NOTES AND COMMENT

NOTES ON THE DAWN OF MANUFACTURING IN CHILE

J. Fred Rippy and Jack Pfeiffer*

BEGINNINGS (1825-1850)

In Chile, as in other countries, the handicraft production by the individual, or by the individual family, of kitchen utensils, pottery, footwear, simple tools, or woven goods was the forerunner of manufacturing industry. The development was slow everywhere, and the market was limited at first to families in the immediate vicinity, then to the nearest village, and finally, when methods had improved enough to produce a larger surplus, it expanded to other villages. In Chile, the process was longer and slower than in the United States and England.

One of the first observers of the backward condition of Chilean manufactures was a Yankee printer named Samuel Johnson, who had gone to Chile in time to witness the struggle against the Spaniards for independence. Johnson, in his diary dealing with the period from about 1811 to 1818, notes that the Chileans were dependent on foreign commerce for almost all their manufactured goods except blankets.[1]

Another on-the-spot observer, who told essentially the same story, was Lady Maria Callcott, an English widow and friend of Thomas Cochrane, who resided in Chile in 1822 and had the following comments to make about the state of Chilean manufactures:

> The people of the country are still in the habit of spinning, weaving, dyeing, and making every article for themselves in their own houses, except hats and shoes. . . . The stuffs of the country are seldom to be purchased in a shop because few are made but for domestic consumption.[2]

Lady Callcott was a shrewd observer, who seems to have possessed a true woman's curiosity about the ways of others, a curiosity which gives one an insight into the whole of the Chilean manufacturing system (manufacturing in the sense that we now consider it of being the production of surplus goods, of articles destined for more than simple home use). She speaks of the manufacture of earthen jars in Valparaíso,

*The authors are respectively professor of American history at the University of Chicago and instructor in history at Oklahoma Agricultural and Mechanical College.

[1] *Diario de un tipográfico yanqui en Chile y Perú durante la guerra de la independencia* (Madrid, 1919), p. 224.

[2] *Journal of a Residence in Chile During the Year 1822* (London, 1824), pp. 125, 130.

where she found that the potters had no regular establishment, no division of labor, and that they did not even use the potter's wheel—a great surprise even for a woman not particularly familiar with industrial life.[3] She also gives one of the first reports on the earliest of all manufacturing establishments in Chile, a factory for making gunpowder which the Spanish royal government had erected at La Chimba, near Santiago, and which had been destroyed by leaders of the movement for Chilean independence. This mill had made use of water to run its equipment,[4] thus foreshadowing what was soon to become one of the chief methods of producing motive power in many of the Chilean industries.

Waterpower was being used at the time of her ladyship's visit to move the machinery of many of the numerous Chilean flour mills. In fact, John Miers, an Englishman who, with his family, was well acquainted with Lady Calcott while she was in Chile, and who later wrote of his own experiences, spoke of the utilization of such power in the flour mill which he built.[5]

In addition to manufacturing flour, Miers was a pioneer in the manufacture of milling equipment in Chile, for he had made all of the equipment needed for a flour mill, with the exception of the millstones, which had to be imported from France.[6] Lady Callcott, in speaking of Miers, adds that he was utilizing a circular saw to make barrel staves, and that this put him "about a hundred years ahead of his time" in Chile.[7] Both of these early English visitors took note of the soap-making, tanning, wine, brewing, and candle-making industries in existence at the time.[8]

Miers, being engaged in manufacturing himself, naturally observed other such establishments. He described a lime works at Polpayco, a small village on the road between Valparaíso and Santiago, which had crude smelting furnaces built in the side of a hill. The type of furnace used and the method of charging it[9] were strikingly similar to the "log furnaces" and the methods employed in connection with such furnaces in the lead mines of Missouri, which were coming into prominence at

[3] *Ibid.*, p. 141.

[4] *Ibid.*, p. 212.

[5] John Miers, *Travels in Chile and La Plata* . . . (2 vols., London, 1826), II, 280.

[6] *Ibid.*, pp. 280-281.

[7] Callcott, *op. cit.*, p. 186.

[8] *Ibid.*, pp. 127, 131, 212, 259. Lady Callcott also indicates that other manufacturing was being carried on. In speaking of North American activities in Chile she says, "Their goods, consisting of common furniture, flour, biscuit, and naval stores, necessarily keep them out of doors more than any other set of people" (*ibid.*, p. 131; see also Miers, *op. cit.*, I, 472; II, 289, 295-303).

