

## A LOOK INTO A NINETEENTH-CENTURY MANCHESTER FACTORY

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About 1830 McConnel & Co., of Manchester, were reputed to be the largest producers of fine cotton yarn in England.<sup>1</sup> The "look into a nineteenth-century factory" that I wish to undertake is based on the extant records of this firm covering its first four decades of existence. On deposit in the University of Manchester since before 1915, when G. W. Daniels presented a brief report in an article in the Economic Journal on their contents, the papers of this firm contain some exceptionally fine data that have been only indifferently exploited, at least until recent years.<sup>2</sup> I was made aware of this collection by the late Seymour Shapiro, who himself made good use of them in his book Capital and the Cotton Industry in the Industrial Revolution (Ithaca, 1968). Several other writers have also drawn from this rich source, but only the recent study by C. H. Lee of the University of Aberdeen actually concerns the firm itself.<sup>3</sup>

McConnel & Kennedy, as the spinning firm was known during most of its first forty years, deserves a full-fledged entrepreneurial analysis, which should in turn be a considerable contribution to the understanding of the Industrial Revolution and the Factory System. My attempt may be considered as a first and highly imperfect effort in this direction with a special emphasis on the firm's internal structure. My purpose in studying this collection was primarily to extract data on fixed investment in machines and buildings in order to have concrete evidence on one important reason for the organization of centrally directed factories. In an article some years ago Fritz Redlich and I tried to suggest some criteria for the study of the evolution of modern factories. We wanted to stress that it was not only the technology that determined the organizational pattern of productive means but that other factors, such as high fixed investment, the quality of the good produced, the costs of raw materials, especially those imported, and the requirements for higher skills for which the industrial factory served as a training institution, should be investigated in detail. These, we felt were among the critical variables on which the sophistication of internal control or management depended. Without managerial sophistication, we surmised, technological progress would have been

seriously impeded at the minimum and moreover many inventions would not have been introduced into the productive process.

It was to a large extent to test such propositions and to collect evidence in support of them that I approached the McConnel & Kennedy papers. Not surprisingly, I did not find all that I wanted; however, I found other material that seems useful in the analysis and description of a manufacturing enterprise in the Industrial Revolution. Especially interesting, although unexpected, was data on insurance coverage and on tax liabilities. I have something to say on the applicability of the Schumpeterian model to the founders of the firm and some speculations on labor conditions in the factory.

James McConnel and John Kennedy founded the firm in 1795, following the dissolution of a four-year partnership for the spinning of yarn in which they had participated with two brothers who were fustian warehousemen. Born in Kirkcudbrightshire in the South of Scotland the son of a yeoman farmer, McConnel came to Chowbent, Lancashire in 1781 there to be apprenticed in the machine shop of Cannon & Smith; William Cannon was his uncle.<sup>4</sup> Three years later John Kennedy, whose grandfather had been a shopkeeper wealthy enough to buy an estate, took the same route.<sup>5</sup> The future partners may have met for the first time in the machine shop. Interestingly, there were at least three other men from the same county in Scotland who eventually became great cotton spinners in Manchester. They include James Kennedy, John Kennedy's brother, and the brothers A. & G. Murray.

Both McConnel and Kennedy were machine makers when they came to Manchester. In addition, McConnel became employed in a spinning mill in Manchester and was well prepared technically in the operations that he would be supervising in the future. Yet, it would be misleading to call the future partners craftsmen. And, although of yeoman stock, they seem not to fit the category of agrarians dispossessed as a result of enclosure movements. Lastly, they were not merchants whose presumed surplus of funds and whose awareness of commercial opportunities induced them to enter the ranks of industrialists. Kennedy, whose father died while he was still young, was sent by his mother to Chowbent as an apprentice in Cannon and Smith's machine shop.<sup>6</sup> This of course does not explain why the two young Scotsmen forsook the land and became great industrialists.

While we can say little of the motivation that drove the two men into the hazardous arena of business, there is better information on their activities as successful cotton spinners. Their original capital contribution when they joined the two warehousemen in partnership in 1791 consisted primarily of a carding engine worth £6 and two spinning mules valued at £162. They probably entered the partnership partly as a result of having the two mules on hand after having constructed them for a customer who was unable to complete payments.

