



Gunpowder Mills Study Group

NEWSLETTER 25, AUGUST 1998

**GMSG MEETING AT THE INSTITUTE OF HISTORICAL RESEARCH
SENATE HOUSE, UNIVERSITY OF LONDON
SATURDAY 23 OCTOBER 1999**

PROVISIONAL PROGRAMME

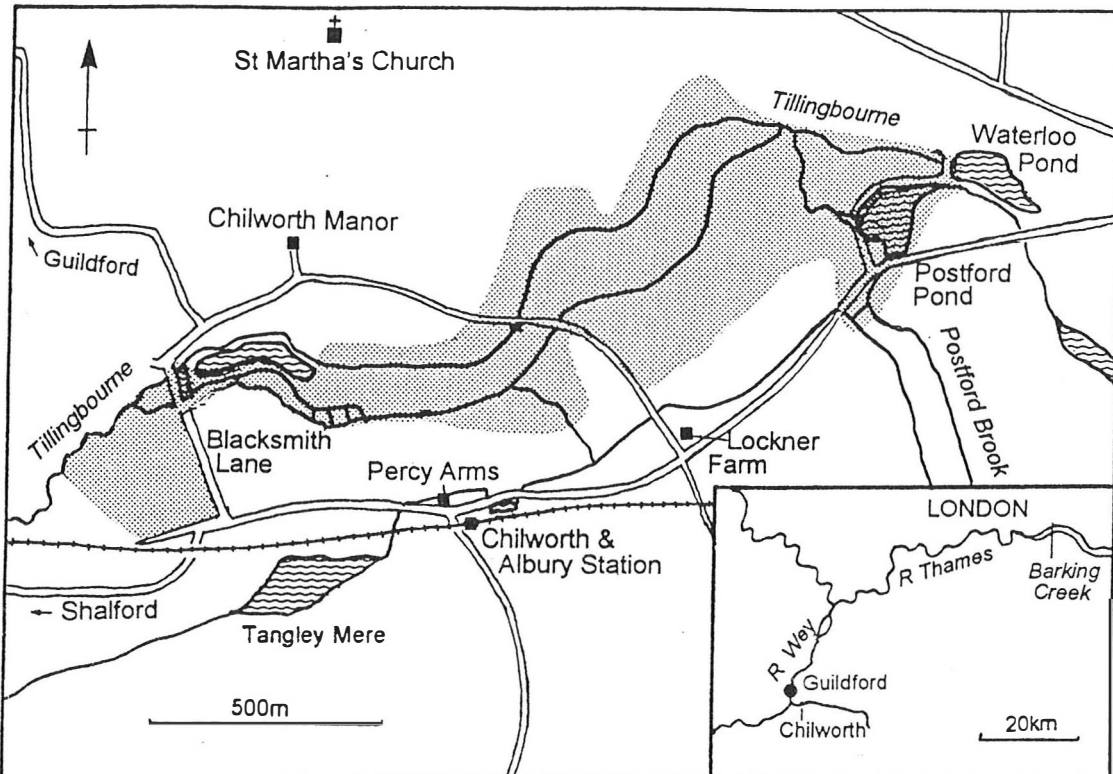
- 10.00-10.30 Assemble and Coffee in the Common Room on the Ground Floor
Theme of Morning Session: Fireworks
- 10.30-10.35 Chairman's Introductory Remarks
- 10.35-11.20 **Eric Montague**, "James Pain & Sons, Fireworks Manufacturers of Mitcham, Surrey, 1872-1965"
- 11.20-11.55 **Alan Crocker**, "Brocks, Fireworks Manufacturers of South Norwood, London"
- 11.55-12.30 **Brenda Buchanan**, "Sir Charles Frederick and the Great Display in Green Park"
- 12.30-13.30 Lunch. It is recommended that members bring a packed lunch which may be eaten in the Common Room where hot drinks can be purchased.
- 13.30-14.15 **Wayne Cocroft**, "A Visit to the Hagley Museum and Library, Wilmington, Delaware, USA"
- 14.15-14.45 **Fred Lee**, "The Lake Superior Gunpowder Co, Marquette, Michigan"
- 14.45-15.15 **Alan and Glenys Crocker**, "A Visit to the Gunpowder Mills at Dimitiana, Peleponnese, Greece"
- 15.15-16.00 Other Contributions and Discussion of Group Activities. It is hoped that this session will include a talk by **Luke Barber** on his survey of "The Chalk Pit, Dartford Gunpowder Mills"
- 16.00 Prepare to vacate room

We shall be meeting in **The Low Countries Room** on the third floor of Senate House. Gooze Street, Warren Street and Russell Square underground stations are nearby. Parking may be available in the University of London car park - entrance at NW corner of Russell Square. to cover administrative costs a fee of £2 will be collected.

Please let Alan or Glenys Crocker know if you are coming and if you would like to make a member's contribution: 6 Burwood Close, Guildford, Surrey GU1 2SB; tel 01483 565821, fax 01483 876781; e-mail a.crocker@surrey.ac.uk or alan@glfd.freeseve.co.uk

GMSG MEETING AT CHILWORTH, 5 JUNE 1999

About 25 members and friends attended the Spring Meeting of the Group at Chilworth and it was particularly nice to welcome Seymour Mauskopf from the USA. This brief account of the meeting does not include historical details of the Chilworth gunpowder mills site as these can be obtained from the new edition of Glenys Crocker's field guide which is reviewed elsewhere in this Newsletter. The map of the site reproduced here is taken from this publication.



Sketch map of the Chilworth gunpowder mills in Surrey, which were on the Tillingbourne, a tributary of the River Wey. Barges brought saltpetre and sulphur up the Thames and the Wey and Godalming Navigations and in return took gunpowder to a magazine at Barking Creek on the Thames estuary. The railway was also used after 1888 when an agreement was made to link the works tramway with Chilworth & Albury Station. The shading represents roughly the areas occupied by powder mills at any time in the past.

We met in the car park of the Percy Arms, named after the Dukes of Northumberland who acquired much of the local land through marriage in 1845. The pub was also used for the Coroner's Court in 1901 when six men were killed by an explosion at mills. The morning was spent exploring the eastern part of the site. First we walked down the route of the 800mm gauge man-powered tramway which linked the works to a siding at the railway station. It was installed by the German company who acquired the mills in 1885. We crossed the millstream which runs along the southern side of the Tillingbourne valley and noted the surviving tramway swing-bridge, necessary because the waterway was also used for transporting gunpowder on punts. We next stopped at the massive terrace of six steam-powered brown powder incorporating mills built in 1885 near the lane between Lockner Farm and Chilworth Manor. Members pointed out that the construction of these is rather complex being partly

brick and partly concrete. We also noted "Burbach 1884" cast on the iron girders which supported the drenching tanks and the journal bearings of the Krupp-Grusen edge runners. The lane crosses the valley on an embankment and it would be nice to know whether this is a dam of a former water mill or simply a causeway constructed to reduce the slope of the lane.

We then crossed the site of the 1916 Admiralty cordite factory, on the south side of the valley, seeing foundations of several timber buildings and the remains of a few brick structures. However across the valley we could also see the more substantial brick buildings of the 1890s cordite factory. The part of the site designated as a Scheduled Ancient Monument has recently been extended to include these structures. At Postford Pond we saw the new housing and office development which in the past few years has replaced the former flour roller-mill, which itself replaced a paper mill. In the late 17th century this was the Upper Works, there being four gunpowder stamp mills on the dam, another on Waterloo Pond just upstream and yet another on the Postford Brook. We visited the site of the last named which are in the grounds of Postford House. This is now occupied by a brick 19th century mill building, used to make pulp for the paper mill and later as a saw mill. It has a small disused water turbine in a pit built for a large earlier waterwheel. We then walked back along the road to the Percy Arms for lunch noting the Postford Stream which runs through the garden of the pub and was used for flowing the meadows.

