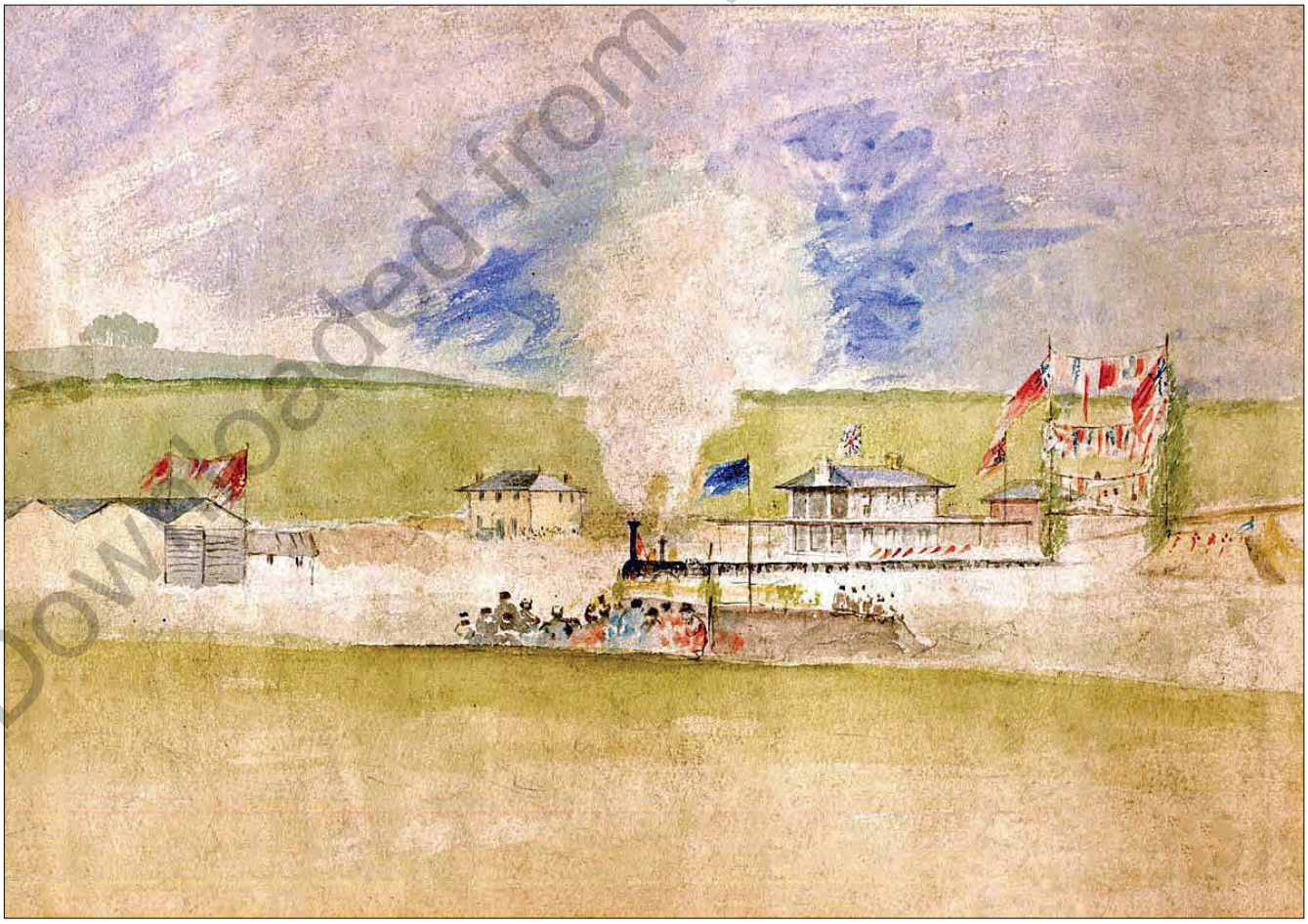
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Hampshire Industrial Archaeology Society

Journal No. 33, (2025)



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All the above are obtainable from Eleanor Yates, Publications Officer, HIAS.
43 Courtenay Road, Winchester, Hampshire, SO23 7ER. *eleanor.yates@ntlworld.com*

Hampshire Industrial Archaeology Society

Hampshire Industrial Archaeology Society was founded as the Southampton University Industrial Archaeology Group in the 1960s by members of the University's extramural classes who wished to continue their studies in industrial archaeology. Recording has included surveys of mills, breweries, brickworks, roads and farm buildings. Restoration work is undertaken by associated groups such as the Tram 57 Project, the Hampshire Mills Group and the Twyford Waterworks Trust. In addition to the *Journal*, the Society publishes a newsletter (*Focus*) twice a year and lecture meetings are held every month throughout the year.

To join, contact the Membership Secretary:
Keith Andrews, 13 Ashley Close, Winchester, Hampshire, SO22 6LR.

Front cover: Linking all the articles in this year's *Journal*, this is a somewhat sketchy depiction of the opening of the railway through Micheldever on 11th May 1840 (just ten years after the Swing Riots) by Richard Baigent (1799-1881). Born in Portsmouth, Baigent was the first Drawing Master at Winchester College, and was in post from 1824 to 1874 – a link is therefore made with our late Editor, Martin Gregory. Sir William Tite's station building is clearly recognisable, as is the Western Road Hotel to the left, which was built by the London & Southampton Railway as a coaching inn for passengers wishing to travel on to Andover. It still exists as the Dove Inn. (Hampshire Cultural Trust)

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Hampshire Industrial Archaeology Society

(formerly Southampton University Industrial Archaeology Group)

Journal No. 33 (2025)

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Editorial

Welcome to issue 33 of our *Journal,* which this year contains two articles, both (coincidentally) relating to the Micheldever area, together with an appreciation of our previous editor, Martin Gregory. It was a huge shock when Martin died early this year and there has been a little confusion over material that may or may not have been sent to him for this *Journal*. If anyone has sent an article, and expected to see it here, please accept our apologies and resubmit it to the email address below for consideration for a future issue.

In our first article, Barry Shurlock looks at the development of the threshing machine, how it came to replace the hard manual work of flailing using a 'poverty stick' and how, despite the obvious relief that might have been enjoyed by farm labourers, they rose up against such mechanisation. In particular, Barry considers the impact on agriculture in Hampshire and the rise of the Swing Riots in the Dever valley.

The second article, written by the Editor, summarises a talk he gave at an event in May 2025 to celebrate the 185th anniversary of the opening of the London & Southampton Railway and the settlement that grew up around (and took its name from) Micheldever station. It examines the building of the line in the context of the year-long commemoration of 200 years of railways and suggests why that celebration is taking place in 2025. (At the end of this article is a belated addendum to one previously published in *Journal* No. 27.)

Howard Sprenger
howard@sprenger.family
August 2025

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Edited and produced by Howard Sprenger.

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The Contributors

Barry Shurlock
Barry Shurlock spent most of his working life as a medical journalist. He has a long interest in local history, is a founder of the Worthys Local History Group and has contributed many articles to the *Hampshire Chronicle* and other outlets. He published articles in the *HIAS Journal* on the pioneering caravan designer Bertram Hutchings (No. 29) and draper and fashion entrepreneur, Thomas Burberry (No. 30). Most recently, he led the Celebrating Hampshire Historians project of the Hampshire Field Club, accessible on its website (*www.hantsfieldclub.org.uk*).

Howard Sprenger
After training as a teacher at St. Luke's College, Exeter, Howard spent ten years teaching in Staffordshire and Hampshire before joining IBM as a technical author. He retired 26 years later as a software development manager and since retiring from teaching Mathematics to adult students in Portsmouth he has moved to Cornwall. He is the author of four railway books and with his wife runs Kestrel Railway Books. He is a past Chairman of HIAS and is the current Editor of the *HIAS Journal*. He was awarded an MA in Railway Studies by the University of York in 2023.

Acknowledgements

My thanks are due to those who have contributed to this edition of the *HIAS Journal*. In addition, Sue Bell has helped me greatly with my Micheldever Station research and also has a great interest in the Dever Valley Swing Riots, which are to be commemorated locally in 2030. Acknowledgements and thanks for the provision of illustrations are made as follows:

Martin Gregory (Figure 1); Hampshire Cultural Trust (front cover); Barry Shurlock (Figure 14 [back cover]); Howard Sprenger (Frontispiece, Figures 15, 16, 17, 28 [back cover]); University of Southampton (Figure 4); Wikipedia Commons (Figures 5, 7, 13, 20).

The authors and HIAS have made every effort to trace copyright holders of illustrations, but if we have inadvertently missed any, we apologise.



Frontispiece: A hand-coloured postcard of Micheldever station probably dating from around 1910. The line was quadrupled and the signalbox opened in 1905. (Howard Sprenger Collection)

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Obituary: Dr Martin Gregory



Our previous Editor, Dr Martin Gregory, died on 28th January 2025 aged 88, soon after the death of his beloved wife, Jennifer, on 10th September 2024.

Martin went to school at Altrincham Grammar followed by Wadham College, Oxford. Jennifer was up at Lady Margaret Hall, Oxford, at the same time, and luckily, Martin's sister was in the same college, so he was able to visit them both. After Oxford, Martin worked briefly at Methuen as a publishing editor but following a visit to Winchester College to discuss the new Physics curriculum being published by Methuen, the head offered him a post and from 1962 to 1999 he taught in the Physics department at the College.

Science at Winchester was taught in Flint Court from the 1870s. It proved so popular that more space was needed and, in 1903, work began on Science School, believed to be the first major building dedicated to school science in Britain. It has been on the same site ever since, which is why it has been able to retain so much of its old equipment. Martin used to create exhibitions and short films about the early days of Physics teaching. His interest in the history of industry and technology goes back to the 1960s and he has researched Stirling and steam engines, building models of both.

This interest led him to be an early member of SUIAG, the forerunner of HIAS. Here, his knowledge of Industrial Archaeology made him a valuable Chair and Secretary. In 2002, when SUIAG became HIAS, its Journal became the *HIAS Journal* and from that year, Martin became its Editor, taking over from Dr Edwin Course, who had edited the *SUIAG Journal* from its inception in 1992.

From 2005 to 2016, Martin was President of the of the Twyford Waterworks Trust (TWT) and he and Jennifer continued to volunteer on open days. His guided tours were both entertaining and educational and he was central to the 'Return to Steam' project for which he supplied everything for the display boards across the whole site and wrote the guidebook. He is also fondly remembered for his appearance in *The Antiques Road Show* when it visited the waterworks.

He was a volunteer miller at the City Mill in Winchester and was an officer of the International Sewing Machine Collectors' Society (ISMACS), which held international meetings and auctions for many years and now offers articles on the history, types, restoration and valuation of sewing machines, as well as a journal, which Martin also edited. His own collection of sewing machines, which he sold recently, was world class and he used to complain about the cost of shipping machines to Japan and America.

His kindness and extensive knowledge will be missed by his children, Paul and Katharine, and his grandchildren, of whom he was immensely proud. He will also be greatly missed by his many neighbours and friends in Winchester College, ISMACS, City Mill, HIAS and TWT.

Eleanor Yates, Publications Officer, HIAS



Figure 1. A model of a Phineas Crowther vertical steam engine built by Martin and with his builder's plate on the wooden base. (Martin Gregory)

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Threshing Machines: Their Invention, Usage in Hampshire and the 1830 Swing Riots

Barry Shurlock

Introduction

The notion that technology has been the driving force of human endeavour – on a par with politics and economics – is well illustrated by the history of farming. Basic hand tools, the harrow and the plough had long been the mainstay of the trade until Berkshire farmer Jethro Tull (1674-1741) demonstrated the promise of such things as the seed-drill, turnip-drill and horse-hoe.[1] The progressive mechanization of farming thereafter undoubtedly had benefits for farmers, but often disadvantaged workers by depriving them of a job or demanding different skill sets.

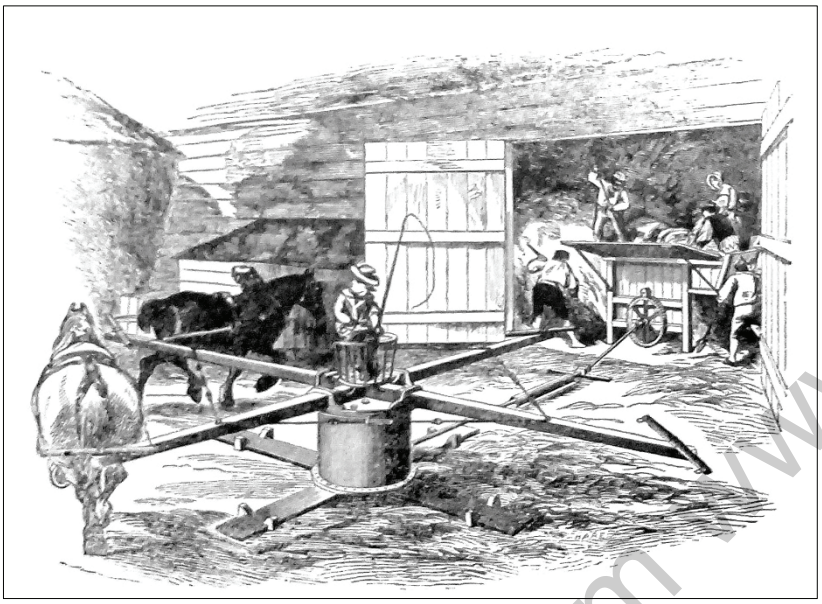


Figure 2. An example of a threshing machine powered by horses, manufactured by Barrett, Exall & Andrewes of Reading some time after 1842.

This came to a head in the Swing Riots that took place across southern England and elsewhere in 1830, with most reports ascribing them in some measure to a detestation of the threshing (or thrashing) machine and machines in general.[2] Some country people still nourished superstitions that all machines were somehow 'unnatural'. A character in Scott's *Old Mortality*, published in 1816, demeaned the 'new-fangled machine' that separated corn from chaff – i.e. a winnower – and 'thus impiously thwarting the will of Divine Providence, by raising wind … by human art, instead of soliciting it by prayer, or waiting patiently for whatever dispensation of wind Providence was pleased to send'.



