapse of the freight rates. At the height of

the boom, between 1853 and 1855, the average rate for freight in Boston was \$14.31 per ton. In some cases, freight rates had risen as high as \$25 per ton, and even as high as \$60. By 1857, the average rate had fallen to \$8.70. With rates so low, extreme clipper ships could not be constructed even at a small profit. And no one would build such costly ships unless high profits were guaranteed.

In the 1860s and 1870s, when California grain was being exported to European ports, some medium clipper ships were built, but few of these came from East Boston yards, whose primary purpose was to satisfy the demand created for shipping between the years 1849-1855, when gold fever and high profits were at a peak. Most East Boston clipper ships were fast, extreme vessels with sharp lines, built more to reach San Francisco in a hurry than to carry huge cargoes. After 1857, although a number of wooden shipyards on the island remained open, their output was dropping. In 1856, 28 ships were built in East Boston, all of them made from wood. A year later, when the number fell to 19, 3 of those 19 vessels were iron steamers, one of which was the Samuel H. Pook designed *Le Voyageur de la Mer*, whose engines were built at the Atlantic Works.¹

Primarily because timber had always been cheap and abundant in America, the United States lagged behind Great Britain in the construction of ocean-going iron vessels. England had been forced to use iron in ship construction because her wood resources had been completely depleted, and over time, iron had become the less-expensive building material in England. In the United States, wood retained a cost advantage over iron, and this was a factor in explaining America's preeminence in clipper ship production. But in building those ships, American designers were approaching the limits of wooden ship construction.

In McKay's *Great Republic*, for example, iron had to be used for strength to brace the frames. The inside frames of that ship were strapped with 4 inch iron braces an inch thick and 36 feet long. There were 90 of these "straps" on each side of the ship.² Iron was heavier than wood, but the rock maple used for the keel of the *Great Republic* was very heavy itself. It was two tiers of 16 by 32 inch hard wood, scarfed together, as was the custom in building a ship with a keel the length of the one acting as a spine for the *Great Republic*. A few years after the launch of the *Great Republic*, in 1859, the English engineer, I. K. Brunel, launched the *Great Eastern*, a 12,000 ton paddle-wheel iron steam ship. It was the largest ship in existence, more than twice the length of the *Great Republic*.³

In 1845, Otis Tufts had built in East Boston the *R.B. Forbes*, an iron-hulled steam tug. After that time, because of the boom in wooden ship construction, no other iron-hulled vessels were built in East Boston until 1857, when *Le Voyageur de la Mer*, an iron steamer, was built for the Pasha of Egypt. This steamer was 216 feet long, 37 feet in the beam, and 22 feet deep in the hold. Plates and frames for her construction were rolled in Pennsylvania, in Norristown and Philadelphia, and the machinery for cutting, punching and molding the plates was set up in East Boston at Holden and Gallagher, who did the work of riveting the frame and plates. Four boilers, oscillating engines of 800 horsepower, were made for her at the Atlantic Works. *Le Voyageur de la Mer* required 3,000 hull plates and 300,000 rivets, a total weight of 881,000 pounds of iron. This was one of the first large iron ships in the United States, and like many early iron vessels, *Le Voyageur de la Mer* was rigged as a sailing ship.⁴

Otis Tufts went out of business before the Civil War, and was unable to take advantage of the immediate impetus the conflict provided for iron shipbuilding. During the Civil

War, the Atlantic Works built two monitors for the government, the *Nantucket* and the *Casco*, turrets and engines for several others, and the frigate *Franklin* at its location on the corner of Marion and Chelsea streets. The Atlantic Works employed more than 800 men in its machine shops, forge shops, boiler shops and single brass foundry in the war years.⁵ During the war, Donald McKay changed his yard over so he could build iron ships and marine engines. A driving spirit behind this new business enterprise was Nathaniel McKay, Donald McKay's youngest brother, who had earlier gone into business making boilers. Another partner was George Aldus, a boilermaker. The new company called itself Aldus and McKay.

In 1863, this yard produced the wooden steamers *General Hooker*, the *General N.P. Banks*, the *Charles W. Thomas*, the *Edward Everett* and several others, all of which were sold to the government for troop transports during the war. Workers at Aldus and McKay also built a monitor, the iron-clad *Nausett*, and two wooden screw-propellers, the *Trefoil* and the *Yucca*, in the years 1864-1865. After the war, Aldus and McKay built the paddle-wheel iron steamer *Ashuelot*, which was delivered to the Boston Navy Yard on November 30, 1865. But the output of this new yard during the war, 4 vessels launched in 2 years, hardly compared with the 13 clipper ships produced by the original McKay shipyard at the same location in 1853 and 1854.⁶

That Donald McKay, with the aid of his brother, Nathaniel, was able to convert his wooden shipyard at 72 Border Street into a yard capable of producing wooden steam vessels and iron-clads is remarkable. It surely contributed to the belief that wooden shipyards could be converted into iron shipyards. Yet the firm failed. Contracts with the Navy were the mainstay of the business during the Civil War, and McKay and his brother were able to keep the company going only

another four years after the war ended. They went out of business in 1869, selling all their assets, shops, equipment, and property, to the Atlantic Works, a symbolic, if not ominous event for those who believed that wooden shipbuilders could succeed in building iron ships. In 1870, the Atlantic Works shifted its entire operation to the site on Border Street where Donald McKay had been in continuous operation since he arrived in East Boston in 1844.⁷

The McKay brothers and George Aldus suffered from bad timing in trying to keep an iron shipbuilding business going in 1869. Iron shipbuilding in America had been given a false start by government during the Civil War, whose liberal expenditures for armored vessels encouraged many private yards to fit themselves up for the production of iron clads. In the war, several firms in Philadelphia and New York spent more than \$1,000,000 establishing shops and machinery. The war forced the government to do what had been done in England by the Royal Navy in peace time as a matter of public policy: provide a large enough volume of business to convince shipbuilders it was in their interest to invest in iron shipyards. In the United States, no such demand was supplied by government outside of war time. Once government orders ceased after the war ended, demand for iron ships fell off precipitately.⁸

Shipbuilders in East Boston continued to hope for a rebirth in their industry, but the opening of the Suez Canal in 1869 put an end to that. For a clipper ship, sailing in the open, the distance from New York to Bombay via the Atlantic was over 14,000 miles. Clipper ships had an edge on the longer routes because they were still faster than steamships in the 1860s. The opening of the canal took away that advantage, since it shortened the trip by 7,000 miles. The canal had the further effect of reducing the gap between

coaling stations, before that a pointed disadvantage for steamships, from 5,000 to 2,000 miles. Sailing ships still competed for trade, but time was not on their side.⁹

The continued decline in the construction of clipper ships after the war brought hard times, but not complete ruin to the economy of East Boston. The island economy, while heavily dependent upon the vitality of the shipbuilding industry, was nonetheless variegated enough to survive. The continued migration of people to the island was a reflection of this vitality. In 1865, there were 2,532 houses in East Boston, an increase of almost 500 over 1860. Most of these homes were one and two family dwellings, often of brick, although more than 100 homes were built for three and four family occupancy.¹⁰ Yet even while workers were still arriving on the island, others were leaving, especially those who worked in the shipbuilding trades.

Between 1865 and 1879, more than half the workers included in a sample of 200 chosen from the city directories of 1846, 1852, and 1860 left the island. Since many of these artisans were long-time residents, it is probable their departure can be attributed to the decline in the industry that initially attracted them to East Boston. Of those who remained in East Boston, some changed professions, leaving shipbuilding for trades unrelated to shipbuilding. Not a single worker in the sample who changed trades and remained in East Boston acquired a skill that would have prepared him for work in an iron shipyard, although one must be careful not to over-interpret from this fact. East Boston, while it did have iron foundries, the Atlantic Works and other machine shops, was not a rival to Delaware River Valley iron shipbuilding. Artisans who remained on the island, and who were willing to learn a new skill, had less opportunity to become iron shipyard workers.¹¹

Throughout the 1870s, residents of East Boston struggled with the unemployment and dislocation brought about by the virtual collapse of the wooden shipbuilding industry. Fourteen shipbuilders were listed in the 1855 *Boston Almanac*. The 1875 *Almanac* listed half that many, and of the 7, only 3 were in business in 1855, attesting to the high turnover rate in the industry and the continued economic downturn.¹² The local newspaper, the *East Boston Argus*, commenting on a report on the increase in the use of ocean-going iron ships by Great Britain, stated that "the building of wooden ships, except of the smallest class," was "virtually extinct."¹³ The paper suggested American shipyards begin building iron ships and expressed the belief that such work could be done in East Boston. The *Argus* worried about the "rapid decline" in wooden ships and the equally "rapid increase of iron ships." Steam was superseding sails "very fast." The newspaper emphasized that while the cost of wooden vessels was "constantly increasing, the cost of iron vessels was decreasing."¹⁴

To make matters worse, two serious fires in East Boston in 1870, one in July and another in September, resulted in property and material damages of over half a million dollars. On September 17, 1870, a fire at the corner of Maverick and New streets destroyed much of the old Atlantic Works facility, resulting in losses of more than \$100,000, in addition to heavily damaging the rigging shop of ~~Albert~~ Lowe, the machine shop of George Bird and the property of joiner William McKie. "We as a community have suffered from the effects of two conflagrations and have witnessed the gradual depression of our shipping interests and other industries therewith connected," commented the *Argus* in an editorial on November 26, 1870, exhibiting a sense of gloom at the same time it tried to rally island citizens.¹⁵

In 1869, the widespread depression in the American

shipbuilding industry prompted Congress to convene a select committee to consider why shipbuilding in the United States had come to a "complete standstill." The Lynch Committee, named after Chairman John Lynch, held sessions in New York, Philadelphia, Boston and Portland, Maine, receiving testimony in each port from important shipbuilders and owners. When the committee came to Boston, Donald McKay, unable to attend, sent a letter, but Samuel Hall and Paul Curtis, still active in the shipbuilding industry, testified at length before the committee.

Hall, who would die not too many months after his testimony, told the committee he had built but one ship since the war, and blamed the state of the industry on the high cost of construction. The duties that builders had to pay on materials from which ships were made had risen sixty per-cent since the war. Iron had gone from \$40 per ton to more than \$80. Rigging, formerly 8 cents a pound, could not be gotten for less than 16 cents in most cities. Hall claimed the industry would completely collapse if Congress did not lower the tariffs that were crippling the trade.¹⁶

Hall stated that if the "articles used in shipbuilding were admitted duty-free, American shipbuilders would be able to go on as formerly." Congressman Erastus Wells, a committee member, noting that he had seen several ships lying idle in Boston, asked Hall if there would be a market for ships if he were to build them. Hall insisted there would be, but admitted that if the Navigation Laws were repealed and American owners were permitted to buy ships anywhere in the world, "all the ships in the world would be built in England."¹⁷ American shipowners, in fact, had purchased ships abroad, circumventing the law that forbade their doing so by hiding their felonies under foreign flags of ownership and registration. None of the shipbuilders,

testifying alongside some of these same owners, brought this matter up for discussion.

Nathaniel McKay submitted a written estimate of the cost of building an iron steamship in the United States and in Great Britain. "The cost to build an iron ship in England ready for sea is 14 pounds per ton; in this country it would be 22 pounds per ton."¹⁸ His brother, Donald, unable to attend the hearings himself, sent a letter in which he explained that the duties on a 1,000 ton sailing ship were \$8,665.33. He recommended that Congress allow a "drawback" on duties paid on materials entering into the construction of new ships, since such a policy had wisely and with great effect been adopted in England.¹⁹

James E. Simpson, builder of the first timber dry dock in the United States at East Boston in 1854, pointed out other disadvantages faced by American builders of wooden ships. In a letter to the committee, Simpson wrote that the lifetime of a wooden vessel was from ten to fifteen years, and during that time a ship had to undergo major repairs, which were so expensive that in most cases the outlay for these repairs exceeded the original cost of the ship. A clipper ship, he said, had to be recaulked and remetaled every two years and rebuilt on an average of every seven years. An iron ship, on the other hand, needed to be docked at least every six months for cleaning and painting. Repairs on iron vessels, he declared, while more numerous than those on wooden ships, were in the long run far less costly.²⁰

Not all shipbuilders and owners were convinced by the argument in favor of iron. George B. Upton, a well-known Boston investor, ship owner and friend of the McKays, claimed that there had been a "strong effort" on the part of British shipbuilders to "magnify vessels built of iron over those built of wood. England," he said, "was a country of cheap

iron. We are a country of cheap and good wood. My own opinion, distinct from one of prejudice, is in favor of wood."²¹ Robert B. Forbes, advocating auxiliary steam ships, a combination of sail and steam, recommended the Navy begin building a "fleet of fast-sailing, efficient screw steamers" to help remedy the crisis besetting the industry.²² His plea was ignored.

If shipbuilders failed to agree on a remedy, they at least agreed on what seemed to be the major cause of their difficulties. Those who testified before the committee when it met in Boston insisted that the duties imposed on imported materials used in the construction of new ships were causing the economic hard times faced by the industry. Every one of them recommended lifting the duties. But the tariff had not been imposed to ruin an industry--it had been levied by the government to help pay for the war, and to support specific domestic industries against foreign competition. Certainly, the tariff worked to aid British shipbuilders by providing them with a competitive advantage, especially in iron ships, and American shipbuilders were right to complain. Getting the tariff revoked would undoubtedly have helped the industry, at least to the extent it lowered builders' costs. But it would not have revived what by that time was a moribund industry.

The increasingly high cost of building a wooden sailing ship, when the price of iron, domestic and imported, was gradually coming down, was one of the reasons East Boston shipyards were silent. Unfortunately for builders, high costs were not entirely due to the tariff. Wages in East Boston, and Boston, remained relatively high in the early 1870s, despite the state of the market, in part because enough artisans, unemployed in the private sector, were able to find repair work at the Charlestown Navy yard. Complicating the issue for builders was the fact that East Boston shipyard

workers had twice struck for higher wages. No matter how depressed the market was at the start of the 1870s, artisans refused to give up hard-won gains. Between 1870 and 1872, wages came down, but not fast enough to revive wooden shipbuilding in East Boston. Wages were already lower in Maine and the Maritime Provinces of Canada.

In 1860, just as the clipper shipbuilding boom was starting to wane, carpenters doing new work in East Boston shipyards were paid, using a gold standard, \$24.00 per week. Caulkers were paid the same. Joiners were paid less, \$21.00, and painters, riggers, and blacksmiths were paid weekly between \$15.00 and \$18.00. In 1872, carpenters doing new work in the shipyards saw their wages drop to \$16.00 a week. The wages of caulkers also dropped to \$16.00, as did those of joiners. Painters in 1872 received, per week, \$13.00. The wages of riggers went up to \$18.66, but soon after came back down and then continued to go down. No figure is available for what blacksmiths were paid per week in 1872.²³

Even at descending wages, shipyard workers remained among the most highly paid artisans in 1872. Wool sorters, in 1860, were paid slightly less than \$7.00 a week. In 1872, their weekly wage rose to almost \$10.00, considerably less than what a skilled shipyard worker earned. The same was true of other industries. Wages were going up, but increases notwithstanding, all but a few of them made much less than skilled artisans in the shipyards. Between 1860 and 1872, the weekly wages of cigar makers rose from \$12.00 to \$16.00, milliners from \$5.72 to \$7.11, and cabinet makers from \$10.56 in 1860 to almost \$15.00 in 1872. Similar wage increases were realized by brewery workers, carriage makers, brick makers, box makers, and workers in the paper and print industries. Musical instrument makers also saw gains in their weekly wage, as did workers in silk, soap and candle, and type-setting

establishments. In fact, wages were going up in every single industry, except shipbuilding. Yet men still made more money in the shipyards, when they worked, than all other workers in the Boston area.²⁴

These figures help explain the paradoxical decline in shipyard wages. A ship carpenter making \$16.00 a week in 1872 had seen his wages plummet 25 per-cent since 1860. The same rate of decrease was true for other artisans in the shipyards, except for riggers, who readily found work in the repair side of the industry. These drops in wages were precipitate, and substantial enough to cause some workers to leave the shipyards, either to leave the Boston area, or to take up other trades unrelated to shipbuilding. As Nathaniel McKay put it when he testified before the Lynch Committee, "the mechanics who have worked side by side with me are to-day driving potato carts through the city."²⁵

Workers were leaving the shipyards in the early 1870s, although not in numbers sufficient to be called an exodus. Enough artisans left the yards to help keep wages higher than they would have been had the yards at that time experienced a labor glut. "Mechanics are going out of the business and seeking other employment," Samuel Hall told the Lynch Committee. "There is a great scarcity even now of mechanics in ship building, which, of course, enhances the cost of wages."²⁶ The few men working in the yards were constructing medium clippers for the California grain trade at only a handful of East Boston shipyards: those of R.E. Jackson, Smith and Townsend, and Campbell and Brooks. But East Boston was never a center for the construction of these ships.²⁷ Donald McKay's last clipper ship, the *Glory of the Seas*, was a medium clipper, built in 1869. In the 1870s, he built only two sloops of war for the government and a yacht for General Benjamin F. Butler.²⁸

So many workers were out of work that the Argus began to make calls for the establishment of a Charitable Mechanics' Association, "founded for the purpose of affording daily relief to its members," who were "disabled or in pecuniary distress."²⁹ Hervey C. Calkin, a congressman on the Lynch Committee, asked Nathaniel McKay if he thought American mechanics were "ready to go to work to build iron ships without waiting one or two years to learn how."³⁰ McKay replied, "I do not think that any man on the other side of the water can beat a Yankee any way. I do not think that any class of mechanics can beat the American mechanics. Of course," McKay continued, "we have got to get some experience in building iron steamers."³¹ Franklin W. Smith, Treasurer of the Atlantic Works, stated that in 1867, out of 227 ships built upon the Clyde, only 14 were made from wood. Holding up a slip of the Glasgow Herald, which told the story of the launches of these iron ships, Smith asked the Lynch Committee, "Why could this not be done here?"³²

Although there were those who testified before the committee, like Boston shipowner George B. Upton, who believed the wooden shipbuilding industry could be revived, most shipbuilders realized that wooden sailing ships, as Franklin Smith maintained, had been superseded by iron ships. While few steps toward the construction of iron vessels had been taken in East Boston, with the exception of the Atlantic Works, which turned out several steam-powered tug boats and ferries in the early 1870s, the situation along the Delaware River was quite another matter.³³ It was there that American shipbuilders had "erected rolling mills, furnaces, and shops," and put into operation "a remarkably large amount of the best labor-saving machinery" for the establishment of a nascent iron shipbuilding industry.³⁴ In 1872, John Roach spent \$2,000,000 establishing a yard at Chester, Pennsylvania, the

city that would become known throughout the country as the "American Clyde."³⁵

Could East Boston compete in the iron ship market? Almost every shipbuilder on the island believed unemployed wooden shipyard workers could be retrained, and provided with skills to work in an iron shipyard. "The art of shipbuilding is very simple if you understand naval architecture, and that the wooden shipbuilders understand," A. C. Stimmers told the committee in New York. Building an iron ship required "only a different arrangement of materials, which is very easily learned. I have seen men acting as common laborers," Stimmers continued, "carrying iron about, and have seen them in six months afterwards driving rivets. If you have the head man right, the labor part is easily learned."³⁶ In East Boston, labor wasn't listening. Boston city directories indicate no artisan who worked in the wooden shipyards on the island acquired the skill necessary to work in an iron shipyard, a noteworthy fact despite the limited number of small iron shipyards in the Boston-East Boston area.

Such a transition was more difficult than most builders testifying before the Lynch Committee believed. Even though Donald McKay, aided by his brother and George Aldus, was briefly able to convert his yard into a small iron shipbuilding establishment during the Civil War, he is the exception that proves the rule. At no point did McKay, limited by capital and the small amount of land at his disposal, turn his establishment into a mammoth yard like those that were springing up along the Delaware in the early 1870s. He was the only island wooden shipbuilder to even make such an attempt. No other wooden shipbuilder in East Boston followed him.

The "smithies, forges, and machine-shops," in the iron shipyards of Chester, Pennsylvania, were but "slightly"

different "from those seen in other branches of the iron-working trades," wrote Charles Barnard in *Harper's New Monthly Magazine*, making a connection between the machine shop and the iron shipbuilding yard.³⁷ He describes how iron was "moulded, cut, or bent into any form as easily as if it were so much silk or cotton.

Fires roar and stream in slender tongues of flame from the cracks of the furnace door. A long iron beam suspended from a travelling crane is thrust into the fire, and men stand about in the fervent heat, waiting...The foreman calls, and one lifts the sliding door of the furnace by a chain, and others grasp the great tools that have been fastened to the cold end of the bar, and drag it from the fire, glowing with white heat. It approaches the great steam-hammer, and a man runs up the ladder to the platform above. The enormous hammer, tons in weight, springs up as lightly as if handled by a giant. Ah! what a terrible crashing blow! The hot iron flies in showers of sparks, and the immense bar bends like lead beneath the blow. The very ground quivers...round and round the bar is turned, and the staggering, smashing blows beat it into new shapes.³⁸

The article is freighted with words like "dim," "vast," "tangle," "ponderous," "grim," "black," "powerful," "hard." Blazingly hot rivets meld one piece of iron to another. "The rivet boys blow their fires and pass the hot rivets incessantly. The din of a hundred hammers fills the air."³⁹

The truth is that there were two shipbuilding industries in the United States, one that used wood, and another that used iron. The men who founded the Atlantic Works, for example, were engineers, as were the men who started constructing iron vessels along the Delaware. John Roach, a man whose name would become synonymous with iron shipbuilding, was a founder and an engine builder in Pennsylvania before he opened his iron shipyard.⁴⁰ The iron

ship, to a large extent, was a product of the machine shop, as Barnard eloquently makes clear. Except for the basic form and shape of a ship--hull, keel, masts, spars--the iron vessel owed its existence to the thinking that gave the world the steam engine, not the sailing ship. The change from wood to iron was gradual, but less evolutionary than it might have seemed, since change came from outside the industry.

