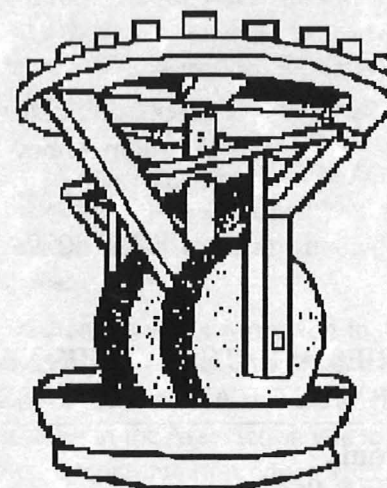


**ROYAL  
GUNPOWDER  
MILLS  
WALTHAM ABBEY**

'TOUCHPAPER' ©  
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# **Touchpaper**

The Newsletter of the  
**ROYAL GUNPOWDER MILLS WALTHAM ABBEY  
FRIENDS ASSOCIATION**



**SEPTEMBER  
2001**

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PLEASE NOTE: Deadline date for submissions to  
the next issue is 15th November 2001



## EDITORIAL

With the Site fully operational the visitors are now flocking in. Actually, flocking in is a bit of an exaggeration as visitor numbers are well down on the projected figures. It's a bit like the Millennium Dome story except that was mainly due to the adverse media. Our problem has been that only a relatively small budget is available for publicity and there seems some reluctance on the national press and television to run articles and programmes.

Nevertheless, the reaction of those who have come has been very favourable so we know we have a worthwhile attraction. Perhaps the best publicity is word of mouth so spread the message to your friends and colleagues.

And now to more immediate Association matters. The AGM looms very close now and this year it is important that we get good attendance as there are important matters to be decided. The main item will be the election of a new Treasurer and a new Chairman.

Having chaired the Association since it's formation in 1998 I am standing down and we urgently need some brave soul to take over the reins. I have enjoyed the last three years but now think it time to give someone else a chance. I shall continue to support the Association where I can and will, with the new Committee's blessing continue to produce Touchpaper and act as a Membership Secretary. Many thanks for all your support which I hope will continue to be given to the new Chairman and Committee.

Norman Paul



# ASSOCIATION MATTERS

## ANNUAL GENERAL MEETING

The AGM will be held at the British Legion Hall on Friday 5th October at 11.00 am.

**Of the present Committee** the following are willing to stand for re-election:

Ernie Cook	Bryan Howard	Dave Manners
Dave Sims	Ron Treadgold	John Wright

Any member wishing to serve on the Committee should send a nomination to the Secretary.

**Of the Officeholders** only the Secretary, Richard Penfold is standing for re-election and we are calling for nominations to the posts of **Chairman** and **Treasurer**, both of whom are standing down this year.

All nominations should be sent to the Secretary by 21st September.

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## REUNION

This will be held at the British Legion Hall on Friday 5th October from midday, after the AGM.

Support for this annual event remains high with over 90 members having booked so far.

You still have time to book your place. The cost is £6 per head (including buffet lunch) and payment should be made to 'WARGM Friends Assocn.' and sent to:

Norman Paul  
24, Anglesey Close,  
Bishop's Stortford,  
CM23 4PE

no later than Monday 24th September.

## MODEL WATERWHEEL

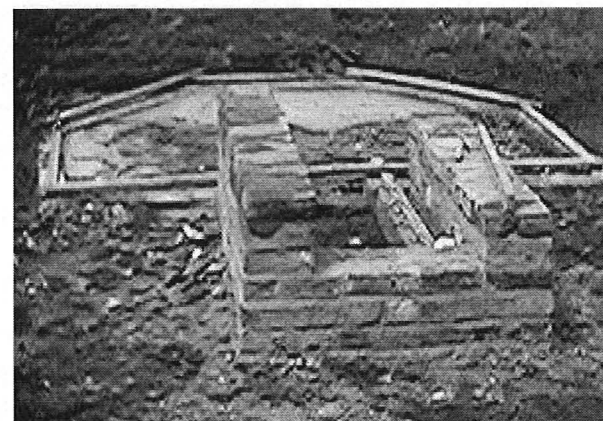
### Update on Progress

As we reported in the March issue this year we are currently constructing this waterwheel feature. Originally we had intended it to be placed alongside the L176 cafeteria building but objections were raised by English Heritage that it would detract from this listed building. Eventually a site was agreed further to the east and facing Queens Mead.



