

**THE NATIONAL SURVEY OF HISTORIC SITES
AND BUILDINGS**

Theme XVII-b

COMMERCE AND INDUSTRY

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VOLUME I

THE HISTORICAL NARRATIVE

United States Department of the Interior
Stewart L. Udall, Secretary

National Park Service
George B. Hartzog, Jr., Director

The National Survey of Historic Sites and Buildings

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PREFACE

The purpose of the National Survey of Historic Sites and Buildings, as outlined in the Historic Sites Act of 1935, is to "make a survey of historic and archeologic sites, buildings, and objects for the purpose of determining which possess exceptional value as commemorating or illustrating the history of the United States." In carrying out this basic directive, each site and building considered in the Survey is evaluated in terms of the Criteria for Classification, which are listed in the appendix to this report.

Each theme study in the course of the Survey consists of two parts: a brief analysis of the theme itself, and a discussion of the sites and buildings which have been considered in connection with the study.

This study is a joint product. The narrative section (Volume I) was written by Survey Historian Charles W. Snell, of the San Francisco Planning and Service Center, who also coordinated the overall study. Mr. Snell wrote the site descriptions for the Western Region, the Southwest Region, and for 29 sites in the Midwest Region (Volume II); Historian Frank B. Sarles, Jr., of the Washington Planning and Service Center, prepared the site data for eight additional Midwest Region sites in Volume II.

Site data in Volume III was prepared as follows: For the Northeast Region by Survey Historian S. Sydney Bradford; Washington Planning and Service Center; for the Southeast Region by Survey Historian Horace J. Sheely, Jr., Washington Planning and Service Center; and for the District of Columbia by Historian Steven H. Lewis, National Capital Region.

The study as here presented is regarded as being in draft form, and will first be submitted to the Consulting Committee of the National Survey, which reviews and makes recommendations accordingly to the Director of the National Park Service. After recommended revisions have been made, the study will be presented to the Advisory Board on National Parks, Historic Sites, Buildings, and Monuments for final evaluations and recommendations to the Secretary of the Interior.

The over-all Survey, as well as the theme study which follows, is under the general direction of John O. Littleton, Chief, National Survey of Historic Sites and Buildings, who works under the general supervision of Robert M. Utley, Chief, Division of History Studies.

George B. Hartzog, Jr.
Director

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The author also wishes to acknowledge his heavy indebtedness to the studies of five economic historians whose studies have been of the greatest value in preparing the Part I analysis of this theme, namely, Harold U. Faulkner, Edward C. Kirkland, Curtis P. Nettels, Douglass C. North, and George R. Taylor. The books of these historians are listed in the Selective Bibliography on page 109.

The many statistics utilized in the Part I analysis are drawn chiefly from two sources:

1. Historical Statistics of the United States, 1789-1945 (Bureau of Census, Department of Commerce, Washington, D. C., 1949), and (2) The Census Records of the United States. Considerable data has been presented in footnotes on the 11 Far Western (the Pacific and Mountain) States because relatively little information on this region has yet appeared in the general economic histories of the United States. The data on the Far West has been collected from the U. S. Census Record for the 1850-1919 period by the author.

CHAPTER I

THE COLONIAL ERA, 1607-1775: THE RISE OF MERCHANT CAPITALISM

COLONIAL COMMERCE

The colonial settler was determined not only to retain his European standard of living in the New World but to improve his economic condition as much as possible. In spite of their utmost efforts, however, the colonists were unable to produce all the articles they deemed desirable for the good life. Necessity dictated that they buy from the more complex industrial communities of Europe a wide range of capital goods, including mill machinery, ship iron, canvas, cordage, Indian trading goods, hardware, bricks, nails, paint, bellows, and instruments. Seventeenth century colonial farmers and artisans also usually worked with tools of European manufacture and defended themselves with imported firearms, cannon, and powder. Many kitchen utensils and sewing equipment were also obtained more cheaply from Europe, while wealthier colonists imported luxury goods such as textiles, wine, brandy, books, paper, spices, sugar, and some furniture. This import trade with Europe was the fundamental fact around which revolved the economic development of the English colonies. From it sprang in large measure their value to England. The central feature of colonial trade was the exchange of American products for European wares; the central economic problem facing the colonies was that of finding the means of paying for their imported goods.

The Trade of the Southern Colonies

The foreign commerce of Virginia, Maryland, the Carolinas, and Georgia in the colonial era consisted of a direct exchange of tobacco, indigo, rice, and furs for European goods. By 1770 the export of staples from the southern colonies amounted to about £ 1,371,244 a year and represented more than half of the 13 colonies' exports. In return the five southern colonies took more than half of all the colonial imports. Tobacco, of which Maryland and Virginia were the chief producers in 1770, was valued at approximately £ 900,000; and nearly all went to Great Britain. Rice, the next most important southern export staple, was valued at £ 340,692. Half of this crop was shipped to southern Europe and the West Indies, and the remainder to England. Practically all the indigo, valued at £ 131,552, went to Great Britain.¹

¹North and South Carolina were the chief producers of rice and indigo in 1770.

After a hundred or more years under this trading system, the southern plantation owners began to find themselves in serious economic difficulty. While production of staple crops increased, the price received fell, and costs of production continued to rise. In this commerce it was the merchant capitalists of England who bought and sold southern colonial produce, purchased English and foreign wares for resale to the planters, owned ships and provided shipping, carried on the servant and slave trade, supplied the capital for the insurance business, and from their surplus earnings lent money to the planters at interest. All these services (or invisible costs) were provided at prices established by the London merchants and Southern planters were forced to bear the cost of these expenses.

The balance of payments in this staple trade therefore naturally favored England rather than the Southern planters. In the 17th century, when this staple agriculture had first taken root in the South, the planters had invested all available capital in acquiring additional lands, servants, and slaves as the most profitable means of employing capital and labor. But when prices for staples began to decline after 1700, the planters found themselves burdened with heavy fixed investments in land, labor, and equipment that could not be readily transferred to developing their own shipping, marketing, or manufacturing facilities. By 1775, the southern planters were seriously in debt, which arose from the heavy importation of European goods.

The Trade of New England and the Middle Colonies

The northern colonies lacked valuable staples that could be exchanged directly for English manufactured goods. While Great Britain was willing to accept minor staples such as ship timbers, furs, whale oil and whalebone, and iron, it prohibited by law the importation of the chief northern products, namely, fish, flour, wheat, and meat. The central problem which faced the Middle and New England colonies in the colonial era was that of converting their chief staples into some means of paying for the much-desired European wares.

In solving this problem the northern colonies attained a much stronger commercial position than did their southern neighbors. For based on shipbuilding, ship owning, and the method of marketing goods--the northerners transformed themselves into traders and merchants. The freights, profits, and commissions earned by English merchants as exporters to the northern colonies were nearly balanced by similar earnings of northern merchants in carrying their products to England. The northerners also acted as traders by importing more European goods than they consumed and selling this surplus to surrounding communities. In addition, they engaged in a wide variety of trade with other parts of the world which enabled them to get products that they could sell in England on terms highly favorable to themselves.

Boston, Philadelphia, and New York arose as the commercial centers for their respective regions. Here foreign goods were imported and transshipped to surrounding settlements; local staples were collected at these ports to be made up into cargoes for export to the different foreign markets. In the 17th century Boston ranked first in importance, New York second, and Philadelphia third. By 1770, Philadelphia had risen to first place, New York was still second, and Boston had dropped to third place.

To Portugal, Spain, and France the northern colonies sent fish and lumber, which were sold for coin, bills of exchange, or southern Europe produce. These proceeds were then carried to England and used there to pay for part of northern imports of English goods.

To the Canary and Madeira Islands the northerners sent fish, lumber, and provisions, which were exchanged for wine. Part of the wine was carried back to the colonies and part was shipped to England, where its sale enabled the northern traders to obtain additional purchasing power for English goods.

Far more important than this commerce was the trade carried on between the northern cities and the West Indies.¹ The northern exports to these islands consisted of fish, horses, lumber, wheat, flour, biscuit, beef, pork, bacon, peas, and Indian corn. In return the northern colonies received Spanish money (pieces of eight), sugar, molasses, rum, indigo, dyewoods, fustic, cotton, wool, salt, and other minor commodities. The West Indies also paid for imports with bills of exchange drawn on English merchants. Most of these commodities were shipped to England and there exchanged for English goods. Rum and molasses were carried to the northern colonies where they were used in the fur trade, the slave trade, the New England fishery, and the Newfoundland trade--in each instance enabling the northerners to obtain additional remittances to England. The northern merchants further increased their buying power by earning freight charges and profits on the cargoes they carried directly to England from the West Indies, the Canary Islands, Madeira, and southern Europe.

In all, this external commerce the balance of payments favored the northern towns. As a result of these extensive trading activities the merchantsoof Philadelphia, New York and Boston accumulated considerable amounts of fluid and surplus capital that they actively employed in the further expansion of commerce and the development of industry. These merchant-capitalists were particularly important in this role as there were no banks or bankers in the 13 colonies prior to 1775.

¹In 1770 the total value of colonial exports to the West Indies amounted to \$844,000, while that to Great Britain was valued at \$1,636,000.

The chief northern export in 1770 was wheat, bread and flour. Valued at £ 636,000 and second only to tobacco, these items were principally from the farms of New Jersey, Pennsylvania, and New York. The next ranking export was dried fish and fish pickled in barrels from New England. Valued at about £ 400,000 in 1770, this export ranked third in importance on the export list.¹

Colonial Industry

In the 17th and 18th centuries North America was a vast wilderness of abundant but undeveloped natural resources. The economic development of this potentially rich empire was retarded by the lack of capital to exploit the resources, the shortage of skilled labor, the absence of good transportation facilities, and the lack of a populous colonial market.

The very process of founding colonies created a scarcity of money by virtue of the necessity which impelled the first emigrants to take with them supplies and tools that were essential for life in their new home. Additional capital was also used up to support them until such time as their farms and products became productive.

There were never enough craftsmen and skilled workmen in the colonies, partly because the best of these could do better in Europe. The result was a continual shortage of trained workmen.

Along the coast and on rivers, ships and boats could be used to transport goods profitably for great distances. But the crude trails and roads inland effectively limited the amount of internal commerce that could be carried by land transport. Only a few valuable products such as iron goods, salt, furs, and liquor, could bear the high costs of land carriage. In 1775 the entire road and land transport system of the 13 colonies was still highly inadequate.

The lack of a populous market was probably the most serious handicap to the development of industry. The rapidity of settlement had widely dispersed the population in single farms and small communities. There were hundreds of scattered small consumers, rather than large markets for manufactured goods. The market of the colonies was thus too small to nourish large-scale colonial enterprises. From about 300,000 settlers in 1700, the population increased to 2,507,000 by 1775. But of this latter figure, only 84,000 or 3.8 percent of the total population lived in the five colonial cities that were able to boast of a population of 8,000 or more inhabitants. In brief, the colonies were still a rural area at the end of the 18th century.

¹Of the value of the exports of New England, 1763-66, the fishery contributed 53 percent, lumbering 14 percent, and agriculture 7 percent; for New York, farm products accounted for 80 percent and lumber 10 percent; and for Pennsylvania, farm products provided 80 percent and lumber 5 percent.

Initial Efforts at Economic Exploitation, 1607-1629

The first two successful English colonies, Jamestown in 1607 and Plymouth in 1620, were founded by commercial or trading companies in an effort to exploit the natural resources of the New World. Granted large powers by the English king, these associations combined the capital resources of many individuals for the large task of outfitting the necessary ships, building forts, and of supporting the settlers until the ventures could take hold. To attract the resources necessary to equip and support these proposed colonies, the commercial companies were given monopolies of the trade, natural resources, and land within their respective territories. The capital for these companies was provided by London merchants who dreamed of quick profits, but who mainly remained in England. The actual settlers were chiefly the servants and employees of the companies.

This plan for corporate trade and production soon revealed its weaknesses once the two colonies had been established. Under the system the fruits of the settler's labor belonged to the company and any surplus produced by his toil went to provide profit for the London shareholders. These pacts also provided that the company would support the colonists with supplies sent from England in the event that the settlers could not produce enough for their adequate maintenance. It did not take the colonists long to realize that they would receive little or no benefit from "working" and therefore proceed to "take life easy." The cost of supplies sent to support these relaxed colonists soon induced the shareholders to look for a new system. The changes adopted called for the transfer of company ownership of land and trade to the individual settlers. On the theory that the settlers would work harder if they received the full fruits of their labor, the ownership of the land was transferred to the colonists in Virginia between 1614 and 1618 and at Plymouth between 1623 and 1627.

As the owners of farms also owned the produce raised, the colonists soon demanded and received the right to sell to the highest bidder. No longer controlling the land and produce, the commercial companies could no longer insist upon a monopoly of trade. Private traders soon took over the business of supplying the farmers with the wares they needed and of marketing their crops. All English colonies founded after 1629, except for Georgia, immediately introduced private ownership and with it competitive trade in farm produce, carried on by individual merchants. Private enterprise was henceforth to be the motivating power of the American economic system.

Industrial Organization of Colonial Society

Prior to 1775 between 90 and 95 percent of the settlers were engaged in agriculture, although the colonial farmer was also usually a part-time builder, artisan, hunter, and in places a lumberman and fisherman. The colonist had come to America to improve his way of life and as a raising standard of living required an increasing use of manufactured products, the procuring of such goods became a paramount interest. These items the settler purchased partly in Europe, but his limited buying power forced him to produce many of the desired commodities with his own labor. Three types of industrial production developed during the colonial era to meet these wants: household manufacturing--the making of articles by members of the family; production of goods by skilled artisans; and third, commercialized industry, which produced crude or semi-manufactured goods to be sold at a profit in a general market.

Household Manufacturing

The most important form of industrial production during the 17th and 18th centuries was household manufacturing. The farmer and his busy wife generally supplied the family with all of the articles of food now prepared in bakeries, creameries, cheese factories, meat packing houses, canning factories, sugar refineries, and breweries.

The farmer was also a skilled woodworker and builder, felling the timbers for his house and barn, shaping up the trees into clapboards, flooring, planks, rafters, and shingles. Assisted by his neighbors in raising the heavy framework into place, he did much of the actual construction work on his buildings. From wood the farmer also made most of his farm equipment, tools, carts, much of the furniture in his house, and his own barrels and chests.

In the northern colonies the rural household usually manufactured its own supply of linen and woolen cloth. The entire family engaged in this complicated and tedious process. Northern farmers also did most of their own leather work, manufacturing leggings and breeches from deerskin. The settler cut his own firewood for heating and cooking and made candles for lighting his home, and soap for laundering. The women of the household did the family laundry about once a month by hand and also the dry cleaning.

Generally, in the 17th century, and also in the western frontier regions in the 18th century, the family supplied itself with such basic items as food products, candles, fuel, furniture, leather goods, and utensils. As communities progressed slightly, the services

of traveling artisans were utilized, who worked on the material supplied by the farmers. The next stage occurred when the household produced a surplus of manufactures which were exchanged in the neighborhood for other local products. The mature stage was reached when an area became well settled and provided with transportation facilities, then farmers produced for general sale, more or less as employees of merchant manufacturers. In the 18th century, on the Atlantic seaboard, merchants supplied farmers with flax, wool, and cotton which their families spun and wove into cloth. This mature stage represented a form of capitalist production, as the merchants owned the raw materials and paid the farmer-workers a wage. By 1775 the northern colonies had achieved this advanced stage of household manufacturing and in so doing, had reached a point in industrial development that had occurred in England by the end of the 17th century.

Skilled Artisans

Skilled artisans represented an intermediate form of industrial organization, situated between the household and commercial manufactures. In the newly and sparsely settled areas these specially trained craftsmen, such as shoemakers, chandlers, carpenters, weavers, blacksmiths, and masons, traveled from farm to farm where they labored in the household on materials furnished by the farmers. The artisans received their pay in the form of board, lodging, and produce or money.

As communities became more closely settled the traveling artisan was able to establish a permanent workshop, producing to order for neighbors who furnished the raw materials and paid him in produce or money. The craftsman usually owned a plot of ground large enough to supply him with vegetables, fruits, meat and dairy products. The crafts represented by the settled artisan in the New England and middle colonies during the 17th century included brick-making, leather tanning, weaving, fulling and dyeing, shoemaking, candle making, blacksmithing, and the manufacture of paper, hats and pottery.

In the next stage of development the settled craftsman purchased raw materials and manufactured goods for general sale, which he displayed at his shop or sold to peddlers or town merchants. If his business expanded the artisan would take apprentices and hired journeymen into his home and shop.

In the 18th century economic evolution brought the small settled artisan, like the household manufactures, within the circle of capitalist production. Ordinarily the small workshop of the craftsman did not expand into large industrial plants, chiefly because the owner did not possess sufficient capital to sustain production for distant markets. The town merchant-traders, as the chief possessors of capital in the colonies, were to play the principal part in the organization of

large scale production. At first they contracted with the artisans for the wares they produced--a practice virtually equivalent to the employment of the craftsmen as wage earners. Inasmuch as the merchants were the owners of the raw materials and also had control over the marketing processes, they were able to reap the profit arising from the difference between production costs and the sale price. The most important of the settled artisan trades of the 18th century included blacksmiths, hatmakers, shoemakers, weavers, tailors, saddlers, and wheelwrights. The work of these craftsmen were not yet fully specialized: Thus, a shoemaker was also a tanner and currier, a weaver a cloth dresser and dyer, and a blacksmith a toolmaker.

The Colonial Commercial Industries

The colonial industries which developed before 1775 had two things in common. First, they took advantage of the resource which America afforded so abundantly, and secondly, the manufacturing processes employed were so simple as to require relatively small amounts of capital for initial development.

Commercialized industry differed from the household manufacturing in that it produced goods to be sold at a profit, not for the immediate use of the manufacturer. Unlike the production of skilled artisans, commercial industry required fairly large amounts of capital in the form of tools, ships and mills owned by a capitalist, which were operated for his profit by workers to whom he paid wages. The chief commercial industries took the raw material of the field, forest, and sea and converted them into a crude or semi-manufactured products that could be exchanged in some oversea market for the commodities which the colonies could not produce themselves.

The fur trade, the fishery, lumbering, shipbuilding, flour milling, and the manufacture of iron were the chief commercial industries of the colonial period.¹

¹After 1715 the northern colonists also engaged in the slave trade, which afforded a new outlet for colonial products and additional employment for colonial ships. Newport, Boston, New York, and other towns sent out ships laden with rum to purchase slaves in Africa and to dispose their human cargoes in the West Indies. Slaves were sold chiefly for commodities marketable in England, and partly for molasses to be carried to the northern colonies as raw material for more rum. In 1750 there were 63 rum distilleries in Massachusetts and about 30 in Rhode Island. By 1771 the colonial slave traders employed between 60 and 70 vessels, each capable of transporting 65 Negroes--an investment equal to about a fourth of Great Britain's stake in the slave traffic. Profits in this trade were very high. There were about 500,000 Negro slaves in the 13 colonies by 1775.

The Fur Trade

The demand of European nobles and rich bourgeoisie for furs was insatiable and high prices were received for luxurious furs. The fur traffic, by virtue of the large profits it afforded, appeared to colonial merchants and traders as a certain road to wealth. Peltries could be obtained at low cost in America from the Indians in exchange for cheap manufactured articles such as axes, knives, beads, trinkets, liquor, guns, ammunition, and bright colored cloth. Transportation charges were not excessive as all the goods could be carried overland by pack horses or along the rivers in boats or canoes.

New England, New York, Pennsylvania, Virginia and South Carolina all yielded large amounts of furs in the 17th century. In the northern colonies the Dutch and English fur traders conducted their business through posts to which the Indians brought their furs. The southern traders, however, traveled long distances to bargain with the Indians in their villages. The French traders also sought out the Indians in their forest haunts, but this advantage was offset by the high price of French trading goods. Low costs in British industry often permitted English traders at Albany to charge less than half of the French prices at Montreal.

The profits of the fur trade led colonial promoters to attempt to monopolize it. But these efforts generally failed: First, because officials and merchants in the colonies "traded on their own" and second, because the would-be monopolists found it impossible to exclude "interlopers" from the American wilderness. In consequence, the dominance of private merchants became the distinguishing feature of the fur trade. Such merchants imported trading goods from Europe and sold them on credit to Indian traders or hired the latter to make inland trading expeditions. The business rapidly centered in a few places--Albany, Charleston, and Philadelphia--where the furs were brought to the merchants, who then exported them to Europe.

The demand created by the white trader led the Indians to destroy fur-bearing animals at a very rapid pace and this compelled trappers and traders to go farther and farther inland. This ever westward movement of the fur trade further entrenched the wealthy merchants because of the larger capital outlays needed to finance the more distant operations. The extension of the fur trade proceeded far more rapidly than the growth of settlement and by 1775 traders were already operating in the vicinity of the Mississippi River.

In the 1760's the annual value of the furs exported from the English colonies amounted to about £ 270,000 and provided a market for British manufactured goods in the amount of £ 135,000 each year.

The Fishery and Whaling

The reports of mariners who explored New England coasts between 1600 and 1615 had called attention to the fishery as the most likely source of wealth in this region. The capital for the initial development of the New England fishery was provided by British merchants, some of whom operated by sending vessels from England and others by financing fishing settlements on the American coast. Settlers were furnished with fishing supplies at a 40 percent price increase and the merchants also reaped a 30 percent profit on the sale of the fish they purchased. The number of vessels engaged in the New England fishery rose from 8 in 1616 to 35 in 1622 and to 50 in 1624. After the arrival of the Massachusetts Puritans in 1630, however, the financial control of the fishery soon passed into the hands of the New England settlers. As early as 1633 the Puritans were building their own fishing vessels--and more cheaply than they could be constructed in England. They fished at first simply to supply themselves with food, but when a surplus was produced, the Puritans soon decided that the profits earned by English capitalists might as well enrich themselves. By 1660 Massachusetts had established her supremacy in New England waters. Gloucester, Marblehead, and Salem emerged as the principal bases of fishing operations, which were conducted by small capitalists who owned the boats, fishing equipment, and stages. They obtained the utmost labor from their workers by giving them between a sixth and a tenth of the season's catch. The fish were sold to Boston or Salem merchants and exported overseas to distant markets. The better grades went to Spain, Portugal, France, the Madeira and Canary Islands, and to Ireland, while the inferior fish were sent to the West Indies for the use of Negro slaves.

By 1700, with an annual export of some 10,000,000 pounds of fish, New England surpassed Great Britain both in the quality and quantity of the fishery. In the decade 1765-1775, 665 vessels and 4,405 men were engaged in the New England codfishery and the total value of their catch was estimated at \pm 1,300,000. By 1775 the annual value of the industry was worth about \pm 225,000 a year.

Whaling also became almost as important an industry as the fishery in the colonial era. Shore whaling became an organized industry in New England near the end of the 17th century. Watchers were stationed on the beach and when a whale was sighted crews were sent out in small boats to harpoon the animal and drag him inshore, where others reduced the whale to marketable products. In the 18th century, as the whales were driven off the coast, New England seamen followed their quarry in whaling vessels out onto the Atlantic. By 1775 the ports which were to become famous in the 19th century had already entered upon their historic careers. Among these were Sag Harbor, New Bedford, Marblehead, Provincetown, but Nantucket was the most important of the whaling ports. By 1775, 360 vessels manned by 4,000 seamen brought back an annual catch of 45,000 barrels of sperm oil and 75,000 pounds of bone, valued only slightly less than that of the codfishery.

The Lumber Industry

As in the fur trade and the fishery, so in lumbering, the abundance of raw material, the utilization of limited but concentrated capital, and extensive foreign markets provided conditions suited to the development of a capitalistic enterprise. The timber products prepared for commercial sale included ship lumber for which pine, cedar, spruce and oak were used as masts, spars, bowsprits, and planks. Shingles, clapboards, and building frames, preferably of cedar, were in great demand, while red and white oak were utilized in the manufacture of staves for pipes, barrels, and casks. The lumber-timber industry first took root on the New England coast between Boston and the Kennebec River, and this region was the chief lumber-producing center during the 17th century. Lumbering also developed to a considerable degree in the Hudson valley of New York and after 1680 in Pennsylvania and North Carolina. Great Britain and the shipbuilding towns of New England bought the northern masts and ship timber, while the coastal Atlantic settlements and the West Indies purchased most of the building lumber and cooperage stock.

The progress of lumbering in New Hampshire and Maine was accompanied by a fair degree of specialization. Here, the farmer-lumbermen lived in forest villages that were primarily logging camps. Trees were felled with axes and hauled overland by oxen to the nearby sawmill or harbor. The numerous small crude sawmills in the New England region stood at the falls of rivers, which were but a few miles from the sea. The waterwheel of the mill operated a saw in a crosswise motion, the rotary saw not having yet been invented. The first mill erected in Maine was probably built near York in 1623 and the first in New Hampshire in 1635.

Simple as these mills were, they offered a vast improvement over the strenuous work of sawing logs by hand, since the labor of one mill operation was about 20 times more effective than that of a hand swayer. This fact gave the mill-owner a strategic position in the industry. The first mills carried only one saw and could be operated by the owner assisted by a son or a hired hand. These early mills cost between \$500 and \$1,000 to build and could produce a thousand feet of lumber a day and net its owner a daily return of between five and 10 dollars. These profits were usually invested in the addition of more saws to the original mills, rather than used to erect more costly new plants. By 1700 the New Hampshire mills were generally operating four saws or more and the control of the lumber industry had already tended to center in the hands of a few mill owners. The enlargement of the sawmills in turn increased the number of wage-earners employed by the owners. The sawmill was constructed in the English colonies before it was in Great Britain and colonial equipment was to remain superior to that of the European mills. By 1720 these sawmills had done their work so well that a stretch of coast six miles wide between Boston and the

Kennebec had been denuded of trees. Already the lumber industry had begun its eastward migration along the coast of Maine and there was a keen rivalry among the northern lumbermen to obtain title to the remaining timberlands. The annual export of lumber and timber products from New England, New York, and Pennsylvania between 1763-1766 averaged \$135,000 a year.¹

The Shipbuilding Industry

The opening of world trade between Europe, India, Africa, the Americas, and the West Indies created an almost insatiable demand for new vessels and due to the scarcity of ship timber in Great Britain, the expense of constructing ships there was extremely high. The resources of the American colonies, on the other hand, encouraged shipbuilding. Magnificent forests abutted on the ocean's edge. Here were readily available the white oak used for planking of the lower parts of the vessels, and the white pine that formed the decks and superstructures. The growth of colonial commerce and fisheries further created a demand for ships.

Soon after the establishment of the Massachusetts Bay Colony in 1630, skilled English shipwrights emigrated to New England, and consequently the standards of colonial shipbuilding were high. The first large ship built in the English colonies, the 30-ton sloop, Blessing of the Bay, was launched in 1631 near Boston. By 1670 Massachusetts had constructed 730 vessels and between 1696 and 1713 the colony produced at least 1,118 vessels totaling 69,500 tons. During the 17th century Boston and Charlestown built more than half of the vessels constructed in New England.

Much of the capital employed in this industry was provided by English merchants who placed orders for vessels in advance of construction and forwarded the necessary ship iron, canvas, and cordage. A master shipwright constructed the vessels under contract with the merchant-capitalists. The shipwrights, who owned their own tools and yards, purchased the necessary timber, and employed the apprentices and skilled artisans to whom they paid wages. As the industry expanded the best shipwrights received more orders than they could fill by themselves; consequently they devoted themselves to supervising the work of their craftsmen and to the business side of the industry.

