At the height of the Spanish-American War, the U.S. Navy blockaded the Cuban port of Santiago, where it trapped several enemy warships. On the morning of July 3, 1898, a lookout aboard the battleship USS Iowa spotted the Spanish fleet under steam as it prepared to break the American blockade and escape to the open sea. The U.S. fleet closed in on the enemy and opened fire. When the smoke cleared a few hours later, hundreds of sailors were dead or wounded, and the Spanish fleet was in shambles. With that battle the U.S. Navy emerged as the principal naval force of the Western Hemisphere. The battle also showed the significance of Philadelphia-built warships: Of the five capital ships that defeated the Spaniards at Santiago de Cuba, three had been built by Cramp.¹

This demonstration of American naval power reflected a decade of preparation in the course of which the navy had initiated a far-reaching fleet modernization program. The construction of what became known as the new navy involved the creation of an industrial base of shipyards and naval armor works as well as ordnance suppliers concentrated in Pennsylvania. Along with the Carnegie steel plant at Pittsburgh, the Bethlehem Iron works in South Bethlehem, the Midvale Steel ordnance factory at Nicetown, the Roach shipyard at Chester, and the Philadelphia Navy Yard with its new dry dock for capital ship overhauls, Cramp was part of “Fortress Pennsylvania,” birthplace of the American steel navy.²
The Philadelphia builders and the U.S. Navy became so closely allied that, in Charles Cramp’s words, the yard became a quasi-public enterprise: “The shipyard has reached a stage of development at which it is not merely a manufactory in private hands, but the greatest naval arsenal in the Western Hemisphere, universally recognized by the Government, the press and the people as a public institution of the first importance to the sea power of the nation.”

This blurring of private and public spheres in weapons procurement was a central characteristic of the military-industrial complex, which had emerged in late nineteenth-century armor production when the federal government helped build up an industrial base of long-term suppliers. The term describes a new quality in state-business relations, shifting the “‘militia theory’ of industrial preparedness practiced in the Civil War to an integrated system which was capable of meeting peacetime demands of an expansionist nation functioning in a hostile environment. The needs of the U.S. Navy—like those of navies abroad—became central for stimulating industrial modernization. The U.S. Navy, rather than the army, became the first service to require industrial products more sophisticated than those normally produced by paleo-industry, i.e., rails and farm machinery.”

With the birth of the military-industrial complex, naval steel suppliers began to procure specialty production equipment of limited usefulness for commercial manufacturing; for this reason, armor contractors started to demand ever growing naval appropriations. To ensure a steady flow of profitable contracts, they developed close relationships with the Navy Department, opened a revolving door between the public and private sectors by hiring former government officials, and received favorable treatment by a Navy Department bent on maintaining its military-industrial base. The navy often tolerated questionable practices on the part of the armor and later gun contractors, including cartel-like price fixing.

Although builders of warships became dependent on naval construction, their situation was slightly different from that of armor producers. For example, the first clear cases of price fixing among major contractors did not materialize until the late 1920s. Moreover, farsighted builders viewed naval contracting only as a means to sustain shipyards during hard times, while they would return to merchant shipbuilding whenever possible. To bolster commercial construction, they advocated a comprehensive overhaul of federal policy to boost the merchant marine, but these reforms failed. Much to the regret of shipbuilders, shipyards remained dependent on military contracts until the end of the century.
Cramp and the Military-Industrial Complex, 1885–1898

The New Navy and Shipbuilding Technology

Cramp commenced naval construction during the economic downturn of the second half of the 1880s. Like many other businessmen, shipbuilders had increased their production capacities and apprenticed new specialists during the preceding upswing, only to see their new facilities and workers idled by yet another slump. In Charles Cramp’s words, “most of the shipyards have gone under on account of periods of depressions, at which time grass and tomato vines grow on the wharves, and at other times there was a gorged condition, then a famine, then a gorge.” This pattern of long depressions and short recoveries was especially pronounced in shipbuilding but also pervaded other sectors of the U.S. economy, which experienced cyclical downturns from 1873 to 1879 and from 1882 to 1885.

Most contemporaries believed that chronic instability during the late nineteenth century was related to overproduction and underconsumption in maturing industrial societies. Presumably, production capacity grew much faster than domestic markets. Arguing that overseas market expansion would provide a remedy, imperialists advocated the construction of a powerful navy to open up new markets. One protagonist argued, “At least one-third of our mechanical and agricultural products are now in excess of our own wants, and we must export these products or deport the people who are creating them. It is a question of millions . . . new markets must be found and new roads opened. The man-of-war precedes the merchantman and impresses rude people with the sense of the power of [the] flag, which covers the one and the other.”

Similar demands for state-sponsored imperialism as a solution to domestic economic problems were made throughout the industrialized world and formed the ideological underpinning for the rapid growth of the British and French colonial empires and the establishment of German colonies during the “scramble for Africa” in the 1880s. In the United States the lack of steel warships was a serious impediment for similar ventures, and the dilapidated U.S. fleet with its wooden sloops and Civil War monitors was in no position to conduct gunboat diplomacy or “impress rude people.” This changed with the creation of the new navy and the construction of America’s first steel warships.

The Navy Department invited shipbuilders’ bids when the naval appropriations bill of 1883 funded the construction of two cruisers, a gunboat, and a dispatch vessel. Cramp submitted a proposal but was underbid by John Roach who received the entire batch. Dismayed by what he perceived as blatant favoritism, Cramp asked Secretary of the Navy William Chandler, “Mr. Secretary, are you going to give all these contracts to one man?” Chandler replied, “I
don't see how I can help it."

Cramp suspected that Roach had submitted an unrealistically low bid: "We got an idea . . . after the bids were opened, that Roach and Chandler were working together so we put in bids lower than it was possible for Roach or anyone else to build the vessels for . . . Roach bid lower yet, and so much lower too, that he cannot begin to do the work according to the specifications."

This suspicion was eventually confirmed: Roach had indeed underestimated his labor and material costs. He later asked the navy to renegotiate the contract, but the new secretary of the navy William Whitney insisted that the vessels be delivered at the original price. The construction of the four ships was also plagued by poor planning, frequent design changes, and material supply problems that resulted in the failure of the first vessel, the gunboat USS Dolphin, to perform according to specifications. The affair virtually ruined the shipyard and forced John Roach, the largest shipbuilder of the day, into bankruptcy in 1885—hardly an encouraging beginning for the new navy.

