

**ROYAL  
GUNPOWDER  
MILLS  
WALTHAM ABBEY**

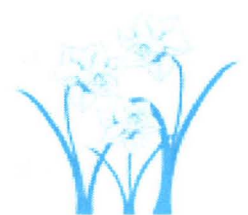
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# Touchpaper

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



**MARCH  
2001**



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



**EDITORIAL**

We open to the public on 6th April !

This issue gives details of the opening and what the entrance fee will be for you as members of the Association.

If, however, you come in at any time as a volunteer and help out in some way then, of course, there will be no charge and you will get free tea or coffee when on duty!

In the centre of this issue you will find two extra pages containing the first part in a series of articles on the history and structure of the listed buildings on site by Les Tucker. These pages are not numbered as readers may wish to take them out and keep a separate set as and when other articles follow. It is hoped that these will form the basis of a more comprehensive set of leaflets which will be on sale in the site shop.

Hope to see many of you over the coming months as you visit the Site.

**Norman Paul**



## OPENING ARRANGEMENTS

There will be formal civic opening on Thursday 5th April and this is followed by an special community weekend for the general public on 6 - 8th April. There will be special events arranged for the weekend. Final details are not to hand at this time but there will be displays by a re-enactment group and a fireworks display. Over the weekend there will be special discounted entry fee.

From then on the Site will be open 7 days a week until October 28th from 10am to 6pm (last entry at 5pm) except for Wednesday 16th May when the site will be closed for the day.

### CONCESSIONS FOR MEMBERS

The Board have agreed a concession for our members of 50% of the normal adult rate on production of your membership card.

### VOLUNTEER PROGRAMME

In addition to our normal working parties there will be an increased scope and need for volunteers when the Site is open. Volunteers will have to enter into a simple written agreement and undergo an induction course on basic health & safety and operational matters. More specialised training will be available for particular tasks such as giving guided tours.

Volunteers on duty will have similar badges to the staff and free admission to the site and will receive free tea and coffee when on duty.

After completing an induction period volunteers will also be eligible to free entry to the site when off duty.

For more information concerning voluntary duties please contact the Visitor Services Manager, Cathy Morton-Lloyd, on 01992 767022.

If you wish to register as a volunteer please contact the Secretary, Richard Penfold (details inside front cover) as soon as possible.

## ASSOCIATION NEWS

Our membership now stands at 437 including 8 overseas members (6 in Australia and 2 in the USA). We thank you all for your continued support in the years leading up to the opening of the Site and hope that you will continue to support the Association. We obviously hope that you will all be visiting the Site after opening and take advantage of the special concessionary rate for members - DON'T FORGET TO BRING YOUR MEMBERSHIP CARD!

Our special thanks to those local members who have carried out so many valuable tasks at the regular working party days. These will continue after opening as there will be many jobs and projects to come.

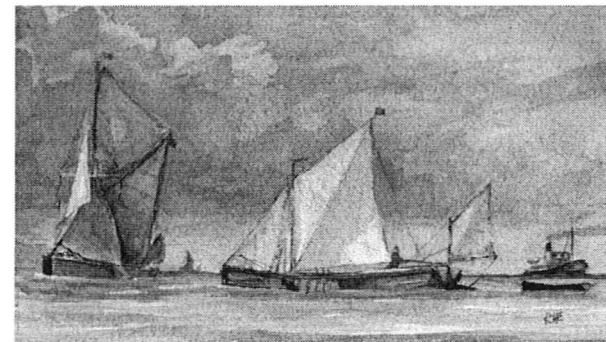
It would be invidious to pick out individual members contributions but special mention should be made of enormous amount of work and drive by Dave Sims and John Wright.

Dave has identified and carried out numerous tasks and not just on the Friday working parties. He is often down at the Site during the rest of the week carrying out little repair jobs that crop up from time to time.

John, as a member of the local U3A, was responsible for overseeing the models which were made by U3A members for the exhibition and is currently our project manager for our waterwheel project.

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Our thanks also to Dick Evans who has painted three watercolour pictures: 2 of sailing barges and 1 of a powder boat. These have been framed and presented to the Company and the Board have sent him a letter of appreciation. These are to be displayed in the Exhibition Centre.



# A WATERWHEEL FEATURE

Building L176, originally the boiler house for the Group A mills of 1857, is to become a visitor restaurant/tea room. The Friends have been asked by the Board if a waterwheel feature could be built nearby and a working party are in the process of designing such a feature which we hope will be ready for the opening in April.

