The Attitude of the English People towards the Introduction of Labour-Saving Machinery During the Industrial Revolution

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by

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PREFACE

Although this work must of course be judged as an entity, it is perhaps best to state that it has been intended as a part of a greater work. This will explain why certain subjects have not been dealt with in the following pages and why the bibliography does not list some material which would certainly have to be consulted in a general study of the introduction of machinery during the Industrial Revolution.

This thesis deals with the period 1760-1810. In the greater work, the thesis presented here will be preceded with a discussion of machinery introduced in England before the Industrial Revolution, and followed with discussions on the Luddite disturbances, the introduction of agricultural machinery and of the power loom, and the impact of machinery on politics, on early socialist thought and on economic theory. Material has been collected simultaneously on all of these subjects, as well as on matters taken up in this thesis. Some material pertinent to this thesis has been collected since it was written. When this material is finally incorporated in the greater work it will make this thesis more nearly definitive and will sharpen the narrative, but it will not alter the general lines of the narrative or substantially affect the conclusions drawn.

It may seem that this thesis does not exactly fulfill the promise of its title. A reason for this is that the general public had no attitude towards the introduction of labour-saving

machinery during the period taken up: the period reveals only the beginnings of such an attitude. Nor had economic thought assimilated the idea of the problem of machinery. Consequently any work pretending to show the attitude of the public towards labour-saving machinery or to trace economic thought (that is, the attitude of specialists) on machinery would consist of a few thin threads drawn over a vast open space. In preparing such a work the writer would be sorely tempted to distort this network of threads or to fill in the gaps with speculation.

The method has been to work upwards from underneath this network of ideas by taking up individually the machines introduced during the period--finding out the effects of these machines so far as that has been possible, discovering the attitudes of persons concerned in their use and relating these attitudes to the effects of their use, presenting the arguments devised by these persons to rationalise their use of machinery or their opposition to it, and then showing how these arguments fared when put before the legislature, a third party to the disputes over machinery. These arguments, thus put before the public as represented by the legislature, did much to create an attitude towards machinery on the part of the general public.

As far as economic thought is concerned, this method will tend to demonstrate that many ideas on machinery were formulated before economists took up the subject. The method will also show that one must be careful about making general statements about the effects of machinery, for these effects differed with the use of different machines.

The present writer believes that such a survey has some interest and significance, and that it is a necessary preliminary to a greater work purporting to describe on a greater scale the attitude of the English people towards labour-saving machinery.

The dates covered by this thesis may call for some defence, not so much the beginning date, 1760, which, however, has not been rigidly adhered to, as the concluding date, 1810. This thesis is a pre-Luddite survey. But the Luddite demonstrations should not be thought of as a climax of anti-machinery sentiment that had been growing up during the previous years. The agitation of the Lancashire Luddites against the power loom was a new phase of anti-machinery sentiment in a county in which the principle of machinery had to a great extent been accepted. The Nottinghamshire Luddites were not really objecting to machinery. The link connecting the pre-1810 period with the post-1810 period was the shearing frame to which the Yorkshire Luddites objected. But by 1810 machines taking care of most of the processes of the wool and cotton trades had been introduced, both trades had been revolutionised, and the legislature had puts its seal of approval on machinery. The activities of the Yorkshire Luddites was an outcropping for which the terrible distress caused by crop failures and measures of the war must take as much blame as anti-machinery sentiment.

The term "machinery" as used in this thesis does not comprehend (1) tools or (2) inanimate sources of power. Thus the steam engine, which may also be called a machine, is not considered a machine because it was pre-eminently a source of power. Throughout

the course of history men have rarely objected to the use of tools, which supplemented the use of their hands, or to the use of inanimate sources of power, which supplanted the use of their brute muscular power. But they have been wary of machinery, which supplanted the skilled use of their hands, because machinery, to a great extent, dissociated men from the act of producing economic goods and depreciated skills which were the property, the capital goods, of certain groups of men. The particular difficulties arising from the introduction and use of machines will be discussed in this work, and not the general difficulties caused by the widespread use of steam engines and the building of factories, which, of course, machinery made possible.

This thesis has been based mainly on the standard trade histories, pamphlets and Parliamentary papers. Free use has been made of trade histories published in recent years and of documents republished in these books, some of which have been later examined. Much of the original work has been based on careful examination of the very valuable reports of Parliamentary committees of 1803 and 1806 investigating the wool trade. Home Office papers have been used to some extent where the narrative depends on them. Fuller use of these and of newspaper sources would add much interesting material but would not materially alter the course of the narrative.

Thanks are due to Professor T. S. Ashton of the London School of Economics and Political Science for reading part of the thesis and for his kind assistance and guidance.

London, August 3, 1949.

ABBREVIATIONS AND SHORT TITLES

J.H.C.: Journals of the House of Commons.

H.O.: Home Office Papers.

Evidence on Woollen Trade Bill, 1802-03: Minutes of evidence on a woollen trade bill proposed in 1803, given before a Parliamentary committee, printed in Parliamentary Papers, (Reports from Committees), 1802-03, vii.

Evidence on Woollen Trade, 1806: Minutes of evidence given before a Parliamentary committee of that year investigating the woollen trade, printed in Parliamentary Papers, (Reports from Committees), 1806, iii.

Report on Woollen Trade, 1806: The report made by the committee referred to above, contained in the same volume as the minutes of evidence. In other works, references are often made to the Report on Woollen Trade when the minutes of evidence are meant, but since both are used in this work and since they each have their own pagination, it is thought best to distinguish between them here.

Other short titles are used in footnotes, but only after the full titles have been given in preceding footnotes.

V.C.H.: Victoria County Histories.

SECTION I. THE COTTON INDUSTRY

CHAPTER I: THE SPRING LOOM

Introductory

The history of machinery in England before 1800 is the history of textile machinery. There were some machines that were not textile machines in use, and put into scattered use, in the early years of the Industrial Revolution but these were not numerous and their use was not yet particularly significant. There were corn mills, for instance, many of which the labouring classes destroyed during the 18th century. But corn mills were ancient machines. Their use was no novelty. They brought about no significant change in industrial arrangements, and the destruction of the mills did not express feeling against the use of labour-saving machinery. The few machines used by industry were overshadowed in importance by new tools, devices, processes and developments, for instance, those processes and developments that brought about important changes in the manufacture of iron and steel.

The great significance of textile machinery was that it revolutionized the cotton trade, and then the wool trade, and then led to a revolution of all industry. Most other machines were unrelated industrial incidents. But the machines introduced into the textile trades fit into a coherent story leading up to the present so-called Machine Age. The beginnings of

this story have considerable meaning now, especially since attitudes towards labour-saving machinery were then adopted that have persisted to the present day and since many of the circumstances giving rise to those attitudes are the same now as then.

There were some machines adopted by the textile trades before the period with which this work deals, 1760 to 1810. Two of the most important were the knitting frame and the ribbon or Dutch loom. The knitting frame was invented in the 16th century and used generally in the 17th. Its introduction caused no trouble in England for the reason, one may suppose, that there was no class of workers having knitting as an occupation. Knitted goods were not used in England, even for stockings, before the century in which the knitting frame was invented. The Dutch loom[1] was also used generally in the 17th century. Its use sometimes aroused the wrath of competing weavers (those who did not own them) as late as the middle of the 18th century. But these two machines, while they caused little industrial revolutions of their own, did not play roles in the main revolution of the textile trades occurring between 1760 and 1810.

Another important textile machine was the fulling machine or mill. It had been in use for centuries and had grown up, so to speak, with the English woollen trade. Its use was habitual and had no effect on the revolution except that it

1 The Dutch loom would weave several ribbons simultaneously.

did provide a precedent for the use of scribbling and carding machines in public mills.[1]

Still another machine, the spring loom, was invented and used to some extent before 1760. It was really not an essential part of the revolution of the textile trades either,[2] but its use was a controversial matter throughout the period 1760 to 1810. Consequently its introduction will be discussed in this work.

It will be convenient to take up the subject of the spring loom first, carrying the history of its use up to the end of the period, and then to take up the early spinning inventions which might be used, as the spring loom, to work either cotton or wool yarn. After this the cotton trade will be treated separately, the history beginning with the invention of the spinning jenny. The dazzling success of this new industry made a powerful argument for the use of machinery in the wool trade. The story of the introduction of machinery into the wool trade will, then, follow, and the effect of this machinery's use in promoting laissez faire will conclude the narrative.

The Spring Loom

The highly ingenious piece of mechanism called the spring loom[3] aroused the wrath of weavers for almost a century. A

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1 Public mills: mills that did work for hire, the facilities of which, therefore, the generality of clothiers, many of whom could not afford to erect mills for their private use alone, could command.

2 As the narrative that follows will tend to demonstrate.

3 Or "flying shuttle". The term "spring loom" emphasizes that the invention was a weaving development, and is more inclusive. The machine actually embodied three distinctive

young reedmaker of Bury, John Kay, patented the machine in 1733.[1] Only five months later, in September of that year, the weavers of Colchester petitioned the King, expressing their "surprise and horror" at finding a patent granted for a machine which would "inevitably ruin them".[2] And so late as 1817 "several Cloth Weavers" of Somerset, Wilts and Gloucester protested in a petition to Parliament that they could no longer provide for their families because of its "extensive introduction" in those counties.[3] In 1822 threats of a disturbance attracted the military to Frome (Somersetshire) when clothiers proposed to introduce spring looms.[4] Even in 1831 the Parliament received a petition complaining of them. By this time the power loom was being used generally and it was perfectly clear that hand-loom weaving, with the spring loom or with the old two-man loom, was on the way out.[5]

Both the 1733 and the 1817 petitions allege that the

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features (as improved in 1735): the wheel shuttle, the picking peg, and the bobbin shuttle.

1 Pat. No. 542.

2 Kay had business connections in Colchester (A. P. Wadsworth & J. DeL. Mann, The Cotton Trade and Industrial Lancashire 1600-1780, Publications of University of Manchester Economic History Series No. 7, Manchester, 1931, p. 451) and, no doubt, had put the machine into use there. (The petition appears in S. P. Dom. Petition Entry Book, 254, fol. 380, dated September 3, 1733. See Wadsworth & Mann, p. 451.) The weavers also protested against a wool opening machine, specified in the same patent, which they feared could do the work of four men, but apparently this latter machine was not put into use. (Ibid.)

3 J.H.C. 72, p. 32.

4 J. L. and Barbara Hammond, The Skilled Labourer 1760-1830, London, 1919, p. 161.

5 J.H.C. 86, Part I, March 25, 1831. As a matter of fact, this petition complained simultaneously of spring and power looms.

spring loom would reduce the need for manual labour by one-half. The distinctive construction of the loom makes such an inference seem obvious. In weaving wide goods,[1] two men had previously stood, one on each side of the loom, throwing the shuttle to each other. Kay's picking peg[2] made it possible for one man, sitting in front of the loom, to do the job alone.[3]

But it should not be blandly assumed (as the weavers did and as many writers have later done) that the spring loom halved the labour necessary to produce a stated amount of goods. The weaver still had to put the warp into the loom and had to repair breaks himself.[4] After the warp was put in, the production of the loom depended simply on the number of times the shuttle carried unbroken weft through the shed.[5] Putting

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1 Kay intended his machine for wide goods and it did not occur to him to try it on a narrow loom. It was so tried, however, by others, and was used to make, as Kay said, "all sorts of narrow woolen goods" but the inventor spoke contemptuously of these efforts. (Wadsworth & Mann, op. cit., p. 470.) Ogden quotes a magistrate as saying around 1769 that "his shuttles are yet in such estimation here, as to be used generally even on narrow goods". Its use for narrow goods was, then, regarded as noteworthy at this late date. (J. Ogden, An Historical Description of Manchester, etc., Manchester, 1783, p. 89.)

2 The picking peg was a wooden handle hanging loosely from two cords which were connected by pulleys to sliding "shoes" on the two sides of the loom. A pull on the peg caused one "shoe" to impel the shuttle across the shed to the other.

3 For an excellent description of the machine see A. P. Usher, A History of Mechanical Inventions, N. Y., 1929, pp. 249-50. Also, Edward Baines, Jun., History of the Cotton Manufacture of Great Britain, London, 1835, pp. 116-17.

4 Evidence on Woollen Trade, 1806, (P.P., 1806, iii), p. 343, testimony of Stephen Smith. This Gloucestershire weaver claimed that putting the chains into the loom took more time and was five times as difficult as throwing the shuttle. Doubtless he exaggerated, but there was point to what he said. (See also ibid., pp. 12-13, 16, 28.)

5 This was not automatically increased by the picking peg. It is interesting to note that Kay called his machine nothing else but the "wheel shuttle", a name which originated,

the advantages of the invention as strongly as possible, Robert Kay, a son of the inventor, claimed in 1764 only that it cut labour one-third on goods one and a half or two yards wide.[1] One would expect quite a significant increase in speed in the narrow looms, but Robert Kay only claimed earnings of twopence over a shilling on goods one-half an ell wide, fourpence on yard-wides. And he credited this increase not to the picking peg but to the greater capacity of the shuttle for weft which made fewer stops necessary.

After 1800 a Stroud weaver said that he never saw a man who could do the work of two men with a spring loom.[3] Another calculated the savings at something under one-fourth.[4] The

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simply enough, from the fact that the shuttle ran on wheels. In later years attention was diverted from this feature and the picking peg device was considered the single distinctive feature of the spring loom. The terms "fly shuttle" and "flying shuttle" did not appear in print until 1780 (Wadsworth & Mann, op. cit., p. 450). The wheel shuttle had often been used without the picking peg feature (ibid., pp. 453-54).

1 Some Considerations of the Weaving of Chequer'd and Strip'd Linen, in archives of Society of Arts, printed by Sir H. T. Wood, The Inventions of John Kay (1704-1770) in Journal of the Society of Arts, lx, p. 84.

2 Some Considerations, op. cit., p. 83. In other words he credited the increased production to the bobbin shuttle feature (which permitted the yarn to be wound in a different way). Weavers who pirated this feature claimed it was an "ancient" or a "Dutch" device, but Kay considered it as much his invention as the picking peg (Wadsworth & Mann, op. cit., pp. 452-53) and apparently he first conceived of its possible use in the loom.

3 Evidence on Woollen Trade Bill, 1802-03, p. 16.

4 Ibid., p. 28, testimony of John Niblett. Another witness said he thought the machine saved one-third (ibid., testimony of Wm. Clement). Still another weaver said four times as much work might be done with the spring loom (ibid., p. 128, testimony of Wm. Illingworth). This might be possible in certain circumstances, but it was certainly not the usual thing.

bulk of the testimony given by woollen weavers before Parliamentary committees in 1803 and 1806 indicates that the spring loom was indeed of benefit, but that its production was closer to 50 per cent greater than that of the old loom (per man, that is) than to 100 per cent.

But the spring loom did not perform this modest feat at first, even though it was perfect in principle in 1735[1] and demonstrably effective in 1747.[2] The productiveness of the spring loom awaited the skill of its operator, and older weavers could not learn to operate it or became impatient before they learned to operate it most effectively.[3] It was difficult for weavers to catch the shuttle properly without its rebounding.[4] Further, the spring loom's speed depended on the quality of yarn used. This is the most important point. The old yarn, uneven in the chain, made the process much slower than it became when strong, uniform, machine-spun weft and warp could be used.[5]

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1 Wadsworth & Mann, op. cit., p. 452.
2 Trials in France showed its value (ibid., p. 459).
3 Some Considerations, op. cit., p. 86.
4 And still is. Even now the "knack of doing this as it should be done, by a simple drop of the hand, is only to be acquired after a great deal of practice." (Luther Hooper, Hand Loom Weaving, Plain and Ornamental, London, 1920, quoted in Usher, op. cit., p. 250.) See also Evidence on Woollen Trade Bill, 1802-03, pp. 12-13 (testimony of John Clayfield to the effect that it took longer to learn the spring loom than the two-man loom).
5 Evidence on Woollen Trade, 1806, pp. 176-77, testimony of James Walker. When the loom began to be used "generally" on narrow goods, around 1770 (Ogden, op. cit., p. 89), by young weavers who could operate the treadles faster, using machine-spun yarn, the shuttle went so fast it seemed a

Nevertheless, weavers noted the picking peg feature and jumped to the conclusion that the spring loom would halve the need for weaving labour.[1] The spring loom's public career began in 1733. In September of that year Kay demonstrated his machine in several parts of the Lancashire woollen district.[2] The loom was received coldly, but apparently the biggest reason for this was because it did not work well.[3] In 1735 Kay had improved the machine with his bobbin shuttle and was not afraid to exhibit it again. Several enterprising weavers took up the new machine.[4]

But the axe soon fell. "The Weavers . . . assembled in a Mob, determined to hinder the Wheel Shuttles Progress, by killing of Mr. John Kay, the Inventor, who very narrowly escaped by flight . . ."[5] The rioters forcibly seized and burned the

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blur, a "tiny cloud". (Wadsworth & Mann, op. cit., p. 470.) The terms "flying shuttle" and "fly shuttle" no doubt came about naturally enough at this time.

1 The weavers promptly concluded that one-half of their body "must starve for want of employment". (Some Considerations, op. cit., p. 85.)

2 Wadsworth & Mann, op. cit., p. 452.

3 Ibid.

4 The weavers had not opposed the spring loom to a man, for, it was said, the mob that assaulted Kay did damage to the "houses" that contained the new machines. (Some Considerations, op. cit., p. 86.)

5 Ibid., pp. 85-86. This assault, made famous in legend, has generally been placed in the year 1753, but since Kay was in France then (Wadsworth & Mann, op. cit., p. 461) that can hardly be correct. The sequence of events as narrated by Robert Kay humours the belief that the riot occurred before Kay's legal tribulations of the 1738-47 period, thus in the decade of the loom's invention. Robert Kay does not mention his father leaving for France right after the riot. although the reason for assigning the date at 1753 has been the supposition (incorrect) that John Kay left for France that year. There are apparently no contemporary notices

wheel shuttles.[1] Kay escaped all right, but was deeply impressed by his experience.[2] The riot served the purpose of the mob, locally at least, for the use of spring looms was afterwards taken up only by manufacturers "who lived at a distance".[3]

This was not the end of the spring loom's immediate troubles. The weavers expressed their opposition in more subtle ways. Workmen loitered on their time and spoiled work to keep the masters ignorant of the loom's advantages, or so Robert Kay claimed. Good workmen opposed the machine, because,

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of the riot, but Kay's narrative seems plausible. One of the popular legends related that Kay escaped to France sewed up in a cotton bag (Thoughts on the Use of Machines in the Cotton Manufacture, Addressed to the Working People in that Manufacture and to the Poor in General, by a Friend of the Poor, Manchester, 1780, p. 9). Like gossips, writers have grasped at tales which would demonstrate Kay's martyrdom. Many of the fables originated in the "researches" of a descendant of the inventor, Lt. Col. Thomas Sutcliffe. Bennet Woodcroft apparently based much of his account of Kay on Sutcliffe's statements (Brief Biographies of Inventors of Machines for the Manufacture of Textile Fabrics, London, 1863) and Woodcroft has been used by most secondary works and the Dictionary of National Biography. John Lord (Memoir of John Kay, Rochdale, 1903) laid low some of the false statements but as a biography his work is disappointing. The best account appears in Wadsworth & Mann (op. cit.). Using French records and Chancery Proceedings, Miss Mann has probably found as much as ever will be found about Kay, and it will be noted that her work is cited frequently throughout this chapter.

1 Some Considerations, op. cit., p. 86. Burning on such occasions is noteworthy. It usually signifies a liesurely job, that the rioters do not fear the authorities or that they have the support of the populace.

2 Kay's fear of riots in France led him to refuse to travel in the provinces of France for the purpose of demonstrating the loom and this is interpreted as support for the belief that the inventor had actually undergone the harrowing experience mentioned in Some Considerations. (Wadsworth & Mann, op. cit., pp. 456, 459.)

3 Some Considerations, op. cit., p. 86.

it was said, its facility would put the bad workmen at a par with them, and the bad workmen opposed the machine because they would be the ones who would first lose their employment.[1] The two arguments (if they were truly used) canceled each other out, but the weavers were probably not inclined to juxtapose them.

There can hardly be any doubt but that Kay ran into genuine anti-machinery sentiment early among workmen weavers, but his opposition did not present a solid front. Some weavers used the machine on the sly and craftily "gave it a bad character to preserve their advantage".[2] Some weavers rented the device at 15s. per year[3] and then refused to pay. The inventor hounded these with law suits from 1737 to 1743, without success and at considerable cost to himself.[4] Finally, in disgust, Kay stopped giving instructions on the use of the loom[5] and tried to secure some sort of reward from Parliament. The fact that his cause evoked no great interest among the legislators might argue their indifference to machinery, but Kay was undoubtedly an unimpressive petitioner. Wearied of waiting, the inventor left England in 1747 and spent most of his later life in France.[6]

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1 Ibid.
2 Ibid.
3 The moderate rental fee is noteworthy. It seems unlikely that Kay would have met with this niggardly treatment if the spring loom had immediately brought about a 100 per cent saving or near that.
4 Wadsworth & Mann, op. cit., p. 451.
5 Some Considerations, op. cit., p. 86. It was after this that many weavers gave up the loom's use after an imperfect trial, Kay maintained. This was a reason for the machine's small progress in 1764, he said.
6 Ibid.

Was the spring loom much used before 1760? Kay's representations to the French government were supported by an independent statement that "at Colchester and throughout the county of Yorkshire no one uses anything but his shuttles"[1] but such a statement was an unholy exaggeration. Colchester may possibly have remained an island where the spring loom was used.[2] The Lancashire woollen weavers may have continued using it, but even there the issue was confused by the ready adoption of the bobbin shuttle, only a part of the spring loom.[3] In 1764 Robert Kay wrote that "great numbers of wood Wheel Shuttles are used in several Branches of the Cotton Manufacture"[4] in Bolton and mentioned that some manufacturers in that city had had "long experience" with it.[5] There were workmen competent in its use in Manchester, also.[6]

Nevertheless, it was surprising, as Robert Kay himself said (1764), "how it comes to pass the Wheel Shuttle has made so small a progress, in a Country where Trade and Manufacturers are of such Importance to everyone, from the King down to the Beggar".[7] Guest wrote that Mr. Kay's "ingenious invention

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1 Wadsworth & Mann, op. cit., p. 467. The statement was made by a "London correspondent to the French government". Of course the "wheel" shuttle may have been used in Yorkshire without the picking peg device.

2 Arthur Young mentions its use there in 1784 but his statement would not support the belief that the loom had been used there continuously. (Annals of Agriculture, ii, p. 109.)

3 The bobbin shuttle was also used in Gloucestershire before 1757 (Wadsworth & Mann, op. cit., p. 467).

4 Letter of Robert Kay to secretary of Society of Arts (see Journal of the Society of Arts, op. cit., p. 75).

5 Some Considerations, op. cit., p. 83.

6 Letter of Robert Kay (see Journal of the Society of Arts, op. cit., p. 75).

7 Some Considerations, op. cit., p. 85.

. . . was not much used among the cotton weavers until 1760".[1] Yorkshire weavers said, in 1806, that the loom came into use there no earlier than 1763.[2] Radcliffe reports that the spring loom came to Mellor (for weaving cotton goods) during the period 1770 to 1788.[3]

The spring loom was, despite its early perfection, comparatively neglected for thirty-five years. Then, around 1765 or 1770, it was caught up when "cotton, cotton, cotton, was the almost universal material for employment".[4] It's use spread during the first active, expansive years of the cotton trade, which Radcliffe places between 1770 and 1788.[5] The popular view, that the spring loom itself created a great demand for weft, and thus inspired the great spinning inventions of 1767 and shortly therea fter,[6] arises from an attractive hypothesis which the historical evidence contradicts.[7] There

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1 Richard Guest, A Compendious History of the Cotton-Manufacture, Manchester, 1823, p. 9. Guest's information, however, was apparently derived from a MS. lent him by Samuel Kay, a son of Robert Kay, and so the source is not independent.

2 Evidence on Woollen Trade, 1806, pp. 81, 108, 128, 165, 176.

3 William Radcliffe, Origin of the New System of Manufacture Commonly Called 'Power-Loom Weaving', etc., Stockport, 1828, p. 61.

4 Ibid.

5 This was written in 1780: "The Fly Shuttle, invented a few years ago, has been found by thousands, to be a most excellent, and happy discovery." (Thoughts on the Use of Machines, op. cit., p. 7.)

6 Of course, the need for spinning machines was recognized early. John Wyatt's son declared his father had the notion of spinning by rollers in 1730 and that the first machine was built in 1733. (Usher, op. cit., p. 262.)

7 Hobson wrote that the cotton trade was stagnant from 1700 to 1750 but that meanwhile "wool, stimulated by the fly-shuttle, expanded." (J. A. Hobson, The Evolution of Modern Capitalism, London, 1926, pp. 85-86.) This absurd statement shows the danger of proceeding on the assumption that the

was a shortage of weft in 1760,[1] but the trade was beginning to expand[2] and the old system of spinning could not comfortably match this expansion.[3] In some small way, of course, the spring loom may have worsened the weft shortage, but this shortage came about mainly because of the trade increase. Later on, machine spinning promoted the increase in numbers of looms and made the spring loom's use a settled matter in the main textile-producing areas.[4] Machine-spun yarn did more for the

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spring loom caused a great increase in production. It also shows the danger of trying to make facts fit theory.

1 The Society of Arts recognized this shortage and offered prizes for spinning machines (infra, p.28) but seemed completely ignorant of the spring loom.

2 "The Cotton manufacture continued to increase until the spinners were unable to supply the weavers with weft," Guest states (op. cit., p. 12), but he does not mention the spring loom in this connection.

3 Infra, p. 30-31.

4 The "mule twist now coming into vogue, . . . added to the water-twist and common jenny yarns, with an increasing demand for every fabric the loom could produce, put all hands in request . . . the old loom-shops being insufficient every lumber-room, even old barns, cart-houses, and outbuildings of any description, were repaired . . . and all fitted up for loom-shops . . . new weavers' cottages, with loom-shops, rose up in every direction." Radcliffe is referring here to the period after 1788 (op. cit., pp. 61ff). This writer says of the 1770-88 period that to "the best of my recollection, there was no increase of looms during this period, but rather a decrease". The machinery advocate who wrote Thoughts on the Use of Machines (1780) "admits" that weavers at that time received less pay and that many men had left their looms to become spinners (p. 14). And yet the manufacturers before the Parliamentary committee in 1780 (investigating spinners' petitions) boldly declared that there were three times as many looms employed as ten years before, that they would gladly employ more looms, and that weavers' wages were then higher than ten years before (J.H.C. 37, p. 926). To this the spinners weakly countered that "there were at this time several looms unemployed" (ibid.). It is difficult to conjure up a hypothesis that will reconcile this conflicting testimony, yet it does not solve things to simply disbelieve the manufacturers' assertion. The increased production of weft and warp was not exported. It

spring loom than the spring loom did for machine spinning. This point will be referred to again later.

Another popular view is that the spring loom was generally used in Yorkshire before 1750. This view has arisen from legends of Kay's troubles with Yorkshire weavers. It is not a correct view, as witnesses before Parliamentary committees of 1803 and 1806 make clear. Mr. Nathaniel Murgatroyd of Bradford had been in the business 30 years in 1803 and had been a weaver. He said the spring loom had been used in the county for twenty years or a little more.[1] Mr. Thomas Priestly of Halifax had been in the trade 54 years. He said the spring loom had been put into use twenty years before or so, when "some used it, but not a great many".[2] Mr. R. Cookson of Leeds said in 1806 that the spring loom was an invention within the 29 years of his experience.[3] No evidence was given in 1803 or 1806 that the spring loom had been used much before this time. The bulk of the evidence indicates that the spring loom was

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is important to consider that the warps first went into the velvet manufacture (Wadsworth & Mann, op. cit., p. 492), that the calico manufacture was only in its beginning at this time and that the water frames were located in new areas to secure water power. Conditions, then, must have varied in different areas, different branches of the trade and according to the ability of workers to adjust themselves to the changes. The cotton boom began in the new areas, especially in the villages. The older localities were not caught in the tide until a little later, near the end of Radcliffe's 1770-88 period. The author of Thoughts mentions that more children and girls were then being "set down to weaving" checks and he forecast an increase of looms in other lines as a consequence of the increased number of spinning machines. (See conflicting testimony on conditions of trade in 1780, infra, p. .)

1 Evidence on Woollen Trade Bill, 1802-03, p. 232.
2 Ibid., pp. 285-86.
3 Evidence on Woollen Trade, 1806, p. 81.

adopted in the 1770s, near to 1780, in Yorkshire. It seems to have been adopted then without the slightest commotion and the suggestion is that the weavers adopted it themselves without any urging from the clothiers.[1]

The introduction of the spring loom, then, was accomplished peacefully in the cotton trade, probably in the period 1765 to 1775, and in the wool trade of Yorkshire, in the period 1775 to 1780, but the case was different in the South-West clothing district. Mr. Nathaniel Watts introduced them into Stroud (Gloucestershire) in 1792 or so.[2] The machines caused great "Uneasiness in the Minds of the Weavers", particularly because it was thought that Mr. Watts intended using them in a factory, which practice would take the weavers from their houses.[3] The weavers gathered on Hartley Common (one witness said 20,000 of them, another 3000 or 4000, both estimates probably being exaggerated) and formed a committee which represented to the gentlemen clothiers that they feared ruin because of the new machines.[4] Mr. Watts gave up the use of the machines, seemingly with good grace, saying that "he would not be the Means of Uneasiness in the County".[5] Actually he sold the looms to some of the weavers. Then, in 1797 or so, when trade was booming during the war, the clothiers applied to the weavers for more weaving whereupon the weavers had "recourse to [the spring loom] gladly themselves".[6] They could make, it was said, from 18s. to 21s.

1 Evidence on Woollen Trade Bill, 1802-03, p. 232.
2 Ibid., pp. 8, 15-16, 299-300.
3 Ibid., p. 317.
4 Ibid., p. 15.
5 Ibid., p. 16.
6 Ibid., p. 300. It was the increase in trade that brought

a week with the new loom, instead of 10s. to 12s., because the clothiers paid the same amount per piece.[1] The Gloucestershire clothiers were interested in getting more weaving done, not in reducing the cost of weaving. At first, it was said, the cloth produced by the weavers with the new machines was not of such good quality, but later they became more proficient.[2]

In 1803 the use of the spring loom in Gloucestershire was not universal, but it was "much used" in the weaving of broads and its use was increasing.[3] There was no more serious trouble over its use in Gloucestershire, a county in which many other important textile machines had made their way by this time and and in which the workmen were not organized to the degree they were in the other counties of the South-West. There seemed to be no adverse consequences arising from the machine's use.[4] There was a great demand for weaving in Gloucestershire at this time which the weavers, even with the new machine, could not supply.[5]

The workmen in Wiltshire remained adamant against the spring loom, throughout these years, although they had accepted the spinning jenny and the scribbling machine during the decade 1790 to 1800. The peculiar circumstances of Wiltshire, with regard

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about the spring loom's introduction, said Mr. Thomas King, Stroud clothier. (Ibid., p. 8.)

1 J. H.C. 58, p. 884.

2 Evidence on Woollen Trade Bill, 1802-03, pp. 300, 320.

3 Ibid., pp. 10, 12, 262, 282.

4 Gloucestershire, through the use of the gig mill by its enterprising clothiers, had obtained a competitive advantage over the other counties in the manufacture of superfine cloths and, consequently enjoyed great prosperity.

5 Infra, p.220. Because of this demand, many unapprenticed persons (many of them women, especially during the war years) became weavers. The legal weavers therefore organized at this time to enforce apprenticeship rules (infra, p. 220).

to machinery, will be discussed later.[1] It will only be mentioned now that the workmen of that county were organised to a degree and were conservative, as were some of the clothiers. Anti-machinery sentiment persisted in the county, especially for the reason that the introduction of the spinning jenny, in the 1790s, seemed to have been attended with considerable distress. And so the workmen were able to state flatly in 1803 that they did not "permit" the use of spring looms.[2] "There is no Opportunity for it in our Neighbourhood," said one of them, "and I hope never will; I think it would be attended with much Distress to the Families employed in the present way."[3] One manufacturer in the county used them, Mr. Hill of Malmsbury,[4] and perhaps a few others. But Malmsbury was in the northern part of the county (near Gloucestershire) where the trade had not been carried on before he built his factory. Mr. Hill used the looms in the factory, paying 8d. a yard for weaving done by the spring loom whereas 15d. a yard could be earned for goods woven on the two-man loom at home.[5] This policy was not one likely to endear the spring loom to the workers, since the profit on the improvement went, presumably, into Mr. Hill's pocket.

The spring loom made slow headway in Somersetshire, also. An intrepid pioneer, who had learned the loom's workings in the

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1 Infra, pp. 120-23.
2 Evidence on Woollen Trade Bill, 1802-03, pp. 81-82.
3 Ibid., p. 25.
4 Ibid., pp. 81-86.
5 Of course the factory pay was clear except for shuttles and bobbins which the worker had to supply. A weaver working at home on the old loom had to pay for sizing, glue, quilling, cost and depreciation of his loom, staying, harness and house rent. (Ibid.)

North, tried in 1801 to introduce the machine into that county. He operated his loom only a few weeks and then abruptly desisted, "on account of the riotous assemblage of a mob, who made him relinquish it".[1] No date can be ascribed to the spring loom's general introduction into Wiltshire and Somersetshire.[2] It had come into some use by 1817 for in that year, when trade slackened and army and navy discharges augmented the labour force, a petition from weavers from all three of the counties of the South-West found its way to Parliament, protesting the loom's "extensive introduction".[3] This petition will be examined here, since it embodies the most common arguments used against the spring loom in its long career.

First, the weavers maintained that "no saving can possibly, in any manner arise by its use", a manifestly false allegation. They then argued that the spring loom injured and impaired the quality of the cloth and they extended (according to the general practice) this argument by maintaining that the credit of the woollen manufacture would be lessened in the foreign market. This argument was also false.[4]

But principally they claimed that, while formerly engaged

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1 J.H.C. 58, p. 885, testimony of Mr. Thomas Joyce.
2 But it was not introduced into Frome (Somersetshire) until 1822. The incident at Frome involving troops, that year, as mentioned on p. 4, was complicated by the matter of pay. The manufacturers proposed to put out no weaving except to spring looms and, at the same time, tried to coerce the weavers into a reduction of pay.
3 J.H.C. 72, pp. 32, 138. A second petition contained the "same allegations and prayer" but came from Gloucestershire only.
4 There are some reasons for believing that cloth produced on the spring loom was slightly superior to that produced on the two-man loom, although, as mentioned, weavers did have some trouble learning to use the former.

in weaving of woollen cloth in "credit and comfort", they could no longer provide for their families. (At this time the hand-loom weavers throughout the nation had entered into their period of decline which ended, after several decades, in their extinction.) The machine tended to lessen one-half of labour "and of course to diminish the population, detract from the Revenue and impair the strength and resources of this Empire". They urged vaguely that the use of spring looms be "restrained" as "may seem most meet". If this could not be done, they asked that they be allowed to emigrate.[1]

The great argument against the spring loom was that it reduced labour. But, surveying the history of the invention from 1733, it can be observed that most weavers opposed it on its introduction not because it caused unemployment but because they imagined that it might.[2] It is often said that the workmen "instinctively" opposed new machinery. Their opposition was rational, not instinctive, but the adjective is appropriate so far as it suggests that their opposition was also traditional. The spring loom was a very simple and inexpensive machine[3] and

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1 This request sounds, in the context of the petition, like a pitiful bluff. The statute prohibiting their emigration, however, was, in these circumstances, an unjust one. Receipt of this petition, of course, caused no great stir in Parliament.

2 "And now 1780 , after the trial of so many years, I verily believe, there would be a greater uproar, if there were any attempt to take the spring loom from us. So changeable is the human mind! But here lies the difference--, Then, they judged before trial--Now, from fact and experience." (Thoughts on the Use of Machines, op. cit., p. 9.)

3 See picture in Guest (op. cit., Plate No. 4, in rear of volume) showing the simplicity of the picking peg device. Looms cost from two to four guineas (Evidence on Woollen Trade Bill, 1802-03, p. 41).

it could have been and was used in the homes of individual weavers. These qualities would cause them to favour it over an expensive machine which only factory owners could buy, but the fact that only one man sat before the spring loom, whereas two had formerly stood beside the old loom, was too impressive. The conservative weavers resisted it in Kay's time, while, at the same time, more enterprising and less ethical persons saw hope for gain from its use and, accordingly, pirated the invention or used it under license and refused to pay up.[1] This kept the machine from being forgotten. It was used in Bolton for cotton, and later its use spread throughout Lancashire, then to Yorkshire and eventually to the South-West.

The story of the spring loom demonstrates the difficulty of making strong statements concerning the time of a machine's introduction. The evidence is fragmentary and vague and, further, the spring loom was accepted at different times in different areas. But it is very clear that it made its great

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1 Miss Mann states that "it can only have been the less conservative attitude of the English weavers and their greater willingness to persevere with experiments which made the career of the invention so different in the two countries," that is, England and France. (Wadsworth & Mann, op. cit., pp. 469-70.) This statement seems arbitrarily introduced, especially if she meant by "English weavers" the generality of English weavers as workmen. In England there was a spirit abroad which did not obtain in France. Some "entrepreneurish" persons, including some weavers, were willing to take their chances against the mob, made up of weavers, to spy and to steal, and also to "persevere in experiments" in order to gain the competitive advantage of new machinery. Kay was patronized in France, and, in this connection, Miss Mann makes the following sharp comment: "Its career in France is, in fact, one of the most striking examples of the futility of the elaborate organisation which the Government had set up to control industry." (Ibid., p. 465.)

gains during times when the textile trades were expanding. During these times the demand for weaving nullified the argument that it would cause unemployment, and the entrepreneurs were willing to pay the same amount or thereabouts for goods woven on the spring loom, thus permitting the weavers to take, or share in, the benefits of the machine's increased production.

And it is also clear that the adoption of the spring loom came, in most areas, <u>after</u> the adoption of machinery for spinning, an important fact. The chain spun by machinery was even and strong.[1] These qualities did more to speed up weaving than Kay's invention.[2] And these qualities made it possible to use the spring loom without frequent interruptions, caused by breaks, which would force the weaver to leave his stool. The spring loom seems to have been used to some extent in the cotton trade before the spinning jenny was put into use (1767), but the cotton fibre was stronger than wool, and anyway it is apparent that the more general use of the spring loom in the cotton trade followed Hargreaves' invention. The spinning

1 The best hand spinners might spin the yarn but still their efforts, joined together, would produce an uneven chain.

2 <u>Evidence on Woollen Trade Bill</u>, 1802-03, pp. 7, 8, 301, 316, 319. James relates that the spring loom was not used for many years in the worsted trade because of (1) the defects of the one-thread wheel yarn and (2) "a prejudice of the old weavers". But "when weft, spun at the mill, came into use, being unbroken, the advantages of the fly shuttle were at once perceived and adopted." One weaver had not been able to weave a piece a week with hand-spun yarn, but "when the system got fairly set a going" could weave a piece a day and could also wind his own bobbins. (John James, <u>History of the Worsted Manufacture in England, from the Earliest Times</u>, London, 1857, p. 356.)

jenny was introduced into the Yorkshire woollen trade in the early 1770s and the spring loom's use in Yorkshire came in 1780 or a few years before. The spinning jenny was introduced into the South-West about 1790 and after, and the use of the spring loom followed in Gloucestershire in 1797 or thereabouts.

Kay advocated the machine with the phrase "great Advantages may arise to the Public" which regularly appears in patent applications and other documents appertaining to 18th century inventions, usually implying that machinery will lower the cost to the public of the goods produced.[1] The adoption of spring looms seems to have been argued, however, by circumstances and not by theory. Josiah Tucker most likely had the spring loom in his mind when, in 1757, he attributed the ba ckwardness of spin-weave in textiles to the "mistaken Notions of the infatuated Populace, who, not being able to see further than the first link of the Chain, consider all such Inventions as taking the Bread out of their Mouths; and therefore never fail to break out into Riots and Insurrections whenever such things are proposed."[2]

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1 And usually written "great saving to the public".

2 Josiah Tucker, Instructions for Travellers, London, 1757, p. 21. Dean Tucker was a writer of some note on economic subjects, one of the early "Liberals" (Charles Gide and Charles Rist, A History of Economic Doctrines, London, 1948, p. 71) campaigning for more freedom in foreign trade, a collaborator with David Hume who, in turn, had great influence on Adam Smith. Dean Tucker reasoned in this fashion about machinery: By machinery (or other abridgements of labour) price was lowered while at the same time a greater number of hands were employed, an apparent paradox. These two consequences came about because cheapness, made possible by machinery, was an inducement to buy, many buyers caused a great demand, demand caused great consumption which necessitated the employment of a "vast Variety of Hands" to work machines, repair them,

This was the traditional view, pretty much supported by tradition, which had been expressed before and would be echoed and re-echoed later on. But Tucker's comment was exceptional in the literature of the time. Very, very few people realized that the introduction of machinery was an issue important to the nation, thus to persons in addition to those in trade.

Lipson quotes an interesting incident. When introduced in North Ireland the spring loom drew crowds. One woman was enthusiastic in her admiration of it. "Clapping her hands, she exclaimed, in Scots-Hibernio phraseology: 'Weel, weel! the warks o' God's wondtherful, but the contrivance o' man bates Him at last!"[1] No doubt the spring loom caused some amazement, simple device though it was. But it did not revolutionize the trade, as the spinning inventions and the power loom did later on.

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and take care of all the other divers duties consequent on the expansion of the trade. He cited the use of certain machines (agricultural tools, the printing press) as support for his argument. In the form presented in "Instructions for Travellers" the argument is very crude, but it is interesting to find it expressed and held with so much conviction before the cotton trade provided the nation with a great example of lower prices stirring up demand and making a tremendous expansion of the trade possible. Adam Smith did not pursue this line of thought with regard to machinery and it seems a little surprising that he was not attracted to it, writing as he was during the years that machinery was being introduced into the cotton trade. Smith did not deal with the problems caused by machinery at all. Dean Tucker, incidentally, treated of the principle of division of labour at some length and with some interesting examples (ibid., pp. 22-23).

1 E. Lipson, The History of the English Woollen and Worsted Industry, London, 1921, p. 143.

CHAPTER II: THE SPINNING JENNY

Early Efforts

Well before Kay invented his spring loom efforts had been made to invent spinning machines. It must have seemed simple to improve on the wheel. In 1678 Richard Haines of Sullington, Sussex, secured a patent for a machine embodying a hand crank which turned six to 100 spindles the threads for which were drawn by hand. He promoted his machine with the argument that it would help establish a linen industry in England, a fond and perennial a spiration, and that it would cheapen the cost of giving work to the poor,[1] a variation of the familiar "helping the poor" argument which inventors often put forward later. It was proposed to place the machines in workhouses, and this scheme attracted distinguished patronage, but, for some reason, Haines' invention did not succeed.[2]

In 1738 a patent was taken out by Lewis Paul for a roller spinning machine invented by himself or John Wyatt or, most likely, both.[3] A mill was set up in Birmingham in 1741 or 1742.[4]

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1 Wadsworth & Mann, op. cit., p. 413.

2 The workhouse was a poor proving ground for machines. When inventors proposed that their creations be introduced there, they usually revealed that private enterprisers did not consider them feasible. And the persons in the workhouse had no interest in devising the little improvements necessary to make most newly-invented machines worthwhile.

3 Baines, op. cit., pp. 109-37. This author is concerned to prove that Wyatt was the inventor.

4 A. J. Warden, The Linen Trade, Ancient and Modern, London, 1864, p. 689.

It interested Edward Cave, editor of the Gentleman's Magazine, who bought out the inventors when they failed.[1] Apparently the mill caused no disturbance, since it never worked well enough to become a threat to anyone's livelihood.

Dwelling on this machine, however, is made worthwhile by the advanced ideas on the use of machinery found in John Wyatt's case for its adoption. Before granting the patent, the privy council ascertained that the Weavers' Company did not object to it and then took the "rather unusual course"[2] of stating their reasons for granting it. This was probably the last instance of official concern being expressed over the introduction of machinery until the effects of the power loom began to be noted.

The inventors expected the machine would save one-third of labour, and it did not occur to the privy council that it might not cause unemployment. Rather illogically the council maintained that this unemployment would be "balanced" by the fact that it would give work to the very young, the old and the blind. Taking the larger view, it would improve quality, lower price and would "restore" English superiority endangered by the French.[3]

Wyatt did not bother with the simple argument that his machine would "help the poor" by "creating" employment. He recognised that displacement of workers by the machine, was the "grand objection to our project".[4] To allay the discontent of the spinners, he advised clothiers to place the machines into the

1 Paul Mantoux, The Industrial Revolution of the 18th Century, 1928, London, 218.
2 Wadsworth & Mann, op. cit., p. 417.
3 Ibid.
4 Ibid.

homes of the spinners, and additionally urged that the "prices . . . not be immediately abated; but as they who use them find the advantage the clothier will take advantage by such degrees, and in like manner will the surplus part of the spinners find other employment".[1] Had this advice been taken, of course, the entrance of machinery into the industrial economy would have been less eventful.

Wyatt suggested how the surplus of spinners would find employment. He made ingenious if artificial calculations on displacement, smuggling in the suggestion, no doubt to curry general favour, that the clothiers could "replace" some of the displaced workers with infirm persons or children burdening the parish. The displaced workers would chiefly be women who had chosen spinning rather than service for the sake of "liberty, etc. (which by the way they seldom make the best use of)".[2] Wyatt recommended that they accept service, for this would best protect their livelihood and their morals, and would help the farmers, who had many complaints, especially in the summer.

Wyatt's further statements are more significant. With the new machine, the clothier's profit would incite him to extend trade. As a consequence he would take some of the dismissed hands back and other hands would be wanted in other branches of the industry. Increased demand would raise the price of wool and this would benefit the farmers. Actually "every person dealing with the clothier will fare the better in some degree or other"

1 Ibid., p. 418.
2 Ibid.

for "'tis manifest that when any trade mends every branch of that trade feels its share".[1]

This is a remarkable anticipation of the "expanded trade"[2] argument later invariably used to justify the use of machinery, although Wyatt did not explicitly mention that lower prices would create greater demand nor did he suggest the "diversity of human needs" argument. In another connection, Wyatt suggested lower prices, however. The machine would enable the English to undersell the foreigner, a point which later inventors invariably stressed. As a corollary to this, Wyatt warned of other countries rediscovering and applying the same invention.[3] This might be called the "dilemma" argument: the idea once conceived constitutes a fait accompli, which cannot be erased from men's minds and, so, has to be accepted as the lesser of two evils.

Wyatt concluded his case by mentioning that not above a fifth of the operators would be required to stand, and these might be "very young" children.[4] This argument is not important except that it calls attention to the fact that it was thought desirable at this time (and throughout the century) to devise ways in which children might be employed.

About fifteen years after Paul's patent, several other

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1 Ibid.
2 The use of this phrase and succeeding ones of this type does not forecast an attempt to name, clarify and form into patterns the thought of the English people towards machinery during this period. There were, however, certain relatively fixed attitudes towards machinery expressed over and over in the same, or very similar words, and it is convenient to name them, taking note of the context in which they appear and qualifying them where that appears necessary.
3 Ibid.
4 Ibid.

inventors plotted spinning machines. The Gentleman's Magazine, which took a special interest in new devices, mentions that in 1755 James Taylor of Ashton-under-Lyne produced a spinning invention, but "he was compelled to relinquish it, by the ill treatment he received from the prejudice of the working class".[1] It also speaks of a machine to spin and reel cotton in one operation devised "about 1753" by Lawrence Earnshaw of Mottram Parish. He showed it, the story goes, to his neighbours and then, shaken by doubts, destroyed it "through the generous, though mistaken apprehension, that it might take bread from the mouths of the poor".[2]

A little later than this the Society of Arts began fumbling around trying to do good. It proposed a reward for inventing a machine for spinning six threads of wool at one time, wool, cotton, flax or silk. Machines devised by at least five inventors were examined,[3] and the fifty pounds were won in the spring of 1764 by a Mr. Harrison "for a masterly improvement in the spinning wheel by which a child may do double the business that even a grown person can with the common wheel".[4] The Annual Register thought highly of this device "from which the nation in general, and the poor in particular, may receive so great and so immediate benefit. It would soon increase, by one-third, perhaps, the number of our most useful hands".[5] The Annual Register did not

1 lxxxiii, p. 662.
2 lvii, pt. II, p. 1200.
3 Baines, op. cit., p. 154.
4 The Annual Register, vii, Chron., p. 66.
5 Ibid. Mention of trade matters in the Annual Register is rare. Throughout the 18th century it seemed quite indifferent to the great industrial changes being wrought.

explain its reasons for believing the poor would benefit from the invention but quite likely it assumed that the demand for spinning was without limit and that the machine would enable children to add their income from spinning, to the family's. At all events Mr. Harrison's machine failed to revolutionize the industry, and trade histories do not mention it.[1] Most of the early spinning machines must have fallen by the wayside because they failed to perform the work for which they were intended.[2]

The Spinning Jenny

Guest relates that the first fustian masters arose about 1750 and the Manchester merchants began exporting fustians about 1760 to Italy, Germany and North America.[3] There were fustian masters before 1750 and Guest's statement is significant for the fact that it fingerpoints the time when the cotton trade began a notable expansion. In 1760 cotton still did not loom large as a Manchester trade.[4] There were about 40,000 persons

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1 MacPherson mentions Harrison's machine but most likely he picked up the notice of it from the Annual Register. (David MacPherson, Annals of Commerce, London, 1805, iii, p. 401.)