The 1 metre wheel, central shaft and bearings have been constructed, and the octagonal wooden pieces which will form the mill pool.

A brick base, on which this will stand is in place, as is the underground electric supply for the circulating pump.

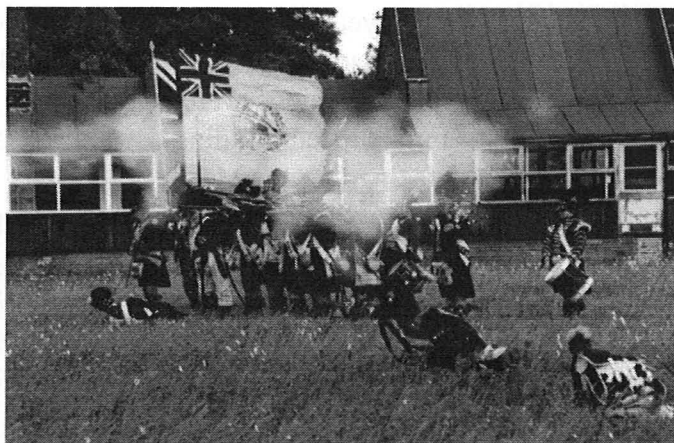


All (!) that remains is for a brick support wheelhouse structure. This is slowly taking shape, being built in 'English Bond' using a supply of old 19th century bricks. It has been slow work due to the weather but it is hoped that the project will be completed by the end of the year.



## SPECIAL EVENTS

Special events are held at the Site every weekend and these have proved very popular, bringing in additional visitors. These events range from Guided Historical Tours to special Children's Events to Re-enactment Displays.



**Napoleonic Association display on Queen's Mead**

Because of the delayed opening some of the events on the proposed programme could not be run but the programme so far this year has been:

- |               |   |
|---------------|---|
| June 23-24    | <b>Historical Guided Tours</b> - History based tours of the site on foot. Subjects included the site's railway and its natural history. |
| June 30-Jul 1 | <b>Napoleonic Association</b> - Display of training techniques including drilling and live firing.                                      |
| Jul 7-8       | <b>Powder Monkey Picnic</b> - Story telling and children's activities.  |
| 14-15         | <b>Essex Militia</b> - Living history, recreating life during the English Civil War, including some live firing.                        |
| 21-22         | <b>Archaeology Weekend</b> - Talks on archaeology and special children's dig for ancient treasures.                                     |
| 28-29         | <b>Historic Costume Day</b> - A costumed look at the Royal Gunpowder Mills' history.  |
| Aug 4-5       | <b>Children's Art Weekend</b> - Arts and crafts for all ages  |
| 11-12         | <b>Gunpowder Games Weekend</b> - Fun & Games for all the family.  |
| 18-19         | <b>Secret Landscape Tour</b> - Historic guided tours of the site's buildings.   |
| 26-27         | <b>Napoleonic Association</b> - A two day event recreating life and battles in Napoleonic times.  |
| Sep 1-2       | <b>Historic Buildings Tour</b> - Historic guided tours of the site's buildings.   |