Although the waterwheels on the site were all undershot this will be an overshot wheel since it gives a better effect. A notice explaining the difference will be affixed and visitors will be able to see the remains of the last remaining undershot waterwheel on site which is adjacent to the Burning Ground.

The wheel is to be constructed in wood driven by water from a submersible pump via an overhead chute. A brick surrounding pool will act as a reservoir into which visitors would be encouraged to throw money.

We think this will be very attractive feature, especially since it has been suggested that L176 may be known as the 'Waterwheel Cafe'.

## LISTED BUILDINGS AT THE ROYAL GUNPOWDER MILLS

by Les Tucker  
PART I

### THE STEAM POWERED INCORPORATING MILLS

In 1787 the Government, prompted by considerations of security of supply, control of output and quality of gunpowder, purchased the privately owned gunpowder mills on the Millhead Stream from the Walton family. At that time the mills were water powered. A canal system provided both water to drive the mills and a means of transport around the site.

The Crimean War 1854-56 revealed major deficiencies in British military supply of materiel and this, together with fears by Lord Palmerston's Defence Committee of French invasion, prompted authorisation of significant military expenditure. At Waltham Abbey this was reflected in the building of the steam powered incorporating mills, termed Group A in 1857, followed by Group B in 1859. Group A and B mills have since been demolished.



*Group D Mills (L153) - pictured in late 1980's*

The succeeding Groups built - from C in 1861 to G in 1888 and the Group A engine and boiler houses comprise the listed steam incorporating mills - summarised below:

| GROUP      | A                                                                | B    | C    | D    | E                 | F    | G    |
|------------|------------------------------------------------------------------|------|------|------|-------------------|------|------|
| Build Date | 1857 <sup>1</sup>                                                | 1859 | 1861 | 1867 | 1877 <sup>2</sup> | 1878 | 1888 |
| Grade      | 2*                                                               | -    | 1    | 2*   | 2*                | 2    | 2*   |
| Bldg No.   | L169                                                             | -    | L157 | L153 | L149              | L145 | L148 |
|            | ( <sup>1</sup> only Engine (L168) & Boiler (L176) houses remain) |      |      |      |                   |      |      |
|            | ( <sup>2</sup> central part 1869 originally for pellet powder)   |      |      |      |                   |      |      |



The steam mills represented a fundamental move away from the water powered Millhead

- 1) In location - built on open land between the Millhead Stream and the Old River Lea.
- 2) In adoption of newer technology - replacement of water power by steam.
- 3) in scale - scale of buildings far beyond the timber structures of the Millhead.
- 4) In output - the steam mills represented a move to a fully industrial basis.

#### **Group A Incorporating Mills 1857**

Group A consisted of a central engine house containing a 30hp compound beam engine, a boiler house and 6 incorporating mills in bays. The incorporating bays (L169) were destroyed by an explosion in 1861 and not rebuilt. Their characteristics were similar to Group C described below.

#### **Group B Incorporating Mills 1859**

In design terms this Group represented a discontinuity from Group A to Group C in that the main power source was water with a steam engine only as a reserve. The Group B mills have been demolished.

#### **Group C Incorporating Mills 1859**

This mill building is of a T shape with a central engine tower, originally housing a steam beam engine and a boiler house at the east end to the rear which contained two Lancashire boilers. To the north and south of the central tower are two sets of bays which held a total of 6 incorporating mills - 3 bays on each side. Each mill comprised a pair of vertically mounted cast iron edge runners, weighing about 4 tons, revolving on a circular iron bed.

*(N.B. Earlier mills had stone runners, some of which can still be seen on the site)*