2 Quite possibly many of the early inventors worked out the ideas of their inventions but could not execute them for lack of mechanical skill. Earnshaw, for instance, was regarded by his neighbours as a wizard in "all sorts of mechanics, and most of the fine arts", yet "he was not (as might naturally be expected) a neat workman; his great genius soared higher". (The Gentleman's Magazine, lvii, pt. II, p. 1166.) Earnshaw's genius may have soared too high. It was said that, despite many attempts, he could not even make a wicker basket. (Ibid.) Lack of persistence and lack of capital have also been suggested as explanations for the failure of early inventions.

3 Guest, op. cit., pp. 10-11.

4 It is perhaps only conventional to cite as support for this statement that, on the coronation of George III, weavers or manufacturers of cotton were not on the list of those who appeared in the procession. (The Manchester Guide, Manchester, 1804, pp. 41-42.)

employed in the industry at that time, according to Baines' careful calculations.[1]

The figures on imports of cotton wool during these years, so far as they reveal the condition of the trade, bear out the meaning of Guest's remarks in a general way.[2] They show an increase during the 1752-56 period over past years. During that period an average of almost 3.6 million pounds was imported each year. The war interrupted this growth. The first year of large imports following the war was 1766 when 6.9 million pounds were imported, more than was again imported in a year until 1777. The average imports from 1766-70 amounted to 4.7 million pounds per year.

French dates the "greatly increased demand for all kinds of cotton goods" with the end of the war, 1763.[3] It does appear that the increased demand began earlier, was restrained by the war, and then flowered in the latter half of the decade.

The increasing extent of the manufacture made demands which the old spinning system could not fulfill. As has been noticed, the Society of Arts, "having been informed that our manufacturers of woollen, linen and cotton, find it exceedingly difficult when the spinners are out at harvest work to procure a sufficient

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1 Baines, op. cit., p. 360.

2 Taken from Wadsworth & Mann, op. cit., Appendix G, pp. 520-21. The amount of cotton wool re-exported is not subtracted from the above figures, for it would not substantially affect the comparison, but it is interesting to observe that re-exports in the big year, 1766, were unusually low.

3 G. J. French, Life and Times of Samuel Crompton, Manchester, 1862, p. 13. This author obtained some of his material from talks with old weavers. They may have associated the increase with the easily remembered date.

number of hands to keep their weavers &c., employed," put up rewards for spinning machines.[1] The weavers made great exertions to satisfy the needs of their masters, but the scarcity of weft impeded them and made their occupations difficult and precarious.[2] The spinners quit spinning during each harvest season, but this was not the only disadvantage of the system.[3] Spinners were undisciplined, spare-time workers, women and old people who could do nothing else, and were scattered all over the countryside, so that the weavers had to walk several miles, often, to pick up little bits of weft. Spinners asked for a price higher than that which the weaver's master allowed and exacted bribes of ribbons and gowns as an additional fee for quickening their efforts. They often foisted defective weft onto the weaver, who was solely responsible to the master for the quality of the cloth, and, cruelest cut of all, they became quite insolent in their behavior.

Since it took six to eight hands to prepare and spin for one weaver,[4] there was little hope for relief under the old system. Technological improvement, in the case of the spinning inventions, clearly fulfilled a need.

James Hargreaves found the answer to this problem about 1764.[5] This poor weaver of Standhill near Blackburn, encumbered

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1 Baines, op. cit., p. 154.
2 About this time the hosiery manufacture began competing for weft. (William Felkin, A History of the Machine-Wrought Hosiery and Lace Manufacture, London, 1867, p. 95.) Hargreaves and Arkwright both emigrated to Nottingham in 1768, finding a healthy market there for the produce of their machines.
3 Guest, op. cit., p. 11 and Ogden, op. cit., pp. 87-89. Also see James, op. cit., pp. 311-12.
4 Radcliffe, op. cit., p. 60.
5 Baines, op. cit., p. 155.

with seven children, produced his machine and worked it in secret. But, undoubtedly to help meet the needs of his family, he made a few machines and sold them.[1]

"The jenny simply multiplied human hands, while the water frame was a substitute for human skill."[2] This statement is accurate so far as it goes. The jenny reproduced hand movements, was hand-powered and was used in cottages, while the water frame was from the first a factory ma chine. But the jenny was truly a machine, not a tool, and it excelled the human hand in that the multiplication of spindles made its produce more uniform.[3]

The jenny required some little judgment in the application of its human power, but right off children 9 to 12 years old managed it "with dexterity", to the great surprise of their elders.[4] Dr. Ure wrote that one woman could easily spin, with a jenny, as much as 16 or 20 or 30 persons could before.[5] This is fair enough, but the capacity of the machine depended on the number of spindles. In 1767 Hargreaves had eight spindles on his machine.[6] A little later twelve spindles were "thought a

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1 Because of this he was unable to protect his machine after he took out a patent in 1770.

2 S. J. Chapman, The Lancashire Cotton Industry, Manchester, 1904, p. 53. This fact is not useful in trying to explain any difference in the reception of the two machines. The water frame substituted for human skill in that its produce replaced linen warps. Some linen warps were made in Lancashire, but, also, great quantities of them were imported.

3 If all spinners using the single wheel spun good quality weft, their efforts, joined together, would still produce an uneven chain.

4 Ogden, op. cit., p. 87.

5 Andrew Ure, The Cotton Manufacture of Great Britain, London, 1861, p. 233.

6 G. W. Daniels, The Early English Cotton Industry, Manchester, 1920, p. 80.

great affair"[1] but Hargreaves mentioned 16 or more when he applied for a patent in 1770. Around 1784 jennies had 80 spindles[2] and 120[3] and even 200 or more were mentioned.[4] The jenny was a tremendously productive machine.

The general conditions existing when the jenny was introduced have been admirably portrayed by Professor Daniels. The halting of Continental trade through difficulties following the Seven Years War, the dislocation of trade consequent upon the troubles with the American colonies, and high food prices, these things combined to cause acute distress.[5] A great number of riots occurred during these years[6]--in 1768 there were the Wilkes riots, violent disputes between sailors and coal-heavers, the assault on Charles Dingley's saw mill, and attacks on farmers as a consequence of the corn shortage[7]--and the riots involving Hargreaves' jenny must be read in this context. But the general causes do not explain the jenny riots.

In the common account of these jenny riots, tradition deals harshly with Mrs. Hargreaves, for it is said that the inventor's

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1 Ogden, op. cit., p. 87.
2 Daniels, op. cit., p. 80.
3 Baines, op. cit., p. 159.
4 An Impartial Representation of the Case of the Poor Spinners in Lancashire, (by R. Mather), London, 1780, p. 3.
5 Daniels, op. cit., pp. 86-88.
6 Students of this period well know that riots occurred very frequently from around this time up to and past the days of the Luddites (1812-16). Riots involving the destruction of machinery obtained great notoriety from the writings of a later period but they probably did not stand out so distinctly from the bulk of disturbances in the minds of persons living at the time.
7 The Annual Register, xi, Chron., pp. 86, 92, 96, 100-02, 105-14.
8 Professor Daniels observes that there was a "riotous and destructive spirit abroad". (Op. cit., p. 88.) No doubt the spirit was, to some extent, contagious.

"secret at length transpired, through an indiscretion of female vanity".[1] A tumult ensued, as a consequence of which, it is said, the inventor migrated to Nottingham in 1768 for the safety and comfort of himself, his wife and the seven children.[2] Thereafter Blackburn suffered the execrations of many historians and biographers for being the scene of this outrage.[3] If the tumult took place in 1768, it might have been the riot which occurred in Blackburn on April 2.[4] However, as Miss Mann suggests, this riot followed by a day the end of the "great election" at Preston, distinguished by numerous and general disturbances, and may have been a by-product of that election.[5]

Other riots occurred on February 17 and 18 and on March 18 and 20, 1769.[6] The ringleaders of these were Oswaldtwistle weavers who, heading a mob of 100, tried to pull down houses in Oswaldtwistle and Blackburn. The puzzling circumstances here are that the riots occurred in 1769, after Hargreaves had left, and that

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1 Ure, op. cit., i, p. 233.
2 Ibid.
3 For example see Baines, op. cit., p. 158. Cooke Taylor wrote about 75 years later that "we believe that to this day the recollection of these outrages is a check on the outlay of capital in this locality". (W. C. Taylor, Life and Times of Sir Robert Peel, London, 1843, 4 vols., i, p. 8.) Many of these later writers became more excited about these riots than contemporaries appear to have been. Cooke Taylor, incidentally, referred to the "sensible address" of D. Rasbotham (infra, p. 37) which was provoked by the jenny riots, but he believed he was referring to the 1779 riots in which Blackburn was also involved. The town was the center of the power loom riots of 1826.
4 Manchester Mercury, August 23, 1768, cited in Wadsworth & Mann, op. cit., p. 380.
5 Wadsworth & Mann, op. cit., pp. 479-80.
6 Manchester Mercury, August 15, 1769, cited in Wadsworth & Mann, op. cit., p. 380. Miss Mann mentions the 1768 riot and the 1769 riots but she does not choose between them.

weavers took part in them.

An inventor's hegira, however, may be poor evidence of the date of a riot provoked by his machine, as the story of John Kay demonstrates.[1] The earliest accounts of the jenny riots do not call in the name of Hargreaves, although most persons writing on the subject at the time (1779-80) eagerly grasped opportunities to moralize on the plights of suffering inventors.[2] Ogden's account makes no mention of Hargreaves:

> The plenty of weft produced by this means gave uneasiness to the country people, and the weavers were afraid lest the manufacturers should demand finer weft woven at the former prices, which occasioned some risings, and the jennies were opposed, some being demolished . . .[3]

A close perusal of Ogden's account is rewarding. This writer, it will be noted, speaks of "some risings" and of weavers being involved (for a good and particular reason). This would support the belief that the jenny riots were those which took

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1 The date of the assault on Kay was put at 1753 because it was believed he departed hastily for France that year. He had gone to France in 1747, however (supra, p. 8, footnote 5). Hargreaves may have been sensitive to feeling against the jenny, wisely leaving Standhill before this feeling culminated in the riots.

2 Arkwright's "case" (1782) promoted some falsities about Hargreaves. Guest (1823) commented: "The pathetic description of Hargrave's Engines being burnt and himself (Arkwright) driven out of Lancashire, was intended to melt the hearts of the members of Parliament. This Mr. Arkwright might as well have done by giving them an extract from Clarissa Harlow--her woes and those of Hargrave being about equally founded in fact." (Op. cit., p. 25.) It was Guest's great a mbition in later life to disprove not only Arkwright's claim to have invented the water frame but Hargreave's claim to have invented the jenny.

3 Ogden was regarded at the time as quite an authority on such matters. Much of his "description" was reprinted in Dr. Aikin's later work (John Aikin, A Description of the Country from Thirty to Forty Miles Round Manchester, London, 1795) to which he made additional contributions.

place in February and March, 1769, in which the Oswaldtwistle (near Standhill, where Hargreaves lived) weavers starred,[1] and this belief seems preferable to the traditional accounts of a single riot in 1768.

Ogden also implies that the jennies had spread rather quickly before the riots, delivering "many a poor endeavouring weaver out of bondage".[2] A pro-machinery pamphleteer mentioned later that "old persons, children, and those who could not easily learn to use the new machines did suffer for a while"[3] and Ogden observed that many spinners hustled around to get other employment.[4] There may be some reason to suppose that the riots came as a consequence of the operation of the jenny rather than of ungrounded apprehensions. However, the fact that the matter of prices was involved in the dispute vitiates the value of these riots as specimens demonstrating straight anti-machinery sentiment. The weavers may have acted partly on behalf of their families, relatives and friends who formerly had spun, but when a magistrate, D. Rasbotham, reasoned with the weavers in a printed address, he urged the former insolence of the spinners as an argument for the jenny's acceptance.[5]

Thus the jenny riots turn out to be rather unimportant affairs, involving about 100 weavers, who were not inspired alone

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1 Two riots are referred to in Rees' Encyclopaedia (s.v. Cotton Manufacture), one of the earliest (1808) accounts of the affair.
2 Ogden, op. cit., p. 87.
3 Thoughts on the Use of Machines, p. 8. The sentence continues: "till families had learned to play into one another's hands, by each taking a different kind of work.
4 Ogden, op. cit., p. 88.
5 Ibid.

by anti-machinery sentiment. But this would not establish that the machine met with a fairly easy and general acceptance right off. Riots, in this case and later, seem to be an inadequate expression of the apprehension felt by the working classes and it will not do to disparage them too much. Anti-machinery sentiment did not invariably show itself in such overt acts. Another correspondent wrote about the riots in a way that gives the atmosphere:

> What rioting and alarm was there, in this Country, about ten years ago, upon the invention of the Spinning Jennies? Many people foreboded the most dreadful consequences from them. The common cry was, that they would take the bread from the Poor, and throw them out of employment. Upon this a mob arose, burnt what Machines they could discover and carried about their fragments in triumph. The persons who did this thought they were doing service to the country . . .[1]

Such a description, vague though it is, probably provides better evidence as to the attitude of the working people than a recital of the "bare facts".

At all events, the riots ceased and much credit was given for this result to D. Rasbotham, magistrate.[2] This gentleman flew into the breach of peace with a "seasonable address" which was probably the first document to be used for the purpose of persuading workers to accept a particular machine. He brought to the weavers' attention the former insolence of the spinners, as we have seen, and mentioned that the jenny would furnish employment for the children. He then "appealed to their own experience of the fly shuttle, against which the like clamour

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1 Thoughts on the Use of Machines, pp. 10-11.
2 Ogden, op. cit., p. 89.

had been raised" despite the fact that they had been used "to the benefit of trade in general, without any bad consequences in the experience of several years, but . . . of particular benefit to the weavers".[1] Here we have the cause of machinery being promoted by the success of a particular earlier machine.

The address was said to have "produced a general acquiescense in the use of these engines, to a certain number of spindles".[2] The excitement died away. "A better spirit succeeded. The Jennies made their way silently, by their own merit."[3]

Significant changes followed the acceptance of Hargreaves' invention. Jennies spread with astonishing rapidity[4] and the number of spindles with which they were equipped multiplied three or four times,[5] this an ominous development. Many spinners "were glad to be employed in carding and slubbing cotton for these engines".[6] Young people could manage the small jennies and by their efforts "plenty" was brought to families "overburdened with children".[7] The weavers shook off their bondage to the spinners and entered a period in which gradually they gained great prosperity. But the spare-time employment of of the aged and of the mistresses in their home, which had brought a small but helpful income into many family circles, had

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1 Ibid.
2 Ibid.
3 Thoughts on the Use of Machines, op. cit., pp. 10-11.
4 Guest, The British Cotton Manufacture, Manchester, 1828, p. 147.
5 Ogden, op. cit., p. 89.
6 Ibid., p. 87.
7 Ibid.

come to an abrupt end. The jenny started the movement of industry away from the home and into the small factory. Further, it introduced into society a new element of instability--technological improvement--which created uneasiness and fear in the minds of the workers. The introduction of the jenny brought changes and its continual growth in size, with the addition of spindles, was another source of instability. This uneasiness of workers was a difficult feeling to express and traces of it are difficult to discover, but its existence cannot be doubted.[1] The jenny was the first machine with widespread and drastic social and economic effects. So far as the term Industrial Revolution means the beginning of an industrial system based on machinery, with all its implications, the Industrial Revolution began with the invention of the jenny.

Was the attitude of the English people affected by the size, construction and capacity of the different machines introduced or only by the more properly historical circumstances? As a contribution to an answer to this question it may be worthwhile to briefly compare the spring loom and the jenny and their introductions, for this comparison will suggest some few tentative conclusions to keep in mind as additional developments are related.

The labour-saving potentialities of both were made obvious in their construction. The spring loom "eliminated" one man and the multiplication of spindles on the jenny struck the eye immediately. Both were machines that took little capital to

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1 The evidence is partly testimonial, mostly circumstantial.

purchase and which could be, and were, used in cottages.

The spring loom was adopted slowly. Weavers were men, who formed a more cohesive group and who commanded a higher rate of pay than the spinners, but there can be no evidence that their united, consistent opposition held back the machine over the lengthy period of 1733 to 1765. The jenny was adopted immediately after its invention. The spinners were mostly women, children and aged persons, scattered, low-paid, quite unable to put up strong, united opposition. This may explain why, although there seemed to be a great deal of anti-machinery sentiment in the air around 1768, the overt acts in which they expressed that opposition were unimpressive. It may explain, in some small degree, why the jenny was quickly put in use.

But a further reason for the jenny's quick adoption seems to have been that as a machine it had greater capabilities which could be more simply realised. It could be quickly mastered by young children, whereas the spring loom was difficult to manage. It produced vastly greater quantities of material than the old method, and much greater in ratio than the spring loom, thus giving its early users a great competitive advantage and forcing others to adopt it if they wished to compete. This is the circumstance from which the principle of the inevitability of machinery arises. Machinery does not invariably advance, but it rarely retreats.

This very productivity would certainly have stirred up great and perhaps decisive opposition from the generality of workmen if an expanding market had not allowed a substantial number of

them to participate with the new machines and had not made more carding and slubbing necessary, which employed some of the spinners. Acceptance of the jenny definitely followed and accompanied expansion of the trade, and thereafter accelerated it.

After 1768 Lancashire showed no opposition to the spring loom and the jenny was accepted in principle. The Yorkshire wool trade took up the use of both shortly after.[1] In the South-West, however, where the trade was, for several reasons, not expanding, neither machine made friends quickly.[2]

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1 Infra, pp. 103-04.
2 Infra, pp. 114-15.

CHAPTER III: THE WATER FRAME

First Factories

Another spinning machine, the use of which had radical consequences, was invented about the same time as the jenny. Richard Arkwright took out a patent for his water frame in 1769, a year before Hargreaves made up his mind to patent the jenny. In the industrial revolution of the cotton industry, Arkwright was the largest figure, personifying the new industrial spirit, with its creative virtues and its residuum of faults. His career provided the example, rewarded as he was by riches, knighthood and the shrievalty of Nottingham, that inspired succeeding industrial barons.[1]

Arkwright emerged with a machine based on the Wyatt-Paul roller spinning idea.[2] From the first he envisaged it as a factory machine, and its use in the factory was largely implicit in its construction. It could be driven by continuous rotative

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1 Baines, op. cit., p. 193.

2 "It is some measure of the remarkable change in economic opinion wrought in the thirty years between Paul's patent and Arkwright's that . . . Arkwright, so far as we have any evidence, does not appear to have been troubled at all" over social objections to it. (Wadsworth & Mann, op. cit., p. 417.) But this is a very poor measure, especially when one considers Arkwright's personality. These times of expanding trade, however, which offered rewards for ingenuity which did not obtain in 1740, certainly created the possibility of a different economic atmosphere coming about.

power, and the use of water power was immediately suggested. Its operation was entirely mechanical so that the judgment of the cottage worker was not necessary. Small children could piece the broken threads.[1] But its construction and operation required fine adjustments which a skilled factory mechanic could make but which the ordinary worker could not. "These machines exhibit in their construction an aggregate of clock-maker's work and machinery most wonderful to behold," Ogden related.[2] Further, water frames cost a great deal of money, 7000 pounds per 1000 spindles, from Arkwright, it was said,[3] and they were not susceptible to infringement by those untutored in mechanics.

The productivity of the machine cannot be precisely described, but it was revolutionary in extent. Workmen represented that water frame factories produced twist for one-sixth the lowest price of hand spinning[4] and estimated that a child attending a machine did as much work as formerly employed ten grown-up persons.[5] Although manufacturers claimed the price of cotton warps was "much reduced" between 1770 and 1780,[6] these cotton warps still cost as much or more than linen warps at the later date,[7] but there was "no comparison between yarn and

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1 "Children are soon very dexterous at connecting broken ends with prepared cotton at the rollers, their small fingers being more active and endued with a quicker sensibility of feeling than those of grown persons." (Aikin, op. cit., p. 173.) Jedidiah Strutt stated that they preferred children from 10 to 12 years of age. (J.H.C. 34, p. 709.)

2 In Aikin, op. cit., p. 172.

3 Impartial Representation, op. cit., p. 2.

4 Ibid., p. 12.

5 Ibid., p. 3.

6 J.H.C. 37, p. 926.

7 Ogden, op. cit., p. 92. "Already [1780], cotton yarn has been offered for sale, as I am credibly informed, almost, if not

cotton warps for goodness"[1] and the seemingly insatiable demand no doubt permitted factory owners to add enormous profits to the cost.[2] Arkwright's wealth and the feverish activities of those who wished to emulate him testify to this.

The most significant thing about the machine was that it made possible the facile production of a virtually new product, cotton warps.[3] This product replaced linen warps in the manufacture of fustians and velvets,[4] and consequently no workers in the cotton trade were displaced. Cotton warps did not compete with cotton weft[5] but, in fact, made possible a greater demand for weft.[6] When Arkwright put cotton warps and weft together

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entirely as cheap as linen yarn, of the same length." (Thoughts on the Use of Machines, op. cit., p. 16.)

1 Ogden, op. cit., p. 92.

2 In 1783 Arkwright was selling at lower prices than his competitors. In 1786 he was forced to lower his prices to meet growing competition from other water frames, after he lost his patent, and from mules. (See Oldknow to Salte, May, 1783, in George Unwin, Samuel Oldknow and the Arkwrights, Manchester, 1924, pp. 11, 45.) He continued in business, highly successful, "probably, with some advantages over his competitors, derived from his experience and established plan of conducting the business". (MacPherson, op. cit., iv, p. 79.) Arkwright's wealth was legendary. The Annual Register related that his income was greater than that of most German principalities, a double-edged remark. (xxxiv, Chron., p. 35.)

3 Formerly they were "little used". (Thoughts on the Use of Machines, op. cit., p. 14.)

4 The assumption that it struck a severe blow at the linen trade does not automatically follow, but linen did decline during the decade. The water frame owners pointed this out in 1780 and argued, not too logically, that cotton would have also declined had it not been "supported" by machines. (J.H.C. 37, p. 926.)

5 Ogden stated "no contrivance in the other machines [water frames], can make the thread hold when it is so slack thrown as to suit for weft, nor can it be supposed the attempt would be made, if possible, as the demand of twist for warps will fully employ them." (Op. cit., p. 92.)

6 Ibid. Ogden's remarks raise some doubt as to whether the workers really considered that cotton warps did not compete with their product but supplanted a previously imported one. Of

to make calico, a new finished product was created, new, that is, for Great Britain. In two senses, then, the water frame was a creative machine rather than a competitive one, so far as Lancashire was concerned.

Arkwright's first factory at Nottingham was turned by horses.[1] His second factory, built at Cromford near Derby in 1773, took on factory proportions, being constructed after the plan of Lombe's famous silk throwing factory of forty years before. It supplied thread for stockings made by Need and Strutt, Arkwright's partners and financial backers, and in 1779 housed 300 workmen and "several thousand" spindles.[2] In 1777 the partners leased a "new erected spinning mill" attached to a forge and corn mill at Birkacre in Lancashire.[3] In 1780 Arkwright and partners had erected fifteen or twenty mills, it was asserted, some of which had been sold to "divers dealers in cotton".[4]

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course, quite a few small entrepreneurs began spinning cotton warps with other machinery during this decade and these are spoken of by Ogden as ringleaders of the disturbances that followed in 1779 (ibid., p. 91). It is interesting to note that Arkwright's patent specification described a machine for the making of "weft or yarn" (Baines, op. cit., p. 152), and probably this signified that Arkwright did not really appreciate, at that time, what his machine would do. His specification, however, could hardly have caused misunderstanding among workers after the machine came into use. Workers complained in 1780 that water frames also made grounds for "Dimmities, Quilted and Flowered Petticoats, and Cotton Hose, which heretofore was a very extensive branch of the laborers business" employing "many thousands". (Impartial Representation, op. cit., p. 6.) They were straining to make a point. The use of cotton warps in corded dimities was a recent thing in 1780. (See J.H.C. 37, p.926.)

1 Guest, Compendious History, op. cit., p. 22.
2 Mantoux, op. cit., p. 229.
3 Wadsworth & Mann, op. cit., p. 489.
4 Impartial Representation, op. cit., p. 2. Unauthorised water

When these factories were erected they caused no alarm. They were not considered "detrimental to the laborious manufacturer, because one or two only of them was then built, and trade at that time every day increasing, and the Cotton exportations very large".[1] Anti-factory sentiment, a great thing later, did not show itself during this period. The children worked on, as happy as hard-working children could be.[2] But the size[3] of these mills, and later their number, strongly impressed the workers. There may have been only fifteen mills, or there may have been double that many and more, but in either case the important thing is that the workmen thought they were numerous and that they were rapidly increasing.[4] They noted also that the water frame constituted a monopoly for the "immense Profits and Advantage of the Patentees and Proprietors" and that a certain factory owner "within a space of ten years from being a poor man not worth 5 pounds, now keeps his carriage and servants, and is become Lord of a Manor".[5]

Supplementary Machines

Meanwhile, the water frame and the jenny had both increased the demand for cardings and rovings which the carders were unable to supply.[6] Carding and slubbing required a "greater range of

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frames spun merrily on and these were said, in 1781, to employ 30,000 persons. (Baines, op. cit., p. 184.) But apparently the spinners believed that fifteen, or twenty, was the number of all the water frame mills.

1 Impartial Representation, op. cit., pp. 2-3. (My italics.)

2 It seems somewhat surprising that Arkwright was not spoken of by his many enemies as a harsh employer.

3 "One of which alone contains three hundred windows and upwards." (Ibid., p. 2.)

4 Ibid., p. 3.

5 Ibid., p. 5.

6 Guest, Compendious History, op. cit., p. 18.

invention" than twisting, as Ogden observed, but there were motives to encourage the attempt for these operations took half the price of spinning, it was said.[1] Stock cards were introduced but they failed to suffice.[2] "At this time the Jenny Spinners were earnestly employed in improving the machines used for carding and roving, and many ingenious contrivances were found to shorten these operations."[3] The carding engine solved one of the difficulties. It was not invented at once nor by any particular individual, but it was invented early.[4] Main improvements came between 1772 and 1774.[5]

Arkwright, "having had his eye on these developments",[6] formed a complete system of carding and roving by machinery, using the adapted water frame for rovings, and obtained a patent in 1775.[7] He claimed that this machinery did not begin to answer

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1 Ogden, op. cit., p. 90.
2 Guest, Compendious History, op. cit., p. 18.
3 Ibid., p. 22. Certain types of carding engines preceded these by seven years or so. (John Kennedy, Observations on the Rise and Progress of the Cotton Trade in Great Britain, Memoirs of the Literary and Philosophical Society of Manchester, IInd Series, III, read Nov. 3, 1815, p. 119.)
4 John Hacking "and his wife" were inventors. "He was a native of Altham, in the parish of Whalley, Lancashire, and it is said, being of an indolent turn, discovered, by means of revolving cards, how to make the wool fit for twisting, and he used to toss off his work in less time than his neighbours. When the knowledge of this machine got bruited amongst them, they rose against him, and destroyed it; and, as a granddaughter states, he was obliged to hide himself in the woods thereabouts for many weeks." (Letter of W. M. Brookes in the Gentleman's Magazine, 1867, iii, p. 337.) An interesting tale, possibly true, but suspect because it falls into the pattern of legends of invention many of which have been disproved.
5 Guest, Compendious History, op. cit., pp. 18-19.
6 Ibid., p. 22. Arkwright may indeed have obtained all his ideas from others, as Guest suggests, but Guest is only expressing one point of view. McCulloch considered Guest's work "very meagre, prejudiced, and superficial" (Edinburgh Review, xlvi, p. 6). This comment was too harsh.
7 Ibid.

or to repay him at that time,[1] but it must have shortly after. Mechanisation of this sequence of operations, and the placing of the sequence into the factory, with its advantages of discipline, concentration and co-ordination, must have brought great savings.

The carding machine, worked by one person, was said to have worked as much material as nine persons could do by hand.[2] Arkwright was quite unable to protect the machine, although he tried,[3] and great numbers of them were put into use during the decade. Jennies were adapted to make rovings[4] and larger jennies produced warps.[5] A great variety of machines--"tumming engines", "winding engines", "twisting mills", "doubling mills", "roving or slubbing wheels"[6]--sprang into being to perform, in different ways, the various tasks in the preparation and spinning of

1 Guest, British Cotton Manufacture, op. cit., p. 16. The question of Arkwright's part in these inventions cannot be discussed here, but it is interesting to note that he made the patent specification very vague. Guest remarked, "There never was a greater practical attempt to mystify a subject since the creation of the world, than this specification of Mr. Arkwright". (Compendious History, op. cit., p. 27.) He may not have been quite clear himself as to how the machinery should have been built and may have wished to "leave room for improvements". But he also wished to make it difficult for infringers to construct the machinery from the specification.

2 J.H.C. 37, p. 925.

3 For a narrative of his troubles see Guest, Compendious History, op. cit., pp. 20-28.

4 Wadsworth & Mann, op. cit., p. 492.

5 Ogden, op. cit., p. 91.

6 These machines are not to be thought of as each performing a separate process. The functions of some machines overlapped those of others. Different machines performed the same process. Further, several names were often applied to the same machines. Thus, for instance, jennies were also called "mad wheels" and yet were often just called "spinning wheels". The "tumming engine" was a "carding engine" used for the first carding. Some machines performed the doubling operation alone, others doubling and twisting, and others doubling and twisting and winding.

cotton.

With these machines, numerous small mills grew up.[1] These machines were not implicitly factory machines, as the water frame appeared to be. But many small factories grew up out of their use.[2] The entrepreneur began, perhaps, with a carding engine in his cottage.[3] The competitive advantage given him by the machine and the increasing demand for his products made possible profits by means of which he was able to add a jenny or two for making rovings. Perhaps later he added spinning jennies and twisting and warping mills. With considerable apprehension the workers saw these carding machines in these small factories "increase with such rapidity that many are now built in every town, village and hamlet in Lancashire and the circumscribing counties".[4] There were believed to be, "on a low computation", some 200 of them, driven by water, with twenty pair of cards (an average) on each, while no estimate could be made of the hand carding engines.[5]

Other usurpers were the doubling and twisting engines, performing simple operations after the spinning, and fifty or more of these were said to exist in 1779.[6] It was alleged that a child, attending one of these mills, replaced eight or ten

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1 Wadsworth & Mann, op. cit., p. 492.
2 The jenny was a cottage machine and continued to be, but it also became a factory machine, as did the mule later on. (See Chapman, op. cit., p. 59.)
3 "The carding engine played an important if not a decisive part in the development of the cotton factory system." (Wadsworth & Mann, op. cit., p. 488. See also, Unwin, op. cit., p. 116.)
4 Impartial Representation, op. cit., p. 3.
5 Ibid., p. 12.
6 Ibid.

people.[1]

During this decade jennies grew rapidly in size. The figures adduced by the spinners and the manufacturers before the Parliamentary committee in 1780 (which was appointed to investigate the petitions of the Lancashire spinners) show that when they mentioned the jenny, they were each talking about a different thing. The manufa cturers claimed a spinner with a jenny could earn as much in two days (4s. to 5s.)[2] as the spinners said he made in a week (4s. to 6s.),[3] but the spinners were thinking of the workers who owned jennies with only 24 spindles. These workers were gradually losing out to their greater competitors. The value of their smaller jennies depreciated with the construction of the larger ones, and the income of the owners of the smaller jennies diminished with the reduction of the price paid for weft. They bore this so long as the demand continued for their work, but when this demand ceased, of course, they were the first to lose employment. It is interesting to note in a pamphlet written in 1780 as a protest against machinery that while the spinners objected first to the water frames, first among the "other inventions" they objected to were the jennies for spinning with 100 or 200 spindles.[4] Some of the workers considered that the larger jennies were actually "new" machines against which they could properly express anti-machinery

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1 Ibid., p. 3. These estimates or, of course, other such estimates of this kind are only suggestive, not precise.
2 J.H.C. 37, p. 926.
3 Ibid., p. 925. Of course the discrepancy was probably not so great as they made out.
4 Impartial Representation, op. cit., p. 3.

sentiment, but actually they vitiated their anti-machinery stand when they wished to retain their vested interest in their own cottage-size jennies.

Meanwhile, the small factory owners, with various kinds of machinery, had rushed in to supply cotton warps,[1] the demand for which the first few water fra mes could not supply.[2] As the number of water frame factories increased, these small mill owners found they could not compete favourably, and this was especially brought to their attention when demand fell off.[3]

Consequently, it can be said, with fair accuracy, that the cotton trade was carried on at this time on three levels. On top, the water frame owners, with only competition among themselves to take into account, felt quite happy about the whole thing. The small factory owners on the second level felt a "jealousy"[4] towards the water frame owners, who owned machinery superior, in some respects, to theirs. And the cottage workers on the third level were beginning to feel a hatred, mainly arising from the "unfair competition" of those who owned larger and

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1 Especially with jennies adapted for this purpose. The author of Impartial Representation wanted it known that "the Cotton ground of these very Callicoes, can now be wrought by the hand labour of these poor men and women, at as cheap a rate, and much more durable than these Patent Machines". (Op. cit., p. 6.)

2 Miss Mann points out that the velvet manufacture originally created the demand, then later the calico manufacture which Arkwright originated in 1773. (Wadsworth & Mann, op. cit., p. 492.)

3 The water frames "produced such excellent twist for warps, that they soon outrivalled the makers of warps on the larger jennies, some of whom had several at work, and had reaped a good harvest of profit by them". (Ogden, op. cit., p. 91.) Ogden thus makes it clear that quality was an important factor.

4 This word, which, incidentally, was frequently used in reference to these matters in the literature of the time, is inadequate as here used, but highly suggestive.

superior machines, towards the owners on both levels above them. But--it is important to observe--machinery was used on all three levels.

The Events of 1779

The Annual Register of 1779 noted that "the new year was ushered in with the most violent gale of wind that has been experienced since the . . . beginning of the present century".[1] And, as if that turned out an omen, the year that followed "presented the most awful appearance of public affairs which this country had perhaps beheld for many ages".[2] The Annual Register was taking into account only international affairs, as we should now term them, but 1779 also proved a critical year in the history of the cotton industry, and these international troubles helped make it so.

There can be no doubt that general conditions had bearing on the 1779 disturbances in Lancashire. This is established by the occupations of the persons who had the leisure and inclination to take part in them, including colliers, nailmakers, labourers, joiners and others,[3] all of whom had general grievances but no particular grievance against machinery.

The cotton spinners stated that the war with America, the war with Spain and the consequent prohibition of cotton imports into that "extensive Kingdom", the cessation of African commerce and the abridgement of it to the West Indies had precipitated the decline of trade and manufactures.[4] The cotton manufacturers

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1 Opening sentence of Chronicle.
2 Opening sentence of Preface.
3 Wadsworth & Mann, op. cit., p. 497.
4 J.H.C. 37, p. 804.

tended to believe that the Irish non-importation measures[1] mainly hurt trade and they recognized "various other causes" for a rise in poor rates.[2]

It is important to note, however, that the manufacturers did not consider conditions of trade unusually bad. Quite the contrary. They spoke of steady demand and seemed pleased and surprised that they were prospering, notwithstanding the stoppage of former and principal markets and the low conditions of other trad es.[3]

Still there was great distress among some of the working classes, and the spinners represented that "many thousand industrious and worthy Members of the Community" were "with their Families, pining for want of Employment, and become destitute of the common Necessaries of Life; and that the Sufferings of the Petitioners in the Month of September" had "become so intolerable as to reduce them to Despair".[4] Strange and distressing as it might appear, some families had been driven to the extremity of going to the brewer to beg of him some grain, with which he fed his hogs, to keep them from famine.[5] Finally they felt they

1 Wedgwood's Letters to Bentley 1772-1780, London (Women's Printing Society, Ltd., for private circulation only), 1903, i, p. 420.
2 J.H.C. 37, p. 926.
3 Before, a period of stagnation occurred in the cotton trade every four or five years, the author of Thoughts on the Use of Machines explained, but "for ten yea rs, with very little intermission, the demand has been good and equal. There have been, in general, good work, and handsome wages. Surely every man among us, of common honesty, will acknowledge this." (Op. cit., p. 12.) Note the optimistic views of the manufacturers appearing before the Parliamentary committee of 1780 (J.H.C. 37, p. 926).
4 Ibid., p. 804.
5 Impartial Representation, op. cit., p. 15.

could "no longer . . . endure the remediless cries of our husbands, wives and children . . . not having it in our power to put food into the mouths of those to whom, under God, we gave existence".[1]

The bare recital of the events of the decade makes it appear as if the workers had, at this moment, looked over their shoulders and suddenly noticed the appalling immensity of machine industry, not just as shown by the water frame factories[2] but also by the small factories and homes that housed the machines ten years of strenuous activity had created. "A Domestic Evil of very great Magnitude, has sprung up . . . and encreased to such an Extent as threatens the total loss of Employment to this very numerous Body of Industrious Individuals; . . . the Evil in Question is the Introduction of Patent Machines and Engines, of various descriptions, which have superseded Manual Labour to . . . a fatal and alarming Degree."[3]

But it is not true that they suddenly took notice of this apparition. Their grievances had accumulated during the period, grievances against the larger jennies, the more numerous and larger water frames, and the carding engines, to which, in 1779, they had not yet become reconciled.[4] When Josiah Wedgwood opined that the lack of foreign demand for goods had "furnish'd them with an excuse for [the] violent measures" that

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1 Ibid., p. 16.
2 They only destroyed one of these factories during the 1779 riots.
3 J.H.C. 37, p. 804.
4 Before the Parliamentary committee of 1780 a witness for the spinners dwelt on the evils of these at considerable length. (Ibid., p. 925.)

followed,[1] he expressed the conventional middle class distrust of the workers, but he still quite accurately sized up the situation. Severe distress brought a desperation which made the working classes bold enough to express their object to what had worried them for some time.

In the competitive arrangement of the trade, the cottage workers suffered first and most. When these workers saw the water frames and the small factories working machines while they continued idle, they quickly judged that the old system would have distributed these productive tasks among more workers.[2] There appeared to be genuine displacement, therefore, caused by machines.

Further, it seemed highly unjust that the trade should be engrossed by persons who had the advantage of large machinery which large capitals enabled them to buy. A great deal of class feeling developed out of this circumstance. The "Jenneys are in the Hands of the Poor, and the Patent Machines are generally in the Hands of the Rich," the spinners complained.[3] Such engines were "a mere Monopoly for the immense Profits and Advantages of the Pa tentees and Proprietors, to the great Loss and Detriment of the Public".[4] Arkwright's rags to riches story did not inspire them but only made them bitter, for they were still in rags.[5]

1 Wedgwood's Letters to Bentley, op. cit., p. 421. (My italics.)
2 But would the volume of trade have been the same under the old system?
3 J.H.C. 37, p. 925.
4 Ibid., p. 805. Monopolies were resented by all classes of the population (infra, p.62).
5 Impartial Representation, op. cit., p. 5.

New machines had seemingly brought new conditions. Other people had benefited from machinery but the workers' condition seemed more miserable than before. The spinners juxtaposed the fact that poor rates had increased during the past six or seven years[1] with the fact that water frames and carding engines had multiplied rapidly in the same period,[2] and convinced themselves that machinery would shortly bring complete ruin.

Only a small spark was needed to set off the explosion and it came, it was said, when one large manufacturer offered to spin cotton at a lower price than the general price.[3] Ogden gave a different version, relating that one of the operators of a larger jenny, "making his complaint to others when they were intoxicated at the alehouse, a resolution was taken to destroy the water machines". They persuaded the "deluded country people" to join them.[4] Either or both of these versions may have been correct; Ogden's story has more plausible detail. Arkwright's Birkacre mill seems to have been the second object of the rioters, after they had destroyed some jennies,[5] and his Cromford mill had been selected as another target.[6]

The attack on the Birkacre mill was the most impressive event of the riotous period, and it caught the eye of contemporary historians to the neglect of the other, smaller acts of

1 J.H.C. 37, p. 925. The manufacturers acknowledged it. (Ibid., p. 926.)
2 Ibid., p. 925.
3 Letters on the Utility and Policy of Employing Machines to Shorten Labour; Occasioned by the late Disturbances in Lancashire, (by Thos. Bentley ?), London, 1780, p. 11.
4 Ogden, op. cit., p. 91.
5 Wadsworth & Mann, op. cit., p. 497.
6 Wedgwood's Letters to Bentley, p. 422.

destruction. But the movement quickly became a vendetta against all machinery, except for jennies with 24 spindles or less. When Wedgwood met a mob October 2 and asked what was going on, rioters freely answered that they had been destroying engines and "meant to serve them all so through the country".[1] On October 5 "their profess'd design was to take Bolton, Manchester & Stockport in their way to Crumford, & to destroy all the engines, not only at these places, but throughout all England".[2]

Fourteen carding engines and two spinning wheels were destroyed at Aspull September 30.[3] The attack on the Birkacre mill followed on Saturday, October 2. The owner (presumably not Arkwright, who was a partner) defended the mill, assisted by a "few neighbours", and surprised the mob by firing at them.[4] One rioter was killed, several wounded and these, of course, were "taken prisoner".[5] This infuriated the rioters. They spent Sunday and part of the next day collecting arms and melting pewter dishes into bullets, and, joined by the Duke of Bridgewater's colliers,[6] returned to the scene Monday marching by

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1 Ibid., p. 420.
2 Ibid., p. 424.
3 Wadsworth & Mann, op. cit., p. 497.
4 Wedgwood's Letters to Bentley, p. 421.
5 Wedgwood said that two were shot dead, one drowned and several wounded (ibid.). The Annual Register stated that two were killed, eight wounded (xxii, Chron., p. 228). The spinners, however, claimed only one dead, "many others" wounded including women (Impartial Representation, p. 4).
6 Wedgwood's Letters to Bentley, p. 421. Mr. Wedgwood was told that the colliers numbered 8000, but The Annual Register spoke of 2000 "or upwards" taking part in the whole operation (xxii, Chron., p. 228). Confusion as to dates, in The Annual Register's account, suggests that newspaper accounts were pieced together to form it. The spinners said "several thousands". (J.H.C. 37, p. 804.)

beat of drum and with colours flying.[1] They destroyed the factory completely.[2] Sir George Saville arrived with three companies of York militia while the buildings were in flames.[3]

The next day, Wedgwood related, "we heard their drum at about two miles distance from Bolton".[4] The mob entered Bolton and "contented themselves with breaking the machinery of the first mill they attacked, but the next, the machinery being taken away, they pull'd down the building and broke the mill wheel to pieces. They next proceeded to Mr. Keys of the Folds, & destroy'd his machine, & water wheel & then went to work with the lesser machines, all above so many spindles; I think 24 . . . I hope the delusion is ended."[5] Expresses arrived in Manchester early next morning from Wigan and Blackburn "both declaring the violence of the insurgents, and the shocking depredations yesterday at Bolton".[6] Sir George Saville responded with various measures of defence in the larger Lancashire towns, at Preston arming, it was said, "300 of the respectable house-keepers, if they would turn out to defend the town which was immediately accepted".[7] Other sturdy citizens had flown to the defence of Arkwright's Cromford mill.[8] Nevertheless, machinery was

1 Wedgwood's Letters to Bentley, op. cit., p. 421.
2 Ibid. Wedgwood put the loss at 10,000 pounds but Arkwright said 4000 to 5000 pounds. (J.H.C. 38, p. 687.)
3 Annual Register, xxii, Chron., p. 228.
4 Wedgwood's Letters to Bentley, op. cit., p. 422.
5 Ibid., p. 424.
6 Annual Register, xxii, Chron., p. 228.
7 Ibid.
8 "All the gentlemen in this neighbourhood being determined to support Mr. Arkwright in the defence of his works, which have been of such utility to this country, fifteen hundred stand of small arms are already collected from Derby and the neighbouring towns, and a battery of cannon raised of nine

destroyed Wednesday, and Thursday proved quite an eventful day in at least four villages or towns, one of which was Blackburn. The series of days of intense activity seemingly ended with Thursday, October 7, but attacks occurred also on October 13 and 14.[1]

The insurrection, then, covered a period at least fifteen days long. A list compiled from the indictments of prisoners brought up at the following assizes shows that about 140 machines suffered the fate intended for them by the rioters, but the list is demonstrably incomplete.[2] The spokesman for the rioters admitted that "in the course of a few days [they] pulled down and broke in pieces several hundreds of the Carding, Doubling and twisting Engines and large Jennies".[3] Several of the places attacked (including at least one dwelling house) contained only one machine.[4] The number of rioters can hardly be ascertained. Wedgwood met a group of about 500 (so he estimated) and believed that the mob that made the first abortive attack on the Birkacre mill must have been another group operating the same day.[5] But the account in the Annual Register, probably picked up from a provincial newspaper, mentions only 2000 taking part on

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and twelve pounders, with great plenty of powder and grape shot . . . five or six thousand men, miners, etc., can at any time be assembled in less than an hour." (Letter in the Manchester Mercury of Oct. 12, 1799 [sic--1779 must be meant], quoted by Mantoux, op. cit., p. 412, footnote.)

1 Wadsworth & Mann, op. cit., pp. 497-98.

2 Ibid. Among those not appearing in the list were Peel's works at Altham and Watson's at Preston, and Mr. Keys' or Kay's, mentioned by Wedgwood, at Folds, near Bolton.

3 Impartial Representation, op. cit., p. 4.

4 Wadsworth & Mann, op. cit., pp. 497-98.

5 Wedgwood's Letters to Bentley, op. cit., p. 421.

the afternoon when Birkacre was destroyed.[1] This is certainly a reasonable figure, and one which would not support the idea that the whole countryside was up in arms.

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1 xxii, Chron., p. 228.

CHAPTER IV: VERDICT ON COTTON MACHINERY

Reaction to the Riots

The Lancashire riots did not excite great national interest in 1779, but they must have stirred up Lancashire considerably.[1] And later on they were looked back on as a milestone in the history of the trade and an impressive example of the unruly nature of the unthinking workmen.

It is constantly alleged that other classes showed strong sympathy with the rioters' objects. The story grew up that a

1 Dr. Cartwright, talking to Wm. Radcliffe, recalled how the riots were at the time a common topic of discussion. (Radcliffe, op. cit., pp. 52-53.) Radcliffe's yarn about the Mellor pastor is well known, but pertinent here: "To shew that the spinsters had gallant friends at the time I will relate an extraordinary occurrence I was witness to in our church (Mellor) one Sunday morning during these troubles. The minister, then 80 years of age, when he came to what should have been the middle of his sermon, introduced the subject of these riotous proceedings, then going on in Lancashire and threatening to visit our neighbourhood. But while giving good and salutary advice to his congregation not to join in such proceedings, he was interrupted by a respectable yeoman, the churchwarden, who, rising up in his seat opposite the pulpit, said in an audible voice, Mr. * * * * * 'it will become you better to follow your text than to ramble away about such Temporal affairs.' Here, before the churchwarden could finish his speech, he was also interrupted by the venerable minister, who, although he was always a very mild and good-tempered gentleman, yet, this unprecedented interruption (as he termed it) completely upset him--he came down from the pulpit into the aisle, when, after giving the gallant yeoman a warm lecture at the door of his pew (which the agitation of his nerves prevented him from opening) the devotions of the morning were ended, the minister being so irritated, as not to be able to return to his former situation." (Ibid., p. 55.)

powerful body of police and military stood by at Birkacre without lifting a finger to prevent "so scandalous an outrage".[1] Considering the armament and warlike demeanor of the insurgents, Sir Richard Clayton and his 50 troops can hardly be blamed for deciding that discretion was the better part of valour that afternoon.