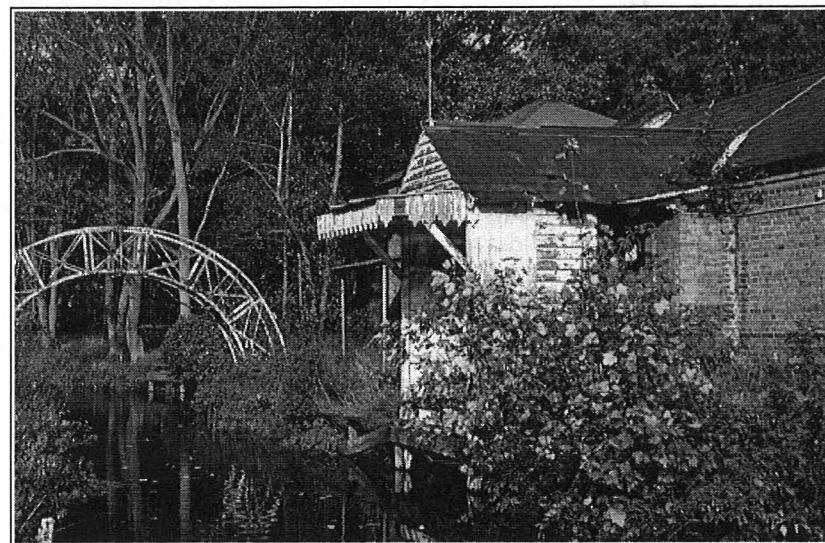
See p 5 for rest of this year's programme:-

## LISTED BUILDINGS AT THE ROYAL GUNPOWDER MILLS

by Les Tucker

### PART III EXPLOSIVE MAGAZINES

The phrase "powder magazine" tends to convey an image of a substantial building storing large quantities of gunpowder, or other explosives, often away from the site of manufacture. However a different type of magazine, of smaller size, performed a usual function within the manufacturing areas.



L 135 'Tray Magazine' (1882 ) Grade 2 listed

### BACKGROUND:

Increasing Government awareness of the need for better safety provision within the manufacturing process was reflected in legislation; Expense and Charge magazines were built in civil and governmental factories - Expense magazines for safe storage of product batches awaiting movement to further processing and the Charge magazines for enabling control of the quantities being worked on in the manufacturing area by providing separate storage for incoming material until it could be moved into processing within the permissible limits.

The listed magazines at Waltham Abbey fall within the 'Expense and Charge' categories.

The main legislation reflecting Government control of gunpowder and later, explosive manufacture, transport and storage was contained in Acts of 1719, 1771, 1772, 1860 and 1875. The first two Acts were concerned mainly with outside transportation and storage. The 1772 Act was the first to include regulation of activity within the manufacturing facility, introducing provision for licensing of manufacture; limiting the amounts of powder which could be processed at one time and laying down limits for material which could be held awaiting processing, minimum distance of storage buildings from mills and the materials to be employed in the construction of storage buildings. The concept applied to storage construction was opposite to that for manufacturing. In the latter, a light construction was employed at appropriate points in order to channel blast away from adjacent buildings in the event of an incident. In contrast, storage buildings had to be of strong construction in order to protect the contents. By the mid 19th century it was apparent that the 1772 Act was failing - it did not cover new types of ammunition and explosives or processes and the mechanics of enforcement were lacking. A particularly serious explosion in Birmingham in 1859 led to the Act of 1860 which covered the new types of explosives and, in the manufacturing area; amended the maximum permissible charge for incorporation, introduced limits for material processed in danger buildings and laid down requirements for Expense magazines. However, in spite of further legislation to improve and extend the 1860 Act, it still failed to adequately regulate the industry. There was a serious explosion in Erith in 1864 and a further one in Birmingham in 1870.

A report of 1864 on conditions at Erith exemplified the situation- magazines not closed or guarded, doors opening directly on to a river bank with a footpath along which the public walked (frequently smoking pipes), the presence of small boys augmenting their pocket money by selling matches to the smokers, passing river steamers emitting showers of sparks from their funnels and, to cap it all, the annual burning of nearby reed bed stubble - all so serious it almost passes into the humourous.

The subsequent Explosives Act of 1875, including an effective licensing and inspection system, finally proved an effective and long lasting medium for control of the industry.