Figure 3. A medieval illustration of a flail in use.

Threshing is the process of harvesting grains of wheat and other cereals from the ear of the sheaf-corn, ready for milling. Today it occurs unseen 'between beater and concave' in a combine harvester, but for centuries it was carried out by hand with a flail. Swinging a relatively long stick with a smaller one hinged at the end enabled a very powerful blow to be delivered to the husk. Applied to stalks of corn laid on a solid floor, it yielded grain mixed with chaff and other debris, which could be 'winnowed away'. Threshing was not an agreeable task: it was drudgery verging on 'downright slavery' – laborious, dirty, inefficient, slow and unpopular with workers, but it had the advantage of providing work in the winter. Even so, by those who had to use the flail, it was often dubbed 'the poverty stick'.

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The advent towards the end of the 18th century of an effective machine to take the place of the flail might have been greeted with relief by farm workers, but instead during Swing Riots of 1830 it became an object of hate, adding to postwar agricultural depression and other causes of rural poverty. For them it was, so to speak, 'the last straw'. This paper first outlines the events of 1830 – mainly in Hampshire – and then describes some of the many attempts by millwrights and others in the 18th century to achieve with a machine what a man could do with a flail. There were numerous false starts, before in 1788 Andrew Meikle (1719-1811), helped by his son,[3] designed a successful product: it was a huge advance in the midst of an agrarian revolution in the Scottish Lowlands.

For accounts of the Swing Riots in general, the reader is referred to a number of major sources,[4] whilst for the county Jill Chambers' studies, now online, are invaluable.[5] The paper also draws on other key sources, including papers from the *Transactions of the East Lothian Antiquarian and Field Naturalists' Society*, published in the area of Scotland where Meikle lived and worked,[6] and John Agnew's paper for the Newcomen Society on the evolution of the threshing machine during the 19th century.[7] Statistical studies by Bruno Caprettini and colleagues at the School of Economics and Political Sciences, St Gallen University, Switzerland, on the distribution of 'threshers' in England and Wales and the role of the threshing machine in the Swing Riots, confirm a strong presence in the south and east of the country. They also broadly support views long held by historians on the social and economic aspects of the riots.[8] Where specific references to these publications are not made in this paper, one of them can be regarded as the source.

Context: Threshing Machines and the Swing Riots

The invention of an effective threshing machine was part of a trend, still in process, that has distanced country people from everyday farming and progressively reduced employment on the land, especially during the autumn and winter. It is therefore hardly surprising that when the threshing machine arrived it was – like many new inventions – greeted with dismay by those whose income it threatened. However, it would probably have been a minor footnote in history without the symbolic role it played in the agricultural riots in the south and east of the country during the autumn of 1830. The first machine to be destroyed was in Kent on 28th August, with the harvest scarcely over, in the village of Lower Hardres, near Canterbury. 'Machine breaking' was nothing new in the country – in 1811, bands of textile workers in the Midlands and north smashed the automated machinery that was taking away their work. Similar scenes featured during the Swing Riots: to avoid the growing signs of trouble, some owners broke[9] (or perhaps disassembled) their machines, whilst others just looked on, or even facilitated it![10]

By early November, the unrest had reached Hampshire. There had already been signs of discontent in September when nearly 200 men from the parishes along the Dever valley signed a petition highlighting the distress of labourers and their families and demanding parliamentary reform. It was drawn up in The White Swan in Sutton Scotney (demolished in the 1960s) by the Radical and Musical Society and taken on foot to Brighton, where King William IV was residing. However, he gave it a very frosty reception and advised the bearer to present the petition to the Home Office in London. There is much more to tell of this story,[11] which involved the prominent activist and political journalist William Cobbett (1763-1835), but clearly Hampshire was ripe for the succession of riotous events that erupted two months later in virtually every corner of the county.

Each incident was different, but typically, a mob of farm labourers approached a local farmer, with threats of firing or damaging property if certain conditions were not met – such as handing out money, removing threshing machines, etc. Frequently, it was preceded by a threatening letter from 'Captain Swing' – a mythical character, the equivalent of the equally mythical 'Ned Ludd' of the Luddites. The exact meaning of the word 'Swing' is not clear. It first appeared in a letter addressed to a farmer in Dover that read, 'You are advised to put away your thrashing machine against Munday next [or]

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you shall have a SWING'. Most probably it threatened the gallows, with a clever back reference to the swing of the flail.[12] One letter was even sent to Waterloo hero, the Duke of Wellington, seated in Hampshire at Stratfield Saye, and an opponent of reform near the end of his premiership.

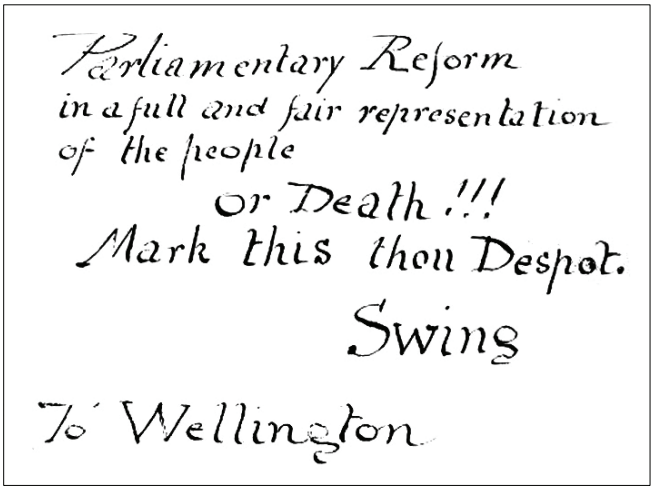


Figure 4. Twelve days before Wellington (who played a major part in countering the Hampshire agricultural riots) resigned as Prime Minister, he received a death threat from 'Swing'.
(University of Southampton Library, MS61/WP1/1159/93)

Many machines were damaged, whilst others that had been dismantled or hidden by their owners were nonetheless found and destroyed. In some places labourers were 'bought off' by promises of better wages and the like or persuaded by a landowner or magistrate to desist. Rioters also trashed more than threshing machines, including workhouses at Headley and Selborne, the ironworks of Robert Tasker at Upper Clatford and William Shepherd at Stuckton, near Fordingbridge,[13] where a sack factory also got caught up in the turmoil. In Gosport, a government contractor and owner of warehouses had three of his ricks burnt and a number of cattle killed.

In the Dever valley, the legacy of the failed petition of the Radical and Musical Society came to a head on 18th November, when a band of hundreds of men from Sutton Scotney and elsewhere moved east through Micheldever and East Stratton, growing all the time and destroying threshing machines as they went. The headline event, however, which led to the hanging of Henry Cook, occurred when a subgroup split off from a gathering at East Stratton – in what is now the Northbrook Arms – and headed to Northington Down Farm, tenanted by Thomas Dowden and owned by Sir Alexander Baring (Baron Ashburton from 1835) seated nearby at The Grange. His son, William Bingham Baring, was assaulted when he tried to quell the riot. Exactly what happened is still disputed – was he really 'knocked senseless to the ground' or was he just 'roughed up'? Whatever really happened, Cook was hanged for assault. In the Winchester trial, Baron Sir John Vaughan, the judge presiding over a General Assize in Winchester, described an orgy of machine breaking:

> '[The rioters] had that day broken a great many threshing machines … Henry Cook had yourself been actively engaged in breaking 12 machines at least … you, with a sledgehammer in your hand, of which the head weighed six pounds and of which the handle was two feet long … were seen to raise it deliberately with both bands, and to strike at the head of Mr Baring. … Even when he was in [a] prostrate and senseless condition you were not satisfied but were making a second effort to complete your purpose. I am satisfied, and completely satisfied, with the verdict that declares that it was your intent to murder Mr Bingham Baring.'

Destroying threshing machines was no longer a capital offence, so Cook was hanged for robbery and 'felonious assault'. At the same time James Thomas Cooper of East Grimstead, Wiltshire, was hanged for 'riotous assembly'. He was the leader of a mob that trashed ironworks.

The trial put an end to the riots but did little to extinguish resentment in the Hampshire countryside. In December 1831, arsonists set fire to Cocum Farm at Barton Stacey, and three men were sentenced to death. One had his sentence commuted to transportation, but the other two were hanged more than a year after Cook and Cooper.[14]

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In the aftermath of the riots, there were various attempts to justify the response of the authorities and to 're-educate' the participants. An eight-page pamphlet, *An Address to the Labourers on the Subject of Destroying Machinery*, published by the Society for the Diffusion of Useful Knowledge, reminded rioters that 'your clothes, your stockings, your shirts, are all made by machines, far more curiously contrived than the thrashing-machine'.[15]

Narrative studies of the Swing Riots, with detailed analysis, have recently been supplemented by Bruno Capretinni and others,[8] providing a much clearer understanding of the distribution of threshing machines and the factors associated with the unrest. Amongst their conclusions, they showed that 'the probability of riots was twice as high' in places where threshing machines had been adopted. Also, areas most suited to wheat growing 'witnessed both greater adoption of threshing machines and markedly more riots' yet had not experienced 'social unrest prior to 1830'. Significantly, there was a 'a clear causal contribution of technological change to social unrest', but in areas where farmworkers had other options for work 'technological unemployment was less likely to translate into social unrest'.

Mechanised Threshing – the Early Days

For at least 150 years there were many attempts to build a machine that could thresh as well as a man with a flail. One approach was to mechanise the flail, and in 1732 a Scot, Michael Menzies, succeeded in building and patenting a working machine with multiple rotating flails. It was praised by the Society of Improvers of Scotland but was not very effective and frequently broke down. A significant advance was made in 1753 by Michael Sterling from Dunblane, who applied the principle of scutcher-mills used to hull the plant flax – beaten to obtain the fibres for weaving linen. It worked for oats, but not for wheat.[16] In 1758, another Scottish farmer called Leckie made a similar machine, but it broke off the ears of corn.[17]

Other experiments were underway in the early 1770s in Northumberland with machines that *rubbed off* grains of corn from the ear.[18] One by 'Mr Oxley at Flodden' was witnessed by Francis Kinloch, who had a model made for Andrew Meikle to test. Unfortunately, in practice the machine fell apart. In 1796, John Jubb, a Leeds-based 'millwright and machine-maker' advertised plans for a 'patent threshing machine' and even offered what was essentially a 'flatpack' for local assembly.[19] It is not clear whether this was similar or not to Meikle's machine.

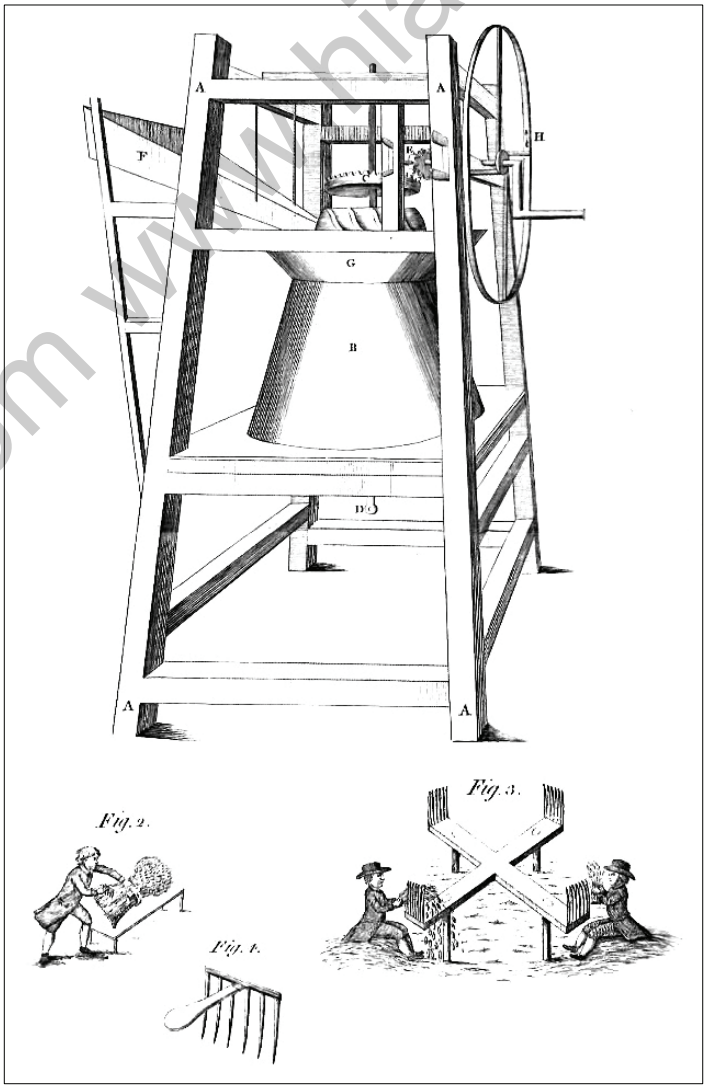


Figure 5. One of many unsuccessful attempts to build an effective threshing machine. Invented in about 1785 by William Winlaw, it operated like a large coffee grinder. (Wikipedia Commons)

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In 1786, the *Annals of Agriculture* published details of a 'mill for separating the grain from the corn in place of threshing' that operated like a modern coffee grinder (Figure 5). It was built by William Winlaw, a celebrated London-based 'engine-maker' with royal patronage, and gained the support of American backers, but sank into obscurity. Clearly, until well into the 18th century a practical threshing machine had not been devised.