[9] Miers, *op. cit.*, I, 369-370.

this time.[10] Miers also observed that the sugar industry, which quite early became one of the best developed Chilean manufacturing enterprises, had been tried out at an *ingenio* north of Santiago, but had been abandoned.[11]

An interesting aspect of the early manufacturing situation was the position taken by the Chilean government. Both Lady Callcott (possibly because she was so friendly with the Miers family) and Miers were disgusted with the national government. Miers had good reason to be, for his purpose in leaving England had been:

> To erect a very extensive train of machinery in that country for refining, rolling, and manufacturing copper into sheathing. . . . I dispatched for Chile, in different vessels, about one hundred tons' weight of machinery, . . . [and] embarked with my wife in a merchant brig, . . . with about 70 tons of machinery, implements, and baggage; taking with me several very skillful workmen, engineers, millwrights, and refiners.[12]

But Miers never accomplished his purpose—in fact he lost, according to his own figures, $40,000 on this enterprise.[13]

The major part of Miers's troubles were encountered in trying to get legal possession of a site for his copper factory; but even if he had succeeded in this, his hopes regarding the success of the plant were not very bright. According to his version, the Chilean government would offer inducements to foreign manufacturers to establish themselves in Chile, and then would tax them out of existence. In substantiation of this, Miers offered the case of an Englishman who was operating one of the few successful breweries of Chile, but who was so heavily taxed that the establishment was unprofitable.[14] Another early manufacturing enterprise that fell by the wayside was a plant, also erected by a foreigner, which was designed to manufacture copper vessels for export to Peru. Taxes forced the plant into bankruptcy.[15] Regarding government policy Lady Callcott made the following observation:[16]

> The duties on all these [importations] are so high, as in many cases to amount to a prohibition, with the view of protecting home-manufactures, forgetting that, excepting

[10] H. R. Schoolcraft, *A View of the Lead Mines of Missouri* (New York, 1819), p. 95. This same crude method of smelting was reported as being used in a Chilean gold mine (Alexander Caldcleugh, *Travels in South America, During the Years 1819-20-21* . . . [2 vols., London, 1825], I, 352-353; II, 43-44).

[11] Miers, *op. cit.*, I, 415; II, 314.

[12] *Ibid.*, pp. 1-2.

[13] *Ibid.*, II, 276.

[14] *Ibid.*, p. 290. Evidence seems to indicate that this was the brewery which a Scotchman named McFarlane had started in 1820 (see Michael G. Mulhall, *The English in South America* . . . [Buenos Aires, 1877], p. 356.)

[15] Miers, *op. cit.*, II, 289.

[16] Callcott, *op. cit.*, p. 289.

hats and small beer, there is not a single manufactory established in Chile; for we can hardly call such the soap-boiling and candle-dipping of the country. And because a man in Santiago has made a pair of stockings in a day, no more foreign stockings are to be introduced; so the ladies must learn to knit or go barefoot.

Despite the handicaps, foreigners continued to try their luck at manufacturing in Chile. According to Miers, however, the only successful foreign manufacturer was a German who was operating a plant to make hemp bags. This plant was located in Santiago, and Miers asserted that it was using machinery to manufacture its product.[17] But Miers's views seem to be a bit severe, especially since he was able to stand the loss of $40,000 without being crushed. His flour mill must have been somewhat profitable even after the government taxes were paid.

The influence of foreigners—in all of the principal industries, such as flour milling, smelting, soap and candle making, and bag making—persisted through the years as manufacturing developed in Chile. From the outset of Chile's industrial life, industries that were of any importance were nearly always controlled, not by natives, but by foreigners. And as new industries were introduced, or as the old ones grew, they were usually owned, controlled, or operated by foreigners.[18]

The extent of the industries that were developed in Chile by 1850 is not clearly evident. One way to get some idea of what they were is to examine the lists of Chilean exports during that period to see if the products listed give any indication as to what industries had developed far enough to produce a surplus that went into foreign trade. A list published by the United States Government for 1837 contained the following goods imported from Chile: 695 gallons of various wines, 102 pounds of cordage (the Chilean hemp industry had its beginnings back in 1822),[19] 315 dollars' worth of leather manufactures, and one gross of glass bottles. (The chief imports of the United States from Chile during these years were the semi-manufactured—"processed"—mineral products of Chile—copper, gold, and silver.)[20] One must not try to derive too much from such data, however, for the list also shows that the United States received from Chile 1,400 square feet of window glass,

[17] Miers, *op. cit.*, II, 275.

