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## The Transformation of Bethlehem Steel, 1904-1909\*

¶ *Charles M. Schwab's aggressive and innovative leadership of Bethlehem Steel early in this century made that firm a success. To some extent, however, the growth of Bethlehem was made possible by the conservative strategy of E. H. Gary's giant U.S. Steel. The dominant firm's willingness to tolerate the loss of a portion of its sales to smaller rivals made their survival and expansion easier than would have been the case in a more vigorously competitive environment.*

In April 1915, an editorial in the *New York Times* described the Bethlehem Steel Corporation as “possibly the most efficient, profitable and self-contained steel plant in the country.”<sup>1</sup> The editorial credited this achievement to Charles M. Schwab, who had taken control of the company in 1904. Many contemporary journalists endorsed the *Times*' view, but there has never been a scholarly account of Schwab's innovations at Bethlehem Steel. The primary objective of this essay is to describe and document how Schwab transformed the company from a supplier primarily of military products into a diversified commercial producer.

Schwab's successful innovations at Bethlehem Steel after 1904 included the reorganization of productive facilities, the adoption of an important new product (the Grey beam), the initiation of a system of incentives for employees, and other changes. By shunning the conservative strategy of E. H. Gary's giant U.S. Steel, Schwab transformed his company into an efficient, integral part of what has come to be called “little steel.” As will be seen, Schwab's ability to move Bethlehem onto a firmer footing depended to a considerable extent on Gary's passive policy of price leadership and on the will-

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<sup>1</sup> Editorial, *New York Times*, April 14, 1915.

ingness of “big steel” (that is, U.S. Steel) to tolerate the loss of a portion of its sales to smaller companies such as Bethlehem. First, however, in order to establish the base on which Schwab built, it is desirable to examine briefly the earlier history of Bethlehem Steel.

#### BETHLEHEM'S EARLY DEVELOPMENT

The modern Bethlehem Steel Corporation traces its history to the founding of the Saucona Iron Company in 1857. The founder, Augustus Wolle, planned to build a blast furnace and to produce pig iron, drawing upon an iron ore deposit near the Saucon Creek in Pennsylvania. However, Charles Brodhead, a local attorney, persuaded him that the venture would be more profitable if the furnace was built near the Lehigh River and if the company concentrated on producing rails for the Lehigh Valley Railroad. Both suggestions were accepted, and, for the next twenty-five years, rails were the sole product of the Bethlehem Iron Company (a name change adopted in 1861).<sup>2</sup>

In 1873, Bethlehem adopted the Bessemer process and joined the Bessemer Association, whose eleven member firms shared the use of patents and agreed to avoid infringing upon each other's sales territories.<sup>3</sup> Bethlehem's conversion to Bessemer production coincided with the onset of a severe depression in 1873. The demand for rails of both iron and Bessemer steel fell sharply, and Bethlehem, which had no regular customers for its new product, was saddled with idle capacity. The company sustained a steep decline in sales and profits, which persisted until 1878 when the economy recovered.<sup>4</sup> Once the demand for Bessemer rails returned to the pre-depression level, Bethlehem's owners were content to pursue a cautious and conservative policy of concentrating their efforts within the one area they knew best — rail production. Such a policy ignored the fact that the market for rails might collapse again, leaving the highly specialized firm in a precarious financial position.

From 1880 on, a series of suggestions to diversify Bethlehem's product line was made by John Fritz, the renowned steelmaster who served as Bethlehem's general superintendent and chief engineer

<sup>2</sup> Joseph M. Levering, *A History of Bethlehem, Pennsylvania, 1741-1892* (Bethlehem, Pa., 1903), 724-25.

<sup>3</sup> Peter Temin, *Iron and Steel in Nineteenth Century America: An Economic Inquiry* (Cambridge, Mass., 1964), 171, 174-75.

<sup>4</sup> James M. Swank, ed., *Classified List of Rail Mills and Blast Furnaces in the United States* (Philadelphia, 1873), 6; *Bulletin of the American Iron and Steel Association* (hereinafter cited as *Bulletin AISA*), VII (October 15, 1873), 460, and XII (July 3, 1878), 153.

from 1860 to 1892. Invariably, his proposals met with stiff resistance from the company's owner-directors.<sup>5</sup> Despite Fritz's repeated urgings, the company failed to purchase nearby ore sources which were needed for making Bessemer steel.<sup>6</sup> Consequently, Bethlehem became increasingly dependent on ores from the Juragua mines in Cuba. Bethlehem's profit margins were reduced as a result of the high cost of ocean freight from Cuba to the ports of Baltimore and Philadelphia, and then inland freight by rail from the ports to the steel mill. The company was unable to pass along its higher costs in the form of higher prices to its customers, lest they turn to other companies to supply their needs for Bessemer rails.<sup>7</sup>

To offset the decline in profits from rail-making, the directors voted in 1885 – again on Fritz's urging – to undertake the production of heavy forgings. He convinced them that the profits on heavy forgings would more than compensate for the company's reduced profits on rail sales: a small amount of steel in the shape of guns or engine shafts would sell for hundreds of dollars per ton, whereas the large quantity of steel required for rails would only sell for tens of dollars per ton.<sup>8</sup> Given their aversion to any form of risk-taking, the directors' decision was made only after Bethlehem virtually was assured a customer for its entire output: the United States Navy. Two types of heavy forgings were required by the navy, hollow forgings for guns and solid forgings for the shafts of ships and engines. The navy also sought a domestic supplier of armor plate, which was used to fortify American warships against cannon fire.

Beginning in the early 1880's, there was a growing movement in Congress to enlarge the navy and to reduce (and eventually end) America's dependence on foreign producers to supply the nation's defense needs.<sup>9</sup> During Grover Cleveland's first administration, his Secretary of the Navy, William C. Whitney, recognized that no American steel company would be willing to spend several million dollars to construct an armor or gun forging plant unless there were sufficient orders to justify the investment. Whitney therefore sought and obtained Congressional approval to stop buying armor and gun forgings abroad and, instead, to anticipate the navy's needs for several years and group them into one large order. He expected

<sup>5</sup> John Fritz, *The Autobiography of John Fritz* (New York, 1912), 174–77, 182.

<sup>6</sup> *Ibid.*, 187, 164, 184.

<sup>7</sup> H. F. J. Porter, "How Bethlehem Became Armament Maker," *Iron Age*, November 23, 1922, 1340; *Iron Trade Review*, February 20, 1913, 482.

<sup>8</sup> Porter, "How Bethlehem Became Armament Maker."