When the navy issued the next round of warship contracts in 1886 and 1887, the memory of Roach's failure was still fresh in the minds of many builders. Several, including Neafie & Levy, John Dialogue, and Pusey & Jones, refused to bid. The small number of competitors led the Army & Navy Journal to believe that "Mr. Roach's late experience with the [Navy] Department has certainly not been such as to encourage the shipbuilders to compete with him for its favors." But Cramp, hard pressed for orders because the yard had few commercial contracts, competed fiercely with the Union Iron Works of San Francisco and Harlan & Hollingsworth for three cruiser and two gunboat contracts. Cramp was also interested in a risky "dynamite cruiser" contract that received no other bids. In December 1886 the yard booked the protected cruiser USS Baltimore, followed by the protected cruiser USS Newark, the "dynamite cruiser" USS Vesuvius, the gunboat USS Yorktown, and the protected cruiser USS Philadelphia. Within ten months the builder had signed five contracts worth a total of $4,728,000, which made Cramp the nation's most prominent warship contractor. Four other vessels were built by the Union Iron Works and the Brooklyn and Norfolk Navy Yards.

The Navy Department signed separate contracts for gun and armor steel with the Bethlehem Iron Company, which, like Cramp, obtained naval contracts to employ idle production capacity. In 1885 and 1886 demand for Bethlehem's steel rails declined, forcing the company to take a $1 million mortgage to maintain its financial viability. A year later the firm bid on a contract for 1,310 tons of gun steel to supply ordnance for warships building in Philadelphia and elsewhere. Bethlehem also obtained a contract for 4,500 tons of armor plates, which were installed aboard armored ships built in Brooklyn and Nor-
Cramp and the Military-Industrial Complex, 1885–1898

folk. (During the 1880s Cramp built only unarmored cruisers.) Bethlehem made extraordinary efforts to secure these orders, obtained a French steel patent, and upgraded its plant at Bethlehem to manufacture naval steel and ordnance.\textsuperscript{13}

Cramp launched facility improvements in preparation for naval construction, procured hydraulic tools, erected a new building for boiler and blacksmith work, and lengthened the machine shop. Charles Cramp related:

Up to the time the Government promised us these contracts we had no hydraulic boiler-making machinery in our works. We still struggled along with our old devices for bending, flanging, and riveting boiler plates, because we did not have the money to buy new machines . . . As soon as we made [the naval contracts] we knew that by improving our facilities it would be of immense advantage to us and partly pay for itself and thereby help us in future competition . . . We got hydraulic machinery for handling these enormous boilers and riveting the plates. We made a large expenditure, amounting to about $350,000.\textsuperscript{14}

Warship construction also facilitated the introduction of new designs when the Navy Department imported hull and engine drawings for the cruiser USS Baltimore from England. The engine plans were particularly useful because they provided American builders with detailed information about the new British triple-expansion engine. Unlike the traditional compound engine, which recycled boiler steam only once, the triple-expansion engine recycled it twice, thereby improving fuel efficiency. Cramp had experimented with this new engine type in the yacht Peerless in 1885, but the English plans enabled the yard to construct more powerful and compact engines. In his review Charles Cramp thanked Secretary Whitney for making these sophisticated drawings available to U.S. builders: “In procuring these plans you have not only performed a valuable service to the navy but you have also conferred a signal benefit on the shipbuilding interest of the country by laying before them the most elaborate results of the best skills and most approved experience abroad.”\textsuperscript{15}

Capitalizing upon its experience with triple-expansion engines in naval construction, Cramp later introduced the system in merchant shipbuilding.\textsuperscript{16}

Charles Cramp believed that although naval work helped yards survive slumps in commercial shipbuilding and experiment with new technologies, in the long run it could not replace more profitable private contracts. Building “men-of-war would simply enable us to perfect our facilities for merchant vessels,” he proclaimed. “We must have mercantile ship-owners. We must continue to build mercantile vessels.”\textsuperscript{17} Government contracting was too complicated and unprofitable to sustain shipyards for any extended period: “No intelligent manufacturer needs to be told that government work alone is not a reliable basis for permanent prosperity. The requirements of the government
as to material, workmanship, and performance, are so severe, that there is but little profit in its work as compared with orders for merchant account.\textsuperscript{18}

This rather critical view was the result of Cramp’s experiences with naval officials who inspected warships during the construction phase and often rejected defective plates and inferior workmanship. As a result of these and other construction problems, the completion of the dynamite cruiser USS Vesuvius was almost two years behind schedule.\textsuperscript{19}

The USS Baltimore, the largest of the five vessels, was ready for her official trial in fall 1889. A trial trip was usually a nerve-racking affair for the contractor because the navy determined afterward whether it would accept or reject the vessel. In 1885 the Navy Department had rejected the USS Dolphin due to insufficient speed and other problems, thereby contributing to Roach’s downfall. Charles Cramp took some precautions to avoid a similar calamity. During a discussion of the USS Baltimore contract, he suggested to Whitney that the navy establish specific penalties for underperformance instead of rejecting the entire vessels. For example, the contract specifications for the USS Baltimore called for at least 9,000 Indicated Horse Power (IHP); Charles Cramp related:

I asked Mr. Whitney what would happen if she developed only 8,999 horse-power. After reflection he said he could not accept her under the contract if drawn that way, and invited a suggestion of remedy. I at once proposed the penalty system. That is to say, a system of deducting a certain sum for every unit of power developed short of the guaranty, as was often done in both naval and merchant shipbuilding practice. He assented to this without argument, but said that in order to make the contract entirely equitable there should be a corresponding premium for excess of performance.\textsuperscript{20}

Penalties provided a safeguard against the rejection of the vessel after her trial trip, and premiums gave the builder an opportunity to reap extra profits.\textsuperscript{21}

The premium system stipulated a bonus of $100 for every unit IHP in excess of the contract specifications. To develop maximum engine power, contractors manned engine rooms with experienced stokers who fed boiler grates with handpicked coal. These efforts paid off handsomely when the USS Baltimore developed 1,064.44 excess IHP and earned Cramp a premium of more than $100,000.\textsuperscript{22}

