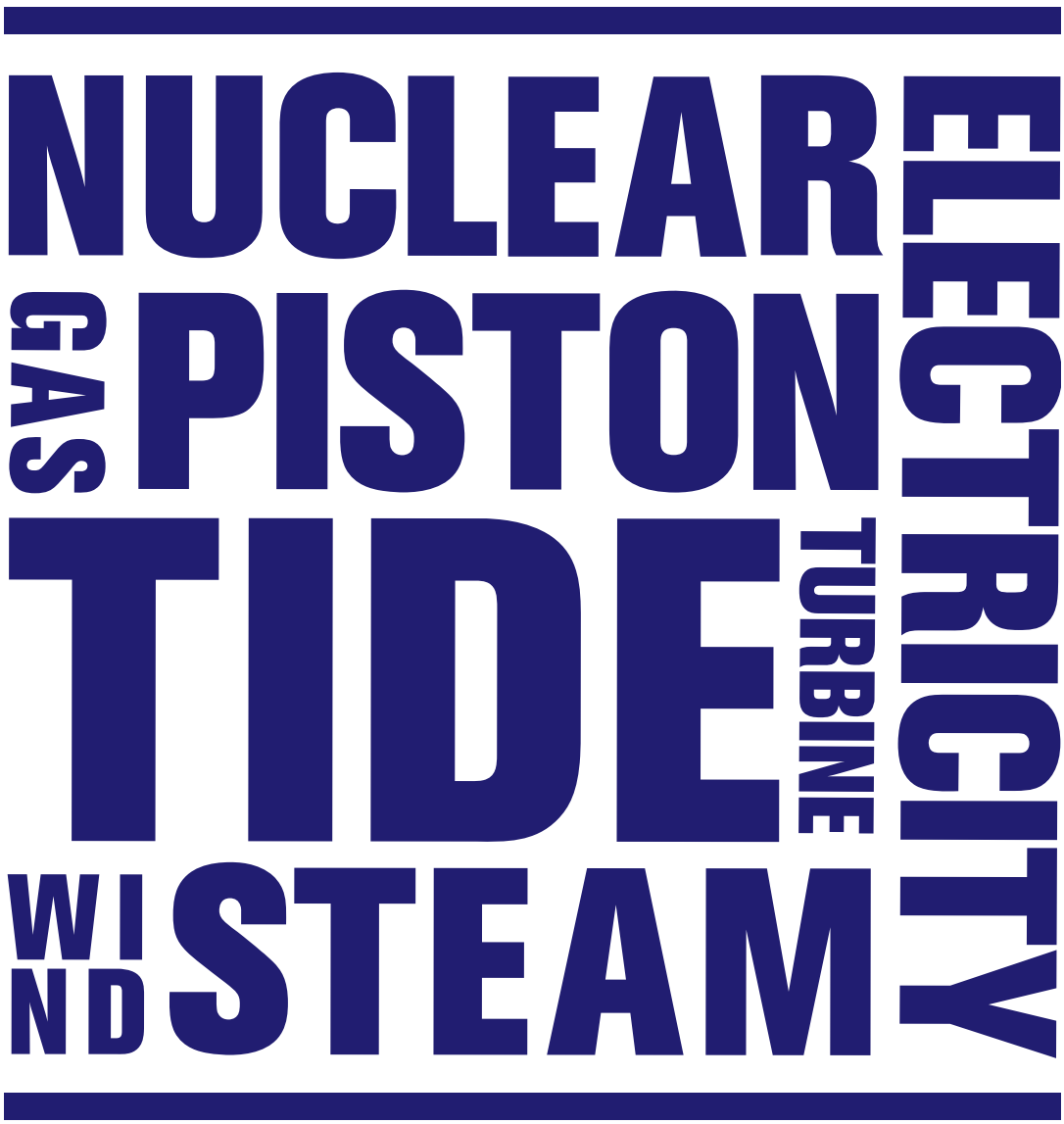
Links

Learning from the Past to Engineer the Future



The Tercentenary of
Thomas Newcomen's Engine

NEWCOMEN 2012
CELEBRATING POWER AND ENERGY

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CELEBRATING POWER AND ENERGY

Links Editor & Layout Designer:
Deborah Jaffé.
editor.links@newcomen.com
07798 603000

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The Newcomen Society,
The Science Museum,
London SW7 2DD.
+44 (0)20 7371 4445
www.newcomen.com

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The Front Cover

The front cover shows the special logo for the 2012 events and graphic for publicity material, designed by Dan Rolfe Johnson.

Writing for Links

Relevant articles and items of news may be submitted to be considered for inclusion in Links.
Articles should be a maximum of 700 words and sent in Word format by email.
Images should be sent separately by email in jpg (digital) format of 300dpi. They should **not** be embedded in the text of the Word document,
Copyright and reproduction issues on images, including diagrams, must be considered and wherever possible permission for publication granted. It is not possible to receive photographs of images in books.
The copy date for the next issue is 1 May 2012
Please submit articles, information, details of events etc to:
The Editor,
Deborah Jaffé at:
editor.links@newcomen.com

Notes on Contributors

John Allen F.I.C.E.; F.Weld.I., E.W.E. has had a long career as an engineer. He is a Past President of the Society and an expert on Thomas Newcomen.
Dr Jim Andrew has worked with Birmingham's Science and Industry Collection since 1974 and is now Thinktank's part-time Collections Advisor. He is Secretary of the Midlands Branch
Dr Michael Bailey is a Newcomen Fellow, who joined the Society in 1973. He has served as Member of Council for several terms, and President between 1995 and 1997. He is an author and lecturer on early railway and locomotive history, and is a consultant and archaeologist for museums and television companies. Michael was also Consultant to UNESCO regarding the Rhaetian Railway's application in Switzerland/Italy for World Heritage status. He represents the Newcomen Society for the 'International Early Railways' Conference series, and is a co-editor of the Conference publications.
Professor Angus Buchanan served for many years on the Council and was President of the Society in 1981-3. He is Emeritus Professor of the History of Technology at the University of Bath,and he has worked on Industrial Archaeology, the Engineering Profession, and I.K. Brunel.
Dr Robert Carr was at first involved with the physical sciences. He has since become more of a generalist, interested in a wider context and in making connections.
Clive Ellam spent his working life as an engineer in the aircraft industry and the Royal Air Force. He joined the Society in 1970, becoming Executive Secretary in 1992 and President from 1999-2001.
Julia Elton is a Past President of the Newcomen Society . She is an antiquarian bookseller specialising in the history of engineering, has written and lectured widely on this subject and is a musician in her spare time.
Adam Hart-Davis is a freelance writer and broadcaster – former presenter on television of Local Heroes, Tomorrow's World, What the Romans (and others) Did for Us, How London was Built, and many others. He has collected various awards for both television and radio, as well as two medals and 14 honorary doctorates and written about 30 books, the most recent was The Book of Time.
Professor Frank James is Professor of the History of Science at the Royal Institution, a Fellow and Council member of the Newcomen Society.
Nigel Hobden is a co-founder of Random Group Ltd. Its roots lie in industrial and engineering design and it now works with clients in the engineering and creative industries implementing, managing and supporting IT systems. Nigel received a BSc degree in Engineering Science from the University of Warwick, where he specialised in computer techniques and business administration and then gained his initial experience at DCA (David Carter Associates) one of the UK's leading design consultancies.
Deborah Jaffé is a design and cultural historian, author of 8 books and editor of Links. She has particular interests in the history of industrial design and the Great Exhibition. Her hidden history of women inventors – a search of historical patents – is published as Ingenious Women,
Jur Kingma M.D. is a retired general practitioner. He is a publicist on industrial archaeology, technical and maritime history of the Netherlands.
John Liffen is Curator of Communications at the Science Museum, London.
Professor Carl-Göran Nilson is a Professor Emeritus and member of the Society, who lives in Sweden.
Professor David Perrett is Professor of BioAnalytical Science, William Harvey Research Institute, Barts & the London School of Medicine & Dentistry, Queen Mary University of London. He is a Fellow of the Royal Society of Chemistry and a Chartered Chemist. He is Immediate Past President of The Newcomen Society, and a member of Council and has served on the Council of the Association for Industrial Archaeology 1986-98. He is actively involved in Industrial Archaeology at local, regional and national levels; lecturing widely and writing on IA, organising regular lecture series, and arranging field visits and conferences.
Geoff Wallis was a founder and former Managing Director of Dorothea Restorations Ltd, leading conservation contractors for over thirty years. He is now a consultant and project manager specialising in the preservation of historic machinery and metal structures. He is a Chartered Engineer, Member of the Institution of Mechanical Engineers, and lectures widely on conservation matters.

The Society's AGM held on 8 February

This is a précis of the AGM minutes. A copy of the full minutes may be obtained by email application to the Society's office at: office@newcomen.com. Because of the difficult time the Society has been having, it is recommended that members apply to see the full minutes of the AGM. Editor

The Society's AGM took place in the Fellows' Library of the Science Museum at 5:45pm on Wednesday 8 February. Forty seven members attended with apologies for absence received from a further seven. The meeting was chaired by Julia Elton who opened the meeting by informing those attending that at the Council meeting that afternoon, Roger Cline had been co-opted to the position of Company Secretary/ Honorary Secretary in place of the late Dr. Peter Merriman. He will remain in office until the AGM of 2013. The accounts to 30 June 2011 were presented by Professor Frank James. The motion to accept these accounts was proposed by Dan Hayton and seconded by Clive Ellam. Members voted unanimously for their acceptance. The annual report to The Charity Commission to 30 September 2011 was proposed for acceptance by Robert Carr, seconded by Clive Ellam. After discussion and due consideration the election of the Interim Executive Group of Dr Michael Bailey, Miss Julia Elton, Professor Frank James and Professor David Perrett to serve until the 2013 AGM was proposed by Tim Shaw, seconded by Edward Sargent.

As returning officer, Jim Cockburn reported the result of the ballot for the three Council positions due to be open from 1 October 2012. Of the five candidates the three elected to serve on Council are: Mr Daniel Hayton, Mr Stephen Jones and Dr David Yeomans. The motion to re-appoint Messrs Errington, Langer, Pinner as the Society's Reporting Accountants and to authorise Council to fix their remuneration was proposed by Jerry Reahse-Felstead, seconded by Dan Hayton. Jim Cockburn reported the result of the vote to increase the Society's subscription fees from 1 October 2012. The Ballot result was: acceptance of the increased fees 163 votes; against acceptance 13 votes. Thus the subscription fees will therefore be increased from 1 October 2012 to £45 for full membership, £35 for affiliate membership and £17 for student membership. Each of the motions above was unanimously accepted by the members attending the AGM. It is unusual to include items of Any Other Business in an AGM. However, in view of the turbulent times through which the Society is going at present, Julia Elton allowed a few minutes to give members the opportunity to raise any questions not covered by the agenda for the meeting. At the end of the meeting, John Porter expressed his personal thanks to all those who had stepped in to undertake the very difficult work of the last few months and who will be continuing to address the problems the Society faces at present. Members attending echoed these sentiments with a round of applause.