¹Annual value of New England lumber exports, 1763-66, was \$75,000; from New York, \$25,000; and from Pennsylvania, \$35,000.

The golden age of colonial shipbuilding was the first half of the 18th century. So low were the prices per ton that New England-built vessels were sold all over the world, and it is estimated that by 1775 30 percent of all the vessels engaged in British commerce had been constructed in American shipyards, while 75 percent of the commerce of the American colonies was then carried in colonial ships. Although Philadelphia and New York had their shipyards, it was New England which truly dominated this industry. Boston, Gloucester, Salem, Ipswich, Newburyport, Haverhill, Durbury, and Hingham and Scituate all built ships in large numbers. Between 1763 and 1766 New England, Pennsylvania, and New York built about 115 vessels a year that were valued at £ 80,500 annually.¹ In 1769 the 13 colonies produced a total of 389 ships aggregating nearly 24,000 tons. Of these, New England built 61 percent, New York 15 percent, the Delaware River 7 percent, Chesapeake Bay 12 percent, and the lower South 4 percent.

The Flour Milling Industry

Gristmills made their appearance in the colonies in the 17th century as soon as a community was settled. Operating chiefly by water-power and located on small streams to avoid the cost of damming the larger rivers, the ordinary gristmill ground the farmer's grain into meal preparatory to the bolting process of sifting the refuse from the meal so as to produce a high grade flour. Most early mills were small local affairs, able to produce only 10 or 20 barrels of flour or meal a week, and were operated by the owner with the aid of his family or a few helpers. Since this milling was of a seasonal nature, in slack times the mill was also used to grind malt for beer or rags for paper manufacture, or its wheel was attached to saws and converted into a temporary sawmill.

Gristmills were regarded as vested with a public interest and their charges for milling were accordingly regulated by law. As the miller received payment from the farmer in grain he had to find a buyer for it; the miller thus also became a trader. He also often acted as an agent or buyer in the marketing of the surplus grain which the farmers in his community had to sell. His trading activities usually led him to import foreign merchandise as stock for a general store and then to advance goods to farmers on credit in anticipation of their future grain deliveries. The milling business, with its related trading activities, thus afforded the mill owner an opportunity to acquire considerable wealth and local influence.

¹Annual export of ships, 1763-66, from New England, about 70 valued at £ 49,000; from New York, about 20 ships, valued at £ 14,000; and from Pennsylvania, about 25, valued at £ 17,500.

In the 18th century the flour mills of the middle colonies gradually increased in size and capital equipment until they became merchant mills. By 1765 such structures were substantial two or three-story stone buildings and had a capacity of from 100 to 200 bushels a day. Beside the mill proper, these plants also usually included a storehouse or grain elevator, screens for cleaning wheat, a bolting house, a bakery for biscuits, and a cooper's shop. In 1763-66, the merchant flour mills of Pennsylvania exported annually about 350,000 barrels of flour valued at £ 350,000 and those of New York 250,000 barrels worth about £ 250,000.

The Iron Manufacturing Industry

The colonies' numerous deposits of bog iron, common in the coastal region, and superabundance of wood, useful in the form of charcoal to smelt iron, appeared to offer excellent opportunities to develop an iron industry. The first experiments were made in Virginia in 1608. In 1620 an iron foundry was established in that colony at Falling River. This work was destroyed by Indians in 1622 and 100 years were to pass before Virginia revived the industry.

The first successful ironworks in the colonies was erected at Saugus, Massachusetts, in 1643. Sponsors of this and latter ventures secured capital by organizing partnerships or companies of "undertakers," to which British and colonial merchants subscribed the capital. Skilled managers were engaged and helpers hired to operate these works. Two types of crude iron were prepared: pig or cast iron, and wrought iron. Pig iron was hard and brittle and used in making pots, pans, and kettles, while tough and malleable wrought iron was manufactured into edged tools. These first iron works were known as bloomeries and were comprised of an open fire and an anvil. The ore and charcoal fuel were smelted together in the open fire, which was driven by hand bellows, and this process yielded "blooms" or pig iron. The pig iron could then be converted into wrought iron by hammering the blooms by hand on an anvil to remove the carbon impurities. As late as 1673 there were only five such plants in existence in New England and their output could supply only a part of the colonists' own needs. Before the end of the 17th century, however, these plants were widely dispersed along the ponds and swamps of the coastal plain of Massachusetts, Long Island, and New Jersey, where the bog iron ore was easily available.

In the 18th century the iron industry moved inland and began utilizing the rock ores which were found in a wide belt extending from western Massachusetts and Connecticut southwestward through the middle colonies to Maryland and Virginia.¹ With this change in ore sources the center of the iron industry then shifted from Massachusetts to Pennsylvania.

¹Some copper was also mined in Connecticut, New York, and New Jersey in the 18th century.

The industry was reorganized on a larger scale that required greater amounts of capital. The furnace and water power superseded the earlier bloomery and hand methods. The new smelting furnaces were conical or square structures, usually 20 feet high, built of brick or stone, and could produce from 12 to 20 tons a week. In the furnace were piled iron ore, charcoal fuel, and limestone, which served as a flux to absorb the impurities. A water-driven bellows forced a draft through this flaming mass and the product was pig iron. Wrought iron was produced by reheating the pig iron at the forge and then hammering it under hammers operated by water power. After this process had been repeated several times, the wrought iron was then shaped into bars or plates on a plating forge. Slitting mills were also used to flatten the bars with rollers and then slice them into rods. Plating and slitting mills, however, were not numerous in the colonies prior to 1775.

The first large exports of colonial bar iron entered Great Britain in 1735. In 1763-66 the total value of annual iron exports from Pennsylvania and New York averaged £ 55,000 a year.¹ In 1771, 7,525 tons of iron were exported and in 1775 the colonies produced a total of 30,000 tons of crude iron--which represented one-seventh of the world's total output. At that date the colonies possessed more forges and furnaces with a greater output of pig and wrought iron than Great Britain.

The two largest industrial undertakings in the colonies in 1775 were the Principio iron works in Maryland and the Peter Hasenclever iron works in New Jersey. Each of these plants represented an investment of about \$250,000.

Revolution, North and South

In spite of the best efforts of the northern colonists in commerce and industry, northern imports of manufactured goods from Great Britain continued to greatly exceed colonial exports,² and like the southern planter, the northern merchant was also seriously in debt. Beginning in 1763, the British Parliament began to pass, and the King to enforce, a series of mercantilistic acts that favored British as against colonial commerce and industry. These laws placed serious restraints upon northern commerce with West Indies, excluded colonial merchants from the northern fur trade and western land speculation, increased prohibitions against colonial manufacturing, and placed a burden of

¹From Pennsylvania, L 35,000; and from New York, £ 20,000.

²In 1770, when colonial industry was at its height, the year's unfavorable trade balance against the northern colonies amounted to £ 1,230,000.

taxation on colonial commerce and industry. The tendency of these imperial measures was to reduce colonial profits and thus increase the difficulty of paying the large colonial debts due to Great Britain. These acts clearly imperiled the existing investments of colonial merchants and closed new outlets for the investment of their surplus capital. In view of this situation, it is not surprising to find many southern planters and northern merchants acting as important leaders in the revolutionary movement that arose in the colonies in 1773-1775.

CHAPTER II

THE EMERGENCE OF A NATIONAL ECONOMY AND THE RISE OF AN INDUSTRIAL SOCIETY,

1775-1860

GENERAL

This period was a time of phenomenal growth and rapid change in the United States. These years saw the establishment of a Federal government and the territorial expansion of the United States to its present continental limits. Its population increased more than tenfold, from 2,781,000 in 1780 to 31,443,321 in 1860. The urbanization of America increased from 5.1 percent of the population in 1790 to nearly 20 percent by 1860, as great cities based on commerce made their appearance. Revolutionary new technological devices instituted changes that led to replacement of animal, man, water, and wind power with steam power in both commerce and industry. New forms of transportation and communication, such as canals, steamboats, and railroads, and the telegraph, vastly speeded up the pace and volume of commerce and industry and also made possible the development of a huge national market. Regions of the nation and its people became increasingly specialized in the production of goods. The net result was that the simple, almost economically self-sufficient society of colonial times was largely replaced with highly complex market-oriented society by 1860.

COMMERCE

As in colonial times commerce remained the chief source of profit, and this continued to provide most of the capital needed for the further development of commerce, transportation, and manufacturing in the United States. But after 1815 there was a profound shift in the nature of that commerce. From colonial times to 1815, the foreign commerce of the United States was the principal trade of this country. After 1815, however, the relative importance of foreign commerce, viewed in the light of national growth, rapidly declined and was replaced by the immense rise and development of internal commerce. Thus while the total foreign commerce of the United States increased almost 16 times--from \$43,000,000 in 1790 to \$687,000,000 in 1860, the total internal commerce of the United States succeeded in reaching a grand total value estimated in the neighborhood of \$5,600,000,000 by 1851-52. During this period the value of American manufactures also increased from \$199,000,000 in 1810 to about \$1,858,000,000 in 1860.

Foreign Commerce

Following the War for Independence the American merchant marine and its export trade underwent a period of severe readjustment, for American vessels and merchants were excluded from the markets of Britain, Spain, Portugal, France, and Holland under the mercantilistic policies followed by those countries. The weak American Confederacy was unable to retaliate in kind and American merchants were thus forced to seek for markets outside of Europe. In 1784 the Empress of China, sailed from New York, made the first visit of an American vessel to Canton; in 1786 the Grand Truk, from Salem, landed a cargo at Mauritius in the Indian Ocean. The first American ship to reach port in India was the Chesapeake, from Baltimore, sometime between 1786 and 1789; and in 1788 Captains John Kendrick in the Columbia and Robert Gray in the Lady Washington, both out of Boston, were the first American ships to visit the Pacific Northwest coast and Russian waters off Alaska, where they traded for sea otter skins. This new trade with Asia was a source of large profits to a few merchants, but as yet contributed but slightly to American commerce as a whole.

After 1789, however, the new Federal government, aided by the outbreak of revolution and war in Europe, was able to reopen European markets to American merchants on favorable terms. During the Napoleonic Wars that raged in Europe from 1795 to 1815, the British, French, and Spanish merchant marines were largely destroyed by the warring powers. The United States, acting as the great neutral in this terrible contest, impartially sold goods to both sides. In the process the American merchant marine engrossed most of the carrying trade between Europe and the French and Spanish colonies in the Western Hemisphere, between Britain and North America, and most of the trade with China and India. This "golden age" of commerce lasted until 1808, when the Federal embargo and the War of 1812 put a temporary halt to American foreign trade.

During this period of unparalleled prosperity, American tonnage registered for the foreign trade jumped from 123,893 tons in 1789 to 1,089,000 tons by 1808 and the percentage of the value of all goods in transit to the United States, carried by American ships, increased from 40.5 percent in 1790 to 90 percent in 1795, and reached 92 percent in 1807. Similarly, the total combined export-import trade of the United States leaped from \$43,000,000 in 1790 to \$246,000,000 by 1807.

After the depression in foreign commerce caused by the War of 1812, American foreign trade again expanded. The total foreign trade of the United States reached an average of \$186,000,000 a year for the period 1816-20, and then more than trebled by 1860, when it averaged \$616,000,000 a year for the period 1856-60. American tonnage registered for the foreign trade also increased from 674,633 tons in

1814 to 2,379,390 tons in 1860. During this same period, however, the percentage of value of foreign trade goods carried in American vessels dropped from 92.5 percent in 1826 to only 66.5 percent by 1860. This latter trend indicated that the American merchant marine was beginning to lose its grip on the foreign carrying trade of the United States.

The principal trade routes of the period were across the North Atlantic, to the West Indies, and to South America, as in colonial times. In addition, as has been noted, new routes were opened with the Dutch East Indies, China, and the Pacific Coast of North America.

As in colonial times, agriculture continued to supply about 80% of the products exported to foreign countries. Goods manufactured in the United States, however, increased their total percentage in foreign trade from about 7 percent in 1810 to approximately 12 percent by 1860. The chief export staple in 1860, amounting to about 54% of the total, was unmanufactured cotton, which was produced by slave labor in the South; next in importance, 11 percent, was the wheat and flour provided by the North and West. The older colonial staples, also produced in the South, unmanufactured tobacco and rice, accounted for 6 and 1 percent of the total respectively. Altogether, the Southern staples provided 61% of the total goods exported in 1860.

The chief domestic manufactured goods exported in 1860, listed in order of value, were manufactured cotton goods, iron and steel, manufactured tobacco, lumber, chemicals, copper and brass products, leather goods, and distilled spirits. The relative trend and importance of the leading domestic exports, from 1790 to 1860, is shown as Chart No. 1, page 20.

The leading imports in 1860 for domestic use were manufactured cotton goods, 9%; woolen goods, 11%; silk goods, 10%; flax goods, 3%; iron and steel, 6%; tea, 2%; coffee, 6%; sugar, 9%; hides and skins, 3%; and alcoholic beverages, 3%. These totaled \$336,282,485 in 1860.

The chief customers of American merchants, both for export and import trade, were Great Britain, the West Indies, France, Cuba, South America, Canada, and Germany, in that order. The trend of this foreign commerce is shown as Charts Nos. 2 and 3, page 21.

As in colonial times, Northern merchants owned and provided the shipping, continued to market the commodities, and imported manufactured goods. In addition they now also provided much of the insurance and credit. Prior to 1812 no one port had dominated American foreign commerce, but the tremendous increase in foreign trade that occurred between 1815 and 1860 resulted in drastic shifts. New York City rapidly became the dominant port in this foreign trade. For the period 1821 to 1860, she had 60 percent of the total imports and 33% of the total exports. Her total foreign commerce in 1860 was worth about \$383,000,000. Boston, with a trade valued at \$58,000,000, was

Chart 1.

VALUE OF LEADING DOMESTIC EXPORTS
OF THE UNITED STATES, 1790-1860
(Values Expressed in Millions of Dollars)

	1791	1815	1816-1820*		1856-1860*	
			Value	% of Total	Value	% of Total
Cotton, Unmanufactured	\$ 0	\$ 17.5	\$ 121.5	39	\$ 744.6	54
Tobacco, Unmanufactured	4.4	12.8	47.5	15	86.5	6
Rice	1.8	2.8	13.1	4.0	11.3	1
Indigo	.5	0	0	0	0	0
Southern Staples, Total	6.6	33.1	182.1	58	842.4	61
Wheat and Flour	7.6	7.2	50.6	16	157.7	11
Other Farm Products	1.3		15.5	4	100.4	8
Total, Agricultural Products	15.5	40.3	248.2	78	1,100.5	80
Lumber & Wood	2.3	3.9	15.5	5	29.3	2
Fisheries	1.2	.9	6.8	2.	3.9	0.3
Domestic Manufactures	.6 (1)	1.6 (2)	21.1	7	167.3	12

(1) Total \$19.7.

(2) Total \$45.9.

* Average for Five-year period.

Chart 2

Value of Domestic Exports
of the United States by Countries
and Areas for Five-year periods
1821-1860

Chart 3

Value of Merchandise Imported
Into the United States by Countries
and Areas for Five-year periods
1821-1860

(Values Expressed in Millions of Dollars)

	1821-25		1856-1860		1821-25		1856-1860	
	Value	% of Total	Value	% of Total	Value	% of Total	Value	% of Total
Great Britain	\$ 118.3	46	\$678.8	49	\$ 151.3	41	\$ 601.6	37
West Indies	49.5	19	100.5	7	69.6	19	205.9	13
France	30.3	12	160.3	12	33.7	9	212.5	13
Cuba	15.4	6	49.4	4	32.6	9	156.0	10
South America	15.2	6	67.0	5	9.9	3	117.4	7
British No. America	10.0	4	102.5	7	1.8	0.5	102.0	6
Netherlands	10.8	4	18.8	1				
Germany	6.8	3	62.0	4	9.5	3	80.2	5
China (1831-35)		3.6			29.8	6	53.7	3
Russia					11.7	3	6.1	0.4

in second place on the Atlantic coast in 1860, while Baltimore and Philadelphia shared third place.

On the Gulf, New Orleans, with an export trade of \$107,000,000 was second only to New York, but this southern city failed to develop an appreciable import trade. San Francisco was the greatest port on the Pacific Coast, with a total import-export trade of about \$26,000,000 in 1860.¹

After 1815 the expanding ocean-carried commerce of the United States moved in swifter and larger ships. These improvements also resulted in greatly reduced passenger and freight rates. During the Napoleonic Wars a premium was placed upon speed as a means of escape from privateers and war vessels. American shipbuilders produced vastly improved sailing ships in response to this demand, of which the "Baltimore clipper" was the first example.

In 1818 New York merchants were convinced that the amount of traffic across the Atlantic was large enough to support a line of vessels sailing at regular intervals. The first such line to be established was the Black Ball Line, with monthly sailings from New York to Liverpool. In 1822 rival packet lines also went into operation and the pressure of competition on this route stimulated the continual improvement in design of these swift-sailing "packet ships." The average time for the westward trip across the Atlantic dropped from 50 days in 1816 to about 38 days by 1822, and to 34.6 days by 1848. At this last date there were 52 such packet lines sailing regularly from New York City. The first vessels of the Black Ball Line ranged from 381 to 424 tons but by 1845 the size of these vessels normally exceeded 1,000 tons. The regularity of sailing and speed of the packet ships won for the United States the sailing supremacy of the North Atlantic.

The clipper ship, the swiftest of all sailing vessels, was also designed by American shipbuilders. First appearing in 1845, these streamlined vessels were first used in the China trade and then in the gold rushes to California and Australia. Clipper ships frequently made the 16,000-mile voyage from New York to San Francisco in 110 days--a trip that ordinary sailing vessels required from 150 to 200 days to complete.

¹The population of these port cities in 1860 was as follows: New York, 1,080,330; Philadelphia, 565,529; Baltimore, 212,418; Boston, 177,840; New Orleans, 168,675; San Francisco, 56,802.

These cities were primarily commercial centers, but already Philadelphia and New York had become the two most important manufacturing cities in the United States. With manufacturing valued at \$136,000,000 and \$159,000,000, respectively, in 1860, they possessed approximately 15% of the country's total manufacturing output. Of the \$30,000,000 in manufactured goods produced in the Far West in 1860, \$19,600,000 of this total was made at San Francisco.

The backbone of the American merchant marine, however, was the smaller, slower, and less graceful freighters. These ships carried the great bulk of the freight to Europe and South America. In the 1830's these full-bowed and broadbeamed vessels were also given sharper prows, flatter and longer fulls, and more sails, thus increasing their speed. Their size was also greatly increased, and they expanded from an average of about 500 tons in the 1820's to more than 1,500 tons in the 1850's.

Further revolutionary increases in speed resulted from the introduction of the steamship. In 1839 the three British steamships operating between England and New York averaged 17 days on the westward crossing, and by 1860 this was reduced to 13 or 14 days. In 1845 the British vessel, the Great Britain, an iron steamship driven by screw propellers, made her first Atlantic crossing. In 1850 a British ship owner instituted a regular run of similar iron vessels to the United States. These new iron ships not only utilized a superior means of propulsion but were drier, safer, and larger than it was possible to build with wood. In 1854 insurance companies recognized this fact by charging higher insurance premiums on wooden vessels than on iron ships. Due to these technological changes, the days of supremacy of America's great merchant marine, based as it was on wood and sail, were already clearly numbered.

The Rise of Banks and Insurance Companies

This great foreign commerce was also the mother of the banking and insurance businesses in the United States. The first two banks, however, were founded to help support the American Revolutionary War effort. In June, 1780, 92 Philadelphians, headed by Robert Morris, organized the Pennsylvania Bank as a purchasing agency and pledged themselves for £ 300,000 to support the war effort. The bank issued notes which were used to buy supplies for the Continental Army and redeemed their notes in cash received from the Congress. The second bank, The Bank of North America, was chartered by Congress on December 31, 1781. This was also organized by Robert Morris at Philadelphia for the purpose of providing the American Confederation with a stable paper currency and to make provision for paying in coin the interest due on the debts of the Continental government.

The next two banks, the Massachusetts Bank at Boston and the Bank of New York, were established in 1784. Private citizens, chiefly merchants, purchased the shares in these banks, thereby providing the institutions with a stock of gold and silver coin. Loans were limited to 30 or 60 days. Managers refused renewals, and insisted in punctual payments. Loans and discounts were confined in the main to a limited number of local merchants with whom the officers were acquainted. None of these banks catered to the common people. Each

bank issued notes which it lent to borrowers and which it undertook to redeem in coin on demand. Loans were made by discounting notes and bills and were secured by commodities involved in foreign commerce. Each bank also received deposits that could be withdrawn in specie on demand.

These banks proposed and by 1798 there were a total of 22 -- such institutions affiliated with the individual states. Their authorized capital totaled about \$15,250,000 and their chief function was to provide merchants with credit for financing the expanding foreign commerce. The New England states then had 12 such banks, the Middle states 8, and the South, 2. Banking continued to expand vigorously: in 1811 there were 89 banks, with an authorized capital of \$52,600,000 and notes in circulation amounting to \$28,110,000; and by 1860 there were a total of 1,562 state banks which had a total authorized capital of \$401,976,000, \$207,000,000 in notes, and deposits of \$327,784,000.

The first national bank, the First Bank of the United States, was granted a twenty-year charter by Congress in 1791. The capital stock was set at \$10,000,000, of which sum the Federal government was to subscribe \$2,000,000. Private parties, chiefly merchants, were permitted to invest the remaining \$8,000,000. The home office was located at Philadelphia and branches were established in Boston, New York, Charleston and Baltimore. Additional branches were later established at Norfolk, Washington, Savannah, and New Orleans. This bank was also a success and the government received dividends of about $8 \frac{3}{8}$ percent a year. When Congress refused to renew the charter in 1811, the First Bank of the United States was acquired by various state banks.

The Second Bank of the United States, also with headquarters at Philadelphia, was chartered by Congress in 1817. With an authorized capital of \$35,000,000, this institution was also financially successful. In 1836, however, Congress refused to renew its charter and it then became a state bank and failed in 1841.

The first incorporated savings bank in the United States was established at Philadelphia in 1816. By 1860 these institutions had deposits totaling about \$150,000,000.

Stock exchanges were organized in Philadelphia about 1800, in New York about 1817, and later at Boston and Baltimore.

The insurance business also developed rapidly during this period. Fire insurance originated in America in 1752, when a group of Philadelphia businessmen formed the Philadelphia Contributorship for the Insurance of Houses from Loss by Fire. The second such company-- the Mutual Assurance Company--was also organized at Philadelphia in 1784. But the chief growth in the insurance business occurred in marine insurance. Prior to 1790 American ship owners had purchased most of this type of insurance in Great Britain. In 1794 the Insurance Company of

North America, with an authorized capital of \$600,000 and headquarters at Philadelphia, was chartered by the State of Pennsylvania. Marine insurance companies thereafter multiplied rapidly. By 1800 there were 33 such companies, with 15 located in New England, 7 in Pennsylvania, and 11 in the South. By 1860 the fire and marine insurance of the mutual and stock companies in force in the United States totaled nearly \$3,000,000,000.

Life insurance also made its appearance. The first company specializing in the field was the Pennsylvania Company for Insurance on Lives and Granting Annuities, established at Philadelphia in 1812. After a slow start, the total of life insurance in force in the United States in 1860 exceeded \$160,000,000.

The Rise of Domestic Commerce

As has been noted, there was a profound shift in the nature of the commerce of the United States after 1815: The relative importance of the foreign commerce declined and was replaced by the tremendous rise and increase of domestic commerce. Thus, while the total value of foreign commerce had increased to \$687,000,000 by 1860, the total value of the internal trade of the United States exceeded \$5,600,000,000 by 1852.

This shift was due to the rapid settlement of the West and to the phenomenal improvements made in inland transportation, which created an continually expanding internal market and also made possible an ever-increasing regional specialization in agriculture, commerce, and industry.

The Louisiana Purchase in 1803 doubled the land area of the United States and the acquisition of Florida, Texas and the Far West between 1815 and 1854 resulted in a 76 percent further increase in size. This new land was rapidly settled, the population of the Midwest thus increased from 1,221,038 in 1810 to 11,357,364 by 1860; and that of the Far West, only acquired in 1846-48, from 178,818 in 1850 to 618,976 by 1860.

Fundamental to the rapid growth of internal trade, however, was the adoption of new instruments of transportation which greatly reduced the cost of carrying inland freight and also vastly speeded up the rate at which this freight could be moved.

First of the improved devices to be put into use was the river steamboat. Fulton's Clermont appeared on the Hudson in 1807. The first river steamer descended the Mississippi in 1812 and in 1817 the first steamer ascended that river, making the trip from New Orleans to Louisville in 25 days. In 1821 the tonnage of steamboats arriving at New Orleans exceeded that of the primitive flatboats and barges for

the first time. Steamboat tonnages on the Mississippi totaled 13,890 in 1820, rose to 302,829 in 1850 and declined to 167,739 tons in 1860.

These vessels increased in size and more particularly in speed. By 1855 the 727 Mississippi steamboats averaged about 500 tons and the time for the trip from New Orleans to Louisville had been reduced to about 8 days. These western steamboats opened up great new markets in the Middle West and made possible the cheap transportation of their bulky agricultural products to the sea. This immense traffic created important new river ports such as Pittsburgh, Cincinnati, Louisville, and St. Louis.¹ At New Orleans receipts from produce from the interior increased from \$9,749,253 in 1815 to \$185,211,254 in 1860. This trade made New Orleans a close rival to New York as an export center during much of this period.

In 1849-50 river steamers also appeared on Far Western rivers. In 1860 there were 43 steamers navigating California rivers and 29 on the Columbia.

The next transportation device to be utilized on a large scale was the canal. Between 1816 and 1840 the American people constructed a total of 3,326 miles of canals, which were built at a cost of about \$125,000,000.² The most important of these great works connected the chief ports of the Atlantic coast--New York, Baltimore, and Philadelphia--with the agricultural regions of the Midwest. By reducing costs of transportation the canals made possible an exchange of western farm products for eastern manufactured goods. As a result of the construction of the Erie Canal, the cost per-ton mile of moving freight from Buffalo to New York dropped from 19.12 cents in 1817 to 1.68 cents in 1830, and was about .81 cents in 1857. By 1855 the total value of all Erie Canal traffic for that year was estimated at \$204,000,000. Movement of goods was also speeded up by canals. Goods shipped from Cincinnati to New York in 1817 took more than 50 days to complete the trip. In 1850, however, this same shipment could be made in 18 days, via the Ohio Canal, Lake Erie, and the Erie Canal, and the Hudson River.

The railroad was the last of these new devices to be adopted. Like canals, railroads were originally built by the great Atlantic port cities in an effort to tap large western agricultural areas. The rivalry of these commercial ports resulted in an intense competition to reach the Midwest through the rapid construction of east-west

¹Population in 1860: New Orleans 168,675; Cincinnati, 161,044; St. Louis, 160,773, and Louisville, 68,033.