[18] The government minting machinery was of French manufacture (Callcott, *op. cit.*, pp. 219-220); and it is highly probable that the shipyards which the same writer saw in Valparaíso (*op. cit.*, p. 116), and the cart manufactories mentioned (*op. cit.*, pp. 122-123), employed some foreign mechanics, if, indeed, these plants were not foreign owned.

[19] Miers, *op. cit.*, II, 314.

[20] In this connection, the activity of another Englishman must be noted. About the year 1846 Charles Lambert introduced a reverberatory furnace which extracted metal from ores formerly considered worthless (Mulhall, *op. cit.*, p. 358).

$2,192 worth of dyed or printed cotton goods, and some silk goods![21] All of these were probably re-exports, or goods transshipped via Chile, and for that reason they appear on the United States government list as "imports" from Chile. The situation remained about the same up until 1850—the only available sources being the United States lists as given in *Commerce and Navigation*. In the lists for 1846, 1847, and 1848, hats, caps, and bonnets ware added to the previous articles. (The manufacturing of hats was among the first Chilean enterprises mentioned by Lady Callcott.)[22]

The following observations are ventured in regard to the state of Chile's industry by the middle of the nineteenth century: (1) There were, despite comments by travelers to the contrary, several true manufacturing industries with a firm foothold in Chile—flour mills which used water for power, wineries, tanneries, and soap and candle factories. (2) There were, in addition, manufactories connected with the mineral industries, many, if not most, of them dominated by foreigners. (3) The government of Chile displayed an increasing interest in the promotion and protection of home industry. (4) There were indications of the types of establishments that would become a permanent part of the Chilean manufacturing system, such as those making pottery, hemp products, copper utensils, and sugar.

FORMATIVE YEARS (1850-1884)

The years preceding 1850 were the embryonic stage of Chilean manufacturing. The next period which seems to form a natural unit in the growth of Chilean enterprise is the period from 1850 up to 1884. During a part of this epoch, the decade from 1850 to 1860, the best sources of information are again the journals of visitors to Chile.

One of the most competent observers was Lieutenant J. M. Gilliss of the United States Navy, who spent four years in Chile (1849-1852) as head of an astronomical expedition sent out by the United States government and who set up an astronomical observatory in Santiago. During that time, he made many interesting observations regarding the activities, customs, and industries of the Chilean people.

The most outstanding, or at least the most frequently mentioned, of the Chilean enterprises at the time of the lieutenant's visit were the flour mills. He observed that flour mills were located at Santiago and also in Concepción, San Bernardo, Constitución, and Curinape—all towns in the central wheat-growing area of Chile, and all not too far

[21] United States Department of the Treasury, *Commerce and Navigation of the United States, 1837* (Washington, 1838), pp. 6-115.

[22] Callcott, *op. cit.*, p. 289.

away from Santiago and Valparaíso to have a ready market.[23] The two or three mills at San Bernardo had machinery driven by water power, as did the larger mills of the Concepción area, which were located on the Bío-Bío River.[24] In both regions, American millwrights, mill owners, or mill operators had built, or were operating, the most efficient manufactories of all Chile. The development of these mills had been a fairly recent accomplishment according to Gilliss. Manufacturers of flour in the United States had taken advantage of the inefficient condition of the Chilean milling industry sufficiently to be able even to gain control of the Santiago market. But by 1849 the Chilean mills, largely due to the efforts of North Americans in Chile, had not only regained the home market, but had captured the markets of California and the West Coast of South America as well. Gilliss stated that by 1850 Chilean wheat-flour exportation had reached 64,359,600 pounds! (This estimate the present writers believe to be too high. Possibly the error was made in the lieutenant's transposition of Spanish weights into American, since the usual Spanish measure, the *quintal*, was not at all stable.) The predominance of the Chilean product in the California market did not last long after United States millers began to kiln-dry their flour and ship it across the country from the Eastern seaboard to the Pacific coast without risk of spoiling.[25]

According to Gilliss, the second most important group of enterprises were those connected with the copper industry. He reported that four establishments were manufacturing copper utensils for domestic consumption, but stated that the smelting methods were very crude and that the moulds employed were no different from those in use two centuries earlier. Two other establishments were manufacturing copper parts and boilers for distilling apparatus, and there was a recently established brass foundry.[26] In addition to these enterprises, which produced actual manufactured products, there were others engaged in metal production. At Huasco, Coquimbo, Copiapó, and Caldera, rather extensive copper smelters were in operation, or were planned in the near future. The Huasco mines were run by an Englishman who used the amalgamation process for reducing the ore.[27] The Copiapó mines, when

[23] *The U. S. Naval Astronomical Expedition to the Southern Hemisphere During the Years 1849-'50-'51-'52* (Vols. I-III, VI [Vols. IV-V not published], Washington, 1855-1856), 1, 30, 48, 57, 234.

