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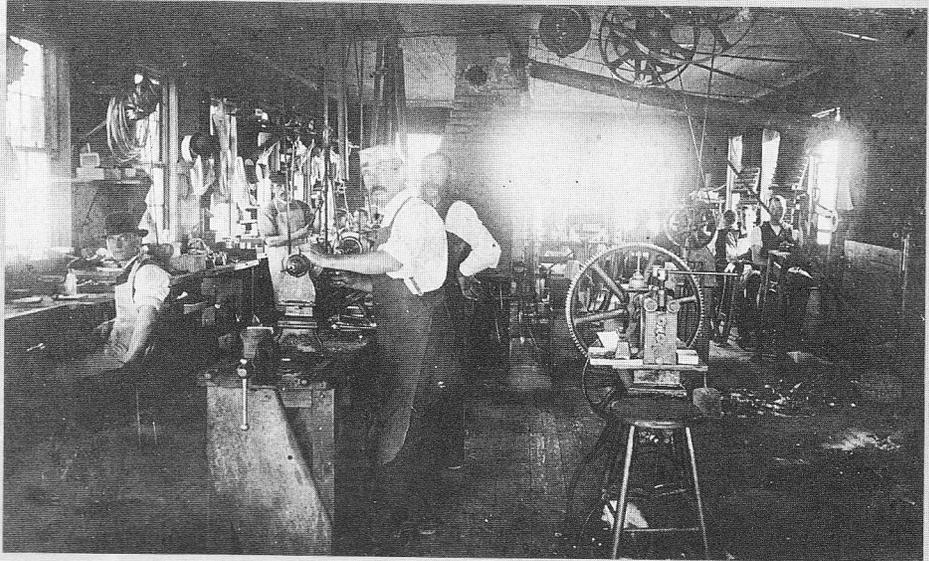
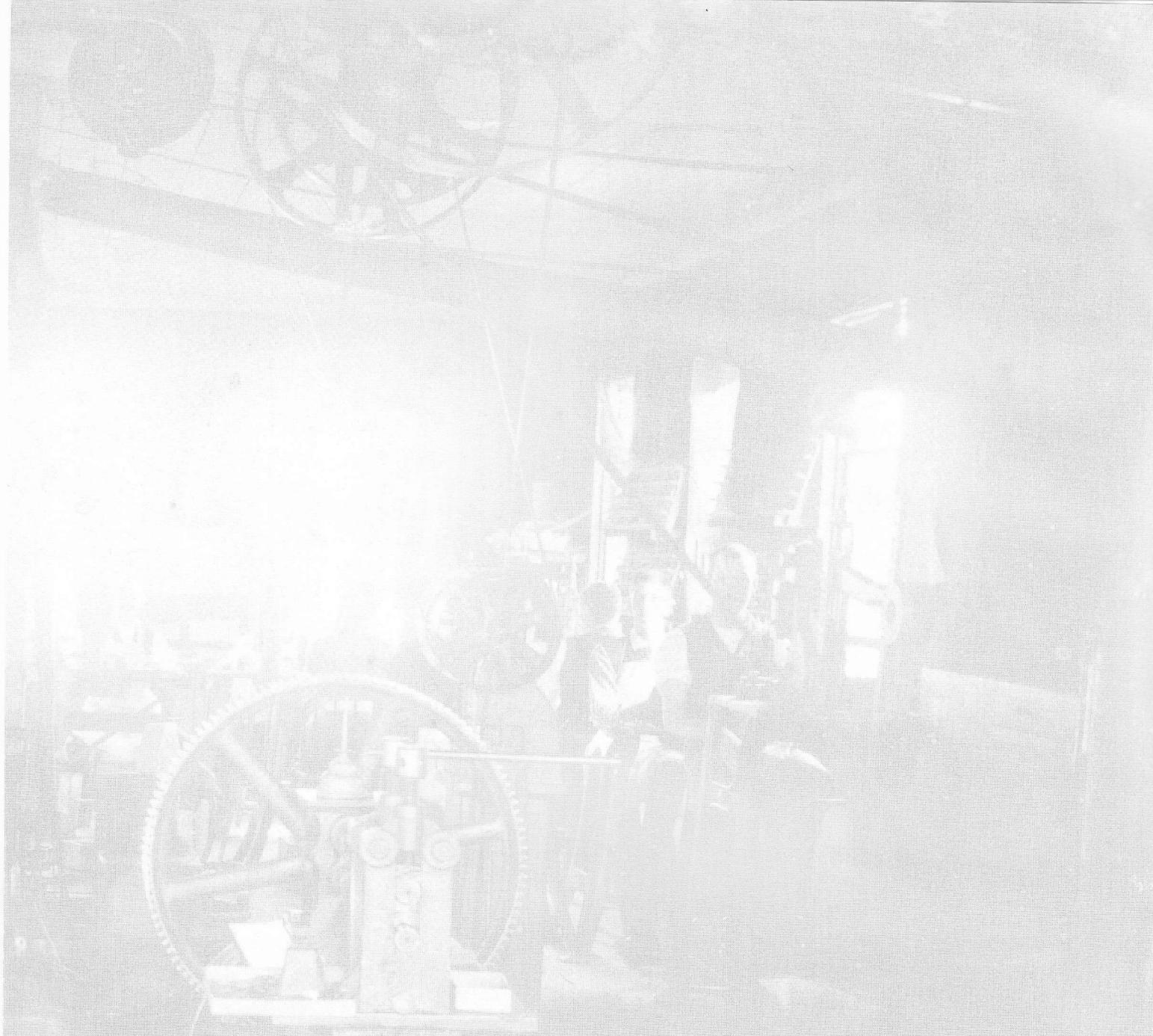
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The Horrors of Competition: Innovation and Paradox in Rhode Island's Jewelry Industry, 1860-1914

PHILIP SCRANTON

Before the Civil War, American jewelry making diverged from watch and household silver production, activities with which it had mingled in the early Republic's craft shops. In and after the 1860s, watch companies moved strongly toward standardization and mass production of inexpensive, reliable timepieces. After a brief fling at trust control in the 1880s, they engaged in fierce price competition that demoralized markets through the next decade.¹ Silverware, made in many styles and qualities from sterling to low grades of plate, emerged from a small cluster of sizable, chiefly New England firms led by Rhode Island's Gorham and Connecticut's Meriden Britannia, while Tiffany in New York drew accolades for imaginative design and breathtaking workmanship.² In jewelry neither standardization nor a stable roster of competitors appeared. Instead, three durable spatial concentrations of small enterprises developed around antebellum beginnings in lower Manhattan, Newark, and the Providence-Attleboros district. Like Tiffany, which bridged silverwork and personal adornments, New York and Newark jewelers ruled the market's peak, whereas the "eastern" shops controlled the cheaper lines.



In 1860 at least 75 jewelry manufacturers operated in Providence, employing 1,750 workers to create products worth \$2.2 million (of \$10 million nationally). The Civil War wrecked business for two years; a third of the shops vanished by 1864. Those with gold and silver stocks realized large profits without manufacturing by selling metals in a rising market, then "retired" when gold stayed high and demand low. Area employment fell to 750 before reviving once vogues arose for patriotic, martial, and funerary styles, fashioned from brass and other base metals. Thereafter, Providence firms shaped jewelry and ornament from silver, low gold (ten karat or under), and nonprecious alloys. Borne by a strong postwar recovery, a group of auxiliary specialist firms (refiners, platers, engravers, gemstone cutters, and tool producers) gained a foothold by 1870. Whereas Brown and Sharpe had been early makers of jewelers' tools and specialized equipment, renewed expansion brought others into the field.³

Despite the mid-seventies depression, the Providence jewelry trade included 142 firms with nearly 3,300 workers by 1880 (three-quarters of them adult men), generating an output worth \$5.4 million, of which \$2.9 million (54 percent) was value added in manufacturing. Specialty services were the province of 32 other companies employing another 300 workers.⁴ As in fashion textiles and batch metalworking, most proprietors were craftsmen (in the trade parlance, bench workers) who had served five- to seven-year apprenticeships, many becoming deft designers. In jewelry the path to proprietorship was relatively straightforward for those with a flair for style, a full set of skills and tools, a

A typical Providence jewelry shop, circa 1900. Albumen print. RIHS Collection (RHi X3 3011).

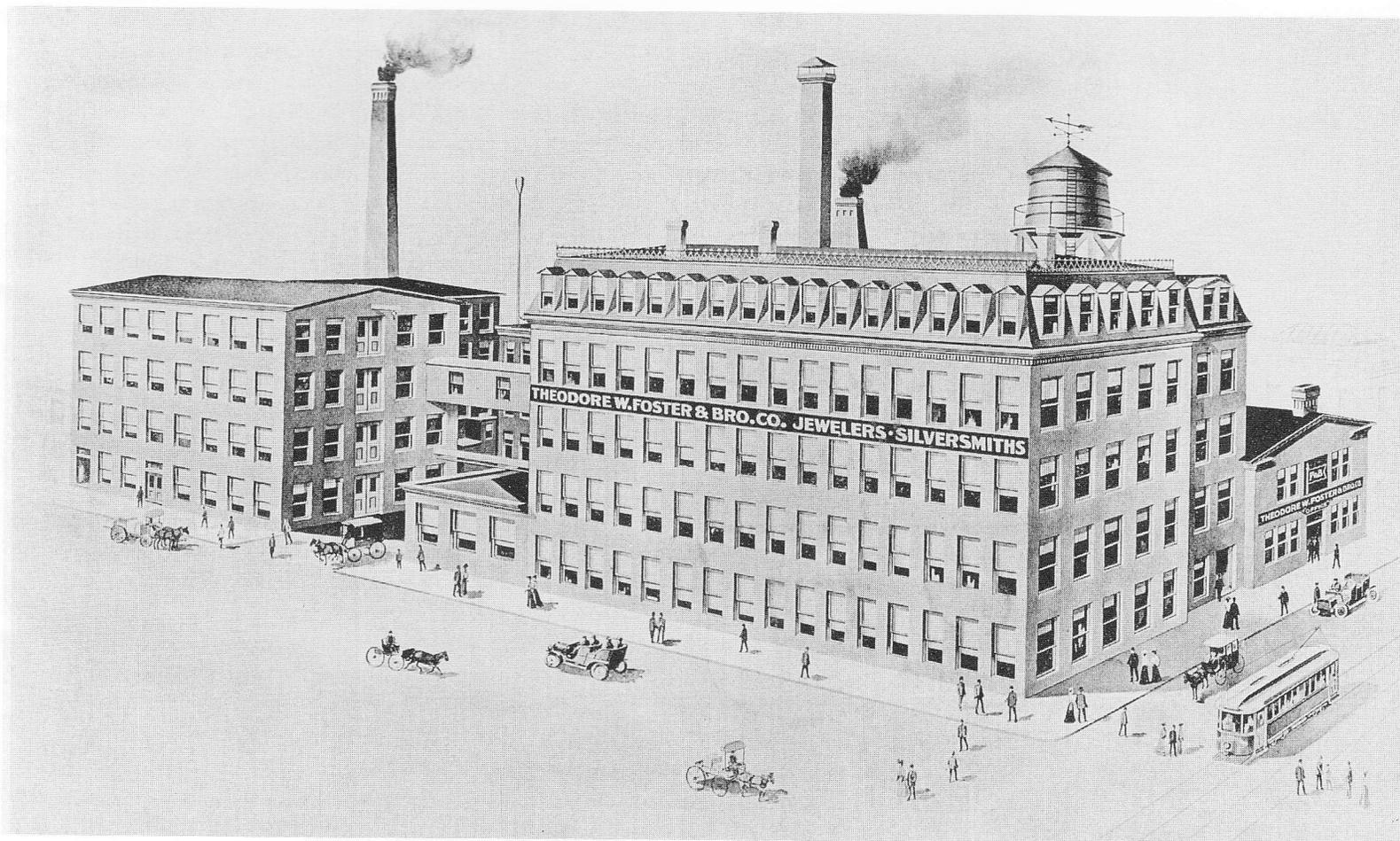
Philip Scranton is Kranzberg Professor of the history of technology at the Georgia Institute of Technology and the director of the Center for the History of Business, Technology, and Society at the Hagley Museum and Library in Wilmington, Delaware.

few hundred dollars in savings, and a sound reputation, which brought access to rented workspace in the jewelry district and modest start-up credit accommodations. Production techniques were then gradually shifting away from slower casting processes toward die presswork to shape soft brasses and German silver into brooches, cufflinks, pins, and other items before their ornamentation with stones, wirework, or enamel and fitting with clasps or chains. In 1885, local jewelers ran nearly seven hundred presses, an equal number of polishing "heads," over five hundred jewelers' lathes, and two hundred small drop hammers for forging. Most presses were foot-operated and were constructed nearby, but the trade drew on nationally renowned Oberlin Smith's New Jersey press works as well.⁵ Firms like Foster and Bailey, which stood ready to provide any of several thousand patterns, adopted metalworkers' systems of job tickets and detailed specifications on pattern drawings, duplicates of which were kept in safes that also held stocks of silver and gold plate. Far less prominent than Brown and Sharpe or Baldwin Locomotive, where such practices seem to have originated, the larger Providence jewelry enterprises were nonetheless fully up-to-date technologically.⁶

Marketing, from midcentury through the 1873 crash, meant semiannual trips to New York to show makers' style samples to Manhattan jobbers, "men of capital [who] bought manufacturers' goods for cash and dealt on long terms with the retailer." The money squeeze of the mid-seventies altered this relationship. Many old wholesale houses folded, and survivors now invited producers to provide *them* credits, to sell on a consignment basis, and/or to accept long delays for settling accounts. Salesmen discharged from failed distributors formed new jobbing firms with minimal resources, then asked manufacturers for comparable "concessions." Desperate for business in difficult times, manufacturing jewelers complied, but by the 1880s those emergency terms of trade had persisted, becoming standard practices: "small orders by post card," returns of unsold goods, cancellations of confirmed orders, expectations of free repairs for damaged items, and demands that makers produce inventories of all styles for immediate shipment at wholesalers' calls. Each imposed costs on manufacturers and added uncertainty to the market, as did jobbers' predilection for paying bills late yet deducting the discounts allowed for timely remittances.

Before eastern jewelers devised countermeasures, these tactics generated three troubling effects. First, the market power of buyers forced substantial inventory risk onto those manufacturers who built up stocks of seasonal styles. Second, jobbers developed a bent for "shopping" one firm's samples to another maker, preferably a new and eager one, to have them duplicated at a lower quote, perhaps with slight design changes. As diesinkers and firms making components (e.g., chains and clasps) enlarged the auxiliary network, this end run grew simpler. A novice company could often closely match a veteran's styles by calling upon the district's disintegrated productive capacities. Third, this rage for copying contributed to intense secrecy among style originators and to hostility toward "garret" upstarts by older firms.

Knockoffs could be produced in as little as two weeks, killing reorders for hot novelties unless their creators had anticipated the market's vogues and built ample inventories. Even then the network's flexibility and swift response time facilitated rapid copying of seasonal hits, thus flooding the trade with cheap imitations, devaluing originators' stocks, and leaving imaginative firms moaning over their lost profits. "One of the greatest evils in the trade [is] the everlasting copying of good styles in inferior materials and workmanship, and cutting of



Theodore W. Foster and Brother, a leading Providence jewelry manufacturer, owned and occupied this plant at the corner of Richmond and Friendship streets. Halftone from the Providence Board of Trade Journal, November 1908. RIHS Collection (RHi X3 3037).

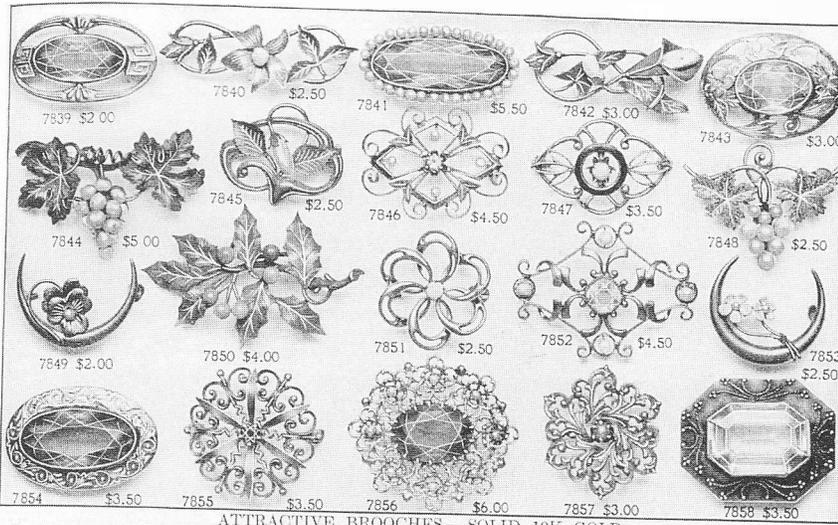
prices,” one Providence jeweler fumed in 1886. Finally, at season’s end, wholesalers circulated among the shops seeking bargain job lots of dead stock, goods made up for orders that had been canceled or for buyers’ calls that had never materialized. By the late 1880s manufacturing jewelers were launching bitter complaints about distributors’ manipulations.⁷

This situation, distressing to established companies but advantageous to wholesalers and fresh entrepreneurs, offers several insights into specialty production, the fashioning of diverse goods for shifting niche markets. Under certain conditions it was entirely possible for an industrial network to be too flexible and too spatially compact for its own good. Distributors learned in the 1880s that they could reap the network’s economic advantages better than could veteran manufacturers by working up a variation on the putting-out system of early industrialization.⁸ Providence’s rapid responses to custom orders, high skill levels, and able auxiliaries encouraged the knockoff game, later long a feature of the New York garment industry.⁹ Critically important were the low entry costs for new establishments and the trade’s sharp seasonality, which routinely pressed workers into months of idleness between two annual rush periods. Together these pull-and-push factors refilled the pool of fledgling shops with skilled workers commencing on their own accounts. Further, adroit second movers chasing seasonal successes held substantial cost advantages over style initiators, who regularly crafted several hundred new samples, only a fraction of which would draw sufficient orders to repay outlays for designing, tooling, and dies. Despite lower selling prices, imitators could score sizable opportunity profits.