\textit{The Structure of the American Shipbuilding Industry, c. 1890}

Upon completion of most of its naval work in the late 1880s, Cramp recommenced commercial shipbuilding as its old customers for merchant tonnage returned with fresh contracts. Clyde ordered the passenger vessels Iroquois and Algonquin, and the Red D Line, the Venezuela and Caracas. Cramp also built the Henry M. Whitney for the Metropolitan Line, the Essex for the Merchants’
& Miners’ Transportation Company, and El Sol for the Pacific Improvement Company. In terms of size, building material, and engine type, these vessels reflected Cramp’s capacity to build better ships than its competitors. Thanks to its naval construction experience, Cramp built larger hulls and made increasing use of steel, which was 15 percent lighter than equally strong iron. El Sol was the first merchant vessel exceeding 4,000 gross tons, and Clyde’s Iroquois of 1889 was the largest steel vessel of the day. Most Cramp-built merchant steamers were now equipped with triple-expansion engines. These innovations solidified Cramp’s position as the nation’s leading supplier of large metal steamships.23

At the beginning of the 1890s the yard had few competitors for large contracts. Like Cramp, the Union Iron Works had obtained naval contracts for three cruisers and a monitor during the shipbuilding depression. But unlike Cramp, the San Francisco yard had no customer base among leading steamship lines, so that it remained dependent on naval contracting until the second half of the 1890s. Harlan & Hollingsworth had traditionally bid against Cramp for contracts for large iron steamers, but the firm lost its competitive edge when owners ordered ships like El Sol, whose length exceeded 400 feet. Operating on the narrow Christiana River in Wilmington, Harlan & Hollingsworth was unable to launch ships of such dimensions. Accordingly, in 1889 the management declared that it would henceforth concentrate on medium-sized vessels and leave larger ships to others. Until Roach’s bankruptcy in 1885 his Chester yard had outclassed Cramp in terms of production equipment and vessel output, but as a result of reorganization and financial streamlining by the founder’s son, John B. Roach, the yard fell behind. During the late 1890s Collin P. Huntington’s Newport News Ship Building & Dry Dock Company became a formidable competitor for large steamship contracts. At the beginning of the decade, however, the company was still relatively inexperienced and lacked Cramp’s extensive connections among steamship operators and government officials.24

The remaining yards for iron and steel shipbuilding included smaller firms, such as Neafie & Levy, Dialogue, and Pusey & Jones, specializing in tugs, yachts, ferries, and barges of less than 1,500 gross tons. Demand for these ships had declined between 1885 and 1887 but increased in the course of the next half-decade. Neafie & Levy’s major customers included the New York, Lake Erie & Western Railroad, which ordered tugs and ferryboats to expand its New York harbor-service fleet. Between 1888 and 1893 Neafie & Levy built twenty-eight small iron steamships and thirty engines for wooden steamers whose hulls were launched at other yards. The firm also capitalized upon its business connections with Central American customers, who had ordered small war-
Neafie & Levy, 1890s. This illustration shows some of the most prestigious vessels built at the yard during this period, including J. P. Morgan’s Corsair at center. Neafie & Levy Ship and Engine Building Company (New York, 1896)

ships and sugar-processing equipment from Neafie & Levy since the 1870s. In 1891 it obtained a contract from the Cuban merchant house of Menendez & Company for the passenger and freight steamer Antonia Menendez, followed by the Purisima Concepcion in 1893. Neafie & Levy felt confident enough to enlarge its plant with new offices, drafting rooms, and workshops. To mobilize capital for these improvements, Jacob Neafie and Edmund Levy incorporated the firm, which was capitalized at $800,000. As in other closely held corporations, the former proprietors controlled the majority of shares and managed day-to-day operations.25

Neafie & Levy’s most spectacular vessel was J. Pierpont Morgan’s steel yacht Corsair II, designed by Morgan’s friend J. Frederic Tams. The New York banker handed Tams a stack of blank checks and instructed him to spare no expense for his magnificent toy. In 1890 the Philadelphia yard received the contract to produce the world’s largest pleasure vessel. Sporting a clipper bow, a black hull, and a yellow funnel, the 240-foot Corsair II was equipped with private cabins and bathrooms, a library, and lavishly furnished social rooms. Morgan struck some of his most important business and political deals during cruises aboard this famous vessel.26
Neafie & Levy competed with several newcomers who established yards to build small and medium-sized iron steamships as demand improved during the late 1880s. Local competitors included Charles Hillman and his sons Bart, Josiah, and Jonathan, who had previously built wooden hulls under the auspices of Birely, Hillman & Streaker of Philadelphia and Bart Hillman of Camden. They discontinued the Camden yard and bought out Jacob Birely and David Streaker to establish Hillman & Sons in 1888. Hillman commenced tug engine building in 1889, then switched from wooden to iron construction, and launched its first iron steamer, the Baltimore & Philadelphia Steamboat Company’s Anthony B. Groves, in 1893.27

At the beginning of the 1890s there were signs that American metal shipbuilding could overcome at least some of the problems that had plagued the industry from the start. First, yard specialization increased among established firms. Cramp was the industry leader for larger warships and passenger liners, and the Union Iron Works committed itself to naval construction. Among the second-class yards, Roach and Harlan & Hollingsworth supplied medium-sized passenger vessels, while smaller firms, such as Neafie & Levy and Pusey & Jones, became specialists for tugs, steamboats, and yachts. Second, in spite of its obvious problems, naval contracting during the 1880s had led to the introduction of major new technologies, including triple-expansion engines and steel hulls. Third, and perhaps most important, American builders of metal ships had come within striking distance of British tonnage prices, probably as a result of greater yard specialization. In 1888, despite higher prices for labor and material, U.S. merchant ships cost only 15 percent more than identical British vessels, compared to a gap of at least 25 percent in the early 1880s.28

True, the U.S. maritime economy still faced serious difficulties, especially as far as the merchant marine was concerned. There were few U.S. foreign trade carriers, and no American steamship line served the pivotal transatlantic route using American-built tonnage. The bulk of the U.S. merchant marine consisted of outdated wooden sailing ships. European vessels still carried almost 90 percent of U.S. foreign trade. But many builders and shippers were confident that these long-term problems could be alleviated through an overhaul of the nation’s merchant marine policy and systematic encouragement of ship-owning in the foreign trade.