²Mileage of the Canals in 1840 was located as follows: Northeast--2,055 miles; Midwest--896; and the South--375 miles. Total canal mileage in 1850 was 3,698 miles.

railroads. Boston, Baltimore, Philadelphia and Charleston all entered the race in 1830 and New York City finally followed suit in 1836. Between 1830 and 1860 the American people constructed a total of 30,626 miles of railroads, which were built of a total cost of about \$1,000,000,000.¹ In the 1850's the lines from the Atlantic ports were completed westward to the river ports on the Mississippi, the Ohio, and on the Great Lakes. Chicago, Milwaukee, and Chattanooga all became important commercial centers as the result of the coming of the railroads.² Railroads further reduced the cost of inland transportation and immensely speeded up the rate of movement. Rail shipments of goods from Cincinnati to New York City in the 1850's could be made in 6 to 8 days, as compared to the 18 days required by the canal route. By 1860 the railroads were winning the intensive competition between canals and river steamers for the passenger and freight business of the domestic trade.

In spite of the phenomenal growth of overland commerce between the Atlantic and Midwest after 1815, the most important method of transportation and the chief trade route in the country in 1860 remained the coastal sea route along the Atlantic Coast.

Here, coastal vessels carried cotton, coal, rice, sugar, molasses, tobacco, and timber to northern cities, and on their return voyages, distributed manufactured goods from the North and Europe along the coast. In 1793 the 122,071 tons of shipping enrolled in the coastal trade was equal to approximately one-third of that registered in foreign commerce. By 1831 tonnage in the coastal trade finally exceeded that in foreign commerce.³ By 1852 it was estimated that the coastal trade carried about \$3,300,000,000 out of the total value of \$5,600,000,000 carried in the domestic commerce; this coastal trade was also six times greater than that transported in American foreign commerce.

Communication was greatly speeded up by the introduction of the telegraph. New York, Boston, Baltimore, Philadelphia, Cleveland, Detroit and Chicago were all linked by means of the telegraph between 1846 and 1848. In 1861 the first transcontinental telegraph line was completed to San Francisco and the United States then had about 50,000 miles of telegraph lines in operation.

The fundamental pattern of this great domestic trade that developed after 1815 was very similar to that which existed between Great Britain and the 13 English colonies in the colonial era. The agricultural South now sent its great staples--cotton, tobacco, and

¹About 21,605 miles of this construction were built between 1850-1860. The railroad network in 1860 was distributed as follows: The Midwest-- 11,055 miles; the Northeast, 10,214 miles; the South, 9,183; and the Far West, 74 miles.

²Population of Chicago in 1860 was 109,260.

³Coastal trade tonnage increased as follows: 1790-103,000; 1800-272,000; 1830-516,979; 1850-1,797,825; 1860-2,644,867 tons.

sugar--to the manufacturing Northeast, receiving manufactured goods and credit in return. The Midwest, an exporter of grain and wheat, carried on a similar direct trade for manufactured goods with the Northeast, but also provided the South with food products, receiving in exchange drafts on the East which were used to pay for manufactured imports.

In 1816 the Midwest sent 80 percent of its agricultural products down the Mississippi River to New Orleans for export. By 1860, however, due to the construction of more efficient lines of transportation (the east-west canals and railroads) 77 percent of this Midwest trade now moved directly to Northeastern Atlantic ports for export.

INDUSTRY

In this period the industrialization of the United States made important and rapid headway, while household manufacturing declined greatly in relative importance as a means of production. The vastly increased population and the rise of cities created large and expanding markets that could be reached by the means of greatly improved inland transportation facilities that were built during this period. Both the volume and pace of industry increased vastly in these years.

This period also saw the introduction and widespread application of many important techniques in industry: the application of steam power, the beginnings of automation, the spread of the factory system, the application of the corporate form to manufacturing, and the perfection of the theory and practice of mass production through the use of interchangeable parts.

Some industries that had been important in the colonial era, such as the fur trade, the slave trade, shipbuilding, and fisheries and whaling, either declined in relative importance or virtually disappeared. These were replaced by new manufactures such as cotton and woolen goods, boots and shoes, men's clothing, and leather. Mining also became an important industry in the 1850's.

American industrialization was thus well underway before the Civil War. Between 1810 and 1860, the value of manufacturing output increased approximately tenfold (from \$199,000,000 to about \$1,858,000) while the population had increased only four and one-half times (from 7,239,000 to 31,443,321). Between 1850 and 1860 the pace of manufacturing increased vastly: cotton textile output increased by 77 percent, wool textiles by 42 percent, hosiery goods by 608 percent, carpets by 45 percent, men's clothing by 55 percent, boots and shoes by 70 percent, coal mined by 182 percent, pig iron by 54 percent, bar, sheet and railroad (wrought) iron by 100 percent, and steam engines and machinery by 66 percent. The overall rate of economic growth in terms of commodity output in the 1850's was in excess of 60 percent.

By 1860 the United States had become an industrial nation that was probably only second to Great Britain.¹

The Decline of Household Manufacturing

Though many manufacturing activities, and especially those in connection with the preparation of food, continued for many decades to be carried on in the home, the relative importance of household manufactures began to decline after 1815. As late as 1820 it is estimated that approximately two-thirds of the clothing worn in the United States was still made in the home, but by 1860, however, household manufactures, outside of the field of food preparation, had largely disappeared in most parts of the United States. This decline took place in two stages: from 1815 to 1830 decreases in household manufacturing in the East were offset in part at least by the considerable expansion in the new frontier areas, and during 1830-1860 the decline was quite general, extending to practically every part of the country. In both periods this primitive form of production thrived only where transportation was difficult and expensive; it was least able to hold its own where canals, river steamboats, and railroads were introduced and made easily available the manufactured goods of domestic or foreign factories.

The Rise of Production for the General Market

After 1815 there came a tremendous increase in production for the general market. This increased output was provided by three expedients: enlarged shop or handicraft production, the spread of the domestic or putting-out system, and the appearance of the factory system.

¹Douglass C. North, The Economic Growth of the United States, 1790-1860 (Englewood Cliffs, N. J., 1961), v.; however, George R. Taylor, in his The Transportation Revolution, 1815-1860 (New York, 1962), 249, on the basis of the evidence presented in Twelfth Census of the United States: Manufactures, Pt. 1, United States by Industries, VII, IV (Washington, 1902), still accepts the older interpretation that the United States only ranked fourth in industry in 1860. These older figures give the value of manufactures as follows:

United Kingdom	\$2,808,000,000
France	2,092,000,000
Germany	1,995,000,000
United States	1,907,000,000.

Prior to 1815 the largest fortunes in the United States were made by merchants engaged in foreign commerce. These, then, were the men who usually provided the capital and acted as the central organizing agents for the increased handicraft production, the domestic system, and the factory system. They assumed the risks, provided the capital, and became expert in finding markets in which to sell at a profit those commodities which the merchants had arranged to have produced at the lowest possible costs. Though the workers in shops or homes still provided their own tools, the raw materials were usually owned by the merchant-capitalists.

As custom work declined in relative importance with the growing production of goods for sale in a general market, the craftsman's shop tended to lose its function as a retail outlet and to become merely a small production unit. Here the master craftsman usually directed the work of an enlarged staff of journeymen and apprentices, but sold his entire output to the wholesale merchant-capitalist and no longer dealt directly with the actual consumer. The enlarged shop method of production resulted in certain crafts, such as shoemaking, tailoring, and hatmaking, being concentrated in restricted areas of the country.

In other lines of manufacturing the enlarged market demand led to the rise of the domestic or putting-out system. Under this method the merchant-capitalist furnished the raw materials to men and women who worked in their own homes to produce products which he collected, assembled, finished if necessary, in a central shop, and marketed, often at very considerable distances. This mode of production was of importance in the manufacture of boots and shoes, the weaving of cotton and woolen goods, and making ready-to-wear clothing.

The third method to meet the growing market demand was the factory system. In this process increasingly large aggregations of workers were assembled under the general supervision of an employer, who, paying money wages, and furnishing buildings, raw materials, and power-operated machinery, organized the production of goods for general market sale. Under the factory system the trend was toward heavy capital investment, integration of industrial processes, and mass production. The development of the factory became extremely rapid in the United States after 1840 and by 1860 the system was becoming important in practically every industrial field.

The Rise of Industrial Corporations

Prior to 1805, manufacturing, like commerce, was usually organized as an individual proprietorship, a family enterprise, or a partnership. The corporate form of organization, though already common for banking, bridge, insurance, and turnpike companies, was rare in

manufacturing.¹ With the growth of the factory system after 1815 and the appearance of large production units, however, the corporate forms and also the unincorporated joint-stock associations became increasingly popular. These organizational forms facilitated the securing of capital from a larger group of persons than could ordinarily be brought together in a partnership, they also provided continuity of operations, and they permitted the flexibility resulting from transferable shares of stock. In spite of the rapid spread of corporations, particularly in the cotton and woolen cloth, and carpet industries, most American manufacturing in 1860 was still carried on by unincorporated units.

Chief Commercial Industries in 1860

The development of manufacturing in the United States in this period was primarily of two kinds: Resource-oriented manufacturing consisting, at least initially, of the simple processing of raw materials in which there were location advantages to sites near raw materials (such as lumber, meat packing, or flour milling); and second, manufacturing of goods in which capital required were relatively small (as in cotton goods, boots and shoes, men's clothing, leather, and woolen goods). The former were the major types of manufacturing in the Midwest and Far West. The Northeast, which accounted for three-fourths of the country's manufacturing in 1850 and for 71 percent of it in 1860, concentrated on that latter type. The ten leading branches of manufactures in the United States in 1860, listed in the order of the total value of their products, were as follows: 1. flour and meal, 2. cotton goods, 3. lumber, 4. boots and shoes, 5. men's clothing, 6. iron, 7. leather, 8. woolen goods, 9. liquors, and 10. machinery. (See Chart No. 16, page 70).

The Cotton Goods Industry

The manufacture of cotton goods brought the industrial revolution and the factory system from Great Britain to the United States. This new American industry was based on a series of English inventions: the spinning jenny (1764), Arkwright's water frame (1769), and Samuel Crompton's mule (1779).

The spinning jenny was the first of these machines to be utilized in the United States. During the American Revolution a shop of the United Company of Philadelphia used a jenny with 24 spindles.

¹Between 1775 and 1801, the states issued a total of 326 charters for corporations. Of these only 8 were for manufacturing.

In 1787 a cotton factory with 10 jennies and 636 spindles began operations at Beverly, Massachusetts. In 1790 Samuel Slater, a young English immigrant, constructed from memory the first Arkwright machine in the United States. Working under the auspices of Moses Brown of Providence, Slater installed this device in a small factory at Pawtucket. Utilizing water power and child labor, this factory in 1791 produced the first cotton warps spun in this country. In 1808 there were 15 small cotton mills with about 8,000 spindles, by 1810 the number of spindles had increased to 87,000 and in 1815 there were 213 spinning mills with a total of 130,000 spindles. As a result of the embargo and War of 1812, New England merchants had shifted much of their capital from foreign commerce to these cotton mills. These new mills were heavily concentrated in southern New England, and there were sizable branches in New York, New Jersey, and Baltimore, and a few in the Southern and Midwest.

The weaving of cotton, however, still depended on the putting-out system and this latter work was still done in the home in 1814. The full development of the factory system in its most representative form thus still awaited further improvements in cotton weaving machinery.

In 1813 Francis Cabot Lowell of Boston and other Massachusetts merchants formed the Boston Manufacturing Company, with an authorized capital of \$400,000, and erected a large spinning mill at Waltham. In 1814 Lowell devised a water-powered loom which was installed in the new factory. Thus for the first time spinning and weaving were done by machinery in one factory. Heavy imports of English cotton goods after 1815 closed many of the small American mills that had sprung up. But when American manufacturers later reconstructed the cotton goods industry, they utilized the Waltham plan, so that a typical factory after 1820 combined spinning and weaving.

By 1840 the making of cotton cloth had become one of the leading manufactures of the United States. Total value of its products increased from \$46,000,000 in 1840 to \$66,000,000 in 1850, and to \$107,338,000 in 1860. In 1860 70 per cent of the capital in the industry was invested in New England mills which produced 75 per cent of the cloth (valued at \$46,600,000). Another 23% of the cloth, valued at \$15,900,000, came from the Middle Atlantic States, and the Midwest and Southern states produced cloth valued at \$3,100,000 and \$2,000,000, respectively. Cotton goods was the second ranking industry of the United States in 1860.¹

¹In 1860 there were 1,091 cotton mills and 5,235,727 spindles. Capital invested totaled \$115,681,774, and the workers numbered 122,028. There were no cotton mills in the Far West in 1860.

The Woolen Goods Industry

In 1788 the first concern specializing in the factory production of woolen cloth established its plant at Hartford, Connecticut. In 1793 two Englishmen, Arthur and John Scholfield, introduced the first water-powered carding machine into Massachusetts. A few small woolen factories were established in the 1790's but all of these failed by 1801.

As a result of the embargo, 17 woolen factories were in operation by 1809. In 1810 the United States also had 1,682 fulling mills in operation. These were places where the cloth was cleaned, shrunk, smoothed, sheared, and dyed after having previously been woven by hand in homes. Ninety percent of these fulling milles were located in the Northeast, 7 percent in the South, and 3 percent in the Midwest. Additional wool factories were erected during the War of 1812, and by 1815, Connecticut, with 25 factories that employed 1,200 workers, was the principal center of this new industry; several factories were also erected in the Middle Atlantic states and a few in the South and Midwest. These factories used water power to turn spinning jennies and to operate the carding and fulling machines, but all weaving was done on hand looms, most of which were located in homes.

The water-powered loom for weaving was introduced in 1815 and was widely adopted in the 1820's. The huge woolen factories with fully integrated operations of spinning and weaving appeared in the 1830's. The value of woolen goods increased from \$20,696,000 in 1840 to \$43,542,000 in 1850, and to \$60,685,000 in 1860. Some woolen cloth was made in almost every part of the country but two-thirds of the total product were produced by the huge mills in New England.¹ Woolen goods was the eighth ranking industry of the United States in 1860.

Men's Clothing

In the 1830's the ready-made clothing industry, operating under the putting-out system, began to arise in seaport towns to supply the necessary clothes for sailors and workmen. The skilled tailor who had formerly worked in a central shop, began to take his work home, where he received help, especially in the less skilled processes, from his wife and children. By 1840 the industry had spread to the Midwest. Cincinnati then had nearly 4,000 women employed in this industry who worked in their homes.

¹In 1860 the United States had 1,909 woolen factories, which employed 48,900 workers, and represented \$35,520,527 in capital invested. There were two woolen mills in operation on the Pacific Coast in 1860, these produced goods valued at \$235,000, employed 300 hands, and represented a capital invstment of \$170,000.

The sewing machine, invented by Elias Howe in 1846, was widely adopted in the clothing industry in the 1850's. This machine not only saved labor, but permitted work of an excellence that was impossible by hand methods. The sewing machine further promoted the growth of the putting-out system in the ready-made clothing industry, because this routine sewing work could be effectively and inexpensively performed by women using the device in their homes.

With declining costs of material and cheaper production methods, the ready-to-wear clothing industry expanded rapidly. In 1860 men's clothing was the 5th ranking industry in the United States, employing 114,800 people and producing goods valued at \$80,831,000. New York state produced more than one-third of this total in 1860, and the cities of New York, Philadelphia, Cincinnati, and Boston together made more than one-half of the total output for the country.

The Boot and Shoe Industry

In 1750 John A. Dager established a small shoe shop at Lynn, Massachusetts. Hiring skilled craftsmen to specialize on specific operations, he started a hand manufacturing factory system on a small scale. By 1800 master shoemakers, employing journeymen and apprentices, made boots and shoes for general sale in their shops, on order for local customers, and for the export trade. Master shoemakers also furnished materials to artisans who, aided by their families, made complete shoes in their homes. Exports in 1809 amounted to 8,500 pairs of boots and 127,000 pairs of shoes. Lynn, the foremost shoe town in the United States in 1809, specialized in women's shoes and produced 100,000 pairs that year.

By 1820 the shoe manufacturing industry had undergone considerable change. As the volume of output was increased to meet the rapidly expanding demand, central shops were developed. In these, most of the cutting was done in order to conserve materials and there, also, the finished products were assembled and inspected. As competition became more intense, processes became constantly more specialized and the importance of careful supervision of production became so great that the work tended to be concentrated in the central shops.

This centralizing process was further speeded up by the increasing use of machinery. In the 1840's machines for pegging brogans and leather rolling were introduced and in the 1850's the sewing machine was also adapted to shoemaking. By the late 50's the central shop took on more and more of the characteristics of a modern factory, and only a few processes were still carried by workers in their homes.

In 1860 the boot and shoe industry was the 4th ranking industry of the United States, employing 123,026 people, and producing goods valued at \$91,889,000. This industry centered in New England, and Massachusetts alone produced more than one-third of the total output. The four leading cities in the industry--Philadelphia, Lynn and Haverhill, Massachusetts, and New York--together produced more than one-fifth of the total for the United States.¹

Leather Industry

During the colonial era small tanneries had arisen throughout the 13 colonies to meet local needs. These plants consisted of vats in which the hides were impregnated with tannin from the bark of oak or hemlock to make them pliable and waterproof; other vats in which the hides were soaked in lime to remove the hair; a circular trough in which bark was crushed by wheels; a building to store bark, and a shop where the hides were scraped, beaten, scoured, and smoothed. By 1775 northern tanneries were importing raw hides and exporting leather to other English colonies and South America.

In 1810 the making of leather goods ranked among the four leading American industries and the processed hides and skins were valued at \$17,935,000. The United States then had 4,316 tanneries. In 1809 Boston merchants formed the Hampshire Leather Company, with an authorized capital of \$100,000. This firm bought tanneries at Northampton and other towns from William Edwards and his partners. Edwards had introduced some important innovations, particularly a rolling machine, patented in 1812, that imparted a smoothness and firmness like that of hammered leather without requiring the former hand labor.

The leather industry expanded rapidly in the 1830's to meet the demand of the growing boot and shoe industry and of the leather manufacturing industries (saddlers, harness makers). In 1860 \$10,500,000 worth of raw hides and skins were imported, chiefly from South America and the East Indies. At that date the leather industry was the 7th ranking industry of the United States, employing 22,679 people and producing products valued at \$67,306,000.²

¹There were no boot and shoe factories in the Far West in 1860; the first organized manufacture of these products began in California in 1863.

²The Far West produced leather products valued at \$351,469 in 1860.

The Flour Milling Industry

The flour milling industry, already important in colonial times, was revolutionized by the inventions of Oliver Evans of Philadelphia. Between 1782 and 1803 he perfected and patented machines that weighted, cleaned, ground, and bolted wheat, returned the middlings to be reground, and packed the flour into barrels. Hand labor was utilized only to pour wheat into the entrance chute and to head the barrels. This appears to be the first instance of complete automation in mechanical manufacturing. To further free his mills from dependence upon water power, Evans also constructed the first high pressure steam engines in the United States and did much to improve the manufacture of this new source of power.

American millers quickly adopted Evans' inventions and this resulted in the further development of large merchant mills. In 1810 there were 2,917 flour mills, merchant and local, in the United States.

Prior to 1850 the principal wheat lands of the nation extended from New York across New Jersey and Pennsylvania to Ohio and southward through Maryland and Virginia into North Carolina. Large merchant mills arose in this area on sites that were accessible both to wheat growers and to vessels engaged in the export flour trade with Europe or supplying urban markets. The greatest concentration of these merchant flour mills was in the Chesapeake area, where cities like Baltimore, Richmond, Georgetown, and Alexandria had available cheap water transportation. In the north similar mills operated wherever rivers and canals provided cheap transportation, such as Rochester and Oswego, and in the Midwest at Pittsburgh, Cincinnati, and St. Louis.

In the 1850's the wheat producing area shifted westward from the Middle Atlantic states to the Midwest and with it also moved the center of the flour milling industry. By 1860 the mills of the midwestern states produced one-half of the flour ground in the United States. In 1860 the flour milling industry was the first industry of the United States, utilizing \$208,297,309 worth of raw materials and producing products valued at \$248,580,360.¹

The Lumber Industry

As in colonial times, the lumber industry remained a major industry during this period. The steam sawmill, introduced into the United States in 1798, freed the industry of its dependence on water power and permitted small sawmills to be constructed anywhere; the use of steam power thus tended to keep the lumber industry decentralized.

¹In 1860 the United States had a total of 13,886 flour mills, which represented a capital investment of \$84,585,000 and employed 27,682 people. The Far West then had 123 mills, 91 of which were located in California, and produced products valued at \$6,096,262.

In 1810 the nation had a total of 2,526 sawmills with an annual output of 94,000,000 feet of lumber. New York and Pennsylvania were then the leading lumber states. From 1803 to 1815 the value of forest products exported average \$3,816,000 a year and represented 11 percent of all exports.

The commercial lumber industry was concentrated in heavily timbered areas that had good outlets to the sea. Thus Maine was the leading exporter of lumber in 1815. New England, New York and Pennsylvania had large merchant sawmills located in the forested upcountry that sent lumber down the rivers and canals to the seaboard cities, either for local use or export. In the South the coastal streams were lined with sawmills--particularly at the falls in North and South Carolina. Large mills were also erected near Savannah, Mobile, and New Orleans, and in the Midwest at Cincinnati.

As in the flour milling industry, the center of the lumber industry gradually shifted westward. As the forests of the older eastern states were cut over, the midwestern states tended to assume the leadership. In 1860 about 38 percent of the nation's lumber was produced by Michigan, Wisconsin, and Minnesota, 24 percent by New York, Pennsylvania, and Maine, and 22 percent by the Southern states. Bangor was then the chief lumber market of Maine, Albany in New York, but the greatest lumber center of the world was Chicago.

As a result of the California gold rush, a commercial lumber industry quickly appeared on the Pacific Coast. With lumber selling for \$400 per thousand board feet at San Francisco in 1849, lumbermen quickly pushed into the redwood forests of northern California and the great forests of the Puget Sound region of Washington, where they erected large merchant sawmills.

In 1860 lumber was the third ranking industry of the United States, and produced about 8,029,000,000 board feet valued at \$104,928,000.¹ It was the leading manufacture of the Midwestern, Far Western, and Southern states.

The Iron Industry

The American iron industry, which had produced one-seventh (30,000 tons) of the world supply in 1775, further expanded its output to meet war needs and the increasing domestic demand. By 1800 numerous

¹In 1860 the United States had 20,870 sawmills, which represented a capital investment of \$143,493,232, employed 75,595 people, and used raw materials valued at \$51,358,400. In 1860 the Far West had 437 sawmills, which represented a capital investment of \$1,923,000, employed 1,807 hands, and produced products valued at \$6,274,839.

furnaces and forges dotted the Atlantic iron belt which extended from Vermont southward to the Carolinas and by 1812 iron works also appeared in Kentucky and Tennessee.

The furnaces in operation prior to 1815 used only charcoal for smelting and a large furnace could produce about 2,400 tons of pig iron a year. The American iron masters resisted technological changes and failed to improve their methods and products. Although much American bar iron was of good quality, the quantity produced did not meet the domestic demand, with the result that manufactures imported about 9,000 tons from Europe in 1810. The relative backwardness of the American iron industry is indicated by the failure of American steel manufactures to make noteworthy progress. In 1810 the domestic output of steel was only 918 tons and it was necessary to import 10,000 tons of foreign steel. Total imports of iron and ironware in 1810 amounted to nearly \$4,000,000.

Much of the American crude iron went to the shops of the village blacksmiths; there to be shaped into numerous articles needed in the primitive agriculture of the times. Other users of crude iron were the foundries which began to appear, where the iron was melted and formed into cast iron goods. In 1810 about 7,000 tons of crude iron also went to 50 rolling and slitting mills, which turned it into nail rods, hoops, wagon tires, and sheet iron. Massachusetts, with 12 such mills, produced half of the rolled iron of the country in 1810. All the products of American iron works were valued in 1810 at between \$12,000,000 and \$15,000,000; production of pig iron then totaled 60,377 short tons and there were 153 iron furnaces.

The three fundamental technical changes that were to revolutionize the American iron industry after 1815 had been worked out by Henry Cort in Great Britain in 1783-84. Two of these processes, puddling and rolling, were first adopted in the United States by Isaac Meason, who erected such a plant at Plumstock in western Pennsylvania in 1816-17. In the rolling process the slabs or blooms from the furnaces were squeezed by a rolling mill to expel the cinders and then rolled into bars. This machine greatly reduced the manpower required in the older method of refining and shaping the iron by beating it with hammers. In the puddling process a reverberating furnace heated the iron without bringing it into contact with the fuel. This method had the great advantage of permitting the substitution of mineral coal for charcoal.

Coal could not be used with the traditional process because of impurities it imparted to the iron when burnt in direct contact with the iron. By permitting large-scale operations and the use of coal, a decidedly cheaper fuel than charcoal, puddling gave a great impetus to the centralization of the iron industry.

The third major improvement, the use of coal in blast furnaces, was not widely adopted in the United States until 1840 and not until 1854 did coal replace charcoal as the predominant smelting fuel. The reasons for this long delay appears to be related to the peculiar characteristics of charcoal iron, its malleability and ease of welding, which suited the chief needs of the American market at that time. The iron made in blast furnaces using coal, on the other hand, was highly suitable for railroad and industrial purposes so that after 1840, when the demand for iron for railroad track greatly expanded, the new technique made rapid headway.

Through production units of cast, forged, rolled, and wrought iron were found in almost every part of the United States, the industry was centered chiefly in the Middle Atlantic states.¹ Pennsylvania was the leading state in 1860, producing 580,049 tons out of the nation's total of 919,770 short tons of pig iron. Massachusetts was the leading state in iron wire and iron forgings. New York, Pennsylvania, and Massachusetts, in that order, produced the bulk of the iron castings. The manufacturing of iron was the sixth ranking industry of the United States in 1860, producing products valued at \$73,175,332, employing 48,795 people, and utilizing raw material valued at \$37,486,056.

Machine Shops and Foundries

Shops and foundries specializing in the production of industrial machinery evolved gradually from a number of diverse industries, such as iron foundries, the arms industry, and the textile industries.

After 1783 many foundries were erected to produce cast iron shovels, plow irons, cooking utensils, hammer heads, anvils, and stove plates. About 1790 Jacob Perkins of Newburyport invented a nail-making machine which could produce a hundred cut nails a minute, and at one-third of the cost of producing a similar number of wrought iron nails. Nail factories quickly appeared in the 1790's. The demand for steam engines gave new impetus to foundry work and led to greater precision in castings. By 1812 a number of small plants were in operation that specialized in producing a single iron product, such as shovels, arms, nails, wire, mill saws, scythes, and steam engines.

The most important advances in the design and production of more efficient and improved machinery, however, were made in the arms and textile industries. About 1785 a Frenchman named La Blanc began the manufacture of locks for muskets on the system of interchangeable parts for the French government. In 1798, Eli Whitney, who was familiar

¹The Far West produced no iron in 1860, but imported it to rework it in foundries into machinery.

with La Blanc's theories, entered into a contract with the United States government to manufacture 10,000 muskets within a two-year period. Whitney planned to use water power machinery which he would devise to mass produce the parts for these arms. He set to work at once and erected his factory at Whitneyville, Connecticut. His plant began production in 1800, but further difficulty in perfecting the necessary machinery delayed delivery of the last of the 10,000 muskets until 1808.

In 1801 Simon North was also awarded a government contract for producing pistols and he began manufacturing on a system somewhat similar to Whitney's, first at Berlin and later at Middleton, Connecticut. While both Whitney and North succeeded in completing a portion of the work by machinery, much of the task of producing their arms still had to be done by hand and their machines were also not yet precise enough so that the completed parts of their weapons were truly interchangeable.