From the Editor

Copy date for the next Links is 1 May

This year marks the 300th anniversary of Thomas Newcomen's atmospheric engine and a large part of this issue of Links focuses on him, his engine, its impact and legacy. To celebrate the year the Society is holding a series of events around the country on the theme of power and energy. I am delighted that John Allen, Jim Andrew, Robert Carr, Adam Hart Davis, David Perrett and Geoff Wallis accepted my invitation to write about Newcomen and the engine for this issue of Links. (p5-11). The Royal Mail issued a series of stamps - Britons of Distinction - on 23 February (p7) and we are pleased it includes one of Thomas Newcomen. David Perrett describes the Farme Colliery Engine depicted on the stamp (p11). As this is a busy year for anniversaries, I have included details of some relevant to members including the first automatic telephone exchange on the public network at Epsom, described by John Liffen. John Porter reports on last summer's Society visit to Canada, Clive Ellam describes a trip made by some members to Tasmania and Frank James reflects on finishing the sixth and final volume of the correspondence of Michael Faraday. The Society's lectures, conferences and visits, on the theme of power and energy, will take us from Thomas Newcomen 300 years ago right up to the present with wind and nuclear power. The Programme of Events accompanying this Links details all these events and contains the booking forms. The 2012 Summer Meeting, to be held in the Shannon and Limerick area of Ireland, is also included. The cover of this issue of Links shows a special 2012 logo and graphic designed by Dan Rolfe Johnson. The graphic will appear on a bag which will be given to those attending the events. I am very grateful to David Exton of the SSPL for providing such excellent images, from the Science Museum Archives, of drawings of Newcomen engines and one of Titanic being built in Belfast. This issue is packed and unfortunately some material has had to be held over for the June issue.

Please, do keep sending material and especially reports of the year's events.

Deborah Jaffé

Newcomen Matters

Books for Kew Bridge Steam Museum

John Porter

These are interesting times at Kew Bridge Steam Museum, one of the few museums in the world that demonstrates a steam engine built before the advent of the Stockton and Darlington Railway in 1825 which also has interesting literary connections. In this bicentenary year of his birth, we recall the wonderfully vivid description of the 90in engine which Charles Dickens gave in his magazine "Household Words" in April 1850. Yet, in spite of all these assets, the Museum struggles to keep afloat financially. If the current HLF application is successful, it will be possible to improve the appeal to families and those whose interests may be a little wider than just steam engines and water supply. As always, the problem is match funding. A very successful fundraiser at the New Year Steam-Up was a sale of technical, railway and general transport books which had been dropped into the Museum. It was so successful that we've run out of stock! So if any members are having a cull of their libraries, Kew Bridge Steam Museum will be grateful for your donations. See John Porter at a meeting, contact him on: 020 8997 1413 or john.s.porter@virginmedia.com.

The Society's Affiliation with Engineering Heritage Australia

Council recently approved the affiliation of the Society with Engineering Heritage Australia (EHA). Michael Bailey will report, in the next issue of Links, on the EHA and what the affiliation will mean for both groups of members. Meanwhile members can find more about the EHA at: www.engineersaustralia.org.au/engineering-heritage-australia

Piston Engine Revolution
Publication of the Conference Volume

The organising committee is pleased to announce the imminent publication of the conference volume, "The Piston Engine Revolution", which was held last April at the Museum of Science and Industry, Manchester. The book is the same size as the Society's Journal and consists of 22 papers (550 pages and about 300 illustrations) in hard cover and printed on good quality, matt, coated paper. A wide range of internal combustion engines topics is embraced, including early gas engines, early aero- and automotive engines, industrial, rail and marine engines, and sleeve-valve designs. Related topics comprise the manufacture of producer gas, the development and testing of fuels, the progress of exhaust valves, and a short biography of Sir Harry Ricardo. Those who attended the conference will receive their copy through the post, but a limited number of additional volumes are available for purchase and may be ordered by sending a cheque payable to The Newcomen Society or full card details to Roger Cline at: The Newcomen Society, The Science Museum, London SW7 2DD or atbooksales@newcomen.com. The price is £35 per copy including p&p (UK and surface mail overseas).

The International Congress for the History of Science, Technology & Medicine

The 24th International Congress for the History of Science, Technology and Medicine will be held in Manchester from 22 to 28 July 2013. Around a thousand experts in these areas are expected to attend which will make this the largest meeting on the subjects to be held on these islands since the 15th Congress in Edinburgh in 1978. Proposals for themed panels/symposia are welcome and may be submitted until 30 April 2012. Thereafter offers of individual papers may be made until the end of November.
Full details can be found at: http://ichstm2013.com/

Dr Peter Merriman

The Society is saddened to report the death of the Honorary Secretary, Dr. Peter Merriman in December. An obituary, by Clive Ellam, is printed on page 18 of this issue of Links. There are also appreciations, by Jur Kingma and Angus Buchannan, of Dr David Henderson Tew whose death was reported in the December issue.

NEWCOMEN 2012

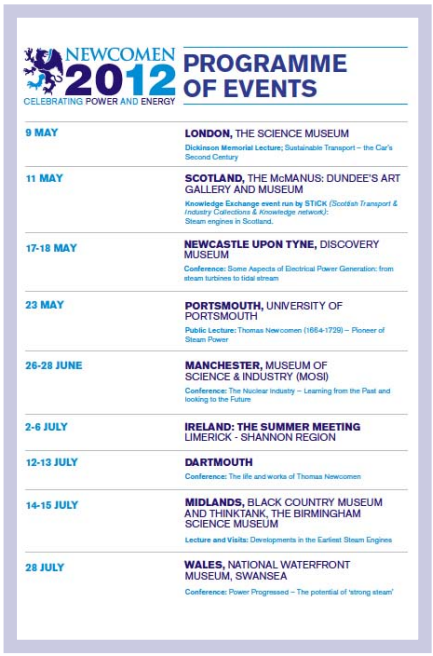
CELEBRATING POWER AND ENERGY

Power and Energy: The Tercentenary of Thomas Newcomen's Engine

To celebrate the tercentenary of Thomas Newcomen's epoch-making steam engine the Newcomen Society is looking at his life and legacy in a series of events being organised by the branches around the country. The main theme of the year is power and energy, befitting an invention that led directly to the industrial revolution and beyond to our modern world.

This issue of Links launches the tercentenary programme. It contains articles by John Allen, Jim Andrew, Robert Carr, Adam Hart Davis, David Perrett and Geoff Wallis, all leading scholars on Newcomen and his achievements, and includes such practical aspects as the restoration of engines. In addition, there is a complete list of the remaining engines and where they are sited. The Royal Mail's Thomas Newcomen stamp, issued on 23 February, is also illustrated.

The Programme of Events, *right*, accompanying this edition of Links gives details of all the lectures, conferences and visits taking place over the coming months. This year's Summer Meeting, also echoing the theme of power and energy, is being organised by Michael Grace and will take place in Ireland in July. Booking forms for all events are included at the back of the brochure.


NEWCOMEN 2012 CELEBRATING POWER AND ENERGY

PROGRAMME OF EVENTS

9 MAY	**LONDON,** THE SCIENCE MUSEUM Dickinson Memorial Lecture; Sustainable Transport – the Car's Second Century
11 MAY	**SCOTLAND,** THE McMANUS: DUNDEE'S ART GALLERY AND MUSEUM Knowledge Exchange event run by STICK (Scottish Transport & Industry Collections & Knowledge network): Steam engines in Scotland.
17-18 MAY	**NEWCASTLE UPON TYNE,** DISCOVERY MUSEUM Conference: Some Aspects of Electrical Power Generation: from steam turbines to tidal stream
23 MAY	**PORTSMOUTH,** UNIVERSITY OF PORTSMOUTH Public Lecture: Thomas Newcomen (1664-1729) – Pioneer of Steam Power
26-28 JUNE	**MANCHESTER,** MUSEUM OF SCIENCE & INDUSTRY (MOSI) Conference: The Nuclear Industry – Learning from the Past and looking to the Future
2-6 JULY	**IRELAND: THE SUMMER MEETING** LIMERICK - SHANNON REGION
12-13 JULY	**DARTMOUTH** Conference: The life and works of Thomas Newcomen
14-15 JULY	**MIDLANDS,** BLACK COUNTRY MUSEUM AND THINKTANK, THE BIRMINGHAM SCIENCE MUSEUM Lecture and Visits: Developments in the Earliest Steam Engines
28 JULY	**WALES,** NATIONAL WATERFRONT MUSEUM, SWANSEA Conference: Power Progressed – The potential of 'strong steam'



A major focus for the year is to publicise the Society and gain new members but just as importantly it is intended to provide interest and enjoyment for existing members

At the top of the page you will see the special new commemorative logo reflecting the power and energy theme. Branches will be using it on their publicity material and a PDF of it can be obtained from the office. Cotton bags, *left,* printed with a distinctive power and energy graphic will be given to all those attending the events. They are ideal for carrying conference packs, books and leaflets and can be used long afterwards. Please contact the editor if you would like one.

Lastly, please send us photographs and short reports of the events for possible publication in forthcoming issues of Links. This will be a fascinating year.

Julia Elton and Deborah Jaffé

NEWCOMEN 2012
CELEBRATING POWER AND ENERGY

The Legacy of Thomas Newcomen & his Atmospheric Steam Engine

Members of the Society write about his contribution and the engines today

Thomas Newcomen 1663-1729

John Allen

There are many different views on the start of the so-called Industrial Revolution, but there is no doubt that the invention and development of the atmospheric steam engine by Thomas Newcomen from about 1712 was a vital move forward. Advances in industry required the use of increasing quantities of coal and as the mines were taken deeper to access more supplies so they became increasingly subject to flooding.

Thomas Savery had developed a steam pump which relied on steam at high pressure and he had taken out patents and written a book extolling its use but in practice it was limited and dangerous in use.

By the time the Savery patent ran out in 1733 it is known that at least 110 Newcomen engines had been put into use with ever increasing cylinder and boiler size, often described as 'Fire Engines'. Later, engineers, notably James Watt, were able to make improvements, but it was the basic design of Thomas Newcomen which allowed this to take place.