After lunch we were able to use an upstairs room of the pub, set up for playing skittles, to have some illustrated talks. In particular Alan Crocker gave an account of the development of the use of waterpower at Chilworth both before and after the East India Company arrived to make gunpowder in 1626. This was followed by a talk by Andrew Norris on a project to record and conserve the small stone arch bridge which crosses the millstream on the north side of the valley. The dating of this bridge would enable a better understanding of the development of the watercourses to be obtained. Finally Brenda Buchanan reported on a document she has discovered which clarifies the calculations reported by Alan Crocker in Newsletter 24, page 6, on the number of barrels of gunpowder which could be made per month in a trough. She plans to write an article about this for a future newsletter.

At 3 o'clock we left the pub to explore the western part of the Chilworth site. We walked along the road to Blacksmiths Lane and noted the manager's residence formerly known as Powdermill House but changed to The Old Manor House by the 1880s. We then walked down to the Lower Works. Until recently it was thought that these were only on the dam which carries Blacksmiths Lane across the valley but it has now been discovered that there were also several stamp mills on a leat running farther west. However, in 1704 the Lower Works were converted to paper making. Nevertheless, much of the land was retained for preparing the raw materials and other purposes by the gunpowder makers. We saw several of these buildings, mainly dating from the late 19th century, including the charcoal house, the saltpetre house, the cooperage and the office. On the other side of Blacksmiths Lane we entered the Middle Works and had tea at West Lodge, thanks to Chris Harris. He works for Guildford Borough Council who own this part of the site and represents them on a small working group (also including Andrew Norris, Glenys Crocker and Alan Crocker) which sits regularly to prepare proposals for the future management of the gunpowder site.

At tea it started to rain and it gradually got heavier and heavier. In spite of this we looked at the millpond, several stone edge runners and various ruined buildings on our way back to the Percy Arms. A few people even went on a diversion to see Andrew Norris's stone arch bridge. Judging by members' comments at the end of the day and from later messages it all seemed to add up to a successful day.

Alan Crocker

NOTES ON 'ELEPHANT' BLACK POWDER

Bill Curtis has provided a copy of a message he has received from **Bill Knight** (Bill), a contact of his in the USA, about the quality of Elephant powder produced at the Pernambuco Mills in Brazil. Jim Kirkland, President of Elephant, had been to Brazil and taken photographs which he was copying to Bill in order to encourage him to write a book on black powder manufacturing techniques. He reported that all the powder made in 1998 had been sold to master distributors. He had seen new equipment set up to clean the powder before it was packaged, had shot with some cleaned powder and was impressed. In future all Pernambuco powder, including that sold for fireworks, will be cleaned.

Bill states that Elephant gives a pH of about 8.2. This is somewhat alkaline due to the mineral content of the charcoal but in the middle of the range of 8.0 to 8.5 for properly made powder. However the US military authorities changed their specification to 6.0 to 8.0 in the early 1980s in order to accommodate problems being experienced by Goex at Moosic. Bill had discussed charcoal with Pernambuco in 1994 and suggested that they debark the imbauba wood they use for charcoal. During the charring process the bark will char to pure carbon even though the wood is charred to 70 to 75% fixed carbon. The pure carbon portion of the charcoal adds to bore fouling and produces sparks when the ball or bullet exits the muzzle. Some shooters refer to these sparks as "fireflies". He also pointed out that a large proportion of the minerals found in the wood will be in the bark. At first the plant ignored this advice but has now started to debark the wood and the 1999 powder will have the new charcoal as well as being cleaned. Bill is looking forward to testing the difference. The company is also searching the southern part of Brazil for trees brought from Europe which would produce more suitable charcoal. Some buckthorn alder does grow in Brazil as a herbal tea is produced from its bark, which is a powerful laxative!

Finally Bill Knight states that the Pernambuco staff admire the powder produced at Aubonne in Switzerland and Bill Curtis confirms that there is no doubt that it is far and away the strongest and cleanest powder available at the moment.

A CLOSING DATE FOR THE GREENWICH MAGAZINE

Peter Jenkins of the Surrey Industrial History Group has provided detailed information which clarifies the date when the Greenwich gunpowder magazine was closed and demolished. A print of this magazine together with some notes by Wayne Cocroft appeared in GMSG Newsletter **19**, p 26. Mary Mills then wrote an article on the location of the magazine in Newsletter **21**, pp 7-8 and there was a review of an article by Mary about the history of the magazine, which included the same print, in Newsletter **22**, p 25. Wayne thought that the print dated from the 1730s but Mary gave a date of 1794, although the costumes worn by figures in the foreground appeared to be earlier. Wayne said that the magazine closed in the 1760s and Mary in 1768.

Peter Jenkins has examined documents in Class WO 47 at the Public Record Office. This is a large and far from homogeneous class. The piece numbers in the range 34-120 are described as "Minutes, Surveyor-General" and cover the period 1749-1792. They are volumes, kept at the Surveyor-General's office, representing his activities in executing the Board's decisions. However the evidence does not establish them as a complete record of the Board's proceedings.

WO 47/77 Jan-Jun 1771

Feb 13, p 125: "Ordered that Lighters be sent to carry the Building Materials from Greenwich

Magazine to Woolwich and that if any Store remains there they be sent to the Tower."

Apr 16, p 320: "Mr Newton Storekeeper at Greenwich Magazine having reported in his letter of the 8th pursuant to an order of the 5th instant that the Magazine and Proof House are entirely down and that there remains only the Office, part of the Guard Room, and the Stage and Bridge Standing and that there still remains a great quantity of Brick & old Timber to be sent to Woolwich which are daily sending lighters."

Apr 24 & 25, p 340: "Mr Hartnell reports that all the Greenwich magazine will be taken down and material sent away in about 3 weeks time."

WO 47/81 Jan-Jun 1773

May 4, p 378: "Ordered that the letter from Mr John Lamb Deputy Expenditor, of 28th ult relating to the assessments on the Landholders for repairing the Walls and Banks of the River Thames, and desiring that the same may be paid for 1771 & 1772 for the Land belonging to the Late Powder magazine at Greenwich be referred to Mr Newton to report, when he quitted the Land, and all that he knows relating to what is set forth."

It seems conclusive that the magazine and proof house were demolished in 1771, probably by the end of May.

The page references in the above transcripts are hand-written ones and not printed ones.

POWDERMILLS COUNTRY HOUSE HOTEL, BATTLE

Whilst searching "gunpowder" on the internet I discovered the Powder Mills Country House Hotel at Battle and completed the electronic request for more information. A beautifully produced package of information arrived the following day explaining that "PowderMills is a stunning 18th Century listed Country House Hotel nestling in 150 acres of parklands, woods and lakes." It was immediately apparent that they specialise in weddings, including civil ceremonies, but also have facilities "professionally designed and equipped to meet the exacting standards of today's conference business". However, they also sent information about the history of the site and this is summarised below.

The hotel is in the valley of the Asten which worked five gunpowder mills. First was "Farthing Mills" with a 6 acre pond. Next came "House Mills" with a 12 acre pond and the residence of the proprietor, which has become the hotel. Further downstream came "Pepper in eye", "Lower Pepper in eye" and "Crowhurst". Powdermill House was originally built in 1676 when the first lease was granted to John Hammond. It was destroyed by an explosion in 1796, rebuilt in the same year and by 1800 the mills were flourishing again. The reputation of the mills is said to have been high during the Peninsular War and the Duke of Wellington visited them in 1806. The powder was packaged by women and sent by wagon to Tonbridge where it was loaded on barges and conveyed by water to magazines at Erith. During the Crimean War, 1300 barrels of Battle powder were used. In 1876 the Duke of Cleveland, then owner of the Battle Abbey estate refused to renew the lease because of the constant danger of explosions and the mills closed. [For further details see H Blackman "The story of the old gunpowder works at Battle", *Sussex Archaeological Collections*, 64 (1923) pp 109-22].

Glenys and I visited the mills with GMSG members John and Kathy Upton about 15 years ago and clearly a lot has happened at the House Mills since then. By coincidence Brenda Buchanan has suggested that the Group might hold a weekend conference at Battle. Perhaps the best way to arrange this would be for a member to get married there and invite the rest of us as guests!