Their four-year agreement with the warehousemen having expired in 1795, thereafter the two Scotsmen went their own way, starting with a capital of some £1600, which they had realized as profit from the defunct firm.<sup>7</sup>

From this time on they expanded rapidly, the partners showing a net worth in 1797 of over £7,000. By the end of 1803 their equity had nearly sextupled to over £40,000 and by 1811 it had again more than doubled to £88,000.<sup>8</sup> Although there is no concrete information as to the source of capital investment, the likelihood is strong that the resources for rapid expansion came from the undisturbed profits of the partners, each of whom had an equal share in the firm.

Until about 1800 McConnel & Kennedy continued to manufacture machines for sale; thereafter they concentrated on the spinning of fine yarns. The evidence indicates that McConnel & Kennedy was one of the more progressive manufacturing establishments and certainly one of very profitable firms of its time in England. In the early twentieth century it lost its identity and eventually became part of the giant combine Courtauld.

From 1795, when McConnel and Kennedy began operations, until 1831, the year of McConnel's death, McConnel remained in charge of the over-all management. John Kennedy took on the direction of the machine shop which probably made the company's textile machinery, during Kennedy's career, for which duty he received a weekly salary of £10 until his retirement in 1826.<sup>9</sup> The extant records do not divulge whether McConnel drew a similarly regular salary. Both partners had unlimited drawing rights, although they were encouraged to leave their profits in the firm by the provision that such funds would earn 5% per annum. The division of profits at the end of the year was equal, but this fact by itself tells little concerning the influence that each of the partners exercised over the strategic decision-making process. Unfortunately, there seems

to be no other evidence that would help us out of this matter. One thing, however, is clear; John Kennedy, whom Andrew Ure<sup>10</sup> called "one of the most scientific manufacturers of the kingdom" and who also was one of the early members of the Manchester Literary and Philosophical Society, was the more famous of the two. According to Julia Mann, he was responsible about 1790 for major modifications in Crompton's mule, permitting much greater velocity of the spindles; possibly even more important over the short run, he was able to construct machines that could operate with a considerable number of spindles. These accomplishments were connected with his successful experimentation in the use of water and steam power as a driving force.<sup>11</sup> Moreover, during the 1790's Kennedy seems to have set the pattern for the arrangement of mules in spinning factories for the following century. He placed two mules, having 372 spindles each, face to face so that one mule minder could service each separately while the other was moving in a returning direction that did not require the minder's attention.<sup>12</sup> It is interesting that Kennedy did not allude to these contributions in his "Observations on the Rise and Progress of the Cotton Trade in Great Britain," which he presented as a paper to the Manchester Literary and Philosophical Society in 1815. Instead he identified William Kelley of New Lanark in 1790 as the first who used machinery to turn mules.<sup>13</sup> Kennedy may have been modest, or he may have been less the technological innovator than the imitator. If the latter was the case, then he and his partner can at least claim to have been among the earliest imitators of progressive technology in Britain.

Did McConnel and Kennedy and their fustian warehousemen-partners begin by operating a factory? If by factory we mean a concentrated workshop irrespective of whether goods were produced primarily by machines, then the most likely answer is no. According to Kennedy they had a shop in which they manufactured machines for sale. Those machines that they used for spinning on their own account they put up "in any convenient garrets" that they could find.<sup>14</sup> While still in the first partnership they were located in the so-called Salvin's Factory, the owner of which occupied part of the premises. Kennedy did not specify for what purpose Salvin used the building, but it is possible that he stored goods in it, the term factory not necessarily having industrial connotations at this time. Since mules were still being operated by hand, they could presumably be put out among various operatives. Samuel Crompton, the inventor of the mule, was able to multiply his own earning power with merely one machine of no more than a dozen or so spindles.

moreover, a mule having up to 120 spindles could be worked manually without trouble by a fairly strong man.<sup>15</sup> These facts suggest that mule spinning, like spinning on a jenny, could be done on a small scale and did not by itself dictate the centralized organization of a modern factory. Since the demand for cotton yarn was strong, there was a rapid increase in output. At the same time there were important advances in the technology of central power with modifications on steam engines permitting them to drive machines. Thus, when increasing numbers of spindles were added to the mule, a central source of power became more necessary which in turn made a factory type of organization more likely.