[24] *Ibid.*, p. 48.

[25] *Ibid.*, pp. 234-235.

[26] *Ibid.*, pp. 213-214.

[27] *Ibid.*, p. 449. The Englishman referred to here was Joshua Waddington, who had "devoted himself to everything calculated to stimulate national industry," and had invested "millions" in mines at Copiapó, Coquimbo, and Huasco (Mulhall, *op. cit.*, pp. 352-353).

viewed by an American sportsman, George E. Peabody, in 1859, were said to have been run by an American who was getting pure copper from the ore after the fourth smelting.[28] A government report of 1856 remarked that a copper foundry (at Coquimbo or Copiapó) was exporting 4,000 *quintales* of copper that year.[29]

Lieutenant Gilliss did not hold a high opinion of manufactories in Chile. He declared that Chile was "almost without factories of any description, . . . dependent on foreign nations for every supply except food."[30] The United States Government report already mentioned was a little less severe, but it expressed essentially the same general idea when it stated that "almost all the mechanical industry of the republic is to be found in the flour-mills, the tanneries and currying establishments, and the tailoring shops where the *ponchos* or *mangos* are made."[31]

Both reports reveal that the writers expected too much of a country that had but recently gained its independence from a system that had, for over two hundred years, discouraged or suppressed manufacturing. Such disparaging remarks about Chilean manufacturing evidently indicate that the reporters wanted to have a division of labor, mass production, and large numbers of workers before they were willing to concede that an establishment was doing any "real" manufacturing. They disclosed lack of foresight in completely dismissing the small enterprises they saw, for these were the very plants in which Chilean manufacturing was being born. Soap and candle factories, leather-goods factories, rug, poncho, and blanket making were scarcely thought worth mentioning.[32] And another enterprise barely touched upon by these writers was that of manufacturing gas for the street lights of both Valparaíso and Santiago. In fact, so little was thought of the matter by foreign observers accustomed to seeing streets lighted by gas that they merely mentioned plans for such lighting or simply stated that the lamps were turned on for the first time.[33]

These observers also overlooked the field of carriage building. Both Mrs. Merwin, another North American eyewitness of the period, and

[28] *South American Journals, 1858-1859* (J. C. Phillips, ed., Salem, 1937), p. 174. Perhaps William Wheelwright had investments here.

[29] Cornelius Wendell, *Report on the Commercial Relations of the United States with All Foreign Nations* (2 vols., Washington, 1856), I, 726.

[30] Gilliss, *op. cit.*, I, 234.

[31] Wendell, *op. cit.*, I, 726.

[32] *Ibid.*; Gilliss, *op. cit.*, I, 48, 63, 213; C. B. Merwin, *Three Years in Chile* (Columbus, 1861), p. 210.

[33] Gilliss, *op. cit.*, I, 37. Merwin (*op. cit.*, p. 123) says the lamps were lighted in Valparaíso for the first time on September 18, 1856; Peabody (*op. cit.*, p. 163) viewed Santiago by gaslight in May, 1859.

Peabody rode in an American-owned and -operated coach line which ran between Valparaíso and Santiago in the 1850's. Peabody gave the following description: "There is a line of regular American Concord Coaches with American drivers, some of them the old Concord Omnibus drivers, their office is just like a Boston Express office, full of Yankees, & every other word an oath."[34] Mrs. Merwin, who was in Chile a few years earlier than Peabody, had observed the same situation. If, as both of them agree, the business was controlled by "Yankees," it would not seem to be a remote possibility that these men turned out some of their own vehicles. After all, the Chilean roads were little more than crude paths, and if a carriage were wrecked or damaged, it would not have been too difficult a task for the "Yankee" to set up a shop to make repairs or manufacture another. An added incentive to local building of such vehicles would have been the low cost as compared to the cost of importing new ones all the way from the United States. On the other hand, there is the possibility that the carriage-building industry was left entirely to the Chileans, as were some other industries (the cause again being excessive taxation on foreign enterprises).

