14.2 INDUSTRIALIZATION AND THE FACTORY

After the Civil War, the United States economy passed into an era of rapid industrialization. The term industrialization is used here to describe a process of development that reorganizes productive activities such that they conform to a machine logic, as opposed to a handicraft logic. That is, the economy becomes increasingly constituted by a series of interconnected machine processes. When we think of the United States undergoing industrialization we are really envisioning its economy becoming a large-scale machine, capable of churning out all of the goods required to sustain the community efficiently and to sustain the machine itself, through production of intermediate goods. When we think of the economy as industrializing we are actually considering a qualitative change in the economic system. To better understand what a qualitative change in the economic system entails, consider the following key features of an industrialized, machine process economy.

LARGE-SCALE TECHNOLOGIES THAT MAKE UP THE CORE OF THE ECONOMIC SYSTEM.

Particular combinations of technology incorporated into the economic system were massive in scale. For example, consider again the case of the railroads. We have previously discussed why railroads required administration from the managerial bodies of corporate entities capable of organizing the business over the scale and scope of its activities. The technology itself was massive – establishment of steam powered with a rail and car transportation system over vast geographical areas was quite literally the greatest engineering marvel that humans had achieved to date. With the railroads came the telegraph, which created the possibility for transnational and interregional rapid communication. Other hallmark technologies of an industrializing 19th century American economy include: electric light and power, streetcars, improvements in steel production, and petroleum refining.

INTEGRATED CHAINS OF PRODUCTION THAT LINK MARKETS AND INDUSTRIES.

The largeness of the business enterprise implies a high degree of interconnectedness between different stages in the production of the social product. To illustrate our point, consider the generation and provisioning of electric power. We can envision a simplified model of electric generation by breaking the whole production process into four stages:

1. Production of fuel source. In this example, we will assume we're talking about a coal fired power plant. This is a good choice, because coal served as the primary fuel source for electric generating during its advent in the United States. Coal is produced by mining and is subject to geological processes that have resulted in an uneven spatial allocation of coal in the earth's crust. Therefore, coal can only be mined in certain areas. The story of coal in America begins in Pennsylvania.
2. Energy conversion. The chemical energy embodied in coal must be converted into mechanical energy before it may be used to generate electricity. This conversion process is accomplished by burning the coal to transform water into steam, which creates the