The next step in this evolution of mass production through the use of interchangeable parts was made by John H. Hall of Portland, Maine. Working under a contract with the Federal government at Harpers Ferry Armory, Virginia, Hall, between 1819 and 1825, invented and produced the water-powered precision machinery needed to produce his rifle by a completely automated process, which required no hand work other than assembly of the completed individual parts. His first 1,000 rifles were delivered in 1825 and the second 1000 by 1827.

The mass production techniques developed by the arms industry spread quickly to Connecticut's clock-making industry. The mass production of cheap brass clocks began there in the early 1830's.

The textile industry was another source that contributed to the development of the machine shop--the industry which was to specialize in the production of industrial machinery. The Waltham cotton mill, established in 1813, found it necessary to form its own machine shop to design and construct the specialized machines needed in the cotton factory. Many other early cotton textile mills followed this practice, but with the increasing demand for all types of machinery these machine shops were able to separate from the mother mills, and began to concentrate on machinery construction. Some became highly specialized, building only one or two types of machinery. Others broadened to include a number of different types of textile machinery, as well as machine tools, locomotives, stationary engines, and hydraulic turbines. By the 1850's American machine shops made rapid progress in the building and use of gigs, taps, and gauges. Precision tools such as the vernier caliper became available in 1851 and the turret lathe first appeared on the market in 1854.

By 1860 the production of machinery had become the 10th ranking industry of the United States, producing products valued at \$52,010,376 and employing 41,223 workers. Though machine shops and foundries were to be found in almost every part of the country, the

industry was centered chiefly in the Middle Atlantic States, with New York and Philadelphia as the leading cities in the industry.¹

Lesser Industries, Old and New

The fur trade, one of the chief industries of the colonial era, expanded to the Pacific Coast in 1789 and revived inland in the Trans-Mississippi West in the early 1800's. In the 1840's, however, after a colorful history in the Far West, the fur trade largely disappeared, due to changes in fashion and the elimination of fur-bearing animals.

The fisheries, another important colonial industry, experienced a vigorous growth after the Revolution but declined in relative importance as one of the major industries of the country. Expanding domestic markets took an increasing portion of the enlarged catch. The cod-fisheries remained the most important fishery, but mackerel, herring, halibut, and lobster fisheries were added. Massachusetts and Maine remained the centers of this industry. The total value of the American fisheries, including whaling, in 1860 has been estimated to have amounted to about \$14,000,000.²

Whaling revived slowly after the American Revolution, but recovered in 1789. The first New England whalers sailed for Pacific waters in 1791. Destroyed again during the War of 1812, whaling again grew phenomenally when peace was restored and in some years its value may have been about equal to that of the rest of the fishing industry. The United States became the world's main producer of whale bone and oil in the period 1815-1860. In 1860 whaling gave employment to 12,000 men, over one-half of whom had their homes in New Bedford, the chief center of the industry. However, the use of petroleum as an illuminating oil and the great decrease in the number of whales was soon to send this industry into a rapid decline.

The shipbuilding industry also experienced a vigorous growth in the period 1775-1860 but declined in relative importance in the national economy after 1815. The supremacy of the American merchant marine during this era was based on the low costs and fine design of the wooden sailing vessels, such as the Baltimore clippers, the packet ships and the clipper ships, produced in American shipyards. The industry extended all along the Atlantic coast, but New England continued to dominate the business, with Massachusetts and Maine as the leading states. In Maine, Bath became the largest shipbuilding center in the country. At East Boston the master builder Donald McKay launched his great clipper ships.

¹In 1860 the Far West had 16 such establishments that produced a total of \$1,686,510, chiefly mining machinery.

²The new fisheries on the Pacific Coast produced \$223,265 in 1860, employed 281 men, and the capital invested in the industry totaled \$46,100.

By the 1850's however, the American superiority in ship-building was being seriously threatened by technological changes in which Great Britain took the lead: the use of iron and steam power in ocean-going ships. The United States failed to keep abreast of these developments. Great Britain could not only produce high-grade iron plates more cheaply than the United States, but her iron work, and particularly her marine engines, were the finest in the world. By 1856 steam navigation of the Atlantic had largely passed into European hands and the construction of iron ships centered in Great Britain.

New techniques and labor-saving devices were also introduced during this period that later gave rise to important industries.

In 1817 William Underwood, an Englishman, introduced canning to the United States, when he began preserving fruits and pickles in glass jars at New York City. In 1825 Thomas Kensett began preserving oysters and fruits in tin canisters; in the 1840's this process was next extended to include vegetables.

As a result of Gail Borden's development of the vacuum evaporation process, the canning of milk began also in the 1850's. But mechanization had not yet advanced far when Borden opened a factory at Wassaic, New York, in 1861.

The first machine-made paper in the United States was produced by Thomas Gilpin, using a cylinder process, near Wilmington, Delaware, in 1817. The mechanization of this industry advanced rapidly and by 1850 most of the paper in the country was made by a single, progressive process which converted rag pulp into rolls of machine-made paper. The manufacture of fur and woolen hats was also largely mechanized by 1860.

Mining and Mineral Production

In 1860 the production of gold dominated the American mining industry and all other forms of mineral production generally stood poised on the threshold of the phenomenal growth that was soon to take place.

In the 1850's gold became the most valuable mineral product of the United States. Small quantities of gold had been mined in the Southern Appalachians since 1792, but it was the discovery of this metal in California in 1848 that revolutionized the industry.¹ From 1848 through 1860 California's mines poured forth a grand total of \$639,105,997 in treasure. California's annual gold production in 1860 still amounted to \$44,095,163. About 90 percent of this gold came from placer mines

¹Total value of gold produced in the United States, 1792-1847, amounted to \$23,537,000.

and the remainder from quartz or lode mines. By 1852 a total of \$51,949,380 in capital had been invested in these gold mines and 100,000 men were working as miners; in 1860 82,573 men were still active in mining. In 1852-53 Californians invented hydraulic mining to work gravel deposits and the mechanized stamp mill to crush the ores from the quartz mines. .

From early colonial times iron ore had been mined in many places along the Atlantic seaboard. In 1860 this was still the case, but more than half of the output now came from Pennsylvania, the center of the iron industry, and production of ore in the Ohio and Cumberland valleys was becoming especially important. Development of the rich iron ore beds of the Lake Superior region was aided by the opening of the St. Mary's Canal in 1855, and by 1860 ore from the Lake region accounted for almost one-tenth of the 919,770 short tons of pig iron produced in the United States.¹

Small scale mining of copper was carried on in Vermont, New Jersey, Virginia, and Tennessee in 1810, but this limited domestic production had to be supplemented by annual imports of 400 tons of crude copper. Small copper refineries were located near Atlantic shipyards. By 1813 three rolling mills had been established at or near Baltimore, Boston, and New York, which produced copper sheets, bolts, spikes, nails, and rods. The output of copper was considerably increased in the 1850's and came from the Ducktown district in Tennessee and the rich mines of the Upper Peninsula region of Michigan. By 1860 the Michigan mines provided three-fourths of the 8,064 short tons of copper produced in the United States.²

The existence of vast coal beds in the United States had been known since colonial times, but their exploitation waited on the development of cheap transportation and improvement in the techniques of using coal. These difficulties were partly overcome in the 1830's. Production of anthracite coal thus increased from 95,000 short tons in 1828 to 9,619,771 short tons in 1859, as canals and railroads provided cheap transportation from the mines of northeastern Pennsylvania to the Atlantic Coast. Here the anthracite coal came quickly into extensive use in the large coastal cities, both for heating homes and for industrial use.

The production of bituminous coal increased from 100,408 short tons in 1828 to 6,013,404 short tons in 1859. Production of this fuel centered in the mines of the Pittsburgh area, where it was utilized to meet the growing industrial needs of the Ohio River Valley.³

¹The Lake Superior iron deposits were discovered in 1844-45.

²Between 1862-1866 copper mines at Copperopolis, California, produced a total of about \$3,100,000 in copper, but the industry then failed.

³Small quantities of coal were also mined in California and Washington in 1860 for local use. Production in California reached 125,000 tons in 1865.

The two principal lead mines in the United States prior to 1803 were located in southwestern Virginia and near Southampton, Massachusetts. The Louisiana Purchase brought into the United States the valuable lead mines near St. Louis, in eastern Missouri. Production there had been carried on since 1719. The Missouri mines met the needs of the Midwest and also sent 200 tons of lead to the Atlantic states in 1810, but the overall production of American mines did not suffice for domestic needs; thus yearly imports of foreign lead averaged 500 short tons in 1809-1810.

By 1819 Missouri's 41 lead mines employed 1,100 miners and yielded about 1,500 short tons of lead a year. The total value of the Missouri production from 1804 to 1819 amounted to about \$2,400,000.

In the late 1820's the production of lead from the Galena district in Wisconsin also expanded considerably, reaching its maximum in 1845-1850. The total production of lead in the United States during this latter period averaged about 28,000 short tons a year and was valued at about \$1,500,000 annually. By 1860, however, lead production had dropped to 15,600 short tons a year.

Petroleum had been long known in the United States and considerable progress was made in improving the refining process in the 1850's. The country's first drilled oil came into production at Oil Creek, near Titusville, Pennsylvania, in 1859, thus marking the beginning of an important new industry. In 1860 production amounted to 500,000 barrels.

The United States in 1860

In 1860 the United States had approximately 10,530,000 gainfully employed workers. Of this total, 1,311,000 were employed in the manufacturing and hand trades, 170,000 in mining, 780,000 in trade and transportation, and 6,210,000 in agriculture.¹

The total national income realized by private production in 1860 has been estimated at \$4,098,000,000. Of this sum, agriculture provided \$1,264,000,000; manufacturing, \$495,000,000; trade, \$494,000,000; transportation and communication, \$694,000,000; mining, \$44,000,000; finance, \$345,000,000; construction, \$184,000,000; and service, \$572,000,000.²

In the 1830's, as the United States converted from a self-sufficient to a market-oriented economic society, unemployment, pauperism, and extreme poverty appeared in the United States as serious urban problems.

¹Historical Statistics of the United States, 1789-1945, a Supplement to the Statistical Abstract of the United States (Bureau of Census, Department of Commerce, Washington, 1949), p. 64.

²Ibid., p. 14.

Only one person out of five in 1860 lived in places of more than 2,500 inhabitants, but in southern New England and in the Hudson and Delaware river valleys, manufacturing complexes had appeared that were comparable to the most industrialized regions of Great Britain.

These New England and Middle Atlantic states were the chief manufacturing regions of the nation in 1860. The Midwestern states led in the production of lumber, flour, liquor, and meat packing products. The leading manufactures of the South were lumber, tobacco, and flour. The South had also made a beginning in the manufacture of cotton goods, machinery, and iron by 1860, but as compared with the total national output, Southern manufacturing production was still small. The Far West had also a start towards industrialization and that region's chief products were lumber, flour, machinery, liquor, and cane sugar, and leather. The degree of industrialization attained by the various regions of the United States by 1860 is shown on Chart No. 4 on page 46.

The development of commerce and industry in the United States did not proceed at a uniform or smooth rate but was interrupted by a number of "Panics" or depressions. Minor or short-lived depressions occurred in 1797-98, 1801-03, 1837, 1847-48, 1854, and 1857. Major ones took place in 1808-1814, 1819-1821, and 1839-1843.

The depression of 1808-1814 resulted from the United States being drawn into the European wars. The Panic of 1818-1821 followed a post-war boom and threw from 40,000 to 100,000 "artificers and manufacturers" out of work in this country. The depression of 1839-1843 was one of the most severe in the history of the United States and is comparable in its effects to the Great Depression of the 1930's. While reliable statistics on employment are not available for this period, Horace Greeley estimated that 200,000 people in New York City, or about one-third of its total of workers were unemployed in 1838. Similar effects on employment were observed throughout the nation during the depression of 1839-43.

SECTIONAL EXHIBIT FOR MANUFACTURING (EXCLUSIVE OF MINING) FOR 1860

Chart 4

Sections	No. of Establishments	Capital Invested (in 000's)	Cost of Raw Material (in 000's)	Number of Hands Employed	Annual Cost of Labor (in 000's)	Annual Value of Products in 000's	Value added by Manufacture (in 000's)
New England	20,671	\$ 257,478	\$ 245,523	391,836	\$ 104,231	\$ 468,599	\$ 223,076
Middle Atlantic	53,287	435,062	444,127	546,243	152,329	802,338	358,211
Midwestern	36,785	194,213	225,619	209,909	63,573	384,607	158,988
Southern	20,631	95,975	86,543	107,721	28,681	155,531	68,988
Far Western	2,041	16,085	13,741	9,711	7,164	30,033	16,291
Aggregate	133,415	\$ 998,803	\$1,015,553	1,278,420 ⁽¹⁾	\$ 348,815	\$1,858,829	\$ 825,555

Population of Sections:

<u>Northeast:</u>	<u>11,393,533</u>
<u>Midwest:</u>	<u>11,357,364</u>
<u>Southern:</u>	<u>7,993,531</u> ⁽²⁾
<u>Far West:</u>	<u>618,976</u>
Total	31,443,321

- (1) Figure includes a total of 270,897 female workers.
 (2) Figure includes 3,953,580 Negro slaves, and is for the states that seceded from the Union in 1860.

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CHAPTER III

THE EMERGENCE OF AN INDUSTRIAL NATION

AND THE RISE OF FINANCE CAPITALISM,

1861-1915.

GENERAL

This was another period of phenomenal growth and rapid change in the United States. The Civil War preserved the Federal Union and ended slavery. From this war there also emerged a new and more powerful national state which was soon to become a world power with colonial aspirations. Alaska was acquired by purchase in 1867, and Hawaii, Guam, the Philippines, and Puerto Rico were all annexed in 1898. Between 1899 and 1910 the United States also became the "policeman" of the Caribbean and the countries of that region became American protectorates.

Internally, the population of the United States increased more than threefold: rising from 31,443,321 in 1860 to 75,994,575 by 1900; and increasing from 91,972,266 in 1910 to 105,710,620 by 1920. Urbanization also proceeded apace--rising from 20% of the total population in 1860 to 40.2% by 1900 and reaching 51.4% in 1920.

In commerce and industry the United States also passed a number of important landmarks: By 1889, the country had clearly become an industrialized nation, as the value of manufactured products for the first time exceeded that produced by agriculture. In 1894 the value of American manufactures exceeded those of Great Britain, thus making the United States the leading industrialized nation of the world. By 1913, as a result of its expanding foreign commerce, the United States had become third ranking nation of the world in its foreign trade and was exceeded only by that of Great Britain and Germany. In 1915, after 300 years of history as a debtor nation, the United States became a creditor nation, and the financial center of the world was transferred from London to New York City.

Economically, the United States transformed itself during this period from a highly competitive market-oriented society into a gigantic market-oriented, but monopoly-controlled society. By 1900 control of this economic world lay in the hands of the finance capitalists.

COMMERCE

The commerce of the United States expanded vastly between 1859 and 1914: foreign trade increased nearly seven times, while the increase of domestic trade cannot be measured because this huge commerce flowed in a vast and largely unregulated market that provided few statistics. The value of the domestic trade was, of course, many times greater than that of the foreign commerce. Some degree of the overall expansion in commerce, however, is revealed by the following figures: in 1870 there were 850,000 persons in the United States engaged in trade, finance, and real estate; in 1900 the number was 2,870,000; in 1910, 3,720,000, and in 1920, 4,940,000. In terms of national income commerce provided \$494,000,000 or 12% in 1859 and \$2,720,000,000 or 18% in 1900. Figures for 1914 and 1919 amounted to \$5,508,000 and \$9,177,000 respectively.

Foreign Commerce

The foreign trade of the United States exhibited a vast increase in this period, and, after 1897, United States investments also began to move overseas, thus marking the beginning of an age of American economic imperialism.

The total foreign trade of the United States rose from \$695,000,000 in 1859 to \$2,429,233,000 in 1900, and then increased from \$4,522,374,000 in 1914 to \$12,597,941 in 1919. As has been noted, by 1913 the United States ranked third among the nations of the world in foreign trade. (see Chart 7, page 47 for the growth of the foreign trade).

The domestic export trade was marked by the decreasing percentage of the total supplied by agriculture and the rising percentage provided by manufacturing, thus marking the emergence of the United States as an industrial nation. Agricultural products thus provided 84.3% of the total in 1880 and 79.1% in 1892, but then dropped to about 69% in 1900 and to 53.9% in 1914. (See Chart 5, page 49).

Raw cotton was the leading agricultural export during this entire period. In 1876 the South was finally able to produce as much cotton as it had in 1859 and exports of this product then increased 30% between 1875 and 1881. Wheat and wheat flour was the other major agricultural export. European crops failed in 1879 and 1892 and as a result, the American export of wheat increased 162% between 1875 and 1881. Huge wheat shipments were again made in 1892 and 1898. These food exports then declined from about 39.8% of the total export value in 1900 to only 20.7% in 1913.

Chart 5

PERCENTAGE DISTRIBUTION
OF UNITED STATES EXPORTS
BY ECONOMIC CLASS, 1896-1915

Year	1896-1900	1901-05	1911-15	1896-1900	1901-05	1911-15
Crude Materials	26.11	30.27	30.74	29.47	33.38	34.91
Crude Foodstuffs	18.90	12.12	8.83	15.08	12.92	12.80
Manufactured Foodstuffs	24.01	22.16	14.32	15.93	12.36	12.56
Semi-Manufactures	9.64	11.30	15.41	13.35	16.65	17.37
Finished Manufactures	21.23	24.07	30.70	26.17	24.69	22.36

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Chart 6

PERCENTAGE DISTRIBUTION OF UNITED
STATES IMPORTS BY ECONOMIC
CLASS, 1896-1915

Chart 7

TOTAL VALUE OF EXPORTS

TOTAL VALUE OF IMPORTS
(IN 000'S OF DOLLARS)

TOTAL VALUE
of
FOREIGN TRADE

1870	\$ 450,927	\$ 462,378	\$ 913,305
1880	852,782	760,989	1,613,771
1890	909,977	823,287	1,833,264
1900	1,499,462	929,771	2,429,233
1910	1,918,835	1,645,505	3,564,340
1915	2,965,756	1,874,849	4,840,605

Manufactured exports, on the other hand, increased their percentage of the total value of the exports from 35.3% in 1900 to 48.8% by 1913. (See Chart No. 5, page 49. At this latter date the leading manufactured exports, in order of value, were iron and steel manufactures (including machinery), copper and copper products, refined mineral oils, lumber, timber and wood manufactures, carriages, and automobiles, and agricultural implements.

As might be expected from the industrialized state of the country, the percentage of imported finished manufactured goods dropped radically: from 48.9% in 1860 to only 26.48% in 1897, and averaged 22.4% for the 1911-15 period (see Chart 6, page 49).

Europe continued to be the main market for American trade but American commerce was in the process of gradually shifting to the less industrialized countries of the world. Thus while Europe took about 75% of United States exports in 1900, this dropped to about 66% in 1914. During the same period American imports from Europe fell from 51.8% of the total imports, to about 46.6% in 1914. (see Chart No. 8, page 51).

The extremely high protective tariff in effect in the United States from 1897 to 1913 probably hindered an even greater expansion of American foreign trade.

The United States was a debtor nation from 1607 to 1914. Until 1873 these debts were incurred chiefly to finance the excess of imports over exports. After 1873, however, they largely represented borrowing to pay interest rates on foreign investments in the United States.¹ In 1915, as a result of World War I, the heavy purchases made in the United States by the European powers of all types of goods converted the United States from a debtor to a creditor nation, and also shifted the financial center of the world from London to New York City.

The Rise of Economic Imperialism

By 1897 the United States had reached a position in the economic world where her own agricultural and industrial resources were largely developed. The nation could thus turn from these internal problems to those of possessing foreign colonies and of exploiting undeveloped resources in foreign lands as a means of investing surplus American capital. Between 1897 and 1919 the total amount of such capital invested in foreign lands increased tenfold, as exhibited on the following chart: (see Chart No. 9, page 52).

¹These net debts amounted to about \$75,000,000 in 1803, rose to \$1,500,000,000 in 1869, to \$2,710,000,000 in 1897, and to \$3,686,000,000 in 1914. In 1914 Europeans had about \$6,750,000,000 invested in the United States.

Chart 8

PERCENTAGE OF DOMESTIC
EXPORTS OF THE UNITED STATES
BY AREAS 1896-1915

PERCENTAGE OF GOODS
IMPORTED INTO THE UNITED
STATES BY AREAS 1896-1915

	1896-1900	1901-05	1911-15	1896-1900	1901-05	1911-15
Northern North America	6.9	8.6	14.2	5.0	5.4	7.7
Southern North America	5.6	6.7	7.7	10.3	13.3	14.5
South America	3.1	3.2	5.2	13.2	12.5	12.8
Europe	76.7	72.3	64.0	52.6	51.3	46.3
Asia	3.9	5.3	5.6	14.6	15.4	15.8
Oceania	2.3	2.0	2.2	3.1	0.9	1.1
Africa	1.5	1.9	1.1	1.3	1.1	1.4

THE DIRECT AND PORTFOLIO
INVESTMENTS OF AMERICAN CAPITAL IN
FOREIGN COUNTRIES BY GEOGRAPHIC AREAS,
1897-1919

Chart 9.

(In Millions of Dollars)

Areas	1897	1914	1919
Europe	\$ 151.0	\$ 489.2	\$ 1,986.8
Canada	189.7	867.2	1,542.8
Cuba & Other West Indies	49.0	336.3	606.2
Mexico	200.2	853.5	908.9
Central America	21.2	93.2	114.8
South America	37.9	365.7	776.2
Africa	1.0	13.2	31.2
Asia	23.0	245.9	309.5
Oceania	1.5	17.0	54.2
International	10.0	30.0	125.0
Total ¹	\$ 684.5	\$3,513.8	\$ 6,955.6

American capital entered all phases of Canadian industry and mining. In Mexico it went chiefly into railroads, copper and lead mining, petroleum, public utilities, and agriculture. In Cuba and the West Indies the money was invested mainly in sugar and tobacco plantations, and in iron mines. In Central America it was invested in railroads, banana production, public utilities, and mining. In South America the capital went into the mining of precious metals and copper. In the Far East this money was invested into oil distributing organizations and trading companies.

Decline of the Merchant Marine

In spite of the great increase in foreign trade and appearance of an American colonial empire, the decline of the American merchant marine was rapid and spectacular after 1861. In 1860 the tonnage of American vessels engaged in the foreign trade was 2,379,396 tons; this fell to 1,448,846 tons by 1870. By 1900 the total had dropped to 816,795 and in 1910 amounted to only 782,517 tons. The percentage of value of all goods in the United States foreign trade, carried in American vessels, fell in a similar pattern, declining from 66.5% in 1860 to 35.6% by 1870. In 1900 it was 9.3% and in 1910 8.7%.

¹Capital invested in Hawaii's sugar refinery industry in 1900 totaled \$7,991,642. Alaska had \$3,600,409 in capital invested in her manufacturing enterprises in 1900.

The few American shipping companies that did make an appearance in this era, such as the American Steamship Company, the Red D Line, and the Ward Line, were of slight significance in view of the overwhelming competition offered by the crack British, Dutch, and German ships engaged in the transatlantic and South American trade.

American shipyards also languished as a result of this situation and survived by constructing vessels for use in the coastal trade. The American merchant marine was to be revitalized and shipbuilding to again become one of the chief industries of the United States only as a result of the efforts of the Federal government in World War I (1917-1920).¹

Domestic Commerce

Another tremendous increase occurred in domestic commerce during this period, due, as in the pre-1860 period, to the rapid settlement of the West and to further vast improvements in the inland transportation system. Again the volume of business increased and its pace also speeded up. A truly continental-sized market developed and new forms of marketing organizations, such as department stores, catalogue houses, and chain stores, appeared to serve both the large urban and rural markets.

The population of the Midwest increased from 11,357,364 in 1860 to 26,333,004 in 1900 and reached 34,019,792 by 1920. That of the Far West rose from 618,976 in 1860 to 4,091,349 by 1900 and numbered 8,902,872 in 1920. The population living in cities of 8,000 or more also increased from 5,000,000 in 1860 to 25,000,000 by 1900, and reached 46,000,000 in 1920.

Fundamental to the development of this huge national market was the completion of the world's greatest railroad network, which linked together every region of the United States and made possible the cheap and rapid transportation of freight and passengers. Railroad mileage increased from 30,626 in 1860 to 257,569 miles by 1915. The distribution of this mileage and the rate of construction are exhibited in the following chart (see Chart No. 10, page 54).

¹In 1917 the United States had about 60 shipyards building metal ships.

Chart 10.

RAILROAD MILEAGE IN THE UNITED STATESBY SECTIONS, 1860-1920

Regions	1860	1880	1900	1920
Northeast	10,365	21,820	32,215	36,045
Midwest	11,055	44,492	86,145	103,656
South	9,183	18,881	48,792	70,962
Far West	74	6,223	20,142	42,498
Total, U. S.	30,626	93,262	192,556	259,941

A truly integrated and nation-wide railroad system began to take form in the 1880's. It was at this time that most railroads adopted a standard gauge for their track.¹ Arrangements were also worked out between the hundreds of railroad companies for the interchange of cars, thus reducing the cost and speeding up the shipment of freight. In 1883 the United States was divided into four time zones by the railroad companies and their timetables were thus regularized across the nation. In 1889 the country was further divided into three great freight districts, within each of which classification was uniform for all railroads. These changes simplified passenger and freight traffic and thereby greatly facilitated the flow of commerce.

This period also saw the introduction and use of important improvements in railroad equipment. George M. Pullman constructed his first sleeping car in 1864 and George Westinghouse took out the first of his series of patents on the airbrake in 1868. By the late eighties the light iron rail had generally been replaced by the heavy and stronger steel rail. As a result of such improvements the running time for the 981-mile trip from Chicago to New York City, via the New York Central Railroad, was reduced from 50 to 24 hours by 1875. The first "trans-continental" railroad reached the Pacific Coast in 1869. In 1876 a "lightning express" completed the 3,317-mile rail trip from New York City to San Francisco in 83 hours and 27 minutes, thus averaging 40 miles per hour for this journey.

¹In 1880 22.3% of all railroad track in the United States was still not standard gauge. The old South, the last great holdout, finally adopted the standard gauge in 1886.

As railroads became the predominant means of transportation, the canals and river steamboats rapidly declined in importance.¹ The only important means of water transportation to escape this general proscription by the railroads were the vessels engaged in the domestic commerce of the Great Lakes and the coastal trade.

On the Great Lakes total shipments increased from 25,000,000 short tons in 1889 to over 125,000,000 in 1910. By 1910 one-third of the total U. S. merchant marine, or 2,895,102 tons, was employed on the Great Lakes.² An important reason for the success of the lake traffic was their location in a region producing bulky commodities such as iron ore, coal, and wheat. Iron was carried from Lake Superior eastward to the great steel plants on Lakes Erie and Michigan, and return cargoes were supplied by coal.

A second reason for the success on the lakes was the continual improvement of the vessels. After the 1880's the propeller steam vessel became the dominant lake carrier. Their size increased from about 231 tons in 1865 to about 3,000 tons in 1910. The ships were also especially designed to carry their heavy loads and machinery was devised to load and unload them rapidly so that the ships could make many trips each year before the lakes froze over.

