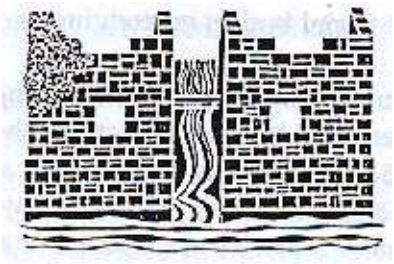


**Gunpowder & Explosives History Group**

**NEWSLETTER 2, FEBRUARY 2001**

**GEHG MEETING AND SITE VISIT**
**WALTHAM ABBEY ROYAL GUNPOWDER MILLS**
**SATURDAY 19th MAY 2001**

**PROVISIONAL PROGRAMME**

| | |
|---|---|
| 10.00-10.30 | Assemble at main entrance to Waltham Abbey RGPM. |
| 10.30-11.00 | Welcome and Group business (probably to be held in the seminar room). Please let the Chair know if there is any matter you wish to raise. |
| 11.00-12.30 | Site visit (1) – self-guided tour of interpretation centre and southern part of site, including nineteenth century steam powered gunpowder mills. |
| 12.30-13.30 | Lunch. Members may bring their own packed lunches, but catering facilities should be available on-site by the time of the visit. |
| 13.30 | Site visit (2) - Assemble at café for walking tour of the northern part of the site led by Wayne Cocroft. |
| 16.0 | Tea at the café and disperse |

Members are advised that we will be visiting parts of the site not normally accessible to the public, these areas are heavily overgrown and rough underfoot, sturdy shoes, or hiking boots, and old trousers are recommended.

Cost – By the time of the visit Waltham Abbey Royal Gunpowder Mills will be open as a visitor attraction, it is anticipated that the admission charge will be at the group rate of around £5 per person, there will also be a small administration charge to include morning coffee of around £2.

## TRAVEL DIRECTIONS TO WALTHAM ABBEY

Waltham Abbey is easily accessible from the M25, members travelling from the east should leave the motorway at Junction 26 and take the new link road (on the southern side of the junction) which leads directly to the main entrance and car park. Members travelling from the west should leave the motorway at Junction 25 and head southwards on the A10, at the first set of traffic lights turn left towards Waltham Cross, at the next set of lights (adjacent to a garage) turn left, at the roundabout take the right turn towards Waltham Abbey, and at the next roundabout turn right. This road then crosses the railway, the entrance to the site is on the left hand side just after the entry to the Lea Valley Country Park, but before the next roundabout.

Waltham Abbey may be reached by rail from London, Liverpool Street Station, take the train to Waltham Cross, come out of the station, turn right and climb the steps and turn right towards Waltham Abbey, the entrance to the site is on left hand side after the entry to the Lea Valley Country Park. The walk will take about 15-20 minutes.

## SIGNET LETTERS OF HENRY IV AND HENRY V (1399-1422)

**Arthur Percival** has sent details of two references to gunpowder found in the royal Signet Papers.

Kirby J L (ed) 1978 *Calendar of Signet letters of Henry IV and Henry V (1399-1422)* HMSO

Letter **303** 26 April 1405 Orders that certain items are delivered from the Tower of London to Gerard Sprouk, for the king's expedition to Wales. Schedule no.75 lists certain necessities for guns and crossbows; it includes 2000lbs saltpetre, 500lbs gunpowder, 400lbs brimstone, 1/4 charcoal, etc.

Letter **979** 18 March 1422 Meaux [to an officer at Caen]. Order to send speedily to the cofferer at Rouen all the gunstones from Caen and Harfleur with all the saltpetre, coal and brimstone at Harfleur…

## FAVERSHAM TUDOR AND STUART MUSTER ROLLS

**Arthur Percival** has also provided a reference to gunpowder in a new book published on Faversham

Hyde, P & Harrington, D 2000 *Faversham Tudor & Stuart Muster Rolls* volume 3 Faversham Hundred Records, £25.00

This new book contains some interesting information on the early history of gunpowder in Faversham, including a return of 1573 that lists the town's first known gunpowder makers - Thomas Gill and William Byrd. Other returns list the town's stock of ordnance, and in 1591 it was recorded that in the Guildhall, then at the end of Middle Row, held 456lbs of gunpowder, 114lb of match, 76lb of lead bullets and 146lb of lead for bullet casting.

# CURIOUS BEDFELLOWS: GUNPOWDER PRODUCTION AT TEMPLE MILLS, LEYTON, IN THE EARLY 1650s

**Keith Fairclough**

In an earlier article this author discussed the industrial uses of the Temple Mills at Leyton during the seventeenth century. It was noted that the mills had first been converted to gunpowder mills by John Berisford soon after the outbreak of the Civil War when he acquired a 21 year lease to the site commencing September 1642, and that he had continued to produce there until the end of the decade. It further noted a short term attempt to continue gunpowder production at this site immediately after Berisford ceased, but concluded that this venture cannot have lasted long, for in March 1653 the Ordnance officers, keen to expand gunpowder production during the First Dutch War, enquired whether Temple Mills could be used for such a purpose.(1)The article did not discuss this short term partnership in detail, as the evidence then uncovered was unsatisfactory, but further research has thrown some light on this partnership and this article discusses this new information.