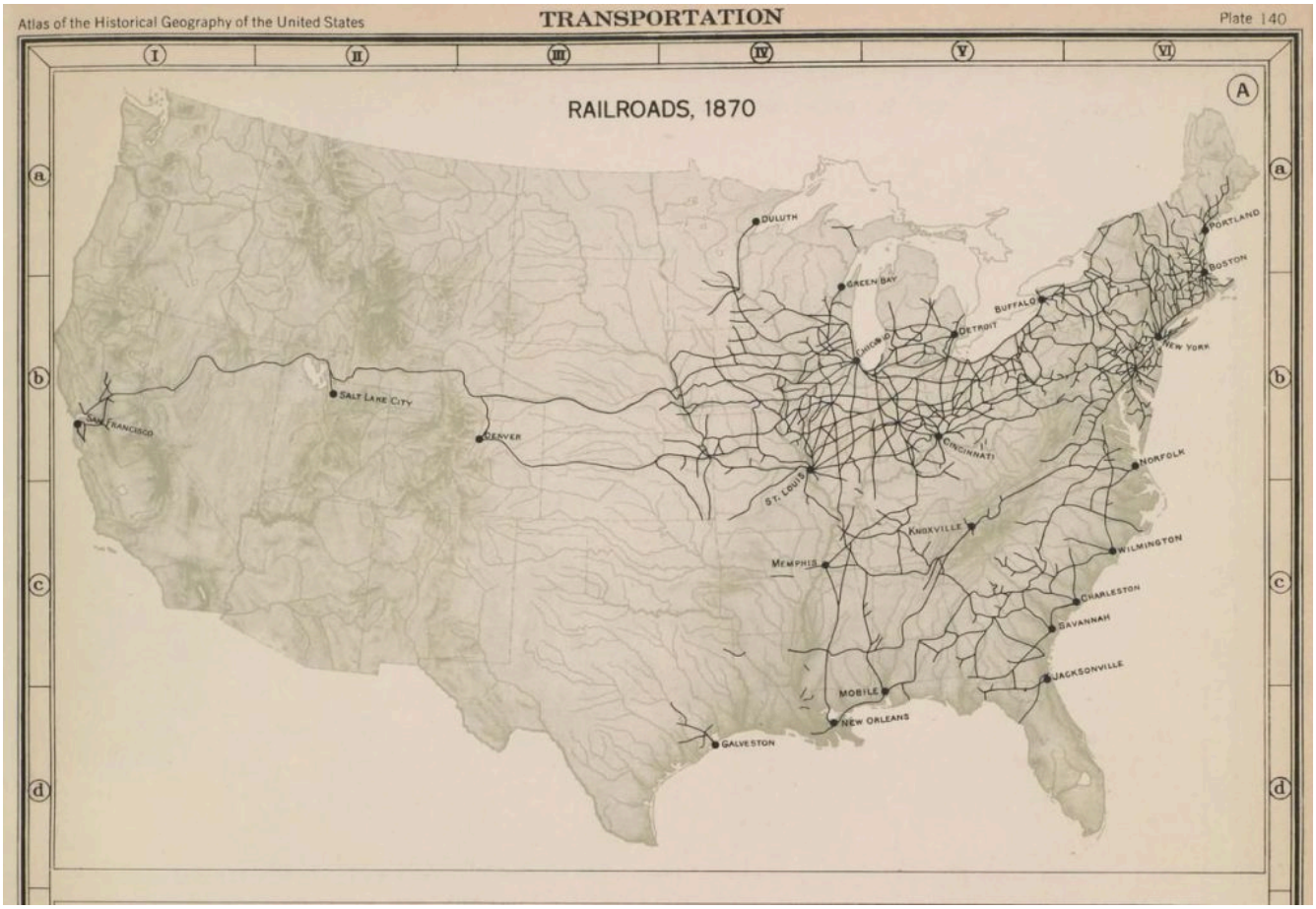

Figure 7. Atlas of the Historical Geography of the United States, Plate 140 by Charles O. Paullin. Curated by the Carnegie Institution of Science

necessary pressure to power an engine. The engine now embodies some of the energy that existed in the coal, less losses due to inefficiencies in the conversion process. The steam engine itself is the product of a set of interconnected production processes.

3. Electric Generation. The mechanical energy of the steam engine is then used to power an electric generator. Electric generators require steel, copper, and most importantly, a patent to produce.
4. Distribution. Once generated, the electricity is distributed to the end user via cables that conduct electricity. Edison's first system in New York used copper as its conductor.

If you think about each of these stages of production occurring as a production process that occupies a different space geographically, then you begin to see how something like the provisioning of electricity is really a network of interdependent production processes that establishes connections between different regions. Coal is mined in Pennsylvania, and then shipped to New York for use as fuel in the production of steam. A boiler and steam-powered electric generator is purchased from a firm in New York that is licensed to sell Edison patented systems. Edison's generators are produced in upstate New York and require a steady flow of steel from Pennsylvania and copper from Michigan for ongoing production. And so on. Every single economic activity is the product of an orchestra of interconnected production processes. To function efficiently those interdependencies must be managed so

that they they function as a whole machine. This is what we mean when we describe the economy as industrialized.

14.3 BIG BUSINESS AND ORGANIZED LABOR

As the business enterprise becomes large it operates on a scale of production that requires the labor of a proportionally large number of workers. The managers of the firm must ensure that they reliably and efficiently meet their production goals. To achieve this end, managers established methods for controlling their labor force so that rate of production remains within their full discretion. Introduction of mechanization into the production process serves as one historical example of the methods of controlling labor. Mechanization establishes the pace of production, by powering machine technology. For example, an assembly line sets the rate at which workers must labor. In this sense, workers on an assembly line must work at roughly the same pace, harmonizing their collected labor. By adjusting the speed of the machine, worker productivity may be adjusted across the board as desired, subject to physical limits of the labor force. Similarly, the machine process results in a "deskilling" process, which tends to homogenize the labor requirements for production. Deskilling transforms the labor process by removing the power that workers enjoy via their specialized knowledge of craft production. Machine production depends, to a much lesser degree, on the specialized knowledge of workers. Instead, this knowledge is transferred to the managerial class, who may possess knowledge of the machine and its technical requirements or retain the expertise of an engineer.