The Steamship Subsidy Debate

Beginning in the 1880s a maritime reform coalition emerged that included shipbuilders, steamship managers, and the Republican Party. The coalition advocated a government program that would grant subsidies to U.S. ships for
each mile sailed in the foreign trade. Reformers argued that this would give the U.S. merchant marine a reasonable chance to compete internationally; equally important, shipyards would be less dependent on troublesome naval contracts. Charles Cramp, a leading spokesman of the reform movement, maintained that the purpose of subsidies was “to promote ship-building and encourage people to own ships . . . They must come to us to build vessels. We do not build vessels to put on our shelves in the open market for sale.”

Federal merchant marine policy had long been a divisive issue between Republicans and Democrats in Congress. During the 1870s and 1880s Republicans introduced appropriations bills for the U.S. Postal Service to compensate steamship lines for the transportation of mails, similar to the Collins subsidy of 1850. These postal subsidies were designed to guarantee a fixed annual income to the nation’s fledgling foreign trade carriers. Most Democrats were roundly opposed to a federal steamship subsidy because it presumably led to favoritism toward individual carriers. They argued that the real problem of the U.S. merchant marine was the exorbitant price of American-built vessels. Their own reform proposals aimed at making changes in the U.S. Navigation Act to enable American shipowners to buy cheap, foreign-built vessels and register them under the American flag. Republicans countered that the admission of foreign-built vessels to U.S. registry amounted to a death sentence for the nation’s shipbuilding industry. The parties remained deadlocked over maritime reform, and Congress passed neither steamship subsidies nor registry law changes.

The Republican victories in the 1888 congressional and presidential elections broke the deadlock. President Harrison and Republican members of Congress, as well as shipbuilders and steamship managers, now formulated a comprehensive policy to revive the nation’s foreign trade carriers. It certainly helped that the federal government reported a surplus of $100 million, representing the accumulated customs duties of the protectionist tariff. In response to the Democrats’ claim that subsidies to individual lines would involve government favoritism, Republicans amended their earlier schemes by a sweeping proposal to grant federal bounties to all American ships engaged in the foreign trade. In 1890 the Senate passed two critical pieces of maritime legislation: the bounty bill, which provided general support to American vessels engaged in foreign trade, and a special subsidy bill supporting express liners. By summer the new merchant marine policy awaited passage in the House of Representatives.

Confident that the legislative package would soon become law, shipbuilders and steamship managers expanded their operations to reap the expected benefits of the government program. Indeed, the anticipated policy change trig-
Cramp and the Military-Industrial Complex, 1885–1898

... gered a speculative fever among investors. British bankers and financiers, for example, provided funds to renovate the Roach shipyard at Chester. The press reported that the investors were motivated by the “likelihood of the passage of the Bounty Bill, now favorably before the House of Representatives,” which would foster demand for new ships and presumably keep the yard busy for years.

Builders also established new facilities, including Maryland Steel’s yard at Sparrow’s Point near Baltimore.

At the height of the fever, Cramp joined the speculative fray. Previously the company’s stock had been exclusively owned by the five Cramp brothers who also served as directors. On June 2, 1890, the firm issued new stocks worth $1,757,500 to the old shareholders, who sold them to outside investors. The latter included some of the titans of American business, such as John D. Rockefeller, Charles Pratt of the machine tool firm Pratt & Whitney, hat manufacturer J. B. Stetson, Wall Street banker Henry Seligman, steamship magnate Clement A. Griscom of the International Navigation Company, and John R. Dos Passos, Philadelphia’s most prominent corporate lawyer (father of the renowned novelist). By the stroke of a pen, the firm had been transformed into a corporation of the first order. This development marked the beginning of the end of proprietary capitalism at Cramp.

Significantly, corporate reconstruction did not involve basic changes in Cramp’s management. The former owners still controlled more than 30 percent of the shares and served as senior executives for more than a decade. Executive continuity was ensured by an agreement signed by the Cramp brothers committing them “to give their services in the management of the company as heretofore during the next five years for an aggregate compensation of $75,000 a year, to be divided among them ... [They further] promise and agree not to engage in the business of ship-building nor to permit the use of their names in any such business.”

Meanwhile, the merchant marine bills that motivated the speculative fever came under political attack. Democrats and the free-trade press charged that the bounty bill was the tool of “subsidy beggars” among shipbuilders and steamship managers who hoped to rob the federal treasury of its huge surplus. A scathing New York Times commentary declared, “The gathering of the subsidy seekers at Washington is not unnatural. They have every reason to look for success in their eager quest. The Republican leaders have declared their sympathy with them. The President has practically invited them. The Secretary of State has been conducting an open campaign in their favor.”

Speculation in the shipbuilding industry fueled public suspicion of the bounty bill. As a result of political pressure, the House of Representatives delayed the passage of the merchant marine bills until after the 1890 elections,
when the Republicans lost their majority. In March 1891 a lame-duck Congress finally voted on the legislation and defeated the bounty bill. It passed the less important subsidy bill, which provided federal funds to a handful of steamship lines.\textsuperscript{37}

The speculative maritime boom collapsed, leaving shipbuilders and other promoters of the bounty bill scrambling for cover. Cramp had purchased prime real estate in South Philadelphia at a cost of \$800,000 to erect a new shipyard to build commercial steamships, but the firm now scrapped these plans. Cramp, like other firms, would have enough trouble keeping its existing facilities employed.\textsuperscript{38}

Cramp tried to make the best of the steamship subsidy bill passed in 1891. This program provided subsidies on a sliding scale ranging from \$4 to \$1 per mile traveled on different steamship routes. Unfortunately, only the lower subsidy classes for the Latin American and Pacific routes received a few meager bids from steamship operators; aggregate annual subsidies for these lines amounted to less than \$200,000 and yielded few steamship contracts. The subsidy of \$4 per mile traveled on the transatlantic route did not receive a single bid. Together with the International Navigation Company (INC), Cramp concentrated its efforts on this highest subsidy class in order to generate at least a few orders.\textsuperscript{39}