No doubt, while the riots went on, a great number of workers stood on the sidelines and approved. And no doubt other persons, whom the spirit of progress had not seized, attributed the rise in the poor rates to the growth of the new manufacturing system.[2] Prosperity had not at that time been definitely associated with machinery. Further, the manufacturers themselves competed against each other without excessive respect for the Golden Rule and it is possible that some of them neglected to worry about the damages wreaked on their competitors, so long as they themselves escaped.[3] A cotton tradesman wealthy enough to pay 20 pounds damages had taken part in the riots.[4] Like the workers, the Lancashire merchants hated monopoly and flatly opposed the granting of patents likely to affect trade and manufactures.[5] In Wigan "the Magistrates, principle Inhabitants,

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1 Edinburgh Review, xlvi (1827), p. 14.

2 "The apprehensions of some persons run high indeed. They seem almost to expect, that the whole cotton manufacture will be performed by machines, and ask, what then will become of our Poor?" (Thoughts on the Use of Machines, p. 11.)

3 Practically all manufacturers disliked Arkwright. When he was defeated in his efforts to enforce his patents in 1785, Manchester was elated (Baines, op. cit., p. 192, footnote). On some other occasions manufacturers urged revolt upon the workers of their competitors (infra, p. 82) but probably not in this case.

4 Wadsworth & Mann, op. cit., p. 497.

5 See petitions of manufacturers of Blackburn, Manchester

and Manufacturers of the Borough . . . at a public Meeting, held the 6th of October,[1] entered into a formal Engagement to lay their Grievances before Parliament, and agreed, that, until the Determination of Parliament was known, the Use of all Machines and Engines worked by Water or Horse, for carding, roving, or spinning of Cotton, should be suspended".[2]

But, on the other hand, although many persons did not understand the plans and aspirations of the industrialists, or sympathise with them, and stood dumbly by while the rioters worked, an attack on property could hardly obtain approval in England among the middle and upper classes. The argument that these classes showed strong sympathy with the workers rests on weak evidence.[3]

Bolton, Stockport, Liverpool and Lancaster protesting against "dangerous" monopolies. (J.H.C. 38, pp. 865, 882.) The Manchester Committee for the Protection of Trade announced that "Caveats have been entered at the Patent Office against the obtention of any Patents that are likely to affect the trade or manufactures of this country, by which means the Committee has had and always will have early notice of every application for patents of that sort, and will thereby have an opportunity of opposing them and of bestowing, or at least recommending, some other mode of reward for ingenuity so as to prevent the pernicious effects of patents". (The Manchester Mercury, Dec. 31, 1782, quoted in Wadsworth & Mann, op. cit., p. 496.)

1 In the heat of the fray. This may have only been a shrewd and designing move on the part of the propertied persons, including manufacturers, but fair motives ought not be ruled out, especially since the workers took it in good faith.

2 J.H.C. 37, p. 804.

3 Kennedy is often cited as an authority for this belief. He wrote in 1815 that the higher ranks, "dreading the increase of poor-rates, took measures to prevent the extension, through the country, of the new methods of shortening labour". (Op. cit., pp. 121-22.) Kennedy's memoir on the cotton manufacture is composed of many vague statements and his tendency to fit developments into logical but theoretical patterns can be plainly discerned. It is difficult to decide how much faith to place in his statement above. Anyway, the case for such an opinion seems to have been later built up on nothing very tangible, sometimes for the purpose of exaggerating the obstacles the early manufacturers had to

It has been mentioned how the citizens rallied to the defence of Preston and of Arkwright's Cromford mill (in a footnote). The workers, later on, blushed over their own excesses.[1] Through their rioting they had pushed law and order definitely over to the pro-machinery side of the question, and thus further weakened their cause, while, in later years, their "disposition to riot" as evidenced by the transgressions of 1779 became a cudgel that was used against them again and again.

The attitude of property and authority was sternly expressed at the quarter sessions in Preston the month following the riots. Here "it was unanimously agreed that the sole cause of the riots that have lately happened in that county is owing to the erection of certain engines for the manufacturing of cotton; that the erection of those engines have notwithstanding been of the greatest utility to the county by the extension and improvement of the cotton manufactory; that the destroying them in one country would only be the means of transferring them to another country; and that, if a total stop was put to the erection of them by the legislature in Great Britain, it would only tend to their establishment, in foreign countries, to the great detriment of trade in this. For these reasons the court came to the resolution

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overcome, sometimes for the purpose of making it evident that workers enjoyed popular support while being oppressed by tyrannical employers and a callous government. The following appears in The Skilled Labourer: "The extent of public sympathy with the rioters is illustrated by the tone of the petition sent up to Parliament next spring by the cotton spinners and others of Lancashire." (Hammond, op. cit., p. 55.) The petition illustrates no such thing.

1 J.H.C. 37, p. 804, and Impartial Representation, op. cit., p. 4.

of transmitting to one of his Majesty's Secretaries of State a copy of their proceeding, intimating a desire at the same time that a special commission may be issued for the trial of the ringleaders now in Lancaster gaol."[1]

The Spinners' Case

The Preston resolution not only expressed indignation but pointed to possible action of the legislature as a consequence of the Wigan engagement. In Parliament the issue, machinery or not, was to be finally determined. Measures were subsequently taken, therefore, to mobilise public opinion before the trial and the spinners' case was presented in the pamphlet Impartial Representation[2] published February 1, 1780, and written by Ralph Mather, a poor friend of the almost fifty work people then imprisoned in Lancashire gaol for their participation in the 1779 riots. The document is well written, and plausible, too, if one adopts the workers' viewpoint.

The philosophy of this pamphlet is illustrated by its answer to the manufacturers' argument that prohibition or restraint of machinery would discourage ingenuity. Mather went beyond this argument, saying, "but this object carries in itself its own confutation, for no wise government ever ought, or ever will encourage such unparalleled inventions, as deprive the industrious poor of whole counties of their bread".[3] And to the argument that machines enabled the trade to obtain what sale it could during difficult times, Mather replied, "that this

1 Annual Register, xxii, Chron., p. 233.
2 As cited frequently herein.
3 Ibid., p. 5.

is not true is evident, for if these innovations were totally suppressed (as in common humanity they ought) the industrious poor would be able to manufacture the cotton, with hand labor in the old manner".[1] In other words, there was a certain quantity of work to be done and the grand objective of government should be to provide for and preserve the employment of the poor by seeing to it that this work was distributed fairly.

To the "dilemma" argument--that the machines might be established in other countries--Mather answered that the superior character of the British cotton product did not depend on the spinning. "It is well known that Lancashire is possessed of the able Weaver, the curious Cutter, the compleat Dyer and Dresser, and the ingenious Finisher . . . whose abilities . . . never were equalled in any other country in Europe."[2] Therefore, a loss of trade need not be feared.

The pamphleteer then attacked the quality of goods made by the new inventions, alleging "great inferiority in point of wear, owing to the grain of the wool . . . being cut to pieces in the carding".[3] In connection with this quality argument, it is perhaps well to mention, at this point, two things: First, that the workers were not always wrong when they maintained that machines made inferior goods.[4] Early machines were sometimes

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1 Ibid.
2 Ibid., p. 6. This is an interesting testimonial to the pride the hand worker felt in his trade. Mather himself must have felt that his response did not exactly meet the argument for he mentioned, following this, that the machines need not be prohibited but only taxed.
3 Ibid., p. 5.
4 Reference is not made here to products such as the "cut-up" stockings of Luddite times. The wide frames made the cut-ups possible but the same machines could make high quality goods.

imperfectly built and imperfectly operated. Generally, however, this machinery produced goods of superior uniformity. Most operations in textile trades were basically simple and most textile products did not require skill beyond that which simply built machines could supply. Secondly, it may be pointed out that this argument had been an important basis for legislation against machinery and certain tools in centuries past, when the government (and gilds) carefully guarded quality lest the credit of the manufacture suffer in foreign markets. The workers brought the argument up from the past. But it did not fit the changed situation in 1780. It was obsolete, when machines could be made to produce goods equal to or better than hand-made goods and when price became the most important factor in trade.

Mather's main contention was that the manufacturers, with machines, were gaining a monopoly of the labour. This contention appears throughout the pamphlet. "The proprietors themselves cannot deny, that the labor, upon a very low computation and average of nine out of every ten of the poor Spinners, has come into their pockets."[1] This assertion was part and parcel of restrictionist arguments expressed then and later by persons who could not comprehend the dynamic nature of an expanding economy. Such arguments, based on static conceptions of a "certain amount of labour", a "certain quantity of goods", a "certain amount of money" and so forth, took particular and temporary conditions (which might nonetheless be real and deplorable) and made them general and permanent. The fact that the

1 Ibid., p. 5.

machine owners were making great profits while at the same time many poor people were unemployed made it seem obvious that, of the "certain amount of labour" necessary to make a "certain quantity of goods", the owners of machinery had taken a disproportionate share.

It was the duty of the government, however, to prevent this "partial distribution of property or labor",[1] and so that it might do so Mather proposed, presumably not expecting that Parliament would agree to prohibit machinery, an elaborate scheme to tax it.[2] This would enable the cottage workers to compete with the machinery and would ensure the general distribution of labour.[3] The spinners here made what was probably the first proposal to tax machinery for this purpose and their idea was taken up by other workmen in later decades to ensure "fair competition".

The spinners' proposals and arguments, coherent in the context of their restrictive economic philosophy, could hardly have been taken to Parliament without being modified. On April 18 the Manchester Mercury poured scorn on the taxing scheme and told the spinners they ought instead to go about raising money to set up machinery throughout Lancashire, devot ing the profits to

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1 Ibid., p. 4.
2 Ibid., pp. 7-13.
3 The spinners proposed to tax water frames according to the amounts they produced, other machines so much per week according to their size and function. They calculated that the water frames would provide most of the revenue, 58,500 pounds out of a total of 72,474 pounds, but that the water frame operators could still have made a 40% profit. They proposed to prohibit hand-winding instruments of more than two spindles and to save some of the roving for old women "who can only Rove, and that but upon one Spindle". (Ibid.)

the relief of the poor.[1] When they presented their petition on April 27, and subsequently appeared before committee, the spinners had trimmed their sails. They described suffering, presented evidence of decreases in earnings and of the increase in poor rates. They maintained the inferiority of the produce of water frames, carding machines and the larger jennies, mentioned that the latter were in the hands of the rich, and assailed the water frames as a monopoly operating "to the great loss and Detriment of the Public".[2] But these arguments were weak out of the context of the restrictionist philosophy.

The Manufacturers' Case

Meanwhile a pro-machinery pamphleteer was at work. Thoughts on the Use of Machines, written by a "Friend of the Poor",[3] was an ingenious and precocious document that began in a moderate, persuasive tone but, unfortunately, ended in a tirade when finally the emotions of the writer overwhelmed him and he revealed the strength of his convictions.

"It is the use of Machines, which chiefly distinguishes man in society from man in a savage state," he declared, listing the axe, hammer, saw, and bellows as machine. Unwarrantably extending the spinners' argument, he maintained that "if we must

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1 Cited by Wadsworth & Mann, op. cit., p. 502.

2 J.H.C. 37, pp. 804, 925. This last argument, against monopoly of the water frames "for the immense Profits and Advantages of the Patentees and Proprietors", could backfire on the spinners, and did. When Arkwright's patent was invalidated in 1785, depriving him of his monopoly, new water frame factories sprang up in much greater numbers than before. But the workmen did not only mean a monopoly in this sense, but that the water frames, no matter who owned them, engrossed the labour hand workers had formerly supplied. They were campaigning, incidentally, to hold their own monopoly.

3 As frequently cited.

go on the principle of having no machines, we must pull [the corn mills] all down, and bruise out corn in Mortars.--What do I say? The Mortar and Pestle are machines for shortening labour. We must crush our corn between two stones, or beat out the flour with sticks."[1] He reviewed machines then in accepted use, the printing press,[2] the spinning wheel, the knitting frame, the spring loom and the jenny, found to be of great utility after prejudice against them was overcome.

All improvements in machines caused some difficulty at first.[3] They increased labour but they changed the kind of labour for some persons.[4] "This change in employment may, for the present, produce some little difficulty, in particular cases. And this is the particular inconvenience I apprehend, from the machines. But this is comparatively nothing, when set against the general benefit, and will be soon over. It is . . . a sacrifice, we ought to make chearfully, to the common good."[5] He acknowledged that extraordinary gains accrued to some manufacturers but these were a necessary reward for ingenuity and could not last long, on ly until trade found its level.[6]

It was generally recognized by all writers on the subject of machinery at this time and throughout the period of the Industrial Revolution that machinery's introduction caused

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1 Thoughts on the Use of Machines, op. cit., p. 7.
2 Before its discovery "Ignorance and Popery, and Superstitution almost universally prevailed". (Ibid., p. 6.)
3 Ibid., p. 8.
4 Ibid., p. 15.
5 Ibid., p. 16. He urged the workers to "forget their present sufferings". (Ibid., p. 9.)
6 Ibid.

temporary unemployment, and most advocates of machinery preceded their remarks with this admission. They treated this temporary unemployment as a matter of little moment, with a sang-froid that helped give political economy the name of "the dismal science". It cannot be claimed that the Friend of the Poor was the first to recognize the fact that machinery caused temporary unemployment but he was at least one of the very first to make the observation with regard to actual conditions arising, apparently, from the use of machinery. This writer may ha ve derived his view on trade "finding its own level" from Adam Smith but Adam Smith had made no observations on the effects of the introduction of machinery.

On existing conditions of trade the Friend of the Poor grew vehement. While other staple manufactures of the Kingdom suffered, "ours has gone on to flourish". Cotton was astonishingly improved and extended, despite great difficulties and the loss of former and principal markets. "This is a plain fact. There is no arguing against it. No man surely dares deny it. There are a million of witnesses to prove it. The whole nation has observed it with wonder." He attributed this prosperity to the fact that new machines had created new products (notably calicoes) which had opened up new markets.[1] The manufacture of the new cotton warps kept money at home and increased labour of the poor. These poor received much greater gains than before the inventions, the weaver perhaps getting less but his wife more. Meanwhile provisions had greatly fallen in price the last two years so that

1 Ibid., p. 13.

a shilling bought as much as 15 or 18 pence.[1]

The future looked rosy to the author of this pro-machinery pamphlet. He resisted the argument that there existed only a certain quantity of labour to be performed.[2] Perhaps this was his most important contribution to the debate. The cotton manufacture was almost a new trade, he said, and new vistas would shortly open up before it as it made greater quantities of goods in new varieties at cheaper prices. This would, of course, mean more employment for those whose work was to dress, bleach, dye and calendar. Later on the manufacture of textiles might be chiefly cotton[3] and perhaps English goods might even vie with East Indian goods in fineness and beauty! "And then,--what a prospect would open upon us!"[4] He could halfway see a great and wonderful future with "all the world become our customers".[5]

A second pro-machinery pamphlet printed anonymously in 1780 was entitled Letters on the Utility and Policy of Employing Machines.[6] The author of this work was less fertile in ideas than the Friend of the Poor and not so imaginative in prophesying a great future for the cotton trade. He proceeded according to form by stating that the invention of tools and machines

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1 Ibid., p. 20. It was to be regretted that the poor spent much of their time complaining and that much of their money found its way to the alehouse.
2 Ibid., p. 18.
3 Suppose common jeans were brought to market with cotton warps. "What a sale we might expect!" (Ibid., p. 16.)
4 This appears to be a remarkable anticipation of the production of domestic muslins. The mule did not come into use until about six years later. But the trade was aware that such goods, if they could be produced, would bring great returns. (Unwin, op. cit., pp. 2-3 and passim.)
5 Thoughts on the Use of Machines, p. 17.
6 As previously cited.

distinguished man from uncivilized savages, by citing machines already in accepted use, and by claiming that the arguments put forward against the use of machines would militate against improvement of any sort. He admitted, also, that the introduction of machines caused temporary unemployment. "The transition indeed cannot always be made without inconvenience to some individuals: but this proceeds from the progressive nature of things . . ."[1] Disregarding the indifference that it implies to the plight of displaced workers, this remark may be seen as an inspired reference of a particular circumstance to a general truth. Progress implies change and change implies "inconvenience to some individuals". The Industrial Revolution was a time of many changes, the introduction of machinery being one of them.

But this writer did not follow the Friend of the Poor in denying that the cotton trade was in a distressed state. On the contrary he acknowledged considerable distress which, however, could not be attributed to "innocent machines". "Do you not think the war a more probable cause of the badness of trade, than the number of spinning-mills and jennies; that the loss of three millions of customers; the war with France and Spain and America at the same time; and the Irish non-importation agreements, are sufficient to interrupt your trade, and produce all the distresses you feel or fear?"[2]

And he did not see machinery as an instrument for the economic conquest of the world, but, instead, he saw its adoption

1 Ibid., p. 16.
2 Ibid., p. 13.

as a necessary defensive step to prevent the ruin of the nation. Man's wants had increased beyond his means of supplying them, he maintained. The nation could not continue to support expensive habits of life, high taxes and high wages[1-2]--unless mechanical inventions could be devised to counterbalance these increased expenses.[3] Here this writer came close to the argument that a nation's standard of living depends on the productivity of its labour. But he was thinking of foreign trade. Prices had to be kept down and quality improved to get and keep foreign markets. The prohibition of machinery would be the worst imaginable step for this would "disarm" British industry and allow other nations, using the same weapons, to beat British industry and capture foreign markets. Here again the fear of being outdone by other nations was used to defend the use of machinery.

The Decision of Parliament

Before Parliament the manufacturers were more specific than their pamphleteers. They did not try to promote the economic philosophy that their specific arguments implied. First of all they countered the spinners' allegations of distress, stating

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1 The pamphlet had a moralistic tone, as might be expected. Attacks on machinery, he asserted, "generally proceed from ignorance and gross immorality" (p. 2). The behavior of the labouring classes was often inexplicable. "How frequently, for instance, in dear times, have we seen them destroying corn and cheese, in order to lower the price of provisions!" The destruction of corn and corn mills was certainly odd and unreasonable behavior, resorted to, apparently, because the labouring classes could think of no other way of expressing their discontent and demonstrating their distress.

2 He believed that workers would share in the profit of using machinery by receiving substantially higher wages. (Ibid., pp. 30-32.)

3 Ibid., pp. 4-6.

that there was full employment, and had been the previous year, in "many parts" of Lancashire, that workers "in general are not distressed for want of employment".[1] Wages of spinners had "varied"--the use of this word was probably acknowledgement that technological change had altered prices during the period --but a jenny spinner (with a large jenny, no doubt) could earn 2s. 6d. per day. Weavers' wages had increased the past ten years, and the number of looms had tripled.

Unexampled prosperity had been enjoyed last spring. Over the ten-year period the manufacture had doubled, the price of cotton warps had been reduced, a new calico manufacture created, quality had improved.[2] The demand could not have been met without the new machinery. The future looked bright, "if the Machines are supported, and Improvements in them encouraged", for "Patent Cotton Warp would answer as well as Linen in many other Articles besides those to which it is now applied".

After the Parliamentary committee had examined the cases of the manufacturers and spinners it agreed with the former that there was "no Want of Employment for the industrious[3] Poor".

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1 J.H.C. 37, p. 926. One of their witnesses acknowledged the increase in poor rates but denied that the introduction of machinery had caused this increase.

2 "Cotton Goods were never made better than they have been within these Five Years; and . . . fewer complaints of them have been made by their Correspondents abroad since the Introduction of the Patent Machines than before." (Ibid.)

3 This qualifying adjective may justly be regarded with suspicion as commonly used during this period. But sometimes it was meant to be complimentary and other times it was used with no special intent. Its meaning here can hardly be divined. Many writers exaggerated unmercifully when they spoke of the improvidence of the poor, but it is obvious that previous ages had allowed the enjoyment of irresponsibility to persons who found joy in that. That allowance, indeed, was one of

The members seemed impressed by the facts that the cotton manufacture had increased, that this increase was owing to the water frames which had established "a very valuable Manufacture of Callicoes . . . in the said County", that the demand could not be supplied without those machines.[1] Principally, however, the committee had been moved by the "dilemma" argument. They reacted with horror to the thought that the machines might get into the hands of their enemies and rivals in trade.

The Parliamentary committee appears to have given a fair hearing to the spinners,[2] but the decision was foregone. The spinners wished to fix a restrictive scheme on industry in harmony with the spirit of Elizabethan legislation, many traces of which still remained on the statute books, but the channels through which the government had previously carried out its measures for the welfare of the working poor had fallen into disuse. The laissez faire attitude had filled the void left by the neglect of old trade customs and regulations, and in this atmosphere the proposals of the spinners could only appear anachronistic, illogical and difficult. While the spinners had negatively spoken of restriction, the manufacturers had spoken of accomplishment and of constructive, optimistic plans for the future. They had asked only to be let alone. This freedom the legislature could supply without effort. The committee adopted the viewpoint of the manufacturers, and its

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the attractive features of those ages. The new industrial system could not permit this lack of responsibility and discipline.

1 These arguments were repeated in the committee's resolutions. (Ibid.)

2 They heard their arguments and repeated them in the report presented to the Commons. (J.H.C. 37, p. 926.)

resolutions were agreed to by the House Nemine Contradicente.[1]

The issue of machinery, or not, was thus formally settled. Thereafter the cotton industry developed along the lines set during the 1770-80 period, with the sanction of the Parliament. Two years later a bill setting the death penalty for persons maliciously destroying textile goods and the instruments used in the manufacture received royal assent.[2]

The great amount of contradictory evidence, adduced by the spinners and manufacturers before the Parliamentary committee, reveals that the two sides of the dispute were speaking of two different worlds, of different branches of the trade, of different geographical areas (for the water frames had been placed in new areas, in villages, to obtain water power), and of sections of the trade using different mechanical equipment. The trade had expanded in some new lines, and in these the demand could not be supplied. The large manufacturers had engrossed a much greater share of the trade, but they had been enabled to do this partly because they had developed the new lines. The workers failed to acknowledge this. The workers had suffered because of the trade decline in the old lines, principally caused by outside conditions. They had also suffered because of competition from the water frames, to the extent that they had undertaken the spinning of warps with machines that could not compete favourably, and from the small factories using carding engines and the larger jennies. These small factories[3]

1 On June 27, 1780. (Ibid.)
2 22 Geo. III c. 40.
3 This is not to suggest that these factories were not enterprises carried on in cottages.

(and the individuals who could afford to buy the newer machines) outdid the handworkers in filling the demand, limited by outside conditions, for the products formerly made in the cottages.

The structure of the trade had been altered by the rapid mechanisation of the previous ten years. The large manufacturers had seized command with their new product, calico, and they had extended their superintendence to the weaving of this material. The small factories and the individuals with machinery had taken the leadership in producing weft. Hence, the workers' complaint that the machines had "cut off" their future expectations of employment[1] was warranted, if they expected to be employed doing their old work the old way. The handworkers were the residuum of the old system not yet taken into the new, and their 1779 rising might well take the name of the "Revolt of the Outcasts". Their group by no means included or represented the labouring class as a whole.

In 1779 this group had expressed genuine anti-machinery sentiment, felt for a very good reason but expressed to no avail. Their battle had been formally lost in Parliament but the terms of the surrender were carried out because of an increase in trade which followed immediately. The handworkers' pamphleteer had warned that, unless machines were prohibited or taxed, the people would again rise up in large bodies or else "distressedly emigrate in large numbers into Ireland",[2] but, happily, they did neither. Radcliffe recalled later that their "opposition was of

1 Impartial Representation, op. cit., p. 15.
2 Ibid., pp. 4, 6.

short duration, as a great demand immediately sprung up for weavers, either lads or lasses, while their mothers and younger children with their hand-wheels, found plenty of employment in winding the weft. The hands, turned adrift from hand cards and the spinning wheel, soon found full employ in the loom on machine yarn, with three to four-fold more wages."[1] The jennies attained an optimum size; the average was around 80 spindles.[2] Further technological improvements of a drastic kind followed and the water frames grew rapidly in number after 1785,[3] but the tremendous expansion of the trade[4] easily accommodated them all. The attitude of the workers towards machinery changed, seemingly with amazing abruptness, and they transferred their enmities to other things, the more ordinary matters of industrial dispute.

The Mule

Anti-machinery sentiment dropped out of the picture in the cotton industry, until the advent of the power loom, and the history of the next important invention, the mule, demonstrates this. The important principle of the mule was that it synchronised the extenuating and twisting processes so that no strain was put on the thread until completed. The machine-spun threads of much higher counts than could be produced before, except by Indian handworkers, made possible the new muslin manufacture, the profit-making potentialities of which the trade

1 Radcliffe, op. cit., p. 55.
2 Aikin, op. cit., p. 179, quoting Arkwright.
3 Baines, op. cit., p. 193.
4 Ibid.

was well aware before the mule came into use. Muslin products did not directly compete with domestic products.

The mule came into use rather slowly. Samuel Crompton devised the machine in 1774, but did not bring it to maturity until 1779.[1] It was said that there were not 1000 mule spindles in 1783. This slowness of adoption can be attributed to crude mechanical construction[2] and to the fact that Arkwright's patent covered the roller-spinning feature of the machine.[3] The mule was not in general use in the wool trade by 1812. Woollen fibers were more difficult to manage by mechanical processes than cotton, and the need for higher count thread not so urgent.[4]

It is important to recognise that the mule furthered no structural change in the industry. It was not extremely expensive,[5] nor difficult to operate. It could be operated by

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1 French, op. cit., p. 30. Crompton feared the rioters in 1779 and hoisted his dismantled machine up into his attic, through a door cut in the ceiling especially for that purpose, when he heard the mob at Folds nearby. The incident testifies to the atmosphere of the time. Mainly, however, Crompton, who was extraordinarily shy, resented people who constantly tried to spy on him in hopes of obtaining his secret (ibid., pp. 41-42, 47-70). Guest mentions that the mule had, "like other inventions, to contend with much prejudice". But it appears that he made that statement for the purpose of introducing a story about himself: "As an instance of which, it may be mentioned, that when a young man, then a Fustian Master, but now a Magistrate in a populous part of Lancashire, established a factory, his father expressed his apprehension that his son Richard and his Mules, would all turn out Asses." (Guest, Compendious History, op. cit., p. 32.)

2 Daniels, op. cit., p. 121. The mule required finer adjustments than the jenny, due to its roller-spinning feature. Yet the operation of the machine, when perfected, was more mechanical than the jenny, having the advantage of allowing the spinner less opportunity for the use of his discretion than the earlier machine.

3 Unwin, op. cit., p. 71.

4 Infra, p. 102.

5 Mules of 130 to 330 spindles cost, in 1797-98, from 50 to 100 pounds. (B. P. Dobson, The Story of the Evolution of the Spinning Machine, Manchester, 1914, p. 91.)

hand, was of compact size and was never covered by a patent.[1] Consequently, mules went into the cottages.[2] Their numbers grew rapidly after 1785 and there were said to be in 1788 some 550 mules, averaging 90 spindles each, compared to 20,070 jennies.[3] This proportion radically changed during the next twenty years, for the mules outdid the jennies,[4] but the new muslin trade occupied the mules for the first years and the jennies worked along side of them as the greatly expanding trade absorbed the produce of both. Replacement took place gradually.

About 1790 the mules started going into factories,[5] and water power was applied to them first in the same year.[6] This was the time when steam power began to be devoted to turning machinery.[7] In 1811 Crompton claimed that the cotton trade was using over 4.6 million mule spindles, compared to a little over 150,000 jenny spindles and 300,000 Arkwright spindles.[8]

Now, the problem created by the mule resulted from its continual increase in size. This problem appeared conspicuously, however, only during the highly competitive days after the turn

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1 Crompton was persuaded to publish the machine for a pittance. (French, op. cit., pp. 51-54.)
2 Guest, Compendious History, op. cit., p. 32.
3 In 1786 the largest mule in Bolton carried 108 spindles. (French, op. cit., p. 64.)
4 "Mule twist [was] now [1788] coming into vogue, for the warp, as well as weft." (Radcliffe, op. cit., p. 6. See also Unwin, op. cit., p. 71.)
5 Guest, Compendious History, op. cit., p. 32. Also, Kennedy, op. cit., p. 129.
6 Baines, op. cit., pp. 205-07, quoting a letter of Mr. Kelly of Lanark mills, manager before Robert Owen came into possession. Between these pages appears a plate with a good drawing of the mule.
7 Guest, Compendious History, op. cit., p. 32.
8 French, op. cit., pp. 102-05.

of the century when the machines were in factories. Bitter disputes occurred over rates of pay when the larger machines, say of 400 spindles, were placed besides others, say of 300 spindles.[1] The workers, naturally, wanted pay according to their produce while the owners wished to engross the benefit of the change their capital made possible. In this circumstance, some owners possessing smaller machines indiscreetly urged strikes upon the workers of some other owners, who were introducing competitively advantageous larger machines, strikes to obtain pay according to produce,[2] which if granted would put the owners on equal terms.[3]

But such disputes do not belong to this story. The workers only objected to doing more and harder work, and to passing the saving on to their employers and, indirectly or later, to the public.[4] These disturbances, and other industrial disputes in the cotton trade, some of which involved the destruction of goods, tools and other property, did not express anti-machinery sentiment.

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1 Report on Artizans and Machinery, 1824, p. 556, testimony of William Bolling.

2 J. Ward, Workmen and Wages, London, 1868, pp. 22-23.

3 Larger machines also helped bfeak down apprenticeship regulations by increasing the proportion of helpers to spinners. (Chapman, op. cit., p. 192.)

4 Such objections are not uncommon at the present day. The newspaper printers of Chicago, for instance, for some time have insisted on doing "bogus work" i.e. when stereotype plates have made it unnecessary to set type, they have set the type anyway and then discarded it unused. Employers complained bitterly of this practice during the 1947-48 printers' strike in that city.

CHAPTER V: THE IMPRESSION CREATED BY COTTON'S SUCCESS

Spectacular Growth of the Trade

> There is among people, in general, a disposition to be alarmed, at any new discoveries . . . Public habits of thinking are not soon altered. Nothing is so much dreaded as Innovation.[1]

This was before the great growth of the cotton manufacture, in the days when, as Guest put it, "new improvements were received, or rather viewed, with dislike and contempt. There was little fluctuation in prices, little competition between individuals, and the mind became contracted from this general stagnation."[2]

The success of the cotton trade had a powerful impact on the conservatism of the English people and their dislike of machinery. The trade kept on growing--and growing. There were set-backs. "I have seen a great many overthrows in the cotton manufacture," Mr. Kirkman Finlay, merchant and cotton spinner, told a Parliamentary committee. "In 1788 I thought it was never to recover; in 1793 it got another blow; in 1799 it got a severe blow, and in 1803 again, and in 1810 . . . but every time that it received a blow, the rebound was quite wonderful."[3] The developments in the cotton trade before 1790 were just a

1 Thoughts on the Use of Machines, op. cit., p. 9.
2 Guest, Compendious History, op. cit., p. 37.
3 Baines, op. cit., p. 359.

hint of what was to come.

As stated before, the average imports of cotton wool into Great Britain amounted to approximately 4.7 million pounds during the years 1766-70. In 1782 there were over 11.8 million pounds imported and in 1787 there were over 23.2 million pounds imported. This was only the beginning. In 1792 there were over 34.9 million pounds imported and the figure for 1800 was over 56 million pounds. In 1810 there were over 132.4 million pounds imported and in 1818 over 177.2 million pounds. And in 1825 there were over 228 million pounds imported. Thus, in a little over 50 years the volume of cotton wool imports was multiplied almost 50 times.[1]

The success of the cotton trade became a source of national pride. England was a trading nation. Its triumphs in trade were shared by the part of the population that was aware of them, and it became common to boast of the accomplishments of cotton as if they were personal accomplishments. "The rise and progress of this fabric is, in this country, almost miraculous," wrote Arthur Young in 1788.[2] The "rapid and prodigious increase of the cotton trade is, perhaps, absolutely unparalleled in the annals of trading nations," wrote Dr. Aikin in 1795.[3] A great many other writers were properly astounded. It became a fashion among them to cite staggering

1 These figures are available in many places. In this case they have been taken from McCulloch's article on the cotton industry in the Edinburgh Review, xlvi, p. 19.
2 Annals of Agriculture, x, p. 253.
3 Op. cit., p. 3.

statistics. "The whole of the factories in Manchester spin threads, in one year, which, tied together, would measure the almost incredible length of 242,511,725 miles!!" said the Manchester Guide, one of the many guide books touting that city's achievements.[1]

Of course, not all elements of the population were aware of the triumphs of the cotton trade, but cotton had a profound social effect on the people of the country. One of Arthur Young's correspondents wrote in 1787 that cotton "seems to be spreading into an almost universal clothing".[2] David MacPherson, in 1805, described the change in these vivid words:

> The rapid increase in the number of spinning engines, which took place in consequence of the expiration of Arkwright's patent, forms a new aera, not only in manufactures and commerce, but also in the dress of both sexes. The common use of silk . . . is proper only for ladies of ample fortune. And yet women of almost all ranks affected to wear it: and many in the lower classes of the middle ranks of society distressed their husbands, parents and brothers, to procure that expensive finery. Neither was a handsome cotton gown attainable by women in humble circumstances; and thence the cottons were mixed with linen yarn to reduce their price. But now cotton yarn is cheaper than linen yarn; and cotton goods are very much used in place of cambrics, lawns, and other expensive fabrics of flax; and they have almost totally superseded the silks.[3] Women of all ranks . . . are clothed in British manufactures of cotton, from the muslin cap on the crown of the head to the cotton stocking under the sole of

1 Manchester, 1804, pp. 41-42.
2 Annals of Agriculture, ix, p. 81.
3 Rees' Cyclopaedia (article on Woollen Manufacture, vol. 38) offers this comment: "About the year 1775, the introduction of Arkwright's inventions . . . into the cotton trade, produced a great change in the article of female dress in England, stuffs and tammies being supplanted by cotton goods, which were become extremely cheap." Cotton clothing for women competed with wool, although MacPherson did not mention this. The article in the Cyclopaedia errs on the side of enthusiasm in saying that this change was produced "about the year 1775".

> the foot. The ingenuity of the calico-printers has produced patterns of printed goods, which for elegance of drawing exceed every thing that ever was imported, and for durability of colour generally stand the washing so well, as to appear fresh and new every time they are washed, and give an air of neatness and cleanliness to the wearer beyond the elegance of silk in the first freshness of its transitory lustre. But even the most elegant prints are excelled by the superior beauty and virgin purity of the muslins, the growth and manufacture of the British dominions. . . .
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> With the gentlemen cotton stuffs for waistcoats have almost superseded woollen cloths, and silk stuffs, I believe entirely: and they have the advantage, like the ladies' gowns, of having a new and fresh appearance every time they are washed. Cotton stockings have also become very general for summer wear, and have gained ground very much upon silk stockings, which are too thin for our climate, and too expensive for common wear for people of middling circumstances.[1]

Many people became curious about the mills and machines that produced this fabric. The Derby silk-throwing works of Sir Thomas Lombe, the first factory in England (1717), had been very famous.[2] The "curious Cotton Works" at Leominster in Hertfordshire had, in the early 1750s, been "viewed with great pleasure and admiration by travellers and all who had seen them".[3] Arkwright's first operations aroused considerable interest and, as Guest relates, "it was common for the respectable inhabitants of the place [Leigh] to go and view his engines, and buy a dozen or two of pairs of stockings, made of yarn spun by them. I have in my possession a pair of stockings so bought at that period."[4] The great capitalist's large Millers Lane factory in Manchester, built in 1780 or

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1 Op. cit., iv, p. 81.
2 J.H.C. 19, February 11, 1731, and Mantoux, op. cit., p. 198.
3 Manchester Mercury, November 5, 1754, cited in Wadsworth & Mann, op. cit., pp. 443-44.
4 Guest, British Cotton Manufacture, op. cit., p. 15.

1781,[1] was remembered by old inhabitants living in 1839: "They can recollect the first factory erected in the town--the one in Miller's lane--and the crowds of people that flocked to see the high chimney belonging to it, when it was in progress of erection."[2] An old timer, who had been one of three children piecing on one of the early mules, "remembered crowds of people coming to see it".[3] The new spinning factories that grew up in Lancashire were the "objects of much curiosity to strangers" and it was said that "it is become a fashion for strangers to visit spinning factories".[4]

This curiosity extended to inventors, "often chimerical and extravagant in their expectations" but in whose "warm brains generate those prolific seeds, those new ideas, and combinations of ideas, which persevering industry broods upon, and brings to perfection".[5] Inventors were called "ingenious artists" and "fanciful projectors", of course, and "philosophy" was commonly ascribed to them, but they were also called "conjurors" and the rooms in which they worked "conjuring rooms".[6] Such names were often applied derisively by the skeptics and the roguish villagers, but they expressed awe and wonderment also. Crompton, the inventor of the mule, was so often watched curiously and "pointed out" to strangers that his trips to town were great adventures in misery for him.[7]

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1 Wadsworth & Mann, op. cit., p. 489.
2 Manchester As It Is, Manchester, 1839, p. 11.
3 French, op. cit., p. 64.
4 Manchester Guide, op. cit., p. 278.
5 Letters on the Utility and Policy of Employing Machines, op. cit., pp. 17-18.
6 French, op. cit., pp. 31, 157 (footnote).
7 Ibid., p. 69 and passim.

But Arkwright, combining invention with industrial success, raised the vocation of inventing to new dignity and respect. The Annual Register, which concerned itself seldom with the sordid affairs of industry, noted the death of Sir Richard in 1792 with a neat tribute to his "uncommon genius and persevering industry":[1]

> Sir Richard, we are informed, with the qualities necessary for the accumulation of wealth, possessed, in an eminent degree, the art of keeping it. His oeconomy and frugality bordered nearly on parsimony. He was, however, if not a great, a very useful character.

And so was the utility of having inventors recognised. Referring to another inventor, MacPherson observed (1805) that "this friend of mankind, who, if he had flourished in antient times, would have been honoured with statues and altars, and been ranked with Mercurius Trismegistus, Minerva, Ceres, Melcartus, and other beneficent deities, now lies interred in a village church-yard without an inscription to record his merits, or even his name".[2] MacPherson was not the only writer who deplored the fate of the early inventors. It was about 1780 when many of the legends about the early inventors began to grow. These tales of persecution had some basis in fact and the moral of them was often sound, but many of the details were fanciful. The respect beginning to be felt for inventors by the public was something new in England. It was not generally felt, or else the writers on commerce during this period would not have adopted their exhortatory manner, but it was being

1 xxxiv (1792), Chron., p. 35.
2 Op. cit., iv, pp. 401-02.

introduced.

The impression that the cotton trade--with its curious mills and its inventors--made on the nation directly affected the attitude of the English public towards machinery. For machinery was the main visible cause of the trade's astounding success. Cotton <u>was</u> machinery. But the new "enlightened" views were only being introduced. It would be incorrect to suggest that the enthusiasm of some "economists" and writers on commerce, or of the guide book writers, or of the early trade historians was reflected in the views of the general public before 1800. On these persons, and on persons connected with the trade, persons living near it and some persons with "enlightened" and "truly liberal" views, the success of the cotton trade made a very deep impression. MacPherson wrote that

> All enlightened writers on the subject of commercial and political economy agree in the great advantage of the abridgement of labour, even to the very people, who feel some inconvenience on the first introduction of it, and have not sufficient sagacity to see that the extension of the manufacture must soon find increased, and more profitable, employment for them all. It is machinery that produces the great works of civilized nations with less manual labour than savage nations bestow on procuring a scanty subsistence, which scarcely keeps them alive. It is machinery that enables the British manufacturer to give higher wages to his workmen than those of other nations do, while he furnishes his goods so much cheaper, and also better (for machinery works with uniform regularity, that they obtain a decided preference in every country on the face of the earth, and render the commerce of Great Britain the commerce of the world. . . .
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> Much has also been said, and written, by well-meaning people against the use of machinery, which, they say, by enabling one man, or boy, or girl, to do the work of twenty, throws nineteen out of employment. In a nswer to this, it must be acknowledged that all human institutions are liable to inconveniences: but the workmen generally do find employment, if willing, during the time of the hardship consequent upon the first introduction

> of a new piece of machinery; and soon after, some times immediately, they feel the great benefit of an increased demand.
>
> . . . the same objections have repeatedly been made against canals. But canals and machinery will notwithstanding continue to be encouraged by all wise governments, especially in commercial nations.[1]

MacPherson's statements, however, were misleading when he spoke of "all enlightened writers" and stated "much has also been said" etc. These statements would give the impression that machinery was a matter of national debate at this time from which some settled conclusions had emerged. This was not so. Not many "enlightened writers" had rushed to print with their ideas on machinery before 1800. The debate had been conducted in a small circle and had appeared in pamphlets, published, in practically all if not all cases, by persons interested in trade. Magazines and newspapers took little notice of it until much later. The controversy, however, produced ideas that became commonplace economic ideas after the turn of the century.

There were many persons, not ignorant, who were still ignorant of the great mechanical transformation of industry being wrought. The naive approach to the subjects of machinery and trade of many government officials and members of Parliament--distracted, of course, by the exigencies of war and politics--show this. When S. Salte, a London merchant, had an interview with the Lords of Trade in 1786 he found that they "hardly knew of a Manufacture of British Muslins". He gave them a lecture on Arkwright's accomplishments and showed them some samples. "They were equally surprised and pleased at my

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1 Ibid., iii, pp. 592-93.

Exhibition."[1] Officials and politicians showed a similar innocence after 1800 and even during the time of the Luddites (1812). The spread of ideas on machinery was quite slow.

And so, in the 1820s, McCulloch wrote in the Edinburgh Review: "How astonishing it is that so few attempts have been made to trace the rise and progress of this great branch of industry, (the Cotton Manufacture of this country,) to mark the successive steps in its advancement, the solidity of the foundations on which it rests, and the influence which it has already had, and must continue to have, on the number and conditions of the people."[2] And Guest, in 1828, complained that "while admiration has been unboundedly lavished on other triumphs of the mind, the successive improvement of the Machinery employed in the Cotton Manufacture, have obtained neither the notice which their own ingenuity, nor their natural importance required".[3] In retrospect the importance of the revolution of the cotton trade can be appreciated but it is a source of constant marvel to persons studying this period of history that its importance was so little appreciated at the time. And that machinery, with its manifold social consequences, was thought by some persons a matter of interest only for the tradesmen.

The effect of the success of the cotton trade on the attitude

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1 S. & W. Salte to Samuel Oldknow, printed in Unwin, op. cit., p. 61.
2 Quoted by Guest, British Cotton Manufacture, op. cit., pp. 11-12. Guest considered McCulloch a great enemy of his, but on this matter they agreed.
3 Guest, Compendious History, op. cit., p. 4.

towards machinery was mostly to prompt persons connected with or interested in commercial affairs to rationalize their ideas and express them, after which their feelings became more intense. The success of cotton and machinery lent conviction to their ideas on political economy. The spread of these ideas came later, when cotton continued to succeed, when more and larger factories were built, when steam engines were used to drive machinery (ca. 1795), especially after the Luddite troubles and the end of the war, and after political economy grew into a subject that began to interest statesmen and informed people.[1]

Persons with definite attitudes towards machinery from the first included the workmen affected by machinery, of course, and those who had seen it or learned of it and feared it, and, occasionally, persons with public responsibilities who sometimes had to arbitrate matters involving the use of machinery. And they included, particularly, the manufacturers who promoted machinery, along with a few writers on commercial subjects and others quite close to the trade. These manufacturers, and those who followed their progress with interest, were the source of thorough-going liberalism or laissez faire. The influence of Adam Smith can hardly be over-estimated. He put words in the mouths of hundreds of manufacturers, statesmen and authors. But the mamufacturers, notably those in the cotton trade, were the ones who put his doctrines into action, who gave physical embodiment to them, and who, especially in the case of the

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1 As mentioned elsewhere, Adam Smith did not treat of the problem of machinery.

cotton trade, dramatically demonstrated their effectiveness. They were the ones who, offering their creations as a fait accompli, proposed laissez faire to the government as national policy in the first decade of the 19th century.

The cause of machinery was inseparable from that of laissez faire, as the history of machinery in the wool trade will tend to demonstrate. The two things grew together, laissez faire providing an environment in which new machinery could be freely created and utilized, machinery helping to break down the restrictions that stood before laissez faire. The cotton trade, the first user of machines, had sprung up from nowhere, so to speak, and knew nothing but laissez faire. But the wool trade had been in existence long and was regulated by a host of statutes dating ba ck many centuries. Some of these statutes were honoured more in the breach than in the observance, but no significant conflict between laissez faire impulses and the old restrictive system had so far arisen. That conflict was to come when machinery was introduced into the wool trade.

The Cotton-Wool Analogy

The leaders of the wool trade had begun thinking early about taking up machinery. Perhaps on no other group had the success of cotton made such a great impression. This was quite natural since, for one thing, cotton competed with wool to some extent and, for another, the cotton giant grew up right next to the enterprising woollen industry of Yorkshire. The clothiers of Yorkshire decided, without much delay, that if machinery could bring success to the cotton trade it ought to do the same for wool

The author of one of the pamphlets written immediately after the 1779 disturbances in Lancashire, advocating the use of machinery in the cotton trade, extended his remarks to wool and made that point. The condition of the wool trade in 1780 was bad, he observed. "Our woollen manufactories have probably suffered full as much by this unsuccessful and unpolitic war as those of Lancashire, without having had the benefits of the same supports."[1] There were two remedies. The first was to allow export of wool (increasing "steadiness of supply") and the second to let "similar machines to those invented in Lancashire, but particularly adapted to the carding and spinning of wool, be put into the hands of the wool and jersey spinners".[2]

"The competition of Europe is now become rather a contest in skill and ingenuity than in natural strength," he said. Goods would have to be manufactured more cheaply and in greater quantities. Demand would then automatically increase three or four times and the amount of work perhaps two times. "The only difficulty that can happen in the introduction of these machines will arise from the groundless fears and prejudices of the work people; to prevent which the employers should throw the machines as much as possible into their hands, and let them experience, in the first instance, the great profit of employing them."[3] This was, of course, salutory advice which the author based on the past decade's experience in the cotton trade.

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1 Hints for the Improvement and Further Extension of our Woollen Trade and Manufactures, (by Thos. Bentley ?), London, 1780, p. 27.
2 Ibid., p. 30.
3 Ibid., p. 31.

The argument grew in force as the cotton trade grew. In 1791 a clothier of the South-West wrote that "if the experience of twenty years already in the use of spinning by water, at Manchester, has produced such general employment and activity there, as that hardly any single person can be found in want of employ; . . . it must necessarily follow that the general introduction and use of them in the Western Counties, and every other part of the kingdom also, must be highly advantageous to the poor and likewise eventually to the community at large. And if Manchester, by the introduction of machines for shortening labour, has induced an increased importation of cotton wool ten fold, the adopting of these machines to the woollen manufacture will occasion an increasing demand for wool, and thereby encourage the wool-grower, and enable the manufacturer to give a better price."[1]

But the analogy between cotton and wool was far from perfect, and one of its most serious imperfections was that the supply of wool could not be increased ten fold, as that of cotton wool had been. The workmen could not deny the success of the cotton trade but they could maintain that the supply of raw wool was limited, and it was. Most references to home wool production speak of it being constant up to the end of the 18th century. Wool was imported, of course, but imported wool only supplied a fraction of the needs[2] and the scarcity

1 Henry Wansey, Wool encouraged without Exportation; or, practical observations on wool and the woollen manufacture . . . By a Wiltshire Clothier, London, 1791, pp. 69-70.
2 It was around 1830 that the importation of Australian wool became important.

and the very high price of wool in the last decade of the century testify to the shortage. This shortage meant, in theory at least, that the number of workmen employed in the wool trade would be reduced if labour-saving machines were introduced. This argument was frequently used during these years by people who opposed machinery.[1]

The prospects of such a shortage did not deter the advocates of machinery, however. When the merchants of Leeds defended their proposal to introduce the gig mill into their town they recited the advantages of machinery to industry.[2] "They instance that of Cotton in particular," the internal and foreign demand for which they thought was nearly like that of their own trade. In a few years it had advanced to its "present importance" and it was still increasing in "amazing" style. Would not machinery bring still greater advantages to wool, "the Produce of our own Island, an Article in Demand in all Countries, and almost the universal Cloathing of Mankind?"