After threshing, grain must be 'dressed' for market by winnowing to separate it from chaff and other debris. Traditionally, this was done by placing the mixture in a basket lined with 'winnow-cloth' in a 'Providential wind'. It was much easier to automate than threshing and various mechanical fans or 'fanners' were devised, originally in Holland. It was Andrew Meikle's father, James, who in 1710 introduced the first effective fanner into Britain for use at the barley mill he had built.[20] The exercise was at first carried out secretly, but much later, in 1768, Andrew Meikle and Robert Mackell filed a patent (No. 896) for a fanner for 'dressing and cleansing corn'. It was certainly not the last word on winnowing, as several passes were required and it was not until about 1800 that a satisfactory machine was devised and patented, by Joshua Cooch of Northampton.[21]

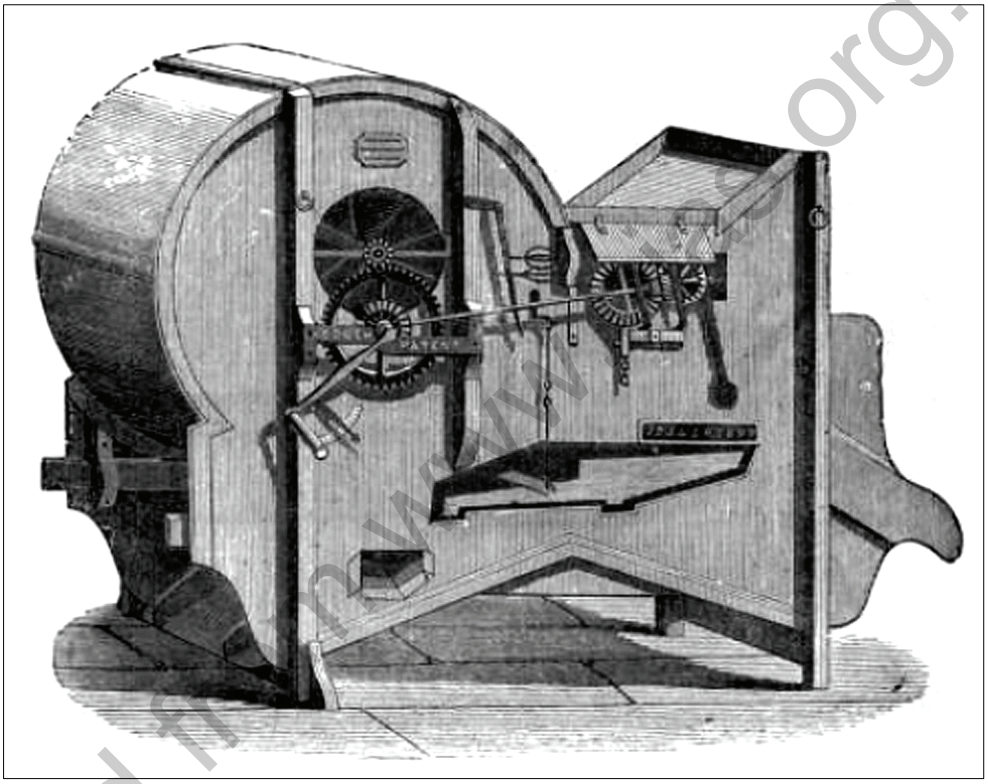


Figure 6. Winnowing machine invented in 1800 by Joshua Cooch (patent No. 2416) of Northampton.

Andrew Meikle

The inventor of the form of threshing machine that finally solved the problem of mechanization, Andrew Meikle (1719-1811), is an example of someone who had the necessary abilities, at the right time in a place where people inspired achievement and needed his skills (Figure 7). The Industrial Revolution in Britain owed much to men like him, described as 'tinkerers', who were able to translate relatively simple ideas into machines that actually worked. Long before he tackled the threshing machine, Andrew Meikle had gained rich experience in his homeland of Haddingtonshire (known since 1921 as East Lothian), on the doorstep of Edinburgh. It was a border region between England and Scotland, recovering from a succession of historic conflicts between the Jacobites and the English.

Meikle was born and grew up in this setting in Saltoun, 20 miles east of Edinburgh, the sixth child in the family. His father James (1672-1727) whom he lost at the age of eight, was employed by the laird, Henry Fletcher. James was an outstanding millwright who, amongst his many jobs, had twice been sent to Holland on missions of 'commercial espionage', which fostered a linen industry in Scotland,

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largely due to the efforts of Fletcher's son, Andrew, Lord Milton. From the late 1740s Andrew Meikle and his brother Robert gained valuable experience from working on the flax-dressing machines required.



Figure 7. Andrew Meikle by A. Reddock. (Wikipedia Commons)

As it happens, Meikle had chosen an excellent place for his workshop; not only was it between the towns of Haddington and Dunbar, in an area with mills of all sorts, driven by horse, wind or water, but it was also on the main thoroughfare between Edinburgh and London. The timing of his possession of Houston Mill, East Lothian, (Figure 9) in about 1749 was also propitious, as it marked a time when, after a period of poor harvests and political unrest, farming in this part of Scotland was catching up with advances pioneered in England; the Rennies were dubbed 'the most skilful and successful agriculturalists'. Here were men who would make a mark in the world of agriculture in other ways, such as Robert Brown (1757-1831),[22] an agricultural writer and neighbour of Meikle,

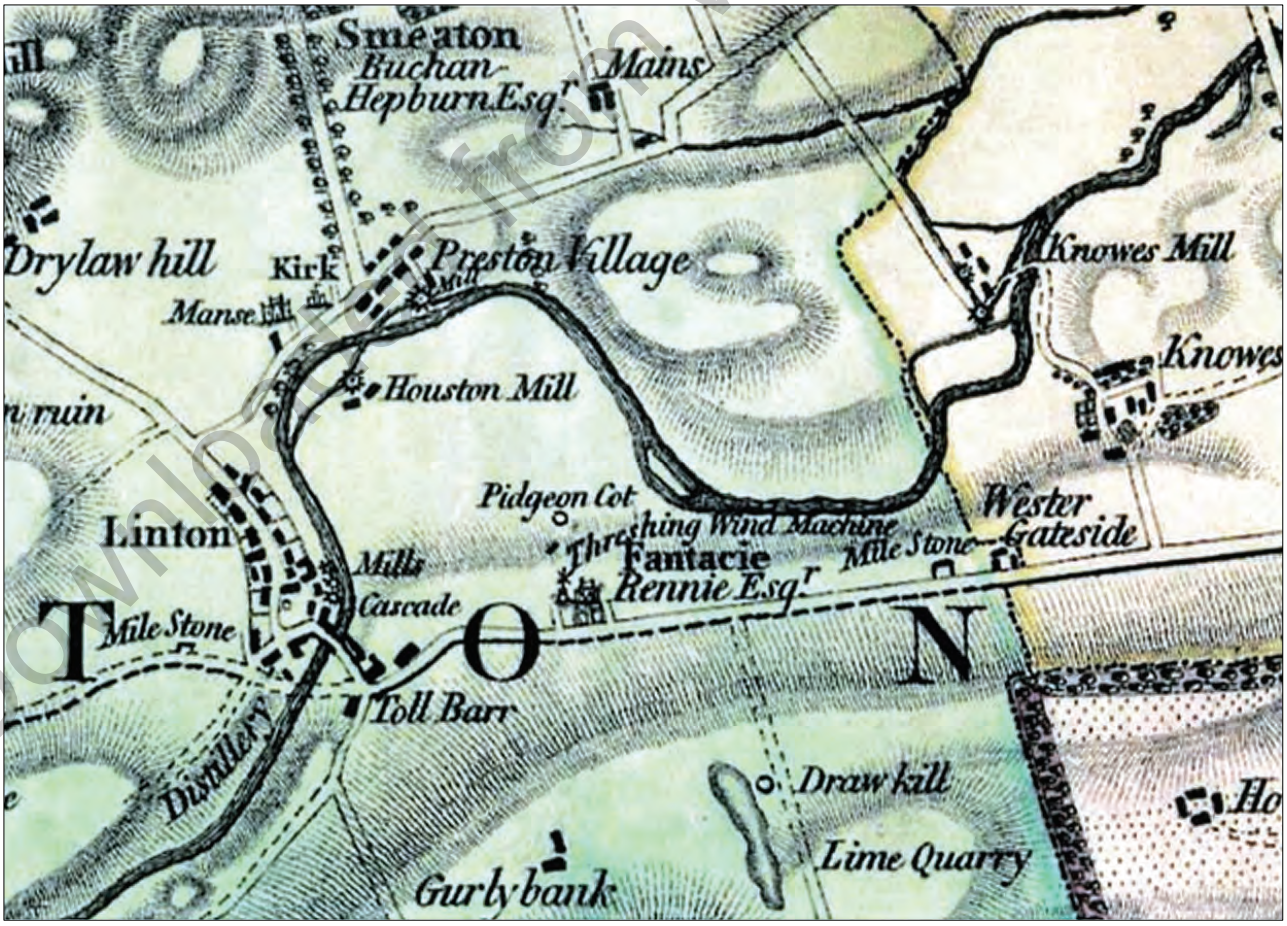


Figure 8. Meikle's home patch in Haddingtonshire/East Lothian (surveyed by William Forrest, 1799).

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Figure 9. Houston Mill, Prestonkirk, East Lothian, where Meikle worked until about 1770. He perfected his threshing machine at Knowes Mill, a mile down river (Dodd & Dodd [6, 52])

who for 15 years edited the *Farmer's Magazine*, published in Edinburgh. A close associate of Brown, and a contributor to the magazine, was George Rennie, Meikle's landlord.

George's brother was the famous engineer, John Rennie (1761-1821), who spent many hours as young boy in Andrew Meikle's workshop. He might have been a millwright, but in fact went on to build bridges, canals, docks, etc. throughout the British Isles, with a pioneer's enthusiasm for structural cast-iron. Samuel Smiles – another native of Haddingtonshire and best known for his *Self-Help* – wrote at length on Rennie's time with Meikle in Volume 2 of his *Lives of the Engineers*, published in 1862. In particular, the young Rennie benefitted from Meikle giving him 'the run of his workshop' even though 'a severe indict was laid [by his parents] against his "idling" away his time'. Even so, his glittering career in civil engineering owed much to Meikle.

Before Meikle tackled the threshing machine, he had already made a considerable contribution to the working of windmills with a 'spring-regulated sail', invented in 1772. One of the essentials of running a windmill is to ensure that its cap faces into the wind. This problem had been automated with the fantail, invented by Wigan blacksmith Edmund Lee and patented in 1745. Others had made it easier to trim sails to the wind by supporting them in a way that gave them a twist like a propeller. But many millers continued to use 'common sails', which had to be repeatedly reefed, according to the wind strength; failure to do so risked the mill 'running out of control'. Meikle solved the problem with a 'spring-regulated sail'. All this demonstrates that he was a successful 'tinkerer' long before he turned to the threshing machine.

'Eureka!' – Meikle's Breakthrough

As outlined above, after many attempts to design an effective threshing machine, it was in about 1785 that Meikle eventually perfected a design that became the first reliable, widely adopted cost-effective machine (Figures 10 and 11). In the 1960s an extremely early example of one of his threshing machines in a remarkable state of preservation was found on a remote farm at Beltondod on Dunbar Common and subsequently disassembled and given to the National Museum of Scotland (ref: W2012.150.2). Meikle's tombstone in the Prestonkirk churchyard, Traprain, East Lothian, succinctly records him as the inventor of 'a machine for separating corn from the straw (constructed upon the principles of velocity, and furnished with fixed beaters or skutchers)'. The 'scutchers' (as usually spelled) or wooden blocks, sometimes iron-clad, were fitted to a fast-rotating drum and beat the ears of corn quickly and hard enough to remove grain efficiently, without damaging it or destroying the machine.

The key feature was that the scutchers could be adjusted to apply sufficient force to dislodge the grain from the husk with some delicacy, without damaging it. It then fell through a coarse sieve or riddle

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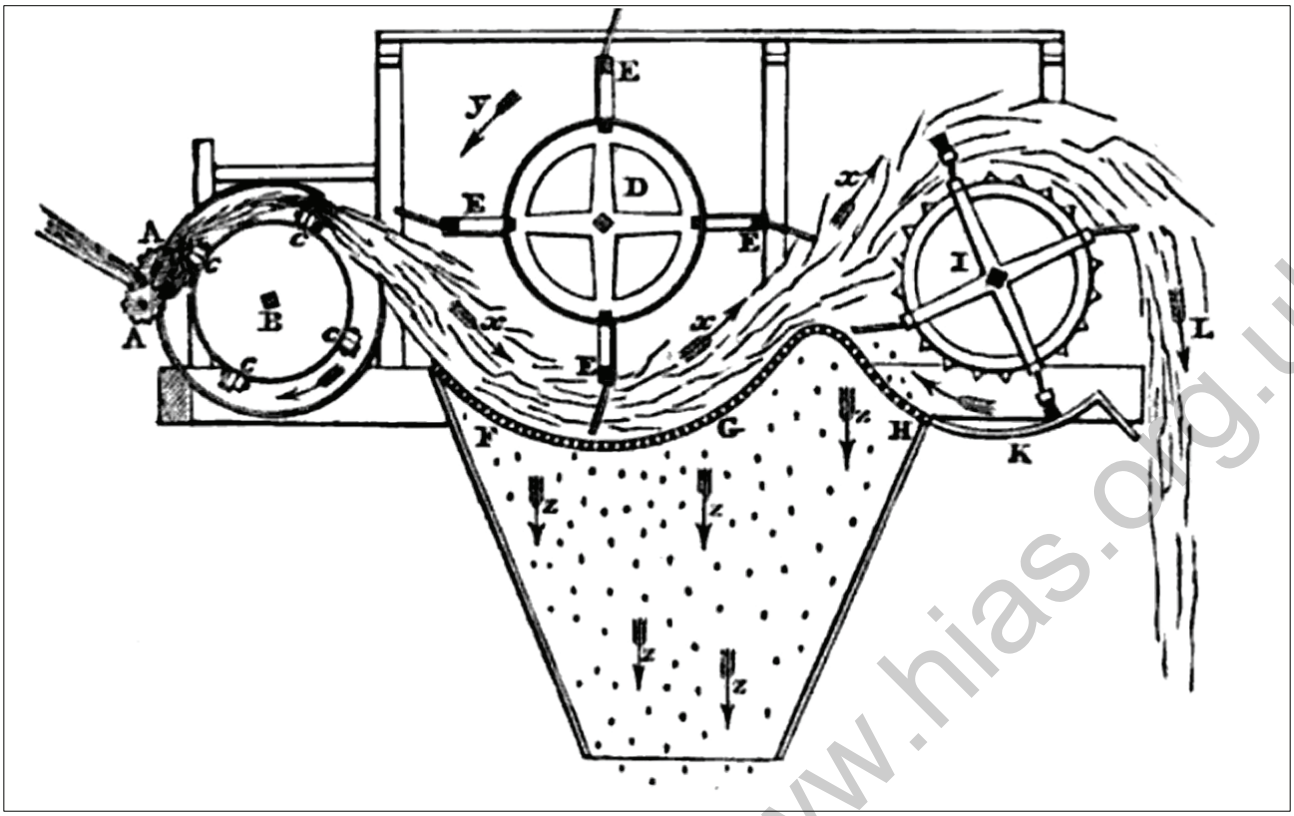


Figure 10. Meikle's threshing machine in David Low's* Elements of Practical Agriculture *(London & Edinburgh, 1838, pp. 119-20). Fluted rollers, A, draw in the straw, which is beaten by four scutchers, C, on cylinder B, the grain dropping through a riddle into F, G, H and so into a fanner or winnowing machine. Four rakes, E, on cylinder D take the spent straw on to cylinder I, which throws it out at L.