In addition to technological requirements leading to a factory organization of production, there were other contributing factors: probably the rise in fixed investment and principally the greater fineness in the counts of cotton yarn. For example, McConnel & Kennedy offered a 180-spindle mule for sale in 1795 for £38 or 4s per spindle.<sup>16</sup> By the beginning of the new century the firm itself for its own needs was employing 300-spindle mules worth £70 each or 4.6s per spindle, according to its inventory. This rather large machine could not be driven by manual power. As a matter of fact the firm had already purchased a 16 hp steam engine from Boulton and Watt for £831,<sup>17</sup> capable of turning sixteen times seven hundred spindles, i.e., 11,200 spindles.<sup>18</sup> This is not to say that the factory had to operate at full capacity in order to be profitable. It is, however, clear that the investment of several thousand pounds, since the cost of the building would have to be included, required careful management and supervision. Besides fixed investment I have also alluded to the quality of the product as a reason for the centralized direction and the close supervision. McConnel & Kennedy concentrated on yarns of 100 counts and considerably more and enjoyed a fine reputation for consistently high quality.

Whatever reasons one might wish to adduce for the factory organization of mule spinning, there is no question that it proved highly successful. Between 1780 and 1830 the price of 1 lb. of 80 count yarn dropped from 42s to 2s 7d.<sup>19</sup> This time span covers the period for which documentation on McConnel & Kennedy is most plentiful. Its end also marks the introduction of a new major technological innovation in mule spinning, the self-actor machine invented by Richard Roberts of Manchester.<sup>20</sup> Since McConnel and Kennedy inventories that are still available stop with 1827, this major innovation obviously plays little role for present purposes. We can say

that the mules became somewhat larger, but the cost per spindle remained almost the same between 1806 and 1827. From 1806 on the cost of a spindle remained about 5.6s. Since the general price indices show an overall decrease of well over 30% during this twenty year period, the fact that the nominal cost per spindle did not change indicates a considerable appreciation in its value, especially since wages also dropped, the latter to be sure to a much lesser extent than prices.<sup>21</sup> The increase in real price might suggest therefore substantial improvements in the construction of mules. To this speculative assessment must be added the caution that our figures are derived from the firm's inventories and that they need not necessarily reflect market values. In addition, we are justified in surmising that these machines were constructed in the factory itself and that, especially in the absence of direct records of wages and raw materials used in their construction, the figures are suspect as true indicators. To be sure, they may be biased toward the downward side inasmuch as the reporting in the inventories and other account books are purely for internal information, unlike today when the accounting systems of firms are guided so strongly by the requirement of reporting for government purposes, especially income-tax liabilities.

As the title of the paper has stated, this is a look into the operations of McConnel and Kennedy and is far from the complete history of the firm. I therefore may be permitted to bring out several other bits of evidence that seem to me significant in what they tell about the operation of a sophisticated business during the Industrial Revolution. One of these concerns the forms in which depreciation on fixed assets was accounted. In the Day Books there is to be found a year-end entry under the heading of "Credit, Sundries, by Wear and Tear". The specific assets recorded include the cottages, four houses, all depreciated at 2 1/2% per year; the so-called New Building, the Factory Engine and Land, depreciated at 3 3/4% and Lighting, for the factory at 7 1/2%. These are examples from 1813 and 1820.<sup>22</sup> For equipment the annual depreciation allowance, as revealed by the inventories, was 10%. What accounted for the different depreciation rates? Most likely, they were related to the expected life of the asset, although Sidney Pollard's discussion of capital depreciation suggests that the answer may not be so simple.<sup>23</sup> As a matter of fact Pollard found that such allowances were not the rule even among large firms; moreover, some of them still took off lump sums at times convenient to them. Pollard accounts for the indifferent attitudes toward depreciation as resulting from the quasi-monopoly that many industrialists enjoyed and

from high profits that they realized from the rapid introduction of technological innovations, reducing their productive costs, in the face of strong market demand. The evidence in the McConnell & Kennedy papers casts some doubts on these assertions.