In a 1668 legal dispute over the terms of the lease acquired by Berisford in 1642 it was stated that in March 1650 Berisford transferred this lease to George Boreman and Josias Dewye, and that in September 1651 Boreman surrendered the lease to John Barcroft and Thomas Colwell. It was further stated that Boreman and Dewye and a William Pennoyer had provided a bond to maintain the mills in a reasonable state of repair.(2) In an attempt to discuss production at the mills in the year after March 1650, it is first necessary to discuss the three persons named above.

## William Pennoyer

William Pennoyer was a prominent London merchant, who, after being appointed to a parliamentary committee to investigate the efficiency of the Ordnance Board in 1649,(3) came to be a major figure in the gunpowder industry over the ensuing three or four years. Earlier in his career Pennoyer had obtained arms for parliament during the Irish rebellion and the Civil War,(4) but he had no known link with gunpowder production. Then in December 1649 he signed a contract to supply the Ordnance with gunpowder made from saltpetre bought from the East India Company.(5) In the ensuing years there is evidence of him purchasing saltpetre from the East India Company,(6) supplying gunpowder to the Ordnance throughout 1650, (7) in May 1651 as a gunpowder maker needing protection from impressment for his employees,(8) and evidence from the first six months of 1652 of him as a merchant prepared to supply gunpowder to the state.(9) There is no evidence in the Ordnance records that he supplied gunpowder during the First Dutch War or thereafter, but as a merchant he did continue to deal in saltpetre.(10)

In his biography of Pennoyer,(11) Lounsbury discusses his involvement in the gunpowder industry, but he never mentions any production sites, and leaves one important question unanswered. Was Pennoyer involved in the production of gunpowder or was he only a merchant with political clout who was acting as an intermediary between the gunpowder producers and the state. It does seem to be the latter, for the only site mentioned in the documentary evidence is the Temple mills, and the nature of that evidence suggests that Pennoyer was not a partner in the venture, but was an important guarantor whose involvement allowed Boreman and Dewye to take over the site.

Another unanswered query is just why Pennoyer, who had been such an important figure in the industry between 1649 and 1652, ceased to be a supplier, especially when the outbreak of the First Dutch War in July 1652 meant that demand for the product suddenly rose. All that can be suggested at present; is that his influence in government circles had waned. In a history of the Anglo-Dutch wars Jones notes that Pennoyer was one of several merchants whose interest were tied closely to those of the Rump Parliament.(12) The authority of this body had begun to decline some time before it was finally dismissed. Is it possible that Pennoyer's withdrawal from the gunpowder industry was somehow linked to these developments.

**George Boreman.**

George Boreman(13) had obtained a commission for making saltpetre and converting it into gunpowder from parliament in February 1646. The exact area is not known, but it probably covered counties in the West Country, including Dorset where he faced problems that caused him to petition parliament in December 1646.(14) It is also possible that he was granted rights to be the saltpetreman in South Wales in April 1646, for an index to a missing letter book of the parliamentary Committee of Both Kingdoms notes 'Mr Bourman to have six Countyes of South Wales'.(15) There is also evidence of him delivering gunpowder to the Ordnance office and other parliamentary bodies. In 1647 deliveries of 210 barrels of gunpowder are recorded in Peter Edwards's munitions database (16), and in 1648 he delivered 70 barrels to the Ordnance, 50 barrels of which were delivered to stores at Portsmouth.(17)

Such evidence suggests a small producer, probably based in the West Country, and this is confirmed by a letter in the records of the Committee for Compounding dated October 1650. The Dorset Committee informed the London officials that George Boreman of Isle Brewers in the county of Somerset had no estate in Dorset except a powder mill at Evershot, 'wherein he hath substituted one Strode who has been a Captain in the Kings Army against whom we have likewise returned a charge of delinquency.(18) Such a comment referred to the fact that both Boreman and Strode had supported the King in the Civil War.

Evidence collected in 1650 noted that Boreman had been the constable of Abdick and Bulston in Somerset, that he had supported and raised money for the King and had never executed any parliamentary warrant. Furthermore he had fought with the King's forces at the siege of Taunton and had offered neighbours £100 to set the town on fire, and had used the church at Isle Brewers as a garrison where he held prisoner several neighbours who supported the parliamentary cause. However, in August 1645 he submitted to the Bridgewater Committee, took the required oaths and was fined £87.(20) George Strode was one of fifteen children of Joan Strode, a widow of Stoke under Hampden in Somerset who had compounded with the parliamentary party.(21) He had captained a troop of horse in the King's army and was accused of being involved in plundering houses.(22) Although Boreman and Strode were obviously involved in the production of gunpowder at Evershot after they had surrendered to the parliamentary authorities, there is no evidence from the royalist Ordnance records that they had supplied the King with gunpowder during the Civil War.(23)

**Josias Dewye**

Josias Dewye was to become one of England's most important gunpowder producers, associated with Chilworth and then Carshalton mills in Surrey.(24) His part in the Temple mills partnership is his first known involvement in the industry. Josias Dewye had been baptised at the parish church of Almer in Dorset on 10 September 1619. He

was the son of Christopher Dewye, and two elder brothers, John and Michael, had been baptised in November 1615 and April 1617 respectively. Detail of Christopher's trade, his marriage and death are not recorded in the extant registers for Almer, and the surviving registers for Mapperton, a tithing within the parish of Almer, where the family were living in 1640, do not commence until the after the Restoration.(25) Neither has any will for Christopher been discovered. Thus, it is not known what background Josias came from. However, his father was dead by 9 July 1640 when Josias Dewye was apprenticed with William Pennoyer, citizen and clothworker, for 7 years. Although Josias was eligible to be made free of the Clothworkers Company after July 1647, it was not until 11 June 1656 that he was admitted to the Livery the following month. The reason for this delay in formally acquiring his freedom is not known.(26) He must have completed his apprenticeship before marrying Elizabeth Richbell at St Katharine's by the Tower on 28 August 1648.(27) Details of Elizabeth's family have not been uncovered, but it can be no coincidence that Mary Cordwell, of the Cordwell family who produced gunpowder at Chilworth between 1636 and 1650, had brothers called Andrew and William Richbell.(28)