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*§ The Grand Magazine at the northern-most part of the site is, surprisingly, not covered by an English Heritage listing. It is however, protected by virtue of being within the Scheduled Ancient Monument area. When this current series on the listed buildings is complete it is proposed to continue with comment on other such important structures within the site.*

## THE LISTED MAGAZINES AT WALTHAM ABBEY

The buildings involved are:-

L 133	L 135
L 141	L 154
L 165	L 170a §

### L 133 Magazine Grade 2 - built 1879

As the Mills expanded with increased steam production so magazines proliferated, particularly at the time of significant expansion in 1878 when new moulded powders were introduced. There is a particular concentration to the north of the steam complex (termed 'Magazine Land' in the guide to the Mills) and L 133 is within this complex. An essential component of the 1878 expansion was the extension of the high level canal system and along with this a lock was built immediately to the north of the magazines to provide a connection with the lower level system and thus with the magazines.

When the gunpowder incorporating mills were converted to cordite incorporation some magazines, including L 133, were utilised to act as Charge magazines for the cordite mills, storing cordite paste.

### L135 Tray Magazine Grade 2 - built 1882

This was a cordite tray store situated on the opposite side of the canal from L 133 with around arched canal footbridge to the north. After incorporation cordite was extruded into the cord-like strands (which gave it its name) which were laid on trays for storage and onward processing. The much photographed L 135 and footbridge is the epitome of the magazines of the Mills. The loading platform with covered porch and elephant hide floor covering fixed with copper nails still survives. The distinctive 4 point lightning conductor on the roof is the standard pattern applied over the whole site from 1858.

### L 141 Sorting House Grade 2 - built 1889

An Expense Magazine at the north end of the steam mills, similarly served by the raised tramway, with raised doors. By 1910 it was termed 'Sorting House', probably by then associated with cordite production.

#### L 154 Expense Magazine Grade 2 - built 1864

Lying to the north of the Group C mills (see Part I) this again is one of the surviving gunpowder Expense magazines for storing material after incorporation. In common with other gunpowder buildings it made the transition to cordite and by 1917 was a store for cordite dough produced by incorporation, in the converted steam mills, of cordite paste - the process of incorporation involving absorption of nitroglycerine into nitrocellulose (guncotton).

#### L 165 Mineral Jelly Store Grade 2 - built 1917

Located at the south end of Queens Mead. Mineral Jelly (Vaseline) was added to cordite dough with the original intention of preventing gun barrel fouling by metallic deposits from shot but it was found to have an important stabilising effect on the cordite material. Reflecting the huge increase in demand for cordite in WWI it became necessary to build this dedicated store for mineral jelly.

#### L 170a Expense Magazine Grade 2 - built 1857

Lying to the east of the site of the first steam mills, Group A (see Part I) this is the earliest Expense magazine on the site. It stored material after incorporation in Group A to await onward transportation for breaking down, pressing etc. When the Group A mills were built a tramway link was established to bring material from the mixing house in the Millhead area. This involved raising on trestles to bring it up to the level of the incorporating mill floor which was raised to accommodate the underfloor drive gear. The tramway was extended to the Expense magazine which therefore has a raised door at the level of the tramway.

**As in the technical field the Waltham Abbey Mills was in the forefront of safety development which fully reflected and, in some instances, was in advance of explosives legislation. The rush of the Industrial Revolution and beyond and the pressures of competition had meant that Victorian industry placed safety far down the list of priorities. The Mills attention to safety was part of the long climb to better and safer working conditions which took place in industry generally and continues today.**



## 2001 CALENDAR

### Forthcoming Special Events

Sep 8-9	<b>Science Weekend</b> - Demonstrations of mini explosions and some scientific fun
15-16	<b>1940's Living History</b> - Re-enactors take the Royal Gunpowder Mills back to the 1940's.
22-23	<b>Hibernation Trail</b> - A look at the hibernation habits of animals and a chance to meet some hedgehogs.
29-30	<b>Napoleonic Association</b> - Display of training techniques, drilling and live firing.
Oct 6-7	<b>Orienteering Challenge</b> - Fun for all the family as visitors are set orienteering tasks around the site.
13-14	<b>Secret Landscape Tours</b> - Special guided tours of the northern end of the site.
20-21	<b>Photography Weekend</b> - Hints and tips on photographing buildings and wildlife on the site.
27-28	<b>Closing Weekend</b> - Event for all the family - no details as yet.