No other contemporary invention was responsible for such rapid and important progress and it is remarkable that until the Newcomen Society was formed in the 1920s that there was so little published on the invention. Much, however, has been published in recent years.

The most pleasing aspect has been the discovery of comments made on the character and honesty of Thomas Newcomen. From the correspondence between James Lowther of London, mine owner and his agent John Spedding we learn 18 Feb 1726/7 " Mr. Newcomen is a perfect honest man --- We have bin [sic] very successful from the first to last in the timing of things about the Fire Engine., which I should hardly have ventured upon if I had not mett with such very honest good man as Mr. Newcomen who I believe would not wrong any body to gain ever so much.'

Of the engine itself was written 'There is nothing that will do our business so well and be less liable to accidents than the engine' and ' tis the cheapest safest and best way to keep the colliery dry'.

In the setting up of the Society they were fortunate to take the name Newcomen as that of the Society, a man we now know was held in such high esteem. Let us now celebrate his success in building his first successful engine in 1712.



A Model of a Newcomen Engine, 1752.
This is a model of a Newcomen an atmospheric engine built at Griff colliery, near Nuneaton, Warwickshire, in 1720. Water was heated in the boiler and the resulting steam was let into the cylinder, pushing up the piston. The steam was then condensed, bringing down the piston. The piston rocked the beam which worked the pump. This model is associated with Dr Stephen Demainbray (1710-1782), a science lecturer of the 18th century. Image No. 10308698 SSPL, Credit © Science Museum/SSPL All Rights Reserved

Newcomen 300

Robert Carr

There have been two great changes in the human condition. The first was the transition from hunting and gathering to agriculture, the Neolithic Revolution, which occurred about 10,000 years ago in the 'Fertile Crescent' of the Middle East. There is no date we can associate with this change - it happened before writing appeared and in any case was a prolonged process. From settled agriculture towns and civilisation developed. Farming, even from early times, began the process of releasing CO_2 into the atmosphere.

The second great change, the Industrial Revolution, occurred in Western Europe and first in Britain, principally in the 18th and 19th centuries although this rapid development has roots that go back further and is probably continuing. The development of the heat engine from around 1700 allowed *Homo sapiens* to obtain mechanical power by means other than from wind, water and muscular exertion – we became even more different from other animals and increasingly dominant – indeed power-full. Species extinction was accelerated.

The first practical heat engine was that invented by Thomas Newcomen and erected at Dudley in 1712. Newcomen engines allowed coal to be mined in great quantities and abundant fossil fuel led to greater iron production, the development of machines, to momentous changes in manufacture generally – to more people and the release of much more CO_2.

From this first heat engine there is a continuous line of development from Newcomen through Watt, Trevithick, the Cornish engineers, and Sadi Carnot, to internal combustion, gas engines, the petrol and diesel engine. Thus from 1712 Pandora's Box was opened and for better or worse the modern world as we know it began to take shape. Arguably 1712 is the most important date in human history and quite where all this will take us remains to be seen.

There is a popular notion that history is driven by great men, usually politicians, but politics is only the art of the possible and that is largely determined by technology. Thomas Newcomen started a colossal change in technological possibility - the outcome of which is very much our responsibility. The process Newcomen set in motion has radically changed the human condition, bringing comfort and material enrichment for many but also global warming, increasing population and widespread species extinction which if unchecked may eventually include ourselves [us]. To solve the problems we are encountering, science and engineering of the highest order will be of paramount importance.

23 May
A Lecture by
Jim Andrew:
Thomas Newcomen,
Pioneer of Steam Power

at the University of Portsmouth

see Programme of Events for details

Thomas Newcomen is not well known to the public, despite producing the first working and effective steam engine in the world. This lecture will look at why this is, how he developed the engine, some naïve stories about how he achieved this despite being a "simple country ironmonger" and what he actually achieved in establishing steam power as the answer to many needs during the Industrial Revolution. He was a modest and religious man who did not "blow his own trumpet" but became very well known among engineers of his day; yet, two generations later, people had hardly heard of him. The Newcomen Society was founded to bring a more rational approach to industrial history and publicise Newcomen's real achievements.
Jim Andrew

The Thomas Newcomen Stamp from Royal Mail

Royal Mail issued its latest series of special issue stamps - Britons of Distinction - on 23 February. It includes a Thomas Newcomen stamp to commemorate the 300th anniversary of his first atmospheric steam engine in 1712. As there is no portrait of Newcomen it was necessary to use an early photograph of the 1810 Farme Colliery Engine (see p11 of this issue of Links). Thomas Newcomen aside, this is an interesting selection of notable Britons in the fields of engineering, technology and architecture that include: Gothic Revival architect Augustus Pugin, Alan Turing the Bletchley Park code breaker and computer visionary, Sir Basil Spence architect of the new Coventry Cathedral and Sussex University. The others in the series are the composer Frederick Delius, textile designer May Morris, ghost story writer MR James, Quaker relief worker and social reformer Joan Mary Fry, SOE operative Odette Hallowes and singer Kathleen Ferrier.



The Thomas Newcomen Stamp issued by The Royal Mail. Image: Courtesy of The Royal Mail

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Thomas Newcomen

Adam Hart-Davis

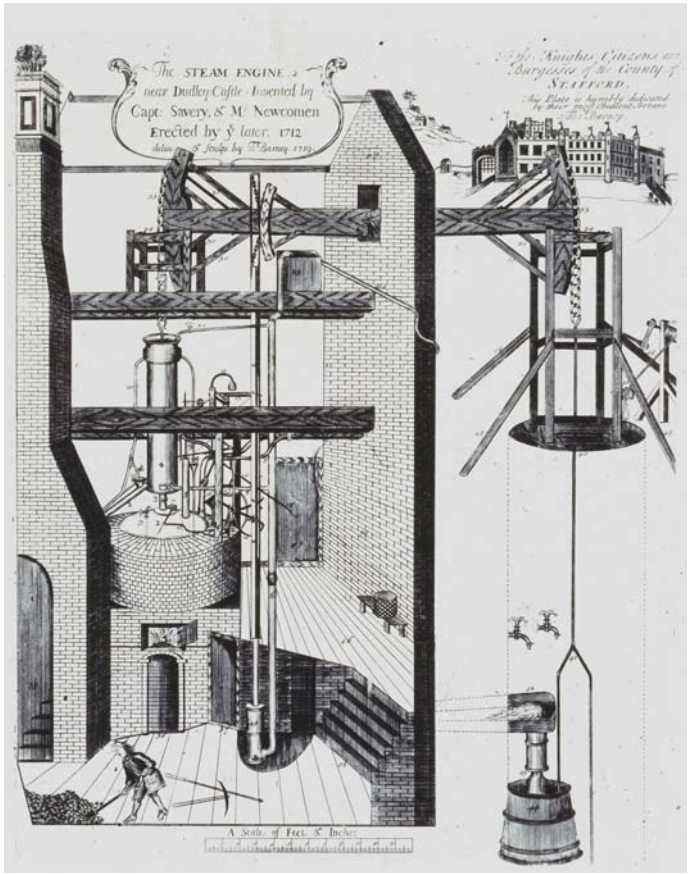
Thomas Newcomen lived and worked in Dartmouth, and described himself as an ironmonger. Much of his time was probably spent making and repairing tools for the men who worked in the tin mines of Devon and Cornwall; so he knew all about the problems of flooding in the mines. In 1712 Newcomen built an engine to pump water from a coal mine at Dudley in the West Midlands. He must have built prototypes before then, and he may have built an engine in Cornwall in 1711, but the one at Dudley is the earliest we know about for certain. His machine was woefully inefficient, and was unaffordable except in coal mines, where the fuel was free, but it was nevertheless the most important step forward ever in the entire history of technology, because for the first time it provided portable power.

Newcomen's engine was not only the ancestor of all today's motors, from the one in your washing machine to the heart of a Formula 1 racing car, but it began the industrial revolution, which changed the world for ever. Even though the engine was huge and extremely expensive, more than a hundred were running by the time he died in 1729, and more than a thousand before 1800. They were erected all over England, and exported to France, Germany, Sweden, Hungary, Austria, and even America. When James Watt devised a critical improvement, 60 years later, the engine became vastly more efficient and useful; it could then power cotton spinning and weaving machines. The wealth it created made Britain great, and enabled the development of an empire that stretched around the world.

Thomas Newcomen was a humble man, religious and retiring, and we know little about him, nor about how he came to invent his engine, yet his impact on the development of technology is felt to this day.

14 July
A Lecture by Adam Hart-Davis
&
The Newcomen Engine in Steam at Dudley

The engine house at the Black Country Living Museum houses the replica of the first recorded Newcomen steam engine, built in 1712. This replica, dating from the 1980s, will be in steam for the Society's visit, on 14 July, when they will also hear a lecture by Adam Hart-Davis and have time to look round this open air industrial museum.



Newcomen's steam engine at Dudley Castle, West Midlands, 1719, *engraving by Barney of the first well-authenticated Newcomen engine, erected near Dudley in 1712. Image No. 10312163. Credit © Science Museum/SSPL. All Rights Reserved*

