



Gunpowder Mills Study Group

NEWSLETTER 26, AUGUST 2000

GMSG MEETING AT THE INSTITUTE OF HISTORICAL RESEARCH SENATE HOUSE, UNIVERSITY OF LONDON SATURDAY 21 OCTOBER 2000

The primary aim of this meeting, as explained below, is to discuss the future of the Group. However it is hoped that members will also report on their current projects. Coffee will be available in the Common Room on the ground floor from 10.00 and we shall start the meeting in the Ecclesiastical History Room on the first floor at 10.30. The length of the meeting will depend on the amount of discussion about the Group's future and the length of the contributions. Senate House is near Goodge Street, Warren Street and Russell Square underground stations. Parking may be available in the University of London car park - entrance at NW corner of Russell Square. There will be no fee for this meeting.

THE FUTURE OF THE GUNPOWDER MILLS STUDY GROUP: A MESSAGE FROM ALAN AND GLENYS CROCKER

Members who attended the meeting on 23 October last year will remember that we reported that we were finding it increasingly difficult to continue running the Group because of our other commitments. Since then the pressure on our time has been such that we were unable to produce the usual February Newsletter or organise a spring meeting this year. We therefore decided not to ask for a subscription for 2000-2001.

After last autumn's meeting we booked a room at the Institute of Historical Research for the corresponding Saturday, 21 October 2000. As indicated above, we propose to hold that meeting, primarily to discuss the future of the Group but also to give members an opportunity to report informally on their current projects. We do not have time to arrange a formal programme.

We have, as most members are aware, been asking for volunteers to take over the several tasks involved for several years. The situation now is that we do not want help with running the Group, but want to hand it over to others entirely. Otherwise we propose that it should be wound up.

Apart from practical considerations, there are several reasons why we think its demise would be acceptable:

1. It has succeeded in what it set out to do, which was to promote interest in what in 1985 was a neglected subject. The amount of work published since then is an indication of what

has been achieved both by individuals and by professional and official bodies in studying and recording the history of the gunpowder industry.

2. Aspects of the subject can now be catered for by other organisations, such as the Association for Industrial Archaeology, the Newcomen Society, SPAB Mills Section, the Ordnance Society, the Arms and Armour Society, and various local and county archaeological and historical societies and museums. Indeed many GMSG members already belong to one or more of these groups and often meet each other at different events. At an international level ICOHTEC provides an appropriate forum.

3. A new focus and contact point for people seeking information may be provided by the developments at Waltham Abbey.

If it is decided to wind up the Group, decisions will have to be taken about the disposal of its assets, which consist of some £1300 in the bank. It is important that members of the Group should state their views on how this money should be used and/or distributed. We suggest two possibilities: financing the publication of selected parts of the Group's work and donations to appropriate organisations or projects.

Publication

Several years ago, it was suggested by Arthur Percival that a selection of papers from our Newsletter might be reprinted in the series of Faversham Papers which the Faversham Society publishes. This is a large series of A4 booklets which deal primarily with the town's local history but which, because of the importance of the gunpowder industry there, also include titles on that industry in general and in other areas of the country, for example: Ted Patterson's *Gunpowder Terminology and Incorporation* (No.27, 1986) and *Blackpowder Manufacture in Cumbria* (No.43, 1995); and Ronald Crozier's *Guns, Gunpowder and Saltpetre: a Short History* (No.58, 1998). On the Faversham gunpowder industry the series includes Arthur Percival's own pioneering work of 1967 and more recently Wayne Cocroft's *Oare Gunpowder Works* (No.39, 1994) based on his RCHME report.

Some progress was made in selecting papers for reprinting in such a volume, largely by David Hansell. Unfortunately however we could never find time to carry out the final stages of preparation, because of the pressure of other work, and the project was repeatedly shelved. Since then much more has been published in the Group's newsletters and it would be possible to furnish more than one Faversham Paper, each with a particular theme or covering a particular period of history. Arthur Percival has indicated that this idea would be worth pursuing.

Donations

Several organisations have helped the Group to achieve its objectives. For example the SPAB Mills Section published our *Gazetteer*, arranged a one-day conference on gunpowder mills and has provided us with a formal address. Others include the AIA, the Newcomen Society, the Faversham Society and several societies which have subsidised publication of articles on gunpowder mills in their journals. It might also be appropriate to make a donation to the Friends of the Waltham Abbey Royal Gunpowder Mills. Clearly there are many possibilities.

Conclusion

We hope that there will be a good attendance at the meeting on 21 October and that those who are unable to come will let us have their views before the meeting.

Alan and Glenys Crocker, 6 Burwood Close, Guildford, Surrey GU1 2SB
tel: 01483 565821; e-mail: alanglercr@glfd.freemove.co.uk