<sup>9</sup> Robert Seager, "Ten Years Before Mahan: The Unofficial Case for the New Navy, 1880–1890," *Mississippi Valley Historical Review*, LX (December, 1953), 491–512; Allan Nevins, *Grover Cleveland: A Study in Courage* (New York, 1947), 217–223; Mark D. Hirsch, *William C. Whitney: Modern Warwick* (New York, 1948), 297–302, 323–28.

that a number of American steel producers might thereby be encouraged to submit bids.<sup>10</sup> But on March 22, 1887, after a year of repeatedly writing to and conferring with steel makers, Secretary Whitney received only three bids. Since Whitney's prospectus had stated that in awarding the contracts preference would be given to firms bidding on both armor plate and gun forgings, the entire contract (valued at more than \$4,000,000) was awarded to Bethlehem, the only company that had entered bids on both items.<sup>11</sup>

Bethlehem established a reputation for quality and reliability in producing gun forgings for the navy; it even made deliveries ahead of schedule. Its success in this field earned the company a contract from the U.S. Army in 1891, for 100 large calibre guns, valued at nearly \$4,000,000.<sup>12</sup> In contrast to the success in forgings, the construction of Bethlehem's armor plant involved numerous unforeseen complications and costly, embarrassing delays. Under the terms of the contract signed on June 1, 1887, Bethlehem was obliged to begin deliveries of armor in December 1889. Reluctantly, the Navy Department granted the company a series of extensions; deliveries began in the fall of 1892, almost three years late.<sup>13</sup> Although the contract with the navy contained no provision for penalties in the event of late deliveries, the delays did cost the company its profitable position as the sole domestic producer of armor. In 1890, after repeated personal requests from President Grover Cleveland, Andrew Carnegie reluctantly agreed to build an armor plant.<sup>14</sup> Carnegie's entry into armor production immediately reduced Bethlehem's share of the market to 50 per cent, and in 1900

<sup>10</sup> *Report of the Secretary of the Navy, 1886*, 10–11, in House Executive Documents, vol. 7, 49th Cong., 2nd sess.; *Report of the Secretary of the Navy, 1887*, iii–iv, in House Executive Documents, vol. 8, 50th Cong., 1st sess.; *Report of the Secretary of the Navy, 1888*, iv, in House Executive Documents, vol. 8, 50th Cong., 2nd sess.

<sup>11</sup> *Report of the Secretary of the Navy, 1887*, Appendix 16, 459–474.

<sup>12</sup> For Bethlehem's gun forging contracts with the Navy, dated May 1, 1887, see U.S. Congress, House Executive Document #294, in vol. 36, 51st Cong., 2nd sess. (Washington, 1891). For the gun forging contracts with the army, see U.S. Congress, House Document #151, in vol. 48, 54th Cong., 2nd sess. (Washington, 1897); and Eugene G. Grace, "Manufacture of Ordnance at South Bethlehem," *Yearbook of the American Iron and Steel Institute* (New York, 1912), 172–74.

<sup>13</sup> *Report of the Secretary of the Navy, 1890*, 17–18, in House Executive Documents, vol. 9, 51st Cong., 2nd sess.; U.S. Congress, Senate, Investigation by the Committee on Naval Affairs, *Prices of Armor for Naval Vessels*, Senate Report #1453, 54th Cong., 2nd sess. Testimony of Benjamin F. Tracy, ex-Secretary of the Navy, February 8, 1896, 129–132, 140–42, 147–48.

<sup>14</sup> *Report of the Secretary of the Navy, 1890*, 18–19; U.S. Congress, Senate, Investigation by the Committee on Naval Affairs, *Prices of Armor for Naval Vessels*, Senate Report #1453, 54th Cong., 2nd sess. Testimony of Benjamin F. Tracy, February 8, 1896, 143, 147, 155–56, and testimony of Andrew Carnegie, 185–191. Carnegie's most recent biographer incorrectly states that Carnegie had entered a bid and had begun producing armor for the U.S. Navy in 1887. See Joseph F. Wall, *Andrew Carnegie* (New York, 1970), 645–46.

**TABLE 1**  
**BETHLEHEM STEEL'S PROFITS, 1890-1895**

	Gross Earnings	Net Earnings	Dividends	% of Dividends on Paid-in Capital
1890	\$6,334,743.85	\$490,846.93	\$240,780.50	9
1891	5,623,233.98	657,402.86	398,807.50	10
1892	6,731,288.83	787,187.11	400,000.00	10
1893	6,476,333.81	1,293,729.89	400,000.00	10 Cash,
		stock + 1,000,000.00		25 Stock
1894	5,359,753.39	1,561,402.42	600,000.00	12
1895	5,358,016.97	1,109,276.53	600,000.00	12

it agreed to reduce its share to 40 per cent in exchange for Carnegie Steel's pledge not to enter the bidding on gun forgings.<sup>15</sup>

After committing itself to contract work for the navy, the company built Siemens-Martin acid open hearth furnaces in order to manufacture steel with the very low amounts of phosphorus required for armor and forgings. After the first of these furnaces became operational in August 1888, Bethlehem also began producing shafts and pumps for non-military ships, as well as open hearth ingots.<sup>16</sup> In view of the growing number of military contracts from the U.S. Navy as well as from foreign governments, and in view of the rising profits from military work after the initial production problems were solved, the company decided to dismantle its Bessemer furnaces in 1896 and totally discontinue rail production.<sup>17</sup> The sole surviving record of the company's sales and earnings for the early 1890's discloses a solidly profitable firm (see Table 1).<sup>18</sup>

Nevertheless, the company was not as profitable as it might have been. There is extensive surviving evidence of waste and inefficiency in the firm's operations, and of an unwillingness to adopt cost-cutting methods. In 1898 Frederick W. Taylor, the controversial pioneer of

<sup>15</sup> John D. Long, *The New American Navy* (New York, 1903), I, 46-52. For a fuller account of the negotiations between the Navy and the armor manufacturers, see Robert Hessen, "A Biography of Charles M. Schwab, Steel Industrialist," (unpublished doctoral dissertation, Department of History, Columbia University, 1969), 165-191.

<sup>16</sup> James M. Swank, ed., *Directory of Iron and Steel Works of the United States* (Philadelphia, 1892), 11th edition, 102, and 12th edition (1894), 93; B. F. Fackenthal, Jr., "John Fritz, the Ironmaster," *Proceedings and Addresses of the Pennsylvania German Society*, XXXIV (October, 1923), 105-106; Report from Kossuth Niles, Lieutenant, U.S.N. to Secretary of the Navy, December 4, 1896, in *Report of the Secretary of the Navy on Cost and Price of Armor*, House Document #151, in vol. 48, 54th Cong., 2nd sess. (Washington, 1897), 91.

<sup>17</sup> Fackenthal, "John Fritz, The Ironmaster," 106.

<sup>18</sup> U.S. Congress, House Document #151, in vol. 48, *Report of the Secretary of the Navy on the Cost and Price of Armor*, 54th Cong., 2nd sess. (Washington, 1897), 29.

scientific management, was hired to introduce a piece-rate system to replace the company's existing day-rate wage system. Taylor first applied his time-and-motion study methods to the handling of raw materials in the Bethlehem yards; he devised procedures whereby only 140 men would be needed to do the work which previously required more than 400. However, Bethlehem's owners were displeased with Taylor's new system. "They did not wish me, as they said, to depopulate South Bethlehem," Taylor later wrote. "They owned all the houses in South Bethlehem and the company stores, and when they saw we [Taylor and his assistants] were cutting the labor force down to about one-fourth, they did not want it."<sup>19</sup> Nor did Bethlehem's owners adopt Taylor's other suggestions which promised to cut costs and increase productive efficiency. Those suggestions included increased job specialization, standardization of work procedures, and salary increases for key personnel (in order to avoid the wasted time and unnecessary expense of training replacements if the key men left the company for higher paying jobs elsewhere).<sup>20</sup> In April 1901, Taylor was dismissed, just six weeks before the company was sold to an owner who was eager to develop fully Bethlehem's profit potential.