The argument was expanded into one advocating laissez faire, as the following quotation, taken from the remarks of several proprietors petitioning in 1794 against a proposed law prohibiting woolcombing machinery, illustrates:[3]

> That the good Policy of the Law, in leaving Manufacturers to their Natural Course, was strikingly evinced in the Business of Cotton, in the Spinning of which the Application of Machinery threatened to deprive of their Maintenance a much more considerable Body of Artizans,

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1 Observations on Woollen Machinery, Leeds, 1803. (See Hammond, op. cit., p. 168, footnote, and infra, p. 167.)
2 Broadsheet of Leeds merchants, November 18, 1791. (See Crump, op. cit., pp. 317-19.)
3 J.H.C. 49, pp. 545-46.

> while in the Progress the Artizans found Employment, and the Cotton Manufactures of the Kingdom were carried to a height both of Excellence and Extent, and the National Wealth was multiplied, beyond all example.

It was undeniable that wool would reach such a height, they maintained, if unchecked by prohibitory laws, especially those prohibiting the use of machinery.

And so the argument went. "In my humble opinion, the woollen cannot too closely follow the steps of the cotton trade: that nation which brings its goods the best and the cheapest will always have a preference, and it is only by means of the adoption of every possible improvement that pre-eminence can be secured." This was written by a manufacturer in 1804.[1] Another manufacturer, at about the same time, saw that "progressive improvement" was the secret of Lancashire's success. This was also the "true way" for the wool trade to succeed.[2]

These arguments were still being put forward after the turn of the century. It still seemed necessary to advocate the use of machinery in the wool trade, whereas it was not for cotton, even though most of the machines used in the manufacture of cotton had already been adapted for wool and put into use. The revolution in the wool trade had already been brought about and the brilliance of cotton's accomplishments should not obscure the fact that a great transformation had taken place.

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1 Observations on the Cotton Weavers' Act, 1804, p. 20 (see Mantoux, op. cit., p. 276).
2 John Anstie, Observations on the Importance and Necessity of introducing machinery into the Woollen Manufacture, etc., London, 1803, p. 60.

Findings of the Assistant Hand-Loom Weavers' Commissioners on this point can perhaps best be shown in tabular form. These are the number of hours of labour needed to manufacture one piece of undyed superfine broadcloth 38 yards long:[1]

1781-1796		1796-1805	
Men.....	1002 hours	Men.....	413 hours
Women.....	797 "	Women.....	205 "
Children.....	1353 "	Children.....	401 "
TOTAL.....	3152 hours	TOTAL.....	1020 hours

These figures show how the revolution of the wool trade, involving the introduction of machines for spinning, scribbling and carding, drastically reduced the amount of labour necessary to produce a certain quantity of goods. This change was brought about, in the main, before 1800.

This revolution in the wool trade was a more complex thing than that of the cotton trade. The woollen fibre was more difficult to handle with machinery, and the machines, taken from cotton which was easy to handle, had to be adapted. The preparatory processes--lumped under the headings of scribbling, carding and slubbing for simplicity--were more numerous and

1 Reports from Assistant Hand-Loom Weavers' Commissioners, 1840, Part III, (P.P., 1840, xxiii), pp. 439-41. The calculations seem to have been presented with the assumption that these things could be precisely calculated. For a great number of reasons they could not be. All the same the picture given by these figures is probably true in the main. It is interesting to note that a greater proportion of men worked in the manufacture in the latter years after the machines were put into use. It was said that during the 1805-20 period, 966 hours were required to make the same piece of cloth. During this period the Lewis shearing machines were put into use, which effected a great saving in wage costs since they replaced the labour of skilled men. But it will be seen that the great saving in hours of labour was effected by the spinning, scribbling and carding machines, before the gig mill and shearing frames were introduced.

involved. Hence, while the cotton revolution was accomplished in a decade, the woollen trade followed behind it several years and the introduction of the various machines was spread over a greater number of years. The effect of these machines was, then, less drastic and less immediately felt.

Another complicating factor was that, while the cotton industry was concentrated in one comparatively small area in Lancashire, the woollen industry was located in two principal areas, the West Riding of Yorkshire and the South-West, consisting of parts of the counties of Gloucestershire, Wiltshire and Somersetshire. These two areas were over 125 miles apart, which, in the 18th century, was an impressive distance. But the woollen trade was also conducted in some other scattered places and the spinning of woollen yarn was being done in most of the agricultural counties of England. Machinery was taken up at different times in different areas. The introduction of machinery in the principle areas, the West Riding and the South-West, had the effect of concentrating, more and more, the trade into those areas, while the outlying districts became progressively less important.

A third complicating factor was that the mechanisation of all the processes of making woollen cloth involved more than the mechanisation of the processes of making cotton goods. After the weaving, cotton goods were ready for sale (except for bleaching, printing, dyeing and so forth) but after the weaving woollen goods had to be fulled so that the fibres became interlocked and the surface of the cloth matted, so to speak.

And then the cloth had also to be finished or dressed, that is, the nap had to be raised and afterwards shorn level.

A fourth factor was that the wool trade (as spoken of here) comprehended two great branches, the woollen industry and the worsted industry. The preparatory processes in these two industries differed, and, of course, worsted cloth did not require finishing.

Consequently, the story of the introduction of machinery into the woollen trade lacks the unity and compactness of that describing the cotton trade, and it also lacks the finality of the latter. Sentiment against machinery in the cotton trade died out after around 1780 (to be reborn, however, when the power loom was introduced in the 19th century). But developments in the wool trade continually stirred up workers until well into that century.

It is, in addition, often urged that the wool trade, being old and established, was unprogressive and hampered by restrictions. The narrative that follows will have some bearing on these charges.

SECTION II. THE WOOLLEN AND WORSTED INDUSTRIES

CHAPTER VI: THE SPINNING OF WOOL

In the West Riding

The revolution of the woollen trade began, as did that of cotton, with the introduction of the spinning jenny. An interesting "division of labour" between the three types of spinning machines came into being. Cotton took up the mule, the worsted industry took up the water frame or throstle, and the woollen industry took up the jenny. Later on the woollen industry adopted the mule, but this was not until around 1820 and after. Before that time the mule had sometimes been employed for making fine cloth for shawls and some few other items.[1] This use of the mule was exceptional.[2]

1 Rees' Cyclopaedia (s.v. Woollen Manufacture), vol. 38.

2 Jonathan Bottomly wrote, in a letter to Mr. George Crompton, 1812, that "mules are used in several parts of Yorkshire and Lancashire for spinning woollen yarn, and to good advantage; when there is a revival of trade they will be generally adopted, as they greatly facilitate the woollen manufacture". (French, op. cit., p. 103.) Mr. Bottomley was somewhat premature in his expectations. He was writing to help Crompton (the inventor) in his efforts to get a reward from Parliament. Mules were used in woollen districts around 1800 (Leeds Mercury, May 31, 1800, see W. B. Crump, The Leeds Woollen Industry, 1780-1820, Publications of the Thoresby Society, vol. 32, 1931, p. 323) but these were most likely used to spin cotton. William Hirst claimed to be the first to introduce mules into the woollen trade and he could not have done so before 1816 (Crump, op. cit., pp. 24-25). A Saddleworth clothmaker said in 1824 that "it is but a few years since the first of these mule jennies, as we call them, were introduced into the woollen manufactory; previous to that they were on the same construction as those in our houses". (Report on Artizans and Machinery, 1824, p. 388.)

This late adoption of the mule seems to provide one of those arguments leading to the conclusion that the woollen industry was "unprogressive" and "hampered by restrictions". Such a conclusion is not warranted in this particular. The mule was not suitable for the spinning of woollen fibres until after certain modifications were made. It was said, after 1817, that "the jenny is still thought to spin better yarn".[1] With the jenny it was easier for the spinner to exercise his discretion in drawing out the slubbings, which were more likely to break than cotton rovings.[2] Furthermore, there was not the urge to produce thread of high counts. Woollen cloths, after all, were felted. It was not desireable, generally speaking, that they should be thin.[3]

There is some reason to believe that the use of the jenny for spinning wool required a certain amount of skill. A Holbeck clothier stated that "There are some men who will spin as much more as other spinners".[4] Around 1815 it was suggested that the mule might eventually prove superior to the jenny because it would be "less dependent on discretion and dexterity of the spinner".[5] Such remarks were not made about

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1 Rees' Cyclopaedia,(s.v. Woollen Manufacture), vol. 38.
2 Ibid.
3 Cloths, however, were made thinner during the last few years of the 18th century (Evidence on Woollen Trade Bill, 1802-03, pp. 206, 269, 352, and Evidence on Woollen Trade, 1806, pp. 163-64). This followed because of the very high price of wool and was, generally speaking, thought undesireable. Later on, in the third and fourth decades of the 19th century, certain types of thin cloths began to be made for export to America.
4 Ibid., p. 73.
5 Rees' Cyclopaedia, (s.v. Woollen Manufacture), vol. 38. The mechanical nature of the mule's operation made the mule

the jenny as used to spin cotton.

Very few years intervened between the time cotton took up the spinning jenny and the time it came into some use in the West Riding of Yorkshire, although some persons have supposed otherwise.[1] Weavers in 1806 testified that the jenny was introduced into the West Riding during the 70's, one, who lived at Wortley (near Sheffield), indicating the year 1773.[2] A report from the riding in 1775 listed "the great improvement in machinery" as one of the causes of the great prosperity of the coarse cloth manufacture in that area.[3]

Actually the "great improvement" was probably as much, and possibly more, an "effect" of this prosperity. Into Yorkshire the spinning jenny again "made its way silently, on its own merit". Its peaceful introduction into the county is something to marvel at and something to explain. Its progress is difficult to trace because of the fact that it aroused no opposition.[4] No doubt its use spread northward and westward

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more difficult to adapt to wool, and yet, when its use became feasible, made its use more desireable.

1 One secondary work states that 18 years elapsed between the jenny's adoption in Lancashire and in the West Riding.

2 Evidence on Woollen Trade, 1806, pp. 81, 113.

3 Calendar of Home Office Papers, Geo. III, 1773-75, No. 1164.

4 The Hammonds (in The Skilled Labourer, op. cit., p. 150) made the inference that a riot was the consequence of the jenny's introduction at Hunslet in 1780, because of the propinquity of two answers in the testimony before the 1806 Parliamentary committee (Evidence on Woollen Trade, 1806, p. 81), one dealing with the jenny and another referring to a riot. Actually the testimony, closely examined, supports the inference that the riot was not the consequence of the jenny's introduction. The witness first denied that the jenny had caused any riots, and then, immediately after, acknowledged that a riot had occurred at Hunslet in consequence of the use of "machinery". Hunslet was the home of Mr. Burrow Copley, a pioneer in the introduction of scribbling machinery, who

from Lancashire, reaching the Leeds neighbourhood some years before 1781. In that year a German was apprehended trying to smuggle out a spinning machine. The Leeds Mercury spoke of jenny spinning as the "practice" of the neighbourhood at that time (and, incidentally, warned that if such attempts by foreigners should prove successful "the consequences to this country may be very fatal").[1]

But the effect of the jenny's progress into the West Riding seems to have been gentle. The machine was not immediately taken up by everyone.[2] It was, seemingly, taken up as the trade warranted. Perhaps this moderation can be attributed to the organisation of the tra de in the domestic system. The clothiers of the West Riding, most of them operating on a small scale, did not get grandiose ideas like those of Arkwright, and in this quieter atmosphere there may have been less anxiety and less compulsion to get the new machines. But the jenny offered less of an economic advantage to wool spinners than to cotton spinners, and this is shown by the fact that the machines did not increase in size to the extent that they did in the cotton trade, nor as rapidly. The first jenny into Bramley

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fought a running battle with workmen over it (infra, p.129). Machine slubbing, produced by Mr. Copley, also caused some fuss later on (infra, p.144). Mr. Copley, and others in Hunslet, possibly owned jennies at this time, but it is unlikely that the presence of these stirred up the trouble. Clothiers may have promoted the use of jennies but, at this time, it is most likely that spinners owned them, in the majority of cases.

1 February 6, 1781 (see Crump, op. cit., p. 314).

2 The introduction of the jenny in Pudsey, for instance, came after 1783 (Evidence on Woollen Trade, 1806, p. 30).

had 18 spindles.[1] Around 1790 the average new jenny probably had 40 spindles.[2] In 1806 jennies of 60 or 70 spindles were used.[3] At this time there was a movement to limit jennies to 160 spindles, but this was part of the campaign to limit the number of looms one person could own, also the number of jennies, thus to prevent factories from coming into Yorkshire and disrupting the domestic system. Such large jennies did not then belong to the domestic clothiers who were urging this limit on themselves. They were probably only imaginary, in the woollen trade, or at least extremely rare. The 60- or 70-spindle jenny was usual at this time when much larger jennies, and especially mules, were being used in the cotton trade. The nature of the wool fibre probably had the most to do with this; it broke more often than cotton, making the larger machines less advantageous.

The jenny did not immediately oust the hand spinners, but supplemented their efforts. As late as 1788 hand spinners were supplying the product and were earning 9d. to 1s. a day in Yorkshire[4] (8d. and 9d. in Lancashire) whereas spinners in

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1 Benjamin Wilson, Jr., Our Village, Bramley, 1860, p. 46.

2 E. Harries reported from Shropshire of earnings of jenny spinners using machines of 30 to 48 spindles. Women could operate the 48-spindle machines but men, using 36-spindle jennies, could earn more. (Annals of Agriculture, ix, pp. 310-11.) This may have been the consequence of longer working hours but probably indicates that skill and strength had something to do with production. In 1793 Thomas Walker (of Yorkshire) bought two 40-spindle jennies of the "best sort". These cost 12 pounds and 2 shillings or a shade over 3s. per spindle. (Crump, op. cit., p. 212.) Mr. Harries mentioned that jennies cost 2s. 6d. per spindle.

3 Evidence on Woollen Trade, 1806, p. 403, testimony of John Edwards, Esq.

4 Annals of Agriculture, ix, p. 277.

most other parts of the country earned 3d. to 6d. per day, 3½d. being the most common figure.[1-2] In 1791 it was said that hands for spinning were so scarce in Halifax that those who purchased the product, instead of deducting 3d. or 4d. from the shilling, were glad to get spinners at the expense of adding that much.[3] Hand spinning was still being done in 1806 and it was said in that year that the jenny was used "a great deal", therefore not universally.[4]

As a Wiltshire clothier, Mr. John Anstie, enviously observed, the introduction of machinery into Yorkshire "originated in very favourable circumstances".[5] After the American Revolution the trade of Yorkshire began to grow markedly. During the years 1776 to 1780 the West Riding produced, according to the records of the Pontefract sessions, an average of 3.2 million yards of broad cloths. The great increase began in 1782, and in 1785 about 4.8 millions (yards) of broads were manufactured. An annual average of that many yards was maintained to 1790. The number of yards of narrow cloths, meanwhile, began increasing in 1784 and increased every year to 1790. In the

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1 Ibid., pp. 266-376.
2 In this case machinery (1) did not cheapen the product and (2) did not create the extraordinary demand for the product. But the disparity in price between the different counties was a condition largely brought about by machinery.
3 Ibid., xvi, pp. 422-23. Arthur Young's informant attributed these prices to "rapid progress of the cotton trade". Cotton, of course, did compete with wool for spinning hands to some extent, but Mr. Young corrected this statement by observing that the highness of the prices was due as much to the prosperity of wool as of cotton. The fact that the woollen trade could pay such prices certainly testifies to its well-being.
4 Evidence on Woollen Trade, 1806, p. 403.
5 Anstie, op. cit., p. 10.

next great decade the yardage of broads almost doubled, being about 9.3 million in 1800.[1] But, taking a clue from the difference in the pay of hand spinners in Yorkshire and in other areas (9d. to 1s. in Yorkshire compared to 3d. to 6d. in other areas in 1788), some more pointed remarks can be made about this prosperity.

Hand spinning had been greatly diffused. The queries of Arthur Young and the replies he received show how very scattered spinning was and also how important a source of income it was to the rural families of many counties. But the Yorkshire trade was expanding partly at the expense of other areas. This trend began before machinery came into use. Yorkshire had taken up the manufacture of heavy woollens and coarse worsted goods especially and had possessed a competitive advantage, it was said, because of cheap living, the industry of its inhabitants,[2] and cheap and abundant coal.[3] But machinery, used in the West Riding while not much used in other areas, accelerated the trend. Jenny spinning helped the concentration of the trade into the clothing areas proper by making adequate production of yarn possible within those areas. Shropshire had sent yarn, hand spun by its hard-working "occupiers of little tenements", to Montgomeryshire for flannels, to the

1 Report on Woollen Trade, 1806, p. 25.
2 The phrase "industry of its inhabitants" may have meant, in those days, the willingness of those inhabitants to work peaceably for little pay. But in this case it must refer more especially to the enterprise of the domestic clothiers of the riding.
3 Rees' Cyclopaedia (s.v. Woollen Manufacture), vol. 38. Of course, the cheapness of coal was not as important a factor as it became later.

West of England and to Yorkshire.[1] And so had many other areas, far from the clothing districts. But Yorkshire, with the jenny, was increasingly able to supply itself with enough yarn for its cloth.

Cunningham states that "though the regular spinners might earn more at the jenny than they did before, there must have been an immense reduction in the number of those who had earned a little with their wheels".[2] No doubt. And the figures on pay for hand spinning show that the spinners who earned more, by hand or by jenny, lived in Yorkshire (and Lancashire) while the spinners who lost out in this competition lived elsewhere. Consequently, the jenny was not considered a "problem" in the West Riding when observers in other areas worried about its effects.[3]

For another thing, the West Riding had a very large worsted trade and it was not possible to spin worsted yarn by machinery until years later.[4] Persons who did not care to take up the jenny could continue to spin by hand, changing only from wool to worsted. There was not an unlimited demand for worsted yarn, of course, but the Yorkshire spinners, living near or in the district where worsted cloths were made, could supply what was needed more advantageously than the spinners from outlying districts. Possession of this worsted trade was an advantage

1 Mr. Harries in Annals of Agriculture, ix, pp. 308-09.
2 Wm. Cunningham, Growth of English Industry and Commerce, Modern Times, Part II, Laissez Faire, Cambridge, 1929, p. 656.
3 Ibid., pp. 654-55. Annals of Agriculture, ix, pp. 310-11, 326, 335.
4 Infra, p. 151.

that the West Riding had over the South-West.

The decade 1778-88 seems to have been the bad one for hand spinners living in counties other than Yorkshire and Lancashire. The price of spinning was halved in that decade, Arthur Young calculated.[1] And yet, in 1788, the woollen manufacture was in an "almost unexampled state of prosperity". It was not perfectly clear to Arthur Young and other contemporaries that the spinning jenny had alone brought about this paradox, but some thoughtful persons considered the jenny an important factor. Mr. Young believed that Suffolk, where hand spinning pay was lowest, should take up something else and admonished that "the introduction of spinning jennies will gradually make it necessary for all the rest [of the counties] to consider in time of some new reliance for their poor".[2]

Could the spinners in these other counties protest against the use of jennies? The machines were not before them.[3] There are scattered notices of jennies being used in different parts of England and Scotland,[4] but in most places the spinners could not see machines to which they might attribute their decrease in pay. Probably most of them did not consider the jenny as a cause of this decrease. Those who did so consider

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1 Annals of Agriculture, ix, pp. 272-77.
2 Ibid., pp. 353-54.
3 Most of Mr. Young's correspondents in 1788 gave the rate of pay for hand spinning in their localities without making any mention of the jenny.
4 For instance, at Shrewsbury in Shropshire. Messrs. Baker operated the only manufactory in that town. "In the infancy of their undertaking, they found great difficulty in getting their wool spun: it is now wrought upon jennies." (Mr. Harries in ibid., pp. 308-09.) A woman using a jenny earned 8s. to 11s. per week.

it probably thought, as Mr. Young's correspondent did, that "the evil will be irremediable".[1]

But to return to the West Riding. As suggested, the use of the jenny contributed to the reduction of pay to the hand spinners in counties other than Yorkshire and Lancashire, and in a remote way thus tended to displace female workers. In Yorkshire there were not many complaints on the part of women, but there were complaints that the jenny had displaced children. Before the jenny, children had started spinning at the age of 7.[2] In those days "almost all the children used to spin".[3] But afterwards there came to be great unemployment among children.[4] The Yorkshire domestic clothiers were saddened by this (also caused by other machines used for the

1 The Rev. Jonathan Carter of Flempton, ibid., p. 326. The Rev. Mr. Carter was not sure that the low rate of spinning arose from the competition of jennies, but manufacturers had told him so. The manufacturers felt they needed cheaper, machine-spun yarn if they were to compete with Yorkshire. Another correspondent, John Heigham, Esq., of Hunston, wrote (ibid., p. 335): "If the trade be lost--if it be hereafter performed by mills and machinery, what is to supply such a defalcation from the present earnings of the poor?--Not, surely, rates: The occupier of lands already staggers under their weight. New branches of manufacture must be sought out . . . and the poor reconciled to them." Arthur Youhg heartily endorsed this eloquent statement.

2 Evidence on Woollen Trade, 1806, p. 79. William Hirst, the Huddersfield clothier who claimed to be the first to introduce the mule into the woollen trade, was "put to earn my own bread" at the age of 7, spinning worsted on the hand wheel. (Wm. Hirst, History of the Woollen Trade for the last Sixty Years, etc., Leeds, 1844, p. 5.)

3 Evidence on Woollen Trade, 1806, p. 73.

4 "Is there no employment [for children] in attending on the jenny?--Yes, but it is not every poor man who has a jenny." (Ibid., p. 79.)

preparatory processes[1]) but they were still convinced that the jenny's use, on the whole, was beneficial.[2]

So much for the jenny in the West Riding. It was the easiest conquest of all for the jenny, or for any other major pioneering textile machine. The story of its conquest is not eventful, but still significant.

In the South-West

An attempt was made to introduce the jenny into the South-West only a few years after it had been invented. This was in Somersetshire in 1776.[3] The machine(s) had been placed in a Shepton-Mallet poor-house, possibly because the inmates there could more easily be persuaded to operate it, but this proved an inadequate sanctuary. Woollen operatives of all descriptions assembled one July evening with the alleged intent of pulling down the houses and taking away the lives of those persons who encouraged and promoted the use of the machine. The clothiers called three magistrates, who whiled away their time in a public inn, their presence deterring the mob. The operatives persisted, however, and when, at 2 o'clock the next morning, two of the magistrates left the town, these operatives moved in, destroyed the machines and "committed other injuries, to a very considerable amount". Meanwhile the remaining magistrate rallied the military. The soldiers seized five "ring-leaders"[4] and a desperate early morning engagement ensued

1 Infra, p. 145.
2 Evidence on Woollen Trade, 1806, passim.
3 Annual Register, xlx, Chron., p. 161. See also Evidence on Woollen Trade Bill, 1802-03, p. 67.
4 This term was used loosely during the period. It was applied

over the possession of the prisoners. Allegedly spurred on by women, possibly spinsters, the boldest operatives began hurling rocks, and after bearing this with "uncommon fortitude and moderation" the soldiers finally fired, killing one man and wounding six. The military remained in possession of the field, with seven wounded.

Memory of this episode lingered on in Somersetshire and the operatives carried their grievance to Parliament that fall.[1] This, it will be recalled, was four years before the cotton spinners of Lancashire took their complaints to the legislature. Some years before the Somersetshire operatives petitioned, Parliament had had to deal with a similar machine-breaking incident.

In 1767 a London merchant, Charles Dingley, had erected a wind sawmill,[2] which worked thirty-six saws at one time,[3] at Limehouse. The sawyers disapproved and in the forenoon of May 10, 1768, four or five hundred persons destroyed the mill[4] "on pretence that it deprived many workmen of employment".[5] Mr. Dingley promptly petitioned Parliament, alleging that authorities had failed to show proper zeal in defence of his property and praying for "Protection and Encouragement to

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to whomever the authorities could lay their hands on, usually the least fleet of foot.

1 J.H.C. 36, p. 7.

2 Annual Register, x, Chron., p. 85. Such sawmills had been known in the Middle Ages and had been unsuccessfully introduced into England in the 17th century. (John Beckmann, A. History of Inventions, Discoveries, and Origins, London, 1872, vol. 1, p. 229.)

3 J.H.C. 32, p. 194.

4 Ibid., p. 15.

5 Annual Register, xi, Chron., p. 108.

repair immediately his Mill".[1] Without tangible encouragement, he repaired the mill, which had originally cost about 4500 pounds, for a cost of about 1000 pounds.[2] Next session he again petitioned the legislature and the main burden of his message was that he had "used his utmost Endeavor to bring the Offenders to Justice; but is advised the Punishment, for such Outrage, can only be as a Misdemeanor at Common Law".[3]

Before committee Mr. Dingley produced a gold medal from the Society of Arts "to shew the general Approbation" of the enterprise from which he conceived "great Utility and Benefit might arise to this Country". One witness testified that "all things of that kind was for the public Good; but it does not employ so many men".[4] Parliament wholeheartedly adopted Mr. Dingley's point of view and agreed to a sum not exceeding 2000 pounds as recompense to him and reward "for having erected and brought to Perfection, for the Benefit of the Public" the mill in question.[5]

Further, the legislature enacted legislation establishing the death penalty for any person or persons who should thereafter "demolish or pull down or begin to demolish or pull down, any Wind Saw Mill, or other Wind Mill, or any Water Mill, or other Mill".[6]

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1 J.H.C. 32, p. 115.
2 Ibid., pp. 160, 194.
3 Ibid., p. 160. One of the rioters, John Smith, was sentenced to suffer seven years imprisonment in Newgate, to pay a fine and to enter into recognizance for his good behavior, on January 10, 1769. (Annual Register, xii, Chron., p. 66.)
4 J.H.C. 32, pp. 15, 194.
5 Ibid., p. 240.
6 9 Geo. III c. 29. The act was quite in the spirit of numerous

The legislature had not concerned itself with the labour-saving implications of the saw mill. It had only acted in a way consistent with the tradition of legislation on riots and the destruction of industrial implements. Those who testified before the legislative committee had urged that such machinery was a public good, as did all inventors of the century and before. But this argument, that machinery effected "savings for the public", did not go very deep. Very few legislators, if any, understood that machinery could create problems of seriousness and scope. The thing that immediately struck their eye was the fact that the operatives had committed an outrage and by doing so had immediately put themselves in the wrong.

As to the plea of the Somersetshire spinners, Parliament expressed itself quite definitely and arbitrarily. It refused to accept the petition. Thus, in two instances before 1780 the legislature had made decisions on matters involving the use of machinery, but these decisions supply evidence only that Parliament was predisposed to defend machinery because it was property.

The operatives seem to have done something towards accomplishment of their end, however. The introduction of the jenny was postponed from fifteen to twenty years. During this period the South-West seemed unaware of the jenny, then being

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previous acts setting the death penalty for unlawful combinations, destruction of textile goods and destruction of tools, tackle and utensils. (E.g., 6 Geo. III c. 28, 12 Geo. I, c. 34.) Such disturbances and destruction arose out of ordinary disputes between masters and men, but this act was a consequence of a riot directed at the machinery itself.

used in the West Riding.

During the next decade, 1780 to 1790, some enterprising clothiers may have taken up the machine in some scattered places, but most of the notices of its introduction cluster around the date of the beginning of the war. Jennies seem to have been cautiously and gradually introduced into Trowbridge (Wilts) before 1790[1] and were being used in Barnstaple, Ottery S. Mary and Wellington, widely separated points in Somersetshire, in 1791,[2] as also in Exeter.[3] Between 1790 and 1794, they were introduced in Frome, Shepton[4] and Taunton (Wiltshire), in this latter place with "considerable spirit and perseverence".[5] A few jennies were introduced in Stapleton (Gloucestershire), not a clothing town, before 1796.[6]

These notices and the context of other evidence indicate that the jenny was quite generally used in the South-West before 1795. The general statements of workmen appearing before Parliamentary committees during the next decade provide ample evidence that the spinning jenny conquered the South-West before the turn of the century.[7] Most of the workmen associated the coming of the jenny with the war and the general expansion of the trade which took place during the ten years or more

1 F. M. Eden, The State of the Poor, London, 1797, iii, p. 802.
2 Annals of Agriculture, xv, p. 494.
3 T. Davis, General View of the Agriculture of the County of Wilts, London, 1794, pp. 55, 140, 154.
4 Annals of Agriculture, xv, p. 494. J. Billingsley, General View of the Agriculture of Somerset, London, 1792, pp. 90-91.
5 Ibid., p. 167.
6 Eden, op. cit., ii, p. 209.
7 Evidence on Woollen Trade Bill, 1802-03, pp. 14, 67, 68, 88, 95, 213.

before the Peace of Amiens. As one Wiltshire workman said, "We kept at work at Trowbridge without Machinery; during the war we had Spinning Machines". When he was asked if persons owning machinery carried on the trade during the war while others could not, he replied, "No, I know of no Circumstance of the kind; we went on very well with our Trade during the War, we have not had so good a Trade since the Peace".[1]

Favourable conditions for introducing machinery existed before the war began, however. One of Arthur Young's correspondents wrote in 1788: "When I observe, that the clothing trade is in a flourishing condition, I do not say this from an intimate knowledge of the state of the trade. But I know that a very considerable Wiltshire clothier, from a great distance, lately wished to put out spinning in this place [Pucklechurch, Gloucestershire], where the hands were before full of work, that the same person has opened a spinning house, at a still greater distance from his residence, and that he wants to introduce the spinning machines."[2] To take care of his increased trade, this clothier was being forced to extend his operations over impossible distances. The difficult of this supplied him with an incentive for introducing machinery and the increase in trade made it less likely that workmen, being busy, would object.

The example of the West Riding was a spur. "The assistance of machinery was had recourse to by the manufacturers of Frome

1 Evidence on Woollen Trade Bill, 1802-03, p. 213.
2 Annals of Agriculture, ix, pp. 298-99.

and Shepton from absolute necessity; for had they continued in the old method, their trade must have been lost, and indeed now the north country manufacturers are beforehand with them, particularly in the application of water, the best 'primum mobile' of all machinery." So wrote the gentleman who surveyed the agriculture of Somersetshire for the Board of Agriculture in 1792, echoing the manufacturers' chief argument.[1]

From 1792 on the trade expanded. Except for an unsettled time when the war began, covering part of 1793 and 1794, and for another time, 1797 and 1798, when Spanish wool could not be obtained, the woollen trade prospered greatly in the decade leading up to 1800. One of the early signs of pressure was the difficulty found in buying wool the latter end of 1792. The material was going into woollen goods for the French army.[2] During the ensuing years the war, with its demand for army cloth and blankets, was a powerful influence on the woollen industry.[3] In the West Riding the number of yards of broads increased from 5.1 million in 1790 to 8.8 million in 1799.[4] The increase, of course, was not perfectly regular. The year 1792 was a great one.[5] Then trade declined from that height, as mentioned.[6]

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1 Billingsley, op. cit., p. 91.
2 Accounts and Papers, 1800, Minutes of Evidence Relating to Wool, (1020, 3), p. 4.
3 H. Heaton, Benjamin Gott and the Industrial Revolution in Yorkshire, The Economic History Review, vol. 3 (1931-32), p. 54. Evidence on Woollen Trade Bill, 1802-03, p. 102.
4 Minutes of Evidence Relating to Wool, p. 11.
5 Ibid. Also Annals of Agriculture, xx, pp. 215-16. Arthur Young wrote, "The increase in this staple manufactory of our country, would appear almost incredible!"
6 Minutes of Evidence Relating to Wool, p. 11, and Annals of Agriculture, xxii, p. 640. Mr. Young said, after mentioning that the decrease amounted to nearly one-eighth: "No farther comment is necessary--it will shew the effect of this war."

The years 1795 and 1796 were extremely prosperous. They were followed by a decline in the next two years (but the volume of trade was still greater than that of 1792), and 1799 was the greatest year ever and 1800 looked rosy.[1] The pattern of trade in the South-West must have closely resembled that of the West Riding, though it is impossible to generalize for the entire area of the South-West. Parts of the South-West differed in the kinds of goods manufactured and in their mechanical equipment. At least the marvelous increase over the ten-year period was acknowledged by practically all parts and by all persons involved in the trade.[2]

Yet the spinning jenny caused uneasiness among work people in most places when it was first brought into use.[3] Conditions of trade varied from time to time and in different localities and any change was liable to be attributed to the machines. Thus in Trowbridge some persons partly accounted for the lowering of the poor rates by citing the introduction of machines "by which better wages are earned".[4] Persons at Frome at the same time (1795) held a "diametrically opposite" opinion. Despite the general attitude of suspicion towards the jennies,

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1 Minutes of Evidence Relating to Wool, p. 11. The year 1800 turned out to be greater than 1799.

2 That is, all parts of the South-West. A manufacturer of Bocking in Essex told of a great decline there. "The War in one Measure, and the Establishment of Machinery in other Parts of the Country, has destroyed our Trade." (Minutes of Evidence Relating to Wool, (1020, 2), p. 38.) There was also a decline in Surrey (ibid., p. 39) and, presumably, other "outlying" districts. Of course, the stuff trade did not prosper during these war years.

3 Supra, p. 115, footnotes 1-6.

4 Eden, op. cit., p. 802.

it appears that they did not cause any serious riots.

During these expansive times, most areas prospered. But the effect of the jenny, as in the case of the West Riding, was to concentrate the spinning about the towns and villages where the other processes of the trade were carried on. In these towns and villages probably as many and possibly more persons kept at the business of spinning, earning better wages, as at Trowbridge. Even if some spinners were displaced, they quickly found employment in other branches of the trade. But the outlying districts suffered. In northeast Cornwall, for instance, earnings by spinning had declined in 1794-95, "owing to the wool-staplers using spinning engines, near their place of residence, in preference to sending their wool into the country to be spun by hand".[1] A poor woman with two small children, formerly earning fourteen pence per day, could afterwards earn no more than ten pence. Many of them became unwilling to "rival a woollen jenny". The competition of the jenny first ousted the inferior spinners and created a demand for finer threads so that the spinners who wished to compete, being paid by the pound, had to perform more work for the same money.[2] The practice of carrying the wool out great distances to the spinners became uneconomic and declined rapidly. It is only natural that this profound change in the industry should be little noted in the centers of trade, enjoying their prosperity. The story can only be learned by studying the reports

1 Annals of Agriculture, xxvi, p. 19.
2 Ibid., xv, p. 585.

of those persons who investigated the country districts.

It is only natural, too, that the attitude of spinners in remote parts should have little effect in deterring the introduction of machinery in these centers. An organized, and to some degree effective, sentiment against machinery prospered only in Wiltshire. A large district in the southeast of this county had no manufactures and depended almost entirely on spinning wool, carried there by clothiers from Bradford, Trowbridge, Devizes, Melksham and even from Gloucestershire and Somersetshire.[1] The attitude of people in this district was clearly antagonistic to machinery before the jenny was introduced into Wiltshire, and it must be remembered that the spinners had been in some distress for several years before 1788.[2] In 1791 the manufacturers prepared some "Observations" recommending precautionary measures that would protect the clothiers and persuade the work people of the "absolute necessity of an extension of the use of Machinery in the woollen business, to preserve that trade in the county of Wilts". These Observations, "sanctioned by the approbation of a respectable clergyman, were delivered by him to the Justices of the Peace, when assembled at the county sessions".[3] This seems good evidence of a concerted effort by the clothiers, aware of strong

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1 Davis, op. cit., p. 155, and Anstie, op. cit., pp. 11-12.

2 In 1788 Governor Pownall wrote that "our manufacturers and merchants must either be content with less profit, so that the labourers may have a share sufficient to live on; or the business of spinning must be done by machines, or the manufacture break up." (Annals of Agriculture, x, pp. 545-46.)

3 Anstie, op. cit., pp. 5-6.

opposition, to introduce jennies and scribbling machines at this time. There are various vague references to riots in Wiltshire in 1792 or thereabouts over the introduction of machinery, one, at least, starting with the burning of a scribbling machine.[1] The clothiers managed to introduce their machinery, despite the feeling in the county.[2]

When the "far greater part of Clothiers" in the towns of Wiltshire and other counties ceased carrying wool to the eastern district of Wiltshire, the spinners living there could find no work. Mr. John Anstie, a clothier of the county, who himself had made strenuous efforts to promote machinery, wrote that "their situation at that time was truly distressing to the feelings of humanity" and that "the warmest advocate for the introduction of machinery . . . could not but be anxiously desirous of devising means for their being employed".[3] In Seend the poor could formerly obtain a shilling or 1s. 2d. a pound, before machinery, but in 1796 they could only get 5d. a pound (a good day's work). The spinners scarcely had the heart to earn the little they could obtain. Eden wrote that

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1 James Bischoff, A Comprehensive History of the Woollen and Worsted Manufactures, London, 1842, vol. 1, p. 315, and infra, p. 136.

2 At the time scribbling and carding machines were introduced, the clothiers ought to have confined spinning of wool by jennies to the excess of quantities which the improved state of the manufacture might have required, Mr. Anstie believed. And they should have reduced the price of spinning by agreement, which could have been effected through the wool being given to the spinners in an "improved carded state". Thus "the evil would have been greatly abated". Some clothiers took these precautionary measures, but they failed because all of the clothiers would not cooperate. (Anstie, op. cit., pp. 56-57.)

3 Ibid., p. 12.

the reduction in the price of spinning was more severely felt in some neighbouring corn parishes than in Seend itself.[1] At Pewsey the competition of machinery was said to have meant a rise in the poor rates to 15s. in the pound.[2] Landholders tried to introduce new kinds of employment for the poor and offered bounties to manufacturers equal to what might be saved by spinning it "at home" by machines.[3] But such efforts were makeshift and not enough to save the situation or deter the manufacturers. The coming of machinery had brought misery to Wiltshire and the work people could hardly be blamed for disbelieving the clothiers who argued that more machinery was needed in the county.[4]

This suffering among the spinners supplied the "grand source from whence . . . sprung the opinions generally entertained in the county of Wilts, adverse to the utility of machinery".[5] The opinions of the spinners were remarkably general. "The concurrence of unfavourable circumstances," Mr. Anstie wrote, "which it might be difficult, even with the utmost caution, to glance at, did, however, most assuredly operate in influencing the judgments of persons of real understanding, and of different political principles, to attribute merely local or accidental effects, as they respected the miseries of

1 Op. cit., vol., 3, p. 796.
2 Reports of Society for Bettering the Condition of the Poor, vol. 4, p. 82.
3 Davis, op. cit., p. 155.
4 Though this argument was valid in the main. Wiltshire was in danger of losing its trade to Yorkshire and also to Gloucestershire. For Anstie's opinion of this see op. cit., pp. 15, 18-19, 23.
5 Ibid., p. 14.

the poor, to the introduction of machinery simply".[1] Mr. Anstie made a most valuable estimate of the feeling of the time in Wilts. The "prejudices of the work people" were "sanctioned in general by the opinion of a great majority of landholders and other persons," he related. Many "persons of respectability" in the county proposed, at the time, to apply to the legislature in order that machinery might be suppressed entirely, not only in Wiltshire but throughout the whole kingdom. Mr. Anstie did not doubt that, "had the opinion of the county been taken at that time, . . . it would have been in favour of the measure"[2] and acknowledged that such a measure would have been supported by "particular towns" outside of the main clothing district.[3] Happily for the clothiers, the persons of respectability did not promote the measure they discussed.[4] But the anti-machinery attitude persisted in Wiltshire and was a great obstacle to the clothiers in the next decade when they tried to introduce more machinery under less auspicious general

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1 Ibid., p. 20, footnote.
2 Ibid., pp. 20-22.
3 "The writer is not, at present, prepared to speak to the actual state of the county of Devon; but if not greatly mistaken, no part of the kingdom would be more benefited by the introduction of machinery." (Ibid., p. 21.) Such an argument was valid in the sense that areas that did not take up machinery could no longer compete against other areas, particularly the West Riding. Machinery was certainly an essential defensive weapon. But Mr. Anstie no doubt believed that the adoption of machinery would automatically enable these areas to compete and to participate in an increased volume of trade which machinery created. Many manufacturers held this belief in the therapeutic effect of machinery.
4 Mr. Anstie had great faith in the sagacity of the legislature. Had the petition been brought up, "certainly it cannot be difficult to determine what the decision of the House of Commons would have been on such an occasion". (Ibid., p. 21.)

circumstances.

The spinning jenny, however, made its way into the South-West. The compulsion of the national market for spinning and for woollen goods made it inevitable that if spinning was to be done at all, in any particular area, it was to be done with the jenny. It seems most likely that it was generally used in Wilts before 1795, but that more of them were put into use after that date. The use of such machines was definitely tied in with increases in the volume of trade, by workmen, clothiers and merchants.[1] After the scarcity of Spanish wool from 1797 to 1799, the large importation that followed was said to have "called for the increased introduction of machinery".[2] By 1800 some masters still used hand spinning,[3] but machine spinning was the usual thing. No one spun except by the jenny at Shepton Mallet, where the riot over its use had occurred in 1776, and, as a workman said, "we have no objection".[4] It was then quite generally acknowledged that the increased trade could not have been supported without the use of the machine.[5]

The further career of the spinning jenny was not altogether uneventful. During the 1816 rising in the eastern counties, labourers attributed their misery partly to the untimely introduction of the jenny[6] and the following incident took place (as related by the Annual Register):

1 Evidence on Woollen Trade Bill, 1802-03, pp. 95, 152, 267, 269, 308, 383.
2 J.H.C. 58, p. 889.
3 Evidence on Woollen Trade Bill, 1802-03, p. 14.
4 Ibid., p. 68.
5 Ibid., pp. 141, 267, 307-08, 349.
6 H.O. 42/151 (June 7).

> Bury [Sussex], May 22. On Wednesday evening a number of persons assembled in a riotous manner before the house of Mr. Wales, hosier, in the butter-market of this town, demanding that he should give up a machine called a spinning-jenny (by the use of which they imagined themselves aggrieved), and threatening destruction to his premises in case of refusal; but by the firmness of Charles Bloomfield, Esq. assisted by the other borough magistrates, and many respectable inhabitants, the intentions of the mob were happily frustrated, and they at length dispersed, although it was found necessary to keep the staff establishment of the West Suffolk militia . . . upon duty all night. In consequence of these tumultuous proceedings, a meeting was next day convened by the alderman (T. Foster, Esq.) at the Guildhall, which was very numerously attended (notwithstanding the shortness of the notice), and every one came forward with the utmost alacrity to support the civil power; upwards of 200 special constables being sworn in, a party of whom have nightly patroled the streets; and we have the satisfaction to state, that no further attempt has been made to disturb the peace of the town.[1]

This disturbance occurred a little less than 50 years after the jenny first spun cotton and incurred the enmity of the Oswaldtwistle weavers, and only a few years before the jenny finally retired in favour of the mule. This simple cottage machine created by James Hargreaves probably directly affected the welfare of more work people than any other machine of the Industrial Revolution. It stirred up a good deal of opposition, but its low cost, extremely great productivity and the superiority of its produce made its adoption quick and general after it managed to penetrate into an area.

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1 lviii, Chron., p. 70.

CHAPTER VII: THE PREPARATORY PROCESSES

Scribbling in the West Riding

After spinning was being done by the jenny, the next processes to be undertaken by machinery were those of scribbling and carding. Carding was a process of "brushing" the washed wool so as to straighten and intermingle the woollen fibres, after which they could be drawn out and twisted slightly into a thick and soft "rope" in the slubbing, and later spun into yarn. The carding was done by handworkers using "cards", that is, hand instruments built on the same principle as the brush, with wire bristles. The process had to be performed several times before the wool was ready for the slubbing. The first carding was called "scribbling".[1] This scribbling, the first of the preparatory processes, started the procession of those processes out of the homes of the workers and clothiers and into the mills.

Scribbling by hand was not a healthy, remunerative or dignified form of employment. On the contrary, it was laborious and unpleasant.[2] As a Dursley clothier put it, "the Scribblers used to work in Bodies, and very close together, and on Wool that from the Oil and Smell became quite Obnoxious; they were

1 See Crump, op. cit., pp. 18-19.
2 Evidence on Woollen Trade, 1806, pp. 160, 162, 194, 197. Although the evidence is contradictory, it appears that scribbling was often done by hand in the cloth-makers' houses. (See ibid., p. 160, and Evidence on Woollen Trade Bill, 1802-03, p. 299.)

a poor, sickly, decrepid Race of Beings".[1] So far as able-bodied men did the scribbling they were a very low class of people, but scribbling was the resort of many persons who were advanced in age or disabled by accident or misfortune.[2]

The scribbling machine was, in principle, the carding machine taken up by the cotton industry between 1770 and 1780, and, like the jenny, it came to Yorkshire from Lancashire. The hand scribblers believed (in 1786) that "upon a moderate computation" four men could do as much work with the machine as 10 by hand.[3] Later on (in 1794) the Gloucestershire scribblers represented that one machine, attended only by one man and a boy, could do as much work as 20 men by hand.[4] The machine was no doubt improved during those eight years. But it was not possible to compute the displacement of workers exactly;[5] the machines varied in size[6] and thus in capacity. At first they might be small and might be operated, by hand or gin, on the premises of a few enterprising clothiers.[7] But they

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1 Evidence on Woollen Trade Bill, 1802-03, p. 308.
2 J.H.C. 49, p. 599. (Petition of clothworkers and wool scribblers of the county of Gloucester.)
3 Leeds Mercury and Leeds Intelligencer, June 13, 1786 (see Crump, op. cit., pp. 315-16).
4 J.H.C. 49, p. 600.
5 Workmen often had very vague ideas on the capacity of machines, which were mostly based on hearsay. Most of them had never seen the machines they complained about. Some ratio, e.g. one man doing the work of 20, was invariably seized on and this capacity attributed to all machines of the type. Their practice in this matter shows their need to simplify the issues.
6 Scribbling machines were sold for a pound per inch of cylinder, carding machines for 16s. per inch of cylinder. (Crump, op. cit., p. 213.
7 The first scribbling machine in Bramley, at Ross Mill, was a "single one without breast or crank". (Wilson, op. cit., p. 46.)

went into the mills early. An advertisement in the Leeds Mercury in November, 1781, offered two scribbling mills, called Guisely Mills, for sale.[1] Scribbling was the first of the processes in the woollen trade to receive water power, except for the fulling, which had been done by water for centuries.[2]

Mechanical scribbling was taken up rapidly. Two scribbling machines had been put into use at Huddersfield before January, 1779.[3] The primitive nature of these machines[4] indicates that mechanical scribbling was only in its beginnings at this date. The German who had been apprehended in February, 1781, for trying to take out a jenny[5] had also intended taking out a model, being made at Armley, of a scribbling machine. The scribblers said in 1786 that there were no less than 170 scribbling machines in an area extending 17 miles southwest of Leeds. They believed that the number of machines in other parts equalled those in this southwestern area, making a rough total of 340.[6]

Most of the clothiers testifying before the Parliamentary committee of 1806 remembered that the scribblers were alarmed at first by the appearance of scribbling machinery, thinking it would take work from them.[7] The quality argument had come up.

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1 Leeds Mercury, November 6, 1781 (see Crump, op. cit., p. 315).
2 H. Heaton, The Yorkshire Woollen and Worsted Industries, Oxford, 1920, p. 22.
3 Advertisement in Leeds Mercury, January 26, 1779 (see Crump, op. cit., p. 314).
4 They had "pairs of cards", as used in hand carding, on rollers, not the long fillets which Arkwright had introduced into the cotton trade. (Ibid., p. 9.)
5 Supra, p. 104.
6 Leeds Mercury and Leeds Intelligencer, June 13, 1786 (see Crump, op. cit., pp. 315-16).
7 Evidence on Woollen Trade, 1806, pp. 73, 96, 132, 160, 194.

"The scribblers, who were in the habit of scribbling by hand, thought, and many Clothiers thought, it could not be well scribbled by machinery," a Leeds merchant recalled.[1]

It seems likely that the scribbling machine provided inspiration for a riot occurring at Hunslet (a village on the outskirts of Leeds) in 1780. The disturbance must have been serious, for a party of soldiers was called to quell it.[2] Hunslet was the home of Mr. Burrow Copley, a pioneer user of scribbling machinery, and, later, of slubbing machinery.[3] Quite possibly personal animosity towards Mr. Copley helped bring about the affair.