Alan Crocker

THE CHALK PIT SITE AT THE DARTFORD GUNPOWDER WORKS

Luke Barber of Archaeology South-East has been carrying out a survey, backed up by cartographic and documentary research, on part of the Dartford Gunpowder Works in Kent. He has provided me with a draft of his report and the following notes are based on this and other information I was able to send him.

The gunpowder industry was established at Dartford in 1732 by Edward Pyke and Thomas Edsall on the site of John Spilman's paper mill which was founded in 1588. Following Pyke's death it was run by Thomas Edsall and his son but when Edsall junior became bankrupt in 1778 the assignees sold it to Pigou and Andrews. The Pigou family owned the land and operated the mills firstly with Andrews and then with Richard Wilks. In 1873 they merged with Charles Laurence who had run the Battle Mills in Sussex. This date confirms Will Adye-White's information in GMSG Newsletter **24**, page 16; the date of c.1850 in the *Gunpowder Mills Gazetteer* is incorrect. In about 1890 a guncotton factory was erected adjacent to the black powder works and in 1898 the firm became part of Curtis's & Harvey Ltd.

It is the site of the guncotton factory (TQ 551728), located in a chalk pit about 200m east of the incorporating mills, which Luke has been investigating. Note that the grid reference for the whole site given in the *Gazetteer* is inaccurate, it was centred on TQ 549727. Buildings are shown in the chalk pit on maps of 1799 onwards. On the tithe map of 1840 these are labelled "Charcoal Works" and the corresponding entry in the apportionment is "Chalk hole containing Saltpetre, Charcoal and other Works and 2 Cottages". Also a lane passes through the pit leading to a dusting house and magazine in a wooded area about 200m away and Luke notes that an application was made to erect a dusting house in 1828. When Lamot du Pont visited the works in 1858 he prepared a sketch map (see *Trans Newcomen Soc* **47**, 1975, page 88) which shows part of the chalk pit with symbols representing "Cords of alder wood", "Cords of Willow and English dogwood", "Engine and boiler house", "Circular sawmill" and two "Coal [charcoal burning] houses". He shows a large complex of buildings for refining saltpetre about 300m north-west of the pit and it seems likely that these had replaced the earlier saltpetre works on the tithe map. Further buildings are shown in the pit on the 1867 25 inch OS map but the function of these is not known.

Between 1867 and the next edition of the OS 25 inch map in 1897 major changes took place. There are many new buildings and also a lime kiln, which is referred to in a document of 1874. However, as explained on page 362 of *The Rise and Progress of the British Explosives Industry*, published in 1909, a guncotton factory was erected on land adjacent to the old black powder factory, i.e. in the chalk pit, in about 1890 and a nitrocellulose powder on the "Troisdorf" system manufactured. [The only reference I have to "Troisdorf powder" is in the index of Guttman's *The Manufacture of Explosives* of 1895. It refers to page 254 of volume **2**, but I only have volume **1**.] The guncotton factory was still being used by Curtis's & Harvey in 1909 but the black powder factory had been given up and the land returned to the Pigou family who owned the freehold. However a works for the manufacture of "Ironclad" incandescent gas mantles had been established. Indeed Curtis's & Harvey had the largest business in gas mantles in the country and this was the only site where they made them.

An article on "Explosives and Dartford" by P H G Draper in the *Dartford Historical & Antiquarian Society Newsletter*, **7**, 1970 pp 40-4, states that the guncotton factory was set up by an Australian, G W MacDonald, who left in 1908 to take charge of the new Curtis's & Harvey Cliffe at Hoo factory. Day to day supervision and laboratory work at Dartford was left to C Gillham. By 1911 the Dartford guncotton works had closed but production of gas mantles continued until about 1922. Later the chalk pit was used by a foundry. Incidentally,

Draper also notes that Pigou's original partner, Miles Peter Andrews, was an ambitious but notorious London rake of humble parentage who died in 1814.

The major part of Luke Barber's project has been surveying and interpreting the remains of the seven buildings, two lime kilns, underground chamber and pump house which survive in the chalk pit. Most of these are probably 19th century and have been re-used several times by different industries so his task has been very difficult. However, two of the buildings contain the foundations of kilns and would appear to correspond to the "Coal Houses" on Lamot Du Pont's map. He noted that charring was done in horizontal cast-iron cylinders 3 ft long and 2.5 ft in diameter set above furnaces and the resulting charred sticks pulverised under edge runners. Recently however a pulverising machine resembling a coffee mill had been installed. These two buildings had however been modified substantially when other kilns for the later industries had been installed. Another building appeared to be a charcoal store.

The underground chamber is not shown on any of the maps. It is behind the face of the chalk pit, about 20 ft long and 8 ft wide, and entered by means of a 24 ft passage. It is lined with Victorian-type bricks and has remains of wooden shelving. It could therefore be a gunpowder or guncotton magazine but it is also known to have been used by the foundry as a store and air-raid shelter. There are also two partially underground chambers, entered by steps, which first appear on the 1897 map. Again they seem likely to be stores for explosives. The two lime kilns are at present a mystery. One appears to have replaced the other before 1897 so they were not built for the gas mantle factory. The pump house with an associated brick channel containing a large ceramic pipe is an even greater mystery. Finally Luke has discovered huge quantities of broken gas mantles, "string", and glass laboratory equipment. This glassware was no doubt from the laboratory run after 1908, as noted above, by C Gillham.

Members wishing to have further details of Luke Barker's project or who feel able to provide detailed interpretations of his discoveries should contact him c/o Archaeology South-East, 1 West Street, Ditchling, Hassocks, West Sussex, BN6 8TS.

Alan Crocker

"GEORGE WAILES & CO, 1889-1960"

Tony Yoward

This is the title of a paper read by Rex Wailes to the Newcomen Society at the Science Museum on 14 April 1976 and published in *Trans Newcomen Soc*, 47 (1974-6), pp 191-206. The following paragraph on page 200 may be of interest to members.

"There was a wide range of machines made, carbon paper coating machines designed by Dr Watmough for The Caribonum Company; an amatol pellet press for Curtis and Harvey's powder mill at Faversham, and Nobel's at Stevenston. After 1945 we had an enquiry from Arcos for one of these; but when they said they wanted to see the drawings first we went no further. For Explosives and Chemical Products in 1924 we designed a paper shell machine, which produced wax paper tubes folded at one end but not the other. They asked for another in 1961 but were too late. (The firm had lost its premises and closed due to the widening of Euston Road). For African Explosives and Chemicals we made fuse cap crimping machines. These were designed to prevent workers from clinching the end of the aluminium cap on to the end of the fuse with their teeth. The jigs we designed for boring them out were used on a 5 inch Whitworth lathe which we had taken in part exchange from the Royal Institution. It had been purchased at the 1851 Exhibition for making Dewar's original apparatus for the production of liquid air. We gave it to the Science Museum, since when it has not been seen."

GUY FAWKES GUNPOWDER RECEIPT

After giving a lecture on gunpowder mills at Haslemere Museum, Surrey, recently, a member of the audience, **Cyril Ward**, gave me a copy of an article which appeared on page 3 of the *Daily Telegraph* on 4 May 1978. It describes the discovery at the Public Record Office of an official receipt, dated 7 November 1605, for 1,800 lbs of gunpowder which was delivered to the Tower of London from a cellar beneath Parliament House. A separate record shows that it cost 15s.6d to move the gunpowder to the Tower. Cyril, who used to work for the Ordnance Board, also has photocopies of the two documents and the receipt and a transcript are reproduced below.

Received into his Majesties store within Th'office of Th'Ordenauce from out of the Vault
 underne the Parliamt howse Corne powder XVIII^o weighte decaied, wch was there laide
 and placed for the blowing up of the said howse and destruction of the Kings Majestie, the
 Nobilitie and Commonalitie there assembled. Received as aforesaid, Corne powder decaied,
 XVIII^o wt. Crowes [crowbars] of yron with rownd pommels or heads, twoe.