Founded in Philadelphia at the beginning of the 1870s, the INC sailed British-built steamships under the name Red Star Line between Philadelphia and Antwerp. Performing quite well during the 1880s, it bought out the American Steamship Company and the British Inman line. In 1888 the INC ordered the express liners \textit{City of New York} and \textit{City of Paris} from Thompson at Glasgow and sailed twenty-two transatlantic liners between the United States, Britain, and continental Europe under the British and Belgian flags. When Congress passed the subsidy bill of 1891, the INC could not apply for funds because its British-built liners were ineligible for U.S. registry and steamship subsidies.\textsuperscript{40}

This predicament irked INC president Clement A. Griscom, who discussed the subsidy question with former secretary of the navy William Whitney at a dinner party. Whitney suggested that the INC should apply to Congress for special legislation authorizing U.S. registry for its largest ships, the \textit{City of New York} and the \textit{City of Paris}, to render them eligible for the recently passed steamship subsidies. In return for this special favor, Whitney suggested, the INC should issue a large liner contract to an American shipyard. Griscom approved of this scheme, which would yield a \$300,000 annual subsidy for the \textit{City of New York} and the \textit{City of Paris} alone.\textsuperscript{41}

Since the registry of foreign-built vessels under the American flag was anathema to shipbuilders, protectionists, and Republicans, Whitney’s pro-
posal triggered a heated debate. The *Nautical Gazette* proclaimed: “We say, No! ... For every foreign-built ship that is admitted under American register it is harder for our own shipbuilders ... [The project] will completely nullify whatever good was expected to be accomplished by the postal subsidy act.”

Charles Cramp and his brothers, who were not only shipbuilders and protectionists but also staunch Republicans, had long voiced similar criticisms. But when the INC proposed its registry scheme in conjunction with a large contract for American-built liners, Cramp changed his mind: if this contract could only be obtained through compromise on the registry issue, so be it. Charles Cramp actively supported the INC’s publicity campaign, traveled overseas to sell the scheme to British investors, and garnered political support in Congress.

As a result of these efforts, Congress passed special legislation enabling the INC to proceed with its plan. American-owned, foreign-built ships exceeding 8,000 gross tons were now eligible for the highest class of steamship subsidies, provided that the owner ordered from U.S. yards “steamships of an aggregate tonnage of not less in amount than that of the steamships so admitted to registry.”

In 1893 the INC registered the *City of New York* and the *City of Paris* under the U.S. flag and ordered two similar vessels from an American yard.

There was little doubt that the INC’s liner contracts would go to Cramp. First, no other builder was so well equipped to construct high-performance vessels exceeding 8,000 gross tons. Second, the steamship company and the shipyard were closely intertwined; the line owned 10 percent of Cramp’s stock, and INC president Griscom was a member of its board of directors. Third, Charles Cramp had helped Griscom advertise the steamship scheme in the United States and Britain. In June 1892 the INC and Cramp signed contracts for the transatlantic passenger liners *St. Louis* and *St. Paul*.

These vessels epitomized the enormous problems of the U.S. merchant marine. Nothing less than a change in the Navigation Act was necessary to encourage the construction of American liners. This policy remained an isolated incident and was no substitute for comprehensive merchant marine reforms. Left to its own devices, the merchant marine did not generate sufficient demand for large ships. It was years before Cramp built such vessels once again.

**The Transformation of Naval Shipbuilding**

While neglecting merchant marine reforms, the federal government developed a far-reaching and expensive program to modernize the U.S. Navy. This nudged yards into naval construction at the expense of commercial shipbuilding. Warships cost the government much more than even a generous bounty to
commercial carriers, and naval shipbuilding involved more government intervention into the private sector than subsidies. Warship construction made shipyards more, not less, dependent on government assistance. Despite these contradictions, the opponents of the merchant marine bill applauded Secretary of the Navy Benjamin Tracy’s plan for the largest military buildup in the nation’s history.

The Tracy program marked the beginning of U.S. battleship construction and involved profound changes in naval strategy and policy. U.S. naval strategy had been based on cruisers of the USS *Baltimore* type, which were designed to destroy an enemy’s merchant ships. But cruisers were not equipped to fight other warships, whose artillery could pierce their relatively unprotected hulls. Naval strategy and ship design changed in 1890 following the publication of Captain Alfred T. Mahan’s study, *The Influence of Sea Power upon History*, which inspired demands for heavily armored cruisers and battleships. One of the most influential books of the period, Mahan’s study argued that a true naval power needed ships that could destroy an enemy’s fleet. The book found perceptive readers among the top officials of the new Republican administration, including President Benjamin Harrison, Secretary of State James Blaine, and Tracy. The secretary of the navy devised a program, at a cost of $281 million, to build twenty-three battleships as well as dozens of cruisers, rams, and torpedo boats.48

This huge project came under political attack from navy critics, such as Democratic senator William J. Bryan and Populist leader Tom Watson, who charged that battleships were entirely unnecessary for the navy’s strategic mission. A naval war with Britain or any European naval power was a remote possibility at best. The nation faced more pressing needs in the civilian sector, the critics argued, including a comprehensive merchant marine policy, agricultural reforms, and Civil War veterans’ pensions. All those programs would suffer if the U.S. Navy received expensive battleships. Even Charles Cramp expressed reservations because the shipbuilding industry was not equipped to build armored vessels. In the end Congress passed a scaled-down version of the naval program and appropriated $16 million for three battleships and one protected cruiser.49

The Navy Department soon invited bids from shipbuilders and armor manufacturers for the battleships USS *Indiana*, USS *Massachusetts*, and USS *Oregon*, the armored cruiser USS *New York* (appropriated in 1888), and the protected cruiser USS *Columbia*. When they examined the specifications, most builders decided not to submit bids because construction would require considerable investments in production equipment, shops, and berths. Only a handful of ambitious builders tendered proposals. The battleships USS *Indi-*
ana and USS Massachusetts, the armored cruiser USS New York, and the protected cruiser USS Columbia went to Cramp for $12 million. The Union Iron Works of San Francisco obtained the contract for the remaining battleship, USS Oregon. The naval program of 1890 solidified Cramp’s position as the navy’s preeminent contractor for modern warships.