PLEASE NOTE: The Association have a big involvement in the Science Weekend on September 8-9 so, if you get this issue in time, why not come along and join us.

The Company will soon be looking at an events programme for next year. Let us know what type of event you would like to see and any suggestions for other events.



## Conkers for Cordite!

A recent visitor to the Royal Gunpowder Mills said that her grandfather had surrendered his conker collection during World War I as his contribution to the war effort. He thought that it had something to do with making cordite and wanted to know the details.

In 1914-1918 Cordite was made by mixing nitroglycerine, nitrocellulose and a stabiliser with acetone to make a dough which could then be extruded as a cord. Subsequent stoving removed the acetone to yield cordite ready for filling munitions.

Heavy shelling on the Western Front required a lot of cordite which, in turn, meant a demand for acetone in large quantities. It is worth noting that South Site had two acetone recovery plants during the second world war but these were not available in 1914-18 and the acetone was lost to the atmosphere.

Before the introduction of modern catalysts acetone was obtained as a by-product from the destructive distillation of wood which yields a mixture of acetic acid, methyl alcohol and acetone in addition to wood tar and charcoal. Demand for acetone soon outstripped this production and a more efficient method of making it was needed. Felix Weissmann came to the rescue as he had developed a fermentation process in his laboratory which converted starch into a mixture of acetone and butyl alcohol. One source of starch was from the fruits of the horse chestnut tree which were digested in vats located at Holton Heath. A photograph in Wayne Cocroft's book, 'Dangerous Energy' shows the decommissioning of this plant in 1932.

The price for revealing the secret was high as Lloyd George was pledged to set up the State of Israel. One might therefore conclude that the present troubles in the Middle East owe some of their origin to an ignorance of chemistry.

Bryan Howard

## VOLUNTEERS - VOLUNTEERS - VOLUNTEERS

A Message from the Company:

**"Many thanks to all the Friends who have been active in helping with a whole range of tasks. The plan is still to expand the volunteers on site and I am sorry that it has taken longer than expected to get back to all those who would like to assist. However, I am now working towards getting people involved through the Autumn and thank you to all those who have offered support."**

**Cathy Morton Lloyd - Visitor Services Manager**

*Looking at our database there are well over 100 members who live reasonably close to Waltham Abbey but only a tenth have so far volunteered. Any help that you can give will be greatly appreciated.*

*If you can help in any way please contact the Secretary, Richard Penfold, for further details.*

## Early Days of Plastic Propellant

The article by Les Tucker in the March issue was of particular interest to me since I used the Listed Buildings, called Groups A, C, D, F and G, for Plastic Propellant Manufacture and Filling from late 1945 until we moved to the South Site in 1952. During this time the concrete blast walls and railway lines serving Groups C, D F and G were demolished by German prisoner of war labour and the buildings were gradually converted to laboratories and given 'N' or 'L' numbers in about 1947.

This all made life difficult for me since, by then, I had improved the filling process and introduced vacuum pressing, to the extent that I was required to produce 100 5" light alloy rocket motors per week for use by Guided Weapons Group. These were used at Aberporth and Larkhill ranges to power test vehicles for guidance systems. The range at Woomera was under construction and the manager from an Australian ordnance factory joined us for 6 months to learn the process and to recruit a junior to run the Australian plant. Drawings for the layout of the plant were produced and the necessary equipment was specified, ordered and manufactured in this country.

In addition to this, Westcott was opened and they had a filling and pressing section for plastic propellant. The manager and their industrial staff were sent to us for training in the necessary inspection techniques and the manager stayed with us until the Royal Ordnance Factories took over the guided weapons to boost motor manufacture around 1954. Also, important advances were made in the propellant by the introduction of ammonium perchlorate as oxidant instead of sodium nitrate and poly-isoButene as binder in place of a solution of polyStyrene in poly-alphaMethyl Styrene. These compositions required more powerful equipment and, in some areas, the development of remote control procedures.