This is one reason unemployed artisans in East Boston did not acquire the skills that would have enabled them to work at places like the Atlantic Works, or other nearby boiler-making facilities and foundries. A man who had spent his entire life working with wood, using his own tools most of the time, was not so easily converted to the very different world of the factory worker, who worked in an enclosed space filled with noise, heavy machinery and tools supplied by the factory owners. In the wooden shipyard, artisans used adzes, broad-axes, saws, bevels, chisels, caulking irons and mallets, inexpensive tools they were expected to bring with them when they arrived at the yard for work.

The metal-working tools used in the iron shipbuilding industry were very different in power, size, and cost from tools used to build a wooden sailing ship. A pair of rollers for a rolling mill cost \$4,000, punching machines \$3,000 each, shears \$1,200, and a planer \$2,000. A drill cost almost \$1,000, a lathe another \$700, and a furnace added at least \$2,500 more to the initial outlays required to get an iron shipbuilding yard up and running. A small iron ship yard could not be established for less than \$60,000, and for a large business enterprise, initial outlays ran between \$200,000 and \$1,000,000. Nor did heavy expenses stop after the yard was established. After spending \$1,000,000 to open his yard, in the following five years John Roach claimed to have invested an additional \$14,000,000 in his business,

\$8,000,000 of which went into plant and material equipment. The average wooden shipbuilding facility could be opened for less than \$20,000.⁴¹

These costs suggest that East Boston wooden shipyard owners, trying to survive in very hard times, were in no position financially to transform their yards into iron shipyards, even if they had the technical know-how. Where would the money come from? There were alarming signs, to shipbuilders, that investors who had once funneled millions of dollars into the construction of wooden ships were taking their capital elsewhere. When he testified before the Lynch Committee, Nathaniel McKay was asked if he knew of any ship owner who had gone entirely out of the business. "Yes, sir," McKay replied. "I know one gentleman who was appointed on the committee of the Board of Trade. He was a very large ship owner; but his money is invested to-day in railroads."⁴²

The most famous commercial and industrial names in New England had formed the backbone of the clipper ship business, both in Boston and East Boston. Clipper ships were named after them. The *Thomas S. Perkins*, *Enoch Train*, *Rufus Choate*, *George Peabody*, *Samuel Appleton*, *Robert C. Winthrop* and *Amos Lawrence* carried the names of their owners to the furthest ports in the world. George B. Upton owned, in partnership with other investors, 12 of McKay's clipper ships, and Enoch Train, also with other investors, 8 of the ships built at the McKay yard in East Boston.⁴³ After the Civil War, Boston investors shifted their capital away from the shipyards, often to railroads, an industry where Boston capital remained a force until Boston investors were displaced by Jay Gould, J.P. Morgan and other more adventurous parvenus.⁴⁴

East Boston shipbuilders failed to address this issue when testifying before the Lynch Committee. Their

dominant concern was to get a reduction in the tariff so that they could compete with the British. Too many of them saw the economic downturn in their industry as temporary, and most failed to understand that wood as a building material for large ocean-going vessels was becoming obsolete, as was sail as a method of propulsion. They were caught in a world they had known all their lives, and were ill-equipped, therefore, to see the fundamental nature of the crisis besetting their industry.

Their misunderstanding of the nature of the crisis led them to believe their workers could be retrained. Builders of wooden ships could easily imagine workers in their yards building an iron *ship*, which is what they were doing when they told the Lynch Committee that wood workers could become iron workers. But could they as easily have imagined their men building a *boiler*? Essentially, that was what the construction of an iron ship most resembled--building a boiler.⁴⁵ Shipbuilders, in conflating two artisanal traditions, succeeded only in clouding an issue they had hoped to illuminate in testifying before the committee.

How did the workers respond? Comparing the 1870 Boston city directory with a list of 200 East Boston shipyard workers culled from the 1846, 1852 and 1860 directories shows that 70 of the 200 workers had left the island by 1870. Of the remaining 130 shipyard workers, 95 listed themselves with the same skills posted in the 1860 city directory. 35 of the artisans who stayed in East Boston changed skills, but not one of them listed a skill that would have put him to work in an iron shipyard. Many artisans adopted skills that had nothing to do with their former work in the shipyards. Cushing Barnes, a shipwright in 1860, became a "saloon keeper." So did Charles Dakin, also a former shipwright. Workers were willing to do almost anything, as long as it did not entail becoming

a puddler, riveter, machinist or boilermaker in a machine shop, iron foundry or iron shipyard.⁴⁶

Joseph Bates and Moses Brown, both listing themselves as caulkers in 1860, became policemen, as did Dummer Erskine, once a shipwright. John W. Goodale, a sparmaker in 1860, became a "toy gun manufacturer." Samuel Hall, Jr., who used to work with his father, left the industry to become a "merchant," and treasurer at the Eastern Rail Road. Several shipwrights and ship carpenters became house carpenters, entering the building trades on the island. Eli F. Southward, a prominent Princeton Street sailmaker, became a producer of "signs and banners." More than 50 per-cent of the 130 workers who remained on the island changed addresses, a not unexpected finding, since physical mobility was a characteristic of the nineteenth-century urban worker in America.⁴⁷

Yet a high percentage of workers, almost half, refused to give up on the shipbuilding trades, even when there was no work. Since even the largest East Boston shipyards did not keep records, it is difficult to know exactly how many shipyard workers were actually employed from 1870-1873. A listing in the directory meant only that a worker possessed a skill. It did not mean employment. In 1870, when a worker listed himself as a "shipwright," or "caulker," it was more an act of hope than an indication that work was available, since almost all yards in East Boston doing new work were virtually shut-down because of the depression and the collapse in the market for wooden ships. Occasional repair work in East Boston and at the Navy Yard, a factor in propping up wages, provided what work was to be had.⁴⁸

It is plausible that workers listing themselves with skills they had been using their entire working lives, whether or not there were jobs for them in the shipyards, were simply

resisting change. Since almost 30 per-cent of the workers in the sample left the island, those who did not probably were digging in their heels. Shipyard workers were a conservative group, not readily given to changing their ways. But circumstances were not improving. A financial "panic" in 1873, in part caused by railroad overexpansion, while it did not directly affect East Boston shipbuilding interests, had an overall negative effect on capital markets. On the island, the panic served to deepen the gloom, prompting even more workers to leave.

About this time, wooden shipbuilding began to pick up in Maine, and the *Argus*, ever searching for reasons to be optimistic, printed the news in a front page article. "We trust," the paper said, "the tide of revival will set equally strong in this direction and that master builders and mechanics of every class may enjoy the benefits of a lively business in this industry. Nothing could be more rejoicing than a return of the life and activity shown in our shipyards before the war."⁴⁹ This was a false hope, demonstrating that editors at the *Argus* were as confused about the nature of the dilemma facing the community as were unemployed workers, or the men for whom they once worked in the shipyards.

For East Boston, what the rise of shipbuilding in Maine meant was doom, not rebirth. While some of these Maine ships were built in Rockport and in Kennebunkport, most came from three new shipyards, E & A Sewall, Houghton Brothers, and Chapman and Flint, in Bath. Almost all of them were large, medium clippers of 2,000 tons or more, designed specifically for the California grain market. Most of these square-riggers had double the space for cargo in relation to tonnage, and were manned by crews one-third the size of those required on the extreme clipper ships produced in East Boston. These ships extended the life of wooden shipbuilding, in the Bath

area, to the end of the 1880s.⁵⁰

For the market they served, these ships represented a technological advance: their large hulls carried tons of grain to Europe, at good speed given their weight. Maine-built medium clippers tended to be longer than extreme clippers, with flat floors, and they had the broad, raking square sterns of ships from an earlier day. They were capable of approaching the speed of the more costly East Boston extreme clippers, but not usually. Speed was a far more important component in the market for extreme clippers than it was for markets served by Maine-built ships, so East Boston clippers remained the fastest sailing ships ever constructed.

Unlike the ships constructed in East Boston, grain clippers had few frills. Inside joiner work was kept to a minimum, and brass, teak and mahogany were used sparingly. Even their names, *Harvester*, *Reaper*, *Granger* and *Thrasher*, a function of grain markets, were very different from *Flying Cloud*, *Great Republic*, *Zephyr* or *Gazelle*. Above all, these ships were less expensive to build than extreme clippers. Labor cost less in Kennebunkport, Rockport and Bath than it did in East Boston. A ready supply of local timber was another advantage.⁵¹

While it is true that some medium clippers for the grain trade were built in East Boston, at a few yards, the island never really participated in this temporary revival in wooden shipbuilding. The center of the industry had shifted. In the 1840s and 1850s, such a shift, the result of geography and good fortune, had helped East Boston get started. In the 1870s, wooden shipbuilding, what there was of it, was focused on yards in Maine, and the iron shipbuilding industry, getting its own start, was located almost entirely south of East Boston, along the Delaware River, where there was more room for large yards than in East Boston, whose small shipyards

could not have been converted into the enormous physical plants that came to dominate iron shipbuilding wherever it became established.

As the 1870s came to a close, gloom in the East Boston shipbuilding community increased. "Never before have so many of our mechanics been out of employment," wrote a reporter for the *Argus*. "Never before was there a time when so many of those willing and anxious to work at any price have found it utterly impossible to obtain means to provide for their families."⁵² The unemployed and their families were directed to go to a Relief Association that had been organized on the island, where workers could receive "necessities, without involving the publicity from which" artisans and mechanics "naturally shrink." The *Argus* printed weekly the amount of bread and clothing that had been given away at the centers run by the Relief Association.⁵³ Whenever possible, the *Argus* emphasized positive developments. "The rumor that the sugar refinery is to be remodelled for other purposes requiring the employment of labor we believe to be well-founded, and under certain conditions, other important mechanical industries will be active and East Boston again become the workshop of the city."⁵⁴

On March 17, 1877, Guy C. Haynes died. He was the "oldest living resident" of East Boston, and excerpts from his journal had graced the front page of the *Argus* for years. Haynes had built the first house erected on the island in 1833 after the formation of the East Boston Company. His family, originally from Boston, was the first to move to the island. Haynes was the "youngest of 23 children," and since he was quite a local favorite, his death saddened the community.⁵⁵ During this decade, other notable citizens passed away, among them Samuel Hall. "In 1839, Mr. Hall came to East Boston, where he established shipbuilding on a firm basis," reported

the Argus. "He was in every respect a self-made man." Hall died on November 13, 1870, at his home on the island.⁵⁶

The 1880 Boston city directory continued to show shipyard workers leaving East Boston. Thirty-six of the artisans listed in the 1870 directory were no longer listed in 1880. Thirty-nine other workers moved to new addresses in East Boston. More than 50 per-cent of shipyard artisans in the sample left the island between 1870 and 1880. Of the ones who remained in 1880, a determined 69, more than 30 per-cent of the sample, listed skills that qualified them for work in a wooden shipyard. Other workers changed skills, and once again, of those who remained on the island, not a single one listed a skill that would have enabled him to work in an iron shipyard. William Burkett, a ship joiner in 1860, and a rigger in 1870, switched to cabinet-making in 1880. Luke Hall, a shipwright and ship carpenter since 1846, became a seller of "fish and oysters" on the Boston waterfront.⁵⁷

The 1880 Boston city directory suggests strongly that hope lingered among the artisans of East Boston. In reality, there was no reason to hope. Wages in the industry had reached rock bottom, and were down, in most instances, to one-third of what they had been in 1860. Ship carpenters, paid \$21.00 per week for new work in 1860, received only \$7.50 for identical work in 1878. The same was true for caulkers, whose wages were down more than 50 percent, averaging \$10.50 in 1878 instead of the \$24.00 per week caulkers could have demanded in 1860. By the close of the decade, wages for artisans in the East Boston shipbuilding trades were in free fall. Wages for other trades continued to rise.⁵⁸

By 1880, there was less reason to believe that iron ships would someday provide the economic stimulus once provided by wooden ships in the yards of East Boston. During the 1870s, the Atlantic works built more than 30 vessels, most

of them small, tugs and lighthouse tenders. No former wooden shipyard workers went to work in their yard on Border Street. Artisans interested in finding work in iron shipyards would not have stayed in East Boston. In 1876, yards along the Delaware produced more than 20 thousand tons of iron ships, up from 8,000 tons in 1872.⁵⁹ The Atlantic Works, a small firm, could never match the output of the large companies along the Delaware River, which was rapidly becoming the center of iron shipbuilding in the nation. If at the beginning of the 1870s there was hope for shipbuilding on the island, there was none at its close. East Boston was finished as a shipbuilding center.

In the 1870s the McKay family, after a series of financial misfortunes, left East Boston. After the failure of Argus and McKay, Nathaniel McKay moved to New York. He later went to Philadelphia, where he started a new career in iron shipbuilding.⁶⁰ The last work Donald McKay did in East Boston, in 1875, was to rerig the schooner-yacht *America*. He then sold his home on Eagle Hill, and purchased the Dana Farm in Hamilton, Massachusetts. In July, 1880, while working on the farm, Donald McKay suffered a stroke. He died two months later, on September 20, 1880. He is buried in Oak Hill Cemetery, Newburyport.⁶¹ His death, fittingly, brings to a close the story of the wooden ships of East Boston.

1. *Report of the Boston Board of Trade, 1857*, pp. 86-90. Also the Bethlehem Shipbuilding Corporation Archives: Atlantic Works, *Account Books, Receipts, Records, Correspondence* at the Hart Nautical Collection, M.I.T. [hereafter BSCA]

2. Henry Hall, *Report on the Ship-Building Industry of the United States*, p. 89.
3. "The Arrival of the Mammoth Steam-Ship 'Great Eastern,'" Scientific American, July 2, 1860, pp. 24-26.
4. Hall, Op. Cit., pp. 200-201.
5. BSCA. Also, *East Boston Argus*, December 12, 1878, and *Boston Looks Seaward*, compiled by workers of the Writers' Program for the WPA in Massachusetts (Boston: Bruce Humphries, Inc., 1941), p. 167.
6. Richard McKay, *Some Famous Sailing Ships*, pp. 370-374, 362. Richard McKay claims that in addition to its naval ventures, Aldus and McKay "took up the construction of railroad locomotives; turning out several fine ones for the old Eastern R.R., the Fitchburg R.R., the Little Rock & Fort Smith R.R. of Arkansas and others." Since no company records survive, this claim cannot be verified.
7. Ibid., p. 362. Also BSCA.
8. Hall, Op. Cit., p. 197.
9. "The Influence of the Suez Canal Upon American Commerce," The U.S. Nautical Magazine, November, 1856, pp. 86-90.
10. *Census of Boston, 1865*.
11. See Appendix II, *Directory Comparison between 1846/1852/1860 and 1870/1880 Boston city directories*.
12. See Appendix I, *Shipbuilding and Related Industries in East Boston*.
13. *East Boston Argus*, October 15, 1870.
14. Ibid.
15. *East Boston Argus*, November 26, 1870.
16. *Causes of the Reduction of American Tonnage and the Decline of Navigation Interests, A Select Report Made to the House of Representatives* (Washington, D.C.: Government Printing Office, 1870), p. 82. [Hereafter the Lynch Report]
17. The Lynch Report, pp. 84-85.

18. The *Lynch Report*, p. 119.
19. The *Lynch Report*, p. 119, 203.
20. James E. Simpson, *Letter*, December 4, 1869, as printed in the *Lynch Report*, p. 205. Simpson had left East Boston for Maine, where he was president of the Portland Dry Dock and Warehouse Company.
21. George B. Upton, *Letter*, November 29, 1869, as printed in the *Lynch Report*, p. 200.
22. Robert B. Forbes, *Letter*, December 6, 1869, as printed in the *Lynch Report*, pp. 199-200.
23. Massachusetts Bureau of Statistics of Labor, *Tenth Annual Report* (Boston: Rand, Avery & Co., 1879), p. 75.
24. Ibid., pp. 68-80.
25. The *Lynch Report*, p. 121.
26. Ibid., p. 85.
27. Hutchins, *American Maritime Industries*, pp. 384-385.
28. Richard McKay, *Some Famous Sailing Ships*, pp. 374-375.
29. East Boston Argus, October 16, 1875.
30. The *Lynch Report*, p. 121.
31. Ibid, p. 121.
32. Ibid., p. 79.
33. BSCA.
34. "Our Iron Shipbuilding Industry," Scientific American, May 5, 1877, p. 273.
35. Ibid. Also, Charles Barnard, "The American Clyde," Harper's New Monthly Magazine, April, 1878, pp. 642-653.
36. The *Lynch Report*, p. 21.
37. Charles Barnard, "The American Clyde," Harper's New Monthly Magazine, April, 1878.

38. Ibid., p. 649-650.

39. Ibid., p. 651.

40. Charles H. Cramp, "The Evolution of Screw Propulsion in the United States," Transactions of the Society of Naval Architects and Marine Engineers, (1909-1910), Part I., p. 156.

41. "Our Iron Shipbuilding Industry," Scientific American, May 5, 1877, p. 273. Henry Hall, Report on the Ship-Building Industry, pp. 199-201. Hall supplies a careful estimate of the machinery and its cost for a small iron shipbuilding facility. In addition to those mentioned, there were: 2 countersinks, \$1,500; 1 frame-bending slab, \$1,500; engine, boilers, pumps, \$4,000; shafting and pulleys, \$5,000; blacksmith shop and fittings, \$3,000; cranes and railways, \$3,000; hand tools, \$2,500; sundries, \$5,000; foundations, \$4,000, and the buildings themselves, \$10,000.

42. The Lynch Report, p. 121.

43. Boston Board of Trade, Annual Reports, 1853-1857.

44. Frederick Cople Jaher, The Urban Establishment, pp. 87-99. See also Alfred D. Chandler, The Visible Hand: The Managerial Revolution in American Business, Robert Dalzell, Enterprising Elite: The Boston Associates and the World They Made, and Ferdinand Lundberg's America's 60 Families. After the Civil War, Boston capital was not the force it had been in the decades preceding the conflict. Brahmins who were still alive in the 1870s and 1880s were a fussy, stodgy, conservative group whose tattered daring did not serve them well in the charged post-war investment climate.

45. John W. Watson, "The Building of the Ship," Harper's New Monthly Magazine, April, 1862, p. 619. "The building of the iron ship," Watson writes, "is in every respect the same as the making of the steamboat boiler."

46. The Atlantic Works in East Boston was one place workers interested in retraining might have found employment. There were also iron foundries and at least one rolling mill, the Norway Rolling Mill, in South Boston. Harrison Loring, who started out as a marine engine builder, was capable of building iron ships at his facility in South Boston, and before the war two iron steamers were constructed in his yard. But after the Civil War his facility concentrated on the production of machinery for sugar and paper factories. It was not a place an unemployed shipyard worker would have gone. See Henry Hall, Report on the Ship-Building Industry in the United States, p. 201.

47. Appendix II. The 200 workers represent a selection of 100 men drawn from the 1860 Boston city directory whose names had not appeared in either the 1846 or 1852 directories, and another 100 whose names had appeared in either the 1846 or 1852 city directory or in both and whose names also were listed in 1860. Thus, some workers on the list had been workers in East Boston shipyards for as long as 25 years, while others may have been but 10 years in the yards.

48. Massachusetts, *Bureau of Statistics of Labor*, 1879, p. 75. Workers were paid more for old work, but disliked doing it, and if given the choice, would much rather have worked on a new ship than recaulked, repainted, or recoppered an old one.

49. *East Boston Argus*, December 27, 1873.

50. Henry Hall, *Report on the Ship-Building Industry in the United States*, p. 71. John G.B. Hutchins, *The American Maritime Industries and Public Policy*, pp. 373-382. Also, Nathan Rosenberg, *Perspectives on Technology* (Cambridge: Harvard University Press, 1972), p. 205-206.

51. Hall, Op. Cit., p. 71. Also Hutchins, p. 382-384.

52. *East Boston Argus*, February 24, 1877.

53. *East Boston Argus*, March 3, 1877. D.D. Kelly, a well-known and wealthy East Boston shipyard owner, ran his own center. He also distributed free tickets to cultural events to the children of unemployed artisans, and made a point of encouraging others to do so. Many riggers, boilermakers, and shipwrights were involved in organizing and running these centers, as were their wives. At least two centers were run by women, one by Mrs. T.D. Demond, and another by Mrs. Isaiah Atkins, whose husband listed himself as a caulk in the 1860 Boston city directory.

54. *East Boston Argus*, December 14, 1878.

55. *East Boston Argus*, March 24, 1877.

56. *East Boston Argus*, November 19, 1870.

57. See Appendix II.

58. Massachusetts, *Bureau of Statistics of Labor*, p. 75.

59. "Iron Ship Building," Scientific American, August 4, 1877, p. 72. Also BSCA.

60. *East Boston Argus*, May 18, 1877.

61. *New York Times*, September 22, 1880. Also, John J. McNamara, Jr., "Monuments of Snow," Sail Magazine, August, 1978.

VII

Conclusion

The change from the use of wood to that of iron in naval structures has effected prominent changes in the requisites of ...every navy yard in the country. The machines which handle that metal are, of necessity, formidable. Hideous monsters, mechanical ogres, stand ready with savage jaws to bite out mouthfuls of solid metal. The metal shrieks as chisels pare it away while sliding under the planing tool, where it cannot writhe, no matter what its agonies. Or it is twisted around by ponderous lathes, which whirl these enormous masses as lightly as if they were shillalahs at Donnybrook Fair.¹

What can be said of the iron ship? She can not suggest the beautiful.²

That artisans who had formerly worked in wooden shipyards in East Boston failed to adopt trades that would have enabled them to work in the small iron shipbuilding industry on the island, or in nearby South Boston, where Harrison Loring had established an iron shipyard, is to some extent demonstrated by the data, which show that more than half the workers in the sample left the island.³ Of those who remained, not one became a machinist, a riveter, a ship fitter, or a driller. Apart from the few who moved locally, and therefore show up in Boston city directories, the whereabouts of other artisans who left East Boston are difficult to determine. Tracking the peripatetic nineteenth-century artisan is an arduous job; tracking laborers, many of them having the same first and last

names, is all but impossible.⁴

Some unemployed workers might have moved to the Delaware River Valley, and surely a few of them did. Workers followed the work. A shipbuilding industry was taking root in the valley, and a need existed, even in the iron shipbuilding industry, for experienced riggers and ship carpenters. It seems reasonable that men who had spent their entire working lives building wooden ships might have changed trades and stayed with the industry. But the evidence in city directories, which does not pertain to artisans who left East Boston, shows that virtually no workers in the sample who changed skills found work in shipbuilding. Most, in fact, chose to enter unrelated trades.