The railroad companies, by operating six steamboat lines over the lakes, had succeeded by 1912 in capturing the passenger traffic, but were unable to control the great traffic in coal and iron. This bulk trade was dominated in 1914 by eight steamship companies, which controlled nearly 46% of this traffic, that were owned by the great steel corporations. United States Steel, which owned the largest of the bulk carriers, the Pittsburgh Steamship Company, set the lake rates for transporting ore.

The American merchant marine engaged in the coastal trade, in contrast to that engaged in foreign commerce, expanded vastly in this period until the United States possessed the greatest coastal fleet in the world.³ These vessels continued to transport bulky commodities such as lumber, coal, cotton, and petroleum along the Atlantic and Pacific coasts. As the railroads increased their mileage and efficiency, however, the competition between the water carriers and the

¹The canal mileage declined from 3,698 in 1850 to 1,991 in 1909. Of this latter figure, 632 miles, or nearly one-third, was then owned by railroad companies. The tonnage of western river steamboats fell from 501,800 tons in 1879 to 153,716 tons by 1910.

²Tonnage on the Great Lakes increased from 5,217 tons in 1816 to 463,123 tons in 1860, and reached 1,063,063 tons in 1890.

³Tonnage of the coastal merchant marine rose from 2,644,867 tons in 1860 to 3,381,522 tons in 1865. It reached 4,286,516 tons in 1900 and increased to 6,818,363 tons by 1914.

railroads became intense. From the 1870's onward there was a progressive establishment of a "harmony of interests" between the rivals in which the railroads dominated the situation. By 1912 this "community of interests" had ended the competition between rail and water carriers on both the Atlantic and Pacific coasts.

Communications were also greatly improved in this period. The first permanently successful cable was laid across the Atlantic Ocean in 1866. The first telephone exchange was opened in 1878 and by 1880 there were 34,305 miles of telephone line in the United States. Long distance telephoning began in 1887. New York City and Chicago were thus connected in 1892 and the first transcontinental telephone line from New York City to San Francisco was completed in 1915.¹

New Forms for Marketing Products

The increasing urbanization of the United States made possible an ever-increasing specialization in commerce.² Improved transportation facilities provided by the railroad system, the introduction of free rural delivery in the 1890's, and the inauguration of the parcels post system in 1913, also brought the farming population into the national market.

This concentration of population enabled wholesalers to specialize in single raw material commodities and led to the development of grain, cotton, coffee, sugar, and other exchanges whose operations were patterned after those of the stock market. In like manner retailers were also able to specialize in single commodities in large cities. Beginning in the 1880's many manufacturers, particularly in petroleum refining, meat packing, sewing machines, and the agricultural machinery industries, also began to build up their own marketing systems to sell directly to the users in the growing national market, thereby eliminating the middleman.

The general store had long been the main marketing unit in the United States and was well adapted for serving a limited market. As the population increased, however, the general store began to evolve in two directions: first, the large urban market led to the appearance and spread of specialized one-line retail stores; second,

¹In 1900 there were 855,000 telephones in the United States; by 1915 this number had increased to 9,172,000.

²In 1860 only about 20% of the population lived in places with 2,500 or more inhabitants. In 1900 this percentage increased to 40.2%, reached 45.8% in 1910, and 51.4% in 1920. In 1860 there were only 141 cities in the United States with 8,000 or more inhabitants; by 1900 there were 285 such communities, and in 1920, 924.

the general store also developed in the 1860's into the huge department store. By 1868, Macy's of New York City, founded by R. L. Macy in 1858 as a dry goods store specializing in ribbons, gloves, lace, and feathers, had added many other lines, such as ready-to-wear clothing, jewelry, china, silverware, and books, to become the prototype of the department store. Similar great department stores were developed by Alexander T. Stewart in New York, by John Wanamaker in New York and Philadelphia, and by Potter Palmer and Marshall Field in Chicago. The stores of these "dry goods kings" were able to reduce costs and secure goods at cheaper prices through their large-scale operations. Improvements in urban transportation also enabled people living in the suburbs to come into the large cities to do their shopping in the department and specialized stores.

A new form, the chain retail store, was also devised to tap the markets of medium-sized and small urban centers. The first example of the chain store to appear was the Great Atlantic and Pacific Tea Company, founded by George F. Gilman in 1858. By 1869 Gilman had 11 store outlets in his chain. F. W. Woolworth opened the first of his "Five and Ten Cent" stores at Lancaster, Pennsylvania, in 1879. By 1890 there were 28 stores in the Woolworth chain. The United Cigar Store chain was started in 1892 and the Kresge system in 1897. These chain stores also made large purchases of goods for cash directly from manufactures at a considerable savings, and by employing "cheap help," were able to sell their goods at low prices to consumers.

Rural buying habits, long served by the country general store and traveling peddlers, were greatly altered by the appearance of the mail-order catalogue houses. There had been a few mail-order houses in existence prior to 1860, but the first such catalogue house aimed specifically at selling to farmers was established by Aaron Montgomery Ward at Chicago in 1872. Sears, Roebuck and Company, founded by R. W. Sears and A. C. Roebuck in 1893, became the second great mail-order house when they moved their business to Chicago in 1895. The low prices offered by the catalogue houses also stemmed from their large-scale purchases of products directly from the manufacturers at reduced prices and from their practice of selling to customers solely for cash.

Commercial advertising became a major business during this period. Advertising, in the form of small advertisements in newspapers, had been employed in the United States since colonial times. After 1861, however, as markets increased in size and became more impersonal, advertising was perfected into a specialized "art."

In New York City R. H. Macy and Lord and Taylor pioneered in developing newspaper display advertising by utilizing larger type faces and columns and introducing illustrations. As a nation-wide market appeared, advertising then spread to magazines having a national circulation. Advertisements in press and periodicals increased about

80% in the 1880's and also spread out-of-doors, as "messages" appeared on billboards, on the blank walls of city buildings and barns, and on the sides of urban vehicles. Department and chain stores, catalogue houses, and manufacturers all widely used these devices to make customers aware of their wares and products.

Banks and Insurance Companies

In 1863 and 1864 Congress passed acts which established a national banking system. By 1865 there were 1,294 of these new national banks in operation. By 1880 the United States had a total of 3,355 banks of all types with resources amounting to \$3,398,945,000.¹ The growth of banking and the increase in banking resources is showing on the following chart, Chart No. 11.

Chart 11.

NUMBER OF BANKS IN THE UNITED STATES, 1880-1915

(Values in Millions of Dollars)

	1880		1900		1915	
	No.	Assets	No.	Assets	No.	Assets
National Banks	2,076	\$ 2,035	3,782	\$ 4,944	7,605	\$ 11,796
Savings Banks	629	882	1,002	2,625	630	4,319
State Commercial Banks	650	882	4,659	3,090	17,791	11,511
Private Banks ²	---	---	989	127	1,036	178
Total	3,355	\$ 3,399	10,382	\$ 10,786	27,086	\$ 27,804

¹The Far West had a total of 237 banks in 1880, with resources amounting to \$132,498,000.

²In 1887 there were 1,001 private banks with assets totaling \$174,478,000.

The assets of life insurance companies also expanded vastly in this period: rising from \$24,115,687 in 1860 to \$1,349,903,198 in 1897, while their surpluses also increased from \$6,955,814 to \$187,892,252. By 1911 their assets amounted to approximately \$4,163,916,000 and resources of all banks and life insurance companies totaled about \$27,795,000,000.

Most of the American surplus capital during the period 1861-1897 was invested in the westward movement and the development of the railroad network. After 1897 large amounts continued to go into railroads, but the investment market now widened to include public utilities, industrial enterprises, foreign properties, and government bonds. Thus the percentage of banking funds invested in such securities rose from 18.0% in 1890 to 27.7% by 1910.

By the early 1900's much of the commercial banking system and most of the large life insurance companies had come under the control of the investment bankers or finance capitalists. The story of the rise of finance capitalism is narrated on pages 66-68 of this study.

INDUSTRY

General

In this period the industrialization of the United States was completed. By 1889, as has been noted, the value of products produced by manufacturing greatly exceeded the value of those produced by agriculture.¹ By 1894 the United States was clearly the most industrialized nation in the world: the value of its manufactures not only exceeded those of Great Britain, France, and Germany individually, but was not far from equaling the combined figures for all three countries. The annual value of manufactures increased from \$1,858,829,000 in 1859 to \$11,406,927,000 in 1899, and the figure reached \$59,914,027,000 in 1919. The growth of manufacturing in the United States for this period is exhibited as Chart No. 12, page 60.

This was the "age of steel," as this metal generally replaced iron in importance. It was also the "age of coal," as this mineral became the main source of power that turned the wheels of American industry and transport. This period also saw the dawn of the "ages of electricity and petroleum," as these became major new sources of industrial power. The factory system, machinery, and the techniques of mass production completed their conquest and were applied to every phase of the industrial process. The center of industry shifted westward.

¹Value of manufactured products in 1889 was \$9,372,379,000, that of agriculture, \$2,460,107,000.

GROWTH OF MANUFACTURING 1870-1910

Chart 12.

Year	No. of Establishments	Capital Invested (in 000's)	Cost of Raw Material (in 000's)	No. of Hands Employed	Annual Cost of Labor (in 000's)	Annual Value of Products (in 000's)	Value Added by Mfg (in 000's)
1870	252,148	\$ 2,118,209	\$ 1,991,742	2,053,996	\$ 620,457	\$ 3,385,860	\$ 1,395,119
1880	253,852	2,790,273	3,396,824	2,732,595	947,954	5,369,579	1,972,736
1890	355,405	6,525,156	5,162,014	4,251,535	1,891,220	9,372,379	4,210,365
1900*	204,750	9,835,086	6,385,970	4,501,919	1,892,574	11,032,951	4,646,981
1910*	264,826	18,428,270	11,788,160	6,262,242	3,205,548	19,945,249	8,162,089
1914*	268,450		13,891,441	8,608,068	3,782,644	23,277,631	9,386,190

* Excludes hand and neighborhood industries.

DISTRIBUTION OF MANUFACTURING WAGE EARNERS

Chart 13.

BY REGION

Region	1899	1919	1900	1920
New England	18.1	14.9	5,592,017	7,400,909
Middle Atlantic	34.1	31.6	15,454,678	22,261,144
Midwest	28.4	31.8	26,333,004	34,019,792
South	13.5	12.6	17,981,237	22,883,579
Southwest	2.4	3.1	6,532,290	10,242,224
Far West	3.5	6.0	4,091,349	8,902,872
Total	100.0	100.0	75,994,575	105,710,620

Chart 14.

POPULATION BY REGIONS

As the manufacturing processes became increasingly complex, scientifically trained chemists and engineers were employed by industry to solve their problems. The corporate form of organization now truly dominated American manufacturing and many corporations became gigantic in size.

This period began as the age of "laissez-faire," an era of bitter and intense competition and warfare that was conducted by industrial titans or "robber barons"; it closed in an "age of harmony" or "monopoly" as industrial rivalry was either eliminated or greatly reduced by a series of nationwide consolidations that were guided through to consummation by the investment bankers. The era ended as an age of finance capitalism.

The Triumph of the Factory System

Although hand and neighborhood industries continued to function during this period, it was quite clear that factories had become the most important means of production in the United States by 1899. That year 512,191 active industrial establishments produced goods valued at \$13,000,149,000 and employed 5,306,143 industrial workers. Of these establishments only two-fifths were factories, yet these 204,750 plants produced \$11,082,951,000 of the total value of the goods and employed 4,501,919 of the workers. Hand, shop, and neighborhood industries, on the other hand, still numbered 307,441 establishments but produced goods valued at only \$1,917,198,000 and employed only 804,224 workers.

Not only were factories taking over production, but the scale of these plants themselves were expanding. In the cotton goods industry, for example, the number of active spindles per factory increased from 14,091 in 1879 to 18,058 by 1899. In boots and shoes the physical product per factory increased from 64,053 in 1879 to 136,313 in 1899. Industry was increasingly mechanized by enlarging the capacity of the machine unit, either by increasing the physical size of the machine or the speed at which it functioned. Thus the horsepower capacity utilized in manufacturing tripled between 1899 and 1919 and the horsepower per worker increased in the same period from 2.11 to 3.24. This increased mechanization was in turn accompanied by an increase in the size of the factories. One result of this rising mechanization was to increase the productivity of the workers. Thus the annual amount of finished steel produced by each steel worker increased from 85 tons in 1899 to 114 tons by 1919.

The increase in the size of factories is illustrated on Chart No. 15, see page 62.

Chart 15.

GROWTH OF UNITED STATES MANUFACTURING ESTABLISHMENTS

	1859	1899	1919
Average Product	\$ 13,429	\$ 54,969	\$ 215,157
Average Workers	9.34	20.49	31.36

By 1919 10,414 large factory establishments amounting to but 3.6% of the total number, employed 56.9% of the total number of wage earners and manufactured 67.8% of the total products according to value.

Westward Movement of Manufacturing

In 1850 the estimated center of manufacturing in the United States was located near the center of Pennsylvania, about 41 miles northwest of Harrisburg. By 1890, the center had moved westward 225 miles to the center of Ohio, at a point a few miles southeast of Canton. During this same period the center of population shifted also westward 243 miles. Between 1899 and 1919, the center of manufacturing again moved westward another 72 miles and southward 10 miles to a point just north of Rushsylvania in Logan County, Ohio; the center of population also shifted westward about 49 miles.

This westward movement of manufactures was caused by the settlement of the West, which had labor and a market, and by the desire of manufacturers to be close to their raw materials. The development of manufactures in these Western areas was retarded by the scarcity of labor and capital in these new communities, and also by the lack of adequate transportation facilities.

In spite of this westward shift, the Northeast remained the most important manufacturing region of the United States, but it declined in relative importance. Thus in 1860 the Northeast accounted for 71% of the nation's manufacturing employment, but by 1899 the figure had dropped to 52.1%, and in 1919 to 45.5%. The Midwest registered the greatest gains, increasing its percentage of the nation's total manufacturing employment from about 16% in 1860 to 28.4% in 1899, and to 31.8% by 1919. The Far West's percentage also rose from 3.5% in 1899 to 6.0% by 1919, while that of the South registered a slight decrease from 15.9% in 1899 to 15.7% in 1919. (See Chart No. 13, page 60; also Chart No. 4, page 46 for the 1860 figures; and Chart 14, page 60 for regional increases in population, 1899-1919).

The Beginnings of Industrial Research

As the manufacturing processes became more complex, serious technological problems arose. In the 1880's industry thus began occasionally calling in trained scientists to solve specific industrial problems as they were encountered in production. The real leader in establishing organized industrial research in the United States, however, was the Federal government, with the Departments of Agriculture and Interior making the pioneering efforts in this field. The Bureau of Fisheries, established in 1871, conducted a series of studies that were of great value to the fishing industry. In 1879 the United States Geological Survey was founded and began producing a series of scientific reports that contained information of the utmost use to the mining industry. The Division of Forestry was established in 1885 and conducted a series of scientific studies on American forests that contained information of great use to the lumber industry. The U. S. Biological Survey was also established in 1885 and began its study of animal life.

The Hatch Act of 1887 set up agricultural experimental stations that through their scientific work were able to revolutionize American agriculture. The Federal Bureau of Standards was founded in 1901 and the U. S. Bureau of Mines in 1910.

Observation of the work of these government laboratories, as well as that of technical schools and universities, finally led private industry to the point where they began to see the tremendous advantages and great ultimate profits that could result from large-scale organized research work in industrial fields. Headed by such firms as the Bell Telephone System, the Du Pont Company, General Electric, and the Eastern Kodak Company, at least 50 companies set up important large research laboratories between 1900 and 1913. By 1913 these private industrial research centers employed approximately 1,000 scientists.

In addition to basic research, every step of the manufacturing process, including the managerial, labor, and production functions, were also submitted to intensive study in an effort to reduce costs of production by eliminating waste of material, effort, and time. The most important of these industrial engineers was Frederick W. Taylor, who began his studies at the Midvale Steel Company near Philadelphia in the 1880's. The first of his influential reports, "A Piece Rate System", was published in 1895. Henceforth Taylor's "Gospel of Efficiency" was applied to every phase of American industry. Manufacturing was machine-tooled with equipment of the greatest precision, which utilized standardized materials to mass-produce a standardized product at a high rate of speed. Every step of production was simplified and specialized so that labor and workmanship also became a part of this system of interchangeable parts.

Corporations, Laissez-faire, and the Era of Consolidations

Corporations had been utilized in industry prior to 1860; but because of the huge sums of capital generally required in manufacturing, they now became the dominant form of business organization in the industrial world. While individual proprietorships and partnerships continued to be more numerous than corporations, these older forms declined greatly in importance. Thus by 1919, while corporations accounted for only 31.5% of the total number of industrial establishments, they employed 86% of all the wage earners and produced 87.7% of the total value of manufactured products.

As in the previous periods of American history, the energy, ambition, and desires of individuals to make money through private enterprise were relied upon to devise, develop, and conduct the nation's industry. Laissez-faire prevailed in the industrial world and man was invited to strive with man and company to war with company in a competition that was guided only by the "laws of the jungle". From this "reign of competition" it was believed that even though some "weaker" firms might go into bankruptcy, the general public would still benefit from the increased production, better facilities, improved services, and cheaper prices arising from this competition. With such high prizes at stake, the business ethics of this period were not high.

The competition in the period 1861-1893 was the most violent that the United States has ever witnessed. The logical outcome of Laissez-faire and economic Darwinism was, of course, monopoly. By 1900 the surviving "stronger" members of the industrial world had achieved this logical but publicly unintended goal.

The efforts of businessmen to survive gave rise to new forms of industrial organizations that were all related to the combinations of rival companies into units for the purpose of eliminating or reducing competition, either by controlling production or by setting prices for goods. These great combinations, which appeared simultaneously both in Europe and the United States, took the form of industrial "pools", "trusts", holding companies, "communities of interest", and mergers.

The panic of 1873, in which the "fit" and "unfit" alike perished, appears to have led surviving manufacturers to make their first real efforts to limit competition by means of "pools". Pools were agreements between rival companies in the same industry whereby production was divided among the contestants according to a mutual plan, thereby establishing "steady prices". Brief periods of industrial peace followed each pool until one of the companies believed itself to be in strong enough position to disregard the terms, thus launching a new war. Pools as a means of combination has serious legal defects. When the terms were broken the injured members could not resort to

courts for enforcement or damages, because under law pools were illegal. Pools generally went out of style in 1887.¹

The "trust" was devised in the 1880's to overcome the legal deficiencies of the pool as a method of combination. Under a trust agreement the stockholders in the rival companies deposited a controlling portion of their company's stocks with a board of trustees and received trust certificates in return. The trust form, which at first appeared to be legal, represented an actual consolidation of the rival companies, as the trustees were given absolute power over member corporations and were able to set production and prices. The trust form of combination reached the height of its popularity between 1887 and 1897.²

Holding companies were invented to take the places of trusts, when these latter devices were found to be illegal. A holding company was an organization created to dominate other corporations by owning or controlling a portion of their stock, and they were virtually indistinguishable from a trust. The holding company movement was greatly facilitated by state laws, particularly those of New Jersey, West Virginia, Delaware, and Maine, that permitted the organization of purely financial corporations with few restrictions on their powers. This device enabled industrial trusts to be legally reorganized as holding companies. The holding company movement had its greatest vogue between 1897 and 1904.

The final refinements in achieving consolidation included "communities of interests" and mergers, which generally came into style in the period after 1904. Under a "community of interest" arrangement, a corporation brought a sufficient quantity of another company's stock to make its influence felt and the director of one company might also sit on another's board. These interlocking directorates then proceeded to "harmonize" the interests of the various corporations for monopoly purposes. Amalgamation or merger involved the outright purchase of one corporation by another.

Between 1887 and 1897 there were 86 industrial combinations formed which represented a total capitalization of \$1,414,293,000. But the era of great consolidation occurred between 1898 and 1904 when a total of 236 major industrial trusts or holding companies were formed, which represented an aggregate capitalization of \$6,049,618,223 and united 5,288 distinct plants.

¹The Interstate Commerce Act of 1887 declared railroad pools to be illegal, a view that was adopted by the U. S. Supreme Court in 1897.

²The Sherman Anti-Trust Act of 1890 declared trusts to be illegal among companies engaged in producing goods entering into interstate commerce. The Federal government between 1890 and 1899, however, brought only 18 such cases into the court, and won 10 and lost 8 of these cases. The U. S. Supreme Court finally applied the law in cases decided in 1897 and 1898.

By 1904, in addition to these industrial consolidations, approximately 1,336 public service corporations (the telegraph, telephone, gas and electric power and light companies) had been formed into consolidations that represented a combined capitalization of \$3,735,456,091. By that date 95% of the nation's railroad mileage, which represented about 80% of the \$9,397,363,907 railroad capitalization, was also consolidated into the hands of six powerful financial groups. The total capitalization of consolidations in all fields in 1904 is estimated to have exceeded \$20,000,000,000. These gigantic consolidations largely eliminated the ruthless competition of the earlier period and established relatively inflexible prices. Competition was henceforth limited to a non-price basis. This series of consolidations occurring between 1887 and 1910 were largely guided by the hands of the investment banker or finance capitalist, whose story now follows.

The Rise of Finance Capitalism: The Investment Bankers

The period 1890-1915 saw a fundamental revolution take place in American economic life: The shift in the control of the economy from the mercantile and industrial capitalists to the finance capitalists. Unregulated and virtually unhindered, finance capitalists achieved a power hitherto unknown in American history. This shift of power came when the expansion of industry reached a size beyond the resource of individual entrepreneurs or banks, and when the movement for consolidation of industry reached a stage where the services of a central investment house became essential to handle the finances involved.

The refinancing and reorganization of corporations was accompanied by rich rewards and a share in the future management of the new firms. These services were provided by the investment bankers and were the usual steps to power taken by finance capitalists.

The first important investment banker appears to have been Jay Cooke, of Jay Cooke and Company of Philadelphia; investment banking also appears to have its origins in the efforts made to finance Federal war efforts during the Civil War. The initial attempts to sell U. S. war bonds through regular commercial banks and government agents in 1861 failed.

In 1862 the U. S. Treasury Department contracted with Jay Cooke to dispose of \$500,000,000 worth of U. S. bonds. To sell this tremendous sum in securities, Cooke devised new methods of promotion; he invented the war bond crusade, employed 2,500 aggressive salesmen, and purchased lavish advertising in newspapers, posters, and broadsides, which appealed to the patriotic spirit of the people. Bonds were thus sold to workers as well as to bankers, merchants and capitalists. By early 1864 the 1862 issue was oversubscribed. In 1865 Cooke successfully sold another \$830,000,000 issue of Federal bonds.

After the Civil War railroads needed huge sums of capital to finance construction and expansion. Jay Cooke and Company undertook the task of selling large issues of railroad stock and bonds in the same manner as they had disposed of U. S. securities. In 1869 he contracted with the Northern Pacific Railroad Company to sell \$200,000,000 of their securities to finance the construction of this transcontinental line. By 1870-71 he had also coalesced a group of 8 firms into a syndicate which agreed to take large issues of Pennsylvania Railroad stocks and bonds; the syndicate also agreed to purchase (or underwrite) any of these securities which they could not sell in the open market. Cooke was successful in these underwriting efforts until September, 1873, when a general collapse of the economy wiped out his banking house.

Other investment bankers now stepped forward to take Cook's place; among these were Kuhn, Loeb, and Company, founded in 1867, and the partnership of J. P. Morgan & Company. John Pierpont Morgan, the greatest of the investment bankers, had come to the United States from Great Britain in 1857. In 1875 Morgan reorganized the Erie Railroad after that bankrupt line had escaped from the grip of Daniel Drew and Jay Gould. In 1878 Morgan, along with Kuhn, Loeb and Co., and Henry Villard of the Northern Pacific, played a leading role in forming the Edison Electric Light Company. Morgan's first great coup, however, occurred in 1879, when he helped save control of the New York Central Railroad for William H. Vanderbilt by successfully selling 250,000 shares of Central stock in Great Britain. Morgan received \$3,000,000 for these services and also a seat on the Central board of directors. In 1892 Morgan helped Henry Villard form the General Electric Company.

Following the great Panic of 1893, Morgan next reorganized the Baltimore and Ohio, the Erie, and the Southern Railway companies. In 1895 he assisted James J. Hill of the Great Northern obtain control of the bankrupt Northern Pacific, thereby establishing a railroad monopoly in the Pacific Northwest.

Morgan then turned his attention to the field of industrial consolidations. In 1901 he played the key role in forming the gigantic U. S. Steel Corporation, capitalized at \$1,400,000,000. He received \$62,500,000 for these services, a seat on the board of directors, and henceforth dominated this great corporation.

The investment bankers' control over the business world was also facilitated by a simultaneous penetration into the nation's sources of credit. J. P. Morgan & Company was a private bank with sizable resources, but the extent of his operations became so great that he quickly reached out to gain control of the even larger resources of the leading banks of New York City. Morgan began by acquiring direct control of the National Bank of Commerce through stock purchases, he then bought part-ownership in the First National Bank. With the resources of these two banks, and by means of stock ownership and interlocking

directorates, he secured control of the Astor, Chase, Hanover, and Liberty National banks by 1903. By 1913 the 9 New York City banks under Morgan's domination controlled about \$2,000,000,000 in combined assets.

As finance capitalists gradually took over control of the banks, the center of banking interest shifted increasingly from commercial to investment banking. The banks themselves became more interested in buying bonds for their own portfolios and they naturally purchased them from the investment bankers who owned the banks. Loans to brokers and individual investors and speculators also became an increasingly important part of the banking business. In 1908 the banks themselves entered the investment business and began to sell securities.¹

Another great source of money was the insurance companies. The three largest companies in New York City, New York Life, Mutual of New York, and Equitable, had combined assets of more than \$1,019,153,000 in 1912, and also about \$70,000,000 in new money to invest every year. Morgan therefore undertook to integrate these sources of money into his empire. By 1909 he had successfully established control over these three great companies by means of interlocking directorates.

Morgan, of course, was not the only great power in the investment banking world. By the 1890's the huge profits of the Standard Oil Company trust were no longer needed in the petroleum refining business. Under the leadership of William Rockefeller and his associates this wealth began to penetrate into railroads, mining, public utilities, and investment banking. Closely allied with the investment house of Kuhn, Loeb & Company and the National City Bank of New York, the Rockefeller interests also secured control of the Second National Bank and the Farmer's Loan and Trust Company, also in New York City. This process has been described as a unique example of an industrial capitalist being transformed into a finance capitalist.

The rise of finance capitalism thus represented a rapid and tremendous concentration of capital, which in effect established a monopoly over investment monies and credit. By 1913 it was estimated that the four principal allied financial institutions in New York City, popularly known as "the money trust," held 341 directorships in 112 banks, transportation, public utility, and insurance companies, whose aggregate resources amounted to \$22,245,000,000. The four great investment banking houses of this period were J. P. Morgan & Co., Kuhn, Loeb & Co., Lee Higginson & Co., and Kidder, Peabody & Co., all of New York City.

¹As has been noted on page 59, the percentage of banking funds invested in industrial, foreign, and government securities increased from 18% in 1890 to 27.7% by 1910.