Second, in this environment of extreme flexibility, price rivalry could readily displace the product competition beloved by industrial specialists. For them, the route to profit ran through a dynamic of differentiation that matched distinctive goods to precise (not generic) needs, thus bypassing price considerations for highly valued utilities expressed in fashion, technical performance (locomotives, machine tools), or varieties of customization (job-printed advertising, accurate iron castings). Hence, in jewelry, established firms wearied of jobbers who presented close copies of their samples and offered them a choice between matching an imitator's price or losing the order to the copyist's shop. The reduced price might bring failure to the garret entrepreneurs that jobbers used as foils, but others would take their places, whereas refusing the cut simply slashed the originator's total sales and transferred business to the scrambling newcomers. Such exchanges heightened traditional tensions between buyers and makers, undermined the latter's profits, and fueled the hostility between veterans and climbers in the eastern jewelry trade.

Other trades—styled textiles and furniture, for example—drew upon comparable industrial districts, replete with new starts, auxiliary enterprises, seasonal swings, and short-lived fashions, but their contemporary problems paled by comparison with those of Providence jewelers.¹⁰ Why this difference? For one thing, the turnaround time to copy fabrics and fine bedroom sets was far longer than for brooches and bracelets. In both sectors, followers commonly echoed leaders' best-sellers for the next seasonal opening, a tactic also essayed when American textile specialists reworked the previous year's European style leaders. Moreover, by the 1880s specialists increasingly sold their worsteds or walnut tables direct to cutters-up or furniture retailers rather than through jobbers.¹¹ This obstructed the spread of information about what was in vogue, occasioning further delays for copyists. Though leaks and gossip about trends were constant, fuller and more reliable information surfaced late in seasons and informed planning for the next round. Jewelry jobbers, however, controlled all but a tiny fraction of the popular trade in the mid-1880s, circulating their selections from makers' samples to hundreds of retailers and thereby directly appropriating timely news on what lines were taking hold in the market. This combined with the quick reproduction cycle to effect an ironic efficiency in jewelry making and marketing that was absent in other specialty consumer-goods trades. Manufacturers would have to struggle against the market power of distributors or else become their pawns.¹²

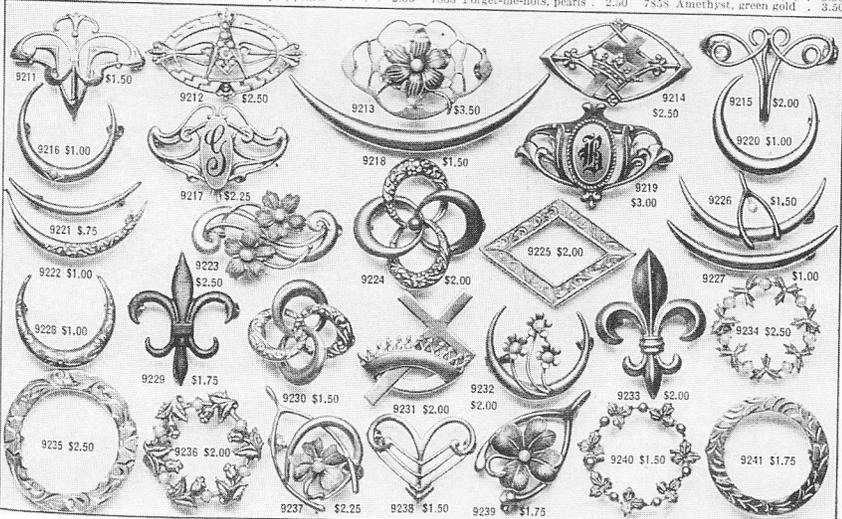
Like styled-textile firms, jewelers gradually articulated two responses: direct selling and trade organization. Reaching retailers individually promised considerable advantage, but the difficulties of the task were the basis for the existence of wholesalers. Direct sales could protect style secrecy and delay piracy. Hiring roadmen would also put larger firms on quite a different footing from tiny competitors who could not afford to support travelers.¹³ Department stores, rising in prominence, sparked the Providence jewelers' first steps, for these retailers bought in fair quantities, paid promptly, and reordered their best-sellers from the original suppliers. In addition, producers' salesmen targeted the best-known independent jewelry retailers, skimming the cream from the top of the trade, and sought out local and national fraternal, business, and sporting associations. Some companies supplemented such campaigns by printing catalogs, mailed to small-town shops, and others hastened their seasonal designing so as to get samples into the market before the New York melees commenced. These countermeasures gathered enough force by 1887 to put jobbers on the defensive through the 1893 crash.¹⁴



ATTRACTIVE BROOCHES — SOLID 10K GOLD

Brooches always make acceptable gifts, and we show here some of the most attractive patterns our stock affords. There are brooches here that will appeal to those who like something different in design and something out of the ordinary in finish. In Nos. 7840, 7842, 7846, and 7848 green gold is very effectively combined with the natural gold colors, and in all other leaf and flower brooches we have used the rose finish to good advantage. The forsythias in No. 7855 are enameled in delicate blue. Baroque pearls with the exception of those on No. 7848 are all genuine and are of the most exquisite luster. The coral berries on No. 7850 the opal in No. 7851, and the amethyst in No. 7856, are all genuine and are of the most stones are the finest imitations. The illustrations show the exact size of the articles.

7839 Amethyst, helix . . . \$2.00	7844 Grapes, baroque . . . \$5.00	7849 Floral baroque pearl . . . \$2.00	7854 Opal, black enamel . . . \$3.50
7840 Floral baroque pearl . . . \$2.50	7845 Grapes, baroque . . . \$2.50	7850 Amethyst, helix . . . \$2.00	7855 Amethyst, pierced . . . \$3.00
7841 Holly, coral . . . \$5.50	7846 Sapphires, baroque . . . \$4.50	7851 Opal . . . \$2.50	7856 Forget-me-nots, pearls . . . \$6.00
7842 Holly, coral . . . \$3.00	7847 Opal . . . \$3.50	7852 Amethyst, baroque . . . \$4.50	7857 Forget-me-nots, pearls . . . \$3.00
7843 Holly, coral . . . \$3.00	7848 Grapes, pearls . . . \$2.50	7853 Forget-me-nots, pearls . . . \$2.50	7858 Amethyst, green gold . . . \$3.50



SOLID 10K GOLD BROOCHES AND CHATELAINES

These brooches are both ornamental and useful. They are of good weight, well made, and solid 10k gold. Black enamel chatelaine, No. 9229, is suitable to wear with any black enamel or gun metal watch. We call attention also to the chatelaine pins, No. 9212 Masonic, No. 9214 Knights Templar, and No. 9234 Christian Science. We will engrave one script or Old English initial on Nos. 9217 and 9219, free of charge. Brooches marked * have safety catches. Pictures show the exact size.

*9211 Chatelaine . . . \$1.50	*9219 Signet, chatelaine . . . \$3.00	9227 Crescent, plain polished . . . \$1.00	*9235 Engraved, circle . . . \$2.50
*9212 Masonic, pearl, pearls . . . 2.50	*9220 Polished crescent . . . 1.00	*9228 Crescent, engraved . . . 1.00	9236 Wreath, pearls . . . 2.00
*9213 Rose gold, baroque . . . 2.50	*9221 Roman crescent75	9229 Black enamel chatelaine . . . 1.75	9237 Good-Luck, pearl . . . 2.25
*9214 Knights Templar . . . 2.50	*9222 Crescent, half chased . . . 1.00	*9230 Coll. pearl, half chased . . . 1.50	*9238 Polished chatelaine . . . 1.50
*9215 Chatelaine, polished . . . 2.00	9223 Snowdrifts, bar, pearls . . . 2.50	9231 Christian Science, pearl . . . 2.00	9239 Good-Luck, baroque . . . 1.75
9216 Pearl . . . 1.00	9224 Coll. Roman, half chased . . . 2.00	9232 Forget-me-nots, bars . . . 2.00	9240 Green gold leaves, gold . . . 1.50
9217 Signet, chatelaine . . . 1.00	*9225 Engraved, polished . . . 2.00	9233 Chatelaine, polished . . . 2.00	balls . . . 1.50
9218 Polished crescent . . . 1.50	9226 Wishbone, bar, pearl . . . 1.50	9234 Im. pris. green leaves . . . 2.50	9241 Engraved circle . . . 1.75

Both hoped-for and unintended consequences followed. Middlemen began making preseason trips to Providence seeking fresh styles, and they behaved rather more equitably on trade terms. Jobbers' threats to boycott direct-selling jewelers abated and makers' profitability strengthened, but manufacturers' selling expenses rose steadily as well. By 1890 reports filtered in that retailers were tiring of the repeated visits by roadmen and often declined to examine samples. Collections also proved a headache to manufacturers selling direct to some fraction of the ten thousand smaller independent stores. In a sense such retailers reunited the three segments of the antebellum trade, vending jewelry, watches, and silverware, but they settled their accounts with the latter sectors' large enterprises before sending pittances off to Providence manufacturers. Even so, the counterattack gave the city's leading companies more leverage in defending prices and more control over production and inventory than had been possible since the early 1870s. The complexities of direct sales and collections convinced these New England firms that trade organization was essential.¹⁵

Providence-area firms created several institutions, as did their New York colleagues. Potentially most important was the New England Manufacturing Jewelers' Association (NEMJA), modeled on the Silver Plate Association, which from the early 1880s had worked successfully to "regulate prices, time of selling, and the rating of concerns" purchasing silverware. These capabilities helped stabilize the marketing of the diverse products of silverware manufacturers, but neither NEMJA nor any other jewelry group could master them. Jewelers' organizations did address other matters collectively: life and theft insurance, pursuit of robbers and burglars who plagued roadmen and shops, litigation against bankrupt jobbers and retailers, and, to some degree, schooling for designers and craftsmen. However, of the key Silver Plate services, NEMJA and the linked Jewelers' Board of Trade managed only to sustain a credit-rating service, failing in attempts to set common seasonal opening dates, curb design piracy, establish standard trade terms, and secure adoption of uniform cost-accounting procedures. The market struggles of the 1880s divided the industry

The Baird-North Company, gold and silver smiths, offered this assortment of ten-karat-gold art nouveau brooches in an 1895 catalog. RIHS Collection (RHi X3 3029).

into groups of firms either selling direct or dependent on jobbers, groups whose interests were opposed on most trade practices. Realizing that NEMJA could neither attract nor destroy the "mushroom" competition, members abandoned it. At the end of its first decade, NEMJA's roster of firms had fallen 60 percent below its mid-1880s peak and its club and meeting rooms had been given up. Only an urgent campaign prevented the association's collapse and retooled it into an occasional banqueting society and source of protariff petitions.¹⁶

Notwithstanding these problems, the Providence jewelry sector achieved two sorts of growth in the 1880s. Its cohort of firms expanded to 170 and its workforce to more than 3,900, roughly a 20 percent increase. Meanwhile, product value rose 43 percent, value added in manufacturing jumped 55 percent, and workers' earnings grew faster than their numbers. These gains reflected in part the effects of technical change noted above and in part a decline in the costs of materials. Expenses for brass and other inputs fell from 46 cents per product dollar in 1880 to 41 cents a decade later, one result of the nonferrous metal producers' increased capacity and intensified competition, circumstances that ultimately led to consolidations after 1893.¹⁷ Thus Providence jewelers quietly profited from upstream technical advances and rivalries.

Because the 1890 census details a host of sectoral costs, a rough estimate of average returns can be ventured. Once all recorded expenses are deducted from product values, the census tabulations suggest that Providence firms enjoyed a margin of \$1.8 million on output of \$7.8 million, or 23 cents per dollar of goods. This sum would be reduced by defaulted accounts or improper discounts taken, but it represented a 30 percent return on reported capital, only a fifth of which was fixed in plant and machinery. As Rhode Island jewelers largely rented their quarters, they had devised an effective investment-minimizing strategy.¹⁸ Yet area jewelers had established a niche that they could not manage or control. Unable to define and promote style trends, manufacturers instead guessed which novelties would capture the uncertain sensibilities of jobbers, retailers, and final purchasers. This situation helps account for the profusion of their product lines, for makers, lacking means to anticipate or shape fashion trends, had to rely on their nimble response capabilities. Soon a general depression would undermine the direct sales tactic, putting jobbers back in the driver's seat and underscoring the weakness of the trade's collective institutions.

In these years Providence's Gorham Manufacturing Company presented a gnawing contrast, over a thousand workers activating a sprawling plant that produced fine silverware and "art goods" in various metals and shared with Tiffany the commanding heights of silver work nationally. In May 1893 Gorham foundry workers constructed an intricate floor mold for a seven-foot-high statue of Christopher Columbus, using plans furnished by Frederic Bartholdi, the designer of the Statue of Liberty. They melted a ton of silver (worth \$25,000), then without incident deftly poured it into the "sunken pit" to cast the centerpiece of Gorham's elaborate Chicago World's Fair display. Some weeks later, after Gorham announced itself very busy, particularly in "large specimens of silverware," the regional jewelry market report carried the pathetic headline "Business Not Altogether Dead."¹⁹ Gorham would not prove immune to the economic slump (it would cut wages 10 percent and shift to two-thirds time in 1894), and there would be a run of fat years for the jewelers over the next two decades; but try as they might, jewelers could never achieve Gorham's visibility, stability, and profitability. The trade's continuing mutations through World War I

will be reviewed in three phases: the depression and recovery of the period from 1893 to 1900; the edgy prosperity from 1901 to 1907; and the troubled prospects that marked the years from 1908 to 1914. Throughout, issues of sectoral structures and networks, technical change, market relations, labor dynamics, and institutional initiatives will be explored.



William R. Cobb operated a Providence jewelry findings firm in the 1890s. It was a typical enterprise, modest in scale and sales and immersed in local production networks; yet it was unusual, for it endured past World War I and left records that have been archivally preserved. Cobb had succeeded Otto Merrill about 1883 in a business that provided jewelers and other makers of metal novelties with diverse components—e.g., clasps; swivels; pin, brooch, and button backs; and glazed, gilt, and enameled joints, mountings, and bars. Cobb's few workers made them by the dozen or the gross for roughly two hundred clients, chiefly in the Providence district, in orders that ranged from \$5 to \$50 and totaled \$15,000 to \$20,000 annually. For each item, Cobb arrived at his sales or contract price by summing his materials costs, the labor expense for the half-dozen or more hourly workers involved, and a "shop expense" estimate, then adding a quarter of this manufacturing cost figure as profit. Cobb used no piece rates, for the work was too varied and his shop too small to make establishing and monitoring them worthwhile. He figured shop expense at 25 percent of the direct labor bill, ignoring charges for toolmaking and for work sent out to other specialists. Though some manufacturing jewelers included these expenses in their cost bases to yield a larger paper profit, Cobb evidently adhered to the widespread view that the practice generated inflated prices that either would be hammered down in negotiations or would balk repeat orders as buyers sought lower rates from other makers. His network of auxiliary firms included, among others, J. Briggs and Son and Vennebeck and Company, who straightened and cut bulk wire and rolled it into special shapes, or die-cut plate into blanks for shields or bars, and J. P. Bonnett, S. W. Cheever, and W. F. Quarters, electroplaters who gilded and burnished components.²⁰

Of course, Cobb was also part of a larger network, that array of findings firms, refiners, diesinkers, tool builders, and others who serviced final-product jewelry companies. Here some explanation is needed, for what the trade called jewelry making and what we commonly take it to be are somewhat different. In 1895 the Providence-Attleboros complex included 350 companies, roughly three-fifths of which (205) sold finished goods. Most (about 140) marketed familiar items—rings, bracelets, necklaces, "ear wires," hair ornaments, and pins for women—but there was also a strong "menswear" trade in watch chains and ornaments, fraternal paraphernalia, patriotic and campaign goods, tie pins, and decorated cuff, shirt, and collar buttons and studs. Sixteen companies specialized in fancy buttons and studs alone, and a dozen represented themselves as "badge houses," including religious, union, and school emblems in their lines. Eighteen others focused on pearl, shell, and stone work for both men and women, and over a score made rings only. For these firms, 68 findings houses provided components, ranging from miles of machine-made brass and plated chain (in two thousand designs offered by H. W. Wilmarth and S. O. Bigney) to the novelties and settings Cobb and others made on contract. (Cobb worked with firms from every trade division.) Associated with both groups were a dozen

platers, 22 die-cutting shops, 6 enamellers, 11 tool and machinery specialists, 14 refiners (who recovered precious metals by recycling shop sweepings).²¹ The auxiliaries worked at the edges of technological change to apply electrical and mechanical advances to the trade's requirements, extending die-press work, annealing, and electrochemistry to practical problems. A group of jewelry and sample-case builders offered their wares to manufacturers of the final products for whom a cluster of printers provided advertising plates, jewelry catalogs, cards for mounted sales displays. Inevitably, several auctioneers stood ready to dispose of seasonal dead stock or a failed entrepreneurs' assets.²²

The auctioneers were fairly busy in the first years of the 1890s depression; though he survived, Cobb saw his turnover and his work force halved in 1892. Two-thirds of Attleboro's workers stood idle that year, and the town sustained some of the men among them by setting them to repairing roads. However, the perennial quest for novelty and a falling silver price interacted to create an 1896 revival, before an overproduction of silver goods caused trade to slump again until 1898. Noting the steady slide of raw silver quotes, according to the trade journal *Manufacturing Jeweler*, "at least one-third of the jewelers" in Providence commenced making silver specialties, "and many increased their bank accounts thereby." Yet, as with earlier and later crazes, the silver balloon deflated once firms rushed to copy successful styles and cut prices to grab orders, ultimately cheapening the goods to the point that their appeal faded. Other fads followed at decade's end, notably "beauty pins" (twisted-wire hair ornaments and brooches with inserted stones), with the same results—huge initial orders, rampant duplications, price slumps, and a collapse of the novelty's desirability.²³

A later trade observer commented acidly on the jewelry sector's peculiar response to heated demand. In other industries, when buyers were eager for goods, prices stiffened and profits bulged; but in jewelry, followers' eagerness to ape innovators' designs yielded a perverse result, multiplying knockoffs of quality low enough to shave prices, wreck profits, and ultimately kill the market. Through this process jobbers and jewelers helped recode fashions as self-destructing, seasonal commodities. Imitation may be a sincere form of flattery, but in fashion trades it routinely proved demoralizing.²⁴ The "evils of overcompetition" derived from the jewelry sector's own structure and technical capacities. Why pay originators \$36 per gross for pins wholesaled at \$50 per gross and retailing at 75 cents each when a copyist might quickly make decent facsimiles for \$24 per gross that could still wholesale and retail at the same price? Five hundred gross of the little beasties (bear and frog pins had their vogues) would provide the alert jobber with \$6,000 in added revenue, support small enterprises,²⁵ and prevent the monopolization of styles by rival jobbers with ties to their originators. Manufacturers well knew the game, proclaiming virtuously the necessity of resisting "1/12th dozen" orders likely destined for duplication, yet most were unable to resist the lure of large sales that might be reaped.²⁶ As in styled fabrics and apparel, copying was endemic and annoying, but moralizing appeals proved as weak as patenting, given the sizable expenses of challenging infringers and the brief life span of designs. Jewelry rested far from Corliss engines or the major electrical corporations' innovations, where the resources for battling patent claims were ample.²⁷