Some ship carpenters and joiners entered the building trades as house carpenters, a lateral move in terms of skill. Others made dramatic breaks with the past, choosing careers that took them far from the shipyards. Joseph Bates, for example, a caulk in 1860, was a patrolman in 1870 and a lieutenant by 1880.⁵ Luke Hall entered a more genteel trade, as did Nehemiah Merritt, a ship carpenter who became president of the Union Mutual Benefit Association. Joseph Goodale, a sparmaker, switched to furniture polishing in 1870. Ten years later, he and his brother John, who had begun building toys in Boston's North End, left the Boston area.

Shipbuilders who testified before the Lynch Committee in 1869 were convinced that artisans in their silent yards could be retrained. Their optimism, to some extent, reflects a cursory understanding of the rigors involved in changing from one industry to what was actually another, and not, as many have supposed, the same industry using a different building material. Iron shipyard skills were factory skills, not skills transplanted from the wooden shipyard. For workers faced with the challenge of learning an

entirely new skill, becoming a policeman was considerably more inviting than learning how to become a boilermaker, a plater, riveter, driller, or pipe fitter.

Building an iron ship required levels of engineering and management expertise unknown to East Boston builders of clipper ships, no matter how sophisticated their understanding of naval architecture, or how advanced their use of labor-saving machinery. For most East Boston shipbuilders, lack of first-hand knowledge in building iron ships partly explains their optimism regarding unemployed artisans. To be run successfully, an iron shipyard demanded levels of organization undreamed of in the small yards of East Boston. And the level of capitalization in an iron yard, as the investment John Roach made in his plant in Chester reveals, was more like that demanded by railroads than clipper ships. The iron shipyard was a modern industrial corporation that little resembled small East Boston shipyards, and workers who crossed the line from wood work to iron work entered an organizational world very removed from the family-owned, paternalistically run shipyards of East Boston.

The alien character of the iron shipyard explains some of the resistance of the artisans. But it is not a complete explanation, since so many artisans showed little resistance to learning other new skills. A skilled worker tended to resist change, as the listings in Boston city directories as late as 1880 reveal. And artisans who built clipper ships were among the most skilled workers this country had ever seen. But something more complicated than simple resistance to change occurred in the transition from wooden sailing ships to smoke-belching iron steamships.

Ships had been made from wood for centuries. It was difficult, if not impossible, for workers who had learned and then practiced the skills of the wooden shipyard to imagine a

world where wood ceased to be the material used in building ocean-going vessels. But that is exactly what had taken place in the shipyards of East Boston. A mode of construction thousands of years old was displaced in less than half a century. How could workers be expected to accept such a change? The many artisans listing themselves in Boston city directories, as late as 1880, as shipwrights, ship-carpenters, mast-makers, oakum-spinners, and caulkers, may simply have been closing their eyes. Given the shock of what happened to them, such behavior would not have been surprising.

Was such change inevitable? The price of iron, as high as \$52.50 a ton in 1837, had dropped to \$16.50 per ton by 1878.⁶ That in itself does not explain the demise of the wooden shipbuilding industry, but when coupled with other events--the loss of markets, technological advances in steam engines, growing evidence that ships made from iron lasted longer than ships made from wood--one understands better the collapse in the wages of East Boston shipyard artisans. Of course, no single factor explains the end of the wooden shipbuilding industry. Nor was the demise technologically inevitable; a drop in the price of iron was probably the most telling factor in the shift from wood to iron. Technology, in this case, operated as a necessary, not sufficient cause.

East Boston, as a community, did not die with the demise of the wooden shipbuilding industry. Only that single industry collapsed, its destruction constituting an extension of the factory system to the building of ships. Iron ships would have to be assembled outdoors, near the water, but their component elements would be shaped inside foundries and smith shops. In shipbuilding, the mechanical, industrial, and practical arts had given way, finally, to technological progress. The victims of that progress, the shipwrights, caulkers, joiners, ship carpenters, and designers of East

Boston who had raised their craft to an art found other work, unsuitable as such work might have seemed after so many years making ships in the yards, where once and for all the "strange staccato tappings--quick, sharp notes of iron music," now replaced the steady ring of caulkers' hammers."

1. W.F.G. Shanks, "*The Brooklyn Navy Yard*," Harper's New Monthly Magazine, December, 1870, p. 9.
2. Charles Barnard, "*The American Clyde*," Harper's New Monthly Magazine, April, 1878, p. 643.
3. See Appendix IIIB. Also, Henry Hall, *Report on the Ship-Building Industry*, p. 201.
4. The organization and condition of United States census records for population makes this so. Unless the researcher knows ahead of time where to look, his is a thankless, often fruitless task.
5. See Appendix IIIB.
6. Henry Hall, *Report on the Ship-Building Industry*, p. 197.
7. Charles Barnard, "*The American Clyde*," Harper's New Monthly Magazine, April, 1878, p. 642.

Appendix I

Shipbuilding and Related Industries in East Boston

BOSTON ALMANAC 1845

Shipwrights and Caulkers

Samuel Hall Liverpool St.

BOSTON ALMANAC 1850

Shipwrights and Caulkers

Bates and Harford	Summer St.
Brown and Lovell	Marine R.R. & Summer
Anson Ellms	Week's Wharf
Samuel Hall	Liverpool St.
Donald McKay	Meridian St.
Holmes and Snelling	Summer St.
Jarvis Pratt	Tuttle's Wharf
A. & G. T. Sampson	Liverpool St.

Steam Sawing and Planing

H. H. Herrick and Co. Maverick St.
J.P. & J.A. Woodbury Border St.

Snip Smiths

John Howe, Jr.
Nathaniel Lufkin
Nason & Cleverland

Joiners House and Ship

W.C. Ford and Co.
Manson & Peterson
N.T. & C.T. Merritt

100

Charles F. & H.D.
Gardiner
L. Hancock Liverpool St.
Marginal St.

Hardwood Lumber

Henry Jones & Co. Clifton's Wharf

Machinists

W. O. Andrews Border St.

Manufacturing and Other Companies

East Boston Iron
& Gas Co. 8 Curtis St.
East Boston Salt Co. Lewis St.
East Boston Wharf Co. Lewis St.

Pumps and Boiler Makers

John K. Carr Sumner St.

Riggers

W.J. Rodney & Co. Sumner St.

Sail Makers

Philip Peak 7 E.R.R. Wharf
S.A. Porter Cunningham's Wharf

BOSTON ALMANAC 1855

Shipwrights and Caulkers

Adams and Andrews Sumner St.
Geo. & Thomas Boote Jeffries Point
Brown & Lovell Sumner St., E.R.R. Wharf
Paul Curtis Border St.
Samuel Hall Border St.
Wm. Hall Maverick St.
R.E. Jackson 166 Border St.
D.D. Kelly Kelly & Holmes Wharf, Sumner St.
Donald McKay Border St.
Albert R. Philbrook Sumner St.
Jarvis Pratt
A. & G.T. Sampson
James E. Simpson Jeffries Point

A.G. & S.H. Whidden Sumner St.

Ship Smiths

J. Hathaway & Co.	Border St.
Jos. Herald	Sumner St.
Nat Lufkin	Bremen St.
James Note	Sumner St.

Machinists

Geo. M. Bird	Lewis St.
Holden & Gallagher	Lewis St.
C. Tufts	Webster St.

Manufacturing and Other Companies

Atlantic Works	
East Boston Company	
East Boston Drydock	7 Change Avenue
East Boston Iron Co.	New Street
East Boston Wharf Co.	22 Lewis Street

Pumps and Boiler Makers

Greenville Chapman & Co.	Sumner St.
H. & S.G. Kenny	86 Border St.

Riggers

W. M. Brewster	Cunningham's Wharf
W. J. Rodney & Co.	Sumner St.

Sailmaking

Mayhew Porter & Co.	Sumner St.
---------------------	------------

Coppersmiths

H.W. Colman & Co.	Lewis St.
John Frasier	30 Lewis St.
Pat. O. Gallagher	Lewis St.
W. Waters	25 Sumner St.

Iron Founders

Arnold & Butts	Chelsea St.
----------------	-------------

Furnaces and Ranges

Rice and Lombard 12 Lewis St.

Ship Painters

M. S. Albertson
Sam F. Ell's
A. Nickerson, Jr.
Sumner St.
Week's Wharf
Sumner St.

BOSTON ALMANAC 1860

Shipwrights and Caulkers

Brown and Lovell 63 Sumner St.
Dolliver and Sleeper 57 Eastern Ave., Simson's Dry Dock
Choate & Gove 237 Commercial St., Marginal St.
H. Hyland Marginal St., N. Jeffries St.
D.J. Kelly Kelly's Wharf, Sumner St.
Kippeler & Rice Maverick Wharf
Ladd & Pipes Foot of Sumner St.
Jarvis Pratt Border St., Foot of Lexington
A. & G.T. Sampson Border St., 377 Commercial
J. Snelling 820 Commercial, Foot of Sumner
A.G. & S.H. Whidden Week's Wharf

Ship Smiths

J. Hathaway & Co. People's Ferry Ave., Border St.
Averill Howe & Co. 50 Eastern Ave., Tuft's Wharf
G.H. & J.G. Leman 236 Broad St.
J. S. Merrim Border St., nr. Eutaw
Cleveland Mason & Co. 29 Border St.

Shipbuilders

Paul Curtis Border St.,
C.F. & H.D. Gardiner Kelly's Wharf, Marginal St.
Sam Hall Border St.
R.E. Jackson 166 Border St.
Wilbur Laskey Border St.
Donald McKay Border St.

Ship Chandlers [19]

All in Boston

Sailmakers [42]

All in Boston

Towboats [Most in Boston]

R.B. Forbes (Used to tow E.B. Clippers)

Surveyors of Lumber [4/5]
(Oak & Ship Timber)

Charles Brooks
S. Brooks
John B. Drew
E.K. Sparrell
14 Bremen St.
Saratoga St., nr. Meridian St.
Border St., Central Square
36 Saratoga St.

(Pine) [3/!7]

Eras. J. Fowles
Geo. Hall
John LeFavor
Marginal St.
3 Maverick St.
9 Centre St.

Machinists

Atlantic Works
Lewis Snow

Machinery & Tools

Atlantic Works

Iron Steamships & Vessel Builders

Atlantic Works

Boiler Makers

Atlantic Works
McKay & Gallagher
E. Snow & Co.
Border St.
Lew's St.

Manufacturing Companies

Atlantic Works
East Boston Gas Co.
East Boston Section Dock Co.
Sam Hall, B. Thomas,
Treas.
East Boston Iron,
Geo. Plummer, Treas. New St.

Marine Engines

Atlantic Works

Mast Makers

N. Loud Sumner St.
A.W. & B.L. Fernald People's Ferry Ave. & Fernald Wharf
Geo. E. Young Condon St.

Mechanical Engineer

Wm. C. Hibbard,
(at Atlantic Works)

Pump and Block Makers

N. Chapman Brown & Lovell's Wharf

Riggers [2/10]

W.M. Brewster & Son Maverick Wharf
Johnson & Parker Simpson's Dry Dock

BOSTON ALMANAC 1865

Shipwrights and Caulkers

Foster and Leighton Darton's Wharf
Gove and Choate Marginal, cor. Jeffries
W.F. Green Nickerson's Wharf
D.D. Kelly Kelly's Marine Rail Road
Ladd & Piper Foot of Sumner
A. & G.T. Sampson Marginal
A.G. & S.H. Whidden Week's Wharf

Ship Smiths

J. Hathaway	Decatur
S. Hathaway & Co.	Border St.
Hunter & Emery	Foot Sumner St.
J.S. Mendum	Border, nr. Eutaw
James Nute	Sumner St.
A. Taylor	63 Sumner St.

Shipbuilders

G. Boole & T. Webster	Jeffries Point
Paul Curtis	Border St.
Curtis & Tilden	Meridian St., Condor St.
Sam Hall	Border St.
R.E. Jackson	166 Border St.
D.D. Kelly	Kelly's M.R.R.
Smith & Cushman	Border St., nr. Eutaw St.
J. Taylor	Eutaw St.

Ship Chandlers

[14]

[All in Boston]

Machinists

G.M. Bird	Border St.
L. Osborn	Marginal St.

Mast & Spar Makers

A.W. Fernald	Fernald's Wharf
P.J. White & Co.	59 Sumner St.

Pump & Block Makers

Chas. A. Greenville	111 Sumner St.
---------------------	----------------

Sailmakers

[All in Boston] Commercial/Lewis Wharves

Dry Docks

E. B. Dry Dock Co.	Border St.
Simpson's Dry Dock	

Boiler Makers

BOSTON ALMANAC 1870

[No Almanac 1870]

BOSTON ALMANAC, 1875

Ship Builders

Campbell and Brooks	334 Border St.
Abiel Gove	290 Marginal St.
W.F. Green	282 Border St.
Robert Jackson	230 Border St.
D.D. Kelly	Summer St.
A. & G.T. Sampson	Marginal St.
Smith and Townsend	374 Border St.

Ship Joiners

W. F. Greene	282 Border St.
H. L. Jones	137 Border St.
William H. McKie	153 Border St.
Sidney Peterson	145 Border St.

Snip Smiths

Albert Cole	273 Border St.
Fitch & Joy	272 Marginal St.
Hathaway and Wright	133 Border St.
S. Hathaway	150 Border St.
Robert Hunter	28 New St.
Edward Johnson	264 Marginal St.
J. & J. Keriston	297 Border St.
J.S. Leman	Marginal opp Simpson's Dry Dock
Nathaniel Lufkin	136 Bremen St.
Benjamin Misener	96 Lewis St.
William A. Mitchell	103 Summer St.
James Nutt & Son	79 Summer St.

Shipwrights and Caulkers

W.H. Fredson 102 Lewis St.
Abiel Gove 299 Marginal St.

Wm. Greene	282 Border St.
D.D. Kelly	Sumner St.
Jos. Ladd	13 Sumner St.
Piper & Marquand	Maverick Wharf
A. & G.T. Sampson	Marginal St.
Sargent & Sleeper	Maverick St.
A.G. & S.H. Whidden	Foot Sumner St.

Sailmakers

All in Boston

Riggers

George Bartley	99 Sumner St.
Miller & Stark	34 New St.

Machinists

George M. Bird & Co.	70 Lewis St.
----------------------	--------------

Iron Steamship and Vessel Builders

Atlantic Works

Boilermakers

Atlantic Works	72 Border St.
E. Hodge & Co.	160 Liverpool St.
Louis Osborn & Co.	74 Lewis St.

BOSTON ALMANAC 1880

Shipbuilders

Atlantic Works	72 Border St.
John M. Brooks	334 Border St.
Malcolm Campbell & Co.	Border St.
Abiel Gove	299 Marginal St.
Robert Jackson	230 Border St.
D.D. Kelly	Sumner St.
Smith & Townsend	374 Border St.
J.E. Taylor	Condor, next Meridian St. Bridge

Ship Joiners

Isaac G. Caswell	20 Princeton St.
------------------	------------------

H.L. Jones & Co. 131 Border St.
Wm. H. McKie 153 Border St.
Sidney Peterson 145 Border St.

Mast and Spar Makers

Thomas Armstrong 276 Border St.
Caldwell & Odiorne Condor St. (also in Boston)
H. Pigeon & Sons 85 Summer St. (also in Boston)
George E. Young & Sons Condor St.

Riggers

George W. Bartley & Son 7 Summer St.
Morrison & Foy 99 Summer St.
William Miller 34 New St.

Sailmakers

[All in Boston]

Ship Smiths [1/3]
Albert Cole 273 Border St.

Steam Boilers, Engines [1/10]

Atlantic Works

Machinists [5/95]

Atlantic Works
M. Carbee & Co. 87 Border St.
Collins & Webb 17 Border St.
F.J. Nelson 173 Summer St.
Louis Osborn & Co. 74 Lewis St.

Marine Rail Ways

East Boston Dry Dock 96 Border St.
D.D. Kelly & Son Summer St.

Boilermakers

Atlantic Works 72 Border St.
Hodge & Co. 160 Liverpool St.
Michael Killilea Tuft's Wharf
Robinson Boiler Works 5 New St.

Dry Docks

East Bo. on Dry Dock

96 Border St.
R. Burnham, Superintendent

Simpson's Patent Dry
Dock

Marginal St.,
Octavius Howe, Superintendent

Appendix II

East Boston Shipyard Worker Data Base: Boston Directory 1846

<u>Name</u>	<u>Skill</u>	<u>Home Address</u>
John Q. Adams	shipwright	Meridian
Joseph C. Adams	blacksmith	Meridian
John Adams	shipbuilder	London
James Adams	shipbuilder	London
James Adams	machinist	Sumner/Havre b
Stephen Bradford	caulker/graver	Maverick
Francis J.A. Boole	shipbuilder	Eutaw
William H. Boole	shipbuilder	Marion
Leonard A. Boole	shipbuilder	Marion
John Boole	shipbuilder	Marion
Joseph Bates	shipwright	Saratoga
Joseph Barner	ship carpenter	Marion
Charles H. Barker	engineer	Princeton
Samuel A. Bailey	mechanic	Meridian
Henry Bailey	carpenter	Meridian
John Bushee	boatbuilder	Liverpool
Samuel K. Burrisson	caulker/graver	Maverick
Gilman G. Burnham	s/w Week's Wharf	Sumner
William H. Brown	carver	Saratoga
George W. Brown	s/w Brown/Lovell	
J.A. Clark	machinist	Havre
John A. Cling	coppersmith	Cottage
William Chilton	machinist	Sumner b
Charles Chesbro	engineer	Sumner
Frederick P. Cheney	cooper	Liverpool
George Chase	joiner	Meridian
Warren Chapman	pile driver	Eutaw
Oliver Chandler	blacksmith/MRW	
Moses Carr	shipwright	Saratoga
John Carr	pump/block maker	Meridian
Luther Colman	engineer/ERR	Webster
George W. Cole	machinist	Webster
David Codding	moulder	Paris b [J.Jackson]
Rufus Cushman	ship carpenter	Bennington
Francis Cushman	pile driver	Meridian
Sam L. Crooker	painter/ERR Whrf	Sumner
Joseph Davis	mast maker	Cottage
Silas Day	machinist	Maverick b
Thomas Ditson	machinist	Paris
John Dillingham		Maverick Sq.
Samuel Dillaway, Jr.,	caulker	Havre
William H. Delano	Bradford & Delano	Saratoga

[43]

Edward H. Deland	ship carpenter	Webster b
Johnson Dilliver	engineer	Saratoga
Thomas T. Douglas	engineer	Everett
Francis Drake	blacksmith	Cottage
James Drake	blacksmith	Paris
Leonard Eastman	machinist	Meridian
Edward Elkins	shipwright	Lexington b
William E. M.	pump/block maker	Chelsea
Samuel Evans	cabinetmaker	Paris
John Farrow	shipwright	Sumner
Almeric W. Ferrald	spalmaker	Liverpool
William Pettyplace	sprintd EBCO	Maverick Sq.
Edward Fitzgerald	cooper	Meridian
Francis F. Luker		Havre
Michael Ford, Jr.,	ship carpenter	Saratoga
Abraham Foss	blacksmith	Webster
Thomas Foster	shipwright	Maverick
Thomas Foster, Jr.,	shipwright	Maverick
Thomas A. Foster	shipwright	Maverick
Warren Foster	shipwright	New
William S. Foster	shipwright	London
George Frame	iron founder	Maverick
Manuel Francis	machinist	Liverpool
Jeremiah S. Fuller	machinist	Sumner
George Garren	caulker/graver	Maverick
Edima E. Gould	pile driver	Everett
Robert Green	cooper	Eutaw
Jos. A. Griffin	pile driver	Meridian
Elisha Gunnison	blacksmith	Border
Oliver Guppy	pile driver	Meridian
Luke Hall	shipcarpenter	Central Sq.
Samuel Hall	shipwright	Liverpool
William G. Hall	Chandler & Hall	Paris
Alvan Hamilton	blacksmith	Everett
H.A. Harford	s/w Tuttle's Wrf	Liverpool
Alexander Hartwell	shp-paintr/Meridian	London
H.Hiram Herrick & Co.	steam mill/Marginal	Sumner
Ezra Hinckley	cooper	Liverpool
David Hodge	caulker/graver	Border
Edward Hodge	caulker/graver	Border
Henry Holden	pile driver	Paris b [Jackson's]
Thaddeus Holmes	caulker	Border
Zephaniah Hosea	shipwright	Border
Edward Howard	moulder	Paris b [Jackson's]
Benjamin Ingalls	coppersmith	Maverick
Jacob Jackson	moulder	Paris
William Jackson	machinist	Liverpool
Thomas Jenkins	engineer	Maverick
A & W Jones	machinists	Liverpool

[91]

Peter Jones	caulker	Marion
William Keen	coppersmith	Maverick
Simeon Keen	shipwright	Maverick
Lauriston Kirby	boulder	Cottage or foundry
Nicholas Lawster	caulker/graver	Sumner
Benjamin Leavitt	machinist	Havre b
John LeFevor	lumber surveyor	Centre
Sam Leonard	shipbuilder	Meridian
Orville Leonard	machinist	Summer
Calvin Lewis	shipwright	Maverick
Oliver Lewis	boulder	Meridian
Nichols Litchfield	shipwright	Marion
Davis Litchfield	ship carpenter	Marion
Stephen Locke & Co.	lumber/centre	Sumner
Michael Looney	sawyer	Meridian
Edward Loring	caulker	Maverick
John洛throp	sailmaker/commercial*	Cottage
Mason Matsch	machinist	Havre b [J. Holden]
David D. Matsch	shipwright	Havre
Donald McKay	shipbuilder	White
Nathaniel McKay		73 Lexington
James McLaughlin	machinist	Chelsea
Duncan McLean	reporter/Bost Post	Meridian
Elijah Morris	shipwright	Havre
Timothy Osgood	shipwright	Marion
Josiah Parsons	caulker	Meridian
Albert Philbrick	sho. captain	Meridian
Henry Pigeon	mast maker	Havre
B.C. Pool	mast maker	Havre
Alfred Randall	EB iron foundry/	Maverick
	Lewis St.	
Charles Reynolds	machinist	Maverick
Joseph Robbins	Lovejoy &	Maverick
	Robbins	
David Robinson	caulker/graver	Maverick
Archibald Ryer	shipwright	Saratoga
Benjamin Seaver	shipwright	Summer
Joseph Seavey	hse/shp joiner	Havre
George Short	blacksmith	Liverpool
John Shute	caulker/graver	Saratoga
Isaac Smith	machinist	Maverick
Gilbert Stevens	machinist	Havre
Noah Sturtevant & Co.		Eutaw
Samuel Treadwell	cabinetmaker	Liverpool
Joshua A. Varney	shipwright/3rd sect.	
William Waters	blockmaker	Maverick
Warren White	coppersmith	Border
	shipbuilder	Border

[137]

* Lothrop lived in East Boston, but worked at Commercial Wharf in Boston, where most rigging was done.