#### ENTRANCE OF SCHWAB

In June 1901, Charles M. Schwab bought controlling interest in the Bethlehem Steel Company (an 1899 name change). Schwab's purchase made him the object of renewed attention in the American press. Less than four months earlier, when he had been selected to be the first president of the United States Steel Corporation, newspapers and magazines throughout the nation had described his meteoric rise in the steel industry. Born in 1862 in Williamsburg, Pa., Schwab completed three years of high school before taking his first job in 1879 as a dollar-a-day laborer in the Carnegie steel works at Braddock. He quickly distinguished himself as a young man of uncommon intelligence, initiative, and leadership ability. In 1897, when Schwab was thirty-five, Andrew Carnegie named him to the presidency of the Carnegie Steel Company; four years later,

<sup>19</sup> Frederick W. Taylor, "The Gospel of Efficiency, II: The Principles of Scientific Management," *American Magazine*, LXXI (April, 1911), 787-88; Frank B. Copley, *Frederick W. Taylor, Father of Scientific Management* (New York, 1923), II, 46.

<sup>20</sup> Papers of Frederick W. Taylor, Stevens Institute of Technology, Hoboken, N.J., files 32, 33, and 119C.

J. P. Morgan chose Schwab for the presidency of U.S. Steel, America's first billion dollar enterprise.<sup>21</sup>

Schwab had learned that Bethlehem Steel was available for purchase after the collapse of negotiations for sale of the company to the British firm of Vickers' Sons and Maxim.<sup>22</sup> Despite intense speculation in the press that Schwab was acting on behalf of U.S. Steel, he, in fact, bought Bethlehem Steel for himself, as an independent investment. Morgan, however, objected that Schwab was undertaking too much and insisted that he turn over control of Bethlehem to the Morgan investment syndicate for the duration of his presidency at U.S. Steel.<sup>23</sup>

A year later, in June 1902, Schwab repurchased Bethlehem from the Morgan syndicate in order to sell it to the United States Shipbuilding Company, a merger of seven shipbuilding firms. This action produced major consequences, both for Schwab's career and for the future growth of Bethlehem Steel.<sup>24</sup> Schwab offered to sell Bethlehem for \$9,000,000 in cash, but the promoters of the shipbuilding merger lacked sufficient capital to meet his price. They made a counter offer, which Schwab accepted: \$10,000,000 each in bonds, preferred, and common stock.

Schwab took every precaution to safeguard his investment in Bethlehem. His bonds were given full voting power, Bethlehem's plant and properties were to serve as collateral for his bonds, and he received a second mortgage on all the properties of the shipbuilding merger. Thus, if the merger proved successful, he would reap a huge profit, but if it failed, he would at least reacquire Bethlehem.

Of all the properties in the merger, only Bethlehem Steel lived up to and, in fact, exceeded its anticipated earnings. When the ailing parent company turned to its thriving subsidiary for financial aid, very little was forthcoming. Schwab believed that he was under no obligation to gamble his assets on the dubious prospect of salvaging the entire venture. When he finally agreed to release \$2,000,000 of Bethlehem's earnings for the use of the parent company, it was only on the condition that his second mortgage bonds be replaced with first mortgage bonds, thereby giving him a primary lien on all the properties of the U.S. Shipbuilding Company. A group of first

<sup>21</sup> For Schwab's background, education, and early career, see Hessen, "A Biography of Charles M. Schwab."

<sup>22</sup> B. S. Stephenson, "Eminent Men of the Iron World, II: Joseph Wharton," *Iron Trade Review*, XL (April 4, 1907), 549; Copley, *Frederick W. Taylor*, II, 154.

<sup>23</sup> Arthur S. Dewing, *Corporate Promotions and Reorganizations* (Cambridge, Mass., 1914), 486.

<sup>24</sup> The formation and subsequent collapse of the United States Shipbuilding company merger is examined in detail in Hessen, "A Biography of Charles M. Schwab," 247-280, from which the present brief account is derived.

mortgage bondholders filed suit to block this action.<sup>25</sup> As a result of this suit, Schwab submitted his resignation to U.S. Steel. He had been accused of fraud, extortion, and of masterminding a plot to fleece the investing public. Although there was no evidence to support any of these charges, the board of directors at U.S. Steel believed that the controversial giant steel corporation could ill afford the unfavorable publicity.<sup>26</sup>

In February 1904, six months after he submitted his resignation to U.S. Steel, Schwab agreed to a negotiated settlement, thereby terminating the law suit against him. A reorganization of the Bethlehem Steel Company was announced; the new entity included all of the steel company's properties and the seven shipyards from the defunct merger.<sup>27</sup> A further reorganization was made on December 10, 1904, when Bethlehem Steel was incorporated in New Jersey with a capitalization of \$30,000,000. The corporation was a holding company, controlling the steel company and its shipyard subsidiaries. Schwab remained as president and major owner of the consolidated enterprise. The challenge he set himself for the future was to build Bethlehem Steel into the most efficient and profitable plant in America.<sup>28</sup>

#### SCHWAB'S INNOVATIONS AT BETHLEHEM

Schwab's first actions to strengthen and enlarge the corporation consisted of selling off its unprofitable properties and investing the proceeds in the yards with the greatest profit potential. The corporation's three most valuable shipyards where the Harlan and Hollingsworth Corporation in Wilmington, Del., the Union Iron Works Company in San Francisco, and the Samuel L. Moore Corporation in Elizabethport, N.J. Each was equipped for shipbuilding and for marine repairs, the latter a lucrative type of work which was only marginally subject to cyclical fluctuations. At these three yards, the top managers were replaced and corporate funds were allocated for expansion and modernization. The other yards were sold or closed down until a buyer could be found.<sup>29</sup>

A second major activity involved the search for new sources of raw materials and efforts to make the existing sources as economical

<sup>25</sup> Dewing, *Corporate Promotions and Reorganizations*, 498-99.

<sup>26</sup> Robert Hessen, "Charles M. Schwab, President of United States Steel, 1901-1904," *Pennsylvania Magazine of History and Biography*, XCVI (April, 1972), 203-228.

<sup>27</sup> *New York Times*, February 6, 1904.

<sup>28</sup> *Bulletin AISA*, December 10, 1904; *New York News Bureau*, October 19, 1904.

<sup>29</sup> This and the next two paragraphs are based on Bethlehem Steel Corporation's *Annual Report*, March 1906.

as possible to operate. A search was begun for coal and limestone deposits so the company could achieve self-sufficiency. During 1905, Schwab personally spent several months travelling to examine iron ore sites in America which Bethlehem Steel might buy or lease.