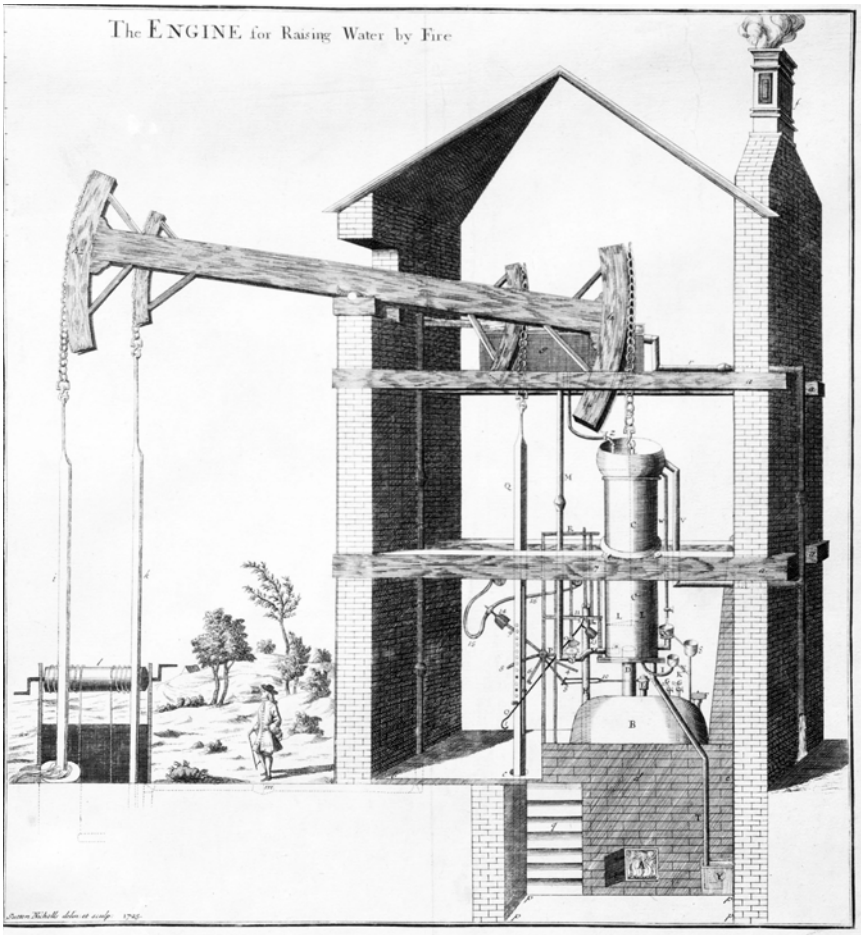
The Replica Newcomen Engine

Geoff Wallis

A full-size replica of Thomas Newcomen's first pumping engine of 1712 was built at the Black Country Living Museum in the 1980s, less than a mile from the site of the original engine. The replica is being refurbished in time for the tricentenary celebrations. Led by me, work includes servicing steam and pump valves, renewing packings and fire-bars, water-proofing and re-wiring the basement, strengthening the timber bob, and renewing the wooden head-frame. The restoration project is featuring in a new Channel 4 TV series about historic developments in industry presented by Guy Martin, who has himself helped service valves, cut out old rods using gas-cutting equipment in the confined space of the replica mine-shaft, and repair boiler brick-work having made the bricks himself using traditional methods. The engine will return automatic operation on steam for the public celebration in July led by Adam Hart-Davis.



Guy Martin gets down amongst the coal to explain the atmospheric principle using a working model Newcomen engine built by John Child of Kew Bridge Pumping Station.



'The Engine for Raising Water by Fire'. *Engraving by Sutton Nicholls of a Newcomen Atmospheric Engine, 1725. Image No. 10280726/1937-0174. Credit © Science Museum/SSPL.. All rights reserved.*







Top*: The engine at work in 2011*
Middle*: Top of the 33m high cast iron rising main*
Bottom*: Outdoor end of the great beam*

Proposed Elsecar Engine Restoration

Geoff Wallis

The Newcomen-type atmospheric engine at Elsecar near Barnsley was built in 1795 for the Fitzwilliam's colliery and pumped for well over 100 years. Although much modified over its working life, the engine is the oldest surviving atmospheric engine still over its original shaft, so is of world-class importance. It is a Scheduled Ancient Monument on the English Heritage Buildings at Risk Register. In 2011 Barnsley MBC received a Stage 1 HLF grant to develop proposals for restoration and 'animation' of the engine, and stabilisation of features in the shaft. Careful thought was given as to how to protect the Engine's metalwork from condensation, its greatest enemy, involving the use of an engine-sized quilt and low-level heating. Animation will be achieved by secreting a small hydraulic ram in the basement.

The shaft is now flooded, but a recent underwater camera survey revealed that it is open to its full 33m depth, with clear access to the Barnsley seam. The Remote Operating Vehicle (ROV) carrying out the survey could have entered and explored the seam but for an old cable that had been dropped down the shaft, threatening to snag the vehicle. The ROV survey also revealed an open clack box 30yds below ground, the cover of which was removed to ground level before the shaft was flooded. The 100ft high 21in diameter cast iron rising main dating from 1836 appears to be stabilised by large softwood clamps resting on stagings. Over the years the 20 T main has slipped sideways at least 9in at the top, such that the wrought iron pump-rod had to be forged to an offset to allow it to enter the main. The intention is to reinstall this so that the Engine and main will again appear complete externally.

The restored engine will be open to the public as part of the adjoining Elsecar Heritage Centre.

Elsecar Heritage Centre, Wath Road, Elsecar, S Yorkshire S74 8HJ. www.elsecar-heritage-centre.co.uk

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The Surviving Newcomen Engines

David Perrett outlines the details of what he believes are all the surviving, complete Newcomen engines

This article outlines what I believe to be all the surviving complete Newcomen engines in the world. Other engines such as replicas and various component parts do exist but are not described here. Most of the engines discussed here should probably be described as Newcomen-type rather than Newcomen engines but the shortened form will be used. The engines are listed in the order of when they were first built but all dates are approximate.
I would be pleased to receive corrections and additional information at: d.perrett647@btinternet.com



1725 Dartmouth Engine. The engine owned by the Newcomen Society and housed in the Memorial Engine House in Thomas Newcomen's birthplace, Dartmouth in Devon, is almost certainly the oldest surviving steam engine in the world. Following research in the Newdigate Archives in Warwick Record Office, Cyril Boucher argues convincingly that the engine was one of at least two built around 1725 for Griff Colliery, north of Coventry. Surviving documents describe an engine with a 22in cylinder cast at Coalbrookdale. In 1731 it was moved to Measham Colliery and in 1821 it was installed, with a second Newcomen engine, in an engine house to supply water to the Coventry Canal. At this time the engine was presumably 'modernised' with the addition of the surviving pickle pot condenser. The 1821 engine house at Hawkesbury Junction still survives. Both engines worked until about 1913 when the supply well dried up and they stood derelict in their engine house. The second engine was scrapped during WWII but fortunately the older engine remained. In 1963 it was donated to the Newcomen Society by the British Transport Commission and dismantled by Arthur Pyne before being moved to Dartmouth. The re-erected engine was formally opened on 24 July 1964. It has a simple untrussed, wooden beam with arch heads, chain connections and a hydraulic device, which is now used to turn the engine over. The operating valves are activated by a plug rod as in the earlier engines.
Sources: Boucher C.T.G. The Pumping Station at Hawkesbury Junction. TNS 35 1962 p59

1760 Fairbottom Bobs. Around 1928 Henry Ford presented Herbert Morton, one of his engineers at Ford's Trafford Park plant, with a list of steam engines he wished to acquire for a planned museum in his home village of Dearborn, Michigan, USA. A Newcomen engine was at the top of the list. The following year Morton took Ford to a site near Ashton-under-Lyne now in Greater Manchester. There, on the site of the former Chambers Colliery, stood the substantial remains of a Newcomen engine built around 1760 and in use until 1827. It was referred to locally as Fairbottom Bobs. The Trustees of the Earl of Stamford's estate donated the engine to Ford and in return he gave them a small footbridge over the adjacent River Medlock. The engine was shipped to Dearborn in October 1929 and soon re-erected, fully restored as the centre piece of the fine collection of English engines in the Ford Museum.



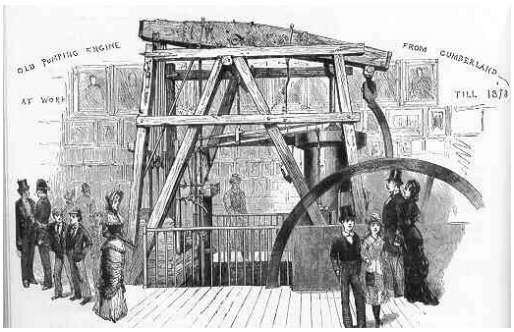
Sources: Morton. F, Strange Commissions for Henry Ford. Privately published 1946
Nevell, M, Roberts J & Champness B, Excavating the Ionic; The rediscovery of the Fairbottom Bobs Pumping Engine. Industrial Archaeology Review 24, 2004, p83
The Henry Ford (Museum), 20900 Oakwood Blvd., Dearborn, MI 48124-5029, USA. www.hfmgv.org

1791 Pentrich Colliery Engine. Built by Francis Thompson (1741-1809) at the Oakerthorpe Colliery, Alfreton, Derbyshire, this is the oldest engine to survive relatively complete and unaltered as well as showing all the essential features as developed by John Smeaton. The 54in diameter cylinder was cast by Smith & Co of Chesterfield and carries the Thompson name. In 1841 it was re-erected at nearby Pentrich Colliery, close to Ripley in Derbyshire, where it worked until 1918. The engine along with its engine house was acquired by the Science Museum in 1920 and is displayed in the main entrance hall.
Sources: The engine was featured in the Engineer 1917
Andersen Trans Inst. Min. Eng. 1917, LII, 396-445
Dickinson H.W. Catalogue of the Collections in the Science Museum: Stationary Engines HMSO 1925
The Science Museum, Exhibtion Road, London SW7 2DD. www.sciencemuseum.org.uk

1795 Elsecar Pumping Engine. The Elsecar Collieries were a series of coal mines sunk in and around Elsecar, south of Barnsley, that were developed by Earl Fitzwilliam. In 1796, the 4th Earl expanded Elsecar Old Colliery with the addition of steam engines. A New Colliery was sunk around 1795 by the Earl immediately to the south of his Elsecar Workshops. This colliery allowed the Fitzwilliams to expand coal production and exploit the transport opportunities presented by the Elsecar branch of the Dearne & Dove Canal which reached it in 1799. A drainage engine was installed at the new mine. Originally, the engine had a 42in cylinder but in 1801 it was replaced with a 48in cylinder from the Butterley Company of Derbyshire. In 1836 the original wooden beam was replaced with the present cast iron beam made at the Milton Ironworks. The engine operated as a mine drainage engine until 1923 when it was replaced by electric pumps. However, these failed in 1928 and the engine was briefly re-steamed. It was also operated in 1937

for a visit by the Newcomen Society. The last operating local mine, Elsecar Main closed in 1984 but the engine, in its house, remained. This engine was possibly the last commercially used Newcomen-type engine and the only one remaining on its original site. It is a Scheduled Ancient Monument.
Source: Clayton A.K. The Newcomen-Type Engine at Elsecar, West Riding. TNS 35 1962 p97

1795 Heslop Engine. This is not a "pure" Newcomen engine since it uses a combination of a single acting, high-pressure cylinder with a Newcomen cylinder. This arrangement had been patented by Adam Heslop in 1790, although it appears to infringe Watt's separate condenser patent, which remained in force until 1800. This winding and pumping engine made at Heslop's Lowca Foundry & Engineering Works was erected around 1795 at Kells Pit, Whitehaven, where it worked for some years. The hot and cold cylinders are 34 and 25 ins in diameter respectively, and the fly wheel is cast iron. It was subsequently used at other local pits (Castlerigg Pit in 1837, Wreah Pit, Whingill). The engine was presented to the Science Museum in 1878 by the Earl of Lonsdale but is not currently on display.