(termed a 'harp' in Meikle's patent), together with chaff, into a hopper, after which it could be winnowed by fanners. To ensure that the scutchers were effective, there were simple means of adjusting the distance between them and 'the breast' (today called the 'concave'), which was critical. Too small and the

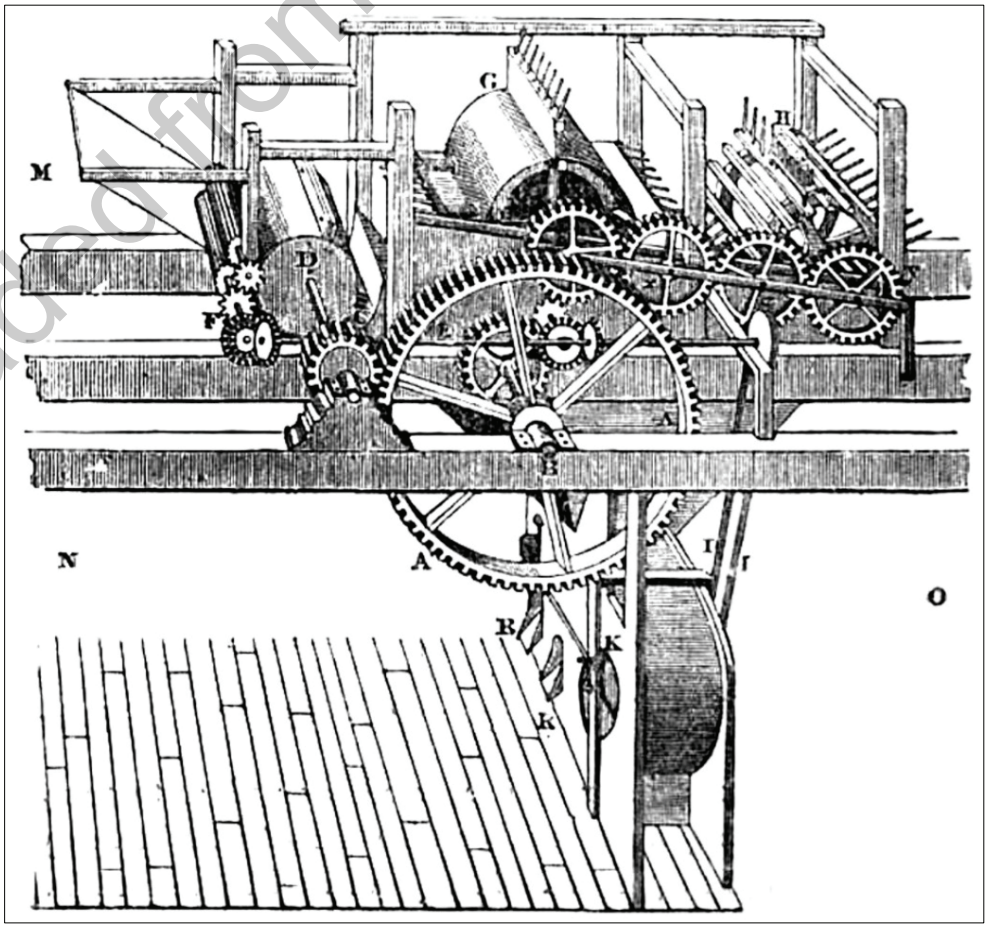


Figure 11. The same machine, showing its gearing. Power (horse, water, etc) is applied to the large wheel, A, with cylinder D bearing scutchers and G and H equivalent to E and I in Figure 10. Also shown is the fanner, K.

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grain was damaged, too large and the grain was not removed from the ear. Sheaf-corn was drawn into the main drum by small, fluted rollers and in later designs, spent straw was expelled by 'rakes' attached to another drum.

Meikle's breakthrough was to copy the use of scutchers in the extraction of fibre from stems of flax. His particular contribution was to employ considerable engineering skill in adopting the principles of flax-dressing to dislodge cereal grains from the husk without damaging them. Another key element was a gear chain that ensured, with the power available (horse, wind or water), that the drum turned fast enough. Equally, the machine needed bearings that turned easily and did not overheat. But it was not until 1785 that he and his son George built a scale model of their machine and in 1787 that a full-scale machine was set up. This was done with great success at Kilbagie (or Kilbeggie), near Edinburgh, for distillery owner, James Stein. A year later, with a similar outcome, Meikle's landlord, George Rennie, set up another driven by a waterwheel on his Phantassie estate. In 1788 it was patented (No. 1645) for 14 years. And a year later Meikle and his brother George, 'engineers', placed a lengthy advertisement in the Scottish press addressed to 'the farmers of Great Britain', claiming that 'repeated trials have established the certainty and perfection of its operation'.[23] It went on:

> 'The corn is not only separated completely from the straw, but made ready for market, by being riddled and cleaned from the chaff. … Any common barn will admit of the erection of the machine, as it requires only an area of *ten feet square.* … Gentlemen may either erect the machine themselves, upon a plan furnished by the inventors, or contact with them for the whole at a fixed price.'

Early machines of Meikle's design were about the size of an upright piano, hand-fed and generally powered by horses, though they could be driven by water or wind, and were later powered by steam. A widely advertised manual was available with full instructions for constructing the machine.[24] On small farms, hand-turned or even pedal-driven machines were used.[25] In one respect it underwent an important change soon after it was patented, the horse-wheel being set in an engine-house beside the threshing barn, its power transmitted through the wall by a rotating beam. The machine as patented was driven by a wooden gear-train, which took up a good deal of space in the engine-house. As a result, it has been suggested that 'the Meikles must have radically reappraised this part of the patent and quickly decided that iron gearing could be designed to nest in a minimal space beside the box of the machine'. However, the rest of the machine was still timber-built, 'albeit with a nest of iron gears supported off the wall-side of the machine'.

Questions asked of Meikle by the celebrated agriculturalist, Arthur Young (1741-1820), provide some insight into assessment of his own machine.[26] He told him that a machine driven by two horses cost about £60, but was £30 more expensive if turned by wind or water. It threshed about 37 quarters of barley or oats in 10 hours, compared to seven bushels by hand in the same period and 'wheat and other grains in proportion to their quality and length of straw'. In use, it required four people: one to drive the horses, one to throw a sheaf to a third, who handed it to another to feed the machine. Regarding repairs, he claimed that the machine could 'go many years without any', and if required 'common workmen' could carry them out. Another comment for two to four horses cited a larger team, of five people – two men, one woman, and two boys – and threshing wheat at about five times the speed of men with flails. Transmitting horse power to the mill was not always straightforward: Charles Vancouver in his *General View* emphasised that it was important to ensure that each animal took its 'fair share of work'; if not properly harnessed they could be injured by 'sudden jerks and strains'.

In 1800 *The Commercial and Agricultural Magazine* published in London made a special feature of the threshing machine, fronting the issue with a long editorial and a plate showing Meikle's machine powered by two horses.[27] There was a simple gear-chain: a horse-wheel 9ft in diameter with 156 cast-

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iron cogs turning a pinion with 19 cogs, that engaged a spur wheel of 96 cogs, that turned another pinion of 12 cogs joined to the drum, diameter 3ft 2in, with six beaters. Hence one turn of the horse wheel made 66 turns of the drum (156/19 x 96/12), which was reckoned to give it a speed of 25 mph – presumably the speed with which the beaters struck the husk.[28] The article stated that 'three strokes are given to each inch of anything that passes through', sheaf-corn entering the machine, through fluted rollers that 'seize with irresistible force, and hurry forward whatever is presented to their grasp'. No maker is credited, but it was reckoned to cost 60 guineas and thresh 12-14 quarters of corn in 10 hours. A larger version for four horses had a drum 4ft in diameter, cost 100 guineas and threshed about 30 quarters in 10 hours.

The editorial commented: 'We have seen models of machines, much more complex, which winnow the corn; and even some which carry the manufacture to the final stage, by grinding it into flour'. It claimed that the threshing machine 'promises a diminution in the usual waste of corn by careless threshing … the next year will see it adopted into general use.' It also mentioned that the 'heavy expense' of barn floors was obviated, the corn was better threshed and the straw, being bruised, was better for cattle fodder. On the other hand, it could not be sold for thatching, whilst a centrally sited threshing machine was less useful on a 'scattered' farm.

The magazine feature was published two years after the celebrated Scottish civil engineer Thomas Telford FRS (1757-1834) had penned a treatise on mills of various kinds for the Institute of Civil Engineers (not published in full until 1968). It included Meikle's machine, and the diagrams used in his patent. Although there are many similarities between the magazine feature and the treatise, they show two slightly different designs with significant differences, perhaps reflecting a 'home-built' variant of Meikle's design. With the gear chain for the toothed wheels A, B, C, D shown by Telford, one turn of A generates 103 turns of D (276/14 x 84/16), rather than 66. The horses walk at 2⅓mph,[29] the drum has a diameter of 3ft 6in and rotates at 300rpm, giving 1,200 strokes per minute of the four scutchers, which are 'pieces of wood faced on one side with a thin plate of iron'. The fluted rollers are 3½in in diameter, turn at 35rpm and are only about ⅛in away from the scutchers. The four rakes that draw out the spent straw, are 'thin leaves of wood, with teeth at the ends, 5in long'. Telford estimated that the machine would thresh 63 bolls[30] in a 10-hour day, saving 30-40% in costs, with a team of six, one each for: tending the horses, handing up sheaves, untying them, spreading them on 'inclined boards', riddling the corn 'from the fanners', and removing spent straw.

National Roll Out of Meikle's Invention

Once Meikle had perfected the threshing machine, it was taken up with remarkable speed. As might be expected, this started near the Scottish borders. The first machine in England was set up nearby in 1789 at Chillingham, Northumberland, by John Bailey (Figure 12) and full details appeared in print a few years later.[31] In these early days, much depended on the ability of local millwrights and other trades to follow Meikle's instructions: 'how to construct [them] was not known widely, and the maker – and purchasers – were sometimes disappointed … frequent repairs were required'.[32] 'Country millwrights' were often blamed.[33] One engineer who was extremely active in Morpeth, Northumberland, was John Raistrick (1738-1826), millwright and maker of pumps and churns. He claimed to have invented the threshing machine and built more than 1,000 of them in the north-east! (His son, John Urpeth Rastrick, 1780–1856, became a celebrated builder of steam locomotives.) Meikle sued him for breach of patent, without success (see below).

By 1800, according to Samuel Smiles, about 350 threshing machines had been built in Fife, which sounds a remarkably high number, even for this privileged part of Scotland, a former 'kingdom'. Further south, where there was 'a general backwardness, or rather aversion in the artificers [engineers etc] … to erect this machine on a small scale, and low price, as is done generally in Scotland', progress was slower, especially for 'the little farmer'. Some blacksmiths and others in the south improvised 'cheap, miniature versions too weak to do anything properly'.[10] A threshing machine was, however,

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showcased in 1801 at an important four-day festival at Woburn, Bedfordshire, and year after year it became a standard item at the show of the Royal Agricultural Society of England. This was an opportunity for farmers to catch up with the latest developments: in 1841, for example, a threshing machine powered by a portable steam engine marked a key step, again featured at the Great Exhibition of 1851. Meikle's invention, however, was not a universal panacea; in the mid-19th century in Oxfordshire, by which time steam was widely available, farmers reckoned that although the threshing machine was good for wheat, the flail was still as cost-effective for barley. Although steam threshing was more effective than other sources of power, it required a dozen or more men, compared to five or six men and boys, working four horses.

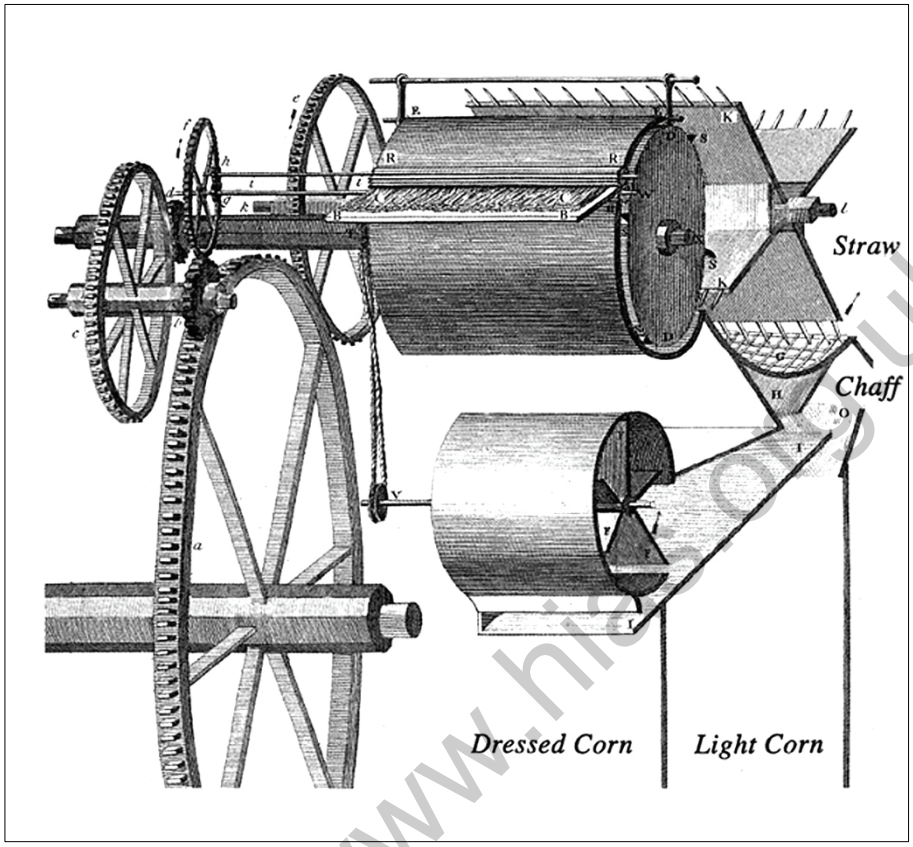


Figure 12. The main components of the first threshing machine in England, John Bailey's Chillingham machine, as published in* General View of the Agriculture of Northumberland, *1795.