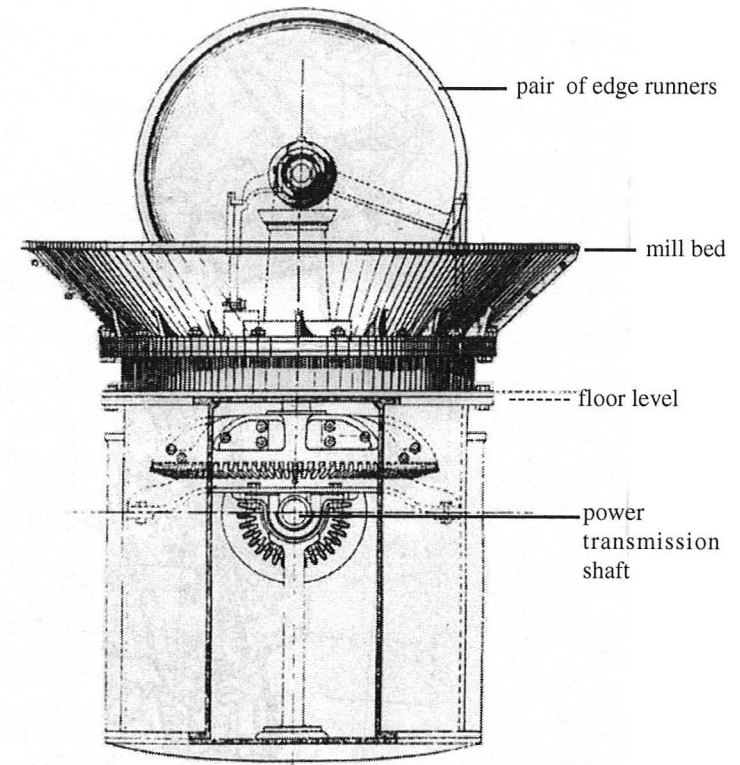
Yellow brick laid in English bond was used to construct the engine house, boiler house and partition walls separating the bays. The partition walls are 0.68 metres (27 inches) thick. The front and rear walls of each bay were of a light felt on wood and the roofs were of composite timber/iron construction. To the west side an open timber verandah allowed loading of materials from the narrow gauge railway. After 1945 when the site became a research station the buildings were converted into laboratories and the verandah was closed in, as shown on the previous photograph of L153.

The boiler house roof reflected contemporary application of wrought iron tension rods with cast iron compression members.

The possibility of accident was inescapable. The design of the light construction front and rear walls and roof of the bays was to channel any explosion to the outside, avoiding transmission to adjoining mills. These walls were relatively easy and economic to repair whilst the strong partition walls provided protection and minimised damage to adjoining bays.

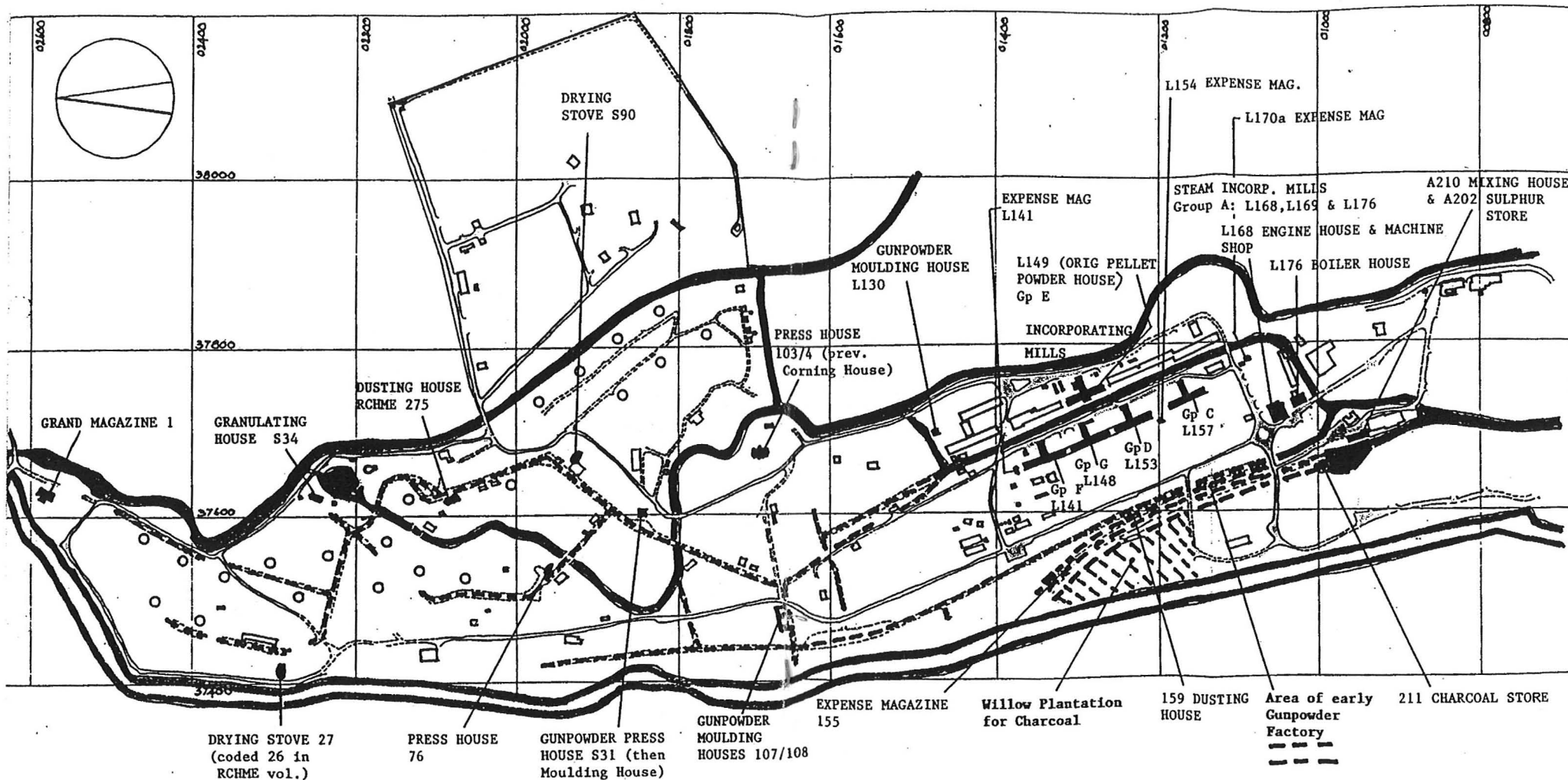
The power transmission from the engine reflected an approach similar to that employed in the textile mills of the time with an horizontal drive shaft in an under floor shaft alley, avoiding damage from the ever present risk of fire. The alley in Group C was lined with cast iron plates bolted together with a top plate forming the mill floor above. The drive was taken from the engine via a connecting rod to a crank on the drive shaft, flanked by a pair of flywheels. Each mill has an horizontal bevel gear wheel with drive being transmitted via a pinion wheel. Motion from the drive shaft was transmitted via a friction clutch engaged by a remote control rod.