One other remark made by Gilliss should be carefully noted. He stated that many foreigners had been granted exclusive patents for establishing plants to turn out cotton fabrics, sugar, biscuit, glassware, paper, and other types of goods, but that "to the present day [1852] . . . there is not one in operation."[35]

The Chileans themselves seemed unaware of the evils of their tariff system. Indeed, the Chileans, or at least one of them on one occassion, took the opportunity strongly to criticize the tariff policy of the United States. In 1880, United States Consul Lucius H. Foote sent from Valparaíso a translation of an article written by the chief of the Chilean bureau of commercial statistics, Ricardo Becerra, who was lamenting the decline of trade between the United States and Chile. In illustrating how this trade had been decreasing since 1856, Becerra pointed out that American copper imports had declined from $1,250,000 in 1863 to but a fraction of that *total*, United States imports of this metal from Chile in 1868 being valued at only $500,000. He asserted that the decline was caused by "the protective, or rather prohibitory, tariff which the government of the United States have [*sic*] put in force."[36] So there

[34] Peabody, *op. cit.*, p. 165.

[35] Gilliss, *op, cit.*, I, 213. Mrs. Merwin mentions (*op. cit.*, p. 84) another circumstance which bears out the statement that Chile had few industrial establishments; she alludes to her visit to the first Chilean *industrial* exhibit, at Santiago, in 1855—at which no manufactured articles were displayed!

[36] *Reports from the Consuls of the United States . . .*, Nos. 1-3 (1880-1881), pp. 79-82 (hereinafter cited as *United States Consular Reports*).

was evidently some question as to whether the Chileans were solely to blame for their policy regarding foreigners.

The last few years of the period 1850 to 1884 were among the most progressive that Chilean industry has ever known. One development in this era meant more to Chile's national economy than any other single factor, for this was the period when extensive exploitation of the nitrates began. Although nitrate is another industry which is generally dealt with as a mineral rather than as a manufacturing enterprise, the raw material, *caliche*, is subjected to a man-made reduction process which may be classed as a semi-manufacture. As is common knowledge, the nitrate fields of Chile are immensely rich; and the revenues from the export of nitrate were the main support of the Chilean government for many years. Chile, however, did not obtain full control of the fields until the end of the War of the Pacific. Until that time copper had been the chief export of Chile; but owing to expanding world use of nitrates and to a new process of extraction, and because of a misdirected attempt to force the copper market, this product was no longer Chile's chief source of revenue. Early in 1885 a United States consul wrote: "It is the settled conviction of persons who are thoroughly acquainted with the subject that Chili has lost her supremacy in the copper market of the world, and there is little or no probability of her being able to to regain it."[37] In fact, in 1883, the year the War of the Pacific ended, nitrate was at the top of the list of exports from Chile to the United States, copper already having declined to fifth place or lower.[38]

Returning more definitely to manufacturing, one may observe that the flour industry registered both the greatest general progress and the most rapid technical progress during the period under review. The flour mills were probably the first of the Chilean industrial plants to utilize steam power. Chile's *Anuario estadístico* for the year 1874 lists four mills in the province to Talca, to the south of Santiago, which were using steam power. The mill called "Talca" utilized a turbine and machinery manufactured in the United States to mill 1,500 *quintales* of wheat a day. The "Conico" mill employed a steam turbine system *manufactured in Chile* and English machinery to mill six hundred *quintales* daily. The mill at San Juan used turbines and machinery from the United States and England to mill seventy-five *quintales* a day and a mill at San Vicente used turbines and "other Chilean machinery" to grind one hundred *quintales* a day. The other mills of the province were still utilizing water wheels. There were seven flour mills in the province of Ñuble, the largest of them producing 42,000 *quintales* a year.[39] The consul of the United States at Valparaíso reported in 1883

[37] *Ibid.*, No. 49 (January, 1885), p. 32. [38] *Ibid.*, p. 31.

[39] Oficina Central de Estadística, *Anuario estadístico de la República de Chile, 1874* (Santiago, 1875), pp. 166, 483.

that the quality of flour produced by the Chilean mills was excellent, and that Brazil, Peru, and Ecuador were the recipients of the surplus. He added, however, that while there were many flour mills in Chile, the best were those which had been built by American millwrights and which had North American proprietors or employed North American workmen.[40]

Still other Chilean industries were put on a firmer basis during the 1870's. One of these was the cart and carriage industry. The central office of Chilean statistics, reporting for 1874, stated that the year had witnessed a great change in this particular industry. At no time before had the shops turned out anything except small two-wheeled carts of very primitive construction with wheels made from round sections cut from a tree trunk; but during 1874 three cart and carriage establishments had turned out twenty coaches, as well as 185 large and small carts and over 1,800 pairs of wheels.[41] The industry managed to export fifty-eight of its products in 1875 and eighty-four in 1876.[42] The Chilean government, anxious to protect the local industry, had placed the following duties on imports of vehicles by 1883: two-wheeled carriages, $225; four wheels and one seat, $450; four wheels and two seats, $750.[43]