Bethlehem's major source of iron ore was the Juragua mines on the north shore of Cuba. In January 1905, Schwab chose Eugene G. Grace for the first of a series of important assignments – increasing the efficiency of the Juragua operations. Grace, who was born in Goshen, N.J. in 1876, took his first job at Bethlehem in 1899 as an electric crane operator, shortly after his graduation from Lehigh University. Grace had initiated several suggestions about ways to eliminate costly delays in the flow of raw materials within the Bethlehem yards, and he had been promoted to supervise and overhaul yard traffic; it was in this capacity that he first met Schwab in 1904. Schwab was immediately impressed by Grace's quick mind, his retentive memory, and his obvious interest in and knowledge about all aspects of Bethlehem's operations.<sup>30</sup>

Grace completed the reorganization of the Juragua mines within six months. Under his direction, the mines were fully mechanized, thereby reducing the cost per ton of ore. Cuban ore was richer in iron and lower in phosphorus than the Mesabi range ores used by U.S. Steel and had the added advantage of containing large amounts of nickel, so that Bethlehem could produce nickel steel at no extra cost. For a ton of iron, Bethlehem's cost was \$4.31, whereas U.S. Steel's cost was \$7.10 per ton.<sup>31</sup>

A series of cost-reducing innovations were adopted in 1908 and became operative by 1910. Bethlehem lacked its own coke making facilities and had been buying coke from the Lehigh Coke Company. A cheaper source became available when Bethlehem signed a contract with a German-owned firm, the Didier-March Company, which agreed to build and operate a coke plant in South Bethlehem with a daily capacity of 2,000 tons. Bethlehem received an option to purchase the new coke plant at the end of twenty years. Substantial savings resulted from the fact that Didier-March was to be supplied with coal from Bethlehem's own mines, thereby permitting a considerable increase in the scale of Bethlehem's coal operations. Once the coke plant was operational, a further savings was achieved; employing a technique he first had observed in a European steel mill, Schwab arranged to purchase all the gas produced during the

<sup>30</sup> Recollections of James H. Ward, May 18, 1949, Grace Biographical Project, Bethlehem Steel Corp., Bethlehem, Pa. Hereafter cited as Grace Biographical Project.

<sup>31</sup> For breakdown of costs, see *Wall Street Journal*, March 19, 1908; also Bethlehem Steel Corporation, *Annual Report*, 1906, 12–13, and 1908, 13.

manufacture of coke. Previously regarded as waste product, this gas was piped into the main Bethlehem plant for only 8¢ per thousand cubic feet, and it became the chief source of the plant's heat and power.<sup>32</sup>

Earlier, in 1905, Schwab had realized that Bethlehem's future was precarious as long as it was heavily dependent upon government contracts. He therefore authorized the first of a series of improvements and additions to the old plant. These included a crucible steel plant for making special steel alloys, a drop-forge shop for producing medium and light forgings (thus complementing the company's older heavy forging facilities), a machine shop for manufacturing large hydraulic presses and pumps, and a rolling mill for open hearth rails.<sup>33</sup>

The production of open hearth rails, which had the advantage of being more durable than Bessemer rails, represented Schwab's first major departure from Bethlehem's traditional product line. Despite the fact that open hearth rails sold for \$6 more per ton than the Bessemer rails, the new rolling mill at Bethlehem was soon operating at full capacity.<sup>34</sup> U.S. Steel, the nation's largest rail producer, did not follow Schwab's lead because such an action would have meant replacing its Bessemer facilities with open hearth equipment. As a late starter, Bethlehem enjoyed a clear advantage: with no heavy investment to protect in obsolete equipment, it could adopt the newest and most efficient technological processes.

In 1905, Schwab also decided upon a second major addition to the company's product line. He purchased exclusive American rights to an invention, a new type of structural beam, which no one else in the American steel industry took seriously. Based on his conviction that this new product represented a major technological breakthrough, Schwab risked his fortune and the future of Bethlehem Steel.

The invention was the work of Henry Grey, who was born in London in 1849 and who emigrated to America in 1870. Grey was serving as general superintendent of the Cleveland Rolling Mills in Newburgh, Ohio, when he learned of efforts to roll a structural beam directly from an ingot. In November 1896, the Ironton Structural Steel Company in Duluth, Minnesota, hired Grey and

<sup>32</sup> Bethlehem Steel Corporation, *Annual Report*, 1910, 11-12, and 1911, 11; Recollections of F. A. Shick, 1949, Grace Biographical Project.

<sup>33</sup> These additions are described in detail in "The Bethlehem Steel Company's Recent Extensions," *Iron Age*, November 1, 1906, 1142-46.

<sup>34</sup> *Wall Street Journal*, April 4, 1908; *Philadelphia Public Ledger*, March 1, 1909; *New York Times*, March 1, 1909.

his associate, George W. Burrell, to try to carry the earlier experiments of Levi and James York to completion. The goal was to produce a new structural shape: a wide-flanged beam which could be rolled as a single section instead of being riveted together like conventional beams.<sup>35</sup>

In 1897, Grey was successful. The objective of the Ironton mill was to perfect the method and then to sell the rights; therefore, the mill was closed down and Grey moved to New York, where he established the American Universal Mill Company. He sought companies to which he could license the structural steel patent or which he could interest in purchasing the patent outright. In June 1897, Grey published an article in a leading steel trade journal describing in detail the new process and its advantages. "In the construction of the iron work of buildings, bridges or other structures," he wrote, "it is highly desirable to secure the greatest possible strength with the least dead weight and at the lowest cost. This the Duluth girder insures."<sup>36</sup> Grey concluded his presentation on a note of optimism: "This should be of interest to engineers and builders everywhere." But he misjudged his audience. Instead of evoking interest and inquiries, his announcement was met with skepticism and indifference. As a later writer observed, "notwithstanding the fact that this new type of a mill showed distinct advantages over any other type which had been used for rolling wide flanged beams, manufacturers in the United States refused to acknowledge these advantages and even went so far as to refuse to believe in the possibility of rolling wide flanged beams satisfactorily in the mill in question."<sup>37</sup> The first plant which utilized Grey's invention was built in a German-owned steel mill in Lorraine, in the Duchy of Luxembourg. Max Meier, the general manager of the Differdingen Works, had learned of Grey's work and hired him to supervise the construction of a Grey beam mill, which became fully operational in 1902.<sup>38</sup>

Schwab first became interested in the Grey beam while he was president of U.S. Steel. He thought the invention showed commercial possibilities and he urged U.S. Steel to purchase the rights. His recommendation was rejected by U.S. Steel's finance committee,

<sup>35</sup> George W. Burrell, "Traces Development of Grey Mill," *Iron Trade Review*, November 4, 1926, 1165; obituary of Henry Grey, *Iron Age*, May 8, 1913, 1147.

<sup>36</sup> Burrell, "Traces Development;" Henry Grey, "A New Form of Structural Steel," *Iron Age*, LIX (June 17, 1897), 14; "A New Process for Rolling Structural Steel Shapes," *Engineering News*, XLVI (November 21, 1901), 387.