Sources: Fletcher H.A. Proc Inst Mech Eng 1879 85
Dickinson H W Catalogue of the Collections in the Science Museum, Stationary Engines HMSO 1925

1800 Moira Colliery Rotative Engine. Herbert Morton acquired not just Fairbottom Bobs for Ford but two more Newcomen Engines as well. Both the other engines employed the crank patented by James Pickard to generate rotary motion from an atmospheric engine. This engine was made by Moira Colliery Co., for use at its Moira Reservoir Colliery in Leicestershire.



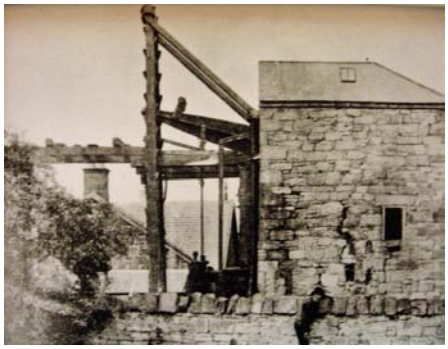
Its 33in diameter cylinder with 51in stroke operated at 15rpm. Its beam directly operates a winding drum and a second beam from the cylinder end of the main cast iron beam is used to pump from a mine shaft. It was shipped to the Henry Ford museum in 1929 and re-erected there.
Sources: Morton. F, Strange Commissions for Henry Ford. Privately published 1946.
King W.J, Beam Engines, Henry Ford Museum c1980

1800 Windmill End (Cobbs) Engine Rotative Engine. This is a rotative, Newcomen-type, engine with a cast iron beam, pickle pot condenser and crank attached to a fly wheel and winding drum that was removed from Windmill End, Netherton, Dudley in 1928 and transferred to the Henry Ford Museum the following year. Its 33in diameter cylinder with 51in stroke operated at 15rpm. The beam operates a mine drainage pump and a winding drum. The rotative engine was sited in an adjacent house at the Henry Ford.
Source: King W.J, Beam Engines, Henry Ford Museum c1980



1810 Farme Colliery Engine. This engine is the sole surviving rotative Newcomen engine in Europe and the only manually operated version left in the world. Farme Colliery was sunk in 1805 by John Farie of Farme Castle on the River Clyde. The engine was installed at the colliery in 1810 by John Mackay. It has a cast iron beam and the cylinder 32in bore by 66in stroke was made at Camlachrie Foundry in the east end of Glasgow. It was hand operated at all times and ran at up to 27rpm winding from a 60 fathom (360ft) shaft and worked substantially in its original form until 1915. It was then put into storage by Glasgow Museums. The engine was loaned to Summerlee Heritage Centre and rebuilt in 1987. It is this engine that is featured on the stamp commemorating Thomas Newcomen which was issued by the Royal Mail on 23 February. (see page 7 of this issue of Links)
Source: David Napier, Engineer, 1790-1869. An autobiographical sketch with notes. Published by James Maclehose & Sons Glasgow. 1912.

1811 Caprington Colliery Engine. The Caprington Colliery opened in the mid 17th century and had constant drainage problems due to being in the low-lying Irvine valley. In 1781 the Carron Company, of Falkirk, supplied parts for a Newcomen engine to Sir William Cunninghame of Caprington, but the pumping shaft collapsed in 1828 and the mine was abandoned. A further engine was ordered from the Carron Company for £352 in 1811. It was erected on a site which survives near Earlston. One of its parts, a knee pipe, bearing the inventory number N1708, was recycled from the 1781 engine. This is a Newcomen-type, atmospheric, beam pumping engine with a 30in bore and a stroke of 54-60in within a 96in long cylinder but with a replacement cast iron beam made around 1837. This engine drained the Blind Coal seam at a depth of 55yds and worked continuously until 1901, when having been replaced by electric pumps, it was donated to the Burgh of Kilmarnock by Colonel Cunninghame of Caprington. Andrew Barclay & Sons erected the engine at the newly opened Dick Institute in Kilmarnock where it remained until 1958 when it was deemed unstable. It is now operated by hydraulic power and on display in the National Museums of Scotland in Edinburgh.
Source: Engineer 15th July 1898
National Museums of Scotland, Chambers Street, Edinburgh EH1 1JF. www.nms.ac.uk



Other 2012 Anniversaries....

Boulton & Watt Engine at Crofton 1812

The 42in Boulton and Watt Engine at Crofton Pumping Station on the Kennet and Avon Canal.
In 1812 the 42in Boulton and Watt engine at Crofton Pumping Station on the Kennet and Avon Canal was installed. Apart from a brief period between 1959 and 1970 this engine has worked continuously since 1812 pumping water into the summit level of the canal and continues doing so today. There will be celbrations to mark this bi-centenary. Steaming weekends on 2/3/4 June; 16/17 June and 30 June/1 July. Other events being organised include the delivery of a narrow boat load of coal. *Ian Broom*

Crofton Pumping Station, Crofton, Marlborough, Wiltshire, SN8 3DW.
www.croftonbeamengines.org

Charles Dickens 1812



Dickens' Journals Online.
A complete online edition of Dickens's weekly magazines, Household Words and All the Year Round has been completed as a joint project by the Universities of Buckingham and Leicester. In their day these were phenomenally popular journals, and carried articles on the enormity and impact of the changes brought by industrialisation. They included 172 articles on Agriculture, 74 on Arts and Sciences and 180 on Commerce covering the building of the railways, factories and the Great Exhibition. Dickens argued for the protection of inventors' rights in the run up to the 1852 Patent Act Poor Man's Tale of a Patent.
www.djo.org.uk/

Titanic Sinks 14 April 1912

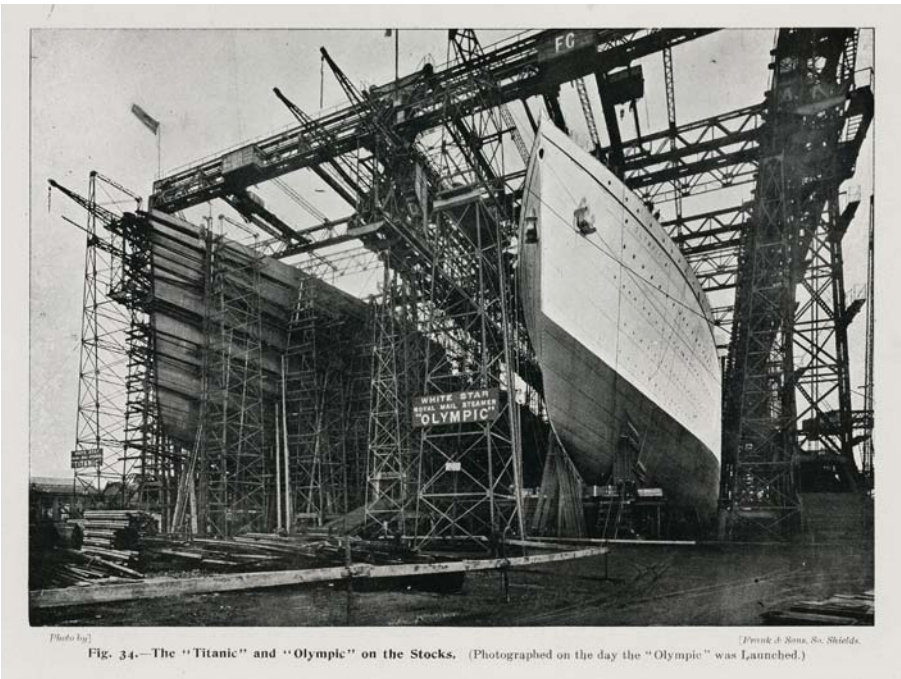
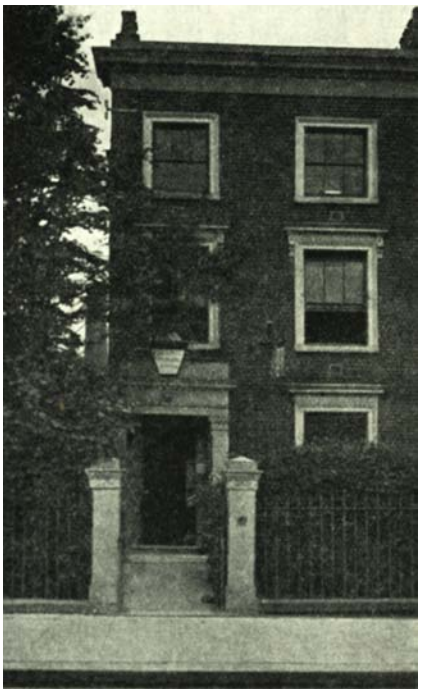


Fig. 34.—The "Titanic" and "Olympic" on the Stocks. (Photographed on the day the "Olympic" was Launched.)

The Titanic and Olympic on the stocks', Belfast, 20 October, 1910.
The White Star Line passenger liners 'Titanic' (left) and the 'Olympic' (right) on the day the Olympic was launched. She was the largest vessel in the world until the launch of the Titanic. Olympic was scrapped in 1935 after striking and sinking the famous Nantucket lightship off the eastern coast of the USA. Titanic struck an iceberg in fog south of Newfoundland en route from Southampton to New York on 14 April 1912. She had been believed by her designers to be unsinkable, but five of the vessel's watertight compartments ruptured, and over 1500 lives were lost. Illustration from 'The White Star triple-screw Atlantic liners 'Olympic' and 'Titanic', 45,000 tons : the largest steamships in the world', published in Newcastle-on-Tyne in 1911. Image No. 1043860. Credit © Science Museum/SSPL. All Rights Reserved

Titanica The Exhibition at Ulster Folk & Transport Museum, Holywood, Co Down BT18 0EU
Discover RMS Titanic objects recovered from the icy Atlantic including original plans of the ship with last minute design changes; trains and trams workers would have travelled on to the Harland & Wolff Shipyard and the more exclusive Minerva car, popular with first class passengers of the time. **Further information at: www.nmni.com/titanic**

Titanic - a one day Conference at The National Archives, Kew TW9 4DU 14 April 2012
This conference will look at all aspects of Titanic in its historical setting from its construction and technology to the great hope it provided for those who sailed on her and to the aftermath of its sinking. Titanic records provide a rich source of information on the 2,223 individuals who sailed on her as well as their families and the communities in which they served. Speakers include specialists from The National Archives, academics, published authors and Titanic experts who will examine the history of the ship, from its construction and launch to its fateful end. Attendees will also be able to view a special Titanic exhibition, housed in the NA Museum.
Further Information at: www.nationalarchives.gov.uk.