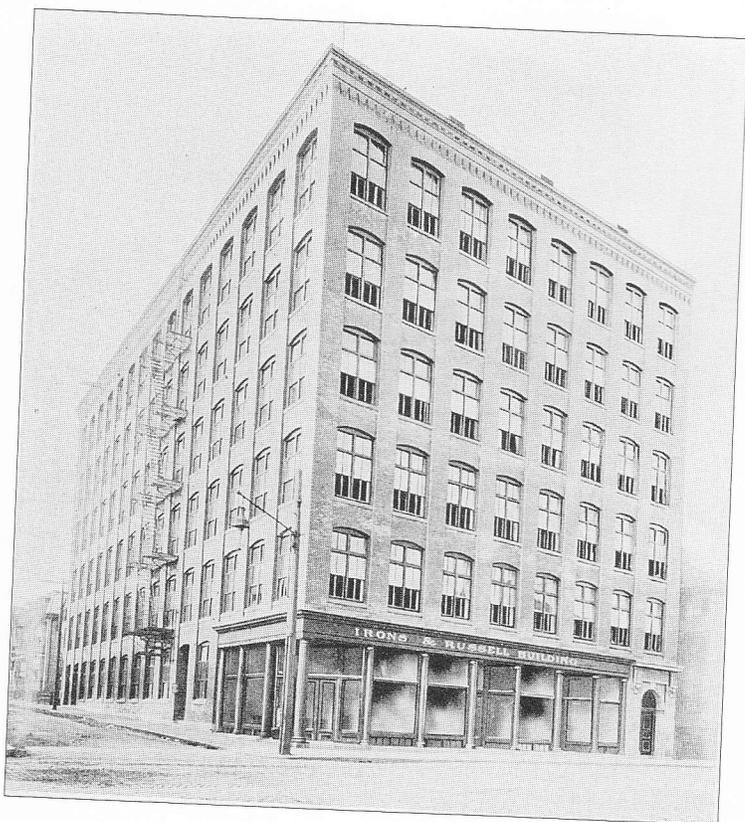
Marketing practices also shifted decisively during the depression in another way. "Since the hard times of '93-'94-'95," said *Manufacturing Jeweler* in 1899, "buyers have been more cautious and conservative in making purchases,

preferring to give small orders and repeating the same as their wants dictate, instead of placing large ones at the risk of being unable to make clean sales." This imposed costs on manufacturers "on account of the greater expense of making small quantities," but it limited their exposure to "losing heavily by [jobbers'] failures" and reduced the scale of end-of-season returns, an old trade abuse. Jobbers once more insisted on six-month credits and "dating ahead," which slowed makers' cash flows. These conditions enhanced the attractiveness of sales to department stores, mail order firms, and "scheme goods" houses (e.g., Buffalo's Larkin Company), for they paid cash promptly on receipt of goods, and the scheme goods houses, at least, placed huge orders for cheap chains, bracelets, and collar studs used as premiums. In 1897 Republicans, restored to power, pushed the jewelry tariff rate to 60 percent *ad valorem*, nearly doubling the 35 percent rate established in the despised Wilson tariff of 1893 and balking the flow of low-end German imports. By 1899 area jewelers noted that it was no longer necessary to "push goods upon buyers," for at last the market was "drawing the goods from the manufacturers." Though the new "copper trust" had forced brass prices up nearly 20 percent and tales abounded of kickback demands among department store buyers, the worst was over.²⁸

One sign of clearing skies was renewed construction of factory "apartment" buildings. Before 1893 five manufacturers had erected multistory plants designed to house their own operations and to provide smaller firms with leasable space that could be reclaimed should the core enterprise expand. In 1893-94 the Kent and Stanley jewelry firm adopted this strategy on a grand scale, erecting the seven-story Manufacturers' Building at a cost of \$625,000. They filed for bankruptcy within two years, victims of "this monster undertaking," and the property passed at auction to Charles Fletcher, a local worsted-fabrics magnate. As it filled with new renters in 1897-98, other investors commenced smaller tenant-oriented structures, completing five of them by 1900 in or near the jewelry district, most with retail stores on the ground level and from four to seventeen manufacturers above. Each was sponsored by real estate and banking interests, not by an individual firm on the older pattern. Indeed, when the area's largest ring maker, Ostby and Barton, doubled the size of its factory at this time, it made no provision for tenants, recognizing that market mechanisms had institutionalized creating factory spaces for lease.²⁹

Outsiders also saw profit potentials in the reviving jewelry industry. In April 1899, drawn by the price increases that the International Silver merger had yielded, New York promoter Seymour Bookman began soliciting leading Providence and Attleboro firms to join a jewelry consolidation that would concentrate about three-fifths of the industry's capacity in one corporation. *Manufacturing Jeweler* mocked the notion, arguing that "it would be utterly impossible to get any considerable number of manufacturers interested, as each one had his own individual opinions and methods of doing business, and would not sacrifice them for a common cause." Better to "organiz[e] against the jewelry credit system that is constantly a loss to them" than to chase this chimera.

One of Providence's largest jewelry-manufacturing "apartment" buildings was the Irons and Russell Building, at the corner of Chestnut and Clifford streets. In 1908 it was occupied by the Irons and Russell Company, emblem manufacturers; Waite, Mathewson and Company, plated jewelry manufacturers; C. Sydney Smith Company and E. L. Spencer, producers of solid gold goods; William Benna Company, silver novelties manufacturers; and Art Metal Company, producers of art metal findings. RIHS Collection (RH1 X3 3014).



Manufacturers interviewed allowed that they would be glad to sell their properties to a trust at high valuations and for cash but admitted that this would hardly limit competition, "for they would immediately go into business again." One sagely added that only "when jewelry is sold like nails, or car-tracks, or any staple commodity, then a jewelry trust might appear feasible." "It would seem as sensible to form a trust of 'artists' brains' as to form a jewelry trust," he continued, because "dealers . . . are ever looking for something new—new creations—and originality." Only a few staple lines might work out in a merger "such as collar buttons, plain band rings, etc., but they are a small part of the great whole."³⁰ Fewer than twenty proprietors responded to Bookman's call at a mid-April meeting to explore his proposal. After findings manufacturer S. C. Bigney vehemently attacked the plan ("Our house will submit to the dictatorship of no man or set of men"), only one maker spoke favorably about the concept. The proposed merger was interred without ceremony when another meeting two weeks later drew an audience of two.³¹

The jewelry trust idea was plainly deficient, as was its initiator's knowledge of the industry. Yet there was an important insight in J. M. Fisher's dismissive comment that "jewelry manufacturers could never successfully unite their interests." As outlined above, the trade was structurally and functionally divided among final-goods makers, component suppliers, and auxiliary specialists. The first group was subdivided into companies primarily working gold and gold plate, silver, or brass (or a combination of these), producing tens of thousands of designs for market segments ranging from giveaway premiums to middle-class finery. Given this spread, there were only a few "interests" or "common causes" around which proprietors could unite, and for each they created a separate institution: a Board of Trade for credit checks, a Security Alliance to pursue thieves, a League for life insurance and a Protective League for theft insurance. At tariff-revision time separate Providence and Attleboro special committees convened to forward jewelers' petitions or protests to Congress, though these did have better effect than occasional proposals promoting a public School of Metallic Arts in the Rhode Island capital. The umbrella New England Manufacturing Jewelers' Association was moribund in the late 1890s, reviving as a rallying point for the trade only when labor agitation surfaced in 1900. With annual dues at only \$15 a firm, half of which was literally eaten up at semiannual banquets, it had neither the resources nor the charge to challenge jobbers' market power, establish quality standards, or, in any sense, regulate competition. This organizational diffusion and incapacity would persist.³²



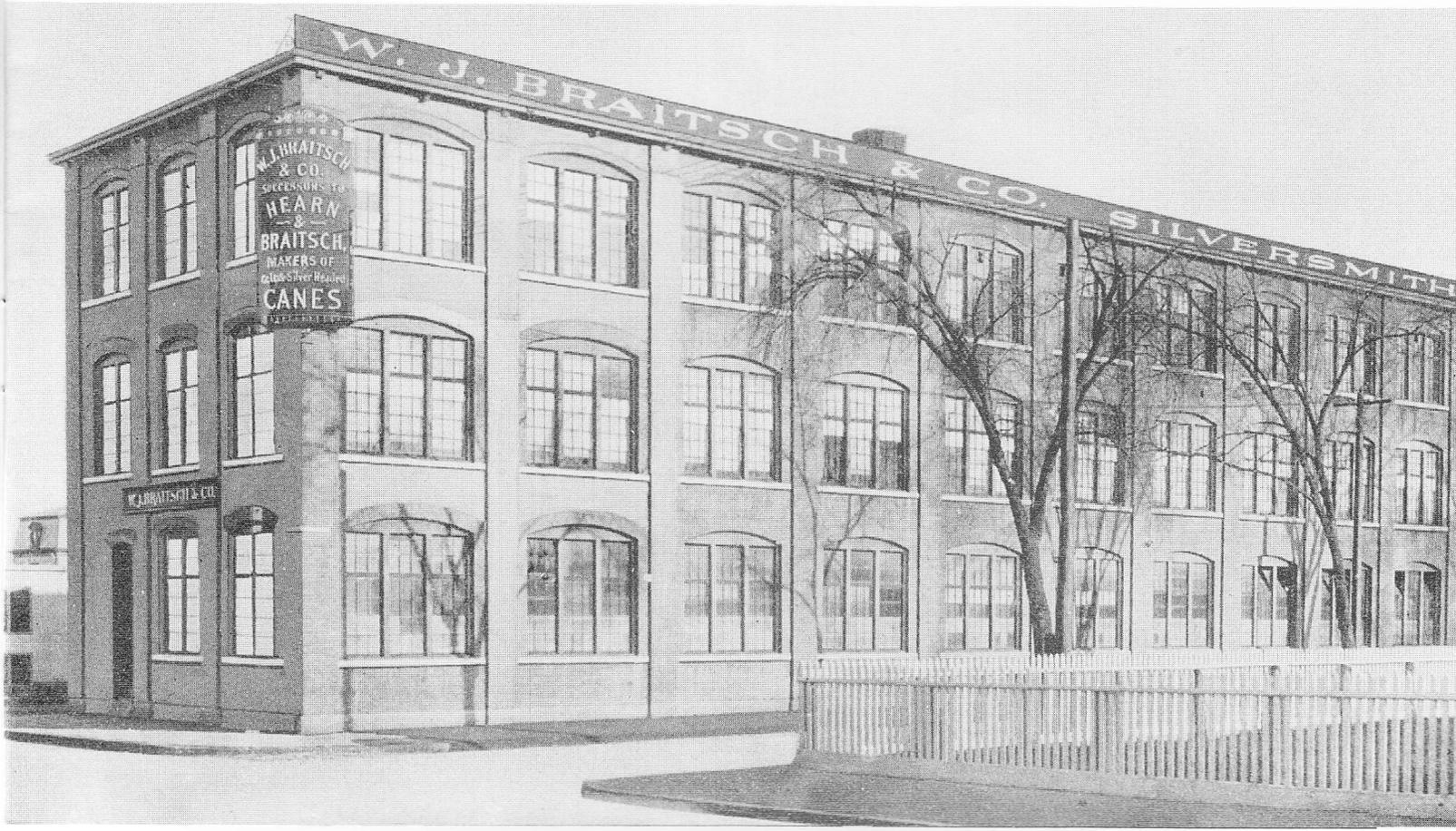
The new century's opening years almost uniformly lifted the fortunes, if not the spirits, of New England jewelry manufacturers. It was a time of both record sales and the first labor controversies in two decades, plus continued anxieties about fierce competition and prickly relations with wholesalers. The raw numbers were surely impressive. Between 1899 and 1906 Providence jewelry output values increased nearly 60 percent to \$21 million, while wage payments rose by half to a work force only 15 percent larger. Moreover, the increase in women's average earnings (34 percent to \$392) far outran men's gains (22 percent), though not their incomes (\$668). Trade in the Attleboros jumped even more dramatically, from \$8.4 million in 1900 to \$14.9 million six years later (up 77 percent), with jewelry employment passing 6,000, approaching Providence's

8,150. For workers as consumers, however, increases in the cost of living of 10 to 15 percent undercut advances in earnings.³³

As always, there are stories behind the statistics. The labor upheaval, accompanied by frequent references to rising consumer prices, may have brought wage hikes despite organizers' failure to establish effective unions; but part of workers' income gains likely came just from longer hours in busier rush seasons. There was no change in the trade's severe seasonality—a brief trade flurry after New Year's, flat springs and summers, and a succession of seventy-hour weeks from September until early December.³⁴ Swelling output values chiefly reflected a substantial increase in the production of gold jewelry after 1900. Materials expenses thus rose by 80 percent, faster than any other cost, with the consequence that value added by manufacture expanded by only 37 percent, appreciably less than the growth in the cost of labor. Put another way, a 60 percent sales increase added just 25 percent to the funds firms could draw on for rent, power, office and sales staff, and other expenses after paying for materials and labor and before figuring profits. More business and higher-grade goods did not necessarily bring commensurate returns.³⁵

The data also conceal the opening phase of a shift in the trade's labor-process organization. Between 1899 and 1906, though the compensation paid to women workers rose, their numbers decreased, at least in the factory reports. Given that male employment increased over a thousand, this seems odd, for women had long been tasked to ancillary jobs (e.g., cleaning and carding jewelry) that should have risen in proportion. As scattered reports first appearing in 1905 indicate, manufacturers were moving the most routine of these tasks outside their factories and into women's homes, setting in motion an outwork and subcontracting dynamic that saved factory floor space and exploited the labor of married women and their children. This practice would expand significantly

W. J. Braitsch and Company, silversmiths, was located at the corner of Potters Avenue and Melrose Street in Providence. Halftone from the Providence Board of Trade Journal, November 1908. RIHS Collection (RHi X3 3009).



over the next decade. Figures on output and employment also mask the substantial turnover of firms in the jewelry industry. A 1903 analysis of the region's trade since 1893 showed the total number of enterprises to have risen from 32 to 385, but it also revealed that 125 (or 38 percent) of the companies present at the onset of the depression had vanished in ten years and that 183 new starts had taken their place. Survivors represented just over half the firms active in 1903. The biggest among them, Ostby and Barton's ring house, with 690 employees, and T. W. Foster, with 305, might exude confidence, but most jewelry entrepreneurs and many workers had reason to greet prosperous years with a caution born from experience.³⁶

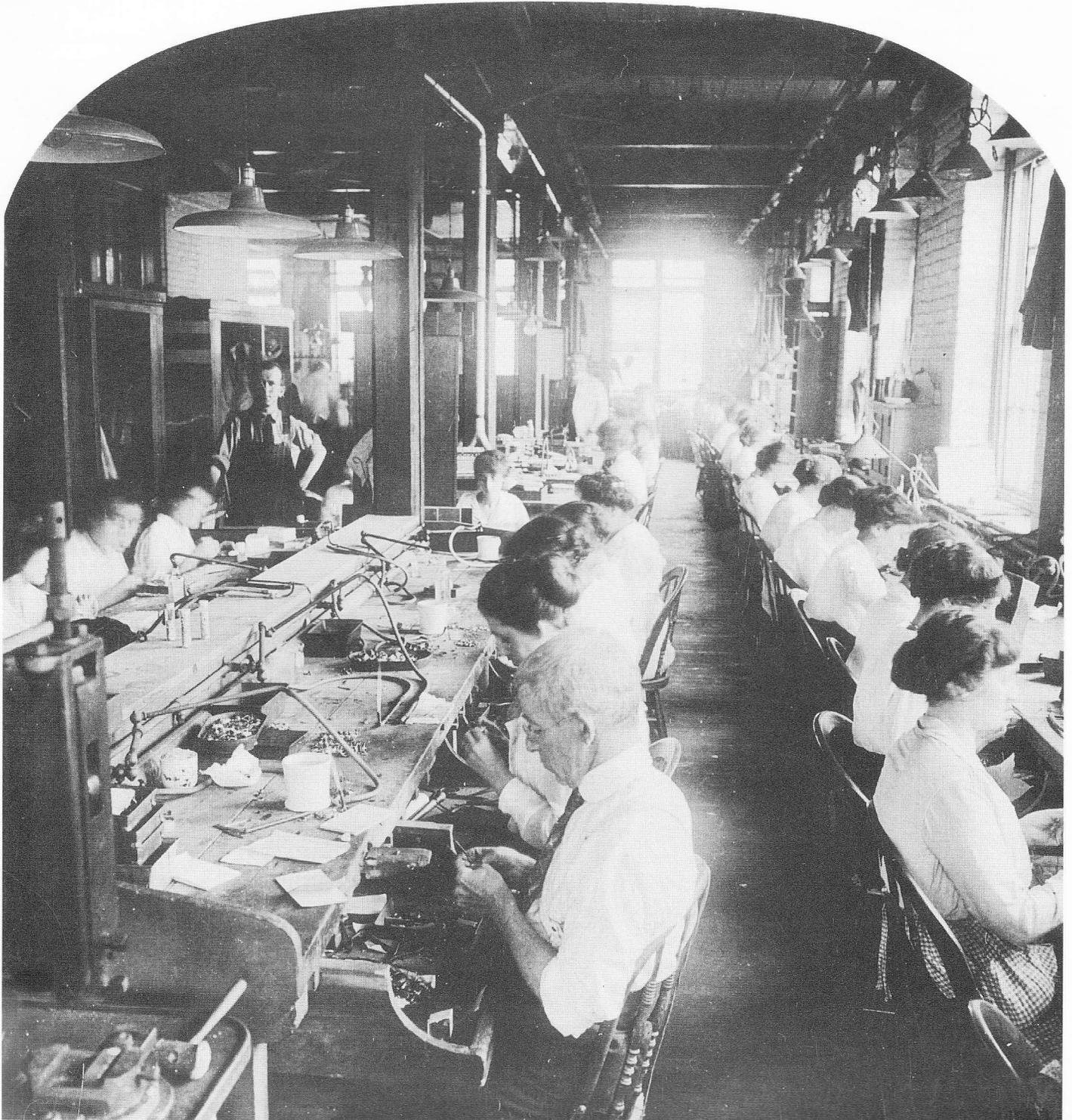
Though rumors of labor organizing circulated through the region in 1900, a visible union movement did not appear until 1903, when the AFL-affiliated Jewelers' Union and its colleague, the Brotherhood of Silversmiths, attempted to build on recent achievements in the New York district. Manhattan's fine jewelers, who dominated the trade's high-end gold and precious-stones division, had staved off a threatened strike in fall 1901 by conceding a nine-hour day to organized workers. The next autumn, nicely timed to correspond with the rush season, the Jewelers' Union targeted Newark, and the silversmiths the entire metropolitan area, calling for nine hours' work with ten hours' pay. When Newark's leading firms (as *Manufacturing Jeweler* reported) "formed a tacit agreement . . . to resist," strikes commenced in late October, just as 600 of Tiffany's 1,700 Newark workers presented similar demands. New York silversmiths struck in early November; at least six firms "accepted the men's schedule" within a week, encouraging the Tiffany force to walk out on the tenth. Management discharged them, only to discover "a great demand for the Tiffany workmen . . . by New York firms who have granted their request for nine hours. They find they must have more men to finish their orders for the holiday trade. Tiffany and five New York silver companies held out and prevailed by mid-December, but Newark jewelers agreed at year's end to commence nine-hour days on 1 January 1903."³⁷