Many Irish laborers were listed in the 1846 directory.

b after address indicates "boarding."

East Boston Shipyard Worker Data Base: Boston Directory 1852

<u>Name</u>	<u>Skill</u>	<u>Home Address</u>
John W. Acres	sailmaker	75 Meridian
William Alexander	ship joiner	42 Saratoga
Lumber Allen	shipwright	227 Meridian
Albert Andrews	engineer	Marginal
Francis M. Andrews	shipwright	77 Lexington
Ebeneezer Atkins		66 Paris
David Atwood	shipwright	17 Marion
Henry Bailey	carpenter	Centre
Paul Bailey	carpenter	Centre
Francis Barber	rigger	4 Border
William Barker	shipwright	171 Meridian
Cushing Barnes	ship carpenter	73 Marion
Joseph Barnes	carpenter	5 Liverpool
Louis D. Bartlett	machinist	Maverick b
Benj. Bartol & H.K. Adams	shipwright caulker MRW	
Zephaniah Bassett	shipsmith*	Chelsea
Edward T. Bates	caulker	18 Summer b
George Bates	ship joiner	17 Bennington
Archibald Bean	sailmaker	15 Maverick
Eben Beard	cabinetmaker	81 Meridian
David Bicknell	machinist	23 London
John Bilby	carpenter	91 Cottage
Jeremiah Bird	machinist	Chelsea
Thomas Bisbee	machinist	11 Winthrop
Abram Bixby	machinist	18 Summer b
Samuel N. Blaisdell	shipwright	17 Liverpool
Sargent Blaisdell	pile driver	130 Saratoga
Henry Blake	machinist	228 Saratoga
Tyler & Blanchard		109 Saratoga
Joseph F. Blasland	ship joiner	71 Meridian
Caifer J. Blount	rigger	67 Cottage
Alfred Boland	painter	75 Maverick
George Boole	shipwright	Lexington
Thomas Boole	shipwright	89 Meridian b
Isaac Boss	sailmaker*	14 Paris
John Boyle	shipwright	Meridian
Morton Bradford	ship joiner	Summer b
William Brewster	rigger	112 Summer b
William M. Brewster	rigger/Cunningham's Wharf	112 Summer
Lawrence Brierty	machinist	Summer b
Charles W. Brown	rigger	30 Trenton
Nathaniel Brown	caulker	66 Summer [44]

William Brown	carver	Summer St.	Saratoga
George P. Buttard	moulder	New	
James Burchsted	mastmaker	43 Chelsea	
William R. Burke	shipwright	19 Bennington	
Joseph Burke	shipwright	Monmouth	
William Burkett	ship joiner	29 Trenton	
Joseph P. Burnham	shipwright	19 New	
John Butler	machinist	15 Maverick Sq b	
Alexander Campbell	shipwright	Batum	
John K. Carlton	cooper	"Jetties	
	"Jetties	64 Summer	
		Wharf	
Henry Carney	engineer	78 Webster	
As. C. Carr	hse/shp joiner	11 Saratoga	
James K. Carr	pump/block maker	Marginal	
	Brown & Lovell		
Moses Carr	ship carpenter	Saratoga	
William Carr	ship carpenter	17 Lexington	
Ira Carver	shipwright	249 Meridian	
Israel Carver	shipwright	35 Lexington	
John Casey	shipwright	1 Bremer	
Robert Cassidy	[hsewright]	93 Meridian	
Thomas Cassidy	[sew. right]	93 Meridian	
Charles Chamberlain	moulder	38 Havre b	
Nathaniel Chapman	pump & block mks	10 Paris	
Charles A. Greenville	Cunningham's Wharf		
Samuel W. Chase	carpenter/Marginal	London	
John Christian	shipwright	14 Liverpool	
Isaac Collier	ropemaker	Cross or Border	
Thomas Collins	machinist	12 Paris b	
Colman Cook, 2nd	joiner	239 Meridian	
Daniel Coontz	machinist	18 Summer b	
John Combs	shipwright	London or Meridian	
Charles P. Cottle	shipwright	109 Saratoga	
George W. Crafts	caulker	2 Border	
Elijah C. Crowe	machinist	11 Winthrop b	
Alonzo Crosby &	wood/Ferry Wharf	Meridian	
N. Gibson	Lewis St.		
Rosea Cromell	shipwright	37 Webster	
Ames Cummings, Jr.	shipwright	278 Meridian	
John J. Curtis	shipbuilder	19 Lexington	
Samuel D. Curtis	shipbuilder	6 Liverpool	
William Curtis	shipbuilder	Saratoga	
Rufus Cushman	shipwright	26 Saratoga	
John Dagin	sawyer	78 Maverick	
Abrau J. Dakin	shipwright	Trenton	
Charles M. Dakin	shipwright	Batum	
Alexander Damon	shipwright	Trenton	
Prentiss Danforth	machinist	Bremen	
Andrew Davis	shipwright	15 Havre [91]	

Sumner A. Davis	blacksmith	17 Seneca
Lyman Dawes	machinist*	9 Havre b
John Dawson	ship joiner	b opp 17 New
Elijah Delano	Doane & Delano	Liverpool or May b
William H. Delano	shipwright	50 Saratoga
Charles H. Dillaway	ship chandler*	54 Saratoga
William Dillaway	Brown & Dillaway	Chelsea
Samuel Dillaway, Jr.	caulker	101 Havre
John R. Dennis	ship joiner	Summer
John M. Doane	shp-jnr/Merid hse	15 Bennington
James Doherty		Saratoga nr Foundry
Albert H. Dolliver & Co.	sailmaker*	76 London
David Doran	shipwright	London
Thomas T. Douglass	engineer	3 Bremen
William Douglass	shipwright	Eutaw
George B. Drew	ship carpenter	59 Meridian
Asahei Duran	carpenter	Cottage
Samuel F. Edwards	pump/block maker	39 Marion
Edward Elkins	shipwright	278 Marion b
Peter Ellis	sailmaker	184 Webster
Samuel Ellis	painter/Week's Wrf.	169 Meridian
William Elm	pump/block maker	Princeton
Benjamin Elwell	shipwright	12 Paris
David Espeln	shipwright	Meridian
James Esson	machinist	Marginal
Leonard Evans	machinist	108 Summer b
George Ewell	shipwright	69 Meridian
William Ewing	shipwright	2 Havre Pl
Albert A. Fairbanks	machinist	30 Havre
P.T. Fallon	machinist	18 Summer b
John S. Farrow	ship captain	38 Summer
Joseph Fenno	caulker	108 Havre
Almon W. Fernald	sparmaker/Tuttle's Wharf	16 Liverpool
Daniel Fernald	sparmaker	18 Summer b
Ebenezer Fernald	pile driver	3 Maverick
Joseph Fernald	machinist	Summer b
Michael Ford, Jr.	shipwright	34 Saratoga
William S. Foster	shipwright	46 Summer
Benjamin F. French	shipwright	96 Summer
John Frothingham	machinist	177 Meridian
Edward Fuller	machinist	29 Maverick
George Fuller	moulder	38 Havre
Jeremiah Fuller	blacksmith*	29 Webster
George Galloway	engineer	Eutaw b
John H. Gardner	machinist	2 Bremen
Charles J. Gibbs	boilermaker	50 Porter
Matthew P. Gibbs	boilermaker	97 Meridian
Charles Ginn	shipwright	57 Saratoga [139]

Benjamin Gleason	ship carver*	181 Meridian
Samuel W. Gleason	ship carver*	181 Meridian
William B. Gleason	ship carver*	Melrose (Boston)
Edward Glover	moulder	Webster
Gustavus A. Godbold	shipsmith*	Chelsea
John Godbold	shipsmith*	Chelsea
Henry St. John	shipwright	Princeton
Thomas Gordon	ship joiner	22 Trenton
Edward J. Gorham	sparmaker	12 Summer
John Graham	machinist	9 Havre
James Gridley	blacksmith	49 Meridian
Joseph Griffin	shipwright	90 Liverpool
John Groves	puddler	Saratoga nr foundry
William Groves	puddler	Saratoga nr foundry
William Grueby	mastmaker	77 Meridian
Briggs Gulliver	caulker	63 Trenton
Edward Hadden	machinist	29 Maverick
John Hall	shipkeeper	London
Luke Hall	shipwright	27 Central Sq
Samuel Hall	shipbuilder/Border	Maverick
William Hall	shipwright	17 Bennington
John Ham	blacksmith	Maverick cr Border
Theodore Hamerich	ship joiner	Meridian nr Monmouth
Joseph Hammond	shipwright	29 Maverick Sq b
Matthew Hanley	blacksmith	51 Maverick
Thomas Harbottle	machinist	16 Liverpool
Austin Harding	caulker	Liverpool
William Harmon	machinist	61 Maverick
Benjamin Harrington	shipwright	22 Trenton
Daniel F. Harrington	2 ERR Whrf.	Wood Island
Thomas Hart	blacksmith/Bremen	Maverick
Thomas E. Harvey	shipwright	278 Meridian b
Samuel Hawkins	machinist	Lexington nr Putnam
Isaac Hawley	machinist	su Havre
Charles Hayes	puddler	Princeton nr Presct
Charles A. Hayes	machinist	12 Havre b
Joseph Hazell	puddler	Saratoga nr foundry
John Hazlett	shipwright	28 Havre
Hiram H. Herrick & Co.	steamplaning mill	63 Webster
	Maverick St.	
George W. Herrick		Lamson
Ezra L. Hersey	shipwright	7 New b
Lewis W. Hewett	machinist	Mavrick nr Sartga
Edward Hickman	puddler	Bennington nr Chls
John Hinckley	ship joiner	Trenton
George C. Hodgdon	shipwright	115 Saratoga
John Hodge	shipwright	Lexington
John R. Hodge	shipwright	143 Everett
Samuel B. Holbrook	shipwright	44 Marion [187]

Jacob R. Holmes &	shipwright/caulkers	12 Central Sq
Joseph Snelling	Sargent's Whrf*	
Thaddeus Holmes	caulker	11 Liverpool
David S. Hooker	blacksmith	Decatur
John Howe, Jr.	shipsmith/Tuft's Wharf	53 Maverick
Lawrence Hoy	moulder	38 Havre
Ambrose P. Huff	caulker	29 Liverpool
Alexander Hutton	shipsmith	32 Havre b
Jacob Jackson	moulder	43 Havre
Robert E. Jackson	shipbuilder/Cen Sq	Saratoga
William Jackson	moulder	81 Meridian
Daniel D. Jacobs	shipwright	11 Lexington
Charles James	shipwright	18 London
Luke Jenkins	rigger	57 Maverick b
William W. Jenkins	shipwright	31 Eutaw
William Jennings	mastmaker	16 Bennington
James Jermon	shipwright	19 Marion
Andrew Johnson	rigger	120 Havre
Jacob A. Johnson	caulker	278 Meridian b
David H. Jones	caulker	11 Paris
George E. Jones	shipwright	2 Lexington Pl
Robert Jones	machinist	57 Maverick b
Lott N. Joy	shipwright	89 Cottage
John Kane	boilermaker	Maverick nr Church
Alanson C. Keen	shipwright	23 Saratoga
Martin Keen	shipwright	29 Maverick Sq b
Simeon N. Keen	shipwright	Saratoga
Peter F. Keller	shipkeeper	115 Havre
Daniel D. Kelly	shipwright/caulker Kelly & Holmes Whrf.	131 Webster
Ignatius A. Kelly	clerk/Glendon Iron Works	55 Maverick
John Kennedy	machinist	Marginal
Simon Lamprell	sailmaker	41 London b
Robert Langell	shipwright	20 Porter
Andrew Leach	ship joiner	4 Paris Pl
Andrew Leach	engraver	Marginal
Thomas Leahy	sawyer	14 Trenton
James M. Leonard	shipwright	Monmouth
Davis Litchfield	shipwright	Lexington
D. Litchfield	brass founder	Lewis
Nichols Litchfield	shipwright	Eutaw
Philip Logan	brass finisher	41 London
William Logan	shipwright	19 Lexington b
Michael Looney	sawyer	191 Meridian
Edward T. Loring	caulker	23 Saratoga
Isaac N. Lothrop	machinist	23 London
John Lothrop	sailmaker/Union Whrf*	38 Cottage [233]

John Lounder	shipwright	7 New
Euenezer Lowe	caulker	New
Nathaniel Lufkin	shipsmith/Bremen	New
Samuel S. Lufkin	cooper	67 Marion
Thomas Mackie	shipwright	98 Sumner
Dennis Mahony	moulder	4 Havre
Jeremiah Mahony	sawyer	opp 40 Havre
Michael Mahony	shipwright	Liverpool
Henry Mainke	cooper	Maverick
Robert Major	shipwright	71 Marion
George Malcolm	shipwright	42 Havre
Henry Marquand	shipwright	24 Trenton
Benjamin T. Martin	42 ERR Wharf	Chelsea
Henry Martin	rigger	5 Border
Henry A. Maso	machinist	London
Nathaniel Matthews	brass finisher	21 Decatur
Watson G. Mayo	pile driver	32 Cottage
Robert McCollum	ship joiner	25 Porter
James McCombe	moulder	Maverick
Angus McDonald	shipwright	19 Lexington
John McDonald	shipwright	9 Monmouth
Vinton McDonald	puddler	Bennington
Daniel McDyer	sawyer	42 Havre
Patrick McGovern	sawyer	36 London
Cornelius W. McKay	shipbuilder	37 Bennington
Donald McKay	shipbuilder	White
Hugh R. McKay	shipwright	71 Meridian
William O. McKee	sparmaker	115 Saratoga
John McKinnon	shipwright	187 Meridian
Alexander McLaughlin	ship joiner	143 Everett
George McCloud	shipwright	Meridian
James S. McCloud	shipwright	Princeton
Lauchland McPherson	shipwright	17 Marion
Samuel McWilliams	joiner	17 Lexington
Charles T. Merritt	ship joiner	6 Central Sq
Nehemiah Merritt	ship carpenter	29 Princeton
Daniel Miller	machinist	143 Everett
John H. Miller	rigger	7 Maverick
John S. Miller	blacksmith	28 Seneca
Francis Milliken	shipwright	6 Border
Samuel Mills	shipwright	62 Bremen
Hugh Monahan	shipwright	London
James Monan	boilermaker	Everett
Morris Morey	shipwright	37 Porter
Jesse Morris	caulker	5 Maverick
Sargent O. Morse	machinist	Centre
Charles B. Morton	cabinet maker/35 ERR Wharf	Meridian
Cornelius B. Morton	joiner	Meridian [281]

Magness Moulton	caulker	278 Meridian b
Joseph C. MacCormore	rigger	Maverick
John Muir	shipwright	Princeton
John L. Mason & Elisha J. Cleveland	shipsmiths/Liverpl & Lincoln's Wharf	19 Border
William Needham	shipwright	Trenton
James Nesbit	machinist	6 Lewis
Hiram Newton	cabinet maker	118 Havre
Anasa Nickerson, Jr.	painter/Cunningham's Wharf	Sumner
David Norris	machinist	31 Webster
Patrick Nugent	machinist	Everett
John W. Odiorne	spalmaker	Maverick
John O'Donnell	shipwright	Eutaw
John O'Haren	blacksmith	30 Seneca
David F. Oliver	caulker	Bennington
Joseph Osgood	machinist	47 Sumner b
Elisha Otis	shipwright	Sumner or Liverpool b
Charles O. Page	ship joiner/Brown & Lovell's Wharf	35 London
Clark Parker	carver	41 Seneca
William Patterson	machinist	32 Orleans b
Frank Pierce	machinist	3 Lewis b
Noelle W. Perry	shipwright	Meridian nr Cen Sq
Israel Peterson	shipwright	17 Decatur
John Petfield	machinist	29 Maverick Sq b
Enoch A. Pettingill	machinist	43 Havre
Henry Pigeon	nest maker/Sumner & 297 Commercial*	20 Havre nr Sumner
Edwin Pinkham	sailmaker	32 Havre b
Addison Plummer	rigger	2 Chelsea
Sewell Plummer	shipwright	278 Meridian
Edward F. Porter	sailmaker/Brown & Lovell's Wharf	
Edward J. Porter	sailmaker	32 Havre
Bennett Potter, Jr.	machinist/Tuttle's Wharf	37 Havre
Thomas Potter	pile driver	Everett
Jairus Pratt	shipwright/Border	Eutaw
William Procter	moulder	4 Sumner Pl
James Punch	sawyer	191 Meridian
James Purcell	machinist	30 Oneida
Thomas Rand	boilermaker	66 Maverick b
John Rand	boilermaker	66 Maverick b
Charles Rice	rigger	9 Winthrop
Frank Ricker	ship joiner	1 Lexington b
Robert Robinson	shipsmith	53 Maverick b
Thomas Robinson	shipwright	Princeton

[324]

Joseph Rollins	puddler	Byron nr Saratoga
John W. Russell	sail maker	203 Oswego
Thomas H. Russell	machinist	13 Lexington
Eden Sampson	shipwright	Lexington
George Sampson	shipwright	Sumner b
William P. Saunders	caulker	Princeton
Edward Sawyer	machinist	45 Chelsea
Humphrey Sawyer	sheet iron wkr	Lexington nr Merid
Benjamin C. Seaver	shipwright	76 Sumner
Joseph P. Sherman	caulker	23 Saratoga b
John Shillaher	machinist	3 Lewis b
John Shute	caulker	Saratoga
John H. Siegler	rigger	Everett nr Cottage
Robert Simmons	blacksmith	13 Cross
W.H. Simmons	blacksmith	Everett cr Lamson
Isaac H. Small	ship carpenter	Chelsea nr Decatur
Andrew J. Smith	shipwright	10 Paris
Ezra Smith	moulder	18 Sumner b
George S. Smith	shipwright	7 Porter
Horatio S. Soule	shipwright	237 Meridian
Samuel Southall	puddler	Saratoga nr foundry
William B. Sprague	shipwright	19 Lexington
John T. Stackpole	moulder	Maverick
Thomas Stafford	sawyer	189 Meridian
William Stapleton	shipwright	167 Meridian b
Gilbert Stevens	machinist	19 Maverick
Thomas Stevens	puddler	Chelsea on Glendon M
Daniel Stevenson	shipwright	12 Trenton
John Stimon	brass finisher	38 Maverick
John Sullivan	rigger	Liverpool nr Decatr
Samuel Swett 3rd	ship joiner	78 Sumner
Edward D. Taylor	tinsmith	12 Sumner b
James H. Taylor	caulker	5 Havre rear
Joseph E. Thayer	caulker	54 Sumner b
Thomas Thompson	rigger	2 Webster Pl
Elijah Towles	sailmaker	4 Liverpool
Dan Tubbs	shipwright	247 Merid cr Wht b
George H. Tucker	shipwright	Saratoga
Otis Tufts	engine & boiler- maker/ft Webster	19 Crescent Pl*
Alden S. Turner	caulker	6 Liverpool
James L. Turner	shipwright	Cross
William Ulman	shipsmith/D.D.	above Cottage
Jonas Underwood	Kelly's Rail Way	
Benjamin Vanderford	pile driver	112 Havre
Henry W. Varney	engineer ERR	Centre
Christopher Volma	shipwright	29 Maverick Sq
William Waite	shipwright	179 Meridian
	machinist	Decatur cr Bremen [371]

Sam Wakefield	shipwright	Saratoga
William Wakefield	caulker	London
Charles Walker	shipwright	Meridian
Gardener Walker	sailmaker	Saratoga
Dan F. Ward	moulder	Saratoga
Foster Ward	moulder	Saratoga
John Ward	moulder	107 Maverick
Jonathan E. Warner	cooper/Tuttle's Wharf	22 Richmond*
Edward Warren	ship joiner	16 Bennington b
Elias Wentworth	pile driver	106 Havre
James Whelpley	shipwright	Eutaw
Charles Winn	rigger	119 Everett
John H. Williams	shipwright	19 New
Farrell L. Winn	moulder	36 Condor
John L. Woods	mast maker	Liverpool
Benjamin Woodside	shipwright	24 Trenton
William E. Wright	shipwright	Trenton
John W. Young	ship joiner/Cunningham Wharf	Marion or Saratoga
Silas Young	ship carpenter	Havre
Peter Youngman	rigger	Everett b
George Yuill	shipwright	9 Monmouth [392]

* indicates person worked in Boston and lived in East Boston, or worked in East Boston and lived in Boston.