But the climax of the struggle in the Leeds area between the scribblers and the promoters of machinery came in 1786. On June 13 of that year a "humble address and petition" of "thousands" of cloth workers appeared in the Leeds Mercury and Leeds Intelligencer. This petition narrated that there were 170 scribbling machines within 17 miles of Leeds, as has been noted, and calculated the number of men these displaced. It reasoned that 4000 men had been left to shift for work or, allowing one apprentice for each family, a total of 8000 hands.[4] It brought up the quality argument: "the injury to the Cloth is great, in so much that in Frizing, instead of leaving a nap upon the cloth, the wool is drawn out and the Cloth is left thread-bare." There was probably a little, but not much, to this

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1 Ibid., p. 162, testimony of Mr. John Hebblethwaite.
2 Ibid., p. 81.
3 Infra, p. 144.
4 A theoretical calculation based on the workers' idea of the machine's capacity.

quality argument.[1] They attributed the unemployment of children to these machines and spoke of the social consequences of this: "it is no wonder to hear of so many executions; for our parts, though we may be thought illiterate men, our conceptions are, that bringing up children to industry, and keeping them employed, is the way to keep them from falling into those crimes, which an idle habit naturally leads to."

The most striking feature of the petition is its touching statement of the plight of the displaced worker, which accurately represents the feelings of insecurity and despair created by the appearance of machinery:

> Some say, Begin and learn some other business.--Suppose we do; who will maintain our families, whilst we undertake the arduous task; and when we have learned it, how do we know we shall be any better for all our pains; for by the time we have served our second apprenticeship, another machine may arise, which may take away that business also; so that our families, being half pined whilst we are learning how to provide them with bread, will be wholly so during the period of our third apprenticeship.[2]

They wanted the machines forbidden. They appealed to the feelings of humanity of those who had power to forbid the use of instruments so prejudicial to their fellow creatures, and threatened, if the machines continued in use, that a "depopulation must be the consequence; trade being then lost, the landed interest will have no other satisfaction but that of being last devoured."

Some of the statements in this petition were controverted

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1 The criticism expressed in the quotation given above is very curious. It sounds like a criticism of the work of a gig mill, but it cannot be.

2 Excerpts from this petition can be found in Crump, op. cit., pp. 315-16.

in the next week's issue (June 20) of the Mercury by "A Well Wisher to the Woollen Manufactory". The author of this letter admitted that there were probably 170 scribbling machines in the area but represented that 120 or 130 of them were very small, each able to do no more work than that which could be done by four hand workers. He mentioned that those driven by water power were often put out of action for lack of water. Very few could work more than half the time and, during a dry season, some could work no more than four hours out of the twenty-four. On the other hand, he stressed the productivity of the new machinery, he stressed the happy effects of the use of other machines, citing, as examples, the spring loom and the spinning machines. These two machines had not been in use for very many years in the West Riding and the Well Wisher's mention of them in this connection demonstrates how quickly they were accepted.

There can hardly be any doubt that this Well Wisher truly wished well to the woollen manufactory. He was none other than our friend Mr. Copley, who was operating, at that time, several of the scribbling machines. His name leaked out and a polemic, prepared by the authors of the petition, appeared in the next issue of the Mercury headed "An Answer to Mr. Copley's False Arguments in Behalf of Scribbling Mills". In this answer the scribblers expressed surprise "that any individual (especially one who calls himself a Clothier) should enter the lists". They deprecated Mr. Copley's claim to the title of clothier and then made this most interesting assertion:

"we are happy to say that out of 1,700 that attends Leeds Cloth Hall, all agree that they [the scribbling machines] ought not to be used, except about nine." If this statement was substantially true it would show a conservatism among the clothiers for which there is some other evidence[1] and possibly support the argument that the work of early scribbling machines was defective. But it is hard to reconcile this statement with the existence of 170 scribbling machines.

In 1806 West Riding merchants remembered that there had been fears among their bretheren in the early days, fears that mechanical improvements would ultimately hurt the trade.[2] But the merchants did not put up any significant opposition to machinery and appear to have been open to proof that the machines could do the work more efficiently. Short-term gains may have overcome long-term fears, for the West Riding took up the general use of scribbling machines very quickly. After the newspaper debate of 1786 the scribblers, apparently, did not cause any further disturbances. They found other, cleaner and more remunerative employment,[3] and seemed quite contented with the new development. In 1791 the scribbling mill was the accepted thing around Leeds.[4] West Riding trade expanded during the 1780-90 decade and especially in the decade following,

1 Evidence on Woollen Trade, 1806, p. 219.
2 Ibid., testimony of Mr. Jn. Waterhouse, Mr. Law Atkinson and Mr. Joshua Taylor.
3 Ibid., p. 162, testimony of Mr. John Hebblethwaite. Also, infra, p.
4 Proclamation issued by Leeds cloth merchants, November 18, 1791, quoted by H. Heaton, Benjamin Gott and the Industrial Revolution in Yorkshire, op. cit., p. 50.

during the war, and in this latter period machinery was thought to have nearly doubled, with new scribbling mills going up everywhere.[1] There came to be several scribbling mills near every manufacturing village.[2] In 1806 it was said that "for many years there has been no scribbling in any other way than by machinery".[3] That year a clothier, asked if the trade could be carried on without machinery, responded in this way: "I should be glad to know where we could find scribblers; none of the Clothiers of the present day would scribble."[4]

Considering the significance of its introduction, for it was the wedge that opened the way for the practice of ha ving all the preparatory processes done in mills, the scribbling machine caused surprisingly little trouble. Most of the scribbling mills were joint undertakings of the clothiers or were public mills to which the smallest clothier could take his material. A large number of persons, therefore, could benefit from their use. They fell into the pattern of the fulling mills, which were familiar to the West Riding, and thus they fitted conveniently into the domestic system. They affected, or seemed to affect, detrimentally only one class of persons, the lowly scribblers themselves.

1 Evidence on Woollen Trade, 1806, p. 94. Have scribbling mills increased in the two years before 1806? "They are certainly building almost every week in some part or other." (Ibid., p. 195, testimony of Mr. Joseph Stancliffe.)
2 Ibid., p. 9.
3 Ibid., p. 162.
4 Ibid., p. 160, testimony of Mr. John Hebblethwaite. It was asserted that at that time everyone in the trade would join in defending the machinery used in the preparatory processes. (See proclamation cited above in Crump, op. cit., p. 318, and Evidence on Woollen Trade, p. 195.)

And so, mechanical scribbling was taken up, with little disturbance or hesitancy, in the decade 1780-90 throughout the West Riding. Did the domestic system especially favour the introduction of machinery? It favoured the introduction of small machines, which were within the reach of the capital of small operators, since, we may suppose, the advantages of such machines were quite generally distributed among the persons following the trade. And it favoured the larger machines that could be placed in the public mills for the use and benefit of all, in the tradition of the fulling mills. But when machines began to be gathered into factories the attitude of the West Riding domestic clothiers was modified by their attitude towards the factories which, it seemed, would tend to eliminate the small operators. They had enthusiastically taken up spinning machinery and machinery for the preparatory processes. In 1806, however, before a Parliamentary committee, they acknowledged that machinery had been a benefit, but they did not extol it, nor did they look forward to the extension of the uses of machinery with happy minds. This may have had some bearing on the fact that, while the West Riding pioneered in adopting certain kinds of machinery, it took up the use of gig mills later than Gloucestershire.[1]

Mechanical scribbling was taken up in the South-West in the decade 1790-1800, the number of years intervening between its general use in the two places being something less than 10. It is convenient to explain this difference in time by

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1 There were other, more important, factors, however. (<u>Infra</u>, pp. 182-222.)

alleging that the clothiers in the South-West were less progressive and more restricted by old trade practices than their northern counterparts. These probably were not decisive reasons. Some clothiers in Wiltshire were certainly conservative, the workmen were capable of taking concerted action to maintain apprenticeship rules and so forth, but still some clothiers in the county made efforts to introduce machinery against the strong opposition of the workmen. Gloucestershire clothiers were quite disposed to take up the use of machinery. The "capitalistic" organisation of the industry in the South-West, of course, may have made the workmen less inclined to concur in changes proposed by the clothiers than the West Riding workmen.

But it is a very important fact that the West Riding benefited by its nearness to Lancashire. The cotton trade was carried on side-by-side with wool in towns like Halifax and in villages near Lancashire. It was easy and natural to carry on experiments with the cotton machinery on wool in these towns and villages. Quite a few workers in these places switched from wool to cotton and from cotton to wool, as one trade and then the other offered better pay.[1] These workers gradually grew accustomed to machinery and at the same time developed some skill in its use. Another fact was that the West Riding had a worsted trade that was getting more and more business away from Norwich. Workers also switched to and from worsted, as conditions varied. These industries, cotton and worsted,

1 Ibid., pp. 150, 400, 421, and Evidence on Woollen Trade Bill, 1802-03, pp. 240, 293-94.

acted as cushions for the woollen industry, absorbing to a degree the shock of changes and fluctuations in that industry.

In the South-West

While the West Riding took up scribbling and spinning machinery in one bound and then attempted to take up dressing machinery in another (which will be described later), the South-West tried to mechanize all these processes in little over a decade.[1] This complicates the picture in the counties of Wiltshire, Gloucestershire and Somersetshire, for while workers were arguing against the scribbling mill they were at the same time worrying about the gig mill.

The scribbling machine seems to have gone into Wiltshire before the other counties in the South-West. Mr. John Anstie made the assertion that the clothiers in his county had "more generally" begun to scribble wool by machinery in 1791. At that time "serious apprehensions were entertained of the shearmen, and other persons employed in the woollen manufactory, committing fresh outrages on the property of those" who owned the scribbling machines.[2] A scribbling mill at Bradford in Wilts was burned down in 1790, 1791 or 1792, causing some alarm. The owner, Mr. Hill, afterwards moved to Malmsbury, further north, where he introduced and used all kinds of machinery.[3] Trade fluctuated during the years

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1 The gig mill had been used in Gloucestershire for many years before this time, which belies, to some extent, the general claim that the South-West clothiers and workmen were unprogressive. But in the 1790-1800 decade its uses were being extended in Gloucestershire.

2 Anstie, op. cit., p. 5.

3 Evidence on Woollen Trade Bill, 1802-03, pp. 81, 84-85.

mentioned, picking up in 1792. But anti-machinery sentiment was probably a more prominent cause of the riot than any badness of trade. The workmen in the Wiltshire clothing towns, particularly Bradford and Trowbridge, seem to have been predisposed to dislike machinery before the distress caused by spinning jennies affected public opinion in the county generally. The scribbling machine went into general use in Wiltshire, even in Bradford, but this was near the end of the decade.[1]

The machine was introduced into Gloucestershire in 1792, no earlier.[2] Most of the machines were water driven in this county and it was said that because of the expense only the "more considerable" clothiers could own them and to these the "inferior" clothiers sent their material.[3] In 1794 the scribblers of the county of Gloucester decided to protest, and they combined with the cloth workers, then fretting over the use of the gig mill, and sent a lengthy petition to the Parliament. There is no indication that the workmen of Gloucestershire were worked up more about the scribbling machine than the workmen of Wiltshire. The contrary is probably true. But the workmen of the former county did petition the legislature and their petition lends some insight into their attitude towards the new machine.

The machine, they represented, had disturbed the ancient and congenial arrangement by which the men did the scribbling,

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1 Ibid., pp. 181, 185. Also, Evidence on Woollen Trade, 1806, p. 305.
2 J.H.C. 49, pp. 599-600. See also, Evidence on Woollen Trade Bill, 1802-03, p. 299.
3 J.H.C. 49, p. 600.

the women and children the carding and spinning. There were many persons out of employ in Gloucestershire, they claimed, who would, of course, burden the parishes. The saving in expense brought about by the scribbling machine did not reduce the price of cloth but, on the contrary, increased it, and this led the petitioners to suspect that the great clothiers with the machines were making unreasonable profits and were engrossing work from the inferior clothiers as well as from the workmen. They observed that other branches of the business were involved in the contest. The card makers, the card board makers and wire drawers, they said, were "very immaterially affected by the before-mentioned machines".[1] Obviously they meant "materially" instead of "immaterially" and truly the card makers must have been concerned. We do not hear much about this class of workers, but they must have had to adapt themselves quickly to a transformation of their trade or get into something else.

The petitioners asked suppression of the scribbling and carding machines, or that these be limited to a certain number "as will not engross the whole of the Labour", or that the petitioners be given other relief. All three of the requests were impractical, of course, and the legislature probably took nothing but formal notice of this single petition.

There was no further trouble over the scribbling machine. Scribblers found work in other branches, particularly weaving.[2]

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1 Ibid.
2 Evidence on Woollen Trade Bill, 1802-03, pp. 162, 308, 318, 371.

Some boys were brought up to be shearmen, that is, cloth workers, instead of scribblers.[1] A Bradford clothier, Mr. William Howard, thought in 1806 that the objections to scribbling and carding machinery had not been completely removed and that this machinery was to blame for the fact that there were "so many boys running about the streets without shoes or stockings on and nearly half-starved".[2] This clothier was not so much objecting to scribbling machinery as to machinery in general. His attitude was, in his own words, "If this new mode of machinery was to become general, what are the workmen to do"? This attitude was important, and widespread. He, like many other persons, believed that, if machines kept growing in number, work would finally vanish from the face of the earth. This was Sismondi's celebrated winch argument, felt and expressed before Sismondi expressed it, that eventually a single king could by turning a winch automatically perform all the work done in England while the population died of hunger. It does not take into account the counter-argument of the infinite nature and diversity of men's wants which Nassau Senior tried to drum into people's heads. But Mr. Howard's stand was curious, too, because he wished to keep the machinerythen in use, only forbidding a further increase in the number of machines. He was a conservative, in the strongest sense of the word. Anyway, by 1800 machine scribbling was the universal practice in the cloth-making districts and the workers were reconciled

1 Evidence on Woollen Trade, 1806, p. 305.
2 Ibid., p. 307.

to it,[1] as was Mr. Howard, and some of them were even happy about it.[2]

Mr. John Wallington's statement on the scribblers, part of which was quoted at the beginning of this chapter on the scribbling machine, shows why they might be happy. "When the Scribbling Machine was introduced," this Gloucestershire clothier explained, "there was a great Clamour against it, the Manufacturers told them that they should have much better Employment, and they have been thrown into different Employments, such as Spinning; now they are dispersed in different Parts of the Manufacture they earn Seventeen, Eighteen Shillings, or a Guinea a Week, they are now clean and neat, and fit to associate with others in the Neighbourhood; it is known to all in the Neighbourhood, that there is a difference in their Appearance and Comfort."[3]

Mr. Wallington drew a strong picture. But he was a shrewd, well-informed observer and it can hardly be doubted but what the scribblers improved their condition, and quite quickly. Their protests had been made, in the West Riding at least and probably in the South-West, following actual displacement by the machines, or temporary unemployment. But these protests had been comparatively mild and the opposition to the machines was not sustained. There was very little skill involved in

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1 "'Machinery is an unpopular Cry in Wiltshire?'--'Yes. . . . We have no Gigs in Chippenham.' 'The term Machinery is an unpopular Word in Chippenham?'--'Certainly not, because there are Scribbling Machines.'" (Evidence on Woollen Trade Bill, 1802-03, p. 188, testimony of Mr. Harry Goldney.)

2 Evidence on Woollen Trade, 1806, pp. 187, 400.

3 Evidence on Woollen Trade Bill, 1802-03, p. 308.

scribbling,[1] thus no pride in the doing and no prestige for those who did. The scribblers commanded little respect in the community, although they received some sympathy, and of this community they were a small segment. Whatever other employment they could get meant improvement in working conditions and usually pay and social standing also. The important thing was that this other employment was available with the steady growth of the Yorkshire woollen industry after the American revolution and of the South-West woollen industry with the beginning of the war against France.

There was an important consequence of this displacement. When many of the scribblers became weavers they did not, and could not, become "legal" weavers, that is, weavers who had served an apprenticeship.[2] Their entrance into the weaving and other branches of the trade contributed to the break-down of apprenticeship, and in this way machinery, entering more or less under the auspices of laissez faire, contributed to the growth of laissez faire. The Parliamentary committee of 1803, investigating the wool trade, heard testimony that not one out of every ten weavers in Yorkshire had been apprenticed.[3] The same condition obtained in Gloucestershire; not so much so in Wiltshire. The scribblers, and workers displaced by other machinery, were not the only ones who became "illegal" weavers

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1 "The slubbing required some skill, but not so much skill as the weaving, or any thing of that sort; the scribbling also did not require so much." (Evidence on Woollen Trade, 1806, p. 68, testimony of Mr. Robert Cookson.)

2 Evidence on Woollen Trade Bill, 1802-03, p. 97.

3 J.H.C. 58, p. 392. Three clothiers said not one out of ten weavers had been apprenticed; one said not one out of twenty had been.

or other skilled workers, including cloth workers, but they must have formed a substantial part of the group.

Other Machines

The other machines performing preparatory processes followed in the wake of the scribbling machine. Scribbling was, as previously explained, the first carding, and the carding machine was simply a scribbling machine with finer cards. The acceptance of one implied acceptance of the other. The petition of the Gloucestershire scribblers, referred to above, indicates that the carding machine was introduced into their county at the same time the other machine was. They complained that the carding machine would do in one day as much work as 80 women could "industriously perform in a like Space of Time".[1] The Gloucestershire workers may have lumped both machines under the name of one in certain sentences of their petition, but there were probably not so many carding machines as scribbling machines in the first days.

In the West Riding the carding machine probably came into service sometime after 1786, although some few of them may very well have been used before then. It is difficult to say, especially since the carding machine *per se* seems to have created no disturbance. It is well to remember that the carding commonly was done by women. Whatever the case, the carding machine was overshadowed by its relative, the scribbling machine.[2]

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1 *J.H.C.* 49, p. 600.

2 "Did not opinions go forth, that the carding engine would do mischief in the manufacture?--Yes, there was a general apprehension among the lower orders, that they should be out of employ." (*Evidence on Woollen Trade*, 1806, p. 403, testimony of John Edwards, Esq.) The witness mentioned that all machines had caused this worry.

Another of the preparatory processes was called slubbing. It followed the carding and was a matter of taking the carded material and forming it into a rope, or a "roving", as it would be called in the cotton trade. It has been called the "first process of spinning" but the purpose of the slubbing was to draw out the yarn, not to twist it, for the direction of the twist was reversed by the jenny anyway.[1] The slubbing required little skill[2] and was done by the children mostly, and by "aged and decrepit people".[3-4] They used, for the work, a common hand spinning wheel, similar to that used for spinning wool but smaller.[5]

Now with spinning being done by the jenny and by the mule (in the cotton trade) and with cotton rovings being produced by the water frame, it was only natural that a machine should be devised to do this slubbing. Such a machine[6] was invented between 1783-86 by John Swindells.[7] It combined features of

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1 Rees' Cyclopaedia, (s.v. Woollen Manufacture), vol. 38.
2 Evidence on Woollen Trade, 1806, p. 68.
3 Ibid., pp. 30, 52, 45, 46.
4 Have new buildings in Pudsey been built on a larger and better principle? "On rather a better principle; for this reason, while the slubbing was followed at home, it took the younger part of the family, they wrought in what we call the house-body; as we have not that work for the younger part of the family, we put them to work to the loom at younger years than we did at that time; consequently we want more upper rooms; airy rooms for the looms." (Ibid., p. 45, testimony of Mr. Jos. Coope.)
5 Rees' Cyclopaedia, (s.v. Woollen Manufacture), vol. 38.
6 A slubbing billy with 30 spindles cost 10 guineas in 1792. (Heaton, Benjamin Gott, op. cit., p. 52.) A billy with 40 spindles was sold for 14 pounds. (Crump, op. cit., p. 213.)
7 See Unwin, op. cit., pp. 31-33, for an interesting discussion of this. The invention had always been attributed to an "unknown Stockport man". One of the trade historians of a later day attributed it to a "man named Stockport".

the mule and jenny[1] and, being a companion machine to the latter, prolonged the use of the jenny in the cotton trade.[2] It provided rovings to any desired degree of fineness at greatly reduced cost,[3] and apparently was received in a friendly way by the jenny spinners. The grateful spinners, it is said, voted a premium to Mr. Swindells when he went bankrupt in 1786.[4]

A reference to billies (the machine was called the "slubbing billy") appears in the Leeds Intelligencer of October 28, 1793.[5] But it is not likely that the clothiers waited seven to 10 years before accepting this machine from the cotton trade. A Pudsey clothier gave 1788 as the date when slubbing began to be done at the mill in the West Riding.[6-7] The billies were logically located in the mills where they could receive the material directly from the carding machines. Children carried it from one machine to the other. Of course these new machines aroused some apprehension in the West Riding.[8] It was related that the "first Slubbing that came into Bramley that had been carded and slubbed by machinery, came from Mr. Copley's, at Hunslet. The women rose in a mob when the cart

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1 Daniels, op. cit., pp. 123-24.
2 Unwin, op. cit., pp. 31-32.
3 Daniels, op. cit., pp. 123-24.
4 Unwin, op. cit., pp. 31-32.
5 Crump, op. cit., p. 320.
6 Evidence on Woollen Trade, 1806, p. 30.
7 The first machine into the woollen trade was the spinning jenny, the "next was the slubbing mill, then the carding machine, which is in fact the same as the slubbing mill, only finer cards than the slubbing billy." (Ibid., p. 73, testimony of Mr. R. Cookson.) Obviously the scribbling Mill is meant. Either his testimony was transcribed incorrectly or Mr. Cookson got mixed up.
8 Ibid., pp. 400, 403.

came with the slubbing, pulled it out of the cart, and trod it under their feet in the street!"[1]

But in spite of the spinsters the slubbing billy came quickly into use in the West Riding. The domestic clothiers of the riding who testified in 1806 approved of the slubbing being done with machinery.[2] Their approval was tinged with a little regret. As Joseph Coope of Pudsey said, before the slubbing was taken away the "younger parts of the family, who could not be employed in spinning and weaving, were employed in slubbing and carding; at present there is nothing for them to do till they come to twelve years old, but winding the bobbins."[3] Children were employed filling the various machines used in the preparatory processes and piecing for slubbing, but it was thought that not half those formerly working could get such employment.[4] There were said to be many boys and girls out of work.[5] This was an interesting consequence of the use of machinery for the preparatory processes, that women and children should lose their work and the family become more reliant on the man as chief breadwinner.[6] It cannot be called a general tendency of machinery. As we have seen, some cotton

1 Wilson, op. cit., p. 46.
2 Evidence on Woollen Trade, 1806, pp. 52, 64, 400.
3 Ibid., pp. 32, 46.
4 Ibid., p. 73.
5 Ibid., p. 52.
6 Although the carding machine took work away from women, it was thought that the sum total of machinery introduced before 1806 seemed to create more employment for women than existed 20 years before. (Ibid., p. 309.) More witnesses were positive that there was less employment for children, although even this testimony was contradicted by some. There was more employment for children in the cotton trade, at the same time, and parish children were being imported.

machinery took work from men and gave it to women and children. And yet, the spinning jenny, which was operated at first by young people, came to be operated by men in the larger sizes which could not be managed by children. No general tendency in this particular can be ascribed to machinery; each machine must be considered separately, and even the effects of a single machine may be different in the various stages of its development. Speaking theoretically we may say that machinery can be most easily devised for and readily applied to tasks which do not require a great deal of skill, and that the construction, tending and repair of such machines may require more skill than the original operations. Where the tending is a mere matter of feeding a machine, or performing some such simple task alongside it, women and children may be more cheaply obtained, perhaps, than men and the agility of their fingers may allow them to perform the task more expeditiously. And yet, the simplicity of such a task may, and often does, inspire another machine or an attachment to the machine to perform it, as, for instance, in our day the automatic feeder replaces the printing pressman's assistant. These more complex machines require the mechanical understanding of men.

Generalisations are dangerous. The advent of machines brought about changes in employment that had social consequences, differing with each machine. In the case of the machinery used in the wool preparatory processes, these machines took opportunities for employment away from boys and girls (under 10-12 years of age) long before the time when it came to be thought

undesireable for such young children to work.

We find, therefore, that the slubbing machine aroused very little antipathy in the West Riding, following, like the carding machine, in the wake of the scribbling machine.[1] About the slubbing machine in the South-West there is mystery. The South-West clothiers made their great efforts to reconcile the workmen to machinery during the war boom years following 1793, but the slubbing billy was not mentioned by them when they told of their difficulties in promoting the jenny, the scribbling machine and the gig mill. The absence of references to the billy seem to point to its being introduced slowly and late, after the turn of the century.

In addition to the billy there was also a machine called the "willey", for washing wool. It effected great savings but

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1 The slubbing billy, like the jenny, became extinct a few decades into the 19th century. The story is interesting. Slubbers, on these machines, generally earned fair wages, about on a par with hand-loom weavers or a little below. But about 1826 the slubbers could earn about twice as much as the hand-loom weavers, who were then well into their period of decline and suffering. The slubbers, it is said, paid the little boys and girls who did piecing for them only a pittance. Despite their good wages they were, as a class, a drunken sort and they thought themselves much superior to the hand-loom weavers, refusing to sit with the latter in the alehouse. Their arrogance in these circumstances had its parallel in the conduct of the weavers, in their halcyon days, of the calico printers at times, of the woolcombers and shearmen, before machinery came to humble them. But in the course of time "a terrible change took place for these proud slubbers--a machine was introduced which made the system of slubbing on what was called the 'billy' useless; it was called the condenser." (Joseph Lawson in the Pudsey District Advertiser, writing in 1886 on Progress in Pudsey, cited in Crump, op. cit., pp. 29-30.) Pride goeth before machinery. The condenser was patented in 1834 and adopted in the second half of the century. (See J. H. Clapham, An Economic History of Modern Britain, Book I, Cambridge, 1926, p. 144.)

seems to have been brought into use in the West Riding as early as 1793.[1] It took dirty work from low-paid workers. The progress of this machine seems impossible to trace in the West Riding and in the South-West. Its use seems to have involved no disturbances and the correct assumption here seems to be that the willey, being a machine that performed one of the preparatory processes that were practically all done by machinery by 1793, quickly went into general use shortly after this date in the West Riding.

So much for the machines that performed the preparatory processes. In the West Riding all of these were taken up quickly, with comparatively little fuss. In the South-West the machines arrived later and met with some resistance, but the most important of them, the scribbling and carding machines, made their way without much delay. The great reasons for the comparatively peaceful entry of these machines must have been that they competed with unskilled--and unorganised--domestic workers and that they were introduced during years of expansion and prosperity.

When machinery for dressing woollen cloth was introduced, to compete against well-paid, skilled journeymen who were, to a degree, organised, serious trouble occurred, especially when trade became slack. But the story of the introduction of dressing machinery must be deferred until after contemporary developments in the worsted trade can be considered.

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1 Crump, op. cit., p. 320.

CHAPTER VIII: THE SPINNING OF WORSTED

Norwich and the West Riding

The worsted branch was no mere adjunct of the woollen branch of the wool trade. In 1772 the manufacture of worsteds in Yorkshire amounted to 1,404,000 pounds sterling, woollens to 1,868,700.[1] In 1771, in addition to the Yorkshire manufacture, the Norwich worsted manufacture amounted to about 1,200,000 pounds.[2] This was at the time the spinning jenny was being introduced into the woollen industry. But while the jenny was especially suited for the spinning of cotton weft and of woollen yarn, it was no good for spinning the hard and strong products, cotton warp and worsted yarn. These could be spun more satisfactorily on the water frame. Later, cotton warps were spun on the mule, but the mule was not adapted to the spinning of worsted yarn, and thus the water frame became pre-eminently the machine for worsted spinning.

Now it is a curious fact that in relating the story of the mechanical spinning of worsted yarn, one half of the industry, as it existed in 1771-72, takes no part in the story. The "zenith" of the worsted trade of Norwich was said to have been reached from 1743 to 1760. By 1771 its decline was apparent.[3]

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1 James, op. cit., p. 282. Also Heaton, Yorkshire Woollen and Worsted Industries, p. 281.
2 James, op. cit., p. 271, quoting Arthur Young.
3 Ibid., p. 270.

This decline was attributed, first of all, to the competition of cotton.[1] The Norwich merchants, having lost their home market to cotton because of fashion, began seeking out Continental markets but the American war cut these off and gravely injured the trade. After this war twelve years of comparative prosperity followed, it was said, but then came the wars with France to "extinguish" the industry.[2] In 1798 the business of the town was said to have been two-thirds of what it was when Arthur Young made his estimate,[3] and it could never recover from the twin blows of (1) cotton and (2) war.

These reasons, however, do not explain why the worsted industry of the West Riding managed to weather these blows and why Bradford rose to a commanding position while, at the same time, Norwich's trade dwindled away. There were other reasons. Arthur Young became exasperated with the cries of distress continually being heard from Norwich, while prosperous noises were being wafted down from Yorkshire, and he came to the plain conclusion that the Norwich merchants and workmen were unprogressive and unresponsive to change. This may not have been the only reason for Norwich's decline as compared to the West Riding industry, but the charge was certainly warranted. Some Norwich merchants thought it was. In 1840, surveying seven depressing decades, these Norwich merchants attributed the decline to three things. First of all they could not compete

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1 Ibid., pp. 308-09, quoting Eden.
2 Ibid., quoting "Senex" in the East Anglian newspaper, February 21, 1832.
3 Ibid., quoting a Norwich inhabitant.

because weavers' wages were kept up without regard to the conditions of trade, "enforced by the union of the weavers"[1] with the legal support of the magistrates. This was a complaint repeated many times. In times of distress the weavers preferred to keep the wages at the same level and suffer unemployment rather than have the labour distributed at a reduced rate. Secondly, the town was kept in turmoil by a "violent and odiously virulent party spirit".[2] Thirdly, the weavers and their fellows would not allow the introduction of labour-saving machinery.[3] One endangered his life if he ventured to introduce machines into the Norwich trade.[4] The weavers, by threatening violence, were able to keep them out. Norwich refused to take up spinning machines with the result that soon the greatest part of yarn used was machine-spun yarn imported from Yorkshire, Lancashire and Durham.[5] It took very little part in the developments that occurred during the Industrial Revolution, maintaining itself in isolation, and does not figure in the story of the introduction of the water frame into the trade, except in this negative way.

The first worsted spinning mill was built in 1784 at Dolphin Holme in Lancashire.[6] This was over ten years after Arkwright had put the same kind of machines, water frames, into use for spinning cotton warps, and as many years after some

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1 Reports from Assistant Hand-Loom Weavers' Commissioners, 1840, Part II, p. 311. See also pp. 303-04, 306.
2 Ibid., p. 306. See also pp. 342-44.
3 Ibid., pp. 341-42.
4 Ibid., p. 307.
5 Ibid., p. 335, and James, op. cit., pp. 386, 638.
6 Ibid., p. 328.

jennies had been put into use in Yorkshire. It was built during the time Arkwright was fighting to maintain his patents against a great number of infringers. Capital was being attracted by the prospects of profit from the use of the water frame. The Dolphin Holme mill was located on the Wyre, between Preston and Lancaster, and was operated by Lancaster capitalists. Although James, the historian of the worsted trade, does not suggest it, this Dolphin Holme mill may very well have been built originally to spin cotton yarn.[1] It began manufacturing worsted yarn, however, and forwarded the product to the worsted manufacturing districts.

Lancashire was, of course, a safe area for machinery by this time. This first worsted spinning factory caused no disturbance, nor did the receipt of the mill-spun yarn cause any trouble in the stuff-making district. This was probably because the spinners of Yorkshire were finding plenty of work at good rates, but also because of the fact that "tradition reports that this first mill-spun yarn was knotty, broken, and of a very inferior description".[2] There were great opportunities for profit in worsted spinning if it could be done mechanically, but the water frames at Dolphin Holme were of rude construction,[3] adequate for the spinning of cotton warps but not for the

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1 Such a factory was built at Tiverton in 1792, intended as a cotton mill. Shortly after the factory's completion, it began manufacturing worsted yarn. (Wm. Harding, The History of Tiverton, London, 1845-47, pp. 198-99.)

2 James, op. cit., p. 328. The experience showed the difficulty of drawing out the woollen fibres.

3 "This machinery, according to the testimony of a person who saw it, consisted of water-frames with only four or six spindles in a box, and of very rude construction." (Ibid.)

spinning of satisfactory worsted yarn. The mill operated until 1791 when it was abandoned as an unsuccessful venture. Later on new partners took over the mill, put in new and improved machinery and carried on the business on a grand scale.

Meanwhile other mills went up nearer to the stuff-making district. The second mill was erected at Addingham near Skipton, in the direction of Lancaster from Leeds. This was the signal for other ventures of the kind, and by 1792 at least seven mills were built further down into the West Riding, including one near Halifax and another near Bradford.[1] An undiscouraged partner in the Dolphin Holme failure built one of these.[2] There was a good demand for worsted yarn during these years before the war and there seemed to be a scarcity of hands to spin it around Halifax and Bradford. One of the reasons for this scarcity was the great progress of the cotton trade in Lancashire and adjacent parts of the West Riding.[3] The mills seemed feasible enterprises and more were built, but mill-spun yarn was a product of limited utility. It was rough and hairy,[4] and difficult to weave. The produce of the Addingham mill was said to have excited some uncomplimentary jokes from the waggish manufacturers of that day.[5] The demand for worsted yarn was not so great after the war began and there

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1 V.C.H., Yorkshire, ii, p. 421, and James, op. cit., pp. 327-28.
2 Ibid., p. 328.
3 Annals of Agriculture, xvi, p. 423.
4 Perhaps this quality was apparent because machine-spun worsted yarn was spun dry. The hand spinner's saliva may have made his product superior.
5 James, op. cit., pp. 355, 593.

were no further important developments until around 1800.

In the early developments Bradford, later the great center of the worsted industry, did not seem interested. The concentration of worsted spinning in Bradford, of course, waited on the general use of the steam engine. When one enterprising gentleman proposed in 1793 to build a mill in that town, the inhabitants opposed his steam engine as a "smoky nuisance" and he gave up the project.[1] In 1800 Messrs. Ramsbotham,[2] Swaine and Murgatroyd erected the first factory there, in the Holme, using a steam engine of 15 horsepower.[3] The construction of this mill aroused a great deal of feeling in Bradford, even among the "respectable portion" of the population, it is said. The inhabitants gathered to keep a man with horse and cart from conveying stones for building the mill. Mr. Murgatroyd, being "a man of considerable prowess stripped his coat, and literally boxed the way clear" so that the cart could proceed.[4] But it is not clear whether the inhabitants were opposing machinery, or the steam engine or the factory. Probably the latter two more than the first. There was a great deal of sentiment against factories in Yorkshire at this time--the domestic clothiers were stirring themselves to defend the domestic system. Part of this feeling must have got into Bradford and may have been dignified and reinforced by the attitude of the respectable

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1 Mules were tried for spinning worsted yarn in Bradford (ibid., p. 328) but were not generally used.
2 Mr. Robert Ramsbotham, one of the earliest users of Cartwright's combing machine.
3 Ibid., pp. 329, 592.
4 Ibid., pp. 592-93.

residents towards "smoky nuisances". This spirit changed and further mills were built in Bradford, ten by 1815, and 26 by 1825.[1]

Now, up to around 1800 mill-spun worsted yarn was disliked by weavers because of its poor quality and was not considered serious competition by the worsted spinners. Their product had the advantage of quality, so that hand spinning received preference and price, and the worsted spinning mills were not numerous compared to the extent of the industry. These circumstances changed with the turn of the century. First of all, the invention of the false reed or slay (for the loom) about 1800 largely overcame the trouble caused by the roughness of mill-spun yarn.[2] The wires of the false slay acted as pioneers to the reed, clearing the shed. Secondly, improved water frames and throstles[3] were put into use around 1805.[4] With these improvements, weavers came to prefer the mill-spun yarn, and this meant the end of hand spinning.

The end was not abrupt. For a good many years the Bradford mills were not able to satisfy the demand for yarn. And yet year after year "less yarn was brought from Craven, and other hand-spinning districts, and henceforward all the operations of the stuff business became more centralized".[5]

So went on the same process that resulted from the introduction of spinning machines into the woollen trade. But the

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1 Ibid., p. 605.
2 Ibid., pp. 355-56, 593.
3 Throstles: the term was generally used to describe water frames deriving power from steam engines.
4 Ibid., p. 593.
5 Ibid., p. 358.

spinning of worsted yarn by machinery was accomplished peacefully. The effect of the competition of mill-spun yarn was felt very late in Yorkshire, after there had been many precedents for the use of machines and after many of the work people had learned the value and need of adapting themselves to new conditions. The hand writing had been on the wall so long that everyone could see. Meanwhile the Yorkshire industry had expanded so greatly that there were many opportunities for employment in other occupations.

The machinery advocates had always argued that, while machinery might cause temporary unemployment, its effect eventually was to create more opportunities for employment. Their argument was borne out in the experience of the cotton and wool trades. Machinery for spinning worsted yarn came into use after many other opportunities for employment had been created by the expansion of the two industries.

CHAPTER IX: THE COMBING OF WOOL

Cartwright's Machine

Shortly after the first worsted spinning mills were built, another machine was invented, one that thoroughly stirred up the worsted industry. This was Cartwright's combing machine. To carry out the subsequent processes of the manufacture, the worsted industry depended on a supply of long wool which was combed, instead of carded, before it was spun into worsted yarn. This combing process was just what one would imagine it to be --the straightening out of the fibres of the long wool so that they lay perfectly parallel to each other. This was done with hand combs, each having two or three rows of teeth. The job was essentially simple, but in practice it required a great deal of skill.[1]

The skill involved in combing enabled the journeymen woolcombers to create for themselves something of a monopoly.[2] In

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1 Heaton, Yorkshire Woollen and Worsted Industries, op. cit., p. 263. For a description of the process see James, op. cit., pp. 249-50.

2 "In order to keep up wages, these workmen established a rule, that none of them should take an apprentice, except his eldest son, to the great detriment of trade, for by restricting the number of hands, wages were advanced, and consequently the price of goods." (Ibid., pp. 250-51.) The woolcombers acknowledged that they restricted entrants to the trade but implied that they did not strictly limit them to eldest sons (Petition of Leicester woolcombers, J.H.C. 49, p. 396). A great many woolcombers were bachelors, who, presumably, had no sons at all. A manufacturer from

1741 it was written that the woolcombers had "for a number of years past erected themselves into a sort of corporation (though without a charter) . . . as they became a little formidable they gave laws to their masters,[1] as also to themselves . . ."[2] They forced a "closed shop", "encouraged idleness", abused "the honest man that would labour" and destroyed his working tools. It was said that they became one society throughout the kingdom.[3]

The woolcombers were able to maintain themselves in a privileged position until towards the end of the century.[4] They

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Nottinghamshire in 1794 spoke of the rule limiting apprentices to eldest sons. (Petition of William Toplis, J.H.C. 49, p. 395.) Articles of the woolcombers in 1812 stated that second sons are "not to be received" but allow for a limited number of apprentices serving the regular seven years. (H.O. 42/130.) The efficacy of such rules depended, of course, on the attitude of the small master woolcombers towards taking apprentices and on the ability of the journeymen to enforce their regulations. Apparently they were able to, and inclined to, enforce them, despite other pressures, at least until around the year 1790.

1 The word "masters" probably does not mean master woolcombers. Master woolcombers (like master cloth workers) existed during the 18th century, but when the spinners enlarged their operations they found they were able to deal directly with the journeymen. (James Burnley, The History of Wool and Woolcombing, London, 1889, p. 159.) Even if the master woolcombers had been able to adopt woolcombing machinery, they would not have done so. They were close to the journeymen and shared the journeymen's attitude towards machinery.

2 A Short Essay upon Trade in general by A Lover of His Country, London, 1741, quoted by James, op. cit., p. 232.

3 Ibid. See also, Sidney and Beatrice Webb, The History of Trade Unionism, London, 1894, p. 31. Burnley comments that "it is only fair to assume that they did not adopt such measures wholly without cause". (Op. cit., p. 164.)

4 "The few survivors of the hand woolcombers still cherish the tradition of the eighteenth century, when they styled themselves 'gentlemen woolcombers', refused to drink with other operatives, and were strong enough, as we have seen, to give 'laws to their masters'." (Webb, op. cit., p. 38.) "Many instances of insolence and aggression by the woolcombers are

obtained higher wages than other operatives, of course.[1] In 1772 Arthur Young spoke of their getting everywhere (in the southern counties) 12 shillings a week on the average, compared to the average of 8s. 5d. for all manufacturers.[2] But apparently the woolcombers did not aspire to get rich. Later, in 1784, Mr. Young wrote, of Colchester, that "Great numbers of combers are here who earn more than the weavers; the consequence of which is, that they will not work more than three or four days a week, and spent the rest in the alehouse."[3] This was the crux of the manufacturers' complaints against the woolcombers before the coming of machinery. They were willing to pay high wages, they said, so that the combers could earn up to 28s. per week,[4] but the combers would work only when they felt like it or when they needed the money, and they were able to prevent others from entering the trade and in each locality were able to "discourage" stranger woolcombers from working.[5] Their liesurely attitude

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on record; the employers' advertisements in the Nottingham Journal, August 31, 1795, and the Leicester Herald of June, 1792, are only two out of many similar recitals." (Ibid., footnote.) For further testimony on the turbulence of the woolcombers and the devices of their combinations see James, op. cit., pp. 251, 322, and J.H.C. 49, pp. 395, 546, and Burnley, op. cit., p. 160.

1 In 1747 they could earn from 12s. to 21s. a week. The London Tradesman, quoted by James, op. cit., p. 249.

2 Six Weeks' Tour through Southern Counties of England, pp. 270-71. Also, pp. 55, 65, 275.

3 Annals of Agriculture, ii, p. 109.

4 J.H.C. 49, p. 395.

5 James, op. cit., p. 322. The woolcombers were mostly itinerant workers. Especially during the few months before shearing time, when wool was in short supply, they traveled to places where the crop of the previous shearing had not as yet been used up. (Report from the Committee to whom the Petitions from the Woolcombers, complaining of certain Machines constructed for the Combing of Wool, were referred, 1794,

towards work especially pinched the manufacturers when business was flourishing and demand strong.[1] Therefore, in 1790, the worsted manufacturers could be expected to favour a machine that would perform this work with regularity. Such a machine would be the first to test the resistance of organised journeymen to mechanical improvements. All other machines had invaded fields occupied by domestic and unorganised workers, with organisation generally following the introduction of machinery, or, more specifically, the concentration of machines in the factory.[2]

The success of machinery in the cotton trade, and of spinning machinery and machinery for the preparatory processes in the manufacture of woollens, recently put into use, inspired some thoughts on the matter of devising machinery for combing wool before 1790.[3] Such a machine was invented in the year 1790 by Edmund Cartwright, a clergyman before he became an inventor, brother of John Cartwright, the political reformer. Dr. Cartwright had invented a power loom previously, in 1784. The first patent was taken out April 27, 1790. A third patent in 1792

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p. 7.) But some of the combers' societies were independent, and the members of these different societies refused to "mix or work with each other". A Lancashire or Yorkshire comber, thus, could not work among Leicestershire combers. (Mr. Toplis' petition, J.H.C. 49, p. 395.) There was no opportunity of hiring combers who were not members of a combination. Practically 100 per cent of the woolcombers were members of a society. (Report on Woolcombers' Petitions, p. 5.)

1 Mr. Toplis' petition, J.H.C. 49, p. 395.

2 That is, if the workers were adult males. The cotton spinners' union was one of the first. There were certainly many other combinations before this time, most of an impermanent sort, but the propinquity of the factory made organisation more practical.

3 Annals of Agriculture, x (1788), pp. 281-82.

"brought it to its present [1790s] state of simplicity and perfection".[1] Since the action of its crank-lasher suggested the movements of a prize fighter, the machine was called Big Ben after a celebrated pugilist of the day.[2] Big Ben was a very ingenious and highly original machine. It was, of course, intended for use in a factory or mill, accepting rotatory motion from a water mill or a horse running in a gin, and was not a machine woolcombers could individually own even if it had been their practice to work in their homes. Dr. Cartwright was optimistic about its prospects and enthusiastic about its capabilities. He wrote that "a set of machinery, consisting of three machines, will require the attendance of an overlooker and ten children, and will comb a pack, or 240 lbs. in twelve hours. As neither fire nor oil is necessary for machine-combing, the saving of those articles, even the fire alone, will, in general, pay the wages of the overlooker and the children; so that the actual saving to the manufacturer is the whole of what the combing costs by the old imperfect mode of hand-combing."[3] From the inventor's description one might get the impression that manufacturers would get their combing done free of charge if

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1 The date of Cartwright's "first" patent is sometimes given as 1789. The difficulty arises because Cartwright did take out a patent for a woolcombing machine that year. It was on a principle different and inferior to that of Big Ben and Dr. Cartwright later preferred to ignore it, referring to the second or 1790 patent as his "first". (See J.H.C. 56, p. 271, and his statement quoted in Burnley, op. cit., p. 115.)

2 Ibid., p. 127. One of Big Ben's fights is described in the Annual Register, 1790, Chron., pp. 1-2.

3 Burnley, op. cit., p. 115.

they used Big Ben. Actually he calculated that the machine would comb wool for less than 1-6th the cost of hand combing.[1] The workers estimated that one man with four or five children could, with the machine, produce as much as 30 hand woolcombers and this figure was cited by them without variation.[2] Although at first Big Ben, when not carefully tended, produced a great amount of noil and pinion,[3] the inventor claimed that the produce of the improved machine was superior to hand combed wool "by at least 12 percent", being equally mixed throughout, slivers uniform and of any required length.[4] A great advantage was that the combed wool came out an even continuous roll, not "in short

1 Redhead, Laing and Marshall, (Store Farmers in the Counties of Roxburgh and Northumberland), Observations on the Different Breeds of Sheep, and the State of Sheep Farming in Some of the Principal Counties of England, Edinburgh, 1792, p. 43. Also, Annals of Agriculture, xix, p. 436.

2 J.H.C. 49, pp. 21, 22, 104, 106, 144 and passim. This estimate is probably as good as any, although, of course, the fact that it was repeated in practically all of the woolcombers' petitions does not mean that it was correct. The workers seem to have based their estimate on the produce of a single machine used at Twerton near Bath (and now part of Bath). A witness told the Parliamentary committee that "there is great Difficulty in seeing those machines" (Report on Woolcombers' Petitions, p. 4, and J.H.C. 49, p. 322). It does appear that the Twerton machine required the labour of more than five children. Eleven worked on the machine (so-called, but actually the word "machine" was used to describe a "set of machines", three to a set) during the day and seven (on one machine of the set, carrying out the final operation of the process) at night. (Ibid.) In 1794 Dr. Cartwright said each set executed the work of twenty men, but in 1800 said that it then did the work of sixty. (Edmund Cartwright, A Memorial read to the Society for the Encouragement of Arts, Manufactures, and Commerce, etc., p. 45.) Perhaps this last estimate refers to the machine as used and improved by Davison and Hawksley (referred to later in the narrative).

3 Noil: the short fibres taken out during the combing. The loss in hand combing amounted to about 10 per cent. Pinion: a West Country term for the same thing.

4 Burnley, op. cit., pp. 115-16.

lengths with irregular Ends, subject both to loss and Imperfection in uniting them".[1] A woolcomber acknowledged that the produce of the machine was "worked nearly as well as if it was worked by Hands, in the old Way".[2] The manufacturers claimed a great saving. It cut the price of combing, they said, from 2½d. or 3d. to a penny per pound, and they expected greater savings when (or if) the machine could work the finer grades of wool.[3]

The machine was started off in a blaze of glory. Dr. Cartwright built one at Doncaster[4] and put on an entertainment for the workpeople of the town in celebration. A procession was arranged and a song composed which included these lines:

NEW BISHOP BLAIZE[5]

Come all ye master combers and hear of new Big Ben,
He'll comb more wool in one day than fifty of your men,. . .
Big Ben was mad e at Doncaster, that place of great renown,
And is a noble fellow, supported by the Crown: . . .
Our triumph then this day there's nothing shall prevent,
For know, our great mechanic by Providence was sent

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1 As the proprietors stated, J.H.C. 49, p. 546.
2 Report on Woolcombers' Petitions, p. 4, testimony of William Eales. It was said that machine-combed wool "held up better while spinning". (Annals of Agriculture, xx, p. 35.)
3 J.H.C. 49, p. 546.
4 Mantoux, op. cit., p. 275, infers that this machine (or a set of them) was put to work in a factory at Doncaster, citing Mary Strickland, A Memoir of the Life, Writings and Mechanical Inventions of Edmund Cartwright, London, 1843, p. 106. Doncaster was famous for knitting of stockings, waistcoats, gloves and such things. It also prepared yarn for use in the West Riding. Thus there were large numbers of spinners and combers in the town. The first machine was no doubt set up at the power loom factory in Doncaster, in which Cartwright was a partner with the Grimshaws, before this factory was burned down. But it cannot be said that Big Ben was successfully or continually used in Doncaster. The Cartwright brothers operated a combing factory at Retford (see infra, p. 175, n. 3.)
5 The woolcombers' tutelary saint.