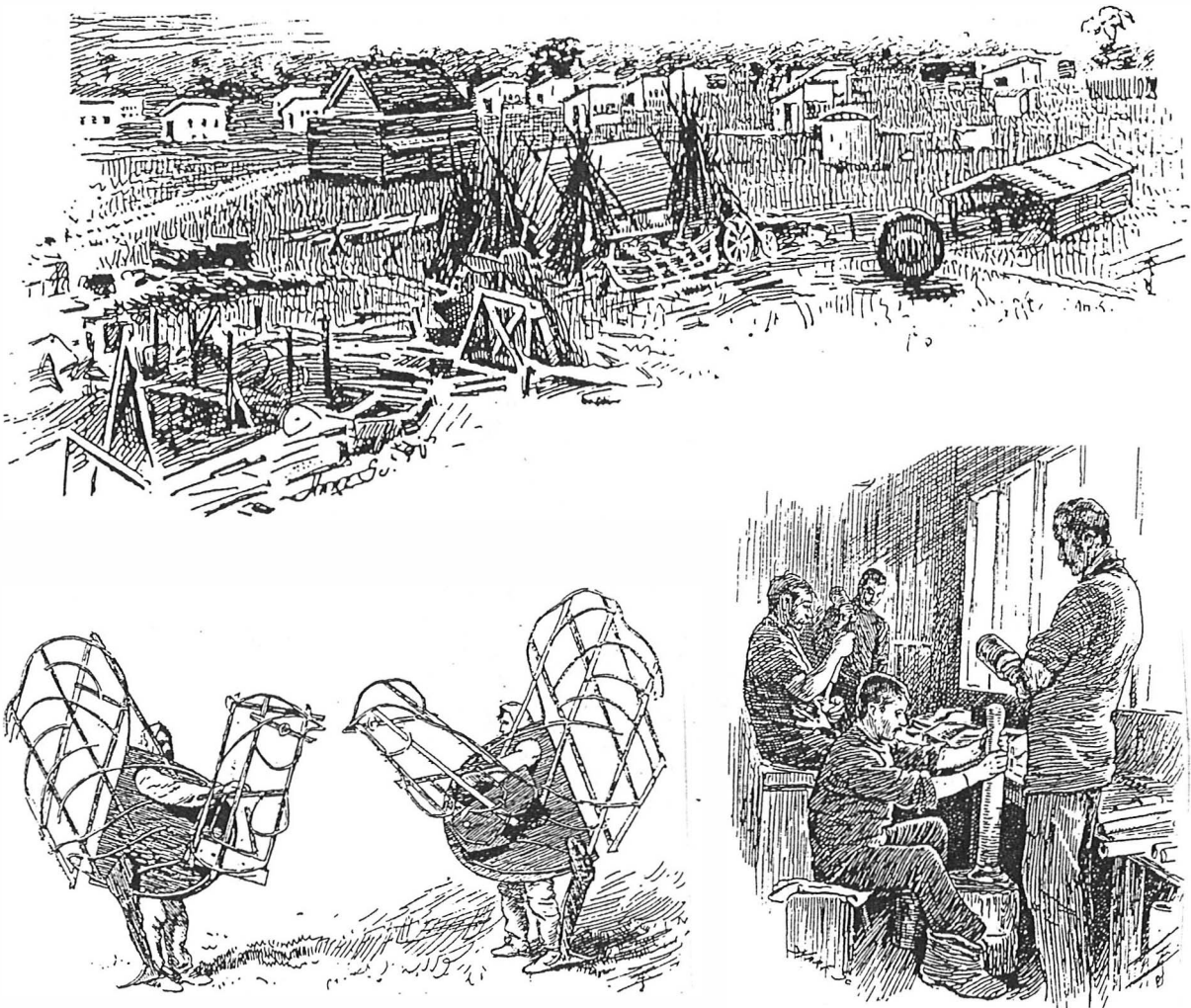
GMSG AUTUMN METING IN LONDON, 21 OCTOBER 1999

Alan Crocker

As usual this meeting was held at The Institute of Historical Research and was attended by about 20 members. The theme of the morning session was fireworks. The first talk was by Eric Montague of the Surrey Local History Council who spoke about "James Paine & Sons, Fireworks Manufacturers of Mitcham, Surrey, 1872-1965". The talk was based on a paper Eric had published in *Surrey History* vol 4, no 1, 1989-90, pp 35-48. This was followed by Alan Crocker who talked about "Brocks, Fireworks Manufacturers of South Norwood, London". This was based on an article provided by Jim Buchanan from *The Strand Magazine* of 1891, pages 468-74, and A St H Brock's *Pyrotechnics, the History & Art of Fireworks Making*, Daniel O'Connor, London, 1922. Unfortunately Alan had left his overheads at home and had to rely on a blackboard for illustrations. However, a few drawings from the *Strand* article are reproduced below.

After lunch Wayne Cocroft spoke on "A Visit to the Hagley Museum and Library Wilmington", Fred Lee on "The Lake Superior Gunpowder Co, Marquette, Michigan", expanding on the note in GMSG Newsletter 25 pages 8-9, and Alan Crocker (again without overheads) on a visit he and Glenys had made to "The Gunpowder Mills at Dimitsana, Peleponnese, Greece". An article based on this last talk is printed in this Newsletter.

At the end of the meeting Alan and Glenys Crocker emphasised that, because of other commitments, they would be unable to continue running all aspects of the work of GMSG for much longer and appealed for offers of help.



A VISIT TO GUNPOWDER MILLS IN THE PELOPONNESE

Alan Crocker

[Adapted from a note published in Newsletter 10 (Jan 2000) of the Mills Research Group]

In October 1999 Glenys and I, together with a dozen other enthusiasts, spent a week looking at mills in the Peloponnese. The tour was managed by Island Holidays and led by John and Chris Henshall, an English couple who have settled in Crete, and Alan Gifford of the Midland Wind and Water Mills Group. We spent the first night in Athens, where we met members of the Greek Mills Society, and six nights in the Peloponnese, three in the mountains at Dimitsana and three on the east coast at Paralio Astros. Dimitsana is the home of the Greek Open Air Water Power Museum, which opened in 1997 following an extensive survey of 91 water-powered sites in the area in 1988-9. These comprised 27 flour mills, 18 fulling mills, 20 gunpowder incorporating mills, 20 gunpowder smoother-dryer mills, 2 bark mills and 1 saw mill. The museum has a working corn mill powered by a horizontal wheel, a "working" gunpowder mill powered by a vertical wheel, a conical fulling or washing tub stirred by a jet of water, ruined tanneries and a tanning display, a raki still, and several informative videos and attractive booklets, including editions in English. It is on a steeply sloping site with several drop towers and chutes directing water to the mills.

We spent half-a-day at the museum and the rest of the week looking at approaching 50 other mills, including several gunpowder mills. Most of the mills were derelict but we saw traditional working corn mills, a mill washing woollen blankets and modern oil and corn mills. The only windmill we got close to was on the coast and this had been converted into a machine-gun post in the civil war of 1946-9. The tour was very rewarding but posed many questions which the museum and its guide books failed to answer. Indeed, we thought that in many ways they were misleading or even completely wrong. The purpose of this note is to state some of these queries in the hope that members will be able to suggest solutions.