The military-industrial base necessary to proceed with the battleship and cruiser program also included the Carnegie steelworks, which booked naval armor contracts. As early as 1889 Andrew Carnegie had concluded that “there may be millions for us in armor.” He upgraded his steelworks for naval steel production, and in 1890 he obtained a $4 million contract. Cramp’s armored vessels received armor made at Carnegie’s steel plant in Homestead, Pennsylvania.

The Philadelphia builder prepared its yard for the battleships Massachusetts and Indiana, the armored cruiser New York, and the protected cruiser Columbia. The task ahead was stupendous. The New York Times reported that “William Cramp & Sons have now on hand the greatest undertaking in the history of American shipbuilding. Four great war ships, the largest vessels ever built in the United States, and designed to be the most powerful fighting ships in the world, must be launched, tried, and turned over to the government in three years’ time.” Cramp committed its entire resources to this project. “Within the past two months the most important object has been accomplished, namely the clearing of all vessels from the . . . stocks . . . Vast quantities of material of all descriptions must come from different parts of the United States. Manufacturers far and wide will have requisitions made upon them, and directly the magnitude of the work in Philadelphia will be felt throughout the whole country.”

Inside the Military-Industrial Complex

The first ship laid down was the armored cruiser USS New York, 384 feet long, 64 feet in the beam, and capable of a speed of 20 knots. This was by far the largest and fastest vessel yet contemplated in the history of the U.S. Navy. The outside armor consisted of a 200-foot steel belt protecting the port and starboard sides, an armored conning tower to shield the command center, and armored gun turrets; on the inside, a protective armor deck extended throughout the entire length near the waterline. The main ordnance consisted of six 8-inch guns. As an armored cruiser, the USS New York featured only a moderate amount of armor and medium-sized guns. Together with high speed and maneuverability, these technical characteristics distinguished cruisers from battleships, which were slower but better protected by heavy armor.

Cramp and the Navy Department signed the contract for the USS New York
on August 28, 1890. Significantly, the vessel plans were by no means complete because the Navy Department had developed only a general outline as a basis for Cramp’s own construction drawings. Cramp’s designers drew detail plans during the construction phase and submitted them to the Navy Department for approval. Individual Navy Department bureaus (chiefly those of construction and repair, ordnance, and engineering) then reviewed Cramp’s plans and suggested improvements. Although this was standard practice in naval shipbuilding, it complicated the construction process because bureau chiefs often wanted to include their latest pet technologies in a new vessel and frequently changed specifications. When a shipbuilding firm signed a contract, it had only a general idea of the vessel it was about to build and had to be prepared for major changes. In the case of the USS New York and Cramp’s other vessels, design changes were numerous because naval technology was changing rapidly while the vessels were under construction.⁵⁴

Despite these looming difficulties, the initial construction phase went according to schedule. The first hull material arrived at the shipyard on September 3, 1890, less than a week after the contract had been signed. On Sep-
tember 30, 1890, Cramp’s men laid the first keel plates. The builder ordered steel castings for the bow and stern sections from the Philadelphia steel mill Morris, Tasker & Company, as well as deck beams from Carnegie in Pittsburgh. Despite some technical problems with the production of these components, the construction of the USS New York was in full swing by early 1891.55

Meanwhile, Cramp improved its facilities to complete the naval contracts. In spring 1891 the firm acquired its old subcontractor I. P. Morris, which produced some of the enormous metal castings installed in the USS New York and other warships. The acquisition cost Cramp $450,000. In addition to castings, Morris supplied all sorts of hydraulic tools for the yard’s riveting and plate-bending departments. For $118,000, Cramp also acquired the B. H. Cramp Manganese Bronze Works, which was owned independently by a family member who had been a naval contractor since 1888 and had furnished almost all U.S. warships with a new type of bronze screw propeller. B. H. Cramp also operated an ordnance shop, which the shipyard’s board of directors considered an important addition to the shipyard’s naval construction capacity. “The Gun Plant for manufacture of Guns under patents of Driggs Ordnance Co. is located upon land owned by B. H. Cramp & Co. and the buildings and steam power for operating said Gun Plant were erected and paid for by B. H. Cramp & Co.”56 The acquisition of new facilities did not end subcontracting in naval shipbuilding. For example, the American Ship Windlass Company of Providence, Rhode Island, supplied windlasses; the George Blake Manufacturing Company of New York made air pumps; Williamson & Brother of Philadelphia provided ash hoists; and the Rand Drill Company of New York manufactured air condensers for the torpedo tubes.57

The first construction problems arose in August 1891, when Cramp’s riveters demanded higher wages and launched a strike. Like other labor conflicts in metal shipbuilding, this one was initiated by the rivet boys, the industry’s least skilled workers. The rivet boys received the lowest pay among shipyard employees and worked long hours under dangerous conditions, which made them prime candidates for spontaneous job actions. Often their actions were supported by more skilled workers in the hull department. When the rivet boys struck for higher wages, their “refusal to work threw out the riveters and holders on, who, having no boys to heat the rivets, quit work. After being out for a day the men, riveters and holders on, concluded not to return unless their wages were increased.”58 As Cramp’s riveting department closed down, work ceased in other shops as well, even though most workers did not join the strike.59
The strike gave Cramp an incentive to begin the mechanization of riveting, which continued over the next two decades. Innovative riveting guns used pneumatic power received through air pipes connected to a central power plant. Cramp’s management, which had already discussed the introduction of pneumatic riveting before the strike, refused to raise wages, installed pneumatic riveting tools, and informed the Navy Department that the completion of the USS New York and the battleships would be delayed. Unable to hold out against their intransigent employer, the strikers admitted defeat in early October 1891.60