Providence interests, employees and manufacturers alike, keenly watched these events unfold alongside nearer organizing drives among Connecticut brass workers and Massachusetts horn and celluloid ornament makers. Gorham moved first, reducing the workweek to fifty-five hours at sixty hours' pay for four summer months in an effort to preempt unionists; then it fired six members of the Silver Finishers' League to emphasize the point. Die cutters made the workers' first sally, presenting the ten-hours'-pay-for-nine-hours'-work demand in May 1903 before conducting a one-day walkout at all the small shops and Gorham. Several small die makers agreed to nine-for-nine and work resumed, but the others refused all propositions; Gorham rejected three different proposals and fired its die cutters. Before the die-shop controversy faded out (without gains for the workers), the Jewelers' Union circularized several hundred regional firms on 15 May with its demands: ten-for-nine, time and a third for work beyond nine hours, and a paid half-hour dinner break during rush seasons. Spring meetings had brought 1,700 Providence men onto its rolls making their Local 9 the largest in any jewelry center. Local 9 soon laid plans for a women's "auxiliary" and for organizing the Attleboros. In tune with the trade's seasonality, the union set 1 September as the deadline for the manufacturers' acquiescence or, that failing, a strike vote. "Through lack of organization," said *Manufacturing Jeweler*, proprietors were "entirely at sea as to what

may be done or what should be done," having believed "that it would be impossible to organize the journeymen into an effective union."³⁸

The summer's delay afforded manufacturers time to effect a collective response, and it also provided the occasion for the union to shoot itself in the foot. Even as NEMJA canvassed its members and several hundred nonmember firms, the Jewelers' Union propelled itself into a headlong contest with Manhattan firms that helped wreck its Providence initiative. A New York worker withdrew from the union and stopped paying his dues. His colleagues at an all-union shop demanded his discharge; its owner refused, and workers left their benches. The union backed the shopmen's position, but 69 Manhattan jewelry manufacturers supported the owner by locking out 1,400 Jewelers' Union members in early

The jewelry industry demanded skilled workers, such as these in a jewelry-assembling room in 1914. Silver gelatin print. RIHS Collection (RH: X3 180).



August. NEMJA soon announced that 252 eastern firms had signed a resolution rejecting Local 9's propositions, just as the union called on Providence members for 50-cent weekly contributions to aid those idled in New York. The women's auxiliary failed to ignite measurable support, and earlier enthusiasm for a strike waned. On 1 September the union president temporized, saying, "We are willing to let [the owners] bide their time; we can wait for a few weeks." Ten days later the New York lockout succeeded and the Jewelers' Union surrendered "unconditionally." The solidarity of Providence manufacturers was never tested, for the union's moment had passed. Local 9's membership faded quietly away, as did the "labor question" in the regional jewelry trades. The conjunction of the New York tactical catastrophe (and its demands for funds from Providence workers rather than offers of funds to back them) with a rare unity among eastern proprietors hostile to "interference" sank the union movement in 1903.³⁹

The antiunion drive gave NEMJA a membership boost, with participation passing the 300 mark in 1904, when the organization incorporated as the more inclusive New England Manufacturing Jewelers' and Silversmiths' Association (NEMJ&SA). Yet the association continued to fumble. It was unable to assemble a group exhibit for that year's Saint Louis Exposition, just as it had earlier failed to mobilize member's contributions to help match a \$50,000 endowment contributed to the Rhode Island School of Design (RISD). Though complaints continued about jobbers' abuse of discounts and the increase of cancellations, though overcompetition and price-cutting remained endemic and all admitted the need for thorough costing, though ideas for invigorating technical education and trade schools surfaced periodically, NEMJ&SA took none of these issues to heart, instead continuing its rounds of banquets and summer excursions. In these prosperous years it managed only to memorialize Congress on behalf of a weak National Stamping Act (prohibiting the marking of gold goods at improperly high karats) and to secure \$350 from members to fund free places in twice-weekly evening jewelry classes held in a RISD basement room. Absent a crisis, the association lapsed into inactivity.⁴⁰

Still the Providence district remained an ideal place to manufacture jewelry. When a Taunton, Massachusetts, editorialist complained that his town could not attract jewelry firms despite its "better facilities," a Rhode Islander offered a pointed response: "Experience has shown that it is easier, more convenient and more profitable to conduct a manufacturing business in places where similar manufactures are largely conducted." Of course, this clustering in part reflected ready access to a pool of workers already "skilled in that particular branch," as at regional textile or shoe centers; but in jewelry there was something more. Nearly all attempts to establish jewelry plants in the West had failed, despite ample capital and worker-training schemes. "The chief reason for this is the difficulty of getting *supplies* promptly. No matter how well equipped a jewelry factory is, there occur every day demands for this, that, and the other line of supplies, or for outside skilled assistance, in one way or another, which is impossible to be obtained . . . in any towns far removed from centers of jewelry making, where such cognate pursuits are carried on." Although Taunton was perhaps near enough to anticipate some spillover from the Attleboros, it could hardly rival the flexible response of the jewelry district's networks.⁴¹

Three sorts of difficulties still troubled individual firms, two relating to the labor force and one to profits. Apprenticeships had faded away in the 1880s (except at Gorham), so that the "all-round" skilled worker had become increasingly

scarce, as in other metal trades. Meanwhile, technical change and the emergence of findings firms and auxiliary specialists had inaugurated a diffuse division of labor, with machine tenders overseeing “automatic” chain makers or running small die presses in findings shops, and highly—but narrowly—skilled men cutting dies or coaxing quality results from plating baths in auxiliaries. However, able “bench hands” still remained crucial for producing hundreds of seasonal samples (often initiating the designs themselves), for carrying out the finishing stages in production, and for handling special orders, repairs, and the reworking of “seconds” too valuable to scrap. A competent bench worker could shift readily from engraving gold rings to ornamenting silver brooches, moving quickly with the vagaries of incoming orders’ sizes and specifications, and could stand both the pressure of the rush season and the stress of short hours or layoffs in the slack months.⁴² In a classic free-rider stalemate, as the core journeymen aged, no manufacturing jeweler proved willing to take the risks and incur the expenses of reinstalling apprenticeships. Few immigrant craftsmen ventured north to Providence either, for they found ample opportunities in the high-end New York-Newark complex (which was not, incidentally, more congenial to the rising Jewish segment of the incoming stream). Locally, young men with a metal-trades interest favored positions at Brown and Sharpe or Gorham (together employing 6,000 in 1907) over the irregularities of the jewelry industry. Thus the first feature of the labor impasse, a shrinking pool of skilled workers, seemed intractable.⁴³

Outwork, informed by obviously gendered views of the labor market, solved the second labor problem, the firms’ inability to provide enough space for factory workers in rush seasons. Huge fall demand in 1905 and 1906 overwhelmed the shop capacities of Providence and Attleboro companies, particularly those in the low-end brass and chain sectors, inducing them to send work out to women “who have long since retired from the jewelry industry.” Though *Manufacturing Jeweler* worried about the market’s enthusiasm for cheap jewelry and declining commitments to quality, proprietors with stuffed order books simply sought means to get the goods made before the fall surge ebbed. By 1906 this entailed sending unspecified “machines” (perhaps foot-powered die presses) to the homes of married women, along with routine piecework—assembling pendants, watch fobs, and 10-cent earrings or attaching finished pieces to cards for retail displays. Shifting these jobs “outside” cleared factory space for other uses and confirmed the value of outwork as a competitive strategy. Firm owners might bemoan the decrease of young men willing to commit to the jewelry trade as a vocation, but they cheerfully pursued “retired” young mothers to fill the busy seasons’ labor requirements.⁴⁴

In the absence of usable company records, the profits question is tricky, for owners often whined about thin margins. Yet finding such complaints amid historically vigorous jewelry markets makes it worth taking them seriously. Late in 1906, proclaimed by *Manufacturing Jeweler* “the best year for ten or fifteen years past,” manufacturers reported that “many goods are really being made at a loss,” for in the months since prices had been set on samples, the cost of silver, stones, and supplies had jumped. Overall this led to a “margin of profit . . . less than usual.” S. O. Bigney added that labor expenses had also risen; thus, “in order to show an equal [dollar] amount of profit over some former years, a larger business had been necessary.” In March 1907 prominent Newark firms announced a 10 percent price increase. *Manufacturing Jeweler* urged New

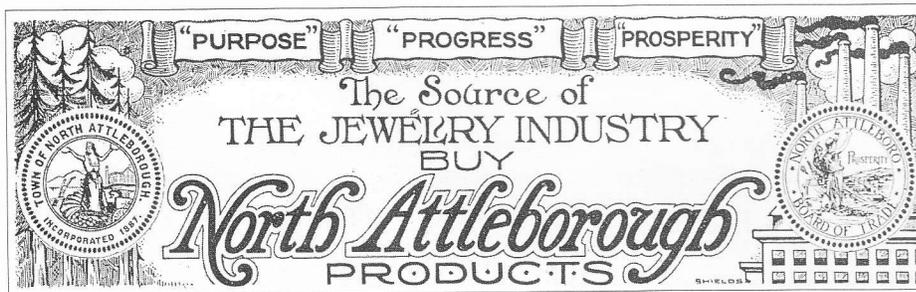
England makers to follow suit and correct the problem of “large sales and small profits.” The leading firms took no action; soon the fall panic threw the trade into a temporary crisis, shrinking hopes of any profits, much less enlarged ones.⁴⁵



Late in September 1907 Attleboro's S. O. Bigney assured delegates to the second annual convention of the National Retail Jewelers' Association in Chicago that huge autumn harvests meant that Rockefeller and the denizens of “Wall Street and the other gambling hells of the country” could not ruin prosperity or plunge the nation into panic and depression. These brave words revealed both Bigney's proprietary populism and his ignorance of finance. Six weeks later, at the height of the panic, Providence's Union Trust Company, with \$28 million in deposits for twenty-five thousand accounts, closed its doors and entered receivership. The Jewelers' National Bank in North Attleboro failed in December, its cashier a suicide. Thus opened an unsettling period in the New England jewelry centers, years in which a gradual accumulation of sour news eroded Bigney's confidence and that of many among his colleagues.⁴⁶

The regional banking crisis receded within six months. Union was the preferred financial institution for jewelry proprietors, and its blocked accounts caused them short-term trouble in amassing payrolls. There was a further difficulty. Firms had, as usual, borrowed substantially from Union Trust to cover expenses

for materials and supplies during the fall rush, giving in promissory notes normally redeemed as revenues trickled in. These notes often required a series of renewals for shrinking balances due the bank. Expecting that spotty winter collections would hazard timely redemptions, proprietors feared that receivers would decline to make the customary renewals as reorganization



Advertisement in the 30 August 1917 issue of *The Manufacturing Jeweler*. RIHS Collection (RHI X3 3043).

proceeded. However, manufacturers reached an accommodation with the bank overseers (by unrecorded means) that averted multiple defaults, and Union reopened under new management in May 1908. The ten Attleboro men who had sponsored the collapsed Jewelers' National fared worse, for the comptroller of the currency assessed the bank's stockholders “100 per cent on the par value of their stock” in order to cover four-fifths of an estimated \$100,000 shortage. By May a 60 percent dividend on depositors' accounts was authorized, and a newly chartered bank gratefully received some \$250,000 issued to the claimants. The panic froze funds and slowed trade, causing considerable anxiety and some real losses; but the jewelry district's larger troubles arose from other quarters—market conflicts, “garret” new starts that created what a trade-journal headline called “Ruinous Competition” in cheap jewelry, and a rapid expansion of outwork, none of which trade institutions could arrest.⁴⁷

Controversies between producers and jobbers were standard fare, but between 1909 and 1912 an old abuse resurfaced. Jobbers refused to order seasonal styles for their own stockrooms, purchasing only sets of samples for their salesmen to show retailers. Now, instead of initial stock invoices that identified the winners among each firm's new styles, followed by further calls for the most

successful designs, manufacturers again encountered pressure to make and hold inventories of their entire lines, ready for a stream of rush orders demanding instant shipment. In order to get the earliest possible look at samples, rival jobbers started circulating among the factories weeks before the informal opening dates, 1 May and 1 December. Enough manufacturers unveiled their new styles that seasons began creeping backward to early April and November. In 1911 leaders of NEMJ&SA and the jobbers' association agreed that new lines would be opened only on 1 May and 1 December, but members and others ignored the agreement. Increasingly chaotic competition resulted, in which (1) final-goods firms responded to design piracy, inventory demands, and price shaving in part by passing these viruses to the findings makers who furnished components; (2) jobbers claimed that they too faced a crisis of rising expenses and slipping margins; (3) retailers protested the inability of manufacturers to organize to solve "the question of standard quality [and] equitable selling prices"; and (4) outwork spread steadily as a craze for mesh bags ballooned.⁴⁸

Mesh bags, copied from European novelties, consisted of a fabric made from interlocked metal rings fashioned into purses of varied sizes and topped with ornamental bar clasps attached to the uppermost row of rings. Though the two halves of the clasp could be formed in die presses, the ring mesh had to be fashioned one link at a time, by hand—a classic low-wage, labor-intensive process. Facing huge demand, jewelry manufacturers engaged subcontractors to secure a homeworking labor force. In 1910 the trade journal *Metal Industry* reported that perhaps two-thirds of the district's working-class women were "engaged in the production of the mesh bag," with many "hustling concern[s]" employing "three or four hundred persons who devote most of their spare time" to it. In one day's Providence newspapers that year, four contractors advertised for sixteen hundred outside hands. Several years later Massachusetts authorities counted over nine thousand outwork mesh makers in the Attleboro area alone. According to the report, "all but two of the [one hundred] contractors found in this industry were women, nearly all married women," some of whom "make an annual profit of \$4,000 or \$5,000." By contrast, "nine-tenths" of home workers "earned less than \$150" yearly.⁴⁹

Though at least four-fifths of the region's twenty thousand outworkers in 1912 were purse makers, moving other tasks outside the factory had attractions elsewhere in the trade. Linking varieties of chain that were not machine producible; attaching "bars, drops, swivels, barrels, catches, or ornaments" to trade items; painting designs on enameled brooches and pins; performing low-end stone setting, beading, burnishing, and wire work—all these occupied women and their children in piecework home production. Proprietors cloaked their tactics in the garb of charity ("of especial value to the unemployed or families where sickness has left them almost destitute for the necessities of life"). Yet their importance to the industry became clear at tariff hearings in 1909, where New England delegates fought (successfully) against any lowering of the barriers to German imports, lest cheap Pforzheim mesh bags derail their specialty market success.⁵⁰

The magnetic appeal and cost-effectiveness of outwork further deranged market and pricing practices in the district, encouraging a spate of new starts by craftsmen hoping to pick up on the mesh bag's persistence. These tiny, almost phantom enterprises fed jobbers' eager demands for ever-cheaper bags by copying designs, playing the outwork game, and engaging finding firms and auxiliary die cutters and platers, thus requiring a minimal initial investment and an



Photo from a Whiting and Davis Company advertisement for mesh bags in Jewelers' Circular, 5 February 1919. RIHS Collection (RHi X3 3038).

in-house staff only for assembly.⁵¹ By 1912 small shops offering cheaper but stylish fashions threatened the viability of older companies, which were wary of making advance stocks and were having trouble keeping their regular employees occupied filling jobbers' erratic orders. The copying tactic became so prevalent that the ever-boisterous S. O. Bigney underwrote a series of trade-journal ads decrying the devaluation of styles, falling quality, and the widespread defiance of the federal Stamping Act. In response, NEMJ&SA claimed that Bigney was merely engaged in self-promotion, for such issues were properly the concern of the association. His ads ceased, but the association, in typical fashion, did nothing.⁵²

The disaggregated production network's decay into a hyperflexibility that undercut the capacities of veteran producers, the multiplying garret new starts and subcontractors, and the market power wielded by jobbers had implications that were soon apparent. Demand for mesh bags from Providence alone surpassed a half-million units in 1911, but the rest of the trade began to flounder in 1912.