All of the waterwheels seen were horizontal, apart from some at the gunpowder mills. There were two types of gunpowder incorporating mills, with stamps or with conical edge runners. The stamp mills had one vertical waterwheel as shown in figure 1. However the structure of these wheels was basically that of a horizontal wheel turned on edge, which appeared to be incredibly inefficient. They could be described as very primitive Pelton wheels as the water

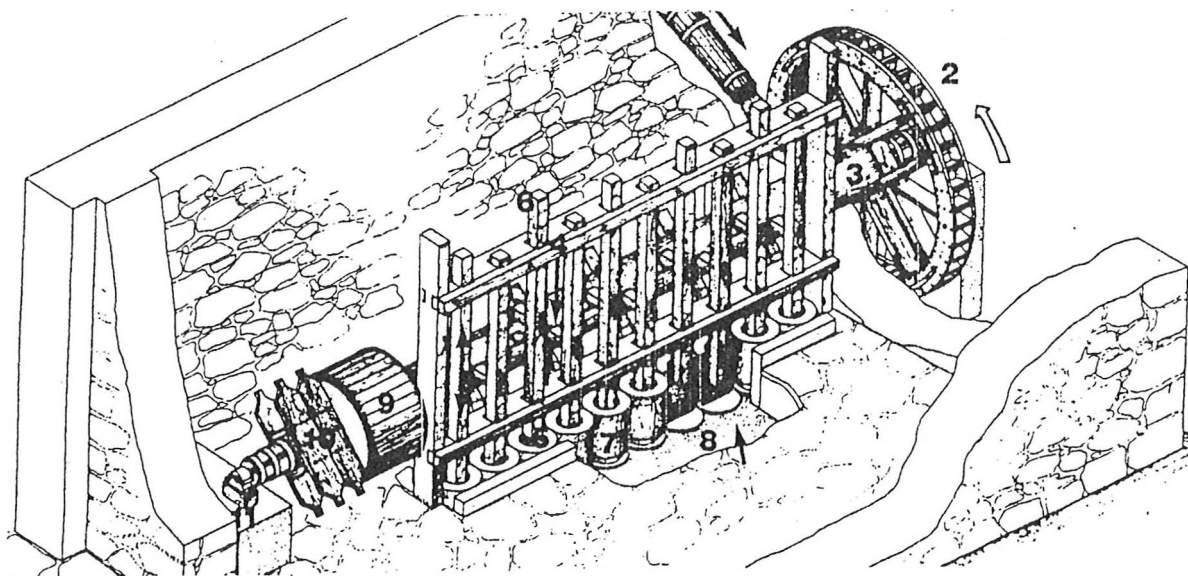


Figure 1. A gunpowder stamp mill and a smoother-dryer mill powered by a vertical waterwheel.

was directed at the vanes through a nozzle at the bottom of a drop tower. Clearly vertical wheels were used for these stamp mills to avoid gearing. However, why was such an inefficient design used?

A conical edge-runner gunpowder mill is shown in figure 2. Each runner we saw was made of reinforced concrete and was powered by a horizontal waterwheel. They were poorly constructed, with the iron reinforcing rods poking through the surface and therefore likely to cause explosions. The inclined axle of the runner had to be loosely fixed into a mortice in the upright shaft just above the bed stone. The stresses on this coupling would clearly be very large. Does anyone have information on this type of edge runner? It would be interesting to establish when, where and for what purposes they were used. An interesting example with three timber cones, said to be a woad mill, appears for example on page 65 of Wilf Foreman's book on *Oxfordshire Mills*. In the Peloponnese the reinforced concrete cones were also used for bark mills but these were powered by animals tethered to a horizontal shaft so that the stresses on the upright shaft would be much smaller.

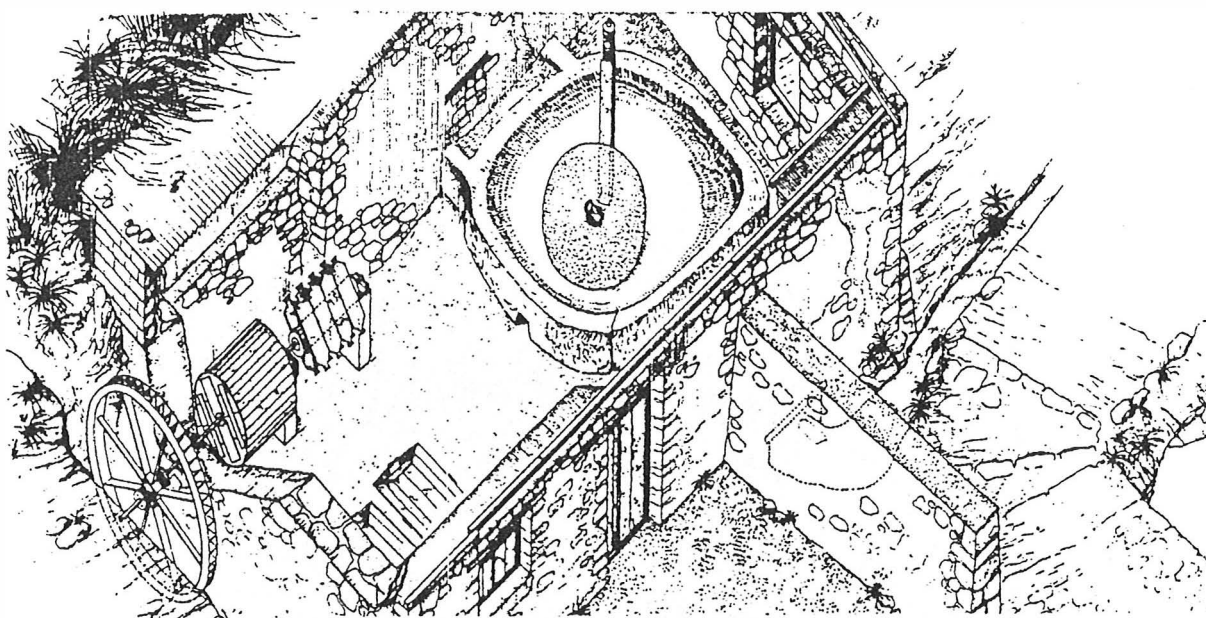


Figure 2. A conical edge-runner mill and a smoother-dryer mill powered by horizontal and vertical waterwheels respectively.