It was thus a disparate group of businessmen who joined together to produce gunpowder at the Temple Mills. Boreman and Pennoyer had supported opposite sides in the Civil War, Boreman and Dewye both had West Country origins, while Pennoyer and Dewye had a previous business link. Further evidence is needed, but that discussed above suggests to this writer that Pennoyer was not a partner in the venture at Temple Mills, but that the venture was undertaken under the umbrella of his authority within the industry, and that it was Boreman and Dewye who formed the partnership to produce gunpowder at the Temple Mills.

Boreman had first produced gunpowder at Evershot, but by March 1650 when he acquired the lease to the Temple Mills he had obviously put George Strode in charge of affairs there in order to allow himself to move to London to produce gunpowder.There is some evidence of operations at Temple Mills soon afterwards, for on 7 May 1650 the Council of State granted George Boreman a licence to bring seven horses to London which he had purchased in the West Country. These horses were 'to be employed by Mr Pennoyer the said Mr Bourman and Company as a teeme or teemes for conveying of saltpetre to certaine powder mills and the powder back to the Tower'.(29)

The site was ready for production, but there are problems in interpreting what happened in the intervening months before September 1651 when Boreman is said to have surrendered the lease to the Temple Mills. The name of George Boreman never appears in the Ordnance records as a supplier of gunpowder during 1650 or 1651. The name of Pennoyer does so on a regular basis, but both before March 1650 and after September 1651.(30) Furthermore in April, May and June 1651 Josias Dewye is delivering gunpowder in his own name.(31) A further complication is added by the fact that in January 1652 it was reported that William Pennoyer, Daniel Judd, John Freeman, Thomas Steventon, John Semaine and George Boreman, described as powder merchants, had been awarded a contract to supply 5000 barrels of English gunpowder at £4 per barrel during the ensuing year.(32) This after, according to legal evidence in 1668, Boreman had surrendered the lease to the Temple Mills in September 1651, and when it is known that the site was idle in March 1653.

The evidence so far uncovered does not allow of any definite conclusions, just a series of possible options. It seems possible that gunpowder produced at the Temple Mills was included in that delivered by William Pennoyer, but Pennoyer must have had other sources of supply as well. It is possible that the deliveries under Dewye's

name in 1651 were of gunpowder produced at the Temple Mills, but it is much more probable that Dewye was producing at Chilworth by that date, heading a group of merchants who took over the site from Mary Cordwell in the autumn of 1650.

Another factor influencing events at the Temple Mills was that Boreman's past caught up with him, and that doubts about his loyalty were a factor in the failure of the partnership between Boreman and Dewye.

The evidence suggests that it was George Boreman who was the senior partner at the Temple Mills and that he was getting the site into a state of readiness soon after acquiring the lease in March 1650. However in August 1650 the Dorset Committee wrote to the Committee for Compounding in London that Boreman had once been in arms against parliament at Ilemore in Somerset and that 'he is now employed as master of many powder mills about London, and conceiving such a trust very disagreeable to his condition, we present it for your consideration'. The Dorset committee were instructed to examine witnesses against Boreman and to seize his estate if sufficient proof was found.(33) In October 1650 evidence of his activities were gathered by Captain Edward Cheek and Mr Christopher Weare from neighbours who had suffered at his hands, Nicholas Baker and his son Robert, both husbandmen of Isle Abbotts, John Mandrey of Hatch Beacham, woollen weaver, and George Stuckey of Isle Brewery, tailor.(34) The evidence was damning and was believed. A decision was taken to seize the estates of both Boreman and Strode. This emerges from a letter written to London in December 1650 by the Gloucester Committee, in which they stated that they had received instructions to seize the estates of Messrs Boreman, Strode and Hardy, but find no such men living in their county.(35)

Such a development might well explain the short-term nature of the partnership to produce gunpowder at the Temple Mills, and might well provide one explanation as to why Dewye organised a group of merchants to produce gunpowder at Chilworth mills. However, this explanation suffers from the fact that Boreman was named as one of five merchants who obtained a contract to supply gunpowder in January 1652 and did have some subsequent involvement with the industry. In January 1653 Boreman was employed to repair 150 barrels of decayed gunpowder stored at Portsmouth(36), and in April 1657 there was some discussion about his underperformance of an agreement to repair 153 barrels of gunpowder for the Ordnance.(37) There is also a possibility that he had some involvement with Dewye at Carshalton after 1661.(38)

Is it possible that such a low-key involvement in the industry was acceptable to the authorities even though his control of a major site such as the Temple Mills was not? Had there been changes in the political climate which saw him suffer a major setback in 1650, but which allowed him to make some effort to recover his fortunes within a year of so? Is it possible that he had returned to his Dorset mills? Whatever, his short-lived involvement with gunpowder production at the Temple Mills was to incur him costs in 1668 when he, Pennoyer, Dewye and John Berisford had to pay damages of £1285 plus costs to the owner of the Temple Mills for not maintaining the site in the state demanded in the 1642 lease.(39)