"Received into his Majesties store within Th'office of Th'Ordenauce from out of the Vault underne the Parliamt howse Corne powder XVIII^o weighte decaied, wch was there laide and placed for the blowing up of the said howse and destruction of the Kings Majestie, the Nobilitie and Commonalitie there assembled. Received as aforesaid, Corne powder decaied, XVIII^o wt. Crowes [crowbars] of yron with rownd pommels or heads, twoe."

Alan Crocker

THE LAKE SUPERIOR POWDER CO, MARQUETTE, MICHIGAN, USA

Fred Lee has sent copies of two descriptions of powder production at the Lake Superior Powder Co taken from the *Marquette Mining Journal*. The first, dated 24 August 1872, explains that the company was set up two years earlier and produced 100 kegs of mining and blasting powder per day using water power. The buildings occupied about 10 acres of a 200 acre tract of land 2.5 miles north of Marquette and were linked by a light tramway. The saltpetre was refined in 90 gallon kettles at 225° F. It was mixed with 6% sulphur and 8% charcoal, which seems to be an unusual recipe. The description suggests that incorporation was carried out using a single edge-runner. The copper plates in the hydraulic press were 20 inches square. The sheets of powder were then taken to the kernelling [coming] mills and sieved into six grades. It was glazed, not because it was necessary but because "a vulgar notion among miners has decided that it must present a bright polished appearance". Finally the powder was dried at 120 degrees. The company tested every batch using a mortar.

The second article, dated 29 May 1875, is much more detailed and is probably more accurate. It explains that the works were on the Dead River and used 2,500 lbs of saltpetre daily. This was refined in eight large kettles containing 660 lbs of saltpetre and 10 gallons of water at a temperature of 280° F. Sodium nitrate was used for some kinds of blasting powder. The refining process was repeated twice for sporting powder. The charcoal was made in pits and not retorts, because the latter used as much timber for fuel as they did for producing the charcoal. Birch, poplar and pine were used for blasting powder and alder, willow and dogwood for rifle powder. The charcoal and sulphur were pulverised in a ball mill and then screened. The ingredients were then mixed and taken to be incorporated in "the wheel mill". This had two pairs of iron edge-runners, 7 ft in diameter and 18 inches thick, one pair weighing 17 tons and the other 13 tons. They ran asymmetrically, the outer wheels traversing a 36 ft circumference circle and the inner ones 21 ft. The charge was 300 lbs in the large mill, 200 lbs in the small one, and they had had no explosions since their establishment in 1869. In the press house a multiple sandwich of 1 inch layers of powder and copper sheets totalling 6 ft in thickness was reduced to 3 ft. The corning machine had a series of toothed cylinders. The equipment was made of brass. Glazing was carried out in iron cylinders 10 ft long and 3.5 ft in diameter with a capacity of 1,250 lbs and turning at 15 rpm. The stove was heated by charcoal fires covered with inverted kettles, the temperature being kept at 140° F. The powder in the stove was placed on canvas-bottomed trays each containing 25 lbs and was dried for at least 7 days. It was then separated into C, F, FF, FFF and FFFF grades, which had particles as large as chestnuts, corn, wheat, flax seed, and clover or grass seed respectively. The works were capable of producing 160 kegs per day but in practice only 120 kegs were being made for about 8 months in the year. The powder was said to be "most excellent". Using the mortar at 45 degrees it had thrown a 24 lbs ball 1,000 ft with a charge of 1.25 ounces, whereas the best achieved by other brands was 600 ft.

Alan Crocker

EXPLOSION IN A CORNING HOUSE AT FAVERSHAM IN 1807

Arthur Percival has sent a copy of an interesting account, which appeared in the *Kentish Gazette* of 23 September 1807, of an explosion in corning house no. 3 of the Marsh Works at Faversham in which six men and three horses died. It was a rectangular timber building with an entrance on each side and the interior divided by partitions into three compartments. One end contained a press with levers and capstan and this was also where the sheets of pressed powder were coarsely broken with wooden mallets. The middle compartment housed the corning machinery which agitated copper sieves of different degrees of fineness. The other end contained a horse mill which powered the corning machine. A constant cloud of dust was produced from the corning process and this impregnated the whole building. At the time of the explosion the press was charged and the sieves were working. There was 840 lbs of gunpowder in the mill, which was the usual charge received twice a day. A similar accident had occurred in corning house no. 1 in 1802 and that had been rebuilt with the press separated from the mill by a high mound.

The description of the building closely matches the drawings of pressing and corning at the Faversham mills in 1796, reproduced by Glenys Crocker's *The Gunpowder Industry* (2nd edition, Shire 1999, page 18). However, it is thought that these were of the Home Works.

Alan Crocker

PAINTING OF OWNER'S HOUSE, WORCESTER PARK GUNPOWDER MILLS

Tim Everson of Kingston Museum has searched a Corporation of London web site (www.cityoflondon.gov.uk) which contains over 30,000 works of art from their collections. These include an 1810 anonymous watercolour on paper, measuring 22cm across of a house belonging to the proprietor of the powder mills at Malden, Surrey, now part of the London Borough of Kingston upon Thames. The mills were at different times known as the Tolworth, Malden and Worcester Park Mills and are thought to have operated from 1561 until about 1620 and again from 1720 to the 1850s. In 1810 they were owned by William Taylor. The painting, as down-loaded from the web, shows a central two-storey building with single-storey wings set in a park. It provides, perhaps, a little information about the status of the owner but more importantly it is an example of the opportunity provided by the web for discovering interesting new information.

COMMEMORATIVE STONE AT LINLITHGOW

Pete Dunn of The Muzzle Loaders' Association of Great Britain has sent information about a commemorative stone on the site of a new shopping complex in Linlithgow, West Lothian, Scotland. This came from a former building on the site which was for Nobel's explosives and the inscription is as follows:

"Nobel's Explosives Company Limited. Regent Factory

In commemoration of the erection of this factory in the coronation year of King Edward VII this tablet was affixed by Sir Charles Tennant, bart. 16 September 1902.

Board of Directors: Sir Charles Tennant, bart. of The Glen, Peebleshire and 40 Grosvenor Square, London, Chairman; Hugh Beckett, esq, Glasgow; Hugh Brown, esq, JP, DL, Glasgow; The Hon Thomas Cochrane, MP, Crawford Priory, Fife; M Pearce Campbell, esq, JP, Glasgow.

Thomas Johnston, General Manager; G W Wainwright, Secretary; Francis J Shand, Assistant Manager; G Smith, Manager Regent Factory; Wm Scott, Architect."

The only part of the original building which Pete was able to find was a gateway. He points out that it was not isolated from the town, being at the end of the High Street, and adjacent to the railway station and a distillery.

MORE PIGEON DROPPINGS

Alan Crocker

I have had no useful response to my note on "Pigeon Droppings" in Newsletter **24**, page 18. In this I worked out that it would require the dung from 750,000 pigeons to produce enough saltpetre to make one tonne of gunpowder in one day. However, I did mention my calculation to a friend who is a vet and he pointed out (not surprisingly) that the model upon which it is based contains several flaws. First, I overestimated the weight of a pigeon as being 1 kg. This, of course, was to the nearest kg and apparently I should therefore have used 0 kg, which would have resulted in no saltpetre being produced! More seriously, it appears that adult pigeons leave most of their droppings around the countryside and not in their houses. It is the baby pigeons, known as squabs, which defecate in the nests. The adults then clean out the nests by pushing the mess down on to the floor of the pigeon house. Being even more ignorant about the behaviour of squabs than I am about "giant" pigeons I have decided to pursue the calculation no further. Perhaps someone knows a pigeon fancier who has practical experience of these matters?

Ted Bacyk, David Bacyk & Tom Rowe, *Gun Powder Cans & Kegs*, Rowe Publications, 295 Lakebreeze Park, Rochester, New York, 14622, USA. US\$65.00 plus shipping. Also available through Bill Curtis, tel 01745 584981.