<sup>37</sup> F. Denk, "Mill Design for Rolling Flat-Flanged Beams," *Blast Furnace and Steel Plant Journal*, V (February, 1917), 61.

<sup>38</sup> "Henry Grey and the New Structural Mill," *Iron Age*, December 31, 1908, p. 1994.

which had final authority over all new acquisitions.<sup>39</sup> In 1905, Schwab decided to pursue his original interest. Accompanied by Grey, Schwab inspected the Differdingen mill. He made a second visit the same year, accompanied by George Blakely, Bethlehem's expert on structural steel. In December of that year, Schwab announced that Bethlehem Steel would undertake the production of Grey beams and that Eugene G. Grace would direct construction of the new plant.<sup>40</sup>

Bethlehem needed \$4,500,000 to construct the new mill on a site purchased in the Saucon Valley. In addition to the royalty paid for use of his patent rights, Henry Grey and his son Charles were to receive a fee of \$85,000 for designing the plant.<sup>41</sup> Schwab decided that the most effective way to raise money was to float a bond issue. He approached his friend Pliny Fisk, an investment banker. After hearing Schwab's presentation, Fisk committed his firm, Harvey Fisk & Sons, to underwrite a \$5,000,000 bond issue. Schwab submitted the following description of the Grey beam mill:<sup>42</sup>

It is designed primarily for the production of a special character of structural material, which is not now made by any other mill in the United States, and which will enable consumers to effect a saving on their buildings, as compared with present shapes and methods of construction. Columns which are now riveted together at an expense of \$9 to \$14 per ton will be rolled in one solid section, facilitating time of delivery as well as adding to the efficiency and strength of the material. . . . To one familiar with the trade the enormous advantages of such sections are quickly appreciated.

Beginning in September 1907, the American stock market collapsed as a result of a panic in the money market. Stock prices fell sharply; new stock and bond ventures were stillborn.<sup>43</sup> The economic outlook was so bleak that many of the executives of Bethlehem Steel recommended that Schwab abandon his plans to build the new mill. Grace later recalled Schwab's reaction:<sup>44</sup>

<sup>39</sup> Sidney B. Whipple, "Notes on Mr. Schwab's Life" (hereinafter cited as Whipple Notes), 121, two volumes of typed notes based on interviews in 1935 with Schwab and his surviving business associates, in the Schwab Memorial Library, Bethlehem Steel Corporation, Bethlehem, Pa. I am grateful to the Bethlehem Steel Corporation for permitting me unrestricted access to the Whipple Notes and to other materials in the Schwab and Grace collections. Of course, it should not be inferred that the Corporation necessarily agrees with my interpretation of the materials in its possession.

<sup>40</sup> *Wall Street Journal*, December 9, 1905; *Philadelphia American*, December 22, 1905.

<sup>41</sup> Whipple Notes, 133, 140.

<sup>42</sup> Schwab to Harvey Fisk & Sons, December 18, 1906, copy in Corporate Records Division, Baker Library, Harvard University; Arthur Pound and Samuel T. Moore, eds., *They Told Barron* (New York, 1930), 84-85.

<sup>43</sup> Victor S. Clark, *History of Manufactures in the United States* (New York, 1929), III, 11-12, 104.

<sup>44</sup> Eugene G. Grace, *Charles M. Schwab* (Bethlehem, Pa., 1947), 26. This memorial address by Grace was reprinted in the 1947 *Yearbook of the American Iron and Steel Institute*.



CHARLES M. SCHWAB, 1862–1939



ARMAMENTS PRODUCTION AT BETHLEHEM

This gave him pause. He believed in giving men leadership, not driving them. In most instances he was inclined to accept the advice of his colleagues, or if he could not sell them when he disagreed he was inclined to feel that his own decision needed to be reconsidered. In this instance he did at first accede to the opinion of his boys, as he called them, and gloomily took the train into New York to consider how a retreat could be worked out. The next morning he phoned his secretary very early and said, "Get up, Wardie [James H. Ward], we are going back to Bethlehem and talk to the boys. I've thought the whole thing over, and if we are going bust, we will go bust big."

Years before, as president of Carnegie Steel, Schwab had shared Carnegie's view that a favorable time for a company to expand its facilities is during a depression, when the costs of labor and raw materials are lower than in normal times. At Carnegie Steel, such expansion was financed by drawing upon undistributed profits from earlier periods of prosperity.<sup>45</sup> But Bethlehem Steel had no such capital reserves; the construction of other new production facilities and the precipitous decline in U.S. Navy orders for armor and ordnance (falling from \$4,400,000 in 1905 to \$4,000,000 in 1906 and then to \$2,600,000 in 1907) had depleted the company's funds.<sup>46</sup>

With the bond issue dead and with no corporate or personal cash reserves to draw upon, Schwab proposed an unusual alternative for raising the money Bethlehem required. Instead of raising funds to pay the contractors and suppliers for the Grey beam mill, he asked them to put up the money themselves, that is, to work without payment, by providing him with service on credit until the venture began to show profits. This approach proved successful. In one instance William H. Tobias, Bethlehem's chief purchasing agent, was sent to Philadelphia to negotiate with the contracting firm that Schwab had chosen for the excavation work. The owner, F. H. Clement, was asked to accept Schwab's personally endorsed notes in payment for the work. Clement not only agreed but told Tobias, "Yes, I'll take your notes, but if you fellows want any money, I'll lend you a million." The offer was accepted.<sup>47</sup>

Schwab personally contacted the directors of the Philadelphia & Reading Railroad and the Lehigh Valley Railroad, the two lines which served the South Bethlehem plant and which would serve the new Saucon plant as well. An agreement was reached with both lines whereby Bethlehem Steel would pay only 50 per cent of its

<sup>45</sup> Hessen, "A Biography of Charles M. Schwab," 142-44.

<sup>46</sup> Bethlehem Steel Corp., *Annual Report*, April, 1907 (covering 1906). A full list of Bethlehem's armor contracts from 1887 to 1915 appears in *Congressional Record*, House, LIII, part 1, December 15, 1915, 287.