After Meikle's breakthrough, threshing machines were built by firms in many places, with some providing what was essentially a 'flatpack' for assembly on site. *The Commercial and Agricultural Magazine* claimed that 'almost all the Threshing Machines in England' had been made by '[Archibald] Stevenson, 74 Margaret Street, Cavendish Square, [London], with 'accurate workmanship and diminished friction [of machinery]', at a price of 34 guineas with a horse-wheel and 22 guineas without. The claim sounds hyperbolic, though Stevenson had taken on the thriving business of William Winlaw, mentioned above.

The Threshing Machine in Hampshire

Definite data on the spread of the threshing machine are difficult to obtain and experts dispute its use in various parts of the country.[34] There are reasons for believing that it came later to the south; after all, it was invented in Scotland and there was a scarcity of farm labour in some areas of the north, due to job opportunities in industry. However, this view has been challenged on the basis of data before 1815 from the *General View* publications of the Board of Agriculture, and in 1830 from the numbers of threshing machines targeted in the Swing Riots. This view is supported by a recent study by economic historians, Caprettini and others, on the threshing machine, and its role in the Swing Riots. They based their work on a search of 60 regional newspapers for the string 'threshing machine', which yielded 549 advertisements. One of their most important findings was that advertisements published in England and Wales in the period in question (January 1800 to July 1830) suggest that threshing machines were most densely located in East Anglia and central southern England – especially in Hampshire, Dorset and Berkshire.

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A search of the *Hampshire Chronicle* by the present author suggests that threshing (or thrashing) machines first appeared in the county after 1800 and grew in use over the next 30 years.[35] This accords with the first advertisement in Hampshire of June 1802 cited by Agnew, when R Thomson of Wickham advertised one 'worked by two Horses, [which] will thrash from seven to twelve Bushels of Wheat, twelve to eighteen of Barley, and from sixteen to twenty two Bushels of Oats within an Hour, with one Man, one Woman, and three Children to attend'. Other advertisements from the *Chronicle* include one of 1815 from Froxfield, selling 'an excellent threshing-machine, winnowing fan and tackle', and another in 1817 from Fairthorn, Botley, 'late in the occupation of Mr Cobbett [the political journalist] a capital portable thrashing machine on an improved principle, patent winnowing-machine'. In the same year for sale at Embley Farm, near Romsey, a 'threshing-machine of 6-horsepower … complete with a large convenient Barn for working the same [presumably to be re-erected elsewhere]', and machines at Exton, and Petersfield, where millwright George Rich offered:

> 'a valuable threshing-machine, 2 horsepower … with rakes, screens, and every necessary apparatus. It will thresh wheat, barley, oats, and seeds of every description, in the most desirable manner. The whole of the machine is in the most complete state of repair, being new about three years hence.'

Between 1820 and 1830 there were machines advertised for sale in the *Chronicle* at Southampton, Portsea, Middle Wallop, Linkenholt, Sparsholt, Barton Stacey and Soberton, and at Andover as part of 'the stock in trade of Mr Calloway, declining the business of millwright' two portable machines.[36] Also by 1818, Catisfield Manor Farm had a threshing machine and John Houghton of Swanwick was hiring one from Richard Hinxman, who farmed at Botley, Titchfield and elsewhere.[37]

These advertisements and other records give some idea of the usage of threshing machines in the county up to 1830, more than 40 years after Meikle's patent. But by far the most detailed evidence comes from records of the agricultural riots in that year, when threats of damage and damage itself indicate beyond question which farms possessed machines. Exhaustive studies of these based on local newspaper reports and court proceedings by Jill Chambers have been published for several counties. The material for Hampshire, has recently been revised and posted online; the file mentions 'threshing' 176 times. More than any other source, it provides a forensic picture of the ubiquity of the threshing machine in the county and proves that in 1830 a very large number of farms possessed threshing machines. Moreover, it describes story after story of 'machine breaking' by mobs of farm labourers. Although we are mainly concerned with the early years of threshing machines, it is worth noting that later, when they were powered by steam, they were probably often hired out by individuals and some wills even make a point of terming the deceased 'a threshing machine proprietor'.[38]

'Buyers and Suppliers'

A key happening in the Swing Riots in the Dever valley involved Francis Callender, steward for the owner of the Stratton Estate, Sir Thomas Baring (1772-1848) (see Figure 23, p.29), son of Sir Francis Baring, founder of Barings Bank. At mid-day on 19th November 1830, a mob of farm workers marched on Callender's premises in East Stratton and broke a threshing machine and bean mill. It was at least the fourth such machine they had broken that day. They demanded £5 from him, then raised it to £10, which he paid, on the condition that they would not approach Baring's mansion, Stratton House (Figure 13). Interestingly, Callender had in the previous March joined a little-known entity, the Winchester and Hampshire Association, dedicated to the 'Suppression and Punishment of Vagrants' and offering rewards for the reporting of crimes.[39] It was probably a product of the Vagrancy Act 1824. At the General Assize held in Winchester a month later, eight men were charged with stealing 'ten sovereigns' from Callender: two were found guilty but 'recommended to the merciful consideration of the Court', and the others were acquitted'

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Figure 13. Stratton Park, East Stratton, home of the Baring family, bankers and politicians, by JP Neale, 1818. (Wikipedia Commons)

In 1810, Vancouver recorded at least one threshing machine on the Stratton estate that had been purchased for a tenant (unnamed) by Sir Francis, who undertook 'to keep the machine in good repair, barring any damage it may sustain by wilful neglect or otherwise [presumably, including rioting]', for which he exacted an increase in rent. Letters written a few years later to Callender, held in the Baring (Northbrook) papers in the Hampshire Record Office (HRO), concern threshing machines nearly 20 years before the riots.[40] They were written when Baring had just taken over the estate and Callender, aged about 29, was new to the job. He was born in Newcastle-upon-Tyne and came to Stratton in about 1810.

At first, he lived at East Stratton, but later tenanted New Down Farm, Micheldever, which still stands alongside the A33. The letters were written by his father, John Callender, at the time when his son was weighing up where to buy a new threshing machine for the estate, and he was lending his experience, especially from the Northumberland district, where he farmed. They consider estimates from two makers, both for £200, namely, George Sked 'engineer and [iron] founder' of Dunbar, Haddingtonshire,[41] and Thomas Darling, probably of West Fortune Farm, North Berwick (which still stands).[42] Sked's brother would set it up, as he has already done for 'Mr Wm Turnbull … of Belton [Dodd, Spott]'. This was on Dunbar Common, Haddingtonshire, where, as mentioned above, one of Meikle's machines was found in the 1960s, though probably on another farm. Sked commented: 'She is the same as Mr Turnbull's only a great deal of More Iron About her'. One letter contains a copy of Sked's estimate for all the necessary metal items (Table 1, opposite). At the foot is written:

> 'This Includes all the Iron Work. The Above Materials I shall deliver here for the Sum of One hundred and fifteen pounds Sterling and Send my Brother … [to] set up the Machine whose wages will be 5 shill^{gs} P [er] day … from the time he leaves home until he returns – I would recommend that the Fanners, the Drum and the Crown Wheel teeth be made here, this

will be Eighteen pounds More … Only about 20£'s worth of Wood will be Wanted, and My Brothers expence may be about 25£ – in Short the Machine will Come to about 200£ when finished … Geo. Sked.'

An Upright Shaft for Large Horse Wheel	Small Upright Shaft with plumbers and Brass
Foot Box with Brass & Screws Compleat	A Main pinion for dº
Cods and bolts for top of dº	Crown Wheel for Driving the Drum
A plat form of Cast Iron on foot of Upright Shaft for	dº … dº … for Driving Rakes and Rollers
Stays Resting on – Compleat	Axle, Arm, Scutchers plate Iron & Bolts for Drum
2 Flanges for fixing Arms on Top of Shafts with Bolts	plumber Blocks & Brasses for dº
Compleat	A pair of flutted Rollers for do with Gudgeons Compleat
12 Segments for Horse Wheel 28 feet Diameter	Axle Arms & Covering for first Rakes … dº
Bolts for Ditto Compleat	dº … dº & ring for Second dº … dº
dº for fixing Stays to the Arms	Wheels for drawing do Bolts and Brasses … dº
dº for Horse Starts with Mounting for Six Horses	dº … for driving rollers with Bolts … dº
Cast Iron Stays for Horse Starts	Iron Work for Fanners & Brasses … dº
The Above Compleats the Horse Wheel	

Table 1. Sked's estimate for the 'ironwork' for a six-horse threshing machine, November 1811.[40]

The estimate is for a large machine, appropriate for the Stratton Estate, with a 28ft wheel turned by six horses. As well as a drum for the scutchers, it has rakes to take out the spent straw and 'fanners' for winnowing. It would be set up on site by a brother of Sked, and the recommendation that 'the fanners, the drum and the crown wheel teeth' are made in the works, implies that some customers took on these tasks. Clearly, all the woodwork would be built on site, either by Sked's brother or perhaps an estate carpenter.

Several months later Frank's father sent him another estimate, from Thomas Darling. The machine was to be powered by six horses or by water, presumably from the river Dever. But a few weeks later Adam Turnbull, farming on the Northumberland coast at Newbiggin and a relative of William Turnbull, wrote that both the suppliers had advised against the use of waterpower as 'the quantity … you mention … would be only a waste of money'. Frank's father strongly recommends the estimate and Turnbull also endorses it, as Darling 'is in vogue for Making the Strongest Machines'. But whether a purchase from either maker was ever made is not known.

Social and Economic Consequences of the Threshing Machine

Like most technological innovations, the advent of the threshing machine sparked major issues that for many years affected their introduction and usage. Most farmers, wanted to know how effective they were vis-a-vis the flail and whether the initial cost of the machine and its powering (by horse, wind or water) was justified by reductions in wages, and possibly by a better quality of grain. Equally, the huge expense of a traditional threshing barn could be avoided.[27, 43] Labourers obviously thought the machines would 'take away jobs' and, aside from any humanitarian feelings farmers might have, they realized that throwing local men 'on the parish' would increase the rates they had to pay. As a result, to minimize these social costs, some of them 'employed more hands than were strictly necessary'.[44]

In some places, labourers resorted to sabotage not associated with the Swing Riots, such as packing sheaves with flints to damage the drum, or 'pretending not to understand mechanical things and showing little willingness to overcome difficulties'.

Although a detestation of the mechanization of threshing and its role in the impoverishment of the farm worker was in the forefront of the Swing Riots, it was only one of the factors involved, as *The Farmer's Magazine* of 1810, published in Edinburgh, opined:[45]

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> ‘Experience has however fully proved, that the apprehensions [of job losses] then entertained were without foundation; because at no period has [sic] the working classes been more regularly employed, and better paid, than since the thrashing-machine was generally introduced.’

And ‘when their incomes were guaranteed, farm workers appear to have welcomed the reaping machine, as they had the threshing machine, as a means to easier work’. Modern analysis supports these views, suggesting that the introduction of threshing machines did not lead to *massive* job destruction. However, work was certainly in short supply after the Napoleonic wars and in the period leading to the Swing Riots, especially in the south and east of the country. Poverty for generation after generation[46] led to schemes for assisted migration, either to the north of the country, the New World or the Antipodes (voluntary transportation!), often through the Hampshire ports of Southampton and Portsmouth. There are many records of ‘sponsored’ or ‘assisted’ emigration before and after the riots – at Romsey,[47] Chawton,[48] Alton[49] and elsewhere, whilst the Earl of Carnarvon, seated at Highclere, mused on the ‘possible emigration’ of a local poacher just released from gaol.[50]

As regards the uptake of threshing machines, this was relatively slow, especially following the Swing Riots, when ‘a virtual moratorium had been declared on the use of them in order to keep the peace’; it was only after about 1840, when development of Meikle’s design had reached maturity, that they replaced the flail ‘on the majority of farms’ (Figure 14, back cover, shows an example of a 1900 machine). Another reason for these hesitations was that while early machines were very effective for wheat, other cereals such as barley and oats still had to be threshed by hand.

The threshing machine and the Swing Riots have become a set piece for economists, social scientists and political theoreticians. The work by Capretinni and others has put them in some perspective:

> ‘The current literature on income and unrest overwhelmingly focuses on negative shocks. In contrast, new technologies represent a positive shock to output and productivity. Threshing machines are labour-saving, producing the same output with less work. This increased profits for landowners but reduced the share of income going to labour. … Social unrest as a result of technological unemployment has so far been a rare event – but such tranquillity is not inevitable. The Swing Riots demonstrate that rapid, regionally concentrated job losses can quickly lead to political instability and violence.’

The Fate of the Inventor – Meikle’s Rewards

The story of Andrew Meikle’s later life will be familiar to any inventor who believes that they have not received their right dues. With hindsight, it is clear that he and his son were not the first ‘tinkerers’ to attempt to make an effective machine, but they were the first to build one that worked well enough for it to be widely used. However, the patent claimed in 1788 unleashed a torrent of venom, which in today’s parlance ‘went viral’. Many others who had attempted the challenge and failed, perhaps recognizing Meikle’s merits, accused him of stealing aspects of their own inventions and expected to share any profits. As Samuel Smiles put it: ‘Pirates fell upon him on all sides and deprived him of the fruits of his ingenuity and even denied him any originality whatever.’ It was clear that any competent millwright with the help of a blacksmith or iron founder could make a machine along the lines of the patent, which drastically reduced the potential income for the inventor.