Over the last two decades, the interest in gunpowder companies has experienced significant growth. However, the area of gunpowder tins and kegs is an area which has been largely ignored. This has been partially rectified by the publication of this book. It is the first major attempt at documenting the tins and labels of the main American producers. Dupont, Hazard, American Powder, Laflin and Rand and Ohio Powder are the companies covered in this volume. A second volume covering the tins and kegs of the smaller mills, the Pacific mills and some of the foreign companies is planned.

The job of documenting these labels must have been a daunting task. To accumulate a collection of this size and scope was a job of monumental proportions. Ted and David Bacyk have spent the last 25 years in the collection, preservation and research of the companies and tins, and the results are spectacular. The entire book is in colour which is outstanding. Tom Rowe was responsible for the photography, and did great justice to the fine graphic details of many of the more ornate labels.

Each company has a brief history. This is followed by a pictorial representation of the tins and kegs. Each page of photographs has two tins or kegs along with dimensions. The approximate date of the tins and the relative rarity, along with estimated values and notes, are clearly and succinctly presented.

The only drawback with the book is the lack of detailed information on the companies. The inclusion of such information as well as more detailed dating of the tins and kegs would have greatly enhanced the book. However the authors have stated in the foreword that the intent was not to be a scholarly history of the powder companies. The book is what it is meant to be, and that is a pictorial sampling of the tins of the above mentioned manufacturers. As such, it is a great book. Priced at US\$65.00 and being completely in colour it is very good value for money. Anyone interested in the tins and kegs of the major American powder manufacturers should buy it. But, be warned, it is light on the scholarly side.

Will Adye-White

Glenys Crocker, *A Guide to the Chilworth Gunpowder Mills*, 3rd edition, Surrey Industrial History Group, 1999, 20 pp (including cover), 18 maps and illus, ISBN 0 9523918 3 X. £1.00 plus £0.25 p&p from the author at 6 Burwood Close, Guildford, Surrey GU1 2SB.

The first version of Glenys's field guide to Chilworth appeared as part of her book *Chilworth Gunpowder* published in 1984. A thousand copies of this sold so quickly that she decided to reproduce the guide as a separate booklet which appeared 1985. This was reprinted in 1990 followed by a 2nd edition in 1994 and now a 3rd. Therefore, altogether, some 5,500 copies have been sold so clearly there is a substantial and continuing demand. Also, a large amount of new documentary research and recording of the site has been carried out and a summary of the results of this has been included in the new edition. This has meant printing on the two inside covers in order to retain the same number of pages. Incidentally, the new cover is orange in order to distinguish it from the earlier yellow editions. The illustrations are unchanged but in some cases it is interesting that, since they were drawn by Rowena Oliver 15 years ago, vegetation has hidden most of the features. The maps have been redrawn and extended to include areas which have only recently been confirmed as being used for gunpowder manufacture during the 17th century. Research and recording of the Chilworth mills is continuing and no doubt in a few years time this edition will again be sold out and a 4th one produced bringing us all up to date again.

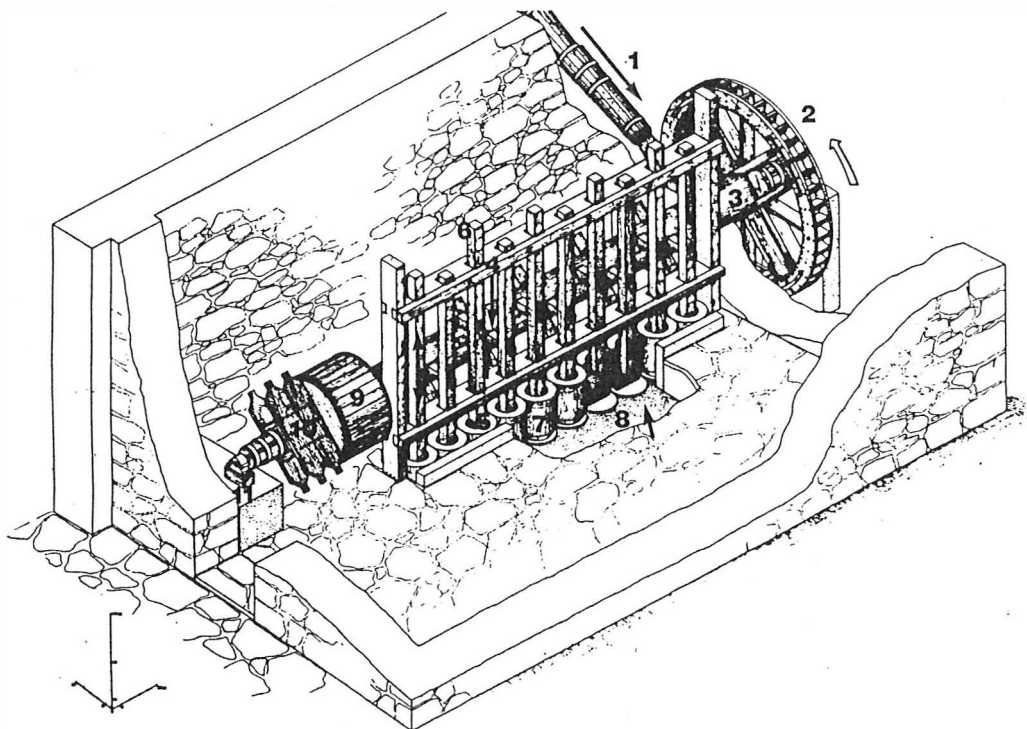
Alan Crocker

Stelios Papadopoulos, *Black Powder, Powder Mills and the Greek War of Independence* (The ETBA Cultural Foundation, Athens, 1997), 35pp, ISBN 960-244-048-1

This small but elegant volume is to be welcomed, for it provides an account of the reconstructed powder mill at Dimitsana in the Peloponnese, previously described by the author in a paper presented to the Gunpowder Section of the 23rd Symposium of ICOTEC in Budapest, 1996. The background briefing on the raw materials and processes of production provided the setting for a fascinating account of the history and present features of the site.

The reference to the Greek War of Independence in the title reminds us of the history of warfare in the region. Freedom from the Ottoman Empire was achieved by a prolonged struggle over the years 1821 to 1828, during which time the village of Dimitsana was the major producer of gunpowder, for as much as 500 *okas* or 137 barrels could be made in 24 hours at the mills there. If that is difficult to comprehend we have only to look at more familiar country locations such as Waltham Abbey, where large-scale production was also based on a rural site offering water-power, timber, and security. Yet in its origins the Dimitsana industry had closer links with Sweden, where itinerant saltpetremen (see Sengt Åhslund, *Gunpowder: The History of an International Technology*, pp 163-81, Buchanan, B J (ed), Bath Univ Press, 1996) also travelled round the villages collecting the noxious materials from which the potassium nitrate was to be refined. In exacting this service from the Dimitsana labourers their overlords were unwittingly assisting their own downfall, for it was from this simple beginning that the gunpowder industry developed, surviving until the 1970s with three mills still in operation.

The manufacture of gunpowder at Dimitsana has now ceased, but in order to commemorate this industry and those who served in it, a powder mill has now been reconditioned at the lower end of a site which with its fulling tub, tannery, and *raki* distillery, conveys the sense of the active industrial/agricultural community which once worked there. The whole has now become a water-powered Open-Air Museum, for which *A Short Guide* is available. This maintains the same high standard as the book under review, and as well as describing the industries on the site it also



The powder mill at the water power museum, Dimitsana, showing: 1. Headrace; 2. Waterwheel; 3. Axle or cam shaft; 4. Cam; 5. Bottom of a stamp; 6. Top of a sramp; 7. Mortar; 8. Ingredients being incorporated; 9. Glazing barrel; 10. Sails for dusting; 11. Axle bearing.

industrial buildings were donated in 1987 by the Metropolitan Bishop of the Church, and it has shows the amount of co-operation which has underlain this enterprise. It has been supported throughout by the ETBA Cultural Foundation, a banking organisation to whom the ruined received assistance from the Peloponnese Region and the European Union.