Each gunpowder mill had a "smoother-dryer" and these are very strange pieces of equipment. They consisted, as shown on the left of figures 1 and 2, of a glazing barrel and flat pieces of wood or "sails" attached to a horizontal shaft. In the case of the stamp mills this was the same shaft as that which powered the stamps but in the conical edge runner mills it was powered by a separate vertical waterwheel. The glazing barrels are conventional but the "sails", which are said to be for dusting, are puzzling. It is claimed that sacks of corned or granulated gunpowder were attached to these so that they rotated with the shaft. At least in the case of the stamp mills, they must have rotated quite slowly, perhaps 10 times per minute. So, as the sacks flopped around the powder would be turned over, and the highly explosive dust passed through the sacking into the building. It all seems to be an incredibly dangerous practice. In Britain and elsewhere in Europe there was a stove for drying, glazing barrels for smoothing, and screens for dusting, all housed in well-separated buildings, at least from about the beginning of the 19th century. In the Peloponnese, until recently, they were all carried out together in one small building which also housed the incorporating mill (stamps or edge

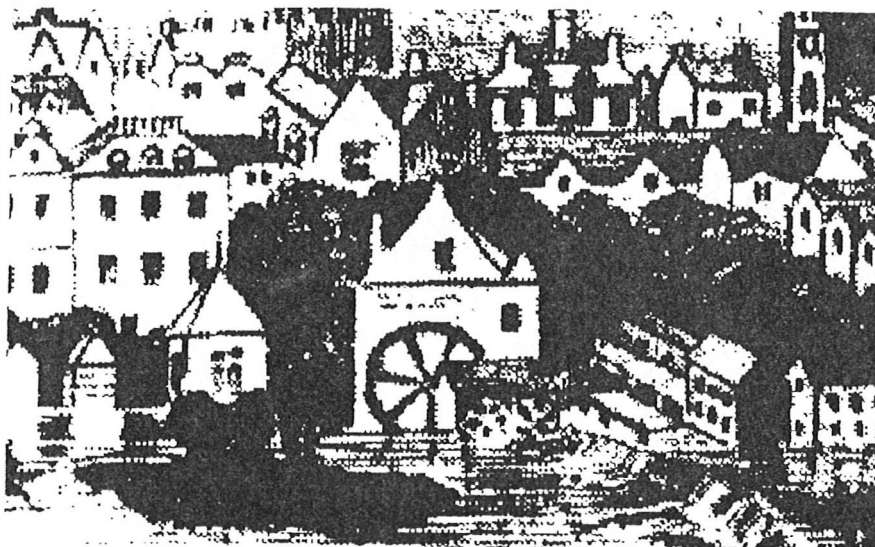
runner) and the corning sieves. So, were these strange "sails" really used for this purpose and do they resemble equipment used in any other type of milling?

Finally it is claimed that the charcoal which was used as an ingredient for the gunpowder was made by burning undergrowth in open fires, over which water was poured at some stage to damp down the flames. In Britain the charcoal was made in forest pitsteads or clamps until the late 18th century and from then onwards in iron cylinders. The gunpowder made at Dimitsana was used by the Greeks against the Turks in their successful War of Independence at the beginning of the 19th century. Could it possibly have been made in this crude way?

We heard that some of the Museum's information on gunpowder manufacture was obtained from a local Dimitsana man who made it for fireworks in the 1960s. It seems very doubtful whether his methods were the same as those used earlier to make it for firearms.

The tour was very successful and we recommend a visit to Dimitsana to all GMSG members. However Island Holidays may not be repeating the tour as sadly John Henshall, one of the leaders, died earlier this year.

GUNPOWDER MILL AT DERBY



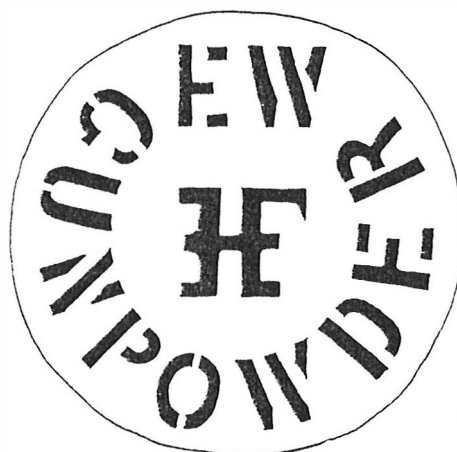
Alan Gifford, of the Midlands Wind and Water Mill Group, has sent us this detail of a print dated 1695 entitled 'East Prospect of Derby' scanned from the book *Derby - an illustrated history*, by Maxwell Craven, Breedon Books, 1988. In the book the caption reads 'Part of the East Prospect of Derby showing Sorocold's water engine house and the gunpowder mill (between it and the bridge chapel)'. Alan says that it ties in with the gunpowder mill and Sorocold's mill being on the same site and he assumes the gunpowder mill is the building close to the weir.

Troisièmes Journées scientifiques Paul Vielle

This conference, subtitled "Instrumentation, experimentation and expertise of energetic materials (powders, explosives and pyrotechnics), of the 16th century to the present day", is being held at the Cité des sciences et de l'industrie, Paris, on 19-20 October 2000. Further details from Patrice Bret, Secrétaire Générale du Comité Lavoisier, Académie des Sciences, 23 Quai de Conti, 75006 Paris, France.

ELTERWATER BARREL STENCIL

The accompanying illustration is taken from a rubbing of a stencil used to mark the tops of barrels of Elterwater gunpowder. The original, which is held by the Langfdale Timeshare Office is a circular sheet of metal, 4 $\frac{1}{8}$ inches across, well-used and damaged a little. The EW clearly stands for Elterwater and the symbol at the centre is presumably 3F, for triple fine powder. This is the only known Elterwater stencil and it is interesting that it is so small. Stencils about 13 $\frac{1}{2}$ inches in diameter were used for the standard 100lbs barrels of gunpowder, which suggest that this one was used for barrels containing only about 3lbs. I would have expected tin canisters to be used for this amount and would be glad to hear from members views on this.