Number of Irish laborers dramatically increased in 1852.

East Boston Shipyard Worker Data Base: Boston Directory 1860

<u>Name</u>	<u>Skill</u>	<u>Home Address</u>
George Acron	ship carpenter	Highland Pl
Alex K. Adams	moulder	100 Decatur b
John Q. Adams	shipsmith	217 Meridian
John Q. Adams	shipwright	102 Lexington
John F. Adamson	shipwright	48 Bennington
Benjamin Albee	calker	9 Princeton
George Aldus	boilermaker/ People's Ferry	22 Murray Ct
McKay & Aldus		
Richard Alexander	shipwright	Border nr White
William Alexander	ship joiner	42 Saratoga
George S. Allen	calker	7 Border b
Jeremiah Allen	blacksmith	52 summer b
Charles H. Anderson	rigger	221 E. Summer
George E. Anderson	shipwright	96 Summer b
Peter Anderson	machinist	4 Webster
Francis M. Andrews	shipwright	21 Liverpool
Henry M. Andrews	shipwright	151 Lexington
John Andrews	blacksmith	44 Border
George Angell	moulder	52 Summer b
Thomas Armstrong	sparmaker/Marginal	53 Marginal
Seth H. Arnold	shipwright	Bremen cr Saratoga
Isaiah Atkins	calker	108 Summer b
David Atwood	shipwright	21 White
David F. Atwood	shipwright	21 White
John Averill	blacksmith	18 London
Samuel Averill	shipsmith/ft	Highland Pl
Howe, Averill & Co.	Webster/21 Eas. Av.*	
William Averill	ship joiner	187 Meridian
Eben O. Avery	calke	173 Webster b
Edwin R. Ayers	shipwright	18 Trenton b
Samuel Babcock	boatman/27 Doane	5 Cross
Henry & Paul Bailey	carpenters/Webster	85 Princeton
James Bailey	shipchandler/232 Commercial Wh.*	2 Cottage
Warren A. Bailey	pile driver	84 Trenton b
James E. Baker	machinist	25 Maverick Sq b
Francis Barber	rigger	6 Border
Ezekiel Barker	shipwright	169 Meridian b
William G. Barker	shipwright	47 Monmouth
Cushing Barnes	shipwright	55 Trenton
Thomas Barnes	calker	19 Lexington
Elijah Bagnall	pump/block maker	Chelsea
	29 Fulton*	
William C. Barstow	Pres & Superintd	[41]

	EBCO 99 State*	
Ames R. Barrett	machinist ERR	Melrose (town)
Nathaniel Barry	joiner	59 Marion
John H. Barstow	shipwright	18 Trenton b
Richard M. Barter	sailmaker	61 London
Isaac Bartlett	hse/shp joiner	88 Chelsea
Lendall Bartlett	ship joiner	88 Chelsea
Benjamin Bartoll	shipwright	147 Chelsea
Zepaniah Bassett	shipsmith/13 Eastern Ave*	Chelsea
Andrew G. Baston	sailmaker	97 Meridian
John G. Bates	calker	89 Webster b
Joseph N. Bates	calker	13 Bremen
George W. Batesby	sailmaker	7 Chelsea Ct
Orrin F. Battey	machinist	90 Trenton
William S. Battis	ballast inspector/ 1 Comm Whrf*	7 Maverick
Archibald Bean	sailmaker	67 Chelsea
John M. Bean	ship carpenter	24 Trenton
Charles H. Bennett	pump/block maker	8 Chelsea Ct
James S. Bent	blacksmith	110 London
Burdick Berry	rigger	Webster
David C. Bicknell	machinist/73 Haverhill*	65 Chelsea
Amasa Bigelow	shipbuilder	131 Chelsea
Francis W. Bird	machinist/	91 Liverpool
Geo. M. Bird & Co.	Border, Cen Sq	
George M. Bird	machinist	45 Chelsea
Jeremiah Bird	engineer	Bremen nr Brooks
William Bird	moulder	Bremen nr Brooks b
John Bishop	shipwright	131 Chelsea
Hiram Bixby	machinist	rear 17 Saratoga
John Bixon	shipwright	88 Trenton
John Black	rigger	82 Cottage
Jonas Blackhall	ship fastener	42 Maverick
Joseph F. Blasland	ship joiner	55 Eutaw
Thomas Boardman	joiner	99 Decatur
Simon Booker	moulder	Bennington nr RR
George Boole	shipbuilder	10 Terrace Pl
Thomas Boole	shipbuilder/	52 Princeton
George & Thomas Boole	Jeffries Point	
Horace Bosworth	machinist	Princeton or Putnam
James Boyce	moulder	Chelsea nr Porter
Hugh Boyle	shipwright	66 East Sumner
Henry Braden	joiner	120 Sumner b
Henry Bradford	calker	227 Saratoga
Morton Bradford	shipwright	12 Princeton
Michael Brennan	carpenter	105 Havre
Nicholas Brennan	sailmaker	108 Havre

Joseph Brewster	calker	102 Summer
W.M. Brewster	riggers/Maverick	Hanover*
W.M. Brewster & Son	Wharf	
Benjamin M. Briggs	shipbolter	56 Marion
Charles O. Briggs	shipwright	2 Marion
Henry Brooks	shipwright	4 Marion
John M. Brooks	shipwright	67 Meridian
Joseph Brooks	ship joiner	75 Marion
Joseph W. Brooks	engineer	14 Centre
Benjamin Brown	calker	89 Webster
Edwin Brown	calker	10 Havre b
George A. Brown	ship joiner	4 Meridian Pl
George W. Brown	shipwright/ Brown Loveill	157 Webster
Henry Brown	calker	6 Bremen
Moses L. Brown	calker	2 Meridian Pl
Nathaniel Brown	calker	10 Summer
Samuel Brown	rigger	113 Saratoga
David Bryden	shipwright	5 Princeton
Joshua Bruckman	machinist	51 Webster
Simon Budrow	sailmaker	90 London
Henry Builing	shipwright	72 Summer
James E. Burdkin	calker	145 Chelsea
William Burke	shipwright	4 Harmony Pl
Alexander E. Burke	shipwright	5 Harmony Pl
Andrew S. Burke	shipwright	47 Monmouth
Fyler Burkett & Co	ship joiner	Condor
Thomas Burkett	rigger	77 Cottage
William Burkett	rigger	12 Marion
Paul D. Burnham	shipwright	99 Princeton
Reuben Burnham	shipwright	23 Saratoga
John Burns	calker	Bremen
William G. Burrison	calker	80 Lexington
Joseph Bushee	shipwright	227 Meridian
Stephen Cain	shipwright	Maverick
Isaac Callbick	shipwright	153 Lexington
Allan Cameron	shipwright	129 Summer
John Cameron	shipwright	25 Maverick Sq
Allen Campbell	shipwright	147 Lexington
Daniel Campbell	shipwright	177 Meridian
Elbridge G. Campbell	moulder	163 Chelsea
Gustaf Campbell	rigger	Putnam nr White
Hector Campbell	ship joiner	79 Lexington
Malcolm Campbell	shipwright	33 Princeton
Michael Carey	machinist	Border
James Carney	shipwright	211 Everett
William Carr	shipwright	17 Lexington
Michael Carroll	shipwright	2 Saxon
Enoch W. Chapman	ship joiner	Bennington b

[131]

Reuben Chapman	boilermaker	54 East Sumner
William J. Cheney	shipwright	93 Meridian
Edward C. Chessman	ship joiner	31 Lexington
Charles C. Clarke	joiner	17 Bennington
William Classen	sparmaker	49 Bennington b
John Cohoosen	rigger	4 Border b
James R. Collins	boilermaker	Marginal
Henry W. Coltman	coppersmith/Lewis*	82 Bremen
Thomas Conlan	moulder	191 Meridian
William Conley	sailmaker	28 Chelsea
Frederick Cook	rigger	Cheever Ct
Thomas Cook	rigger	78 Summer
John H. Coombs	shipwright	80 Maverick
Nathaniel Copeland	shipbuilder	156 Princeton
Joseph Corrigan	ship carpenter	211 Everett
Lyman Costello	shipwright	217 Meridian
Charles F. Cottle	shipwright	112 Prescott
George W. Cottle	ship joiner	101 Trenton
John Cox	pump/block maker	9 Marginal
George W. Crafts	calker	7 Brooks
Peter Cratty	moulder	Chelsea
James Croft	boilermaker	80 Decatur
Robert Crosbie	shipwright	11 Meridian
Hosea Crowell	shipwright	3 Bremen
Charles W. Cummings	shipwright	237 Meridian
Edmund B. Currant	calker	84 Summer
Nathaniel Carrier	pump/block maker	19 White
John Curry	shipwright	8 Harmony Pl
Rufus Cushman	shipwright	6 Saratoga
Charles M. Dakin	shipwright	4 Lexington
Alexander Damon	ship joiner	25 White
Henry Damon	sailmaker	9 Maverick
John W. Darton	shipwright	58 Princeton
John W. Darton, Jr.	shipwright	1 Hunnewell Pl
Samuel W. Darton	shipwright	58 Princeton
David Davidson	shipwright	145 Lexington
Andrew Davis	shipwright	15 Havre
Charles D. Davis	shipwright	181 Lexington
Duncan Davis	shipwright	54 Marion
George Davis	ship fastener	Bremen
Thomas Davis	shipwright	109 Saratoga
C. Davison	shipwright	63 Trenton
John Dawson	shipwright	46 Monmouth
Marias Day	shipwright	65 Trenton
Henry M. Delano	shipwright	113 Webster
Henry Demer	rigger	2 Everett Ct
Joseph F. Dennett	shipwright	227 Meridian b
Joseph Denton	shipwright	4 Brooks
Charles Derby	machinist	39 Havre

[180]

Samuel Dillaway, Jr.	caiker	White nr Putnam
James Dimick	ship carpenter	161 Border
John Dingwell	shipwright	24 Liverpool
David W. Doane	shipwright	229 Meridian
Patrick Dolan	sawyer	51 Maverick
Dolliver & Sleeper	shipwrights/calkers	20 New
William Douglass	shipwright	20 White
John R. Dow	shipwright	82 Chelsea
Timothy Dowd	boilermaker	74 Bremen
Joshua Downing	moulder	27 London b
Cornelius Drew	shipwright	225 Everett b
Sylvanus Drew	shipwright	120 Princeton
William Drew	shipwright	120 Princeton b
William Drummond	rigger	7 Lamson
Joseph Dunbar	shipwright	83 Princeton
James Dutton	shipwright	92 Chelsea
James Early	moulder	15 Oneida
William Eastman	shipwright	141 Meridian
Francis J. Easton	cooper	78 Princeton
William Edwards	shipwright	Trenton
Zebina Eldredge	machinist	139 Chelsea
Edward Elkins	shipwright	Princeton nr mill
John H. Eliot	calker	20 Trenton
Benjamin H. Elwell	shipwright	68 Border
Philip English	cooper	81 Princeton
Drummer Erskine	shipwright	222 Meridian b
John Ervea	boilermaker	6 Oneida b
Henry Ewell	ship carpenter	110 Lexington
Thomas Ewell	ship carpenter	110 Lexington b
William S. Ewell	ship carpenter	110 Lexington b
John Fader	shipwright	7 Sumner b
Peter Farrell	shipwright	6 Eutaw
John Fay	boilermaker	124 Havre
Daniel F. Fernald	spalmaker	10 Harmony Pl
Joseph Fernald	calker	10 Havre b
Benjamin Fifield	machinist	86 Trenton
J. F. Fifield	shipwright	53 Webster
James J. Fifield	machinist	7 Putnam
Robert Finley	pile driver	217 Meridian
Alexander Fisher	shipwright	113 Saratoga
John Fisher	rigger	131 Saratoga
William H. Flint	sailmaker	68 Maverick
Amos Ford	shipwright	112 London
John Ford	calker	47 N Marginal
Michael Ford, Jr.	shipwright	34 Saratoga
George Francis	calker	225 Everett b
William J. Francis	calker	96 Sumner b
Arnold Freeman	calker	3 Marion
Charles E. Finch	shipwright	139 Saratoga

[229]

Willard H. French	shipwright	53 Trenton
W. Frost	ship joiner	Condor b
George Gallup	shipwright	14 Trenton
Joseph W. Gardner	ship joiner	93 Meridian b
Alvin Gage	ship joiner	143 Lexington
James A. German	shipwright	48 Monmouth
Thomas Gillier	sparmaker	9 Winthrop
Charles Ginn	shipwright	57 Saratoga
Samuel W. Gleason	ship carver	181 Meridian
Thomas Glynn	shipwright	118 Havre
Thomas Glynn	boilermaker	157 Everett
Francis M. Godbold	shipsmith	Marginal
Gustavus A. Godbold, Jr.	shipsmith/Marginal	Chefsea b
Henry St. John Godbold	shipwright	10 Princeton
James Godbold	shipsmith	Chefsea
Godbold & Son		
John Genly	boilermaker	36 Maverick
John W. Goodale	sparmaker	29 Marion
Joseph W. Goodale	sparmaker	96 Lexington
Benjamin Godspeed	calker	120 Summer
Sylvester Goodwin	shipwright	22 Liverpool
Mark Googins	shipsmith/Atlantic Works	18 Paris
Philip C. Googins	machinist	75 Marginal
Jacob C. Gould	caiker	10 Havre b
Salma E. Gould	pile driver	33 Central Sq
Choate Gove	shipwright/caiker	Marginal
Gove, Choate & Mason		
Edward Y. Graves	shipwright	39 Eutaw
William F. Green	shipwright	Bennington
Andrew Green	shipwright	Summer
Edward Haddon	machinist	128 East Summer
James Hall	caiker	32 Havre b
John E. Hall	caiker	Bremer
Luke Hall	shipwright	13 Central Sq
Luke Hall, Jr.	shipwright	73 Marion
Luther Hall	coal and wood	28 Havre
Hall & Robbins		
Samuel Hall	President Maverick Bank/shipbuilder	129 Webster
Samuel Hall, Jr.	shipwright	32 Central Sq
William Hall	shipwright	1 Louisiana Pl
William Hall, Jr.	shipwright	1 Louisiana Pl
William Hansen	wood turner	11 Everett b
Isaiah Harding	caiker	108 Summer b
Seth Harding, Jr.	rigger	140 Everett
Thomas H. Harper	moulder	149 Summer
Christopher W. Harrill	shipwright	86 East Summer

[271]

James F. Harrington	shipwright	67 Marion
James Harrow	ship carpenter	66 Sumner b
Nelson Hatch	shipwright	47 Lexington
John Hathaway & Co.	shipsmith/Border	122 Meridian
Daniel Haven	boilermaker	151 Everett
Elnathan Hawes	sail maker	235 Havre
John Hawes	sawyer	Princeton or mill
Arthur Hayes	pile driver	Bennington
Alonzo H. Hayes	joiner	110 Chelsea
John F. Haynes	shipwright	46 Sumner b
Joseph Haynes	ship joiner	110 Chelsea
John G. Hazlett	shipwright	Decatur
Nelson P. Heidman	rigger	108 Summer
Duncan Henderson	shipsmith	53 Trenton
Cornelius Hennessey	boatbuilder	Summer
Otto Hennessey	shipsmith	Condor or pottery
James Hickman	sawyer	120 Everett
John Hittenhime	rigger	1 Colony Pl
Jacob Hodge	calker	77 Trenton
John A. Hodge	oakum spinner	123 Lexington
John R. Hodges	calker	133 Everett
Hall Hodgkins	shipwright	9 Marion
Thaddeus Holm	calker	236 Princeton
Cornelius B. Holmes	ship joiner	47 Lexington
Holmes & Chapman	pump/block makers/Brown & Lovell's Wharf	
Kendall Hopkins	pile driver	227 Meridian
Thomas Horgum	boatbuilder	76 Trenton
Richard Hosea	calker	392 Saratoga
Jonas Howes	ship carpenter	120 Summer b
Josiah Howes	boatbuilder	32 Havre b
John Humes	ship carpenter	58 Cottage
Calvin Hutchins	shipwright	70 Bremen
Harry Hyland	shipwright/calker	7 Terrace Pl
John F. Ireland	calker	227 Meridian b
David C. Irving	shipwright	19 Marion
Joseph Irving	shipwright	1 Lexington Pl
Andrew Jackson	mastmaker	3 Putnam
Jacob Jackson	moulder	27 London
Robert F. Jackson	shipbuilder/166 Border	116 Webster
William Jackson	moulder	Maverick
William S. Jackson	shipwright	70 Bremen b
Frederick A. James	ship joiner	39 Princeton
Humphrey James	shipwright	131 Saratoga
Henry Jenkins	calker	120 Summer b
Andrew Johnson, James	riggers/Simpson's	Marginal
Parker	Dry Dock	
Amherst Josslyn	shipwright	229 Meridian

[318]

William H. Kaharl	moulder	Decatur
Daniel D. Kelly	shipwright/calker	Sumner
Thomas Kenny	calker	53 Bennington
Joseph S. Knowlton	shipwright	23 Central Sq
Nathaniel Langell	shipwright	126 Saratoga
John Larkin	cooper	10 Havre
John Larkin	shipwright	63 Cottage
Charles Laskey	shipwright	3 Harmony Pl
Levert Lausen	rigger	3 Percival Pl
Andrew Leach	shipwright	13 New
Frank Lamont	moulder	116 London
Thomas W. Leray	calker	6 Central Sq
Andrew Lewis	calker	16 Bremen
Calvin Lewis	shipwright	8 Saratoga
George Lewis	shipwright	Bremen
Alfred Litchfield	calker	120 Summer b
Davis Litchfield	shipwright	128 Lexington
Nicholas Litchfield	shipwright	opp 47 Eutaw
Peter Lobridge	rigger	London
Michael Looney	sawyer	191 Meridian
David R. Lovering	ship joiner	Brooks
Ebenezer Low	calker	15 New
George H. Manson	shipwright	46 Saratoga
John S. Marquand	shipwright	82 Princeton
Edwin Mauder	calker	120 Summer b
William F. Maybery	shipwright	Bremen
William McAlister	shipwright	28 Havre
John McCaffrey	moulder	61 London
Alfred McClure	sail maker	141 Saratoga
Donald McDonald	shipwright	52 Liverpool
David McKay	shipbuilder	1 Lexington Pl
Donald McKay	shipbuilder/Border	Eagle Hill
Nathaniel McKay	<i>McKay & Aldus</i>	73 Lexington
William McKay	ship joiner	49 Monmouth
William O. McKee	sparmaker	75 Marion
Charles McKenney	shipsmith	216 Meridian
William H. McKie	<i>Burkett, Fyler & Co</i>	86 Princeton
Alexander McKinnon	calker	53 Bennington
John McKinnon	shipwright	53 Bennington b
John McKinnon, Jr.	calker	53 Bennington b
Philip McLane	calker	108 Summer b
John S. McLoud	shipwright	179 Meridian
Martin McMahan	shipwright	35 Porter
William McMonagle	shipwright	39 Maverick
Murdock McNeal	ship carpenter	London
Kennard McNeal	shipwright	7 Summer
James McNeil	shipwright	179 Everett
Thomas McNerney	calker	27 Porter
John McNulty	calker	44 Liverpool

[367]

John McNulty	calker	Orleans
John McPhail	ship joiner	179 Meridian
James E. McPherson	shipwright	44 Monmouth
Lauchlin McPherson	shipwright	23 White
Angus McQuarry	shipwright	153 Lexington
James McQueen	sail maker	10 Liverpool
Ithamer Mereen	ship joiner	84 Sumner b
Noah Merritt	ship carpenter	25 Princeton
David Metcalf	shipwright	Pope
Samuel Mills	shipwright	62 Bremen
Benjamin R. Mitchell	calker	73 Chelsea
George B. Moffatt	shipwright	21 Monmouth
Richardson Moffatt	shipwright	235 Meridian
Hugh Monahan	shipwright	9 Meridian
James Monahan	shipwright	11 Meridian
Patrick Morey	shipwright	135 Saratoga
Jesse Morris	calker	5 Maverick
George Morse	calker	89 Webster b
William P. Morse	shipwright	Trenton
Fred Mott	calker	89 Webster b
Joseph Mott, Jr.	calker	88 Princeton
Gould Northup	shipwright	16 Liverpool
John Nugent	shipwright	6 Eutaw
Timothy Osgood, Jr.	shipwright	69 Meridian
Warren Osgood	shipwright	19 Monmouth
Leavilt B. Palmer	sail maker	38 Saratoga
Robert Parker	moulder	Webster House
David Parmenter	shipwright	71 Meridian
Josiah Parsons	calker	101 Havre
Thaddeus Perkins	ship joiner	99 Havre
Erskine Pierce	shipbolter	29 Maverick b
Addison Plummer	rigger	145 Lexington
Samuel A. Porter	sailmaker/190 Comm. Wharf*	135 Chelsea
Silas Porter	sparmaker	67 Meridian b
Jairus Pratt, Jr.	shipbuilder/Border	19 White
Jairus Pratt	shipwright/calker	7 Eutaw
Elisha P. Pride	shipwright	35 Prescott
William H. Purdy	iron moulder	85 Liverpool
Hendrick G. Purinton	machinist	68 Trenton b
Oliver Purinton	machinist	82 Trenton
Van Buren Purinton	machinist	68 Trenton b
Warren L. Rand	shipwright	227 Meridian
Francis M. Randall	ship joiner	10 Bennington
Edmund Reed	ship carpenter	27 Central Sq b
Adoniram Rich	shipwright	64 Bremen
Benjamin Roberts	shipwright	99 Saratoga
Palmer Roberts	boilermaker	7 London
Joseph Rollins	puddler	Byron