For the good of mankind, boys--a trophy, then, we'll raise
To our British Archimedes, our new Bishop Blaize.
The hungry he gives bread to; the naked, too, he clothes;
May health and joy and riches, attend him as he goes:
Then fill your glasses high, boys! and give him three huzzas;
Here's our good and worthy master--our new Bishop Blaize![1]

Such were the admirably progressive sentiments of some of the citizens of Doncaster. It is said that this song did duty at the feast and then "became for several years a favourite and popular air among the lower classes in the town and neighbourhood of Doncaster".[2] Perhaps so, but it is not likely that the hand woolcombers themselves lifted their voices to its melody.

Dr. Cartwright's machine won the admiration of several distinguished persons, including the president of the Society for the Encouragement of Arts, Manufactures, and Commerce, the Archbishop of Canterbury and Lord Chancellor Eldon.[3] It was highly regarded by the agricultural interests. Farmers engaged in making the surveys for the Board of Agriculture visited Cartwright and were impressed. They observed that the inventor had given up his "sacerdotal functions" to devote himself to manufactures, "in which line, his ingenuity bids fair to make him a very useful member of society".[4] Sir John Sinclair suggested a plan to send a machine to the Shetland Islands, where, he believed, it would solve some economic problems.[5] Arthur Young was enthusiastic. "Too much cannot be said," he wrote, "in commendation of such mechanical establishments, which tend

1 Strickland, op. cit., pp. 106-07.
2 Ibid.
3 Cartwright, op. cit., p. 39.
4 Redhead, Laing and Marshall, op. cit., p. 43.
5 Cartwright, op. cit., p. 40.

directly to the benefit of all the poorer classes, contrary to the false ideas of half-informed men." The stout hands then confined to the comb-pot, "half stifled in the unwholesome employment", might, with the adoption of Big Ben, be better employed in other labour.[1] This other labour would be, of course, agricultural labour.

But the inventor needed more than the interest of dilettantes and the good will of farmers. He needed to attract hard-headed manufacturers who would use and perfect the machine as a competitive instrument. At the time of the Bishop Blaize celebration referred to above several firms were negotiating with Dr. Cartwright for the use of Big Ben,[2] and of course the worsted manufacturers were eager for such a machine. Despite all the attention Big Ben received, however, it does not seem that many machines were put into use. In 1794 the proprietors of "Four large and expensive Manufactories in the Counties of Nottingham and York" had taken up combing machines.[3] These may have included Messrs. Davison and Hawksley of near Nottingham, the most successful and persistent users of Big Ben,[4] and Robert Ramsbotham, a bold enterpriser who first introduced it in Bradford.[5] These may have also included William Toplis of

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1 Annals of Agriculture, x, pp. 281-82, and xix, p. 436.
2 Cartwright was to receive a 10s. premium for every pack of wool combed by his machines. (Redhead, Laing and Marshall, op. cit., p. 43.)
3 J.H.C. 49, p. 545.
4 Ibid., pp. 322ff., testimony of Joseph Jennings. See also James, op. cit., p. 566, and Burnley, op. cit., p. 127. Hawksley seems to have made some decisive improvements on Big Ben. He patented some of these in 1793. (James, op. cit., p. 566.)
5 Ibid., pp. 322, 566.

Cuckney, Nottinghamshire, who after suffering from the lack of woolcombers when trade flourished and from their "irregular and improper conduct" had invented his own machine for which a patent was granted in 1793.[1] There may have been a few more machines,[2] including one set in use at Twerton (Bath),[3] but not many more. The successful use of woolcombing machines in 1793-94 was certainly not widespread. The woolcombers protested against Big Ben to the legislature in 1794, and when they did they were, the very great majority of them, protesting against its imagined or future effects. Dr. Cartwright's strenuous campaign to popularise his invention had impressed them more than it had the worsted manufacturers, it would seem.

The Protest of the Woolcombers

This protest was impressive. There were said to have been forty petitions, or even "fifty or sixty", sent in by woolcombers from different parts of the country to Parliament.[4] Twenty-four were received by the House of Commons from January to May, 1794,[5] which period not only coincided with the sitting

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1 J.H.C. 49, p. 395. See also Burnley, op. cit., pp. 135-36. Mr. Toplis had put a water frame to work spinning worsted in 1788 or before. The scarcity of woolcombers forced him to advertise in newspapers for them, offering wages of 18s. to 21s. (Annals of Agriculture, x, pp. 280-81.)

2 One petition alleged that the machines were "rapidly multiplying". (J.H.C. 49, p. 21.) The soundest supposition seems to be that the machines were being tried at different places but were not often successfully used.

3 Report on Woolcombers' Petitions, pp. 4-5.

4 Strickland, op. cit., p. 198, says "fifty or sixty" and adds the fatal phrase, "as early as the year 1796". The protest of the woolcombers assumed legendary proportions in later days.

5 The first January 24, the last May 5. Most of them were received during February and March.

of Parliament but also covered the annual period of slack work for the woolcombers. These petitions were sent from Devonshire, Wiltshire, the North Riding of Yorkshire, Somersetshire, Warwickshire, Worcestershire, Leicestershire, Norfolk, Cornwall and Durham. It is not at all likely that machines were put into operation in all of these areas. It is possible that machines were put into use in none of them except Somersetshire, and it is significant that no petitions came from Nottinghamshire or the West Riding, where combing machines were surely put into use. The petitions were the result of an organised campaign, made possible by the association of combers throughout the country, and most of the petitions, of course, were worded identically.[1] The points mentioned in most of the petitions were: that the machine diminished labour "to an alarming degree", that one machine tended by a man and four or five children did the work of 30 men, and that the hand woolcombers would, as a consequence of its use, become a burden to the state.

Several petitions brought forward the significant argument that the supply of wool as a raw material was limited, implying that there existed therefore only a specified amount of work to be done.[2] The "reasons adduced in support of Machines employed in other Manufactures, such as Cotton, Silk, Linen, etc. will not apply to the Woollen".[3] This was a perfect ly valid argument, so long as one considered the wool trade by itself.

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1 This seems apparent from the wording of the précis that appear in the Journals.
2 J.H.C. 49, pp. 21, 396, 552.
3 Ibid., p. 21.

It was often used by other workers in the woollen and worsted industries when they stood in opposition to machinery, and it was an argument that the machinery advocates replied to with predictions of an increased supply which were not borne out by succeeding events. And it was an argument that would naturally occur to the woolcombers, who generally lacked work each year during the two or three months before shearing time when the wool of the previous shearing had been used up.[1]

It was further argued that with machines "the whole Trade will be engrossed by a few powerful and wealthy Adventurers" and that "after short Competition, the surplus Profits arising from the Annihilation of Manual Labour will be transferred into the Pockets of the Foreign Consumers",[2] this last phrase a curious example of restrictive reasoning. The customary weak contention that foreign competition need not be feared "even in the present state of the manufactory" was inserted in one petition,[3] showing that the workers were conscious of the argument to the opposite effect generally put forward by the advocates of machinery.

But the main argument of the woolcombers, the one on which they meant to stand or fall, was simply that they would lose their work because of the machine.[4] This argument seemed valid.

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1 Report on Woolcombers' Petitions, p. 6.
2 J.H.C. 49, p. 21.
3 Ibid., p. 552.
4 They claimed that there were 50,000 woolcombers that would lose their work (ibid., p. 21). They probably meant that the 50,000 constituted the whole body of woolcombers at the time. This figure was universally accepted without question by all persons concerned with this matter, and taken to mean that there were 50,000 woolcombers in the Kingdom.

It completely convinced the Parliamentary committee for which Mr. Bastard reported on March 13.[1]

This committee examined three woolcombers, two from Exeter and one from Plymouth, and a serge maker from Tiverton, all of the workman witnesses therefore being from Devonshire. These witnesses referred to only one machine, the one working at Twerton. One witness, William Eales, had worked alongside of the machine and was that rarity, a workman who could definitely establish that he had been displaced by a machine.[2] When there was not enough wool for the machine and for the hand woolcombers working alongside of it, the hand workers were, of course, dismissed.[3] A fifth witness was a worsted manufacturer of London who was displeased because the prosperity of Davison and Hawksley seemed to affect adversely the price of wool. This partnership, he said, had left with the woolstapler "unlimited orders for any quantity" of wool for use in their machines and this, of course, made the price of wool too dear.[4]

These witnesses no doubt expressed the sentiments of woolcombers throughout England, of some of the manufacturers, also, who did not own or plan to own machinery themselves. But their evidence was a shaky base for legislation. Many questions were not put forward that should have been. The committee certainly failed to access accurately the efficiency of the machine and did not seem concerned with the extent of its use at the time.

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1 Ibid., p. 322.
2 Report on Woolcombers' Petitions, pp. 4-5.
3 Ibid., p. 8.
4 Ibid., p. 6.

And the evidence of the manufacturers who were using machinery was not asked for. Nevertheless a bill to protect the woolcombers from "injury" caused by the machine was ordered April 8, 1794. It was prepared by Mr. Buller, Mr. Popham, Mr. Bastard, Mr. Rolle and Mr. Baring[1] and came up for second reading April 14. It would have prohibited the use of the machine simply on the grounds that it caused unemployment among the woolcombers, without reference to the traditional grounds for such legislation, that machinery detrimentally affected quality. Had it been passed the resulting law would have been a conspicuous anomaly, something of a Parliamentary volte-face, and, from the point of view of the manufacturers of the nation, a dangerous precedent.[2] And it is not at all certain that the bill would not have been passed had not the committee of worsted manufacturers of Yorkshire, Lancashire and Cheshire intervened at the last minute.

Before this intervention the battle in defence of the machine had been waged by Dr. Cartwright and Mr. Toplis, both inventors, individually, and by four manufacturers of York and Nottingham (including, perhaps, Mr. Toplis). Dr. Cartwright had learned of the woolcombers' petitions from the votes and he sent in a counter-petition which was received March 18.[3] The

1 J.H.C. 49, p. 439.
2 This was recognized by Mr. Toplis. Once the principle (i.e. prohibition of machinery) received sanction, every manufactory in the kingdom would be exposed to applications for similar restraints, both in agriculture and manufactures, he maintained. (Ibid., pp. 395, 564.)
3 Ibid., p. 347.

inventor submitted that machines saving manual labour "are beneficial to the interests of this kingdom" and should be encouraged, but he was impressed by the strength of the woolcombers enough to say that he would concur in a plan to limit the sale of the machines to a certain number annually. This plan was ingenious.[1] Estimating the total number of woolcombers at 50,000, he calculated that 3125 entrants to the trade were annually needed to keep up that number. Instead of the new entrants to replace the deceased woolcombers, 156 sets of machinery could be introduced without injuring those "already bred to that occupation".[2]

Mr. Toplis wanted no such compromise. In his petition, received March 31,[3] he boldly assailed the character of the woolcombers, recited the difficulties involved in getting them to work, and introduced the sturdy old "dilemma" argument.[4] Mr. Toplis' arguments were ordinarily popular in Parliament and perhaps they were the ones that prompted the House to defer the second reading on April 14 and again on April 29.

On May 2 the petition of the proprietors of the "Four large and expensive Manufactories" was received.[5] This petition is historically important because it contains a classic statement of the laissez faire idea:

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1 He inserts it in his Memorial, op. cit., p. 45.
2 But what about the eldest sons and those apprenticed to the trade? They would delay execution of such a scheme.
3 J.H.C. 49, p. 395.
4 Machines would enable the English to undersell foreigners. But if machines were prohibited, foreigners might take them up and undersell the English.
5 Ibid., p. 545.

> It appears to be the General Right of the Subject, which the Wisdom of the Legislature has for Ages admitted, that he be at Liberty to exercise his Art or Profession in that Way which appears to be the most conducive to his Interest, nor offends against the Laws or the Right of others; that of this Interest he is himself in all respects the fittest Judge, and that from this unfettered and well-directed Pursuit of Individual Interest, has arisen, and ever will arise, the greatest Aggregate of National Benefit.

The appearance of this statement shows how intimately laissez faire was associated with the introduction of machinery. Liberty under laissez faire included the liberty of introducing machines.

> Under the Protection of the Law, vesting in some of the Petitioners and others the Right of certain Patents, the Public has become possessed of a very valuable Improvement in the combing of Wool by Machinery as preparatory to the Spinning of Worsted Yarn, one great Staple of the National Trade: . . . great Benefit has already resulted from this improved Mode of Combing, but in no proportion to what is expected to result, whereby a great Saving in the Production of Yarn will be obtained, and the Manufactures of the Kingdom be carried to Market with greater Advantage both to the Manufacturer and Consumer.[1] . . .
>
> The good Policy of the Law, in leaving Manufacturers to their Natural Course, was strikingly evinced in the Business of Cotton, in the Spinning of which the Application of Machinery threatened to deprive of their Maintenance a much more considerable body of Artizans, while in the Progress the Artizans found Employment, and the Cotton Manufacturers of the Kingdom were carried to a height both of Excellence and Extent, and the National Wealth was multiplied, beyond all Example.

And here the proprietors made a shrewd point. It would be an "unequal Line of Justice" to grant the advantage of machinery for the carding of cotton and deny it for the combing of wool, the "latter being, for Ages, the Favourite Produce of the

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1 In progress of time these machines would save "to the National Produce" much over one million pounds per year, they claimed. Otherwise the nation would be charged for this "additional load". (Ibid.)

Kingdom". On the other hand, they thought that the growth of wool fit for combing might increase with demand and that wool, if unchecked by prohibitions, would reach the height of cotton. These tentative forecasts were hardly realistic. They only illustrate the strength of the proprietors' belief in the efficacy of laissez faire and machinery.

Parliament was hesitant. The woolcombers stood to lose if the machines were allowed and the manufacturers stood to lose if they were not.[1] The crisis came on May 9 when the bill came up again for second reading. The petition of the worsted committee[2] was simultaneously presented. This petition simply stated[3] that the woolcombers' bill was "prejudicial" and asked that the committee be heard. The Commons then negatived the bill with a vote of 67 to 24, and it was eventually put off for six months.[4]

This meant the death of the woolcombers' bill. The plight, or the imagined plight, of the woolcombers, however, was not forgotten. The Parliament was still convinced that Big Ben would put the hand workers out of work and next year, 1795, it resolved the matter by passing a bill relaxing 5 Elizabeth c. 4. It permitted the displaced woolcombers to exercise another trade

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1 If forced to abandon machine combing they would severally be subjected to the "ruinous obligation" of paying 1500 to 2000 pounds per annum. (Ibid., p. 546.)
2 The worsted committee was authorised by the "Worsted Acts" of 1777. It was thus a quasi-official body.
3 That is, its précis appearing in the Journals (49, p. 571).
4 Ibid. The motion was that the Commons go into a committee of the whole House to consider the bill. Mr. Bastard and Mr. Rolle were tellers for the Yeas.

in any town or place in Great Britain without serving an apprenticeship. This was a laissez faire solution, which assumed, with the machinery advocates, that the effect of machinery was not to decrease the total number of opportunities for employment. The woolcombers thought the privilege it offered them a poor consolation, and later historians have implied that the solution was inadequate. But it is difficult to suggest any other course the legislature could have taken. Any other course would have been foreign to the context of the times, at least. It would take powerful arguments, pulled out of a hat, to prove that Parliament's solution, so far as it went, was not perfectly correct. The significant thing about this bill was that it demonstrated that the legislature was willing to solve a problem arising from a conflict between laissez faire and the Elizabethan system by breaking down the restrictive apprentice system, thus creating more laissez faire, so to speak. There was no difficulty getting the second woolcombers' bill passed.[1] Its rapid passage showed the way a strong wind was blowing.

Now, in view of later developments, or the lack of them, this great commotion in the legislature over the introduction of Big Ben seems something of a joke. Actually, almost fifty more years passed before a really practical woolcombing machine was put into use.

Despite Dr. Cartwright's optimism and his and Major Cartwright's strong efforts to promote the machine in these early

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1 Mr. Ryder, Mr. Rose and Mr. Hobart were ordered to bring in the bill on June 2. It was passed by Commons on June 15 and received royal assent June 26.

years[1] and despite the ardent desire of the manufacturers to be free from dealings with the unmanageable woolcombers, Big Ben was not extensively used. Davison and Hawksley used six sets at Arnold Mill, with great success, but they seemed to have a genius for adapting machinery which few others could match.[2] Machines were set up at Retford,[3] Worksop and Bedworth in northern Nottinghamshire,[4] and at Bromsgrove, Worcestershire.[5] But Davison and Hawksley estimated in 1800 that all the woolcombing machines then in use produced only five or six times as much as their own mill produced, and that these machines together produced a little over 2 per cent of all combed wool.[6]

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1 Major Cartwright and another brother, Charles, were involved financially in the inventor's affairs. In 1800 they defended the patents in court (Cartwright v. Amatt and others) before Lord Chief Justice Eldon in the Court of Common Pleas. They received the verdict and were awarded 1000 pounds damages. But they could not afford the litigation that would have been necessary to protect the inventor's rights. (Strickland, op. cit., p. 177.) Major Cartwright was active in detecting instances of piracy. (Ibid.)

2 See Burnley, op. cit., pp. 116, 130, 141, and J.H.C. 56, p. 272.

3 This mill belonged to the Cartwright brothers. (Annals of Agriculture, xx, p. 35.)

4 J.H.C. 56, p. 272.

5 Ibid., p. 456.

6 These figures are suggestive only. Davison and Hawksley said they saved 4500 pounds per annum with the machines, and this they "would verify on oath" if necessary. They estimated the savings to the trade then at between 25,000 and 30,000 pounds annually and estimated that the savings to the trade would amount to 1,200,000 pounds per year if Big Ben were universally adopted. (Letter in Cartwright, op. cit., pp. 96-97.) Davison and Hawksley probably included in their estimate the machines that were operating outside Cartwright's patent or under another patent. With Mr. Toplis, his erstwhile ally who claimed to be an inventor in his own right, and perhaps others, Cartwright made compromise agreements. (J.H.C. 56, pp. 272, 417.) Cartwright told a Parliamentary committee in 1801 that "the degree in which the machines have been adopted is far too small to flatter the patentee with even a hope of paying the interest on his debt". (Ibid., p. 272.) Cartwright had obtained some property through marriage, but

Why was Big Ben so little used?[1] There seems to be no real evidence that the attitude of the combers had very much to do with it. Nor did the so-called "unprogressiveness" of the worsted trade have much to do with it. The Cartwrights endeavoured to persuade Parliament that "a main Cause why the Machines did not get into extensive Use" was that people were in doubt about the patents, and said that another cause was that they did not have enough money to hire agents to demonstrate the machines, "to shew their Advantages, and to remove Prejudices and ill founded Objections".[2] These factors may have played some little part, but such things were not enough to hold back other machines and are not enough to explain Big Ben's non-use.

The machines would only do for use on certain coarser grades of wool, for one thing.[3] And for another its use on these grades was unsuccessful in the hands of most manufacturers. Mr. Ramsbotham set one to work in a room behind a house in Kirkgate (Bradford), using a horse as a source of power, but he became disillusioned. After a trial he took it down and sent it away. "It would appear to have been a source of loss and annoyance, as the old gentleman is said to have taken off his hat to it as it left his yard; no doubt . . . expressing the

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lost everything with his inventions and business ventures. He was no Arkwright.

1 Mantoux says (op. cit., p. 275) that Big Ben "was, nevertheless, in use in a good many factories by the beginning of the nineteenth century, especially around Nottingham and Bradford," citing the Report on Woolcombers' Petitions and the report on Cartwright's application for extension of his patent (J.H.C. 56, p. 272). The contrary view is, of course, presented here.

2 Ibid.

3 Ibid. 49, p. 545.

charitable hope that 'Big Ben,' . . . might prove a better servant to its new master."[1] Big Ben never did prove an adequate servant, although it kept in circulation. The handcombers became contemptuous of the machine they had earlier feared.[2] During the great strike of 1825, Big Ben was talked of as a weapon to use against the woolcombers, but it was then said that "there is much to discover and much to be extended before these engines will supersede the use of animated machinery".[3]

On this matter James opined that the 1794-95 proceedings "humbled the woolcombers, and rendered them more tractable. When the combers accepted reasonable wages, the combing machine, being an imperfect instrument, soon fell into comparative disuse, hand-combing being so much a superior process".[4] Although the 1794 rebuff may have hurt the morale of the woolcombers, James' interpretation may be questioned. Much later, during the 1825 strike, the hand workers were threatened with machinery. The masters told the workmen, significantly, the combing of wool "half by machinery and half by hand" was making rapid progress.[5] "The combers had better turn in and do the work than let it be done by Big Ben," they said.[6] But it may be doubted that, as James implies, the machine played

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1 James, op. cit., p. 566.
2 They were "very confident in expressing the opinion that it was folly to imagine any machine would ever be produced that could comb wool equal to that combed by hand". (Burnley, op. cit., p. 144.)
3 A Bradford correspondent, July 27, 1825, cited by Burnley, op. cit., p. 170.
4 Op. cit., p. 323.
5 Burnley, op. cit., p. 171.
6 Ibid., p. 174. See also infra, p. 179, n. 1.

an important part in making the woolcombers more tractable in 1794-95. The coming of war reduced the demand for combing and reduced the price for it,[1] and the large number of petitions against Big Ben sent to Parliament the early part of 1794 may be, at least partly, explained by this. Although the war stimulated some other sections of the wool trade,[2] the stuff industry suffered during the early war period.[3] It seems possible only to conclude that the combers lost their arrogant ways because of general conditions of trade rather than the invention of the woolcombing machine. The woolcombers enjoyed some periods of prosperity after the war, notably from 1818 to 1825, but the trade fluctuated with the changes in foreign demand for worsted products and with the accessibility of these markets.[4] The 1825 strike broke the woolcombers. There were no more festivals for Saint Blaize after this strike.[5] Platt and Collier's machine of 1827 was still not satisfactory, at this late date, though it was utilized to a greater extent than any previous machine.[6] It was S. Cunliffe Lister's machine that, between 1840 and 1850, put the seal on the hand woolcombers' fate.[7] It seems reasonable to assert the view, antithetical to the one put forward by James, that had the hand combers

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1 Petition of the proprietors, J.H.C. 49, p. 545.
2 Supra, pp. 106-07, 115-18.
3 James, op. cit., p. 367.
4 Ibid., pp. 282, 367-400.
5 Burnley, op. cit., pp. 175, 206.
6 Ibid., pp. 151-54.
7 Ibid., pp. 183, 250. Even this late in the game the men resented the machines. At first it answered only for "certain sorts" and the men said they wished one of the owners would put some of the sorts he gave to men to the machines. This would show what the machines were worth.

managed to maintain their adamant pose and their high wages in prosperity, this successful combing machinery would have been perfected earlier.[1] Instead they went into a period of decline simultaneously with the invention of the imperfect machine.

The career of the woolcombing machine ran similar to that of Dr. Cartwright's other principal invention, the power loom, in interesting ways. Both inventions showed great inventive talent, but both were imperfect at first and both were not successfully put to use until after several decades. The kindly, good-humoured poet and clergyman had argued that "even on the principle of humanity" to the workers it was not desireable to restrain machinery since "the introduction of new inventions or improvements is in general so gradual as to affect those whose occupation they interfere with almost imperceptibly".[2] But both the woolcombers and the hand-loom weavers suffered for decades, during the gradual introduction of these machines. The difference was that the power loom contributed directly to

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1 High wages and, especially, strikes stirred up interest in machinery among manufacturers who might not have considered it otherwise or who might even have been prejudiced against change. One result of the 1825 strike mentioned by the Bradford and Wakefield Chronicle, October, 1825 (as quoted by James, op. cit., p. 406, footnote): "The machines invented by Messrs. Dawson and Lister for combing wool, and for which they have obtained a patent, are now getting into active operation. We understand they answer uncommonly well, and that the yarn produced by the wool combed by them, is, if anything, superior to that manufactured from wool combed by hand labour." This machine was not really successful but such experiemnts with machines led to eventual success. Referring to the disasterous 1832 woolcombers' strike, James wrote that "it compelled the masters to seek in the combing machines, which had been improved by Messrs. Platt and Collier, relief from the intolerable conduct of their workmen." (Ibid., p. 435.)

2 Burnley, op. cit., p. 114.

the gradual decline of the weavers from around 1810 to 1840, whereas the woolcombing machine was not a very important factor in the decline of the woolcombers until the latter date. Another difference in the careers of the two inventions was that Big Ben seems to have suffered no violence despite the unruly nature and itinerant habits of the woolcombers.[1] This absence of assaults on the woolcombing machine would appear to bear out, generally, the points made in this narrative.

During the period being especially considered here, 1790 to 1810 or so, the attitude of the woolcombers is clear. They disliked machinery simply because it threatened their jobs and their position. They expressed this dislike in a prosaic way without venturing into theoretical whys and wherefores. They might have so ventured if the scare of 1794-95 had proved a solid threat to their livelihood, but it did not.

The action of the worsted committee, in sending a delegation to Parliament in order to stop the first woolcombers' bill, showed an absence of jealousy among the manufacturers. Most of the members did not operate woolcombing machinery, although, of course, some of them may have thought they would like to later on. The decisive action of the committee was a rather disinterested defence of the principle of machinery.[2]

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1 Big Ben was an intricate affair and could have been put out of action very easily.

2 The efforts of the committee had not "been restricted to the repression of frauds in the trade. It has prominently assisted in numerous measures for the general benefit of the stuff manufacture, and expended large sums with that intention. In all steps undertaken to prevent the exportation of our wool and yarn, it took a part, and prosecuted parties who, contrary to law, exported these articles. Also in giving

Parliament acted equivocally in dealing with the woolcombers as it did in the next decade when the conduct of the woollen industry came up for review. A whole new world of economic thought and activity had grown up beside the old. It had weakened the old world so that it was about to collapse, and, having done this de facto, this new world wanted its existence confirmed de jure. This put the legislature in a difficult position for, despite the manufacturers' appeal to ancient "rights" embodied in the common law which "the Wisdom of the Legislature has for Ages admitted", these manufacturers represented change of a fundamental nature. The first woolcombers' bill showed that a group of legislators existed that was willing to pass restrictive legislation for the benefit (as they saw it) of the woolcombers. The majority in the Parliament perhaps had less concern for the welfare of these workers, though it had some surely, but this majority was only being realistic when it passed the second woolcombers' bill. The latter legislation expressed the spirit of the times and of the future.

This spirit was to receive further expression after machinery introduced for the dressing of woollen cloth caused difficulty between manufacturers and another group of skilled workers.

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rewards to inventors: for example, in 1785, to James Hartley of Gisburn, one hundred guineas, as a gratuity, for his invention in washing wool [probably to keep him from taking out a patent for his invention, which patent would have given a "monopoly" to the patentee]; in preventing the exportation of machinery used in the trade; and in opposing attempts of the Legislature to put down the use of machinery in combing." (Extracted from the order book of the committee by James, op. cit., pp. 298-99.)

SECTION III. MACHINERY AND LAISSEZ FAIRE

CHAPTER X: THE GIG MILL IN YORKSHIRE

The Machine

As we have seen, troubles over the use of spinning and carding machinery came to a head in the cotton trade in 1779. Jennies came into common use in the woollen trade of Yorkshire at and before that date, and the policy of using scribbling and carding machines in the West Riding was disputed between 1780 and 1786. The use of all these machines was an issue in the South-West between 1790 and 1795. These machines were generally accepted in the principal clothing districts, with a few reservations on the part of the workmen, by 1800. It is true that some workmen caviled at the spring loom when Parliament investigated the woollen trade in 1803, but the use of this machine was not really an issue. The spring loom was not universally used in the South-West at that time and there was sentiment against it, but it was used in the nation to a degree that made its complete success a foregone conclusion in the clothing districts. It was discussed in 1803 mainly for the bearing its operation had on apprenticeship and on the use of other machines. The revolution in the trade had been accomplished by 1800.

It was after the successful accomplishment of that revolution that the dispute over the use of additional machinery in the woollen trade, for the dressing of cloth, arose. This

dispute, therefore, forms something of a separate chapter in the trade's history. The controversy came to a head in 1802 and 1803, at the time of the Peace of Amiens and at a time when trade slackened following the big gains of the previous years. This slackening of trade was not serious. In 1801, 1802 and 1803, according to the records of the Pontefract Sessions,[1] Yorkshire manufactured 13.5 million, 13.7 million and 13.9 million yards of narrows and broads. This was a decline from the 15.2 million yards of 1799 and the 15.3 million yards of 1800. But the production of 1801, the poorest year of the decade, was higher than that of any previous year excepting 1799 and 1800. And the decline in production came in 1801, not in 1802 and 1803 when the complaints of the workmen were heard throughout the land. Judging from the number of cloth workers in each district (a pretty good way of judging, except that the number of cloth workers cannot be definitely ascertained), Yorkshire was producing from two to three times as many woollen cloths as the South-West at this time.[2] There is no guarantee that the conditions of trade in the South-West reflected those of the West Riding, but they must have in a very general way and had there been a great difference this would have been brought out before the Parliamentary committees of 1803 and 1806. Before these committees the manufacturers and merchants[3] were

1 Report on Woollen Trade, 1806, p. 25.
2 Evidence on Woollen Trade, 1806, p. 249.
3 Production of narrows and broads in the West Riding rose to a new mark of 15.4 million yards in 1804, and then to 16.2 million yards in 1805. The 1806 committee met, therefore, when the trade was enjoying unprecedented prosperity.

not inclined to complain about the state of trade during the first few years of the century, but instead were inclined (as were the members of Parliament) to look at the broad picture showing the great gains of the industry during the war period.

In 1802 and 1803, however, the condition of the workmen was affected by the fact that many soldiers and sailors had been discharged. These discharged men swelled the labour force. Some of them tramped around trying to find jobs and were unable to find them. They were quite ready to believe that machinery, put into use during their absence, had taken their jobs away from them. The return of these men lent some colour to stories of distress. Nevertheless, distress was not general.[2]

In these circumstances the woollen trade asked Parliament for some far-reaching legislation. Workmen of the trade, in Yorkshire and in the South-West, while not in serious distress, were worried about the machines for dressing cloth being newly introduced. They tried to invoke old statutes to prevent the use of the machines and asked for legislation limiting and prohibiting their use. The large manufacturers and clothiers of Yorkshire and the South-West were annoyed with a great many old statutes that had accumulated on the statute books during past centuries which, they said, unduly restricted the trade. They asked that these old statutes be taken off the books.

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1 Evidence on Woollen Trade Bill, 1802-03, p. 171. See also Hammond, op. cit., pp. 172-73.

2 Cloth workers in the West Riding were not complaining of the badness of trade. (Evidence on Woollen Trade Bill, 1802-03, p. 177.) There was a great deal of evidence that weavers were in great demand in the South-West. (Ibid., pp. 137, 252, 265, 271, 279, 329, 335, 354, 368.)

The domestic clothiers of Yorkshire, siding with both these groups and yet standing between them, were becoming alarmed over the spread of factories (the practice of merchants becoming manufacturers). They asked for some very special legislation to preserve the domestic system. All of these groups took their worries to Parliament, and Parliamentary committees thoroughly investigated the conduct of the trade from 1802 to 1806. The legislature dealt rather equivocally with the matters brought to its notice during the decade, but finally made decisions that set the pattern of the trade, generally speaking, for over a century, expressing thereby the economic philosophy that guided the government in its relations with all industry for that period.

Machinery was at the bottom of the trouble that brought about these Parliamentary inquiries. Machinery made possible the factories of Yorkshire. Machinery attracted attention to the anachronistic legislation remaining on the statute books.[2] Machinery had some bearing on the break-down of apprenticeship rules, in which both the workmen and manufacturers were interested.[3] And the fear of machinery prompted the workmen to

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1 In most particulars, not including factory legislation.
2 Infra, p. 245.
3 A most interesting point. The old apprenticeship rules and the general use of machinery were certainly incompatible. The Parliamentary committee of 1806 tried to establish that the use of machinery in the textile trades made apprenticeship rules anachronistic. It was not successful when it tried to prove that machinery made the tasks of the workmen simpler, but, of course, most machines in use at this time performed tasks that had been done by unapprenticed workers. The exception was the spring loom. The seven-year apprenticeship was unnecessary in many branches of the textile trades in 1806, but machinery, by itself, had not made it

appeal to the legislature. Essentially the conflict before Parliament was between machinery and laissez faire on one side and the old methods and a system of restriction on the other.

The machine that took the center of the stage at this time was the gig mill. This machine did work which had been done formerly by a class of workmen called "cloth workers", "cloth-dressers", "shearmen" or "croppers". The work of these cloth workers involved a great deal of skill; the finish of the cloth depended on their efforts. They were journeymen, generally very well-paid,[1] and they were also well organised, as the following narrative will demonstrate. They worked under a master dresser who finished cloths for a merchant, or--especially when machinery came into use--under a clothier.[2]

These workers performed two main operations. With hand implements called "handles" bearing "teasels"[3] they raised the

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so. The Elizabethan statute was headed for doom, but the effect of machinery on its descent was mostly indirect. Illegitimate workers entered all trades during times of prosperity and expansion, to remedy the deficiency of workmen (see Evidence on Woollen Trade Bill, 1802-03, pp. 8, 307, for revealing remarks). (By doing so they lessened the need for machinery.) But did machinery create that prosperity and expansion? In a very large degree it made that expansion possible and to some degree it created it, as many contemporaries, especially the machine-users, believed, but this effect is impossible to assess. As mentioned elsewhere (supra, p. 141) the displacement caused by machinery created "illegal" workers in other branches of the trade, especially weaving. When it appeared that the woolcombers' employment would be taken from them, Parliament relaxed the Elizabethan statute (supra, pp. 173-74). In these ways the use of machinery contributed directly to the break-down of the system of apprenticeship, but it must not be thought that displaced workers constituted the bulk of the "illegal" weavers. The greatest effect of machinery on apprenticeship was general and indirect.

1 Infra, p. 218, n. 2.

2 Crump, op. cit., pp. 38-39.

3 "The use of teazle-heads is a remarkable feature in the

nap of the cloth. Then, with large hand shears, they "cropped" the cloth so that it was even and smooth. Neither of these jobs was nearly as simple as the mere mention of the operation makes it sound, but the complications are not pertinent here. The gig mill did the first operation, raising the nap, leaving the work of shearing to be performed by the cloth workers as before. The gig mill, therefore, did not take all their work from them. On occasion they spoke of it as "halving" their work,[1] although the shearing was considered the more important moiety.[2] This fact gave them a weapon to fight against the machines, for by refusing to do the shearing, to work "after the gig" as they expressed it, they could prevent the gig from being successfully used. In doing so, however, they stimulated efforts to devise and use machines for the shearing also, machines which eventually took all their old work from them.

The gig mill was a simple machine, not new, but centuries old at the time of these troubles. Leonardo da Vinci had invented a gig mill.[3] The gig mill was a factory machine, usually driven by water, as the name implies.[4] The teasels or cards

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process; for no combination of wires has yet been found that will effect the required object so efficiently as the little elastic prickles on the surface of the teazles." (George Dodd, The Textile Manufactures of Great Britain, London, 1844, p. 105.) This quotation refers both to hand and machine dressing, for the teasel heads (that is, the heads of the plants) were mounted on "handles" for use on the gig mill also. (Evidence on Woollen Trade Bill, 1802-03, pp. 159, 169, 305, and Evidence on Woollen Trade, 1806, p. 276.) Wires are now used.

1 Evidence on Woollen Trade Bill, 1802-03, p. 161.
2 Ibid., p. 198.
3 Usher, op. cit., pp. 237-38.
4 The cost of a gig mill was given as 40 pounds in 1840. (Reports from Assistant Hand-Loom Weavers' Commissioners,

of the hand-dresser were mounted on a drum. The cloth passed over and partly around this drum, being unwound from one cylinder mounted on the frame and wound onto another cylinder while the teasels on the revolving drum raised the nap. The ancient difficulty with this machine was that pressure could only be applied by stretching the cloth between the cylinders. If it was not sufficiently taut the nap was not properly raised, but more severe stretching (most cloths were wet when they went through the mill) damaged the ground of the cloth. If wire cards were used instead of teasels, these cards tore holes in the cloth.[1] This is the principal reason why the gig mill was made illegal in the 16th century.[2] The successful use of this machine, the simple principle of which had been discovered so long ago, shows the genius of the Industrial Revolution. It is difficult to select any particular development that made the use of the machine generally feasible in 1800 when such use was not feasible before.[3-4] Various enterprisers experimented

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1840, Part III, p. 439.) It would not have paid a small manufacturer to have a gig mill of his own. (Evidence on Woollen Trade Bill, 1802-03, p. 152, testimony of Mr. W. H. Awdry, a small master of Chippenham.) The small manufacturers could hire the gigging done. But the best results were obtained by the manufacturers who owned their own gigs, since they could supervise the work more carefully.

1 An instance is related of wire cards taken from a scribbling engine being substituted for teasels (Ibid., pp. 119, 123.) Much of the damage ascribed to the machine came about because cards were used.

2 Infra, p. 191, n. 2.

3 Some clothiers were using gig mills with great success in 1800 while others could not find the secret of using the identical machines. Mr. Thomas Fowle of Chippenham, for instance, tried the gig mill but abandoned it, saying that his "Gig Mill was not a good one; I had not Time to prepare it the proper way". (Evidence on Woollen Trade Bill, 1802-03, p. 135.) Hence the great and detailed mass of

with it for years, when success seemed unlikely, improving workmanship, making small adjustments, having the cloth made

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contradictory evidence on the quality of work performed by the gig mill given before the Parliamentary committees of 1803 and 1806.

4 But it is interesting to investigate the alterations that were made on the gig mill. For one thing, various means were devised so that the pressure of the cloth on the drum could be delicately adjusted. (Ibid., pp. 267, 275, 304, and Evidence on Woollen Trade, 1806, pp. 389-91, 425.) For another, it became a practice to begin dressing the cloth with "dead" teasels, changing to sharper teasels as the dressing proceeded. (Evidence on Woollen Trade Bill, 1802-03, pp. 304, 312.) But, it may be suspected, the most important practice tending to make the gig mill feasible, especially for the manufacture of superfine cloth, was that of having the cloth made heavier when it came to the clothiers from the weavers, after which it could be dressed down to the required weight. A Gloucestershire clothier suggested this in a revealing remark. He stated that "we advanced the price of our weaving in order to have our cloths made stouter than they were before, which is the reason they come out the more from the gig afterwards than in the ordinary way, having a much greater substance from the loom". (Evidence on Woollen Trade, 1806, p. 361.) No other clothier made such a remark before the Parliamentary committee, and the successful ones may have deliberately refrained from doing so in order that they might keep the secret. The Gloucestershire manufacturers fostered the legend that their water gave them an advantage which manufacturers in the West Riding could never hope to possess. But William Hirst, who claimed to be the first man in the West Riding to discover the secret, proved that this claim was "all fudge". Mr. Hirst's fascinating story of his adventures as a manufacturer (Wm. Hirst, History of the Woollen Trade for the last Sixty Years, etc., Leeds, 1844) supports the inference made from the quotation given above. He said that he was the first in the West Riding "who made cloth suitable for gig-razing" (p. 13, my italics), mentioning that ordinary fabrics were made worse by being finished by machinery. While not revealing the secret in so many words, he stated that he paid his weavers extra, adding that "I could always make the most profit on those goods which had cost the most for weaving". He also remarked that "when the cloths were well put together in the looms, I could put a lustre on them in the gig which would almost enable a man to shave himself in them". Rees' Cyclopaedia (s.v. Woollen Manufacture, vol. 38) describes a "recent improvement" in West Riding goods at this time (1813-17) which consisted of weaving with softer and heavier yarn, and this seems to be a reference to Hirst's enterprise. After weaving with this yarn the fibres

differently, until finally it became practical.[1]

With the gig mill, one man and two boys could raise four pieces of cloth 36 yards each in 12 hours. Doing the same work by hand, 24 men would be required.[2] These were the figures given by workmen before the 1803 committee.[3] One manufacturer estimated that the gig saved about "three-fourths of labour" and two of them estimated that the cost of the work was one-half less.[4] But the manufacturers did not stress the saving. They professed that they desired to use the gig mill because it finished the goods better, and they were able to satisfy the Parliamentary committee of 1806 that it did.[5] The truth of their claim is generally borne out by the

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became more interlocked during the fulling and the cloth, then, was apparently better able to withstand the "impetuosity" of the gig mill.

1 William Hirst, referred to in the previous footnote, claimed that the secret of dressing woollen cloths with the gig mill came to him in a flash after he had seen the gig mill working only five minutes. But later he "learnt that one or trials in anything new, was not sufficient: care and patience are required before theire usefulness can be understood". His difficulties, he said, "would have shaken the faith of thousands". (Hirst, op. cit., pp. 15, 21.)

2 That is, usually, 18 men and six boys (Evidence on Woollen Trade Bill, 1802-03, p. 147).

3 Ibid., pp. 103, 118, 147, 165, 181, 193.

4 J.H.C. 58, pt. 2, p. 886, and Evidence on Woollen Trade, 1806, p. 400. Also ibid., p. 428. One clothier, who disapproved of the gig, sent some cloths to be gigged because he "had understood it was cheaper" (Evidence on Woollen Trade Bill, 1802-03, p. 152). But Mr. A. Lloyd Edridge of Chippenham stated that the savings of the gig (which he used) had been over-stated. The purchase of teasels was expensive and it was necessary to keep on extra hands (ibid., p. 367).

5 Report on Woollen Trade, 1806, p. 6. A Chippenham clothier who disapproved of gigs admitted that the finish of gigged cloths "certainly has a better Appearance to the Eye". (Evidence on Woollen Trade Bill, 1802-03, p. 130.) All the clothiers who did use the gig made this claim without reservations.

circumstances of the machine's adoption, although the point was hotly disputed. The workmen claimed that the gig mill di defective work, and in some cases it did, but the main grievance of the workmen was that the machine took all the labour of raising the nap from them and, in the case of coatings, an important item in Yorkshire, it took all the labour of dressing for these were not short after the raising.[1]

A very noteworthy thing about gig mills was that they had been put into limited use long before their use became an issue. It is not at all unreasonable to suspect that they were used in Gloucestershire continuously from the 16th century.[2] Mr.

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1 Evidence on Woollen Trade, 1806, p. 235. Coatings were sometimes dressed by "Duffell Drummers" or "Cutting Rowers", that is, cloth workers who specialized in coatings, but usually they were dressed by regular cloth workers. (Ibid., p. 236.)

2 "In 1532 a gig-mill and a fulling mill at Cam were leased for twenty-one years to Alice, wife of John Tyndale." (V.C.H. Gloucestershire, ii, p. 157.) A statute in 1551 (5 & 6 Edw. VI c. 22) prohibited their use. A proclamation of the king in 1633 (Rymer's Foedera, xix, p. 446) against them shows that they were used in spite of the statute. A report of a royal commission on the clothing industry in 1640 states that in England they had "bin suppress in all places thereof Except in Gloucestershire, about Stroudwater, where they dayly more and more increase, to the great disgrace preiudice, and danger of the ruining of the Manufactures there, if not in time prevented." (G. D. Ramsay, The Report of the Royal Commission on the Clothing Industry, 1640, The English Historical Review, vol. 57 (1942), p. 486. See also, Historical Manuscripts Commission, Portland, viii, p. 2.) Gloucestershire clothiers were using gig mills in 1707. (J.H.C. 15, p. 456, December 11). The question arises, were these gig mills the same machines that were prohibited by the 16th century statute? The Atkinsons of Huddersfield were winners in such a suit but, despite the court's decision in their favour, Mr. Law Atkinson later professed that "we consider ourselves that it is really the same". This question, which is casually discussed in some secondary works, would seem to be a complex one but it is not. The question arose in 1633. Then the Gloucestershire

John Anstie, the Wiltshire clothier, wrote (in 1803) that gig mills had been used in Gloucestershire for dressing coarse white cloth "it is presumed longer than any person can remember".[1] Talking to a manufacturer whose father was a fuller, he learned that there was scarcely a fulling mill in the neighbourhood that did not also have a gig mill, "most of them apparently of old construction". In some mills where there were no gigs, the construction of the mills made it evident that they had been used before. Mr. Anstie cited some "ancient" terms used to describe the processes of mechanical gigging.[2] A clothier of Uley, Gloucestershire, stated in 1803 that his father had used a gig 60 years before.[3] The other Gloucestershire clothiers appearing before the Parliamentary committee could not remember any time when the gig had not been in use.

Wiltshire was a different proposition, and so was Somersetshire. When a "Mr. Everet" erected one for dressing broadcloth, near Warminster, in 1767, a great number of shearmen, from clothing towns in Wiltshire and Somersetshire, said

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clothiers argued that they did not use the kind of "gig mills, prohibited by statute, which are used with card wires, theirs being used only with small teazles, for the gentle raising of the cloth at the first work". (V.C.H., Gloucestershire, ii, p. 159.) Card wires or teasels, the gig mills or mozing mills did the same sort of work (though not necessarily the same work, for the dressing of cloth was divided, often, into two main processes, mozing and rowing), the point being whether the use of them affected the quality of the cloth. Card wires or teasels, the machines were the same except for that detail.

1 Anstie, op. cit., pp. 67-68.

2 Ibid., pp. 71-72.

3 Evidence on Woollen Trade Bill, 1802-03, p. 269, testimony of Mr. Daniel Lloyd. See also ibid., p. 253, testimony of Mr. Edward Sheppard.

to be 500 in number, assembled one Saturday in July and destroyed the machine.[1] The cloth workers were able to keep the gig mills out of these counties until the turn of the century.[2] This riot in 1767 was one of the early evidences of anti-machinery feeling in Somersetshire and Wiltshire.

In the Leeds Area

Gig mills had been in use in Yorkshire for a "long time", that is, a few gig mills. Witnesses before the Parliamentary committee of 1803 suggested that they dated back about sixty years.[3] The best testimony came from Daniel Whitworth, a cloth worker and an old-timer, who was acquainted with the gig mill since 1755 when he had been an apprentice. The gig "was in its Infancy then", he told the committee.[4] One Halifax manufacturer said he gigged his cloths as far back as the year 1760,[5] but one might legitimately suspect that his gig was

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1 Annual Register, x, Chron., p. 116.

2 But Mr. Anstie stated that gig mills had been used in Wiltshire, as well as in Gloucestershire, for many years. (Op. cit., p. 69.) The question to ask is, where in Wiltshire? The clothiers who testified before the Parliamentary committees of 1803 and 1806, which made efforts to find out the extent of the mills, do not mention any gig mills in Wiltshire but the recent ones--with one exception. This exception was a gig mill at Kingswood, Wiltshire, which had been operating before 1780 and which was owned by the celebrated Mr. Austin, whose cloths were very famous at this time. (Evidence on Woollen Trade Bill, 1802-03, p. 103.) But Kingswood, though literally in Wiltshire, was spoken of as being 12 miles, and it is about six miles on a direct line, from the border of Wiltshire. (Ibid., p. 108.) It was a little island of Wiltshire, completely surrounded by Gloucestershire. Persons who committed offences there had to be carried across Gloucestershire to Wiltshire proper for trial. For our purposes here, we may consider that Kingswood was located in Gloucestershire.

3 Ibid., pp. 246-47, 373.

4 Ibid., p. 226.

5 Evidence on Woollen Trade, 1806, p. 399. Testimony of John Edwards, Esq.

located in Lancashire.[1] In the latter county gig mills were used universally, though not necessarily to a great extent, by the end of the century.[2] A gig mill was operating near Huddersfield in 1783 or thereabouts[3] and another near Halifax about 1785 if not earlier,[4] and these may have been the same ones referred to by Mr. Whitworth and the Halifax manufacturer as being in use many years before. There were said to be about eight manufacturers who put these mills (of varying sizes) into use in the county before 1800.[5] All of the gig mills in Yorkshire were located in the Huddersfield-Halifax area, and at Wakefield. The influence of the cotton industry was strong in this area. This was particularly advantageous to the weavers, who could and did change from wool to worsted or from either to cotton, according to which paid the best.[6] It was not particularly advantageous, of course, to the cloth workers, but we may suppose that in certain indirect ways the proximity

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1 He did not gig superfine cloths because the gig was "too distant" from his house. He gave these cloths to a master dresser near Halifax who, in 1806, "dared not" use a gig. (Ibid.)