In rescuing an important part of the industrial history of this region these organizations have made a welcome contribution to its economy and ethnography. Less obviously, they have also made a special contribution to the history of the technology of gunpowder making, for the powder mill displays some features with which this reviewer at least is not familiar. They are to be seen in the accompanying plan provided by Dr Papadopoulos, which shows a whole system operating from one camshaft - with stamps for crushing and incorporating the ingredients, a revolving barrel for compacting and glazing the grains, and rotating sails to which bags would be attached, to remove the dust and clean the grains. This arrangement would have made an economical use of the waterpower available, but the proximity of the different working parts must have constituted a hazard, in addition to which the regulation of the different speeds would have been difficult to achieve. In particular, the sails would have required a gentle rather than a vigorous movement. Indeed the procedure for dusting shown here is very novel, although this evidence does raise the possibility that some such rotating device may have been known in western Europe before the sloping reel or bolter used in the milling industry was commonly adopted. This comparative theme could be developed further, but enough has been said to show that this well-produced and annotated small book contains enough riches to show the importance of international studies of this subject.

That said, it may seem greedy to ask for more, but the reference in the text to the 20 powder mills mapped in the Dimitsana area in 1989, and the map showing the numerous centres of production in the eastern Mediterranean, both place the Dimitsana mill in a broader context about which we would love to learn more.

Brenda Buchanan

[Editor's note: Members are reminded of the announcement in Newsletter **24**, page 19, about the mills tour to the Peloponnese, particularly Dimitsana, organised by *Island Holidays* for 12-19 October. ETBA Cultural Foundation have been members of GMSG for ten years (see Newsletters **6**, p 14; **7**, p 13; **9**, pp 6-7, with a plan of the restored mill illustrated here). We also have a copy of the 1989 large-format 81-page report, including 11 maps and 145 photographs and with a 7-page English summary, of a detailed survey of the 91 water-powered installations at Dimitsana, including the 20 gunpowder mills. An account of the mills tour to Dimitsana has been included in the programme of the GMSG Autumn Meeting on 23 October.]

Mary Mills, *Greenwich - The 300 years before the Dome*, A5, soft cover, 1999, 239 pp, 100 illus, ISBN: 0 9535245 0 7. £9.95 incl p&p; M Wright, 24 Humber Rd, London SE3 7LT.

GMSG member Mary Mills has written this absorbing book about the industries of the Greenwich peninsula (formerly in Kent but now in south-east London) at an appropriate time - when the Millennium Dome is being constructed on part of the site. It is divided into 23 chapters starting with the draining of Greenwich Marsh and then providing self-contained accounts of the various industries, families and events which have influenced the area. For example chapters are devoted to "The Atlantic Cable", "British Carbolic", "Sailing Barges", "Coal and Chemicals" and "The Great War". Mary did of course write a paper on "The Greenwich Gunpowder Depot" which appeared in GMSG Newsletter **21**, pp 7-8 and articles she has published in *Bygone Kent* on "The

Explosives Magazine at Greenwich" and "Gunpowder - Inspection and Death" were reviewed in issues 22, p 25 and 23, p 24 respectively. These topics are also covered in the book as is the history of the East Greenwich Gas works which Mary has researched in depth. It is an excellent book to dip into on all sorts of topics. The text is easy and entertaining to read and the numerous illustrations are well-chosen. What a pity however that some of these, particularly the maps, are printed so small that it difficult or even impossible to read the text on them, even when using a magnifying glass.

Alan Crocker

Jim Lewis, *London's Lea Valley, Britain's best kept secret*, Phillimore, 1999, 124 +xii pp, c165 illus, £14.99. ISBN 1 86077 100 9 (hard back).

GMSG member Jim Lewis has written a fascinating book based on what he calls the birthplace of the post-industrial revolution, that is the Lea Valley. The Lea rises near Hertford and enters the Thames between Bow and West Ham. Jim devotes separate short chapters to over thirty industries, inventions or entrepreneurs and a feature of the book is that each of these can be read independently. Of particular interest to members will of course be the 3-page chapter on "From Gunpowder to Tourism - the Peaceful Explosion", which summarises the story of the Waltham Abbey Royal Gunpowder Mills, illustrated by four photographs. However there are other relevant chapters including "The Man with the Imaginative Flare [Congreve]", "The Royal Small Arms Factory Enfield Lock - the Early Years" and "Who put the Lee in the Lee-Enfield Rifle?". Also, in view of the fact that Curtis's and Harvey made gas mantles at the Dartford gunpowder mills (mentioned elsewhere in this Newsletter), it was interesting to discover that Jules Thorn, who gave his name to Thorn-EMI, first came to Britain in 1923 as a representative of an Austrian gas mantle manufacturer, which became bankrupt three years later. Other industries include road vehicle, ship, locomotive and aircraft building and there are accounts of James Dewar and his vacuum flasks, Charles Babbage and his computer, Joseph Edison Swan and his light bulb, and much else. All this is beautifully illustrated although it is a pity that the publishers have spread some photographs unnecessarily across the gutter. Still it is a very informative and entertaining book to dip into and Jim is to be congratulated for doing all this work on a valley which he clearly loves dearly.

Alan Crocker

Frank Page, "Gunpowder - An Exploded View", *Black Powder*, vol 45, (1998) pp 37-41 .

This paper, in the official journal of the Muzzle Loaders' Association of Great Britain, is an account of an investigation using scanning electron microscopy of nine different types of gunpowder. There is a micrograph at x265 of each powder plus a detail at x2,000 in one case and a whole grain at x50 in another; they show enormous differences. The powders and the results are as follows:

1. Curtis's & Harvey Diamond Grain of about 1890. Exceptionally good with an even mixture of fine particles of the three ingredients.
2. Powder bought in the 1930s which might have come from the Lake District. Well-mixed but with larger particles.
3. Blasting powder of the 1930s. Large particles with the charcoal retaining the structure of wood.

4. A cheap powder which many people use today. Large areas of saltpetre and charcoal not completely pulverised.
5. TPPH powder which many people "swear by". Generally incorporated but containing many large pieces of saltpetre and charcoal.
6. Military powder of 1865. Similar to 1 but only had 3 hours incorporating so pre-grinding of components helps.
7. Snider powder (x265 and x50). Grains covered with small sulphur crystals but internally still well-ground and incorporated. Surface crystals probably caused by heating.
8. French powder of 1775 (x265 and x2,000). Well incorporated but with many crystals of calcium sulphate, thought to arise from using saltpetre contaminated with calcium nitrate.
9. ICI TS20 powder, a special batch produced for the world championships in 1973. It seems that this worked well but it contains many large particles.

The text of the paper is written in a very informal way but the factual information it contains is very illuminating

Alan Crocker

ICI AND CARDOX BOOKLETS ON EXPLOSIVES

John Boucher, who is a mining engineer and keen industrial archaeologist, has given us the following booklets:

1. *Explosives: the sale, storage & conveyance by road*, ICI Nobel Division, undated but A4 and perhaps 1960s, 20pp plus 7 fold-outs. The booklet is divided into sections on sale of explosives (1 page), storage (5), conveyance on roads (3), specifications for stores (7) and the fold-outs provide detailed plans and elevations of different types of stores, setting up a lightning conductor for a store, how to arrange explosives cases inside stores and the design of a steel door for a store.
2. *The Sale and Storage of Explosives*, ICI Nobel's Explosives Co Ltd, undated but after 1975, A4, 8 pp. Updated version of corresponding parts of 1, but without plans.
3. *The Conveyance of Explosives by Road*, ICI Nobel's Explosives Co Ltd, undated but after 1975, A4, 4 pp. Updated version of corresponding part of 1
4. *Explosives in Demolitions*, ICI Nobel's Explosives Co Ltd, undated but probably 1980s, A4, 8 pp, 7 illus. Sections on choice of explosives; methods of demolition; demolition using borehole, concussion and plaster charges. Subsections on concrete foundations, floors and roofs; brick and concrete walls, piers and pillars; chimneys; bridges and viaducts; buildings; steel plate and girders; masonry, brickwork and concrete.
5. *Explosives in Coal Mining*, ICI Nobel's Explosives Co Ltd, undated but probably 1980s, A4, 8 pp, 17 illus. Sections on choice of explosives, stone blasting, coal-getting, delay firing in uncut coal; firing in holed coal; pulsed infusion firing. Subsections on Permitted Explosives (Polar Ajax, Dynagex, Dynobel, Unigel, Carrifrax); shaft sinking; drifting; ripping, wedge, fan and drag cut patterns.
6. *Cardox non-explosive CO² blasting system: the alternative to explosives*, Cardox, undated but probably 1980s, 8 pp, 12 illus. Mainly on blasting concrete but also on clearing fertilizer stores, pitch beds, cement feed chutes etc. [Works at Faversham visited by GMSG in 1997]

Contact me if you would like further particulars.