In the Day Books there is another type of frequently recurring entry of considerable interest. It records the payments of premiums for fire insurance. These entries not only permit an insight in the way that a progressive manufacturing firm tried to protect itself against risk; they also help in the effort to assemble an outline of the factory complex and of the values assigned by the enterprisers to buildings, equipment and stock. It remains a question at this point whether McConnell & Kennedy insured itself for the total value of its properties. Preliminary study of these entries suggests that the properties were not insured either on the depreciated values, nor on the market or replacement values. A thorough analysis of the insurance records also would be useful at this time in the light of efforts to exploit the archives of the Sun Fire Office and the Royal Exchange, both only recently opened for scholarly perusal. Stanley Chapman of the University of Nottingham has been trying to use these records to identify the value of fixed assets of firms in the Industrial Revolution in Great Britain.<sup>24</sup> If the evidence from McConnell & Kennedy is the same type that is available in the archives of fire insurance companies now being exploited, then one must be cautious in drawing conclusions. McConnell & Kennedy had numerous policies with at least seven different insurers, among which the Sun Fire appeared only for a few years at the beginning of the century and the Royal Exchange insured only a fraction of the assets. There is the further question whether the firms insured themselves fully. For McConnell & Kennedy I cannot give a satisfactory answer at this time. In 1818, for example, the Manchester firm seems to have insured itself to the value of nearly £100,000. Included in this evaluation was stock as well as building and machinery. This figure, however, does not represent the value of goods shipped out, for which the firm also often had to purchase insurance. The total insurance bill per year over a three year period from 1811 to 1813 was between £425 and £507. Thereafter the sum for premiums clearly increased as the values of the capital investment rose.

Another item of some importance was the firm's tax bill. The tax liabilities that British manufacturing firms were subject to during the Industrial Revolution are on the whole

poorly reported in the histories of businesses. To trace these liabilities in the government archives would be at best a most laborious task, if it is at all possible. Moreover, taxes in the early nineteenth century were primarily raised by local governments, making the chore of tracking individual firms' liabilities even more difficult. In 1813 McConnel & Kennedy, for example, paid in excess of £600 taxes, including £55 for John Kennedy, one of the two partners. During this year, as well as for several years before, the firm also was liable for an income tax, a levy of 10% on "Profit from Trade," for purposes of paying for the war against France. McConnel & Kennedy paid £100 in 1813, suggesting that their profit for the previous year was £1,000, which was a low valuation, indeed. In addition they paid Property Taxes, Poor Leys, Church Leys, Police Rates, and Highway Assessment. At this time the depreciated value of buildings, land, engine and lighting was over £36,000 and the depreciated value of equipment and stock very likely was a similar sum. If these estimates are correct, then the tax liability of the firm was less than 1% of its capital investment. After the Napoleonic Wars the income tax was eliminated, and the tax liability of the firm was consequently substantially smaller.

These data are valuable for the description and analysis of the firm. They are not very enlightening when one wishes to delve into the question of day-by-day management. I wanted (and still want) to search for further clues on the organization of internal and external operations. Concerning the external part there is considerable evidence. Extensive letter files divulge how the firm sold its product and how it procured its raw materials. It sold much of its goods through commission merchants, and its areas of greatest penetration were Northern Ireland with Belfast as its center, the west of Scotland with Glasgow as the main market, and then various areas on the continent of Europe, among them Hamburg, Berlin and St. Gallen. For raw materials McConnel & Kennedy went primarily to Liverpool where numerous middlemen offered their services. The firm also attempted to open direct connections with American suppliers.

While such facts can be established with relative ease, it becomes very difficult to find out which officials of the firm were in charge of these activities and what type of office staff they had. Not much less obscure is the method by which the labor force was organized. Mr. Catling, whose valuable book on the spinning mule is based partly on his own experience in Manchester factories during the present century,