A writer in *Metal Industry* worried

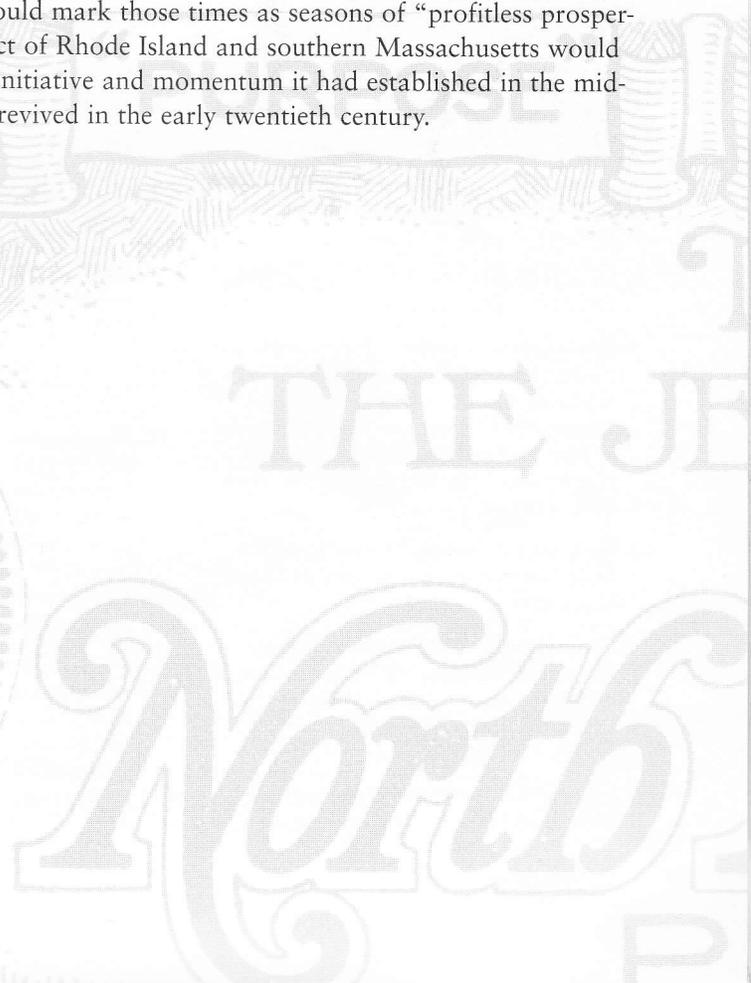
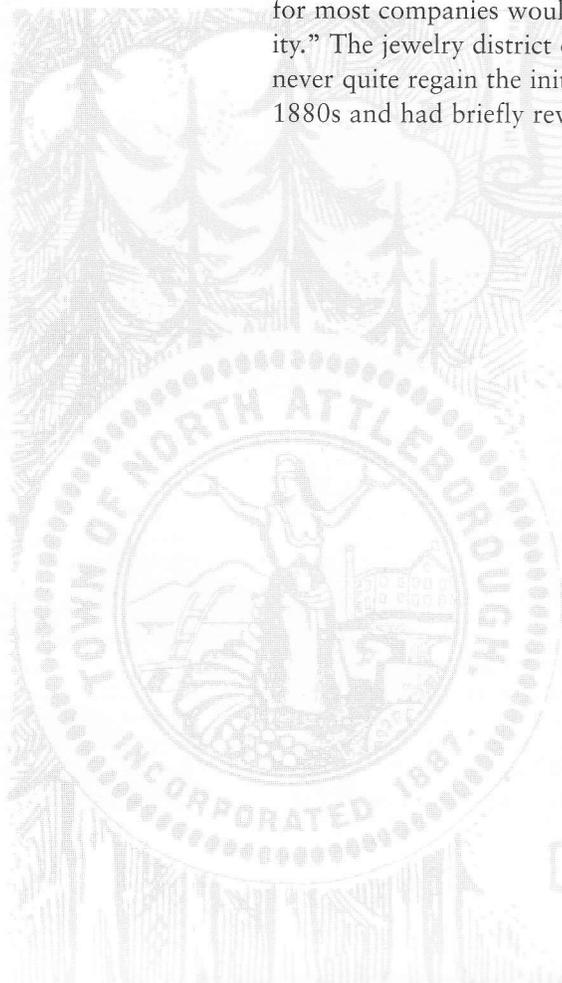
about the collapse of season-opening orders for wholesale stock: "The custom that has prevailed for the past two or three years on the part of the jobbers to send in their orders to the manufacturers for exactly the number of articles needed . . . and thus make the manufacturer carry the entire stock, has grown to a larger extent than ever this year. This has resulted in the manufacturer having . . . to fill orders at a moment's notice and then carry the book account for an indefinite period. In [addition] there has been a constant string of failures, bankruptcy proceedings, extensions, and other financial difficulties that in the aggregate have amounted to a considerable total and, generally speaking, it is the manufacturer who gets the short end."⁵³ Exactly so.

At NEMJ&SA's April banquet, *Metal Industry* reported, proprietors muttered about the "unusually large number of failures [among] their customers." That spring most jobbers unnervingly delayed buying even samples of new lines until late May, perhaps in reaction to massive design theft, effectively "curtailing [producers'] activities." Orders recovered moderately in the fall, but 1913 was a disaster. A general economic recession suppressed jewelry demand as much as it undercut machine tool sales, and the shift in market power punished jewelry manufacturers. Thirteen Providence firms sought bankruptcy protection in

1914; others scurried to make arrangements with their creditors, for the trade contraction now fell wholly upon producers holding quantities of jewelry that was not wanted and a dead loss. The 1913-14 crash proved the worst reversal in twenty years. "In 1893, while the manufacturers suffered severe losses through failures [among clients], it was the jobbers who were in straitened circumstances, while it is now the manufacturers that are being driven to the wall," an observer noted. Holding seasonal stock and extending long credits in a fashion trade represented a recipe for disaster.⁵⁴



By 1914 the Providence and Attleboro jewelry industry had taken a critical misstep. With mutual distrust and subsectoral specialization obstructing any coordination to moderate either the effects of outwork or the pressures from wholesalers, leading enterprises lost the price advantages of novelty to rivals seeking short-term gains through copying and outwork. Particular new starts might temporarily reap quick returns, but "ruinous" competition's effects on the New England jewelry industry would be regretted for the next half century. A capacity for swift adjustment to fashions, erected in the years after 1880, devolved into a hyperflexible network that advantaged eager copyists, cynical jobbers, and large retailers.⁵⁵ Production did not collapse in the region, for there was no other American center that possessed all the requirements of a disaggregated jewelry-manufacturing district, and there was little incentive for any locale to attempt to amass them. Nor did all firms slide into the slough; a few innovated, e.g., framing exclusive contracts to provide jewelry to schools, fraternities, and colleges, a strategy that carved a durable niche for the Balfour Company. Though there would be occasional busy years ahead, weak margins for most companies would mark those times as seasons of "profitless prosperity." The jewelry district of Rhode Island and southern Massachusetts would never quite regain the initiative and momentum it had established in the mid-1880s and had briefly revived in the early twentieth century.



Notes

1. David Landes, *Revolution in Time* (Cambridge, Mass., 1985); Michael Harrold, *American Watchmaking: A Technical History of the American Watch Industry, 1850-1930* (Columbia, Pa., 1981).
2. Charles Venable, *Silver in America, 1840-1940* (New York, 1994); Oliver Carsten, "Work and the Lodge: Working Class Sociability in Meriden and New Britain, Connecticut, 1850-1940" (Ph.D. diss., University of Michigan, 1981), 78-81, 87-92; U.S. Tariff Commission, *Silverware* (Washington, D.C., 1927); George Gibb, *The Whitesmiths of Taunton* (Cambridge, Mass., 1946), chaps. 9-13.
3. Similar auxiliaries appeared in New York and Newark. See *New Jersey Commerce and Finance* 2 (1906): 145; *Manufacturing Jeweler* 1 (1884-85): 335, 397; 2 (1885-86): 268; 14 (1894): 12-16, 324.
4. Department of the Interior, *Report on Manufactures of the United States at the Tenth Census* (Washington, D.C., 1883), 428.
5. *Rhode Island State Census, 1885* (Providence, 1887), 599; Arthur Cox and Thomas Malim, *Ferracute* (Bridgeton, N.J., 1985), 21. Clasp and chain work, attaching goods to cards for retail display, and packing were tasked to women workers at this time, but polishing remained defined as a skilled male job into the early 1900s.
6. *Manufacturing Jeweler* 4 (1887-88): 492; John Brown, *The Baldwin Locomotive Works, 1831-1915* (Baltimore, 1995).
7. *Manufacturing Jeweler* 2 (1885-86): 161, 170, 228; 3 (1887-88): 221; 5 (1889-90): 294.
8. See Maxine Berg, *The Age of Manufacturers, 1700-1820* (London, 1985).
9. *Garment Manufacturer* 8 (February 1902): 19-20, (June 1902): 35-36; B. M. Selekman, Henriette Walter, and W. J. Cooper, *The Clothing and Textile Industries in New York and Its Environs*, Regional Plan of New York, Monographs 7-9 (New York, 1925).
10. For a fuller discussion, of these issues, see Philip Scranton, *Endless Novelty* (Princeton, N.J., 1997).
11. On textiles, see Philip Scranton, *Figured Tapestry* (New York, 1989); on furniture, see Philip Scranton, "Manufacturing Diversity," *Technology and Culture* 35 (1994): 476-505.
12. Jewelers' low entry costs might again be underscored here. By 1885 rental space in purpose-built jewelry factories was easily leased by the room, with or without power. A foot press and a Brown and Sharpe jewelers' lathe would run about \$200, less if purchased from a used-equipment dealer, and skilled workers would already own a full tool kit. Both rental factory lofts and used textile machinery were available in Philadelphia, but textile operations demanded far more room, and starting with fewer than ten looms or five hundred spindles had become a dubious proposition. At Grand Rapids and elsewhere, furniture production was space-demanding and shared quarters were unusual; new firms thus had to find an empty mill or build their own rudimentary factory, install power, and then secure machinery from builders, for active secondary markets were rare.
13. Small firms might stretch to afford the estimated \$100 cost of two two-week selling trips to New York, but keeping a full-time salesman on the road necessitated about \$1,500 annually for travel expenses and likely a similar sum for commissions. *Manufacturing Jeweler* 3 (1886-87): 174; 9 (1891): 1363.
14. *Ibid.* 5 (1888-89): 193, 581, 587; 6 (1889-90): 115, 264; 7 (1890): 70.
15. *Ibid.* 9 (1891): 1364, 1407; 10 (1892): 283.
16. *Ibid.* 1 (1884-85): 173, 216; 2 (1885-86): 215; 5 (1888-89): 307, 540, 581, 587; 6 (1889-90): 115, 222; 11 (1892): 253; 25 (1899): 92; 29 (1909): 510.
17. *Report on Manufactures . . . Tenth Census*, 428; Department of the Interior, Census Office, *Report on Manufacturing Industries in the United States at the Eleventh Census*, pt. 2: Statistics of Cities (Washington, D.C., 1895), 470-77; William Lathrop, *The Brass Industry* (Mount Carmel, Conn., 1926), 154-57.
18. *Report on Manufacturing Industries . . . Eleventh Census*, pt. 2, 470-77.
19. *Manufacturing Jeweler* 12 (1893): 648-49, 809; 13 (1893): 39. In this era *Manufacturing Jeweler* published two volume numbers each year, as well as a separately paginated Anniversary Issue (hereafter cited as AI) in October or November. For a useful profile of work at Gorham, see *American Jeweler* 17 (1897): 191-94.
20. William Cobb & Co. Papers, Cost Book, 1893-1914, Rhode Island Historical Society; see esp. pp. 10-21. As penciled annotations suggest, Cobb used his trade experiences to quote initial prices and then tracked costs to discover whether he had made a decent profit. This helped him defend prices on repeat orders from downward pressures, as did his frequent notations of tool costs for initial orders that had not been figured in earlier. For an overview of the careers of Bonnett, Quarters, and other platers, see *Manufacturing Jeweler* 25 (AI, 19 Oct. 1899): 52-57; 37 (AI, 16 Nov. 1905): 50-54.
21. For a profile of the Mossberg tool firm, see *Machinery* 4 (1897): 9-10.
22. *The Jobber's Handbook for 1895: A List of Manufacturing Jewelers and Kindred Trades* (Providence, 1895), 52-60, 154-76; *Manufacturing Jeweler* 12 (1893): 395-96.
23. *Manufacturing Jeweler* 24 (1899): 110, 124, 171; 26 (1900): 56; 28 (1901): 40; 29 (1901): 522. In earlier articles I accepted Nina Shapiro-Perl's argument that the 1890s depression created widespread homework and deskilling within the jewelry trades. Further research in industry sources suggests dating this decay to the years after 1905. See Nina Shapiro-Perl, "Labor Process and Class Relations in the Costume Jewelry Industry: A Study in Women's Work" (Ph.D. diss., University of Connecticut, 1983).
24. *Manufacturing Jeweler* 50 (1912): 1154. For the "dishonest" making of silver novelties, see *ibid.* 28 (1901): 40.
25. For an account of a small firm's rapid expansion due to jobbers' beauty-pin orders, see *ibid.* 28 (1901): 76.
26. *Ibid.* 26 (1900): 231-32; 38 (1906): 795-96.
27. In the thirty years before World War I, the trade press reported only a few notable patent lawsuits, each of which concerned a findings innovation (in clasps or separable studs, for example). Advertisements on occasion contained the word *patented* in reference to designs, perhaps to warn off imitators, but to my knowledge no court tests of jewelry-design infringements took place. On the insignificance of patents, see *ibid.* 24 (1899): 316.
28. *Ibid.* 24 (1899): 41-2, 59; 25 (1899): 244; 26 (1900): 56, 124; 35 (AI, 10 Nov. 1904): 58. Returns (other than for defects) were uncommon in other fashion trades, but book publishers were plagued by them. Dating ahead involved shipping an order and dating the invoice sixty or ninety days later, at which time the six-month calendar for payments commenced. Findings houses seemed most involved with scheme goods, especially chains and studs, which provided them an outlet beyond supplying manufacturers.

29. Ibid. 25 (1899): 30; 27 (1900): 32; 30 (1902): 29; 35 (AI, 10 Nov. 1904): 26-34. Of ten buildings profiled in the 1904 report, only one had space unleased. Three others were also constructed at Attleboro in 1899. Ibid. 26 (1900): 56.
30. Ibid. 24 (1899): 162, 241, 261-62, 266. International Silver had a rocky start, passing several preferred-stock dividends in 1900 and being forced to reverse its price advances in 1901. Ibid. 26 (1900): 528; 28 (1901): 98.
31. Ibid., 284-86, 317-18, 360.
32. Ibid. 24 (1899): 286; 25 (1899): 183-84; 26 (1900): 191-92; 29 (1901): 527-28; 43 (1908): 710-14. The Rhode Island School of Design was founded with a small fund left over from the Philadelphia Centennial Exposition. It was supported in the late nineteenth century by the Metcalf family. NEMJA sponsored an annual prize competition for jewelry designs, but it had few other relations with the school during this period. Ibid. 32 [1902]: 447.
33. Ibid. 32 (1903): 336; 33 (1903): 66; 43 (1908): 1082D.
34. Overtime increments to hourly rates were not paid, manufacturers asserting that they got no more for the jewelry just because it was made after dark.
35. *Manufacturing Jeweler* 43 (1908): 1082D. This residual in Providence was \$4 million in 1899 and \$5 million in 1906.
36. Ibid. 33 (1903): 66; 37 (1905): 416; 40 (1907): 602. These figures omit an unknown number of companies that started after 1893 and expired before 1903.
37. Ibid. 31 (1902): 447, 512, 612-12, 634, 694, 712, 768; 31 (AI, 6 Nov. 1902): 4, 6; 32 (1903): 24.
38. Ibid. 32 (1903): 44, 52, 70, 84, 267, 288, 293, 378, 462, 511-12, 516, 567.
1. 32 (1903): 567-68, 651-52; 33 (1903): 128, 162, 172B-172D, 192-98, 239-40, 242, 291, 300B. *Manufacturing Jeweler* provided surprisingly enhanced coverage of events, encouraging owners to compromise and printing extended interviews with organizers and union officials. In 1905 remnants of Local 9 presented an eight-hour demand, which was ignored. Ibid. 36 (1905): 397-98.
40. Ibid. 30 (1902): 447, 506, 516, 574; 31 (1902): 629, 729; 32 (1903): 651-52; 34 (1904): 32, 420; 35 (1904): 219-20, 241, 292; 36 (1905): 456-64, 526, 682-84; 37 (1905): 650-52; 38 (1906): 14-18, 370-72, 795-96; 39 (1906): 180; 41 (1907): 664. A Metcalf heir pledged the \$50,000 RISD endowment if it was matched by other donors. After months of pleas in *Manufacturing Jeweler*, area jewelry manufacturers contributed less than \$4,000, whereas Brown and Sharpe alone donated \$5,000 and Gorham \$2,000. The Stamping Act supported by NEMJ&SA contained enforcement provisions that all parties agreed were inadequate.
41. Ibid. 38 (1906): 693-94. Taunton was to be disappointed; by 1911 daily "shop trains" seven and eight cars long were leaving the town to carry hundreds of workers to jewelry factories in Attleboro. *Metal Industry* 9 (1911): 404.
42. Scattered reports and the Cobb records suggest that in these years bench workers earned 25 cents (and up to 40 cents) an hour, or \$15 a week, averaging ten months' employment on a sixty-hour basis, including three long-hour months and three of short time, with a two-week (unpaid) summer shutdown and about six weeks of lay-off in the spring. The most able sample makers worked year round, earned \$1,000 or more annually, and were often tempted to become entrepreneurs themselves.
43. *Manufacturing Jeweler* 39 (1906): 319-20; 40 (1907): 55-56. As usual, proposals for a specialty trade school, this time at Attleboro, failed in 1907. Ibid. 40 (1907): 297-98, 316, 338, 814.
44. Ibid. 37 (1905): 99-100, 416; 38 (1906): 617-18; 39 (1906): 830. The contemporary sources consulted contain no mention of the possibility that jewelry work might be less manly than other metal-trades occupations.
45. Ibid. 39 (1906): 415-16, 760; 40 (1907): 28, 369-70.
46. Ibid. 41 (1907): 516, 657, 672, 950, 1040, 1080.
47. Ibid. 41 (1907): 672, 950, 1080; 42 (1908): 228, 656, 734. "Garret" firms were tiny new enterprises that often occupied attic rooms in manufacturing buildings.
48. *Metal Industry* 7 (1909): 85, 192; 425, 463; 8 (1910): 96; 9 (1911): 489; *Manufacturing Jeweler* 43 (1908): 6; 44 (1909): 407-08; 49 (1911): 575; 50 (1912): 480, 792, 1064, 1154. It is not clear why jobbers began refusing to purchase initial seasonal inventories, for they already had long credits and return privileges from the manufacturers.
49. *Metal Industry* 8 (1910): 359; Margaret Abels, "Jewelry and Silverware," in *Commonwealth of Massachusetts, 45th Annual Report on the Statistics of Labor, 1914* (Boston, 1914), V-102-3. Although homeworkers were poorly paid, their "most usual . . . 10 cents an hour [earnings were] high . . . for home work and would permit an individual working nine hours a day to make a living," noted Abels. P. 107. Eileen Boris's *Home to Work* (New York, 1994), a study of motherhood and industrial homework, does not discuss the jewelry industry's anomalous women contractors, but they are a subject well worth pursuing.
50. Abels, "Jewelry," 93-102, 107; *Manufacturing Jeweler* 44 (1909): 451-53, 476-82, 535-36.
51. Findings companies by 1910 could provide frames as well as rings; some, like Providence's Metal Products Corporation, had their own designers. *Machinery* 17 (1910-11): 181-84. Such capabilities reduced entry costs to less than a hundred dollars.
52. *Manufacturing Jeweler* 50 (1912): 702; *Metal Industry* 9 (1911): 363.
53. *Metal Industry* 9 (1911): 528; 10 (1912): 51. The jobbers' tactics were termed "hand-to-mouth" buying.
54. Ibid. 10 (1912): 181, 224, 438; 11 (1913): 54, 145, 233, 319-20, 447, 539; 12 (1914): 47, 92, 179, 317, 530.
55. This pattern, with a reduced proportion of outwork, continued into the 1920s. See Children's Bureau, U.S. Department of Labor, *Industrial Home Work of Children: A Study Made in Providence, Pawtucket, and Central Falls, R.I.* (Washington, D.C., 1922). By the 1920s the F. W. Woolworth chain alone purchased 10 percent of the nation's cheap jewelry. *Manufacturing Jeweler* 68 (1921): 84. For an approving examination of present-day intensified competition, see Richard D'Aveni, *Hypercompetition: Managing the Dynamics of Strategic Maneuvering* (New York, 1994).