[415]

Worthy Rollins	calker	120 Sumner b
Joseph Roop	calker	39 Bennington
Benjamin T. Roundy	calker	161 Chelsea
George R. Rumney	shipwright	95 Decatur
Richard W. Rumney	calker	16 London
Andrew Rybrie	rigger	14 Central Sq
Archibald C. Ryder	shipwright	28 Saratoga
William W. Rymill	calker	2 Putnam
A & G.T. Sampson	shipwright/calkers Border	41 Chelsea
Charles Sampson	shipwright	236 Princeton
Judah M. Sampson	calker	145 Meridian
William W. Sanborn	ship bolter	110 Princeton
William Sanders	calker	12 Bennington
Robert Sanderson	shipwright	277 Saratoga
Ida Sandford	shipwright	149 Lexington
George W. Sargent	shipwright	226 Princeton
Gorham P. Saunders	calker	37 Havre
James Saunders	rigger	55 Maverick
Benjamin C. Seaver	calker	25 Border
John G. Seavey	ship joiner	130 Everett
Richard Seely	shipwright	3 Hunnewell Pl
John Shattuck	calker	6 Central Sq
Gershon Sherman	calker	Lexington
Joseph P. Sherman	calker	25 Saratoga
Frederick Silk	rigger	Orleans
Alexander W. Small	shipwright	Decatur
Andrew J. Smith	shipwright	1 Short
Andrew Smith	shipwright	93 Meridian
Barrett H. Smith	shipwright	Condor
Franklin Soule	moulder	3 Eutaw b
Harrison Soule	moulder	3 Eutaw
Eli F. Southward	sailmaker	24 Princeton
John Spear	shipwright	38 Border
John A. Spear	sparmaker	89 Meridian
Andress Sproul	ship joiner	Jeffries
Will Spurr	calker	95 Marginal
Josiah P. Stackpole	moulder	15 Maverick
William C. Staples	sparmaker	Condor
John Stark	rigger	90 Havre
Samuel R. Stinson	calker	4 New
Lincoln Stoddard	shipwright	5 Lexington Pl
William J. Stoddard	shipwright	96 Trenton
Daniel A. Story	shipwright	31 Eutaw
Elisha Story	ship carpenter	17 Saratoga
Walter H. Stover	calker	53 Marginal
Charles S. Sweet	shipwright	227 Meridian b
Edward A. Swett	calker	3 Pearl b
Ebenezer Taylor	calker	155 Border

[464]

John Taylor	shipbuilder	Border
Justin E. Taylor	shipbuilder	214 Meridian
Melzar Thomas	ship joiner	Brooks
Simeon P. Thomas	calker	93 Meridian b
William Thomas	shipwright	6 Terrace Pl
George B. Townsend	calker	14 Centre
Frank Tremain	sawyer	190 Saratoga
Charles E. Turner	calker	64 Saratoga
James Turner	ship carpenter	27 Central Sq b
Otis T. Turner	shp/hse joiner/ Kelly's Wharf	Webster House b
James Tutlow	boilermaker	9 Wesley
William A. Twitchell	shipwright	139 E Sumner
William H. Varney	naval architect**	29 Maverick Sq b
Luther T. Vinal	calker	74 N. Marginal b
Hiram C. Vose	shipwright	5 Brooks
Charles Wagner	rigger	122 Everett
George Wagner	ship carpenter	1 Bennington
Edward Walter	sailmaker	67 Meridian
Joseph T. Wardell	calker	74 N. Marginal b
William Waters	coppersmith/Border	14 Border
William Waters, Jr.	coppersmith	15 Condor
Thomas White	moulder	27 London b
Francis O. William	calker	22 Chelsea b
George B. William	rigger	151 Sumner
Samuel Wood	shipwright	80 Brooks
Thomas Woods	rigger	36 London
Andrew Woodside	shipwright	235 Havre
Benjamin Woodside	shipwright	237 Havre
David Woodside	shipwright	18 White
Joseph Woodside	shipwright	Bennington
Joseph Woodside	shipwright	Webster House b
William Wright	sailmaker	32 Princeton
John A. Yeatin	moulder	Glendon House
Silas Young	ship carpenter	2 Cross

[498]

* This person worked in Boston.

** Varney is the only advertized naval architect in the data base.

Streets in East Boston were initially named after "great" men, great battles, and Packet ship ports in England and France. Later, poets, like Byron and Pope, and birds came into fashion as the city spread out from the waterfront.

Appendix IIIA: Data Base Comparison I

East Boston Shipyard Worker Data Base: Directory Comparison [Names from 1846/1852 listed in 1860 Boston Directory]

<u>Name</u>	<u>Skill</u>	<u>Address</u>	<u>Year</u>	<u>Address</u>	<u>Year</u>	<u>Skill</u>
John Q. Adams	shipwright	Meridian	1846	102 Lexington	1860	shipwright
Joseph Bates	shipwright	Saratoga	1846	13 Bremen	1860	caulker++
Henry Bailey	carpenter	Meridian	1846	85 Princeton	1860	carpenter
Rufus Cushman	ship carpenter	Bennington	1846	26 Saratoga	1852/60	shipwright++
Samuel Dillaway, Jr.	caulker	Havre	1845	White nr Putnam*	1852/60	caulker
Edward Elkins	shipwright	Lexington b	1846	Princeton nr mill*	1860	shipwright
William Elm	pump/block maker	Chelsea	1846	Princeton	1852+	pump/block maker
John Farrow	shipwright	Summer	1846	38 Summer	1852+	ship captain?++
Almon W. Fernald	sparmaker	Liverpool	1846	16 Liverpool	1852+	sparmaker
Michael Ford, Jr.	ship carpenter	Saratoga	1846	34 Saratoga	1852/60	shipwright++
Salma E. Gould	pile driver	Everett	1846	33 Central Sq	1850	pile driver
Luke Hall	ship carpenter	Central Sq	1846	13 Central Sq*	1852/60	shipwright++
Samuel Hall	shipwright	Liverpool	1846	129 Webster*	1852/60	shipbuilder/Pres. Maverick Bank
William G. Hall	shipwright	Paris	1846	1 Louisiana Pl*	1852/60	shipwright
Hiram & Herrick	steam planing mill	Summer	1846	63 Webster	1860	steam planing mill
Jacob Jackson	moulder	Paris	1846	27 London*	1852/60	moulder
William Jackson	machinist	Liverpool	1846	Maverick	1860	boulder++?
Calvin Lewis	shipwright	Maverick	1846	8 Saratoga	1860	shipwright
Nichols Litchfield	shipwright	Marion	1846	Eutaw	1852/60	shipwright
Davis Litchfield	ship carpenter	Marion	1846	128 Lexington	1860	shipwright++
Michael Looney	sawyer	Meridian	1846	191 Meridian	1852/60	sawyer
Edward Loring	caulker	Maverick	1846	23 Saratoga	1852+	caulker
Donald McKay	shipbuilder	White	1846	Eagle Hill	1852/60	shipbuilder
Nathaniel McKay		73 Lexington	1846	73 Lexington	1860	McKay & Aldus
Timothy Osgood	shipwright	Marion	1846			
Timothy Osgood, Jr.**				69 Meridian	1860	shipwright
Josiah Parsons	caulker	Meridian	1846	101 Havre	1860	caulker
Henry Pigeon	mastmaker	Havre	1846	20 Havre	1852+	mastmaker
Archibald Ryder	shipwright	Saratoga	1845	28 Saratoga	1860	shipwright
Benjamin C. Seaver	shipwright	Summer	1846	25 Border*	1852/60	caulker++
Joseph Seavey**	hse/ship joiner	Havre	1846	130 Everett	1860	ship joiner
John Shute	caulker/graver	Saratoga	1846	Saratoga	1852+	caulker
Gilbert Stevens	machinist	Havre	1846	19 Maverick	1852+	machinist
William Waters	coppersmith	Border	1846	14 Border	1860	coppersmith
<hr/>						
William Alexander	ship joiner	42 Saratoga	1852	42 Saratoga	1860	ship joiner
Francis M. Andrews	shipwright	77 Lexington	1852	21 Liverpool	1860	shipwright
David Atwood	shipwright	17 Marion	1852	21 White	1860	shipwright
Francis Barber	rigger	4 Border	1852	6 Border	1860	rigger

William Barker	shipwright	171 Merid	1852	47 Monmouth	1860	shipwright
Cushing Barnes	ship carpenter	73 Marion	1852	55 Trenton	1860	shipwright
Zephaniah Bassett	shipsmith	Chester	1852	Chester	1860	shipsmith
Archibald Bean	sailmaker	15 Maverick	1852	67 Chelsea	1860	sailmaker
David Bicknell	machinist	23 London	1852	65 Chelsea	1860	machinist
Jeremiah Bird	machinist	Chester	1852	Bremen nr Brooks	1860	engineer++
Joseph F. Blasland	ship joiner	71 Meridian	1852	55 Eutaw	1860	ship joiner
George Boole	shipwright	Lexington	1852	10 Terrace Pl	1860	ship builder++
Thomas Boole	shipwright	89 Merid b	1852	52 Princeton	1860	ship builder++
Morton Bradford	ship joiner	Summer b	1852	12 Princeton	1860	shipwright++
William Brewster	rigger	112 Summer b	1852	Hanover (Boston)	1860	rigger
William R. Burke	shipwright	10 Bennigtn	1852	4 Harmony Pl	1860	shipwright
William Burkett	ship joiner	28 Trenton	1852	12 Marion	1860	rigger++
William Carr	ship carpenter	17 Lexington	1852	17 Lexington	1860	shipwright
John Coombs	shipwright	London	1852	80 Maverick	1860	shipwright
Charles P. Cottle**	shipwright	109 Saratog	1852	112 Prescott	1860	shipwright
George W. Crafts	caulker	2 Border	1852	7 Brooks	1860	calker
Hosea Crowell	shipwright	37 Webster	1852	3 Bremen	1860	shipwright
Charles M. Dakin	shipwright	Eutaw	1852	4 Lexington	1860	shipwright
Alexander Damon	shipwright	Trenton	1852	25 White	1860	ship joiner++
Andrew Davis	shipwright	15 Havre	1852	15 Havre	1860	shipwright
John Dawson	ship joiner	New b.	1852	46 Monmouth	1860	shipwright++
William Douglass	shipwright	Eutaw	1852	20 White	1860	shipwright
Benjamin Elwell	shipwright	12 Paris	1852	68 Border	1860	shipwright
Daniel Fernald	sparmaker	18 Summer b	1852	10 Harmony Pl	1860	sparmaker
Joseph Fernald	machinist	Summer b	1852	10 Havre b	1860	calker++
Charles Ginn	shipwright	57 Saratog	1852	57 Saratoga	1860	shipwright
Samuel W. Gleason	ship carver	181 Merid	1852	181 Meridian	1860	ship carver
Gustavus Godbold	shipsmith	Chester	1852	Chester b	1860	shipsmith
John Godbold**	shipsmith	Chester	1852	Chester	1860	shipsmith
Henry St. John Godbold	shipwright	Princeton	1852	10 Princeton	1860	shipwright
Edward Hadden	machinist	29 Maevrk	1852	128 E. Summer	1860	machinist
John Hall	shipkeeper	London	1852	Bremen	1860	calker++
John Hazlett	shipwright	28 Havre	1852	Decatur	1860	shipwright
John Hodge	shipwright	Lexington	1852	123 Lexington	1860	oakum spinner++
John R. Hodge	shipwright	143 Everett	1852	143 Everett	1860	calker++
Robert Jackson	shipbuilder	Saratoga	1852	116 Webster	1860	shipbuilder
William Jackson	moulder	81 Meridian	1852	Maverick	1860	moulder
Andrew Johnson	rigger/SOD	120 Havre	1852	Marginal?	1860	rigger
Daniel D. Kelly	shipwright/caulker	131 Webster	1852	Summer	1860	shipwright
Andrew Leach	engraver	Marginal	1852	13 New	1860	shipwright++
James S. McCloud**	shipwright	Princeton	1852	179 Meridian	1860	shipwright
Nehemiah Merritt**	ship carpenter	29 Princetcn	1852	25 Princeton	1860	ship carpenter
Samuel Mills	shipwright	62 Bremen	1852	62 Bremen	1860	shipwright
Hugh Monahan	shipwright	London	1852	9 Meridian	1860	shipwright
Jesse Morris	caulker	5 Maverik	1852	5 Maverick	1860	calker
Addison Plummer	rigger	2 Chelsea	1852	145 Lexington	1860	rigger
Jairus Pratt	shipbuilder	Eutaw	1852	Eutaw	1860	shipbuilder/caulker
Joseph Rollins	puddler	Byron	1852	Byron	1860	puddler

George Sampson	shipwright	Sumner b	1852	41 Chelsea	1860	shipwright/calker
William P. Saunders	caulker	Princeton	1852	12 Bennington	1860	caulked
Joseph P. Sherman	caulker	23 Saratg b	1852	25 Saratoga	1860	caulked
Andrew J. Smith	shipwright	10 Paris	1852	1 Short	1860	shipwright
John T. Stackpole**	moulder	Maverick	1852	Maverick	1860	moulder
James L. Turner	shipwright	Cross	1852	27 Central Sq	1860	ship carpenter++
Benjamin Woodside	shipwright	24 Trenton	1852	237 Havre	1860	shipwright
William E. Wright**	shipwright	Trenton	1852	32 Princeton	1860	sailmaker++

* Address discrepancy resolved in favor of 1860 directory.

** Indicates discrepancy in first or last name.

+ Name discontinued in 1860 directory. Not included in 1870/1880 comparison.

++ Skill change in 1860 directory.

Appendix IIIB: Data Base Comparison II

East Boston Shipyard Worker Data Base: 1846/1852/1860 and 1870/1880 Boston Directory Comparison

<u>Name</u>	<u>Address</u>	<u>Skill</u>	<u>1870 Address/Skill</u>	<u>1880 Address/Skill</u>
John Q. Adams	102 Lexington	shipwright	Same	49 Maverick/Same
William Alexander	42 Saratoga	ship joiner	Same	Not listed
Benjamin Albee	9 Princeton	calker	104 Saratoga/Same	148 Border/Shipwright
George Aldus	22 Murry Ct	boilermaker	36 London/Same	Belmont Ct/Same
Francis M. Andrews	21 Liverpool	shipwright	Not listed	
George Angell	52 Summer b	moulder	Not listed	
Thomas Armstrong	53 Marginal	sparmaker	158 Marginal/same	85 Brooks/Same
Seth Arnold	Bremen	shipwright	Not listed	
David Atwood	21 White	shipwright	Same	Same
William Averill	187 Meridian	ship joiner	Not listed	
Henry Bailey	85 Princeton	carpenter	Same	Same
Francis Barber	6 Border	rigger	10 Border/Same	Not listed
William Barker	47 Monmouth	shipwright	Same	Same
Cushing Barnes	55 Trenton	shipwright	53 Eutaw/Saloon Keeper*	Not listed
Nathaniel Barry	58 Marion	joiner	Matapan/carpenter*	Same
Zephaniah Bassett	Chelsea	shipsmith	Same	Same
John H. Barstow	18 Trenton b	shipwright	Not listed	
Isaac Bartlett	88 Chelsea	hse/shp joiner	Same	Same
Lendall Bartlett	88 Chelsea	ship joiner	Not listed	
Benjamin Bartoll	147 Chelsea	shipwright	Union Ct/Same	Not listed
Joseph Bates	13 Bremen	caulkert++	86 Eutaw/Policeman*	Same/Police Lieut.
George W. Battenby	7 Chelsea Ct	sailmaker	Not listed	
Archibald Bean	67 Chelsea	sailmaker	Not listed	
Charles H. Bennett	8 Chelsea Ct	pmp/blk maker	26 Curve/Car builder*	Moved to Newton
Burdick Berry	Webster	rigger	Not listed	
David Bicknell	65 Chelsea	machinist	Not listed	
Amasa Bigelow	133 Chelsea	shipbuilder	Not listed	
Jeremiah Bird	Bremen nr Brooks	engineer++	Not listed	
Francis W. Bird	45 Chelsea	machinist	E. Walpole, MA/paper manufacturer.* Same	
William Bird	Bremen	moulder	Not listed	
Jonas Blackhall	42 Maverick	ship fastener	Not listed	
Joseph F. Blasland	55 Eutaw	ship joiner	65 Lexington/Same	20 Decatur/Same
George Boole	10 Terrace Pl	ship builder++	Not listed	
Thomas Boole	52 Princeton	ship builder++	Not listed	
Morton Bradford	12 Princeton	shipwright++	Same	15 Princeton/Carpenter
Nicholas Brennan	108 Havre	sailmaker	9 London/Same	202 Bremen/Same
William Brewster	Hanover (Boston)	rigger	Not listed	
Benjamin Briggs	56 Marion	ship bolter	135 Brooks/Shp carpenter	Not listed
Charles O. Briggs	2 Marion	shipwright	Not listed	
Henry Brooks	4 Marion	shipwright	Same	46 Marion/Same
John M. Brooks	67 Meridian	shipwright	147 Marion/Same?	95 Trenton/Shp builder

Edwin Brown	10 Havre b	calker	Same	Same
George A. Brown	4 Meridian Pl	ship joiner	118 Princeton/Same	130 Brooks/Same [45]
George W. Brown	157 Webster	shipwright	Same	Not listed
Moses Brown	2 Meridian Pl	calker	125 London/Policeman*	Same
William R. Burke	4 Harmony Pl	shipwright	Not listed	
Fyler Burkett & Co	ship joiner	Condor	Not listed	
William Burkett	12 Marion	rigger++	32 Central Sq/Same	Charlestown/Cabinetmaker*
William Carr	17 Lexington	shipwright	Same	Not listed
Nathaniel Carrier	19 White	pmp/blk maker	Not listed	
Charles C. Clarke	17 Bennington	joiner	Not listed	
William Classen	49 Bennington b	sparmaker	Same	Not listed
John Cohoosen	4 Border b	rigger	Not listed	
John Coombs	80 Maverick	shipwright	Not listed	
Nathaniel Copeland	156 Princeton	ship builder	Not listed	
Joseph Corrigan	211 Everett	ship carpenter	Not listed	
Lyman Costello	217 Meridian	shipwright	Not listed	
Charles P. Cottle**	112 Prescott	shipwright	63 Lexington/Same	86 Lexington/Same
John Cox	9 Marginal	pmp/blk maker	Not listed	
George W. Crafts	7 Brooks	calker	73 Princeton/Same	b 191 Sumner/Same
Robert Crosbie	11 Meridian	shipwright	129 Eutaw/Same	Same
Hosea Crowell	3 Bremen	shipwright	184 Saratoga/Same	Not listed
Rufus Cushman	26 Saratoga	shipwright++	374 Border/Shipbuilder	37 Saratoga/Same
Charles M. Dakin	4 Lexington	shipwright	Border/Saloon Keeper*	Same
Alexander Damon	25 White	ship joiner++	Same	Same
Henry Damon	9 Maverick	sailmaker	Same	Same
John W. Darton	58 Princeton	shipwright	36 Monmouth/Carpenter	Same
John W. Darton, Jr.	1 Hunnewell Pl	shipwright	Not listed	
Andrew Davis	15 Havre	shipwright	9 Havre/Same	Same
George Davis	Bremen	ship fastener	Same	Same
John Dawson	46 Monmouth	shipwright++	Not listed	
Henry Demer	2 Everett Ct	rigger	Not listed	
Samuel Dillaway, Jr.	White nr Putnam	caulker	Same	Same
James Dimick	161 Border	ship carpenter	22 Haynes/Same	Not listed
William Douglass	20 White	shipwright	Same	36 Monmouth/Shp carpenter
Sylvanus Drew	120 Princeton	shipwright	158 Princeton/Same	Same
William Drew	120 Princeton b	shipwright	Not listed	
Francis J. Easton	78 Princeton	cooper	Same	Same
Edward Elkins	Princeton nr mill	shipwright	119 Lexington/Shp carpenter	Not listed
Benjamin Elwell	68 Border	shipwright	53 Saratoga/Caulker	Same
Philip English	81 Princeton	cooper	Same	Same
Dummer Erskine	222 Meridian b	shipwright	393 Meridian/Policeman*	Same/Lieut.
Henry Ewell	110 Lexington	ship carpenter	Same/Shipwright	143 Lexington/Same
Thomas Ewell	110 Lexington b	ship carpenter	Same/Shipwright	63 Marion/Same
William S. Ewell	110 Lexington b	ship carpenter	200 Brooks/Same	143 Lexington/Same
Daniel Fernald	10 Harmony Pl	sparmaker	11 Lexington/Shipwright	108 Eutaw/Same
Joseph Fernald	10 Havre b	calker++	Not listed	
J.F. Fifield	86 Trenton	shipwright	Not listed	
James J. Fifield	7 Putnam	machinist	160 Bennington/Same	131 Princeton/Same