2 Ibid., pp. 369, 399. The Lancashire woollen industry was devoted to the production of coatings and other coarse products. It was said that "they make a good many coatings there" (ibid., p. 309). Cloth workers in Yorkshire were paid according to the value of the cloth they worked on, and they did not object particularly to the cheap cloth being done by the gig.

3 Ibid., p. 281, testimony of Joshua Shaw.

4 Evidence on Woollen Trade Bill, 1802-03, p. 217. See also Evidence on Woollen Trade, 1806, p. 395, testimony of Mr. Abraham Barraclough. This cloth worker lived at Leeds at the time he testified, but he had worked for the Atkinsons of Huddersfield in 1783.

5 Evidence on Woollen Trade Bill, 1802-03, p. 377. See also ibid., pp. 246-47, Evidence on Woollen Trade, 1806, p. 217.

6 Ibid., p. 400, and Evidence on Woollen Trade Bill, 1802-03, pp. 240, 293, 294.

of this area to the cotton industry created conditions favourable to the introduction of machinery. This is not to say that the cloth workers around Huddersfield and Halifax were reconciled to gig mills. Quite the contrary.

Until 1791 or later the gig mill had not been seen up at Leeds. Very much impressed with the value of the machinery they had adopted a short time before for spinning and the preparatory processes, and also with the spring loom, the enterprising merchants of this town heard rumours that "various Kinds" of machinery for the "better and more expeditious" dressing of woollen cloth had been "lately invented". They had heard, no doubt, of Mr. Austin's great success in the use of the gig mill in Gloucestershire, about which something will be said later. They had heard that many of the machines were already made and set to work and that "great numbers more are contracted for" in other parts of Yorkshire, in Lancashire, Derby, Chester, Wiltshire and Gloucestershire. Greatly alarmed by this threat to their trade from merchants of other parts who would have the "Enjoyment of superior Implements in their Business", the Leeds merchants called a meeting for October 18, 1791, to discuss what might be done. Almost every merchant in town attended. A committee was appointed to obtain one of each of the different machines[1] "on the most approved Construction" and a subscription was taken to pay for the

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1 When the merchants spoke of "different" machines they had in mind different makes of gig mills, possibly, and they may also have been referring to the shearing frame which was invented in 1784 at Sheffield. The use of shearing frames, however, was not practical at this time.

erection of these machines. The idea was that the machines would be inspected by the trade before being brought into general use.[1]

The merchants then informed the public of all this in a broadsheet, dated November 18. In this announcement the merchants represented that they did not have to defend their conduct in this matter, at a time when people in every other manufacture were exerting themselves to bring work to the market at reduced prices, and since Leeds chiefly depended on foreign demand which was influenced by competition from other nations where taxes were lower and labour costs were only half of what they were at home. They did, however, take the trouble to defend their conduct, in order to prevent misrepresentations, "which have usually attended the Introduction of the most useful Machines". They spoke of the amazing successes of the cotton industry, which had "internal and foreign Demand . . . nearly alike to our own". They cited the successful and approved use of the spring loom, the jenny and the scribbling machines. And they concluded their broadsheet with this paragraph:

> From these Premises, we the undersigned[2] Merchants, think it a duty we owe to ourselves, to the Town of Leeds, and to the Nation at large, to declare that we will protect and support the free Use of the proposed Improvements in Cloth-Dressing, by every legal Means in our Power; and if after all, contrary to our Expectations, the Introduction of Machinery should for a Time occasion a Scarcity of Work in the Cloth Dressing Trade,

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1 This information is contained in the broadsheet referred to in the following paragraph of the text. The broadsheet is reprinted in Crump, op. cit., pp. 317-19.

2 Sixty-one firm names were printed on this broadsheet.

> we have unanimously agreed to give Preference to such Workmen as are now settled Inhabitants of this Parish, and who give no Opposition to the present Scheme.

Brave words. But nothing seems to have happened after the publication of the broadsheet. There were a few bold men among the Leeds merchants, Mr. Gott for one, but these merchants were not able to maintain, as the cloth workers were, the common front they had proclaimed.

Some time later, in 1797, Messrs. Johnson of Holbeck (near Leeds) dared to set up a gig mill. As a Halifax cloth worker said, the cloth workers were "uneasy" between the years 1796 and 1799.[1] This feeling may have come about because of the trade decline in the years 1797 and 1798. In 1796 they created a formal cloth workers' institution.[2] This was not the beginning of cooperation among the cloth workers for they had acted with great unanimity before this time. The 1796 institution was not their sick club but a special combination created for certain purposes, among which opposition to machinery could certainly be counted. In view of all this Messrs. Johnson were rash to set up their gig mill. The cloth workers, undoubtedly with the support of workers in other branches of the trade,[3] pulled it down and totally destroyed it.[4] As William Cookson, merchant and magistrate of Leeds, told of

1 *Evidence on Woollen Trade*, 1806, p. 248, testimony of John Tate.
2 *Ibid.*, p. 231. The special institution lasted until 1799.
3 "Every Class of Workmen make a common Cause with that of the Cloth Workers," wrote Mr. Cookson on August 18, 1802. (H.O. 42/66.)
4 *Leeds Mercury*, November 25, 1799, cited by Crump, *op. cit.*, pp. 46-47.

the riot, "there was a great crowd, many hundreds were present, and some disguised, but all lights were immediately put out; and though a very considerable reward was offered from Government and from the Magistrates, and the parties were summoned up who were known to be there, and who could not prove an alibi, no argument or entreaty could prevail upon any one to confess who were the active parties in the business".[1] Without doubt the cloth workers had done the job, but nothing could be done because it was "so difficult to bring the Matter home to the Persons concerned".[2] This difficulty must show that the cloth workers were not without support from many of the inhabitants of Leeds.

The next year an Armed Association was formed at Leeds to protect the country and the merchants from the French and from the machine-smashers, but this association, of which Benjamin Gott was captain-commander for a time, failed to frighten the cloth workers.[3] Mr. Gott persisted in his efforts to introduce a gig. But finally, after receiving threatening letters, having his windows smashed one night and being required to put an armed guard around his house, he surrendered and dismantled his gig mill, in 1801 or 1802.[4] This ended the efforts to introduce the machine into Leeds for another spell. Mr. Cookson had been sending cloths down to Mr. Waterhouse at Halifax and to the Atkinsons at Huddersfield to be gigged,[5]

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1 Evidence on Woollen Trade, 1806, p. 369.
2 Evidence on Woollen Trade Bill, 1802-03, p. 378.
3 Heaton, Benjamin Gott, op. cit., p. 58.
4 Ibid.
5 Evidence on Woollen Trade, 1806, p. 366.

but he desisted from this practice which offended the cloth workers.[1] And in 1802, when noise of strife over gig mills in Wiltshire and Somersetshire was being heard, he was using his personal influence, as magistrate, to persuade "one or two houses who meditated the adding a gig mill" not to do so. He feared, otherwise, that Leeds "should have had such horrid outrages to deplore . . . as have been practised in the West".[2]

Earl Fitzwilliam, the lord lieutenant, acknowledged the intimidation. "The journeymen are now masters," he wrote to the home secretary. "They are the tyrants of the country; their power and influence has grown out of their high wages . . ."[3] But he felt, also, that the merchants had not been forthright enough. "It is indeed unfortunate the masters have yielded so often, that they have lost superiority." Though powerful, the cloth workers were "an order of men not necessary to the manufacture,[4] and if the merchants had firmness to do without them, their consequence would be lost . . ." He felt like suggesting that the merchants go ahead and introduce the machinery, despite opposition, to bring the subject of machinery to a test.[5] But though Earl Fitzwilliam felt that

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1 Ibid., p. 372. "I certainly would send the fine cloths to be dressed by machinery, than if I lived anywhere else than where I do; I do not wish to breed disturbance, or breed disquiet as a magistrate, but I am convinced that the gentlemen, who do use machinery, are superior to me in dressing."

2 H.O. 42/66, William Cookson to Earl Fitzwilliam, Leeds, August 18, 1802.

3 Ibid., Earl Fitzwilliam to Lord Pelham, September 27, 1802.

4 Earl Fitzwilliam was alluding to the fact that shearing machines had become feasible at this time and were being introduced in some other areas.

5 Ibid.

way, the merchants were unwilling to chance it. The law against gig mills became "as complete in effect, nay more so, than if enacted by Parliament".[1]

It is perfectly clear that the cloth workers managed to keep the gig mill out of the Leeds area[2] for about 25 years, from 1791 until into the second decade of the 19th century. There are references to gig mills being used there before the time of the Luddites but these were only used to raise coatings or blankets.[3] The cloth workers tolerated this use, presumably because most of them did not consider working on coatings remunerative employment. A gig mill used for coatings was, however, destroyed in 1812.[4] For practical purposes it may be considered that the gig mill was not used in Leeds until William Hirst discovered the South-West clothiers' secret of dressing superfine cloths with the machine in 1813. Hirst lived in fear of his life for three years, but he was so successful with his gig mill that many others rushed to imitate him and the machine became acceptable in the years that followed the end of the war.[5]

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1 The words of Mr. Cookson. (Ibid., William Cookson to Earl Fitzwilliam, Leeds, August 18, 1802.)

2 "How many Gig Mills are there about Leeds?--None at all, I believe." (Evidence on Woollen Trade Bill, 1802-03, p. 227, testimony of John Taite, or Tate, a cloth worker.) "There are not gig mills in our neighbourhood," said James Graham, Esq. (Evidence on Woollen Trade, 1806, p. 446.)

3 Gigs were used in Leeds to raise blankets in 1802 (Evidence on Woollen Trade Bill, 1802-03, p. 378). They were being used to raise coatings in 1813 (Hirst, op. cit., p. 14).

4 Crump, op. cit., p. 47.

5 Mr. Hirst had been an ordinary cloth worker and had been an employee of Mr. Gott. His cloths, dressed with the gig, became a sensation and he rose to riches and affluence in a few years, later following to poverty in a manner just as

In Other Parts of the Riding

In other parts of the West Riding there had never been more than a dozen gig mills (that is, firms using gig mills), and the cloth workers believed there were fewer than that, from six to eight.[1] In 1802 there were five firms using them in or near Huddersfield within an area of one mile,[2] two more within seven miles of Huddersfield, and two firms using them near Halifax.[3] There seem to have been two at Wakefield operating before 1806.[4] The two mills in Halifax belonged to

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dramatic. When he began using the gig he offered to pay his cloth workers 30s. a week as long as he lived, but they refused to work after the mill. He kept ten armed men every night to guard his premises, never went out at night, and always carried a brace of pistols on him during the day. He claimed that some manufacturers were prejudiced against him (they were no doubt competitors) for introducing machinery, and said that, even in 1825 or thereabouts, he was still blamed for that by many persons. One prominent citizen refused to contribute to a fund being raised for Mr. Hirst in his poverty because Mr. Hirst had been the "cause of so many long chimnies being built". (Hirst, op. cit., passim.)

1 Evidence on Woollen Trade, 1806, pp. 234-35, testimony of John Tate, Halifax cloth worker. This witness said "seven or eight" on one occasion (p. 234) and "six or seven" on another. He was an alert and knowledgeable witness. (See also Evidence on Woollen Trade Bill, 1802-03, pp. 377-78.) Although more than eight gig mills are identified in the narrative above, these may not have been all working at any one time.

2 Ibid., testimony of Mr. Law Atkinson. These gig mills were of different capacities. One gig belonging to the Atkinsons would raise four pieces at a time. Altogether their force consisted of six machines which could handle a total of 12 pieces at one time. One of the other firms owned a gig with a capacity of four pieces. The other three firms in Huddersfield owned "singles". Mr. Atkinson thought that, including the Halifax gigs, there were actually 15 or 16 machines in the West Riding with a capacity of 25 cloths.

3 Ibid., and p. 217.

4 Ibid., p. 279 and Evidence on Woollen Trade, 1806, pp. 375, 378. There may have been more gig mills than those cited above, but probably not, and surely not many more. There was, of course, Mr. Edwards' mill mentioned before (supra, p. 193).

Messrs. John and Samuel Lees (or Lease) and to Mr. Waterhouse. Five mills near Huddersfield belonged to the Atkinsons, to Mr. Horsfals, to Mr. Brooke, to Mr. Hudson, and to Fisher and Mallison.[1] Two of these had been erected in 1796 or 1797,[2] and at least one (Atkinsons') had been operating for many years. The Halifax gigs were old timers,[3] Mr. Waterhouse's having been erected in 1789.[4]

The cloth workers had resorted to legal action against the gig mills some time between 1785 and 1790 when they unsuccessfully tried to prove that a sixteenth century statute against gig mills (5 & 6 Edw. VI c. 22) made illegal those being operated by the Atkinsons.[5] The action failed because the court decided that the mills in use were not the same machines as those described in the statute.[6] The serious campaign against the machines in the Huddersfield-Halifax district began in the spring or summer of 1802.

As mentioned before, trade had slackened somewhat the previous year and later in 1802 there were some discharged soldiers and sailors added to the labour force. The cloth workers were again "uneasy". There was serious trouble over the taking of apprentices,[7] especially in the new factories

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1 Ibid., p. 261, and Evidence on Woollen Trade Bill, 1802-03, pp. 246-47.
2 Ibid.
3 Ibid., p. 217.
4 Evidence on Woollen Trade, 1806, pp. 388-89.
5 Supra, p. 191, n. 2.
6 Evidence on Woollen Trade Bill, 1802-03, p. 373.
7 Evidence on Woollen Trade, 1806, p. 300. This trouble had no doubt arisen out of the great prosperity of 1799-1800 when "illegal" workers were called on to remedy the deficiency of workmen.

that had been erected in the north around Leeds by merchants, among these Mr. Gott.[1] And further south, in the Huddersfield-Halifax district, dressing by gig had been increasing[2] and a few shearing frames had been introduced, not enough of them to have any effect on trade but enough to arouse fears that all of the work might one day be lost.[3] The cloth workers decided that the time had come to call a halt.

In addition to these grievances, the West Riding cloth workers may have derived some inspiration from their correspondence with the cloth workers in the South-West,[4] whose animosities were being aroused by new gig mills in Wiltshire, and their campaign may have gained some momentum after the West Riding workers heard of the outrages in Wiltshire and of the Bath meeting in August. At this meeting the manufacturers of the South-West expressed their determination to put the gig mills into use despite opposition, which, the West Riding workers felt, would make the use of the gig inevitable in Yorkshire or carry away the trade.[5] But the West Riding

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1 Mr. Waterhouse's place of business in Halifax was called an "illegal" shop. It was, of course, difficult to get legitimate cloth workers to work after the gig. In this way, to a small extent, the machines intruded themselves into the matter of apprenticeship.

2 Evidence on Woollen Trade Bill, 1802-03, p. 378, testimony of Mr. Law Atkinson.

3 Testimony on the shearing frame was not accepted by the 1803 committee of Parliament. Consequently the feelings of the workmen towards that machine at the time are not revealed by the committee's report. In 1806 the gig mill was still being objected to much more strenuously than the shearing frames.

4 H.O. 42/66, Mr. James Read to Lord Pelham, August 9.

5 According to Mr. Cookson (H.O. 42/66, letter dated a "Sunday Evening" in August). This shows a belief in the efficiency of the gig mill that the workmen would not admit of openly.

cloth workers began their campaign before the troubles in the South-West, and the inspiration may as well have passed from the north to the south.[1]

In the spring of 1802 the cloth workers formed a "Brief Institution".[2] There is every reason to believe that the cloth workers had formed combinations many years before this.[3] They had had a "sick club" for several years which probably served other purposes besides supplying assistance for the sick.[4] Their organisation before the Brief Institution had been rather loose, perhaps, but made efficient by a "Spirit of Unanimity"[5] and made feasible by the high rates of pay the Yorkshire cloth workers received when at full work.[6] The Brief Institution was an organisation like that of 1796-99, superimposed on the sick club, receiving contributions of three halfpence a week from the workers each month, but sometimes as much as a shilling, 18d. or more.[7]

The Brief Institution was formed, apparently, for two main reasons, the first, to maintain the apprenticeship

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1 Mr. Read thought all the cloth workers in the Kingdom were governed from Leeds (H.O. 42/66, August 9).
2 Evidence on Woollen Trade Bill, 1802-03, pp. 373, 217-23.
3 In 1793 the Leeds Corporation formed a committee against combinations. (Heaton, Benjamin Gott, op. cit., p. 57.)
4 The counsel for the 1803 committee, Mr. Dauncey, a harsh man, asked one workman, who had been receiving sick benefits, what his ailment had been, "lack of work?"
5 As a workman put it. (Evidence on Woollen Trade Bill, 1802-03, p. 226.)
6 Workmen of the West Riding spoke of receiving 30s. per week when fully employed in 1806. One of them mentioned that the rate of pay had been about 24s. twenty years before. It had increased to 30s. by 1799 and probably earlier. (Evidence on Woollen Trade, 1806, pp. 240, 278, 289.)
7 Ibid., p. 239, Evidence on Woollen Trade Bill, 1802-03, pp. 219, 233.

system,[1] and the second, to carry on the fight against machinery, by coercion and by an appeal to Parliament.[2] Practically every single one of the 150 cloth workers of Halifax, the 600-700 of Huddersfield and the 1400-1500 of Leeds contributed to the institution.[3] There was no printed rule against working after the gig mill, but it was clearly understood that the object of the institution was to secure a united front against it.[4] There was some pretence of paying sickness benefits from the fund, but the workers knew that the money was being collected for the purpose of putting their case against the gig mill before Parliament.[5]

When Mr. Law Atkinson got wind of the combination, in the spring of 1802, he promptly called up his men and insisted on their hiring on to Christmas or leaving before trade became brisk. The men struck but later returned to work, that is, all of them but two out of 24 or 25.[6] The Atkinsons produced more gigged cloths than any other West Riding manufacturer, probably more than the rest combined, and, of course, were very unpopular among the cloth workers. Their gig mills sometimes damaged their cloths, it was said. Mr. Law Atkinson acknowledged that they had had "too much damage done, but owing only to the carelessness or willfulness of the workmen; we have

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1 Evidence on Woollen Trade, 1806, p. 231.
2 Ibid., p. 372.
3 Evidence on Woollen Trade Bill, 1802-03, pp. 219-23.
4 Or so a steward of the institution told Mr. Law Atkinson. (Ibid., p. 374.)
5 Ibid., p. 217, testimony of John Tate, a cloth worker. He stated that in 1803 they had no other grievance but the gigs.
6 Ibid., p. 373.

had some reason to suspect they have been tampered with by the institution men".[1] In November, 1802, the cloth workers assaulted Messrs. Atkinsons' men in the night and cut and damaged cloths on their tenters. The firm pursued this affair and secured the conviction of nine cloth workers before the magistrates.[2] The cloth workers tried to intimidate the employees of the Atkinsons in other ways, with beatings, by dragging them by the hair of the head and threatening to "gig" those who worked after the gig. But the Atkinsons were clever enough and determined enough to successfully defy the cloth workers and keep the gig mills going.

Other manufacturers were not so successful. The mill of Messrs. John and Samuel Lees of Halifax was stopped.[3] Mr. Mallison's mill, near Huddersfield, was stopped in 1802 or 1803. A Huddersfield fine-drawer claimed that Mr. Mallison had become disgusted with the machine, but Mr. Mallison flatly stated before the Parliamentary committee of 1803 that he had abandoned it because of the machinations of the cloth workers.[4] Mr. Hudson suffered a turn-out of workers because he used the gig, and thereafter only used it for dressing blankets and other coarse work.[5] The same thing, a turn-out, happened to

1 Evidence on Woollen Trade, 1806, p. 432.
2 Ibid., pp. 264-65, Evidence on Woollen Trade Bill, 1802-03, pp. 373-75.
3 John Tate, a cloth worker, claimed that "Mr. Lease's trade stopped, and that stopped with it". (Evidence on Woollen Trade, 1806, pp. 234-35.) Possibly, but the general circumstances make it seem likely that the activities of the cloth workers, sometimes evasive before the Parliamentary committees, brought this about.
4 Ibid., pp. 235-36.
5 Ibid., p. 398.

Mr. Steers in Wakefield where the cloth workers were notorious for refusing to work unless their conditions were complied with.[1] It is not clear that all these events occurred at the same time, that is, in the summer and fall of 1802, but it is most probable that they did. The manufacturers did not mention a general strike in 1803 when they testified before the Parliamentary committee, but Mr. Cookson of Leeds wrote of such a strike in Huddersfield in August. The masters were in a weak position because they did not wish to lose the shipping season, and so they yielded.[2]

Almost at the same time the trouble over apprenticeship was coming to a head in Leeds. There was a great turn-out at Mr. Gott's factory because he had taken two apprentices over 14 years of age.[3] Mr. Gott fought the cloth workers for some time, using various resources,[4] but finally gave in. An agreement between the masters and men was made before the magistrates, the first part of 1803, with the victory going to the men. After this there has hardly any more trouble over the matter of apprenticeship.[5]

The cloth workers had substantially won their battle. It was said in 1803 that there remained only three or four

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1 Ibid., p. 375.
2 H.O. 42/66, letter dated a "Sunday Evening" in August.
3 Heaton, Benjamin Gott, op. cit., p. 58.
4 Evidence on Woollen Trade, 1806, p. 232. The strikers were supported by institution funds (ibid.). Mr. Gott tried to get his cloths dressed by other firms, but the workers foiled this by having their fellow workers in other forms refuse to dress them. (Ibid., p. 367, and Evidence on Woollen Trade Bill, 1802-03, p. 227.) It will be recalled that Mr. Gott abandoned his gig mill about this time.
5 Evidence on Woollen Trade, 1806, p. 300.

firms using gig mills in the West Riding,[1] and it seems quite likely that these few were mostly dressing coatings with the machines.[2] But the cloth workers took the issue to Parliament, all the same. Before the committee of 1803 they were asked why they had brought up the issue, when the machines had been in use for so long and when there were so few of them in use. Their most able spokesman, John Tate, replied, "A thing always has its Period, and when a Man thinks that he can get his Grievance redressed when he sees it, there can be no Harm in it".[3] This answer was fair enough, but weak all the same.

Now the Parliamentary committee of 1803 was created to hear evidence bearing on the woollen trade bill which had been prepared at the request of the clothiers, manufacturers and merchants. This bill, if enacted, would have repealed a great number of old statutes regulating the woollen trade, notably 5 & 6 Edw. VI c. 22 which prohibited the use of gig mills. Courts in the West Riding and in the South-West had decided that the gig mills referred to in the statute were not the same machines as those in use,[4] but the manufacturers who had won these verdicts still had no confidence in them and the cloth workers in the South-West were inclined to test the issue in court again. Parliament could not decide, in 1803, whether to pass the woollen trade bill and so put off the matter until further information could be obtained, meanwhile

1 Ibid., p. 234.
2 Ibid., pp. 261, 398.
3 Evidence on Woollen Trade Bill, 1802-03, p. 216.
4 Ibid., p. 373, and H.O. 43/83, James Read to Lord Hawkesbury, February 19, 1805.

passing a bill temporarily suspending some of the old statutes, including 5 & 6 Edw. VI c. 22, to forestall the embarrassment of court action.[1] The cloth workers could not say, after this, that they had won a victory before Parliament, but neither had they decisively lost. They kept hope, and meanwhile they continued to apply pressure on the manufacturers of the West Riding.

They retained their grievance against Mr. Horsfals for finishing coatings with the gig mill.[2] There was trouble with this employer, also, for employing a woman as a fine-drawer,[3] and in 1804 Mr. Horsfals' mill in Huddersfield was mysteriously destroyed by fire.[4] There was trouble, too, with Mr. James Walker, a master clothier of Wortley, and to this employer they sent several anonymous letters threatening to burn his mills, one threatening his life.[5] In December, 1804, there was a mysterious fire on the premises of the Atkinsons in Huddersfield. Mr. Law Atkinson did not believe that this fire had been maliciously started,[6] but the cloth workers made it appear so when they foolishly wrote an anonymous letter, dated September 28, 1805, to one of the principal fire insurance companies in London:[7]

> Gent. Directors,
> At a general but private Meeting of the Chairman of all the Committees of Cloth Workers in this County

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1 Infra, p. 247.
2 Evidence on Woollen Trade, 1806, p. 261.
3 Ibid., p. 262.
4 Ibid., p. 312.
5 Ibid., p. 181.
6 Ibid., p. 312.
7 J.H.C. 61, p. 701, appendix.

(viz. York) it was ordered to desire you (for your own profitt) not to insure any Factory where any Machinery was in belonging to the Cloth Workers. For it was ordred again, to petition Parliament for our rights; and, if they will not grant us them, by stopping the Machinery belong us, we are determined to grant them ourselves, but does not wish you to be any loser thereby.

By order of the
Cloth Workers.

N.B. Only remember Bradley Mill[1] in this County, which did not do 1-6th of what was wishd for; and expect more about Decr.

W. R.

This letter did not have the desired result on the insurance company and when produced before the 1806 Parliamentary committee, anxious to ferret out combinations, it created, of course, a bad impression when added to the stories of conspiracy and violence the manufacturers had to tell. It might be well to digress here briefly to mention that the 1806 committee took special note of the combinations formed by the cloth workers in its report. "Your Committee would here close their Report," it was written, "but in the progress of their Inquiries some circumstances have come to their knowledge, which, whether regarded in their relation to the well-being of the Woollen Manufacture, or that of the Country at large, appear to be of a highly interesting nature."[2] They then recited the evidence of combination that had been given and displayed the letter quoted above as evidence of the dangerous purposes that might be served by such combinations. "The least of the evils to be apprehended (though an evil in itself abundantly sufficient to accomplish the ruin, not only of any particular branch of Trade, but even of

1 Bradley Mill belonged to the Atkinsons of Huddersfield and had recently been partly burned down.
2 Report on Woollen Trade, 1806, p. 15.

the whole commercial greatness of our Country) is, the progressive rise of Wages . . ."[1] The commercial consequences of combination, however, did not worry the committee nearly as much as the possible political consequences.[2] The fact that these latter carried such weight reminds the reader of history of the political atmosphere of the time, charged as it was with rumours of uprisings and French plots. This atmosphere did not enhance the logic of the manufacturers' case, when they advocated the use of machinery, but it led the legislators to regard the workers with some suspicion when they acted as a group to put forward their case against machinery. This feeling coloured the proceedings without a doubt. On the other hand, attempts to explain laissez faire tendencies solely or mainly in terms of the political atmosphere of the time cannot stand up. The proceedings of the Parliamentary committees of 1803 and 1806 show an earnest and sincere attempt to get at the facts behind the issues brought to Parliament by manufacturers and workers.

Despite all they had to conceal about their combinations, the cloth workers hopefully appeared before the 1806 committee.[3] They brought forward some trifling instances of unemployment caused, or alleged to have been caused, by the few gig mills then in use.[4] But they had more worries than grievances. When asked

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1 Ibid., p. 17.
2 Ibid.
3 The cloth workers' legal and other expenses of bringing their complaints to Parliament were said to have cost them between 10,000 and 12,000 pounds. (Evidence on Woollen Trade, 1806, p. 239.)
4 Ibid., pp. 235, 261, 277. In one instance the gig mill was allegedly operated continuously through the winter because there was plenty of water, while, at the same time, the men

if the machines were hurting them, John Tate made this revealing reply: "Certainly not, but if they were to become more general, the effect would be more severely felt."[1] His companions said the same thing in different words.[2] This was their great apprehension, during these years, that the machines might "become more general". They were in a strong position, they were not in distress,[3] but they were afraid of machinery. Their fear was surely not unreasonable, considering the success of earlier machines in the woollen trade, the success of the gig mill in Gloucestershire at this time, and the fact that another machine which would drastically affect their livelihood --the shearing frame--was being tentatively introduced at the same time.

The cloth workers gained no success before the Parliamentary committees. But they had cut down the number of firms using gig mills to the "three or four" they mentioned. The

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in the shop were only making four or five shillings a week. Another instance shows the difficulty of clearly demonstrating that machines caused unemployment. The cloth worker believed a gig he operated put two men out of employ. Did the master turn two out because of the gig? "I do not know that he has turned any off since I knew him on account of the gig mill, there were three or four men who were obliged to leave, but it was on account of slack trade. . . . I did not mean to be understood that two men had actually left their place on account of the gig mill. . . . if that gig mill had not been going the same work would have employed two more men." Specific instances of men being displaced by machinery are difficult to find. Displacement was usually something that could be appreciated only theoretically, although, of course, when machinery actually caused unemployment, this condition was anything but theoretical from the point of view of the unemployed.

1 Ibid., p. 235.
2 Ibid., p. 277, Evidence on Woollen Trade Bill, 1802-03, p. 226.
3 Evidence on Woollen Trade, 1806, p. 277.

West Riding abandoned the attempt to introduce the gig mill. Although it had pioneered in the introduction of other machinery, it fell behind the South-West in this instance. William Hirst, as mentioned before, claimed to be the first man to discover and apply the secret of dressing fine cloths in the West Riding like those that obtained a great reputation for the South-West. He began using the gig mill in 1813 and, for several years after this date, he lived in constant fear of violence from the cloth workers.[1] In 1817 the cloth workers of the West Riding said that, although, in 1806, there had been only five gig mills in the county,[2] there were 72 in 1817.[3] This may be given as the date when the use of the gig mill was accepted and general in Yorkshire. It is over 25 years after the Leeds merchants bravely decided they would put the machine into use.

This postponement was the accomplishment of the cloth workers of the West Riding. It shows the strength of their organisation and their determination to fight the machines in good times and bad. A worker said that there were not twenty cloth workers in the county who did not belong to the institution, so few that they could be picked out without it being necessary to ask for their tickets.[4] This degree of organisation

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1 Mr. Hirst no doubt exaggerated when he made his claims. The Atkinsons, for one, had been manufacturing fine cloths, although they did not have a high reputation for them. But all the other evidence points to the substantial truth of Mr. Hirst's statements.

2 That is, firms using gig mills. The workers learned this from the evidence given in 1806, not from memory or from special knowledge.

3 J.H.C. 72, p. 49 (petition of cloth workers of Leeds). See also J.H.C. 71, p. 431.

4 Evidence on Woollen Trade, 1806, p. 232.

made their refusal to work after the gig effective. In addition to this refusal, they used force as a weapon. Their campaign had not brought a great deal of violence, but the cloth workers were capable of it and they certainly used it as a constant threat. They were the men who became, in 1812, the Luddites of Yorkshire.

There is one more consideration of importance in the postponement of the gig mill's use in Yorkshire. The manufacturers not only faced the animosity of the workers but, after buying their gigs, also faced an indefinite period of experimentation before they could expect to profit from them. If it had been simply a matter of buying the machine and using it, the cloth workers might not have been able to resist the gig mill.[1]

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1 When asked why he did not use the gig mill, Jeremiah Naylor, Esq., Wakefield merchant, said, "I never saw one, I do not know what benefit it is". (Evidence on Woollen Trade, 1806, p. 378.)

CHAPTER XI: THE GIG MILL IN THE SOUTH-WEST

Gloucestershire's Success

Now, as mentioned, gig mills had been put into use in Gloucestershire many years before this time.[1] The cloth made in that county had at first, however, been "partly dressed by hand and partly by Gig".[2] This phrase can be taken two ways. It can mean that each cloth, being partly raised by machine, was also raised by hand. Some cloths had to undergo the raising process as many as twelve times. Or it can mean that the army cloths and other coarse cloths had been dressed by the machine while the fine cloths had been left for the hand workers.

Mr. Austin of Wotton-under-Edge (sometimes spoken of as "Wootton") was the first manufacturer to discover how to finish his superfine cloths wholly by the gig mill.[3] It seems that he began so using the machine in 1783 or thereabouts.[4] His cloths earned great renown for their finish and, around 1788 or so, other Gloucestershire clothiers, inspired by the "Credit of the Wootton Cloths", began to emulate the Austin technique. The West of England had had a reputation for fine

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1 See supra, pp. 191-93, for the early use of gig mills in the South-West.
2 Evidence on Woollen Trade Bill, 1802-03, pp. 252, 254.
3 This discovery illustrates that a "development" may be as important as a new invention, or more important. The part such developments and processes played in the Industrial Revolution has not been adequately stressed.
4 Ibid., pp. 347-49.

cloths, but this development set the reputation for Gloucestershire products above those of Wiltshire and Somersetshire and gave the West of England the edge, as far as superfine cloths were concerned, over Yorkshire for many years.

This was an extension of the use of the gig mill. No doubt, with this extension, more gig mills were built, especially after the war began.[1] The cloth workers objected when the gigs were first used to do all the raising, but the masters convinced them that they would not lose their jobs.[2] And the masters later claimed that they had not lost their jobs. One of the Wotton-under-Edge clothiers said that "before we used the gig, of course the shearmen had more to do, as they did the work which the gig now does; after the gig was introduced the same number of shearmen were employed, and still are employed; I know not an instance of any one man having been out of employ in consequence of the introduction of the gig mill".[3] At all events, the workmen "had the good sense to drop" their objection.[4]

All the same, some Gloucestershire cloth workers joined some scribblers of the county in sending a lengthy petition to Parliament in May, 1794.[5] In this they alleged that the finished products of the gig mills were "deceitfully made" and were of inferior quality and argued that the extensive

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1 Ibid., pp. 261, 269, 308. "They are more so than when I was a Boy, but there were many in Gloucestershire when I was a Boy." (Ibid., p. 160, testimony of George Close.)
2 Ibid., pp. 254, 306.
3 Evidence on Woollen Trade, 1806, p. 365.
4 Evidence on Woollen Trade Bill, 1802-03, pp. 254, 306.
5 J.H.C. 49, p. 599.

use of the gig mill would cause unemployment and ruin "many Hundreds of Families". They did not wish to suppress the mills but only to restrict their use to coarse cloth.[1]

But this complaint was forgotten and the gig mills were kept in "quiet use" from then on.[2] In 1802 one manufacturer could say that "there are public mills now all through the county". He knew of only one manufacturer who did not use them and this one did not because he lived too far away to use them with profit.[3] Dressing by gig had become universal in Gloucestershire.[4]

How had this been brought about some 25 years, say, before the Yorkshire clothiers could use the same machine? The most conspicuous difference between the two counties was that the cloth workers of Gloucestershire were not strongly organised and militant. Although manufacturers generally were quick to suspect combination among the workers, the Gloucestershire manufacturers did not speak of any in 1803 and

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1 This petition claims that the gig mills were first applied to cloths other than army and other coarse cloths in 1792. A witness in 1803 spoke of a great deal of dressing being done by hand and by gig seven years before. (Evidence on Woollen Trade Bill, 1802-03, p. 161.) But the testimony of the clothiers who appeared before the Parliamentary committee of 1803 suggests that the extension of the gig mill's use came before 1790. The 1794 petition, unhappily, does not quite square with the other evidence on this matter, but, of course, it may have come from the cloth workers of only one town or one district in the county, in which the use of the gig mill had only recently been extended. They may have been ignorant of the machine's more extensive use in other places.

2 Evidence on Woollen Trade Bill, 1802-03, pp. 254-55, 306.

3 Ibid., p. 308.

4 Ibid., pp. 160, 162, 170, 174, 176, 254, 308, and Evidence on Woollen Trade, 1806, pp. 249, 360, 363, 434.

one of them expressly denied that "combinations of discontented Persons relative to the Gig Mill" existed in the county.[1] A spirit of combination grew strong in Wiltshire, because anti-machinery sentiment in that county was being nursed by many different sections of the population and because of some special circumstances. But the gig mill had been pioneered in Gloucestershire long before and the general feeling against machinery did not seem to exist. Other circumstances did not favour the growth of combination.

Not that the Gloucestershire cloth workers received higher pay than those of Yorkshire and Wiltshire. The contrary was true,[2] although the Gloucestershire workers were not badly

1 J.H.C. 58, pt. 2, p. 885, testimony of Mr. Henry Dyer.
2 It is definite that the Yorkshire cloth workers received more than the Gloucestershire cloth workers. Workmen of the West Riding spoke of receiving 30s. per week, when fully employed, in 1806. One of them mentioned that the rate of pay was about 24s. twenty years before that time. It had increased to 30s. by 1799 if not earlier. (Evidence on Woollen Trade, 1806, pp. 240, 278, 289.) Cloth workers in Gloucestershire earned up to 18s. per week when in full work. This was the figure given by the manufacturers (one of them said 18s. to a guinea) who presumably would have given the highest figure. (Ibid., pp. 255, 434-35.) A Wiltshire worker said cloth workers in that county received 17s. or 18s. when fully employed, and he remarked that Gloucestershire cloth workers "did not get quite so much". (Ibid., p. 438.) This remark appears to have been unmotivated, but the worker did not have sure knowledge of conditions in other districts. A Somersetshire workman said that cloth workers in his county earned 14s. during a full week. (Ibid., p. 436.) The West Riding cloth workers were paid according to the quality of the cloth they dressed (ibid., p. 240), receiving 5 per cent of its value (Hirst, op. cit., p. 15) which was determined before the cloth was dressed. An interesting point is that the West Riding manufacturers seem to have just placed their gig mills at the disposal of the cloth workers. The Atkinsons allowed them the use of the gigs for no charge (Evidence on Woollen Trade Bill, 1802-03, p. 374). The Raynors of Wakefield charged a shilling a man per week

paid. Perhaps their rate of pay could be called a "happy medium", not high enough to make them arrogant, but, on the other hand, not low enough to make them discontented. A clothier from Wotton-under-Edge maintained that "our shearmen were much more satisfied to cut the cloths after they were dressed by the gig than when they did the gig part themselves; this was the case when it was first used".[1] This statement seems a little too strong,[2] especially when one considers that

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for the use of their gig mill (Evidence on Woollen Trade, 1806, p. 278). This would seem to open up the possibility of the cloth workers earning more money by following the gig. But manufacturers did not speak of the workers after the gig earning more money, nor did the workers speak of earning less. The shearing was more difficult after cloths had been raised by the gig (ibid., p. 429), and this used up some of the savings. But some other method of pay must have been devised so that the machinery owners could benefit from their investment. When he first put his gig mill into use, Mr. John Jones of Bradford offered to pay fourpence a yard for shearing cloths after the gig and to guarantee a minimum weekly wage. The workmen refused his offer (Evidence on Woollen Trade Bill, 1802-03, p. 336), but not necessarily because the method or amount of pay was unsatisfactory. This matter of pay has important bearing on the attitude of the workers towards the introduction of machinery, but getting the required information is extremely difficult. The evidence referred to above only justifies the statement that the Gloucestershire cloth workers were getting less than those in Yorkshire and no more than those in Wiltshire.

1 Evidence on Woollen Trade, 1806, p. 360, Mr. Dyer's testimony. "I believe the shearmen themselves would object to have it put down, because it would give them a more unpleasant and unprofitable Part of the Work to do," said Mr. John Wallington. "They have now as much Work as they can do of the lighter parts." (Evidence on Woollen Trade Bill, 1802-03, p. 306.) Mr. Edward Sheppard of Uley strongly supported this testimony (ibid., p. 255).

2 Mr. Dyer had a very high opinion of the gig mill. Since the beginning of the French war, trade had increased "very greatly with us, in our part of the world, which I attribute solely to the gig mill, and I am sure it is from nothing else". Hearing this remark, Mr. Jackson, for the cloth workers, quite properly observed that trade had increased in Wilts and Somerset also. (Ibid., p. 363.)

the shearing was more difficult after the gig mill, but it does seem evident that the Gloucestershire workers, generally speaking, were content to work after the machinery.[1]

And not that the machines in Gloucestershire did not cause a form of displacement. There was some testimony given before the Parliamentary committee of 1803 that there had been unemployment in Gloucestershire, "when Peace was" and before.[2] There was, at the same time, overwhelming testimony from the manufacturers that there was plenty of work, in fact that the demand for workers greatly exceeded the supply.[3] But the testimony alleging unemployment referred to work dressing cloth while the manufacturers were speaking of a shortage of weavers.[4] The conclusion obviously follows that the gig mill had changed the proportion of cloth workers to weavers. It is pertinent to note, therefore, that at this time the Gloucestershire weavers formed an association to campaign against unapprenticed weavers.[5] Some of the "illegal" weavers that had prompted this association may have been displaced cloth workers. It would, however, be rash to assume this outright. The new "illegal" weavers may have been young workers who took up weaving instead

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1 In Gloucestershire there was more cloth trade in villages than in towns (Evidence on Woollen Trade Bill, 1802-03, p. 249.) This may have had some bearing on the fact that combinations sprang up in the Wiltshire towns of Bradford, Chippenham and Trowbridge, but not in Gloucestershire.

2 Ibid., pp. 165, 169, 171.

3 Ibid., pp. 252, 265, 271, 279, 329, 354.

4 The Austins declared that they could not produce enough goods to satisfy the demand because of lack of weavers (ibid., p. 354). The Stroud weavers were said to be choosy about the sort of work they accepted. (Ibid., p. 279.)

5 Ibid., pp. 44ff. Evidence on Woollen Trade, 1806, p. 351.

of dressing, since the wages of cloth workers were not excessively high, or immigrant workers. As the manufacturers claimed, none of the working cloth workers may have been displaced at all. The gig mill may have halved their work, so to speak, but the increase in Gloucestershire's trade may have given them enough more shearing to do to exactly compensate for this. All the circumstances make it appear that this was the case.

There can be no question but that the trade of the county improved with the use of the gig mill.[1] Gloucestershire goods obtained a ready market, being preferred to those of the other counties,[2] and it was a common practice for the clothiers of Somerset and Wilts to send their cloths to Gloucestershire to be dressed.[3] One Somersetshire clothier sent his cloths 90 miles to be gigged in Gloucestershire.[4] This, of course, increased the volume of dressing done in the latter county, and gave the Gloucestershire cloth workers more shearing to do. Thus Gloucestershire increased its trade at the expense of Wiltshire and Somersetshire,[5] and in this way benefited from the introduction of machinery.

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1 In good times the cloth workers, if discontented, would not have been able to gain the support of other dissatisfied workers, which would have been helpful had they decided to oppose the masters. The weavers and cloth workers were traditional allies. (Hammond, op. cit., p. 168.) The fact that the Gloucestershire weavers were organised at this time and militant, emphasizes, by contrast, the peaceful condition of the Gloucestershire cloth workers.

2 Evidence on Woollen Trade Bill, 1802-03, pp. 261, 307, 311, 328, 363, 368-69. Evidence on Woollen Trade, 1806, p. 428.

3 Ibid., p. 365, and Evidence on Woollen Trade Bill, 1802-03, pp. 195, 256, 333-34, 337-38, 368-69.

4 Ibid., p. 369.

5 Ibid., pp. 253-54, 329, 338, and Evidence on Woollen Trade, 1806, pp. 424, 434.

Here can be observed again (as in the case of spinning machinery) the strange consequence, which is after all not so strange, of machinery being favoured in the place where it had come into general use and hated vehemently in the places where it had not. This arose from the tendency of machinery to concentrate the trade, in turn derived from the compactness and productiveness of machinery, which made it inevitable wherever economic forces were allowed free play.

Trouble in Wiltshire

Now while peace and happiness reigned in Gloucestershire,[1] the opposite was true in the other two counties. The clothiers of Wiltshire and Somersetshire made no moves to introduce the gig mills in the first part of the decade before 1800, although they were feeling the pressure of competition from Gloucestershire. They clearly understood that the workmen of their two counties disapproved of machinery, especially the gig mills, and that the workmen had the backing of many conservative clothiers and of many "respectable" citizens. But in the latter part of the decade they began sending cloths away, to Gloucestershire and to London, to be gigged. A gig mill was erected at Cuper's Bridge, London, expressly for the purpose of accepting unfinished cloths from the South-West and dressing them for London merchants.[2]

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1 Gloucestershire workers joined those of the other two counties in petitioning Parliament against the suspension bill in 1803, but the Gloucestershire weavers were more prominent in this than the cloth workers. (See Anstie, op. cit., p. 75, and Evidence on Woollen Trade Bill, 1802-03, p. 309, for comments on this.

2 Mr. Joseph Barnes was sent for from the West of England to

The Wiltshire and Somersetshire clothiers, some of them, that is, sent their cloths away for the reason that their customers had been complaining about the old mode of dressing, or so they stoutly maintained.[1] They had suffered the great humiliation of having other goods, dressed according to the mode introduced by Mr. Austin, preferred to theirs and were anxious to regain their reputations.[2] While most of them did not dare introduce gig mills themselves, it was feasible to send the cloths away, even though this practice was also something the cloth workers ordinarily disliked.[3] The "working People know who dress by Hand and who not", as a Wiltshire clothier told the 1803 committee. But towards the end of the decade, "perhaps, there was not so much said about it, as a good many were in the Militia and Army". This clothier felt, in 1800, that he could send his cloths away without "being exposed to Observation". He was then just setting up in business for himself and "was told it was a very good Opportunity to begin; as I had never had any dressed by the Hand, I should

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establish the business, presumably in 1792 or before. The Cuper's Bridge gig mill dressed cloths brought in the rough from Wilts (Evidence on Woollen Trade Bill, 1802-03, p. 329). It also redressed cloths having a poor finish. Mr. Barnes said they rarely had to redress Gloucestershire cloths, but had redressed "hundreds" of hand-dressed cloths from Wiltshire. (Evidence on Woollen Trade, 1806, pp. 423-25.)

1 Gig dressing was also cheaper but, in justice to the clothiers, it must be remembered that this cheapness was an advantage possessed by the Gloucestershire clothiers with whom they competed.

2 Evidence on Woollen Trade Bill, 1802-03, p. 333, testimony of Mr. John Jones, and p. 368, testimony of Mr. William Shephard of Frome, Somersetshire.

3 "Our Reason for not having the Gig at Home, is to avoid Riots," said Mr. Wm. Shephard of Frome. But he was able to send his cloths to Gloucestershire(ibid.).

subject myself to no Difficulty by turning off People".[1] The practice had been indulged in before, but it seems most likely that it began to be used extensively only in 1799 and 1800 when trade was expanding greatly.[2]

The disadvantages of sending the cloths away to be gigged were, first, of course, the cost of the transportation and, second, the fact that the hired work was likely to be done carelessly when not done under the eyes of the owner of the cloths. It may be supposed, also, that it cost more to hire the work done than to do it with one's own machinery. Consequently, some of the more daring clothiers began, around 1800, to install some gig mills. One of the first was erected by Mr. Brown of Bath.[3] While Bath lies in Somersetshire it is also on the corner of the county, next to Wiltshire to the east and Gloucestershire to the north. This mill was erected in 1799 or 1800.[4] Two more mills were erected near Bath, but in Wiltshire and nearer to Bradford and Trowbridge, about five and seven miles,[5] respectively, to the southwest.[6] These belonged to Mr. Bell and to Mr. John Jones. Another gig mill was erected at Chippenham, in Wiltshire and about 12 miles northwest of Bath, in 1799 or 1800, belonging to Mr. Edredge,[7]

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1 Ibid., pp. 145, 152, testimony of Mr. Wm. Henry Awdry, master clothier of Chippenham, Wiltshire.
2 Mr. Sheppard of Frome began sending his cloths away in 1800. (Ibid., p. 368.)
3 Ibid., p. 181.
4 Ibid., p. 145.
5 The distances are map, not road, distances.
6 Ibid., p. 181.
7 Ibid., pp. 152, 155, 362.

and a second was put into use at Chippenham shortly after, apparently operated by a Mr. Tarrant.[1] A sixth mill was put into use, possibly at Melksham (seven miles south of Chippenham), by Mr. Edward Jacques, but this mill may not have been operating in 1803.[2] Gig mills were used by Mr. Hill at Malmsbury.[3] It will be recalled that Mr. Hill fled from Bradford several years before after troubles in that town over the use of machinery and set himself up in business at Malmsbury where there had previously been no woollen trade. Malmsbury is closer to Gloucestershire to the west than to the clothing towns of Wiltshire to the south and Mr. Hill's establishment did not figure in the troubles that followed in Wiltshire. A gig mill erected at Warminster (Wiltshire, south of Trowbridge) in April or May, 1802, by Mr. Peter Warren, did figure in those disturbances.[4]

There may have been some few more gig mills in Wiltshire and Somersetshire than these eight,[5] but certainly only a few, if any, more. The workmen admitted that the number of mills in the county was not great. When James Read, chief magistrate of Bow Street, was sent out into Wiltshire by the home secretary in 1802 he reported back that "I find that amongst the clothiers in this county not more than five or six have introduced them". He thus concluded that the grievances of the cloth workers in the county were "in a great measure imaginary both as to the

1 Ibid., p. 362. Evidence on Woollen Trade, 1806, p. 315.
2 Ibid., p. 314.
3 H.O. 42/66, James Read to Lord Pelham, September 5.
4 J.H.C. 58, pt. 2, p. 886, testimony of George Wansey.
5 For vague mention of another see Evidence on Woollen Trade, 1806, p. 311.

introduction of gig mills as well as to the effect of them".[1]

These grievances were certainly "in a great measure imaginary", but it seems likely that the cloth workers considered the sending away of cloths to be finished elsewhere a serious grievance that was not imaginary, though difficult to prevent. Nor was the apparent growth of the gig mills in number imaginary. Two of them had been added in 1802, Mr. Warren's in Warminster and Mr. Jones' at Staverton near Bradford.[2] The picture the cloth workers conjured up, of gig mills everywhere, was imaginary but, all the same, likely to take on reality in a short time.