The completion of the USS New York fell further behind schedule as a result of design changes involving the 3-inch-thick steel deck designed to protect engines and boilers from enemy shot. Initially, the navy’s specifications called for ordinary steel plates, made by Carnegie in Homestead. In spring 1891 the mill shipped several plates to the shipyard, where specially trained workers installed them aboard the armored cruiser. But in July the navy discussed plans to replace steel plates with composite nickel-steel plates, the latest development in armor technology. According to the chief of the Bureau of Ordnance, William Folger, recent tests in the United States and Britain had proven its superiority over all-steel plates, as nickel “appears to impart a vicious quality, if such an expression can be used, which eliminates the [plate’s] tendency to crack under impact.”61 While the Navy Department argued over Folger’s nickel-steel proposal for almost two months, Cramp continued to install all-steel plates aboard the USS New York. On September 17, 1891, the navy finally informed the shipbuilder that the all-steel protective deck plates would have to be ripped out and replaced. Although the shipbuilder was annoyed by this change, it had no choice but to have the armor bolts unscrewed and the protective deck removed.62

After Cramp had ordered a new set of deck plates, the shipbuilder realized that this type of armor posed unforeseen problems. Charles Cramp informed the secretary of the navy that “nickel steel is very tough and is harder to work than the all-steel.”63 Carnegie’s steelworkers clearly agreed: As soon as the contract for nickel-steel arrived in Homestead, they demanded higher wages because forging and rolling the new type of steel proved time-consuming and difficult. Since the old steel wage scale that was in effect between July 1891 and June 1892 did not even include a category for nickel-steel, the Amalgamated Association of Iron, Steel and Tin Workers asked Carnegie to discuss the matter with union representatives. The New York Times reported in January 1892 that “it is now the intention of the Amalgamated Association . . . to demand an increase of 200 per cent. over the scale. The indications are that this will be refused and a struggle appears probable.”64 Indeed, Carnegie refused
the 200 percent increase for nickel-steel over ordinary steel. The controversy lit the fuse of the most ferocious conflict between capital and labor in the late nineteenth century—the Homestead Strike of 1892.\textsuperscript{65}

At Cramp the armor problems accumulated. The USS New York was ready for several plates in fall 1891, but the Navy Department, whose bureau chiefs were discussing further design changes, failed to process Cramp’s plans and specifications promptly. The builder forwarded stacks of precision drawings for the armored conning tower, side armor, and gun turrets to the Bureau of Construction and Repair, which handed them over to the Bureau of Ordnance. Months passed before Cramp received word that the armor plans and specifications had been approved. The builder submitted plans for the 8-inch gun turrets on February 16, 1891, but the Bureau of Ordnance deliberated for twelve months before ordering the first turret armor. On April 10, 1891, Cramp submitted conning tower plans to the Navy Department, which ordered the plates thirteen months later. The first side-armor plans for the 200-foot belt left the shipyard in July 1891 and were finally approved in January 1892.\textsuperscript{66}

These delays caused acute problems at the shipyard. Charles Cramp later recalled how “a large force of special mechanics, trained in the working of armor had to be continued in [Cramp’s] service, awaiting daily the receipt of said armor. These mechanics could not be utilized to the same advantage in other lines of work; their pay was higher than ordinary mechanics; yet the contractor could not afford to discharge them, lest their services could not be obtained when the armor etc. was received.”\textsuperscript{67} These men remained idle for months because the Navy Department did not approve, and Carnegie did not deliver, armor plates according to schedule. In February 1892 Charles Cramp, infuriated, wrote to the secretary of the navy that the armor crisis had “now reached the unendurable stage.”\textsuperscript{68}

In spring 1892 the department finally sped up the approval of plans and pressed Carnegie to increase armor production for the USS New York. The steel company managers proved receptive to the navy’s prodding because they wanted to complete most plates before Carnegie’s wage contract with the steelworkers’ union expired at the end of June 1892. As a result, Carnegie’s men worked day and night to turn out steel plates for Cramp’s armored cruiser. Although the mill shipped fifteen side-armor plates to Philadelphia in June, it was still working on the turret and conning tower when events took a dramatic turn.\textsuperscript{69}

On July 1, 1892, Carnegie’s managers declared the Homestead works a non-union shop. This was a carefully planned move inspired by Carnegie’s long-standing feud with the Amalgamated Association of Iron, Steel and Tin Workers and his belief that union labor exercised too much control at the point of
production. The controversy over the navy's nickel-steel in January 1892 had contributed to this confrontation, which reached its climax when the steelworkers responded to a lockout by taking over the plant. On July 6, 1892, when strikers and Pinkerton detectives slugged it out during the Battle of Homestead, pieces of the USS *New York*'s unfinished armor lay scattered inside the idle shops. The military-industrial complex had crashed to a halt.\(^70\)

Charles Cramp was extremely worried about what he called the "well-known situation at the Homestead Mills." On August 19, 1892, he asked the secretary of the navy whether any provisions "for meeting the pressing requirements of the *New York* have been completed."\(^71\) Arrangements had indeed been made by state authorities and Carnegie's management: On July 12, 1892, the Pennsylvania militia took control of the Homestead plant out of the hands of the steelworkers. The management hired strike breakers, restarted the mills, and resumed armor production in August 1892. Three months later Cramp's inspector at the steel plant reported to Philadelphia: "Two days' observation at the Homestead Mills enables me to say that the general situation there is much better than I anticipated, or than is generally believed to be in the East . . . All the mills are running, some of them on double turn."\(^72\)

These strenuous efforts resolved the USS *New York*'s armor crisis. Once Carnegie shipped the remaining plates, Cramp completed the ship and sent her off on the trial trip in May 1893. She earned her builders a large premium for excess speed and proved one of the navy's most seaworthy vessels. But the construction of the USS *New York* was only a qualified success to her builder: Cramp claimed losses of more than $211,000 as a result of construction delays. These losses were largely offset by the $200,000 speed premium, but the armor delays had wiped out almost all the profit of naval shipbuilding.\(^73\)

These problems paled next to those involving the battleships USS *Massachusetts* and USS *Indiana*. Completion of both ships was delayed by the rivet boys' strike of 1891. More important, each battleship required 2,000 tons of armor steel (four times the amount installed aboard the USS *New York*) whose design and construction posed unprecedented difficulties, starting with the change from all-steel to nickel-steel. Moreover, the specifications called for side-armor plates 18 inches thick, exceeding the thickness of any other steel plate made in the United States. The plates were initially designed with horizontal and vertical curvatures to fit tightly on the hull. But according to Charles Cramp, the steel experts discovered that it "was impossible to bend 18-inch plates to a double curvature, and the vertical warp was dispensed with, thereby rendering the original drawings and templetis useless."\(^74\) Moreover, Carnegie realized that the plate shop could not roll 18-inch steel plates because it lacked the necessary equipment. Acting upon a proposal submitted by Charles Cramp, the Navy
Department reshuffled its armor contracts and had the 18-inch plates rolled at the Bethlehem Iron Works instead.\textsuperscript{75}