Loss of worker control over the production process results in the ability for the managerial class to retain a larger share of the monetary value of the output of the labor process. Managerial focus on cost efficiency and meeting its production targets, coupled with control over the labor process, resulted in dangerous and poor working conditions. The large business enterprise, by exercising its control over the labor process in order to exploit its workers, created the conditions for the emergence for an organized labor movement.

An exhaustive review of the labor history in the United States is beyond our reach, however, we may highlight some of the major themes and events that helped shape its development.

THE KNIGHTS OF LABOR

Organized in 1869 by tailors in Pennsylvania, the secret organization named the Noble Order of the Knights of Labor would serve as an organizational body for workers seeking collective action following the Panic of 1873. Coal miners helped drive membership growth in the Knights of Labor through the depression of the 1870s. By 1884 there were 70,000 members of the Knights of Labor. By 1886 this figure exploded to 700,000.

The Knights of Labor participated in strikes in order to achieve their primary goal of an 8 hour workday. Most notably, the Knights of Labor won a struggle against Jay Gould over a dispute concerning the Wabash Railroad in 1885.

THE GREAT RAILWAY STRIKE OF 1877

Railroads figure prominently in the course of American economic history for they have left lasting and transformative imprints on the course of development. It is natural, then, to link a major moment in the history of the labor movement to consequences of railroad speculation and administration. The economic depression of the 1870's was global in nature and was caused largely by a financial crisis related to the value of railroad securities. The Panic of 1873 emerged from a financial system that had become increasingly fragile during the speculative episode in railroad securities, mostly bonds, following the Civil War. Jay Cooke, a major US banker during the latter part of the 19th century, was heavily vested in the market for Northern Pacific bonds to interests in Europe. During the 1870s Europeans were less keen to accept the risk associated with holding American railroad bonds. In turn, this led to the inability for Cooke to continue issuing debt and ultimately resulted in his firm becoming insolvent. The failure of Jay Cooke & Company set off a wave of bank failures and a closure of the New York Stock Exchange. The result of this financial panic was a nearly decade long depression.

As a result, railroads were under pressure to cut their labor costs. Notable railroads such as the Pennsylvania and Baltimore & Ohio Railroads had administered waves of wage cuts. Railroad workers organized themselves in the summer of 1877 and succeeded in bringing the railroad system in the eastern part of the United States to a grinding halt. Striking railroad workers were joined by sympathetic workers in other mining and manufacturing sectors, which resulted in fears on the part of the state and business interests that labor was growing into a coherent and powerful countervailing force. To quell the strikers, initially local militias were deployed. However, local militias were ineffective due to their propensity to defect and join the strikers, as they found themselves in common interest with their fellow members of the community. Consequently, National Guard and federal troops were brought into cities under the control of the strikers and were far more effective, because the soldiers were not particularly vested with the interests of the community and more likely to follow the orders of their commanding officers.

The strikes of 1877 serve as an important moment in the development of the political economy of the labor situation in the United States. Following the strikes, membership in labor organizations increased substantially. Likewise, more national guard units were established with an eye toward checking the power of labor going forward. In the realm of economic theory, the struggle between big business and big labor was taken as a serious matter of consideration. The development of neoclassical economics owes much of its theory of distribution to the international labor struggle that reached a fever pitch in the 1870s. For example, John Bates Clark, the father of the marginal product theory of distribution, was working out a theory of distribution that sought to move consideration of the distribution of the social product away from conflict between social classes, toward one based upon marginal contributions of each ***factor*** of production (land, labor, capital) in the production process. The result, is a theoretical system that finds fairness in an unequal distribution of income and wealth. Bates' theory was a direct response to the class conflict embodied in events like the Great Strikes of 1877.

While it is not possible to give the history of the labor movement in the United States a thorough treatment here, we can summarize some of central implications and consequences:

- Ongoing coherence and emphasize around the demand for an 8 hour working day.
- Development of systems of administration and organization capable of exerting a countervailing force against big business.

Maryland National Guard Sixth Regiment fighting to suppress strikers in Baltimore. Harper's Weekly, Journal of Civilization, Vol XXL, No. 1076, New York. Public domain.

- Formation of institutions capable of allowing workers to regain some of the control over production that was lost with the demise of handicraft production as a result of industrialization.