When soldiers and sailors, discharged after the Peace of Amiens, returned to the South-West in 1802 and found no work waiting for them the tension mounted in Wiltshire. The discharged service men believed, understandably enough, that machinery had taken their employment away during their absence. In Wiltshire during the war, it will be recalled, spinning machines and scribbling machines had been introduced. The soldiers felt they had a right to expect better of their country. "Some of us may perhaps more or less served in His Majesty's Service some Six, Eight or ten years in Defence of him and his Country," one of them wrote. "Now the Contending Nations are at Peace with each other we are send home to starve. Will our Masters that have discharged us hold with this? We know that it have been mentioned to our great men

1 H.O. 42/66, James Read to Lord Pelham, September 5.
2 A Wiltshire clothier said he believed that the gig mill was "gaining ground" in the county (Evidence on Woollen Trade Bill, 1802-03, p. 255).

and Ministers in Parliament by them that have Factorys how many poor they employ, forgetting at the same time how many more they would employ were they to have it done by hand as they used to do. . . . Five grants of Poors Rates granted last year, and our Gentlemens time is so took up with skeming Inventions to take away Poors Labour that if a Vestry is called there is hardly any Person to Attend, so we find them grantings is not settled, that People is determined not to pay such a number of Rates, and so often I am informed by many that there will be a Revolution and that there is in Yorkshire about 30 thousand in a Correspondent Society."[1]

There was distress in Wiltshire in the summer of 1802. "That the woollen business in the county of Wilts, in particular, is at present in a depressed state cannot possibly be denied," wrote Mr. John Anstie, the Wiltshire clothier.[2] The evidence on this point is difficult to analyze. As we have seen, there was no particular distress in the West Riding at the time and there was prosperous talk issuing forth from Gloucestershire. But it does appear that in Wiltshire trade was worse in the summer of 1802 than it was in 1803,[3] when persons engaged in the trade gave their testimony before the Parliamentary committee. And it also appears that trade in Wiltshire suffered more than that of the other counties, at least distress was mentioned in connection with Wiltshire more

1 H.O. 42/65, July 26.
2 Anstie, op. cit., p. 7.
3 Evidence on Woollen Trade Bill, 1802-03, p. 137 (testimony to the effect that trade revived somewhat at Christmas time). (See also, ibid., pp. 169, 335.)

often and controverted less successfully than in connection with the other counties. The evidence is not good enough to justify strong conclusions, but it seems reasonable to suspect that the Wiltshire trade took the brunt of the peace-time decline for the whole trade because, being not so well equipped with machinery as the other counties, it could not compete favourably.[1-2] This is what Mr. Anstie believed,[3] and if it was true the solution, as he and other Wiltshire clothiers maintained, would seem to have lain in introducing more machinery, not less. The cloth workers and the conservative clothiers of the county could not see it that way. They advocated the exactly contrary course.

There does not seem to have been any formal and general organisation of the Wiltshire and Somersetshire cloth workers existing before 1802.[4] But the workers were fired with the "Spirit of Unanimity", and many of them were gathered in the larger towns of Chippenham, Bradford, Trowbridge, Warminster and Frome where organisation was easy.[5] The opposition to

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1 One Wiltshire master spoke of discharging men, about 20 of them, because he could not compete with those who had gig mills. He was angry about it. (Ibid., pp. 181, 184.)

2 Gloucestershire was Wiltshire's chief competitor. The West Riding, where there were at this time only a few gig mills, produced more coarse goods than fine.

3 Anstie, op. cit., p. 19.

4 James Read wrote that the Wiltshire "Clubs are certainly not of many months' standing". This was in August, 1802. (H.O. 42/66, letter to Lord Pelham dated August 11.)

5 The leading lights of the cloth workers came from the towns, of course. At this time, when machinery was coming into use in Wiltshire, the movement of the industry to villages had begun in this area. The object was to obtain water power. Mr. John Jones' mill, for instance, was at Staverton and not at Bradford, where he lived, and the mills of most of the clothiers who incurred the enmity of the cloth workers

machinery among the cloth workers brought them together in the time of crisis in 1802, and the general feeling against machinery among other workmen lent them support.[1] Then the arrival of the discharged soldiers and sailors "before the manufacturers were ready for them"[2] crystallized the body of cloth workers into an organisation having its headquarters at Trowbridge.[3] A committee was appointed to manage the affairs of the organisation and tickets were printed. The presence of the soldiers gave the combined cloth workers a military appearance when they took part in disturbances.[4] Although the organisation's strength and militancy was based on the particular circumstances obtaining in Wiltshire and Somersetshire, it drew inspiration from the higher-paid, more strongly organised cloth workers of Yorkshire with whom the committee corresponded. The Wiltshire cloth workers claimed that their club was only a part of a general movement of cloth workers throughout England, Scotland and Ireland whose resolution was not to work after gig mills.[5]

Preventing the use of gig mills was the prime and professed

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at this time were located in similar villages. This movement no doubt affected opportunities for employment of the town workmen in a way they thought undesireable.

1 According to Mr. Read "almost every labouring manufacturer" in Wiltshire was "impressed with an opinion that the use of machinery is the only cause of their being out of employ". (H.O. 42/66, September 5.)

2 Ibid.

3 There were no gig mills at Trowbridge (Evidence on Woollen Trade Bill, 1802-03, p. 207). Mr. Read marveled that anti-machinery sentiment should exist where there were no machines (H.O. 42/66, September 5).

4 Ibid.

5 J.H.C. 58, pt. 2, p. 886, testimony of Mr. John Jones.

object of the organisation of Wiltshire cloth workers.[1] There were three lines of action by means of which they could possibly attain this object: they could refuse to work after the gig mills, they could terrorize the manufacturers by threatening them and destroying their property, and they could try to secure enforcement of the statute of Edward VI's reign prohibiting the machines.

It was said that three-fourths of the men fell in with the plan to refuse working after the gigs,[2] and strikes occurred at Mr. Jones' at Bradford and at Warminster. Shearing frames were then promptly introduced in both places.[3] It does not appear that the manufacturers considered these shearing frames an adequate answer to the withdrawal of the men's labour. Mr. Jones was very willing to reach some agreement with the cloth workers on terms that seem to have been reasonable and to abandon the use of the shearing frames.[4] It was said that it would require a "great deal of time" to accomplish the complete introduction of these new machines.[5] This did not mean that the machines were n ot practical but that a great deal of equipment would have been needed which could not have been obtained immediately. Mr. Anstie perhaps expressed the sentiment of the generality of manufacturers when he said that the introduction of the shearing frame ought not be insisted on at the

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1 Ibid.
2 Ibid.
3 H.O. 42/66 and Evidence on Woollen Trade Bill, 1802-03, pp. 337, 345.
4 Ibid., p. 342, and H.O. 42/65, July 26.
5 H.O. 42/66, September 5.

time,[1] but that the gig mill's use was indispensable if the trade of Wiltshire was not to be lost.[2] The shearing frame, however, was the only answer to the refusal of the men to do this work that the manufacturers could think of without giving up their important function of seeing to the dressing of the cloth.

The first violence occurred in Warminster. For many weeks the cloth workers had refused to work and when, on June 15, 1802, a dog kennel and a rick of oats worth 20 pounds were maliciously set on fire, this was attributed to them.[3] The disturbances spread northward. A dispute over wages in Trowbridge in the middle of July caused a strike and on the night of July 21 Littleton Mill, owned by Mr. Naish of Trowbridge, was burned down.[4] Anti-gig mill sentiment did not inspire this illegal act, for Mr. Naish did not use gig mills. However, after the clothiers hastily reached a wage settlement with the Trowbridge cloth workers on the day following Mr. Naish's loss, the destruction con tinued. Other mills were destroyed, barns and outhouses of clothiers were burned down (including some belonging to Mr. Jones[5]) and guns were fired into the houses of the clothiers.[6] By the end of July the damage had amounted to 8000 pounds, it was estimated. The destruction continued throughout August and sporadic illegal acts were committed

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1 But the principle involved could not be conceded.
2 Anstie, op. cit., pp. 24-29.
3 H.O. 42/65, Matthew Davies to Lord Pelham, June 15, 1802.
4 Annual Register, 1802, Chron., p. 67.
5 Evidence on Woollen Trade Bill, 1802-03, p. 114.
6 J.H.C. 58, pt. 2, p. 886, testimony of Mr. George Wansey.

in the months that followed.[1] Something like a reign of terror was installed in Wiltshire and Somersetshire, with destruction as far south as Frome.[2]

The most important figure in the events that transpired in Wiltshire was Mr. John Jones, justice of the peace in Bradford, the clothier who had introduced both gig mills and shearing frames into the area. With a view of settling the dispute, he met with seven cloth workers representing the Wiltshire organisation on July 26 in the presence of Mr. Benjamin Hobhouse, M. P. At this meeting Mr. Jones offered to give work to all the unemployed in the parish of Bradford, to hire cloth workers to do the shearing rather than the shearing frames whenever the cloth workers should want work, and promised not to do any gigging or shearing for hire. These were liberal terms, seemingly, but the cloth workers wanted no compromise. They left the meeting in a huff.[3]

It has been observed that the combination act poisoned many agreements of this nature between workers and employers,[4] and this was no doubt true. Law officers of the Crown wished to proceed against the cloth workers who had met with Mr. Jones, only being restrained by the protests of Mr. Jones, who had promised the delegates that no advantage would be taken of their presence, from doing so.[5] But this interpretation of the

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1 Ibid., testimony of Mr. John Jones.
2 Evidence on Woollen Trade Bill, 1802-03, p. 117.
3 H.O. 42/65 (July 26) and J.H.C. 58, pt. 2, p. 886.
4 Hammond, op. cit., p. 174.
5 H.O. 42/66 (September 6).

failure of the two parties to agree at the meeting with Mr. Jones ignores the determination of the larger manufacturers to introduce the gig mill and the almost irrevocable opposition of the cloth workers to the machine. This was the raison d'etre of the dispute, and a matter on which agreement was impossible. While leaving the meeting one cloth worker remarked that "he would rather be hanged to the highest Tree, than recommend to the other people to accept of Mr. Jone's offer, or to work after Machinery".[1]

And so the rioting and destruction continued. These acts, of course, did little to improve the conditions of trade which provided the background for the cloth workers' discontent. The destruction of two mills belonging to Mr. Naish of Trowbridge threw about 600 persons out of employ, it was estimated.[2] The uncertainty created in the county undoubtedly hurt cloth production and it was said that in consequence of the rioting "the principal part of the Cloth working branch has been transferred to London, Bath, and other Places".[3] It was thus that the movement of the cloth dressing branch out of Wiltshire, begun before, was intensified. Some manufacturers were seriously disposed to leave the two counties if they could not obtain protection for their property,[4] and there is no reason to suppose that this was an idle threat.[5] And while the workers might have

1 Evidence on Woollen Trade Bill, 1802-03, p. 342.
2 H.O. 42/66, James Read to Lord Pelham, September 6.
3 J.H.C. 58, pt. 2, p. 886, testimony of Mr. George Wansey.
4 Ahstie, op. cit., pp. 18-19.
5 Mr. Hill had moved to Malmesbury. Such movements were by no means unusual, before this time or after.

been glad to see some of the machine-minded manufacturers leave,[1] their departure would certainly have seriously injured the trade of Wiltshire and Somersetshire.

The Issues

The cloth workers, especially the discharged soldiers, seemingly the victims of "blind" economic forces, certainly deserved sympathy. It would not be correct to assert that they did not receive sympathy. Lord Pelham, the home secretary, was not inclined to be harsh. The following paragraph, from a letter of his to Mr. James Read,[2] the chief magistrate of Bow Street who was sent out to Wiltshire to investigate the disturbances, may be taken as typical of the attitude of those officials who had no stake in the outcome of the events:

> It appears to me (Lord Pelham wrote) from these accounts (from Lord Fitzwilliam of Yorkshire) that the successful establishment of the machinery is a subject of great national importance inasmuch as the pre-eminence of our cloths in great measure depends upon it; at the same time the immediate interest of the shearmen and others who may be deprived of their accustomed support and means of living is not to be disregarded, however irregular and dangerous their mode of maintaining their interest may have been.[3]

Nor did the manufacturers have eyes only for their own welfare. Mr. John Anstie's voice was a representative one among the larger manufacturers.[4] "It is not sufficient to say," Mr.

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1 Particularly Mr. Jones. In the summer of 1803 he testified that there were "Four Men now at large" who had sworn to put him to death. (Evidence on Woollen Trade Bill, 1802-03, p. 345.)

2 Mr. Read, however, was strongly inclined to side in with the manufacturers. Perhaps this inclination was natural on the part of a law enforcement officer.

3 H.O. 42/66 (September 2).

4 He had been chairman of the General Wool Meeting of 1788 and was the person who did the most to obtain the wool bill

Anstie wrote, "everything will find its proper level; and if people are deprived of one particular mode of employment, they will find another!" He did not fall in with the extreme laissez faire view. The legislature should interfere "as far as it is consistent with the freedom of the trade" to guard against the evils of sudden alterations and ought to pay regard for the immediate interests of the working people.[1]

But in this conflict over machinery the manufacturers were representing, as Lord Pelham pointed out, the national interest, while the cloth workers were seemingly acting contrary to the national interest as well as contrary to their own short run and long run interests.[2] At this moment in history the English population was outstripping the capacity of English agriculture to supply it with food.[3] The increased and improved production of exportable goods was not only desireable but absolutely necessary if this increased population was to be kept on the island. Many persons connected with the government and among the manufacturers saw this very clearly.[4] Some of them were inclined to be tolerant of the working classes at first, but when the opposition to machinery persisted among members of this

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of that year (allowing the import of wool) to which Arthur Young objected very stremuously.

1 Anstie, op. cit., pp. 88-89.

2 Their short run interest lay in maintaining the county's standing in the manufacture of woollen cloths against the competition of Gloucestershire, and their long run interest was the national interest.

3 This point can hardly be disputed, but it is interesting to observe how the great number of food riots between 1760 and 1815 bear it out.

4 The desireability of this was clearly seen at the time, but the absolute necessity of it was not generally appreciated.

group, their attitude became stiffer and harsher and the division between the classes became more sharply defined.

The cloth workers were fighting a lost cause against manufacturers who were convinced that machinery was necessary and who were determined to put it into use. The clothiers individually tried to prevail on the men to work after the gig mill and made various promises to secure work and ample wages for the cloth workers.[1] These moves, however, failed to pacify the cloth workers. And so, on August 16, the manufacturers gathered at the White Hart Inn at Bath to plan their campaign in concert. There had been no public advertisement of the meeting because the manufacturers were "in great Apprehension of being way-laid by the Persons employed in the Trade".[2] Another reason for secrecy may have been that the manufacturers did not want the more conservative clothiers of the two counties to take part in the deliberations. The Bath meeting did not represent the generality of clothiers, but only the machine-minded among them. The outcome of the meeting was an important resolution. The clothiers

> Unanimously Resolved, that, for the preservation of the trade of this part of the Country, it is the determination of this Meeting to defend the Machinery already introduced, and any which, from its utility, may be judged advisable hereafter to introduce into the Woollen Manufacture, against the attacks of any Person or Persons whomsoever; the Manufacturers engaging to find employ for all Persons in their respective employment in some

1 J.H.C. 58, pt. 2, p. 886, testimony of Mr. George Wansey. The cloth workers, of course, may have suspected, perhaps with good reason, the good faith of some of the manufacturers or they may have shrewdly foreseen that changed circumstances would have made such promises worthless, however well intentioned.

2 Evidence on Woollen Trade Bill, 1802-03, pp. 338-39.

> other branch of the Manufacture, of which such Person shall be capable, at ample and sufficient wages, in case, by the introduction of Machinery, the services of any such Person shall be rendered unnecessary in the Particular branch of Manufacture in which they are now or have lately been employed, so long as such persons shall demean themselves with propriety.[1]

This resolution aroused the counties of Wiltshire and Somersetshire and caused fear among the cloth workers as far away as the West Riding, as previously noted. It deserves a little notice. The phrase "for the preservation of the trade of this part of the Country" truly expressed the main motive of the manufacturers in insisting on the gig mill's use. The promise of employment for displaced workers in other branches was probably received with suspicion, but even if it could have been taken at face value it could not have been enough to comfort the cloth workers. The effect of machinery was often twofold. In the first place it displaced workers, causing the "temporary inconvenience" of unemployment until the reduced price or improved quality excited a demand for a greater volume of production of goods or until accumulated capital was invested in divers other enterprises. In the second place it often reduced skilled workers to the level of unskilled workers. Sometimes these workers could transfer their skills, but often they could not. Yet these skills, gained by training and experience, made up, as Adam Smith pointed out, the only capital possessed by the worker.[2] Machinery to supplant this capital, then, had to make its way against the opposition of a "vested

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1 J.H.C. 58, pt. 2, p. 886.
2 The worker often owned capital in addition to this: his tools. But machinery made his tools obsolete.

interest". It is probably true that machinery which would supplant skilled workers invariably met the greatest opposition.[1] This was the case with the gig mill, which was introduced to supplant the work of the cloth workers.[2] The cloth workers were offered other employment, but they did not want other employment. They wanted to continue at their old jobs.

The concluding remark of the paragraph cited above, "so long as such persons shall demean themselves with propriety", sounded rather ominous and its intent, of course, was strictly didactic.

The principal purpose of the Bath meeting, however, was not to pass resolutions but to create a fund for the prosecution of cloth workers involved in the destruction of property.[3] This fund was promptly and generously subscribed to, and several cloth workers were apprehended, tried and sentenced, one being hanged. There were not, however, as many opportunities for spending this fund for the prosecution of offenders as the clothiers had expected, when an uneasy peace settled down over Wiltshire and Somersetshire that autumn, and the money was available for another purpose.

At this time a great deal of anti-machinery sentiment existed in Wiltshire, not only in the minds of the cloth workers. As mentioned before, machinery had not been able to demonstrate its advantages in these counties and so had not conquered the

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1 For several reasons in addition to the one suggested here.
2 But not in the cases of the scribbling mill and of other early textile machines.
3 Evidence on Woollen Trade Bill, 1802-03, p. 339.

conservatism of the inhabitants. This conservatism was shown, particularly, by many of the smaller clothiers of the county. Of the 28 or 30 clothiers in Bradford, it was said that only four sided in with the machinery advocates.[1] "If all the world, except Bradford, were to use it, I would not; I mean the gig and shearing frame," said one Bradford clothier.[2] There was a great deal of anti-machinery sentiment among smaller clothiers in Chippenham,[3] also, and presumably in Trowbridge. To some extent the attitude of these clothiers originated in their feelings of affinity to the workmen, but jealousy of the larger clothiers had a great part in creating this attitude. Mr. Francis England, a master clothier of Bradford, spoke for the rest when he expressed his fear that the gig mill owners were trying to master the trade.[4-5]

A positive anti-machinery sentiment existed also among disinterested "persons of respectability" who then considered "the introduction of machinery into the woollen trade as unfriendly to the general interest, and peculiarly injurious to

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1 Ibid., p. 201. See also, pp. 181, 194.
2 Evidence on Woollen Trade, 1806, p. 306.
3 Evidence on Woollen Trade Bill, 1802, pp. 186-87.
4 Ibid., p. 194. Mr. John Jones had tried to hire Mr. England as superintendent of his Bradford factory. When Mr. England declined to take the job, Mr. Jones allegedly said, "Good God, Francis, it is no use your pretending to make Cloth, or any but those who have such places as me". The manufacturers, of course, vehemently denied that they intended to master the trade.
5 The split between the larger clothiers and smaller clothiers existed in Yorkshire also, but the gig mill did not come into early use in Yorkshire and the split did not come about over the issue of machinery. It came about over the erection of factories, the factory owners, like Mr. Gott and the Atkinsons, being opposed by the domestic clothiers.

the poor".[1] The sufferings of the spinners in Wiltshire, for the relief of whom high poor rates had to be paid, was responsible for much of this. In Warminster many inhabitants were said, by the high constable, to have been "disgusted" by the introduction of machinery and Mr. Jones of Bradford found that many persons refused to act as special constables.[2]

These attitudes, for and against machinery, had their origin, of course, in self-interest, as persons on both sides saw it. These attitudes could, and often did, exist without a diversity of relatively abstract arguments to support them, or to obtain broader support for them. But such arguments did develop out of the controversy and it is interesting to observe those that were thought most important at the time. The three principal objections to machinery, according to Mr. Anstie, were (1) that the limited supply of wool made displacement a necessary result of the use of machinery, (2) that the gathering up of people in factories resulted in the corruption of morals, and (3) that the staple manufacture of the nation would be endangered because, with machinery replacing native skills, it could more easily be transferred to other nations.[3] Of these arguments, the first was certainly valid to some extent,[4] that is, it contained a

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1 Anstie, op. cit., pp. 7-8.
2 H.O. 42/65, Wm. Hughes to Lord Pelham, June 23, and H.O. 42/66, Mr. Jones to Lord Pelham, August 1.
3 Anstie, op. cit., pp. 34-36.
4 Rees stated (Rees' Cyclopaedia, s.v. Woollen Manufacture) that, with machinery, the woollen trade employed fewer workers than before. Considering spinners this was probably true. But when he averred that the ill consequences of displacement were only avoided in the West Riding because cotton absorbed the displaced workers he was going too far. It seems most likely, judging from the bulk of the evidence, that the increased

sound premise. The domestic production of wool remained almost constant for many years, not being capable of rapid expansion, despite the great demand and the high prices paid, and imported wool supplied only a dab.[1] The expansion of the woollen trade did not come about, as did that of cotton, because machinery had effected a great reduction in the price of the goods. These woollen goods sold for a higher price in 1800 than they did in 1790, a price 30 per cent higher, one manufacturer stated.[2] The goods cost considerably less to manufacture, it is true, but the greatly increased price of wool more than absorbed the savings.[3] The new demand for woollen goods came from abroad and arose out of war-time circumstances, although the improved quality of machine-made woollen goods certainly gave English merchants a very great competitive advantage. Now, Mr. Anstie replied to this argument by saying that he believed that the

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production of woollen goods not only supported the same number of workers in the West Riding but also supported a substantially increased population. Rents were rising and many buildings were going up in the riding.

1 John Luccock, An Essay on Wool, London, 1809, pp. 338-60. See also Evidence on Woollen Trade Bill, 1802-03, pp. 322-28.

2 J.H.C. 58, pt. 2, p. 885, testimony of Mr. John Wallington. Superfine cloth that sold for 16s. around 1790 sold for 19s. in 1802 (Evidence on Woollen Trade Bill, 1802-03, p. 206).

3 The price of Spanish wool was said to have gone up 100 per cent (J.H.C. 58, pt. 2, p. 885). Spanish wool increased from 3s. 6d. to 6s. 6. (Evidence on Woollen Trade Bill, 1802-03, pp. 8, 206). Mr. Wm. Cookson of Leeds conceived that "the immense quantity of machinery employed by the legal Clothiers leaves them at the mercy of the Woolstapler or the Woolgrower; if there is a rise the Woolstapler gets it, if there is a brisk market he rises his wool perhaps the next day, and if there is a fall, the lower Clothier, who cannot keep his goods, sustains the loss". (Evidence on Woollen Trade, 1806, p. 172. See also p. 405.) The clothiers suspected that the Spaniards kept watch on the amount of machinery used in England and jumped the price of their wool accordingly.

annual growth of wool in Great Britain could be increased and that more could be obtained from Spain, Africa and the East Indies.[1] These expedients were resorted to in the course of events but, unfortunately for Mr. Anstie's case, they could have no immediate effect on the amount of wool available.

Like most of the machinery advocates, Mr. Anstie could not formulate a pat and cogent argument against the charges of immorality and corruption in factories which then were said to exceed anything "this side of the infernal regions".[2] This, apparently, was one of the necessary evils of the time which, however, could be mitigated somewhat by legislation and stricter discipline.[3] Of course, this argument was not strictly an argument against machinery.

The third argument seems to have been widespread in the South-West.[4] It will be recalled that legislation preventing

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1 Anstie, op. cit., pp. 41-49.

2 Ibid., pp. 57-58. The use of this argument shows that the relation between machinery and factories was generally perceived at the time. The greatest indignation was aroused by conditions in the cotton factories, but indignation was also aroused by conditions in the factories manufacturing woollen goods (e.g. see article on Woollen Manufacture in Rees' Cyclopaedia).

3 Anstie, op. cit., pp. 57-58. The attitude of the writer of The Leeds Guide (1806) is typical. He deplored the morals of the factory system but thought it impossible to combat the evils arising from the system. It was not desireable for the legislature to interfere, or at least such interference could not be expected (pp. 101-03).

4 The impartial writers of the agricultural surveys in the South-West for the Board of Trade attached considerable weight to this argument. Billingsley feared that improvements would ultimately be the means of "disseminating manufactures in other countries" to the prejudice of export trade (op. cit., p. 91). Davis wondered if machinery would make "those manufactories movable that have hitherto been fixtures". Only time would bring the answer to this question. (Op. cit., p. 159.)

the emigration of skilled artisans stood on the statute books to prevent the skills of British workmen being transferred to other nations. The portable character of machinery, especially of the ideas embodied in machinery, seemed to nullify these laws (although the export of tools and machinery was prohibited also) and make it possible for gigantic competing industries to grow up in other nations. This argument arose from a limited and, one might say, mercantilist conception of foreign trade. Mr. Anstie replied within the bounds of this conception. Other nations will use machinery, and were using machinery at the time, he said, and it would be foolish to place the national security in prohibitory laws which could only have effect in the kingdom. He used the familiar "dilemma" argument. If "checked by injudicious restrictions", English industry would remain in a "torpid state" while other nations attained an "equal degree of perfection" in the use of machinery, and this, with the lower price of their labour, would enable them to beat out English industry in the competitive race. Mr. Anstie extended the "dilemma" argument. The solution lay, he believed, not in restrictions but in the lack of them. This would give "scope to the human intellect", encourage "progressive improvement", enable English industry to keep always one step ahead of competition.[1] Most of the energetic and competitively-minded enterprisers were, with Mr. Anstie, hitching their wagons to the star of "progressive improvement". But the argument based on it did not appeal strongly to the conservatively-minded, for

1 Anstie, op. cit., pp. 9, 32, 24-25.

"progressive improvement" was an impalpable and precarious thing.

The answer lay, then, in laissez faire, the roots of which grew in the common law of the realm, or so Mr. Anstie claimed. The "only justifiable reason the common law admits of, for the restriction of the right to do anything" was that that thing might be contrary to the public benefit. He applied this touchstone to the statute of Edward VI prohibiting the use of the gig mill. The purpose of the statute had been to prevent the quality of cloth being damaged by the machine, but since the machine then in use did not damage the quality of cloth the statute should be construed "by the liberal spirit of the common law of this realm". Any other course would deprive the subject of his "original rights".[1]

This statute became the point on which the opponents and advocates of machinery focused their efforts. An appeal to the statute was, as mentioned before, the third recourse of the cloth workers, after they had attempted to put the gig mill out of action by refusing to work after it and by intimidating the clothiers with threats and destruction. On the 31st of July, 1802, two shearmen appeared at the assizes at Salisbury and presented a paper to the grand jury complaining of the gig mills.[2] There were undoubtedly other threats of invoking 5 & 6 Edward VI c. 22, which greatly alarmed the clothiers. At the same time the Gloucestershire weavers organised an association

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1 Ibid., pp. 71-73.
2 H.O. 42/66, James Read to Lord Pelham, September 6, 1802.

and began a campaign against unapprenticed weavers, an extension of which was threatened in Wiltshire and Somersetshire, and prosecutions were threatened and one undertaken for alleged violation of an old statute (2 & 3 Philip and Mary c. 11) limiting the number of looms clothiers and weavers could possess.[1]

The machine-using clothiers rose to this challenge. A fund had already been created, for the prosecution of cloth workers involved in the recent disturbances, and it was resolved to use this money to apply to Parliament for the repeal of these statutes and others.[2] The Gloucestershire clothiers joined in this enterprise and a petition from these clothiers of the three counties was received by the House of Commons on December 9. In the ordinary conduct of their trade, though "wholly free from any evil intention", these clothiers were "harassed and threatened by divers vexatious prosecutions", it represented.[3] The clothiers asked that the statute prohibiting the use of gig mills, and also that statute limiting the number of looms one person could possess, be repealed. The activities of the weavers in Gloucestershire gave them the excuse for attacking the latter statute. But they also asked for the repeal of 5 Elizabeth c. 4 (the apprenticeship law) and a host of other statutes dealing with length, breadth and weight of cloths, tentering, stretching, straining, the sale of cloths tacked or folded, the pressing of cloths and so forth,

1 H.O. 43/83.
2 Evidence on Woollen Trade Bill, 1802-03, p. 340.
3 J.H.C. 58, p. 75.

all of which, they represented, were anachronistic.[1] The idea had developed until a radical revision of the legislation regulating the conduct of the whole trade was involved.

This application started off a great train of industrial and legislative events that finally ended with legislation in 1809, after an extensive investigation of the industry by Parliament. The whole story is interesting enough, but only the high spots can be touched on here. A bill to accommodate the clothiers was ordered on December 13, but the Government had its doubts about such a rash step and Lord Pelham, the home secretary, prevailed upon the Parliament to wait until the question could be more thoroughly gone into. The next six years were spent "going into" the question, while legislation temporarily suspending the statutes was enacted year after year until the members of Parliament finally felt they could make a decision.

Twenty-five petitions from various sections of the trade were received by the House of Commons, for or against the bill, between April 25 and June 27, 1803.[2] Certain clothiers and merchants of Yorkshire asked that the repeal of 5 Elizabeth c. 4 be extended to that county, as did the stuff manufacturers of that county and the manufacturers of Norwich. On the other hand, clothworkers of the South-West strenuously protested against the proposed bill and they were supported in this by some Wiltshire clothiers, who thought the bill was "too comprehensive", and by some of the domestic clothiers of Yorkshire,

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1 Ibid., pp. 884-87.
2 Ibid., passim.

worried over the proposed repeal of 5 Elizabeth c. 4. The trustees of the cloth hall of Leeds, representing the domestic clothiers, sent down a petition against the bill.

In view of all these conflicting requests, Parliament put off consideration of the measure and appointed a committee to investigate the wool trade that summer. A bill suspending the statutes in question was meanwhile ordered (July 27) and received royal assent on August 11. It was passed with the "solemn pledge and assurance" that a bill for general revision and regulation of the statutes would be brought forward as soon as the necessary information, on which the bill would be based, could be secured.

And so the parade of witnesses began, the manufacturers of the South-West and Yorkshire advocating repeal, workers of both areas opposing it, and, meanwhile, the domestic clothiers of the West Riding trying to promote legislation to "explain and amend" the acts in question. The report of Mr. Henry Lascelles for the committee to whom the petitions of the Yorkshire manufacturers of woollen cloth were referred, in 1804, explained the stand of those West Riding domestic clothiers.[1] It told of the domestic system. The master clothiers of the system had served regular apprenticeships in the trade, bringing up, in turn, apprentices and employing the poor as workmen. The trade had been conducted partly in the masters' houses, partly in those of the workmen. Within the last twenty years trade had

1 J.H.C. 59, p. 226.

increased and machinery had been introduced, "the use of which machinery, in the preparatory process of the raw material,[1] is conceived by the Master Clothiers, who are now the Petitioners for relief, to be useful in carrying on the trade". But the collecting of looms in large factories would tend to destroy the domestic system "which has hitherto been productive of the most beneficial effects". The large manufacturers would "swallow up" and "totally annihilate" the domestic trade. And so the domestic clothiers wanted to limit the number of looms that could be operated in one house or factory, and they also wanted to strengthen the apprenticeship law by increasing the penalties for employing persons not brought up to the trade as apprentices. In other words, having accepted machines for the preparatory processes, they wanted legislation to preserve the status quo.

The report of the committee of 1806 was the most decisive pronouncement on the use of machinery and the other related matters that had been brought to the attention of Parliament during these years. The committee viewed the domestic system with approval, because it allowed persons with small capital to advance, it was not subject to large fluctuations, it encouraged frugality, favoured health and morals. Yet it could not agree that the factory system seriously threatened the domestic system (as a matter of fact the latter carried on for many years after 1806) and it thought the factory system a complement to the other. The domestic system could furnish skilled labour for the

1 Approval of the gig mill, thus, was not conceded.

factory system while the owners of the factories had the large capitals necessary for experimentation and improvement. The committee, therefore, did not fall in with the views of the domestic clothiers.

The committee concluded that the gig mills and shearing frames finished woollen goods in a superior manner.[1] Their use was not a serious threat to the workmen. Other machines had been introduced without impairing the comforts or lessening the numbers of workmen; actually machines had stirred up a fresh demand for labour from the increased sa les of the articles produced. Furthermore, patents prevented the too sudden establishment of most machines.

The committee could not consider any kind of prohibition against the use of machines, for

> . . . if the principles on which the use of these particular Machines is objected to were once admitted, it would be impossible to draw the line, or to foresee the fatal extent of their application. No one will deny, that, if Parliament had acted on such principles 50 years ago, the Woollen Manufacture would never have attained to half its present size. The rapid and prodigious increase of late years in the Manufactures and Commerce of this Country is universally known, as well as the effects of that increase on our Revenue and National Strength; and in considering the immediate causes of that augmentation, it will appear that, under the favour of Providence, it is principally to be ascribed to the general spirit of enterprize and industry among a free and enlightened People, left to the unrestrained exercise of their talents in the employment of a vast capital; pushing to the utmost the principle of the division of labour; calling in all the resources of scientific research and mechanical ingenuity; and, finally, availing themselves of all the benefits to be derived from visiting Foreign Countryes, not only for forming new, and confirming old commercial connections, but for

1 Report on Woollen Trade, (P.P., 1806, iii), p. 6, or J.H.C. 61, p. 697.

> obtaining a personal knowledge of the wants, the taste, the habits, the discoveries and improvements [of the peoples of these countries].[1]

It was by the use of machinery "above all" that the industry of the country was able to improve quality, cheapen price and progress beyond "the most sanguine calculations", despite crushing taxes and rising prices. This was the positive aspect of the question. But the committee was tremendously impressed by the negative aspect, too, the fear that "powerful and civilized" nations, eager to become England's competitors in trade, might adopt the same machinery.[2]

The committee did more than defend and advocate machinery. The spirit of laissez faire pervaded its report, as instanced by the paragraph quoted above and, more particularly, the following:

> The right of every man to employ the capital he inherits, or has acquired, according to his own discretion, without molestation or obstruction, so long as he does not infringe on the rights or property of others, is one of those privileges which the free and happy Constitution of this country has long accustomed every Briton to consider as his birthright; it cannot therefore be necessary for Your Committee to enlarge on its value, or to illustrate its effects. These would be indubitably confirmed by an appeal to our own Commercial prosperity, no less than by the history of other trading Nations, in which it has been ever found, that Commerce and Manufactures have flourished in free, and declined in despotic countries.[3]

This was the fruit of the past forty years' experience in the use of machinery, the capitalists' Declaration of Independence, a landmark in economic history denoting the end of the old Elizabethan system and the beginning of the era of laissez

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1 Ibid.
2 Ibid., p. 698.
3 Ibid., p. 699.

faire. The report of the committee of 1806, and the death of the cotton weavers' arbitration bill in 1808,[1] put the seal on the old system and showed the way to a century of unparalleled economic accomplishment.

Actually the bill repealing the old statutes was not passed in the session following publication of the 1806 committee's report. In 1808 efforts were made again to put the bill through but, upon receipt of petitions against it, another suspending bill was passed. The repeal bill finally received royal assent on June 15, 1809, on which date machinery officially received its full freedom.

1 Mantoux, op. cit., p. 473.

CHAPTER XII: CONCLUSIONS

Subsequent History

The 1806 report did not signify the end of anti-machinery agitation, which, indeed, has not ended to this day of writing. The 1806 committee indicated its strong approval of the shearing frame, just as the 1780 committee investigating the cotton trade had approved of the water frames. After 1780, it will be recalled, trade revived and the cotton workers reconciled themselves to the water frames and the other machines that had been adopted during the previous decade. But after 1806 there followed a few good years and then some disasterous ones, 1811 to 1816, with crop failures and distress, the war with America and Orders in Council. Anti-machinery sentiment flared up in 1812 as the Luddites of Yorkshire, the cloth workers who had been agitating against the gig mill, destroyed shearing frames, the Luddites of Nottinghamshire destroyed knitting frames, and the cotton weavers of Lancashire destroyed power looms.

Sentiment against power looms continued for many years. The use of these machines opened up a new phase of agitation against machinery which led to the investigation by committees of Parliament and by commissioners of the condition of the hand-loom weavers in 1834 and 1840 to 1845. The Luddites of Nottinghamshire were not really agitating against machinery, for they had been using the knitting frame for over two

centuries. The Yorkshire cloth workers, however, were making a last protest against the shearing frames, some of which had been put into use before 1800 and quite a few more in the decade 1800 to 1810.

Some mention of these shearing frames has been made in the preceding narrative. They were not numerous enough to effect the workers at this time, though they certainly caused apprehension, especially when they were used to do the shearing when the cloth workers refused to do that work after the gig mill. The first shears were just like those the men used except that they were mounted on a frame so that one man could operate several of them.[1] In 1806 one man was able to operate four pairs of shears mounted on a frame, but he was only able to do the work of two men with this equipment.[2] A great deal of equipment had to be purchased before a manufacturer could crop all of his cloths with shearing frames,[3] and this no doubt was an obstacle to the rapid adoption of the frames. Furthermore, these machines did not greatly reduce the cost of the cropping.[4] They were said to do a much evener job of cropping, however, than hand workers could do, the cloths being finished with "mathematical nicety".[5]

Distress was so general in 1812 that some sort of rioting and destruction would seem to have been inevitable. Machinery

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1 Crump, op. cit., p. 44.
2 Evidence on Woollen Trade, 1806, p. 430, testimony of Mr. Joseph Barnes.
3 The Atkinsons used shearing frames in 1806 but did not have enough of them to follow their gig mills (ibid., p. 431).
4 Ibid., p. 427, testimony of Mr. Joseph Barnes.
5 Ibid., and pp. 378-79, testimony of Mr. Joshua Taylor.

was certainly one of the grievances that prompted the sad events of that year, but the sorting over of these grievances and the weighing of them will have to wait for another day. Meanwhile the story of the introduction of most machines, except for the power loom, into the textile trades has reached a tolerable stopping point with the successful introduction of the gig mill and the pronouncements of the 1806 committee. Although more machines were introduced later and more trouble followed, the attitude of the influential sections of the population towards machinery was firm and openly avowed by the end of the first decade of the 19th century.

It remains to consider the significance of the developments related in the preceding narrative so far as that has not been done alongside of the narrative. The first section dealt with machinery introduced into the cotton trade. It was fortunate, although of course only natural, that machinery should have been developed first in cotton, unhampered as it was by age and restrictions. But the argument that this was cotton's advantage over wool should not be over-stressed. Cotton had a great many more possibilities for development, unlimited sources of supply of raw materials and a great potential demand for finished goods. Without belittling the enterprise of the cotton inventors and manufacturers, it can be pointed out that the calicoes and muslins of India showed the way the trade was to develop, leaving up to them to find out how to do it. They discovered the mechanical means of doing so and were the first of the textile manufacturers to discover this, mainly because the cotton fibre was

the easiest of all fibres to handle. After accomplishing this the development of the trade was wonderful and the manufacturers, and the conditions of freedom in which they operated, can be congratulated for this unprecedented expansion. The effect of the use of machinery in this trade was to lower price, which created demand, and to produce a great quantity of goods, which supplied it, with the consequence that many more people could be employed than before. Something had been created that had not previously existed. This was the effect of machinery, people said with this inspiring example before them, and would be the effect of machinery introduced into other trades.

Restrictions did not keep the wool trade from taking up machines. The fragility of the woollen fibre made the use of those machines more difficult and the savings from their use smaller, but they were still put into use very soon after cotton had done so. The woollen manufacturers showed ingenuity in adapting those machines and in devising additional machines for dressing cloth. But the consequences of the use of machines in the wool trade differed from those of cotton. The cost of manufacturing goods was reduced, but the supply of raw material was limited and the price of raw wool was raised with the increase in demand. The cost of woollen goods was not reduced by machines and the increased demand for those goods was not created by machines. The cotton theory was not borne out by the wool trade. However, machines improved quality with the consequence that English woollen goods received preference in foreign markets, and they made it possible to supply enough

goods to satisfy those markets. And, although the history of the wool trade during this period was not as dramatic as that of cotton, it still reveals a marvelous accomplishment.

The introduction of machines in both trades brought about the concentration of those trades in certain areas, to the detriment of outlying areas, though this is not shown so clearly in the case of cotton because it had never been so diffused. This effect of machinery caused disturbance and some suffering. On the other hand the mere concentration brought additional economies. The taking out and collecting of work had previously cost a great deal in time and money.

The introduction of machines also created immediate unemployment for certain classes of workers, casting them adrift to find something else to do. This effect was not merely theoretical. Its actuality was shown by experience with the spinning jenny and water frame, the scribbling machine and the gig mill. The effect was often hidden because machines were introduced in times of expanding trade and their effect only became apparent when trade contracted. According to their readiness to take up some other employment, when and if it became available, the workers were able to reconcile themselves to machines. They were not willing to do so at first but in the textile districts they soon grew used to change. Of course, in most cases other employment was available or became available shortly and the total effect of machinery was certainly to create additional opportunities for employment, often at improved wages.

"Progressive Improvement"

The first two sections of this work dealt with machines that affected the situation of unskilled workers mainly. These workers were not able, because they lacked prestige, finance and organisation, to put up any strong opposition to machinery. But when machines were introduced that affected skilled workers the story was radically different. These workers were able to postpone the use of some machines for a considerable number of years. If their organisations had been still stronger and if unskilled workers had been similarly organised, they might have postponed the use of these machines for greater periods of time. Would this have been desireable? Without considering society's need or desire for an abundance of goods or the special need of Great Britain for a surplus of economically-produced exportable goods, it would seem not to have been desireable for the workers to hold out longer against these machines. There is an inevitability about labour-saving machinery, so long as traces of freedom remain in the economy, that spells eventual defeat of their attempts. Delay encourages workers to keep in their same trade, gradually declining, until finally they lose out. The most pitiful groups of workers in the early 19th century were the woolcombers and weavers, and also the cloth workers, who refused to accept the fact of change. Their sufferings lasted over decades.

It certainly can be demonstrated that workers in a particular locality are unwise to oppose machinery. The adamant stand of the cloth workers in Wiltshire hurt their business,

caused the loss of a great deal of trade to Gloucestershire and in this way brought additional distress to the county. The success of the workers of Norwich in keeping machinery out, and in dictating to their employers other conditions of employment, surely contributed to the downfall of that town as a worsted center. This argument could be extended to refer to a nation, instead of a particular locality, and it was by the machinery advocates during these years.

In some places and in some circumstances, workers were determined to oppose machinery in good times and bad, but the greatest opposition arose, as might be expected, in the bad times. Consequently the good times were most favourable to the introduction of machinery and, in fact, all the major textile machines were introduced in the years of prosperity. During these years the workers were too busy to worry about machinery, while on the other hand the increased demand made greater production necessary and the entrepreneurs could get the capital to finance improvements. But in these good times machinery could be over-introduced so that when bad times followed machine equipment made over-production feasible. The entrepreneurs were inclined to run their machines, which were fixed capital, and dismiss their workers on whom they were not liable to pay taxes, interest or depreciation. This was the case when the Peace of Amiens caused a slump of trade and the soldiers returned to Wiltshire. The sight of machines running while at the same time men were out of work was something that inspired the greatest animosity against machinery.

This was one "inconvenience" of machinery and in this may be detected the possibility of miscalculations on the part of entrepreneurs the cumulative effect of which could cause serious fluctuations in trade, "boom and bust". Some of the most enterprising and inventive capitalists of this period suffered the greatest disasters in their personal fortunes. Two gentlemen frequently cited in this work, William Hirst and William Radcliffe, were examples. They both made great contributions to the Industrial Revolution and both made a great deal of money, but they both lost all they had.

These were some of the effects of the introduction of machinery. But of course machinery was not the only contributor of change to the period of the Industrial Revolution. These, in a larger sense, were effects of the doctrine of "progressive improvement", flourishing in an atmosphere of laissez faire and using machinery as a tool. The phrase implies continuous change. The domestic clothiers of the West Riding were not advocates of "progressive improvement". They were willing to accept improvement but they did not wish to accept the inconveniences and risk of continuous change. The true advocates were the men like Hirst and Radcliffe, who failed, and Arkwright and Oldknow, who succeeded, men who were willing to chance the competition that led to creation. They were the men who sped the developments of the Industrial Revolution and put Great Britain far in the lead of other nations.

The inconveniences of "progressive improvement" were very real. The constant increase in the number of spindles of the

spinning jennies worried the owners of smaller jennies in Lancashire during the decade 1770 to 1780. The constant change in competitive status caused by this sort of thing and the introduction of other machines gave a feeling of fear and insecurity to those who had no creative role in these developments. The attitude of workers towards machinery is inadequately revealed by their riots and by their statements before Parliamentary committees. Perhaps the memories of George Jacob Holyoake will help convey the feeling:

> The rise of machinery was the circumstance that filled the working class with despair. The capitalist able to use machinery grew rich, the poor who were displaced by it were brought in great numbers to the poor-house. A man so strong thinking as Horace Greeley had his mind inclined to protection by the misery he witnessed in his father's household, when handloom weaving was superseded by merciless inventions. Political economists made what seemed cold and heartless speeches to the poor, to prove that machinery tended to the benefit of society, not seeing that acquiescence in the meantime exacted a fine spirit of self-sacrifice from the thousands who were turned from their employment to famish under the parsimony and ignominy of parish relief, in order that the next generation might benefit by their destruction.[1]

Mr. Holyoake's statement is a strong one. No doubt he accurately states the feelings of the workmen for he was one himself a generation later. But was he correct in attributing this suffering to machinery as his workmen friends did before him? It can at least be said in rebuttal that the suffering caused by the first machines used by the textile trades was quite transient, though admittedly real. As a result of this "enlightened" people in 1810 were optimistic about the prospects

1 G. J. Holyoake, The History of Co-operation in England: Its Literature and Its Advocates, Philadelphia, 1875, pp. 15-16.

of the increased use of machinery. Later on, with the growth in the use of the power loom pari passu with the decline of the hand-loom weavers, their attitude was less optimistic.

Or was Francis Place correct when he visualized a race between machinery and population? According to Place, all the leaders of the workmen, of which Holyoake later became one, "disregarded the fact that the people had increased and were increasing, and over-running the means of subsistence; and that under the hindrances opposed by the landlords to the improvement of husbandry by the application of chemistry and machinery to land, the actual increase of produce was very small, whilst the increase of people was very great . . ." Machines, for agriculture and for industry, should be encouraged and should be allowed to beat population in the race.[1]

Mr. Place's conception was limited and undeveloped, and it was applied particularly to Great Britain. But it suggests a general theory of the effects of machinery--of an increasing diversity of cheaply produced goods more than making up for the economies in the use of labour, originally and temporarily effected by machinery, by their increased numbers and particularly by their greater diversity--and perhaps this is the line of thought that should be pursued. If so the protagonist in the race should be called "ingenuity" or "enterprise", the creator of diversity, and not "machinery", the dumb multiplier of things.

1 G. Wallas, The Life of Francis Place, London, 1918, pp. 168, 170-71, 181.

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