From the bevel wheel a vertical shaft passed to an horizontal spindle on the edge runners.



The use of underfloor transmission had 2 major advantages - it separated two 'alien' systems - metal drive gear and gearing, associated with heat and possible sparks, from the explosive powder dust laden atmosphere of the mill rooms and it lessened the risk of a machine part breaking or becoming detached and falling onto the mill bedplate. In addition, in the event of an accident, the drive machinery was protected and therefore reusable without expensive repair.

Architecturally, full advantage was taken of the tall central engine tower and boiler house to design buildings beyond the strictly utilitarian. They were of Italianate style with characteristic round arch openings. The engine and boiler houses had dentril cornices and chamfered brick plinths and the boiler house had brick bay dividing pilasters. Overall there is an impression of careful design and construction with the style of the central buildings offsetting the necessarily functional incorporating bays.



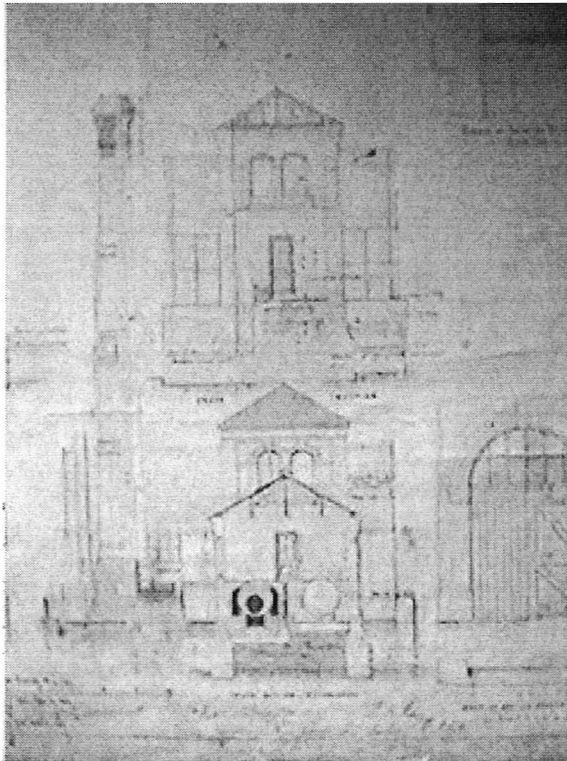
SITE MAP OF THE ROYAL GUNPOWDER MILLS WALTHAM ABBEY

### Groups D, E, F, G Incorporating Mills 1867 - 1888

Developments in armaments and metals technology led to a steady growth in size of guns and volumes of gunpowder required. In response, these further groups of mills were built. In an expression of confidence in the validity of Group C the design and architecture of D, F and G closely followed it and also E after modification.