Boreman had meanwhile pursued other business activities. In 1656 he acquired a contract for clearing ballast from the Thames which he still held at his death in 1683.(40) It is also possible that he was the George Bourman who in 1661 held a lease to the Three Mills in West Ham, a tidal mill about a mile further downstream from the Temple Mills. Further evidence is needed definitely to confirm this identification, and if it is correct, further evidence of the nature of Boreman's involvement with this particular mill would be welcome.(41)

At his death, Boreman was described as an esquire of East Green in Kent, and he expressed a wish to be buried in the parish church of Green as near to his father as possible. The will makes reference to several houses in Thames Street, London and to the profits of the Ballast Office, which were to benefit his wife Sarah and their daughter of the same name, but is otherwise uninformative about his business activities, and no link with the gunpowder industry, the Dewye family, or with the West Country can be discerned. He did take pride in his collection of religious and legal books, and left a small bequest to the poor prisoners in the Kings Bench.(42)

Notes

1. K.R. Fairclough, 'Temple Mills as an industrial site in the 17th century', *Essex Archaeology and History* **22** (1991), 115-21.

2. PRO: C6 193/4.

3. W. Reid, 'Commonwealth supply departments within the Tower and the committee of London merchants', *Guildhall Miscellany,* **2** no.8 (1966), 319-52.

4. R H Lounsbury, *Pennoyer Brothers: colonisation, commerce, charity in the seventeenth century* (Philadelphia, 19??), 103-7, 111; *Calendar of State Papers Domestic (CSPD)* 1644, 232, 234.

5. *CSPD* 1649-50, 456-57.

6. E.B. Sainsbury, ed., *A Calendar of Court Minutes of the East India Company 1650-54* (1913), 14, 25, 65, 86, 140, 141.

7. PRO: WO 49/86 fos.30, 33, 36, 39, 44, 51, 52, 57, 66, 105; *CSPD* 1650, 150, 536, 571, 573, 577, 578, 581, 583, 588; Lounsbury, *Pennoyer brothers,* 162.

8. *CSPD* 1651, 226.

9. *CSPD* 1651-52, 114, 115, 275.

10. *CSPD* 1655, 387; *CSPD* 1656-57, 188, 193; *CSPD* 1657-58, 380; *CSPD* 1658-59, 208, 212, 214; Lounsbury, *Pennoyer brothers,* 153, 168-69.

11. Lounsbury, *Pennoyer Brothers*.

12. J.R. Jones, *The Anglo-Dutch wars of the seventeenth century* (London, 1996), 87-88.

13. This spelling of his name is used because it was the one he chose when he signed his will in 1663. Other variants in the evidence discussed include Bourman, Bowrman, Bowreman and Bowerman.

14. *CSPD* 1645-47, 493; PRO: SP 21/23, 114. The problems are not outlined.

15. PRO: IND 1/8893 (formerly SP 21/13).

16. Personal communication Dr Peter Edwards.

17. PRO: WO 49/82 fos. 99,106.

18. *Calendar for the Committee for Compounding,* 2585; PRO: SP 23/152 p.541. The parish registers for Isle Brewers do not survive for the years before 1694, but the limited bishop's transcripts that are available for the years before that include a couple of references to the name of Bowrman or Bowerman: E. Dwelley, *The bishop's transcripts at Wells* (2 vols, c.1914), ii, 43-47.

19. *Calendar for the Committee for Compounding,* 907.

20. *Calendar for the Committee for Compounding,* 118, 1292; PRO: SP 23/152, 547-548.

21. *Calendar for the Committee for Compounding,* 1495-97.

22. PRO: SP 23/152, 549. The Dorset gunpowdermill was not the only link between the two families. In April 1649 the Dorset committee ordered that Mr George Boreman should hold and enjoy the impropriate rectory and parsonage of Netherbury which had been sequestered from Mrs Strood, widow, probably George's mother: C.H. Mayo, *The minute books of the Dorset standing committee* (Exeter, 1902), 514.

23. I. Roy, ed., *The Royalist Ordnance Papers 1642-46,* Oxford Record Society, **43** and **49** 2 vols, Banbury (1964 & 1975).

24. M. Wilks, 'Josias Dewye and the Carshalton gunpowder mills', *GMSG Newsletter,* **8** (Nov. 1990), 9-14; A.G. Crocker, G.M. Crocker, K.R. Fairclough & M.J. Wilks, *Gunpowder Mills: Documents of the Seventeenth and Eighteenth Centuries,* Surrey Record Society **36** (2000), 21-36.

25. E.A. Fry, ed., *The registers of Almer, co. Dorset 1538-1812* (London, 1907), 7, 10, 11.

26. Personal communication, David Wickham, archivist of The Clothworkers Company, 19 Oct. 1999.

27. A.W. Hughes Clarke, ed., *The registers of St Katharine by the Tower, London 1636-1665,* Publications of the Harliean Society, **76** (London, 1946), 114.

28. PRO: PROB 11/359 sig. 3; for details of Cordwell family, see Fairclough, 'The Cordwell family: gunpowder producers at Chilworth 1636-50', *Surrey Archaeological Collections,* **87** (2000), 113-26.

29. *CSPD* 1650, 540; PRO: SP 25/64, 318.