Frank and Lillian Gilbreth Bring Order to Providence: The Introduction of Scientific Management at the New England Butt Company, 1912-13

JANE LANCASTER

In December 1911 Frank and Lillian Moller Gilbreth had been married for seven years. They celebrated Christmas in their Plainfield, New Jersey, home, watching as their five children, aged eight months to six years, played with their new building blocks next to the Christmas tree.¹ Frank was a self-made man, a successful building contractor, with offices in New York and London. His California-born wife, Lillian, acted as his adviser and junior partner. She had recently submitted her Ph.D. dissertation, which applied psychology to management, to her alma mater, the University of California at Berkeley. Both Gilbreths were keenly interested in scientific management, which was almost a secular religion among progressives of a certain type, and both were disciples of Frederick Winslow Taylor, the patriarch of the movement.

Yet within a month of that apparently peaceful Christmas, the Gilbreths' world was turned upside down. Tragedy struck in January 1912, when the two oldest children contracted diphtheria; six-year-old Anne recovered, but five-year-old Mary died. The parents, particularly Frank, were devastated, but they were unable to talk freely about Mary's death. "It was an experience that an understanding psychiatrist might possibly have adjusted," Lillian wrote later, "but it was not adjusted, and left a permanent scar."² In addition, Lillian's dissertation was rejected by the University of California's academic senate, which, according to Lillian, felt "that it should not break a precedent by omitting the requirement of a final year in residence."³ That was a requirement she had found difficult to meet, since she had young children and her work in the family contracting firm to keep her in New Jersey.

By the middle of 1912 the Gilbreths had moved to Providence, where they started a new life, professionally, personally, and academically. On one level the motivation for their move was obvious: the house in Plainfield held many unhappy memories. Moreover, the building trade was in one of its periodic recessions, and with Gilbreth, Inc., in disarray, they had decided to wind down the contracting business and set up a management consultancy company in Providence, where Frank had been engaged to introduce the principles of scientific management to the New England Butt Company. They would remain in Rhode Island for the next seven and a half years. It would be a productive period for both of them, with Frank developing ways of measuring and simplifying motion while Lillian applied psychology to management, stressing the importance of teaching workers *why* as well as *what*. The Gilbreths' innovations at New England Butt would lead to a split with Taylor and change the direction of scientific management. Lillian would publish her rejected Ph.D dissertation and then write another one at Brown University and earn the right to put the letters *Ph.D.* after her name. In December 1912 she would have another baby,

The Gilbreth family in Rhode Island, 1914.
From left: Frank Gilbreth; Frank Jr. (aged 3);
Mary (aged 8); Lillian; Ernestine (aged 6); Bill
(aged 18 months); Helen Douglass (a
Brown College student who helped with
the children while Lillian was completing her
doctoral dissertation); Martha (aged 4); and
Martha Bunker Gilbreth (Frank's mother). No.
85-123, Gilbreth Collection, National Museum
of American History, Smithsonian Institution.

Jane Lancaster is completing a doctoral dissertation on Lillian Gilbreth at Brown University.

and she would have five more before she and her husband moved back to New Jersey in 1920.⁴



The Gilbreths were ready to move into scientific management consultancy in 1912, but their contact with the New England Butt Company, and thus their move to Providence, came about by chance. During the winter of 1911-12 Frank Gilbreth lectured on scientific management to a meeting of the Town Criers, a Providence “booster” club whose professed aim was to “study, promote and practice the most scientific and efficient business building methods and to boost Rhode Island.” The club boasted nearly five hundred members, many of whom attended weekly luncheons or evening lectures.⁵ Gilbreth’s talk must have made a considerable impact on at least one member of the audience, John G. Aldrich, vice president of New England Butt. In April 1912, on Aldrich’s urging, Frank Gilbreth wrote to New England Butt’s president, Herbert N. Fenner, offering his services, which Fenner promptly accepted.⁶

Ever methodical, the Gilbreths made a list (“The One Best Way to attack the problem,” according to Lillian) of the pros and cons of moving to Providence. Among the advantages that Lillian enumerated were two factors that directly affected her: since the new client, New England Butt, was located in Providence, she would be able “to see this initial work from day to day”; moreover, officials at Brown University “had proved cooperative in the plan of her taking the last year of attendance for her doctorate there and obtaining the necessary last word information on education and psychology.”⁷ Thus, even in a book she wrote to celebrate her husband’s achievements, Lillian made it clear that she had a strong supervisory interest in the work Frank undertook.

It has been suggested that the Gilbreths’ partnership illustrated the “narrativization of science,” in that Frank did the measurements while Lillian told the stories.⁸ At New England Butt, Frank Gilbreth measured and photographed, directed his young engineers, and cajoled the workers to accept the new methods, while Lillian stayed home with the babies (she was pregnant for the sixth time when the New England Butt contract began) and set down the theory of the importance of “the human element.” *Cheaper By the Dozen*, the 1948 best-seller written by two of the Gilbreth children, contains valuable insights into the Gilbreths’ work, and in the light of recent developments in cultural theory, it reveals more than the authors intended:

It was Mother who spun the stories which made the things we studied really unforgettable. If Dad saw motion study and team-work in an ant hill, Mother saw a highly complex civilization, governed, perhaps, by a fat old queen who had a thousand black slaves to bring her breakfast in bed mornings. If Dad stopped to explain the construction of a bridge, she would find the workman in his blue jeans, eating his lunch high on top of the span.⁹

What her children saw as a fascinating story-telling technique, Lillian applied to a much wider audience in her work on scientific management. While she told her children the stories that humanized science and technology, she also wrote the words which, by adding the human element, softened the harshness of the efficiency schemes devised by technocrats like her husband. The combination of the scientific-sounding “technic” and the female virtue of cooperation summarized the Gilbreths’ work at New England Butt.¹⁰ It was this combination of words and ideas, coded male and female, that made the Gilbreths’ work

unique, and that made what they did at New England Butt not only an important turning point in scientific management but a small step towards the feminization of American culture.¹¹

At New England Butt the Gilbreths developed a new scientific management synthesis that combined elements of Taylorite time study (which focused on time and measured work with a stopwatch) and Gilbreth motion study (which focused on movement and used moving pictures and specially calibrated clocks), added industrial betterment and personnel work, and wove everything together with the insights of psychology. It was a synthesis that bridged the masculine world of Frank Gilbreth, the self-made building contractor, and the increasingly feminine world of the turn-of-the century university, where Lillie Moller had studied literature and psychology.¹² It used state-of-the-art technology in the form of the chronocyclegraph, an instrument combining a motion-picture camera and a clock capable of measuring very small units of time, to discover movements that could be simplified or eliminated.¹³ To deal with the human element, it drew on the developing discipline of industrial psychology to persuade workers to accept the indicated changes.



The New England Butt Company had been founded in 1842, taking its name from its original product—butt hinges.¹⁴ At that time all such hinges were manufactured in England, but within a few years the company had captured most of the American market. New England Butt incorporated in 1853 and two years later started to diversify, adding braiding machines to its product line. Formerly all braiding machines had been made in Europe, but with the introduction of electricity the need for braided coverings for electric wires meant a vastly increased demand. By the early twentieth century the company was making braiding machines for a variety of purposes, including “fish lines, shoe laces, corset laces, curtain cords, clothes line, wicking, shoe thread, sash cord . . . dress braids, military braids, rickrack braids . . . square braids . . . oval braids . . . antennae wires, [and] tire beads.” In 1912 it had over two acres of floor space, including a foundry and several assembly shops. There were about three hundred employees, many of whom were skilled machinists. The company was not unionized.¹⁵

The Gilbreths' project started out in an orthodox way. Horace K. Hathaway, a close associate of Taylor, made a preliminary visit to the plant, discussed his findings with Frank Gilbreth, and then reported to New England Butt. Noting that the workers seemed in “a receptive frame of mind” and ready to cooperate, Hathaway informed the company that “there is apparently no reason why the application of Scientific Management in your plant should not prove to be profitable,” but he cautioned that “this is not to be a hundred yard dash, but a long hard pull.”¹⁶ One of the basic tenets of orthodox Taylorism was that it took three to five years to install a system of scientific management in a way that would avoid backsliding once the installers withdrew. Taylor liked to talk about “a mental revolution” on the part of both workers and management, without which “scientific management does not exist.”¹⁷ But the Gilbreths were in a hurry, and they tried to install their system in thirteen months. This system was intended to be a model for other Gilbreth installations, as the system that Taylor had created at the Tabor Company in Philadelphia served as a model for his other installations. Charles Going, an old acquaintance, later wrote that he believed the Gilbreths were trying to “Out-Taylor Taylor” on this installation.¹⁸

In this 1912 photo a stopwatch expert (left) observes a worker assembling a braider according to a method developed by S. E. Whitaker, as Frank Gilbreth watches from behind his specially designed clock. Gilbreth was attempting to prove that his micromotion system was considerably more accurate than the stopwatch method. Gilbreth Collection, National Museum of American History, Smithsonian Institution.

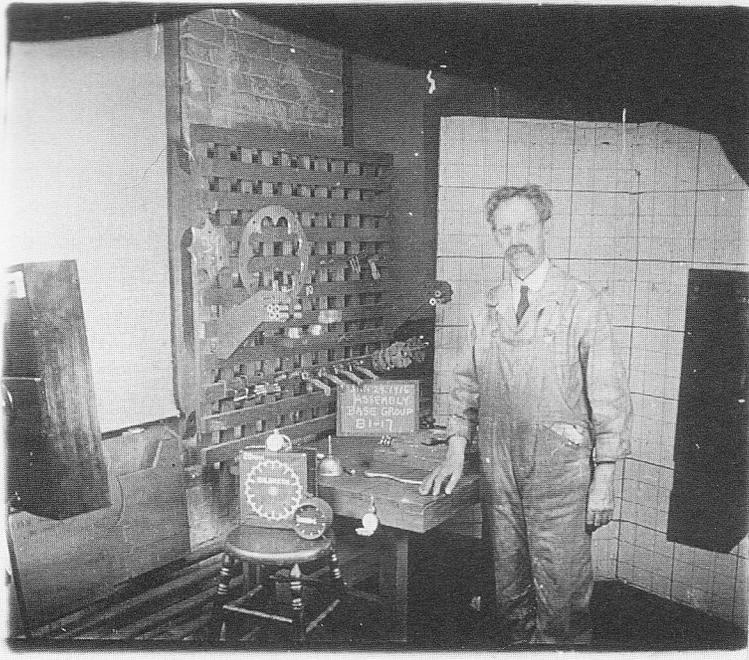


Still seeing himself as very much a Taylorite, Gilbreth surrounded himself with a Taylor-trained team of scientific management installers. Horace Hathaway, characterized by Gilbreth friend and biographer Edna Yost as an ultraorthodox Taylorite who “to the end of his long professional life . . . crossed the *t*’s and dotted the *i*’s according to his teacher,” was retained as a consultant. One of Hathaway’s assistants, Albert Shipley, was hired to organize the planning department, machine-shop toolroom, and storeroom. Former Hathaway assistant Leroy B. Fraser worked as a production clerk in the planning department. H. R. Brown, formerly of Link-Belt, another model Taylorite scientific management installation, was hired for time study, task and bonus setting, and machine respeeding. S. Edward Whitaker, who had worked with Taylor and Morris Llewellyn Cooke, another early advocate of scientific management, in 1906, was employed as an assistant in micromotion study, and he also helped change the cost-accounting and bookkeeping systems. Others trained by Taylor or his associates were hired for the installation as well.¹⁹

Yet it was the unorthodox parts of the installation that generally proved the most successful. One of these innovations was the “betterment room,” a motion-study laboratory where Frank Gilbreth filmed volunteer braider assembly people at work. The Gilbreths explained the elaborate new micromotion

method used there as “recording motions by means of a moving camera, a clock that will record different times of day in each picture of a motion picture film, a cross-sectioned background, and other devices for assisting in measuring the relative efficiency and wastefulness of motions.”²⁰ Much like ancient Greek sculptors, who used more than one model, Frank filmed many workers in his attempt to find an ideal movement.²¹ To elicit the cooperation of the workers, he showed them the film and asked for their comments and suggestions (a practice that Taylor disapproved of), and he invited them to a series of lectures on scientific management that he organized. He was also not above using financial incentives: volunteer operatives willing to be filmed were paid a bonus. Voluntarism was a major part of an effort to avoid labor problems.²²

Other Gilbreth innovations²³ included a tickler system, a reminder file for following up every order, every purchase, and every appointment. This system, which required accurate filing and regular input of information, posed some initial difficulties, but once they were overcome it seems to



An operative prepares to be filmed against a cross-sectioned background for a micromotion study of the packet system. Braider parts were placed on the vertical lattice by a lower-paid worker to enable the higher-paid operative to work faster. No. 94-1803, Gilbreth Collection, National Museum of American History, Smithsonian Institution.

have been effective. Another innovation was the “packet” system, which involved placing parts to be assembled in the correct sequence on hooks on a vertical lattice. This work was done by a low-paid worker, usually a boy, and it enabled the skilled assembler to work much faster. The parts were to be checked in the stockroom, but if a faulty component was somehow placed in the packet, the assembler was supposed to move on to a new workbench rather than spend time filing the incorrect part into shape. According to John Aldrich, the packet method reduced the time taken to assemble certain types of braiders from 37½ minutes to 8½ minutes, with the result that “workmen now turn out a much larger output with no more effort than formerly.”

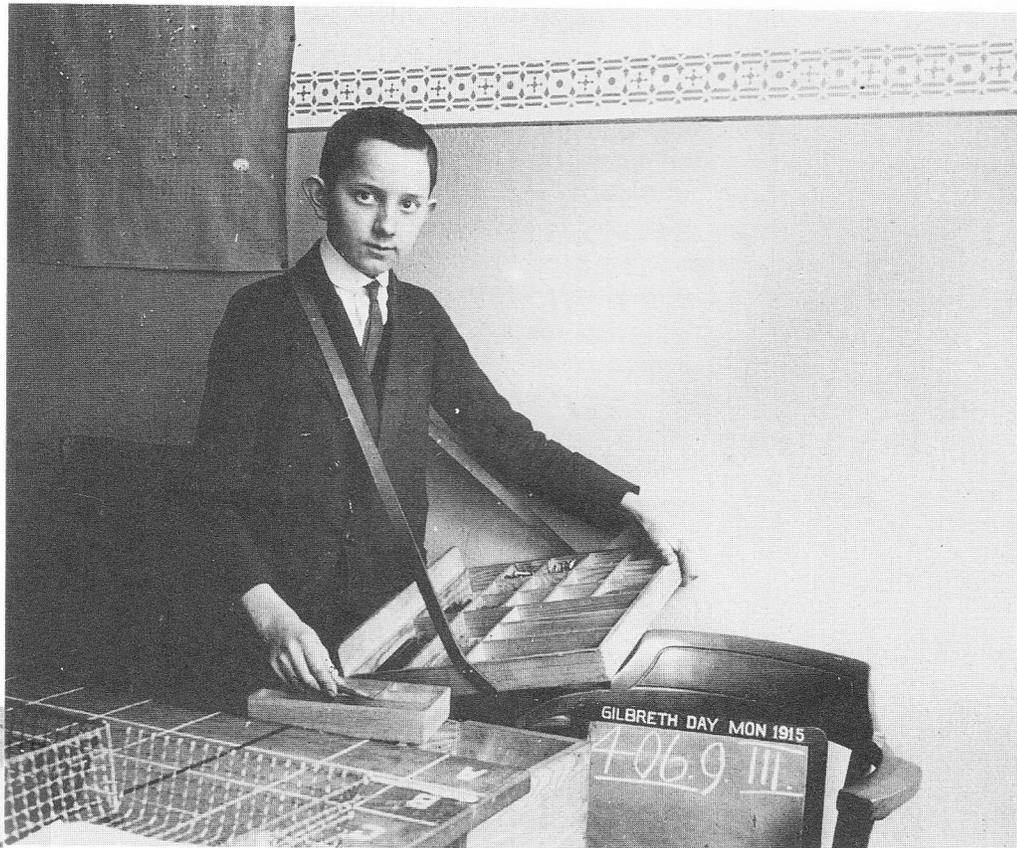
The Miller truck, another innovation, was a wheeled trolley that brought packets of materials to the workers and then served as a workbench and a transporter of finished products. Proponents of the Miller truck claimed that it saved 50 percent in the

costs of handling machinery and parts within the factory. In an innovation that did follow a Taylor model, functional foremen were introduced. Under this system, foremen (who were sometimes clerical workers) were given specific jobs rather than general supervisory responsibilities. These jobs included such functions as routing work, writing instruction cards, checking stores, and maintaining shop discipline.



Although it is difficult to be certain what the workers felt about the changes at New England Butt, clues do exist in Edgar Whitaker’s daily letters to Frank Gilbreth and in the letters later written to Margaret Hawley, a woman who was writing a master’s thesis on Frank Gilbreth in 1927-28. Hawley wrote to more than a hundred people who had known or worked with Frank Gilbreth over the years.