Alan Crocker

DAS FEUERWERBUCH

Tony de Reuck, a former colleague of mine at the University of Surrey has sent me a draft copy of an English translation of the version of *Das Feuerwerkbuch* (c1400) which is held by Freiburg University (MS 362). Tony is Assistant Editor of The Arms and Armour Society, which is planning to publish this work together with a commentary, again in English, by Gerhard Kramer. He wondered whether I could comment on technical details. A facsimile, German transcript and analysis of the book was published in Kramer's *Berthold Schwarz Chemie und Waffentechnik im 15. Jahrhundert* (Deutsches Museum, Munich, 1995). Kramer also contributed a chapter entitled 'Das Feuerwerkbuch: its importance in the early history of black powder' to *Gunpowder: the History of an International Technology* (University of Bath, 1996). He has concluded that until the 16th century calcium nitrate and potassium nitrate was used to make gunpowder and, as noted by Brenda Buchanan (GMSG Newsletter 20, pp 19-21), this is very controversial.

Alan Crocker

A Bibliography of Works on Explosives

Will Adye-White has sent us a photocopy of a 40-page (small octavo) bibliography on explosives taken from a book published by Van Nostrand, New York, in 1883. The title page of the book is as follows "Explosive Materials. A series of lectures delivered before the College de France at Paris by M P E Bertholot, translated by Marcus Benjamin, to which is added a Short Historical Sketch of Gunpowder translated from the German of Karl Braun by John P Wisser, and A Bibliography of Works on Explosives".

The bibliography lists approaching 400 works dating from 1641 (Collado. On the Invention of Powder, in Spanish) to about 1880. Let me know if you would like a copy.

Alan Crocker

MATERIAL PROVIDED BY JIM BUCHANAN



Jim Buchanan has continued to send a wealth of material including the the fine Kennall Vale advertisement reproduced above (original in colour). A list of this material is given below:

- (1) A bound A4 reprint, 10 pages, of a 1926 catalogue entitled *British Smokeless Sporting Gunpowders, manufactured by Curtis's & Harvey Ltd and Nobel's Explosives Co Ltd*, published by Nobel Industries Ltd, Nobel House, Buckingham Gate, London SW1.
- (2) Photocopy of an article on "Making Guncotton by the Displacement Process" from *Arms and Explosives*, June 1906, pp 77-79.
- (3) Photocopy of an article on "The Nitroglycerine plant at Waltham Abbey. Nathan, Thomson and Rintoul's System", from *Arms and Explosives*, July 1906, pp 90-92.
- (4) Photocopy of a review of Guttman's "Monumenta Pulveris Pyrii" from *Arms and Explosives*, Sept 1906, pp 121-122.
- (5) Photographs of 7 canisters: (1) John Hall & Son, Dartford, "Glass" gunpowder (made at Davington); (2) John Hall & Son, "Rifle" gunpowder, No 4, extra large grain - "Registered 27 June 1851" on neck; (3,4) Curtis's & Harvey FFF gunpowder, Hounslow and London; (5) Pigou, Wilks & Laurence, Dartford and Battle, "Challenge" gunpowder; (6) Curtis's & Harvey "Austral" gunpowder; (7) Curtis's & Harvey ["Diamond"].
- (6) Photograph of a circular metal object, perhaps the top of a flask stopper, with the words 'Aberfoyle-gunpowder' around half of the perimeter and a strange drawing of a stack of 5 shapes tied(?) together and with a small hammer and pick superimposed.
- (7) Colour photograph of a circular metal plate about 15 inches across with four fixing holes in the rim with the words "To be Returned to Curtis's & Harvey, Gunpowder Works, Hounslow" cast around a central rectangular depression measuring about 4.5" x 3.5".
- (8) Photocopies of 8 documents: (1) Curtis's & Harvey invoice, 16/11/1837; (2) Fernilee receipt, 3/12/1880; (3) Worsborough Dale invoice, 28/11/1890; (4) Gatebeck statement, 26/6/1893; (5) Gatebeck receipt, 17/7/1893; (6) "E.C." receipt, 1/5/1923; (7) South Wales representative's card for 'New' Sedgwick, undated but 'New' inserted by hand, therefore shortly after 1857; (8) Reverse of (7) with list of powders available.
- (9) Photocopies of papers relating to the E.C. powder factory at Bean in the Parish of Stow near Dartford, including the cover of the E.C. purchase agreement dated 10/12/1884, a small scale plan of the site and two photographs of the buildings.
- (10) Photocopies of 10 invoices etc, dating from 1896-1933 concerning purchases of powder by firms in Melbourne from Kynoch Ltd, the British Explosives Syndicate (Glasgow), Curtis's & Harvey, Nobel's Explosives Co Ltd. Also 4 pages of Curtis's & Harvey publicity material including one recommending Brown Sporting Powder, following tests at Hounslow in 1887.
- (11) A tie-on label with the words "From the King Powder Co Inc, manufacturers of blasting, pellet, sporting, dynamite, permissibles and detonite explosives, King's Mills, Ohio".

BOOK REVIEWS

David Harding, *Small Arms of the East India Company*, vol III, *Ammunition and Performance*, Chapter 21, *Gunpowder*, the author, for limited distribution, Oct 1999. A4, comb bound, viii + 81 pages, 5 illus. £5 (post free) from Alan and Glenys Crocker - address at foot of page 2. [ISBN 0 9530853-3-3 (vol III); ISBN 0 9530853-5-X (vols III and IV boxed)].

GMSG member David Harding has generously produced this facsimile offprint of the gunpowder chapter in his four volume opus on *Small Arms of the East India Company* for the benefit of those interested specifically in the history of gunpowder manufacture. It also contains relevant parts of the contents list, introduction, source notes (433), index and bibliography etc.

Following a useful 11-page introduction including 'Gunpowder basics', and 'Assessing the quality of gunpowder', the chapter is divided into sections on 'The Europe powder and English powder in general' (17 pages), 'The Country Powder in the mid-18th century (Madras, Bengal and Bombay)' (17 pages), 'The Country powder c1770-c1856 (Madras, Bengal and Bombay)' (15 pages), 'Manufacture and proof of the Company's powder, 1842' (6 pages), 'Miscellaneous gunpowder topics (Improved propulsion effect with percussion ignition, Grain size of Board of Ordnance powders, Indigenous Indian gunpowders)' (4 pages) and 'Summary of known grain sizes' (2 pages).