Planning of the new area allocated on the South Site commenced in 1948 and the writing of specifications and ordering of new and better equipment was another activity and resulted in the purchase of new milling and sawing machines for oxidant preparation, a new more powerful pug mill and a longer horizontal press.

I must point out that the Building L169 mentioned in Les Tucker's article could not be the same one as that mentioned as 'destroyed by explosion in 1861'. L numbers, denoting laboratory area, were not given to buildings until around 1947/8. It must have been rebuilt as a cordite building and was used by myself for oxidant preparation and storage of empty rocket motor cases from 1945 until 1952. It was presumably demolished after this since it no longer appears on the site map.

Also, steam engines were removed from these buildings long before 1945 and were replaced by 30 HP DC electric motors, probably at about the same time as the central Boiler and Power House was built.

Again, the two mills in Group B were in full use until early 1941 when a parachute mine fell on to an empty Reel Store situated between Millhead Stream and the boundary fence (A twin bomb landed in the watercress bed on the Abbey Farm). The two mills and the waterwheel were virtually undamaged but the light roof and wall cladding blown off. The subsequent demolition which took place about 1950 can now, only be regarded as vandalism!

'Dick' Doe

# TOUCHBYTES

## Batty but True ...

Napalm inventor, Dr Louis Fieser, is said to have spent years developing a 'bat bomb'! Has any more ridiculous weapon been invented?

The idea of using animals as unwitting aerial weapons isn't new. Viking mercenary, Harald Sigurdsson, fighting for the Emperor of Constantinople between 1035 and 1044 and campaigning against the Saracens of Sicily, laid siege to a large town which refused to surrender. He ordered birdcatchers to snare birds seen leaving the town to feed in the trees near his siege lines. These he 'tarred' with fir shavings mixed with wax and sulphur before lighting and releasing them. The unfortunate birds returned to their nests in the thatched roofs of the town, resulting in a conflagration which led to the town's surrender. Harald was a grim man who "lived by the sword". Later, as King Harald or *Hardraade* (Hard Ruler) of Norway, he tried to conquer England but met his fate at the hands of another King Harold at the battle of Stamford Bridge in 1066.

Ken Newman

## Letter from Australia...

I always enjoy Touchpaper reading about old familiar names and places. The V2 article in the March issue brought back memories as I arrived home from school about 15 minutes before it landed - a little later and who knows...!

With the June issue more memories of Newton's Pool as I designed the suspension rig. I still have a coloured photo of a charge going off. Occasionally I would stand at the edge of the pool when the charge was fired, the ground shaking under my feet. Locally I am often reminded of RO and an old colleague Dr Sims as I pass some holiday units called 'The Simbo Flats'.

I will shortly be coming back for a few weeks and the old site will certainly be one of the places I must revisit.

Allen Clarke  
NSW Australia

## PLEASE REMEMBER

DEADLINE FOR THE  
DECEMBER ISSUE:  
15th November 2001

## CHRISTMAS CARDS

Last year we designed and had printed two versions of a Christmas Card, one for the Friends and one for Company use. To simplify matters, this year we are having a single common card for use by both Friends and the Company and which will also be sold in the Site shop. With a single design and a larger quantity ordered this will reduce the cost somewhat from last year.

Also, to further simplify things the Operating Company will purchase the stock and we will sell them on their behalf.

Last year's card showed a view of the site of 1861. This year the card will show a full colour picture of the renovated last remaining waterwheel on site.



*N.B. This may not be the actual picture as we are still trying to produce a better image.*

Cards will soon be available within a few weeks and will be on sale at the AGM and Reunion at a cost of 35p each.

Those unable to attend either event can order cards by post in multiples of 10 cards costing £4 including postage.

Please note: It will not be cost effective to send less than 10 cards by post

### To Order by Post:

Please apply to the Editor at the address shown on the inside front cover and please remember to make your cheques payable to the 'WARGM Friends Association'.