The Grade I listing of Group C reflects its status as the design template for the later development.

D, F and G differed only in detail from C. For example, some red brick was used in construction rather than the same yellow brick as the main structure. Group E had originally been constructed in 1869 for the manufacture of the new pellet powders with an hydraulic accumulator tower in addition to engine and boiler house, but was converted to gunpowder production in 1877 with the accumulator tower retained to service a central hydraulic system. The general style and layout of the other Groups was followed.



*part of engineering drawing  
ca. 1880 showing end view  
of boiler house with central  
tower behind.*

*Full original drawing is  
held in the Site archives.*

D, F and G were ranged in line alongside C, bordering Queens Mead and E faces them across the Middle Stream Canal.

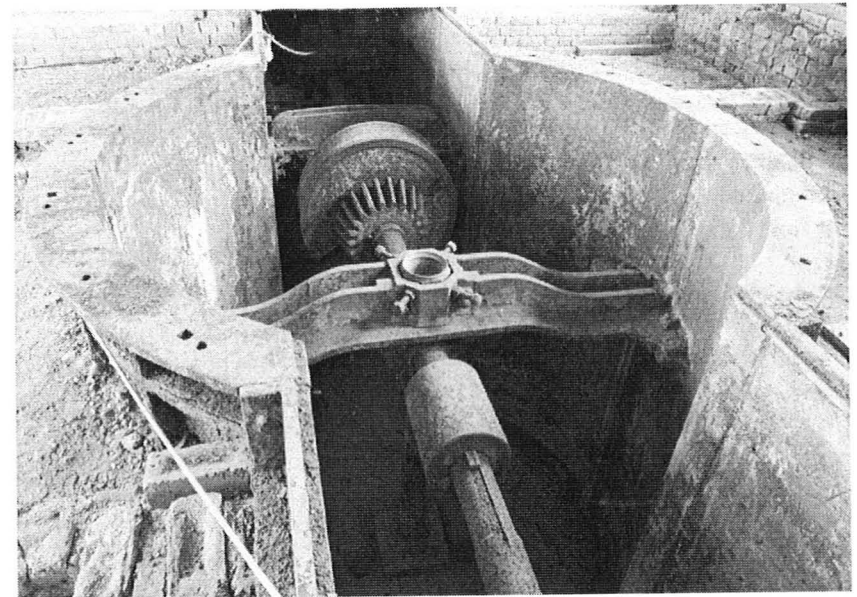
By 1888 Waltham Abbey had 40 steam powered incorporating mills. It was estimated that steam driven runners were about 30% more productive than water driven.

### THE INTRODUCTION OF CORDITE

Towards the end of the 19th Century gunpowder was supplanted as a service propellant by the chemically based cordite and, over a very short timescale the mills were converted to the production of this more powerful propellant. Group C was converted to a cordite press and D, E, F and G to cordite incorporation. This involved the removal of the gunpowder edge runners and the covering over of the underfloor transmission train.

Cordite is a mixture of Nitrocellulose (Guncotton) and Nitroglycerine. The nitroglycerine is absorbed into the nitrocellulose to form a stiff dough using a mixing incorporater based on those used in the bread making industry. The resultant dough was forced through a die into long cords - hence the name Cordite.

Steam continued to be the power source but the drive was converted to an overhead shaft with drive belts to the cordite 'dough' incorporators.



In L157 the floors have been excavated to reveal the, still extant, drive shaft and gearing although the Beam Engine and Steam Boilers were removed when the factory ceased all production in 1945.

### THE RESEARCH ESTABLISHMENT 1945 - 1991

The Royal Gunpowder Factory closed as a production site on 28th July 1945 but reopened two days later as an experimental outstation of the Armament Department at Woolwich. It later became a full research and development establishment and continued as such until final Government closure in 1991.