Alan Crocker

G I Brown, *The Big Bang - a history of explosives*, Sutton, 1998, 256 pp, c100 illus, £19.99. ISBN 0 7509 1878 0 (hard back).

Newsletter 24 contained a note on this book based on an article in *The Independent*. Subsequently I received a copy from the publisher and felt that the book deserves a more substantial review. Its scope is very wide as indicated by the titles of the 16 chapters: The invention of gunpowder; Making gunpowder; The Powder Trust; Testing gunpowder; 'Crakys of War'; Mining and civil engineering; Gunpowder modifications; Nitroglycerine; Dynamite; Guncotton; Smokeless powders; Lyddite and TNT; Setting it off; Nuclear fission; Nuclear fusion. There are also useful scientific appendixes and an excellent index with about 1250 entries.

As can be seen from the contents, much of the book is of direct relevance to the interests of members of GMSG. It is both easy to read, factually correct and very well illustrated. In particular it provides a convenient source of reliable information about all sorts of topics related to explosives, including many fascinating stories about the people involved. For example, in the first chapter there is a very clear account of Roger Bacon's cryptic recipe, of about 1260, for making gunpowder: "Sed tamen salispetrae *luru vopo vir can utriet* sulphuris et sic facies tonitruum et coruscationem". The phrase in italics is unintelligible but in 1904 Lt-Col Hime recognised the letters as an anagram for "R vii part v nov corul v et" so that the whole reads "But however of saltpetre take seven, five of young hazlewood and five of sulphur and so you will make thunder and lightning". This gives a recipe of 41.2% saltpetre, 29.4% charcoal and 29.4% sulphur, very close to the composition of early gunpowder.

Later in the book there is an account of the problems associated with Congreve rockets which were almost invariably blown off-course and greatly disliked by the Duke of Wellington. There is also a story illustrating the success of brown or cocoa powder. In a sea battle in 1898 between four American and five Spanish ships, with roughly equal numbers of men, the Spanish lost all their ships and suffered 400 casualties, whereas the Americans (using brown powder) had no losses. Again it is interesting that gunpowder was used in the Ecton copper mines in Staffordshire in 1638, only 11 years after its first known use for mining in Hungary and that one ton of gunpowder and one ton of candles were used per week in digging part of the Box railway tunnel east of Bath. Finally, Thomas Carlyle listed gunpowder, along with printing and the Protestant religion as "one of the three great elements of modern civilisation".

I hope this gives the flavour of at least the early chapters of George Brown's book. I am sure that I will continue to dip into it for fun as well as to use it for reference and I strongly recommend members to get a copy.

Alan Crocker

J R Partington, *A History of Greek Fire and Gunpowder*, reprint with new introduction by Bert Hall, Johns Hopkins Univ Press, 1999, pb, 381 pp + xxxi. £16.50. ISBN 0-8018-5954-9.

James Ruddick Partington, who was a professor of chemistry at the University of London and his authoritative book on Greek fire and gunpowder was published in 1960. The chapters are entitled: Incendaries in Warfare; The Book of Fire of Mark the Greek; The Legend of Black Berthold; Miscellaneous Treatises on Military Arts; Gunpowder and Firearms in Muslim Lands; Pyrotechnics and Firearms in China; Saltpetre. This reprint has a new 16 page introduction by Bert Hall of the University of Toronto.

Writers of eminence, *Chemistry, Theoretical, Practical and Analytical, as applied to the arts and manufactures*, Wm Mackenzie, London. Article on "Gunpowder", vol 2, pp 133-150. A photocopy of this substantial article has been sent to us by **Alan Birt**, a friend in the Association for Industrial Archaeology. He suggests that it is by that writer of eminence, Major Morgan, RA, Assistant Superintendant at the Royal Gunpowder Factory at Waltham Abbey, and was probably published in the late 1870s. In the volume it is positioned between "Gun-cotton" and "Gutta-Percha". It contains a wealth of detailed information starting with remote history including Alexander the Great being unwilling to attack the Oxydracae, who lived between the Hyphasis and the Ganges because they overthrew their enemies with thunder and lightning which they threw from their walls. It then goes on to discuss the raw materials at length (5 pages, double columns), giving for example detailed analyses of grough saltpetre and analyses and densities of charcoals made from different woods at different temperatures, but not much information about sulphur. There are then 5 pages on the proportions of the ingredients to be used, with lots of tables giving the results of various tests. This is followed by a 5-page section on manufacture, with much detail of each stage based on Waltham Abbey processes for different types of powder: LG (large grain), FG (fine grain), RLG (rifle large grain), RFG (rifle fine grain) and RFG² (for Martini-Henry rifle). For example, different procedures of 1st dusting, glazing and 2nd dusting were used for RLG and RFG but they had the same stoving and then RFG had a 3rd dusting. Finally there are short sections on testing, properties and analysis of the finished powder. It all provides a very thorough account with much unfamiliar detail.

Frederic S Lee, "Market Governance in the American Gunpowder Industry, 1865-1880", typescript, 44 pages

This is an academic paper by member Fred Lee, who is a Reader in the Department of Economics of De Montfort University. The abstract reads as follows:

"The article is a case study of market governance in the American gunpowder industry from 1865 to 1880. At the end of the Civil War, the American gunpowder industry consisted of three large national powder companies and many regional and local powder companies. A social network existed between the national and major regional powder companies, but this was not sufficient to prevent a decline in profits and prices after 1865. Consequently they drew on their social network to develop better market governance mechanisms, such as a bilateral agreement to control the powder trade in the Pennsylvania anthracite coalfields and the Gunpowder Trade Association (GTA). The first section of the article delineates the nature and structure of the gunpowder industry and its markets. The second section covers the period 1865 to 1872 and examines the social network, the problems it had with market governance in the face of market demand variability, and the various unsuccessful and successful attempts to fashion better market governance mechanisms. The third section delineates the management of the gunpowder markets from 1872 to 1880, concentrating on the GTA; and the last one evaluates its effectiveness."

Fred argues that studies of market governance mechanisms, which he defines with great care, have shortcomings, which he has addressed through this case study. It probably takes an economic historian to follow this, but the paper also contains lots of factual information which will be of wider interest. There are for example seven tables of data on, for example, compositions (including sodium nitrate), demand from coal and metal mines, brands of rifle powder, prices, Du Pont quarterly sales of rifle powder (2 pages), and GTA price-quantity deviations, and price and profit mark-up changes for rifle and blasting powders (a 2-page more complicated table). Finally there are over 50 references.