30. PRO: WO 49/86 fos.30, 33, 36, 39, 44, 51, 52, 57, 66, 105; *CSPD* 1650, 571, 573, 577, 578, 581, 583, 588; Sainsbury, *EICo minutes 1650-54,* 101-2, 104, 106.

31. PRO: WO 49/84 fo.164; WO 49/86 fos.143,145,154,155; *CSPD* 1651, 567,571,572.

32. PRO: SP 25/66, 249.

33. *Calendar for the Committee for Compounding,* 293, 300.

34. PRO: SP 23/152, 547-48.

35. *Calendar for the Committee for Compounding,* 383-84. The Calendar suggests that the letter to the Gloucester committee might have been a mistake as all were Dorset men. Hardy was not involved in the gunpowder mills in Dorset, but was investigated at the same time: PRO: SP 23/152, 543-46.

36. PRO: WO 47/2, unfoliated.

37. *CSPD* 1656-57, 540. PRO, SP 18/164 no.89.

38. Crocker *et al, Gunpowder Mills: Documents of the Seventeenth and Eighteenth Centuries,* 28.

39. Fairclough, 'Temple mills as an industrial site'.

40. *CSPD* 1656-57, 168, 262, 291; *CSPD* 1657-58, 38, 121, 234; PRO: PROB 11/373 sig. 53.

41. K.R. Fairclough, *Owners of the Three Mills 1539-1728,* River Lea Tidal Trust pamphlet (London, 1999).

42. PRO: PROB 11/373 sig. 53

## ECTON, DERBYSHIRE

**Alan Crocker** has sent in information from a recent article on the Ecton mines, Derbyshire. They have long been associated with the early use of gunpowder for mining purposes, and its use is mentioned in Dr Robert *Plot's The natural history of Staffordshire* published in 1686. In the mid-1990s, John Barnatt, an archaeologist with the Peak District National Park Authority, began exploring some of the underground working for signs of prehistoric mining activities. One discovery was a group of gunpowder shot holes, described as being `absolutely exceptional', on account of their wide diameter (no figure given) and being several feet long; before firing the hole would have been sealed with a wooden plug. Isolated shot holes are notoriously difficult to date, but due to their large size, reflecting inexperience in the use of powder, it is argued that these shot holes date from the earliest phase of gunpowder use at Ecton. The piece notes that Jacob Mumma, a Dutchman, carried out the earliest experiments with gunpowder, he rented the mine between 1665 and 1668.

Sykes, J 2000 Antler points to prehistoric mine workings *Industrial Heritage* **26**, No.2, 2-6

## WALTHAM ABBEY ROYAL GUNPOWDER MILLS

Waltham Abbey Royal Gunpowder Mills is due to open the public over the weekend of 6-8 April 2001, the official opening will take place on 16 May, the ceremony being performed by the Duke of Gloucester. A visit to Waltham Abbey for the group is planned for Saturday 19 May, details of which are on page 1.

*Wayne Cocroft*

## TREATISE ON FORTIFICATION AND ARTILLERY 1846

**Charles Trollope** has recently acquired a copy of Hector Straith's 1846 *Treatise on Fortification and Artillery* (4th ed). Chapter 26, 517-542, is on 'Gunpowder', and covers the following aspects of the subject: discovery & use, proportions of ingredients, principles regulating them, the incorporation of ingredients as followed at Waltham Abbey and at the three presidencies of India, proof and detonation of gunpowder.

Straith was formerly an Army major, and a professor of fortification and artillery at the Honourable East India Company's Military seminar at Addiscombe.

**DUPONT GUNPOWDER LABELS** **Wayne Cocroft**

Reproduced below is a selection of DuPont gunpowder labels from the beginning of the twentieth century.


DuPont FFFG, M.IND.RGTRDA NUM.10645 SEPT 19 DE 19 0. REG. U.S. PAT. OFF. Black and white, DUPONT and oval in red, 70mm x 25mm.


Golden Pheasant Gunpowder, in small black text REG.U.S.PAT.OFF.M.IND. RGTRDA.NUM.8656.NOV 11 DE 1908. Full colour, 75mm x 59mm, 69mm x 53mm, 58mm x 45mm, 47mm x 35mm


Indian Rifle Gunpowder, in small black text REG.U.S.PAT.OFF M.IND RGTRDA NUM.8657 NOV.12 DE 1908. Full colour, 76mm x 62mm.


In small black text below box, REG. U.S. PAT. OFFICE M.IND RGTRDA. NUM.8686 NOV 17 DE 1908. Black and white, diameter 134mm also 92mm

## A VISIT TO SPANDAU GUNPOWDER WORKS, GERMANY

**Wayne Cocroft**

Spandau, lies about 15km to the north-west of Berlin, at the confluence of the rivers Havel and Spree, formerly it was an important strategic position and was defended from the 11th century by a castle. In the late sixteenth century, the Venetian fortress expert Francesco Chiaramelle de Gandino, remodelled the castle to form a large star fort known as the Zitadelle. Later the town was incorporated into a defensive system of traverses and earthworks and around the town the main Prussian arsenal developed.

Gunpowder manufacture perhaps started as early as the mid-fourteenth century at Spandau and by the Great War the arsenal had developed into a vast manufacturing complex, producing explosives, artillery, small arms and ammunition. At the end of the war large sections of the factory were dismantled, to comply with the terms of the peace treaty, including the explosives area. Nevertheless, during the inter-war period Krupp maintained an illicit design office in Spandau, away from the scrutiny of the allied Control Commission. Under the Third Reich, between 1933 and 1945, sections of the Zitadelle were used as a gas warfare laboratory, including the barrack blocks where larger windows were inserted. In the closing days of the Second World War, the almost deserted Zitadelle was surrendered to advancing Soviet forces without resistance.