Amot Ford	112 London	shipwright	106 Putnam/Same	Same
Michael Ford, Jr.	34 Saratoga	shipwright++	Same	9 Saratoga/Same
Charles Ginn	57 Saratoga	shipwright	Same	Not listed
Samuel W. Gleason	181 Meridian	ship carver	Same	Not listed
Thomas Glynn	118 Havre	shipwright	373 Border/Same	[93]
Thomas Glynn	157 Everett	boilermaker	87 Cottage/Same	Same
Francis Godbold	Marginal	shipsmith	Not listed	
Gustavus Godbold	Chelsea b	shipsmith	Not listed	
John Godbold**	Chelsea	shipsmith	Not listed	
Henry St. John Godbold	10 Princeton	shipwright	b 10 Princeton/Same	13 Princeton/Same
John W. Goodale	29 Marion	sparmaker	Boston/Toy gun manuf.*	Not listed
Joseph W. Goodale	96 Lexington	sparmaker	Boston/Furniture polisher*	Not listed
Mark Googins	18 Paris	shipsmith	Same	Same
Philip C. Googins	75 Marginal	machinist	Not listed	
Jacob C. Gould	10 Havre b	calker	Not listed	
Salma E. Gould	33 Central Sq	pile driver	Same	Same
Choate Gove	Marginal	shipwright/calker	Not listed	
Edward Hadoen	128 E. Summer	machinist	Not listed	
Luke Hall	13 Central Sq	shipwright++	63 White/Shp carpenter	Wk Boston/Fish & Oysters*
Luke Hall, Jr.	73 Marion	shipwright	Same	Brighton/Bds Academy Hill
Samuel Hall	129 Webster	shipbuilder/Pres. MSB	Same	Deceased
Samuel Hall, Jr.	32 Central Sq	shipwright	Same/Merchant, Treas. ERR*	Not listed
John Hall	Bremen	calker++	Same	B 45 Bennington/Same
William G. Hall	1 Louisiana Pl	shipwright	387 Meridian/Same	Not listed
William Hall, Jr.	1 Louisiana Pl	shipwright	387 Meridian/Same	Not listed
Isaiah Hardino	108 Summer b	calker	Not listed	
Seth Harding, Jr.	140 Everett	rigger	160 Chelsea/Same	150 Putnam/Same
Elnathan Hawes	235 Havre	sailmaker	Not listed	
John Hawes	Princeton nr mill	sawyer	Not listed	
John Hazlett	Decatur	shipwright	Same	Not listed
Hiram & Herrick	63 Webster	steam planing mill	Same	Not listed
John Hittenhime	1 Colony Pl	rigger	187 Brooks/Same	Not listed
John R. Hodge	143 Everett	calker++	Not listed	
John Hodge	123 Lexington	oakum spinner++	Same/Caulker	Same
Jonas Howes	120 Summer b	ship carpenters	Not listed	
Josiah Howes	32 Havre b	boatbuilder	12 Paris/Same	Not listed
Robert Jacks	116 Webster	shipbuilder	Not listed	
Andrew Jackson	3 Putnam	mastbuilder	223 Marion/Woodturner*	Not listed
Jacob Jackson	27 Londun	moulder	1 Thatcher/Same	Not listed
William Jackson	Maverick	moulder++?	b 1 Thatcher/Same	80 Camden
Andrew Johnson	Marginal?	rigger	67 Chelsea/Same	203 Saratoga/Same
William H. Kahar	Decatur	moulder	Not listed	
Calvin Lewis	8 Saratoga	shipwright	Same	
Daniel D. Kelly	Summer	shipwright	Same	
Andrew Leach	13 New	shipwright++	Same	28 Liverpool/Shp carpenter
Alfred Litchfield	120 Summer b	calker	Not listed	
Nichols Litchfield	Eutaw	shipwright	42 Marion/Same	Not listed
Davis Litchfield	128 Lexington	shipwright++	Same	Not listed
Michael Looney	191 Meridian	sawyer	335 Marion/Same	Same

David R. Lovering	Brooks	ship joiner	Not listed	
David McKay	1 Lexington Pl	shipbuilder	42 Decatur/Shipwright	Same
Donald McKay	Eagle Hill	shipbuilder	Same	Deceased
Nathaniel McKay	73 Lexington	McKay & Aldus	Same	Moved to Philadelphia
William McKay	49 Monmouth	ship joiner	Same	Same
James S. McCloud**	179 Meridian	shipwright	Not listed	[146]
William O. McKee	75 Marion	sparmaker	68 Maverick/Same	Same
William H. McKie	86 Princeton	Burkett & Fyler	Same	109 Princeton/Same
Alex McKinnon	53 Bennington	calker	17 Maverick/Shp joiner	27 Decatur/Same
John McKinnon	53 Bennington b	shipwright	69 Bennington/Same	13 Winthrop/Same
John McKinnon, Jr.	53 Bennington b	calker	Not listed	
Nehemiah Merritt**	25 Princeton	ship carpenter	Medford/Merritt & Rupp	Same/Pres. Union Mutual Benefit
Assoc.*				
Samuel Mills	62 Bremen	shipwright	102 Bremen/Carpenter	Same/Carpenter
Hugh Monahan	9 Meridian	shipwright	141 Meridian/Same	
Jesse Morris	5 Maverick	calker	225 Everett/Same	Not listed
George Morse	89 Webster b	calker	b 73 Maverick/Same	55 Maverick/Same
William P. Morse	Trenton	shipwright	223 Trenton/Same	Same/Sparmaker
Fred Mott	89 Webster b	calker	Not listed	
Timothy Osgood			Not listed	
Timothy Osgood, Jr.**	69 Meridian	shipwright	Not listed	
Josiah Parsons	101 Havre	caulker	Not listed	
Addison Plummer	145 Lexington	rigger	163 Chelsea/Same	218 Princeton/Same
Jairus Pratt	Eutaw	shipbuilder/calker	Deceased	
Jairus Pratt, Jr.	19 White	shipbuilder	Moved to Hyde Park	
H. G. Purinton	68 Trenton b	machinist	Same	Same
Oliver Purinton	82 Trenton	machinist	125 Trenton/Same	Not listed. Deceased?
Van B. Purinton	68 Trenton	machinist	Not listed	
Adoniram Rich	64 Bremen	shipwright	Not listed	
Joseph Rollins	Byron	puddler	Same/Machinist*	Not listed
Archibald Ryder	28 Saratoga	shipwright	Same	25 Saratoga/Same
Charles Sampson	236 Princeton	shipwright	Same	70 Trenton/Ship builder
George Sampson	41 Chelsea	shipwright/calker	Marginal/Same	21 Saratoga/Same/VP EB Savings Bank*
Judah Sampson	145 Meridian	calker	26 Eutaw	Not listed
William W. Sanborn	110 Princeton	ship bolter	Not listed	
Gorham P. Saunders	37 Havre	calker	Same	Not listed
William P. Saunders	12 Bennington	calker	Deceased	
Benjamin L. Seaver	25 Border	caulker++	b 160 Summer/Same	28 Bremen/Same
Joseph Seavey**	130 Everett	ship joiner	9 Crescent Pl	Not listed
John Shattuck	6 Central Sq	calker	Policeman*	Deceased
Joseph P. Sherman	25 Saratoga	calker	46 Liverpool/Same	Not listed
Andrew J. Smith	1 Short	shipwright	12 Marion/Same	Not listed
Franklin Soule	3 Eutaw b	moulder	Not listed	
Harrison Soule	34 Eutaw	moulder	Not listed	
Eli F. Southward	24 Princeton	sailmaker	Boston/Signs & Banners*	Boston/Wire Signs
John Spear	38 Border	shipwright	Not listed	
John A. Spear	89 Meridian	sparmaker	i62 Princeton/Same	Same
John T. Stackpole**	Maverick	moulder	Not listed	
Lincoln Stoddard	5 Lexington Pl	shipwright	359 Meridian/Same	21 Eutaw/Same

William J. Stoddard	96 Trenton	shipwright	Not listed	
Daniel A. Story	31 Eutaw	shipwright	b 52 Eutaw/Same	52 Eutaw/Lumber Surveyor*
Elisha Story	17 Saratoga	ship carpenter	Same/shipwright	Not listed
Ebenezer Taylor	155 Border	caulker	Not listed	
John Taylor	Border	shipbuilder	Not listed	
James L. Turner	27 Central Sq	ship carpenter++	Not listed	
William Varney	29 Maverick Sq	naval architect	Not listed	
Luther T. Vinal	74 N. Marginal b	calker	b 10 Henry/Same	Not listed
William Waters	14 Border	coppersmith	Same	Same
Andrew Woodside	235 Havre	shipwright	Same	Same
Benjamin Woodside	237 Havre	shipwright	148 Trenton/Same	152 Trenton/Same
David Woodside	18 White	shipwright	87 Condor/Same	Not listed
Will E. Wright	32 Princeton	sailmaker†	Not listed	[200]

** Indicates discrepancy in first or last name.

†† Skill change in 1860 directory.

* Skill change unrelated to shipbuilding trades in 1870-1880 directories.

Appendix IV

East Boston Shipbuilders

<u>Firm</u>	<u>Number of Ships 1839-1860</u>
	<u>Built at East Boston</u>
Atlantic Works	15+
G. & T. Boole	5
E. & H.O. Briggs	1
Brown, Bates & Delano	3
Brown & Lovell	4
Joseph Burke	2
Burkett & Fyler	1
Andrew Burnham	1
Paul Curtis	22
Jackson & Ewell	7
C.F. & H.D. Gardiner	5
William Hall	4
Samuel Hall	48
Samuel Hall, Jr.,	2
Daniel D. Kelly	12
William Kelly	1
Donald McKay	53
Hugh R. McKay	4
Pratt & Osgood	3
Jarvis Pratt	1
Otis Tufts	2

- + Atlantic Works constructed iron ships and ship components, such as engines (boilers). This firm remained in business until 1928, building vessels and components of vessels of iron, steel, and composites. In 1928, it was purchased by the Bethlehem Steel Corporation.

** McKay built 15 more vessels between 1860-1875.

Sources: Sumner, pp. 696-699; Hart Nautical Collections; R. McKay, pp. 365-376; Howe & Matthews; Annual Register Books.

Bibliography

Hugh G. J. Aitken, *Scientific Management in Action: Taylorism at Watertown Arsenal, 1908-1915* (Princeton: Princeton University Press, 1985).

Robert G. Albion, *The Rise of New York Port, 1815-1860* (New York: Charles Scribner's Sons, 1939).

Robert G. Albion, *Forests and Sea Power* (Hamden, CT: Archon Books, 1965).

Cleveland Amory, *The Proper Bostonians* (New York: Nathaniel Farmer, 1947).

Edwin Bacon, *The Book of Boston: Fifty Years' Recollections of the New England Metropolis* (Boston: The Book of Boston Company, 1916).

Bernard Bailyn, *The New England Merchants in the Seventeenth Century* (Cambridge: Harvard University Press, 1955).

Bernard Bailyn, *Voyagers to the West: A Passage in the Peopling of America on the Eve of the Revolution* (New York: Alfred A. Knopf, 1986).

Bernard & Lotte Bailyn, *Massachusetts Shipping 1697-1714: A Statistical Study* (Cambridge: Cambridge University Press, 1959).

George Pierce Baker, *The Formation of the New England Railroad Systems* (Cambridge: Harvard University Press, 1937).

William A. Baker, *A History of the Boston Marine Society, 1742-1967* (Boston: Boston Marine Society, 1968).

William A. Baker, *A History of Bath, Maine and the Kennebec River Region* (Portland, ME: The Anthoensen Press, 1973). 2 Vols.

Alex W. Bealer, *The Tools That Build America* (New York: Bonanza Books, 1976).

Edwin C. Bearss, *Boston: Charlestown Navy Yard 1800-1842*, 2 vols. (U.S. Department of the Interior/National Park Service, 1984).

Anthony Bimba, *The History of the American Working Class* (New York: Greenwood Press, 1968).

Carl Bridenbaugh, *The Colonial Craftsman* (New York: New York University Press, 1950).

Carl Bridenbaugh, *Cities in the Wilderness: The First Century of Urban Life in America 1625-1742* (New York: Capricorn Books, 1938).

Van Wyck Brooks, *The Flowering of New England 1815-1865* (New York: E. P. Dutton & Company, 1936).

Albert Bushnell, ed., *Commonwealth History of Massachusetts* (New York: States History Company, 1927-1930). 6 Vols.

W.H. Bunting, *Portrait of a Port: Boston, 1852-1914* (Cambridge: The Belknap Press of Harvard University Press, 1941, 1979).

Aileen Chamberlain, *Beacon Hill* (Boston: Houghton Mifflin, 1925).

Alfred D. Chandler, *Strategy and Structure* (Cambridge: M.I.T. Press, 1962).

Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge: The Belknap Press of Harvard University Press, 1977).

Howard I. Chapelle, *The History of American Sailing Ships* (New York: W. W. Norton, 1935).

Arthur H. Clark, *The Clipper Ship Era* (New York: G. P. Putnam's Sons, 1911).

Victor S. Clark, *History of Manufactures in the United States:* Vol. I, 1607-1860. Vol. II, 1860-1893 (New York: Peter Smith, 1949).

Jonathan Coad, *The Royal Dockyards, 1690-1850: Architecture and the Engineering Works of the Sailing Navy* (England: Gower Publishing Company Limited, 1989).

John Commons, et al., *History of Labour in the United States*, 4 Vols. (New York: The Macmillan Company, 1918-1935).

William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W. W. Norton & Company, 1991).

Merle Curti, *The Making of an American Community: A Case Study of Democracy in a Frontier Community* (Stanford: Stanford

University Press, 1959).

W. H. Curtis, *The Elements of Wood Ship Construction* (New York: McGraw-Hill Book Company, Inc., 1919).

John Henry Cutler, *Honey Fitz: Three Steps to the White House* (New York: Bobbs-Merrill, 1962).

Richard Henry Dana, Jr., *Two Years Before the Mast: A Personal Narrative* (Boston: Houghton Mifflin, 1911).

Richard Henry Dana, Jr., *The Journal of Richard Henry Dana, Jr.*, 3 Vols., ed. by Robert F. Lucid (Cambridge: Harvard University Press, 1968).

Robert F. Dalzell, *Enterprising Elite: The Boston Associates and the World They Made* (Cambridge: Harvard University Press, 1987).

Arthur B. Darling, *Political Changes in Massachusetts, 1824-1848* (New Haven: Yale University Press, 1925).

Alan Dawley, *Class and Community: The Industrial Revolution in Lynn* (Cambridge: Harvard University Press, 1976).

Samuel Adams Drake, *Old Landmarks and Historic Personages of Boston* (Boston: Little Brown & Co., 1900).

Thomas Dublin, *Women at Work: The Transformation of Work and Community in Lowell, Massachusetts, 1826-1860* (New York: Columbia University Press, 1979).

Jacques Ellul, *The Technological Society* (New York: Alfred A. Knopf, 1964).

Garnett Eskew, *Cradle of Ships* (New York: G. P. Putnam's Sons, 1958).

Walter Firey, *Land Use in Central Boston* (Cambridge: Harvard University Press, 1947).

Emerson David Fite, *Social and Industrial Conditions in the North During the Civil War* (New York: Frederick Ungar Publishing Company, 1963).

Esther Forbes, *The Running of the Tide* (Boston: Houghton Mifflin Company, 1948).

Robert William Fogel, *Railroads and Economic Growth: Essays in*

Econometric History (Baltimore: The Johns Hopkins Press, 1964).

Michael Frisch, Daniel J. Walkowitz, eds., *Working Class America: Essays on Labor, Community, and American Society* (Chicago: University of Illinois Press, 1983).

Siegfried Giedion, *Mechanization Takes Command: A Contribution to Anonymous History* (New York: W. W. Norton & Company, 1948).

David T. Gilchrist (ed.), *The Growth of the Seaport Cities 1790-1825, Proceedings of a Conference Sponsored by the Eleutherian Mills-Hagley Foundation, March 17-19, 1966* (Charlottesville: University Press of Virginia for the Eleutherian Mills-Hagley Foundation, 1967).

Joseph A. Goldenberg, *Shipbuilding in Colonial America* (Charlottesville: The University of Virginia Press, 1976).

Doris Kearns Goodwin, *The Fitzgeralds and the Kennedys* (New York: Simon and Schuster, 1987).

Martin Green, *The Problem of Boston: Some Readings in Cultural History* (New York: W. W. Norton, 1966).

Basil Greenhill, *The Evolution of the Wooden Ship* (New York: Facts on File Books, 1988).

Herbert G. Gutman, *Power and Culture: Essays on the American Working Class* (New York: Pantheon Books, 1987).

H. J. Habakkuk, *American and British Technology in the Nineteenth Century: The Search for Labour-Saving Inventions*, (Cambridge: The University Press, 1962).

Jurgen Habermas, *Toward a Rational Society* (Boston: Beacon Press, 1970).

Lewis M. Hacker, *The Course of American Economic Growth and Development* (New York: John Wiley & Sons, 1970).

Oscar Handlin, *Boston's Immigrants: A Study in Acculturation* (Cambridge: The Belknap Press of Harvard University Press, 1941, 1979).

Oscar and Mary Handlin, *Commonwealth A Study of the Role of Government in the American Economy: Massachusetts 1774-1861* (New York: New York University Press, 1947).

Alvin F. Harlow, *Steelways of New England* (New York: Creative Age Press, 1948).

Louis Hartz, *The Liberal Tradition in America: An Interpretation of American Political Thought Since the Revolution* (New York: Harcourt, Brace, 1955).

David Freeman Hawke, *Nuts and Bolts of the Past: A History of American Technology, 1776-1860* (New York: Harper and Row, 1988).

Robert L. Heilbroner, *The Worldly Philosophers: The Lives, Times and Ideas of the Great Economic Thinkers* (New York: Simon & Schuster, 1953).

Richard Hofstadter, *The Age of Reform: From Bryan to F.D.R.* (New York: Alfred A. Knopf, 1955).

David A. Hounshell, *From the American System to Mass Production: 1800-1932* (Baltimore: The Johns Hopkins University Press, 1984).

Brett Howard, *Boston: A Social History* (New York: Hawthorn Books, Inc., 1976).

Octavius T. Howe and Frederick C. Matthews, *American Clipper Ships, 1833-1858* (Salem: Marine Research Society, 1927). 2 Vols.

Thomas Hughes, *American Genesis: A Century of Invention and Technological Enthusiasm, 1870-1970* (New York: Viking Penguin, 1989).

Charles P. Huse, *The Financial History of Boston, from May 1, 1822 to January 31, 1909.* (Cambridge: Harvard University Press, 1916).

Louis C. Hunter, *Steamboats on the Western Rivers: An Economic and Technological History* (Cambridge: Harvard University Press, 1949).

Louis C. Hunter, *A History of Industrial Power in the United States, 1780-1930.* Vol. I: *Waterpower in the Century of the Steam Engine* (Charlottesville: The University of Virginia Press, published for the Eleutherian Mills-Hagley Foundation, 1979). Vol. II: *Steam Power* (Charlottesville: The University of Virginia Press, 1985).

John G. B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914* (Cambridge: Harvard University Press, 1941).

Jane Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1961).

Jane Jacobs, *The Economy of Cities* (New York: Random House, 1969).

Frederic Cople Jaher, *The Urban Establishment: Upper Strata in Boston, New York, Charleston, Chicago, and Los Angeles* (Chicago: The University of Illinois Press, 1982).

Reese V. Jenkins, *Images and Enterprise: Technology and the American Photographic Industry 1839-1925* (Baltimore: Johns Hopkins University Press, 1975).

Arthur M. Johnson and Barry E. Supple, *Boston Capitalists and the Western Railroads: A Study in Nineteenth-Century Railroad Investment Process* (Cambridge: Harvard University Press, 1967).

David Alan Johnson, *Founding the Far West: California, Oregon, and Nevada, 1840-1890* (Berkeley, Los Angeles: University of California Press, Ltd., 1992).

Howard Mumford Jones, *The Age of Energy: Varieties of American Experience, 1865-1915* (New York: The Viking Press, 1970).

Matthew Josephson, *The Robber Barons: The Great American Capitalists, 1861-1901* (New York: Harcourt, Brace and Company, 1934).

John F. Kasson, *Civilizing the Machine: Technology and Republican Values in America 1776-1900* (New York: Grossman Publisher, 1976).

Robert Keane, *The Apologia of Robert Keane*, ed. Bernard Bailyn (New York: Harper Torchbooks, 1964).

Edward Chase Kirkland, *Men Cities and Transportation: A Study in New England History, 1820-1900*. 2 Vols. (Cambridge: Harvard University Press, 1948).

Peter R. Knights, *The Plain People of Boston, 1830-1860: A Study in Growth* (New York: Oxford University Press, 1971).

Peter R. Knights, *Yankee Destinies: The Lives of Ordinary*

Nineteenth-Century Bostonians (Chapel Hill: The University of North Carolina Press, 1991.)

John Koren, *Boston, 1822-1922: The Story of Its Government and Principal Activities During One Hundred Years* (Boston: City of Boston Printing Department, 1922).

Gabriel Kolko, *The Triumph of Conservatism: A Reinterpretation of American History, 1900-1916* (New York: The Free Press, 1963).

Gabriel Kolko, *Railroads and Regulation, 1877-1916* (New York: W.W. Norton & Company, Inc., 1965).

John Kouwenhoven, *Made in America: The Arts in Modern Civilization* (New York: Doubleday & Company, 1948).

Roger Lane, *Policing the City of Boston 1822-1885* (Cambridge: Harvard University Press, 1967).

Benjamin W. Larabee, *The Merchants of Newburyport, 1764-1815* (Cambridge: Harvard University Press, 1962).

Hillel Levine, Lawrence Harmon, *The Death of American Jewish Community: A Tragedy of Good Intentions* (New York: The Free Press, 1992).

Ferdinand Lundberg, *America's 60 Families* (New York: The Vanguard Press, 1937).

George E. Marcus, Michael M. J. Fischer, *Anthropology as Cultural Critique: An Experimental Moment in the Human Sciences* (Chicago: The University of Chicago Press, 1986).

Herbert Marcuse, *One Dimensional Man: Studies in the Ideology of Advanced Industrial Society* (Boston: Beacon Press, 1964).

Karl Marx, *Capital*, Vol. I, Ch. VII, in Robert Tucker, *The Marx Engels Reader* (New York: W. W. Norton & Co., 1978).

Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1964).

Leo Marx, *The Pilot and the Passenger: Essays on Literature, Technology, and Culture in the United States* (New York: Oxford University Press, 1988).

F. O. Matthiessen, *American Renaissance: Art and Expression in the Age of Emerson and Whitman* (New York: Oxford University Press, 1941).