In his introduction David notes that: (a) the Company's three Presidencies (Madras, Bengal and Bombay) seem never to have run short of gunpowder, (b) that in the mid-18th century the Company's Indian-made powder was good enough in cannon but often complained of in smallarms, so British-made powder was used in muskets and (c) from the late 18th century onwards, Madras and Bengal powders were adequate but Bombay powders inferior, at least for some time prior to 1830. Regarding the quality of gunpowder he notes that 'we inevitably lack the evidence of surviving specimens: written records are the only guide' and contrasts this with the case of smallarms of which many examples survive. He also remarks that historians have only recently begun to give gunpowder the attention it deserves but have concentrated on the industrial archaeology of the manufacturing processes rather than the combustion of the end product in firearms.

The East India Co was established in 1600 but David does not explain from whom they obtained their powder until 1625. They then set up their own mills in Surrey, first at Thorpe but then, in 1926, at Chilworth. However, this venture was not a success and after about 10 years the mills were sold. Thereafter until the late 1780s they bought powder commercially in England to supplement any available locally in India. (The earliest Company reference to Indian gunpowder which is mentioned dates from 1670). The English suppliers included Dewey 1667 (Carshalton), Hudson 1685 (Waltham Abbey), Rich 1685 (Wandsworth), Humphreys c1705-09, de Berdt c1705-10 (Wandsworth), Shephard 1711-12, Walton 1714 (Waltham Abbey) and Fogg 1717-20 (Bedfont).

In the mid-18th century the Company lost Madras to the French for two years and had other setbacks and therefore decided to make a concerted effort to produce more and better powder in India. They consulted Richard Chauncy, who was on their Court of Directors and a partner in the Oare gunpowder mills, but he was not particularly helpful. However in 1753-54 a set of models of a modern English powder mill and its machinery was sent to Madras and David provides a fascinating description of these items. Nevertheless the Company still relied mainly on English makers including Taylor 1757 (Worcester Park), Chauncy & Vigne 1757-59 (Oare), Edsall 1758-62 (Dartford), Pearce, Price & Co 1758 (Faversham and Chilworth), Underhill & Ravens 1758 (Bedfont), Walton 1758-63 (Waltham Abbey), Eade & Bridges

1863 (Ewell). Of these Walton (53%) and Edsall (35%) had the biggest orders. David also gives the following list of marks on barrels landed at Madras in 1766: 'BEW' Bridges, Eade & Wilton (Ewell), 'MPA' Miles Peter Andrews (Dartford and Oare), 'IT' John Taylor, 'W' Walton? (Waltham Abbey), 'WT' William Taylor (Worcester Park). The amount of gunpowder being sent to India annually in the period 1761 to 1778 varied between 214,800lb in 1766 to 60,250lb in 1778, but in the latter year Bengal made 150,000lb and Madras 192,000lb (Bombay unknown). David goes on to discuss the quality of the Europe powder and it is clear that much of it had deteriorated before it reached India.

In the late 17th and early 18th centuries the Company bought some gunpowder from Indian powdermakers and some was made under the supervision of an officer of the Company. However by c1800 the mills were all directly under the control of the Company and were supplying all that was needed. David discusses these changes at the Madras, Bengal and Bombay mills, particularly the efforts to improve the quality and the methods used for testing powder. He emphasises that, although there is a vast amount of information in the records, the picture is in many ways incomplete. In particular it is not known when new technology like edge runner mills, powder presses, gloom and steam stoves and charcoal cylinders were introduced. However in 1812-14 an attempt was made to introduce Congreve's improved post-1783 methods and having failed almost completely at Madras no immediate efforts were made to use them at Bombay and Bengal. David feels that the reasons for this still need to be explored thoroughly but suggests that some of Congreve's claims need to be questioned. However for this later period, from c1770 to c1856, David concentrates mainly on powder quality, grain size and proof tests. He does however provide some information on the equipment used and includes an illustration of an edge runner mill at Bengal c1850 which was powered by two bullocks. In 1842 each mill had two 6-ton gunmetal (bronze) edge runners 60in diameter and 18in wide and the trough was also of bronze. The proportions were 75% saltpetre, 13.3% charcoal and 11.7% sulphur, which suited the local wood used for charcoal. Drying was carried out by spreading the powder on canvas cloth laid on terraces surrounded by high walls. If the temperature rose above 130°F (Bengal) or 136°F (Madras) shades or shutters were drawn across the openings!

In this review, I have only commented upon a few topics which particularly interested me personally. I hope however that I have been able to indicate that this chapter of David Harding's treatise contains a wealth of crucial information which is all clearly presented. It represents an enormous amount of well-documented research and all gunpowder historians should have it readily available.

Alan Crocker

Lucie Tassigny, *Le Salpêtre en Touraine, 1775-1800*, Centre d'Études Supérieures de la Renaissance, A4 softback, 176 pages, about 30 illustrations (many in colour)

GMSG member Patrice Bret has sent us a copy of this impressive French thesis. It starts with an overview of the French Department of Powder and Saltpeter from 1336 to 1800. This is followed by a chapter on Science in the Service of the Country, divided into (a) an illustrious journey: Lavoisier and Clouet in Touraine and (b) better knowledge for better powder. The next chapter is Of Men and Techniques and discusses the administrators of saltpeter production, the workshops, refining techniques and the delivery and price of saltpetre. Finally there is a chapter on The End of the Revolutionary Exploitation of Saltpetre and Dissentions between the Saltpeter-makers and the Population. It is concluded that, after Paris, Touraine occupied the the second place in the production of saltpeter.

Glenys and Alan Crocker, *Damnable Inventions: Chilworth Gunpowder and the Paper Mills of the Tillingbourne*, Surrey Industrial History Group, 2000: xiv + 146 pp, 62 illus. ISBN 0 9538122 0 0 (soft back). £6.50 post free from the authors - address at foot of page 2.

It is easy to forget how in England industry's centre of gravity shifted northwards in the 18th century. If nothing else, this book comes as a salutary reminder that Surrey, now among the serenest of counties, was once renowned for its manufacturing capacity. Its resources of sand and woodland (for charcoal) fuelled a long-lived glass industry; its forges and furnaces were kept busy by Wealden iron; Guildford and Godalming were centres of the woollen trade; and by the late 17th century, according to Evelyn, the secluded valley of the Tillingbourne, east of Guildford, sported "Mills for Corn, Cloth, Brass, Iron, Powder etc."