From the 1950s, the town of Spandau has administered the Zitadelle as a historic monument. Museum displays within the Zitadelle cover the history of the town and its fortifications, within these displays there are few references to the powder mills. Artefacts on display include an embroidered factory banner (at its centre is large black Prussian eagle surrounded by the text *Königliche Pulver-Fabrik zu Spandau 1891*), and a packet of small arms ammunition manufactured at Spandau. A number of photographs illustrate the works, but are mainly of the central steam plant, although one view did show an abandoned waterwheel.

RAF air photographs taken in early 1945, held by Keele University, show the section of the works where the water-powered gunpowder mills stood as open ground; other areas show evidence of recent bombing. Today there are few traces of the gunpowder works. Most of the area is covered by a new housing development of low-rise apartment blocks, probably put up during the 1980s or 1990s. The area where the main group of water-powered mills was situated is now a public open space, criss-crossed by paths and laid out with park benches. One of the former watercourses has been retained, although landscaped, amorphous earthworks are evident, which may indicate the survival of buried archaeological remains. Little acknowledgement is given to the history of the area and the only public recognition is a single street sign *Pulvermuhlenweg*. Around the housing development odd fragments of the works still survive, these include sections of the watercourses, remains of the outer defensive traverses and rails laid in stone sett roads. Within the works' area few buildings survive, they include a Wachegebäude [Watchbuilding] (203) and Untersuchungsstelle [Lower searching place] (233). In woodland, to the north, the Wasserturm [Watertower] (285) and the Umkleideschuppen [Equipment Shed 4] (286) are visible and more may exist. A steel railway bridge linked the powder works to an island in the Havel, this accommodated a number of administrative, or design offices, and power houses for steam raising plant for generating electricity and heating the works.

One curious link with the Royal Gunpowder Factory at Waltham Abbey was the provision of almost identical ornate cast iron telephone pillars. One was on display within the Zitadelle and another remained *in situ* in a nearby street.

Note the building numbers refer those given on the 1904 plan reproduced in Schulze, M P 1996 The gunpowder mill at Spandau, 351-58 in Buchanan, B J 1996 *Gunpowder: the history of an international technology* Bath University Press

*See also*:

Preussisch-Deutsche Pulvergeschichte *Deutsches Waffen Journal* 1983 **3** 298-302

Preussisch-Deutsche Pulvergeschichte *Deutsches Waffen Journal* 1983 **4** 462-465

Preussisch-Deutsche Pulvergeschichte *Deutsches Waffen Journal* 1983 **5** 588-592

Preussisch-Deutsche Pulvergeschichte *Deutsches Waffen Journal* 1983 **6** 862-867

Preussisch-Deutsche Pulvergeschichte *Deutsches Waffen Journal* 1983 **8** 1020-1023

Preussisch-Deutsche Pulvergeschichte *Deutsches Waffen Journal* 1983 **9** 1144-1146

Note: Deutsches Waffen Journal is available at the Royal Armouries Library

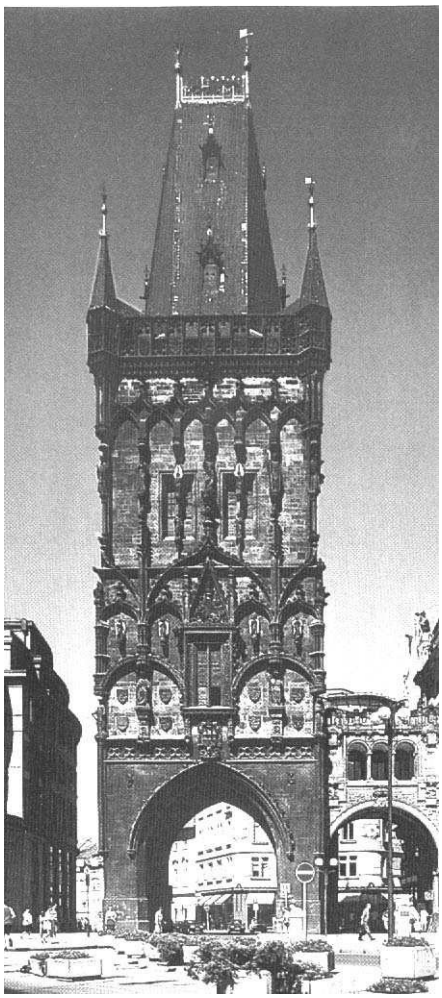
## GUNPOWDER AND RIDEAU CANAL, CANADA

**Arthur Percival** as the result of correspondence with a local history enquirer has discovered the following information on the Rideau Canal. The Rideau Canal, stretching 126 miles between Ottawa and Kington, on Lake Ontario, was built between 1826 and 1832; principal amongst the reasons for its construction was as a military waterway to speed the movement of troops. The officer in charge of the project was Lieutenant Colonel John By, Royal Engineers, formerly Superintendent of the Royal Gunpowder Factories. All the materials for the project were supplied by the Board of Ordnance, and were shipped from Montreal and sold to the contractors at cost. A 'List of stores required for the Service of the Rideau Canal', dated 11 December 1828, was sent by John By to Francis Sisson the Ordnance Storekeeper at Montreal. This contains an order for a large number of tools and shovels, chauldrons of coal, barrels of cement, and 400 barrels of 'gunpowder, large grained, for miners' use'. No powder works were working in Canada at this date and it is presumed that British mills supplied the powder.