A letter to Hawley from Harry Hopkins, a New England Butt operative, testified to the Gilbreths’ shrewdness in installing the new methods in the office first. “It was a matter of amusement to us men in the shop to see [Frank Gilbreth] start in the office,” recalled Hopkins, “and it also made us feel as we were not the only ones that needed to be taught management. But the Officials took it a [*sic*] good spirit and when we started in the shop it seemed as though we were better prepared for it by the example the office set for us.” In another letter to Hawley, Joseph Piacitelli, who started at New England Butt as an office boy in 1912 and later became a Lillian Gilbreth-trained consulting engineer, noted the success Frank Gilbreth had in gaining the workers’ cooperation for his motion studies. “I do not know of any time when Mr. Gilbreth failed to get the cooperation of the workers,” wrote Piacitelli. “Invariably the men were enthusiastic and gave him hearty cooperation in his efforts to make the method less fatiguing. The workmen selected to be studied were always considered by him not merely as workers but investigators, having respect for their knowledge of their own work and utilizing their experience towards the establishment of the ‘ONE BEST WAY.’”²⁴



The Gilbreths installed some of their scientific management innovations in the office first. Desks were cross-sectioned so materials could be put in the most efficient position; office boys delivered supplies to specially partitioned drawers. No. 80-20578, Gilbreth Collection, National Museum of American History, Smithsonian Institution.

Cleanliness may or may not have been next to godliness, but it was certainly a notable feature of efficiency (as well as Americanization) in the minds of many progressives. Whitaker thus spent much of his first month on the job trying to clean up the plant. "I find the toilets and urinals in quite an untidy condition," he informed Frank Gilbreth on 4 July 1912 (a day when the plant was closed). "I have spent a good part of the day, trying to determine a practical way of cleaning the closets, without an excess of hard labor." Giving a graphic example of the grim thoroughness of many scientific management people, he went on to "recommend the issuance of a Standing Order, providing that the care of the toilet rooms be assigned to a definite person and that daily the bowls shall be swabbed out on the inside with a cloth using one circular motion, and then flushed, and that twice a week the outside shall be wiped over with a moist cloth." Whitaker returned to the subject of cleaning the toilets six days later, when in true scientific fashion he reported that he had tried various chemicals but found their use "somewhat risky." Dilute sulfuric acid damaged the enamel as did oxalic acid, so he settled on a proprietary brand, Dutch Cleanser, which although it required "hard rubbing," seemed safer. He was also anxious to find the best method of cleaning the windows, which were coated with iron rust. Dutch Cleanser was again his choice for the job. Timing himself cleaning a large (sixty-paned) window, he found it took fifty-five minutes, but he suggested that "lower-priced labor" might be less efficient.²⁶

By 11 July Whitaker had turned his attention to emptying the wastebaskets. Aaron, a janitor, had a method that involved collecting all the wastepaper into one basket, which he then took down to the cellar and emptied over the coal pile in front of the boilers. This procedure caused great irritation to the fire-

But despite the Gilbreths' best efforts, Whitaker did report personnel problems related to the changes that were taking place. In October 1912 a Mr. Linkamper, an engineer working on the braiding machines, wrote to John Aldrich about "his feeling of uncertainty under the present arrangements and his feeling that he is not doing profitable work, or a discontinuance of the present relations." His concerns were cleared up after "fatherly talks" with Whitaker and a man from the Planning Office named Littlefield. Another incident that same month, this one involving an instance of apparent managerial ineptitude, ended less happily. Henry Flynn, a machinist in the betterment room who had been receiving a generous bonus for participating in the micro-motion studies, was transferred, over his protests, to another floor, thus losing his bonus, and he subsequently left the company.²⁵

man, since the papers scattered all over the floor and were difficult to shovel into the furnace. Whitaker therefore devised a new method: Aaron would collect the paper in a burlap sack and then deposit the sack in a specially painted barrel (stenciled "Paper" in black letters), and the fireman could burn the paper at convenient times. "I am gradually working out a definite time-table for Aaron," added Whitaker, and by August he was trying to put that timetable into effect. Starting at 6:00 A.M., he followed Aaron on his morning rounds "and pushed him through his morning sweeping and dusting tasks by 8.15 instead of his usual hour of 9.30." Aaron clearly did not take well to this pushing, for Whitaker commented that the janitor was "a foreigner and does not readily understand what he is told, and likes, or has a natural tendency to argue matters." Yet Whitaker remained optimistic; "If one is very patient I think he can be taught to do all the necessary work, using the right motions, in an hour and a half." But the wastebaskets seem to have been a problem area, and perhaps because Aaron may not have been literate in English, Whitaker suggested that they be emptied instead by an office boy, who would "look out for checks or money or valuable documents."²⁷

While Gilbreth was prepared to deal with worker resistance to change through the use of incentives and industrial psychology, some of that resistance was rendered unnecessary by inefficiencies of management and disputes among the installers during the early months of the installation. When Hathaway recommended that machinists be relieved of responsibility for grinding and repairing their own tools, a change that he believed would increase productivity by reducing the time that machines were idle by 5 to 25 percent, the machinists reacted unfavorably, since it was a change that would undermine their traditional role and their sense of individuality in the work culture. The implementation of Hathaway's proposal was impeded less by the workmen, however, than by a series of operational delays. A toolroom for storing, sharpening, and maintaining tools had to be set up, but the company's management took several weeks to remove some obsolete machines that were occupying the needed space. Then Albert Shipley arrived without the necessary classification system for the toolroom. Next the delivery of a new tool grinder was delayed, and the machine did not arrive until November 1912. In August 1913 Whitaker reported to Gilbreth that the men clearly preferred to grind their own tools to their own specifications, and that "the Taylor Grinder, which was purchased at a large cost, has probably not been used since Mr. Shipley gave demonstration with it for Micro-Motion pictures, early in the spring."²⁸

A second recommended change, the respeeding of machines, would have had a direct impact on the workers, but it was "virtually sabotaged" by Carl Barth, another ultraorthodox Taylorite, who would not allow Gilbreth the use of his slide rule methods to calculate the new speeds.²⁹ This was not the first time that Taylorites had refused to share information with Gilbreth; in a flurry of letters between Taylor, Hathaway, and Sanford E. Thompson (an early Taylor disciple) in 1908, the three men had agreed that "Mr. Gilbreth is not a man whom it would be well to place a good deal of dependence on unless there is something further in view," and they had decided that he should be denied access to the Taylor tools and secrets unless he was "ready to pay for it."³⁰ Gilbreth tried to deal with the respeeding problem by sending one of his people, an engineer named Robertson, to confer with Barth and visit companies where the slide rule method had been used. This effort ended in failure when Robertson, soon

after returning to New England Butt, left Gilbreth's employment to work for Barth in Cleveland.³¹

In August 1912 Whitaker reported a potentially serious labor problem involving a carpenter, Steven Vose, who had recently left New England Butt for reasons that do not seem to have survived. Vose had spoken to organizers for the Industrial Workers of the World, who had then called a meeting. After word was "quietly passed" among the company's workers (excluding the foremen), about eighty employees met on the evening of 16 August in Olneyville, a working-class area of Providence some two or three miles from the New England Butt factory. Little seems to have been accomplished at the meeting, and the IWW never gained a foothold at the company. When news of the incident reached Taylor, however, it served to worsen the already poor opinion he had of Frank Gilbreth's competence. Gilbreth "had no business whatsoever to undertake the systematizing of a large company of this sort without having any experience in the field," Taylor wrote to Hathaway. Hathaway's reply revealed the ambivalence that many felt about Frank Gilbreth: they liked him personally, but they had doubts about his orthodoxy as a Taylorite. "I like Gilbreth and admire his ability," declared Hathaway, "and I see no good reason why he should not ultimately be able to do good work in the systematizing line if he plays the game according to the rules." But, he added, "I must confess to a certain amount of uneasiness as to his adhering strictly to the rules."³²



Aside from such innovations as the packet system and the Miller truck, where the Gilbreths' approach differed from those of most other scientific management installers of the time was in its insistence on a simultaneous improvement of the workers' environment. Known in Germany, where it originated, as welfare work, the systematic effort to improve working conditions was called industrial betterment in the United States. The principles and methods of this effort strongly resembled those expounded by Lillian Gilbreth in her rejected Ph.D. thesis, which was published in serial form in *Industrial Engineering and Engineering Digest* beginning in May 1912, when the Gilbreths were starting the installation at the New England Butt Company. Lillian's thesis can thus be read as a manual for the application of psychology in that installation.³³

Stressing individualism, Lillian insisted that scientific management was "built on the basic principle of recognition of the individual, not only as an economic unit but also as a personality, with all the idiosyncrasies that distinguish a person." Individual differences could best be recognized and put to productive use through the application of psychology, she said. Examining the psychological aspects of worker training, she claimed that the attitude of the worker toward both his foreman and his employer improved under the new system she was advocating; instead of being "natural enemies," they "all now become friends, with the common aim, cooperation, for the purpose of increasing output and wages and lowering costs." (As Elton Mayo showed a decade later in the Hawthorne experiment, the increased attention paid to workers under the new system was probably a more important determinant of increased output than any minor changes in training methods or working conditions.)³⁴

Lillian's approach to training was less authoritarian than that of the more orthodox Taylorites. Lillian believed that the best teachers simply clarified what

the worker already knew. Teachers were the “*means* of presenting to him the underlying principles of his own experience,” she said; it was only when he understood that the new methods were derived from actual study of workers, rather than from the imagination of “experts,” that he would “be able to cooperate with all his energy.” Her itemization of the methods of teaching under scientific management included written methods, like detailed instruction cards describing what had to be done, and oral methods, whereby the foreman told the workers what to do and how to do it. She also included object lessons, using working models, demonstrations, and moving pictures. Recognizing the changing nature of the labor force, she noted that training films were particularly useful “when the workers do not speak the same language as the teacher.”³⁵

Lillian concluded her treatise on a strongly optimistic note: with the cooperation of the workers, she declared, industrial warfare could cease and “true ‘Brotherhood’ may some day come to be.” It was, certainly, a utopian view, but like other scientific management pioneers (and like Herbert Hoover, for whom she was to work in the early 1930s), she believed that the system would solve most of the problems of the developing industrial economy. Lillian recognized that traditional schemes of welfare work had an “underlying flaw,” for they could be regarded by both sides as charity. If welfare work improved the physical conditions of a plant, for instance, employees would be inclined to see that improvement as only reasonable, while the employer might resent the fact that his employees saw as a right what he himself construed as generosity. If an employer offered workers a new plant library or a picnic, they might resent it as charity, preferring to see the expended money in their paychecks instead. Lillian suggested that welfare and betterment could be so integrated into the general management scheme under scientific management that there would be no need for a company welfare department. While admitting that “it may be necessary . . . to provide for nurses, physical directors or advisors,” she contended that these people “benefit the employers as much as the employés. They must go on the regular payroll as part of the efficiency equipment.” This was to reassure the workers that “there is absolutely no feeling of charity, or of gift, in having them; that they add to the perfectness of the entire establishment.”³⁶

New management practices at New England Butt do seem to have given the workers some sense of ownership in their work as well as increasing their productivity. According to Edna Yost, visitors to New England Butt saw “men with a new type of interest in their work” who were receiving better wages than before (a not insignificant factor), and who, rather than losing all pleasure in the jobs they did, felt that their dignity was intact. They had weekly meetings with senior management, where policies were discussed and criticized and where “the president of the company sat on the same kind of chair and had the same kind of cigar to smoke.”³⁷ This vision of equality was what Lillian Gilbreth described in the concluding pages of *The Psychology of Management*, where she argued that scientific management “will accomplish two great works. 1. It will educate the worker to the point where workers will be fitted to work, and to live. 2. It will aid the cause of Industrial Peace.”³⁸

The Gilbreths’ version of welfare work, or “betterment,” covered many practical details, including decent working conditions, chairs, better lighting, clean bathrooms, lunchrooms, and regular rest periods. It also involved education for the workers through libraries and lectures. The Gilbreths believed that better conditions would lead to contented workers, which in turn would mean

greater profits—a claim made (and proved) by progressive employers at least as far back as Robert Owen at the New Lanark Mills in Scotland in the 1820s.

The fundamental difference between the old and the new styles of scientific management lay, in fact, beyond the different emphases on time or motion, beyond different technologies in the use of the stopwatch or the movie camera, beyond the personal ambitions and antagonisms of Taylor and Frank Gilbreth. It lay, rather, in very different assumptions about workers. It was a difference that echoed the classic contrast between the ideas of English philosophers Thomas Hobbes and John Locke, between pessimistic and optimistic views of human nature, reflected, respectively, in the ideas of Taylor and the Gilbreths. Taylor saw workers as morally weak, in need of help and discipline to discover and do the right thing; hard work, he believed, helped to improve their morality and well-being. Revisionists like the Gilbreths, on the other hand, saw workers as good men and women being stifled by poor environments; in the view of the revisionists, both better morality and hard work could be promoted by improvements in workers' physical and environmental conditions. Orthodox Taylorites decried "soldiering"—a communal work-culture practice of employees who had a tacit (or sometimes spoken) agreement to pace themselves in their work, thus necessarily limiting production—and they saw it everywhere. Like most of their contemporaries, many Taylorites disliked labor unions, and they wished

The Gilbreths believed in eliminating unnecessary fatigue. Toward that end, workers were provided with chairs. Whether the Gilbreths approved of pinups is not clear. No. 85-122, Gilbreth Collection, National Museum of American History, Smithsonian Institution.



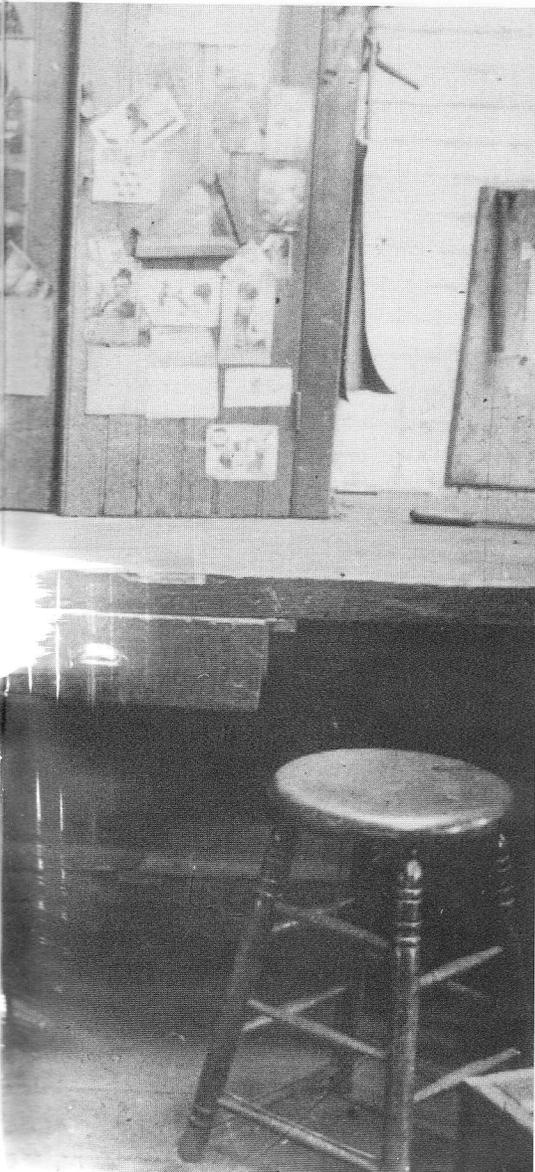
to replace collective bargaining with individual piecework arrangements based on “scientific” measurements of how long particular tasks should take. Although the revisionists (who seldom spoke of soldiering) praised individuality and self-reliance, they worked with unions, and they managed to arrive at an understanding with the American Federation of Labor by the early 1920s.³⁹



As part of the effort to educate and broaden the outlook of workers at New England Butt, Frank Gilbreth invited them to a series of lectures on scientific management. These talks started in July 1912 and continued every Tuesday evening for at least nine months, taking place in a room (dubbed “Frederick Taylor Hall”) in Frank Gilbreth’s sister’s music school. Attendance records, punctiliously kept by Whitaker, show that audiences ranged from a low of fourteen, when Robert Kent, an editor of *Industrial Engineering*, spoke about Watertown Arsenal (where the introduction of scientific management had led to major labor unrest), to a high of over two hundred, when Frederick Taylor himself addressed an audience that included the members of the Town Criers.

Women made up a significant minority among the lectures’ attendees, usually accounting for 10 to 20 percent of those present. On one occasion they even outnumbered the men, fifteen to fourteen; this was to hear a panel that included two women—a Miss Lucas, “a teacher in a children’s school,” and Miss Page, of the recently established Providence Cooperative Employment Bureau. Miss Page also spoke on at least two other occasions, as did Alice Hunt, the president of the Providence chapter of the Consumers’ League. The presence of a representative of the Consumers’ League suggests that elements of scientific management appealed to social workers and “social feminists” as a means of raising living standards among the general population. For Hunt’s talk on 25 March 1913, “a neat card invitation was placed in the hands of every man and woman employed in the machine shop of New England Butt Company,” Whitaker reported.⁴⁰

Another effort to encourage the workers involved the so-called Home Reading Box. This was a way of redistributing old magazines. In rather typical Frank Gilbreth fashion, it involved an elaborate system under which young men in cars collected magazines from householders and deposited these magazines through a window into a box at New England Butt (“that the day’s work might not be interrupted”). The workers could take as many as they liked and either keep or return them. Responding to criticism that the magazines were of the “lighter variety,” Gilbreth noted that the box’s contents included *Scribner’s*, *Century*, *Atlantic Monthly*, and six volumes of the *Encyclopedia Britannica*! “I believe with all my heart that it is the best scheme yet devised to help in educating the worker,” he told a reporter from the *Providence Journal*. Gilbreth saw the worker as suffering from two major problems: “In the first place he has no vocabulary. In the second place he cannot read fast or remember what he does read.” Gilbreth’s Home Reading Box reflected the optimistic, progressive spirit of the time: give the workers access to knowledge, the thinking ran, and they will use it. (Andrew Carnegie had another scheme for workers’ self-improvement, better organized but much more expensive.) Doing its part in this self-education movement, the Providence Public Library set up a branch at New England Butt. The first book borrowed, it reported, was Dante’s *Divine Comedy*, taken out by an Italian employee.⁴¹





The Providence Public Library supported the Gilbreth-initiated self-education program by opening a branch at New England Butt. No. 93-4440, Gilbreth Collection, National Museum of American History, Smithsonian Institution.