In March 1893, when Bethlehem prepared the first shipment of side-armor plates, the Navy Department decided that nickel-steel had been made obsolete by the so-called Harvey process, which produced subcarbonized steel displaying even more “vicious qualities” than nickel-steel. The secretary of the navy approved the necessary changes in the specifications, canceled the order for 18-inch nickel-steel plates, and signed a new contract with Bethlehem for Harvey-ized battleship armor for the USS Massachusetts and USS Indiana. As the steel company commenced production, its managers realized that “the application of the Harvey process, assuming the best rate of progress at all stages, adds about six weeks to the time required for the manufacture of each plate.”\textsuperscript{76}

When the first new steel plates finally arrived in August 1894, further problems arose because the Harvey process had warped the plates unevenly, making it impossible to install them according to plan. “The original standardization was destroyed and each bolt had to be separately measured and trimmed for its particular place [on the hull],” Charles Cramp reported.\textsuperscript{77}

As a result of these and other problems, the completion of the USS Massachusetts fell two years behind schedule, and completion of the USS Indiana was delayed two years and six months. While waiting for an occasional armor shipment, the Cramp firm had to store the unfinished battleship hulls in remote corners of the shipyard. Charles Cramp related: “During this time [1894] the Cramp Company undertook large contracts for the merchant marine [the St. Louis and St. Paul], and the fact that this vessel [the USS Indiana] was still in the yard led to their having to buy new lands, develop new water facilities, and greatly increase the size and expense of their list of employees and of their general organization.”\textsuperscript{78} Moreover, the company suffered financial losses when the Navy Department delayed its contract installments because construction had made insufficient progress. Combined with the depression of 1893, this pushed the shipyard to the brink of insolvency. According to Charles Cramp, “the company was . . . in dire need of money. It was then carrying more than a million and a quarter of dollars in loans at abnormal rates of interest, with a . . . pay roll of upwards of ten thousand dollars a day, and upwards of five thousand employees, which represented fully twenty thousand persons dependent upon the continuation of work in the company’s yard. It was the time of financial panic and to have thrown these men out of employment would have been a calamity to the city and the State.”\textsuperscript{79} The Cramp firm almost repeated the Roach disaster of 1885, when the navy’s most important contractor went bankrupt amid the chaos of the government’s naval reconstruction program.
The Ramifications of Military Contracting

Despite its problems with naval construction, Cramp booked contracts for the protected cruiser USS Minneapolis (1891), the battleship USS Iowa (1892), the armored cruiser USS Brooklyn (1893), and the battleship USS Alabama (1896). After a fierce bidding contest with British builders, Cramp also received a Japanese contract for the cruiser Kasagi in 1896. Cruisers posed fewer construction difficulties and were delivered closer to schedule than battleships.80

Cramp’s commitment to naval construction was partly a result of the lack of alternatives. The builder would have preferred private contracts because they involved fewer organizational problems and were usually more profitable than naval contracts. But the private market, already weakened by the failure of the bounty bill in 1891, reached a new low when the panic of 1893 curtailed credit for new steamship projects, especially for high-performance ships. During the five years between the Panic and the return of commercial prosperity in 1898, Cramp procured only nine private contracts, including a yacht, a tugboat, and a ferry. This potpourri of high-technology naval construction and low-quality commercial shipbuilding was not terribly efficient. A commentator pointed out that there were “five slips, each capable of building a [passenger liner]; on one was a tug, on another was a battleship, on another was a ferryboat, on another a yacht, and on another a revenue cutter. It is absolutely impossible to practice economies under such circumstances and build the ships so that they would compare favorably in cost with ships built abroad.”81 The sight of ferries, tugs, and barges occupying berth space designed to accommodate passenger liners and capital ships was to become all too common in American shipyards.

Charles Cramp hoped that future naval programs would prove less troublesome as the Navy Department learned from its mistakes, streamlined its contracting procedures, and settled on a standard battleship. At the turn of the century administrative reforms eliminated some of the worst bottlenecks in the Navy Department. But Cramp’s demand for standardization, intended to eliminate delays caused by constant design changes, was another matter. Charles Cramp viewed the USS Indiana as the best candidate for a standard battleship. “Our very first attempt at capital ship design produced a type which I consider the fairest compromise of all divergent qualities and necessities yet reached anywhere . . . the ‘Indiana’ class is able to combat any first-rate battleship afloat as to armor and armament; she has as much speed as will ever be needed for maneuvering purposes, and her coal capacity is sufficient for any cruise that the policy of the United States will ever require in war.”82 He argued that the USS Indiana should be duplicated in ten exact copies. Although un-
understandable from the point of view of a contractor who wanted to complete his naval contracts closer to schedule, Cramp’s demand for a standard battle­ship was unrealistic. Warship designers had only begun to explore the possibilities of capital ship technology and already were working on new designs for hulls, turrets, and fire control systems that were to be incorporated in the next generation of capital ships. As a result, the USS Indiana became technically obsolete a few years after her commissioning.83

In making the transition to naval shipbuilding, builders often suffered heavy financial losses. Barely “saved from threatened bankruptcy,” Cramp sued the government for $1.4 million to recoup losses incurred during the construction of the armored cruiser USS New York, the battleships USS Massachusetts and USS Indiana, and the protected cruiser USS Columbia. As the case wound its way through the courts, the navy argued that Cramp bore partial responsibility for the delays and had forfeited claims by signing supplemental contracts. The courts granted Cramp only a nominal damage award, which caused financial problems more than a decade after the ships had left the yard. Other contractors fared even worse. Delays during the construction of the torpedo boat USS McKensie bankrupted the Hillman shipyard, which was unable to obtain loans when the navy refused to issue contract install­ments according to schedule. Naval contracting was certainly “not a reliable basis for permanent prosperity,” as Charles Cramp had pointed out.84