<sup>47</sup> Whipple Notes, 140; recollections of F. A. Shick (1935), Whipple Notes, 147.

total monthly freight bills. The other half, not to exceed \$470,000, could be paid in drafts on Drexel & Co., the prominent Philadelphia banking firm. Drexel, in turn, would be reimbursed by selling \$1,000,000 par value in notes of the Bethlehem Steel Company. If Drexel could not find a buyer, the railroads themselves agreed to buy the notes. Thus, by a circuitous process, Schwab arranged for his suppliers to underwrite his new mill.<sup>48</sup>

The Grey beam mill became operational in January 1908. In July 1908, however, Bethlehem Steel faced a new financial crisis. It needed at least \$1,500,000 in operating funds for the new mill and for meeting the interest payments on its bonds. For a company of its growing size, Bethlehem was critically short of working capital. Schwab appealed to bankers and brokers of his acquaintance, but he was unable to raise the needed funds.<sup>49</sup>

Schwab then turned to his mentor, Andrew Carnegie. Relations between the two men had been reserved since early 1902, when Schwab's alleged gambling exploits at Monte Carlo created a front-page scandal and provoked Carnegie to write to Morgan that Schwab was morally unfit to continue as president of U.S. Steel. In 1908, however, impressed by Schwab's acumen in perceiving the commercial value of the Grey beam, Carnegie came to Bethlehem's aid. The older man lent Schwab U.S. Steel bonds to use as collateral for bank loans.<sup>50</sup>

In October 1908, after Schwab had raised the capital necessary to ease the financial strain on the company, he turned over operating authority to Eugene Grace.<sup>51</sup> He thereby freed himself to find clients for the Grey beam. Schwab's wide circle of friends and acquaintances included some of the nation's leading architects and construction engineers; he conferred with many of them to persuade them to use the new beam. News of the availability of the Grey beam had brought in a few orders — 8,000 tons for the State Educational Building in Albany, N.Y., and 3,000 tons for a sugar refinery in Boston — but these were hardly adequate to sustain the plant. In order to demonstrate the value of Bethlehem's new

<sup>48</sup> Whipple Notes, 133, and II, 20, 140.

<sup>49</sup> See, for example, the letter to Schwab from A. Barton Hepburn, president of the Chase National Bank, refusing a loan of \$1,500,000 to Bethlehem Steel, August 26, 1908, copy in Schwab Memorial Library.

<sup>50</sup> In 1908, the *Wall Street Journal* reported the rumor that Carnegie was giving financial aid to Bethlehem Steel (issue of December 24, 1908). Carnegie's aid was confirmed in 1951 by Schwab's personal assistant — see James H. Ward to John C. Long, December 11, 1951, Grace Biographical Project. See also U.S. Congress, House of Representatives, *Committee on Ways and Means, Hearings*, House Document #1505, 60th Cong., 2nd sess. Testimony of Andrew Carnegie, December 21, 1908, 1787–88.

<sup>51</sup> Grace to John C. Long, April 18, 1947, Grace Biographical Project.

product, Schwab needed a showcase sale to a leading architect for a major building project. He nearly succeeded when Daniel R. Burnham was commissioned to build the Field Museum in Chicago and Schwab persuaded him to build certain sections with Grey beams. But the Field Museum venture was postponed and Schwab lost his showcase.<sup>52</sup>

Once again Pliny Fisk came to Bethlehem's assistance. Fisk was handling a bond issue to finance construction of new headquarters for the Gimbel Brothers department store in New York. The contractor, Louis Horowitz of the Thompson-Starret Construction Co., was apprehensive that the continued depression in the money market might cause Fisk to postpone or even abandon the Gimbel bond issue. When Horowitz pressed Fisk to close the deal, Fisk imposed one new condition: his friend, Charles Schwab, must have the order for structural steel. Horowitz agreed to meet with Schwab. At their meeting Schwab said: "This is an important building. My sections are new and I want you to introduce them. I will name you a favorable price." Horowitz answered: "If the architect is satisfied, and if you make the price right, we will buy your steel."<sup>53</sup>

The architect, Ernest R. Graham, recognized the advantages of the Grey beam and agreed to use it. The price negotiated between Horowitz and Schwab was \$32 a ton. After closing the deal, Schwab left for Europe. During the six weeks he was away, steel prices fell sharply; the contract price of \$32 a ton for Grey beams was now more expensive than the current price for conventional riveted beams. Schwab was determined to meet the market. On his return from Europe, he went to see Horowitz and said that he supposed "we will have to re-trade the Gimbel job." Horowitz replied that if prices had risen during Schwab's absence, he would have held Schwab to the lower price, and that consequently the original price they had agreed upon would stand. This contract for 12,000 tons, valued at \$384,000, was Bethlehem's first major sale of Grey beams.<sup>54</sup>

Even after the completion of the Gimbel building, Schwab faced the problem which confronts most innovators — the battle against inertia, the fight to persuade people to abandon a routine method

<sup>52</sup> *Wall Street Journal*, September 3, 1908; Whipple Notes, 159.

<sup>53</sup> Whipple Notes, 160.

<sup>54</sup> Whipple Notes, 160–61; *Historical Sketch of the Development of the Bethlehem Steel Company and Bethlehem Steel Corporation*, pamphlet dated October 2, 1911 (copy in Schwab Memorial Library), 9; Desk Diary notation for March 22, 1909: "Closed up matter of Gimbel Building with E. R. Graham and Pliny Fisk," quoted in Whipple Notes, 161.

for a new one.<sup>55</sup> Schwab's approach was to persuade architects to submit two cost estimates to their clients, one based on the use of conventional riveted beams, the other on Bethlehem beams (the name by which the Grey beam became more widely known). The new method promised substantial savings in steel tonnage and labor costs because it eliminated overlapping sections of steel and the need to rivet them together. Because of these significant advantages and Schwab's relentless sales campaign, the Bethlehem beam began to win acceptance.<sup>56</sup>

By August 1909, sales of structural steel and open hearth rails had more than offset the continuing decline in armor and ordnance sales to the government. Schwab told a reporter for the *Wall Street Journal* that "all the departments of the Bethlehem Steel Corporation, with the exception of the ordnance plant, are running fully. We have been forced to refuse additional orders for structural steel, owing to the already congested condition of our mills."<sup>57</sup> Three days later, the *New York Times* carried an announcement of Bethlehem's plans to enlarge its structural steel facilities. Schwab told the *Times*: "This year I will spend \$5,000,000 improving the Bethlehem plant. There will be a new beam mill to roll smaller structural steel — six to twelve inch beams — so that I can run the original mill on larger sections." Commenting on the growing market for Bethlehem beams, Schwab stated:<sup>58</sup>

We have found a steady demand for this new structural steel and the present necessity for rolling small sections handicaps the larger work for which the new mill was planned. No other concern can manufacture steel that way, as I have the exclusive patent rights for Bethlehem, but I have been agreeably surprised at the way this steel has found its place. You know there is always a certain amount of prejudice to be overcome.

The new mill for producing smaller structural steel sections was completed in 1911. Its completion established Bethlehem as the largest producer of structural steel in the eastern region of the United States. Although no figures are available that establish the proportion of Bethlehem's sales and profits represented by the Grey

<sup>55</sup> For examples of resistance to innovation, see Victor S. Clark, *History of Manufactures*, II, 71, 275, concerning resistance to the Bessemer process for making rails and boiler plates; H. F. J. Porter, "Nickel Steel: Its Practical Development in the United States," *Cassier's Magazine*, XXII (August, 1902), 483, on early prejudice against steel in any form (as opposed to wrought iron); and W. Paul Strassman, *Risk and Technological Innovation* (Ithaca, N.Y., 1959), 55, on opposition to crucible steel.

<sup>56</sup> Recollections of Eugene G. Grace (1935) in Whipple Notes, 257–58, 270.

<sup>57</sup> *Wall Street Journal*, August 2, 1909.