## 27th SYMPOSIUM OF ICOHTEC, PRAGUE, 22-26 AUGUST 2000

**Brenda Buchanan**

4th Meeting of the Gunpowder/Explosives Section: 'Explosives Technology in War and Peace'



Powder Tower, Prague

In 31 sessions ranging from 'Technology in the Middles Ages and early Modern Europe' to 'Measuring technology in the Late 20th and early 21st Centuries', 115 papers were presented at the ICOHTEC Symposium. 11 of these were on 'Explosives Technology', and the cohesive nature of our subject was demonstrated by the fact that they required a whole day rather than a single meeting for their presentation.

The introductory paper, inspired by the impressive Powder Tower in Prague, was on the theme of 'Gunpowder Magazines: Security and Symbolism'. It was presented by **Brenda Buchanan**, who noted that despite the importance of storage for the quality, durability, and safety of the powder, there has been little if any research on these structures. On the basis of physical and documentary evidence, the following categories were proposed: Symbolic (showing authority); Functional (simple and efficient); Engineered (substantial, and vaulted to withstand bombardment); Commercial (lightly built warehouses, for a rapid transit of powder for trade); and

Military (or Imperial, if the large stores of powder were for expansion overseas). The threat of lightning strikes was also discussed, especially the British controversy of the 1770s over pointed and rounded rods, with its political overtones.

**Bengt Ahslund** presented a survey of the problems of military procurement in Sweden in the 17th and 18th centuries. Amongst the significant details was the wastage of 17% allowed in the saltpetre refining process, which is especially notable given the difficulty of procuring this ingredient against competing uses (such as the manuring of the land), and its importance in the gunpowder recipe. In 1682, for example, it constituted 73% of the whole (with sulphur 10% and charcoal 17%). The contribution by **Leif Martensson** placed these generalities in a specific context, for in that same year gunpowder production began at the Royal Gunpowder Mills at Torsebro, in southern Sweden, the subject of his paper. Of particular interest in this account were the changing methods of incorporation used; stamp mills until c.1830; revolving cylinders containing the ingredients until 1875; and wheel or edge runners from that date until 1929 when the mills closed. Research continues quality control and the testing of the powder.

Visitors to the restored gunpowder mills at Torsebro are able to see surviving buildings on an authentic site, but those who visit Australia's only 'operating powder mill at Launceston in Tasmania. The subject of **Ian Rae's** paper entitled 'The Gunpowder Mill in the Antipodes', will have a different experience here they will find some authentic equipment, covering all the stages of production, assembled after a study of British sites such as Waltham Abbey, and with reference to expert material such as Drayson's 'Treatise' of 1830 (PRO, Kew), but at a location which has no connection with the industry. It was concluded that although the project has received the expert attention of a civil engineer and is much visited, fulfilling the important role of informing tourists about a now dead industry, it lacks the sense of continuity, technological development, and community involvement, which only an authentic site can provide.

With **Darwin Stapleton's** paper on the du Pont powder mills in Delaware, USA, we moved to a site which also aims to attract and inform visitors, but from a solid historical base, sustained by an inevitable archive and library. It is the study of these sources, which has allowed the case for the 'Multiple Transfers of French Technology' to be made. Du Pont's training by the French establishment (though probably not by Lavoisier himself) provided the vital link. Perceiving the backwardness of American production, after the family's own transfer to the States in 1799-1800, du Pont returned to France and acquired official manuals, technical drawings, and utensils, though not the skilled workers he wished for. He compensated for this lack of expertise by the further import from France of millstones, glassware, eprouvettes, and technical journals, though all of which he was able to establish the works as the leading powder mills in the USA.

In his paper on 'The Invention of a French Explosives Technology for Coal Mining without Firedamp Accidents at the End of the 19th Century, **Rene Amiable** presented the only study we had at this meeting of the use of explosives for mining. We were reminded of the grave accidents arising from firedamp explosions, and of the need for compounds which would not produce fames when exploded in mines. In Britain, dynamite was found acceptable, but in France a 'Commission du grisou' was et up in 1877 to study the problem. Experiments were carried out at Sevran by Mallard and Le Chatelier (mine engineers), and Sarrau and Vielle (explosives engineers), and conclusions were reached in 1888 about the theory (the inflammation, temperature,

and pressure of detonation) and practice (the selection and use of appropriate explosives), of an 'anti-firedamp explosives' technology.

On military matters, **William Curtis** presented a paper on the 'Boring up of Guns – a 19th Century Economical Stop gap Solution'. In the period of relative peace from the 1820s, the enlarging by lathes of the bore of existing stocks of cast iron guns was introduced, as both an economy (it deferred obsolescence) and for technical reasons (the increased calibre meant heavier projectiles could be used). There was a problem of recoil with these lightened guns, but this was counteracted by the need for a lower charge of gunpowder – the reduction in some cases being as much as two-thirds. These modified guns fell out of use with the introduction of new weapons from the 1850s, but some still survive at Fort Belan in North Wales. Cast originally in the Napoleonic Wars and converted in the early 1840s, they have a calibre of 5.82 inches rather than the earlier one of 4.632 inches. Are they the sole survivors of this practice, which was also adopted by the French and Americans.