asserts that the basic organizational element in the spinning mill was the mule minder, whose word was law for those who worked under him. In some ways the mule minder seemed to have functioned like an internal sub-contractor, being quite autonomous within his precincts. If McConnel & Kennedy acted in the way that twentieth-century spinners in Manchester did, then, according to Mr. Catling, a mule minder would be given enough material at the beginning of the year so that he could take care of the average repairs expected on his two machines. He would presumably be responsible for the cost of "normal" repairs up to an agreed limit and, on the other hand, gain by having some of the material meant for repair left over after the end of the year. His compensation depended on the output of his machines, and it was therefore in his interest to reduce the time that they were out of operation for technical reasons. His natural impulse to control his crew in order to maximize his income was further abetted by the employer; the wage packets for all those who worked under his direction were turned over to him.<sup>26</sup> The elaborated model of the mule minder as here suggested probably reflects in outline the reality of the early nineteenth century. There is certainly a good case to be made that the modern factory organization evolved from an internal sub-contract, which meant in essence that the master-operative formerly working on his own was brought into a centralized workshop or protofactory, as Dr. Fritz Redlich and I have preferred to call this institutional form.<sup>27</sup> If that was the case, it relieved the owner and/or manager of detailed supervision. As long as it proved profitable and efficient there was no particular reason to adopt a more highly bureaucratized organization, one that reduced dependence on an outside labor market and one in which a hierarchial promotional system prevailed. Under today's system the autocratic foreman, a model into which the Manchester mule-minder seems to fit, if he was not indeed an internal sub-contractor, has lost most of his power.<sup>28</sup> In the factory of McConnel and Kennedy the mule minder controlled the bulk of the child labor. In 1833, for example, almost all the children under the age of 14 in the factory were "employed by operatives rather than masters."<sup>29</sup> This statement made to the Factory Commission presumably meant that the firm itself claimed no control over the piecers, who worked on the mules. During the previous year, of 1,500 persons reported to have been employed, nearly half were aged 20 years or less. Over 900 of the total work force was employed by the "masters" and the remainder by the "operatives", which I would like to translate to mean, subject to the control of foremen.

Clearly the bulk of the work force was engaged in producing yarn. There is, however, only one wage book in the McConnel & Kennedy Papers that deals with spinning, and it is restricted to two years in the 1830's. A second wage book for the early period of the firm's existence is still extant. It provides us with interesting insights into the labor conditions of a small, important crew, the workers of the "Machine Shop", for the ten-year period between 1822 and 1832. It suggests the possibility that here, too, a number of sub-contractors played a major role. John Kennedy was in charge and drew a regular wage of £10 per week. Exactly how he functioned is not spelled out. It may be doubted that he was very active in the management of this crew which varied in size from some 20 to 40 steadily employed persons. Well before he retired from the firm in 1826, Kennedy was engaged in various civic affairs; his participation as head of the machine shop may have been minimal. The persons whose wages were recorded in the book in question seemed to have fulfilled a number of different tasks, among them normal upkeep and repair. There were also several women who were paid by the piece for keeping the clothing on carding rollers in shape.

The employees in the machine shop whose records prove to be the most fascinating were men whose earnings showed enormous variation. Two of these obviously enjoyed a superior position. From 1822-1827 the following annual earnings were recorded for them: Robert Waterhouse - £491, 887, 452, 462, 417; James Deardon - £331, 916, 1545, 444, 358. For most of the remainder of the group, the annual wages varied between over £30 and about £100. These two men proved to be the most interesting not only because of the large sums that they had been paid but also because through good fortune their time-sheets for part of this time are still extant. On these sheets the number of hours that each man devoted to a particular task during the week were entered. For example, during the week ending 5th. February, 1825, when James Deardon received £108 from McConnel & Kennedy, his time sheet records him to have worked thirty hours or 3 days, divided up into 3 hours on drawing frames, 10 hours on jack frames, 9 hours on mules and 8 hours on miscellaneous things. The week following he was paid only £8, yet he worked 75 hours or 7 1/2 days.<sup>30</sup> Obviously we are dealing here with an extraordinary situation in that the sums paid out could not have represented merely wages to the individuals. The most likely explanation of these data seems to be that these two men were sub-contractors at the same time that they were employees of the firm. Their skill may have been such that it was in the