These welfare measures were designed to promote industrial democracy and, ultimately, brotherhood and industrial harmony by expanding the horizons of the workers. New England Butt employees may also have found encouragement in the interest taken in them by the teachers and students of the Gilbreth Summer Schools. These free, two-week sessions of instruction in scientific management were held during four summers, from 1913 to 1916. Their curriculum consisted of morning and evening lectures, between which the participants, who were mostly business-school professors of management, visited plants, most often New England Butt, where they talked to operatives about the installation of scientific management. With a flair for publicity, Frank Gilbreth invited a steady stream of well-publicized visitors to New England Butt. The most important, from his professional viewpoint, was doubtless Frederick W. Taylor, who spent an hour touring the plant on 11 February 1913. According to Whitaker, Taylor was favorably impressed:

He had a pretty comprehensive view of all except the Foundry. He was photographed in a series of Micro-motion study pictures; the packet method of assembly was demonstrated for him; he declared this method was the quickest he had ever seen; he said that he had never seen a better Tool Room; he expressed his opinion that the cross-sectioning of the desks in the Planning Department was a fine scheme.⁴²

But whatever Taylor might have said to Whitaker, it is clear that the success of Frank Gilbreth's innovations at New England Butt irritated him. Taylor was already suspicious of Gilbreth's grasp of scientific management.⁴³ He had initially been convinced that Gilbreth's inexperience would lead to strikes and walkouts,

but this had not occurred. John Aldrich had in fact praised Gilbreth's work when he spoke at the December 1912 meeting of the American Society of Mechanical Engineers. Aldrich particularly applauded the accuracy of the micromotion studies, which he termed "the least expensive as well as the only accurate method of recording motion and time-study data."⁴⁴ That success was especially galling to Taylor and his supporters, since they had become identified with stopwatch studies, and Frank Gilbreth had applied for a patent on his method of micromotion study.

The situation came to a head following complaints from another Gilbreth client, M. C. Hermann of the Hermann, Aukam Company in New Jersey, for whom Gilbreth was also installing a scientific management system in 1912-13. Sympathetic to Hermann's dissatisfaction, Taylor sent one of his more orthodox disciples to complete the job, despite the fact that Gilbreth's contract with Hermann still had two months to run. This episode led to a serious split between Taylor and Gilbreth, and thus within the scientific management profession. The factional conflict continued until the Gilbreths' approach—combining time study, motion study, and psychology—became the new orthodoxy in the postwar years, after the death of some of the more intransigent pioneers.



Some "backsliding," or deviation from the original plans, occurred at New England Butt while Frank Gilbreth was in Europe during the summer of 1913. In a fifteen-page, single-spaced letter written after his return, Gilbreth listed forty items that needed attention. The planning department was cited as requiring particular care. According to Gilbreth, the department needed supervision from before seven o'clock in the morning, since "at the present time [it] is a wild and savage orgy until about eight o'clock." He identified a key factor in the department's unruliness: whistling. "Whistling in the planning department is one of those things that should be prohibited, as apparently it is the start of the general melee which follows." Other departments had problems as well. Gilbreth was also critical of certain promotions in the company. These, he said, "have certainly not led me to believe that Taylor's second law of management, namely,—The Scientific Selection of the Worker, has been carried out. Thurber on the bulletin board and Gilbert on the time desk are two examples that would require further proof to satisfy me that any science (or even Christian Science) was used in demonstrating their selection." In addition, Gilbreth's incentive scheme had collapsed, with "no prizes . . . awarded since May." Gilbreth concluded his long list of criticisms with a request for a two-thousand-dollar payment for his services, notwithstanding the fact that he had been in Europe for the previous six weeks.⁴⁵

John Aldrich was more sanguine in his published reports about the scientific management installation. In a 1923 article in *Management Engineering*, he claimed that most of the elements of the Gilbreth scheme were still in effect. There had been no labor troubles, he said; on the contrary, "the plant shows evidences of an *esprit de corps*, and a pride in the system and the business." Aldrich nonetheless spent much of his article explaining that the firm's increased productivity was due to standardization of the product, which was not part of Gilbreth's plan. However, the new system of management allowed New England Butt executives to work on long-range planning and initiate their own improve-

ments, since the introduction of a middle-management level meant that the company's senior men were "relieved of a maze of details." Thus the real benefits to the company were a by-product of Gilbreth's installation.⁴⁶



Because of changes in the demand for braiding machines, many of the Rhode Island firms that manufactured them went out of business or merged with other companies. New England Butt continued its independent existence until 1948, when it became part of the Wanskuck Company. Since 1987 Wanskuck has been part of the Wardwell Company of Central Falls.

When the New England Butt betterment room was dismantled in the mid-1970s, J. T. Black, a consultant to the Wanskuck Company, found hundreds of Gilbreth-era photographic plates, two Carl Barth slide rules, some tickler cards, and directions for use of the Taylor tool grinder. He also found the production clerk's desk, which was cross-sectioned for the more efficient placement of supplies. Many of these items were given to the industrial engineering department at the University of Rhode Island, where Black was then employed, but since then they have vanished, probably thrown away. Black took many of the photos with him to his next job at Ohio State University, and he later donated them to Purdue University and the Smithsonian Institution.⁴⁷

Notes

1. There are glass plates of color autochrome images of the children in the Gilbreth Collection in the Division of Engineering and Industry, Smithsonian Institution, Washington, D.C.
2. Quoted in Edna Yost, *Frank and Lillian Gilbreth: Partners for Life* (New Brunswick, N.J.: Rutgers University Press, 1948), 207-8. This "romantic" biography, written by a friend and colleague of Lillian Gilbreth, does not cover the last twenty years of Lillian's long career; Lillian lived until 1972, and she continued working until 1968. The book contains no footnotes, and it usually leaves the sources of its direct quotations of Lillian unidentified. However, Yost had access to Lillian's unpublished 1941 autobiography, which is currently in a restricted collection at Purdue University, where the Frank and Lillian Gilbreth Collection of papers is housed.
3. Lillian Moller Gilbreth, *The Quest of the One Best Way: A Sketch of the Life of Frank Bunker Gilbreth* (1926; reprint, [New York]: Society of Women Engineers, 1990), 36. Lillian's dissertation was accepted by her professors at Berkeley, but the Ph.D. was not conferred because of the academic senate's objection. After she had completed her first semester's work toward a Ph.D in 1902, she explained, her studies were "broken off" as she traveled in Europe, met Frank, became engaged, married, and raised "a fine family of interesting youngsters." She then resumed her studies, probably about 1909, and "it was understood that the University of California would accept me as a student *in absentia*. This would be possible because I would be working in the engineering department on a management thesis and, at that time, there were no scientific management installations in industry on the West Coast." "Lillian Moller Gilbreth," in *There Was Light: Autobiography of a University, Berkeley, 1868-1968*, ed. Irving Stone (New York: Doubleday, 1970), 87. Inquiries to the University of California archives, made in an attempt to check this story, revealed that the records for the relevant years were missing.
4. Biographical information from Yost, *Frank and Lillian Gilbreth*, and Frank Gilbreth, Jr., and Ernestine Gilbreth Carey, *Cheaper by the Dozen* (New York: Thomas Crowell & Sons, 1948). The books written by the Gilbreth children, including *Belles on Their Toes* (New York: Thomas Crowell, 1950), are useful additions to the Gilbreth family mythology. The story is continued, with closer reliance on documentable evidence, in Frank B. Gilbreth, Jr., *Time Out for Happiness* (New York: Thomas Crowell, 1970). The main source of primary material on the Gilbreths is the extensive Gilbreth Collection at Purdue University, which contains more than 170 archival boxes of business papers, manuscripts, press clippings, and private correspondence. (References to this collection will follow the form GC, ser. [series] number when applicable, c. [container or box] number, f. [folder] number or name.) The Smithsonian Institution has a collection of original Gilbreth photographs, taken between 1910 and 1924, including approximately 2,250 glass stereo slides, 202 stereo cards, and 31 autochromes (images produced by an early process in color photography).
5. John S. Gilkeson, Jr., deals with the Town Criers in chapter 8 of *Middle-Class Providence, 1840-1920* (Princeton, N.J.: Princeton University Press, 1986). An incomplete series of weekly newsletters of the Town Criers can be found in the Rhode Island Historical Society Library. The quotation is from *Town Crier* 1 (June 1912): 12; the information on membership is also from this issue.
6. F. B. Gilbreth to Herbert N. Fenner, 29 Apr. 1912, GC c. 159, f. 0952-2. Frank's services were not cheap. "They still think I am a very great man," he remarked to Lillian in an early 1913 letter about his contract with the Hermann, Aukam Company. "It is mostly because I charge such high fees." He told his English agent, James Butterworth, that the New England Butt Company was "paying me more for less time than I would get with a \$200,000 building." In a letter to John Aldrich, Gilbreth complained that New England Butt would pay him only \$1,400 for two and a half months' work in the summer of 1913, six weeks of which he had spent traveling to conferences in Europe and working on another contract in Germany, both while also receiving pay from "my Hebrew clients," the Hermann, Aukam handkerchief factory in New Jersey. F. B. Gilbreth to L. M. Gilbreth, 13 Jan. 1913, GC c. 112, f. 0813-6; F. B. Gilbreth to James Butterworth, 18 May 1912, GC c. 117, f. 0816-54; F. B. Gilbreth to John G. Aldrich, 8 Sept. 1913, GC c. 117, f. 0616-51.
7. L. M. Gilbreth, *Quest*, 48, 49.
8. Martha Banta, *Taylored Lives: Narrative Productions in the Age of Taylor, Veblen, and Ford* (Chicago: University of Chicago Press, 1993), 334 n. 54.
9. Gilbreth and Carey, *Cheaper by the Dozen*, 22.
10. "I feel our plant was fortunate in that it was one of the first . . . to have the services of these two people," remarked New England Butt's vice president, who was well aware of Lillian's contribution to the installation. J. G. Aldrich to Edward Rice, 27 Feb. 1940, GC restricted file c. 2, f. "Children."
11. Assumptions about gender characteristics show great resilience and internationality. A Gallup Poll of approximately a hundred adults in twenty-two countries, conducted from August through November 1995, found that "men and women around the world shared the perception that women are more emotional, talkative and affectionate than men, while men are perceived as more courageous, aggressive and ambitious." *Providence Journal-Bulletin*, 27 Mar. 1996.
12. On the feminization of the universities (and the concerns this evoked), see Lynn D. Gordon, *Gender and Higher Education in the Progressive Era* (New Haven, Conn.: Yale University Press, 1990).
13. There is a Gilbreth clock, and a short extract from one of the Gilbreth motion-study films, on permanent display in the Museum of Science and Technology, Smithsonian Institution.
14. Extensive research into when the word *butt* started to amuse Americans suggests that it acquired its present meaning during World War II.
15. "New England Butt Company Leading Maker of Braiding Machines," typescript, Rhode Island Historical Society MSS 775, folder 23; transcribed from the Providence *Evening Bulletin*, 14 Mar. 1931.
16. Horace K. Hathaway to New England Butt Company, 8 June 1912, GC c. 95, f. 50702-5.
17. Frederick Winslow Taylor, testimony before a U.S. House of Representatives special committee, January 1912, in Frederick W. Taylor, *Scientific Management* (New York: Harper & Bros., 1947), 26-27; quoted in Daniel Nelson, *A Mental*

- Revolution: Scientific Management since Taylor* (Columbus: Ohio State University Press, 1992), 5.
18. Charles B. Going to Margaret Hawley, 30 Oct. 1927, GC c. 111, f. 0812-1.
 19. Yost, *Frank and Lillian Gilbreth*, 217. Hathaway and Fraser corresponded with Margaret Hawley, a woman writing a master's thesis on Frank Gilbreth, in 1928. Copies of their letters are in GC c. 111, f. 0812-1 and f. 0812-2. A letter from John Aldrich to Hawley, 7 Sept. 1928, is also in the latter folder.
 20. Frank B. Gilbreth and Lillian M. Gilbreth, "Motion Study as Industrial Opportunity," in *The Writings of the Gilbreths*, ed. William R. Spriegel and Clark E. Myers (Homewood, Ill.: Richard Irwin, 1953), 221.
 21. This comparison was made by Marta Braun in *Picturing Time: The Work of Etienne-Jules Marey (1830-1904)* (Chicago: University of Chicago Press, 1992), 341.
 22. See John G. Aldrich, "Ten Years of Scientific Management: War, Boom, and Depression Have Made Few Changes in the System," *Management Engineering* 4 (February 1923): 6.
 23. Much of the following information about the Gilbreths' innovations is from Aldrich's "Ten Years of Scientific Management." A number of articles on scientific management, with references to the New England Butt installation, appeared in 1912 and 1913 in *Industrial Engineering and Engineering Digest*, which also carried monthly reports on the installation.
 24. Harry Hopkins to Margaret Hawley, 11 Jan. 1927, and Joseph Piacitelli to Hawley, 9 Mar. 1927, GC c. 111, f. 0812-2.
 25. S. E. Whitaker to F. B. Gilbreth, 14, 26 Oct. 1912, GC c. 159, f. 610-0952-2.
 26. S. E. Whitaker to F. B. Gilbreth, 4 July 1912, GC c. 150, f. 610-0952-2, and Whitaker to Gilbreth, 10 July 1912, GC c. 159, f. 610-0952-2. See Suellen Hoy, *Chasing Dirt: The American Pursuit of Cleanliness* (New York: Oxford University Press, 1995), 137-49. There were several connections between the work of the Gilbreths and the pursuit of cleanliness (with its role in Americanizing the immigrant labor force), including the Gilbreths' 1920 contract with Lever Brothers.
 27. S. E. Whitaker to F. B. Gilbreth, 11 July, 8 Aug. 1912, GC c. 159, f. 610-0952-2.
 28. H. K. Hathaway, Report, 79-91, GC c. 95, f. 0702-5; S. E. Whitaker to F. B. Gilbreth, 19, 25, 27 June, 1, 10, 12, 24, 27 July, 18 Nov. 1912, GC c. 159, f. 0952-2; Whitaker to Gilbreth, 7 Aug. 1913, GC c. 54, f. 0696-1.
 29. Brian C. Price, "One Best Way: Frank and Lillian Gilbreth's Transformation of Scientific Management, 1885-1940" (Ph.D. diss., Purdue University, 1987), 166.
 30. Sanford E. Thompson to F. W. Taylor, 11 Jan. 1908, Taylor to H. K. Hathaway, 20 Nov. 1908, Thompson to Taylor, 24 Nov. 1908, Thompson to Hathaway, 7 Dec. 1908, Taylor Collection, Stevens Institute of Technology; quoted in Milton J. Nadworny, "Frederick Taylor and Frank Gilbreth: Competition in Scientific Management," *Business History Review* 31 (Spring 1957): 25.
 31. F. B. Gilbreth to Carl Barth, 26 Sept. 1912, Barth to Gilbreth, 9 Oct. 1912, 10 Nov. 1912, GC c. 117, f. 0816-45, and S. E. Whitaker to Gilbreth, 28 Aug., 11 Oct., 15 Nov. 1912, 10, 22, 29 Jan., 19 Mar. 1913, GC c. 159, f. 610-0952-2; quoted in Price, "One Best Way," 165-66.
 32. S. E. Whitaker to F. B. Gilbreth, 19 Aug. 1912, GC c. 159, f. 0952-2; F. W. Taylor to H. K. Hathaway, 2 Sept. 1912, and Hathaway to Taylor, 9 Sept. 1912, Taylor Collection; quoted in Price, "One Best Way," 209-10.
 33. After its serialization in *Industrial Engineering and Engineering Digest* between May 1912 and May 1913, Lillian Gilbreth's *The Psychology of Management: The Function of the Mind in Determining, Teaching, and Installing Methods of Least Waste* was published in book form in 1914. A second edition appeared in 1918 (New York: Sturgis & Walton); subsequent citations are to this edition. Lillian Gilbreth was not the only researcher applying psychology to management problems. Hugo Munsterberg, a German psychologist working at Harvard University, published *Psychology and Industrial Efficiency* (Boston, Houghton Mifflin) in 1913, several months after publication of the German version, *Psychologie und Wirtschaftsleben*. Lillian was fluent in German and may well have read this book while preparing her dissertation.
 34. L. M. Gilbreth, *Psychology of Management*, 18-19, 89. Elton Mayo, an Australian psychologist, discovered and named the "Hawthorne effect" while investigating the effects of changes in working conditions at Western Electric's Hawthorne plant in Cicero, Illinois. He established that workers were responding to the interest shown in them by the investigators, and that the improved illumination and other such changes were irrelevant to their increased productivity. The best recent account is Richard Gillespie, *Manufacturing Knowledge: A History of the Hawthorne Experiment* (Cambridge: Cambridge University Press, 1991).
 35. L. M. Gilbreth, *Psychology of Management*, 220-21, 226.
 36. *Ibid.*, 332, 330.
 37. Yost, *Frank and Lillian Gilbreth*, 236.
 38. L. M. Gilbreth, *Psychology of Management*, 331.
 39. See Samuel Haber, *Efficiency and Uplift: Scientific Management in the Progressive Era, 1890-1920* (Chicago: University of Chicago Press, 1964), 149-50.
 40. S. E. Whitaker to F. B. Gilbreth, 26 Mar. 1913, GC c. 159, f. 610-0952-2. Alice Hunt's lecture was attended by thirty-one men and ten women. Hunt and Lillian Gilbreth were fellow members of the Wednesday Club, a women's debating society in Providence. A photograph showing Frank Gilbreth delivering one of the lectures in the series, addressing an audience of about a dozen people (at least six of them women), is in the Smithsonian's Gilbreth Collection.
 41. Information on the Home Reading Box can be found in Yost, *Frank and Lillian Gilbreth*, 238, and "Anti-fatigue Museum Started Here," *Providence Sunday Journal*, 22 Mar. 1914, sec. 5.
 42. S. E. Whitaker to F. B. Gilbreth, 13 Feb. 1913, GC c. 159, f. 610-0952-2.
 43. F. W. Taylor to H. K. Hathaway, 2 Sept. 1912, Taylor Collection; quoted in Nadworny, "Frederick Taylor and Frank Gilbreth," 26. Perhaps the best account of the split within scientific management can be found in Nadworny's article.
 44. The quotation, labeled "What John Aldrich said ten years ago," appears on the cover page of a promotional reprint by Gilbreth of Aldrich's "Ten Years of Scientific Management," GC ser. 3, c. 21, f. "Materials of Frank and Lillian Gilbreth."
 45. F. B. Gilbreth to J. G. Aldrich, 8 Sept. 1913, GC c. 117, f. 0616-51.
 46. Aldrich, "Ten Years of Scientific Management," 1-6.
 47. See J. T. Black, "IE's Have Roots Too," *Industrial Engineering* 10 (May 1978): 22-29.

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Mesh bags were a best-selling item for Providence jewelry manufacturers during the early years of the twentieth century. Photo from an advertisement in Jewelers' Circular, 5 February 1919. RHHS Collection (RHi X3 3038).