One of the aggrieved parties was Francis Kinloch (from 1795, Sir Francis, 6th Baronet)[51] of Gilmerton, near Edinburgh, who in the late 1770s had observed some designs of threshing machine in Northumberland and made a model to be powered by water, which he sent to Meikle – by then at Knowes Mill[52] – for testing. Unfortunately, ‘it was torn to pieces in a matter of minutes’, and the same result ‘befell a full-sized version’ installed by Kinloch himself. It had scutchers of a kind, ‘four pieces of fluted wood … upon springs’ designed to act with less force on the corn, but they still

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rubbed and probably bruised the ears, rather than striking them. However, Kinloch clearly thought that Meikle had stolen his idea, whereas it had triggered him to do better.

Near the end of the patent's 14-year span, Meikle sued '[John] Raistrick of Northumberland', for pirating his design. A report in the *Commercial and Agricultural Magazine* conceded that the design was 'chiefly' Meikle's', but a jury had apparently decided that it 'was not entirely' his, a verdict welcomed by the magazine for enabling the patent to be 'thrown open to the public and the probability of further improvements … by the more numerous makers'.

Meikle did not live to see the unequivocal support for his claim to be THE inventor of the threshing machine, which has however lasted the test of time. But in the year before his death, he did at least receive some financial reward. This was championed by the Scottish statistician and agricultural pioneer, Sir John Sinclair (1754-1835), who had always been a supporter. A subscription taken out to support him attracted some 500 individuals and a total of nearly £1,500. It is perhaps surprising that it took so long for the threshing machine to be invented, after all, the Romans could build mills. But the critical problem that had to be solved was the tricky one of applying sufficient force to the ear with such delicacy that it harvested the grain without bruising it.

Threshing Machines and 'Health and Safety'

Health and safety legislation in Britain started with the Factory Act of 1802, aimed mainly at the protection of child labourers and improvements in workers' conditions in mills and other industrial sites, though significant advances required the Act of 1833.[53] It was, however, a very long time before any legislation was passed to protect workers from the obvious hazards of threshing machines. The main drum in Meikle's threshing machine bearing iron-plated scutchers turned at a rate of 200-250rpm or more. It was fed by hand, by spreading out sheaves on a 'inclined board' and feeding them between two small metal rollers turning at about 35rpm. The whole process was powered by horses walking round outside the barn, or by shafts taken in from a waterwheel or windmill. Spent corn was raked out with wooden 'leaves' furnished with 5in long 'fingers.' Clearly, opportunities for accidents were ever-present, especially if the machine were not attended by a 'skilful mechanic'. Many accidents did occur and were reported in detail in local papers. In one case, for example, a machine 'caught [a man's] frock and wound him round and before the horses could be stopped … he dashed his head on the floor of the barn … was removed to … Hospital but died in three hours. The jury expressed a hope that [the farmer] would erect a cover over the spindle.'[54] In another, a young boy of 13 'driving the horses attached to the threshing machine, was by some inattention forced down, and so dreadfully crushed on the head, by the lever and frame of the machine, as to cause his immediate death'.[55]

It was, however, 90 years after Meikle's invention before any legislation was passed to improve the safety of the machines, largely through demands of the public and the Royal Agricultural Society of England (RASE). In 1872, it awarded a 'special silver medal' to a Lincolnshire farmer for devising a safer means of feeding the machine. This involved 'shaker boxes' and rakes that did the job of loosening and untying the straw twisted round sheaves to hold them together. The RASE also offered prizes for the invention of guards of various kinds to protect workers from the potential hazards of rotating machinery. Eventually, in 1878 the Threshing Machine Act made it obligatory for manufacturers to incorporate guards for 'the drum and feeding-mouth' of every machine. It was the first piece of legislation brought in to improve safety in agriculture.

Discussion

Riots are a fact of life in the history of this and many other counties. *Haydn's Dictionary of Dates*, published in 1868, fills an entire page of small close-leaded type with detail of those between 1222 and 1868 – and yet manages not to list the Swing Riots! The causes were manifold, but 'poverty' was often the trigger, as it was in 1830. Laying the blame on the threshing machine is understandable,

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especially as it blocked year-round work, but in hindsight the situation was more complicated. The first significant contributions to the mechanisation of agriculture in Britain were the relatively straightforward drills and horse-hoes of Jethro Tull. By comparison, the threshing machine proved difficult to perfect, but Meikle's invention fast-forwarded the notion that machines could replace men and women. Mechanical reaping came later, in 1827-1828, generally regarded as the invention of another Scot, clergyman Patrick Bell. It was horse-drawn and based on the scissors principle – still used today – with a revolving 12-vane reel to pull crops over a cutting knife. As a man of the cloth, he never sought a patent.

The combine harvester – perhaps soon to be totally automated with GPS and AI – originated in North America, and Australia, and only entered Britain in 1928, when the Lincoln-based threshing machine maker Clayton and Shuttleworth decided to enter the field. But they soon faced financial problems and were sold after only five machines had been built. A pioneer in the early use of the combine harvester in Hampshire was civil engineer and farmer Roland Dudley, owner of the Linkenholt Estate in the north of the county, who in 1935 acquired one from the American company Holt.

There are still many questions about threshing machines in Hampshire and elsewhere that need to be answered, especially concerning the numbers in use at various periods, their manufacturers and suppliers of parts, and their operation. Overall, the subject provides a set piece for industrial historians that is at least as important as the riots of the Luddites, and yet it is they who acquired the etymological label of unrest following the introduction of new technology.

Overall, the flail or 'poverty stick', the threshing machine and the Swing Riots are incidental marks of the technological advances, which have utterly changed the landscape, the communities and the economy of Hampshire and the rest of the country. Equally, the story of the invention of the threshing machine is an example of Scottish engineering skills advancing the rural south.

Acknowledgements
I am grateful to John Agnew of the Newcomen Society for helpful comments on an advanced draft; to Professor Bruno Capretinni of the School of Economics and Political Science of the University of St Gallen, Switzerland, for sharing the results of his studies; to Pat Craze of East Stratton for generously sharing his knowledge of the Swing Riots in the Dever valley and to Edward Fennell, coordinator of the 'Captain Swing' Bicentenary Commemoration 2030, for suggesting the threshing machine as a topic of research.

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[28] This suggests a rate of rotation of about 100rpm, though rates up to 250rpm are sometimes cited.
[29] He does not give the diameter of A, but this speed and a drum rotation of 300rpm suggests a diameter of A of about 21ft.
[30] In Scotland, the 'boll' equalled 6 or even 7 bushels, but in England it might be 'the old boll' of 6 bushels, or 2 in the new (*OED*; *Scottish National Dictionary*; *dsl.ac.uk*).
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[38] For example: 5M62/27, p. 511b; 5M62/54, p.183.
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Railway 200 and Micheldever 185

Howard Sprenger

In 2020, as Chairman of HIAS, I was invited to give a talk at the village of Micheldever Station to celebrate the 180th anniversary of the completion of the London and Southampton Railway (L&SR) and the founding of the community that surrounds the station. This was postponed due to the pandemic, as was the rearranged event the following year, so it eventually took place, two years late, on 8th May 2022. In 2025, I was asked to give an updated version of the talk as part of the Railway 200 celebrations, which (according to the website, *railway200.co.uk*) marks 'the 200th anniversary of the modern railway'. By so doing, Micheldever station would commemorate its 185th anniversary in the context of the wider development of railways in Great Britain and the world. This article is a record of that talk.

Early Railway Development and Railway 200

A series of Railway 200 events has been planned throughout 2025 culminating on 27th September – 200 years to the day in 1825 when hundreds of passengers travelled 26 miles between Shildon, Darlington and Stockton behind George Stephenson's *Locomotion No. 1*. In the words of the website, this event 'set in motion a train of events that changed the world forever'. There is no denying that railways have had a profound impact on civilisation, so it is right to commemorate their development, but what exactly are we celebrating in 2025 and what is meant by 'the modern railway'?

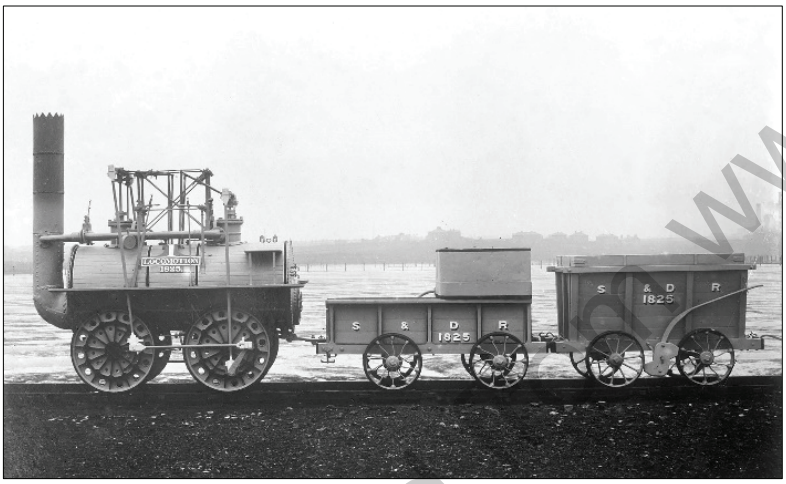


Figure 15. A replica of Locomotion No. 1 and an S&DR wagon built by the North Eastern Railway in 1914. (Howard Sprenger Collection)

There is evidence for structures akin to a 'railway' dating back to prehistoric times whereby timber planks were laid down to provide an easier passage over difficult terrain, although it should be acknowledged that they had no influence on what came later.[1] In medieval times, wooden 'wagonways' were increasingly employed in industrial situations, such as mines, to make the transportation of heavy ore easier, whether hauled by human or animal power. In around 1500, a funicular railway, operated by human or animal power through a treadwheel, was opened to serve a castle in Austria.[2] In England, a wagonway was built by German miners at Caldbeck, Cumbria, possibly in the 1560s,[3] and another was built to carry coal at Prescot, near Liverpool, maybe as early as 1594.[4]

The development of cast iron in the 18th century led to metal plates being fixed onto the wooden rails to increase their durability and load-bearing capability – these became known as plateways. Later, the plates became L-shaped so that the wheels could be guided in addition to being merely supported. From this time on, it was a story of almost continual development and improvement. The flange was moved from the plate onto the wheel, so that plain 'edge rails' could be laid. These were easier and cheaper to produce, and as cast iron gave way to wrought iron and then steel, their strength and resilience increased dramatically.

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The first railway to be authorised by Parliament was the Middleton Railway, opened in 1758.[5] Now operating as a heritage line, this is the world's oldest continuously working railway and was the first to regularly use steam locomotives in 1812. A host of similar lines followed including the Little Eaton Gangway, Derby (1795),[6] the Lake Lock Rail Road, Wakefield (1798 – the world's first public railway open to anyone rather than being a private line in a mine or connecting one to a canal),[7] the Surrey Iron Railway (1803)[8] and the Swansea and Mumbles Railway (1804), which became the first to carry passengers in horse-drawn trams five years later.[9]

The world's first steam locomotive-hauled railway journey took place on 21st February 1804, when a locomotive built by Cornishman, Richard Trevithick, hauled a train of five wagons loaded with pig iron (plus 70 men who had clambered aboard) along the tramway of the Penydarren Ironworks, in Merthyr Tydfil, Wales.[10]

From Stockton to Darlington – the First Modern Railway?

With so many railways operating well before 1825, it is reasonable to ask why the bicentenary of the Stockton and Darlington Railway (S&DR) has been chosen to commemorate 'the modern railway'. It was the first public railway to use steam locomotives, but as we have seen, many decades of development had led to this event. The reason has less to do with history and more to do with marketing.

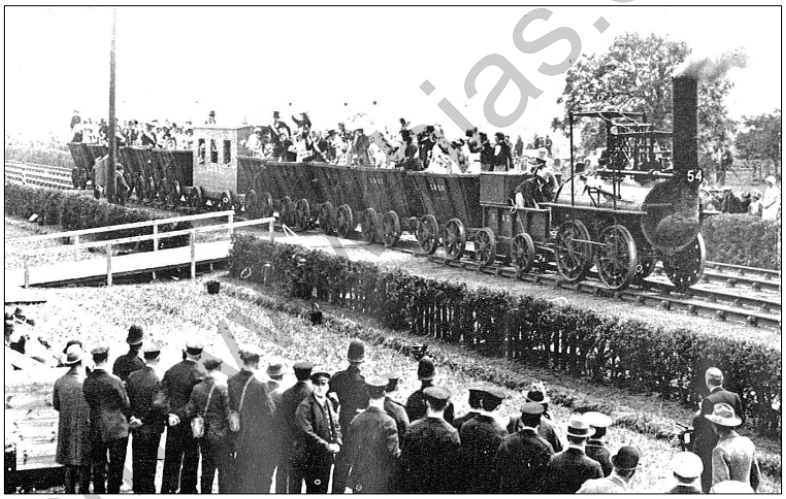


Figure 16. The 1925 S&DR centenary celebrations organised by the LNER two years after it was formed in 1923. (Howard Sprenger Collection)

In 1923, 120 independent railway companies, large and small, were combined into four groups, which became known as the 'Big Four'. The largest of these was the London, Midland and Scottish Railway (LMS) and its biggest rival was the London and North Eastern Railway (LNER). Each new company was keen to create a corporate identity and establish its provenance and historical significance, so with the 100th anniversary of the S&DR only two years away in 1925, the LNER was in pole position to set out its credentials as the major contributor of the four to the development of railways.



Figure 17. The 1975 S&DR 150th anniversary celebrations organised by British Rail. (Howard Sprenger)

It took inspiration from its largest constituent company, the North Eastern Railway, which had commemorated the 50th anniversary of the S&DR in 1875, and in doing so, the LNER stole a march on the LMS, whose commemoration of the centenary of the Liverpool and Manchester Railway (L&MR) would have to wait until 1930. The significance of the S&DR was reinforced in 1975, when British Railways hosted 150th anniversary celebrations at Shildon.