interest of McConnel & Kennedy to pay them a retainer irrespective of the amount of work that they did. They may have brought in their own crews for specific work that was not recorded on the time sheets, or they may have done work for the firm at home and had others in Manchester working for them in sheds attached to individual dwellings. Deardon, for example, was important enough to have found a place in the Directory for Manchester and Salford for the years 1824-5. His occupation was given as <sup>31</sup>filer, and his location was in the vicinity of the factory. Only persons of some prominence and certainly no ordinary workers were honored with an entry in this directory, which served above all the needs of industry and commerce. Would this mean that Deardon was an independent craftsman who was employed whenever needed? This indeed may have been the case in 1825. In 1819, however, the name of the 29-year old Deardon appears in a list of married men employed by McConnel and Kennedy that had been submitted to an investigating committee of the House of Lords.<sup>32</sup> It is possible, lastly, that Deardon was functioning both as head of a work crew within the factory and as an independent operator outside of it. He may have made independent purchases on his own account and then sold the machine or parts for machines to the firm, which possibly for the sake of simplicity kept the record of payments in the wage book.

It is quite interesting that no one in a similar work crew in the spinning mill of W & G Strutt in Belper received wildly fluctuating wages such as Deardon. In the country mill in the east of England the joiners and the millwrights were being paid completely on a day rate; their wages were lower than those of their opposites in McConnel & Kennedy. It would require an in-depth study comparing the two enterprises to discover which one was operating at lower production costs. With the heavy concentration of the cotton industry in Manchester many external economies were derived from the high specialization that made a nineteenth-century German economic historian call the city one large factory.<sup>33</sup> Under such conditions it may not have been difficult for a man like Deardon to contract out many of the repair jobs assigned to him in McConnel & Kennedy's factory.

Lastly, it is of some interest that after 1826 the wage book reveals only very infrequently an unusually large payment. As a matter of fact, the size of the crew diminished greatly, and the wage rates even of the best paid were considerably reduced. The evidence from this wage book while suggestive is by itself inconclusive. During the same period imports of raw

cotton increased sharply from 169 million pounds in 1824-26 to 240 million pounds in 1829-31 while the value of the final product, wages and salaries and value added all showed decline in wages being the lowest of the three indices.<sup>34</sup> The wage bill and the wage rates, as well as the individual annual incomes of the workers in the machine shop, therefore seem not to have followed a general pattern. The changes may be accounted for by a new structural pattern whereby McConnel & Kennedy went outside of the firm (to the market) for services previously carried out internally, and/or it may reflect the end of a period of expansion with no need for additional capital equipment.

Even this brief look into the firm's operations from its birth in the 1790's until about 1830 shows that James McConnel and John Kennedy fit the pattern of Schumpeterian entrepreneurs. They were among the first to make use of Boulton & Watt steam engines to drive their machines, to introduce gas lighting and central heating in their factory buildings, and to increase the productivity of their mules. We can assert, furthermore, in the absence of evidence to the contrary that they were able to expand their enterprise rapidly without the benefit of bank loans or other direct outside assistance. Unfortunately, we know little concerning their methods of day-to-day management inside the factory. For their outside operations, that is, buying and selling, they followed contemporary practice in using commission agents for sales and cotton brokers in Liverpool for purchases of cotton. Within the factory the mule minder seems to have acted as an autocratic foreman, if not an internal sub-contractor. For a few years in the 1820's the evidence permits us to speculate that a somewhat similar arrangement might have existed in the machine shop, with the likelihood that the sub-contract of the foremen may have been carried on off the factory's premises.

A fuller study of the McConnel and Kennedy material will unquestionably uncover further valuable material. This was merely a preliminary foray!

#### Footnotes

I wish to thank the Pasold Research Fund for financial assistance in research.

<sup>1</sup>McConnel & Co., Ltd., A Century of Fine Cotton Spinning (Manchester, 1913), p. 5.

<sup>2</sup>G. W. Daniels, "The Early Records of a Great Manchester Cotton-Spinning Firm," Economic Journal, XXV (1915), 175-188.

<sup>3</sup>Cf. Michael M. Edwards, The Growth of the British Cotton Trade 1780-1815, (Manchester, Manchester University Press, 1967); Harold Catling, The Spinning Mule (Newton Abbot, David & Charles, 1970); C. H. Lee, A Cotton Enterprise, 1795-1840. A History of M'Connel & Kennedy, Fine Cotton Spinners. (Manchester, Manchester University Press, 1972).

<sup>4</sup>McConnel & Co., Ltd. Century, p. 8.