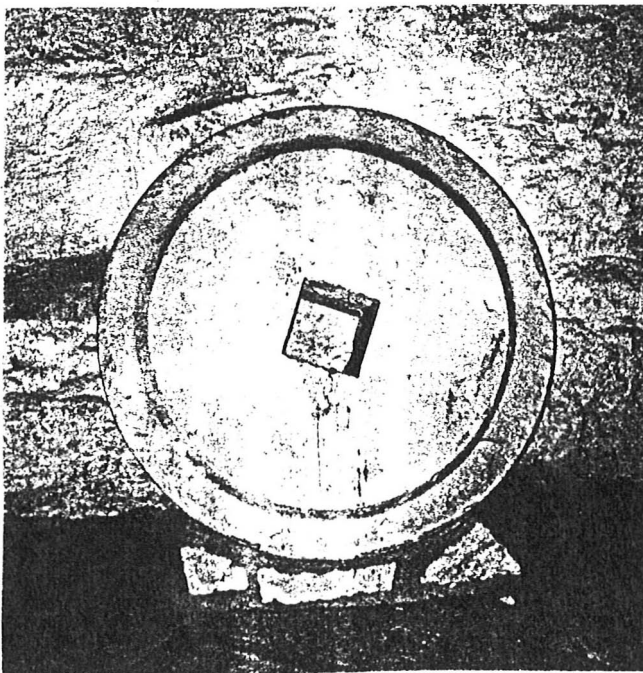
Fred has indicated that he can probably provide a copy of his paper to anyone seriously interested: Dr Frederic S Lee, Dept of Economics, De Montfort University, The Gateway, Leicester LE1 9BH.
Alan Crocker

THE POWDER-MAKING PRICKETTS

Arthur Percival has sent us a file of information compiled by descendants of William and Henry Prickett who, in 1836, left John Hall's gunpowder works at Faversham to help to establish new mills in Connecticut. These mills had been set up in 1835 by Allen A Denslow and three brothers, Parkes, Allen and Neeland Loomis, under the name Loomis & Denslow, and were on the Scantic River at what is now Hazardville. At first they were not satisfied with the gunpowder they made and therefore recruited workers from England. Others included George Prickett, John Bridge, William Colvin and his son William, and John, James and Matthias Pierce. In 1837, Col Augustus G Hazard (1802-68) acquired a quarter of the firm and it became known as Loomises, Hazard & Co and then, in 1843, The Hazard Powder Co. Some of the English powder-makers were killed in explosions and some left the industry following accidents but others and their descendants continued to have roles of responsibility at several different mills. For example, William Prickett's son Edward became sole superintendant of the mills from 1867 to 1905, when he was succeeded by his son Edward L Prickett. He became superintendant of the Schaghticoke plant of the Hercules Powder Company at Valley Falls, New York in 1915 and played this role until 1929 when it closed. His brother, Clifford D Prickett, was appointed assistant superintendant in 1890 but was transferred to Wilmington in 1904 as assistant to Lamot DuPont and in 1913 became a vice-president of the newly formed Hercules Powder Co.

This information and a great deal more comes from *History of the Explosives Industry in America* by Van Gelder and Schlatter, Columbia University Press, 1927, and from family history notes prepared by Edward Law Prickett in 1939 with a few additions by his daughter. There are 13 typescript pages in all and copies can be provided to those interested.

WULZBURG FORTRESS NEAR WEISSENBURG, NORTH OF INGOLSTADT



Charles Trollope has visited this fortress, which is north of Ingolstadt, which itself is 70 km north of Munich. It was built in 1588 and, in a bastion called the Russmühle (which Charles says means "Horse Mill"), there is a chamber 15 metres in diameter for a horse-powdered gunpowder mill. It was still in use in the 19th century and the bed and edge-runners remain. The bed is 60 inches and the stones 44 and 48 inches in diameter, and all are 14 inches thick. The accompanying photograph shows one of these stones. Charles asks why the edge runners are of different diameters. Any ideas?

Address: Clay Barn, Fingrinhoe, Colchester, Essex CO5 7AR

DOCUMENTS ON FRENCH GUNPOWDER MILLS

Bill Curtis has been looking at documents on the Crimean War held in the Library of the *Service Historique de l'Armée de Terre (SHAT)* at the Chateau of Vincennes, in Paris. In the index notes to Artillery he noted the following references to gunpowder mills, but did not examine the documents.(4H13/1,2& 3)

Poudreries (et raffinages civils) 1712/1920: Alger, Angoulême, Bordeaux, Esquerades, le Pont de Buis, Lille, Marseille, St Médard, St Ponce, Sevran Livry, Toulouse, Vonges.

Supprimées: Avignon, Bastia, Berbière, Besançon, Clermont Ferrand, Colmar, Constantine, Biskra, Dijon, Essonne, La Ferg, Lyon, Maronne, Metz, Nancy, Paris Monteuil, Perpignan, Port Louis, St Jean d'Angely, Verdun, 1665-1887.

Military: le Bouchet, le Ripault, St Chamas, 1767- .

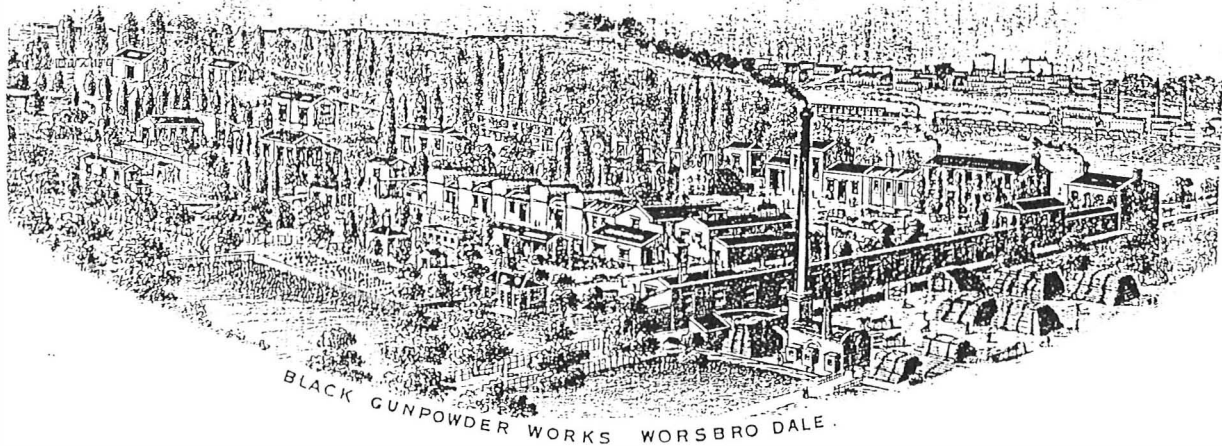
SALES OF ALICE PALMER'S BOOK

It is encouraging to report that the first printing of Alice Palmer's *The Low Wood Gunpowder Company, its inception and early growth, 1798-1808*, which GMSG published at the end of 1998 and which was reviewed on page 2 of Newsletter **24** has sold out. We had 100 printed and after copyright, review and complimentary copies were distributed still had about 80 left. These have all been sold and we have several new orders, so a second printing is being arranged. The price will be the same £7.50 (£6 to GMSG members) plus £1 p&p from Alan Crocker; address on back page.

Wayne Cocroft, *Dangerous Energy, the Archaeology of Gunpowder and Military Explosives Manufacture*, English Heritage, 1999, £45. ISBN 1 85074 718 0

I understand that Wayne's book has at last been published but I have not seen a copy. It will be the subject of an in-depth review in the next GMSG *Newsletter* but I felt that it should be mentioned briefly here. The flier explains that it provides the first overview of sites and monuments associated with the manufacture of gunpowder, propellants and high explosives for military purposes in Britain, which makes me wonder how many sites have been excluded because they were non-military. Nevertheless it "gazetteers" [a plural noun in my dictionary!] 385 relevant sites and documents site layouts, building types, power sources and communication networks. The back of the flier has a sentence 42 words long that I failed to master. Also, information prior to the late 18th century is, for some obscure reason, in bold italic print whereas the rest is normal. However, it manages to explain that the book covers a wide range of topics on the history and archaeology of gunpowder and explosives in Britain including social history and planning, preservation, conservation and presentation issues with respect to future use of the sites. Also I am sure that it is better written than the flier. Incidentally, this does not say how long the book is but last autumn, when the price was going to be about £30, an earlier flier said that it would be about 450 pages and have over 400 illustrations. Presumably these numbers can now be increased by 50%! In any case I am sure that all members will want to have a copy of Wayne's book and I certainly look forward to studying it in detail.

Alan Crocker



From a reproduction of a 1898-9 Kynoch price list for ammunition and gunpowder.
Available from Jim Buchanan, 8 Chiltern Walk, Tunbridge Wells, Kent TN2 2NJ

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Deadline for next issue: Jan. 15, 2000; earlier submission, especially on 3.5" floppy disc appreciated

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