Otto Mayr and Robert C. Post, eds., *Yankee Enterprise: The Rise of the American System of Manufactures* (Washington, D.C.: Smithsonian Institution Press, 1981).

Judith A. McGaw, *Most Wonderful Machine: Mechanization and Social Change in Berkshire Paper Making, 1801-1885* (Princeton: Princeton University Press, 1987).

Richard C. McKay, *Some Famous Sailing Ships and Their Builder, Donald McKay* (New York: G. P. Putnam's Sons, 1928).

Richard C. McKay, *South Street: A Maritime History of New York* (New York: G. P. Putnam's Sons, 1934).

Marc Scott Miller, *The Irony of Victory: World War II and Lowell, Massachusetts* (Chicago: University of Illinois Press, 1988).

David Montgomery, *Beyond Equality: Labor and the Radical Republicans, 1862-1872* (New York: Alfred A. Knopf, 1967).

David Montgomery, *The Fall of the House of Labor: The Workplace, the State, and American Labor Activism, 1865-1925* (Cambridge: Cambridge University Press, 1987).

Elting E. Morison, *Men, Machines and Modern Times* (Cambridge: M.I.T. Press, 1966).

Samuel Eliot Morison, *The Maritime History of Massachusetts 1783-1860* (Boston: Houghton Mifflin, 1921, 1941).

Samuel Eliot Morison, *The Ropemakers of Plymouth: A History of the Plymouth Cordage Company 1824-1949* (Boston: Houghton Mifflin Company, 1950).

Samuel Eliot Morison. *One Boy's Boston, 1887-1901* (Cambridge: The Riverside Press, 1962).

Samuel Eliot Morison, *Harrison Gray Otis, 1765-1848: The Urbane Federalist* (Boston: Houghton Mifflin, 1969).

Richard B. Morris, ed., *Encyclopedia of American History* (New York: Harper and Row, 1976).

Lewis Mumford, *Technics and Civilization* (New York: Harcourt

Brace & World, Inc., 1934).

Lewis Mumford, *The Pentagon of Power* (New York: Harcourt Brace Jovanovitch, 1964).

Lewis Mumford, *The Myth of the Machine: Technics and Human Development* (New York: Harcourt Brace Jovanovitch, 1966).

David Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (New York: Alfred A. Knopf, 1977).

Douglass C. North, *The Economic Growth of the United States 1790-1860* (New Jersey: Prentice Hall, Inc., 1961).

Eugene O'Neill, "The Hairy Ape," published in *Complete Plays* (New York: Viking Press, 1988).

Arnold Pacey, *Technology in World Civilization: A Thousand Year History* (Cambridge: The M.I.T. Press, 1990).

William N. Peterson, "Mystic Built": *Ships and Shipyards of the Mystic River, Connecticut, 1784-1919* (Mystic, CT: Mystic Seaport Museum, 1989).

Karl Polanyi, *The Great Transformation: The Political and Economic Origins of Our Time* (Boston: Beacon Press, 1944).

David M. Potter, *People of Plenty: Economic Abundance and the American Character* (Chicago: The University of Chicago Press, 1954).

Nathan Rosenberg, *Perspectives on Technology* (Cambridge: Cambridge University Press, 1976).

Barbara Gutmann Rosenkrantz, *Public Health and the State: Changing Views in Massachusetts, 1842-1936* (Cambridge: Harvard University Press, 1972).

Marjorie Drake Ross, *The Book of Boston: The Victorian Period, 1837-1901* (New York: Hastings House Publishers, 1964).

Steven J. Ross, *Workers on the Edge: Work, Leisure, and Politics in Industrializing Cincinnati, 1788-1890* (New York: Columbia University Press, 1985).

Joseph G. Raybeck, *A History of American Labor* (New York: The Macmillan Company, 1959).

John Robinson & George Francis Dow, *The Sailing Ships of New England, 1607-1907* (Salem, MA: Marine Research Society, 1922).

Steven J. Ross, *Workers on the Edge: Work, Leisure, and Politics in Industrializing Cincinnati, 1788-1890* (New York: Columbia University Press, 1985).

Arthur M. Schlesinger, Sr., *The Rise of the City 1878-1898* (New York: Macmillan, 1933).

Stanley K. Schultz, *The Culture Factory: Boston Public Schools, 1789-1860* (New York: Oxford University Press, 1973).

Philip Scranton, *Proprietary Capitalism: The Textile Manufacture at Philadelphia, 1800-1885* (Cambridge: Cambridge University Press, 1983).

Philip Scranton, *Figured Tapestry: Production, Markets, and Power in Philadelphia Textiles, 1885-1941* (Cambridge: Cambridge University Press, 1989).

Carl Seaburg and Stanley Paterson, *Merchant Prince of Boston: Colonel T.H. Perkins, 1767-1854* (Cambridge: Harvard University Press, 1971).

Richard Sennett, Jonathan Cobb, *The Hidden Injuries of Class* (New York: Alfred A. Knopf, 1972).

James F. Shepherd, Gary M. Walton, *Shipping, Maritime Trade, and the Development of Colonial North America* (Cambridge: The University Press, 1972).

Merritt Roe Smith, *Harpers Ferry Armory and the New Technology: The Challenge of Change* (Ithaca: Cornell University Press, 1977).

Edward Rowe Snow, *The Romance of Boston Bay* (Boston: The Yankee Publishing Company, 1944).

Edward Rowe Snow, *The Islands of Boston Harbor* (New York: Dodd, Mead & Company, 1936, 1971).

John Staudenmaier, *Technology's Storytellers* (Cambridge: The M.I.T. Press, 1985).

Orra L. Stone, *History of Massachusetts Industries, Their Inception, Growth and Success* (Boston, Chicago: S. J. Clarke Publishing Company, 1930). 2 Vols.

Dana Story, *The Building of a Wooden Ship, "Sawn Frames and Trunnel Fastened,"* (Barre, MA: Barre Publishers, 1971).

Dirk J. Struik, *Yankee Science in the Making* (Boston: Little, Brown and Company, 1948).

George Rogers Taylor, *The Transportation Revolution, 1815-1860* (New York: Holt, Rinehart and Winston, 1951).

E. P. Thompson, *The Making of the English Working Class* (New York: Random House, Inc., 1963).

B. Traven, *The Death Ship* (New York: Alfred A. Knopf, 1934).

Frederick Jackson Turner, *The Frontier in American History* (New York: Henry Holt & Co., 1920).

Anthony F. C. Wallace, *Rockdale: The Growth of an American Village in the Early Industrial Revolution* (New York: W. W. Norton & Company, 1972).

David Ware, *Cities and Immigrants: A Geography of Change in Nineteenth-Century America* (New York: Oxford University Press, 1971).

Norman J. Ware, *The Industrial Worker 1840-1860* (Gloucester, MA: Peter Smith, 1959).

Norman J. Ware, *The Labor Movement in the United States 1860-1895* (Gloucester, MA: Peter Smith, 1959).

Sam B. Warner, Jr., *Streetcar Suburbs: The Process of Growth in Boston, 1870-1900* (Cambridge: Harvard University Press, 1962).

W. Lloyd Warner, Paul S. Lunt, *The Social Life of a Modern Community* (New Haven: Yale University Press, 1941).

Adna Ferrin Weber, *The Growth of Cities in the Nineteenth Century: A Study in Statistics* (Ithaca: Cornell University Press, 1899, 1963.)

Max Weber, *Basic Concepts in Sociology* (London: Peter Owen Limited, 1964).

Max Weber, *The Protestant Ethic and the Spirit of Capitalism* (New York: Charles Scribner's Sons, 1958).

Walter M. Whitehill, *Boston: A Topographical History*

(Cambridge: Harvard University Press, 1959).

Sean Willentz, *Chants Democratic: New York City & the Rise of the American Working Class, 1788-1850* (New York: Oxford University Press, 1984).

Langdon Winner, *Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought* (Cambridge: The M.I.T. Press, 1977).

WPA Writer's Program, *Boston Looks Seaward: The Story of the Port, 1630-1940* (Boston: Bruce Humphries, Inc., 1941).

Joanne Yates, *Control Through Communication: The Rise of System in American Management* (Baltimore and London: The Johns Hopkins University Press, 1989).

Nineteenth Century Sources

George Adams, (comp.), *The Boston Directory for ...* (Titles vary) (Boston: George Adams, 1846-1857; Adams, Sampson & Co., 1858-1880).

Nathaniel I. Bowditch, "Gleaner Articles," *Fifth Report of the Record Commissioners, 1880* (Boston: Rockwell and Churchill, 1884).

Joseph B. Felt, *Annals of Salem* (Boston: James Munroe & Company, 1849). 2 Vols.

Abner Forbes (comp.), *The Rich Men of Massachusetts: Containing A Statement of the Reputed Wealth of About Two Thousand Persons, with Brief Sketches of Nearly Fifteen Hundred Characters* (Boston: Printed for Redding & Co., Hotchkiss & Co., fetridge & Co., & W. V. Spencer, 1852).

R. B. Forbes, *Personel Reminiscences* (New York: Library Editions, 1970). Reprint of 1882 Boston edition.

Edward E. Hale, *Letters on Irish Immigration: First Published in the Boston Daily Advertiser* (Boston: Phillips, Sampson & Co., 1852).

John Hayward (comp.), *A Gazetteer of Massachusetts, Containing Descriptions of All the Counties, Towns and Districts in the*

Commonwealth...Revised edition (Boston: John P. Jewett & Company, 1849).

Edward Hazen, Popular Technology, or, Professions and Trades (New York: Harper and Brothers, 1846). 2 Vols.

T. W. Higginson, ed., Harvard Memorial Biographies (Cambridge: Sever and Francis, 1866). 2 Vols.

Moses King (comp.), King's Hand-Book of Boston Profusely Illustrated (Cambridge: Moses King, 1879).

Lauchlan McKay, The Practical Ship - Builder: Containing the Best Mechanical and Philosophical Principles for the Construction of Different Classes of Vessels, and the Practical Adaptation of Their Several Parts, with the Rules Carefully Detailed (New York: Collins, Keesee and Company, 1839).

Nathaniel B. Shurtleff, A Topographical and Historical Description of Boston (Boston: A. Williams, 1871).

Caleb H. Snow, History of Boston (Boston: Abel Bowen, 1824).

Charles Stimpson, Jr. (comp.), The Boston Directory (Boston: Charles Stimpson, Jr., 1831-1846).

William Sumner, A History of East Boston, (Boston: J.E. Tilton and Company, 1858).

Charles M. Wiltse and Michael J. Birkner, editors, The Papers of Daniel Webster, Correspondence, Vol. 7, 1850-1852 (Hanover, NH: The University Press of New England, 1986).

Government & Archival Documents

Abstract of the Census of Massachusetts, 1865, Prepared Under the Direction of Oliver Warner, Secretary of the Commonwealth (Boston: Wright and Potter, 1867).

Acts and Resolves of Massachusetts. Published by the Secretary of the Commonwealth. (Boston: Wright and Potter, 1831-1880).

The Bethlehem Shipbuilding Corporation Archives: Atlantic Works, Account Books, Receipts, Records, Correspondence, Hart Nautical Collections, Massachusetts Institute of Technology.

The Bethlehem Shipbuilding Corporation Archives: Simpson's Patent Dry Dock, Account, Wage, Receipt Books, 1856-1878, Hart Nautical Collections, Massachusetts Institute of Technology.

Boston Board of Trade, Annual Reports, 1843, 1844; 1853-1860.

William A. Baker, Papers, Hart Nautical Collections, Massachusetts Institute of Technology.

Arthur H. Clark, Collection, Hart Nautical Collections, Massachusetts Institute of Technology.

Customs House, Annual Enrollment Books.

Customs House, Annual Register Books.

"Development of Shipbuilding and Ship Repair in East Boston," Extract from talk before Propeller Club of Port of Boston, given by George Stebbins, March 12, 1930 [Based on notes supplied by George McConnell].

Francis DeWitt, Abstract of the Census of ...Massachusetts...1855 (Boston, 1857).

East Boston Company, Annual Reports.

East Boston Dry Dock, Records 1824-1872. [MSS 734] Manuscript Collection of the Baker Library, Harvard University.

East Boston, Rigger's Journal, 5 May, 1856-28 May, 1859. Hart Nautical Collections, Massachusetts Institute of Technology.

East Boston Timber Company, Letters 1834-1840. [MSS 47] Manuscript Collection of the Baker Library, Harvard University.

East Boston Wharf Company, Minute Book 1833-1866. [MSS 778] Manuscript Collection of the Baker Library, Harvard University.

Henry Hall, Report on the Ship - Building Industry of the United States, 1884. [Report Based on the 1880 Census]

Thomas Hutchinson, The History of the Colony and Province of Massachusetts Bay. 2nd. Edition. Vol. I (London: Printed by M. Richardson, 1760) Vol. II (London: Printed by J. Smith for G. Kearsly, 1768).

Edward Johnson, Wonder-Working Providence, 1628-1651.

Reproduced under the auspices of the American Historical Association. General Editor, J. Franklin Jameson (NY: Charles Scribner's Sons, 1910).

Charles G. Loring, *Arguments on Behalf of the Eastern Railroad Company at a Hearing of the Petitions of David Pingree and Others, and W. J. Valentine and Others before the Railroad Commission of the Massachusetts Legislature, Boston, March 7, 1845* (Boston: Dutton and Wentworth, 1845).

John Lynch, et. al., *Causes of the Reduction of American Tonnage. Report of a Select Committee to the House of Representatives on 17 February, 1870.*

Maverick Fire Insurance Company, *Insurance Records, 1849-1851.* [MSS 798] Manuscript Collection at the Baker Library, Harvard University.

Massachusetts Bureau of Industrial and Labor Statistics Reports, 1870-1880.

Massachusetts Historical Society, Collections.

Massachusetts Historical Society, *Proceedings. 1st Series, 1791-1883. 2nd Series, 1884-1907.*

Massachusetts House Documents, 1830-1880.

Joseph Nimmo, Chief of the Bureau of Statistics, *Report to the Secretary of the Treasury in Relation to the Foreign Commerce of the United States and the Decadence of American Shipping, 1870,* House Executive Document 111, 41 Congress, Second Session.

Report of the Boston Landmark Commission on the Potential Designation of the Donald McKay House as a Landmark under Chapter 722 of the Acts of 1975. 18 pgs. Illustrations, maps.

Report of the Committee of Internal Health on the Asiatic Cholera., Boston City Documents, 1849, No. 66.

Report of the Special Commission on the Subject of the East Boston Ferries, 1857.

Records of the Governors and Company of the Massachusetts Bay in New England, edited by Nathaniel Shurtleff, M.D. 4 Vols., 1628. (Boston: From the Press of William White, 1853).

Lemuel Shattuck, *Report to the Committee of the City Council*

Appointed to Obtain the Census of Boston for the Year 1845, Embracing Collateral Facts and Statistical Researches Illustrating the History and Conditions of the Population, and Their Means of Progress and Prosperity (Boston: J. H. Eastburn, 1846).

Lemuel Shattuck and others, *Report of the Sanitary Commission of Massachusetts 1850*, facsimile edition (Cambridge: Harvard University Press, 1948).

Franklin W. Smith and Nelson Curtis, *Wooden Ships Superseded by Iron; Cheap Iron Indispensable for the Revival of American Commerce; A Commercial Marine Essential to National Progress and Defence* (Boston: A. Mudge & Son, Printers, 1869).

The Sanitary Commission of Boston: The Report of the Medical Commission Appointed by the Board of Health of the City of Boston to Investigate the Sanitary Conditions of the City (Boston: Rockwell and Churchill, 1875).

The Statistical History of the United States, From Colonial Times to the Present (New York: Basic Books, 1976).

United States Bureau of the Census, Eighth Census: 1860, *Population Returns*, Boston, Ward 2, East Boston.

United States Bureau of the Census, Ninth Census: 1870, *Population Returns*, Boston, Ward 1, East Boston.

United States Bureau of the Census, Tenth Census: 1880, *Population Returns*, Boston, Ward 1, East Boston.

United States Bureau of the Census, Tenth Census, Vol. IV, *Report on the Agencies of Transportation in the United States* (Washington: Government Printing Office, 1883).

United States Commissioner of Navigation, *Annual Reports*, 1884-1914.

Carroll D. Wright, *The Social, Commercial, and Manufacturing Statistics of the City of Boston* (Boston: Rockwell and Churchill, 1882).

Carroll D. Wright, *Analysis of the Population of the City of Boston as Shown in the Census of May, 1885* (Boston: Rockwell and Churchill, 1885).

George E. Waring, *Boston in 1880*, from "Report on the Social Statistics of Cities," Census Office, Department of the

Interior, 1886.

Oliver Warner, *Statistical Information Relating to Branches of Industry in Massachusetts: For the Year Ending June 1, 1855* (Boston: W. White, 1856).

John Winthrop's Journal, "History of New England," 1630-1649, 2 Vols. Reproduced under the auspices of the American Historical Association, James Kendall Hosmer, editor. (New York: Charles Scribner's Sons, 1908).

Periodical Literature

American Historical Review
Commercial and Financial Chronicle
The Connecticut Historical Society Bulletin
The Atlantic Monthly
The American Neptune
Harper's New Monthly Magazine
Hunt's Merchant Magazine
Journal of American History
Journal of American Studies
The Log of the Mystic Seaport
The Mariner's Mirror
New England Quarterly
Nile's Weekly Register
North American Review
Sail Magazine
Scientific American
Technology and Culture
U.S. Nautical Magazine

Newspapers

Boston Daily Bee
Boston Evening Transcript
Boston Weekly Advertiser
Bunker Hill Aurora
East Boston Argus-Advocate
East Boston Ledger
New York Times
Weekly Evening Voice (Boston)

**Articles/Papers
Dissertations**

John Arrison, "Charlestown Navy Yard 1800-1876: Report on Ship and Shipbuilding Technology," Prepared for Boston National Historical Park, Charlestown Navy Yard, November 22, 1988.

Charles Barnard, "The American Clyde," Harper's New Monthly Magazine, April, 1878.

Robert K. Cheney, "Industries Allied to Shipbuilding in Newburyport," The American Neptune, January, 1957.

Charles H. Cramp, "The Evolution of Screw Propulsion," Transactions of the Society of Naval Architects and Marine Engineers, Vol. XVII-XVIII, 1910-1910.

Joan Didion, "Trouble in Lakewood," The New Yorker, July 26, 1993.

Robert B. Gordon, "Who Turned the Mechanical Ideal into Mechanical Reality?" Technology and Culture 29, October, 1988.

Elton W. Hall, "Sailcloth for American Vessels," The American Neptune, January, 1971.

John V. Goff, "Traces of the Shipyard Workers: Shipbuilding in the Connecticut River Valley, 1800-1850," The Connecticut Historical Society Bulletin, January, 1981.

"Half-modelling," The Apprenticeship Shop of the Bath Marine Museum, Bath, Maine [unattributed].

Ernest Ingersoll, "The Lading of a Ship," Harper's New Monthly Magazine, September, 1877.

Bruce M. Lane and C. Gardner Lane, "New Information on Ships Built by Donald McKay," The American Neptune, April, 1982.

Nathan Lipfert, "The Shipyard Worker and the Iron Shipyard," The Log of the Mystic Seaport.

N. Macleod, "The Shipwrights of the Royal Dockyards," Mariner's Mirror, July, 1925.

John J. McNamara, Jr., "Monuments of Snow," Sail Magazine, August, 1978.

Thomas Jay Misa, *Science, Technology and Industrial Structure: Steelmaking in America, 1870-1925*, A Dissertation in the History and Sociology of Science, University of Pennsylvania, 1987.

Cedric Ridgely-Nevitt, "Auxiliary Steamships and R.B. Forbes," The American Neptune, January, 1941.

Norman N. Rubin, "Variances in Dimensions of Half-Models," The American Neptune, July, 1977.

W.F.G. Shanks, "The Brooklyn Navy Yard," Harper's New Monthly Magazine, December, 1870.

U.S. Nautical Magazine: "Bent Timber for Ships," May, 1856; "Boston and European Steam Navigation," September, 1855; "Boston Ship Stock Market," October, November, 1854; "Clipper and Iron Ships," July, 1857; "Durability of, and Season for Cutting Ship Timber," January, 1855; "Gales on the Atlantic," July, 1857; "The Influences of the Suez Canal Upon American Commerce," November, 1856; "Iron Keelsons, Stronger, Lighter and Cheaper Than Wood," September, 1855; "Iron Sea-Going Vessels Less Reliable Than Wood," May, 1856; "Iron versus Wooden Ships," January, 1854; "Lieut. Maury's Notice to Navigators," August, 1855; "On Tree-Nails and Tree-Nailing," February, 1857; "The Causes of Foundering," April, 1856; "The Forbes's Rig for Ships," August, 1855; "The Ship-BUILDER and the Apprentice," April, 1856; "The Ship-BUILDERS of the United States," October, 1854; "Ship-BUILDING," March, 1857; "Ship-Owning," March, 1857; "Suez Canal, and Its Effects on Commerce," October, 1856; "Will the Great Eastern Pay?" September, 1857.

Earle R. Warren, "The Nineteenth-Century Shipyard Worker, Attitudes and Action," Presented at the Symposium on the American Schooner at the Bath Marine Museum, May 6, 1973.

Earle R. Warren, "Shipyard Strike 1866: An Action for the Eight Hour Day," Presented at the 14th Maritime Symposium of the Maine Maritime Museum, Bath, Maine, May 4, 1986.

Scientific American, "A British Captain on Iron Ships," July 6, 1861; "Iron Ship Building," August 4, 1877; "The Most Powerful War Vessel in the World," August 28, 1875; "Novelty in Ship Building," May 30, 1874; "Our Iron Shipbuilding Industry," May 5, 1877; "The Arrival of the Mammoth Steamship

'Great Eastern' at New York," July 2, 1860;

John W. Watson, "The Building of the Ship," Harper's New Monthly Magazine, April, 1862.