<sup>5</sup>Seymour Shapiro, Capital and the Cotton Industry in the Industrial Revolution (Ithaca, Cornell University Press, 1968), p. 170.

<sup>6</sup>Dictionary of National Biography, (London, Oxford University Press, 1921-2), Vol. X, pp. 1316 f.

<sup>7</sup>C. H. Lee, "Marketing Organization and Policy in the Cotton Trade: McConnel & Kennedy of Manchester 1795-1835," Business History, X (1968), 89 f.

<sup>8</sup>University of Manchester Library, McConnel & Kennedy Papers, "Inventories." Also, Shapiro, Capital and Cotton, p. 252.

<sup>9</sup>University of Manchester Library, McConnel & Kennedy Papers, "Wage Books."

<sup>10</sup>Andrew Ure, The Cotton Manufacture of Great Britain, 2 Vols., (London, H. G. Bohn, 1861), I, 390ff.

<sup>11</sup>Julia de L. Mann, "The Textile Industry; Machinery for Cotton, Flax, Wool, 1760-1850," in Charles Singer, et. al., eds., A History of Technology, 5 Vols. (London, Oxford University Press, 1958), IV, 280-288.

<sup>12</sup>Catling, The Spinning Mule, p. 46.

<sup>13</sup>John Kennedy, "Observations on the Rise and Progress of the Cotton Trade in Great Britain," Memoirs of the Literary and Philosophical Society of Manchester, Second Series, VIII (1819), pp. 115-137.

- <sup>14</sup>McConnel & Co., A Century, p. 9.
- <sup>15</sup>Catling, Spinning Mule, pp. 9, 37, 48.
- <sup>16</sup>Ibid., p. 43.
- <sup>17</sup>Daniels, "Early Records," p. 178.
- <sup>18</sup>Catling, Spinning Mule, p. 47.
- <sup>19</sup>Ibid., p. 55.
- <sup>20</sup>Ibid., pp. 61 ff.
- <sup>21</sup>B. R. Mitchell, Abstract of British Historical Statistics, (London, Cambridge University Press, 1962), pp. 343, 470, 471.
- <sup>22</sup>University of Manchester Library, McConnel & Kennedy Papers, "Day Books".
- <sup>23</sup>Sidney Pollard, The Genesis of Modern Management, (Cambridge, Mass., Harvard University Press, 1965), pp. 233-249.
- <sup>24</sup>Cf. Stanley Chapman, "Fixed Capital Formation in the British Cotton Industry," Economic History Review, Second Series, XXIII (1970), pp. 235-266.
- <sup>25</sup>Cf. Francis E. Hyde, B. B. Parkinson and S. Marriner, "The Cotton Broker and the Rise of the Liverpool Cotton Market", Economic History Review, 2nd. Series, VIII (1955), pp. 75-88.
- <sup>26</sup>Catling, Spinning Mule, I wish also to thank Mr. Catling for his oral observations.
- <sup>27</sup>Herman Freudenberg and Fritz Redlich, "The Industrial Development of Europe: Reality, Symbols, Images," Kyklos, XVII (1964), pp. 372-403.
- <sup>28</sup>Cf. Delbert C. Miller, "Supervisors: Evolution of an Organizational Role," in Robert Dubin, et al., Leadership & Productivity (San Francisco, Chandler Publishing Co., 1965), pp. 104-132.

<sup>29</sup>University of Manchester Library, McConnel & Kennedy Papers, "Misc. Deeds and Documents."

<sup>30</sup>University of Manchester Library, McConnel & Kennedy Papers, "Wage Book," September 1822-September 1831; Manchester Central Library McConnel & Kennedy, "Time Books."

<sup>31</sup>Pigot & Dean's Directory for Manchester, Salford, etc., for 1824-5.

<sup>32</sup>Lords Papers 1819 (hL 24), pp. 47-48. I wish to thank Dr. R. S. Fitton for making me aware of this list.

<sup>33</sup>Gerhart von Schulze-Gävernitz, Der Grossbetrieb, (Leipzig, 1892), p. 51.

<sup>34</sup>Phyllis Deane and W. A. Cole, British Economic Growth 1688-1959, 2nd ed., (London, Cambridge University Press, 1967), p. 187.