The Chief Industries of the United States, 1900-1919

Many of the industries that had been important in the pre-1860 period continued to maintain their place among the chief industries of the United States in the 1900-1919 period. Among this type were iron and steel, machinery, lumber, flour milling, men's clothing, boots and shoes, and woolen goods. Other industries, such as liquors and leather, declined from leading ranks in the 1900's. New industries, such as slaughtering and meat-packing, printing and publishing newspapers and periodicals, car and general shop construction by steam railroad companies, automobiles, and petroleum, appeared to take their place. The rank and value of the chief industries of the United States in 1900 and 1914 are shown on Chart No. 16, page 70.

Railroads

In the period following the Civil War railroads became the most important industry of the United States, as well as the dominant means of transportation. It was an era of almost unbelievably rapid expansion and construction: Mileage increased from 30,626 in 1860 to 257,569 miles by 1915 (See Chart No. 10, page 54). The building and operating of railroads tremendously stimulated the iron and steel industry and also the mining of coal.

The demands for capital to finance this railroad development were insatiable. In 1860 the total combined value of railroad stocks and bonds was \$1,849,481,000; in 1897 it was \$10,635,000,000, and in 1915 it totaled \$21,128,000,000. The scale of business also expanded vastly. Total traffic earnings rose from \$334,000,000 in 1867 to \$1,122,090,000 in 1897 and reached \$2,956,193,000 in 1915. Dividends also increased from \$32,125,000 in 1867 to \$87,111,000 in 1897 and these reached \$328,478,000. In 1910 railroads employed 1,700,000 people or about 4.4% of the total labor force.

After 1865 promoters such as Jay Cooke perfected methods of selling bonds and watered stocks¹ to the public in order to obtain funds both for railroad construction and to make money for themselves. These practices introduced an era of speculation into railroading in which legitimate chance-taking shaded imperceptibly into criminal fraud.

¹Watered stocks were stocks that had a printed par value but which exceeded the actual value of the assets of the company and therefore often represented no value at all.

Chart 16

RANK OF THE 11 LEADING INDUSTRIES OF THE UNITED STATES IN 1860, 1900, and 1914

Rank	Industry (1860)	Value of Products (in 000's)	Industry (1900)	Value of Products (in 000's)	Industry (1914)	Value of Products (in 000's)
1	Flour and Meal	\$ 248,580	Iron & Steel, Steel Works & Roller Mills	\$ 803,968	Slaughtering & Meat Packing	\$ 1,651,965
2	Cotton Goods	107,338	Slaughtering & Meat Packing	790,253	Iron & Steel, Steel Works & Rolling Mills	918,665
3	Lumber	104,928	Foundry & Mach.	644,991	Flour Mill & Grist Mill Products	877,680
4	Boots and Shoes	91,889	Lumber & Timber Products	566,622	Foundry & Machine Shop Products	866,545
5	Men's Clothing	80,331	Flour Mill & Grist Mill Products	560,719	Lumber & Timber Products	715,310
6	Iron (Cast, forged rolled, wrought)	73,175	Clothing, Men's	415,256	Cotton goods	676,569
7	Leather	67,306	Printing & Publishing Newspaper & Periodicals	347,055	Cars & General Shop Construction & Repairs by Steam R. R. Companies	510,041
8	Woolen Goods	60,685	Cotton Goods	339,200	Automobiles	503,230
9	Liquors, spirituous	56,589	Carpentering	316,102	Boots & Shoes	501,760
10	Machinery	52,010	Woolen Manufactures	296,990	Printing & Publishing Newspapers & Periodicals	405,906
11	Carriages, Wagons & Carts	35,553	Boots and shoes	261,029	Bread & Other Bakery Products	491,893

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The operations of railroads also fell into the hands of individuals who were less concerned with the prosperity of the railroads or the welfare of the communities served than with making money for themselves. This they could do most rapidly through the stock market, where the stocks and bonds of the railroad corporations were bought and sold, and where the main interest was not traffic but the manipulation of stock prices and the issuing of "watered" stock. A classic example of such manipulation was provided by the operations of Daniel Drew, Jim Fisk, and Jay Gould with the Erie Railroad from 1864 to 1873.¹ By 1883 it was estimated that of the \$7,500,000,000 indebtedness of the railroads, about \$2,000,000,000 represented "watered" securities. It is small wonder that the cycles of business depression which swept the nation in 1873 and 1893 were in part caused by the overexpansion of the railroads and by their financial practices.

Cornelius Vanderbilt emerged in 1864 as the prototype of the new railroad capitalist who was to dominate the railroad world during this period. He united a group of small and struggling railroads in New York State into a vast system. In 1869 Vanderbilt consolidated these holdings into a new corporation called the New York Central and Hudson River Railroad, and issued \$42,500,000 in watered stock. By his death in 1877, Vanderbilt had accumulated a personal fortune of \$100,000,000 and formed a major railroad empire.

The competition among railroads was the most violent in that era's bitter economic warfare because of the very nature of railroading. Investments in roadbeds and terminals were fixed; a certain minimum payment was necessary, whatever the extent of operations, and operating expenses did not increase proportionately to the amount of traffic carried. Hence the railroads were desperately eager for traffic volume and would continue operations under any circumstances which promised some return. Deficits on some traffic would be borne if they could be made up on others; periods of extended loss would be suffered in the hope of future profits. The railroads therefore engaged in bitter rate wars for the purpose of diverting to their own lines as much of the existing traffic as was possible. In areas that were safe from competition the rates were set at all the traffic would bear. In disputed territories, however, rate cutting, the rebate,² and discrimination between long and short hauls, were applied with vicious efforts on the businesses and communities involved. The disastrous economic consequences of this intensive competition on the railroads soon became apparent.

¹Other excellent examples include the operations of Jay Gould with the Union Pacific, Kansas Pacific, and Denver and Rio Grande, 1873-1883; and J. P. Morgan and C. S. Mellen with the New York, New Haven, and Hartford railroad in 1903.

²The rebate was a reduction from the published tariffs which railroads granted to corporations or individuals in order to secure their traffic patronage.

The first great "pool" in the United States was devised by three railroads operating out of Chicago in 1870 to divide the traffic among them and to end rate cutting wars. The pool was rapidly adopted by railroads in other sections of the country and also in manufacturing. But as has been noted, the pool could not be enforced in court and the evils of this system of unlimited competition could not be checked, for no one man or group of men was yet able to impose a dictatorship upon the railroad world.

In 1893 the greatest financial storm the United States had yet experienced shook the nation to its economic foundations. Five hundred and fifty-four banks and 156 railroads went into bankruptcy in that year. Into this whirling vortex plunged some of the nation's greatest railroads: the Union Pacific, the Northern Pacific, and the Santa Fe in the West; the Erie and Baltimore and Ohio railroads in the East; and 11,000 miles of railroad in the South.

This general chaos of bankruptcy afforded a great opportunity for an era of actual consolidations. As railroad after railroad was reorganized by the finance capitalists, the stronger roads invested in the weaker one or provided the funds necessary for financial readjustment. Master railroad chiefs, such as Edward H. Harriman and James J. Hill, completely rebuilt the original flimsy construction of the consolidated railroads and the "Gospel of Efficiency" was applied to every phase of railroading.

Between 1893 and 1900 Harriman thus obtained absolute control of the Union Pacific. In 1901 he next established control over the great Southern Pacific system, and by 1905, had created a "community of interest" control over the Santa Fe,¹ thus forming a vast integrated railroad empire west of the Mississippi. In 1893-95, James J. Hill, master of the Great Northern railroad, working with J. P. Morgan and Company, obtained control of the bankrupt Northern Pacific; these lines were "harmonized", and Hill thus also created a vast railroad monopoly in the Pacific Northwest. In April, 1901, the Harriman and Hill empires began a struggle to obtain control of each other by acquiring stock in disputed companies. By May, 1901 it was evident that unless the Harriman and Hill-Morgan interests made peace, the number of bankruptcies on Wall Street would be appalling.

Peace took the form of the Northern Securities Company, a holding company with a capital stock of \$400,000,000 that was chartered in the State of New Jersey in 1901. This company established a community of interests between the two rivals, who controlled 41,000 miles of railroad, and effectively limited competition west of the Mississippi.²

¹Harriman is another example of a railroad capitalist who became transformed into a finance capitalist.

²The United States Supreme Court ordered the dissolution of the Northern Securities Company in 1904, but this decision did not restore competition.

The degree of nationwide consolidation achieved by 1906 is revealed by the following figures: of the 228,000 miles of railroad in the country that year; about 95% were controlled by seven groups, which also controlled 85% of the total railroad earnings. These great rail consolidations included: the Vanderbilt-Morgan roads, with over 22,500 miles, dominating the northern routes from New York to Chicago; the Pennsylvania Railroad Company's interests (20,000 miles) controlling the railroads west from Pennsylvania and Maryland; the J. P. Morgan railroads (18,000 miles), dominating the Southeast; the Gould lines (17,000 miles), and the Rock Island system (15,000), controlling the Mississippi Valley. The Hill-Morgan lines (21,000) miles had a monopoly in the Pacific Northwest and the Harriman interests (25,000 miles) had a monopoly in the central west and the southwest. These seven groups were actually united by interlocking directorates and by investment houses into four super groups. In this manner competition was eliminated or reduced in the railroad world.

Car and General Shop Construction and Repairs by Steam Railroad Companies

Railroading was so important in this period that the construction and repair of railroad equipment by steam railroad companies became one of the chief manufacturing industries of the United States. About 1880 this type of construction by railroad companies began to become important. The number of locomotives increased from 15,618 in 1876 to 30,140 by 1890 and rose from 37,663 in 1900 to 66,502 in 1915. Similarly, the number of freight and passenger cars rose from 399,524 in 1876 to 945,311 by 1890 and increased from 1,400,244 in 1900 to 2,397,383 in 1915. In 1900 this industry, producing goods valued at \$444,022,000. was the 14th ranking industry; by 1914, with goods valued at \$510,041,000 it was in seventh place, and by 1919, with products valued at \$1,279,235,000, it was the tenth ranking industry of the United States.

Iron and Steel Industry

Until 1865 iron was the chief metal in use, but new technological changes then so reduced the costs of producing steel that the United States entered upon the "Age of Steel".

The great events that led to this change occurred in 1856-57 when two men, Henry Bessemer of Great Britain and William Kelley of Kentucky, working independently of each other, invented a method since known as the Bessemer process. In this process a blast of cold air was forced through the molten pig iron to oxidize the foreign substance.

After this step the necessary quantities of carbon and other elements could be introduced so as to make the desired qualities of steel. The Bessemer process was well suited to the use of high grade iron ore. As bituminous coal, chiefly in the form of coke, could be used to smelt the iron, the iron and steel industry was able to distribute itself across the nation. Until 1908 the Bessemer process was the chief method of producing steel in the United States.¹

The first Bessemer-Kelley steel in the United States was produced at Wyandotte, Michigan, in 1864 by William Durfee. The second such plant, owned by Alexander M. Holley, began operations at Troy, New York, in 1865. The first steel railroad rails were rolled at the Cambria Iron Works at Johnstown, Pennsylvania in 1867.

The Bessemer process, however, could not be used on low-grade iron ore that had a high phosphorous or sulphur content. The open hearth or Siemens-Martin process, so-named after its French and German inventors, was introduced into the United States in 1868 by Abram S. Hewitt at Trenton, New Jersey. Pig iron, scrap iron, old steel, and ferromanganese were piled into the shallow bowl of the furnace, and cooked by heat which was located outside of the molten mass. This process took longer than the Bessemer method, but frequent samples of the steel broth could be taken, and it was thus possible to supervise accurately the course of operations; open hearth steel was also tougher than the Bessemer product. At first, however, there was little demand for the open-hearth steel because of its greater cost and limited use. About 1879 further technical improvements were introduced which increased the capacity of open-hearth plants and thus reduced the costs. Because of the superiority of the steel product and due to the fact it could use a greater variety of iron ore, the open-hearth method of production finally exceeded that of the Bessemer method in 1908.

Large scale production of steel began in the United States in the early 1870's, and the product found an excellent market in the expanding railroad network.² In 1880 the United States surpassed Great Britain in the production of Bessemer steel and in 1900 also in the production of open hearth steel.³

Pennsylvania, the leading pig iron producing state in 1860, was able to retain this dominant position in the development of the new steel industry in spite of the fact that the early pioneering efforts in the Bessemer process were made in Michigan and New York. This was due

¹In 1892 the United States produced 4,168,000 tons of steel by the Bessemer method as compared with 670,000 tons by the open-hearth method.

²By 1910 the new automobile industry was also using large quantities of steel.

³United States steel production in long tons: 1867-19,694; 1870-68,750; 1880: 1,247,335; 1890-4,277,071; 1900-10,188,329; 1910-26,094,919; 1915-32,151,036; and 1919-34,671,232 tons.

to the fact that the iron ores of the Great Lake mines could be cheaply transported by water to the steel furnaces at Pittsburgh, where there was already available abundant quantities of low-cost fuel such as coke and natural gas. Pittsburgh thus became the steel city of the United States, and by 1904 was producing 63.8% of the pig iron and 53.5% of the steel made in the United States.¹

The titan of the new American steel industry was Andrew Carnegie, who had come to this country from Scotland and worked his way up to the position of private secretary to the president of the Pennsylvania Railroad Company. Carnegie invested his money in the Union Iron Mills, which erected its steel furnace at Pittsburgh in 1870. In 1874-75, Carnegie and his associates next built the Edgar Thomson Steel Works about 12 miles from Pittsburgh. Designed by the great steel engineer, Andrew L. Holley, this was the largest and most efficient Bessemer steel plant in the nation and it produced a large volume of steel at a low cost. The company sold steel rails to railroads and received rebates on its shipments from the competing Baltimore and Ohio and Pennsylvania railroads. Carnegie also eliminated competitors by buying up rival steel companies. In the 1880's he began to integrate his steel operations by acquiring ownership or control of the supplies of fuel and ore used in making steel, and also of the transportation system that brought the raw materials to his furnaces.

In 1871 Henry Clay Frick had begun acquiring coal lands in the Connellsville area of Pennsylvania and building ovens to produce coke. By 1895 Frick owned about 40,000 out of the 65,000 acres of this coal region and baked about 80% of its coke. Carnegie bought into the Frick Company, and in 1889 Frick became one of the directing geniuses of the Carnegie organization. Railroads were built to connect the various Carnegie steel plants and coke ovens. Long term leases were also secured Mesabi ore-bearing lands in the Lake Superior region. When rates were raised by Lake carriers for transporting the iron ore, Carnegie established his own fleet of ore carriers and built a railroad running from Pittsburgh to Lake Erie to link up with the fleet.

Other steel companies, such as the Federal Steel Company, incorporated in 1898 and headed by Elbert H. Garry, and the National Steel Company, initiated Carnegie to the best of their abilities by acquiring control of their fuel and ore supplies and transportation systems. By 1890 the Carnegie group produced from 30% to 50% of the nation's steel and the Federal Steel Company about 30%.

¹U. S. pig iron and steel production in 1904, by region:

Districts	Pig Iron	Steel
Pittsburgh	63.8	53.5
Eastern	13.8	25.7
Great Lakes	11.4	16.1
Southern	8.8	2.9
Far Western	2.2	1.8

The steel finishing companies, which converted the semi-finished steel produced by Carnegie, Federal, and National Steel into manufactured products, also began to integrate by acquiring coal and ore lands, and next planned to erect their own steel producing plants, thus rendering themselves independent of the larger steel companies.¹

Andrew Carnegie countered in 1900 with an announcement that he was planning to build his own wire-rod, sheet and tube-making mills. This declaration threatened the beginning of a large-scale competitive war that would cut the prices and profits of all makers and hence was sufficient to bring all steel men and the investment bankers to the peace table.

Their solution was the formation of the United States Steel Corporation, which was incorporated as a holding company in New Jersey in 1901. J. P. Morgan and Elbert H. Gary were the leading figures in establishing this gigantic corporation, which had a capitalization of \$1,400,000,000 and fully integrated the interests and resources of the 9 rival steel companies. Not only was competition thus eliminated, but the incorporators also made money by issuing an estimated \$726,846,817 in watered stock.

United States Steel continued to strengthen its position as the dominant firm in the steel industry. In 1907 it acquired the Tennessee Coal, Iron, and Railroad Company, with its vast reserves of coal and iron ore in the Birmingham-Chattanooga area, and also erected large new mills at Gary on the shores of Lake Michigan. Producing 60% of the nation's steel, U. S. Steel Corporation set the prices for American steel; these prices were adopted by the smaller rival steel companies.

The iron and steel industry was the first ranking manufacturing industry of the United States in 1900, producing products valued at \$803,968,000 and employing 222,490 people. By 1919 it was the second ranking industry, producing products valued at \$2,828,902,000, and employing 416,748 workers.²

¹By the 1890's the American Steel and Wire Company of New Jersey, headed by John W. Gates, had established a monopoly through its control of patents. It produced from 75 to 80% of the iron rods, 65 to 90% of the wire nails, and 100% of the barbed wire in the United States. The American Tin Plate Company of New Jersey similarly produced nearly 100% of American tin plate. Other important finished steel firms included the American Steel Hoop Company and the National Tube Company.

²Rise of the Iron and Steel Industry, 1900-1919:

	No. of Plants	Capital	Workers	Value of Products
1900	668	\$ 513,392,000	222,490	\$ 803,968,000
1910	654	1,492,316,000	278,000	1,377,152,000
1919	695	3,458,935,000	416,748	2,828,902,000

The Far West Steel Industry in 1919, had:

26	\$ 16,013,506	5,412	23,739,213
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Foundry and Machine Shops

Already one of the leading industries of the United States in 1860, the foundry and machine shop industry increased in importance as the use of machinery was extended and expanded in every phase of manufacturing. The manufacture of machinery by machine tools also became more complex, precise, and automatic and this was made possible by the standardization of parts and the use of mass production techniques. By 1900 machine tools to produce machines, such as lathes, grinders, boring mills, drill presses, planers and milling machines had been vastly improved. One of the most important improvements effecting the production of machinery was the use of Taylor-White high-speed carbon tool steel for cutting metal, which more than doubled the production of machine tools. This research for devising carbon steel was conducted by Frederick W. Taylor and J. M. White at the Bethlehem Steel Company and the results of their findings were published in 1906 in a paper entitled "The Art of Cutting Metal."

By 1900 foundry and machine shop products ranked as the third industry of the United States, producing products valued at \$644,991,000 and employing 414,000 workers. By 1919 it was in third place, with products valued at \$2,282,251,000 and 998,000 wage earners.¹

The Automobile Industry

The manufacture of automobiles became one of the important American industries between 1910 and 1919.

In 1877, an American lawyer and inventor, George B. Seldon of Rochester, New York, built a gasoline engine and made drawings of a carriage to be driven by a three-cylinder engine. He applied for and received a patent for a gasoline driven vehicle in 1895.

Several other American inventors developed their own automobiles in the early 1890's. In 1892 Charles E. Duryea built a gasoline-propelled car and began producing this automobile at Springfield, Massachusetts, in 1895. Henry Ford built his first gasoline car in 1892-93. Hiram P. Maxim, Elwood Haynes, Ransom E. Olds, and Alexander Winton also all devised their own cars. In 1899 there were 80 establishments in the United States building cars to order and they produced a total of 3,700 motor vehicles that were valued at \$4,750,000. This new industry underwent a period of intensive competition: between 1903 and 1926 a total of 181 companies were formed to manufacture automobiles; by 1926 only

¹Foundry and Machine Shop Industry in the Far West:

	No. of Establishments	Capital	Workers	Value of Product
1900	474	\$ 14,444,215	9,532	\$ 20,524,334
1909	955	50,657,000	17,499	45,619,000
1919	1,124	76,769,697	24,239	108,112,180

44 of these firms were still in existence.

The giant of this new industry was Henry Ford, who began his real production at Detroit in 1903, with an investment of \$28,000 in cash in his third such firm. Ford concentrated on devising a standardized car that was built of interchangeable parts and could be mass-produced at low cost. In 1908 he introduced the Model-T, a light four-cylinder touring car of 20 horsepower that could carry 5 passengers and he was to manufacture this same type of car without important modification until 1927.¹ In 1913 he adopted the moving assembly line and thereby achieved a daily capacity of 1,000 cars and actually produced more than one-half of the 397,000 automobiles built in 1913. These mass-production techniques allowed Ford to reduce the base price of the Model-T from \$950 to \$250, thereby putting the car within the reach of a much greater number of purchasers. Of the 1,363,521 passenger motor vehicles manufactured in 1919, the Ford Motor Company produced about 800,000.

The second major automobile company to appear in this period was the General Motors Company, which was organized by William C. Durant in 1908. Durant had started by purchasing a wagon factory and converting it into the successful Buick Company. With these profits he then obtained control of the Cadillac, Oldsmobile, and Oakland Companies, and united them all in 1908 into the new General Motors firm. By 1921 this company produced about 15% of the nation's automobiles.

By 1905 Detroit, Michigan, had clearly become the center of the new automobile industry. This was due to its location near producing centers of wood, iron and steel,--the materials utilized in making automobiles, and also to the fact that Detroit had many small cart and wagon shops which were able to specialize in the production of automobile parts, which were finally assembled into cars in the industries' central factories.

By 1914 the automobile industry was the eighth ranking industry of the United States and produced products valued at \$503,230,000. In 1919 it was the third ranking industry and manufactured products valued at \$2,387,902,000. The capital invested in the industry in 1919 totaled \$1,015,443,000.

¹Between 1908 and 1926 Ford made a total of 15,000,000 Model-T cars.

The Petroleum Refining Industry

As has been mentioned, the history of the petroleum industry began with the drilling of the oil well at Titusville, Pennsylvania, in 1859 and by 1865 the value of petroleum produced reached \$16,000,000 a year. The large scale development of this industry, however, was at first severely retarded by the lack of transportation facilities and of efficient refining machinery. Originally the oil was placed in barrels and these were carried on barges down the rivers to the cities. By 1866 the railroads had devised the wooden tank car and in 1870 the iron tank car made its appearance.

In 1865 Samuel Van Syckel built a five-mile pipeline through which pumps pushed the crude oil, and by 1874 the pipeline of the Tidewater Pipe Company successfully carried crude petroleum over the Alleghany Mountains. The pipeline method of transporting oil was so economical and flexible that there were 18,000 miles of such lines in operation by 1900.

Further progress was also made in refining techniques. The petroleum of the important Lima-Indiana oil field, opened in 1885, contained a high percentage of sulphur, which gave its oil and products a vile smell. Herman Frasch, a German-born chemist, was employed by the Standard Oil Company for two years, during which period he successfully devised a method for refining the oil and eliminating the odor.

In the 1860's small petroleum refineries quickly appeared in New York City, Philadelphia, Baltimore, Pittsburgh, the oil regions, and Cleveland. John D. Rockefeller, the future giant of this industry, entered the business at Cleveland in 1862 with an investment of \$4,000. In 1867 he united the refineries of five small companies into the firm of Rockefeller, Andrews & Flager. Additional capital was soon required and the company was again reorganized in 1870 into the Standard Oil Company of Ohio, with an authorized capital of \$1,000,000. The refining capacity of the firm's Cleveland plant was about 600 barrels a day, or about 4% of the total oil refining capacity in the United States.

In 1872 Rockefeller approached the Pennsylvania, the Erie, and New York Central railroads and demanded and received large rebates on all petroleum that his company shipped over their lines. In addition, the railroads agreed to supply him with information on oil shipments made by rival companies over their lines. This agreement gave Standard Oil an important economic advantage over rival refining companies and Rockefeller was able to buy out many of his competitors. The construction of oil-carrying pipelines next threatened to undermine Standard Oil's advantageous agreement with the railroads; Rockefeller therefore quickly entered the pipeline business in the 1870's. By 1879 most of the pipelines in the Appalachian Oil Field were brought together in the United Pipe Lines Company, in which the Standard Company held the controlling interest. Similar pipelines constructed by rival

companies were also acquired by Standard in the 1880's. Standard's - monopoly of rail and pipeline transportation was used as a major two-edged sword against both the oil well owner as well as the independent refiners to set prices.

By 1879 Standard controlled between 90 and 95% of the petroleum refining capacity of the nation. This dominance was further extended in 1882 by the establishment of the Standard Oil "trust". Under this agreement the stock holdings of 41 companies were placed in the hands of 9 trustees, who dictated the policies of the constituent companies. A monopoly was thus established and prices set for refined petroleum products.¹

In an effort to restore competition, the state courts of Ohio ordered the Standard Oil trust broken up into 20 separate companies in 1892. By 1899, however, Rockefeller had succeeded in restoring monopoly conditions.

The Standard Oil Company of New Jersey, originally established in 1882, was reorganized as a holding company in 1899. Its capital stock was increased from \$10,000,000 to \$110,000,000 and the new stock issued in exchange for the stock of the 40 constituent concerns. Standard Oil of New Jersey now held practical monopolies of pipelines in the Appalachian, Lima-Indiana, and Mid-Continent oil fields. By 1904 it controlled 40,000 miles of pipelines as against 550 miles by its only rival. It also produced about 33.5% of all the crude petroleum in the United States and 87% of all the refined products. In 1904 it marketed 85% of the American products in this country and 90% of that sold abroad. Standard Oil's earning capacity increased from \$8,000,000 in 1882 to \$57,459,356 in 1905 and its dividends from 5 1/2% in 1882 to 30% in 1898, and these reached 48% in the early 1900's. Between 1882 and 1906 the company distributed more than \$500,000,000 in dividends. Of these earnings and of the accumulated value of the properties of the company, John D. Rockefeller was entitled to more than one-fourth.

In 1911 the United States Supreme Court ordered a dissolution of the Standard Oil Company of New Jersey. This order was carried into effect but competition was not restored as a "community of interest" arrangement had been perfected by various individuals who held controlling stock in the separated companies.

Spurred on by the increasing use of the automobile, the refining of petroleum products emerged as the 7th ranking industry of the United States in 1919. Its products were then valued at \$1,632,533,000.

¹The trust issued \$70,000,000 in trust certificates, of which \$46,000,000 was owned by the trustees.

The Lumber Industry

The lumber industry, one of the chief industries since colonial times, maintained its position during this period as one of the major industries of the United States. Following the Civil War the industry was increasingly mechanized, means of transportation were improved, the important centers of lumbering continued their shift westward and southward, and like other industries, lumbering also went through an era of immense consolidation.

Beginning in the 1880's a number of new machines were invented for use in lumbering and these greatly increased its output. In 1881-82 John Dolbeer of Eureka, California, invented the Dolbeer steam logging donkey, which revolutionized logging in the United States by allowing crews using this steam engine to get huge logs to the rivers, railroads and mills in a shorter time. In 1883 Horace Butlers of Ludington, Michigan, obtained a patent for power-log skidding machinery. This system of transporting logs by wire ropeways was later improved by Spencer Miller and G. Haines Dickinson. The first ground skidder with power was operated in the pine regions near Pitcock, Georgia, in 1896. In 1897 W. A. Fletcher of Kirbyville, Texas, invented the first pine logger.

In 1868-69 James W. Haines of Genoa, Nevada, perfected the V-flume to transport lumber from the mountains to the Comstock Lode. By 1871 this device was also in use in California to move huge redwood and pine logs.

In the 1860's steam towboats were used on the rivers of the Midwest and on the waters of Puget Sound to move huge lumber rafts to the sawmills. On the Pacific Coast special sail and steam schooners were also developed to carry the lumber cheaply from the great mills to the markets. In the 1880's various types of locomotives were designed to meet the special problems of lumbering and railroading became a vital part of the industry. The first Shay locomotive with gears adjusted to give it more power was manufactured in 1885.