During this time the existing buildings were once again modified to become research laboratories and it is evident that, even then, the mills were considered to be important structures worthy of careful preservation. After removal of machinery the various building floors were relaid to accommodate laboratories and small scale process bays. A major addition to the mills were the closing in and weather proofing of the verandahs allowing safe egress of staff, equipment and materials between laboratories in each complex. Once again, this can be seen in the cover photograph. It was possible to walk from the Group D mills right through to Group F entirely under cover.

During this period very little new building was considered necessary with most of the original buildings re-used as a fitting tribute to the design and workmanship of the original builders.

The cumulative repetition of style and scale of these mills creates, overall, an impressive architectural grouping. There is a strong symmetry lending an impression of power and, at the same time, large scale efficient industrial organisation.

With the development of the Site as a major visitor attraction and educational resource many of the buildings will once again have a change of use. A major refurbishment and preservation programme has been carried out and, in time, it is hoped that all such buildings will once again be in use.

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### THE GUNPOWDER STUDY GROUP

Membership of the Gunpowder Study Group includes many well known academics and other people with a special interest in the history, development and uses of gunpowder. Since its inception it has been ably run by Professor Alan Crocker and Glenys Crocker. It holds a number of meetings throughout the year on a variety of topics relating to gunpowder and has a regular newsletter.

Alan and Glenys have recently decided to hand over the running of the group and the new chairman is Professor Brenda Buchanan.

The group has also decided to expand its remit to include other explosives and propellants and to this end it will now be known as the Explosives Study Group (*Ed. Not sure of the exact name at this time*). With this change it is likely that some members will be interested in joining. Unfortunately we do not have full details in time for this issue but will give more information in the June Touchpaper. Meanwhile, interested members can get in touch with Brenda Buchanan at:-

13 Hensley Road, Bath, BA2 2DR.

We wish the group well in their new role.

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### SEATS

Enclosed with the December Touchpaper was a flyer asking if any members would like to purchase a bench seat for the site in memory of a past one and we are pleased to report that a number of you have responded to the company in their request.

The seats are of superior quality and will bear an appropriate identifying carved inscription. If you wish to sponsor a seat please get in touch with Lynne Lennard at the Royal Gunpowder Mills, Powdermill Lane, Waltham Abbey, Essex, EN9 1BN



## 'GOOD OLD CHARLIE'

Charlie Carrington was a well known character who ran the Chemical & Glassware Stores. He delighted in putting one over 'Them Up There' and this proved useful to me as I will relate.

I had my first lesson in guile from Percy Smith who ran the guncotton lab. during the war. The lab. had a board floor which was scrubbed every Saturday morning (yes, we worked then) but soon got dirty and made the job of picking up spilt guncotton difficult. I suggested to Percy that we could do with some linoleum on the floor and he agreed. The application was submitted and refused. Nothing daunted we marched to the burning ground and found some old pieces of lino which we distributed about the floor and Percy then applied to have the 'worn out' lino replaced. This application went by a different route and was agreed.

Many years later (I was by then Chairman of the Staff Side of the Whitley Council) Tom Pearson, the fire Chief, came to me with a problem. When the Brigade had fire drill and spotted a leak in an hose they circled it with an indelible pencil which would mark on the wet hose and remain visible when dry. He was not allowed to order them as the stores stocked 'Chinagraph' wax pencils. These were virtually impossible to use on a wet hose and, even if they did manage to get the marks to stick they would crack off as the hose dried or, if the weather was hot, melt into the canvas making repairs impossible.

I arranged with Charlie for Tom to put in a request for '6 Hose Markers' which he (Charlie) would annotate "Not a stock item, try local supplier".

Armed with this Tom went to the office, demanded two shillings out of petty cash, went to the local stationers and bought 6 indelible pencils.

Jim Jeacocke

### .....PUTTING ONE OVER ON CHARLIE

You couldn't always get anything you wanted from Charlie Carrington and getting replacements glass cloths, used for wiping beakers etc., from him was not easy. Being used around the labs they had a short life and usually ended up with numerous holes. To get a new one you had to take the remains of the old one back. Of course we tried to get more by tearing the old ones in half and asking for two but Charlie's eagle eye would spot they were really just one cloth and that's all you got.

I did manage to get one over on him on one occasion when I tore an old cloth into four ragged bits and dyed three of them in a variety of very pale colours.