Epsom telephone exchange, Station Road (now Upper High Street), Epsom, 1912. Courtesy of BT Archives

The first automatic telephone exchange on the public network at Epsom 18 May1912

This year marks the centenary of the introduction of the UK's first automatic telephone exchange on the public network. The Post Office manual exchange at Epsom, Surrey, was 'cut-over' to Strowger step-by-step machine switching at 3pm on Saturday 18 May 1912. This was the first of a series of trials of competing systems of switching before the Post Office made the decision in 1922 to standardise on Strowger. There were several reasons why Epsom was chosen. Purely local calls within Epsom exchange comprised over one third of the total; the number of subscribers overall was quite small at around 350, minimising the ill-effects of any breakdown; it was felt that the subscribers there would be amenable to being asked to do extra work in making calls; and it would take comparatively little time to 'educate' them in the technique of dialling. The conversion was immediately successful. Connexion times were reduced dramatically, particularly on local calls. Within three months traffic increased by 60 per cent offering the promise of reduced staff costs. There was, however, a later irony. By the early 1930s Epsom auto exchange could not be expanded further. As it was outside the London 10 mile limit of automatic working, the new exchange, opened in 1932, was manual. Epsom's telephone users lost their dial telephones and did not regain them until 1965.

John Liffen presented his paper on the First Automatic Telephone Exchange on the Public Network at the Society's London meeting in February 2012. It will be published in the Society's Journal later this year.

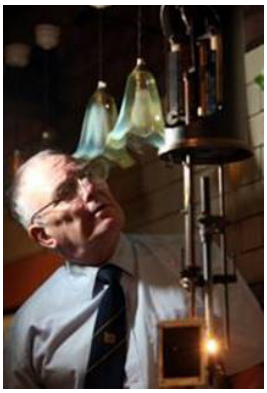
News from Museums.....

MOSI

Michael Bailey

Manchester's Museum of Science and Industry (MOSI), which has been an independent trust since opening in 1983, was absorbed into the National Museum of Science and Industry (NMSI) on 1 February. It joins the London Science Museum, the National Railway Museum in York and the National Media Museum in Bradford as part of the NMSI group. The MOSI Trust has been disbanded and the NMSI Trustees have responsibility for all its activities. The former Director, Tony Hill, has stood down from his position, and the NMSI Director of Learning, Jean Franczyk, has been appointed as Director.

The Electric Lamp Shines - An arc lamp has been restored to full working order. Electrical engineer, Ron Whalley, has powered up the basic form of historic light in the Electricity Gallery using a generator from the Electric Construction Company. Ron said: 'The arc light hadn't been fired up for many years but the light and generator just needed some servicing and a safety barrier so that it can be demonstrated to the public. This was a significant development in lighting and this lamp is one of only two working examples left in the country.' It gives a very intense form of white light and was first demonstrated in a crude form by Sir Humphry Davy to the Royal Institution. He coupled chemical cells together to form a battery and connected them to two carbon rods. After touching the rods together he drew them apart and an arc shaped spark was drawn between them. By the mid-1800s the arc lamp was developed for use in streets, railway stations and large buildings but it was never practical for domestic lighting as the lights were too bright and smoked slightly and were very maintenance-intensive. By World War I the filament lamp replaced most public lighting, but arc lamps remained in use particularly in cinema projectors even into the 1980s because of their high output point source of white light.



Ron Whalley with the lamp

Museum of Science and Industry, Liverpool Road, Castlefield, Manchester M3 4FP . www.mosi.org.uk

The Wedgwood Museum & Archives

David Jacques

The current uncertainty about the future of the Wedgwood Museum arises from a verbal judgement late in 2011 that its contents could be sold to add to the pension pot of former employees of the Wedgwood company. This came as a surprise as the Museum had always seen itself as independent from the company. The judgement of the Attorney-General is expected to consider appealing against it. Meanwhile the trustees and director are adamant that the Museum must remain unsold, as the primary record of the artistic and scientific achievements of Josiah Wedgwood, his descendants and company employees. Josiah's scientific achievements are being reassessed; he invented the pyrometer and was a central member of the Lunar Society. His archives have very recently been added to theUNESCO 'Memory of the World' register, meaning that it has been identified as one of only 20 items and collections among Britain's libraries, archives and museums to represent the outstanding heritage of the UK. Josiah's son Tom has now been recognised as the first person to establish, in 1791, a method to copy visible images chemically to permanent media.

Museum website: www.wedgwoodmuseum.org.uk

Michael Faraday

Frank A.J.L. James reflects on completing The Correspondence of Michael Faraday



South Foreland was one of the lighthouses in the programme to electrify lighthouses using magneto-electricity in the 1850s and 60s.

There is always a tendency for us to read our current disciplinary categories back into the past. Thus Marc Brunel and his son Isambard are perceived as engineers, whilst Michael Faraday, frequently portrayed as working alone in his basement laboratory at the Royal Institution, is seen as a scientist – a word not coined until 1833. Faraday's case is complicated by his becoming by the end of the 19th century and still in the present the iconic figure of electrical engineering, due to his inventions of the electric motor, transformer and generator. Furthermore, one of the things that his complete extant correspondence shows is that, contrary to his usual image, he was also an innovatory figure in the practice of Victorian engineering.

There are many examples that illustrate this, covering the range of possible outcomes from failure to success in practice. In the 1820s Faraday worked closely with the Brunels in attempting to develop a form of motive power, called a gaz engine, based on his work of liquefying gases, that he began in 1823. Despite much effort and investment, this failed to produce any practical technology. Far more successful was the application of the field theory of electro-magnetism formulated by Faraday following his 1845 discovery that magnetism was a universal property of matter. Using field theory and working with William Thomson (later Lord Kelvin) Professor of Natural Philosophy at Glasgow University, they were able to develop a theory of long distance telegraph signalling that showed it would be possible to send a readable signal through a cable across the Atlantic Ocean. Faraday read a paper on this to the Institution of Civil Engineers (of which he had been an Honorary Member since 1838) in 1857 and the following year the first telegraph cable was laid from Ireland to Newfoundland. Although it soon ceased functioning for a number of reasons, while it worked it did show what could be achieved by the new theory of the field.

Somewhere in between the failure of the gaz engine and the success of field theory, lies Faraday's work on lighthouses and therein lay the real surprise of editing his entire correspondence. Faraday was constantly being asked by the state and its agencies, ranging from the Admiralty to the Home Office, for scientific advice. Typically most of these were episodes of short duration, for example the inquiry he conducted into the explosion at Haswell Colliery, County Durham, in which 95 men and boys had been killed in 1844, or his advice ten years later not to attack Cronstadt using sulphur ships during the Anglo-French war against Russia. However, his appointment in 1836 as scientific adviser to the Corporation of Elder Brethren of Trinity House, the English and Welsh lighthouse authority, initiated a strand in Faraday's career that would last until very nearly the end of his life in 1867.

It was, of course, known that Faraday held this position, and later a similar role at the Board of Trade to work on colonial lighthouses, but his early biographers had minimised his involvement, preferring instead to concentrate on Faraday's scientific research. Thus when the papers of Trinity



Professor James with the six volumes of Michael Faraday's correspondence.

House became available for study in 1994, I was expecting perhaps fifty or so letters, and nothing prepared me for the more than five hundred letters that passed between Faraday and the Corporation between 1836 and 1867. In total roughly 17% of his extant letters after 1836 deal with lighthouse matters. Of course much of this work was of a mundane nature, continuing his role, and that of the Royal Institution, in providing scientific advice for the state and its agencies. Thus he would analyse the drinking water used by lighthouse keepers and ensure that the red and white lead used for painting the lighthouse exteriors had not been adulterated.

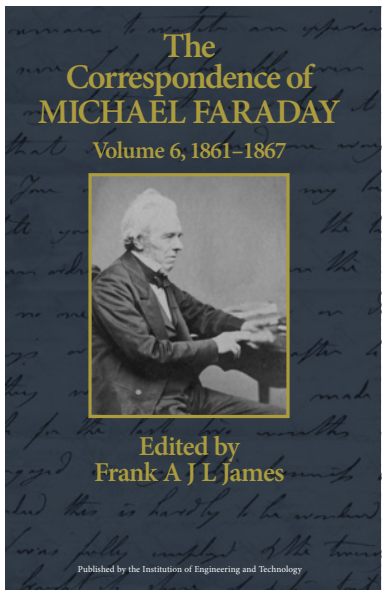
But in a couple of areas Faraday's involvement with Trinity House was far from mundane. In February 1841 Faraday visited St Catherine's lighthouse on the Isle of Wight where he received a complaint from the keeper about having to continually keep the lanthorn clean because of the products of combustion from the flame. As a consequence Faraday invented a double wall cylindrical lamp cowl that allowed the products of combustion to be syphoned away from the lanthorn, which he described at a meeting of the Institution of Civil Engineers. This was so successful that it was installed in all lighthouses as well as other buildings such as the Athenaeum, Buckingham Palace and the new Houses of Parliament. Faraday made the invention over to his brother Robert who patented it – the only piece of Faraday's work to be so protected.

The other example of innovation was the programme to electrify lighthouses using magneto-electricity in the 1850s and 1860s. This was the first use of electricity for power purposes (as opposed to communication) and its implementation can in large measure be directly attributed to Faraday's influence within Trinity House. Nothing else can really account for the decision to develop this new technology in remote areas, usually exposed to inclement weather and with staff whose skill levels and social habits left much to be desired. Although Faraday did not develop the technology (that was done by Frederick Holmes, a rather obscure figure), he was present at the key meetings where it was decided to install the light at the South Foreland lighthouse and later at Dungeness, as well as advising Lady Howard de Walden about using it at Portland Bill. The electric light first shone across the Channel from the South Foreland on 8 December 1858. Thereafter Faraday frequently visited the site to monitor performance and on one occasion had to walk across snow covered fields to reach the lighthouse. John Tyndall, Faraday's successor at both the Royal Institution and Trinity House, continued with the electrification programme, but he did not share Faraday's almost metaphysical belief in the power of electricity. Thus the idea of using a steam engine to drive an electric generator to power a carbon arc in a lighthouse lanthorn came to be seen as cumbersome and the electrification programme was terminated. Electricity was not used again for lighthouses until the 1920s following Swan's invention of the filament lamp and the beginnings of the centralised supply of electricity.