The tanneries likewise continued to expand during the period, and the shoemaking industry grew—with government aid in the form of a tariff of $27 a dozen—until shoes (and harness) were being exported.[44] The brewing industry was quite well developed by the middle 1870's, water power being used in the breweries as in many other Chilean industries. One establishment in the town of Chillán turned out 100,000 gallons of beer in 1874. Most of the capital invested in the breweries was German. Hemp manufacturing was also making progress; figures for 1875 and 1876 disclose exports of tackle, rigging, and cordage, the United States being among the countries receiving cordage, rope, and twine from Chile. Hemp products were being turned out in the 1880's by at least two large ropewalks, which, as one of the United States consuls reported, were using machinery in the manufacturing process.[45]

[40] *United States Consular Reports*, No. 49 (January, 1885), p. 39.

[41] *Anuario estadístico de la República de Chile, 1874*, p. 167.

[42] *Estadística comercial de la República de Chile, 1876* (Valparaíso, 1877), Part I, pp. 317-318.

[43] *United States Consular Reports*, No. 35 (November, 1883), p. 156.

[44] *Ibid.*, p. 154; *Estadística comercial de la República de Chile, 1876*, Part I, pp. 317-318.

[45] *United States Consular Reports*, No. 49 (January, 1885), pp. 39-40; *Anuario estadístico de la República de Chile, 1874*, p. 167; *Estadística comercial de la República de Chile, 1876*, pp. 317-318; United States Treasury Department, *Commerce and Navigation of the United States, 1878* (Washington, 1879), pp. 28-73.

There were also indications by 1884 of the growth of a few other Chilean industries. Bottles of "good quality" and "poorly-made" glassware were being turned out at Lota. Local enterprise was supplying not only wool, but sulphuric acid, tartaric acid, sulphate of copper, and soda ash for the two woolen mills of the country, one of them located at Tomé. Sugar refining was beginning at Viña del Mar, and the manufacture of wrapping paper was reported at one or two unidentified places.[46]

But Chile was still backward in heavy industry. The government was using foreign-built rolling stock on the state railways. English materials were used on the railroad from Valparaíso to Santiago, while American equipment was being tried out on the line running south from the capital. The director of the state railways had given a North American a contract for the introduction of "palace, saloon, and sleeping cars," and rolling stock from the United States was said to be the only kind in use on Chile's tramways. It was reported in 1883 that there were only twenty foundries and machine shops in the whole country—and it was said even of these that nearly all were "owned and managed by Englishmen," who had imported the plants and were importing all of the raw materials except coal, but were turning out first-class products.[47] Some idea of Chilean dependence on foreign nations for iron and steel products may be obtained from a glance at the following partial list[48] of imports from the United States in 1884 (England, Germany, and France were probably exporting still larger quantities of the same type of materials to Chile):

Partial List of U. S. Exports to Chile in 1884

Article	*Value*
Plows	$18,361
Pumps	7,500
Steam pumps	10,169
Cooking ranges	5,462
Carpenters' tools	21,695
Agricultural tools	4,347
Blacksmiths' tools	6,046
Railway materials and machinery	1,116,811
Steam engines	39,436
Machinery, general	63,655
Saw machines	13,962

[46] *United States Consular Reports*, No. 49 (January, 1885), pp. 39-40.

[47] *Ibid.*, pp. 33-36.

[48] United States Bureau of Foreign Commerce, *Commercial Relations of the United States with Foriegn Countries, 1884-1885* (Washington, 1886), p. 770.

Threshing machines	25,615
Cut nails	41,890
Carriages	8,680

Summarizing manufacturing progress in Chile between 1850 and 1884, one may observe the following developments: First, all of the industries in process of establishment in 1850—brewing, carriage and cart making, flour milling, soap and candle making, copper smelting—were still in existence and more firmly established. Second, a few new industries had their beginning: glass making, sugar refining, the manufacture of rope, cordage, paper, and woolen textiles; foundries and machine shops that were to form the basis of future heavy industries; and the important nitrate industry. Third, besides an increased utilization of water for motive power, steam power came into use for the first time in Chilean manufacturing. Fourth, the government of Chile was still following its policy of offering tariff protection to home industry and was at the same time trying to foster exports.