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The L&MR is arguably a much more significant milestone in the development of the modern railway than the S&DR. It was the first 'inter-city' railway, the first to use steam power exclusively, the first double-track railway, the first to be signalled, the first to have a timetable and the first to carry mail. Had the 'Big Four' been formed a few years later, it is almost certain that the LMS would have taken the lead, and we would be celebrating 'the 200th anniversary of the modern railway' in 2030. If we wanted to mark 200 years of passenger rail travel, we should have been celebrating the Swansea & Mumbles Railway in 2009.

The London & Southampton Railway Comes to Micheldever

The first section of the L&SR opened between Nine Elms (the original London terminus) and Woking on 21st May 1838 followed by the Woking to Shapley Heath section on 24th September the same year. Two further sections, Shapley Heath to Basingstoke and Winchester to Northam Road, opened on 10th June 1839, with the final two sections, Basingstoke to Winchester (including Micheldever) and Northam Road to Southampton, opening on 11th May 1840.[11] However, the station at Micheldever did not become known as such until February 1856, having been named Andover Road from the opening and Popham in railway literature published before that.

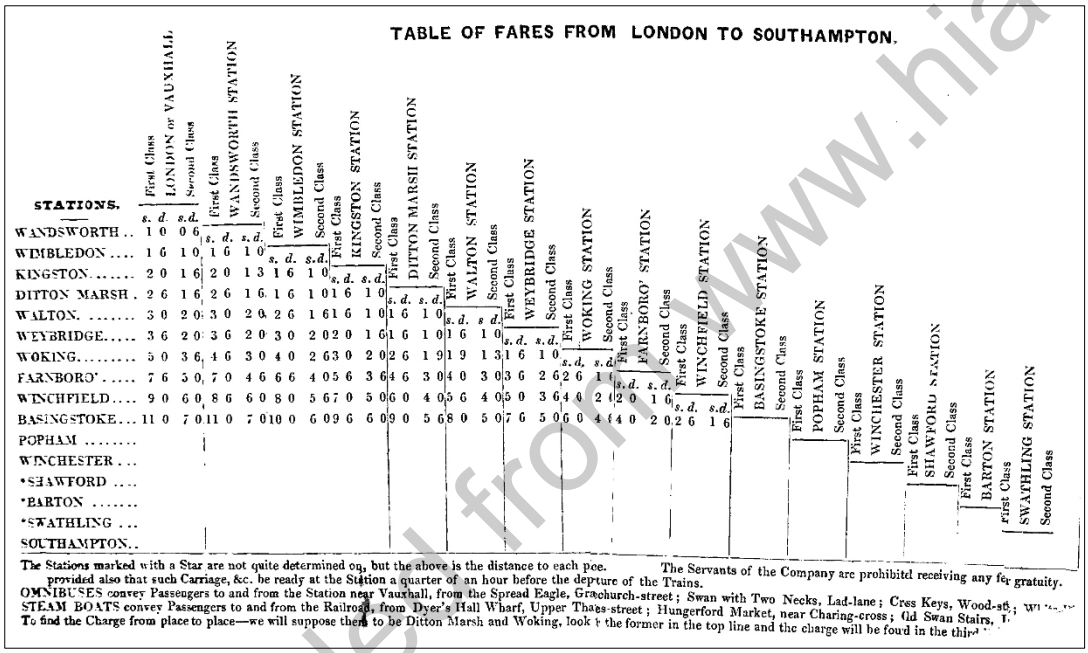


TABLE OF FARES FROM LONDON TO SOUTHAMPTON.

STATIONS.	LONDON or VAUXHALL		WANDSWORTH STATION		WIMBLEDON STATION		KINGSTON STATION		DITTON MARSH STATION		WALTON STATION		WEYBRIDGE STATION		WOKING STATION		FARNBORO' STATION		WINCHFIELD STATION		BASINGSTOKE STATION		POPHAM STATION		WINCHESTER STATION		SHAWFORD STATION		BARTON STATION		SWATHLING STATION	
	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class	First Class	Second Class
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
WANDSWORTH ..	1 0	0 6																												
WIMBLEDON	1 6	1 0	1 0	0 6																										
KINGSTON	2 0	1 6	2 0	1 3	1 6	1 0																								
DITTON MARSH .	2 6	1 6	2 6	1 6	1 6	1 0	1 6	1 0																						
WALTON.	3 0	2 0	3 0	2 0	2 6	1 6	1 6	1 0	1 6	1 0																				
WEYBRIDGE.....	3 6	2 0	3 6	2 0	3 0	2 0	2 0	1 6	1 6	1 0	1 6	1 0																		
WOKING.....	5 0	3 6	4 6	3 0	4 0	2 6	3 0	2 0	2 6	1 9	1 9	1 3	1 6	1 0																
FARNBORO'	7 6	5 0	7 0	4 6	6 6	4 0	5 6	3 6	4 6	3 0	4 0	3 0	3 6	2 6	2 6	1 6														
WINCHFIELD....	9 0	6 0	8 6	6 0	8 0	5 6	7 0	5 0	6 0	4 0	5 6	4 0	5 0	3 6	4 6	2 6	2 0	1 6												
BASINGSTOKE...	11 0	7 0	11 0	7 0	10 0	6 0	9 6	6 0	9 0	5 6	8 0	5 0	7 6	5 0	6 0	4 0	4 0	2 6	2 6	1 6										
POPHAM																														
WINCHESTER ...																														
*SHAWFORD																														
*BARTON																														
*SWATHLING ...																														
SOUTHAMPTON..																														

The Stations marked with a Star are not quite determined on, but the above is the distance to each pce. The Servants of the Company are prohibited receiving any fee or gratuity.
provided also that such Carriage, &c. be ready at the Station a quarter of an hour before the departure of the Trains.
OMNIBUSES convey Passengers to and from the Station near Vauxhall, from the Spread Eagle, Gracechurch-street; Swan with Two Necks, Lad-lane; Cres Keys, Wood-st; W...
STEAM BOATS convey Passengers to and from the Railroad, from Dyer's Hall Wharf, Upper Thames-street; Hungerford Market, near Charing-cross; Old Swan Stairs, L...
To find the Charge from place to place—we will suppose them to be Ditton Marsh and Woking, look for the former in the top line and the charge will be found in the thir...

Figure 18. Taken from the* London & Southampton Railway Companion *published in 1839, a year before the line was opened throughout, Micheldever station is referred to as Popham, later to become Andover Road. The proposed Eastleigh station was at this time known as Barton.

Looking at a railway map (Figure 19), the line clearly heads slightly westwards from London before turning in a more southerly direction at Basingstoke – not the most direct route, which would have run closer to Guildford, as the Portsmouth Direct line did a decade later (albeit via Woking). The meandering route to Southampton was chosen with a view to the L&SR, or the London & South Western Railway (LSWR) as it would become in 1839, striking out from Basingstoke towards Bristol. This reflected the original intention of the promotors, who in 1830[12] (the year the L&MR opened) had published their prospectus for the Southampton, London & Branch Railway Company – the 'Branch' being a line from Basingstoke to Bath and Bristol.[13] After trying and failing to woo the nascent Great Western Railway (GWR) to join its route to gain access to London, and with the GWR's engineer, Isambard Kingdom Brunel, promoting an independent route for his line, the L&SR considered pressing on with its own Bristol line and opposed the GWR's bill,[14] which was eventually passed on 31 August 1835.[15]

It is not surprising, therefore, that Brunel was no fan of the L&SR and the GWR was as protective of its monopoly at Bristol as the LSWR was of its position at Southampton – a rivalry that was acknowledged formally by a 'non-aggression' pact signed on 21st October 1884, whereby each would avoid encroaching upon the other's territory. In the light of the politics surrounding the earliest years

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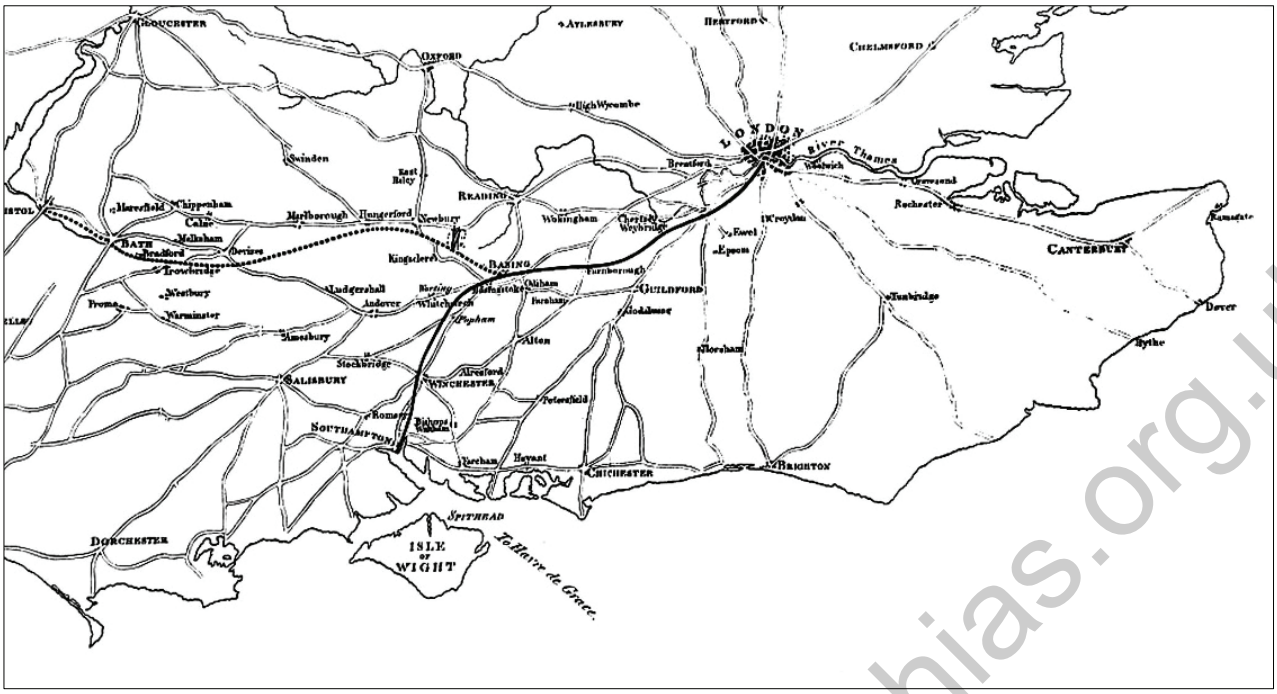


Figure 19. A map of the London & Southampton Railway that was included in the share prospectus, clearly showing the proposed 'branch' (dotted line) from Basing to Bath and Bristol.

of the L&SR, the choice of Brunel Close as the name of a new road next to Micheldever station would seem to be singularly inappropriate.

The engineer appointed to oversee the construction of the L&SR was Francis Giles (1787-1847) who, like many of his contemporary railway engineers, had formerly been a canal engineer. He had alienated himself from George Stephenson by opposing the latter's route for the Liverpool and Manchester line across Chat Moss, saying, 'No engineer in his senses would go through Chat Moss … in my judgement a railroad certainly cannot be safely made … without going to the bottom of the Moss.' Stephenson retaliated by stating that 'the whole wealth and strength of the [L&SR] would be forever buried' in the St George's Hill cutting at Weybridge.[16] As it was, Giles seriously underestimated the cost of building the railway – there were extensive delays, costs escalated out of hand and share values slumped. The railway company directors lost patience and to spare Giles's professional reputation, he was allowed to resign rather than be sacked and this was recorded in the company's minutes of 13th January 1837.[17]

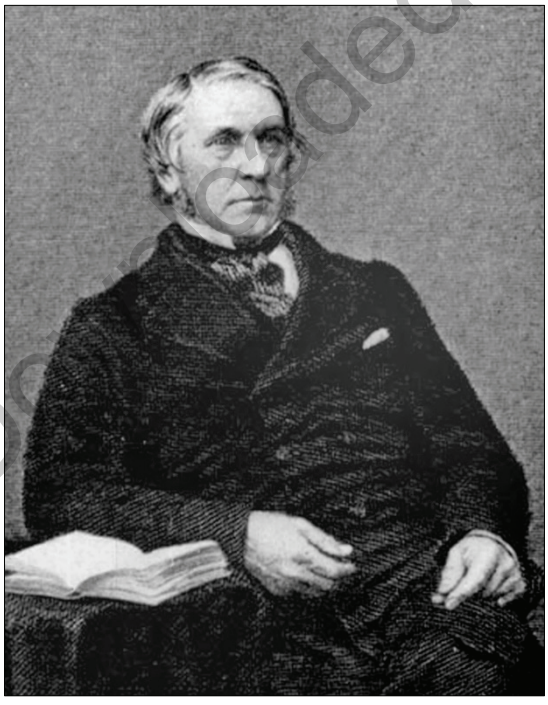


Figure 20. Joseph Locke. (Wikipedia Commons)

George Stephenson plays no documented part in the history of the L&SR, but as Lancashire interests held half the shares in the company,[18] it is reasonable to assume that his opinion was sought and no surprise therefore that Giles' replacement was Joseph Locke (1805-1860), Stephenson's assistant on the L&MR, and indeed, the driver of *Rocket* when William Huskisson MP was run over and killed at the opening. Amongst many other railway projects, Locke was responsible for the Grand Junction Railway, the Lancaster & Carlisle Railway, Carlisle to Glasgow and Edinburgh, the Manchester & Sheffield Railway, the Fareham Viaducts

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and railways in France, Holland and Spain. He was MP for Honiton and president of the Institution of Civil Engineers[19] – truly a major railway engineer of his time who ranked alongside Brunel and Robert Stephenson.



Figure 21. Sir Thomas Brassey.



Figure 22. Sir William Tite.