<sup>58</sup> *New York Times*, August 5, 1909.

beam, some indication of the product's importance to the company can be seen in a comment from a leading industry trade journal: <sup>59</sup>

To the Bethlehem Steel Corporation the exclusive right to manufacture and sell under the Grey patents has meant much more than the benefits derived from selling Grey sections alone. The possession of the Grey right has made Bethlehem the only company in the United States able to supply every structural steel requirement. Bethlehem not only has the Grey sections, but also a full line of standard sections, plates, bars, and the like. Many customers have been relying upon Bethlehem for their entire tonnage. As a result, Bethlehem has built up a huge structural business in the East.

### CONTRAST WITH U.S. STEEL

During the period when Schwab was expanding Bethlehem, the largest and most powerful firm in the industry was U.S. Steel. A comparison of Schwab's policies with those of Judge Elbert H. Gary, the head of U.S. Steel, lends some perspective to the development of Bethlehem Steel.

Seldom were two steel industry leaders so dissimilar in their policies as Schwab and Gary. They had clashed repeatedly during the period when Gary was chairman of U.S. Steel's executive committee and Schwab was the firm's president.<sup>60</sup> Referring to that period, Schwab later said: "Judge Gary, who had no real knowledge of the steel business, forever opposed me on some of the methods and principles that I had seen worked out with Carnegie — methods that had made the Carnegie Company the most successful in the world."<sup>61</sup> Gary resembled the early owners of Bethlehem in his desire to take as few risks as possible and to secure a stable share of the market. Unlike Schwab, Gary did not favor acquiring sources of raw materials long in advance of their actual use, nor did he approve of the policy of granting partnerships to bright young managers and superintendents, nor of the bonus system for workmen.<sup>62</sup>

Schwab, by contrast, was an avid proponent of bonus plans to encourage extra effort and efficiency. In 1901, during his brief ownership of Bethlehem, one of the first changes he introduced was an experimental bonus system for machinists, a plan whose cover-

<sup>59</sup> *Iron Trade Review*, November 4, 1926, 1207.

<sup>60</sup> Hessen, "Charles M. Schwab, President of United States Steel, 1901-1904."

<sup>61</sup> Whipple Notes, 94.

<sup>62</sup> *Ibid.*; Schwab's testimony, *United States v. U.S. Steel Corp.*, transcript in Columbia University Law Library, XI, May 19, 1913, 4172f.

age he extended in 1906.<sup>63</sup> Schwab's bonus plan was calculated on observations of what the most and least capable machinists could produce during a given work period. The norm or base point was set at 80 per cent of the best man's output. Any man consistently unable to reach the 80 per cent output figure was either dismissed or demoted to a less demanding job. Any man who exceeded that figure received a bonus, as did his foreman and department head.<sup>64</sup>

Schwab also established a bonus arrangement for salesmen in his extended plan in 1906. His approach was designed to discourage them from cutting prices in an effort to increase the size of an order. Therefore the salesman's bonus was based not on the number of tons ordered but on the amount of profit per ton. In calculating the bonus of a superintendent of a blast furnace, the average monthly cost of converting a ton of ore into pig iron was taken as the base point. If he reduced the monthly average cost by 5 per cent, he received a bonus of 20 per cent of the savings; if the savings were 10 per cent, he received one fourth of that amount; and if he reduced the cost by 15 per cent, he received one-third of the savings.<sup>65</sup>

Years later, summarizing the system he had established, Schwab said: <sup>66</sup>

As the corporation has grown, the original plan has been extended as far as practicable throughout the organization. Bethlehem has made wide use of piece rates, tonnage rates, premiums and group incentive plans for wage earners, and various forms of incentive payments for supervisors and others in the ranks of management. Do so much and you get so much; do more and you get more — that is the essence of the system.

The distinctive feature of Bethlehem Steel's bonus system was that it directly and immediately rewarded the employee for extra effort or increased efficiency. This differed from the bonus system at U.S. Steel, which was proposed by George W. Perkins and approved by Gary in 1903. Under the Perkins plan, a percentage of profits was set aside for distribution to workers based on the general progress of the company, rather than on the performance of an individual worker. Instead of bi-weekly or monthly payments directly to the worker, U.S. Steel reinvested the bonus money in shares of its own preferred stock. If a worker left U.S. Steel or was discharged for any reason, he forfeited all claim to the bonus.<sup>67</sup>

<sup>63</sup> Bethlehem Steel Corporation, *Annual Report*, March 1906; Whipple Notes, 154.

<sup>64</sup> J. Stephen Jeans, ed., *American Industrial Conditions and Competition* (London, 1902), 176–78.

<sup>65</sup> Arundel Cotter, *The Story of Bethlehem Steel* (New York, 1916), 19–21.

<sup>66</sup> Charles M. Schwab, *The Bethlehem Bonus System* (Bethlehem, 1931), 3.

<sup>67</sup> David Brody, *Steelworkers in America: The Nonunion Era* (Cambridge, Mass., 1960), 24–25, 89; Cotter, *Story of Bethlehem Steel*, 13–14, 20–22; John A. Garraty, *Right-Hand Man, The Life of George W. Perkins* (New York, 1960), 110–13.

The major policy difference which separated Gary and Schwab, however, was not bonus systems but Gary's aversion to price-cutting or price competition. He considered that Schwab had been a co-conspirator with Carnegie in this offense against business stability and harmony. In 1909, referring to the period before the formation of U.S. Steel in 1901, Gary condemned the form of competition which had prevailed:<sup>68</sup>

A competitor was treated as a common enemy. Methods for his defeat and overthrow were used regardless of good morals or good policy. . . . Certainly, it was not permanently beneficial to the general public; and, from the standpoint of good morals, was a shame and a disgrace . . . there was in some cases lack of confidence, a withholding of information, a piracy of business, an indiscriminate and reckless cutting of prices . . . an overbearing, unfair destructive competition which drove many out of business, kept many others on the ragged edge of existence and brought demoralization to the industry.

From 1901 on, because Gary considered price competition to be both immoral and unprofitable, U.S. Steel established firm prices for its products and announced them in the steel trade journals. The giant firm generally resisted any price changes in the face of either rising or falling demand, in times of prosperity or of depression. Gary believed that everyone in the industry would benefit from the absence of price fluctuations. Price and wage stabilization were major innovations within the industry; U.S. Steel led and other firms followed.<sup>69</sup>

But not all firms followed, and not all of the time. Knowing U.S. Steel's prices, smaller firms secretly cut prices, and other firms entered new fields of production knowing that they would not face price competition from the giant of the industry. Those firms which sold below U.S. Steel's price sometimes received orders to the limit of their productive capacity, then the remainder went to U.S. Steel. Although this "remainder" was as much as 50 or 60 per cent of the market, depending on the product, this usually forced some of U.S. Steel's plants to run at less than full capacity.<sup>70</sup>

Gary's policy of price stabilization was a source of bitter frustration to one of the Carnegie veterans, William B. Dickson, who was

<sup>68</sup> Gary's speech of October 15, 1909, in volume I of *Addresses and Statements of Elbert H. Gary*, compiled by U.S. Steel Corp., 8 volumes, 1927, copy in Baker Library, Harvard University.