Rising on the slopes of Leith Hill, the tallest point in South East England, the Tillingbourne may not be much of a river by conventional standards, but it falls steeply into the Wey and its fast flow made its banks an ideal site for water-powered industry. Who first recognised its potential is not known but when the East India Company opened its gunpowder works at Chilworth in 1626 it did so on the site of disused corn and fulling mills. When the powder plant contracted for a time in 1704, paper mills were installed on the site.

It is the story of these two intertwined industries which Glenys and Alan Crocker tell in this book. Each has written separately about them before - Glenys in her pioneering study of *Chilworth Gunpowder* in 1984, and Alan in the first detailed account of *The Paper Mills of the Tillingbourne* in 1988. Since then more information about both has come to light and the authors, helpfully, decided to update their work in a single book. The title *Damnable Inventions* they owe to one of Surrey's greatest sons, William Cobbett, who was never at a loss for a memorable expression. Coming from the other end of the Hog's Back, he probably knew the valley from childhood days. What "seems to have been created by a bountiful providence as one of the choicest retreats of man" had "been, by ungrateful man, so perverted as to make it instrumental in ... carrying into execution two of the most damnable inventions ... of man ..., namely the making of *gunpowder* and of *banknotes*!"

The outcome of Glenys's and Alan's collaboration is an exemplary contribution to local, and indeed national, history, since in Chilworth both powder and paper industries responded to national needs and reflected changes in technology. Though their mastery of their respective topics is clear, they wear their scholarship lightly and write pellucidly. Though the book is packed with information, it is eminently readable. Should there be any difficulties with such technical terms as 'dandy roll' and 'traverse', they have provided a glossary which provides clear explanations. References are religiously cited and there is a comprehensive index. With the illustrations, which are well reproduced, it is clear Glenys and Alan have taken great trouble, searching out originals, sometimes from obscure sources, which enhance understanding of the text.

Well printed by the long-established Bristol firm of Arrowsmith's, this book is splendid value for money. One topic of extraneous conjecture might be the fine Dutch gables of Chilworth's Old Manor House. These are in a style also represented in Surrey, as the authors point out, by Kew Palace, West Horsley Place and Slyfield Manor, all of the 1630s. The house bears a 1609 datestone and Glenys and Alan, rightly I think, suggest this date is too early to be associated with the gables. Perhaps rather they owe their existence to one of the Dutch papermakers who arrived in England in the later 17th century? They are of a type commonest between 1650 and 1725, and were often added on to older buildings to give them extra presence. Is it just a coincidence that in Godalming, where papermaking started in about 1660, there is a small but conspicuous group of Dutch gables from the 1660s?

Arthur Percival

Alan Crocker, Glenys Crocker, Keith Fairclough and Michael Wilks, *Gunpowder Mills: Documents of the Seventeenth and Eighteenth Centuries*, Surrey Record Society vol XXXIV, 2000, hardback, xxvi + 180 pages, 27 illus. ISBN 0 902 978 11 X. Obtainable for £15 from Surrey History Centre, 130 Goldsworth Road, Woking, Surrey GU21 1ND

The second proofs of this volume have been returned to the printers and it should therefore be available within a couple of months. It contains information on four documents: (a) a deed of sale of Carshalton mills, Surrey, dated 1661, (b) an inventory of William Buckler's house and his mills at East Molesey and Wandsworth, Surrey, and at Faversham, Kent, dated 1678, (c) an inventory of Thomas Pearce & Co's mills at Faversham, Kent, magazine at Barking Creek, Essex, mills at Chilworth, Surrey, office in Castle Alley Cornhill, London and magazine at Liverpool, dated 1753, (d) the letter book (279 letters) of William Tinkler of Chilworth mills, Surrey, 1790-1791. These documents have been transcribed and analysed by Michael (who sadly died in May 1998), Keith, Glenys and Alan respectively and Glenys, on behalf of the Surrey Record Society, has acted as the overall editor. Glenys has also written two introductory chapters on the gunpowder industry and on the manufacture of gunpowder. These are followed by four chapters, one for each of the four documents and each is divided into four sections. These give a physical description of the document, an historical introduction, an introduction to the transcript and finally the transcript itself. In addition indexes of persons, places, ships and carriers have been provided for the Tinkler letter book. There are also two extensive general indexes, one for subjects and one for persons, places and organisations. The introductory pages contain a very full bibliography.

Brenda Buchanan, 'Waltham Abbey Royal Gunpowder Mills: The Old Establishment', *Trans Newcomen Soc*, vol 70 (1998-99), pp 221-50. Offprints available for £2 (incl p&p) from Brenda Buchanan, 13 Hensley Road, Bath BA2 2DR

This article is based on a talk given by Brenda to members of the Newcomen Society when they visited the Waltham Abbey site in April 1998. It provides a history of the Waltham Abbey gunpowder mills up to 1787 when they were taken over by the Crown. After an introduction it has sections on sources, myths and traditions, development, locations and processes, supply and demand, further developments, interpretation and 'the Old Establishment': the final phase. There are 19 figures including 5 recent photographs of the site, 46 notes and an appendix reproducing a 1909 letter from Guttman. to Rhys Jenkins.

Much of the material covered and several of the illustrations will be familiar to many members of GMSG. For example, there is a discussion about whether the technology of edge runners used in oil mills influenced gunpowder manufacturers. Also Farmer's well-known view of the site in 1735 is reproduced but it is interesting to see the buildings it shows located on a modern rather rough sketch plan. The importance of Waltham Abbey in supplying gunpowder to the Board of Ordnance and the East India Company in the 1760s is summarised. The expansion of the site in the 1770s is then outlined making reference to plans of 1801 and 1806 and John Smeaton's drawings in the Royal Society library. It is a pity that these have all reproduced badly, they should have been retouched or redrawn as was done for the corresponding Smeaton drawings for the gunpowder mill at Worcester Park (see for example GMSG Newsletter 19, pages 15-20).