While Locke was the L&SR's engineer for the line, the actual building was contracted out to Thomas Brassey (1805-1870) who had worked with Locke on the Grand Junction Railway. Brassey's company alone was responsible for one-sixth of Britain's railways and by the end of his life, over 6,500 miles of railway worldwide had been built by him. He left a colossal fortune of £3.2million at his death.[20]

Not far from Winchester station is Brassey Road – a much more appropriate name for a Hampshire thoroughfare than that chosen at Micheldever. The organisers of the Micheldever Station 185th anniversary celebrations felt that people living on the road might be unaware of the origin of the name, so leaflets including a brief history of Brassey were distributed to all residents, who were encouraged to come along to the two-day commemoration event. As part of the weekend's programme, Brassey was the subject of a talk given by a member of the Thomas Brassey Society and an information board about him was unveiled at the station.

The architect for the L&SR was Sir William Tite (1798-1873) who designed many station buildings in addition to Micheldever, such as Nine Elms, Windsor Riverside, Southampton Terminus, Gosport, Carlisle Citadel, Axminster and Honiton. He also designed the Royal Exchange, London, was MP for Bath and twice president of the Royal Institute of British Architects. He was knighted in 1869.[21]

The first Chairman of the L&SR was local banker Sir Thomas Baring (1772-1848) who lived at nearby Stratton Park (see Figure 13 on page 18). He was the first Chairman of the L&SR, serving between 1833 and 1834. A member of the Baring banking family (the bank famously brought down

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by Nick Leeson in 1995), he was opposed to Sunday travel and the instigator of a 'benefit society' for the navvies working on the line.[22] He was MP for High Wycombe and later, Hampshire.



Figure 23. Sir Thomas Baring.

After the Opening – Some Notable Events

It is not the intention of this article to document the history of Micheldever station through the 185 years of its existence following its opening in 1840. For that, readers are directed to *Parsons & Prawns*[23] by Peter J Clarke (available from Branchstow Books: *www.branchstow.co.uk*). A few notable items of interest are recorded here, however.

Anyone passing through Micheldever cannot fail to notice the quarried area to the north and east of the station and the large oil storage facility that was built in the space left by the chalk extraction. Chalk had been quarried here for the widening of the line at Brookwood and Weston Colley in the early 20th century but in around 1930, the Southern Railway commenced taking spoil for the new Southampton Western Docks.[24] Over 1,000 tons a day was extracted to enable 400 acres of land to be reclaimed for the docks, which became largest in the world when they were completed in 1934 (Figures 24 and 25).

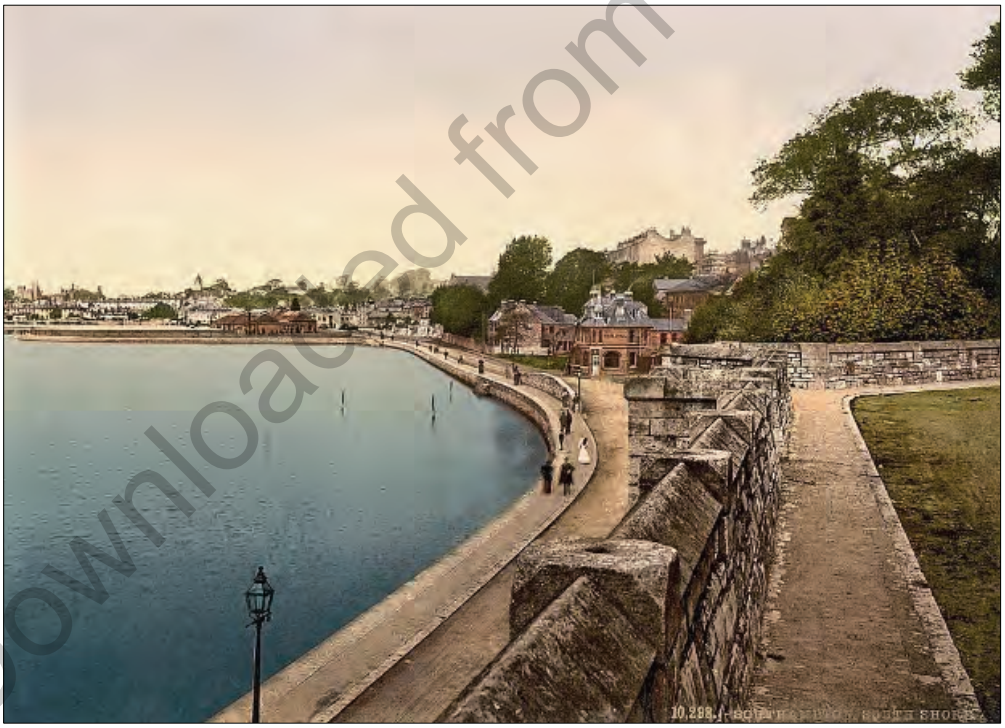
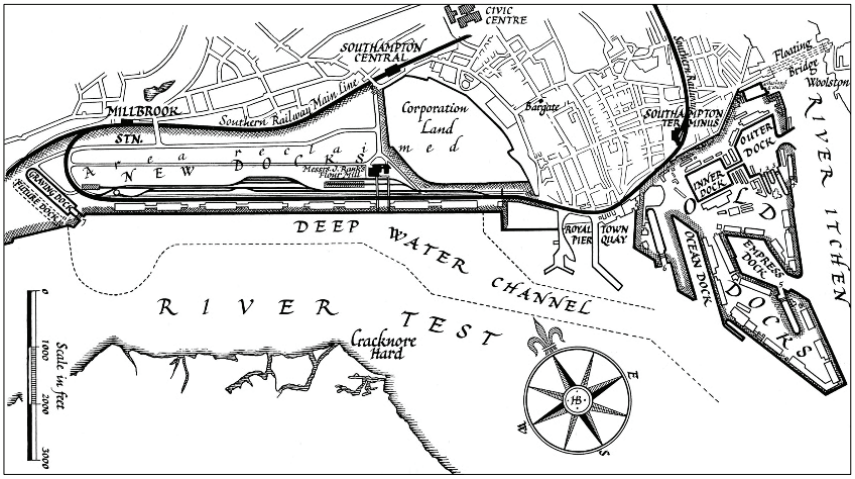


Figure 24. Southampton's Western Shore before the New Docks were developed, and now the site of West Quay shopping centre.

An amusing incident was recorded by the *Exeter & Plymouth Gazette* on 8th September 1933 (Figure 26). The resourcefulness of the footplate crew has to be admired in an age long before mobile phones or 'cab to shore' radio.

Construction of the first Air Force Reserve Depot at Micheldever started in February 1938 and it became operational in September 1939. Using the huge space quarried away by the Southern Railway, thirty 650-tonne cylindrical tanks were built side-by-side and encased in 0.6m of concrete covered with earth to a depth of 6 to 9m, the whole edifice faced with a concrete blast wall. The tanks were removed about ten years ago.

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ENGINE-DRIVER GIVES FIRE ALARM.

Message Conveyed on Piece of Coal.

A 36-acre corn crop on a farm between Winchester and Micheldever Station was saved from complete destruction by the driver of an express train from Southampton to Waterloo yesterday. A shrieking train whistle passing Micheldever Station brought out the stationmaster and the driver threw to him a piece of coal with the words, "Field of corn on fire."

Figure 25 (left) The plans for the New Docks that were developed by the Southern Railway. The reclaimed land was filled with chalk quarried from beside Micheldever station.

Figure 26 (above) Newspaper article from 8th September 1933.

The sidings laid in the quarried area have been used over the years to store redundant rolling stock, most recently in 2012, when several car transporters arrived for temporary storage. Twelve years later they were still there and because their wheel bearings had become seized over the years, they were cut up on site in 2024, and any usable parts recovered.

The First Recorded Car Journey in the United Kingdom

Possibly Micheldever station's most unusual claim to fame is as the location of the first recorded car journey in the UK. This was made by The Hon Evelyn Ellis with his Panhard et Levassor powered by a Daimler engine. On 6th July 1895, he drove from Micheldever to Datchet, a distance of 56 miles, in 5 hours 32 minutes (average speed 9.84 mph).[25]

There is some debate around the exact circumstances of Ellis's journey. Having bought the car in Paris, he drove it to Le Havre to catch the ferry, and one version of the story is that he put it on a train on arrival at Southampton, offloading it at Micheldever and proceeding to Datchet from there. This has to be questioned. Having driven from Paris to Le Havre, why would he not drive to Datchet directly from Southampton? There is no doubt that Micheldever was on his route, as he picked up





Figure 27 (left). The Hon Evelyn Ellis at the tiller of his Daimler-powered Panhard et Levassor automobile.
Figure 28 (above). The commemorative plaque attached to Micheldever station building.
(Howard Sprenger)

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Frederick Simms there, whose description of the journey is the only one we have. (Simms was the managing director of the Daimler Motor Syndicate.) Issue No 4 of *Autocar* (published only a few months after the event on 30th November 1895 and still going strong) leaves the reader in no doubt that Ellis drove from Southampton to Datchet – and then on to Slough, Abingdon, Cheltenham and Malvern, although this is likely to have been over successive days.[26]

Either way, the journey has been recorded by the Transport Trust with a plaque commemorating the journey fixed to the wall of Micheldever station building, and perhaps this is for the best as any similar commemoration in Southampton Docks would be inaccessible to the public.

Conclusion

The events celebrating 185 years of Micheldever station were a resounding success and a tribute to the organisers, led by Sue Bell. The fact that they could tie in with the wider Railway 200 celebrations was fortuitous, but the reasons for those commemorations happening in 2025 possibly owe more to the commercial department of the erstwhile LNER than to any substantive historical basis. We should not complain, however. Any opportunity to celebrate the legacy of railways must be savoured, and we can do it all again in 2030!

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Addendum to Road Names in Hedge End (*Journal* No. 27, 2019, p.15)

Howard Sprenger

After this article was published in 2019, HIAS member, David Cheffy, who had also investigated the derivation of the railway-themed Grange Park Estate road names, passed me his notes. He had found an additional three that I had missed, all of which were public schools that had locomotives named after them. (In my defence, they are slightly apart from the rest of the roads on the estate.) My thanks therefore go to David for identifying Charterhouse Way, Haileybury Gardens and Radley Close.

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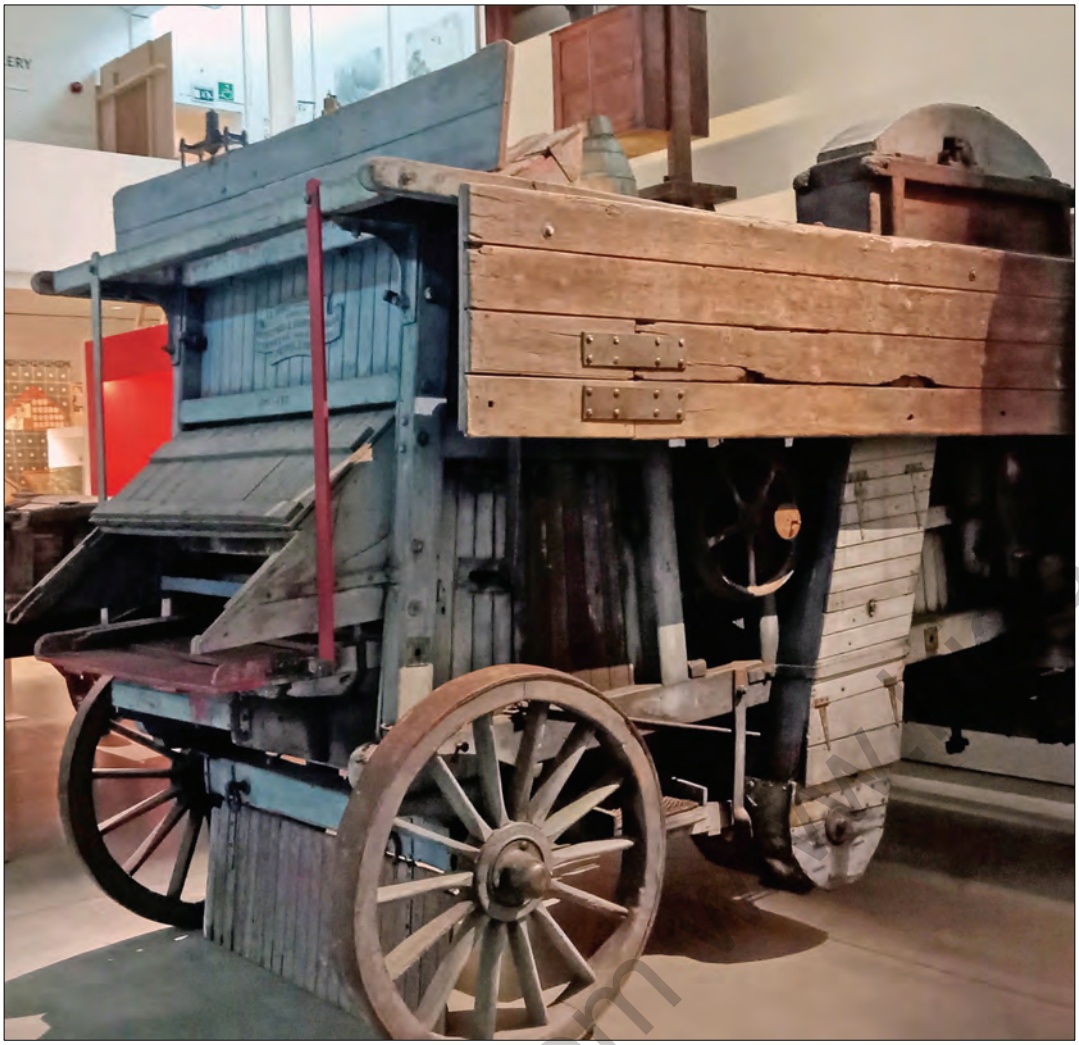


Figure 14. In 1788, Andrew Meikle patented the first practical threshing machine that made the flail redundant and led to massive machines like the one shown here, a 'double blast' model, No. 11473, made in 1900 by Edward Humphries of Pershore, Worcestershire. This carried out a process now incorporated in the combine harvester (Museum of English Rural Life, Reading, No. 2007/61). (Barry Shurlock)

Figure 29. A recent view of Micheldever station building from a similar angle to that on the front cover. The roof of the Dove Inn can just be made out to the left. Photograph taken 5th June 2016. (Howard Sprenger)



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