**Rodney Carlisle's** paper entitled 'From Invention Style to R & D Style': The case of the Dashiell Rapid Fire Breech', raised the question of the role of individual research in matters of military or naval concern. As advances in smokeless powder for large artillery weapons led to a demand by the navy for improvements in rapid fire breech mechanisms, Robert Dashiell worked successfully in the 1890s to develop a rapid fire breech for a 5-inch gun. However, this posed the question, should patent and royalty rights be received for this achievement, or should it be seen as an assigned piece of naval development work? The matter was resolved in Dashiell's favour, evidence of the gradual adoption of an industrial or laboratory approach to these matters of procurement by the armed forces. A third paper of related interest was to have been presented by Enn Hendre on 'Karl Papello (1850-1958) and his 'Apparatus for Laying Guns', but our Estonian colleague was unfortunately not able to attend. In the gap thus created, we were pleased to have a paper prepared for an earlier conference on Military History, and now presented by **Bart Hacker**. This was on the subject of uniforms, especially those worn by women, and provoked a lively discussion.

Our attention was focussed on high explosives by **Ernst Homberg** on his papers on 'Dyestuffs and Explosives as Petrochemicals: the Chemical transformation of Royal Dutch Shell during World War 1'. At the outbreak of war, the Company was in a difficult position because as a result of the merger of Royal Dutch and shell in 1907, it had headquarters in both the neutral Netherlands and combatant Britain. In addition, its first chemical factory, where nitrotoluene for explosives and dyestuffs was produced from toluene, was now in German territory. The decision to support Britain led to a constant transfer of chemists, technology and know-how from the R&D laboratory in Amsterdam and the technical departments in the Hague, as well as the top secret transfer of the installations of the Rotterdam distillery where toluene was made from Borneo gasoline, to Britain. The Company also helped with the establishment of TNT factories for the military in Britain, and later Holland. This experience together with an interest in dyestuffs, dropped after the war, helped a low-tech oil firm develop into a chemically oriented international company.

A broad survey of 'Armament as the Catalyst of production Engineering' was presented by our last speaker, **Veijo Kauppinen**. After reference to pre-8th century arms factories such as the Italian Beretta, the emphasis was placed on American arms production, with the growth of an interchangeability of parts requiring high standards of accuracy, a control of tolerance, and improvements in measuring techniques, calling for special tools. These qualities were seen as the basis for the 20th century

developments of Numerical Control and Automatically Programmed Tools, work on both of which was supported and funded by the US Air Force, emphasising the role of armaments as a catalyst of production engineering.

**Post script**: After the intensive discussions sparked by the papers described above, Prague still had something to teach us, for the **Prague Post** (read only on my way home) contained an article on the Vitava river which noted that, 'The name of one street, Sanytrova, reminds us that the production of saltpetre – requiring massive amounts of organic waste – was a major industry on the Old town bank'. Was saltpetre produced from sewage in this way in other central European towns, especially those that were land-locked and so unable to enter into trade with India?

## RECENT PUBLICATIONS

Cocroft, W D 2000 *Dangerous Energy the archaeology of gunpowder and military explosives manufacture* English Heritage ISBN 1 85074 718 0

Available from: English Heritage Postal Sales, **www.english-heritage.org.uk**, price £45.00

Crocker, G and Crocker, A 2000 *Damnable Inventions Chilworth gunpowder and the paper mills of the Tillingbourne* Surrey Industrial History Group ISBN 0 9538122 0 0 £6.95

Fairclough, K 2000 The East India Company and gunpowder production in England, 1626-1636, *Surrey Archaeological Collections*, **87**, 95-112

Fairclough, K 2000 The Cordwell family, gunpowder producers at Chilworth 1636-1650, *Surrey Archaeological Collections*, **87**, 113-126

Offprints of the above two articles above are available from Surrey Archaeological Society, Castle Arch, Guildford GU1 3SX tel. 01483 532454. The cost of both papers is about £2.20 plus postage, please confirm price before sending a cheque or send an open cheque limited to £4.00.

## PUBLICATIONS FOR SALE

Crocker, G 1988 *The Lowwood Gunpowder Works A Short History* £1 incl.p&p

Palmer, A 1998 *The Low Wood Gunpowder Company its inception and early growth 1798-1808* Gunpowder Mills Study Group Cost £7.50 members £6 p&p £1

Harding D F, 1999 *Smallarms of the East India Company 1600-1856* Volume III *Ammunition and Performance* Foresight Books

Offprint of Chapter 21, Gunpowder – including relevant sections of contents list, introduction, index, etc Cost £5 p&p £1

## EXPLOSIVES ON THE INTERNET

Members are invited to submit details of Internet sites containing information on the history of explosives.

Ballincollig, Cork **www.corkcoco.cccmm/services/amenity/gunpowder/index.html**

Birmingham Proof House **www.gunproof.com**

Chartmills, Faversham **www.faversham.org/attractions/chartmills.html**

Gunpowder mills on the Internet **www.argonet.co.uk/users/cjhicks/gpwww.html**

Hagley Mills, Delaware **www.hagley.lib.de.us/**

Pont-nedd-vechan Gunpowder Works **www.iarecordings.org/c2.html**

Royal Naval Cordite Factory Holton Heath **www.corfe-castle.demon.co.uk/hhin.htlm**

Waltham Abbey Royal Gunpowder Mills **www.wargm.co.uk**

## PRINCIPAL CONTENTS

*Names in brackets indicate sources of information rather than authors*