The results of these improvements are shown in the number of board feet of lumber produced annually: production increased from 12,755,543,000 feet in 1869 to 35,077,597,000 in 1899, and reached its peak of 46,000,000,000 feet in 1906-1907.¹

¹Lumber production, in board feet: 1879-18,125,432,000; 1889-27,038,734,000; 1910-44,500,000,000; 1915-37,011,656,000; and 1919-34,552,076,000 feet.

The white pineries of the Great Lake States were the chief center of lumbering from the 1880's until 1900, with other important centers developing in the South and the Far West. The abundant stands of pines in the Midwest developed because a whole series of rivers in Michigan, Wisconsin, and Minnesota provided cheap water transport routes to the sawmills and nearby markets. Along with the stands of timber, possession of sites for storage booms and for improvements of navigation became strategic points in the lumber business of this region. From the 1880's through the 1890's Michigan was the chief lumber producing state of the nation. Wisconsin took this lead in 1900 and was replaced by Washington in 1905.

The repeal of the Southern Homestead Act in 1876 opened the forests of the South to unrestricted cutting. Speculators then moved in buying pine tracts for from \$1.25 to \$3.00 an acre and hardwood forests at \$5 to \$10 an acre. Northeastern and Great Lake lumber barons then moved into the South. Nathan Bradley and C. F. Hackley of Michigan acquired about 200,000 acres between them: Daniel F. Sullivan, with 1,730,000 acres, became the lumber king of Florida, and H. J. Lutchter of Pennsylvania held about 700,000 acres in Texas and western Louisiana.

In the Far West, the transcontinental railroads, particularly the Northern Pacific and Southern Pacific, held millions of acres of federal land grants in Washington, Oregon, California, and Idaho, that contained the greatest stands of timber in the United States. After obtaining control of the Northern Pacific in 1895, James J. Hill vigorously advertised the railroad's timber holdings in the Pacific Northwest as against the pinelands of the South in an effort to increase the railroad's traffic. In 1900 there occurred a stampede of Great Lake lumbermen to the Far West and this led to a wave of speculative buying of forest lands in the Far West that had no equal elsewhere in the nation. Tracts of land bought for \$10,000 in 1899 resold for \$110,000 in 1909.

The regional shifts in the centers of the lumber industry are illustrated by the following figures on the nation's lumber production: in 1869, the Northeast with 35.7% of the total production, was the chief center; by 1890's however, the Northeast's share had dropped to 25%, and in 1920 this amounted to only 6.5%. The Great Lake Region, producing 28.2% in 1869, became the chief producing area with 35% by 1880; by 1900 its share had declined to 25%, and in 1920 amounted to only 7.1%. The South became the chief lumber-producing area with 32% in 1900, this share increased to 44.8% in 1910, and then declined to 42.6% by 1920. The Far West, with only 3.4% in 1880, increased its percentage to 18.4% in 1910, to 35.7% in 1920 and by 1930 the Far West was the chief lumber-producing region of the United States.¹

¹In 1919 the chief lumber states, in order of production, were as follows: 1. Washington; 2. Oregon; 3. Louisiana; 4. Mississippi; 5. California; 6. Texas; 7. Arkansas, 8. Alabama, 9. Wisconsin, and 10. Idaho.

As in other major industries, the lumber industry also underwent a vast consolidation, in this case based on the ownership of timberlands. The central figure in this concentration of ownership was Frederick Weyerhaeuser, the king of the American lumber barons. Weyerhaeuser came to the United States from Germany in 1852. In 1855 he took a job on a sawmill crew at Rock Island, Illinois. In 1860, in partnership with Frederick C. A. Denkmann, he purchased his first sawmill for \$3,600. In 1869 he added a second mill, which was capitalized at \$16,200. In 1871 Weyerhaeuser formed his powerful syndicate, the Mississippi Logging Company, which united 17 large lumber firms of the upper Mississippi region and had an authorized capital of \$1,000,000. This company obtained control of the strategic points on the Midwest Rivers, reduced competition by setting production, and by 1879, owned or controlled 3,000,000 acres of timberland in Wisconsin. By 1892 Weyerhaeuser's Pine Tree Land Company, incorporated in 1890 with an authorized capital of \$1,000,000, also held 274,292 acres of timberland in Minnesota. By this date Weyerhaeuser was the greatest single figure in the lumber industry of Wisconsin, Minnesota, Illinois, and the Mississippi Valley in general, and here he and his associates controlled about 10,000,000 acres of timber.

In 1900 Weyerhaeuser decided to extend his operations into the Far West and it was his announcement of the purchase of 900,000 acres with some 40 billion feet of standing timber from Hill's Northern Pacific at a price of \$6 an acre, that touched off the stampede of Great Lake lumber barons to the Pacific Coast. The Weyerhaeuser Timber Company, capitalized at \$6,000,000, was incorporated in 1901 to manage this new empire. By 1910 this company held 1,901,436 acres of timber, with a footage of 95.7 billion feet of timber in Washington, Oregon and California. In Idaho, under various other company names, Weyerhaeuser also held an additional 916,000 acres.

In 1901-1902 the Weyerhaeuser interests moved in the South, where they acquired 170,000 acres of timberland in Arkansas and Louisiana. By 1914 it is estimated that the combined Weyerhaeuser interests owned 291,900,000,000 feet of timber or about 10% of all the privately owned timber in the United States. At his death in 1914, Weyerhaeuser's personal forest was estimated to be somewhere between \$300,000,000 and \$600,000,000.

The degree of concentration of ownership of the nation's timberland is shown by the following figures: By 1910 almost one-eighth of all the privately owned timber in the United States was included in the 3 gigantic holdings of Weyerhaeuser, the Southern Pacific, and Northern Pacific, and one-half of all the privately owned timber was included in 195 holdings.

In 1900, the lumber industry was the 4th ranking industry of the United States, in 1914 it was again in 4th place, and in 1919,

with products valued at \$1,387,471,000, it occupied the 9th rank.¹

The Flour Milling Industry

Important since colonial times, the flour milling industry maintained its position as one of the leading industries of the United States during this period. In general the industry, as in the pre-1860 period, shifted westward and southward, thus following the centers of wheat production. The six leading wheat producing states in 1879 were Illinois, Indiana, Ohio, Michigan, Minnesota, and Iowa; in 1899, they were Minnesota, North Dakota, Ohio, South Dakota, Kansas, and California.

The successful introduction in the 1870's of hard, red winter wheat, extended the area of important wheat production southward to Kansas, Oklahoma, Texas, and westward to Washington. In 1878-79, Cadwallader C. Washburn, a Minneapolis miller, began experimenting with the problem of milling hard wheat and devised an automatic, all-roller graduated reduction mill which produced a high quality white flour called "patent flour". This invention helped increase the area planted in hard wheat, and as this area expanded, new mills were set up at Kansas City, Wichita, Salina, Hutchinson, and Topeka, all in Kansas, at Oklahoma City, and at Dallas, Fort Worth, and San Antonio in Texas.

The one important exception to this westward movement of the milling industry was Buffalo, New York. After declining as an important milling center, Buffalo was able to rebuild this industry due to the cheap freight rates for transporting wheat via the Great Lakes, the cheap hydroelectric power arising from the developments on the Niagara River, and its favorable position as a distributing center. In 1903 the Washburn-Crosby Company built the largest flour mill in the world in Buffalo.

Minneapolis, however, was the greatest milling center of the United States during this period. By 1901 Kansas City was in second place, and not until 1930 was Buffalo to surpass Minneapolis

U. S. Lumber Industry, 1880-1919:

	Sawmills	Capital	Workers	Value of Products
1880	25,758	\$ 87,295,949	148,290	\$ 233,608,886
1900	23,043	312,424,838	413,257	555,042,605
1910	33,000	487,828,773	547,148	753,388,368
1920	26,119	1,357,991,571	538,788	1,387,471,413

Figures for the Far West in 1920, are as follows:

1920	3,274	\$ 430,604,983	130,155	\$ 467,818,305
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as the chief center of the country. Rated by value of flour milling products, the 8 leading states in 1899 were Minnesota, New York, Ohio, Pennsylvania, Illinois, Indiana, Missouri, and Wisconsin. In 1919 the order was Minnesota, Kansas, New York, Illinois, Missouri, Ohio, Washington and Texas.

In 1900 the flour milling industry was the fifth ranking industry of the United States. In 1914 it was in third place and in 1919 it occupied sixth place.¹

Slaughtering and Meat Packing

In the first quarter of the 19th century the packing and curing of meats, particularly of hogs, was undertaken on a large scale on the edge of the midwestern livestock belt. By 1818 Cincinnati had emerged as the center of this business. Here, commission merchants purchased the hogs from farmers and turned the animals over to slaughtering houses for butchering. By the 1840's the butchering process had been so perfected that five men could cut up an animal at the rate of more than one a minute. The carcasses were then carried to the packing plants where they were soaked in various packing solutions, chiefly salt, and then cased in barrels. The by-products of the animals were also completely utilized and converted into lard, oil, soap, glue, and brushes. Nearly 500,000 hogs were thus packed at Cincinnati in 1848 and this city remained the leading meat-packing center of the nation until 1863, when Chicago, with its superior transportation facilities, took over that lead.

By the 1850's the method of sterilizing meat by heat and enclosing it in airtight receptacles was also widely in use. In 1859 the United States had 259 meat packing establishments whose total products were valued at \$29,441,000.

The meat packing industry was revolutionized in the late 1870's by the introduction of the refrigerated railroad car and the cold storage plant. About 1877 Gustavus F. Swift, a Chicago meat packer, and an engineer named Chase devised the refrigerated railroad car which made possible the long distance shipment of meats. In 1875 Dr. Carl Linde produced a practical compression machine and in 1885,

¹Flour Milling Industry in the United States, 1880-1919:

	Mills	Capital	Workers	Value of Products
1880	24,338	\$ 177,361,878	58,407	\$ 505,185,717
1900	25,258	218,714,104	73,103	560,719,063
1919	21,135	830,495,722	90,597	2,052,434,000

E. E. Fendrick invented an exhaust-steam absorption machine which led to the use of cold storage plants for storing meat. These devices made it possible to concentrate meat packing operations into large factories and to also substitute a dressed beef trade for the former shipment of live cattle to eastern cities.

By 1890 the great Chicago packing houses of Armour, Swift, Nelson, Morris, Hammond, and the National Packing Company, had organized the "Beef Trust," which quickly established a monopoly in the meat packing business. As the corn producing belt shifted westward after 1861, so did the meat packing industry. In 1890, the centers of the industry, ranked by the value of products, were Chicago, Kansas City (Kansas), New York, Philadelphia, and East St. Louis. By 1910 they were Chicago, Kansas City, South Omaha, East St. Louis, St. Paul, Fort Worth, Sioux City, St. Joseph, Denver, Wichita, Indianapolis, and Oklahoma City.

By 1900 slaughtering and meat packing had become the second ranking industry of the United States; in 1914 and again in 1919, it occupied first place.¹

The Cotton Goods Industry

A leading manufacture since 1840, cotton goods maintained its position as a major industry. The number of spindles in the nation increased sevenfold between 1860 and 1919, increasing from 5,235,727 to 35,481,000. These spindles also ran faster and turned out more yard. Further inventions made the weaving loom so automatic that one operator could attend 30 such machines. Cotton factories also increased greatly in size (see page 61).

As in the pre-1860 period, New England remained the center of the cotton goods industry, but its percentage of the total manufacturing products dropped from 75% in 1860 to less than 50% by 1920, as the industry took hold in the South. This increase in the spindleage of the South is shown on the following chart: (See page 87).

¹Meat Packing Industry of the United States

	Establishments	Capital	Workers	Value of Products
1880	872	\$ 49,419,213	27,297	\$ 303,562,413
1900				790,253,000
1919				4,246,291,000

Cotton Spindles by Region:

	Total U. S.	New England	South
1880	10,653,435	8,500,000	500,000
1890	14,384,000	10,934,000	1,570,000
1900	19,472,232	13,171,000	4,368,000
1910	28,267,000	15,735,000	10,494,000
1920	35,481,000	18,287,000	15,231,000
1925	35,032,000	15,975,000	17,292,000

This shift began in the 1890's and by 1925 the spindleage of the South exceeded that of New England. The Southern industry centered chiefly in North Carolina, South Carolina, and Georgia and its rise was due chiefly to Southern efforts.¹ The development of the Southern cotton goods industry was due to several advantages. The mills were located close to the source of raw cotton and costs of freight for transporting the raw materials to the mills and for exporting the finished goods were lower than in New England. Labor and materials were cheaper in the South and hence the costs of constructing factories and housing for employees were lower. Cheap hydroelectric power was available in the South. Southern mills were taxed and assessed at lower rates than in New England and local exemptions and special inducements were provided to aid the rise of Southern factories. Finally, there was little legislation in the Southern states to prohibit long hours of work, child labor, or low wages for employees.²

In 1900 the cotton goods industry was the eighth ranking industry of the United States and produced goods valued at \$339,200,000. In 1914 it was in sixth place, with products valued at \$676,569,000 and in fifth place in 1919, with goods valued at \$2,125,272,000.

The Woolen Goods Industry

The manufacture of woolen goods remained highly localized and concentrated in the Middle Atlantic and New England states, as it had been in the pre-1860 period. The manufacture of worsteds began about 1870 and made great progress, but the most spectacular advance was made in the manufacture of carpets. Factory production of carpets began in 1841 when Evastus B. Bigelow of Boston adapted the power loom to the weaving of ingrain carpets and a few years later to the weaving of Wiltons and Brussels. Although most carpets were hand woven until after 1865, the value of manufactured carpets and rugs reached \$7,857,000 in 1860. In 1864 Smith & Skinner of Yonkers applied the power loom to the weaving of Axministers and output expanded greatly.

¹Southern capital controlled 84% of this southern spindleage, Northern capital, 11%, New England capital, 3%, and Western capital, 2%.

²In 1900 29.6% of the Southern cotton mill operators were under 16 years of age as compared with 10.2% in New England.

New York, Pennsylvania and Massachusetts retained their position as the chief centers of the woolen goods industry. In 1900 this industry was the 10th ranking industry of the United States and in 1919 in 15th position, producing goods valued at \$296,990,000 and \$1,065,434,000 respectively.

Men's Clothing Industry

The men's clothing industry remained one of the major industries and women's ready-to-wear clothing also moved up near to the 10 chief industries of the United States.

This was the period in which both men and women generally shifted from custom-made to factory-made clothing. The value of men's factory-made clothing increased almost 8 times between 1900 and 1919 and that for women 21 times.

New York State produced slightly less than half of men's clothing in 1900 and was followed by Illinois, Ohio, Pennsylvania, and Maryland. In 1919 New York State still produced 43.2% of the men's clothing and was followed by Illinois, Pennsylvania, Ohio, and Maryland, in that order of importance.

In men's clothing, New York City concentrated on the production of cheap and high style items, while Chicago and Rochester specialized in the middle grade clothing.

Men's clothing, with products valued at \$415,256,000, was the 6th ranking industry of the United States in 1900. In 1914 it occupied the 14th place, and in 1915, the 12th position, with goods valued at \$458,211,000 and \$1,162,986,000 respectively.

In women's ready-to-wear clothing, New York state produced 60% in 1900 and 76% in 1919, and was followed by Pennsylvania, Illinois and Ohio. New York City produced all grades of women's clothing. The value of women's clothing increased from \$437,888,000 in 1914, to \$1,208,543,000 in 1919 and the industry rose from the 12th to the 11th rank among the chief industries of the United States.

New York City was the center of both the men's and women's clothing industry from 1861 to 1915 because of the large supply of cheap labor provided by immigrants from Europe and also because of its closeness to large markets. These industries in New York City were characterized by a large number of contract shops. Because men's clothing styles changed much more slowly, factory production in this industry was more stable and its plants larger than those in women's clothing, which were produced in thousands of small shops.

The Boot and Shoe Industry

A machine for sewing the uppers to the soles of shoes with great speed was first patented by Lyman B. Blake and then improved by Gordon McKay. The McKay stitcher was put on the market in 1862 and enabled a worker to sew several hundred pairs of shoes a day. Factories thus took over production and these plants increased in size. (See page 61.)¹

In 1900 New England, with 48.8% all production, was still the chief center of the industry. This was still true in 1919, but its percentage had dropped to 43.8%, while that of New York state had increased from 11.1% to 16.4%, and that of the Midwest from 13.2% to 15.0%. These shifts are illustrated in the chart which follows:

Boot and Shoe Production, 1900-1919, by States

	<u>1900</u>	<u>1919</u>
Massachusetts	40.3	38.0
New Hampshire	8.5	5.8
New York	11.1	16.4
Missouri	4.2	8.3
Ohio	9.0	6.7
<hr/>		
Percentage of Total:	73.1	75.2

St. Louis and New York City were the centers that registered the greatest gains in this industry. New England's decline was due to its distance from the great interior markets of the Midwest.

Although boots and shoes were produced by hundreds of factories, the industry was consolidated and controlled by the United Shoe Machinery Company. This corporation owned 6,000 basic patents covering all phases of the manufacturing of shoe machinery. By refusing to sell any of its machinery, the company forced shoe manufacturers to lease its equipment and to pay a royalty upon every pair of shoes made. This practice enabled the United Shoe Machinery Company to set terms and to become the overlord of the boot and shoe industry.

The boot and shoe industry was the 11th ranking industry in the United States, with products valued at \$261,029,000 in 1900. It was in 9th position in 1914 and 13th place in 1919, with products valued at \$501,760,000 and \$1,151,896,000 respectively.

¹The output of men's and women's shoes increased from 135,700,000 pairs in 1899 to 180,600,000 pairs in 1909 and 199,880,000 pairs in 1919.

The Malt Liquor Industry

Rum had been the national drink during the colonial era, but the growth of the farming population in the Midwest led to its replacement by whiskey, which was distilled from corn or rye. In 1810 Pennsylvania was the chief center of the whiskey distilling industry, but this soon shifted to New York and Ohio.¹ By 1850 Cincinnati was the chief center. In 1860 the distilled or spirituous liquor industry was the 9th ranking industry of the United States and produced products valued at \$56,589,000.

After 1885, however, whiskey was replaced by malt beverages as the national drink.² The malt brewing industry was revolutionized between 1873 and 1893 by the researches of the French and Japanese scientists Pasteur and Takamine. Takamine was brought to this country for a brief period to solve problems relating to the fermentation of corn. Scientifically trained brewmasters were also imported from Germany to supervise the technological changes occurring in the American brewing industry.

By 1900 the production of malt liquors, with products valued at \$237,270,000, had become the 13th ranking industry of the United States. In 1914 it was in 15th place, with products valued at \$442,149,000.³ The National Prohibition Act of January 29, 1919 made illegal the manufacture of intoxicating liquor (beverages with more than one-half of one percent alcohol). Breweries and distilleries ceased making these products and owners received no compensation for losses incurred. This act went into effect on January 16, 1920.

¹In 1810 there were 14,191 distilleries in the United States; these produced 22,977,000 gallons of whiskey and 2,827,000 gallons of rum. There were only 132 breweries and these produced 5,750,000 gallons of malt liquor.

²It is interesting to note, however, that by 1887, a "whiskey trust" had been formed to control the distilling industry.

³Production of malt liquor, given in barrels, increased as follows: 1870, 6,600,000; 1880-13,300,000; 1890-27,600,000; 1900-39,500,000; 1914: 66,200,000, and then fell to 9,200,000 barrels in 1920.

The Rise of Other Important Industries:

The Electrical Industries

The Electrical Communication Industry

The application of electricity came first in the communications field, where the electric battery furnished sufficient current for telegraph operations. Western Union Telegraph Company, organized in 1855, became the giant in this field. Its last important rivals, the American Telegraph Company and the United States Telegraph Company, were acquired in 1866. By 1883, under the guidance of Jay Gould, Western Union's capitalization was increased to \$80,000,000 and the company had achieved a monopoly of telegraph lines in the United States.

The Bell Telephone Association was organized in 1877. The owners of the Bell telephone patents quickly established a monopoly by leasing the patent rights rather than selling them. In the 1890's the American Telephone and Telegraph Company, under the leadership of Theodore N. Vail, established a complete monopoly by purchasing the many rival telephone companies that appeared when the Bell patents expired.

In 1909 the American Telephone and Telegraph Company, by then a huge holding company, also acquired control of the Western Union Telegraph Company, thus forming a monopoly of both the telephone and telegraph industries. This consolidation was broken up by the Federal courts in 1913, but in 1917 the Bell Telephone Company still owned 7,326,000 of the total of 11,716,000 telephones then in the United States.

Electrical Lighting and Motors Industries

The age of electrical power began in the late 1870's. Using the discoveries of the English scientist Sir Humphrey Davy, Charles F. Brush of Cleveland devised a simplified arc lamp and also an improved dynamo. The Brush Electric Company of Cleveland, organized in 1877, purchased Brush's patent rights and in 1879 erected a power plant with Brush dynamos in San Francisco to light 21 arc street lights. This was the first central power station in the world. By 1880 similar Brush stations had been completed in Boston and Philadelphia. Arc lights, however, were too brilliant and also too expensive for use in the home.

In 1877 Thomas A. Edison of Menlo Park, New Jersey, turned his attention to this problem. The Edison Electric Company was chartered in New Jersey to finance this work in 1878 and the company was

backed by J. P. Morgan and Henry Villard of the Northern Pacific Railroad. In return for assigning his patent rights to this company, Edison received 2,500 out of the company's 3,000 shares of stock. In 1879-80, Edison invented and patented the incandescent bulb, and also designed his own dynamos, direct current carrying conduits, bulb sockets, and current meters. In 1882 the Edison Company opened its first direct current central station at Pearl Street in New York City, which distributed electricity for incandescent lighting purposes into 85 buildings.

Edison's use of direct current, however, left further problems to be solved for it was not feasible to transmit direct current more than one mile due to the increased size and the resulting high cost of the conductors needed.

George Westinghouse of Great Barrington, Massachusetts, was the inventor who solved this problem. He acquired the patent rights for a "secondary generator" that had been invented by two Europeans, and in 1886, assisted by William Stanley and other engineers, devised an alternating current lighting system whereby the flow of current could be increased or decreased by a transformer for lighting purposes. Shortly after 1886 Pittsburgh and Buffalo installed Westinghouse alternating current stations.

Between 1879 and 1886 the combined efforts of Brush, Edison, and Westinghouse thus devised practical and economical lighting systems. In the early 1900's Nikola Tesla, a Hungarian scientist in the employ of Westinghouse, made possible the long distance transmission of alternating current through his development of a high potential magnifying transmitter.

The next phase in the age of electricity was its application as power to move machinery. In 1883 Charles Joseph Van Depoele patented and built two small electric railways that used direct current motors. In 1888 Frank Julian Sprague also devised and patented a direct current electric motor and installed it in the first modern urban trolley system in the nation at Richmond, Virginia. The use of direct current motors in industry, however, was also limited by the short distance that this type of power could be transmitted.

In 1888, Tesla, working for Westinghouse, invented a simple and reliable alternating current motor, which made possible the wider use of electrical power in industry.¹

¹In 1899 the amount of power purchased and applied through electrical motors amounted to be 1.8% of the industrial power machinery in the United States. By 1919, however, this figure had risen to 31.7%. The total primary factor applied through electrical motors also increased from 5% in 1899 to 55% by 1919.

Two further developments, in which Westinghouse took the lead, now gave further impetus to the use of electricity in industry, namely, the economical production of electricity by waterpower and steam power.

In 1895 the first of three 5,000 horsepower alternating current generators to be driven by waterpower was installed at Niagara Falls. This spectacular feat was the basis of a hydroelectric power development in the United States that was to provide 4,000,000 horsepower by 1912.¹

In 1896 Westinghouse purchased the American patent rights to a compound reaction steam engine or steam turbine which had been invented in 1884 by Charles Parson in Great Britain. Westinghouse and his engineers quickly adapted the steam turbine for generating low cost electricity. By 1912 these turbines were producing more than 8,000,000 horsepower.² With these many inventions large amounts of electrical power could now be generated economically and also transmitted cheaply great distances from large central steam or hydroelectric power stations.

In the business phase, the electrical industries also went through an era of consolidation. By 1890 Villard had brought about a consolidation of the various Edison companies into the Edison General Electric Company, and also acquired the Sprague company which had developed electric street railroad equipment. In 1892 Villard and Morgan next chartered the General Electric Company, which by exchanges of stock, united into one giant firm the manufacturers of alternating and direct current equipment, of Brush arc and incandescent lighting equipment, and of electric railway equipment.

In 1891 George Westinghouse similarly organized the Westinghouse Electric and Manufacturing Company to consolidate his various holdings and interests. Competition between these two giants of the electrical industry was intense until 1896, when the firms entered into a patent pool which covered the manufacture of light bulbs, electric motors, dynamos, and railway equipment. After 1896 these two companies were the only full-line electrical producers in the United States. The value of exports of electrical equipment increased from \$10,507,000 in 1904 to \$79,719,000 in 1919.³

¹Hydroelectric power output increased from 7,387,000,000 kilowatt hours in 1912 to 21,261,656,000 by 1922.

²Electricity produced by steam turbines increased from 17,364,610,000 kilowatt hours in 1912 to 39,942,801,000 in 1922.

³Figures on the Electrical Manufacturing Industry, 1899-1919:

	<u>Establishments</u>		<u>Capital</u>		<u>Workers</u>
1899	581	\$	83,660,000	\$	42,013
1919	1,404		857,855,000		212,374

The Rubber Industry

About 1900, as a result of the rise of the automobile industry, Akron, Ohio, became the rubber capital of the world.

E. M. Chaffee of Boston established the Roxbury India Rubber Company in 1833; this company manufactured shoes, coats, caps and wagon covers. In 1839, after several years of fruitless experiments, Charles Goodyear accidentally discovered the process of vulcanization. Further research enabled him to produce a new stretchable rubber material which was waterproof, resilient, and also an excellent insulator. He patented this process in 1844. The early rubber industry was largely centered in New England. In 1870, however, Benjamin F. Goodrich moved from New York to Akron, where he established a rubber plant and several similar small plants were also erected in that vicinity.

The rubber industry was then revolutionized by the discoveries of two American chemists that were made just as the time the new automobile industry was making its vast expansion. In 1899 Arthur Marks patented his alkali process of reclaiming rubber and shortly thereafter George Oenslager discovered a new method of rubber acceleration which speeded up manufacture and also improved the rubber. Based on the demand on the automobile industry, the rubber industry also became important. In 1900 both the Goodyear Tire and Rubber Company and the Firestone Tire and Rubber Company built their main plants at Akron to be near the center of automobile manufacture. The imports of crude rubber increased from 4,377,000 pounds in 1900 to 556,546,000 pounds by 1919, and about 70% of this increase was used to manufacture automobile tires, tubes, and accessories.