So why hasn't Faraday's significant role in engineering practice been noticed before? In part it was due to a belief in the value of 'pure science' that became common in the last third of the 19th century. Although there was no issue about applying the results of science for technological purposes, indeed that was necessary to justify increasing support for scientific research, it was altogether another matter for one of the icons of 19th century science to be seen to be intimately involved in engineering practice. Hence the downplaying of Faraday's engineering work by his early biographers. This had the effect of reinforcing a perceived division between the practice of science and that of engineering – to the detriment of both in my view.

The publication of all of Faraday's 5053 extant letters means that we can now see him in the round without the ideological filters imposed by late Victorian (and indeed 20th century) writers. This can, I hope, only have a beneficial effect not only in our historical understanding of Faraday, but also of the historical relations between science and engineering which should caution us from too readily applying today's disciplinary boundaries to the past.

The Correspondence of Michael Faraday: Vol 6: 1861-1867



The Correspondence of Michael Faraday: Vol 6: 1861-1867. Edited by Frank A J L James Published by The Institution of Engineering and Technology. Hardcover 800 pages ISBN-10: 0863419577 £85

Tasmania, 2011

Clive Ellam

In November 2011, a party of Newcomen Society members and friends travelled to Tasmania, via Melbourne, to explore the island before joining Engineering Heritage Australia (EHA) members in Hobart for the 16th Australasian Engineering Heritage Conference. This note describes some highlights of our visit to Tasmania

After British settlers arrived in Tasmania in 1803, roads and bridges were an early requirement. We saw several bridges, ranging from Australia's oldest large stone arch bridge (convict-built in 1823-5) at Richmond, to Batman Bridge (1966-68), Australia's first cable-stayed bridge. We also inspected several other convict-built bridges, including the dry stone Spiky Bridge (1843), named after its parapet of vertical stones, and the Red Bridge (1836-8) at Campbell Town, which recently had stainless steel anchor rods grouted



A general view of the 1823-5 convict-built Richmond Bridge

unobtrusively into its brick arches to withstand modern traffic loadings. In contrast, we saw the parallel steel arch spans of Launceston's Kings Bridge (1863 and 1903) and the 1946 road/rail Bridgewater lift bridge.

In 1874, tin mines opened in the north-east on the Blue Tiers above St Helens, where the History Room preserves mining memories. We examined models of the, now derelict, Anchor Mine stamp battery and its, now vanished, 20m (66ft) water wheel, to prepare for our next day's bush walk to see the battery.

We moved on to Derby, where mining continued until 1946, to visit the Tin Mine Centre. The Beaconsfield Mine and Heritage Centre showed us gold mining; it occupies the original Beaconsfield Mine 1880-1914 buildings, which once housed three very large steam pumping engines (1903) by Hathorn Davey of Leeds. Sadly, only the engine houses survive; they now display relics associated with the mine. Adjacent to the Heritage Centre, a new mine, sunk in 2000, produces about 60,000 ounces



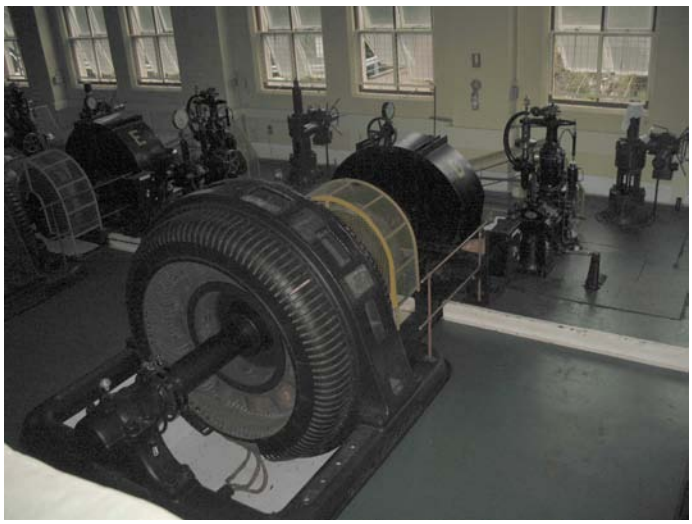
The derelict Atlas Mine stamp battery

of gold per year and visitors can watch the surface operations. Large-scale copper mining and smelting was developed at Queenstown, principally by the 1893 Mount Lyell Mining and Railway Company led by the mining engineer and metallurgist Robert Sticht, General Manager from 1897. Sticht introduced pyritic smelting, in which the sulphur in the ore is burnt, and the local environment was devastated by fumes and tree felling, so that Queenstown became surrounded by bare mountains. Recently, much effort and money has revived the growth of vegetation. Sticht's office, preserved almost unchanged, suggests he was cultured and intelligent. However, in company documents, now at the University of Melbourne, Sticht appears complicit in a 1912 cover-up to avoid liability for several deaths in an underground fire. The company escaped liability but thereafter working conditions were slowly improved and Sticht, who strongly opposed unionisation, was quietly sidelined. We saw several early 20th century hydro-electricity installations, the oldest being the 1908 Moorina station, built deep in the bush for the Pioneer tin mine, which ran until closure by Hydro Tasmania in 2008. Its future is uncertain,



The 1916 machine hall of the Waddamana A power station, which is now a museum

although its three Pelton wheel turbine/alternator sets remain. In contrast, the Mount Lyell Company's 1914 Lake Margaret station, near Queenstown, still generates for Hydro Tasmania, the current owners. Seven Pelton wheels driving open-framed alternators provide a capacity of about 8.5MW. Each alternator originally had its own Pelton-wheel/DC-exciter set but the grid now provides excitation current. Water is brought from Lake Margaret through a recently renewed 2.2km (1.4m) wood-stave pipeline followed by a steel pressure penstock. Waddamana A station (1916-1964), near the centre of the island, is now a museum. Displays of sectioned machinery and other components explain hydro-electric power generation and distribution. Like Moorina and Lake Margaret, Waddamana has Pelton wheel turbines but the alternators are more enclosed than at Lake Margaret. We were allowed to visit the adjoining, newer Waddamana B station which closed in 1994.



Hydro-electricity generation requires water storage dams and we saw several of varying size and construction. The Pioneer mine's modest Frome dam was Australia's first concrete-faced rock-fill dam, with a concrete upstream wall, buttressed downstream by compacted rock fill. Simpler construction was seen in the reinforced concrete slab and buttress Mount Paris dam. The largest dam visited was the Hydro Tasmania Cethana dam, a 110m (361ft) high concrete-faced rock-fill dam on the Forth River.



Much of the Tasmanian 1066mm (3ft 6in) gauge railway network is now closed and we visited three 'preserved' railways, all rebuilt on redundant track beds. The 3ft 6in gauge Don River Railway, near Devonport, on the track bed of the former Devonport to Melrose branch, owns an extensive collection of locomotives and rolling stock and has a well-equipped workshop. The 610mm (2ft) gauge Redwater Creek Railway at Sheffield re-uses the former Railton-Roland track bed and the rebuilt Sheffield station. The principal locomotive is a Krauss 0-4-0T, which is small enough to be turned on an adapted wagon turntable. The site also houses other steam engines. The longest railway visited, the 'West Coast Wilderness Railway', is a rebuild of Mount Lyell's 1896 railway from Queenstown to the port of Strahan, which includes two Abt rack sections to surmount the watershed between two rivers. Tourist trains are hauled over the watershed by restored, original Dübs & Co (Glasgow) steam locomotives and thence by diesel to Strahan.



After visiting a Georgian farm complex with a water-wheel powering a distillery, a major highlight was a visit to the Boyer newsprint mill, owned by the Norwegian company Norske Skog, which exploits a unique process using Tasmanian hardwoods rather than softwoods. Most of the output moves by rail to the port of Burnie and we saw the train depart, headed by four diesel-electric locomotives.

Above Top: An alternator set in full operation at Lake Margaret
Above: One of the 1896 Neilson rack & adhesion locomotives on an adhesion section of the West Coast Wilderness Railway
Below: The Abt rack of the West Coast Wilderness Railway.

For help with visits in Melbourne, we thank Owen Peake, then EHA National Chair, and Miles Pierce, the Victoria EHA Chair. In Tasmania, we thank Bruce Cole, Tasmania EHA Chair; Kym and Ian Mathews, St Helens and Mike Cooke, a former operator there; and our enthusiastic guide at Moorina. Finally, we thank Paul Saulter for making all the necessary arrangements through his company, Heritage of Industry.

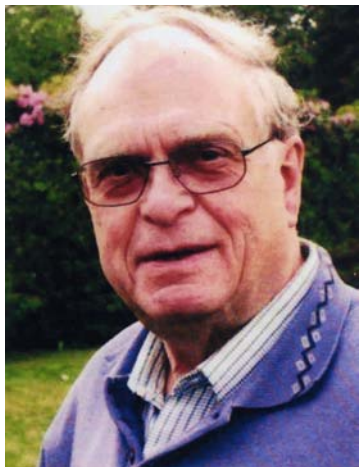
Heritage of Industry: www.heritageofindustry.co.uk

Obituaries

Dr. Peter Merriman 1929-2011

The Newcomen Society's Honorary Secretary, Dr Peter Charles Merriman, died on 28 December 2011, aged 82, following a short illness. He had been a member of the Society since 1973 and was first elected to Council in 1980, after which he served for several terms as an elected member before being elected Honorary Secretary in 2004. He was appointed to a Newcomen Fellowship in February 2011.

Peter Merriman graduated in chemistry at University College London, afterwards gaining his PhD at the same institution. On leaving university, he obtained a Short Service Commission in the Royal Air Force, in lieu of National Service, most of which he spent at RAF Locking, near Weston-super-Mare teaching electronics. Following his RAF service, he became a chemistry teacher at Wells Cathedral School, afterwards moving to Oswestry School, where he was also a House Master. In 1967, he joined Wiggins Teape, the paper makers, as a graduate recruiter, moving with his wife, Daphne, and his children to Beaconsfield to live a short distance away from the country house where the Wiggins Teape research laboratories were located. After several years recruiting graduates, he joined the Chemical Industries Association, eventually becoming their Safety Officer, in which role he made several appearances on the BBC 'Today' programme to explain chemical safety issues. During this period, he took great delight in telling people that he worked for the CIA and watching their eyebrows go up! Peter's entry into the Newcomen Society was not quite conventional. By 1973,



Peter and I had become members of a small coterie of commuters from Beaconsfield to Marylebone. On the opening day of the 1973 Summer Meeting, held in Cardiff, Peter observed me on the train with my suitcase, en route to my first such event and proceeded to quiz me as to what I was doing. He expressed great interest in the Society and asked how he could join in the Summer Meeting, so I sent him off to talk to John Butler, the Executive Secretary. What passed between them, I never knew, but Peter appeared in Cardiff later that day. In due course, his membership was approved by Council in the usual way.