<sup>69</sup> Edward S. Meade, "The Price Policy of the United States Steel Corporation," *Quarterly Journal of Economics*, XXII (May, 1908), 452-466; Abraham Berglund, "The United States Steel Corporation and Price Stabilization," *Quarterly Journal of Economics*, XXXVIII (November, 1923), 1-30.

<sup>70</sup> Unpublished autobiography of William B. Dickson, Pattee Library, Pennsylvania State University, University Park, Pa. Hereafter cited as Dickson Papers.

second vice president of U.S. Steel. Dickson complained to President Ellis Corey in 1904 that the steel corporation was losing the respect of its competitors and the patronage of its largest customers, primarily because of its price policy on rails, structural material, plates, billets, and bars. Dickson explained:<sup>71</sup>

In economy of operations, reduction of cost, and improvement in the efficiency of our operating force, we have, I feel, accomplished even more than was expected when the Corporation was organized. All this good work is, however, to a large extent neutralized by the irregularity of operations. For some time past we have been operating at not much over 50% of our capacity, including blast furnaces. As an inevitable result, costs have increased; works standing idle have deteriorated relatively more than if they had been in operation; the men are disheartened and a certain amount of apathy exists.

Dickson believed that the result of U.S. Steel's rigid adherence to stable prices in the face of price-cutting by its rivals was "simply to build up competition." The dominant steel corporation, he stated, had two options: to buy out its rivals at high prices, or to drive them out by resuming brisk competitive price-cutting policies. He counselled the latter course, saying that "we are even now looked upon by vigorous competitors as an 'easy mark.' . . . it is better by all odds to make . . . profit on a full output at competitive prices than by half output at artificial prices."<sup>72</sup>

Gary's blueprint for stability within the industry often worked against the dominant position of U.S. Steel. If, during the depression of 1907, U.S. Steel had cut prices as Carnegie Steel had done during earlier depressions, smaller firms like Bethlehem probably would not have been able to survive. Thus, Bethlehem's ability to withstand the depression and its ability to introduce successfully new commercial products must be partially attributed to Gary's policies. Fixed prices served as a magnet to draw aggressive smaller firms into price and product competition with the giant steel corporation. In 1906, for example, Schwab led Bethlehem into the production of open hearth rails. If U.S. Steel had cut prices on its Bessemer rails in the face of actual or even potential competition, rivals like Schwab might have been deterred. But newcomers knew that Gary would ignore their challenge, that he would adhere to the prevailing price. High prices offered a financial buffer to every challenger; Bethlehem, for example, could absorb the heavy start-

<sup>71</sup> Dickson to William E. Corey, August 10, 1904, Dickson Papers.

<sup>72</sup> *Ibid.*; Dickson to Corey, February 16, 1909, and section on Elbert H. Gary in Dickson's autobiography.

up costs of the new open hearth rail mill and could absorb higher unit costs until it could match U.S. Steel's economies of scale.

Gary's policy of price stabilization created massive dissatisfaction among the managers, superintendents, and sales managers of U.S. Steel's subsidiaries, who repeatedly urged Gary to end fixed prices rather than continue to lose orders. In February 1909, the price stabilization policy was abandoned. Gary reluctantly yielded to those within the steel corporation who wanted to be able to cut prices in order to reduce competition from smaller firms.<sup>73</sup>

It was ironic that Gary unwittingly had been Schwab's and Bethlehem's benefactor; his price stabilization policies had made it possible for Bethlehem to weather the difficult years of innovation and a severe depression. By 1909 Bethlehem was strong and flourishing. The Grey beam had become a commercial success and there was an unexpected sharp upturn in military orders. Bethlehem received U.S. Navy contracts for 7,731 tons of armor valued at \$3,200,000, as well as contracts for \$2,300,000 in guns, gun forgings, gun mounts, target shells, and armor-piercing shells.<sup>74</sup> Early the next year, Bethlehem received the largest order in its history — a contract valued in excess of \$10,000,000 to manufacture armor, guns, and shells for the navy of the Argentine Republic.<sup>75</sup>

## CONCLUSION

When Schwab took active control of Bethlehem Steel in 1904, it was a small but solidly profitable firm. He soon managed to develop the company far beyond the vision of its earlier owners. When he staked the future of Bethlehem on the success of the Grey beam, he acted on his own judgment in a way which few of his predecessors or contemporaries would have dared. Henry Grey wrote in 1909: <sup>76</sup>

To Charles M. Schwab belongs the credit for introduction of this mill to the United States, as without his courage and backing the new structural mill and the new structural shapes would in all likelihood have been allowed to lie dormant for many years. It is one thing to invent a process or mill and another thing to get a man who can see that it is a good thing and is willing to spend the large sums of money necessary to put it into active operation.

Schwab exhibited the preeminent characteristic of an entrepreneur-

<sup>73</sup> *Iron Age*, February 25, 1909, 648.

<sup>74</sup> *Congressional Record*, 64th Cong., 1st sess., LIII, Part I, 287 (Washington, 1916); Senate Document #521, 61st Cong., 2nd sess. (Washington, 1910), Appendix E, 128.

<sup>75</sup> Bethlehem Steel Corporation, *Annual Report*, 1910, 9.

<sup>76</sup> Henry Grey, letter, *Iron Age*, January 14, 1909, 160–61.

ial innovator — in Professor Joseph Schumpeter's famous phrase, the ability "to see beyond the reach of familiar beacons."

Schwab was concerned with the long-term growth and profitability of Bethlehem Steel. In 1907, having perceived that Bethlehem was too heavily dependent upon naval contracts, Schwab discontinued paying dividends on Bethlehem's preferred stock (7 per cent non-cumulative), of which he owned 85,000 of the 150,000 shares. He declared: "Not until the Bethlehem Steel Corporation is a commercial proposition, and not dependent upon the Government for existence, will I favor a resumption of dividends on the preferred stock."<sup>77</sup> Despite strong criticism from other stockholders, and despite the fact that by 1909 Bethlehem had been transformed into a diversified enterprise, Schwab adhered to his policy of passing dividends and plowing back all earnings into expansion and further diversification. In February 1916, Bethlehem Steel resumed dividend payments on its preferred stock and began paying dividends on its common stock for the first time.<sup>78</sup> Schwab announced a cash payout of \$30 per share, the largest dividend ever paid by an American business firm — a tribute both to Schwab's leadership and to the solid foundation upon which he had built Bethlehem Steel.

Charles Schwab's success with Bethlehem derived largely from his shrewd business sense, his boldness, and his willingness to innovate. These qualities clearly separated him from the austere Judge Gary of U.S. Steel, whose policies had inadvertently contributed so much to the survival and growth of Bethlehem Steel. The conservative, passive, tolerant strategy of the head of the industry's largest firm provided the "protective umbrella" under which Schwab was able to transform Bethlehem from a position of vulnerability to one of sustained strength.

<sup>77</sup> *New York News Bureau*, March 1, 1907; *Wall Street Journal*, April 17, 1907.

<sup>78</sup> Bethlehem Steel Corporation, *Annual Report*, 1916, 14.