In 1806 John Rennie carried out a survey of the site and reported, for example, on the dimensions of waterwheels at the mills. Brenda has attempted to interpret this information in terms of the surviving remains of watercourses and buildings but has found it difficult to be conclusive. In particular the locations of the Smeaton mills, one of which may not have been

built, is a problem. Rennie discussed improving the efficiency of the water power used on the site but concluded that steam power should be explored, referring to Harvey's 14hp steam engine at the Battle gunpowder mills in Sussex [not Surrey!].

One is left feeling that it should be possible to learn far more about the Waltham Abbey site in the late-17th and 18th centuries. Let us hope that Brenda and others associated with the project to open the site to the public next year will in due course provide us with a more comprehensive record.

Alan Crocker

De Witt Bailey, *British Board of Ordnance Small Arms Contractors 1689-1840*, 96 pages, quarto, soft bound, coloured covers, May 2000. ISBN 1-948216-16-6. £12.50 plus £1.50 post & packing in UK, £2 overseas surface mail, £4 overseas airmail (outside Europe), from W S Curtis, P. O. Box 493, Rhyl, Wales LL18 5XG

The British Ordnance System depended on the work of a great many contractors whose productions encompassed every individual part of a firearm from the wood of the stock, to the barrel, the lock and all the small parts. De Witt Bailey's extensive researches over the past 30 years in the records of the Board of Ordnance have enabled him to identify 605 of these suppliers, many of whose names can be found marking the regulation firearms of the period. In this study, the contractors are identified both alphabetically and under a combination of their date periods and the nature of their work. An overview explaining The Ordnance System and the technicalities of the measurements and currency then in use is followed by a chapter describing Special and Limited Production Arms illustrating the diversity of the contractor's ordnance production. This work takes its place alongside the author's acclaimed *Pattern Dates for British Ordnance Small Arms 1718-1783*.

[Information supplied by the publisher]

TROISDORF SMOKELESS POWDER

Jim Buchanan has provided information about Troisdorf powder which was mentioned in the report on the survey carried out at the chalk pit site at the Dartford gunpowder works by Luke Barber of Archaeology South-East in GMSG Newsletter 25, page 6. In the issue of *Arms and Armour* of October 1898 it is noted on page 205 that they had received a small pamphlet containing a few particulars of this powder which was manufactured by Pigou, Wilks & Laurence at their new works at Dartford. It was essentially a guncotton powder and the pamphlet contained a number of favourable reports. The note sounds rather noncommittal! Then in an article on "Smokeless Powders Manufactured Abroad" on page 90 of the 2 July 1917 issue of *Arms and Armour* it is stated that "Troisdorf became prominent in this country in the year 1897 in connection with its use in imported Mannlicher cartridges for Bisley long-range competitions. It was occasionally recorded as Pigou Wilkes [sic] powder, in recognition of the black powder firm which acted as distributing agent, and had undertaken to equip a works for its manufacture. There was also a shot gun Troisdorf powder". A comparative analysis of the two, as made in 1898 was:

Troisdorf shot-gun fibrous 33 bulk: 24.9 insoluble nitrocellulose, 61.7 soluble nitrocellulose 11.5 starch, agar and dye, 1.9% moisture.

Troisdorf rifle gelatinized: 1.5 insol. nitrocellulose, 96.5 sol. nitrocellulose, 2.0% moisture.

This article goes on to say that formerly the German navy used small-arm powder made on Troisdorf lines but had changed to the Rottweil composition of 72.8 insoluble nitrocellulose, 25.0 soluble nitrocellulose, 1.0 camphor and diphenylamine and 1.2% moisture.

The Waltham Abbey project is on schedule for opening to the public before Easter in 2001. At a recent Board meeting it was decided that there should be a formal opening, before a invited audience with a royal presence, on 5 April. The intention is that the site will then be open to the public but on the weekend of 21/22 April there will be a second, festive opening for the general public.

Progress on developing the visitor attraction is progressing well under the newly appointed Director, Robert Taylor, who was previously at the Chalk Pits Museum at Amberley, Sussex. Contractors are currently converting buildings and work on the static and interactive displays, videos etc is nearing completion. Personally I have been advising on the gunpowder displays and am currently involved with the preparation of guide books etc. However, there still seem to be a near infinite number of points to sort out like: How will rubbish bins be emptied? How will we stock and operate the book shop? What sort of vehicle do we need for tours of the site? From where do we get rails for the narrow gauge railway on the site? Anyhow it's all in hand and it will be great when it opens.

DANGEROUS ENERGY: The book by **Wayne Cocroft** with this title, which is being being published by English Hereitage, is due to be launched officially on 2 November but may be available earlier. The price is still uncertain but is unlikely to be no more than £45.

PRINCIPAL CONTENTS

Names in brackets indicate sources of information rather than authors

The future of the GMSG	A & G Crocker	1
GMSG Meeting in London, 21 October 1999	Alan Crocker	3
A Visit to Gunpowder Mills in the Peloponnese	Alan Crocker	4
Elterwater Barrel Stencil	Alan Crocker	7
Das Feuerwerkbuch	[Tony de Reuck]	7
A Bibliography of Works on Explosives	[Will Adye-White]	7
Material Provided by Jim Buchanan	[Jim Buchanan]	8
David Harding, <i>Small Arms of The East India Co: Gunpowder</i>	Alan Crocker	9
Lucie Tassigny, <i>Le Saltpêtre en Touraine, 1775-1800</i>	[Patrice Bret]	10
Glenys and Alan Crocker, <i>Damnable Inventions</i>	Arthur Percival	11
Alan Crocker, Glenys Crocker, Keith Fairclough and Michael Wilks <i>Gunpowder Mills: Documents of the 17th and 18th Centuries</i>	[David Robinson]	12
Brenda Buchanan, <i>Waltham Abbey: The Old Establishment</i>	Alan Crocker	12
De Will Bailey, Ordnance Small Arms Contractors 1689-1840	[Bill Curtis]	13
Troisdorf Smokeless Powder	Jim Buchanan	13
Waltham Abbey Royal Gunpowder Mills Project	Alan Crocker	14

Published by the Gunpowder Mills Study Group

Edited by Alan Crocker, 6 Burwood Close, Guildford, Surrey GU1 2SB, UK

Tel 01483 565821, Fax 01483 876781

e-mail: A. Crocker@surrey.ac.uk and alan@glfd.freemove.co.uk