The Canning Industries

The Fish Canning Industry

In 1864 William and George Hume and Andrews S. Hapgood, working in California on the Sacramento River, opposite to the city of Sacramento, devised a commercially feasible method of canning salmon. In 1866 they moved their cannery to Eagle Cliff, Washington, on the Columbia River. Here their operations in 1867 marked the beginning of the multi-million-dollar salmon canning industry that soon developed on the Columbia River. Between 1874 and 1878 salmon canning also spread along the entire Pacific Coast and northward to Alaska. The early period was marked by intense competition but in 1892 the Alaska Packers Association of San Francisco was formed. This organization united 90% of the 30 canning companies operating in Alaska into a trust, which largely eliminated cut-throat competition in Alaska and held production at profitable levels. In 1898 the Columbia River Packers Association was organ-

ized at Astoria, Oregon, merging 8 of the most important canneries into a unit, and competition was also reduced on the Columbia River. By 1919 the canned fish industry of Alaska, California, Oregon, and Washington were worth more than that of all the remaining states of the country.¹

The Fruit and Vegetable Canning Industry

As has been noted (see page 42), canning of fruits and vegetables had begun before 1860, but it was not to become an important industry until after further technological progress had been accomplished.

A machine press to cut tops and bottoms for cans was invented in the 1850's. In 1876 the Howe floater was devised which rolled the cans, and by 1885 the manufacture of cans had become a specialized industry. The problem of food fermentation in cans was solved in 1895, when Professor Henry L. Russell completed his experiments that eliminated the swelling and unpleasant odors of canned food. Although the canning of fruits and vegetables as an industry was widely distributed throughout the United States, by 1900 its center was definitely located in the Far West. Thereafter it became the most rapidly growing food processing industry in the nation, due to the expanding markets provided by the growing urban population and the excellent transportation facilities afforded by the vast railroad network. By 1920 the chief center was located in California and that state's canned fruits and vegetable products were almost equal in value to the combined value of the rest of the United States.²

¹Pacific Coast Fish Canning Industry, 1890-1919.

	Canneries	Capital	Workers	Value of Products
1890	62	\$ 1,733,660	1,934	\$ 4,999,473
1900	115	8,675,881	5,501	11,307,415
1919	263	149,219,395	12,531	79,035,603

²Rise of the Canned Fruit and Vegetable Industry in California, 1880-1919:

	Plants	Capital	Workers	Value of Products
1880	12	\$ 1,152,000	1,172	\$ 1,389,798
1900	136	4,397,935	5,041	13,081,829
1919	303	63,649,112	22,406	189,956,000

Mining and Mineral Production

General

Until 1897 the production of minerals came largely from underground mines and in the application of machinery and new techniques to underground mining, the gold and silver mining industry of the Far West continued to play the leading role.

In 1860 Philip Deidesheimer of El Dorado County, California, working at the Comstock Lode in Nevada, invented a system of timbering known as the square set (timbers locked together in hollow cubes and each cube interlocked with the next in endless series) which made possible the development of large ore chambers deep underground. In 1863 G. F. Dietken of Auburn, California, obtained a patent for an inexpensive chlorination apparatus which was an improvement over the process of separating gold from sulphurets first discovered by the German chemist, Plattner. In 1862 Almarin B. Paul of Nevada City, California, also working in Nevada, devised a highly improved version of the basic California stamp mill and a chemical process that became known throughout the mining world as the "Washoe pan process", or "Washoe pan amalgamation", to extract silver ore. In 1866-68 nitroglycerine and dynamite, invented by Alfred Nobel of Sweden, were used in the California and Nevada mines. A. F. Hallidie of San Francisco devised a flat, woven-wire cable for use in hoisting from great depths in mines. The Burleigh compressed air drill, based on French invention, was perfected between 1849 and 1866, and introduced in 1874 for use in mining on Comstock Lode and the Sutro tunnel in Nevada. In 1877 a number of inventors interested in Colorado mining further improved the compressed air drill and about 1897, J. George Leyner, a Colorado machinist, invented the jackhammer.

With the development of deep lode mines in California and Nevada in the 1860's, blowers for ventilation and powerful pumps were devised to provide air and to prevent underground streams from flooding the deep mine shafts. Joseph Moore and George W. Dickie of the Risdon Iron Works in San Francisco invented the famous Chollar-Norcross pump for this purpose in the 1880's. These improvements spread eastward from the Pacific Coast and were applied in eastern underground mining operations.

The use of machinery and the development of deep mining required huge sums of capital and the corporate form of business organization was quickly applied to the gold and silver mining industry of California and Nevada in the early 1860's. The San Francisco Stock and Exchange Board was organized in 1862 for this purpose and stock shares in the Comstock mines of Nevada were sold to some 30,000 people to provide the capital necessary to develop these deep mines.

After 1897 the major improvements were made in surface mining and the exploitation of low-grade ores. In the late 1890's open pit or strip mining of iron ore was developed in the Mesabi region, where the deposits of ore were near the surface and shallow. Steam shovels dug the pits and loaded the ores onto railroad cars. In 1904 open pit mining of low grade copper ore was instituted at Bingham, Utah. Similar open copper pits were developed at Ruth, Nevada, in 1907, and at the New Cornelia mine in Arizona in 1913. The percentage of bituminous coal mined by machinery also increased from 5.3% in 1891 to 12% by 1896, and by 1919, 60% of the underground production was cut by machines.¹ Anthracite coal, on the other hand, was still largely mined in 1900 by the same primitive methods that had been in use since 1860. In 1919 only 1,575,205 tons of the total of 88,092,201 tons of anthracite coal produced was cut by machines and only 2,006,879 tons was produced by strip mining.

Mining experienced a phenomenal growth after 1860 as this industry furnished practically all of the nation's fuel, its principal metals, and much of its building materials. Fuels (coal and petroleum) provided more than one-half of the total value of mineral production, and metals (copper, iron, lead, and gold and silver) most of the remainder.

The relative value of these minerals is shown on Chart 17 which follows:

Chart 17.

VALUE OF MINERAL PRODUCTION
IN THE UNITED STATES, 1880-1919
(in 000's of Dollars)

Mineral.	1880	1900	1919
1. Coal, Bituminous	(1) ---	\$ 220,930	\$ 1,160,616
2. Petroleum, Crude	\$ 24,601	75,989	760,266
3. Copper	12,943	100,615	432,274
4. Coal, Anthracite	(1) ---	85,758	364,927
5. Lead	9,573	24,652	239,274
6. Iron Ore	(2) ---	184,053	197,313
7. Gold & Silver	70,717	114,912	105,043
<hr/>			
Total value of all Mineral Production	\$ 367,463	\$1,108,936	\$ 4,623,770

(1) Value of Anthracite and Bituminous coal: \$95,640.

(2) Estimated value of iron ore \$50,000.

¹In 1919, however, only 1.2% of bituminous coal was produced by strip mining.

In spite of its vital significance in making possible the development of the United States' great manufacturing and transportation systems, the mining industry employed only from 2 to 3% of the total working population and produced about 2% of the total national wealth. In 1919 there was about \$6,146,208,107 in capital invested in the mining industry and the industry employed 1,131,000 workers and provided products valued at \$4,623,770.

The Bituminous Coal Mining Industry

About 1870 bituminous coal replaced anthracite coal as the main source of power and chief fuel; and by 1919 the output of bituminous was nearly six times that of anthracite.¹ Most of the bituminous coal was used in the steam boilers of factories, locomotives, and steam vessels. In coked form it was essential in the new Bessemer method of smelting iron and producing steel. Between 1871 and 1920 the energy produced by coal multiplied nearly 12 times.

The United States had the greatest deposits of bituminous coal in the world and they were scattered across the continent from the Pacific Coast to the Appalachians. The great producing areas prior to 1900, however, were the Appalachian fields, which extended from near Lake Erie southward into northern Alabama. These fields, the major source of the 1870-1900 output, were developed at an early date because of the generally superior quality of the coal and because the deposits were easily accessible to miners and located close to the great industrial centers of the nation.

Between 1900 and 1919 bituminous coal production tended to move slowly westward and southward. Important development of bituminous coal mining took place in Colorado and even more in Alabama, which was stimulated by the rise of the Birmingham steel industry. Pennsylvania, however, remained the chief bituminous coal-producing state, and in 1919 still produced nearly twice as much as that of West Virginia, her closest competitor. Important strip or open pit mining also began in southern Illinois to supply the rising industries of Chicago and St. Louis.

The value of bituminous coal increased from \$110,420,801 in 1890 to \$502,037,688 in 1915 (see also Chart No. 17, page 97).

¹ Production of bituminous coal in net tons: 1860-6,494,260; 1870-17,371,305; 1880-42,831,758; 1890-111,302,322; 1900-212,316,112; 1910-417,111,142; 1915-442,624,426; and 1919-465,860,058 tons.

As a business, the supplies of bituminous coal were so vast that it was impossible to create a monopoly by purchasing and combining the coal-bearing lands into one or two units. Violent competition thus reigned unlimited throughout this period and accounted for the unfortunate condition of this industry. As little capital was needed to mine bituminous coal, thousands of small operators conducted the business in the 19th century. By 1900, however, large holdings of bituminous coal lands were formed by integrated industries such as United States Steel, Bethlehem Steel, the public utilities controlled by Insulls, the railroads, and the Ford Motor Company. These corporations bought and operated mines to supply their own needs. A few large coal companies, such as Consolidated Coal Company and the Pittsburgh Coal Company, also made their appearance but competition continued unchecked.

The total amount of capital invested in ahthracite and bituminous coal mining amounted to \$2,343,935,332, in 1919. The bituminous industry employed 621,998 workers and produced products valued at \$1,160,616,013. There were 6,916 establishments and 8,994 active coal mines.

The Crude Petroleum Industry

The first successful commercial oil well was drilled at Titusville in northwestern Pennsylvania in 1859 and by 1860 this area was producing 500,000 barrels a year. In the 1870's the oil-producing area spread into western New York, southeastern Ohio, and West Virginia, which with Pennsylvania, was known as the Appalachian field. In 1877 the first successful commercial oil wells were drilled in the Far West, at Pico Canyon in southern California. By 1880 the California wells were producing 41,981 barrels a year. The petroleum-producing area next advanced into the Midwest with the opening of important Lima (Ohio)-Indiana field in 1885. Wildcatters began to explore eastern Texas in the 1890's and in 1901 struck oil at Spindletop, with a gusher coming in there.

In 1900 the Appalachian field was still the most important oil area in the United States, producing 57% of the total. The Lima-Indiana field produced 34%, Southern California, 6%, and Texas 1%.¹

¹Production of crude petroleum, 1876-1919:

	<u>Barrels</u>		<u>Value</u>
1876	9,133,000	\$	22,988,000
1880	26,286,000		24,601,000
1890	45,824,000		35,365,000
1900	63,621,000		75,989,000
1910	209,557,000		127,900,000
1919	378,367,000		760,266,000

By 1909 the Rocky Mountain field had been opened in Colorado, Montana, and Wyoming. As a result of the demands of the expanding automobile industry, the production of oil also increased greatly and between 1871 and 1920 the energy produced by petroleum multiplied 42 times.

By 1919 the main centers of petroleum production had moved westward and southward. The chief states, in order of value, were Oklahoma, Texas, California, West Virginia, and Kansas. The total value of crude petroleum and natural gas products in 1919 amounted to \$931,793,423. There were 9,970 enterprises and 268,784 wells. Capital invested in the industry totaled \$2,446,446,795 and the crude petroleum and natural gas industry employed 124,603 people.¹

The Copper Mining Industry

In 1861 the copper region in the upper peninsula of Michigan produced 89.5% of the total United States output of 8,400 short tons. Michigan retained that leading position until the mid-1880's, when the center of the copper industry shifted to the Far West. Beginning in 1883, under the leadership of George Hearst, Marcus Daly, and W. A. Clark, the copper mining industry at Butte, Montana, became highly developed and in 1887 Montana became the leading copper producing state. This state held first place until 1907, when Arizona, with important centers at Bisbee, Morcenci, Globe, and Jerome, moved into first place. The copper-producing area also expanded with low-grade ore mining operations beginning at Bingham, Utah, in 1904 and at Ruth, Nevada, in 1907. Large-scale copper mining also commenced in Alaska in 1911.²

¹Value of petroleum produced in 1919, by oil fields:

Rocky Mountain	\$ 22,371,577
Pacific (California)	139,018,663
Gulf Coast	27,942,728
Mid-Continent	464,045,161
Illinois-Indiana	32,909,441
Lima-Indiana	6,218,317
Appalachian Field	239,244,405

²The operations in Utah, Nevada, and Alaska were owned by the Guggenheim interests, which also had large copper mines in Chile. The Guggenheim also controlled Anaconda Copper Company of Montana and thus had a practical monopoly of American copper production. J. P. Morgan was associated with these copper ventures.

In 1919 Arizona was still in first place with 46.5% of the total production; Michigan, with 19%, was second, with Montana and Utah in third and fourth places respectively. In 1919 there were 195 producing enterprises in the copper mining industry and 226 active mines; the industry employed 46,999 workers; the capital invested totaled \$853,639,017, and the value of the product, before smelting, was \$181,258,087.¹

The Anthracite Coal Industry

From 1860 to about 1870 anthracite coal was the main source of power and the chief fuel for the industrial system of the country. In the 1870's however, its place was usurped by bituminous coal and thereafter anthracite coal was chiefly used for domestic purposes, such as heating homes.

The deposits of anthracite coal were localized in the Wyoming, Lehigh, Schuylkill, and Susquehanna river valleys of northeastern Pennsylvania. The railroads that built into this region were driven by the intense competition for carrying the anthracite coal from the mines to the cities to purchase the mines. Between 1873 and 1896 they endeavored to eliminate competition by means of pools.

By 1900 a community of interest had been established among the five anthracite railroads and the Temple Iron Company by means of interlocking directorships and stock ownership, thus giving this group control over 72% of the total shipments. The Pennsylvania and the Delaware and Hudson railroads, the two anthracite roads independent of

¹ U. S. Copper Industry, 1870-1919 Copper Smelter Production

	<u>In Short Tons</u>		<u>Value</u>
1870	14,113		----
1880	30,240	\$	12,942,720
1890	129,882		40,523,042
1900	303,059		100,615,450
1910	540,080		137,180,257
1919	643,210		239,274,000

the organization, cooperated with the group, thus establishing a monopoly control over the anthracite coal mining industry. The value of the product of anthracite coal reached \$364,926,950 in 1919.¹

It employed 126,000 workers in 1890, 169,497 in 1910, and 154,571 in 1919.

The Lead Mining Industry

In the 1890's the Far West became an important center of lead production. By 1919 three-fourths of the smelter production came from Missouri, Idaho, and Utah, in that order.² Other states that produced important quantities of lead were Oklahoma, Kansas, Montana, and Colorado. In 1919 there were 432 lead enterprises, and 473 mines. The capital invested totaled \$197,223,814; the industry employed 24,030 workers and its ores were valued at \$75,579,347.³

¹ Anthracite coal industry, 1860-1919.

	Net Tons	Value
1860	8,115,842	===
1870	15,664,275	===
1880	28,649,812	---
1890	46,468,641	\$ 66,383,772
1900	57,367,965	85,757,851
1910	84,485,236	160,275,302
1919	88,092,201	364,926,950

² Important lead production began at Kellogg, Idaho, in 1894. Between 1894 and 1920, 8,669,000 tons were taken from the Bunker Hill Mine.

³ U. S. lead mining industry 1861-1919.

	Short Tons	Value at the Smelter
1861	14,100	===
1870	17,890	---
1880	95,725	\$ 9,572,500
1890	157,844	14,205,960
1900	280,188	24,652,144
1910	540,080	137,180,257
1920	643,210	239,274,000

The Iron Mining Industry

Pennsylvania, as the center of the iron mining industry, produced more than half of the ore in 1860. In the 1870's, however, this center began shifting westward to iron ranges of the Marquette, the Menominee, the Gogebic and Vermillion ranges of Michigan, Minnesota and Wisconsin. In the 1890's the great Mesabi field came in.

By 1900 Michigan was the leading iron-producing state, with Minnesota and Alabama in second and third place. By 1919 the Michigan-Minnesota-Wisconsin region was the greatest iron ore district in the world and produced 85% of the United States ore. The dominance of this region was due to the high grade of the ore, to the fact that it was readily accessible (by strip or open pit mining on the Mesabi Range) and to the efficient system of railroads and Great Lake vessels that transported the ore at low cost from the mines to the great steel plants.

The iron-ore mining industry was greatly stimulated by the rise of the steel industry. In the late 1890's the great steel corporations, such as Carnegie, Federal, and National Steel, purchased or secured long-term leases on iron ore lands in the Lake Superior region to insure their future ore supplies. These companies, as the chief users of the ores, produced the ore in sufficient quantities to meet their needs. The value of iron ore produced increased from \$101,289,289 in 1915 to \$197,313,000 by 1919.¹ The industry employed about 140,000 people.

Gold and Silver Mining

The production of gold and silver continued to dominate the mining world until the 1890's, when the output and the value of other minerals began to rise very rapidly to meet the needs of manufacturing.

Gold and silver mining centered in the Far West, first in California, and then in the early 1860's spread eastward to Nevada, Idaho, Montana and Colorado. California was first from 1848 to 1870 in its production and then occupied second place from 1871 to 1900; the total yield of its gold mines from 1848 to 1900 exceeded \$1,300,000,000; Nevada occupied first place from 1871 to 1879, and its mines yielded \$392,238,693, chiefly in silver, during this period. Colorado moved into first place in 1880 and its mines had yielded a total of \$1,163,829,916 in gold and silver by 1922.

¹Iron Ore Production in the United States, 1874-1919, in Long Tons:

1874	4,017,857	1910	57,014,906
1880	7,120,362	1915	55,526,490
1890	16,036,043	1919	60,965,418
1900	27,553,161		

Idaho's gold mines produced about \$52,000,000 between 1861 and 1866; Montana about \$150,000,000 between 1862 and 1875; Arizona about \$30,000,000 between 1877 and 1887; and the Dakotas, \$59,246,340 between 1875 and 1877. Gold mining began in Alaska in 1880 and by 1900 its gold mines had yielded a total of \$29,128,245.

By 1919, however, gold mining had declined in relative importance in the mining world. There were then 852 enterprises and 931 active mines. Capital invested in the mining of precious metals totaled \$304,962,152 and there were 19,182 workers employed.¹

The United States in 1919

In 1919 the United States had 41,610,000 gainfully employed wage earners. Of this total 11,170,000 were employed in industry, 1,230,000 in mining, 6,030,000 in trade, 1,420,000 in finance and real estate, 4,200,000 in transportation and public utilities, and 10,680,000 in agriculture. (See Chart 18, page 105).

The total national income realized by private production in 1919 amounted to \$55,539,000,000. Of this sum manufacturing produced \$14,340,000,000; agriculture, \$12,699,000,000; trade, \$9,177,000,000; transportation, \$6,089,000,000; mining, \$1,910,000,000; finance \$1,233,000,000, and electric light and power and gas companies, \$429,000,000. (See Chart 19, page 106).

Of the total population of 105,710,620, 51,406,017,017 lived in rural areas and 54,304,603 in urban places with 2,500 or more inhabitants. Of this latter figure, 46,307,640 lived in 924 cities with 8,000 or more inhabitants.

The Northeast, with 45.5% of the total industrial working force, and the Midwest, with 31.8%, were still the chief manufacturing regions of the nation; together they employed 76.3% of the total industrial labor force. (See Chart 13, page 60).

¹Production of Gold and Silver in the United States, 1860-1919:

	Gold	Silver	Total
1860	\$ 46,000,000	\$ 156,800	\$ 46,156,800
1870	50,000,000	16,434,000	66,434,000
1880	36,000,000	34,717,000	70,717,000
1890	32,845,000	57,242,100	90,087,000
1900	79,171,000	35,741,000	114,912,000
1910	94,778,348	31,102,223	125,880,571
1919	56,915,390	58,127,395	105,042,785

Chart 18

INDUSTRIAL DISTRIBUTION OF GAINFUL WORKERS

IN THE UNITED STATES, 1820-1920

(In Thousands of Persons)

Years	Total Workers	Agriculture	Industry	Mining	Trade, Finance, & Real Estate	Transportation	Construction
1820	2,880	2,070	350	---			(3)
1830	3,930	2,770	---	---			
1840	5,420	3,720	790	15			(3)
1850	7,700	4,900	1,285	90	420	(2)	(3)
1860	10,530	6,210	1,970	170	780	(2)	(3)
1870	12,920	6,850	2,810	180	850	580	700
1880	17,390	8,570	3,305	320	1,280	850	850
1890	23,720	10,170	4,800	470	2,060	1,470	1,400
1900	29,070	10,950	6,460	750	2,870 ⁽¹⁾	2,020	1,640
1910	36,720	11,850	8,500	1,060	4,040 ⁽¹⁾	3,200	2,310
1920	41,610	10,680	11,170	1,230	4,940 ⁽¹⁾	4,200	2,190

(2)	1850-1860 figures for transportation included in Trade, Finance and Real Estate.	(1)	Year	Trade	Finance & Real Estate
(3)	Construction figures for 1820, 1840, 1850 and 1860 are included in manufacturing for those years.		1900	3,520	520
			1910	4,140	800
			1920	6,030	1,420

Adapted from Historic Statistics of the United States, p. 64.

Chart 19

NATIONAL INCOME OF THE UNITED STATES BY PRIVATE PRODUCTION,
(In Millions of Dollars) 1799-1919

Year	Total Income	Agriculture	Manufacturing	Trade	Mining	Transportation & Communication	Service	Construction
1799	668	264	32	35	1	160	64	53
1809	901	306	55	41	2	236	110	72
1819	855	294	64	55	2	176	132	58
1829	947	329	98	61	3	143	163	66
1839	1,577	545	162	135	5	277	222	95
1849	2,326	737	291	196	16	398	355	133
1859	4,098	1,264	495	494	44	694	572	184
1869	6,288	1,517	1,000	1,039	102	718	968	387
1879	6,617	1,371	960	1,166	153	896	1,099	360
1889	9,578	1,517	2,022	1,803	232	1,154	1,341	631
1899	13,836	2,983	2,714	2,578	416	1,528	1,745	655
1909	24,033	5,311	4,824	4,310	859	2,648	2,544	1,153
1919	55,539	12,699	14,340	9,177	1,910	6,089	4,465	1,633

Adapted from
Historical Statistics
of the United States, P. 14.

<u>Finance Electric Light & Power & Gas</u>		
1899	196	58
1909	492	157
1919	1,233	429

As in the pre-1860 period, the development of commerce and industry in the United States did not proceed at a uniform or smooth rate but was interrupted by a number of panics or depressions. Minor ones took place in 1890, 1903, and 1907-08. Major depressions occurred from 1873 to 1878, from 1883 to 1885, and from 1893 to 1896. More moderate depressions took place in 1910-1911 and 1913-1914.¹

The national wealth of the United States increased from \$16,160,000,000 in 1860 to \$88,517,000,000 in 1900 and this figure reached \$186,300,000 by 1912.² Careful studies conducted between 1890 and 1904, however, presented some sobering facts on the distribution of this wealth. By 1900 it was estimated that 80% of the national wealth was owned by only 20% of the total population and that the remaining 80% of the people, owning only 20% of the national wealth, lived on the margin of existence. By 1900 it was also estimated that 10,000,000 persons out of a total population of 75,994,575 actually lived in poverty. This situation was to influence the political and economic reform movements of the 1890-1915 period.

¹Unemployment was large and severe in the 1890's; from 1897 to 1915 it ranged from 6% to 20%, with the average being about 10%.

²See Chart No. 20 page 108.

Chart 20.

NATIONAL WEALTH OF THE UNITED STATES, 1774-1922

(in Millions of Dollars)

1774	\$	600	1850	\$	7,135
1784		850	1860		16,160
1794		1,950	1870		26,460
1800		2,400	1880		43,642
1807		2,518	1890		65,037
1825		3,273	1900		88,517
1830		3,825	1904		107,104
1840		5,226	1912		186,300
			1922		320,804

Historical Statistics of the United States, 1789-1945,
pp 9, 10.

Chart 21.

RANK OF THE LEADING INDUSTRIES OF THE
UNITED STATES IN 1919

<u>Rank</u>	<u>Industry</u>	<u>Value of Products</u> (in 000's)
1.	Slaughtering and Meat Packing	\$ 4,246,291
2.	Iron and Steel, Steel Works and Rolling Mills .	2,828,902
3.	Automobiles	2,387,903
4.	Foundry and Machine Shop Products	2,289,251
5.	Cotton Goods	2,125,272
6.	Flour Mill and Grist Mill Products	2,052,434
7.	Petroleum (refined)	1,632,533
8.	Shipbuilding	1,456,490
9.	Lumber and Timber Products	1,387,471
10.	Cars and General Shop Construction by Steam Railroad Companies	1,279,235
11.	Clothing, Women's	1,208,543
12.	Clothing, Men's	1,162,986
13.	Boots and Shoes	1,155,041
14.	Bread and Other Bakery Produce	1,151,896
15.	Woolen and Worsted Goods	1,065,434

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CRITERIA FOR THE EVALUATION OF HISTORIC
SITES AND BUILDINGS

1. Structures or sites at which events occurred that have made a significant contribution to, and are identified prominently with, or which outstandingly represent, the broad cultural, political, economic, military, or social history of the Nation, and from which an understanding and appreciation of the larger patterns of our American heritage may be gained.
2. Structures or sites associated importantly with the lives of persons nationally significant in the history of the United States.
3. Structures or sites associated significantly with an important event that outstandingly represents some idea or ideal of the American people.
4. Structures that embody the distinguishing characteristics of an architectural type specimen, exceptionally valuable for a study of a period style or method of construction; or a notable structure representing the work of a master builder, designer, or architect.
5. Objects that figured prominently in nationally significant events; or that were prominently associated with nationally significant persons; or that outstandingly represent some great idea or ideal of the American people; or that embody distinguishing characteristics of a type specimen, exceptionally valuable for study of a period style or method of construction; or that are notable as representations of the work of master workers or designers.
6. Archeological sites that have produced information of major scientific importance by revealing new cultures, or by shedding light upon periods of occupation over large areas of the United States. Such sites are those which have produced, or which may reasonably be expected to produce, data affecting theories, concepts, and ideas to a major degree.
7. When preserved or restored as integral parts of the modern urban environment, historic buildings not sufficiently significant individually by reason of historical association or architectural merit to warrant recognition may collectively compose a "historic district" that is of historical significance to the Nation in commemorating or illustrating a way of life in its developing culture.
8. To possess national significance, a historic or pre-historic structure, district, site, or object must possess integrity.

For a historic or prehistoric structure, integrity is a composite quality derived from original workmanship, original location, and intangible elements of feeling and association. (A structure no longer on the original site may possess national significance if the person or event associated with it was of transcendent importance in the Nation's history and the association consequential.)

For a historic district, integrity is a composite quality derived from original location, and intangible elements of feeling and association.

For a historic or prehistoric site, integrity requires original location and intangible elements of feeling and association. (The site of a structure no longer standing may possess national significance if the person or event associated with the structure was of transcendent historical importance in the Nation's history and the association consequential.)

For a historic object, integrity requires basic original workmanship.

9. Structures or sites which are primarily of significance in the field of religion or to religious bodies but are not of national importance in other fields of the history of the United States, such as political, military, or architectural history, will not be eligible for consideration.

10. Birthplaces, graves, burials, and cemeteries, as a general rule, are not eligible for consideration and recognition except in cases of historical figures of transcendent importance. Historic sites associated with the actual careers and contributions of outstanding historical personages usually are more important than their birthplaces and burial places.

11. Structures, sites, and objects achieving historical importance within the past 50 years will not as a general rule be considered unless associated with persons or events of transcendent significance.

12. Structures, sites, and objects proposed for addition to the National Park System must also meet standards of suitability and feasibility.