Of course it may be that he was just having an off-day but I did manage to get four brand new cloths on that occasion.

Norman Paul

## V2 Rocket Narrowly misses the Powder Mills

March 7th 1945

It is most likely that this rocket attack was destined for the RGPF but landed outside the factory in Highbridge Street. The houses just behind the crane on the top left hand side of the picture were part of the workers houses at the top of Powdermill Lane so the actual crater was just to the west of the present roundabout by the entrance to the town.



The crater was 75 ft in diameter and about 35 ft deep full of water from a fractured water main.

The whole front of the Home Guard Drill Hall had collapsed in a heap of bricks and girders. Two larger houses were only open shells with doors, ceilings, window frames and stairways smashed into rubble. There was a total of 4 deaths, including 3 children, and 53 injured in the explosion.

Although the RGPF must have been a prime target this was the nearest that any of the V1 or V2 rockets fell although a number of incendiary bombs did fall on the site; one of which demolished in last surviving gunpowder mill.

*Our thanks to Neil Reardon for a copy of the original press article and photograph*

## TOUCHBYTES

Good Wishes ..

**"Shooters Hill Local History Group send their best wishes to the Royal Gunpowder Mills Friends Association"**

Keith Littlewood Hon.Sec.

Keith has expressed great interest in our project and his Group are considering joining as an affiliated body. They applaud the acquisition of the ex-Woolwich Arsenal railway stock which is of particular interest to them as they are neighbours to the site where the Greenwich Borough Museum is due to open in the Spring and 'Firepower', the Museum of Artillery, is being established. They extend their friendship to the Association and wish to establish links to exchange knowledge on the work carried out at both Waltham Abbey and Woolwich.

*We were very short on bits and pieces of information and news this time and would welcome any and all contributions.*

### REMEMBER

**DEADLINE FOR THE  
MARCH ISSUE:  
15th May 2001**

### I'm My Own Grandpa

I am my own grandpa, it sounds funny I know But you'll see just what I mean, from the tale below.

Many years ago, when I was 23 I was married to a widow who was pretty as can be. This widow had a grown-up daughter who had hair of red. My widowed father fell in love and soon the two were wed.

This made my dad my son-in-law and changed my very life. My daughter was my mother, cause she was my father's wife!

To complicate the matter, though it brought me joy, I then became the father of a bouncing baby boy.

My little baby thus became a brother-in-law to dad, and so became my uncle though that was very sad.

For if he was my uncle that also made him brother

To the widow's grown up daughter who of course was my stepmother.

Father's wife then had a son who kept him on the run and he became my grandchild for he was my daughter's son.

My wife is now my mother's mother and it really makes me blue, because although she is my wife she's my grandmother too!

Now if my wife is my grandmother then I am her grandchild and every time I think of it, it nearly drives me wild.

For now I have become the strangest case you ever saw -

**As husband of my grandma I am my own grandpa!**

*Thanks to Dennis Eldridge for sending in this tortuous poem.*

## HOW LOGICAL ARE YOU ?

1. How many animals of each species did Moses take into the Ark?
2. Some months have 31 days and some have 30. How many have 28?
3. Divide 30 by 1/2 and add 10
4. How many birthdays does the average man have?
5. If you were alone in a deserted house at night and there was a lamp, some firewood and a candle and you only had one match, which would you light first?
6. Why can't a man living in York be buried west of the Trent?
7. You have 2 coins totalling 11p and one of them is NOT a 10p piece. What are the two coins?
8. How much soil, to the nearest cubic inches is there in a hole that is 2" deep and 2" by 4" square?
9. Is it legal for a man to marry his widow's sister?
10. If you drove a bus from Waterloo with 40 passengers and dropped 7 off and picked 2 up at Aldwych, stopped at Holborn and picked up 5 before driving to Liverpool Street 5 minutes later, what would the driver's name be?

*Supplied by Dennis Eldridge  
Answers in our next issue*

### ANSWERS TO POST-CHRISTMAS CONNECTIONS PUZZLE

Jim was 20 had Brown hair and brought Bread & Cheese  
Julian was 25 with Blond hair and brought Bread & Ham  
Jack was Bald at 40 and brought Boiled Eggs  
Jake was 50 with Black hair and brought a Meat Pie  
Jeremiah was 60 with grey hair and brought a Turkey Leg.