Peter retained his interest in electronics and radio throughout his life and, as well as his Newcomen Society activities, became a member of the Colossus Rebuild Team at Bletchley Park and later served as a Volunteer Guide there. He also possessed a fine singing voice and was for many years a mainstay of the Beaconsfield Amateur Operatic Society and of the choir at St Mary and All Angels C of E Church.

Although Peter never contributed to the formal proceedings of the Newcomen Society, his involvement in its activities was considerable and he will be much missed. He is survived by Daphne, their sons Andy and David, and several grandchildren.

Clive Ellam

Dr. David Henderson Tew 1920-2011

Until some twenty years ago, the Transactions of the Newcomen Society regularly printed a list of the presidents of the Society, and even though that excellent tradition has been abandoned I feel pretty certain that David Tew would have been our senior Past-President when he died last September. Keith Gale, Ronald Clark, John Crabtree, Keith Gilbert, Frank Nixon and Alec Skempton, who had served in the office of President for the period immediately before him, were all dead. The passing of David Tew is thus worth commemorating on grounds of seniority, not only for his distinguished service as President in the years 1979-1981, but also for his long and efficient service to the Society as its Honorary Solicitor through some difficult times.

My first clear recollection of David is of the occasion in 1967 when he brought his wife and two young daughters to the lively summer meeting in the Lake District organised by Lord Wilson, which encouraged me to take my own family to several subsequent conferences. Then in 1968 he and I attended the International Congress for the History of Science, Technology and Medicine as the representatives of the Newcomen Society. The conference was held in Paris, in the aftermath of the 'Czech Spring' and the upheaval of the student riots that summer, and was the occasion when ICOHTEC, the International Committee for the History of Technology was established. David and his family took a charming apartment on the Rue du Cherche Midi for the duration of the Congress, and entertained myself and others to a very pleasant lunch there one afternoon.

As President of the Newcomen Society, David organised the 1981 summer meeting at Hertford College, Oxford, where he had been a student himself, and arranged an excellent programme with a distinctly rural flavour. Later in the same year he organised a joint meeting with the American Society of Mechanical Engineers when they visited Britain to put a plaque on the Newcomen engine at Dartmouth, in the course of their International Historic Mechanical Engineering Landmarking programme. David remained very supportive when I succeeded him as President, attending the summer meeting which I hosted at Bath in 1982.

David Tew spent most of his career as a solicitor in Rutland, which stimulated his long-standing interest in land drainage, canals, canal lifts, and pumping engines, about which he conducted some valuable research. He communicated some of the results of this work to the Society, by papers in the Transactions on: 'John Smith of Coven, Engineer, 1827-79' (vol.26, pp.161-8); 'Canal Lifts and Inclines' (vol.28, pp.35-58); and 'The Continental origins of the man-engine' (vol.30, pp.49-62). He had the grievous misfortune of suffering a severe viral paralysis in 1989, which seriously impaired his activity for the remainder of his life. Nevertheless, with the constant support of his wife, Brenda, he tackled his handicap with characteristic determination and registered for a PhD

degree at the University of Leicester, which he achieved in 1998 with a dissertation on 'The origins, rise and decline of the Free Mining Customs in England and North Wales: a legal standpoint'. He was supervised by Professor Marilyn Palmer, who recalls triumphantly pushing his wheelchair across the platform to receive this Degree. It was a fitting tribute for a valiant historian of technology.
Angus Buchanan Past-President, 1981-83.

David Tew was a member of the Society for no less than 67 years and Member of Council for 30. Born in Hampshire in 1920, the son of a Chief Justice in the Colonial Service in Sierra Leone, he attended Bryanston School and went on to read history at Hertford College Oxford, the fourth generation of his family at that college. After war service he spent several years as a bookseller in Cambridge but then switched to the law and worked for many years as a solicitor in Oakham. His longstanding interest in the history of technology led him to join the Society in 1944 and take part in the first post-war overseas visit to the Netherlands in 1949. Thereafter he was a regular at Summer Meetings. During the two seasons he was President, he took, as the subject of his Presidential Address, 'The Roman Waterways in the Fens'. Outside the Society he was an officer of the National Traction Engine Club and also of The Railway and Canal Historical Society. Using his legal expertise, he helped many people in the industrial heritage movement and was also very active in his Church and local community. Although he had no engineering background his scope of interests in the history of technology was remarkable. He read three papers to the Society, published six books as well as his PhD. His scholarly standards were high. In 1989 illness brought an end to David's regular trips to Council which he had enjoyed very much. His outstanding service was recognised when he was elected one of the first Newcomen Fellows in 2010. Dr John Russell presented his certificate to him to his great delight.

David died on 14 September 2011 in Oakham. His strong will and good humour had made it possible, with the care of his beloved Brenda, to stay at home all those years. He will be much missed by Brenda, his daughters, their families and all his friends. I am glad to say "I was one of them".
Jur Kingma

Gas Turbines

Carl Göran Nilson responds to an article in December Links

In the December 2011 issue of Links there is an article on the history of the gas turbine. There is a statement that in 1947 the Royal Navy's Motor Gun Boat 2009 was the first ever gas turbine propelled sea going vessel. However, in 1940 the Royal Swedish Navy , in desperate need of ships to meet the demands of the recently begun WW2, scraped together old but still usable ships. Many of them were modernized. So was the mine layer or light cuiser by the name HMS Clas Fleming.

She was originally commissioned in 1914. In 1940 she was found worthy of a thorough modernisation. Her original length of 80m was increased to 86m and her displacement of 1850 tons was increased accordingly to about 2100 tons, but the most interesting change was in her machinery. Her two old Parsons steam turbines, developing 3250 hp each, and their boilers were replaced by two rather peculiar machines. The principle is explained with reference to figure 1. This type of machine was invented in the 1920s by an ingenious design engineer, Erik Johansson, who was employed by the shipyard Götaverken.

In short there is a two-stroke supercharged diesel engine with the sole purpose of driving its own supercharger. The rich flow of exhaust gases from the diesel engine is led to a gas turbine, a slightly modified steam turbine, which via gearing, turns the ship's screw. As can be seen in the diagram there is also an astern turbine on the same shaft as the forward turbine. Undeniably, the ship is gas turbine propelled.

The modern gas turbine's axial compressor, and combustion chambers, are here replaced by the supercharger and the diesel engine. In both cases this unit may be called a gas generator. So, HMS Clas Fleming, recommissioned in 1940, was the first ever sea going vessel propelled by gas turbines. She, being a twin screw vessel, had two gas turbines, each developing 3600hp at 3000rpm.

The Web

Nigel Hobden has interesting websites to consult

Engineers & the US National Parks
From bridges to tunnels to space ships to gold mines, and more, the US National Park Service has been collecting detailed 3D renderings of a wide variety of projects. The Historic American Engineering Record (HAER) is a joint project of the National Park Service, the American Society of Civil Engineers, and the Library of Congress that has been documenting these great engineering feats.
http://news.cnet.com/2300-13772_3-10011370.html?tag=newsletter&tag=nl.e434

US Spy Planes
There is a fascinating website of detailed photographs of US U2 spy planes from the 1950s to the present unmanned ones. The pictures include exteriors, interiors, cockpits, pilots suits and views from above and on the ground.
http://news.cnet.com/2300-11386_3-10008939.html?tag=newsletter&tag=nl.e434

Ancient Computers in use Today: if it ain't broke don't fix it.
A lengthy article in PC World dispel the myth that all major computer programmes are regularly updated.
...While much of the tech world views a two-year-old smartphone as hopelessly obsolete, large swaths of our transportation and military infrastructure, some modern businesses, and even a few computer programmers rely daily on technology that hasn't been updated for decades....
Read the full article at:
www.pcworld.com/article/249951/if_it_aint_broke_dont_fix_it_ancient_computers_in_use_today.html

The Newcomen Diary

March

14 London

Engineering the Olympics: by Sir John Armitt, Chairman The Olympic Delivery Authority. 5.45pm at The Director's Suite, Science Museum, London Please note change of venue

20 Southern

The Development of Heathrow Airport: by Ian Anderson.

April

4 Midland

The First Newcomen Engine, Why 1712?: by John Allen (member) and Dr Jim Andrew (member).

11 London

Rolls Royce Cars: by Philip Hall.

18 North Eastern

Vickers Master Shipbuilder, Sir Leonard Redshaw; by Leslie Shore (member) Meeting starts at 6pm.

19 Western

The Michell Engine: by John Anning (member).

24 Southern

William Walker, The Diver who saved Winchester Cathedral: by Gary Wallace-Potter.

May

9** London

Dickinson Memorial Lecture: Sustainable Transport, the Car's Second Century. Professor Julia King CBE FREng.

11** Dundee

Knowledge Exchange event run by STICK (Scottish Transport & Industry Collections & Knowledge network): Steam engines in Scotland.To be held at The McManus: Dundees's Art Gallery and Museum. Booking essential

17-18** North Eastern

Conference: Some Aspects of Electrical Power Generation: from steam turbines to tidal stream. To be held at the Discovery Museum. Booking essential

19 Western

Uses of Steam in Bristol: by Paul Stevens.

23** Southern

Thomas Newcomen (1664-1729), Pioneer of Steam Power: by Dr Jim Andrew (member). To be held at University of Portsmouth at 6pm followed by a drinks reception. Admission free but places are limited, reservations from: events@port.ac.uk.

June

26-28**North Western

Conference: The Nuclear Industry– Learning from the Past and Looking to the Future. To be held at MOSI. Booking essential

July

2-6** Ireland

The Summer Meeting, Limerick - Shannon Region. Booking essential

12-13** Dartmouth

Conference: The life and works of Thomas Newcomen. Booking essential

14-15** Midlands

Lecture and Visits: Developments in the Earliest Steam Engines to be held at Black Country Museum and Thinktank, The Birmingham Science Museum. Booking essential

28** Wales

Conference: Power Progressed – The potential of 'strong steam'. To be held at National Waterfront Museum, Swansea. Booking essential

***This is one of the special 2012 events. Please see the separate Programme of Events for booking forms and further information.*

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24 April 2012 Newcomen Visit to the Isle of Grain Liquefied Natural Gas Facility

The facility can supply 24% of Britain's gas requirements. There will be an engineering style talk about the history and background to the site. This will be followed by a tour of the site and the LNG tanker docking facilities. Places are limited.

Contact: Fred Starr 020 8764 7837 or newcomen.starr@yahoo.com